 <p>BROCKVILLE CITY OF THE 1000 ISLANDS</p>	<p>Drinking Water Quality Management System Operational Plan</p>
<p>City of Brockville Drinking Water System</p>	<p>REF:152-401 VERSION 12 DWQMS 2.0</p>
<p>REVISED BY: J. Buckland/C. Sluytman</p>	<p>ISSUE DATE: 2009-08-01</p>
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Drinking Water Quality Management System

Operational Plan

City of Brockville Drinking Water System Owner / Operating Authority

Original Copy:
C. Sluytman, Supervisor Water Systems

Copies:
M. Wren, Mayor
S. MacDonald, City Manager
P. Raabe, Director of Engineering & Infrastructure

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1 Introduction

The mandated province-wide application of quality management principles in municipal water treatment operations originated as a recommendation from the Part 2 Report on the Walkerton Inquiry. The Report states:

The purpose of the quality management approach in the context of drinking water is to protect public health by achieving consistent good practice in managing and operating a water system. The hallmarks of this approach include:

- the adoption of best practices and continual improvement;
- real-time process control (e.g., the continuous monitoring of turbidity, chlorine residual, and disinfectant contact time) wherever feasible;
- the effective operation of robust multiple barriers to protect public health;
- preventive rather than strictly reactive strategies to identify and manage risk to public health, and;
- effective leadership.

In the interest of implementing the Report recommendation, the Ministry of the Environment, Conservation and Parks (MECP), in consultation with quality management system experts and representation from drinking water system operating authorities throughout the province, developed the Ontario Drinking Water Quality Management Standard (DWQMS). The DWQMS specifies the minimum requirements for all drinking water quality management systems in Ontario.

This Operational Plan describes how the City of Brockville meets or exceeds the requirements of the MECP-prescribed standard (DWQMS) and is applicable to the management and operation of those works described in Section 6 of this manual.

2 Quality Management System Policy

The City of Brockville is dedicated to delivering a clean, safe, reliable, drinking water supply to the consumer while remaining compliant with all regulatory requirements. Achievement of those commitments is supported by risk-based process evaluation, staff competency, effective communications, and appropriate contingency / incident response measures.

The managers and employees of the City of Brockville who are directly involved in the production and delivery of safe drinking water are committed to and share in the responsibilities for implementing, maintaining, and contributing to the continual improvement of the Drinking Water Quality Management System.

3 Commitment and Endorsement

The system owner, the City of Brockville, supports the ongoing development, implementation, maintenance, and continual improvement of the Drinking Water Quality Management System (DWQMS) for the Brockville Water Systems Division, as documented in this Operational Plan. Endorsement by the owner, (represented by the Mayor), and Top Management, (represented by the City Manager and Director of Engineering & Infrastructure), formally acknowledge the need for, and support the provision of sufficient resources to maintain and continually improve the City of Brockville DWQMS.

The Designated QMS Representative(s), appointed by Top Management, acknowledges the roles and responsibilities of that appointment as defined under Element 4 of the Ontario Drinking Water Quality Management Standard.

_____	Endorsement on original copy
Date	_____ City of Brockville (Owner) Matt Wren - Mayor
_____	Endorsement on original copy
Date	_____ City of Brockville (Top Management) Sandra MacDonald – City Manager
_____	Endorsement on original copy
Date	_____ City of Brockville (Top Management) Peter Raabe – Director of Engineering & Infrastructure
_____	Endorsement on original copy
Date	_____ Designated QMS Representative Clay Sluytman – Supervisor Water Systems

4 QMS Representative

Top Management of the Operating Authority has appointed and authorized the Water Systems Supervisor to serve as the Quality Management System (QMS) Representative. The alternate QMS Representative, in the absence of a Water Systems Supervisor, will be the Water Systems Chief Operator.

The following table identifies the responsibilities and authorities of the City of Brockville QMS Representative.

Title	Responsibilities / Roles
<p>Designated QMS Representative:</p> <ul style="list-style-type: none"> • Supervisor - Water Systems • Alternate – Chief Operator - Water Systems 	<ul style="list-style-type: none"> ▪ Ensure that processes and procedures needed for the DWQMS are established and maintained ▪ Report to Top Management on the performance of the DWQMS and any need for improvement ▪ Ensure that current versions of documents required by the DWQMS are being used at all times ▪ Ensure that personnel are aware of all applicable legislative and regulatory requirements that pertain to their duties for the operation of the drinking water system ▪ Promote awareness of the DWQMS throughout the relevant City departments ▪ Review and authenticate DWQMS documentation ▪ Schedule / conduct internal audits, and serve as external auditor liaison ▪ Report DWQMS results to staff and top management ▪ Manage corrective actions ▪ Ensure continual improvements are achieved

5 DWQMS Document and Records Control

Details regarding DWQMS document identification, retention, storage and disposal are contained within the Document Control Procedure, attached as Appendix A. DWQMS records are retained according to the Records Control Procedure, attached as Appendix B.

6 Drinking Water System Process Description

DRINKING WATER SYSTEM NUMBER:	220001263
DRINKING WATER SYSTEM NAME:	BROCKVILLE WATER TREATMENT
DRINKING WATER SYSTEM OWNER:	CITY OF BROCKVILLE
DRINKING WATER SYSTEM CATEGORY:	LARGE MUNICIPAL RESIDENTIAL
DRINKING WATER SYSTEM CLASSIFICATION:	WATER TREATMENT PLANT (CLASS III) TRUNK WATER DISTRIBUTION (CLASS III) LOCAL DISTRIBUTION (CLASS II)
PERMIT TO TAKE WATER:	3112-CZQS85 Issue Date: March 15, 2024 Expiry Date: March 31, 2034
DRINKING WATER WORKS PERMIT:	152-201 Issue Date: May 21, 2021 Expiry Date: May 20, 2026
MUNICIPAL DRINKING WATER LICENCE:	152-101 Issue Date: December 13, 2023 Expiry Date: May 20, 2026
OPERATING AUTHORITY:	CITY OF BROCKVILLE

General

The facilities, consisting of a Class III direct filtration design water treatment plant having an approved capacity of 36.4 ML/d, a Class III trunk water distribution system and a Class II local distribution system are owned and operated by the City of Brockville.

Source water for the treatment process is drawn from a surface water source, the St. Lawrence River. Potentially pathogenic organisms are removed from the raw water source by the following processes:

- Pre-chlorination
- Coagulation / flocculation
- Filtration
- Post-filter chlorination (primary disinfection)
- Plant effluent chlorination distribution system chlorine residual (secondary disinfection)
- UV disinfection (operated as needed during periods of low source water temperature or excessive flow rates)

This multiple barrier approach helps to ensure consistently compliant drinking water quality, and ultimately improves the level of public health protection.

Process Summary

The City of Brockville's Water System Division is a direct filtration plant, located on the St. Lawrence River and serves the City of Brockville (population 22,000), and a portion of the Township of Elizabethtown-Kitley (population 350). The treatment process is composed of a number of sub-units: a 900 mm raw water intake pipe equipped with zebra mussel control that lies on the bottom of the St. Lawrence River extending 294 metres off shore at a depth of 10.5 metres, a low lift pumping station, coagulation and flocculation using polyaluminum chloride as a coagulant, pre and post filter disinfection by chlorine gas, two dual media – silica sand and granular activated carbon filters, fluoride addition, plant effluent UV disinfection and process wastewater discharge. The design maximum capacity of the plant is 36.4 ML/d (million litres per day). A process flow diagram of the Water System plant is included as **Figure 1**

Section 6.1 Brockville Drinking Water System Process Diagram.

Raw Water Supply

Source water for the Brockville Water System Division is obtained from the intake crib which is located in the St. Lawrence River, 294 m offshore at a depth of 10.5 m. The intake line is 900 mm in diameter and has a capacity of 90.9 ML/d. Before entering the low lift station the water from the intake passes through a fixed screen that prevents fish, logs, leaves or other debris from entering the treatment plant. The low lift station is equipped with three (3) pumps. Two of the low lift pumps each have a capacity of 18.2 ML/d @ 23.2m of total dynamic head (TDH) and the third has a capacity of 22.7 ML/d @ 23.2m TDH. One of the 18.2 ML/d pumps is backed up by an auxiliary diesel engine to provide emergency pumping during a power failure.

Due to the presence of zebra mussels in the Great Lakes, the intake is protected from their infestation with two PVC chlorine supply lines. These two lines operate one at a time and provide a chlorine solution to the mouth of the intake. This chlorine solution discourages the development of a colony. This process is effective since zebra mussels in their infancy or villager stage are effectively controlled by relatively low concentrations of chlorine. This method has proven to be very effective in keeping the intake line clear and is used throughout the Great Lakes Basin.

Coagulation / Flocculation

The low lift station pumps the raw water through a 610mm raw water header to a raw water meter chamber located south of the main plant. The meter chamber is an underground vault where raw water travels from the low lift station to the filters. Chlorine is added when Zebra mussel control is not in effect, and Poly Aluminum Chloride (PAC) is also added as a coagulant. Agitation to assist the hydraulics in the mixing is provided by a circulating pump located in the chamber.

The flocculation tanks are arranged for series flow through two cells, in three parallel sets. At the maximum flow of 36.4 ML/d the retention time is twenty minutes. Water entering the flocculation tanks is forced to flow spirally upward. This stirring action causes the small floc particles formed in the coagulation process to join together to form larger floc particles. These coagulated particles are readily removed by the filtration process. The water then passes on to the filters through the floc water conduits.

Filtration

There are two dual media filters 8.25m x 5.5m in size, each with a capacity of 19,600 m³/d at a TDH of 18 m. Each filter consists of 600 mm of Granular Activated Carbon (GAC) on top of 300 mm of fine sand. The sand and GAC are supported by a sub-layer of gravel and a system of underdrains. Each filter is rated at a surface loading rate of 290 L/min/m². Water passes through the filter by gravity; first through the GAC where most of the pinpoint floc is removed, then through the fine sand, which removes the finer floc particles not trapped in the GAC layer. The filtered water then passes into a clearwell via the conduit and then into the treated water reservoir. A rate control valve limits the rate of water passing through each filter. This valve is set by the plant operator according to the water demand from the distribution system. During operation, as water passes through the filter, the floc particles build up in the pores of the filter. This results in a loss of head through the filter (an increase in the resistance to passage of water) and an increase in the turbidity (suspended matter in water) of the filtered water. When a loss of head or filter effluent turbidity reaches a defined level, the filter is cleaned by backwashing.

Disinfection (Chlorination and UV - Ultraviolet Irradiation)

Chlorination is a form of chemical inactivation of pathogenic organisms using an oxidant (such as free chlorine), which to be effective is to be in contact with the water for a specific amount of time. The Ontario Drinking Water Standards evaluates the effectiveness of chemical inactivation using “CT”, where CT (mg/L-min) is the product of disinfectant residual (mg/L) and contact time in minutes. The Brockville Water Treatment Plant is continuously monitoring CT values through the SCADA system. This allows the operators to always have current CT data available. Operators ensure that the chlorine in the system is at an amount suitable for proper inactivation even without the use of the UV system in the event of a UV system failure.

In the event of an issue impacting free chlorine residual through the normal treatment processes, a small amount of chlorine can be added immediately before the water leaves the treatment facility. This ensures that there is a suitable chlorine residual entering the distribution system to protect the water from contamination as it travels through the mains to consumers.

The UV system is a secondary disinfection system that is used as a multi-barrier treatment effective for the inactivation of many waterborne pathogens. The UV disinfection system at the Brockville Water Treatment Plant is operated as needed during periods of low source water temperatures, or in event of excessive flow leaving the plant to ensure CT requirements are met.

Prior to the water entering the distribution, the water passes through the UV Disinfection System. Ultraviolet light is electromagnetic radiation just beyond the blue end of the light spectrum, outside the range of visible light. It has a much higher energy level than visible light, and in large doses will inactivate bacteria, oocysts, and viruses. The UV energy is absorbed by genetic material, fusing RNA and rendering the microbes unable to replicate.

The UV system is composed of two UV reactors, 1 duty and 1 standby. The reactor applies a minimum UV dosage of 20 mJ/cm² and has a rated design capacity of 40 mJ/cm² at a flow rate of 36.4 ML/d. The system is equipped with flow paced dosing and adjustable ultraviolet intensity.

Local Reservoir Storage

Treated water is conveyed from the Clearwell chlorine contact chamber to the on-site storage reservoir, before being drawn into the Highlift pumping station. The single cell underground concrete reservoir has a baffled inlet and baffle curtains throughout to minimize mixing within the reservoir. The reservoir has an operating capacity of 3,400 m³ at 3.50m of depth, and a maximum capacity of 3,800 m³ at 3.90m of depth.

Backwashing and Process Waste Residuals Management

Backwashing involves reversing the flow through the filter to remove the floc particles from the bed. This is done by pumping filtered water from the reservoir up through the filter. The rate of backwash is higher than the filter rate and the bed is expanded so that the fines are flushed from the pores of the bed. A backwash pump with a capacity of 45.4 ML/d is reserved for backwash operations. To ensure the bed is properly cleaned and not damaged during the backwash operation, a rate control valve controls the backwash flow rate. Waste backwash water is collected in the filter troughs. It then passes through the filter drain gate to a holding tank. From the holding tank the waste backwash water is pumped to sanitary sewer.

Water Distribution System

Treated water is pumped from the Water System plant into the City's water distribution system. The distribution system consists of approximately 130 kms of underground pipes ranging in size from 100 mm in diameter to 400 mm in diameter and are made of a variety of material including cast iron, ductile iron, poly vinyl chloride (PVC), concrete, steel, high density polyethylene (HDPE), and asbestos cement. The distribution system supplies approximately 8,400 service connections and 940 fire hydrants.

Elevated Storage Tank

The City has two water storage facilities; the Perth Street elevated storage tank and the Parkedale Avenue reservoir. Water is supplied to both facilities through 400 mm, 500 mm and 600 mm diameter concrete pressure pipe feeder mains. The Perth Street elevated storage tank has a capacity of 1,900 m³ and is equipped with a flow control valve that is continuously monitored by the treatment plant's SCADA system.

Parkedale Avenue Reservoir

The Parkedale Avenue reservoir, and booster pumping facility services two geographical areas which are Zone 1 (the area south of the 401), and Zone 2 (the area north of the 401). Built at grade-level, the Parkedale Reservoir is a 7,600 m³ capacity, single cell, concrete tank equipped with an inlet flow control valve from the Zone 1 distribution system, and an outlet flow transfer pipe to the Zone 1 suction header. The Parkedale site also includes:

- Zone 1: One-chamber pump suction header consisting of a reservoir transfer pipe, and equipped with two constant speed, electrically driven, horizontal, double suction type pumps rated at 8.2 and 16.0 ML/d at a TDH of 45.7 m and one variable speed diesel motor driven pump rated at 22.7 ML/d at a TDH of 45.7 m, all discharging to a common header pipe connected to the Zone 1 distribution system feeder main.
- Zone 2: One-chamber pump suction header consisting of transfer pipes from the Zone 1 pump discharge header and equipped with three pumps which are rated at 8.2 and 16.0 ML/d at a TDH of 45.7 m and one rated at 3.3 ML/d at a TDH of 28.0 m, all discharging to a common discharge header connected to the Zone 2 distribution feeder main.

Booster Pumping Stations

In order to maintain sufficient pressure throughout the water distribution system, the City has two booster pumping stations. One is located in the southeast section of the city on First Avenue and the second one is located on the corner of Reynolds Drive and Sunset Boulevard.

Township of Elizabethtown-Kitley Water Distribution System

The City of Brockville also supplies water to approximately 350 residents located in the Township of Elizabethtown-Kitley via approximately 12 kms of 250 and 300 mm diameter PVC and HDPE watermain. The watermain passes through a metering chamber located at the west boundary between the City and Township and has a booster station located at Lily Bay. The system was constructed in 1996 by the Ministry of Transportation and Ontario Clean Water Agency on behalf of the owners, the Township of Elizabethtown-Kitley. This distribution system is operated by the City

of Brockville. The metering chamber and booster station are integrated to the SCADA system to accommodate monitoring. Potential future fire flow requirements have been addressed by over-sizing the pipes where required. However, the pumping station is not sized for fire flows. Fire hydrants have been installed and are used only for the planned flushing of the watermains. The booster station pumps are exercised daily to ensure proper operation, and during summer flushing maintenance operations.

Sample Analysis

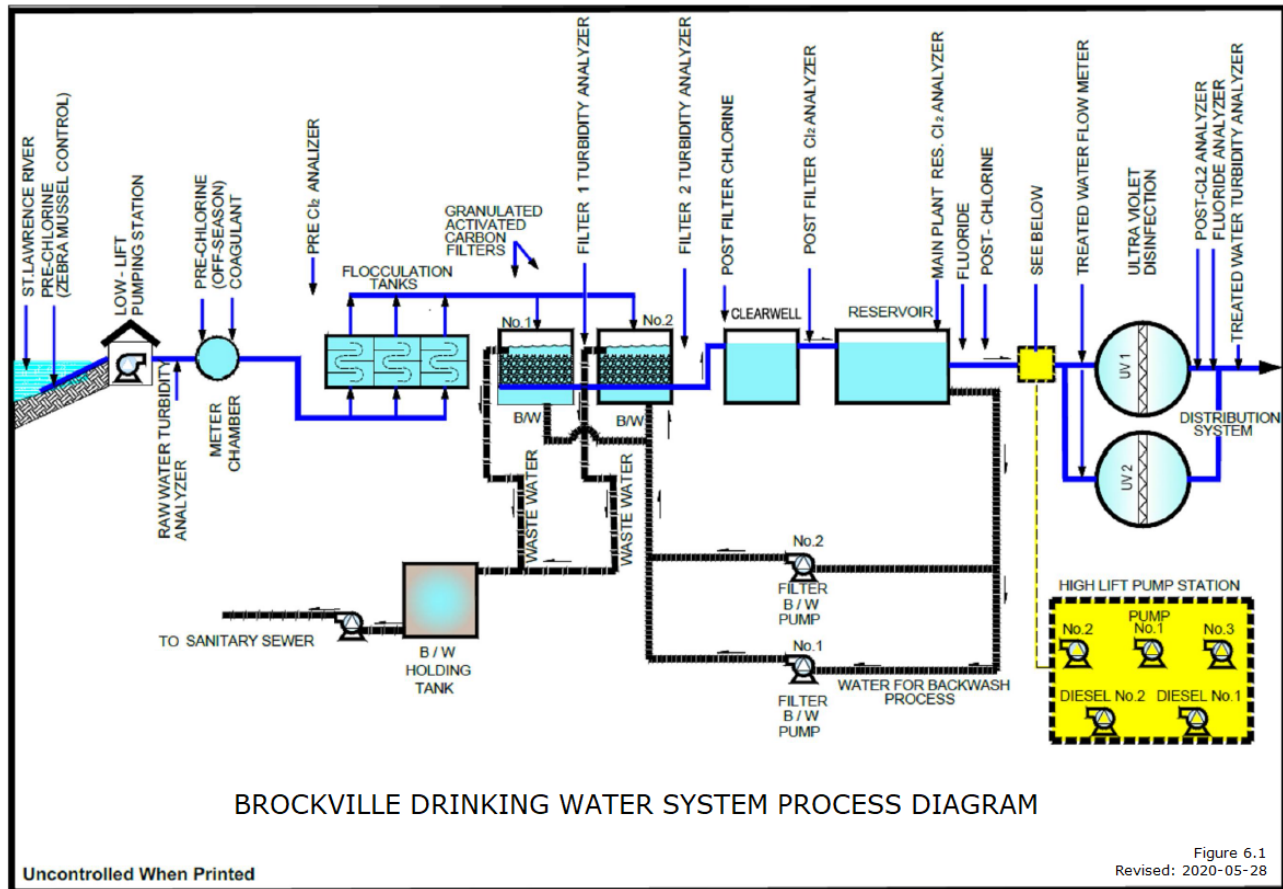
Provincial regulations dictate the sampling and monitoring requirements for the system. Water quality is tested throughout the treatment process and from dedicated sampling points located throughout the distribution system, with an emphasis on points located at the extremities of the system. Where required by regulation, samples are submitted to an accredited laboratory for analyses.

Critical Upstream or Downstream Processes

The Brockville Drinking Water System is not connected to any adjoining water systems, and there are no critical upstream or downstream processes.

See Figure 6.1 – Brockville Drinking Water System Process Diagram

Figure 6.1



Source Water Overview

General

The City of Brockville obtains its raw water from the St. Lawrence River. The quality of water from the St. Lawrence River is considered reasonably stable and of good quality. The temperature of the water ranges from 0 °C to 25 °C with an average of 12 °C. The water clarity is generally high, and turbidity is very low with levels averaging less than 0.5 NTU, indicating a very small amount of particulate material entering the intake. The raw water colour is low with a UV transmittance typically in excess of 90%, indicating low organic material presence. The raw water is slightly basic with an average pH level of 7.8 – 8.2, and average alkalinity between 80 - 95 mg/L. The relatively low levels of E. coli and total coliforms in the raw water indicates a minimal presence of Giardia and Cryptosporidium organisms.

Event Driven Fluctuations

The location of the City's raw water intake provides for fairly consistent raw water characteristics. However, periodic weather events may cause the physical characteristics to fluctuate. In late summer when the raw water temperature is at its highest, the City may experience a slight taste or odour present in the treated water. While these issues are aesthetic in nature and pose no health risk, operators routinely make appropriate process adjustments to mitigate these issues where possible. Compounds such as geosmin and methyisoborneol (MIB) which may cause taste and odour are monitored through sampling and laboratory analysis as necessary. Such monitoring provides support data to confirm the granular activated carbon filtration media efficacy as it progresses through its life cycle.

High easterly wind events tend to increase the suspended solids in the St. Lawrence River causing turbidity levels in the raw water to increase. Plant operators are required to make the appropriate process adjustments to treat the elevated levels of turbidity, such as modifying coagulant dosing, and reducing production rates.

During the spring, and through the summer plumes of algae can be detected in the raw water. Algae can clog the filter beds, which require staff to increase the frequency of filter back washing. Routine monitoring for compounds associated with certain types of algae is conducted from June through October.

Operational Challenges

The City's most significant operational challenges are related to a lack of redundancy in key areas including raw water delivery, treated distribution via the trunk network, a lack of appropriately scaled redundant backup power systems, and limited storage volume to accommodate protracted downtime. Extended shutdown maintenance or failure of the single intake system, or trunk distribution network require significant downtime to rectify which may impact water availability. Limited storage volumes reduce the amount of time the system can be out of production without significant use restrictions being put in place.

Threats

The St. Lawrence River is fed from a great number of tributary water shed areas including the Great Lakes, and is susceptible to a number of potential contaminations from a variety of sources including industrial runoff, agricultural runoff, commercial and recreational watercraft, municipal runoff, etc. The depth of the raw water intake and its distance from shore help to reduce the risk of contamination from entering the intake.

Associated Documents and Records

- Schedule C – Director's Directions for Operational Plans (Subject System Description Form)

7 Risk Assessment

The procedure entitled DWQMS Risk Assessment, attached as Appendix C, describes the method of hazard identification, risk assessment, reliability and redundancy of equipment, and critical control point determinations for the Brockville drinking water system. The procedure consists of four main exercises; hazard identification, risk assessment, critical control point determination and critical limit identification.

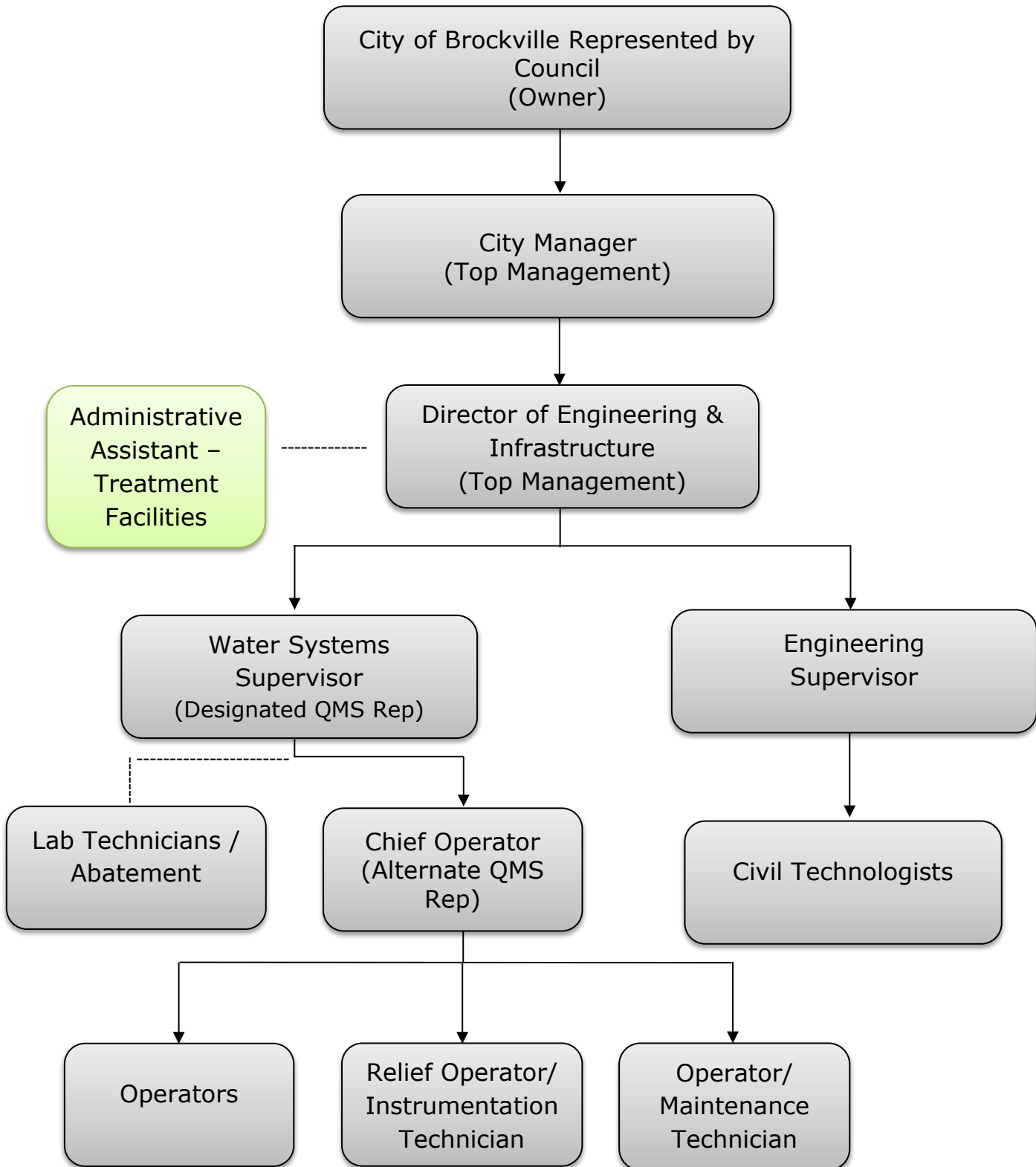
8 Risk Assessment Outcomes

Appendix D documents the hazard identification exercise conducted for the Brockville drinking water system. All hazards were identified, assessed, and ranked according to the DWQMS Risk Assessment procedure (Appendix C).

Appendix D identifies the control measures in place to address the potential hazards and hazardous events, identifies the critical control points and their respective critical control limits along with the processes and/or procedures in place to monitor the critical control limits.

Critical control limit deviation response procedures are identified in Appendix D. These procedures include instruction for reporting and recording deviations from the identified critical control limits.

9 Organizational Structure



----- Not a direct report

Responsibilities and Authorities

Detailed job descriptions are available for all Engineering & Infrastructure Department positions in the City of Brockville Personnel Procedures Manual. The table provided below summarizes responsibilities and authorities of personnel considered most directly related to the provision of a safe and reliable municipal drinking water supply for the City of Brockville.

CITY OF BROCKVILLE COUNCIL – (OWNER)	
Responsibilities	Authorities
<p>In addition to ensuring the provision of safe and reliable municipal water supply to the serviced areas of the City of Brockville and the Township of Elizabethtown-Kitley Township, Council is also responsible for:</p> <ul style="list-style-type: none"> • Participating in Council meetings and Council committee meetings and meetings of other bodies to which they are appointed by the Council • Obtaining and giving due consideration to information about the operation or administration of the municipality from the City Manager and from other appropriate City staff • Evaluating the policies and programs of the municipality such as bylaw enforcement, taxation, property permits and inspections, planning, public works (roads, water, and sewer), parks and recreation, fire services, police services • Endorsing the DWQMS and providing a representative to participate on the DWQMS Management Review Committee 	<p>On behalf of the electorate of the City of Brockville, and in accordance with the Municipal Act, Council is authorized to:</p> <ul style="list-style-type: none"> ▪ Perform the listed responsibilities ▪ Drinking water system and DWQMS improvements or changes ▪ To authorize resources to improve or change the drinking water system and DWQMS ▪ Approve and review policies for the management and operation of City assets ▪ Review, revise, and approve proposed and existing bylaws, expenditures, user fees, taxation rates, ▪ Hire, evaluate, discipline, or terminate City Management Staff and contracted service providers
CITY MANAGER – (TOP MANAGEMENT)	
Responsibilities	Authorities
<p>As the senior City staff person reporting to Council, the City Manager responsibilities include:</p> <ul style="list-style-type: none"> ▪ Oversight of the operation and management of all City departments ▪ Ensuring that the policies and direction from Council are effectively communicated to senior department managers ▪ Ensuring that policies and direction from Council is carried out by the appropriate City departments 	<p>Authorities of the City Manager include:</p> <ul style="list-style-type: none"> ▪ Perform the listed responsibilities ▪ Communicate information from senior managers directly to Council ▪ Request expenditure approval from Council and implement approved expenditures ▪ To convey and mandate council policy and direction to the department senior managers ▪ To hire, evaluate, discipline, or

<p>Responsibilities</p> <ul style="list-style-type: none"> ▪ Direct supervision of senior department managers ▪ Endorsing the ongoing development of the DWQMS and participating on the DWQMS Management Review Committee 	<p>Authorities</p> <p>terminate utility management staff</p>
<p>DIRECTOR OF ENGINEERING & INFRASTRUCTURE - (TOP MANAGEMENT)</p>	
<p>Responsibilities</p> <p>Reporting to the City Manager, the responsibilities of the Director of Engineering & Infrastructure include:</p> <ul style="list-style-type: none"> ▪ Ensuring the safe, reliable, and compliant management and operation of all of the City’s physical infrastructure as well as the neighbouring Township of Elizabethtown-Kitley Water Distribution System ▪ Direct supervision of Engineering & Infrastructure Department Supervisors and administrative staff ▪ Coordinating budget preparation ▪ Preparation and presentation of Engineering & Infrastructure Department Reports to Council ▪ Administration of the Collective Bargaining Agreement for department personnel ▪ Ensuring adequate and competent staffing ▪ Ensuring appropriate staff training ▪ Investigating and responding to public complaints and inquiries ▪ Participating on the DWQMS Management Review Committee 	<p>Authorities</p> <p>The Director of Engineering & Infrastructure is authorized to:</p> <ul style="list-style-type: none"> ▪ Perform the listed responsibilities ▪ Evaluate and prioritize long-term department needs ▪ Prepare, review, and approve design specifications ▪ Select contractors, and equipment ▪ Develop and implement departmental administrative and technical policy ▪ Recruit, hire, evaluate, discipline, or terminate Engineering & Infrastructure Department staff in accordance with City policies ▪ Within the scope of the Engineering & Infrastructure Department, communicate directly with regulatory agencies and the public on behalf of the City (owner)
<p>ENGINEERING SUPERVISOR</p>	
<p>Responsibilities</p> <p>Reporting to the Director of Engineering & Infrastructure, the responsibilities of the Engineering Supervisor include:</p> <ul style="list-style-type: none"> ▪ Preparation or review of engineering design for all of the physical infrastructure operated by the City ▪ Coordinating / supervising work of consulting engineers retained for study or design assignments ▪ Preparing cost estimates and specifications for construction projects ▪ Municipal traffic and transportation planning ▪ Managing City storm water policy 	<p>Authorities</p> <p>The Engineering Supervisor is authorized to:</p> <ul style="list-style-type: none"> ▪ Perform listed responsibilities ▪ Participate in hiring, supervision, evaluation, and discipline of Engineering staff in accordance to City policy

Responsibilities	Authorities
<ul style="list-style-type: none"> ▪ Preparing applications for approvals and subsidies related to the City’s physical assets ▪ Management of City construction projects ▪ Managing department computer applications 	
CIVIL TECHNOLOGISTS	
Responsibilities	Authorities
<p>Reporting to the Engineering Supervisor, the responsibilities of the Civil Technologist include:</p> <ul style="list-style-type: none"> ▪ Develop / maintain the preventive maintenance program ▪ assist with engineering design functions defined under Engineering Supervisor ▪ Prepare approvals and funding applications ▪ review and analyze treated water use and distribution system performance and condition ▪ Investigate distribution system failures and provide technical assistance for repair personnel ▪ Construction supervision, inspection, and testing of new water distribution infrastructure construction 	<p>The Civil Technologist is authorized to:</p> <ul style="list-style-type: none"> ▪ Perform listed responsibilities
SUPERVISOR, WATER SYSTEMS - (DESIGNATED QMS REP)	
Responsibilities	Authorities
<p>Reporting to the Director of Engineering & Infrastructure, the responsibilities of the Supervisor, Water Systems include:</p> <ul style="list-style-type: none"> • Ensuring the efficient, safe and compliant operation of the City’s Water Treatment and Distribution System • Providing supervision, technical direction and training to water treatment and distribution staff • Maintaining provincial operator certification • Assisting the Director of Engineering & Infrastructure with the water treatment and distribution budget preparation and long term planning • Communicating with regulatory authorities to ensure compliance with applicable legislation • Preparing and presenting Municipal water treatment and distribution information to Council, City Staff, managers and the public • Serving as the Designated QMS Representative, is responsible for the following duties: 	<p>The Supervisor, Water Systems is authorized to:</p> <ul style="list-style-type: none"> • Develop, approve and implement operations, maintenance and safety policies and procedures related to water treatment and distribution • Supervise and inspect the work of contractors • Evaluate and prioritize the long-term rehabilitation and upgrade to the City’s infrastructure(s) • Participate in hiring, evaluation and discipline of unionized and non-unionized staff in accordance with City Policies • Communicate with Regulatory Agencies. • Serve as backup ORO of the Water Treatment and Distribution Systems • Order/purchase necessary supplies and services • Apply various City By-laws

Responsibilities	Authorities
<ul style="list-style-type: none"> • Participating on the DWQMS Management Review Committee • Scheduling and chairing the annual management review meetings • Scheduling annual internal audits. • Conducting risk assessment reviews once every calendar year and full risk assessment reviews every thirty-six months • Responding to Corrective and Preventive Actions • Continual improvement • Essential supplier and service agreements • Operational plan revisions 	<ul style="list-style-type: none"> • Chair DWQMS Management review meetings
CHIEF OPERATOR, WATER SYSTEMS (Alternate QMS Rep)	
Responsibilities	Authorities
<p>Reporting to the Supervisor, Water Systems, the Chief Operator Water Systems, is responsible for:</p> <ul style="list-style-type: none"> • Compliant, efficient and safe operation of the Water Treatment and Distribution System • Reviewing water treatment and distribution documents and records • Preparing reports • Assisting with budget preparation and long-term planning • Coordination of preventive and emergency maintenance requirements • Scheduling/work planning and supervision of Water Treatment and Distribution Operators and on-site contractors • Maintaining provincial Operator Certification equivalent to the classification of the assigned systems • Providing and documenting operator training • Preparing, revising and approving operational procedures • Documenting and maintaining records of water treatment and distribution operations • Monitoring and controlling expenditures; approving equipment and supply purchases • Inspection, repair and maintenance of all equipment used by the City in the Water Treatment and Distribution Systems 	<p>The Chief Operator Water Systems is authorized to:</p> <ul style="list-style-type: none"> • Perform listed responsibilities • Carry out the duties of the Supervisor Water Systems in the event of the Supervisor's absence • Communicate with regulatory agencies • Evaluate and recommend prioritization and upgrading needs • Serve as primary ORO of the Water Treatment and Distribution System

OPERATOR, Water Systems	
Responsibilities	Authorities
<p>Reporting to the Chief Operator, Water Systems, Operators shall be responsible for:</p> <ul style="list-style-type: none"> • Monitoring and documenting water treatment and distribution system operating conditions in accordance with regulations and City policies and procedures • Collecting samples and performing laboratory analyses • Reviewing operating data and adjusting processes to maintain safe water quality and regulatory compliance • Assisting with report and procedure preparation • Performing preventive and emergency maintenance as directed within the treatment and distribution system • Perform routine scheduled inspections and carry out associated operational duties within the treatment and distribution system’s buildings, equipment and site to ensure the facilities are operating effectively • Maintaining provincial operator certification • Reporting and performing corrective actions for incidents of non-compliance in accordance with legislation and City policies and procedures 	<p>Operators have the authority to:</p> <ul style="list-style-type: none"> • Perform listed responsibilities • Serve as Operator in Charge or Overall Responsible Operator if qualified and authorized by the Chief Operator or Supervisor Water Systems • Conduct monthly analyzer verifications
RELIEF OPERATOR/INSTRUMENTATION TECHNICIAN, WATER SYSTEMS	
Responsibilities	Authorities
<p>Reporting to the Chief Operator, Water Systems, the Operator/Instrumentation Technician – Water Systems shall be responsible for:</p> <ul style="list-style-type: none"> • Routine inspections and operational checks on all equipment, buildings and treatment facilities, including those related to the Trunk Distribution system • Development of operating and inspection assignments for operations group to follow; these items may be related to new or refurbished equipment, new technology or Best Management Practices • Preparation and review of Standard Operating Procedures (SOP’s), work plans and other protocols. This also includes the development of a computerized maintenance planning database and various support modules • Assist the Chief Operator Water Systems in carrying out scheduled maintenance repairs with 	<p>Operator/Instrumentation Technician – Water Systems have the authority to:</p> <ul style="list-style-type: none"> • Perform listed responsibilities • Serve as Operator in Charge or Overall Responsible Operator if qualified and authorized by the Chief Operator or Supervisor Water Systems • Conduct monthly analyzer verifications

<p>staff and/or outside contractors</p> <ul style="list-style-type: none"> • Monitoring and documenting water treatment and distribution system operating conditions in accordance with regulations and City policies and procedures • Review and update Work Plans • Review Work Plans with Contractors to ensure that the City of Brockville’s Safe Work Policies are communicated, verified and inspected during the Contractor’s implementation of the Work Plan • Participate in identifying and updating safe work practices and procedures in addition to scheduling and documenting safety training • Assist the Chief Operator, Water Systems in the preparation of reports on operations, equipment updates, and other technical or Ministry of the Environment, Conservation and Parks (MECP) required documents • Prepare cost estimates, request for quotations from suppliers, and assist the Chief Operator Water Systems in preparing the justifications for budget requests 	
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OPERATOR/MAINTENANCE TECHNICIAN, WATER SYSTEMS

Responsibilities	Authorities
<p>Reporting to the Chief Operator, Water Systems, the Maintenance Technician – Water Systems shall be responsible for:</p> <ul style="list-style-type: none"> • Routine inspections and operational checks on all equipment, buildings and treatment facilities, including those related to the Trunk Distribution system • Development of operating and inspection assignments for operations group to follow; these items may be related to new or refurbished equipment, new technology or Best Management Practices • Preparation and review of Standard Operating Procedures (SOP’s), work plans and other protocols. This also includes the development of a computerized maintenance planning database and various support modules • Assist the Chief Operator Water Systems in carrying out scheduled maintenance repairs with staff and/or outside contractors • Monitoring and documenting water treatment and distribution system operating conditions in accordance with regulations and City policies and procedures • Review and update Work Plans • Review Work Plans with Contractors to ensure that the City of Brockville’s Safe Work Policies are 	<p>Maintenance Technician – Water Systems have the authority to:</p> <ul style="list-style-type: none"> • Perform listed responsibilities • Serve as Operator in Charge or Overall Responsible Operator if qualified and authorized by the Chief Operator or Supervisor Water Systems • Conduct monthly analyzer verifications

<p>communicated, verified and inspected during the Contractor's implementation of the Work Plan</p> <ul style="list-style-type: none">• Participate in identifying and updating safe work practices and procedures in addition to scheduling and documenting safety training• Assist the Chief Operator, Water Systems in the preparation of reports on operations, equipment updates, and other technical or Ministry of the Environment, Conservation and Parks (MECP) required documents• Review cost estimates, request for quotations from suppliers, and assist the Chief Operator Water Systems in preparing the justifications for budget requests• Performing maintenance work, this includes lubrications, oil changes, checking mechanical seals, packing glands and other preventive maintenance items, checking safety equipment such as: oxygen masks and tanks, safety harnesses, ropes, fire extinguishers, checking alignment, belt tensions, chain tensions, impellers, wear rings, calculating wear and performance of equipment using instruments such as micrometers, calipers, dial indicators, etc.• Diagnosing causes of malfunctions.• Repairing or replacing equipment or parts that show a wear and/or malfunction or in the case of breakdown.• Examples of equipment worked on include all types of pumps, motors, variable speed drives, control and metering devices, chlorinating and chemical addition equipment, distribution equipment and associated equipment, hoists, compressors, valves (electrical, hydraulic, water and safety devices).• Installing pumps and piping systems.• Maintaining standby generators, mowers, cutoff saw, portable pumps and other mechanical equipment in good working order.• Repairing equipment by electric and acetylene welding such as guards, railings, pump housings and also fabricating new equipment.• Cleaning, repairing, replacing and installation of 110 volt and 550 volt electrical equipment such as wiring, switches, breakers, contactors, relays, etc.	
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ABATEMENT/LAB TECHNICIAN	
<p>Responsibilities</p> <p>Reporting to the Supervisor Wastewater Systems, the Abatement/Lab Technician is responsible for:</p> <ul style="list-style-type: none"> • Provide technical laboratory support for the Engineering & Infrastructure Department • Perform analytical analysis pertaining to the Wastewater Treatment facility • Perform technical assistance for the WTP regarding calibration and test methods, sample analysis, review of standard operating procedures, and review of sampling results for QA/QC purposes • Prepare Technical Reports and support the compilation of committee and council reports for the Supervisor Water Systems and Chief Operator Water Systems • Develop and implement of the Sewer Use By-Law including various projects and monitoring programs required to ensure compliance with the By-Law • Assisting in the implementation and maintenance of the DWQMS 	<p>Authorities</p> <p>Abatement/Lab Technician has the authority to:</p> <ul style="list-style-type: none"> • Perform listed responsibilities • Enforcement of the Sewer Use By-Law • Provide supervision and training to the Assistant Abatement/Lab Technician
ADMINISTRATIVE ASSISTANT – TREATMENT FACILITIES	
<p>Responsibilities</p> <p>Reporting to the Supervisor Wastewater Systems, the Administrative Assistant is responsible for:</p> <ul style="list-style-type: none"> • Provide administrative assistance to the Supervisor, Chief Operator and Operators of Water Systems • Receive and compile operational, maintenance, inventory and laboratory reports through various software programs and databases • Assist in the preparation of committee and council reports and ensure that the reports are received by the Clerk’s office in a timely manner • Record all Operator Certification and Licensing for the Engineering & Infrastructure Department, register operational staff in training programs and certification exams, arrange accommodations, expenses and transportation as necessary 	<p>Authorities</p> <p>The Administrative Assistant has the authority to:</p> <ul style="list-style-type: none"> • Perform listed responsibilities • Provide administrative support to the division during the Supervisor’s absence • Carry out City’s purchasing policies and business practices in the purchasing and procurement of materials and services

10 Competencies

The following table lists the required and desired competencies of City of Brockville staff whose performance may have a direct impact on drinking water quality.

COMPETENCY REQUIREMENTS TABLE		
POSITION	REQUIRED COMPETENCIES	DESIRED COMPETENCIES
Director of Engineering & Infrastructure	<ul style="list-style-type: none"> • Civil Engineering Degree • exceptional written and verbal communications • exceptional supervisory, scheduling, planning skills • knowledge of workplace safety and all regulations, standards, guidelines, and specification related to the operation and management of the City’s physical assets • advanced capability in budget preparation / analysis • thorough knowledge of emergency procedures • working knowledge of standard office software 	
Engineering Supervisor	<ul style="list-style-type: none"> • Civil Engineering Diploma • knowledge of workplace safety and all regulations, standards, guidelines, and specification related to the operation of the City’s physical assets • proficient with standard office and engineering software • strong supervisory, organizational skills • strong communications and presentation skills • Budget preparation/analysis 	<ul style="list-style-type: none"> • First Aid/CPR • Confined Space Training • Knowledge of emergency procedures
Civil Tech.	<ul style="list-style-type: none"> • Civil Engineering Technologist Diploma • G drivers license • knowledge of applicable legislation, guidelines, standards and specifications • knowledge of water treatment and distribution system modeling techniques 	<ul style="list-style-type: none"> • Confined space entry training • First Aid/CPR • Confined Space Training

POSITION	REQUIRED COMPETENCIES	DESIRED COMPETENCIES
	<ul style="list-style-type: none"> • working knowledge of Microsoft Office, Haestad WaterCAD, GIS, AutoCAD applications • scheduling/work planning • written/verbal communications skills 	
<p>Supervisor, Water Systems</p>	<ul style="list-style-type: none"> • Class 3 WT, Class 3 WDS License • G License - Province of Ontario • Post-secondary degree or diploma in a related discipline • Water Chemistry, laboratory analysis and sampling skills • Knowledge of water treatment and water distribution processes and equipment • Mechanical, electrical, instrumentation and control systems knowledge and aptitude • Demonstrated aptitude in the areas of pumps, motors, valves and chemical feed systems • Experience with Supervisory Control and Data Acquisition software (SCADA) • Aptitude in reviewing plans, engineering drawings, etc. • Working knowledge of emergency and contingency planning and procedure writing • Knowledge of Occupational Health & Safety, Water and Regulatory requirements (Provincial, Federal) • Strong supervisory skills including scheduling, planning, budget preparation/analysis, project management • Strong Technical Writing abilities, verbal communication skills, use of Microsoft Office and other communication tools 	<ul style="list-style-type: none"> • 4 years experience in at least ONE of the following systems: <ol style="list-style-type: none"> (1) Class 3 WTP (2) Class 3 WDS (3) Class 3 WWT • 3 years experience in a Supervisory position in WT, WWT, or Utilities Sector • Combination of experience, education or licensing in a chemical, environmental or mechanical discipline • First Aid, CPR and Confined Space Training

POSITION	REQUIRED COMPETENCIES	DESIRED COMPETENCIES
Chief Operator, Water Systems	<ul style="list-style-type: none"> • Class 3 WT and Class 3 WDS License • G License - Province of Ontario • Post-secondary degree or diploma in a related discipline • Water Chemistry, laboratory analysis and sampling skills • Knowledge of water treatment and water distribution processes and equipment • Familiarity with mechanical, electrical, instrumentation and control systems • Demonstrated aptitude in the areas of pumps, motors, valves and chemical feed systems • Experience with Supervisory Control and Data Acquisition software (SCADA) • Familiarity in reviewing plans, engineering drawings, etc. • Knowledge of emergency and contingency planning and procedure writing • Knowledge of Occupational Health & Safety, Water and Wastewater Regulatory requirements (Provincial, Federal) • Familiar with budget preparation and analysis • Strong written and verbal communication skills, some technical writing and reporting • Working knowledge of standard office software 	<ul style="list-style-type: none"> • A minimum of 2 years experience in ONE of the following systems: <ul style="list-style-type: none"> (1) Class 3 WTP (2) Class 3 WDS (3) Class 1 WWT • Minimum 1 year experience in a Supervisory position in WT, WWT, or Utilities Sector • Combination of experience, education or licensing in a chemical, environmental or mechanical discipline • First Aid, CPR and Confined Space Training
Relief Operator/ Instrumentation Technician, Water Systems	<ul style="list-style-type: none"> • Class 3 WT, Class 3 WDS • 3 years OIC in a Water System Class 3 or above • G License – Province of Ontario • 2 years post-secondary education in related discipline • Water Chemistry, laboratory analysis and sampling skills 	<ul style="list-style-type: none"> • A minimum of 4 years experience in ONE of the following systems: <ul style="list-style-type: none"> (1) Class 2 WT (2) Class 1 WDS • Experience, education or licensing in a chemical,

POSITION	REQUIRED COMPETENCIES	DESIRED COMPETENCIES
	<ul style="list-style-type: none"> • Knowledge of water treatment and water distribution processes and equipment; valves, pumps, motors, chemical feed systems • Proficiency with mechanical, electrical instrumentation and control systems including SCADA systems • Knowledge of Occupational Health & Safety, Water and Wastewater Regulatory requirements (Provincial & Federal) • Familiarity in reviewing plans, engineering drawings, etc. • Knowledge of Emergency and Contingency planning and procedure writing • Strong written and verbal communications skills working knowledge of standard office software 	<p>environmental or mechanical or instrumentation discipline</p> <ul style="list-style-type: none"> • First Aid, CPR and Confined Space Training • DZ drivers license • Heavy Equipment Operations (i.e. loader, boom truck, backhoe)
<p>Operator/Maintenance Technician, Water Systems</p>	<ul style="list-style-type: none"> • Maintenance Mechanic Certificate • Class 3 WT, Class 3 WDS • 3 years OIC in a Water System Class 3 or above • G License – Province of Ontario • 2 years post-secondary education in related discipline • Water Chemistry, laboratory analysis and sampling skills • Knowledge of water treatment and water distribution processes and equipment; valves, pumps, motors, chemical feed systems • Proficiency with mechanical, electrical instrumentation and control systems including SCADA systems • Knowledge of Occupational Health & Safety, Water and Wastewater Regulatory 	<ul style="list-style-type: none"> • A minimum of 4 years experience in ONE of the following systems: <ul style="list-style-type: none"> (3) Class 2 WT (4) Class 1 WDS • Experience, education or licensing in a chemical, environmental or mechanical discipline • First Aid, CPR and Confined Space Training • DZ drivers license • Heavy Equipment Operations (i.e. loader, boom truck, backhoe)

POSITION	REQUIRED COMPETENCIES	DESIRED COMPETENCIES
	requirements (Provincial & Federal) <ul style="list-style-type: none"> • Familiarity in reviewing plans, engineering drawings, etc. • Knowledge of Emergency and Contingency planning and procedure writing • Strong written and verbal communications skills working knowledge of standard office software 	
Operator, Water Systems	<ul style="list-style-type: none"> • Class 2 WT, Class 1 WDS • G License - Province of Ontario • 2 years post-secondary education in related discipline • Water Chemistry, laboratory analysis and sampling skills • Knowledge of water treatment and water distribution processes and equipment; valves, pumps, motors, chemical feed systems • Familiarity with mechanical, electrical, instrumentation and control systems including SCADA systems • Knowledge of Occupational Health & Safety, Water and Wastewater Regulatory requirements (Provincial, Federal) • Written and verbal communication skills • Working knowledge of standard office software 	<ul style="list-style-type: none"> • A minimum of 2 years experience in ONE of the following systems: (1) Class 3 WT (2) Class 3 WDS (3) Class 1 WWT • Experience, education or licensing in a chemical, environmental or mechanical discipline • First Aid, CPR and Confined Space Training • DZ drivers license • Heavy Equipment Operations (i.e. loader, boom truck, backhoe)
Abatement/Lab Technician	<ul style="list-style-type: none"> • Post secondary Laboratory Science Diploma with 3 years related work experience; or an equivalent of 3 years post secondary education and work experience. • Working knowledge and theory of spectrophotometry, pH measurements and dissolved oxygen instrumentation and microbiological techniques. • Wet laboratory methods 	<ul style="list-style-type: none"> • Diploma in Laboratory Science; 3 years experience in Environmental Science with 1 year of entry level supervisory experience; WQA License • 3 years experience at a similar sized facility(ies)

POSITION	REQUIRED COMPETENCIES	DESIRED COMPETENCIES
	including gravimetric analysis, pH measurements, solution and standards preparation and vacuum filtration. <ul style="list-style-type: none"> • Statistical analysis, use of data management tools, and use/development of standard operating procedures, QA/QC methods. 	<ul style="list-style-type: none"> • First Aid, CPR and Confined Space Entry. • Abatement programs or similar experience an asset.
Administrative Assistant – Treatment Facilities	<ul style="list-style-type: none"> • Gr. 12 or equivalence and post-secondary education in office management. • 2 years experience working in an industrial or mechanical office management setting. • Very strong oral and written communication skills. • Proficiency in typing, and in all areas of administrative support to the Division. • Experience with a personal computer and software experience that includes Microsoft Office products. • Knowledge of Water and Wastewater Treatment systems. 	<ul style="list-style-type: none"> • Diploma in Industrial or Office Systems Management. • 5 years experience in an industrial or mechanical office management setting. • In addition to Microsoft Office products, experience in working with Database management software or maintenance management systems.
<p>NOTE: It is acknowledged that the stated academic qualifications (degree, diploma) are not competencies. They are listed for several positions to illustrate the level of competency required in scientific, mathematical and engineering fundamentals.</p>		

Satisfying Competencies

10.1 Satisfying Competencies

The competency requirements identified in the above table are developed, maintained and confirmed by the following:

- Candidates considered for hire must submit proof of education, licensing and required competencies during the hiring process through the Human Resources Department of the City of Brockville.
- Employees may receive training including such topics such as confined space,

occupational health and safety, personal hygiene, treatment process operations, regulatory requirements, equipment operation and maintenance, contingency plans and new treatment equipment technologies.

- Training is provided using a variety of delivery methods: current utility staff, technical experts, process field technicians, engineering groups and contracted professional services trainers. Training provisions for certification meet or exceed those required by Ontario regulations. Training promotes staff awareness of the relevance of their duties and how their actions affect the production and delivery of safe drinking water.
- The City of Brockville provides financial support to staff completing operator certification examinations, renewing certificates, and for independently attending related training.

11 Personnel Coverage

The City employs 12 persons in positions directly involved with the day-to-day operations of the water treatment and distribution systems who are all certified operators in accordance to the requirements of the applicable provincial legislation. Of those 12 certified operators, 2 positions are non-union and the remainder are employed according to the terms and conditions of a collective agreement. In the event of labour dispute, coverage will be temporarily provided by the non-union City staff positions: Supervisor Water Systems, and the Chief Operator Water Systems.

The table below shows the positions directly involved in operating the drinking water facilities operation and the times during which they are normally on duty. The numbers and letters in the matrix indicate the number of persons and the type of certification they hold.

Summary Table of Drinking Water System Personnel Coverage

Hours	On-call Operator	Supervisor Water Systems	Chief Operator Water Systems	Operator Water Systems
Monday to Friday 0700hr – 1530hr		1 WT/WD	1 WT/WD	10 WT/WD
Saturday & Sunday 700hr – 1530hr				1 WT
Off-hours, weekends, holidays	1 WT 1 WD			
Labour Dispute		1 WT/WD	1 WT/WD	

*Specified times and staffing are typical, however 8 hour shift start and stop times may vary.

** Operators have 30 minutes to respond to alarms, according to the Collective Bargaining Agreement.

11.1 Overall-Responsible-Operators (ORO)

The Supervisor and/or Chief Operator, Water Systems is designated as the Overall-Responsible-Operator (ORO) for the Water Treatment Plant, Local Water Distribution System, and the Trunk Water Distribution System. In the absence of a non-union ORO from the Water Systems Division, a qualified, licensed Operator may be assigned this responsibility and notification provided to all operations staff, fire dispatch and the Director of Engineering and Infrastructure in writing by email.

11.2 Water Systems Personnel

The Chief Operator, Water Systems Division receives overall direction from the Supervisor, Water Systems Division, and is normally assisted at the Water Treatment Plant (WTP) and Water Distribution by the Water Systems Operators.

Water Treatment

The WTP is staffed 7 days per week from 07:00 to 15:30 hrs. Treatment Operators conduct day to day operation, testing, and maintenance of the Water Treatment Plant. The WTP is continuously monitored by the Supervisory Control and Data Acquisition (SCADA) system. One Treatment Operator is always on-call to respond to any problems in the water treatment system detected by the SCADA system – this duty is rotated through all Treatment Operators according to a schedule determined by the Chief Operator. If an alarm condition occurs, an auto-dialer is activated to notify the WTP on-call operator by cell phone. If the on-call operator does not respond to the call and acknowledge the alarm condition, the auto-dialer begins calling a list of cell phone and home phone numbers that will alert other Water Systems Division staff to the problem until the alarm is acknowledged. Any alarms, corrective actions or other call-outs are recorded in the Water Systems Division log book

Water Distribution

The day-to-day monitoring and maintenance of the local and trunk Water Distribution Systems is carried out by the Water Systems Division.

Distribution System issues are frequently first detected by the public. In the event of an issue, such as a water main break, the Water Systems Division after hour's emergency

phone number connects concerned callers to the fire department dispatch, who then notifies the On-Call Operator by cell phone as per the current Water Systems Division Distribution On-Call listing.

According to the Collective Bargaining Agreement, Water System Operators must respond to all after-hours calls within 30 minutes. All pertinent information and corrective actions are recorded in the Water Systems Division electronic records system.

11.3 Rationale

Most alarm conditions can be addressed by one Operator when following standard operational procedures. Contact information for all operators is readily accessible by the on-call operators and ORO.

The 30-minute response time is considered a reasonable time frame based on the extent of the alarm coverage in place, conservative alarm set points, and the multiple monitoring and treatment barriers that exist within the Water Systems Division – all of which prevent risk to public health.

12 QMS Communications

The procedure for communicating relevant Drinking Water Quality Management System information to the Owner, Operating Authority personnel, suppliers, and to the public is documented in the DWQMS Communications Procedure, attached as Appendix J.

13 Essential Supplies and Services

Appendix K provides a listing of contact information for Essential Supplies and Services.

Quality of Supplier Products and Services

Quality Assurance of Essential Supplies and Services is achieved through documentation of applicable accreditation, licences and certifications. The City of Brockville requires that suppliers of process chemicals verify the quality of each product through documented references like Certificates of Analysis, Referenced Standards or Standards Organizations, or use of Pre-qualification process.

Once each audit cycle, a standard letter is sent to all essential suppliers identified on the Essential Supplies and Services List (Appendix K – Procedure 1011). The letter includes a brief description of the City of Brockville DWQMS and also highlights the direct relationship between the supplier and the City. Each supplier is requested to authorize and return an Agreement to Supply form from their authorized company representative which outlines their agreement to supply as per quality requirements specified.

14 Review and Provision of Infrastructure and Resources

Throughout the year, the City of Brockville regularly reviews the adequacy of its infrastructure by utilizing a variety of methods and programs, as described in the Infrastructure Review Procedure. Information collected through the use of these programs is recorded by the appropriate staff and is used in preparation of the annual budget. This information assists City staff in identifying and prioritizing a list of required infrastructure projects. This list of infrastructure projects is then included in the City's annual capital budget for consideration by City Council. Projects not selected by Council are documented and placed back in the rolling ten-year capital plan.

The Infrastructure Review Procedure is attached as Appendix E.

15 Infrastructure Maintenance, Rehabilitation and Renewal

MAINTENANCE/REHABILITATION AND RENEWAL PROGRAMS

The City of Brockville recognizes that a key part of ensuring safe drinking water is to provide adequately maintained and where necessary improved infrastructure. In order to achieve this goal the City has established planned programs for maintenance, rehabilitation and renewal.

MAINTENANCE - PLANNED

The Supervisor of Water Systems is responsible for the planning of scheduled maintenance activities for each of the respective areas. The scheduling of the activities is based on variety of criteria including; regular inspections, equipment manuals requirements and past experience. The planned maintenance work is recorded in the appropriate log books and daily work record sheets. Work orders may be issued regarding the work. Once completed, work orders will be signed off by the operator in charge of the work and returned to the originator.

MAINTENANCE – UNPLANNED

Unplanned maintenance work is a result of unexpected equipment malfunction or breakage. The Supervisor of Water Systems is responsible for unplanned maintenance activities for each of the respective areas. The overall responsible operator normally responds to emergency maintenance during regular working hours with the on-call operator responding during off hours. Unplanned maintenance work is recorded in the appropriate logbooks and daily work record sheets. Work orders may be issued regarding the work. Once completed, work orders will be signed off by the operator in charge of the work and returned to the originator.

REHABILITATION AND RENEWAL

The Director of Engineering & Infrastructure, in consultation with the Supervisor of Water Systems and the Engineering Supervisor, are responsible for identifying rehabilitation and renewal projects and for the preparation of the associated budgets. These projects are then included in the City’s ten-year rolling plan and presented to Council during annual budget proceedings for their consideration. Projects not selected are documented and placed back in the ten-year capital plan and Council is made aware. The effectiveness of the City’s maintenance program is periodically reviewed through a

performance evaluation where a comparison of each activity is made to the previous year.

The following is a summary of activities used by the City of Brockville to maintain, rehabilitate and renew the infrastructure of the City's drinking water system:

1. Hydrant Inspections
2. Valve Inspections
3. Leak Detection Program
4. Watermain Break Monitoring
5. Ten-Year Capital Plan – Water
6. Ten-Year Capital Plan
7. Water System Monthly Reports
8. Engineering Reports
9. Flushing Program

16 Sampling and Monitoring

The Drinking Water System sampling and monitoring program for the City of Brockville is designed to comply with all legislated requirements. A series of Standard Operating Procedures are listed in Appendix F.

17 Measurement and Recording Equipment Calibration and Maintenance

Annual Flow Meter Calibrations are performed by a certified instrumentation technician. The results of the annual flow meter calibrations are included in the Annual Summary Reports for Council – a requirement under Reg. 170/03 (Schedule 22). Appendix “G” describes the procedure used to perform Maintenance and Calibration on measurement and recording devices.

18 Emergency Management

The Emergency Response Procedure, Appendix L, describes the general response and recovery processes to be followed when dealing with a drinking water emergency and evaluating the effectiveness of completed response and recovery operations. The procedure also identifies the requirements for and the processes used to identify potential future drinking water emergencies, develop contingencies to respond to potential emergencies, and evaluate the effectiveness of those contingencies.

The City of Brockville has an Emergency Plan which is supplementary to the Water Systems Emergency Response Manual. These plans identify the City of Brockville's overall role during municipal emergencies and the internal mechanisms to fulfill that role. Specific to drinking water emergencies, the Water Systems plans contain response plans for drinking water system critical infrastructure failure which outlines the response and recovery actions, considerations, and corporate level responsibilities for major drinking water emergencies.

19 Internal Audits

Internal Audits are conducted at least once per calendar year to verify conformity of the drinking water quality management system to the requirements of the Drinking Water Quality Management Standard. Internal Audits are a “check” activity of the standard that provides a formal process for evaluating the effectiveness of the management system.

A detailed procedure for conducting internal audits is attached as Appendix H.

20 Management Reviews

Management Reviews are conducted at least once every calendar year for the purpose of reporting to Top Management the status of the DWQMS and to provide the information needed to make decisions on the maintenance and continual improvement of the DWQMS.

A detailed procedure for completing management reviews is attached as Appendix I.

21 Continual Improvement

Continual improvement of the QMS shall be achieved by:

Tracking Continual Improvement

- Document all continual improvements on FORM 005 - DWQMS Continual Improvement Record
- Continual improvements will be reviewed at the annual management review meeting

Implementing Best Management Practices

- Review and consider best management practice recommendations from MECP at least once every 36 months with Top Management at the annual management review meeting and document in meeting minutes
- Document all best management practice reviews on FORM 005 - DWQMS Continual Improvement Record

Identification and Management of Corrective Actions

Corrective actions involve taking measures to eliminate causes of identified nonconformances of the Quality Management System with the requirements of the DWQMS or other undesirable situation.

Corrective actions may be initiated as a result of the following indicators:

- Internal audits
- External audits
- Management reviews
- Customer Complaints

- Staff suggestions
- Trend identified in management reports

Any employee can initiate corrective actions by issuing FORM 001 - DWQMS Continual Improvement Analysis. This form will identify:

- Root cause of identified non-conformity
 - Corrective immediate short term action to be taken
 - Actions taken to correct the non-conformity and prevent the non-conformity from re-occurring
 - Auditor statement verifying corrective actions are effective
-
- All corrective actions taken to correct non-conformities will be documented in FORM 005 - DWQMS Continual Improvement Record and reviewed at the annual DWQMS Management Review Meeting.

Identification and Management of Preventive Actions

Preventive actions are taken to eliminate or prevent the cause of a potential nonconformance.

Preventive actions may be initiated as a result of the following indicators:

- Opportunity for improvements identified in audits
- Risk assessment outcomes
- Infrastructure review outcomes
- Staff suggestions
- Management review action items
- Customer complaints
- Emergency response training outcomes
- Trends identified in management reports

Any employee can initiate preventive actions by issuing FORM 001 - DWQMS Continual Improvement Analysis Form. This form will identify:

- Staff to identify and take actions to eliminate the occurrence of potential non-conformities (through preventive actions)
- Actions taken to prevent a non-conformity from occurring
- Statement verifying preventive actions are effective

All preventive actions taken to prevent potential non-conformities will be documented in Form 005 - DWQMS Continual Improvement Record and reviewed at the annual DWQMS Management Review Meeting.

Associated Documents and Records

- FORM 001 - DWQMS Continual Improvement Analysis Form
- FORM 005 - DWQMS Continual Improvement Record

RECORD OF REVISIONS

Operational Plan 152-401 Version No.	Date	Revision Description(s)	Revision By
10	2020-05-28	<p><u>Updated</u> standard headers.</p> <p>Table of Contents – <u>Added</u> Local Reservoir Storage at page 13</p> <p><u>Updated</u> Owner, Top Management and Supervisor Water Systems.</p> <p>Element 3 – <u>Updated</u> Owner, Top Management and Supervisor Water Systems.</p> <p>Element 6 – <u>Updated</u> PTTW expiry date. <u>Updated</u> Permit To Take Water expiry date to March 31, 2024. General – UV disinfection changed from “operated seasonally” to “as needed basis”. <u>Added</u>: Local Reservoir Storage section. Backwashing and Process Waste Residuals Management – <u>Removed</u>: From the holding tank the waste backwash water is pumped to a settling tank where the suspended matter is settled out as sludge. This sludge is cleaned daily from the bottom of the settling tank by a siphon sludge removal system and then pumped to the sewage plant for further treatment. The supernatant (clear water from the top portion of the settling tank) is returned to the river. <u>Replaced with</u>: From the holding tank the waste backwash water is pumped to sanitary sewer.</p> <p><u>Updated</u> 6.1 Process Flow Diagram – removed settling tank.</p> <p>Element 9 – <u>Updated</u>: ORO responsibilities for Supervisor and Chief Operator</p> <p>Element 11 – <u>Updated</u> Section 11.2 Water Systems Personnel.</p> <p>Element 14 – <u>Added</u>: as described in the Infrastructure Review Procedure.</p> <p>Element 15 – Rehabilitation and Renewal – <u>Added</u> comment “and council is made aware”.</p> <p>Element 19 – <u>Removed</u>: Internal Audits are conducted at least once per 12 months. <u>Replaced with</u>: Internal Audits are conducted at least once per calendar year.</p> <p>Element 21 – <u>Replaced</u> MOECC with MECP. <u>Added</u> that the Corrective Action form will include: Actions taken to correct the non-conformity and prevent the non-conformity from re-occurring. <u>Removed</u>: Corrective Action Request form will identify;</p> <ul style="list-style-type: none"> ▪ Operational staff or other staff to identify and eliminate the occurrence of potential non-conformities ▪ Potential non-conformities will be submitted to QMS rep for review ▪ All potential non-conformities will be documented in the annual summary report and reviewed and the annual DWQMS Management Review Meeting <p><u>Replaced with</u>: Corrective Action Request form will identify;</p> <ul style="list-style-type: none"> ▪ Operational staff or other staff to identify and take actions to eliminate the occurrence of potential non-conformities (through preventive actions) 	J. Buckland/ C. Drake

Operational Plan 152-401 Version No.	Date	Revision Description(s)	Revision By
		<ul style="list-style-type: none"> ▪ Potential non-conformities will be submitted to QMS rep for review; after which verification of implementation can be scheduled through the next internal audit, ▪ All actions taken to prevent potential non-conformities will be documented in the annual summary report and reviewed at the annual DWQMS Management Review Meeting <p><u>Updated:</u> standard header for appendices – <u>removed</u> “issued by”.</p> <p>Appendix A – Section 3.0 – changed signature block to standard header. Section 4.3.2: <u>Changed</u> “signed” to “authorized”. Section 4.3.3: <u>Removed:</u> procedure title, DWQMS reference, issued by and issued date, revision date and revised by, and a signature of approval from the QMS representative. <u>Replaced with:</u> a standard header. Section 4.3.4: <u>Removed:</u> Hard copies shall display the original signature of approval.</p> <p>Appendix C – <u>Updated</u> Drinking Water Health Hazard definition. Section 4.1.3: <u>Added:</u> At this stage, the Team considers the potential hazardous events and associated hazards as identified in the current version of the Ministry of the Environment, Conservation and Parks’ (MECP’s) document titled “Potential Hazardous Events for Municipal Drinking Water Systems”. Section 4.1.7: <u>Replaced</u> every three years with every thirty-six months.</p> <p>Appendix D – <u>Updated</u> Fluoridation section – changed likelihood to 3 from 5. Updated from alarm systems to visual inspections and lab analysis</p> <p>Appendix E – Section 4.2: <u>Replaced</u> once each year with once every calendar year.</p> <p>Appendix F – <u>Added</u> HAA’s to quarterly sampling. <u>Added</u> the section Seasonal Sampling and Analysis. Modified table contents and layout. <u>Removed:</u> The monthly report shall be forwarded to the Water Systems Supervisor and Director of Engineering & Infrastructure who communicates the sampling, testing and monitoring results to the owner in the form of a Quarterly Report to Council</p> <p>Appendix G – Section 4.2: <u>Added</u> “or Maintenance Technician”. Modified table contents and layout.</p> <p>Appendix H – <u>Added</u> references to DWQMS Forms. Section 4.4.2: <u>Replaced</u> “once every twelve months” with “once every calendar year”. Section 4.4.2: <u>Added</u> “or changing risks”. Section 4.5.1: <u>Added</u> - Review previous internal and external audit results to verify any previous findings are still appropriately addressed. <u>Added</u> Section 4.6.3: If hiring a consultant to carry-out the internal audit, their standard audit checklist and report format is acceptable and considered to meet the requirements and intent of this section.</p> <p>Appendix I – <u>Added</u> reference to procedure # and appendix in Related Forms.</p>	

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		<p>Appendix J – Section 4.2 <u>Added</u>: monthly reports. Section 5.0 Owner – <u>Removed</u>: reference to Quarterly reports. <u>Added</u>: reference to monthly reports.</p> <p>Appendix K – <u>Updated</u> Corix to Iconix. <u>Removed</u> Holland as an alternative coagulant company. <u>Updated</u> Hanson to Forterra. <u>Added</u> MIS Department to list.</p>	
11	2021-06-16	<p>Replaced Environmental Services with Engineering & Infrastructure</p> <p>Element 6 – <u>Revised</u> process information descriptions to provide additional detail. <u>Clarified</u> information regarding CT monitoring and disinfection/inactivation systems. <u>Revised</u> source water overview and updated referenced parameter values. <u>Revised</u> Operational Challenges section to include information regarding limited redundancy in key areas of the treatment and distribution network and support systems.</p> <p>Element 9 – <u>Removed</u> Administrative Coordinator position from organizational structure.</p> <p>Element 10 – <u>Removed</u> Administrative Coordinator position from competencies.</p> <p>Element 21 – <u>Added</u> reference to DWQMS Form 005 – Continual Improvement Record and FORM 001 - DWQMS Continual Improvement Analysis. <u>Expanded</u> upon the BMP, Corrective Action and Preventive Action sections. <u>Added</u> Associated Documents and Records section</p> <p>Appendix D- <u>Updated</u> Risk Assessment Outcomes.</p> <p>Appendix H – <u>Revised</u> to indicate use of new FORM 001 - Continual Improvement Analysis Form and FORM 005 - Continual Improvement Record Spreadsheet. <u>Replaced</u> old forms.</p> <p>Appendix J – <u>Removed</u> reference to monthly reports and inspection reports in section 4.2.</p>	J. Buckland/ C. Drake
12	2024-09-26	<p>Element 3 – <u>Updated</u> Owner, City Manager & Supervisor</p> <p>Element 4 – <u>Added</u> Alternate QMS Rep – Chief Operator – Water Systems. <u>Removed</u> reference to DWQMS Committee.</p> <p>Element 6 – <u>Updated</u> PTTW dates. <u>Updated</u> MDWL issue date. <u>Added</u> Schedule C. <u>Revised</u> section for testing geosmin and MIB to “as necessary”.</p> <p>Element 9 – <u>Added</u> Relief to Operator Instrumentation Technician role. <u>Removed</u> reference to filling in on water operators’ duties for Operator/Maintenance Technician</p> <p>Element 11 – <u>Updated</u> Personnel Coverage to 12.</p> <p>Appendix A – <u>Removed</u> section 4.3.5 reference to procedure addition or revision notification form. Update associated documents.</p> <p>Appendix C – <u>Changed</u> reference to DWQMS Committee to DWQMS Risk Assessment Team</p> <p>Appendix D - <u>Updated</u> Risk Assessment Outcomes.</p>	J. Buckland/ C. Sluytman

Operational Plan 152-401 Version No.	Date	Revision Description(s)	Revision By
		<p>Appendix F – <u>Removed</u> instruction “once the original certificate of analysis is received, the completed COC form must be attached to the corresponding certificate of analysis and filed in the appropriate file.” <u>Changed</u> monthly summaries to quarterly summaries.</p> <p>Appendix G – <u>Updated</u> equipment. <u>Added</u> clarification between verifications and calibrations. <u>Updated</u> equipment O & M manuals.</p> <p>Appendix I – Revised section 4.2 list descriptions.</p> <p>Appendix K – <u>Added</u> Robotic and Process Automation Co. as an essential supplier/service provider. <u>Revised</u> ISI Controls to Excelpro Inc. and <u>updated</u> contact info.</p>	

APPENDICES

PROCEDURE TITLE: Document Control Procedure		PROCEDURE NO.: 1001.2
		ISSUE DATE: 2009-01-08
AUTHORIZED BY: C. Sluytman	REVISED BY: J. Buckland	REVISION DATE: 2024-06-25

DOCUMENTATION CONTROL

1.0 DESCRIPTION

This procedure outlines the methods utilized by the City of Brockville to control the creation, approval, distribution, and revision of all **documents** related to the Drinking Water Quality Management System (DWQMS).

2.0 PURPOSE

Consistent control ensures the currency, accuracy, and ease of retrieval of DWQMS documentation. It is critical to the Drinking Water Quality Management Standard that all documentation is properly maintained (stored, protected, retained and disposed of).

3.0 RESPONSIBILITY

The QMS Representative is responsible for the control of all DWQMS documentation. All internal documentation is authorized by the QMS representative prior to issuance of current or revised procedures. The QMS representative provides authorization within the document standard header.

4.0 PROCEDURE

4.1 Document control within the DWQMS system may include:

Internal Documentation

- Operational Plan and its associated policies and procedures
- Standard Operating Procedures
- Internal and External Audit Reports
- Management Review Meeting Minutes
- Work Instructions
- Forms

External Documentation

- Drinking Water Regulations (applicable only)
- Industry Standards (applicable only)
- Municipal By-laws (applicable only)
- Equipment Manuals

4.2 The QMS Representative maintains a current listing of all internal and external documentation using FORM 010 DWQMS Master Document List. This listing contains a DWQMS reference, document title, date of last revision and location.

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4.3 Internal Documentation

4.3.1 All documentation within the DWQMS system is reviewed and updated (as required) on an annual basis.

4.3.2 Internal documentation affected by the DWQMS shall be clearly marked as "UNCONTROLLED WHEN PRINTED" and authorized by the QMS Representative.

4.3.3 All DWQMS procedures shall be identified with a standard header.

4.3.4 All DWQMS documentation originals shall be stored at the Water Systems Division in a hard copy format.

4.3.5 DWQMS approved documentation (new or revised) is presented to all personnel affected. New procedures are inserted in the hard copy binder and obsolete procedures removed. Obsolete procedures are retained for a period of one year at the Water Systems Division.

4.4 External Documents

4.4.1 All copies of external DWQMS documents are stored at the Water Systems Division.

4.4.2 Current equipment manuals are located at the Water Systems Division

4.4.3 All obsolete DWQMS internal and external documentation are promptly removed from use.

4.4.4 All obsolete internal and external QMS documents that are subject to disposal are recycled or destroyed. The manner of destruction may include but not be limited to shredding, rendering, incineration or deletion.

4.4.5 Internal and external documentation are reviewed at a minimum on an annual basis as a component of the annual internal audit and management review. Reviews may also be conducted on the basis of a significant change in operations (e.g. process, equipment).

See Appendix B Records Control Procedure 1002 for the exercising and methods utilized for records.

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5 Associated Documentation

- FORM 010 DWQMS Master Document List
- Appendix B Records Control Procedure 1002
- Appendix J Communications 1010

PROCEDURE TITLE: Records Control Procedure		PROCEDURE NO.: 1002.1
		ISSUE DATE: 2009-01-08
AUTHORIZED BY: C. Drake	REVISED BY: J. Buckland	REVISION DATE: 2020-02-26

Records Control

1.0 Procedure Description

This procedure provides guidance for the identification, use, retention, storage and protection of all records generated that are related to the DWQMS.

2.0 Reason for Procedure

Consistent control ensures the ease of retrieval of each record generated by City of Brockville employees. Proper maintenance of records is critical for conformance with the DWQMS and also for compliance with drinking water legislation. It is important that records are legible, readily identifiable, retrievable, stored, protected, retained and disposed of.

3.0 Responsibility

The designated QMS representative is responsible for ensuring that an effective method for controlling all DWQMS records exists.

4.0 Procedure

- 4.1 Legibility of hard copy records is ensured through staff communications and training.
- 4.2 Records may be retained electronically and/or in hard copy.
- 4.3 Minimum retention times for all Ministry of the Environment, Conservation and Parks (MECP)-required records are maintained as per the relevant regulations.
- 4.4 In cases where a minimum record retention time is not specified by a regulation, including those required to demonstrate conformance to the DWQMS, records are retained for a minimum of 15 years.
- 4.5 Filing and storage of paper records are such that they are protected from damage and are readily retrievable. Records from the current year are stored in filing cabinets at the Water Systems Division. All records older than one year are stored, clearly marked with the dates and types of records contained within (so that they are readily identifiable), at the Water Systems Division.

PROCEDURE TITLE: Records Control Procedure		PROCEDURE NO.: 1002.1
		ISSUE DATE: 2009-01-08
AUTHORIZED BY: C. Drake	REVISED BY: J. Buckland	REVISION DATE: 2020-02-26

- 4.6 Electronic records are stored on the City Hall central computer and Watertrax and are backed up daily.
- 4.7 Records may be retained beyond 15 years, depending on storage capabilities.
- 4.8 Records are made available to the public where required by legislation.
- 4.9 All obsolete internal and external QMS records that are subject to disposal are recycled or destroyed. The manner of destruction may include but not be limited to: shredding, rendering, incineration, or deletion.

5.0 Associated Documents

- *Ontario Regulations*

PROCEDURE TITLE: Risk Assessment Procedure		PROCEDURE NO.: 1003.2
		ISSUE DATE: 2009-03-10
AUTHORIZED BY: C. Sluytman	REVISED BY: J. Buckland	REVISION DATE: 2024-06-25

1.0 PURPOSE

The purpose of this procedure is to document the process for completing the City of Brockville’s DWQMS risk assessment. The procedure describes the methods for hazard identification, risk assessment, and critical control point determination.

The systematic approach used for risk identification and assessment lessens the likelihood of overlooking potential treatment process hazards and associated risks to drinking water quality and public health. Hazard analysis, identifying critical control points, establishing critical limits and control instructions provides all operators with consistent direction for responding to conditions that pose a risk of jeopardizing drinking water quality.

2.0 SCOPE

The risk assessment process described in this procedure is applied to all aspects of the City of Brockville’s drinking water system as per the requirements of the Ontario Drinking Water Quality Management Standard.

3.0 DEFINITIONS

ITEM	Definition
DWQMS	Drinking Water Quality Management System.
Drinking water health hazard	<ul style="list-style-type: none"> a) a condition of the system or condition associated with the system’s waters, including anything found in the waters, i) that adversely affect...; ii) that deters or hinders (or is likely to...) the prevention or suppression of disease; or iii) that endangers or is likely to endanger public health; b) a prescribed condition of the drinking water system; or c) a prescribed condition associated with the system’s waters or the presence of a prescribed thing in the waters.
Risk	Probability of identified hazards causing harm, including the magnitude or consequences of that harm.
Risk assessment	Systematic methodology of identifying hazards or hazardous events that may affect the safety of drinking water and evaluating their significance.
Likelihood	Probability of a hazard or hazardous event occurring, taking into account the frequency of the event (how often/how likely).

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- Consequence** Severity of the result of the hazard or hazardous event if the hazard is not controlled.

- Detectability** Ease with which the presence of the hazard or an occurrence of the hazardous event can be detected.

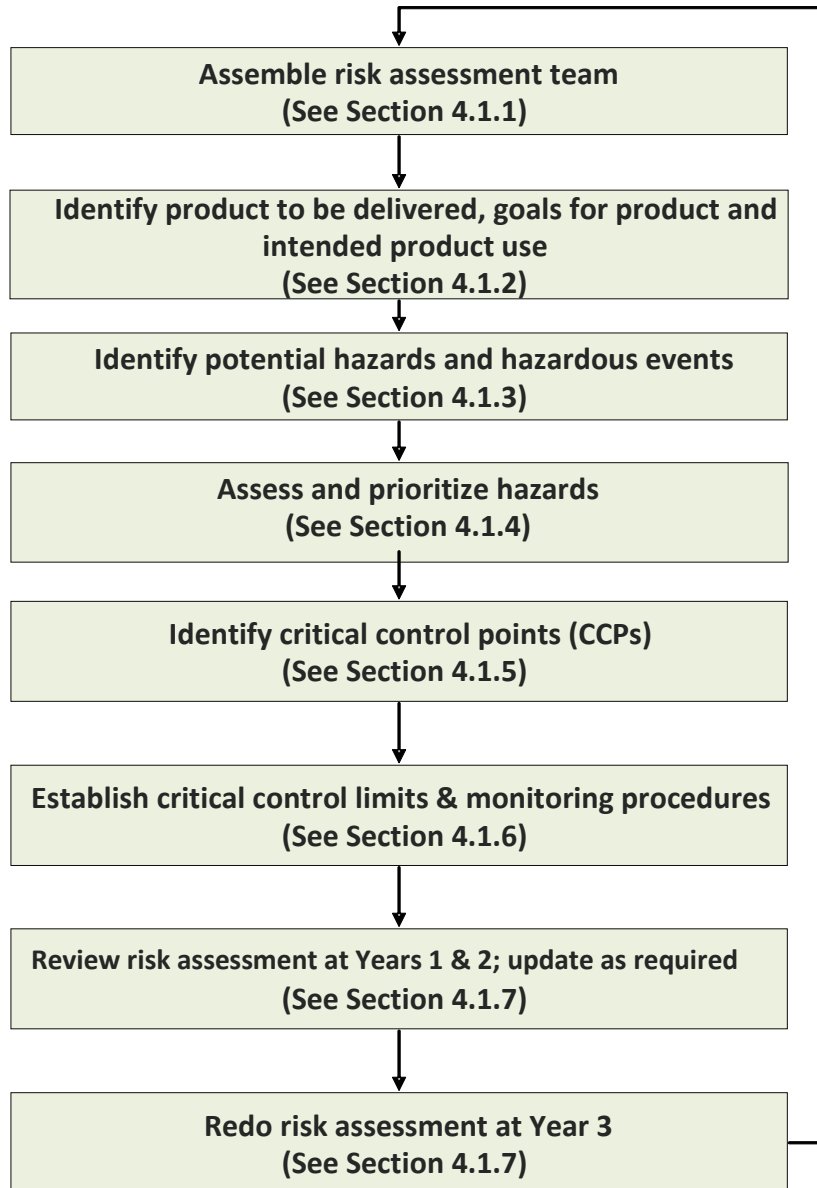
- Critical control point** An essential step or point in the subject system at which a control can be applied by the operating authority to prevent or eliminate a drinking water health hazard or to reduce it to an acceptable level.

- Critical control limit** The point at which a critical control point response procedure is initiated.

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AUTHORIZED BY: C. Sluytman	REVISED BY: J. Buckland	REVISION DATE: 2024-06-25

PROCEDURE

Risk Assessment Process – Overview



PROCEDURE TITLE: Risk Assessment Procedure		PROCEDURE NO.: 1003.2
		ISSUE DATE: 2009-03-10
AUTHORIZED BY: C. Sluytman	REVISED BY: J. Buckland	REVISION DATE: 2024-06-25

4.1.1 Step 1: Assemble DWQMS Risk Assessment Team

- The City of Brockville’s DWQMS Risk Assessment Team includes Operational Staff and other City staff and/or external resources that may be pertinent to participate in the risk assessment exercises to provide expertise in specific processes or hazard areas.
- Members of the DWQMS Risk Assessment Team should include those familiar with the City’s processes and controls relating to water treatment and distribution, applicable legislative and regulatory requirements, applicable public health issues, and common hazards associated with drinking water and drinking water systems.
- The DWQMS Risk Assessment Team must have the authority to make recommendations for the implementation of hazard control measures.

4.1.2 Step 2: Identify Product to be Delivered and the Goals for the Product

Before the Risk Assessment is initiated, the DWQMS Risk Assessment Team reviews the description of the drinking water system contained in the Operational Plan in order to:

- Refresh their view of the system in its entirety;
- Verify the currency of the system description contained in the Operational Plan.

4.1.3 Step 3: Identify Potential Hazards/Hazardous Events

The DWQMS Risk Assessment Team examines the City’s drinking water system and identifies potential hazards and hazardous events that could compromise the performance of the system and/or the quality of the drinking water along with considering the reliability and redundancy of equipment.

- To begin this activity, the DWQMS Risk Assessment Team lists drinking-water system process steps and activities in order (i.e. upstream hazards, raw water intake, treatment, distribution, user-related hazards, etc.).
- For each process step, the Team notes the step in the **Risk Assessment Matrix** and identifies all of the potential hazards and hazardous events that could occur at that step. These hazards are listed in the **Risk Assessment Matrix** alongside the relevant process step. At this stage, the Team considers the potential hazardous events and associated hazards as identified in the current version of the Ministry of the Environment, Conservation and Parks’ (MECP’s) document titled **“Potential Hazardous Events for Municipal Drinking Water Systems”**.
- If an identified hazard affects the system in its entirety, it need not be correlated with a specific step; rather, “Whole System” can be entered as the process step.

Potential hazards can affect the drinking water system infrastructure or the drinking water itself. Hazards can be biological, chemical, physical or radiological and any of those listed in MECP’s document referenced above.

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The team identifies additional potential hazardous events and associated hazards (additional to those listed in the MECP document).

4.1.4 Step 4: Assess and Prioritize Hazards

The DWQMS Risk Assessment Team evaluates each listed hazard against the following criteria:

Likelihood (L): The Team assesses the likelihood of occurrence of the hazard or hazardous event and assigns one of the numerical ratings listed below. For this assessment, the DWQMS Risk Assessment Team must estimate how frequently the hazard or hazardous event could occur.

Description	Likelihood of Hazardous Event Occurring	Rating
Rare	May occur in exceptional circumstances. Has not occurred in past	1
Unlikely	Could occur at some time. Historically, has occurred less than once every 5 years.	2
Possible	Has occurred or may occur once or more per year.	3
Likely	Has occurred or may occur on a monthly to quarterly basis.	4
Very likely	One or more occurrences on a monthly or more frequent basis.	5

- Consequence (C): The DWQMS Risk Assessment Team assesses the consequence of occurrence of the hazard or hazardous event and assigns one of the numerical ratings listed below. For this assessment, the Team must estimate the severity of the impact of the hazard or hazardous event on the drinking-water system if it were to occur.

Description	Consequence of Hazardous Event Occurring	Rating
Insignificant	Little to no public exposure or health risk AND/OR insignificant impact to drinking-water system.	1
Minor	Minor public exposure (i.e. cluster of users) AND/OR minor health risk AND/OR manageable disruption to drinking-water system.	2
Moderate	Moderate public exposure (i.e. neighborhood of users) AND/OR health impacts for small population AND/OR significant disruption to drinking-water system.	3

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Description	Consequence of Hazardous Event Occurring	Rating
Major	Major public exposure (i.e. multiple neighborhoods of users) AND/OR potential health impacts for large population AND/OR major disruption to drinking-water system.	4
Catastrophic	Exposure and potential health impacts to all users within the drinking-water system AND/OR complete failure of drinking-water system.	5

- Detectability (D): The DWQMS Risk Assessment Team assesses the level of detectability of the hazard or hazardous event and assigns one of the numerical ratings listed below. For this assessment, the DWQMS Risk Assessment Team must determine what indicators or notification triggers would exist (i.e., how obvious it would be) if the hazard or hazardous event were to occur.

Description	Detectability of Hazardous Event	Rating
Very detectable	Easy to detect. Obvious. SCADA monitoring in place.	1
Moderately detectable	Moderately detectable. Alarm present. Weekly sampling, testing, monitoring and/or special programs are in place.	2
Normally detectable	Normally detectable. Detectable on rounds or regular maintenance. Monthly sampling, testing and/or monitoring are in place.	3
Poorly detectable	Poorly detectable. Not normally detected before problem becomes evident. Quarterly (or less frequent) sampling, testing and/or monitoring are in place.	4
Undetectable	Cannot detect before problem becomes evident.	5

The DWQMS Risk Assessment Team will list scores for likelihood, consequence and detectability in the appropriate columns of the **Risk Assessment Matrix**. A risk rating is then determined for each hazard as follows:

$$\text{Risk Rating} = \text{Likelihood} \times \text{Consequence} \times \text{Detectability}$$

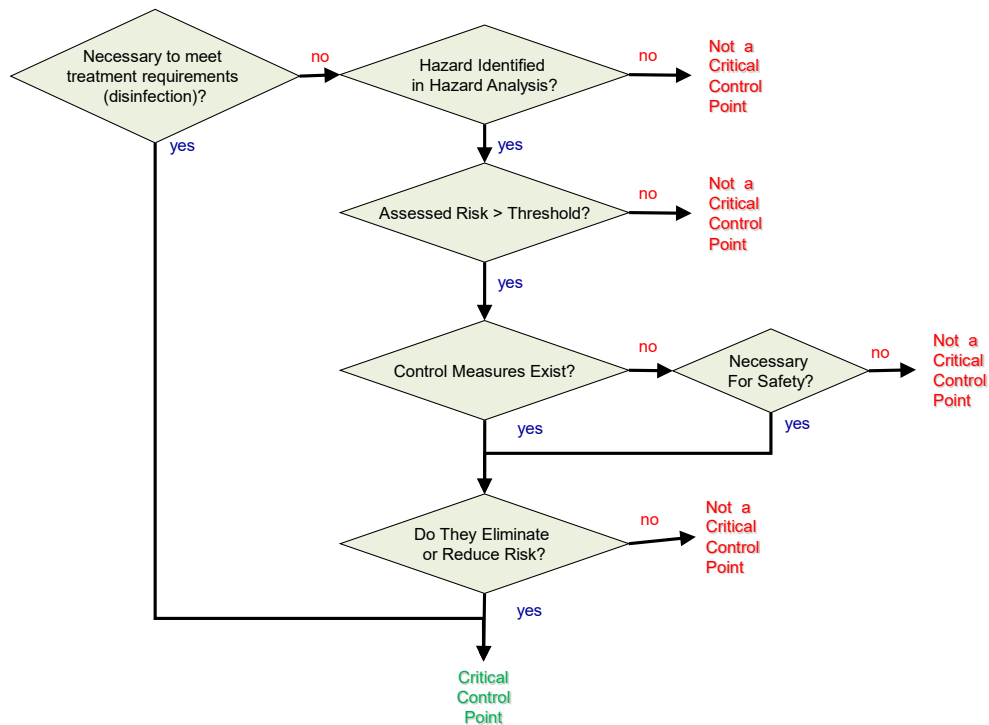
$$= L \times C \times D$$

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Risks are prioritized by sorting the risk ratings from greatest to least. A greater risk rating indicates a more significant risk. All hazardous events related to primary or secondary disinfection are considered significant and thus are considered to be Critical Control Points.

Step 5: Identify Critical Control Points

Each significant hazard (i.e., with a high risk rating value OR related to disinfection) is evaluated to determine whether a critical control point (CCP) can be established at that hazard location. The process for identifying critical control points is as follows:



The CCP must be measurable with an operational point of control to reduce or eliminate the hazard. As an absolute minimum, CCPs must be established to meet minimum treatment requirements for primary and secondary disinfection as outlined in O. Reg. 170/03 and the Procedure for Disinfection of Drinking Water in Ontario.

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4.1.6 Step 6: Establish Critical Limits & Monitoring Procedures for Critical Control Points

Wherever a critical control point is identified, the DWQMS Risk Assessment Team ensures that critical control limits, and control procedures are established to respond to breaches of the critical control limit. The establishment of critical control limits and critical control procedures may be delegated to staff within the work area in which the CCP is identified. Critical control limits can be derived from a variety of sources, including but not limited to:

- Regulatory requirements;
- Scientific literature;
- Studies/experiments;
- Consultation with experts; and/or
- Knowledge of system limits and operational capabilities

4.1.7 Steps 7 & 8: Periodic Review and Re-Conducting of the Risk Assessment

The DWQMS Risk Assessment must be reviewed at least once every calendar year as required by the Drinking Water Quality Management Standard. The intent of the review is to verify the currency of the information used to complete the assessment and to ensure that the assumptions used in the risk assessment remain valid. The QMS Representative will also ensure that the annual review is documented as a means of recording its completion. The annual review may be initiated at an earlier time by the DWQMS Risk Assessment Team if the drinking water system is changed in such a way that the currency or thoroughness of the risk assessment is impacted.

The DWQMS Risk Assessment will be re-assessed in its entirety at least once every thirty-six months as required by the Drinking Water Quality Management Standard

Procedure Title: Risk Assessment – Outcome Summary		Procedure No.: 1004.4
		Issue Date: 2009-06-08
Authorized By: C. Sluytman	Revised By: C. Sluytman, P. Raabe, S. Allen, C. Deir, D. Sharpe	Revision Date: 2024-09-18

Description of Hazard	Available Control Measures	Risk Evaluation Likelihood (L)	Risk Evaluation Consequence (C)	Risk Evaluation Detectability (D)	Risk Evaluation Assessed Risk	CCP Yes / No	Critical Control Limit (can be qualitative or quantitative; use appropriate units)	Monitoring Processes and/or Procedures	Response Procedures
		1-5	1-5	1-5	$L \times C \times D = 1-125$				

Appendix D has been removed from the publicly accessible version of the DWQMS Operational Plan. Appendix D is available upon request. Requests are subject to review. Removal of the Risk Assessment – Outcome Summary, which includes Risk Evaluation and Control Measures from the public document is intended to protect the system from individuals or actions which may seek to bypass openly published controls.

Procedure Title: Risk Assessment – Outcome Summary		Procedure No.: 1004.4
		Issue Date: 2009-06-08
Authorized By: C. Sluytman	Revised By: C. Sluytman, P. Raabe, S. Allen, C. Deir, D. Sharpe	Revision Date: 2024-09-18

Description of Hazard	Available Control Measures	Risk Evaluation Likelihood (L)	Risk Evaluation Consequence (C)	Risk Evaluation Detectability (D)	Risk Evaluation Assessed Risk	CCP Yes / No	Critical Control Limit (can be qualitative or quantitative; use appropriate units)	Monitoring Processes and/or Procedures	Response Procedures
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Description of Hazard	Available Control Measures	Risk Evaluation Likelihood (L)	Risk Evaluation Consequence (C)	Risk Evaluation Detectability (D)	Risk Evaluation Assessed Risk	CCP Yes / No	Critical Control Limit (can be qualitative or quantitative; use appropriate units)	Monitoring Processes and/or Procedures	Response Procedures
		1-5	1-5	1-5	$L \times C \times D = 1-125$				

Appendix D has been removed from the publicly accessible version of the DWQMS Operational Plan. Appendix D is available upon request. Requests are subject to review. Removal of the Risk Assessment – Outcome Summary, which includes Risk Evaluation and Control Measures from the public document is intended to protect the system from individuals or actions which may seek to bypass openly published controls.

Procedure Title: Risk Assessment – Outcome Summary		Procedure No.: 1004.4
		Issue Date: 2009-06-08
Authorized By: C. Sluytman	Revised By: C. Sluytman, P. Raabe, S. Allen, C. Deir, D. Sharpe	Revision Date: 2024-09-18

Description of Hazard	Available Control Measures	Risk Evaluation Likelihood (L)	Risk Evaluation Consequence (C)	Risk Evaluation Detectability (D)	Risk Evaluation Assessed Risk	CCP Yes / No	Critical Control Limit (can be qualitative or quantitative; use appropriate units)	Monitoring Processes and/or Procedures	Response Procedures
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PROCEDURE TITLE: Infrastructure Review		PROCEDURE NO.: 1005.1
		ISSUE DATE: 2009-01-08
AUTHORIZED BY: C. Drake	REVISED BY: J. Buckland	REVISION DATE: 2020-02-26

Infrastructure Review

1.0 Procedure Description

This procedure defines the process used by the City of Brockville to review the adequacy of the infrastructure and resources necessary to operate and maintain the drinking water system safely and effectively.

2.0 Reason for Procedure

The Infrastructure Review Procedure ensures periodic evaluation of the condition and capacity of infrastructure components. The results of the evaluation are used to prioritize future resource allocation.

3.0 Responsibility

The Director of Engineering & Infrastructure, in consultation with the Supervisor of Water Systems, and the Engineering Supervisor is responsible for the administration of the infrastructure review and its preparation.

4.0 Procedure

- 4.1 This procedure is applicable to all City of Brockville infrastructure components that fall under the scope of the DWQMS.
- 4.2 Infrastructure review is conducted at least once every calendar year.
- 4.3 Infrastructure review considers the latest risk assessment outcomes when determining adequacy of the infrastructure.
- 4.4 The above named staff also considers previous infrastructure review summary reports, input from other City staff, MECP Compliance Inspection Reports, flow data trends, water quality reports, and maintenance records to determine priority needs.
- 4.5 The list of identified infrastructure work shall be prepared on an annual basis for consideration and inclusion in the City’s capital budget.
- 4.6 Any infrastructure work not approved by Council during the capital budget proceedings shall be documented and included for consideration in future years.

5.0 Associated Documents

- Hydrant Inspections
- Valve Inspections
- Leak Detection Program
- Water System Plant Monthly Reports
- Thirty Year Capital Plan – Treatment
- Ten Year Capital Plan – Distribution
- Engineering Reports
- Risk Assessment Outcomes

PROCEDURE TITLE: Drinking Water Sampling, Monitoring and Analysis		PROCEDURE NO.: 1006.2
		ISSUED DATE: 2009-01-08
AUTHORIZED BY: C. Sluytman	REVISED BY: J. Buckland	REVISION DATE: 2024-09-26

Drinking Water Sampling, Monitoring and Analysis

1.0 DESCRIPTION

This procedure describes the sampling schedule and analytical program used for monitoring water quality at the Brockville Water Systems Division. It also outlines the responsibilities of operators and outside agencies in regards to analyses performed and reporting duties.

2.0 PURPOSE

Regular and strict adherence to a schedule is required to meet legislated requirements and to ensure that all operators involved are aware of their responsibilities and the required timing. All sampling and analysis is performed to comply with Ontario Regulation 170/03 as amended or to monitor additional parameters that affect water quality monitoring or aid in process control.

3.0 RESPONSIBILITY

All operators who have been issued a valid Ontario Drinking Water Operator Certificate are permitted to carry out drinking water sampling and conduct laboratory analyses. The operators perform all drinking water sampling, as well as the daily analyses. All other analyses must be performed by the staff of an accredited laboratory.

4.0 PROCEDURE

Sampling, testing and monitoring upstream

Sampling, testing and monitoring of the upstream raw water source is conducted by the Ministry of the Environment, Conservation and Parks' (MECP's) Drinking Water Surveillance Program (DWSP). No additional upstream sampling, testing or monitoring is conducted.

Continuous Monitoring

The following process areas are monitored continuously with on-line analyzers:

- **Intake Well:** temperature
- **Meter Chamber:** raw water free chlorine residual, turbidity, pH
- **Flocc Water:** Pre-filter free chlorine residual
- **Filter 1 and 2:** turbidity
- **Clear well:** free chlorine residual
- **Main plant reservoir:** free chlorine residual

PROCEDURE TITLE: Drinking Water Sampling, Monitoring and Analysis		PROCEDURE NO.: 1006.2
		ISSUED DATE: 2009-01-08
AUTHORIZED BY: C. Sluytman	REVISED BY: J. Buckland	REVISION DATE: 2024-09-26

- **Main plant discharge:** free chlorine residual, turbidity, fluoride and pH
- **Brockville water distribution:** Parkedale Reservoir free chlorine residual

A SCADA system, which provides operators with the capability to continuously monitor all measurable plant parameters, is currently in place. All alarm process set points (Hi and Low) shall be tested monthly.

Daily Sampling and Analysis

Routine laboratory tests are generally conducted daily at the plant by the operators on duty to confirm online critical control point (CCP) analyzer readings, as specified in (Table 16-1). Routine laboratory tests and SCADA process trending is recorded on the daily lab log sheet and uploaded to the Watertrax database. The daily log sheets are stored on the **City’s main server at City Hall.**

Table 16-1:

Daily analyses for (CCP) are as follows: raw water, process water and filtered water from the Brockville Water Systems Division.

Raw / Pre-Treated Water	Filtered Water	Treated Water	Main Plant Discharge
Free Chlorine	Turbidity (Filter 1 & 2)	Free Chlorine (clearwell)	Free Chlorine
Turbidity		Free Chlorine (Res Effluent)	Fluoride
pH		Aluminum (Clearwell)	UV Transmittance
Temperature			pH

Weekly Sampling and Analysis

Weekly bacteriological analysis is performed on raw water and treated water from various points in the Brockville distribution systems as indicated in Microbiological Sampling Procedure 205 as per O.Reg 170/03. Bacteriological samples shall be delivered in designated coolers to the accredited laboratory within 36 hours after sample is taken. Our accredited laboratory provides pickup and delivery services. If the laboratory is unable to pickup and deliver samples City staff shall arrange to

PROCEDURE TITLE: Drinking Water Sampling, Monitoring and Analysis		PROCEDURE NO.: 1006.2
		ISSUED DATE: 2009-01-08
AUTHORIZED BY: C. Sluytman	REVISED BY: J. Buckland	REVISION DATE: 2024-09-26

deliver samples, samples must be delivered within 36 hours from time sample was taken.

Quarterly Sampling and Analysis

On a quarterly basis, drinking water from the Brockville distribution system shall be collected and tested for Trihalomethanes (THM’s), Haloacetic Acids (HAA’s) and Nitrates/Nitrites.

Annual Sampling and Analysis

Annual samples are typically collected as per Ontario guidelines and must be analyzed for inorganics (Schedule 23) and organics (Schedule 24). Samples to be analyzed under Schedule 23 and Schedule 24 shall be collected from the treated water discharge tap.

Additional Sampling Requirements

Challenging conditions

Sampling, testing and monitoring activities may increase when operational challenges are experienced, such as in the following cases: raw water temperature increases, high easterly winds, during spring algal blooms or during the presence of zebra mussels; all of which require plant operators to make process adjustments in response to changing conditions.

Lead Sampling

Lead sampling will be conducted in the Brockville distribution systems as per Ontario regulations.

Adverse Sample Results

Reference procedure for Adverse Water Quality Incidents (AWQI) SOP 201.

Chain of Custody and Certificate of Analysis Records Control

Chain of Custody

A Chain of Custody (COC) form shall be completed and submitted to the laboratory with all samples.

Sample tracking

All samples submitted to the accredited lab must be tracked by entering the COC number on FORM 004 DWQMS Caduceon Report & Invoice Tracking Form. Once original lab results are received by email, the certificate of analysis report number shall be entered on the tracking form and must correspond with the COC submitted. Once the accredited laboratory uploads lab results to the Watertrax database, the date of upload shall also be entered on the tracking form.

PROCEDURE TITLE: Drinking Water Sampling, Monitoring and Analysis		PROCEDURE NO.: 1006.2
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AUTHORIZED BY: C. Sluytman	REVISED BY: J. Buckland	REVISION DATE: 2024-09-26

Certificate of Analysis (COA)

All emailed lab Certificate of Analysis and corresponding COC forms shall be stored on the Y server at City Hall under the appropriate file for the samples taken.

Report Circulation

All other regulatory sampling, testing, and monitoring results shall be compiled using the Watertrax database to form part of the quarterly summaries and annual report.

Associated Documents

- SOP 201 Adverse Water Quality Incident (AWQI)
- SOP 204 Sampling Schedule Brockville and Elizabethtown
- SOP 205 Microbiological Sampling
- FORM 004 DWQMS Caduceon Report & Invoice Tracking Form

PROCEDURE TITLE: Measurement and Recording Equipment Calibration and Maintenance		PROCEDURE NO.: 1007.2
		ISSUED DATE: 2009-01-08
AUTHORIZED BY: C. Sluytman	REVISED BY: J. Buckland/G. Grant	REVISION DATE: 2024-06-11

MEASUREMENT and RECORDING EQUIPMENT CALIBRATION and MAINTENANCE

1.0 DESCRIPTION

This procedure describes the methods used by the Brockville Water Systems Division to ensure that all measurement and recording equipment is verified, calibrated and maintained.

2.0 PURPOSE

Accuracy of measurement and recording equipment is essential to providing quality drinking water to the consumer with confidence that the characteristics of the water meets or exceeds the legislated requirements and internal targets set by Brockville Water Systems Division.

3.0 RESPONSIBILTIIY

The Water Systems Operators, under the direction of the Chief Operator, shall conduct monthly verifications and annual calibration and maintenance of all continuous monitoring and recording equipment.

A certified instrumentation technician conducts the annual calibration of flow, pressure and level monitoring equipment.

4.0 PROCEDURE

4.1 This procedure is applicable to the following types of equipment:

- On-line chlorine residual analyzers
- On-line turbidimeters
- On-line fluoride meter
- On-line pH meters
- Flow meters
- Level transmitters
- Portable colorimeters
- Portable turbidimeters
- Portable pH meters
- Portable flow meters
- Pressure Transducer

PROCEDURE TITLE: Measurement and Recording Equipment Calibration and Maintenance		PROCEDURE NO.: 1007.2
		ISSUED DATE: 2009-01-08
AUTHORIZED BY: C. Sluytman	REVISED BY: J. Buckland/G. Grant	REVISION DATE: 2024-06-11

- 4.2 The Water Systems Chief Operator or Maintenance Technician schedules the regulatory annual calibration of flow meters, pressure and level instrumentation with a certified instrumentation technician.
- 4.3 Summary of measurement and recording equipment verification, calibration and maintenance is as follows.

Monitoring Parameter & Location	Equipment	Verification or Calibration Schedule	Verification or Calibration Technician	Verification or Calibration Method	Verification or Calibration Record
<p><u>Chlorine Residual</u></p> <ul style="list-style-type: none"> Raw water Clear Well Main plant reservoir effluent Plant effluent Parkedale Reservoir 	HACH CL 17S HACH CL 17	<p>Monthly verification</p> <p>Annual maintenance & calibration</p>	<p>WS Operators</p> <p>Certified OEM Technician</p>	<p>Bench top comparison as per instruction manual</p> <p>As per instruction manual</p>	<p>Monthly verification sheet and/or operational logbook</p> <p>Annual calibration certificates</p>
<p><u>Chlorine Residual</u></p> <ul style="list-style-type: none"> Raw water Clear Well Main plant reservoir effluent 	HACH Pocket Colorimeter (portable)	<p>Every 3 month verification</p> <p>Annual maintenance & calibration</p>	<p>WS Operator</p> <p>Certified OEM Technician</p>	<p>Certified Colour Standards</p> <p>Certified Colour Standards</p>	<p>Monthly verification sheet and/or operational logbook</p> <p>Annual calibration certificates</p>

PROCEDURE TITLE: Measurement and Recording Equipment Calibration and Maintenance		PROCEDURE NO.: 1007.2
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Monitoring Parameter & Location	Equipment	Verification or Calibration Schedule	Verification or Calibration Technician	Verification or Calibration Method	Verification or Calibration Record
<ul style="list-style-type: none"> Plant effluent Parkedale Reservoir 					
<p><u>Chlorine Residual</u></p> <ul style="list-style-type: none"> Distribution System – superchlorination of new or reconstructed water mains 	Palintest 1000 (High Range Testing-Portable)	Annual Calibration	Certified OEM Technician	Certified Colour Standards	Annual calibration certificates
<p><u>Turbidity</u></p> <ul style="list-style-type: none"> Raw water Filter #1 & #2 Plant effluent 	HACH 1720E HACH TU5300	Monthly verification Annual maintenance & calibration	WS Operator Certified OEM Technician	Bench top comparison as per instruction manual As per instruction manual	Monthly verification sheet and/or operational logbook Annual calibration certificates
<p><u>Turbidity</u></p> <ul style="list-style-type: none"> Raw water Filter #1 & #2 	HACH 2100Q (Portable)	Every 3 month verification	WS Operator	Certified Standards	Monthly verification sheet and/or operational logbook

PROCEDURE TITLE: Measurement and Recording Equipment Calibration and Maintenance		PROCEDURE NO.: 1007.2
		ISSUED DATE: 2009-01-08
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Monitoring Parameter & Location	Equipment	Verification or Calibration Schedule	Verification or Calibration Technician	Verification or Calibration Method	Verification or Calibration Record
<ul style="list-style-type: none"> Plant effluent 					
<p><u>Fluoride</u></p> <ul style="list-style-type: none"> Plant effluent 	HACH DR1900 (Portable)	Every 3 month verification Annual maintenance & calibration	WS Operator Certified OEM Technician	Bench top comparison as per instruction manual	Monthly verification sheet and/or operational logbook Annual calibration certificates
<p><u>Level</u></p> <ul style="list-style-type: none"> Overhead tank Parkedale Reservoir 	Rosemount	Annual maintenance & calibration	Certified OEM Technician		Annual calibration certificates
<p><u>Flow</u></p> <ul style="list-style-type: none"> Parkedale Zone 2 	Rosemount differential pressure	Annual maintenance & calibration	Certified OEM Technician		Annual calibration certificates
<p><u>Flow</u></p> <ul style="list-style-type: none"> Raw water Filter #1 & #2 Plant effluent Backwash 	Krohne mag	Annual maintenance & calibration	Certified OEM Technician		Annual calibration certificates

PROCEDURE TITLE: Measurement and Recording Equipment Calibration and Maintenance		PROCEDURE NO.: 1007.2
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Monitoring Parameter & Location	Equipment	Verification or Calibration Schedule	Verification or Calibration Technician	Verification or Calibration Method	Verification or Calibration Record
<ul style="list-style-type: none"> PAC feed 					
<p><u>Flow</u></p> <ul style="list-style-type: none"> First Ave Zone 3 	MARS MUN-1	Annual maintenance & calibration	Certified OEM Technician		Annual calibration certificates
<p><u>Pressure</u></p> <ul style="list-style-type: none"> Plant effluent Filter #1 & #2 Loss of Head Parkedale zone #1 & #2 First Ave booster 	Rosemount	Annual maintenance & calibration	Certified OEM Technician		Annual calibration certificates
<p><u>pH</u></p> <ul style="list-style-type: none"> Raw water Treated water 	HACH DPD1P1	Monthly verification Annual maintenance & calibration	WS Operator Certified OEM Technician	Bench top comparison as per instruction manual	Monthly verification sheet and/or operational logbook Annual calibration certificates

PROCEDURE TITLE: Measurement and Recording Equipment Calibration and Maintenance		PROCEDURE NO.: 1007.2			
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AUTHORIZED BY: C. Sluytman		REVISED BY: J. Buckland/G. Grant		REVISION DATE: 2024-06-11	
Monitoring Parameter & Location	Equipment	Verification or Calibration Schedule	Verification or Calibration Technician	Verification or Calibration Method	Verification or Calibration Record
<p><u>pH</u></p> <ul style="list-style-type: none"> Raw water Treated water 	HQ11d Probe (Portable)	Prior to initial daily use	WS Operator	Known pH Buffer Standards	WD1002 Flushing Worksheet and/or operational logbook
<p><u>Bench Test</u></p> <ul style="list-style-type: none"> All parameters 	DR 1900	Every 3 month verification Annual maintenance & calibration	WS Operator Certified OEM Technician	Colour Standards	Monthly verification sheet and/or operational log book Annual calibration certificates

4.4 All verifications, calibrations and maintenance shall be performed according to the manufacturer’s instructions.

4.5 All verifications and calibrations shall be recorded in the applicable logbook and/or verification sheet and/or calibration log or record of calibration sheet.

5.0 Associated Documents

The following instruction documents:

- O and M Manual HACH 1720E Turbidimeters
- O and M Manual HACH TU5300 Turbidimeters
- O and M Manual HACH 2100Q Turbidimeters
- O and M Manual HACH CL 17 Chlorine analyzer
- O and M Manual HACH CL 17S Chlorine Analyzer
- O and M Manual HACH HQ11D (portable) pH Analyzer
- O and M Manual HACH DPD1P1 pH Analyzer
- O and M Manual HACH DR1900 Spectrophotometer
- Procedure 812 Analyzer Maintenance

PROCEDURE TITLE: Internal Audit Procedure		PROCEDURE NO.: 1008.2
		ISSUED DATE: 2009-01-08
AUTHORIZED BY: C. Drake	REVISED BY: J. Buckland	REVISION DATE: 2021-03-29

INTERNAL AUDIT PROCEDURE

1.0 DESCRIPTION

This procedure describes the Internal Auditing process used by the operating authority to verify the effectiveness of the DWQMS.

2.0 PURPOSE

This procedure is applicable to and shall be followed by all Internal Auditors, regardless of origin, for the City of Brockville internal audits.

3.0 RESPONSIBILITY

The QMS Representative shall assign the responsibility of conducting internal audits only to qualified persons.

4.0 PROCEDURE

4.1 Qualifications

4.1.1 The QMS Representative maintains Form 002 DWQMS List of Qualified Internal Auditors including names, titles, and qualifications.

4.2 Training

4.2.1 Internal Auditors shall have completed the applicable Internal Auditing Training Audit Course, to be qualified to conduct Internal Audits.

4.3 Sources

4.3.1 Internal Auditors may be sourced from other municipalities, consultants, etc. provided that evidence of their qualifications is made available to the QMS Representative.

4.4 Frequency and Scope

4.4.1 The QMS Representative shall prepare Form 009 DWQMS Internal Audit Schedule on an annual basis.

PROCEDURE TITLE: Internal Audit Procedure		PROCEDURE NO.: 1008.2
		ISSUED DATE: 2009-01-08
AUTHORIZED BY: C. Drake	REVISED BY: J. Buckland	REVISION DATE: 2021-03-29

4.4.2 Internal audits shall be conducted on each element of the DWQMS at least once every calendar year. Additional audits may be scheduled based on previous audit results, or commensurate with the impact of the change in requirement or changing risks on the operation of the water system.

4.5 Audit Team Roles and Responsibilities

4.5.1 Lead Auditor:

- Open the audit file
- Review previous internal and external audit results to verify any previous findings are still appropriately addressed.
- Conduct the audit according to the procedure and the audit schedule
- Follow Form 006 DWQMS Internal Audit Checklist
- Develop the DWQMS Internal Audit using current chosen method (Form 007 DWQMS Internal Audit Field Reports or software)
- Notify the auditee of the scope and objectives of the internal audit.
- Set and conduct opening meetings, as appropriate
- Prepare and distribute the opening meeting agenda
- Collect objective evidence
- Report audit results clearly and concisely
- Set and conduct closing meeting
- Report audit findings and issue corrective actions if required using Form 001 DWQMS Continual Improvement Analysis Form
- Log the corrective action on Form 005 DWQMS Continual Improvement Record Spreadsheet
- Prepare audit report
- Follow-up on corrective actions
- Close the audit file

4.5.2 Auditor

- Follow the direction/instructions of the Lead Auditor
- Be fully prepared for the audit
- Conduct the audit according to the procedure and Form 006 DWQMS Internal Audit Checklist
- Report audit results clearly and concisely

PROCEDURE TITLE: Internal Audit Procedure		PROCEDURE NO.: 1008.2
		ISSUED DATE: 2009-01-08
AUTHORIZED BY: C. Drake	REVISED BY: J. Buckland	REVISION DATE: 2021-03-29

4.6 Conducting the Audit

- 4.6.1 The QMS Rep shall determine a Lead Auditor from the assigned Audit Team members.
- 4.6.2 The Audit Team shall follow FORM 006 DWQMS Internal Audit Checklist to complete the internal audit.
- 4.6.3 If hiring a consultant to carry-out the internal audit, their standard audit checklist and report format is acceptable and considered to meet the requirements and intent of this section.

4.7 Audit Results

- 4.7.1 The final Internal Audit Report and any associated corrective actions shall be submitted to the QMS Representative.
- 4.7.2 Corrective actions shall be logged by the Internal Audit Team on FORM 005 DWQMS Continual Improvement Record Spreadsheet.
- 4.7.3 Opportunities for improvement identified in the audit reports should be logged on FORM 005 DWQMS Continual Improvement Record Spreadsheet and considered through the continual improvement process as well.
- 4.7.4 Responses to corrective actions shall be assigned to the responsible individual by the QMS Representative.
- 4.7.5 When all corrective actions have been addressed, verified, and signed off by the Internal Audit Team, the internal audit shall be considered closed.
- 4.7.6 The QMS Representative shall retain the Internal Audit Report, copy of the completed internal audit checklists, field reports, if used, and all related corrective actions.

PROCEDURE TITLE: Internal Audit Procedure		PROCEDURE NO.: 1008.2
		ISSUED DATE: 2009-01-08
AUTHORIZED BY: C. Drake	REVISED BY: J. Buckland	REVISION DATE: 2021-03-29

5.0 Associated Documents and Records

- Form 001 DWQMS Continual Improvement Analysis
- Form 002 DWQMS List of Qualified Internal Auditors
- Form 005 DWQMS Continual Improvement Records Spreadsheet
- Form 006 DWQMS Internal Audit Checklist
- Form 007 DWQMS Internal Audit Field Reports
- Form 009 DWQMS Internal Audit Schedule
- Audit Report
- Previous internal and external audit reports and findings

PROCEDURE TITLE: Management Review		PROCEDURE NO.: 1009.2
		ISSUED DATE: 2009-01-08
AUTHORIZED BY: C. Sluytman	REVISED BY: C. Sluytman	REVISED DATE: 2024-02-28

MANAGEMENT REVIEW

1.0 DESCRIPTION

This procedure defines the process by which the performance of the DWQMS is evaluated by the Management Review Committee.

2.0 PURPOSE

Management reviews are conducted to assess the existing DWQMS performance, and to make decisions that support needed revisions and improvements to the DWQMS.

3.0 RESPONSIBILITY

The QMS Rep is responsible for ensuring that management reviews are conducted at least once every calendar year. Management reviews shall be conducted during a meeting of the following participants who together form the Management Review Committee:

- A City Council Representative
- City Manager
- Director of Finance and IT Services
- Director of Engineering & Infrastructure
- Supervisor Water Systems

Other participants may be added at the discretion of the Management Review Committee. The meeting is chaired by the QMS Representative.

4.0 PROCEDURE

4.1 A management review meeting shall be conducted at least once every calendar year following completion and documentation of an internal audit.

4.2 Prior to the Management Review Meeting, the QMS Representative shall provide a meeting agenda and include summaries of the following;

- A. Incidents of Regulatory Non-Compliance
- B. Incidents of Adverse Drinking Water Tests
- C. Deviations from Critical Control Limits and Response Actions
- D. Effectiveness of Risk Assessment Process

PROCEDURE TITLE: Management Review		PROCEDURE NO.: 1009.2
		ISSUED DATE: 2009-01-08
AUTHORIZED BY: C. Sluytman	REVISED BY: C. Sluytman	REVISED DATE: 2024-02-28

- E. Internal and Third-Party Audit Results
- F. Results of Emergency Response Testing
- G. Operational Performance
- H. Raw Water Supply and Drinking Water Quality Trends
- I. Follow up Action Items of Previous Management Reviews
- J. Status of Management Action Items Identified Between Reviews
- K. Changes that Could Affect the Quality Management System (QMS)
- L. Customer Feedback
- M. Resources Needed to Maintain QMS
- N. Results of the Infrastructure Review
- O. Operational Plan Currency, Content and Updates
- P. Staff Suggestions

- 4.3 The Management Review Committee shall review and discuss all information presented to make recommendations and initiate action as appropriate to improve the content and implementation of the Operational Plan and related procedures to ensure the provision of adequate resources.
- 4.4 Minutes of management review meetings shall be maintained by the QMS Representative. The minutes shall document all new and outstanding action items as well as any decisions made by the Committee.
- 4.5 The results of the management review, any identified deficiencies, decisions and action items are reported to the owner via e-mail following the occurrence Management Review meetings.
- 4.6 The QMS Representative shall be responsible for communication and implementation of the management review action items. Communications will be in accordance with the communications procedure.

5.0 ASSOCIATED DOCUMENTATION

- Appendix J Communications Procedure 1010

PROCEDURE TITLE: Communications Procedure		PROCEDURE NO.: 1010.2
		ISSUED DATE: 2009-01-08
AUTHORIZED BY: C. Drake	REVISED BY: J. Buckland	REVISION DATE: 2021-04-09

COMMUNICATIONS

1.0 Description

This procedure outlines the methods of internal and external communication of relevant aspects of the City of Brockville Drinking Water Quality Management System (DWQMS).

2.0 Purpose

Consistent and efficient methods of communication are essential to ensure that all relevant quality management system information is adequately transferred to all involved parties.

3.0 Responsibility

The Designated DWQMS Representative is responsible for implementing and monitoring the DWQMS Communications Procedure.

4.0 Procedure

4.1 Communications shall be conducted by any or all of the following:

Internal Communications

The City uses several methods of communicating new information among staff including:

- log books/minutes
- staff meetings
- schedules
- memorandums
- email

Information communicated internally may include, but is not limited to:

- emerging and existing legal requirements
- introduction or changes to City policies, procedures, or other instructional documents
- equipment installation or replacement
- notice of projects or studies
- temporary process abnormalities

External Communications

The City of Brockville uses a variety of methods to communicate drinking water information to customers.

- Using web-based, social media and public media channels, including: City website, Twitter, Facebook, local news outlets, etc.;
- Roadway signs and banners can help advertise larger-scale events;

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- Door knockers and in-person door-to-door communications regarding water service disruptions and other distribution system maintenance activities;
- Printed information may be included with customer bills (bill inserts)
- Annual reports containing summaries of the drinking water system description, condition, and performance are available to interested members of the public at the municipal office and also may be downloaded on the City of Brockville website.
- Current water quality results are available on request from the municipal office.
- Verbal and written communications with customers as per the Customer Complaint Procedure

4.2 Information pertaining to the operation of the municipal drinking water system must also be communicated to the owner, as represented by the City of Brockville Council for the following:

- Annual reports are presented to Council by the City Manager or by the Director of Engineering & Infrastructure.
- Incidents of non-compliance are immediately reported to the Director of Engineering & Infrastructure
- Water related construction project reports are routinely reported at City Council Meetings by the City Manager, the Director of Engineering & Infrastructure, or other appropriate City staff.
- Council is represented on the DWQMS Management Review Committee and takes part in the annual management review as required Appendix I Management Review Procedure.

5.0 Summary Table Describing Communication of the DWQMS

Target Audience	Method of Communication
Owner (Council)	<ul style="list-style-type: none"> • Council provides representation on the Management Review Committee. • Internal and external DWQMS Audit Report findings are presented at Management Reviews. • Council is kept aware of the condition and performance of the DWQMS through reports received from the City Manager and other City staff presented at or provided as reference materials at regular Planning & Operations Committee and Council meetings. • Hard copies of all reports and other correspondence are retained in accordance with Appendix B Records Control Procedure.

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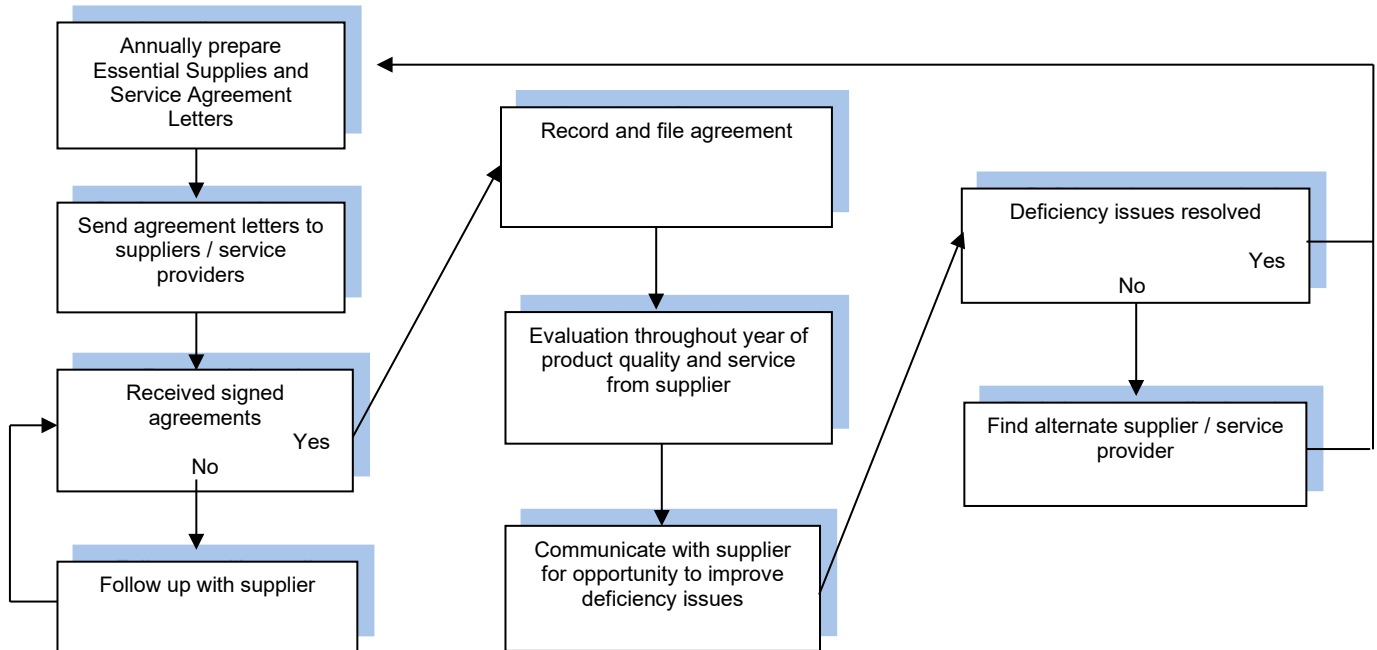
Target Audience	Method of Communication
City Staff	<ul style="list-style-type: none"> • Substantial revisions/additions, and a review of audit results will be provided annually to all relevant staff. • New employees are provided an overview of the Operational Plan during orientation. • Details of DWQMS communications are documented in DWQMS files.
Public	<ul style="list-style-type: none"> • Summary descriptions of the DWQMS and related benefits may be provided on the City of Brockville website.
Suppliers	<ul style="list-style-type: none"> • Top Management has directed Engineering & Infrastructure staff to communicate the relevant aspects of the Quality Management System to suppliers. Relevant aspects include the requirements for quality and supply of essential supplies and services. • Communication may be written (email, P/O boiler plate, letter)

6.0 Associated Documentation

- Appendix A Document Control Procedure
- Appendix B Records Control Procedure
- Appendix I Management Review Procedure
- SOP 202 Customer Complaint Procedure

PROCEDURE TITLE: Essential Supplies and Services		PROCEDURE NO.: 1011.2
		ISSUED DATE: 2009-01-08
AUTHORIZED BY: C. Sluytman	REVISED BY: J. Buckland	REVISION DATE: 2023-09-28

PROCEDURE FLOW CHART



ESSENTIAL SUPPLIES and SERVICES

ESSENTIAL SUPPLY OR SERVICE	PROCUREMENT	QUALITY REQUIREMENTS
Disinfectant (Chlorine Gas Sodium Hypo) Brenntag Canada Inc. 2900 J-B Deschamps Blvd. Lachine, Quebec H8T 1C8 514-636-9230	<ul style="list-style-type: none"> Chlorine gas is received in 150 lb cylinders. Set delivery schedule. Min inventory at <u>WS</u> 2-3 week supply NaOCL as backup for disinfection. 	<ul style="list-style-type: none"> NSF approved. Certificate of Analysis received before shipment.
Coagulant Chemical Kemira Water Solutions Canada P.O. Box 1540 Brantford, ON N3T 5V6 519-759-7570	<ul style="list-style-type: none"> Coagulant Chemical is received in 25,000 kg bulk shipments. Delivery shipped within 5 days of order placed. Min inventory at <u>WS</u> 30 day supply. 	<ul style="list-style-type: none"> NSF approved. Certificate of Analysis received before shipment.

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ESSENTIAL SUPPLY OR SERVICE	PROCUREMENT	QUALITY REQUIREMENTS
<p>Diesel Fuel Supplier</p> <p>W.O. Stinson & Son Ltd. 4726 Bank Street Gloucester, ON K1T 3W7 613-822-7400</p>	<ul style="list-style-type: none"> • Set monthly fuel delivery schedule. • Fuel delivered within 24 hour of placing order. • Min inventory at <u>WS</u> 24 hour supply. 	<ul style="list-style-type: none"> • USL # 2 colour diesel.
<p>SCADA Instrumentation and Controls</p> <p>Robotic and Process Automation CO. 4301 County Rd 15 Brockville, Ont. K6V 5T2 Office: 613-342-1585 Cell: 613-349-9140</p> <p>Excelpro Inc 515 Legget Dr, Suite 110 Kanata, Ont K2K 3G4 613-345-1502</p>	<ul style="list-style-type: none"> • 24 hour emergency service. • Local contractor. 	<ul style="list-style-type: none"> • Knowledgeable staff of WS SCADA integration, software and operating alarm systems.
<p>Accredited Laboratory Services</p> <p>Caduceon Environmental Laboratories 285 Dalton Ave Kingston, ON K7K 6Z1 613-544-2001</p>	<ul style="list-style-type: none"> • Set sampling schedule. • After hours emergency lab services. 	<ul style="list-style-type: none"> • Licensing and Accreditation. • MECP Scope of accreditation.

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ESSENTIAL SUPPLY OR SERVICE	PROCUREMENT	QUALITY REQUIREMENTS
<p>Water Main Pipes & Fittings/Repair Clamps for PVC, DIP, CIP, ACP, HDPE</p> <p>Iconix Waterworks 2446 Leitrim Road Gloucester, ON K1T 3V3 613-822-4379 613-858-6074 (after hours)</p>	<ul style="list-style-type: none"> All items on essential pipe/fittings/repair clamps listing are stocked at WS. Each item has a predetermined min/max in stock quantity. Once minimum stock quantity is reached, an order is placed to return to maximum stock quantity. Reorder items will be received within 2 days of order placement. Short notice/emergency items will be received within 8 hrs of order placement. 	<ul style="list-style-type: none"> Sufficient warehouse stock of essential products to fill order. Documented verification of delivery load contents to order placed. Documented verification that received products conform to applicable AWWA and City of Brockville standards. All documentation to be provided prior to product off load.
<p>Reinforced concrete high pressure pipe supply and technical support for repair</p> <p>Forterra 5387 Bethesda Road Stouffville, ON L4A 7X3 905-640-5151</p>	<ul style="list-style-type: none"> Short notice/emergency piping repair items can be delivered on site within 8 hrs of emergency order placement. Technician on site within 24 hours of technical support request to effect assessment of type of repair required and onsite technical assistance to effect repair. 	<ul style="list-style-type: none"> Sufficient warehouse stock of required product. Documented verification of delivery load contents to order placed. Documented verification that product conforms to applicable AWWA standards. All documentation to be provided prior to product off load.
<p>IT Services</p> <p>MIS Department City of Brockville</p>	<ul style="list-style-type: none"> Delivery of uninterrupted internet service during long term power outage events. Delivery of uninterrupted access to City file servers during long term power outage events. Delivery of uninterrupted email service during long term power outage events. 	<ul style="list-style-type: none"> Knowledgeable staff

PROCEDURE TITLE: Emergency Management		PROCEDURE NO.: 1012.1
		ISSUED DATE: 2011-07-05
AUTHORIZED BY: C. Drake	REVISED BY: D. Richards	REVISION DATE: 2017-04-10

EMERGENCY MANAGEMENT

1.0 DESCRIPTION

This procedure identifies potential emergencies that can occur within the Brockville Water Systems, including the owner and operating authority responsibilities, municipal emergency planning measures, steps for response and recovery, testing and training requirements, communication protocol, and emergency contact information for emergency management.

2.0 PURPOSE

This procedure is applicable to the potential emergency situations that could result in the City of Brockville’s ability to maintain a supply of safe drinking water to the consumers. Should a water systems emergency go beyond the scope of this procedure, the City of Brockville’s Emergency Plan shall take precedence.

3.0 RESPONSIBILITY

4.0 PROCEDURE

5.0 IDENTIFYING POTENTIAL EMERGENCIES

5.0.1 The Risk Assessment Outcomes shall be used for identifying potential emergency situations that may arise. The Risk Assessment is reviewed once every calendar year and if any additional emergencies are identified they shall be added to the list shown in Appendix D – Outcome Summary.

5.0.2 Other sources of information for identifying potential emergencies include:

- Corporate Audits
- Insurance company reviews
- Records of past emergencies
- New reports about emergencies in other systems
- Ministry of Environment, Conservation and Parks Inspections

5.1 Emergency Response and Recovery

5.1.1. Overall emergency response and recovery shall be the responsibility of the on-call Water Systems Operators and the Water Systems Chief Operator (ORO). The Water Systems Supervisor, Director of Engineering & Infrastructure and the owner shall be notified in the event that the water quality poses an acute health risk to consumers and a boil water advisory or drinking water advisory must be issued.

PROCEDURE TITLE: Emergency Management		PROCEDURE NO.: 1012.1
		ISSUED DATE: 2011-07-05
AUTHORIZED BY: C. Drake	REVISED BY: D. Richards	REVISION DATE: 2017-04-10

5.1.2 Standard Operating Procedures and Emergency Plans cover the following information:

- Assessing the situation;
- Protecting consumers, employees, equipment and other assets.
- Communication;
- Shut down and startup operations;
- Restoring operations.

5.2 Emergency Contacts

5.2.1 An up to date form 104 Emergency Contact list shall be maintained by the Water Systems Chief Operator (ORO), and available to all Environmental Services Water Systems employees.

5.3 Emergency Response Training

5.3.1 All Water Systems employees shall receive training in emergency response, as appropriate for the nature of the emergency.

5.3.2 Training may be provided by in-house staff or by qualified contractors/trainers.

5.3.3 This training shall include, but not limited to, a review and test of the Water Systems Emergency Plans and Standard Operating Procedures.

5.4 Emergency Response Testing

5.4.1 All potential emergencies shall be tested.

5.4.2 Different testing methods may be used including mock tests, tabletop exercises and classroom and quiz.

5.4.3 Testing shall be managed, arranged and recorded by the Water Systems Chief Operator (ORO).

6.0 Associated Documents

- Form 104 Emergency Contact List
- Water Systems Emergency Procedures Manual
- Municipal Emergency Plan for the City of Brockville
- SOP 201 Adverse Water Quality Procedure