

Owner:

Municipality of Middlesex Centre

Operating Authority:

Municipality of Middlesex Centre



**Drinking Water Quality Management Standard
(DWQMS)**

Operational Plan

For the following systems:

Birr Well Supply System

Melrose Well Supply System

Middlesex Centre Distribution System

Overview of Operational Plan

The Operational Plan is one portion of the mandated Drinking Water Quality Management Standard (DWQMS) that is enforced by the Ministry of the Environment, Conservation and Parks for all Drinking Water Systems in the province of Ontario. This operational plan is a document created by The Municipality of Middlesex Centre to help ensure that safe, reliable drinking water is provided to all the citizens, businesses, and visitors of the Municipality of Middlesex Centre. The operational plan is a document that provides an understanding of the drinking water systems, the responsibilities of the owner and operating authority of the systems, and a commitment to the provision of safe drinking water. This allows the Municipality of Middlesex Centre to plan, implement, check and continually improve, which builds confidence and security in the drinking water systems we operate.

Differentiation between the Operational Plans of the various Water Systems

The Municipality of Middlesex Centre consists of a total of 3 drinking water systems. The systems in Birr and Melrose have dedicated well supply systems. The water supply for the Middlesex Centre Distribution System (Arva, Ballymote, Delaware, Denfield, Ilderton and Komoka-Kilworth) is supplied from the Lake Huron Primary Water Supply System and the City of London. Each of the drinking water systems has their own Operational Plan, however for ease of use, the Municipality of Middlesex Centre has combined them into one manual.

The operational plan applies to all Middlesex Centre's drinking water systems. However, Element 6 Drinking Water System Description, contains unique descriptions for each system, which should only be read for the system being audited. For example, if the Birr Water System is being audited, only the drinking water system description for Birr is required. In addition, Risk Assessments (Element 8) were completed for each system separately but are combined together. Each risk assessment contains a header identifying the system it applies to.

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Ownership and Operation

The Municipality of Middlesex Centre is the Owner and provides governance for all water systems. The Operating Authority manages, operates and maintains all water systems. Under the Quality Management System (OMS), the Operating Authority is responsible for implementing and maintaining the OMS in partnership with the Owner.

Element 1. Quality Management System (QMS)

This Operational Plan describes the contents of the drinking water Quality Management System for all Middlesex Centres drinking water systems. The contents of this Operational Plan are based upon the requirements of the *Drinking Water Quality Management Standard (Version 2.0)*.

This Operational Plan has been reviewed and endorsed by both the Owner and the Operating Authority.

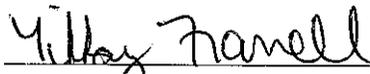
Element 2. QMS Policy

The OMS Policy documents the commitment to the quality management system. The Policy can be found in Appendix G. Communication of the OMS Policy is described in the Communications Procedure (ADMIN-1200). The OMS Policy is posted in the main work locations and a copy is posted on the Municipality's website.

Appendix G OMS Policy

Element 3. Commitment & Endorsement

This Operational Plan has been reviewed and endorsed by the Operating Authority and the Owner. The signature below shows that the Operating Authority and their Top Management is committed to an effective Quality Management System by ensuring that the Quality Management System is regularly assessed to confirm its ongoing applicability and relevance.



Acting CAO Municipality of Middlesex Centre
(Top Management, Operating Authority)

January 18, 2019

(Date)

The Owner shows their commitment and endorsement through Council resolution.

Top Management ensures the Operating Authority is aware of all applicable legislative and regulatory requirements. Top Management ensures the OMS is communicated according to

procedure, by following the Communication Procedure. The Internal Audit Procedure and the Management Review Procedure describe how proper communication is monitored.

Top Management determines, obtains and provides the resources needed to maintain and improve the QMS, as demonstrated through records created under the QMS, and through the Management Review Process. The Monitoring, Maintenance, Operations and Quality Procedure describes how a need for resources may be identified, documented, and addressed.

Controlled copies of the related procedures are located on MIDDLESEX-CENTRE\ENVIRONMENTAL SERVICES\E08 Water\DWQMS of the Municipality's central server.

ADMIN-1200	Communication Procedure
ADMIN-1900	Internal Audit Procedure
ADMIN-2000	Management Review Procedure

Element 4. QMS Representative

The QMS representative is the Water/Wastewater Operations Compliance Coordinator. Top Management appoints, authorizes and maintains the QMS representative. The QMS Representative, has both the responsibility and authority to:

- Administer the QMS by ensuring that processes and procedures needed for the QMS are established and maintained,
- Report to Top Management on the performance of the QMS and any need for improvement.
- Ensure that current versions of documents required by the QMS are being used at all times,
- Ensure that all personnel are aware of all applicable legislative and regulatory requirements that pertain to their duties for the operation of the Middlesex Centre Water Systems,
- Promote the awareness of the QMS throughout the Operating Authority

The letter of Appointment for the QMS Representative can be found in Appendix D.

Element 5. Document and Records Control

Procedures are in place for QMS Document Control and Record Control, which describe how documents and records are controlled.

ADMIN-500	Document Control Procedure
ADMIN-510	Record Control Procedure
Appendix E	List of Documents

Element 6. Drinking-Water System

All water systems listed below are owned, managed, operated and maintained by the Municipality of Middlesex Centre.

Process flow diagrams and GIS Drawings for each of the drinking water systems can be found in Appendix A.

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. In 2018, the raw water turbidity ranged from 0.13 – 2.72 NTU. For 2018, the average daily use was 8.7 m³ with a maximum daily flow of 46.7 m³.

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.

There are 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, at a depth of 23.8m, is equipped with a submersible pump rated at 5.45L/s. Well #3, which is drilled to a depth of 24.7m, is also 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. In 2018, the raw water turbidity ranged from 0.11 – 1.31 NTU. For 2018, the average daily use was 37.1 m³ with a maximum daily flow of 94.2 m³.

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 is pumped from the wells injected with sodium hypochlorite before entering into an aerator for iron oxidization then to a reservoir. From the reservoir, the water is transferred to three multimedia pressure filters for iron removal. These filters are backwashed once per week and the water goes to a holding tank. After settling the water is put back into the raw water reservoir. After the water is filtered, it can be chlorinated for a second time, analyzed for free chlorine residual and stored in a triple-chambered underground clear well. After the three distribution pumps and a fire pump which provide water to the Melrose distribution system there is a final chlorination system, allowing for the top up of the chlorine residual as it leaves the plant. 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 the following water systems:

- 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.

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. In 2018, the average daily use was 122 m³ with a maximum daily flow of 303m³.

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. Average daily use in 2018 was measured at 20 m³ with a maximum daily flow of 61 m³.

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 Rechlorination Facility, where the flow and pressure are regulated and the chlorine residual is maintained. The flow travels to the Tower on the opposite side of the system where the level is regulated by a pressure switch at the Tower. When the Tower 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 Tower is through a private network. In 2018, the average daily use was 368m³ with a maximum daily flow of 832m³.

The Denfield Distribution System taps into the 1200mm main from the LHPWSS. The water feeds the 130 m³ reservoir which is owned by 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. Average daily use in 2018 was measured at 31 m³ with a maximum daily flow of 72m³.

The water supply for the Ilderton distribution system is obtained from the LHPWSS. The water is controlled by the station and feeds the reservoir which is owned by Middlesex Centre. High lift pumps at the Ilderton reservoir provide water to the distribution system and tower. The reservoir is equipped with three pumps. A sodium hypochlorite disinfection system with

containment and two metering pumps is available for booster disinfection. Average daily use in 2018 was measured at 616 m³ with a maximum daily flow of 1397 m³.

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 then fed to the distribution system and the tower. Average daily use for 2018 is 949m³ with a maximum daily flow of 1984m³.

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.

Appendix A Process Diagrams and GIS drawings

Element 7. Risk Assessment

The procedure entitled Risk Assessment describes the method of hazard identification, risk assessment, and critical control point determination for all Middlesex Centre's systems.

Related Procedures are located on the central server: MIDDLESEX-CENTRE\ENVIRONMENTAL SERVICES\E08 Water\DWQMS

ADMIN-700 Risk Assessment Procedure

Element 8. Risk Assessment Outcomes

The results of the Risk Assessment are documented in the Risk Assessment spreadsheet.

Controlled conditions for each Critical Control Point (CCP) identified in the Risk Assessment spreadsheet are described in detail in the CCP procedures.

Appendix B Birr Risk Assessment Spreadsheet
 MC Distribution System Risk Assessment Spreadsheet
 Melrose Risk Assessment Spreadsheet

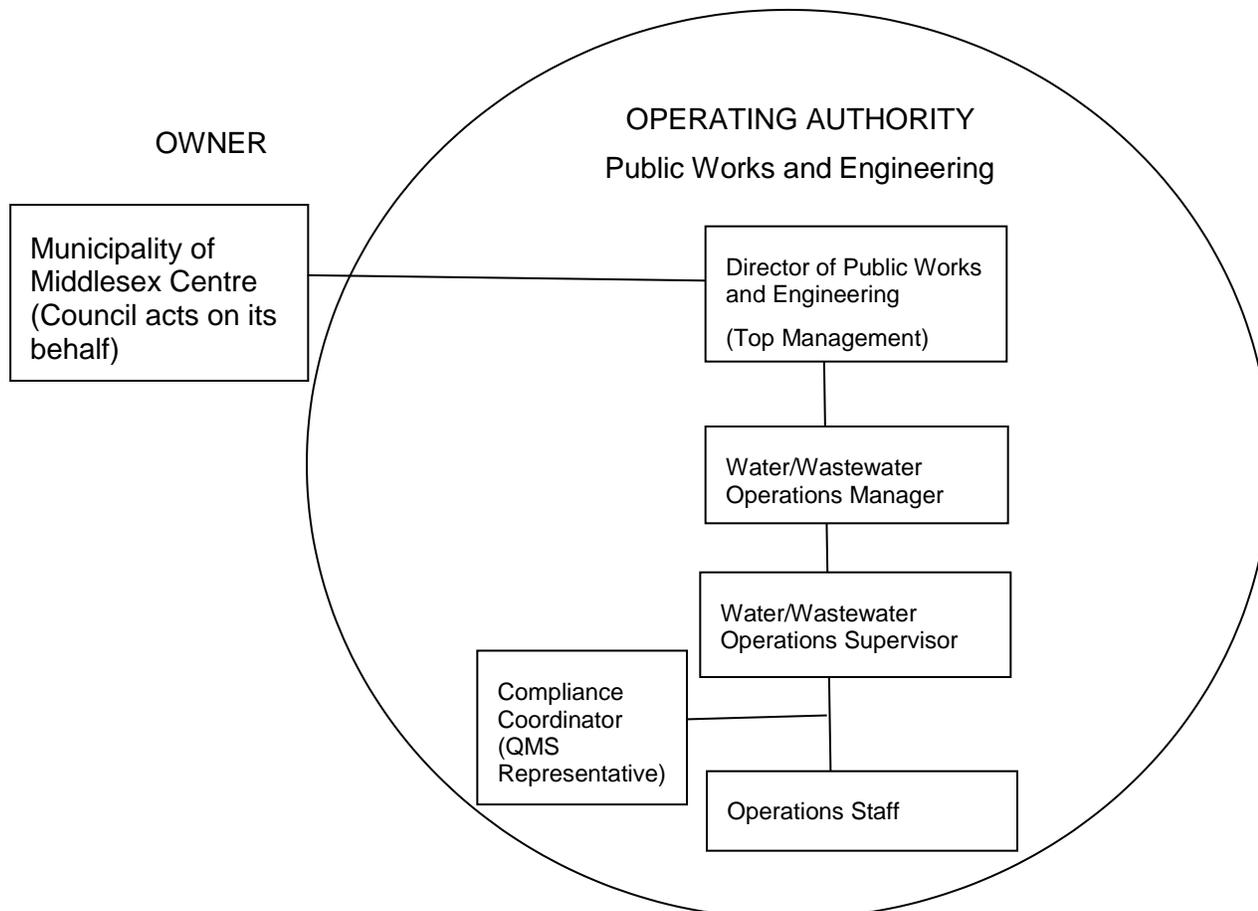
Appendix C CCP procedures designated by a 'CCP' prefix in their title,

Element 9. Organizational Structure, Roles, Responsibilities & Authorities

The organizational structure, roles, responsibilities and authorities for the Municipality are described in the Structure and Responsibilities Procedure.

The Roles and Responsibilities of the QMS representative can be found within Element 4.

ORGANZATIONAL STRUCTURE



ADMIN-900

Organizational Structure, Roles, Responsibilities & Authorities Procedure

Element 10. Competencies

The Training Procedure describes how competencies are identified, maintained, and documented. It also describes activities to ensure personnel are aware of the relevance of their duties and how they affect safe drinking water.

Related Procedures are located on the central server: MIDDLESEX-CENTRE\ENVIRONMENTAL SERVICES\E08 Water\DWQMS

ADMIN-1000

Competencies

Element 11. Personnel Coverage

The method to ensure sufficient personnel coverage at all sites is documented in the procedure:

ADMIN-1100 Personnel Coverage

Element 12. Communications

The Communication Procedure describes how the QMS is communicated between Top Management, Owner, Operating Authority personnel, suppliers, and the public.

Related Procedures are located on the central server: MIDDLESEX-CENTRE\ENVIRONMENTAL SERVICES\E08 Water\DWQMS

ADMIN-1200 Communications Procedure

Element 13. Essential Supplies & Services

A list of all supplies and services deemed essential to the delivery of safe drinking water can be found in the Water and Wastewater Emergency Response Plan Manual. The list typically includes a primary and a secondary supplier to ensure the procurement of essential and critical supplies and services. Standard order quantities and order set points may also be included.

Where applicable, supplies must meet NSF and ANSI standards. Chlorine supplies must meet NSF/ANSI Standard 60. Supplies are verified against the order requisition when received. In the case of any discrepancies, the delivery may not be accepted. Integrity of the supplies is also checked at time of delivery.

Process chemical orders are typically made when there is approximately two weeks supply remaining. Approximately a one-month supply is ordered at a time.

Through contracts and agreements, suppliers are aware of the DWQMS and their requirement of providing the correct products.

All laboratories used for analysis are accredited facilities.

During emergency situations, essential supplies are available to operations staff.

Appendix F Essential Supply and Services

Element 14. Review & Provision of Infrastructure

A procedure has been created to review the adequacy of infrastructure and the resources necessary to operate and maintain the drinking water system safely and effectively.

Related Procedures are located on the central server: MIDDLESEX-CENTRE\ENVIRONMENTAL SERVICES\E08 Water\DWQMS

ADMIN-1400 Review and Provision of Infrastructure

Element 15. Infrastructure Maintenance, Rehabilitation & Renewal

Infrastructure maintenance, rehabilitation, and renewal are addressed by the following:

Planned Maintenance: Planned maintenance is scheduled using a Computerized Maintenance Management System. Scheduled tasks are typically defined by manufacturer's literature when available and revised (or created) as needed according to operator experience/observations. This information is put into the applicable planned maintenance system by the Operations Supervisor or designate and planned maintenance tasks are communicated via work orders to the operators. Completed tasks are reviewed and signed off by the operator.

Unplanned Maintenance: Unplanned maintenance tasks result from equipment malfunction or breakage.

The Operator typically responds to unplanned maintenance during normal working hours while the on-call operator responds during off-hours. Documentation of unplanned maintenance tasks is recorded in the logbooks. Notification of Operations Supervisor is completed as soon as possible

Preparation measures to expedite unplanned maintenance include equipment redundancy (back-up units), spare parts inventory, as well as documented repair and safety procedures.

Rehabilitation/Renewal/Capital: Refer to Element 14 Review and Provision of Infrastructure.

Element 16. Sampling, Testing & Monitoring

Sampling, testing and monitoring is described in the following procedure:

ADMIN-1600 Sampling, Testing and Monitoring procedure

Element 17. Measurement & Recording Equipment Calibration & Maintenance

Methods of measurement and recording equipment calibration and maintenance are described in the procedure ADMIN-1700.

ADMIN-1700 Measurement & Recording Equipment Calibration & Maintenance

Element 18. Emergency Management

Refer to procedure ADMIN-1800 and Emergency Response Plan for Emergency Management.

ADMIN-1800 Emergency Management

Element 19. Internal Audits

The Internal Audit Procedure ADMIN-1900 describes how conformity of the QMS is evaluated on an annual basis. The procedure describes how audit criteria, frequency, scope, methodology and records are identified. It also describes how corrective actions are initiated as a result of an internal audit, and provides references to the Corrective Action Procedure.

Other procedures relating to Internal Audits are:

ADMIN-1910	Internal Audit Checklist
ADMIN-1920	Corrective Action Procedure
ADMIN-1930	Corrective Action Form

Element 20. Management Review

The Management Review Procedure describes Top Management's review of the QMS. This includes instructions related to the required inputs of the meeting. The procedure also describes how Top Management considers results, identifies deficiencies, records and forwards results to the Owner and to other key personnel.

ADMIN-2000	Management Review Procedure
ADMIN-2010	Management Review Checklist

Element 21. Continual Improvement

The Operating Authority and Owner of the Middlesex Centre Water Systems attempt to continually improve the Quality Management System through the use of the QMS Policy, Internal Audits, Corrective Actions, Management Review, and the Analysis of Process Data.

The Corrective Action Procedure describes how QMS-related corrective or preventive actions are documented, and how steps are followed when implementing corrective and preventive actions.

The Corrective Action Procedure under Element 19 helps to ensure, continual improvement is achieved.

Table of Revision

Revision No.	Date (dd/mm/yyyy)	Description of Revision
3	16/03/2017	Updated Owner/Operator information in drinking water systems, Birr to one well, added table of revisions
4	12/05/2017	<i>Updated revision date and items in Operational Plan</i>
5	02/01/2018	<i>Updated revision date and items in Operational Plan</i>
6	21/06/2018	<i>Updated revision date and items in Operational Plan</i>
7	20/12/2018	<i>Updated revision date and items in Operational Plan</i>
8	16/12/2019	<i>Updated revision date and items in Operational Plan</i>