

City of Hamilton's Drinking Water Systems

DWQMS SUMMARY REPORT (2015) Safe Drinking Water Act



DWQMS 2015 Summary Report
BCOS Record #: PW-WW-R-004-015
Issue #: 1

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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	Greenville 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 2015. 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 2015.

1.3 Overview of Key Milestones

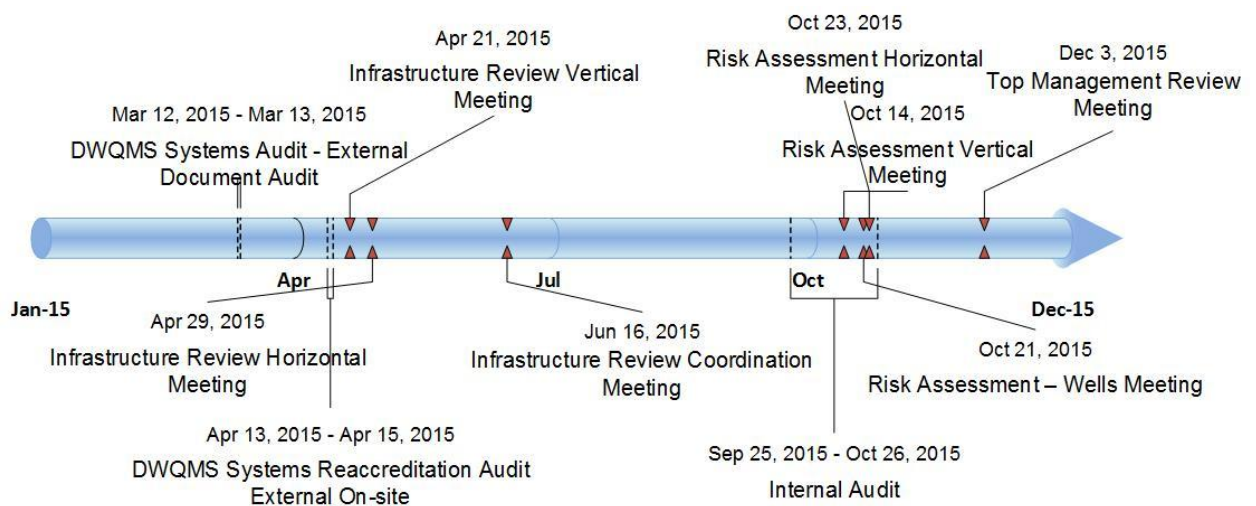
DWQMS milestones related to the accreditation of the City's Operating Authority are described below:

- 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
 - June 2015 – Council adopted Final Internal Corporate Audit 2015-04

Figure 1-1 illustrates key DWQMS milestones which occurred in 2015.

Figure 1-1: Project Pipeline - 2015



1.4 DWQMS Operational Summary

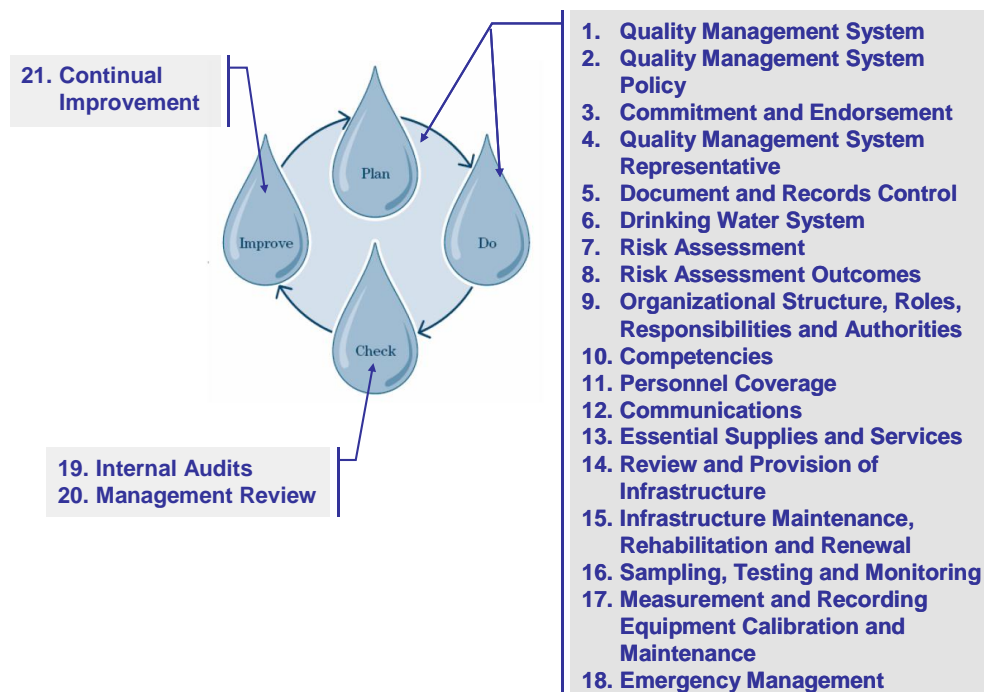
Figure 1-2 illustrates the Plan, Do, Check and Act elements of the DWQMS Standard. The Ministry of the Environment was committed to reviewing the DWQMS once all final Licences had been issued. Once the Licences had been issued for all DWs in Ontario, the Ministry of Environment and Climate Change (MOECC) initiated a review of the Standard in April 2012 and issued a draft in March 2013 for informal review and comments. The MOECC posted a draft of the Standard on the Environmental Registry in 2015 with comments due by the end of December 2015. It is anticipated that the

revised Standard will be issued in 2016.

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 Permit to Take Water (PTTW) for 2 Carlisle wells, FDC03R and FDC05.

There were 4 Amendments to the City's DWSs submitted to the MOECC in 2015. In addition, there were 25 Form 1 approvals for extensions to the distribution system and 0 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 re-evaluation of the Risk Assessment scope, criteria, data fields and update of Risk Assessment Outcomes was conducted in 2014 as it was the 3 year

“redo” milestone for the Risk Assessment. The 2015 Risk Assessment was an interim review by a condensed review team comprised of the Managers of Plant Operations and Water Distribution & Wastewater Collection along with the ORO-Treatment and ORO-Distribution. Since a new ORO-Distribution was hired in December 2015, a Risk Assessment Coordination meeting was held on January 28, 2016 to ensure that the ORO-Distribution was aware of the identified risks. The team also reviewed the outcomes from 2014 and focused on new and upgraded infrastructure (e.g. horizontal, vertical, including wells).

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. revised 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 2015 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 ongoing, completed and upcoming capital upgrades and projects that were considered in the 2015 Risk Assessment:

- Capital Delivery - Water Projects (Updated August 2015)
- DWQMS Infrastructure Review Outcome Brief, Report Date July 2015
- 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 Freelton DWSs
- BCOS Database Quality Non-conformance Module
- Plant Operations Process Supervisor, (Completed) Operations Event Forms, Plant Operations
- Updated Emerging Issues Brief (Draft)
- Critical Control Point Summary - Woodward DWS PW-WW-L-032-005 (Draft Updated December 2015)

- DWQMS Risk Assessment - Water Treatment Plant Report PW-WW-R-032-010 (Outcomes updated from previous DWQMS RA)
- Woodward Avenue, Water Treatment Plant Study, Stage 5 Report – Draft, September 2015, Risk Register – Existing Plant: Ability to Meet 650 ML/d Design Capacity
- 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)
- Meeting Minutes DWQMS Risk Assessment - Wells (October 15, 2014)

In 2016, 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 (2015) 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 April 2015 to discuss vertical and horizontal infrastructure and a coordination meeting was held in June 2015.

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 - Small Capital	<ul style="list-style-type: none"> • Valve and Meter Replacement • Preventative Maintenance • Emergency Repairs • Customer Complaints

Infrastructure Type	Input Data
Horizontal Infrastructure - Large Capital	<ul style="list-style-type: none"> • Replaced, Rehabilitated and New Watermains • Stand-Alone and Coordinated Works (i.e. with Sewers and Roads) • Condition Assessments • Capital Upgrades • Master Plan Schedule
Vertical Infrastructure Small Capital	<ul style="list-style-type: none"> • Preventative Maintenance • Emergency Repairs • Capital Upgrades - Coordination and Scheduling
Vertical Infrastructure - Large Capital	<ul style="list-style-type: none"> • Master Plan Schedule • Site Specific Condition Assessments • Reservoir Inspections • Water Capital Projects Lists • Well Studies and Investigations

3.3 Overview of Results

The outcomes and recommendations from the Infrastructure Review Meetings are documented in meeting minutes for the 2015 review. Attendees at the Infrastructure Review Coordination meeting utilized the outcomes from the meeting as input to capital planning and budget preparation. A summary of the outcomes was provided to Top Management as a reference for future planning. Hamilton Water discussed the 2015 Infrastructure Review at the Top Management Review meeting on December 3, 2015.

The 2015 Infrastructure Review concluded that vertical and horizontal infrastructure is generally found to be available, when needed, and maintained and improved, when necessary.

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 March 2015, QMI-SAI Global conducted an off-site documentation surveillance audit. There were no non-conformances or opportunities for improvement found. Because this was the third year of the audit cycle, 2015 included an on-site

reaccreditation audit in April 2015. Hamilton Water was recommended for re-accreditation with 2 minor non-conformances and 1 Opportunity for Improvement.

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 is required within 18 months of the Audit Services audit closing. Hamilton Water continues to work on the closure of these findings.

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.

Eight new internal auditors were trained in 2015 to ensure that there was coverage across all of Hamilton Water.

2015 DWQMS Internal Audit

The Internal Audit Team conducted a full internal audit from September 25 to October 26, 2015. The 2015 audit assessed the implementation of all 21 elements of the DWQMS Standard with an emphasis on Level IV and V documentation and front-line staff. Key meetings relating to the internal audit include:

- Opening meeting – September 25th, 2015
- Closing meeting – October 26th, 2015

The results of the annual DWQMS Internal Audit conducted in September/October 2015 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 Hamilton Water. The DWQMS contains the

required procedures and records to illustrate the establishment and continual improvement of the management system.

While non-conformances were not ranked as major or minor, there were findings identified in this audit that could become a major non-conformance. Major non-conformity means that in the opinion of the auditor:

- a) A required element of the DWQMS has not been incorporated into the management system;
- b) Required procedures have not been developed or implemented;
- c) A systematic problem with a management system is evidenced by several minor non-conformities; or
- d) There is failure to take corrective or preventive action.

Based on the number of findings related to document and records control there appears to still be a systematic problem and a need to reassess the current document and record control systems to address the issues and improve the process.

Results of the verification of the two audit findings from the external audit by SAI-Global earlier in 2015, indicates that further corrective action is required.

Findings from the process audits of the four Well DWSs (Carlisle, Freulton, Greensville and Lynden), Woodward Wastewater Treatment Plant and water distribution systems indicates a need to assess the current verification and calibration processes for the portable chlorine HACH meters in all areas.

Findings from the audit with Engineering Services Division, Construction Section indicate a need to assess the inclusion of this Section in Hamilton Water's DWQMS Operational Plan.

In conclusion, with the timely completion of the corrective actions issued as a result of this audit, the overall conformance to the Standard and the City of Hamilton's DWQMS is suitable and the implementation and maintenance effective. The non-conformances and potential non-conformances were uploaded in the BCOS Database in November/December 2015. Root cause investigations will be undertaken in early 2016. Following this, corrective action plans will be implemented by delegated staff, where required.

2016 DWQMS Audit Plan

The Compliance Support Group of the Compliance & Regulations Section will be developing an Audit Plan for the 2016 DWQMS internal audits. A full internal audit is proposed to be undertaken in September/October 2016. 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 'ACT' 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 2015, the DWQMS Top Management Review was held on December 3rd. 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

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 2016 at the Senior Management Team (Hamilton Water- SMT) meetings. A summary of key continual improvement actions are provided in Table 6-1.

Table 5-1: Management Review Outcomes

No.	Summary of Action Item	Rsp.	Due Date
1	<p>Item background: A new Pressure District (PD 25) was established to improve water pressure in a localized area. The switch was implemented with little impact to customers. The project was a great example of collective ownership with two years of planning, three months of work and one day of implementation.</p> <p>Action Item: Submit the successful implementation of PD 25 as a Team Project for the City Manager's Award.</p>	W&WW Operations	TBD - to meet the 2016 Award Schedule
2	<p>Action Item: For the 2016 DWQMS Infrastructure Review, Hamilton Water to work more closely with the Public Works, Engineering Services Division to review large diameter water mains.</p>	C&R	Quarter 2, 2016
3	<p>Action Item: Review water quality parameters in the Freelon and Greenville DWSs to analyze trends.</p>	SI	Quarter 2, 2016
4	<p>Action Item: Begin the evaluation of options (i.e., comprehensive metering) to address water loss in the distribution system.</p>	WD&WWC	Quarter 1, 2016

Note Hamilton Water Section references: Water and Wastewater (W&WW); Compliance and Regulations (C&R); Sustainable Initiatives (SI); Water Distribution and Wastewater Collection (WD&WWC)

6 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.

7 NEXT STEPS – TIMELINE

The management system requires ongoing commitment by staff and management. A challenge will be to ensure that 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 2016 include the following:

Month of 2016	Scheduled DWQMS Milestones
January to June	<ul style="list-style-type: none"> Investigate and correct internal audit findings from DWQMS Internal Audits
February\March	<ul style="list-style-type: none"> Annual O.Reg. 170 Schedule 22 Report and DWQMS Summary Report to Council
March	<ul style="list-style-type: none"> Hamilton Water- SMT Meeting #1 DWQMS 3rd Party Surveillance off-site Documentation Audit Infrastructure Review Meetings
July	<ul style="list-style-type: none"> Hamilton Water - SMT Meeting # 2
September	<ul style="list-style-type: none"> Hamilton Water - SMT Meeting # 3 DWQMS Internal Audit
October	<ul style="list-style-type: none"> Risk Assessment Review Meetings
December	<ul style="list-style-type: none"> DWQMS Top Management Review

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