

Municipality of Middlesex Centre



QMS Operational Plan

For the:

Middlesex Centre Distribution System

OP #052-401

Melrose Well Supply System

OP #052-403

Birr Well Supply System

OP #052-404

QMS Operational Plan



Ministry of the Environment,
Conservation and Parks

Schedule C – Director's Directions for Operational Plans (Subject System Description Form) Municipal Residential Drinking Water System

Fields marked with an asterisk (*) are mandatory.

Owner of Municipal Residential Drinking Water System *
Municipality of Middlesex Centre

Subject Systems

Name of Drinking Water System (DWS) *	Licence Number *	Name of Operating Subsystems (if applicable)	Name of Operating Authority *	DWS Number(s) *
1. Middlesex Centre Distribution System	052-401	NA	Middlesex Centre Water & WW	260004202
2. Melrose Well Supply System	052-403	NA	Middlesex Centre Water & WW	260002915
3. Birr Well Supply System	052-404	NA	Middlesex Centre Water & WW	220005492

Contact Information for Questions Regarding the Operational Plan

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Alternative Formats:

If you require this document in an alternative format, please contact the Municipality of Middlesex Centre at 519-666-0190 or customerservice@middlesexcentre.on.ca.

1.0 Introduction

This operational plan describes the Municipality of Middlesex Centre's quality management system (**QMS**) that:

1. **Meets the requirements** of the Drinking Water Quality Management Standard (**DWQMS**), and
2. Helps ensure we **consistently achieve the intended outcomes** of our drinking water systems' processes and programs.

The Municipality of Middlesex Centre is the **owner** and Middlesex Centre's Water & Wastewater Operations is the **operating authority** for the Middlesex Centre Distribution System, Melrose Well Supply System and Birr Well Supply System.

Our operational plan, other QMS information (e.g. standard operating procedures, work instructions, forms), and training programs - all support achieving our **QMS Policy commitments (p. 6)**.

Organization and People sections of this manual describe:

- the **commitments** we've made (sections 2 and 3)
- the **people** we have and their **roles, responsibilities and authorities** (section 9)
- how we ensure staff **competencies** and **coverage** (sections 10 and 11)
- the ways in which we **communicate internally** (among staff and to the owner) and **externally** (to essential suppliers and to the public) (section 12)

System Operations and Maintenance sections describe:

- the processes and programs we have in our **drinking water system** (section 6)
- **risks** associated with our drinking water system (sections 7 and 8)
- **supplies and services essential** to our operations and maintenance (section 13)
- ways in which we annually **review the adequacy of our infrastructure** (section 14)
- what infrastructure **maintenance, rehabilitation and renewal programs** we have (section 15)
- how we maintain a **state of emergency preparedness** (section 18)

Support and Performance Evaluation sections describe:

- the ways in which we manage and **control documents and records** (section 5)
- how we **sample, test, and monitor** for process control and finished water quality, with what **calibrated equipment**, and how we **share results** (sections 16 and 17)
- how we **conduct internal audits** to verify we achieved everything we should (section 19)
- the content of our **QMS reports to top management** and to the **Owner** (section 20)

The Continual Improvement section describes:

- how we **track and measure continual improvement** (section 21)

This operational plan is available for viewing by the public online at: [<https://www.middlesexcentre.on.ca/municipal-serviceswater/water-supply>].

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2.0 Quality management system (QMS) policy

As the owner and operating authority for the municipality's drinking water systems, the **Municipality of Middlesex Centre** and **Water & Wastewater Operations division** are committed to:

- Managing and operating the drinking water systems in a responsible manner in accordance with documented quality management policies and procedures.
- Providing the customer with clean, safe drinking water.
- Maintaining and continually improving each quality management system.
- Complying with applicable regulations and legislation

Signed this _____ day of _____, 2022 at Middlesex Centre, Ontario.

CAO (Top Management)

Director of Public Works & Engineering
(Top Management)

Manager of Water & Wastewater Operations
(QMS Representative)

These **policy commitments are communicated** to staff through QMS awareness training and made available to the public through our website.

3.0 Commitment and endorsement

As decision-makers for the drinking water systems and representatives of **top management** and the **owner**, we are committed to:

- a) ensuring that **an effective QMS** is in place that meets the requirements of the **DWQMS**,
- b) ensuring that the operating authority is **aware of all applicable legislative and regulatory requirements**,
- c) **communicating the QMS** according to the procedure for communications, and
- d) determining, obtaining or **providing the resources needed** to maintain and **continually improve** the QMS.

Signed this ____ day of _____, 2022 at Middlesex Centre, Ontario.

CAO (Top Management)

Director of Public Works & Engineering
(Top Management)

Manager of Water & Wastewater Operations
(QMS Representative)

This page's signatures are **updated within six months of changes** to the personnel who hold the positions listed above.

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Owner endorsement of this Operational Plan is obtained through a council resolution **within one calendar year** of changes to council.

4.0 QMS representative

The **Manager of Water & Wastewater Operations** is appointed the role of Quality Management System (QMS) Representative for the Municipality of Middlesex Centre. Irrespective of other responsibilities, the **QMS Representative** has both the responsibility and authority to:

- a) administer the QMS by ensuring that **processes and procedures needed for the QMS** are established and maintained,
- b) **report to Top Management** on the performance of the QMS and any need for improvement,
- c) **ensure** that **current versions of documents** required by the QMS are being used at all times,
- d) ensure that **personnel are aware of all applicable legislative and regulatory requirements** that pertain to their duties for the operation of the drinking water systems, and
- e) **promote awareness of the QMS** throughout the operating authority.

July 22, 2019

LETTER OF APPOINTMENT

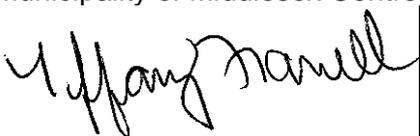
Eric Joudrey is appointed and authorized by Top Management as the Quality Management System ("QMS") representative under the Drinking Water Quality Management System for water systems owned by the Municipality of Middlesex Centre, including:

- Birr Well Supply
- Melrose Well Supply
- Middlesex Centre Distribution System (servicing communities of Arva, Ballymote, Delaware, Denfield, and Komoka-Kilworth and Ilderton)

The QMS Representative, irrespective of other duties, shall:

- A) Administer the Quality Management System by ensuring that processes and procedures needed for the Quality Management System are established and maintained.
- B) Report to Top Management on the performance of the Quality Management System and any need for improvement.
- C) Ensure that current versions of documents required by the Quality Management System are being used at all times.
- D) Ensure that personnel are aware of all applicable legislative and regulatory requirements that pertain to their duties for the operation of the subject system, and
- E) Promote awareness of the Quality Management System throughout the Operating Authority.

Signed,
Municipality of Middlesex Centre



Tiffany Ferrell CPA, CA
Acting CAO, Municipality of Middlesex Centre

5.0 Document and records control

Documents created through QMS implementation and during daily systems operations are reviewed on a regular basis for consistency, and effectiveness by the QMS Rep and/or designate. All documents within the QMS that are not current will be taken out of circulation, archived then disposed of when required.

Records of operational activities are maintained in a legible manner, readily identifiable, retrievable, stored, protected, retained and disposed of as required by the Safe Drinking Water Act, 2002 and its various regulations.

The Master List of Documents maintained and stored on the municipal network drive which is managed by Middlesex County who ensures all documents are backed-up on a weekly basis, preventing loss of information. A list of documents, including filling location and retention can be found in [Appendix A](#)

6.0 Drinking water systems

The Municipality of Middlesex Centre is the **owner** and Middlesex Centre's Water & Wastewater Operations is the **operating authority** for Middlesex Centre's three (3) drinking water systems:

- Birr Well Supply System (DWS # 220005492) - Small Municipal Residential System
- Melrose Well Supply System (DWS # 260002915) - Small Municipal Residential System
- Middlesex Centre Distribution System (DWS # 260004202) - Class II

These Municipality of Middlesex Centre systems provide potable water to the residents and businesses of in the Municipality of Middlesex Centre. The water systems within the municipality include the Class II Middlesex Centre Distribution System consisting of six (6) different subsystems, and two (2) Small Municipal Residential Systems known as Birr Drinking Water System and Melrose Drinking Water System.

The Middlesex Centre Distribution System obtains water either directly from the Lake Huron Primary Water Supply System (LHPWSS) or from the City of London Distribution System served by the LHPWSS. The Birr and Melrose Drinking Water Systems are well water systems. The Municipality of Middlesex Centre owns, manages, maintains and operates the facilities described below.

Process Flow Diagrams and GIS Drawings for each of the drinking water systems are located in [Appendix "B"](#).

Birr Well Supply System

The Birr Well Supply System consists of one groundwater well. The well is located approximately 5m from the pump house in the Village of Birr. The well is equipped with a submersible pump and is rated at 88m³/day. The raw water quality is typically good and it is rare for there to be any instances of bacteriological growth. Other than usual water usage increases in the summer months (where flows are still within system capacity), there are no operational challenges due to event-driven fluctuations.

Raw well water is pumped from the well into a 51m³ concrete reservoir. The water is disinfected using a sodium hypochlorite disinfection system, consisting of one 100L storage tank and two chemical metering pumps (one duty and one standby) with a feed line discharging into the underground reservoir. Two submersible high lift pumps, each rated at 81.7 L/min, subsequently pump the water through a 150mm watermain to the distribution system. There is no storage or other components in the distribution system. No upstream or downstream processes that are relied upon to ensure the provision of safe drinking water.

Melrose Well Supply System

The Melrose Well Supply System consists of two deep-drilled groundwater wells:

- Well #2, is a drilled well at a depth of 23.8m, is equipped with a submersible pump rated at 5.45L/s
- Well #3, is a drilled well at a depth of 24.7m, is equipped with a submersible pump rated at 5.45L/s

The raw water quality is typically good and it is rare for there to be any instances of bacteriological growth. Other than the usual water usage increases in the summer months and water being used for fires (where flows are still within system capacity), there are no operational challenges due to event- driven fluctuations.

Raw well water from the production wells enters the treatment plant equipped with flow meters prior to the lines merging into a single common header where liquid sodium hypochlorite is injected as part of the primary disinfection process for the system. Following sodium hypochlorite injection, the water is conveyed overhead through a single pipe to an aeration unit. The aeration unit injects high volumes of air into the water to enhance the oxidation of iron. The aerated water enters into an underground aeration chamber prior to being drawn up by one of two centrifugal pumps and conveyed to one of three aesthetic filters. The three aesthetic filters are used primarily for the removal of the oxidized iron. Each filter system is configured with five backflow prevention devices and valves to ensure the proper functioning of the filters in normal and backwash modes. Under normal flow conditions, filtered water is directed past a second sodium hypochlorite injection point which is located just downstream of the three filters and just upstream of the two large contact time reservoirs which are located below grade in the Treatment Plant. The treated water in the reservoirs is directed to a clear well. There are four high lift vertical turbine distribution pumps:

- Pump #1 (2.35 L/s) is the normal operation pump
- Pumps #2 and #3 (both 4.65 L/s) will automatically be engaged with required demand
- Pump #4 (38 L/s) which is considered the emergency fire pump.

The aforementioned high lift pumps direct water downwards via piping into a below grade chamber where a final sodium hypochlorite injection point is located; this final sodium hypochlorite injection point is not typically used. There is no storage or other components in the distribution system.

There are no upstream or downstream processes that are relied upon to ensure the provision of safe drinking water.

Middlesex Centre Distribution System

The Middlesex Centre Distribution System is comprised of six (6) different sub-systems obtaining water either directly from the Lake Huron Primary Water Supply System (LHPWSS) or from the City of London Distribution System served by LHPWSS. The six (6) water sub-systems are:

- Arva Distribution System
- Ballymote Distribution System
- Delaware Distribution System
- Denfield Distribution System
- Ilderton Distribution system
- Komoka-Kilworth Distribution System

The water supply for all of the distribution systems is the Lake Huron Primary Water Supply System. The source of the water obtained by the LHPWSS is Lake Huron, a surface water source. Raw water is treated using conventional chemically assisted flocculation and sedimentation systems, dual-media filtration, and gaseous chlorine as the primary disinfectant. The LHPWSS is owned by the Lake Huron Joint Board of Management and their Operating Authority is Ontario Clean Water Agency.

Arva Distribution System

The water supply for the Arva Distribution System is obtained from a 1050 mm pipeline from the London distribution system. The London distribution system is owned and operated by the City of London. A 200mm cast-iron pipeline

with flow meter and in-line vertical turbine fire pump distributes treated water. Two chemical metering pumps are available for secondary disinfection to boost sodium hypochlorite levels.

Ballymote Distribution System

The Ballymote Distribution System obtains water from a 300 mm pipeline from the London distribution system. The London distribution system is owned and operated by the City of London. A re-chlorination injection point exists with a portable chlorine feed system, a sampling tap immediately downstream from the injection point and a chlorine analyzer measures free chlorine residual in the water entering the distribution system.

Delaware Distribution System

The Delaware Distribution System obtains water through a 300 mm main from the London distribution system. The London distribution system is owned and operated by the City of London. The treated water from the London distribution system is fed through the Delaware Re-Chlorination Facility, where the flow and pressure are regulated and the chlorine residual is maintained. The flow travels to the Water Standpipe on the opposite side of the system where the level is regulated by a pressure switch at the Standpipe. When the Standpipe level reaches a specified set point the control valve is called on to provide water. As the water goes through the station it is chlorinated. The rate of flow and the chlorine residual are monitored and recorded by SCADA. Communication between the Re-Chlorination Facility and the Standpipe is through a private network.

Denfield Distribution System

The Denfield Distribution System taps into the 1200mm main from the LHPWSS. The water feeds the 100m³ reservoir that is owned by The Municipality of Middlesex Centre. The booster pumping station has two booster pumps rated at 3.8 L/s and one variable speed pump with a rated capacity of 40 L/s.

A sodium hypochlorite system is used to boost the chlorine entering or leaving the reservoir. Water is then fed to the distribution system.

Ilderton Distribution System

The water supply for the Ilderton distribution system is obtained from the LHPWSS. Water supply from the LHPWSS enters the waterworks building (Booster Station), which is owned and operated by the Municipality of Middlesex Centre. Water is conveyed to the distribution system and water tower with three (3) high lift pumps each rated at 17 L/s. A sodium hypochlorite disinfection system with containment and two metering pumps are available for booster disinfection. The Ilderton Water Tower is fed via a 300 mm water main and has a storage capacity of 2,050 m³.

Komoka – Kilworth Distribution

The water supply for the Komoka-Kilworth Distribution system is obtained from the LHPWSS via 400 mm main. The water feeds the 2817 m³ reservoir, which is owned by Middlesex Centre. The booster pumping station has two booster pumps rated at 53.7 L/s along with a sodium hypochlorite system, which is used to boost the chlorine entering, or leaving the reservoir. Water is fed to the Komoka Water Tower that has a storage capacity of 1,500 m³ and to the Intermediate Booster Pump Station that is equipped with variable frequency drives (VFD's) to supply flow to Kilworth during period of high flow.

Other than usual water usage increases in the summer months, there are no operational challenges due to event-driven fluctuations for any part of the Middlesex Centre distribution system. The treatment of the raw water at the LHPWSS is a critical upstream process that is relied upon to ensure the provision of safe drinking water.

7.0 Risk assessment

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Each of the drinking water system's process and program steps from source water to consumers' taps are evaluated for risks of failure (including a review of potential failures related to source water, water treatment, and water distribution).

At least once every calendar year, Middlesex Centre's Water & Wastewater Operations division conducts a review of the currency of information and validity of the assumptions used in the risk assessment. The updated risk assessment outcomes are presented at the next Management Review meeting for review and approval.

At least once every thirty-six months, Water & Wastewater Operations re-assess drinking water system risks using the risk rating criteria included below (adding ratings for likelihood, consequence and detectability & response).

Likelihood		Consequence		Detectability & Response	
1	Rare: Has occurred or may occur less frequently than once every 10 years, given the existing control measures.	1	Insignificant or no: Service interruption to customers (<5%) or loss of available water supply (duration of <3 hours, and/or minor pressure fluctuations), or insignificant or no public notification.	1	High Detectability and/or Excellent Response: Automatic response AND alarm. Excellent ability to respond in comparison to best practices and considering resources available ¹ .
2	Unlikely: Has occurred or may occur approximately once every 5- to 10-year period, given the existing control measures.	2	Localized minor: Service interruption to customers (5-15%) or loss of available water supply (duration of 3-6 hours and/or sustained minor drop in pressure), or localized public notification.	2	Moderate Detectability and/or Very Good Response: Requires system to be running to receive alarm and/or call-out is delayed. Very good ability to respond, considering resources ¹
3	Possible: Has occurred or may occur approximately once per 5-year period, given the existing control measures.	3	Moderate: Localized major / widespread minor: service interruption to customers (16-30%), loss of available water supply (duration of 6-12 hours, and/or sustained drop in pressure below 260kPa) and/or illness, or city-wide media coverage.	3	Detectable and/or Good Response: Visually detectable on operator's rounds; Regular maintenance would discover the problem (such as through facility checks). Good ability to respond, considering resources ¹
4	Likely: Has occurred or may occur approximately once per year, given the existing control measures.	4	Major: Service interruption to customers (31-60%), loss of available water supply (duration of 12-24 hours, and/or sustained drop in pressure below 260kPa but above 140kPa) and/or illness, or province-wide media coverage.	4	Poor Detectability and/or Fair Response: Not inspected on a regular basis; Would not be detected before a problem was evident; Lab tests that are not done on a regular basis (e.g. quarterly). Fair ability to respond, considering resources available ¹ .
5	Very likely: Has occurred or may occur approximately once per month, given the existing control measures.	5	Catastrophic: Service interruption to customers (>60%), loss of available water supply (duration of > 24 hours and/or sustained drop in pressure below 140kPa resulting in loss of fire flow) and/or illness, or national and/or international media coverage.	5	Undetectable and/or Poor Response: Cannot detect. Poor ability to respond, considering resources available ¹ .

¹ Resources available (to effectively carry-out QMS Policy commitments) include: qualified staff, infrastructure, essential supplies and services (e.g. equipment, materials, facilities / space, consultants / contractors, etc.

The purpose of the risk assessment is to:

- **identify** potential **hazardous events** and associated **hazards**,
- **assess the risks** associated with the **occurrence** of the hazardous events,
- **rank** the hazardous events according to the associated risk,
- **identify control measures** to address the potential hazards and hazardous events,
- **identify critical control points**, and

- **identify response procedures** when an identified risk cannot be controlled.
- Consideration of the potential hazardous events and associated hazards from the document titled "[Potential Hazardous Events for Municipal Residential Drinking Water Systems](#)" is included in the risk assessment process.

When reviewing the currency of the risk assessment information, the following may be considered:

- a) process changes.
- b) changes in reliability and redundancy of equipment.
- c) the occurrence of emergency events.
- d) the occurrence of deviations from critical control limits.
- e) non-conformities identified in the QMS or related to standard operating procedures.

A high risk is considered to be a risk assessment score of **9** or higher.

The recommended **minimum critical control points** are **related to disinfection** requirements; and therefore, regardless of risk assessment scores, any items related to **disinfection** are **automatically considered Critical Control Points**. Items that **cannot be controlled** should not be considered CCP's, **regardless of their score**.

8.0 Risk assessment outcomes

The outcome of the risk assessment process is summarized in the [Middlesex Centre Risk assessment outcomes](#) record which documents:

- a) the identified potential **hazardous events and associated hazards**,
- b) the **assessed risks** associated with the occurrence of the hazardous events,
- c) the **ranked** hazardous events,
- d) the identified **control measures** to address the potential hazards and hazardous events,
- e) the identified **critical control points** (CCP's) and their respective **critical control limits** (CCL's),
- f) procedures and/or processes to **monitor the CCL's**,
- g) procedures to **respond to deviations** from CCL's, and
- h) procedures for **reporting and recording deviations** from CCL's.

and can be found in [Appendix C](#).

8.1 CRITICAL CONTROL POINTS AND CRITICAL CONTROL LIMITS

Critical limits are established as indicators that a critical control point is out of control. The limits provide staff with a range of acceptable values within which no corrective actions are required.

Critical limits define the point at which staff must take action to prevent escalation of the critical event or to correct the critical event.

- Critical limits may be determined based on regulatory requirements, process monitoring capabilities, off-hours response time, and historical plant performance.
- Process alarms (if available) are normally set at, or near critical limits. Responses to breached critical limits are detailed in the Operations Manual.

Critical control limits are documented in the associated CCP monitoring and/or response procedures.

Critical control points (CCP's) identified in the risk assessment and their respective critical control limits (CCL's) are summarized in the following tables:

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CCP	Condition	High CCL	Low CCL
Primary disinfection	Normal operating condition	3.00 mg/l	1.0 mg/l
Secondary disinfection	Chlorine residual at point of entry (POE)	3.00 mg/l	0.30 mg/l
Distribution system chlorine residual	Chlorine residual measured with grab sample	4.00 mg/l	0.2 mg/L free chlorine
Backflow prevention	Ideal system pressures No illegal cross-connections	NA	NA

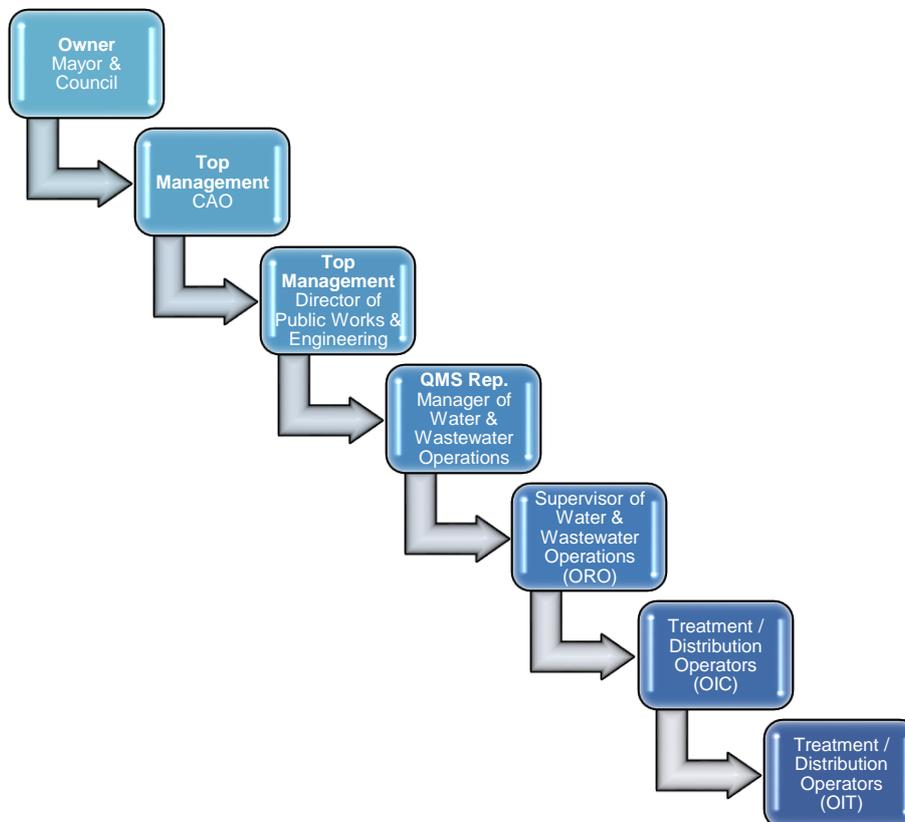
Procedures listed below describe how CCL's **are monitored** and include **response procedures** for when **CCL's are reached** related to the following situations:

- **CCP-801 Chlorination Control**
- **CCP-802 Control System Failure**
- **CCP-803 Backflow Prevention**

Requirements for **reporting and recording deviations** from CCL's are included in these CCL response procedures.

9.0 Organizational roles, responsibilities, and authorities

The organizational structure related to Middlesex Centre's Water & Wastewater Operations is depicted below:



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The QMS Representative ensures that the responsibilities and authorities for the relevant roles are assigned and communicated throughout the organization (to the owner and operating authority personnel). Roles, responsibilities and authorities related to provision of safe drinking water are described below:

Role	Responsibilities	Authorities
Owner – Mayor & Council	<p>Supply safe drinking water to consumers.</p> <p>Ensure the operating authority is accredited.</p> <p>Review drinking water system reports and endorse the operational plan prepared by the operating authority and make decisions based on these.</p> <p>Provide the resources needed to maintain and continually improve the drinking water system (DWS) and quality management system (QMS).</p>	<p>Report to the public on matters required by legislation.</p> <p>Provide / review / approve policy.</p> <p>Review, revise, approve proposed by-laws (or changes), user fees, expenditures, taxation rate.</p> <p>Provide resources necessary to continually improve DWS / QMS.</p>
Top Management – Chief Administrative Officer (CAO)	<p>Carry-out the commitments described in sections 2 and 3 of this operational plan.</p> <p>Make recommendations to the Owner ensuring the necessary DWS / QMS resources are provided.</p> <p>Participate in Management Reviews.</p>	<p>Report to council and the public.</p> <p>Provide resources necessary to continually improve DWS / QMS.</p>
Top Management – Director of Public Works & Engineering	<p>Carry-out the commitments described in sections 2 and 3 of this operational plan.</p> <p>Ensure compliance with MDWL.</p> <p>Make recommendations to the Owner ensuring the necessary DWS / QMS resources are provided.</p> <p>Participate in Management Reviews.</p>	<p>Report to council and the public.</p> <p>Communicate with Owner, public, regulatory agencies on OA's behalf</p> <p>Recommend improvements or changes.</p> <p>Provide resources necessary to continually improve DWS / QMS.</p>
QMS Representative – Manager of Water & Wastewater Operations	<p>Carry-out the commitments and responsibilities described in ss. 2 and 4 of this operational plan.</p> <p>Identify need for resources / infrastructure upgrades</p> <p>Coordinate infrastructure improvement projects and respond to water servicing requests.</p> <p>Present reports for Management Reviews.</p>	<p>Communicate with MECP, Owner, and top management.</p> <p>Carry-out QMS Rep duties described under s.4 of this OP.</p> <p>May assign a designate to perform duties.</p>
Supervisor of Water & Wastewater Operations (ORO*)	<p>Act as ORO, oversee DWS operations, maintenance, and optimization activities.</p> <p>Supervise and coordinate treatment / distribution operators –SOP's followed & records completed.</p> <p>Oversee sampling, monitoring and test programs.</p> <p>Report and act on AWQI's, deviations from SOP's, any issues of non-compliance.</p>	<p>Coordinate Water Operator training</p> <p>Receive and follow-up on external complaints.</p> <p>May assign a designate to perform duties in their absence.</p> <p>Report to QMS Rep – Manager of Water and Wastewater Operations with documented findings and proceed as instructed</p>

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Role	Responsibilities	Authorities
Treatment / Distribution Operators (OIC's **)	<p>Carry-out work in line with QMS Policy commitments.</p> <p>Operate and maintain treatment and distribution systems safely in accordance with requirements.</p> <p>Keep records of all activities (e.g. logbook entries, notes of computer records review) as required.</p> <p>Report and act on AWQI's, deviations from SOP's, any issues of non-compliance.</p> <p>Attend training, maintain certification requirements.</p>	<p>Evaluate and test processes and equipment to optimize performance</p> <p>Make operational decisions: respond to adverse conditions, alarms, and report as required.</p> <p>Receive and follow-up on external complaints.</p> <p>Report to OIC and/or ORO with documented findings and proceed as instructed</p>
Treatment / Distribution Operators (OIT's ***)	<p>Carry-out work in line with QMS Policy commitments.</p> <p>Operate and maintain treatment and distribution systems safely in accordance with requirements and as instructed.</p> <p>Keep records of all activities (e.g. logbook entries, notes of computer records review) as required.</p> <p>Report and act on AWQI's, deviations from SOP's, any issues of non-compliance as instructed.</p> <p>Attend training, maintain certification requirements.</p>	<p>Report to OIC and/or ORO with documented findings and proceed as instructed.</p>

ORO** – Overall Responsible Operator; *OIC** – Operator-in-charge, *****OIT** – Operator-in-training

10.0 Competencies

Competencies required for personnel performing duties directly affecting drinking water quality are described below:

Overall Responsible Operator	Operators-in-Charge (OIC)
Minimum Class II Water Distribution & Supply Certification and understanding of role within QMS.	Minimum Class I Water Distribution & Supply. Understanding of role within QMS.

Water Operators hired must have a minimum **OIT** (Operator-in-training) Certificate in Water Distribution & Supply. They must also understand their role within the QMS. An OIT cannot act as neither OIC nor ORO until they've attained the minimum Class I certification.

Competency records are retained by the QMS Representative and input into a third party software program to track training and certification for individual operators.

The municipality recognizes the value of **training and development** of its employees. Furthermore, it is recognized that continuing education is a requirement for certified and licensed staff of the Water & Wastewater division. The responsibility for such training lies not only with the employer, but also with the individual.

The Water & Wastewater division may administer certain tests, conduct interviews, verify references and/or request specific documentation as part of the hiring process in order to verify skills, experience and knowledge.

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In order to meet the ongoing changes to technology, software, the requirements of applicable legislation, and water operations processes, all operators shall receive training as required by compliance obligations. The training may be provided by qualified employees or contracted subject matter experts.

O. Reg. 128/04, s.29 includes the following table that summarizes the required annual training hours for Operators, as related to the highest class of drinking water system where the Operator is employed. For Middlesex Centre, Class II Water Distribution and Supply applies – a minimum of 12 hours continuing education and 35 hours total per year:

TABLE
ANNUAL TRAINING FOR OPERATORS

Type and Class of Subsystem Where the Operator is Employed	Training Requirements	Minimum Total Hours
Limited Groundwater or Limited Surface Water	7 hours or more of continuing education, with the remaining hours to at least the minimum total as on-the-job practical training	20
Class I Water Treatment or Class I Distribution or Class I Distribution and Supply	7 hours or more of continuing education, with the remaining hours to at least the minimum total as on-the-job practical training	30
Class II Water Treatment or Class II Distribution or Class II Distribution and Supply	12 hours or more of continuing education, with the remaining hours to at least the minimum total as on-the-job practical training	35
Class III Water Treatment or Class III Distribution or Class III Distribution and Supply	14 hours or more of continuing education, with the remaining hours to at least the minimum total as on-the-job practical training	40
Class IV Water Treatment or Class IV Distribution or Class IV Distribution and Supply	14 hours or more of continuing education, with the remaining hours to at least the minimum total as on-the-job practical training	50

O. Reg. 128/04, s. 29, Table.

The **QMS 10-01 On-the-job practical training form** is used to track on-the-job practical staff training. CEU-accredited training providers issue training certificates as the record of training.

Activities to ensure that personnel are aware of the relevance of their duties and how they affect safe drinking water include: providing access to training on relevant legislation and related regulations; staff meetings and orientation sessions reminding staff of roles and responsibilities related to QMS Policy commitments; and conducting internal audits with staff and interviewing them about the relevance of their duties and how they affect safe drinking water.

11.0 Personnel coverage

This section describes the coverage provided for Municipality of Middlesex Centre water operations. All operators are informed of scheduling requirements and the staff are made aware of the schedule, including on-call duties, via email and are able to access it on the division’s shared network drive.

- Water operations is staffed daily by water operators (**Operators-in-charge**, or “**OIC’s**”) on a regular basis from 7:30 am to 4:00 pm weekdays and 7:30 am to 11:30 am weekends.
- Off-hours on-call coverage is provided 24 hours a day on a rotating basis.
- The **Overall Responsible Operator (ORO)** is the Supervisor of Water & Wastewater Operations. The ORO must be available at all times to direct OIC’s on the operations of the system and to respond immediately and effectively to emergencies.
- In the event the ORO is not available, a qualified water operator holding a Class II certificate will be designated ORO.

After-hours / weekends/ statutory holiday coverage

- The drinking water systems are controlled and monitored by SCADA. Any alarm condition is routed to an automated dialer that is programmed to call a call centre, who then text messages the alarm details to the water operations staff.
- A water operator (OIC) is on stand-by based on a weekly rotation. The stand-by operator takes the necessary actions to investigate and address any alarm conditions.
- An emergency Middlesex Centre contact number directed to a 24-hour answering service is available to the public. The answering service in turn has the emergency contact information for appropriate staff.
- Weekend and Statutory Holiday coverage/ sampling are the responsibility of the designated stand-by operator.

Emergency and vacation coverage

- The Supervisor (ORO) ensures that coverage of the Middlesex Centre water operations is continuous: 24 hours/day, 7 days/week. One designated ORO is available on-call 24 hours/day, 7 days/week. An alternate ORO will be designated as required. The name of the ORO is recorded daily in the logbook.
- In an emergency, continuity of operations is critical in order to consistently provide safe drinking water to our consumers. Middlesex Centre has a pandemic plan that describes pandemic response procedures (such as those implemented during the COVID-19 pandemic) that includes strategies for the physical separation of staff; establishing remote work options (such as for online training); allows for independent work to be carried out; and if needed, regulatory relief obtained from the Ministry for out-of-ordinary conditions (such as for short-staffing).
- Changes made to O. Reg. 128/04 further clarify rules and expectations in personnel coverage for short-staffing scenarios (e.g. pandemics, strikes and lock-outs) that the Water & Wastewater division would employ to ensure safe drinking water and regulatory requirements are consistently met.

12.0 Communications

This section describes how relevant aspects of the Quality Management System (QMS) are communicated **between top management** and the Owner, operating authority personnel, essential suppliers and service providers, and the public. These communications will occur as described in [QMS - 12 Communications Procedure](#)

13.0 Essential supplies and services

Supplies and services essential for the delivery of safe drinking water have been identified and contacts kept up-to-date in the emergency response plan's **emergency contact list** section.

The following table summarizes quality requirements of essential supplies and services and how they're procured:

Essential supply or service	Quality requirements	Means to ensure procurement
Chemicals and equipment	<p>All process chemicals and materials interacting with water must meet applicable AWWA and ANSI standards (NSF/60, NSF/61 and NSF 372).</p> <p>Safety data sheets required for each chemical product used.</p> <p>Proof of product conformity must be verified upon delivery.</p>	<p>A 45-day supply of sodium hypochlorite is maintained.</p> <p>Sodium hypochlorite is stored at the Komoka Booster Pump Station.</p> <p>Chemicals can be moved from one facility to another in the event of a shortage or an emergency.</p>

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Essential supply or service	Quality requirements	Means to ensure procurement
		An inventory of routine materials and equipment is carried out. Supervisor/Manager orders as required.
Distribution system parts	All distribution system chemicals and parts must meet applicable AWWA and ANSI standards (NSF/60, NSF/61 and NSF 372). Proof of product conformity must be verified upon delivery.	A minimum inventory of distribution system parts is maintained. Supervisor/Manager orders as required. Parts can be moved from one facility to another in the event of a shortage or an emergency.
Laboratory Services	Licensed and accredited as per O. Reg. 248/03 Drinking Water Testing Services. Proof of licence, accreditation and authorization to conduct tests requested verified with each new contract.	Contract with qualified, licensed, accredited labs. Drinking water tests required are verified on the lab's listing of authorized tests.
Calibration products, equipment, and services	Instrument calibrations and/or verification by qualified third-party. Reagents for verifications are maintained within expiry dates.	Tracking of verification / calibration dates (1:12 months). Unexpired verification reagents in stock.

Operators **verify quality requirements of received chemicals** are met with each delivery and documentation retained on file. When quality requirements are not met, the Operator contacts the Supervisor/Manager directly so that **corrective action** is initiated.

Contact information for supplies and services that may be used in emergencies are included in the emergency plan.

14.0 Review and provision of infrastructure

At least once per calendar year, the Water & Wastewater division prepares capital and operational budgets and presents these to Middlesex Centre's council. Capital budget items are selected through risk-based decisions made by reviewing:

- the latest risk assessment outcomes
- any issues related to the drinking water system's reliability and redundancy
- infrastructure conditions (e.g. age, failure, material, sizing, etc.)
- and, any long-term infrastructure and asset management plans available.

The Director of Public Works and Manager of Water & Wastewater Operations review the 6-year project plan to update infrastructure priorities, considering the following information:

- official plans
- previous priority lists
- engineering assessments
- MECP inspection reports
- flow data trends
- water quality reports
- operators' suggestions
- risk assessment outcomes
- and maintenance records.

The prioritization of capital budget items is documented through **QMS 14-01 Infrastructure Review Meeting** minutes.

The program is reviewed with operating authority staff and presented to Middlesex Centre council by the Director during budget deliberations.

Upon approval of the plan, the Water & Wastewater Operations division begin the process of implementing the approved recommendations over the course of the fiscal year.

15.0 Infrastructure maintenance, rehabilitation and renewal

A summary of the Water & Wastewater division's infrastructure maintenance, rehabilitation and renewal programs is available through a work order system and the asset management plan.

The work order system serves as a reminder system to carry-out **preventive maintenance** activities at their required timelines; and keeps records of these maintenance activities. The preventive maintenance program is based on compliance obligations and on original equipment manufacturer recommendations included as part of equipment manuals.

Service agreements exist with qualified contractors for priority items such as SCADA system maintenance and calibration services for measurement instrumentation.

When equipment or systems breakdown, **reactive maintenance** is carried-out and records are maintained using "Annual Maintenance Summary" Word document and the deviations from normal operating conditions are recorded in logbooks.

Larger and longer-term maintenance activities that are carried out less frequently (e.g. pump rehabilitation, reservoir cleaning) are tracked through asset management plans.

The Water & Wastewater Operations division communicates the **summary of** and reports on **the effectiveness of** regular and long-term infrastructure maintenance, rehabilitation and renewal programs to Middlesex Centre council **at least once per calendar year** through the annual budget process and through annual water quality reports.

16.0 Sampling, testing and monitoring

The sampling, testing and monitoring programs are carried out to provide operators with knowledge to **proactively operate** the drinking water system; **ensure water quality** is maintained; and **ensure compliance obligations** are met. All legislated sampling is conducted as prescribed in the **Safe Drinking Water Act and applicable Regulations**.

Sampling requirements are **planned by the ORO** and **QMS Representative** and carried-out by operational staff. All staff who sample, test and monitor for water quality, have received **appropriate training and are qualified** to do so.

All sampling is conducted by operations staff or in-line Continuous Monitoring Analyzers. Legislated analyses are performed by an accredited laboratory, where operations staff conducted in house analyses on all other aesthetic parameters.

The Water & Wastewater division uses a **Sampling calendar** for all of its water systems, based on legislative requirements and timeframes. With each of the bacteriological sample taken, operators use a colorimeter to record free chlorine residuals and enter results in an electronic data collection system.

Bacteriological and chemical samples are taken in accordance with the accredited laboratory's instructions and tests are carried-out by the accredited lab with results reported to LIMS (Laboratory Information Management System) and listed staff. Received reports are checked then stored electronically in the Water & Wastewater network drive.

Additional **sampling** may be conducted **for challenging conditions** in addition to the regular schedule to account for out-of-ordinary conditions (e.g. watermain break repairs or related to construction activities within Middlesex Centre).

SCADA provides **continuous monitoring** with analyzers recording data of critical control points (such as turbidity and free chlorine residual) at the point of entry into the distribution system, and uploads that data at a minimum of 5 minute intervals to eRIS reporting and information system. The recorded data is reviewed within 72 hours by operators and again by Compliance Coordinator. The operator on duty verifies online continuous monitoring equipment's accuracy against bench-top results and make adjustments as necessary.

Records of sampling, testing and monitoring activities (e.g. those collected in the electronic data collection system, Watertrax, Laserfiche and N:\ drive, and test results provided by accredited labs) are reviewed and maintained by the QMS Representative to ensure compliance obligations and safe drinking water quality requirements are consistently met.

Relevant sampling, testing and monitoring activities that take place **upstream** of Middlesex Centre's drinking water systems are carried out by the Lake Huron Primary Water Supply System and the City of London.

Communication

The sampling and testing results are summarized in the annual report. As required by regulation, Middlesex Centre's council is provided with a copy of the **Annual & Summary Report** which includes these results.

More immediate communications of sampling and testing results take place when **adverse water quality incidents** are identified (see section 12.0 Communications).

17.0 Measurement and recording equipment calibration and maintenance

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As accuracy of measurement and recording equipment is essential in the provision of safe drinking water, **calibration, verification and maintenance** of this equipment is critical to instill confidence in the data recorded.

- Measuring and recording equipment is maintained by **qualified staff** and/or **third-party service provider**.
- As per the Municipal Drinking Water Licence, **flow measuring devices** and **measuring instrumentation** that form part of the **CT monitoring system** (e.g. continuous chlorine analysers, level sensors) are checked and calibrated as necessary at least once every 12 months (or more frequently, if specified) using the method specified by the manufacturer.
- The **certificates of calibration** and/or **records of verification** are retained on file, and the instruments bear a record of the **most recent calibration / verification date**.
- The QMS Rep and/or ORO or designates is responsible for coordinating a **qualified staff person** or **third-party** for the required calibration and / or verification of the measurement and recording equipment (incl. continuous analyzers, colorimeters and turbidimeters).

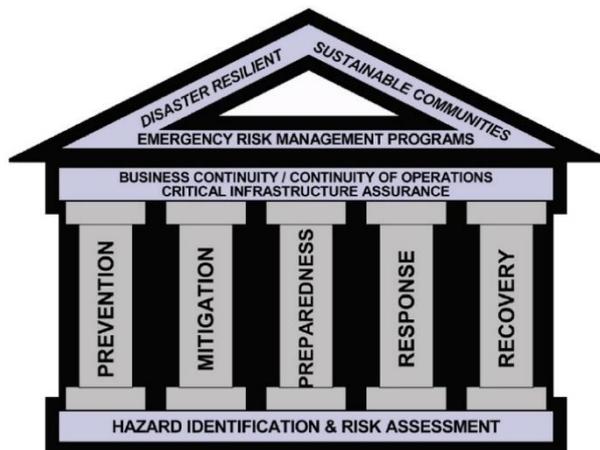
A work order system is used to track the full listing of measurement and recording equipment, their records, next calibration due dates and provide task instructions for the work carried-out by internal operations staff. The Operations & Maintenance manual also includes SOP's specific to analyzer calibrations and verifications for those devices performed by staff.

18.0 Emergency management

We maintain a **state of emergency preparedness** by:

- a) maintaining a list of potential emergency situations or service interruptions (see **Risk assessment outcomes**),
- b) identifying processes for emergency response and recovery (see **Water emergency response plans**),
- c) conducting **emergency training and testing** activities,
- d) identifying Middlesex Centre and Water & Wastewater Operations **responsibilities** during emergency situations,
- e) referring to **municipal emergency planning** measures for larger-scale incidents (see **Middlesex Centre's Emergency Response Plan**), and
- f) having an **emergency communication protocol** in place and an up-to-date **list of emergency contacts**.

For potential environmental emergencies, Emergency Management Ontario's five core components of emergency management are considered:



- **Prevention** – actions taken to prevent an emergency or disaster.
- **Mitigation** – actions taken to reduce the effects of an emergency or disaster.
- **Preparedness** – actions taken prior to an emergency or disaster to ensure an effective response.
- **Response** – actions taken to respond to an emergency or disaster.
- **Recovery** – actions taken to recover from an emergency or disaster.

In the context of our QMS, “emergencies or disasters” can contribute to potential adverse impacts.

Where possible, we plan actions to **prevent** or **mitigate** these adverse impacts and their consequences.

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Where we cannot prevent or mitigate impacts and their consequences; we prepare **planned response actions** in advance of an emergency to ensure we are effective in our response.

When emergencies do occur, we **respond** and take actions to **recover** from them (returning to normal operations).

In order to be prepared for potential emergencies, we **share our Water emergency response plan** with staff, interested parties and persons working under our control; **periodically test** our planned response actions and **train** our staff.

The emergency communication protocol is activated based on emergency notification levels outlined below:

Emergency Notification: Level 1

Level 1 Emergencies are generally those that can be addressed by the Operating Authority's own resources and do not require notification beyond that dictated in Ontario Regulation 170/03, *Schedule 16, Reporting Adverse Results and Other Problems*.

Level 1 Emergencies can typically be resolved by following the applicable Emergency Response Procedures.

Emergency Notification: Level 2

Level 2 Emergencies are generally those that can be addressed by the Operating Authority's own resources, but may require additional outside resources as deemed necessary. No additional notification beyond that dictated in Ontario Regulation 170/03, *Schedule 16, Reporting Adverse Results and Other Problems*. Level 2 emergencies require the notification of the owner and require the involvement of the Director, Public Works and Engineering.

If a Boil Water Advisory (BWA) or Drinking Water Advisory (DWA) is to be issued, additional resources as directed by the Public Health Inspector (Medical Officer of Health) may be needed. If an alternate water supply is to be made available for the duration of the incident, additional staff may be needed to secure a water supply and deliver to affected water consumers as soon as is practical.

Level 2 Emergencies can typically be resolved by following the requirements of the Emergency Response Plan

When issuing a BWA or DWA, the applicable Standard Operating Procedures are to be followed. If an event reaches this level, there is a need for both an effective operations response and effective issues management.

Emergency Notification: Level 3

Level 3 Emergencies are those that cannot be addressed by the Operating Authority's resources. Additional resources may include, but are not limited to, assistance from outside work forces, such as regulators, emergency responders. Notification beyond Ontario Regulation 170/03, *Schedule 16, Reporting Adverse Results and Other Problems* is required, including contacting the Owner as per procedures found in Emergency Response Manual.

If a large scale (typically greater than 200 residences) BWA or DWA is to be issued, additional resources from the Public Health Inspector will be needed. If an alternate water supply is to be made available for the duration of the incident, additional staff will be needed to secure a water supply and deliver to affected water consumers as soon as is practical. It is possible for an event to initially be responded to as a level 1 or 2, but continuing circumstances could elevate it to a level 3 (e.g., adverse water quality incident results in a boil water order/advisory).

Examples of a Level 3 emergency include:

- Potential or Actual Unsafe Water (large scale Boil Water Order/Advisory)
- Community emergency affecting water supply/distribution
- Large scale water treatment plant or system failure
- Catastrophic watermain break
- Activities that will attract media attention whether warranted as an emergency or not; and
- Loss of service/inability to meet demand

QMS Operational Plan

Level 3 Emergencies will require the coordination of several groups/agencies, which may include:

- Fire Chief
- Public Health Inspector (Medical Officer of Health)
- Ministry of the Environment, Conservation and Parks
- Owner

Level 3 Emergencies will require coordination between Operating Authority Emergency Response Plan and Owners Emergency Response Plan

The following chart is to be used to guide in determining which emergency response level is applicable and as such, which resources may be required and will require notification. Not all incidents listed will require all noted resources and needs to be addressed on a case-by-case basis.

Emergency Level	Incident Type (Examples)	Potential Resources Required Based on Incident Type	Response Guidance	Person/Group Requiring Initial Notification (Dependent on Incident Type)	Person/Group Responsible for Coordinating Response
1	Single Adverse Test Result Localized Watermain Break Minor Equipment Malfunctions	Operations Staff Public Health Inspector Owner MECP	Emergency Response Plan Equipment manual	Local MOH MECP (SAC)	Water/Wastewater Operations Supervisor Water/Wastewater Operations Manager or Designate
2	Multiple Adverse Test Results Boil Water Advisories Drinking Water Advisory Loss of Key/Transmission Watermains Multiple Plant Equipment Malfunctions/Failures Hazardous Material Spills	Operations Staff Public Health Inspector Owner MECP BWA/DWA Notification Resources (notices and delivery Staff) Outside Contractors and Equipment Alternate Water Supply	Emergency Response Plan Equipment manual Municipal Emergency Response Plan	Local MOH MECP (SAC) Owner Fire Chief	Water/Wastewater Operations Manager or Designate Water/Wastewater Compliance Coordinator Director Public Works and Engineering
3	Multiple Adverse Test Results Large Scale Boil Water Advisories Large Scale Drinking Water Advisory Large Scale Loss of Key/Transmission Watermains Fire/Large Scale Multiple Plant Equipment Malfunctions/Failures Large Scale Hazardous Material Spills	Operations Staff Public Health Inspector Owner MECP BWA/DWA Notification Resources (notices and delivery Staff) Outside Contractors and Equipment Alternate Water Supply	Emergency Response Plan Equipment manual Municipal Emergency Response Plan	Local MOH MECP (SAC) Owner Fire Chief	Water/Wastewater Operations Manager or Designate Water/Wastewater Operations Supervisor Director Public Works and Engineering

When emergency situations arise, we take the opportunity to assemble a cross-functional team to host a **debrief session** which includes the discussion of the following key questions:

- 1 **Why** did the emergency event / failure occur?
- 2 What **went well?** (to identify which practices and planned actions we should continue with)
- 3 What **didn't go well?** (to identify opportunities for improvement so that we are better prepared in a similar situation in the future)
- 4 Other **opportunities for improvement** / lessons learned.

The information gained from the debrief session would then contribute to the **review and revision** of emergency plans and contribute to continual improvement of emergency preparedness and response.

19.0 Internal audits

We conduct internal audits **at least once every calendar year** to provide information on **whether our QMS:**

- **conforms** to our own QMS requirements and to the requirements of the Drinking Water Quality Management Standard (DWQMS); and
- **effectively implemented and maintained.**

At a minimum, the **audit criteria** shall include the DWQMS. Various elements of the DWQMS can be evaluated as part of each internal audit conducted, as it applies to the specific process or program being audited.

The **scope** of the internal audit considers existing situations (e.g. system weaknesses have been recognized; have occurred) as well as the original plan for auditing drinking water system processes and process failures or emergency situations programs.

The standard for conducting management system audits, **ISO 19011:2018 Guidelines for auditing management systems** is used as the method to carry-out internal audits. If a sector-specific internal audit training program is available, the methods presented in the training program can also be followed (e.g. internal auditing for the DWQMS).

For each internal audit conducted, we:

- define what **processes and programs** form part of that **audit's criteria and scope**;
- **select auditors** and conduct audits so that we **ensure objectivity and impartiality** of the audit process (for example, no one is auditing their own work);
- **review previous** internal and external **audit results** (to ensure previous actions taken continue to be effective); and
- ensure that **results of audits are reported** (through Management Review meetings).

Following each audit conducted, an **internal audit report** is prepared as the record of the audit. The audit report summarizes details of the audit conducted, along with the summary of findings, as applicable: positive findings, non-conformities, and opportunities for improvement.

The **findings summarized** in the internal audit report are linked to the **continual improvement system** (see section 21.0). Any non-conformities and opportunities for improvement identified through the internal audit are recorded in the **continual improvement report and tracking system** established under section 21.0. A future internal and external audit will review the effectiveness of these actions taken.

20.0 Management review

Top management reviews our QMS at planned intervals (at least once every calendar year) to ensure continuing **suitability, adequacy and effectiveness of our QMS.**

The QMS Representative prepares the required information using the **QMS 20-01 Management Review Meeting form** which includes consideration of items required for Management Review meetings and prompts for the required outputs of these meetings (a summary of which is documented in Management Review Meeting minutes).

Management Review Inputs

The QMS Representative provides information and data relevant to the following items, for the review:

- a) incidents of regulatory non-compliance,

- b) incidents of adverse drinking water tests,
- c) deviations from critical control point limits and response actions,
- d) the effectiveness of the risk assessment process,
- e) internal and third-party party audit results,
- f) results of emergency response testing,
- g) operational performance,
- h) raw water supply and drinking water quality trends,
- i) follow-up on action items from previous management reviews.
- j) the status of management action items identified between reviews,
- k) changes that could affect the QMS,
- l) consumer feedback,
- m) the resources needed to maintain the QMS,
- n) the results of the infrastructure review,
- o) operational plan currency, content and updates, and
- p) staff suggestions.

Management Review Outputs

- a) ensure management review is conducted at least once every calendar year,
- b) consider the results of the management review and identify deficiencies and action items to address the deficiencies,
- c) provide a record of any decisions and action items related to the management review including the personnel responsible for delivering the action items and the proposed timelines for their implementation, and
- d) report the results of the management review, the identified deficiencies, decisions and action items to the owner.

21.0 Continual improvement

We are committed to tracking and measuring continual improvement by:

- a) reviewing and considering applicable **best management practices**,
- b) documenting a process for identification and management of **QMS Corrective Actions** that includes:
 - i. **investigating the cause(s)** of an identified non-conformity,
 - ii. **documenting the action(s)** that will be taken to correct the non-conformity and prevent the non-conformity from re-occurring, and
 - iii. **reviewing the action(s)** taken to correct the non-conformity, verifying that they are **implemented and are effective** in correcting and preventing the re-occurrence of the non-conformity.
- c) documenting a process for identifying and implementing **Preventive Actions** to eliminate the occurrence of **potential non-conformities** in the QMS that includes:
 - i. **reviewing potential non-conformities** that are identified to determine if preventive actions may be necessary,
 - ii. documenting the outcome of the review, including **the action(s), if any**, that will be taken to prevent a non-conformity from occurring, and
 - iii. **reviewing the action(s)** taken to prevent a non-conformity, verifying that they are **implemented and are effective** in preventing the occurrence of the non-conformity.

QMS Operational Plan

We have established a spreadsheet to track and measure continual improvement, available as **QMS 21 - Continual Improvement tracking spreadsheet**. The QMS Representative is responsible for tracking and monitoring continual improvement through the application of best management practices, corrective actions, and preventive actions.

When a non-conformity occurs, we use the **QMS 21 - Continual Improvement form**, and:

- a) react to the non-conformity and, as applicable:
 1. take action to control and correct it;
 2. deal with the consequences, including mitigating adverse conditions;
- b) evaluate the need for action to eliminate the causes of the non-conformity in order that it does not recur or occur elsewhere, by:
 1. reviewing the non-conformity;
 2. determining the causes of the non-conformity;
 3. determining if similar non-conformities exist, or could potentially occur;
- c) implement any action needed;
- d) review the effectiveness of any corrective action taken;
- e) make changes to the QMS, if necessary.

Corrective actions taken are appropriate to the significance of the effects of the non-conformities encountered, including the adverse impact(s).

We retain documented information as evidence of:

- the nature of the non-conformities and any subsequent actions taken;
- the results of any corrective action.

Revision History

#	yyyy-mm-dd	Description (current version details plus two previous revisions' details)	By
04	2022-06-06	Removed AWQI reporting procedure in Element 12 and replaced reference to O. Reg 170; added reference to current work order system and remove reference to future work order system in Element 15; added continuous data recording program, review and frequencies to Element 16	Eric Joudrey
05	2022-06-22	Revised Element 11 from to state that changes to O. Reg 128/04 had been made in regard to staffing shortages	Jocelyn Tyler
06	2022-06-24	Added document locations in Appendix A	Jocelyn Tyler
07	2022-07-17	Removed internal audit three-year requirements	

QMS Operational Plan

