SUBJECT: Drinking Water Quality Management System Operational Plan (PW08121) - (City Wide)

RECOMMENDATION:

(a) That the Drinking Water Quality Management System (DWQMS) Operational Plan be approved for submission to the Ontario Ministry of the Environment by January 1, 2009;

(b) That the Mayor, City Clerk, General Manager of Public Works and Senior Director, Water and Waste Water Division, be authorized and directed to execute the Drinking Water Quality Management System (DWQMS) Operational Plan, in a form satisfactory to the City Solicitor.

EXECUTIVE SUMMARY:

The Water and Wastewater Division of Public Works has developed a Drinking Water Quality Management System (DWQMS) to meet Ontario's legislative requirements under the Safe Drinking Water Act, 2002 and Ontario Regulation (O.Reg.) 188/07 entitled “Licensing of Municipal Drinking Water Systems”. The Ministry of Environment’s (MOE) Drinking Water Quality Management Standard prescribes the requirements of the DWQMS. The legislation and DWQMS Standard have specific requirements for the “Owner” of a drinking water system which includes endorsement of the DWQMS Operational Plan. Following the DWQMS Guidance document, the “Owner” of a drinking water system is defined as the Mayor and Council. “Top Management” of the
Operating Authority is defined as the General Manager of the Public Works Department and the Senior Director of the Water and Wastewater Division.

The Operating Authority is required to submit an endorsed DWQMS Operational Plan to the MOE by January 1, 2009. The DWQMS Operational Plan Manual documents the Operating Authorities’ DWQMS including procedures, associated tables, descriptions of the drinking water systems and the outcomes of the DWQMS risk assessment. The DWQMS Operational Plan must be developed as one of the requirements for a DWS licence.

Staff hosted Drinking Water Due Diligence Training sessions for the Mayor and Council and the Senior Management Team. The purpose of the training was to formally inform the Owner (Council) of the new legislative framework for water and their responsibilities under the Safe Drinking Water Act and DWQMS System.

As required by the DWQMS Standard, Top Management for the DWQMS is seeking Council’s endorsement of the DWQMS Operational Plan Manual.

**BACKGROUND:**

The recommendation contained within this Report has City wide implications.

The Water and Wastewater (WWW) Division of Public Works has developed a DWQMS Operational Plan for the City’s drinking water systems. The DWQMS Operational Plan conforms to the Ministry of Environment's DWQMS Standard. It is a priority of the Public Works Department to provide effective, safe, sustainable drinking water, wastewater, and storm sewer services. Report PW08121 summarizes the legislative background, contents of the DWQMS Operational Plan, submission requirements and the upcoming audits by the Canadian General Standards Board (CGSB) that was appointed by the MOE as the Accreditation Body for the DWQMS.

**Safe Drinking Water Act and Regulations**

The purpose of the Safe Drinking Water Act, 2002 is to protect human health by controlling and regulating drinking water systems and drinking water testing in the province. Through its supporting regulations and standards, the Safe Drinking Water Act defines requirements for the treatment and distribution of drinking water and for the competency of operators and analysts in the industry. The accreditation and licensing of the City’s Environmental Laboratory for drinking water testing was one of the earlier requirements of the Safe Drinking Water Act. The City’s Environmental Laboratory has fulfilled this requirement since 1995. The Environmental Laboratory had an assessment in April 2008 which confirmed its maintenance to the ISO 17025 Standard.

Ontario Regulation 188/07 entitled Licensing of Municipal Drinking Water Systems requires Operating Authorities to be accredited. Ontario Regulation 188/07 also requires the City to submit an Owner (Mayor and Council) endorsed DWQMS Operational Plan to the MOE by January 1, 2009. Accreditation of the Operating Authority is achieved through the successful audits of the Division’s DWQMS by the Canadian General Standards Board, the MOE’s appointed Accreditation Body. As approved by Council on June 27, 2007 (PW07095), the WWW Division is submitting its DWQMS Operational Plan under the Limited Scope; Full DWQMS which requires
documentation (PLAN) of all 21 Elements of the DWQMS Standard by January 1, 2009 followed by full implementation (DO) of the DWQMS by January 1, 2010.

Drinking Water Systems Licences

The MOE has revised its process for licensing and regulating drinking water systems in the Province of Ontario. The revisions will replace the current “Certificate of Approval” process with a more comprehensive “Drinking Water Licence” process. In order to successfully achieve licensed status, a municipal drinking water system will be required to:

<table>
<thead>
<tr>
<th>DWS Licence Requirement</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Obtain a Permit To Take Water</td>
<td>In Place</td>
</tr>
<tr>
<td>• Develop DWQMS</td>
<td>Documentation in Place (PLAN), Full Implementation In 2009 (DO)</td>
</tr>
<tr>
<td>• Submit a DWQMS Operational Plan which has been endorsed by the Owner</td>
<td>Completed, Awaiting Owner (Council) Endorsement</td>
</tr>
<tr>
<td>• Develop and Submit a Financial Plan</td>
<td>In Progress, Due July 1, 2010</td>
</tr>
<tr>
<td>• Obtain a Drinking Water Works Permit</td>
<td>MOE Guideline Released in late September 2008</td>
</tr>
<tr>
<td>• Complete the Accreditation Process</td>
<td>Systems Audit (Early 2009), Verification Audit (Early 2010)</td>
</tr>
</tbody>
</table>

Ontario is in a transition phase between the existing Certificate of Approval (CofA) process and the new Municipal Drinking Water Licence process. During the transition phase, all new or amended water works will be processed under the current CofA process. The WWW Division will be preparing the applications for a Drinking Water Works Permits and Licences which will accompany the submission of the DWQMS Operational Plan in mid-December 2008. The City will receive provisional Municipal Drinking Water Licences (one per DWS) after the completion of the Accreditation Body System Audits in early 2009. The City will receive the full Municipal Drinking Water Licences after the successful completion of the Accreditation Body Verification Audits in early 2010. Once received, all amendments to water works or new water works would follow the “Guide on Applying for DWWP and Licence Amendments, Licence Renewals and New System Requirements” which is under development by the MOE.

The Drinking Water Quality Management Standard

The MOE’s DWQMS Standard identified the requirements for the WWW Division’s DWQMS. The DWQMS Standard has 21 elements and follows the “PLAN-DO-CHECK-IMPROVE” continual improvement cycle similar to ISO standards. The WWW Division’s DWQMS Operational Plan meets and in some cases exceeds the requirements of the MOE’s DWQMS Standard.

**ANALYSIS/RATIONALE:**

**DWQMS Operational Plan**

The DWQMS Operational Plan is an integrated document for all six Hamilton drinking water systems (DWS) including the larger Hamilton DWS; the Carlisle, Greensville, Freelton, and Lynden communal well DWS and the Fifty Road DWS (distribution only).
DWQMS Operational Plan Manual includes the following sections:

<table>
<thead>
<tr>
<th>Operational Plan Tabs</th>
<th>Summary of Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Tab 1: DWQMS Operational Plan Summary Report</td>
<td>Summarizes how Operating Authority will meet the 21 elements of the DWQMS</td>
</tr>
<tr>
<td>• Tab 2: DWS Descriptions</td>
<td>Individual descriptions of the City’s six drinking water systems including process charts and a map illustrating the geographic scope of the distribution systems</td>
</tr>
<tr>
<td>• Tab 3: DWQMS Level 3 Procedures (Divisional)</td>
<td>Documented procedures describing in detail how the Operating Authority meets the subject element of the DWQMS Standard.</td>
</tr>
<tr>
<td>• Tab 4: DWQMS Level 4 Procedures and Matrices</td>
<td>Associated documents relating to Level 3 procedures and where required, Section specific Level 4 procedures</td>
</tr>
<tr>
<td>• Tab 5: DWQMS Risk Assessment Outcomes</td>
<td>Matrices documenting the outcomes or products of the DWQMS risk assessment including critical control points, critical control limits and control measures</td>
</tr>
<tr>
<td>• Tab 6: Associated Documentation</td>
<td>Other documentation relevant to the DWQMS Operational Plan, as required.</td>
</tr>
</tbody>
</table>

Copies of the full DWQMS Operational Plan Manual are available through the General Manager of Public Works’ office or at 700 Woodward Avenue, Administration Building, Compliance and Regulation Section (WWW Division), for full review and comments.

A full copy of the DWQMS Operational Plan Summary Report (Tab 1) is attached as Appendix A of this Report. The DWQMS Operational Plan Summary Report provides a concise summary of the entire DWQMS and refers to the more detailed Level 3 system procedures.

The Operational Plan must be endorsed by the System Owner and Top Management of the Drinking Water System(s). As such Section 3.0 of the DWQMS Operational Plan Summary Report includes Section 3.0 entitled Commitment and Endorsement. Space has been allotted for the signatures of the Mayor and City Clerk as signing authority for the Owner and the General Manager of Public Work Department and Senior Director of the WWW Division as Top Management of the Operating Authority. Signatures will be added after Council endorses the DWQMS Operational Plan as evidence of Owner and Operating Authority’s commitment and endorsement.

**DWQMS Implementation Schedule**

The DWQMS “Plan” has been completed with the submission of the DWQMS Operational Plan. The “DO” components of the DWQMS will be implemented over 2009. WWW Division staff is taking a proactive approach and have already initiated the implementation of some DWQMS elements. The DWQMS Operational Plan will be the subject of an off-site Systems Audit or document review in early 2009. If required, revisions will be made to DWQMS documentation to address any nonconformances found by the Accreditation Body (Canadian General Standards Board). The
Accreditation Body will be on-site in early 2010 to conduct the full Verification Audit to verify that the DWQMS has been implemented as documented.

City of Hamilton’s Divisional Approach

Public Works is undertaking a unique approach to complying with the MOE’s DWQMS Standard. It is a priority of Public Works to provide effective, safe, sustainable drinking water, wastewater, and storm sewer services. Staff is applying Division-wide strategic planning and program-based solutions to legislative changes and operational issues. As a result, the WWW Division’s approach to the DWQMS Standard is a DWQMS supported by a Division-wide “Beyond Compliance Operating System” or BCOS System.

The Beyond Compliance Operating System integrates the DWQMS, Biosolids Quality Management System, Environmental Laboratory Quality Management System and conforms to environmental (ISO 14001:2004) and health and safety (CSA Z1000) standards.

The legislative aspect of the DWQMS places a higher priority on its development. Staff has been concurrently developing select Beyond Compliance Operating System and DWQMS procedures or “Plan” requirements. However, it is anticipated that the implementation (or “Do”) stage of the Beyond Compliance Operating System will take longer to implement due to its expanded Divisional and environmental, health and safety scope.

ALTERNATIVES FOR CONSIDERATION:

The submission of an Owner (Council) endorsed DWQMS Operational Plan by January 1, 2009 is a legal requirement under the Safe Drinking Water Act and the related O.Reg 188/07 entitled Licensing of Drinking Water Systems. Council has the option of not submitting the DWQMS Operational Plan, but in doing so risks non-compliance with the SDWA and potential charges from the MOE.

FINANCIAL/STAFFING/LEGAL IMPLICATIONS:

Annual costs for Systems Audits (off-site document reviews) or Verification Audits (on-site audits every 3 years) to be undertaken by the Canadian General Standards Board (MOE appointed Accreditation Body). These annual costs will be incorporated into the WWW Division’s annual operating budget. The 2009 cost for the Systems Audit will be approximately $5,500.

The WWW Division has identified a team of 18 internal auditors which include representatives from each of the WWW Division Sections including select Section managers. The Internal Audit Team received DWQMS Audit Training in September 2008 and will be conducting a scoped DWQMS audit in November 2008. At a minimum, the Internal Audit Team will conduct a full DWQMS audit on an annual basis as a continual improvement tool for the DWQMS. Results of internal audits are reported to Top Management of the Operating Authority.

In 2010, the WWW Division will develop a Financial Plan as a requirement under O.Reg 453/07 under the Safe Drinking Water Act. The purpose of the Financial Plan is to ensure long-term financial sustainability of the City’s drinking water systems.
The DWQMS Operational Plan meets the intent of the approved DWQMS Policy approved by Council on June 27, 2007 (PW07095).

The DWQMS Operational Plan is consistent with the Public Works’ Innovate Now Strategic Plan specifically with the Communities, People, Processes and Finances vision drivers. In regards to Communities, the DWQMS will assist in the promotion of a healthy environment and secure services. The DWQMS supports the WWW Division’s ability to continue to deliver clean, safe drinking water to City of Hamilton customers and therefore enhances the Hamilton community and its citizens’ quality of life. The DWQMS has enhanced the planning and communication related to water operations and therefore enhanced the security and readiness of the Operating Authority to address nonconforming water incidents, if they occur. Of environmental interest, the DWQMS is a sub-system of the Division-wide Beyond Compliance Operating System (BCOS). BCOS is an environmental, health and safety management system. The BCOS System will be developed over the next two years and where possible include integrated procedures with the DWQMS.

The DWQMS includes elements related to competency and training. Through the DWQMS, core and developmental training requirements have been developed for water staff that could potentially impact the quality of water in the DWQMS Competency Matrix. The Operating Authority will track conformance to the Competency Matrix as one aspect of the implementation of the DWQMS. Concurrently, the WWW Division is developing a division-wide training program including job specific training plans to improve competency of staff and promote staff’s overall professional development.

In regard to processes, the development of the DWQMS has resulted in the formal documentation of several processes associated with the treatment and delivery of clean, safe drinking water. Many processes occurred but were enhanced to meet the requirements of MOE’s DWQMS Standard. An example of DWQMS processes includes improved documentation, communication and management review processes and the new internal audit program for the DWQMS. Overall, the DWQMS includes 21 elements in which the WWW Division met with enhanced or new processes as documented in the DWQMS Operational Plan.

An element of the DWQMS includes the requirement for the annual review of the adequacy of infrastructure to deliver safe drinking water. This element relates directly to the Financial vision driver of the Strategic Plan, specifically efficient and effective management of infrastructure. This infrastructure review will utilize data from the linear (pipes) and vertical (treatment) asset management databases, as they evolve. The purpose of the review is to ensure funding is concentrated on higher risk or aging infrastructure and existing infrastructure is maintained to maximize its lifespan. The WWW Division and Top Management of the DWSs will coordinate the vertical and horizontal infrastructure reviews. The outcomes of the infrastructure reviews will be reported to the Owner (Council) through the budget process. In the summer of 2010, the DWQMS Financial Plan will also be developed to support the long-term financial sustainability of the City’s drinking water systems. The DWQMS Financial Plan will be posted on the City’s website to ensure it is accessible to the public.
RELEVANT CONSULTATION:

Staff hosted Drinking Water Due Diligence Training sessions for the Mayor and Council and the Senior Management Team of the WWW Division. Attendees also included the City Manager, General Manager of Public Works and the Director of the Capital Planning and Infrastructure Division. The purpose of the training was to formally inform the Owner (Council) of the new legislative framework for water and its responsibilities under the Safe Drinking Water Act and DWQMS System.

After endorsement of the DWQMS Operational Plan, copies of the DWQMS Operational Plan will be made available to the public at strategic locations throughout the City. In addition, the Canadian General Standard Board (MOE Accreditation Body) will be undertaking a Systems Audit (off-site document review) of the DWQMS Operational Plan in early 2009. This step allows the Accreditation Body to verify that the “Plan” component of the DWQMS Standard has been met. In early 2010, the Accreditation Body will conduct an on-site Verification Audit to ensure procedures are implemented as documented in the DWQMS Operational Plan. Once accreditation is achieved, the auditor will conduct annual Systems Audits with a full Verification Audit to be completed every third year.

CITY STRATEGIC COMMITMENT:

By evaluating the “Triple Bottom Line”, (community, environment, economic implications) we can make choices that create value across all three bottom lines, moving us closer to our vision for a sustainable community, and Provincial interests.

Community Well-Being is enhanced. ☑ Yes ☐ No
The DWQMS is a quality management system to support the operations of the Water and Wastewater Division in the continued delivery of clean, safe drinking water to City customers.

Environmental Well-Being is enhanced. ☑ Yes ☐ No
The DWQMS is a sub-system of the Division-wide Beyond Compliance Operating System (BCOS) which is an environmental, health and safety management system. The BCOS System will be developed over the next two years and where possible include integrated procedures with the DWQMS.

Economic Well-Being is enhanced. ☑ Yes ☐ No
The DWQMS includes the requirement for the review of the adequacy of infrastructure to deliver safe drinking water. This infrastructure review will utilize data from the linear (pipes) and vertical (treatment) asset management databases. In the future, the DWQMS Financial Plan will be developed to support the long-term financial sustainability of the City’s drinking water systems.

Does the option you are recommending create value across all three bottom lines? ☑ Yes ☐ No

Do the options you are recommending make Hamilton a City of choice for high performance public servants? ☑ Yes ☐ No
The DWQMS includes new documented procedures and processes which will enhance communication and integration between Sections within the WWW Division and related Divisions/Departments. The DWQMS will also increase the effectiveness of Divisional staff and maximize the use of existing resources.
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Preface

A key priority of the City of Hamilton’s Water Wastewater (WWW) Division is to ensure the protection of worker health, public health, property and the environment through its Beyond Compliance Operating System (BCOS). The BCOS Program is a key initiator of an improved environment, health and safety (EHS) compliance culture throughout the City’s WWW Division. The BCOS Program integrates the MOE’s DWQMS Standard, Biosolids QMS, Environmental Laboratory QMS and conforms to environmental (ISO 14001:2004) and health and safety (CSA Z1000) standards. Select DWQMS element procedures have been integrated with the BCOS System procedures. Integrated procedures are identified through the “BCOS + DWQMS” text in the procedure title. Procedures pertaining to DWQMS alone are identified by the “DWQMS” in the procedure title. The figure below identifies the BCOS System as an “umbrella” program that supports other scoped management systems of the WWW Division.

BCOS Framework & DWQMS Sub-System
1 QUALITY MANAGEMENT SYSTEM

1.1 Purpose

The purpose of this DWQMS Operational Plan is to document the City of Hamilton’s Drinking Water Quality Management System as part of the City’s efforts to ensure that clean, safe and reliable drinking water is supplied to all of its customers. The DWQMS Operational Plan meets and sometimes exceeds the requirements of the Ministry of the Environment’s (MOE’s) Drinking Water Quality Management Standard.

1.2 Scope

This Operational Plan applies to all Sections within the City of Hamilton’s Water and Wastewater (WWW) Division. The contents of the Drinking Water Quality Management System Operational Plan Manual include the following tabs:

<table>
<thead>
<tr>
<th>Tab</th>
<th>Tab Title</th>
<th>Integrated vs System Specific Documents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DWQMS Operational Summary Report</td>
<td>Integrated Document</td>
</tr>
<tr>
<td>2</td>
<td>Drinking Water System Descriptions</td>
<td>System Specific Documents</td>
</tr>
<tr>
<td>3</td>
<td>DWQMS Level 3 Procedures</td>
<td>Integrated Documents</td>
</tr>
<tr>
<td>4</td>
<td>Matrices &amp; Level 4 Procedures</td>
<td>Integrated Documents</td>
</tr>
<tr>
<td>5</td>
<td>DWQMS Risk Assessment Outcomes</td>
<td>Integrated Documents / Process Specific</td>
</tr>
<tr>
<td>6</td>
<td>Associated Documents</td>
<td>Integrated Documents</td>
</tr>
</tbody>
</table>

The WWW Division has developed an integrated DWQMS Operational Plan Manual. The majority of the documents in the DWQMS Operational Plan pertain to all six of the City’s drinking water systems (DWSs). The use of integrated procedures ensures the DWQMS is efficient and effectively communicates common requirements for the DWSs to WWW Division staff. The DWS descriptions (Tab 2) are system specific descriptions of the City’s DWSs. This section of the DWQMS Operational Plan also includes a map entitled “Drinking Water Systems – DWS” which illustrates the geographic scope of the City’s water distribution systems.
1.3 Definitions

AWQI  Adverse Water Quality Incident. Any situation where the drinking water in the system (treatment / distribution) does not meet the requirements listed in O.Reg 170 Schedule 16.

BCOS System Beyond Compliance Operating System – Environmental, health and safety management system within the WWW Division. BCOS encompasses the requirements of the ISO 14001;2004 and CSA Z1000-06 management standards and is an umbrella system to the scoped Environmental Laboratory QMS, Biosolids QMS and DWQMS.

Biosolids QMS Biosolids Quality Management System – designed to manage and continually improve EQH&S performance of biosolids activities, products and services, from wastewater collection to land application processes.

BLT  BCOS Lead Team. Includes SMR, Compliance Support Group, staff representatives (QA Supervisors or equivalent) from each Section in the WWW Division.

Controlled Document Document pertaining to the work in the Division deemed to be important to the functioning of the Division, as approved by the indicated staff, authorized for release and distribution. Controlled documents have a unique BCOS issuance number.

Corrective Action Action to eliminate the cause of a detected non-conformance.

COH City of Hamilton

C&R Section Compliance and Regulations Section

CS &CO Customer Service and Community Outreach Section

DWQMS Drinking Water Quality Management System, as defined in O. Reg. 188/07

DWS Drinking-Water System

EQH&S Environmental, quality, health and safety

I & SWP Infrastructure & Source Water Protection
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab QMS</td>
<td>Lab Quality Management System - The City of Hamilton’s WWW Division Lab operates under ISO/IEC 17025:2005 which demonstrates that they operate a quality system, are technically competent and are able to generate technically valid results.</td>
</tr>
<tr>
<td>Level 3</td>
<td>A procedure that relates to more than one Section within the WWW Division.</td>
</tr>
<tr>
<td>Level 4</td>
<td>Sectional Procedure</td>
</tr>
<tr>
<td>Level 5 and Higher Procedure</td>
<td>Procedure within Sections of the Water and Wastewater Division, broken down / organized based on criteria and requirements set by each Section.</td>
</tr>
<tr>
<td>OIC</td>
<td>Operator in Charge</td>
</tr>
<tr>
<td>ORO</td>
<td>Overall Responsible Operator</td>
</tr>
<tr>
<td>Operating Authority</td>
<td>Staff within the WWW Division responsible for the operation, maintenance and providing support services to the COH DWS (including water treatment and distribution)</td>
</tr>
<tr>
<td>Owner (AWQI)</td>
<td>Manager Compliance &amp; Regulations (Owner for the purpose of adverse water notifications). Superintendent Environmental Laboratory or Designate (Owner backup).</td>
</tr>
<tr>
<td>Owner (DWS)</td>
<td>Every person who is a legal or beneficial owner of the City’s Drinking Water system. Since the City’s Public Works Department is a publicly-owned organization, the Mayor and Council (as representatives of the public) act as Owners. The City Manager has also been identified as the Owner Representative.</td>
</tr>
<tr>
<td>Preventive Action</td>
<td>Action to eliminate the cause of a potential non-conformance.</td>
</tr>
<tr>
<td>QA</td>
<td>Quality Assurance which is the planned and systematic pattern of actions necessary to ensure that management and technical controls are being followed.</td>
</tr>
<tr>
<td>Regulators</td>
<td>Ontario Ministry of the Environment and City of Hamilton’s Health Department</td>
</tr>
<tr>
<td>SMR</td>
<td>Systems Management Representative (for both DWQMS and BCOS).</td>
</tr>
</tbody>
</table>
SMT  Strategic Management Team, including the Senior Director of the WWW Division, Director of Water and Wastewater Treatment and all Section Managers.

Top Management (DWQMS)  A person, persons or group of people at the highest management level within an operating authority that makes decisions about the QMS and makes recommendations to the owner about the subject system or subject systems. The General Manager of Public Works and Senior Director of the WWW Division have been identified as Top Management of the DWS.

WD & WWC Section  Water Distribution & Wastewater Collection Section

WWW Division  Water and Wastewater Division of the Public Works Department

WWW Engineering Section  Water Wastewater Engineering Section
2 QUALITY MANAGEMENT SYSTEM POLICY

The DWQMS Policy has been approved and endorsed by the Owner and Top Management of the City’s DWSs. The DWQMS Policy was endorsed by the Owner (Mayor and Council) on June 27, 2007 and was re-formatted into the below poster. The Policy is posted internally at several City of Hamilton WWW Division facilities. The DWQMS Policy will also be communicated to the public through posting on the City’s website.
3 COMMITMENT AND ENDORSEMENT

The Owner (Mayor and Council) and Top Management of the Operating Authority support the development, implementation, maintenance and continual improvement of the DWQMS which supports the City’s six DWSs. The Owner acknowledges their role through the receipt and review of DWQMS reports related to adequacy of infrastructure, audits and management reviews and by provision of resources to support the DWQMS. Top Management of the Operating Authority includes the General Manager of the Public Works Department and the Senior Director of the WWW Division. Top Management supports the DWQMS through provision of resources, ensuring staff is aware of relevant legal requirements, and supporting DWQMS communications.

The signatures below further serve as endorsement of the DWQMS Operational Plan Manual.

___________________________________________  __________________________________________
Fred Eisenberger  Scott Stewart
Mayor  General Manager, Public Works
DWS Owner Representative  Department

___________________________________________  __________________________________________
Kevin C. Christenson  Jim Harnum
City Clerk  Senior Director, WWW Division
(Signing Authority on behalf of Council)  DWS Top Management Representative
4 QUALITY MANAGEMENT SYSTEM REPRESENTATIVE

Ms. Rosa Gonzalez, Manager of Compliance & Regulations Section, has been appointed as the Systems Management Representative (SMR) for the WWW Division’s DWQMS and BCOS Systems. The SMR is responsible for:

- Ensuring that the DWQMS is established, implemented and maintained;
- Reporting to Top Management and SMT regarding DWQMS performance;
- Promoting awareness of the DWQMS and of WWW Division staff roles and responsibilities;
- Managing the DWQMS Internal Audit Program.

5 DOCUMENT AND RECORDS CONTROL

5.1 Control of Documents

A procedure has been developed that outlines document control processes for the Operating Authority. The procedure entitled “BCOS + DWQMS Control of Documents” (PW-WW-P-010-001 – see Tab 3) is an integrated procedure (BCOS + DWQMS) that applies to all Sections of the Water/Wastewater Division. The purpose of this procedure is to control the issue, change and approval of documents, ensuring that only up to date approved documentation is used by WWW Division’s staff. The Control of Documents procedure also ensures that staff can locate and access documents relevant to their work, in the format most suitable to their work, whether they are created internally or externally to the WWW Division.

The WWW Division’s BCOS and DWQMS documentation is identified using a unique numbering system specified in the Control of Documents Procedure (PW-WW-P-010-001). The BCOS Database stores and protects DWQMS procedures and also has the ability to track all revisions, reviews and approvals to DWQMS procedures. Several Sections also use specialized dashboards to ensure efficient access to Level 4 (Section specific) DWQMS procedures. WWW Division staff access secure Word versions of DWQMS procedures through the BCOS Database or specialized dashboards.

Level III Divisional Documents are developed by the Compliance Support Group (CSG) and reviewed by BLT Members and SMT. Final approval of Level III documents is completed by the Senior Director of the WWW Division. As stated, the BCOS Database tracks all document approvals. The need for Level IV and V Sectional Documents is determined by each Section Manager and/or other Senior Section staff. A Sectional staff member is assigned responsibility for development of
the draft procedure. The corresponding Section Manager approves Level 4 procedures.

Electronic master copies of documents are considered to be Controlled Documents. Hard copies of these documents are considered to be uncontrolled copies unless categorized as controlled with an electronic stamp stating “This is a Controlled Document Do Not Photocopy” printed in the footer. Hardcopy-Controlled documents are stored in designated locations and are updated by the Section Document Coordinator or designate.

All Level 3 DWQMS procedures must be reviewed, at minimum, once every year. All Level 4 procedures shall be reviewed at minimum every three years or more frequently as required.

Obsolete documents are retained within the BCOS Database. When a document becomes obsolete, the setting for the document changes from Active to Obsolete. Only limited staff have access to obsolete documentation.

5.2 Control of Records

A procedure has been developed that outlines record control processes for the Operating Authority. “Control of Records (PW-WW-P-016-001 – see Tab 3)” is an integrated procedure (BCOS + DWQMS) that applies to all Sections of the WWW Division. The purpose of this procedure is to ensure that both COH and Non-COH records identified as critical to the BCOS and DWQMS Systems properly collected, identified, accessed, filed, stored, maintained, reviewed and disposed of after their designated retention times.

Record profiles are developed in the BCOS Database which identify record type, record name, record identification method, storage location, retention time, person responsible and review frequency. In some cases records are uploaded or attached to the record profiles. Record retention periods are defined in individual BCOS Database record profiles. All retention times stated are minimum times and do not supersede legal, governmental or other requirements.

After the indicated storage period, unless otherwise specified, all records are destroyed by deletion, shredding, disposal in trash or recycling as determined by the controlling Supervisor, Senior Director of the WWW Division, or the Manager of the C&R Section, as relevant. Electronic copies are removed from the active BCOS Database, labeled “obsolete” and archived in a separate directory.
6 DRINKING WATER SYSTEM PROCESS DESCRIPTION

The City of Hamilton owns and operates the Hamilton DWS (treatment and distribution) as well as, the communal well DWSs (Carlisle, Freelton, Greensville and Lynden) and the Fifty Road water distribution system. Detailed Process Descriptions including process flow charts/maps are found in the following procedures (see Tab 2):

- DWQMS Description of Hamilton Drinking Water System (PW-WW-P-030-001)
- DWQMS Description of Carlisle Drinking Water System (PW-WW-P-030-02)
- DWQMS Description of Freelton Drinking Water System (PW-WW-P-030-003)
- DWQMS Description of Greensville Drinking Water System (PW-WW-P-030-004)
- DWQMS Description of Lynden Drinking Water System (PW-WW-P-030-005)
- DWQMS Description of Fifty Road Drinking Water System (PW-WW-P-030-006)
- Map entitled “Drinking Water Systems – DWS” (PW-WW-VA-030-001) illustrates the geographic scope of the City of Hamilton’s water distribution systems.

7 RISK ASSESSMENT

A procedure has been developed that documents the process followed by the City of Hamilton’s WWW Division in planning, completing, documenting, reviewing and maintaining its DWQMS Risk Assessment. The procedure entitled “DWQMS Risk Assessment” (PW-WW-P-032-01 – See Tab 3) applies to all Sections of the WWW Division. The DWQMS Risk Assessment examined all aspects of the water uptake, treatment and distribution processes controlled by the WWW Division.

Members of the DWQMS Risk Assessment Team are outlined in the DWQMS Risk Assessment procedure (PW-WW-P-032-001). The DWQMS Risk Assessment Team examines each of the City of Hamilton’s drinking water systems to identify potential hazards and hazardous events that could compromise the performance of any or all of the systems and subsequently impact the City’s ability to deliver clean, safe drinking water to its customers.

The Risk Assessment Team evaluates each identified hazard against criteria as outlined in the DWQMS Risk Assessment procedure (PW-WW-P-032-001), taking into account the redundancy and reliability of equipment. A Risk Factor is established for each hazard. Hazards with High (>10) Risk Factors or Medium (>6<10) that require special attention are considered to be Critical Control Risks. Critical Control Risks are evaluated to determine if they are Critical Control
Points (CCP). Regardless of the Risk Factor score, any hazards that relate to drinking-water disinfection are considered to be CCPs.

The DWQMS Risk Assessment Team identifies CCPs and establishes Critical Control Limits (CCLs) for each CCP. CCLs are established based on regulatory and operational conditions in place.

The Risk Assessment Team ensures that hazards are mitigated and controlled through the use of monitoring, maintenance, inspections/checks, standard operating procedures, emergency response procedures or infrastructure improvements as documented in the Risk Assessment matrices.

The DWQMS Risk Assessment is reviewed annually to verify the currency of the DWS information and any assumptions made in completing the Assessment. A new DWQMS Risk Assessment is conducted every three years.

8 RISK ASSESSMENT OUTCOMES

The City of Hamilton’s DWQMS Risk Assessment is extracted from a more broadly-scoped “Asset Management Risk Assessment Matrix” which is not part of the scope of the DWQMS. The DWQMS Risk Assessment was completed in the summer of 2008. Risk Assessment outcomes relating to DWQMS requirements have been documented in the following DWQMS Risk Assessment charts (see Tab 5):

- Table 1: DWQMS Risk Assessment – Critical Control Point Summary Chart (PW-WW-L-032-001)
- Table 2: DWQMS Risk Assessment – Water Treatment Plant (PW-WW-L-032-002)
- Table 3: DWQMS Risk Assessment – Well Systems (PW-WW-L-032-003)
- Table 4: DWQMS Risk Assessment – Water Distribution Systems (PW-WW-L-032-004)

A summary of relevant Critical Control Points identified during the Risk Assessment exercise is documented in the DWQMS Risk Assessment Critical Control Point Summary Chart (PW-WW-L-032-001). All records pertaining to the City of Hamilton’s completed DWQMS Risk Assessment are included in Tab 5 of this Operational Plan Manual.
9 ORGANIZATIONAL STRUCTURE, ROLES, RESPONSIBILITIES AND AUTHORITIES

The Roles, Responsibilities and Authorities Procedure (PW-WW-P-006-01 – see Tab 3) is an integrated procedure (BCOS + DWQMS) for the BCOS System and DWQMS Sub-system that describes how roles, responsibilities and authorities are defined, communicated and maintained to ensure accountability in the implementation of the BCOS and the DWQMS Systems.

The BCOS and DWQMS Roles, Responsibilities and Authorities Procedure applies to all Sections within the WWW Division. Roles, responsibilities and authorities relating to other sub-systems under the BCOS umbrella are defined in Level IV procedures and do not fall within the scope of the DWQMS.

The WWW Division and Section Organization Charts (PW-WW-R-006-001) identify key roles within the WWW Division. The WWW Division Roles and Responsibilities Matrix (PW-WW-R-006-002) defines WWW Division Roles, Responsibilities and Authorities relating to the BCOS and DWQMS Systems. Both of these documents are reviewed on an annual basis or sooner if significant organizational changes occur within the WWW Division.

CSG and BLT are responsible for ensuring that WWW Division staff are kept aware of their respective roles, responsibilities and authorities as they relate to the DWQMS. All WWW Division Staff are expected to be aware of their roles, responsibilities and authorities. Below is an Organizational Chart defining the Owner, Top Management, Strategic Management Team and BCOS Lead Team.

Organizational Structure
10 COMPETENCIES

The BCOS + DWQMS Competency and Training Procedure (PW-WW-P-033-001 – see Part C) is an integrated procedure (BCOS and DWQMS) that applies to all Sections of the WWW Division and to all types of training including but not limited to water quality, environmental, and health and safety training. The procedure defines the framework for identification, delivery and tracking of training requirements related to WWW Division operations and documents how the WWW Division ensures competencies of staff that could have a direct input on water quality.

The DWQMS Competency Matrix (PW-WW-L-033-001) lists required core and developmental competencies for job positions that could potentially impact the quality of water. Training requirements listed in the Matrix are established and approved by the respective Section Managers and include Core and Developmental Training requirements. Positions potentially impacting the quality of water have been identified as follows:

- Positions that require a Drinking-Water Operator’s Licence (Treatment Operator, Distribution Operator, or Water Quality Analyst);
- Positions that supervise licensed Operators or Water Quality Analysts; and
- Other positions as recommended by the respective Section Manager.

The WWW Division has established a Training Committee that leads the development of the Division’s Training Program, develops the framework for Training Plans, and provides recommendations for linking training activities to current staff position and career goals. Training can include a mix of training methods including classroom, hands-on, web-based, self paced, on-the-job, equipment/site specific training, conferences, seminars, off-site training, operational meetings, one-to-one training, job shadowing and video presentations. Inputs to Training Plans are identified in the BCOS + DWQMS Competency and Training Procedure (PW-WW-P-033-001).

DWQMS Awareness Training is considered to be a Core Training requirement for all WWW Division staff and is thus included in all job-specific Training Plans. This training may also be provided to other City staff outside of the WWW Division as required, as well as to Vendors providing essential supplies and services (refer to Section 13.0 of this Operational Plan).

Training data is managed through the Division’s Learning Management System (LMS – currently under development). Each Section within the Division has an appointed member of staff who is responsible for managing the Section’s training records within the LMS; these responsibilities are outlined in the BCOS + DWQMS Competency and Training Procedure (PW-WW-P-033-001).
Training records may include Certificates/Licenses, training matrices, sign-in sheets, registration forms, attendance lists, tests/quizzes, comment sheets, etc. These records are managed according to the Control of Records procedure (PW-WW-P-016-001). Questionnaires may be used to gather feedback regarding effectiveness of training. Feedback is used to identify continual improvement opportunities for the WWW Division Training Program and Training Plans.

11 PERSONAL COVERAGE

The DWQMS Personnel Coverage Procedure (PW-WW-P-006-003 – see Tab 3) is a DWQMS-specific procedure that describes how adequate staffing and personnel coverage are ensured and maintained within the Operating Authority. The procedure details personnel coverage measures followed during regular business hours as well as during evenings, weekends and holidays, and applies to both water and wastewater operations as relevant within the WWW Division at the City of Hamilton.

The City’s WWW Division is comprised of several Sections. Level 4 (Sectional) Personnel Coverage procedures should be referenced for Section-specific processes, where applicable.

12 COMMUNICATIONS

12.1 Internal Communications

The BCOS + DWQMS Internal Communications procedure (PW-WW-P-008-001 – Tab 3) has been developed to describe the WWW Division’s communication processes with internal stakeholders. This is an integrated procedure (BCOS + DWQMS) that applies to all Sections within the WWW Division. The DWQMS Communications Plan (PW-WW-R-008-002) has been created to support the communication needs of the Drinking Water Quality Management System (DWQMS) and ensures the Owner (Mayor and Council), WWW Division staff, suppliers, contractors and customers understand the efforts and measures being put in place to protect the City’s drinking water systems.

Section 5.3 of the Internal Communications Procedure (PW-WW-P-008-001) specifically deals with DWQMS-related Internal Communication. Top Management ensures that Council is aware of the DWQMS and communicates with Council to seek decisions/approval and input through Council meetings, informal DWQMS meetings and Council Update Documents. CSG Group facilitated BCOS / DWQMS Awareness Training for the WWW Division staff was undertaken in the summer of 2008. The Awareness Training included a verbal introduction of BCOS and DWQMS sub-system followed by a presentation of the BCOS Awareness Video.
question and answer session was held prior to the closing of the BCOS / DWQMS Awareness Training Sessions. Starting 2009, a formal presentation of the Operational Plan is provided each year to all staff, and new employees are provided with an overview of the Operational Plan during orientation. Staff meetings may also be used as a forum for informing staff of DWQMS news, changes and updates.

CSG publishes the BCOS Channel newsletter which is used as an internal communications tool for WWW Division staff. Two issues of the BCOS Channel newsletter have been issued as of December 2007.

12.2 External Regulatory and Other Communications

The BCOS + DWQMS External Regulatory and Other Communications procedure (PW-WW-P-008-002 – see Tab 3) is an integrated procedure for the BCOS and DWQMS Systems. The purpose of this procedure is to describe the WWW Division’s communication processes with regulatory and other external environmental stakeholders. This procedure applies to all Sections within the WWW Division.

Section 5.2 of the External Regulatory and Other Communications procedure (PW-WW-P-008-02) discusses DWQMS external communications. Provisions for communication with the public are established in the DWQMS Communication Plan (PW-WW-R-008-002) for each calendar year. The C&R and CS&CO Sections work together to provide the public with updated information regarding the DWQMS Operational Plan, the DWQMS Financial Plan, and Water Quality Reports. These documents are made available for review in hard copy at specific City locations or electronically (City website). The Control of Records procedure (PW-WW-P-016-001 – Tab 3) describes the control and locations of these documents. Communication with suppliers is completed according to the DWQMS Essential Supplies & Services Procedure (PW-WW-P-023-001) and the annual DWQMS Communication Plan (PW-WW-R-008-002).

The External Regulatory and Other Communications procedure (PW-WW-P-008-002) also discusses processes for communication with the Canadian General Standards Board (Accreditation Body), the Ministry of the Environment, and various other related environmental regulatory communications.

13 ESSENTIAL SUPPLIES AND SERVICES

The DWQMS Essential Supplies and Services Procedure (PW-WW-P-023-001 – see Part C) is a DWQMS-specific procedure that describes the processes by which the WWW Division identifies the supplies and services that it deems essential to its Water-related operations. The procedure also documents the process followed by the Operating Authority in completing quality assurance reviews for the essential
supplies and services. This procedure pertains to the essential supplies and services related to the DWQMS only, and applies to all Sections within the WWW Division in which essential supplies and services have been identified.

The BCOS Database module entitled “Supplier Management” lists the WWW Division’s water essential supplies and services which include the following as of October 7th, 2008:

<table>
<thead>
<tr>
<th>Responsible Section</th>
<th>Essential Supply or Service</th>
<th>E =Essential, NE = Not Essential</th>
<th>Name of Vendor</th>
<th>Responsible Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant Operations</td>
<td>CAL GAS</td>
<td>E</td>
<td>LINDE CANADA</td>
<td>QA Supervisor</td>
</tr>
<tr>
<td>Plant Operations</td>
<td>CAL GAS &amp; MSA SENSORS</td>
<td>E</td>
<td>MSA CANADA</td>
<td>QA Supervisor</td>
</tr>
<tr>
<td>Plant Operations</td>
<td>Carbon Filters</td>
<td>E</td>
<td>America Carbon - Primary Calgon - Secondary</td>
<td>QA Supervisor</td>
</tr>
<tr>
<td>Plant Operations</td>
<td>CERT. ALL EQUIPMENT</td>
<td>E</td>
<td>TRANSCAT</td>
<td>QA Supervisor</td>
</tr>
<tr>
<td>Plant Operations</td>
<td>Chlorine</td>
<td>E</td>
<td>Pioneer</td>
<td>QA Supervisor</td>
</tr>
<tr>
<td>Plant Operations</td>
<td>CHLORINE DPD’S</td>
<td>E</td>
<td>ABB</td>
<td>QA Supervisor</td>
</tr>
<tr>
<td>WD&amp;WC</td>
<td>DPD chlorine residual testing powder/pillow (free &amp; total)</td>
<td>E</td>
<td>Supplier: Clear Tech:</td>
<td>QA Supervisor</td>
</tr>
<tr>
<td>Plant Operations</td>
<td>F&amp;P SIMULATOR</td>
<td>E</td>
<td>ABB</td>
<td>QA Supervisor</td>
</tr>
<tr>
<td>Plant Operations</td>
<td>Filters for wells</td>
<td>E</td>
<td>Siemens</td>
<td>QA Supervisor</td>
</tr>
<tr>
<td>Plant Operations</td>
<td>FLUKE MULTIMETERS</td>
<td>E</td>
<td>WESCO</td>
<td>QA Supervisor</td>
</tr>
<tr>
<td>Plant Operations</td>
<td>Fluosilic Acid</td>
<td>E</td>
<td>Mincam</td>
<td>QA Supervisor</td>
</tr>
<tr>
<td>Plant Operations</td>
<td>Generator Supply and Service</td>
<td>E</td>
<td>TBD</td>
<td>QA Supervisor</td>
</tr>
<tr>
<td>Responsible Section</td>
<td>Essential Supply or Service</td>
<td>E=Essential, NE = Not Essential</td>
<td>Name of Vendor</td>
<td>Responsible Person</td>
</tr>
<tr>
<td>---------------------</td>
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</tr>
<tr>
<td>Plant Operations</td>
<td>HACH 2000 FNU FORMAZIN</td>
<td>E</td>
<td>ABB</td>
<td>QA Supervisor</td>
</tr>
<tr>
<td>Plant Operations</td>
<td>HACH PORTABLE COLORIMETER</td>
<td>E</td>
<td>ABB</td>
<td>QA Supervisor</td>
</tr>
<tr>
<td>Plant Operations</td>
<td>KROHNE MAG METER SIMULATOR</td>
<td>E</td>
<td>ACI</td>
<td>QA Supervisor</td>
</tr>
<tr>
<td>Plant Operations</td>
<td>Polyaluminum Chloride</td>
<td>E</td>
<td>Kemira/Eaglesbrook Inc</td>
<td>QA Supervisor</td>
</tr>
<tr>
<td>CSG Group</td>
<td>Power Supply</td>
<td>E</td>
<td>Horizon Utilities Corporation</td>
<td>QA Technologist</td>
</tr>
<tr>
<td>Plant Operations</td>
<td>RO Water</td>
<td>E</td>
<td>Woodward Laboratory</td>
<td>QA Supervisor</td>
</tr>
<tr>
<td>Plant Operations</td>
<td>ROEMOUNT MAG METER SIMULATOR</td>
<td>E</td>
<td>SPD</td>
<td>QA Supervisor</td>
</tr>
<tr>
<td>Plant Operations</td>
<td>SCADA Equipment &amp; Service</td>
<td>E</td>
<td>Alan Bradly Bristol Ifics Fiberwire Hatch Mott Eramosa</td>
<td>QA Supervisor</td>
</tr>
<tr>
<td>Plant Operations</td>
<td>Sodium Hypochlorite</td>
<td>E</td>
<td>Anchem Sales</td>
<td>QA Supervisor</td>
</tr>
<tr>
<td>Plant Operations</td>
<td>TURBIDITY STD’S</td>
<td>E</td>
<td>ABB</td>
<td>QA Supervisor</td>
</tr>
<tr>
<td>Plant Operations</td>
<td>UV Equipment, Parts and Service</td>
<td>E</td>
<td>H2 Flow - Primary Siemens - Secondary</td>
<td>QA Supervisor</td>
</tr>
<tr>
<td>Plant Operations</td>
<td>Wells Service and Maintenance</td>
<td>E</td>
<td>Loto Water International Water Services</td>
<td>QA Supervisor</td>
</tr>
</tbody>
</table>

Essential supplies and services are uniquely identified as “E” in the “Supplier Code” field of the BCOS Database’s Supplier Management Module. A supply or service is identified as essential if, and only if, it meets at least one of the following requirements:
• Essential to the safe delivery of water
• Related to drinking-water disinfection (primary or secondary).

A QA Review of all DWQMS essential supplies and services is undertaken at least once per year. Essential supplies and services are rated as Level 1 (Good), Level 2 (Adequate), or Level 3 (Needs Improvement). Vendors with a Level 1 standing are reviewed annually, at minimum, by the QA Supervisor or delegate. Vendors with a Level 2 standing are interviewed and reviewed at a higher frequency by the appropriate QA Supervisor or delegate. Vendors with a Level 3 standing are reported to the City of Hamilton’s Purchasing Department using the Vendor Performance – Incident Reporting Form located in the City’s Purchasing Policy. Appropriate corrective action measures are identified for these vendors. Vendor ratings are logged into the Supplier Management Module of the BCOS Database.

Vendor nonconformances are logged into the Supplier Nonconformance Module of the BCOS Database and are communicated to the appropriate Section Manager as they are identified. The QA Supervisor (or equivalent) and Section Manager (or delegate) communicate the nonconformance to the vendor and identify appropriate corrective action measures. Vendor nonconformances are reviewed on an annual basis. Vendor QA Reviews, vendor nonconformances, and resolution actions are discussed as an input to DWQMS Management Review.

14 REVIEW AND PROVISION OF INFRASTRUCTURE

A DWQMS Review and Provision of Infrastructure procedure (PW-WW-P-025-001 – see Tab 3) has been developed to document the process followed by the City of Hamilton’s WWW Division in reviewing the adequacy of its drinking-water system infrastructure. This is a DWQMS-specific procedure that applies to all of the City’s DWS-related infrastructure, including both horizontal and vertical infrastructure.

The DWQMS Infrastructure Review is divided into four phases as follows:

• Phase 1: Identify Infrastructure Review Teams;
• Phase 2: Compile & Distribute Background Information;
• Phase 3: Convene Infrastructure Review Meetings;
• Phase 4: Report Infrastructure Review Findings & Recommendations.

The DWQMS Infrastructure Review Team is comprised of three sub-teams including the Horizontal Review Team, the Vertical Review Team and the Infrastructure Coordination Team. Members of each Team are identified in the DWQMS Review and Provision of Infrastructure procedure (PW-WW-P-025-001).

Inputs to Infrastructure Review can include but are not limited to the Current 10-Year Capital Plan, results from previous infrastructure reviews, operational maintenance &
customer complaint data (DataStream and/or Hansen), asset & infrastructure data, the Asset Management Risk Assessment Matrix, information regarding water quality initiatives, information regarding Section-specific system improvement initiatives, relevant Master Plans, water quality data (LIMS), and any other relevant information.

The Vertical Review Team is responsible for completing the review of vertical drinking-water system infrastructure, including the Woodward Water Treatment Plant, pumping stations, reservoirs, towers and other DWS infrastructure controlled and maintained by the PO Section. A report is generated from this review and serves as an input to the Infrastructure Coordination Review.

The Horizontal Review Team is responsible for completing the review of horizontal drinking-water system infrastructure including all watermains and other infrastructure controlled and maintained by the WD&WWC Section. A report is generated from this review and serves as an input to the Infrastructure Coordination Review.

The Infrastructure Coordination Team reviews and coordinates the findings of Vertical and Horizontal Infrastructure Reviews with the goal of providing overall infrastructure recommendations that balance the needs of both vertical and horizontal DWS infrastructure. An Infrastructure Review Report is provided to Top Management for approval and is subsequently presented to the Senior Director of Capital Planning & Improvement and to Council via the budget reporting process.

15 INFRASTRUCTURE, MAINTENANCE, REHABILITATION AND RENEWAL

The procedure entitled DWQMS Infrastructure Maintenance, Rehabilitation & Renewal (PW-WW-P-026-001 - See Tab 3) describes how the WWW Division undertakes maintenance and infrastructure renewal programs related to the water infrastructure. Infrastructure maintenance, is addressed by the both planned and unplanned maintenance.

Planned maintenance is scheduled and records are stored in DataStream (PO Section) and Hansen (WD&WWC Section). Server files are backed up daily. Scheduled tasks are typically defined by manufacturer’s literature when available and revised (or created) as needed according to operator experience / observations. Planned maintenance tasks are communicated to the person responsible by issuance of work orders from the DataStream (PO Section staff) or Hansen (WD&WWC Section staff). Completed work orders are reviewed and signed by the designated Superintendent of the respective Section.

Unplanned Maintenance: Unplanned maintenance tasks result from equipment malfunction or breakage and / or customer complaints. The Overall Responsible Operator(s) typically responds to unplanned maintenance during normal working hours with approval from the respective Superintendent(s) of Maintenance from the PO and WD&WWC Sections. Measures to prepare for and expedite unplanned
maintenance include equipment redundancy (back-up units), spare parts inventory, availability of updated GIS maps water infrastructure, as well as documented repair and safety procedures.

Replacement of aging fixed heavy equipment, as well as upgrades, expansions, and in-ground systems improvements are planned by the infrastructure review teams as described in Section 14 of this DWQMS Operational Plan Summary Report. The asset management databases for both vertical and horizontal infrastructure along with operations and maintenance data assist in the prioritization of infrastructure renewal projects. Infrastructure renewal is implemented via maintenance and annual updates of the 10-Year Capital Plan which requires approval by the approval of the Owner (Mayor and Council).

16 SAMPLING, TESTING AND MONITORING

The Sampling, Testing and Monitoring procedure (PW-WW-P-013-004 – see Tab 3) applies to all Sections of the WWW Division. This procedure describes how the WWW Division undertakes water sampling, testing and monitoring to ensure the production and distribution of safe drinking water. A description of how results are communicated as required and that regulatory requirements are met is also provided in this procedure.

Sampling, testing and monitoring requirements are identified and incorporated into various sampling plan and schedule documents. These documents are reviewed and updated as necessary to incorporate regulatory and/or operational sampling, testing and monitoring requirements. The WWW Division’s Sampling, Testing and Monitoring procedure includes both grab sampling (i.e. discrete samples representing water characteristics at a particular time) and well as continuous sampling (i.e. the measurement of parameters and processes through the use of online monitors and instruments) methods.

All grab samples brought for analysis to the City of Hamilton’s Environmental Laboratory are collected according to protocols as specified by Sampling Protocol (PW-WW-CR-EL-V-011) and Sampling Protocol, Lead (PW-WW-CR-EL-V-012).

Continuous samples are collected an analyzed through the use of online analyzers and instruments as per the Real Time SCADA Data Assessment (PW-WW-WWT-PO-006-Online Analyzers).

As required and/or regulated, sampling, testing and monitoring results are communicated to: the Operating Authority, Owner (AWQI), Owner (DWS), Regulators, and to the public.
17 MEASUREMENT AND RECORDING EQUIPMENT CALIBRATION AND MAINTENANCE

The procedure entitled “DWQMS Calibration & Maintenance of Measurement & Recording Equipment” (PW-WW-P-010-001 – see Tab 3) describes the requirements for the calibration and verification of measurement and recording equipment used for sampling, testing and monitoring.

Types of recording equipment used for sampling testing and monitoring include:

- Chlorine field kits
- Continuous chlorine analyzers
- Flow meters
- Fluoride meters
- pH meters
- Thermometers
- Turbidity analyzers
- U.V intensity analyzers

For each type of recording equipment, the procedure provides information including maintenance frequency, methods and a description of how records of maintenance activities are kept. Also provided is a listing of who is responsible for the maintenance of equipment and related record keeping.

18 EMERGENCY MANAGEMENT

The BCOS + DWQMS Emergency Response Procedure (PW-WW-P-012-001 – see Tab 3) is an integrated procedure for the BCOS System and DWQMS Sub-system. This procedure describes processes developed to meet Emergency Preparedness requirements of the DWQMS. This procedure applies to all Sections within the Water and Wastewater Division.

The BCOS + DWQMS Emergency Response Procedure (PW-WW-P-012-001) includes a list of emergencies that could potentially impact one or more of the City’s drinking-water systems. A Risk Assessment approach is used to identify possible risks and to highlight risks requiring Emergency Plans. The procedure also outlines steps to be taken to activate the applicable Emergency Response Plan in either a major emergency (i.e., Corporate/City of Hamilton) or a minor emergency (i.e., within the WWW Division).
A Critical Emergency Resource List is included in the procedure and lists the City’s Corporate, WWW Divisional and Sectional Emergency Response Plans and/or procedures. The Critical Emergency Resource List also specifies under which emergency circumstances the Corporate, Divisional and Sectional procedures are deployed.

Annual testing of the City of Hamilton (Corporate) Emergency Response Plan, Water & Wastewater Division Emergency Response Plan, Plant Evacuation Procedure (PW-WW-P-012-002), and E2 Plan is required. Upon completion of testing, a post-emergency meeting is held to determine possible improvement actions and document any procedural upgrades that may be required.

WWW Division staff must receive training for all Emergency Response Plans and/or procedures. Training requirements for Divisional Plans/procedures are determined by SMT. The City’s Emergency Management Office determines training requirements for the City of Hamilton Emergency Response Plan.

19 INTERNAL AUDIT

The BCOS + DWQMS Internal Auditing Procedure (PW-WW-P-017-001 – see Tab 3) is an integrated procedure that describes how the WWW Division conducts objective and systematic internal audits as a means of measuring the performance of its BCOS Program and its DWQMS. DWQMS Internal Audits assess DWQMS-related processes against the DWQMS Standards and relevant system procedures.

Internal auditors are appointed by the SMT of the WWW Division and are identified in the BCOS + DWQMS Internal Auditor List (PW-WW-L-017-003). This list is examined and revised (where necessary) once every three years. Auditors must remain objective and unbiased in their assessments of DWQMS processes and procedures, and are prohibited from auditing their own work.

The SMR holds overall responsibility for ensuring that internal audits are planned and executed according to the requirements of the DWQMS Standard and of the BCOS + DWQMS Internal Auditing procedure (PW-WW-P-017-001). The SMR appoints a Lead Auditor on a per-audit basis to assist in planning the internal audit and to oversee the execution of the internal audit.

The DWQMS Internal Audit process is summarized as follows:

- Step 1: The internal audit is initiated;
- Step 2: A document review is conducted;
- Step 3: Internal auditors prepare for on-site audit activities;
- Step 4: On-site audit activities are completed;
- Step 5: The Audit Report is prepared, approved and distributed;
• Step 6: The audit is completed;
• Step 7: Audit follow-up is conducted.

At minimum, all elements or clauses of the DWQMS must be audited once annually. All DWS facilities falling within the scope of the DWQMS must be audited at least once every three years.

Audit findings may indicate the need for corrective, preventive or improvement actions. Corrective, preventive and improvement actions are recorded in the BCOS Database (See Section 21.0 of this Operational Plan). The completion and effectiveness of the corrective and preventive actions is verified by the Lead Auditor, or designate.

Once scheduled internal audits are completed, the SMR (or designate) reviews audit findings and compiles the information for presentation to SMT. Audit findings must be considered in future relevant audits. In addition, the Internal Audit Program is reviewed on an annual basis as an input to DWQMS Management Review.

20 MANAGEMENT REVIEW

The DWQMS Management Review procedure (PW-WW-P-018-001 – See Tab 3) is a DWQMS-specific procedure that has been developed to document the process followed by Top Management in planning, executing and documenting DWQMS Management Reviews, including provision of feedback to the Water/Wastewater Division and reporting of review results to the Owner. The Management Review process ensures that all levels of the organizational structure are kept informed and aware of DWQMS and DWS performance.

The SMR has a significant role in the DWQMS Management Review process, including the coordination and facilitation of Management Review meetings and the compilation of required input data for presentation to Top Management. Required inputs to Management Review are listed in the DWQMS Management Review procedure (PW-WW-P-018-001). Other Managers or Division staff may be invited to assist in presenting information to the Management Review Team or to assist in the review of information where they offer additional expertise or insight regarding the subject matter. Top Management is responsible for reviewing the input materials presented and generating outputs as specified in the DWQMS Management Review procedure (PW-WW-P-018-001).

Management Review Meetings can be conducted as one meeting per year or be split into several smaller meetings over the course of the year. Either method is acceptable as long as all required review inputs and agenda items are addressed over the course of the year.
DWQMS Management Review outputs must be documented and retained as proof of completion. The SMR prepares minutes of Management Review meetings for this purpose. Top Management Representatives are responsible for communicating Management Review results to the Owner as per the DWQMS Management Review procedure (PW-WW-P-018-001).

21 CONTINUAL IMPROVEMENT

The integrated Corrective & Preventive Action procedure (PW-WW-P-015-001 – see Tab 3) applies to both the BCOS and DWQMS Systems. This procedure documents the process to be taken to ensure the effective resolution of BCOS and DWQMS system nonconformances and legal noncompliances. The process includes a root cause analysis, identification of corrective / preventive actions and verification of their effectiveness. This procedure applies to all Sections within the Water and Wastewater Division. The scope of this procedure does not include the management of adverse water quality events; this process is documented in Assessment of Drinking Water Quality Conditions and Corrective Actions for Drinking Water Systems Under the City of Hamilton Water / Wastewater Division (PW-WW-P-015-001).

Section 5.3 of the Corrective and Preventive Action procedure (PW-WW-P-015-001) specifically illustrates how actual or potential DWQMS nonconformances are resolved. Nonconformances are entered into the “Quality Nonconformance” Module of the BCOS Database. Once details of the nature of the actual or potential nonconformance are entered into the BCOS Database, a Root Cause Analysis can be completed and an action plan can be developed to correct or prevent the nonconformance. Once the action plan has been implemented, the effectiveness of the corrective or preventive action must be verified. All of the above information must be entered into the BCOS Database. Once the effectiveness of the plan has been verified, the nonconformance report can be closed out.

BCOS software tracks the revision history of document.