

CITY OF HAMILTON'S DRINKING WATER SYSTEMS  
DWQMS SUMMARY REPORT



Safe Drinking Water Act



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# 1 - INTRODUCTION

## 1.1 Purpose

This Drinking Water Quality Management System (DWQMS) Summary Report is being submitted to Council (Owner) on behalf of Top Management (General Manager, Public Works and Director of Hamilton Water) of the City's five drinking water systems (DWS), as shown below.

Licence Number	Drinking Water System
005-101	Hamilton DWS
005-102	Freelton DWS
005-103	Greensville DWS
005-104	Carlisle DWS
005-105	Lynden DWS

The purpose of this DWQMS Summary Report is to keep Owners (Mayor and Council) of the City's DWS informed about the ongoing performance of the DWQMS, including major milestones achieved in 2017. This report also assists Owners in meeting their Standard of Care responsibilities under the Safe Drinking Water Act (SDWA).

This DWQMS Summary Report is a key communication tool from Top Management to the Owner as referenced in Element 12 Communications of the DWQMS Standard. This Report also meets the communication requirements of Elements 14 Review and Provision of Infrastructure and Element 20 Management Review of the DWQMS Standard as identified in Sections 3 and 5, respectively.

## 1.2 Scope

The DWQMS Standard requires that the Operating Authority report on certain aspects of the DWQMS to Owners (Mayor and Council), specifically the outcomes of Element 14 Review and Provision of Infrastructure and Element 20 Management Review. This report fulfills the communication requirements of these elements and exceeds the Standard's requirements by providing information on external and internal DWQMS Audits, Risk Assessment and other major milestones of the DWQMS for 2017.

## 1.3 Overview of Key Milestones

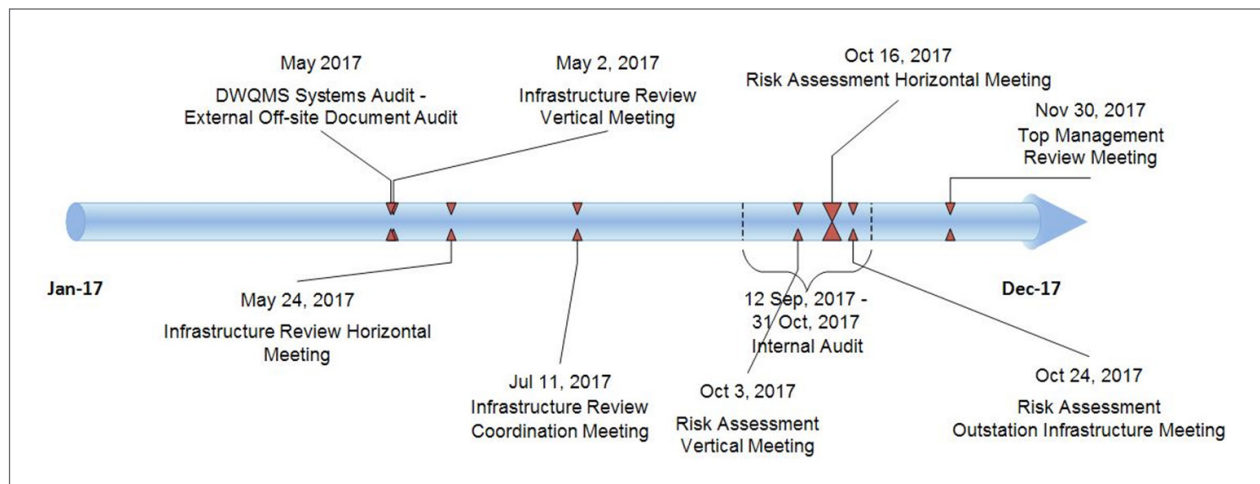
DWQMS milestones related to the accreditation of the City's Operating Authority are described below:

- November 2008 – DWQMS Operational Plan endorsed by Owners,
- April 2009 – Operating Authority achieves Partial Scope; Entire DWQMS accreditation,
- June 2009 – Operating Authority receives Municipal Drinking Water Licences and Drinking Water Works Permits for all five City DWs,

- February 2011 – On-site Verification Audit by Canadian General Standards Board (CGSB),
- July 2011 – Operating Authority achieves Full Scope; Entire DWQMS accreditation,
- 2012 – Identified QMI - SAI Global as the new Accreditation Body,
- 2012 – Standard of Care Training for Mayor and Council,
- May 2013 – External Systems Audit (off-site document review),
- June 2013 – Operating Authority receives reaccreditation,
- May 2014 – External Systems Audit (off-site document review),
- June 2014 – Received renewed Municipal Drinking Water System Licences for each of the City's five DWs,
- First quarter 2015 – re-endorsement of the DWQMS Operational Plan by Owners,
- March (off-site document review) and April (on-site audit) 2015 – re-accreditation of the DWQMS by external registrar, SAI-Global,
- May 2016 – External Systems Audit (off-site document review),
- May 2016 – Standard of Care Training for Acting General Manager and new Councillor,
- May 2017 – External Systems Audit (off-site document review).

Figure 1-1 illustrates key DWQMS milestones which occurred in 2017:

**Figure 1-1: Project Pipeline - 2017**





## 1.4 DWQMS Operational Summary

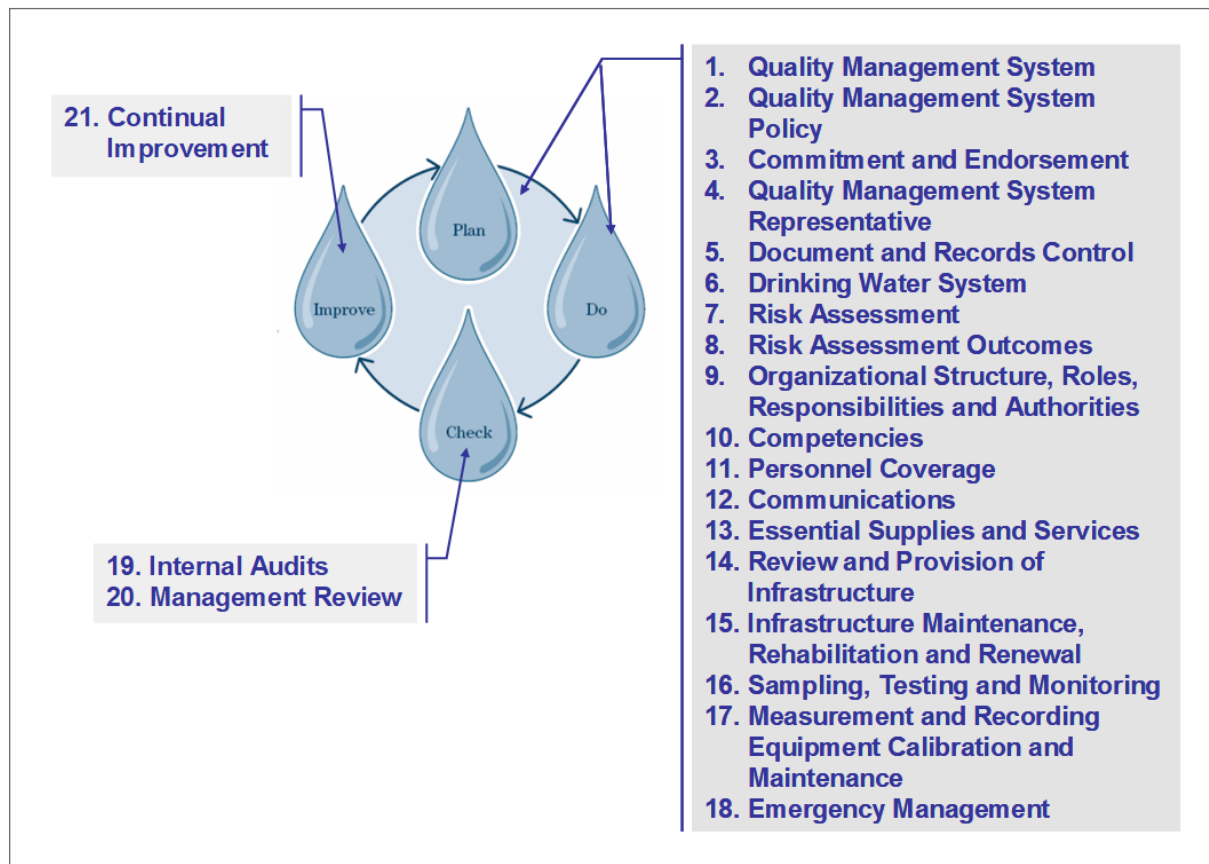
Figure 1-2 illustrates the Plan, Do, Check and Act elements of the DWQMS Standard. In 2017, the Ministry of the Environment and Climate Change revised the Standard and issued V 2.0.

The following sections of this report include an overview of milestones related to the following

elements of the DWQMS:

- Section 2 - Element 8 Risk Assessment Outcomes
- Section 3 - Element 14 Review and Provision of Infrastructure
- Section 4 - Element 19 Internal Audits
- Section 5 - Element 20 Management Review

**Figure 1-2: DWQMS Standard Elements**



## DWS Licences & Permits Approvals

The city renewed the Permits to Take Water (PTTW) for 2 Carlisle wells, FDC03R and FDC05 to remove the requirement to monitor private wells.

In 2017, Licences and Permits were revised to include the Watermain Disinfection Procedure and MOECC template changes. In addition, there were 12 Form 1 approvals for extensions to the distribution system and 5 Form 2s for like for like infrastructure replacements (e.g. pumps).



## 2 RISK ASSESSMENT

### 2.1 Overview

The DWQMS Standard requires that the Risk Assessment be reviewed on an annual basis and redone every three years to verify the currency and validity of the information. A full review of the Risk Assessment scope, criteria, data fields and update of Risk Assessment Outcomes was conducted in 2017 as it was the 3 year “redo” milestone for the Risk Assessment.

Staff from across Hamilton Water collaborated on updating the existing information considering the following key questions:

- Are identified control measures still valid and if so, are they still in place?
- Have additional controls been implemented?
- How has equipment condition, raw water quality, operational controls etc. revise the risk score?
- Are any modified “Risk Factors” now considered to be Critical Control Risks?

Similar to previous years, there were no significant risks identified through the 2017 process, which were not captured through an existing Hamilton Water initiative or project.

### 2.2 Key Updates

As part of the Risk Assessment, process changes, including capital upgrades in the DWSs, are considered and the associated risk scores (i.e. likelihood of occurrence) are updated as needed. The following includes a list of materials that were considered in the 2017 Risk Assessment:

- Capital Delivery - Water Projects (Updated September 2017)
- 2017 DWQMS Infrastructure Review outcomes
- Critical Control Point Summary Chart PW-WW-R-032-009 (Outcomes updated from previous DWQMS RA)
- DWQMS Risk Assessment - Water Distribution Report PW-WW-R-032-012 (Outcomes updated from previous DWQMS RA)
- Review of Adverse Water Quality Incident Notifications - Yearly Summary, Woodward Avenue Drinking Water Subsystem, Distribution, Carlisle, Lynden, Greenville and Freelon DWSs

- BCOS Database Quality Non-conformance Module (audits and inspections)
- 2017 Emerging Issues Meeting outcomes
- Critical Control Point Summary - Woodward DWS PW-WW-L-032-005
- DWQMS Risk Assessment - Water Treatment Plant Report PW-WW-R-032-010 (Outcomes updated from previous DWQMS RA)
- Hamilton Water Emergency Generator Locations (PW-WW-L-012-006)
- Critical Control Point Summary - Wells & Fifty Road DWS PW-WW-L-032-005
- DWQMS Risk Assessment - Wells Systems Report PW-WW-R-032-011 (Outcomes updated from previous DWQMS RA)

In 2018, scoped review of the HW Risk Assessment will be completed. Compliance and Regulations will continue to work with the Asset Management Section to enhance linkages with the State of the Infrastructure Report.





## 3 REVIEW AND PROVISION OF INFRASTRUCTURE

### 3.1 Purpose

The Operating Authority must ensure and verify, on an annual basis, the adequacy of water infrastructure. In order to satisfy the requirements of the DWQMS Standard, the Operating Authority conducted a formal review of its vertical (water treatment, storage and pumping) and horizontal (watermains) infrastructure. The scope of the review also considered the operation, maintenance and replacement of existing infrastructure assets as well as new infrastructure planned for the immediate and long-term future. A Coordination Meeting was held with the Management Team of Hamilton Water to discuss the outcomes of both the horizontal and

vertical infrastructure reviews. This DWQMS Summary Report (2017) includes a brief summary of the results of the DWQMS Infrastructure Review.

### 3.2 Process

The Operating Authority assembled teams of representatives from across relevant sections of Hamilton Water, Engineering Services and Planning and Economic Development to conduct the review of water infrastructure. Teams met in May 2017 to discuss vertical and horizontal infrastructure and a coordination meeting was held in July 2017.

The DWQMS Infrastructure Review teams collected and examined input data related to various asset management, maintenance and capital programs. A summary of the type of “indicator” data examined is provided below:

Infrastructure Type	Input Data
Horizontal Infrastructure – Maintenance	→ <ul style="list-style-type: none"> <li>• Watermain Repairs</li> <li>• Hydrant and Valve Inspections</li> <li>• Valve and Meter Replacement</li> <li>• Substandard Service Replacement</li> <li>• Preventative Maintenance</li> <li>• Emergency Repairs</li> <li>• Customer Complaints</li> </ul>
Horizontal Infrastructure - Large Capital	→ <ul style="list-style-type: none"> <li>• Replaced, Rehabilitated and New Watermains</li> <li>• Condition Assessments</li> <li>• Capital Upgrades</li> <li>• Master Plan Schedule</li> <li>• Corrosion Control Program and Corrosion Control Building</li> <li>• Asset Management – Critical Watermain Age Profiles and Inspections</li> </ul>
Vertical Infrastructure – Maintenance	→ <ul style="list-style-type: none"> <li>• Preventative Maintenance</li> <li>• Breakdowns and Emergency Repairs</li> <li>• Capital Upgrades - Coordination and Scheduling</li> <li>• Life Cycle Best Practices</li> </ul>
Vertical Infrastructure – Large Capital	→ <ul style="list-style-type: none"> <li>• Master Plan Schedule</li> <li>• Reservoir Inspections</li> <li>• Water Capital Projects Lists</li> <li>• Well Studies and Investigations</li> </ul>

### 3.3 Overview of Results

The outcomes and recommendations from the Infrastructure Review Meetings are documented in meeting minutes for the 2017 review. Attendees at the Infrastructure Review Coordination meeting utilized the outcomes from the meeting as input to capital planning and budget preparation. Hamilton Water discussed the 2017 Infrastructure Review at the Top Management Review meeting on November 30, 2017.

The 2017 Infrastructure Review concluded that vertical and horizontal infrastructure is generally found to be available, when needed, and maintained and improved, when necessary. There was significant discussion at the Infrastructure Meetings about ensuring that sufficient capital funds were available for long-term upgrades and maintenance. It was acknowledged that life-cycle replacement funds were being used for emergency or short-term work. This results in a budget shortfall for long-term replacement and maintenance activities. There is work ongoing to confirm that current and projected spending allocations are adequate for drinking water.



## 4 DWQMS AUDITS

The DWQMS accreditation process requires both 3rd Party Accreditation Audits and annual internal audits by the Operating Authority. The cycle of external audits includes an on-site Verification Audit every 3 years and Systems Audit or documentation review annually.

### 4.1 External DWQMS Audits

Hamilton Water utilizes the services of QMI-SAI Global as the Accreditation Body for the DWQMS. In 2017, QMI-SAI Global conducted an off-site documentation surveillance audit. There were no non-conformances or opportunities for improvement found.

### 4.2 Internal Corporate Audit

Corporate Audit Services conducted an audit of Hamilton Water with regards to water supply compliance and conformance in Q1 2015. The Close Out meeting was held on May 7, 2015 and the Final Report was adopted by Council on June 24, 2015. It was noted in the report, that given the large volume of audit and inspection reports that were reviewed, there was a very low volume of non-compliance/non-conformance items detected.

Hamilton Water provided evidence that all compliance requirements were met. Two findings were identified regarding conformance activities. One was related to the new Mayor and four Councillors requiring Standard of Care training and the signing of the DWQMS Commitment & Endorsement. This was completed on June 24, 2015. The second finding was related to 24 open findings from the 2014 Internal Audit. Evidence of closure of all 2014 findings was provided to Corporate Audit Services in November 2016 and verified in 2017.

### 4.3 Internal DWQMS Audits

The Operating Authority must conduct internal audits to evaluate the conformity of the DWQMS with the requirements of the DWQMS Standard and its procedures, at least annually.

## Internal Audit Team

The Audit Team consists of staff members from all sections of Hamilton Water. The diversity of our Audit Team is an advantage and ensures that auditors do not audit water processes related to their job or area of authority. Independence of auditors avoids potential conflict of interest and provides a fresh set of eyes on water processes external to their day to day responsibilities.

## 2017 DWQMS Internal Audit

The Internal Audit Team conducted a full internal audit from September 12 to October 31, 2017. The 2017 audit assessed the implementation of all 21 elements of the new release of the DWQMS Standard V2.0 and preparation for the 2018 DWQMS Re Accreditation audit. Key meetings relating to the internal audit include:

- Opening meeting – September 12, 2017
- Closing meeting – October 31, 2017

The results of the annual DWQMS Internal Audit conducted in September/October 2017 demonstrate that the City of Hamilton's DWQMS is a maturing system and that opportunities to improve the DWQMS continue to be identified to ensure that the system is relevant and appropriate for HW. The DWQMS contains the required procedures and records to illustrate the establishment and continual improvement of the management system.

The highest number of findings in the 2017 Internal Audit was related to:

- Element 5 – Document and Records Control
- Element 16 – Sampling, Testing and Monitoring
- Element 18 – Emergency Management

This coincides closely with the findings by the external auditor, SAI-Global, for audits that they have conducted on other municipalities in Ontario.

Our high risk findings, that are closely connected to compliance requirements, were related to:

- Element 15 – Infrastructure Maintenance, Rehabilitation and Renewal
- Element 17 – Measurement and Recording Equipment Calibration and Maintenance

The findings identified in this audit will be assigned for further investigation and corrective/preventive actions.

In conclusion, with the timely completion of the corrective actions issued as a result of this audit, the overall conformance to V2.0 of the DWQMS Standard and the City of Hamilton's DWQMS is suitable, the audit process is adequate, and the implementation and maintenance effective.

## 2018 DWQMS Audit Plan

The Compliance Support Group of the Compliance & Regulations Section will be developing an Audit Plan for the 2018 DWQMS internal audits. A full internal audit is proposed to be undertaken in October/ November 2018. The Audit Plan will be reviewed and approved by the management team prior to implementation.



## 5 MANAGEMENT REVIEW

The PLAN component of Element 20 Management Review of the DWQMS Standard requires a documented procedure to describe how the Operating Authority reviews the suitability, adequacy and effectiveness of the DWQMS. The 'CHECK' component of the element requires that Top Management participate in a management review at least once per year to review the DWQMS and consider recommendations for continual improvement. Required outputs of the meeting are:

- Consideration of the results of the management review and identifying deficiencies and action items to address deficiencies,

- Provide a record of decisions and actions items related to management review action items including responsibilities and timelines,
- Report the results of the management review to the Owner.

In 2017, the DWQMS Top Management Review (TMR) was held on November 30th. Attendees included Top Management (General Manager of Public Works and Director of Hamilton Water), Directors, Section Managers, Overall Responsible Operators (OROs) for treatment and distribution, the System Management Representative and staff from the Compliance Support Group.

### Management Review Action Items

**Table 5-1: Management Review Outcomes**

No.	Summary of Action Items	Status
1	Transfer of Review – Sr. Project Manager General Manager's Office to facilitate discussions, collect and compile comments from all PW Divisions on the new Transfer of Review process. Update: Engineering Services has taken the lead for PW and has been facilitating sessions.	Complete
2	2017 Annual DWS Report - GM Public Works and Director Hamilton Water to meet to review and discuss need for a presentation to the PW Committee and/or Council. Update: This meeting was held February 2, 2018.	Complete
3	Wilson Street Project - IP&SD to prepare a briefing note for GM Public Works regarding the issues and delays.	Complete
4	MOECC Inspections - SMR to schedule a meeting with the inspector. Update: The meeting was held on December 15, 2017.	Complete
5	Lynden Communications - CS&CO to send an update newsletter to Lynden residents regarding the status of their current and future water supply.	On hold pending meeting with GM re funding
6	Lynden Communications - CSG and CS&CO to conduct an audit of the process used to send information to Lynden residents via the electrical utility.	Complete



No.	Summary of Action Items	Status
7	Procedures - CSG to revise the chlorine level visual aids to include the high chlorine adverse level.	Mar. 2018
8	Emergency Repairs - Director of Operations to discuss the list of 2017 emergency repairs (Policy 10) to determine root cause and provide information for budget discussions.	Aug. 2018
9	Asset Management - GM Public Works recommends that a presentation to Council be made.	Q1 2019
10	Kenilworth Pumping Station (HD005) – GM Public Works to attend a meeting with vendor for to discuss the warranty issues and vendor performance. Need to follow our own Purchasing Process and put vendors on notice even after the warranty period.	Q1 2018
11	Equipment Purchasing – PMATS to review and consider creating an approved equipment list.	Dec. 2018
12	Corrosion Control - It is recommended that HW present to Council an update on the CCP after the Annual Summary Report is approved or lined up with the mail out to residences regarding the CCP.	Q2 2018
13	Risk Assessment – CSG to prepare briefing note regarding the risk assessment on the Capital Program. What information do we have\ can be used to determine the gap of what we are spending on capital replacement, how much we should be spending and what is the risk.	Aug. 2018
14	Audit Findings – It was suggested that the comparison chart of HW findings to SAI-Global/NSF findings for Ontario municipalities be presented to Council. This action can be combined with the previous action items for a presentation to Council.	Q1 2018
15	Emergency Response – CSG to send the Fort McMurray WebEx to GM Public Works. Update: The WebEx and LMD review were sent December 1, 2017.	Complete
16	Watermain Approvals – IP&SD to prepare a briefing note following the Fire Underwriter Survey workshop.	Jan. 2018

No.	Summary of Action Items	Status
17	New Developments – At the 2018 DWQMS TMR, discuss concerns regarding new developments and Developer issues.	Sept. 2018
18	Continual Improvement - Discuss with the BLT at the December meeting which tasks are to be included in the Sectional KPI for tracking overdue BCOS task progress that will be included in the SARs. Update: This topic was discussed at the December 12, 2017 BLT meeting.	Feb. 2018
19	New Developments – Sr. Project Manager General Manager's Office to prepare a briefing note regarding changes to the Development Approval related to HW and P&ED. This brief is to include a review of fees collected by HW from P&ED related to services HW provides to the Development Application Review workflow.	Q3 2018

Note Hamilton Water Section references: BCOS Lead Team (BLT); Compliance and Regulations (C&R); Compliance Support Group (CSG); Customer Service and Community Outreach (CS&CO); Infrastructure Planning & System Design (IP&SD); Planning and Economic Development (P&ED); Plant Maintenance & Technical Services (PMATS); Sustainable Initiatives (SI); Water and Wastewater (W&WW); Water Distribution and Wastewater Collection (WD&WWC).

Overall, Top Management and Section Managers concluded that the DWQMS is suitable, adequate and effective. Continual improvement action items were identified and will be tracked for closure during 2017 at the Senior Management Team (Hamilton Water-SMT) meetings. A summary of key continual improvement actions are provided in Table 5-1.



## 6 FINANCIAL PLAN

The need to prepare a Water Infrastructure Financial Plan is, in part, a regulatory compliance issue specific to the water licensing requirements defined within the DWQMS and more specifically detailed under Regulation 453/07 - Financial Plans made under the Safe Drinking Water Act, 2002. The required Financial Plan for water systems must address a minimum six-year time-frame and be approved by council prior to submission to the province of Ontario. The resulting plans must also be made freely available to the general public. Water Infrastructure Financial Plans for Hamilton have typically been developed to cover a ten-year period of time in order to reflect consistency with the current rate budget process.

The first Financial Plan was created in 2010. The latest revision was approved by Council on January 29, 2014. This most current plan was sent to the Ministry of Municipal Affairs and Housing on January 31, 2014. The next update of the Water Infrastructure Financial Plan is required this year. Efforts are currently under way to provide a new council report by summer of 2018.

## 7 CONCLUSIONS

The outcomes from the internal DWQMS audit and the Management Review concluded that the DWQMS is adequate, suitable and effective and conforms to the requirements of the DWQMS Standard. Corrective action plans from the audit and action items from the Management Review will be implemented to ensure continual improvement of the DWQMS.

## 8 NEXT STEPS – TIMELINE

The management system requires ongoing commitment by staff and management. Maintenance and improvement of the system continues to be a high priority of the Operating Authority. Major next steps related to the maintenance of the DWQMS in 2018 include the following:

Month of 2018	Scheduled DWQMS Milestones
January to July	<ul style="list-style-type: none"> <li>Investigate and correct internal audit findings from DWQMS Internal Audits</li> </ul>
February/March	<ul style="list-style-type: none"> <li>Annual O.Reg. 170 Schedule 22 Report and DWQMS Summary Report to Council</li> </ul>
March	<ul style="list-style-type: none"> <li>Hamilton Water - SMT Meeting #1</li> <li>Infrastructure Review Meetings</li> <li>Risk Assessment Meetings</li> </ul>
April/May	<ul style="list-style-type: none"> <li>DWQMS 3rd Party Surveillance off-site Documentation Audit</li> <li>DWQMS 3rd Party Surveillance on-site Audit</li> </ul>
June	<ul style="list-style-type: none"> <li>Hamilton Water - SMT Meeting # 2</li> </ul>
September	<ul style="list-style-type: none"> <li>DWQMS Top Management Review</li> </ul>
October/November	<ul style="list-style-type: none"> <li>DWQMS Internal Audit</li> </ul>
December	<ul style="list-style-type: none"> <li>Hamilton Water - SMT Meeting # 3</li> </ul>

