

City of Hamilton's Drinking Water Systems

DWQMS SUMMARY REPORT (2016) Safe Drinking Water Act



DWQMS 2015 Summary Report
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Table of Contents

1	Introduction	4
1.1	Purpose	4
1.2	Scope	4
1.3	Overview of Key Milestones	4
1.4	DWQMS Operational Summary	5
2	Risk Assessment	6
2.1	Overview	6
2.2	Key Updates	7
3	Review and Provision of Infrastructure	8
3.1	Purpose	8
3.2	Process	8
3.3	Overview of Results	9
4	DWQMS Audits	10
4.1	External DWQMS Audits	10
4.2	Internal Corporate Audit	10
4.3	Internal DWQMS Audits	10
5	Management Review	11
6	Conclusions	14
7	Next Steps – timeline	14

List of Tables

Table 5-1: Management Review Outcomes	13
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List of Figures

Figure 1-1: Project Pipeline - 2016	5
Figure 1-2: DWQMS Standard Elements	6

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 2016. 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 2016.

1.3 Overview of Key Milestones

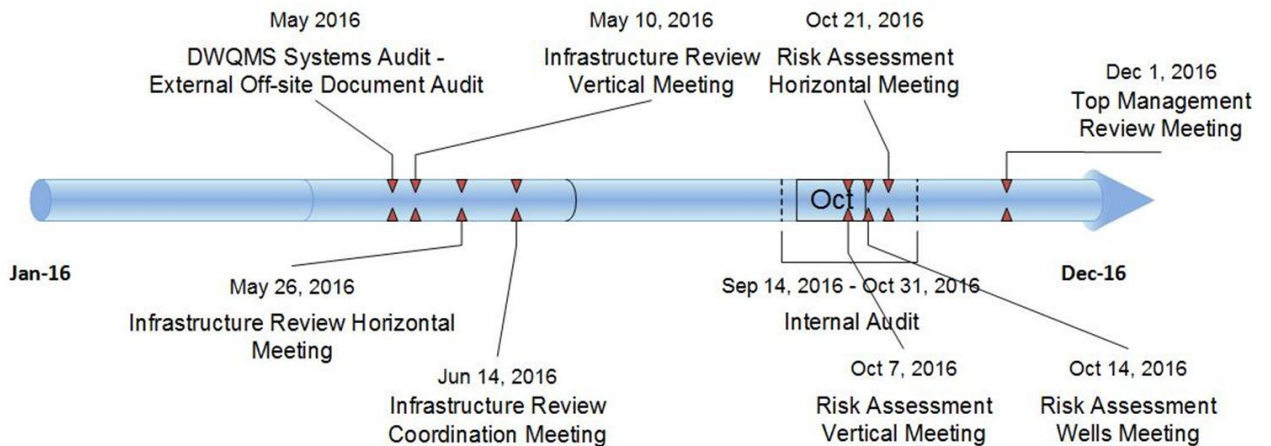
DWQMS milestones related to the accreditation of the City's Operating Authority are described below:

- 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 DWSs,
- 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 DWSs,
 - 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.

Figure 1-1 illustrates key DWQMS milestones which occurred in 2016.

Figure 1-1: Project Pipeline - 2016



1.4 DWQMS Operational Summary

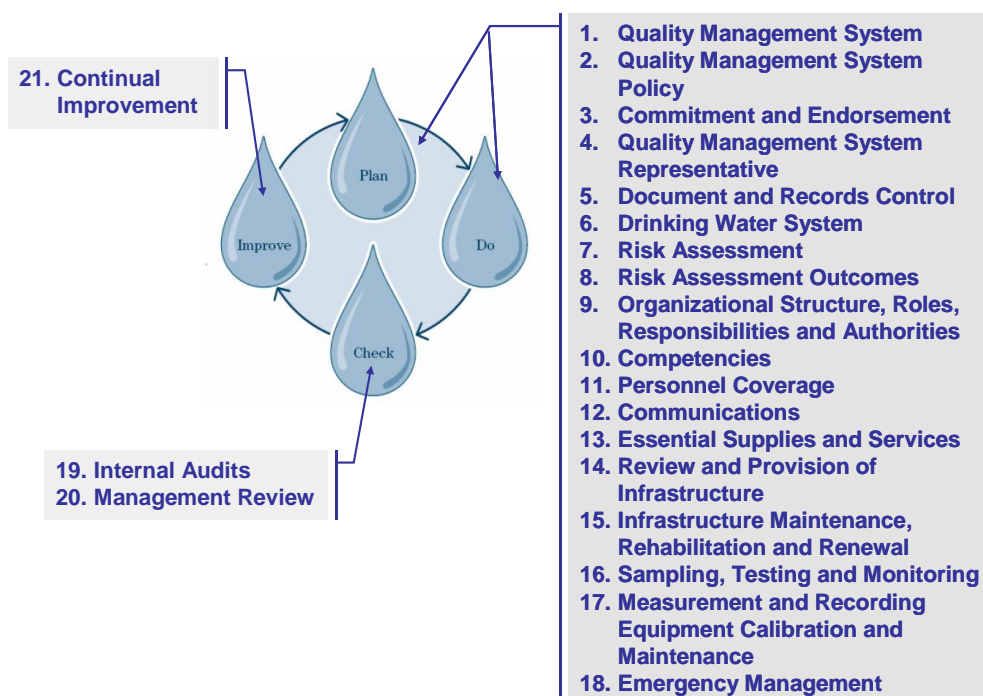
Figure 1-2 illustrates the Plan, Do, Check and Act elements of the DWQMS Standard. The Ministry of the Environment was committed to reviewing the DWQMS once all final Licences had been issued. Once the Licences had been issued for all DWSs in Ontario, the Ministry of Environment and Climate Change (MOECC) 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 2017.

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.

There was 1 Amendment to the City's DWSs submitted to the MOECC in 2016. In addition, there were 23 Form 1 approvals for extensions to the distribution system and 8 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 2016 Risk Assessment was an interim review by a condensed review team comprised of the Managers of Plant Operations, Plant Maintenance and Technical Services and Water Distribution & Wastewater Collection along with the ORO-Treatment and ORO-Distribution. The team also reviewed the outcomes from 2015 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 2016 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 2016 Risk Assessment:

- Capital Delivery - Water Projects (Updated August 2016)
- DWQMS Infrastructure Review Outcome Brief, Report Date July 2016
- 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 (audits and inspections)
- 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
- 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
- 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 2017, a full 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 (2016) 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 2016 to discuss vertical and horizontal infrastructure and a coordination meeting was held in June 2016.

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 • Substandard Water, Water Loss, Frozen Services, Corrosion Control Program
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 2016 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 2016 Infrastructure Review at the Top Management Review meeting on December 1, 2016.

The 2016 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. An Action Plan was created to confirm that current and projected spending allocations are adequate for drinking water. Rules and procedures will be developed to limit how allocated funds can be spent (i.e. funds allocated for water capital projects should not be spent on emergency maintenance or special projects).

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 May 2016, 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. A final closure report is forthcoming.

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.

2016 DWQMS Internal Audit

The Internal Audit Team conducted a full internal audit from September 14 to October 31, 2016. The 2016 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 14th, 2016
- Closing meeting – October 31st, 2016

The results of the annual DWQMS Internal Audit conducted in September/October 2016 demonstrate that the City of Hamilton's DWQMS is a maturing system and that opportunities to improve the DWQMS (i.e. training, document and records control) 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.

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, the audit process is adequate, and the implementation and maintenance effective.

2017 DWQMS Audit Plan

The Compliance Support Group of the Compliance & Regulations Section will be developing an Audit Plan for the 2017 DWQMS internal audits. A full internal audit is proposed to be undertaken in September/October 2017. 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 2016, the DWQMS Top Management Review was held on December 1st. 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	M. Bainbridge to set up a meeting with Hamilton Water and Hamilton Hydro to discuss the October 29, 2016 incident and electrical transients.	Q2 2017	M. Bainbridge
2	CSG to follow up with Corporate GIS regarding water outstation information provided on publicly available maps (i.e. map.hamilton.ca).	Q2 2017	W. Jackson
3	M. Bainbridge to send a reminder notice that there remains a development freeze in Carlisle.	Q1 2017	M. Bainbridge
4	At the 2017 Infrastructure Review meetings, E. Waite to present critical watermain age profile information at the following intervals: <50, 50 – 100, and >100.	May 2017	E. Waite
5	At the 2017 Infrastructure Review meetings, E. Waite to present critical watermain age profile information by Pressure District.	May 2017	E. Waite
6	E. Waite and N. Winters to meet to discuss water loss initiatives, projects and results.	Q2 2017	E. Waite/ N. Winters
7	Woodward DWS - Examine longer trend data over ten years for E. coli in raw water. Present findings at 2017 SMT.	Q1 2017	I. Routledge
8	Woodward DWS - Examine chloride and sodium in raw water to determine if there is a correlation. Present findings at 2017 SMT.	Q1 2017	I. Routledge
9	Carlisle DWS - Examine water tower levels. Look at the volume of water delivered in Carlisle year over year to determine if there is any effect of conservation over the last 10 years. Present findings at 2017 TMR.	Nov 2017	I. Routledge/ S. McCauley
10	U. Ehrenberg to provide a briefing note to M. Bainbridge regarding the provincial intensification target and its implications.	Q4 2017	U. Ehrenberg
11	Add the Capital Delivery link to the WD&WWC workspace.	Q1 2017	M. Gladysz

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. 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 2017 include the following:

Month of 2017	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 Infrastructure Review Meetings
May	<ul style="list-style-type: none"> DWQMS 3rd Party Surveillance off-site Documentation Audit
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
November	<ul style="list-style-type: none"> DWQMS Top Management Review

BCOS software tracks the revision history of document.