
Subject: Annual Water and Wastewater Quality Management System Update

Report to: Public Works Committee

Report date: Tuesday, December 7, 2021

Recommendations

1. That Report PW 54-2021 **BE RECEIVED** for information as the Annual Water and Wastewater Quality Management System Update; and
2. That the 2021 Water QMS Internal Audit Report, 2021 Water QMS External Audit Report, and 2021 Wastewater QMS Internal Audit Report **BE RECEIVED** for information.

Key Facts

- The purpose of this report is to provide a summary outlining the main processes and work performed by the Water and Wastewater Division to support the Water and Wastewater Quality Management Systems (QMS).
- The *Drinking Water Quality Management Standard* was created under the *Safe Drinking Water Act, 2002*. It requires Drinking Water System Owners to implement and maintain an accredited Water QMS. Niagara Region has maintained accreditation of its Water QMS since 2009.
- Currently, there is no requirement for the Niagara Region to implement a QMS for wastewater services; however, the Division has elected to do so as a due diligence measure.
- The Water QMS and the Wastewater QMS Operational Plans were previously endorsed by Council on December 12, 2019 under PW 67-2019, Annual Water-Wastewater Quality Management System Update.
- Minor administrative changes were made to the Water QMS and Wastewater QMS Operational Plans in May 2021 and February 2021, respectively. These revisions were approved by the Commissioner of Public Works on behalf of Council as per the delegated authority granted to the Commissioner under Report PW 109-2008.

Financial Considerations

A total of approximately \$30,500 (including non-recoverable HST) has been expended in quality management system program costs in 2021 to-date. These routine costs include: annual maintenance and support fees for software used in support of the QMS, and consulting fees for an off-site third-party accreditation audit of the Water QMS. These costs were included in the 2021 approved operating budget for Water and Wastewater Operations.

Expected expenses of \$30,000 have been included in the proposed 2022 operating budget. These expenses include consulting fees for an offsite third-party Water QMS audit, and the annual QMS software maintenance fee. An additional \$12,000 has been included in the proposed 2022 operating budget for remote consulting service fees to provide user upgrades to QMS software.

Analysis

This annual update summarizes the outcomes of significant quality management activities that are conducted in support of the Water QMS and Wastewater QMS, as well as internal and/or external changes that may impact either QMS.

Water QMS

The *Safe Drinking Water Act, 2002* mandates the development, implementation, and accreditation of a drinking water quality management system as a condition of issuance of a municipal drinking water licence. Niagara Region holds five municipal drinking water licences - one for each of its drinking water systems. Accordingly, we are legally required to maintain accreditation of our Water QMS.

Roles and Responsibilities – Water QMS

Key Water QMS roles are described in Table 1.

Table 1: Roles and Responsibilities – Water QMS

Role	Assignment
System Owner	Niagara Region (represented by Regional Council)
Operating Authority	Niagara Region (represented by staff of the Water and Wastewater Services Division)

Role	Assignment
Top Management	Commissioner of Public Works Director, Water and Wastewater Services Division Associate Director, Water Operations & Maintenance Associate Director, Water-Wastewater Engineering Associate Director, Water-Wastewater Integrated Systems Associate Director, Water-Wastewater Asset Management
QMS Representatives	Water-Wastewater Quality Management Specialist, reporting to Associate Director, Water Operations & Maintenance (<i>primary</i>) Water-Wastewater Quality Management Specialist, reporting to Manager, Wastewater Quality & Compliance (<i>backup</i>)

Owner Roles and Responsibilities – Water QMS

An owner endorsement of the Water QMS Operational Plan is a requirement of our Water QMS accreditation. The Water QMS Operational Plan was last endorsed by the current term of Regional Council on December 12, 2019 under PW 67-2019, 2019 Annual Water and Wastewater QMS Update. Further administrative updates were approved by the Commissioner of Public Works as per the delegated authority granted to the Commissioner under Report PW 109-2008.

As Owners of Niagara Region's drinking water systems, Regional Council has specific responsibilities as defined within the *Safe Drinking Water Act, 2002*. A significant one of these is the "Standard of Care" clause (section 19 of the *Act*). This clause requires Councillors to "exercise the level of care, diligence and skill in respect of a municipal drinking water system that a reasonably prudent person would be expected to exercise in a similar situation" and to "act honestly, competently and with integrity, with a view to ensuring the protection and safety of the users of the municipal drinking water system."

Internal Audits of the Water QMS

The Water QMS is subject to annual internal audits by water and wastewater staff. All internal auditors have completed applicable training led by a qualified and competent trainer. Through the audit process, internal auditors assess conformance of the division's Water QMS with Ontario's *Drinking Water Quality Management Standard* and with divisional policies and procedures.

The following elements of Ontario's *Drinking Water Quality Management Standard* were examined during the 2021 internal audit:

- Element 3 – Commitment and Endorsement
- Element 7 – Risk Assessment
- Element 11 – Personnel Coverage
- Element 16 – Sampling, Testing and Monitoring
- Element 18 – Emergency Management
- Element 19 – Internal Audits

The division's internal audits are typically more rigorous and thorough than external accreditation audits, and the number and detail of audit findings demonstrates this. The internal audit findings include 8 non-conformances, 6 potential non-conformances, and 21 best practices. These findings are detailed in the Water QMS Internal Audit Report (Appendix 1 to this report).

External Audits of the Water QMS

The Water QMS is also subject to external auditing by a third-party auditor as a means to achieve and maintain accreditation to the *Standard*. Accreditation of the Water QMS is a condition of the Region's Municipal Drinking Water Licences. Without continued accreditation, these licences would be revoked.

An off-site surveillance audit was conducted in May 2021 to confirm that the Water QMS adequately addresses the requirements of all 21 elements of the *Standard*. The Water QMS External Audit Report (Appendix 2) provides details of the external auditor's findings. The auditor recommended that Niagara Region maintain its accreditation as a Drinking Water System Operating Authority, with no non-conformances or opportunities for improvement identified.

Water QMS Risk Assessment

An internal risk assessment is required every 36 months for each of Niagara Region's water systems, with complementary risk assessment reviews to be completed at 12 and 24 months between the assessments. A full risk assessment for the Water QMS was completed in 2021, with reviews to follow in 2022 and 2023.

There were **no high-scoring risks identified** during the 2021 full risk assessment. Any previously identified high-scoring risks have been mitigated through capital projects, operational adjustments, or through continual improvement initiatives.

The Region's "critical control points", representing critical process steps, remain unchanged following the 2021 risk assessment review. They include:

- Coagulant feed;
- Filter effluent turbidity;
- Disinfectant feed;
- Primary disinfection;
- Secondary disinfection.

Risks associated with these critical control points are all low-scoring, as they are well-controlled with existing preventive measures and monitoring/response procedures.

Water QMS Management Review

Water QMS Top Management and the QMS Representative meet twice per year to complete a QMS Management Review as required by the *Standard*. At these meetings, Top Management reviews the status of the QMS and identifies corrective actions and continual improvement opportunities to enhance the QMS and associated operations.

Part 1 of the 2021 Management Review was completed on May 31, 2021; Part 2 is scheduled to be completed on November 29, 2021.

Action items identified at the Management Review meetings are summarized in Table 2.

Table 2: Management Review Meetings and Results – Water QMS

Review Meeting	Date	Results
Part 1 – 2020	May. 28, 2020	<i>Previously reported in 2020 QMS Update to PWC</i>
Part 2 – 2020	Dec. 03, 2020	Two new action items relating to: <ul style="list-style-type: none">• Continual improvement (2)
Part 1 – 2021	May. 31, 2021	Five new action items relating to: <ul style="list-style-type: none">• Staff suggestions/customer complaints• Continual improvement• Infrastructure review• Emergency management (2)

Review Meeting	Date	Results
Part 2 – 2021	Nov. 29, 2021	<i>To be reported in 2022 QMS Update to PWC</i>

Changes Impacting the Water QMS

No forthcoming changes have been identified that may impact the Water QMS.

Wastewater QMS

The Water-Wastewater Services Division has opted to develop and implement a Wastewater QMS as a due diligence exercise. The benefits of the Wastewater QMS are numerous and include documentation of policies and procedures, a formalized risk assessment program, incorporation of compliance requirements into standard operating procedures, and an audit program that promotes continual improvement of quality management practices.

Roles and Responsibilities – Wastewater QMS

Key wastewater QMS roles are described in Table 3.

Table 3: Roles and Responsibilities – Wastewater QMS

Role	Assignment
System Owner	Niagara Region (represented by Regional Council)
Operating Authority	Niagara Region (represented by staff of the Water and Wastewater Services Division)
Top Management	Commissioner of Public Works Director, Water and Wastewater Services Division Associate Director, Wastewater Operations, Maintenance & Laboratory Services Associate Director, Water-Wastewater Engineering Associate Director, Water-Wastewater Integrated Systems Associate Director, Water-Wastewater Asset Management
QMS Representatives	Water-Wastewater Quality Management Specialist, reporting to Manager, Wastewater Quality & Compliance (<i>primary</i>) Water-Wastewater Quality Management Specialist, reporting to Associate Director, Water Operations & Maintenance (<i>backup</i>)

Internal Audits of the Wastewater QMS

Like the Water QMS, annual internal audits of the Wastewater QMS are also undertaken by water and wastewater staff. All internal auditors have completed applicable training led by a qualified and competent trainer. Through the audit process, internal auditors assess conformance of the division's Wastewater QMS with Ontario's *Drinking Water Quality Management Standard* (as modified to suit wastewater operations) and with divisional policies and procedures.

Currently, there is no legislative requirement for the Niagara Region to implement a Wastewater QMS, internal audits of the QMS are undertaken strictly out of due diligence and best practice.

The following elements of Ontario's *Drinking Water Quality Management Standard* were examined during the 2021 wastewater internal audit:

- Element 2 – QMS Policy
- Element 4 – QMS Representative
- Element 5 – Document & Records Control
- Element 6 – Wastewater System
- Element 11 – Personnel Coverage
- Element 12 – Communications
- Element 13 – Essential, Supplies & Services
- Element 21 – Continual Improvement

The internal audit findings include 13 non-conformances, 0 potential non-conformances, and 14 best practices. These findings are detailed in the Wastewater QMS Internal Audit Report (Appendix 3 to this report).

External Audits of the Wastewater QMS

There is no requirement for the Wastewater QMS to be audited nor accredited by an external body. Therefore, no external audits are performed.

Wastewater QMS Risk Assessment

An internal risk assessment is completed every 36 months for each of Niagara Region's wastewater systems, with complementary risk assessment reviews to be completed at approximately 12 and 24 months between the assessments. A full risk assessment for

the Wastewater QMS was completed in the fall of 2021, with reviews to follow in 2022 and 2023. 2021 risk assessment high-risk items are described in Table 4.

Table 4: High-Risk Items – Wastewater QMS Risk Assessment

Category	Examples	Total # Risks	# High Risks	Common Risk Factors	Addressed through
Treatment Plant	Major treatment processes, control systems, standby power, etc.	446	58 (13%)	<ul style="list-style-type: none"> • Aging infrastructure, • Compliance and process risks, • Maintenance needs, • Security 	64% ongoing capital projects; 36% through future capital projects, maintenance activities or operational adjustments
Collection System Facilities	Sewage pumping stations, odour control facilities, combined sewer over flows	132	25 (19%)	<ul style="list-style-type: none"> • Aging infrastructure, • Compliance and process risks, • Maintenance needs 	68% ongoing capital projects; 32% through future capital projects, maintenance activities or operational adjustments

Risks Relating to Sanitary Gravity Sewers and Sanitary Forcemains

As part of this risk assessment exercise, the Water-Wastewater Asset Management Group assessed risks associated with sanitary gravity sewers and sanitary forcemains. Risks were assessed using the risk scoring criteria as defined in the Corporate Asset Management Risk Assessment (CAMRA) model. The scoring criteria consider factors such as pipe age and life expectancy, break history, condition inspection results, population impacted in the event of a failure, and estimated duration and severity of failure.

The Region owns 306 km of gravity sewers and forcemains; 29 km (9.5%) of these were found to be at high-risk of failure. The Water-Wastewater Asset Management group will be reviewing these high-risk mains to prioritize needs and identify scopes of work.

Addressing Risk

For each high-scoring risk identified in the 2021 risk assessments, one or more action items has been initiated and assigned to a member of Divisional staff. High-scoring risks are typically mitigated through operational adjustments, or continual improvement initiatives or capital projects. The Water-Wastewater Services Division works in coordination with the Corporate Asset Management Office to prioritize capital needs and allocate funding for high priority projects.

Wastewater QMS Management Review

Wastewater QMS Top Management and the QMS Representative meet twice per year to complete a QMS Management Review as required by the Standard. At these meetings, Top Management reviews the status of the QMS and identifies corrective actions and continual improvement opportunities to enhance the QMS and associated operations.

Part 1 of the 2021 Management Review was completed on August 24, 2021; Part 2 is scheduled to be completed on November 23, 2021.

Action items identified at the Management Review meetings are summarized in Table 5.

Table 5: Management Review Meetings and Results – Wastewater QMS

Review Meeting	Date	Results
Part 1 – 2020	Jun. 22, 2020	No new action items identified.
Part 2 – 2020	Nov. 12, 2020	One new action item relating to: <ul style="list-style-type: none">• Wastewater compliance
Part 1 - 2021	Aug. 24, 2021	No new action items identified.
Part 2 - 2021	Nov. 23, 2021	To be reported in 2022 QMS Update to PWC

Changes Impacting the Wastewater QMS

The Ministry of the Environment, Conservation, and Parks (MECP) has indicated that a quality management standard will be developed for wastewater systems. Unlike the *Drinking Water Quality Management Standard*, conformance and accreditation to the Wastewater Management Standard will be voluntary. Development of the Wastewater Management Standard is industry-driven. There is no forecasted publication date at this time.

Governmental Partners

Drinking water system Operating Authority staff work closely with the MECP to ensure that comments and concerns related to current and future drafts of the Drinking Water Quality Management Standard have been considered. When changes are made to the Standard, they are incorporated into the Region's Water QMS and are also considered for incorporation into the Wastewater QMS as relevant and/or feasible.

Water and Wastewater Operating Authority staff meet quarterly with Area Municipal counterparts to share resources, experiences, and best practices pertaining to water and wastewater quality management and compliance.

Public and/or Service Users

The Water QMS Policy, Water QMS accreditation information, and Wastewater QMS Policy are available to the public and service users via the Niagara Region's external website.

The most current approved versions of Operational Plans are available upon request to a Water-Wastewater Quality Management Specialist (molly.macdonald@niagararegion.ca or michelle.max@niagararegion.ca).

Updates to the Water and Wastewater QMS Operational Plans

The Water QMS Operational Plan and Wastewater QMS Operational Plan were revised in late 2019 and were re-endorsed by Regional Council on December 12, 2019 under Report PW 67-2019, Drinking Water Compliance and Water-Wastewater Quality Management System Endorsement. Since that time, minor administrative changes were made to the Water QMS and Wastewater QMS Operational Plans in May 2021 and February 2021, respectively, and these revisions were approved by the Commissioner of Public Works on behalf of Council as per the delegated authority granted to the Commissioner under Report PW 109-2008.

Alternatives Reviewed

The Ministry of the Environment, Conservation, and Parks has appointed two accreditation bodies who are authorized to conduct external audits of Drinking Water Quality Management Systems under Part IV of the Safe Drinking Water Act, 2002.

Niagara Region appointed QMI-SAI Global for Water QMS accreditation services in 2013. QMI-SAI continues to act as the Region's external auditor for the Water QMS.

Relationship to Council Strategic Priorities

Niagara Region's Water and Wastewater Quality Management Systems, and associated audit processes, relate directly to Council's Strategic Priority 4.1 of committing to "high quality, efficient and coordinated core services". The Water QMS and Wastewater QMS are used to drive continual improvement within the Water and Wastewater Services Division; they increase accountability by defining clear roles and responsibilities for divisional staff, and they increase data accessibility through documented standard operating procedures and associated record-keeping practices.

The Water QMS and Wastewater QMS also relate to Council's Strategic Priority 4.2 of committing to "enhanced communication". The continued accreditation of the Region's Water QMS, and the due diligence established through the Region's Wastewater QMS, provide residents with assurance that their drinking water is safe and that the associated systems are competently managed.

Other Pertinent Reports

- PWA 109-2008, DWQMS Update (October 29, 2008).
- PW 67-2019, 2019 Annual Water and Wastewater Quality Management System Update (December 3, 2019).

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Appendices

Appendix 1	Water QMS Internal Audit Report
Appendix 2	Water QMS External Audit Report
Appendix 3	Wastewater QMS Internal Audit Report