

Municipality of Lakeshore Water Supply System

Quality Management System (QMS)

Operational Plan

March 2024



OUR COMMUNITIES. OUR HOME.



Together We Are Lakeshore | [Lakeshore.ca](https://www.lakeshore.ca)

Table of Contents

List of Figures	4
Abbreviations	4
Introduction	5
Element 1 - Quality Management System (QMS)	6
Element 2 - Quality Management System Policy	7
Element 3 - Commitment and Endorsement	8
Element 4 – QMS Representative	9
Element 5 – Document and Records Control	10
Element 6 – Drinking Water Systems	12
Element 7 – Risk Assessment	20
Element 8 – Risk Assessment Outcomes	23
Element 9 – Organizational Structure, Roles, Responsibilities, and Authorities	31
Element 10 – Competencies	32
Element 11 – Personnel Coverage	34
Element 12 - Communications	36
Element 13 – Essential Supplies and Services	40
Element 14 – Review and Provisions of Infrastructure	42
Element 15 – Infrastructure Maintenance, Rehabilitation and Renewal	43
Element 16 – Sampling, Testing, and Monitoring	45
Element 17 – Measurement and Recording Equipment Calibration and Maintenance	46
Element 18 – Emergency Management	47
Element 19 – Internal Audits	50
Element 20 – Management Review	52
Element 21 – Continual Improvement	54
Appendix	56

List of Figures

Figure 1 - John George Water Treatment Plant Schematic 15

Figure 2 - Stoney Point Water Treatment Plant Schematic 16

Figure 3 - Lakeshore Drinking Water Systems – Distribution Water Service Areas ... 17

Figure 4 - Quality Management System (QMS) – Organizational Structure..... 29

Abbreviations

MECP | Ministry of Environment, Conservation, and Parks

DWQMS | Drinking Water Quality Management Standard

QMS | Quality Management System

SDWA | Safe Drinking Water Act

DWS | Drinking Water System

SCADA | Supervisory Control and Data Acquisition

UWSS | Union Water Supply System

OCWA | Ontario Clean Water Agency

WUC | Windsor Utilities Commission

CEUs | Continuing Education Units

ORO | Overall Responsible Operator

OIC | Operator-in-Charge

OIT | Operator-in-Training

ERP | Emergency Response Plan

FRRP | Flood Rapid Response Plan

WWMP | Water/Wastewater Master Plan

AMP | Asset Management Plan

CAR | Corrective Action Report

Introduction

Ontario provides a strong legislative and regulatory framework with a consistent set of standards and rules designed to ensure, maintain and improve upon the delivery of safe, high quality, reliable drinking water from source to tap.

Following the Walkerton drinking water tragedy in 2000, Justice Dennis O'Connor, in Part Two of the Report of the Walkerton Inquiry, recommended the adoption of quality management for municipal drinking water systems. As part of this report, he further recommended that a quality management standard, specifically designed for drinking water systems, be developed and implemented in Ontario.

Based on the above, the Safe Drinking Water Act (SDWA) was introduced in 2002, with the following purpose (as outlined in SDWA 2002, S.O. 2002, c. 32 - Bill 195 Part I Interpretation):

1. To recognize that the people of Ontario are entitled to expect their drinking water to be safe; and
2. To provide for the protection of human health and the prevention of drinking water health hazards through the control and regulation of drinking water systems and drinking water testing.

The SDWA also mandated the requirement to implement a Drinking Water Quality Management Standard (DWQMS) in Ontario. DWQMS was established in 2007 and the final version was posted on Ontario's Environmental Registry in April 2017.

This standard is a proactive and preventative approach to assuring drinking water quality while maintaining legislative requirements mandated through the Province and overseen by the Ministry of Environment, Conservation and Parks (MECP). The DWQMS was created based on

a Plan, Do, Check and Improve approach and is comprised of 21 elements.

The DWQMS was followed in the development of the Municipality of Lakeshore's Drinking Water Systems Operational Plan, which is part of the overall Quality Management System (QMS).

The primary objective of the Operational Plan is to provide an elaborate overview of the drinking water QMS that has been developed and implemented at Lakeshore. This Operational Plan is specifically designed to govern and uphold the operation and maintenance of Lakeshore's water intake, treatment, and distribution infrastructure, ensuring the delivery of safe and high-quality drinking water to its consumers.

This Operational Plan covers a comprehensive scope, encompassing the various activities and personnel involved in every operational aspect of the drinking water systems. Also included in the Operational Plan is the Policy (Element 2), Standard Operating Procedures, Risk Assessment (Element 7) and other required QMS documentation (Element 5, 9, 16) to further enhance the overall integrity of Lakeshore's drinking water systems.

All internal and external communications regarding the drinking water QMS will be as outlined in this Operational Plan and conducted in accordance with DWQMS Element 12 - Communications.

This Operational Plan is an active document which will be improved and updated as best management practices are identified and new opportunities for improvements arise in accordance with DWQMS Element 21 – Continual Improvement.

All 21 elements of the DWQMS have been addressed in the QMS Operational Plan.

Element 1 - Quality Management System (QMS)

1.1 Purpose

This element sets forth the requirement to develop and document an Operational Plan that outlines processes and procedures of the drinking water system to meet the requirements of the Drinking Water Quality Management Standard (DWQMS).

1.2 Description

The Municipality of Lakeshore, as the Owner and Operating Authority of its drinking water systems, is required to attain conformance to the DWQMS developed by the MECP.

This Operational Plan was developed to set the framework and guidelines to attain conformance as required by the standard and to meet the requirements of Element 1.

It should be recognized that successful implementation of DWQMS does not only depend on meeting the intent of the Standard's 21 elements, but also relies on the inputs and outputs of those elements and their interdependency in the operation and maintenance of the system to ensure quality and reliability of safe drinking water. The result is a series of processes and procedures that impart efficiency and effectiveness to be able to deliver the Operational Plan which forms part of the QMS.

The responsibility levels within the Operational Plan and its elements vary. This document will further outline the responsibility of each role and the commitment required to deliver the plan.

Element 2 - Quality Management System Policy

2.1 Purpose

This element identifies the requirement to develop a Policy that provides the foundation for the Quality Management System (QMS). The Policy is a driver to establish documented commitments to demonstrate that a QMS is important in the management and operation of delivering safe drinking water and to enhance customer confidence in drinking water quality.

2.2 Description

The Policy is as follows:

That the Municipality of Lakeshore is committed to establishing and maintaining a QMS that is compliant with the DWQMS to facilitate the provision of safe drinking water to all consumers.

That the Municipality of Lakeshore agrees to:

- Ensure that the QMS appropriately addresses all aspects of the drinking water system;
- Comply with all relevant legislative and regulatory requirements for the supply of safe drinking water;
- Maintain and continually improve the drinking water QMS; and
- Communicate pertinent operational and water quality information to the Owner of the drinking water system, consumers, and the public.

That the ongoing compliance and continual improvement of the QMS will be achieved through formalized processes.

That all internal and external communication regarding the QMS will be conducted in accordance with DWQMS Element 12 - Communications.

2.3 Reference

This element references the following elements:

- DWQMS Element 12 – Communications
- Quality Management System (QMS) Policy Statement (Appendix 1)

Element 3 - Commitment and Endorsement

3.1 Purpose

This element is the formal commitment and endorsement of the QMS and the associated Operational Plan by the Owner (Council) and Operating Authority (Top Management).

3.2 Description

The Operational Plan for the drinking water QMS is required to be reviewed and approved by the individuals in Top Management and endorsed by the Municipality of Lakeshore's Council.

This endorsement confirms that the Municipality of Lakeshore is committed to ensuring that a drinking water QMS is developed and implemented according to the requirements of the DWQMS. That these parties are committed to endorsing the contents of the Operational Plan and to demonstrate an on-going dedication to the success of the drinking water QMS program.

This endorsement further confirms a commitment to undertake the necessary steps to ensure that the established QMS complies with all applicable legislation and regulations and assures to identify and provide all resources required for the maintenance and continual improvement of the system.

The signatories of the Municipality of Lakeshore further commit to ensuring that the drinking water QMS is regularly assessed to confirm its continued applicability and relevance.

To promote awareness and understanding of the drinking water QMS by Council and Top Management, this written endorsement of the Operational Plan will be communicated to relevant parties according to the requirements of DWQMS Element 12 - Communications.

Owner's Endorsement

Tracey Bailey
Municipality of Lakeshore Mayor

Operating Authority's Endorsement

Krystal Kalbol, P.Eng
Corporate Leader - Operations

Division Leader - Water Management

Garry Punt
Team Leader, Water Management (ORO)

Element 4 – QMS Representative

4.1 Purpose

This element identifies the individual who will serve as the drinking water QMS Representative for the Municipality of Lakeshore, and the required responsibilities of the individual assigned to the role.

4.2 Description

The Division Leader – Water Management has been appointed as the QMS Representative for the Municipality of Lakeshore Drinking Water Systems. In their absence, the Division Leader – Water Management (or the Corporate Leader – Operations) may appoint another QMS Representative through consultation with the Corporate Leader – Operations, Division Leader – Water Management and the Overall Responsible Operator (ORO).

The QMS Representative is the appointed, authorized, and responsible person for administering all processes associated with the QMS and based on the MECP's DWQMS.

The below outlines the responsibilities of the QMS representative:

1. Administer the Operational Plan by ensuring that processes and procedures needed for the Quality Management System are established and maintained;
2. Report to Top Management on the performance of the Quality Management System and any need for improvement;
3. Ensure that all personnel have access to the latest documentation required by the Quality Management System as detailed in Element 5: Document and Records Control;
4. 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;
5. Promote awareness of the Quality Management System throughout the Operating Authority; and
6. Engage in the identification of legislative and regulatory requirements that apply to the operation of the drinking water QMS.

4.3 Reference

This element references the following elements:

- DWQMS Element 5 - Document and Records Control
- DWQMS Element 9: Lakeshore Water Services Personnel Responsibilities & Authorities

Element 5 – Document and Records Control

5.1 Purpose

This element outlines the process by which the Municipality of Lakeshore manages, documents and maintains records related to the QMS and how the information and data related to drinking water is maintained and controlled.

5.2 Description

Document and Records

Internal and external controlled documents and records that are required by the Operational Plan are provided within the DWQMS Current & Relevant Documents and Records List (Appendix 2).

Only the QMS Representative (or the appointed representative), in conjunction with the Water Compliance Coordinator have access to make the required modifications.

Documents and records will be managed to maintain ongoing currency and legibility. To ensure that documents are readily identifiable, each is assigned a unique name. A description of the documentation and a number may also be included, where appropriate.

To ensure that documents contain accurate and complete information a complete review and approval process prior to the distribution of the information will take place.

Access to current documentation will be given to personnel according to their individual roles and responsibilities. Documents electronically controlled are saved in Compliance Science and distributed in a read-only format with only the authorized personnel having access to make modifications.

Paper documents and records will be stored in filing cabinets and in designated areas with appropriate security and access restrictions.

Element 5 – Document and Records Control

Retention and Disposal

Documents and records that surpass the age noted on The DWQMS Current & Relevant Documents and Records List are shredded.

Retention and Disposal of non-regulated documents will be handled through the Document Retention Policy-Non-Regulatory.

The retention and disposal of QMS documents and records is the responsibility of the Water Compliance Coordinator.

5.3 Reference

This element references the following:

- Document Retention Procedure – Non-Regulatory
- DWQMS Element 5: Current & Relevant Documents and Records List
- DWQMS Element 9: Lakeshore Water Services Personnel Responsibilities & Authorities

Element 6 – Drinking Water Systems

6.1 Purpose

This element outlines the details related to the Municipality of Lakeshore's Drinking Water Systems and all associated components.

6.2 Description

Drinking Water Systems

Lakeshore's Drinking Water Systems are owned by the Municipality of Lakeshore and operated by the Operations Department, under the Water Management Division.

Lakeshore's Drinking Water System consist of both the John George Water Treatment Plant and the Stoney Point Water Treatment Plant, along with the associated distribution systems that includes the Belle River Elevated Storage Tank, the Maidstone Elevated Storage Tank (decommissioned), Haycroft and Comber Reservoir & Pumping Stations and all distribution mains.

The Municipality of Lakeshore also includes areas that are supplied with drinking water from neighbouring drinking water systems which include the following:

- Tecumseh Water Service Area which is supplied from the Windsor Water System (source water: Detroit River);
- Union Water Service Area which is supplied from the Union Water Supply System (source water: Lake Erie); and
- Tilbury-Wheatley Water Service Area which is supplied from the Public Utilities Commission for the Municipality of Chatham-Kent (source water: Lake Erie).

This section also outlines characteristics, fluctuations and threats with respect to Lakeshore's DWS.

Water Treatment

Lakeshore operates two water treatment systems as identified below:

1) John George Water Treatment Plant

The John George Water Treatment Plant is located on Lakeview Drive. It is a conventional filtration surface water treatment facility with a design capacity of 36,400 m³/day. The maximum volume of water that can be taken from Lake St. Clair is 30,000 m³/day or 34,722 l/min.

This system includes a Low Lift & Intake System whereby water is drawn into the plant through a 1,050 m long, 1,200 mm diameter intake. A zebra mussel control system can pump a chlorine solution to the main intake. There is a frazil ice control system in place as well. The raw water flows through bar screens and traveling screens into a pump well.

Element 6 – Drinking Water Systems

The raw water is pumped by any combination of four low lift pumps, into a force main that carries water to the Water Treatment Plant

The water from the force main flows through up to four solid contact upflow clarifiers and includes four dual media filters.

Primary disinfection is achieved by ultra-violet irradiation and gaseous chlorine injection which provides free chlorine contact. The filter effluents flow through two in-ground water storage reservoirs which operate in series.

The treated water flows to a clear well to be pumped by a combination of three high lift pumps located in the high lift pump area. Water is pumped into the distribution system, as needed.

The water treatment process and distribution components are controlled by a dedicated SCADA computer system and monitored by certified operators during regular working hours and by an alarm monitoring service after hours.

A 900kW back up diesel generator is available to permit the treatment plant to remain in operation when a power failure occurs.

A schematic of the John George Water Treatment Plant can be found in Figure 1: John George Water Treatment Plant Schematic.

2) Stoney Point Water Treatment Plant

The Stoney Point Water Treatment Plant is located on St. Clair Road. It is a conventional filtration surface water treatment facility with a design capacity of 4,546 m³/day. The maximum volume of water that can be taken from Lake St. Clair is 4,600 m³/day or 3,180 l/min.

This system also includes a Low Lift & Intake System whereby water is drawn into the plant through a 1,219 m long, 600mm diameter intake.

The raw water flows into a pump well. The raw water is pumped by a low lift pump into a force main that carries water to the clarifier.

The water from the force main flows through one solid contact upflow clarifier which provides coagulation, flocculation and sedimentation of the raw water.

The water from the clarifier flows by gravity into an intermediate pump well in the water treatment plant. It is pumped from the pump well into the filters. There are two dual media filters.

Primary disinfection is achieved by gaseous chlorine injection which provides free chlorine contact. The filter effluents flow through two in-ground water storage reservoirs which operate in series.

Element 6 – Drinking Water Systems

The treated water flows to a clear well to be pumped by a combination of three pumps located in the high lift pump area. Water is pumped into the distribution system, as needed. The water treatment process and distribution components are controlled by a dedicated SCADA computer system and monitored by certified operators during regular working hours and by an alarm monitoring service after hours.

A 175kW back up diesel generator is available to permit the treatment plant to remain in operation when a power failure occurs. A portable generator is located outside the water treatment plant to provide power in the event that the generator fails.

A schematic of the Stoney Point Water Treatment Plant can be found in Figure 2: Stoney Point Water Treatment Plant Schematic.

Water Distribution

Lakeshore's Drinking Water Systems is comprised of five water distribution systems.

The water distribution systems are routinely flushed in order to maintain an acceptable chlorine residual throughout. Chlorine residuals are also recorded, and actions taken as required as per O. Reg 170/03 and associated Lakeshore SOP documents.

The water distribution systems are shown in Figure 3: Lakeshore Drinking Water Systems – Distribution Water Service Areas.

1) John George Water Service Area

This service area distributes water to the area bounded on the west by Manning Road (County Road 19), on the south by Kings Highway 401, on the east by East Ruscom River Road and on the north by Lake St. Clair and VIA railway.

There are two elevated water storage tanks in the distribution system:

The Water Tower located in the community of Belle River which has a capacity of 5,800 m³; and

The Water Tower located on Wallace Line which has capacity of 1,515 m³. It should be noted that this water tower was decommissioned in 2018 and is no longer in operational service.

2) Stoney Point Water Service Area

This service area distributes water to the area generally bounded on the west by East Ruscom River Road, on the south by County Road 8, on the east by a line midway between Gracey Sideroad and Richardson Sideroad and on the north by Lake St. Clair. There are two pump stations with in-ground reservoirs in the distribution system which provide re-chlorination if needed.

Element 6 – Drinking Water Systems

The Haycroft Pump Station and reservoir located on Comber Sideroad (County Road 35) at Lakeshore Road 303 has a capacity of 425m³. Comber Pump Station and reservoir located in the community of Comber and has a capacity of 1,008 m³.

An emergency 70kW diesel generator is available at each pump station to permit the booster station to remain in operation should a power failure occur and an additional portable generator is available at the Comber Pump Station and Reservoir.

The Haycroft and Comber Pump Stations are controlled and monitored from the Stoney Point Water Treatment Plant via SCADA system.

3) Union Water Service Area

This service area distributes water to the area bounded on the west by Manning Road (County Road 19), on the south by County Road 8, on the east by Rochester Townline Road and on the north by Kings Highway 401. This system receives water from the Union Water Supply System (UWSS).

The owner of the UWSS is the UWSS Joint Board of Management and the Operating Authority is the Ontario Clean Water Agency (OCWA). The Operating Authority is responsible for ensuring the provision of safe drinking water.

4) Tecumseh Water Service Area

This service area distributes water to the area generally bounded on the west by Manning Road (County Road 19), on the south by Kings Highway 401, on the east by Scott Side Road and on the north by County Road 42. This system receives water from the Windsor Water System through the Town of Tecumseh Water System.

The owner of the Windsor Water System is the City of Windsor, and the Operating Authority is Windsor Utilities Commission (WUC). The owner of the Tecumseh Water System is the Town of Tecumseh, and the Operating Authority is the Town of Tecumseh.

5) Tilbury-Wheatley Water Service Area

The Tilbury-Wheatley Water Service Area is comprised predominantly of privately owned water systems in the rural areas generally east of Big Creek. The water supply source for the Tilbury-Wheatley system is Lake Erie and the Wheatley Water Treatment Plant supplies water to the community of Tilbury and to the consumers in Lakeshore.

This is the only water supply system within the Town that is not operated by the Municipality of Lakeshore. This Water Service area is supplied and operated by the Public Utilities Commission for the Municipality of Chatham-Kent.

Figure 1 – John George Water Treatment Plant Schematic

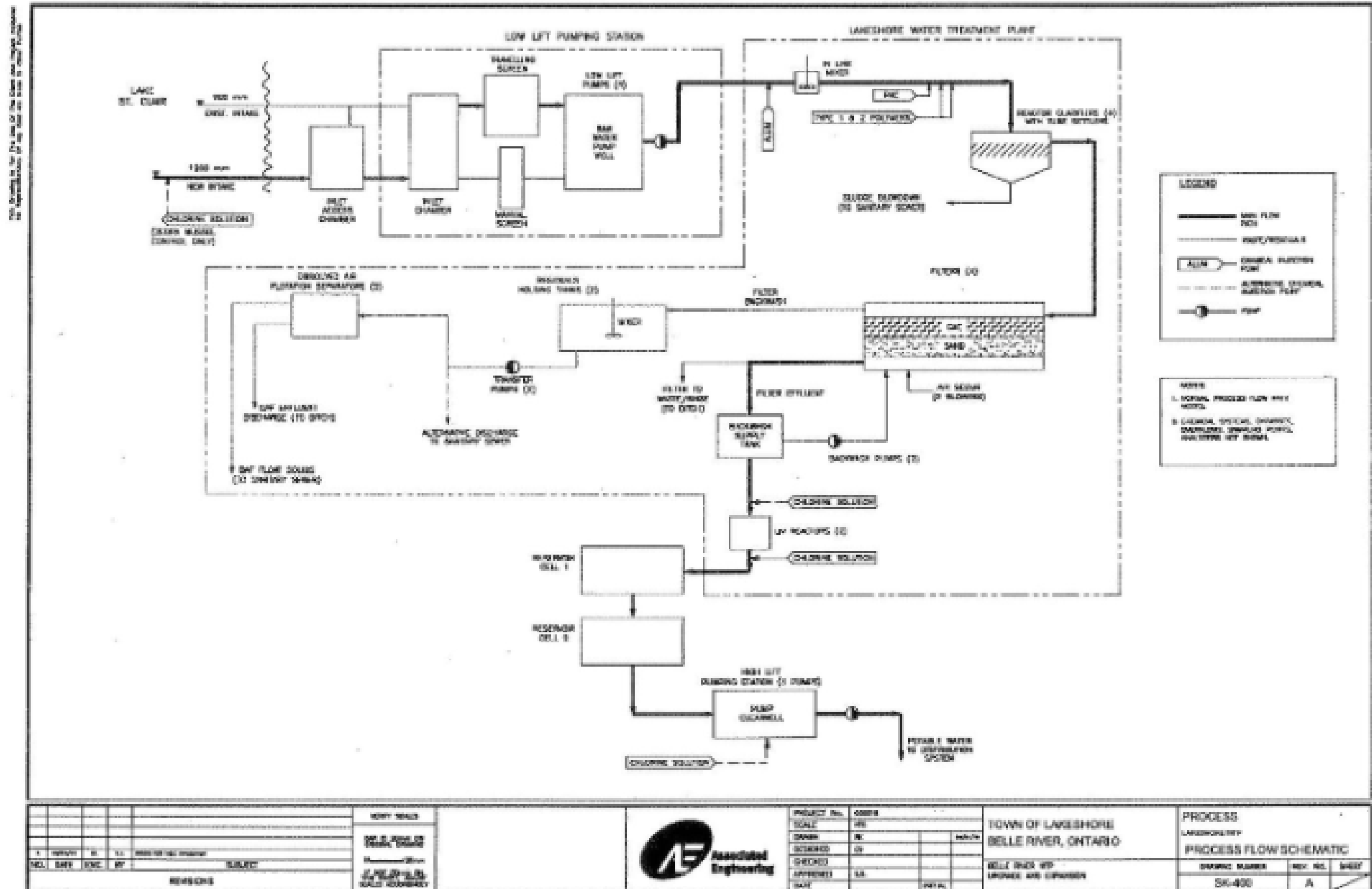
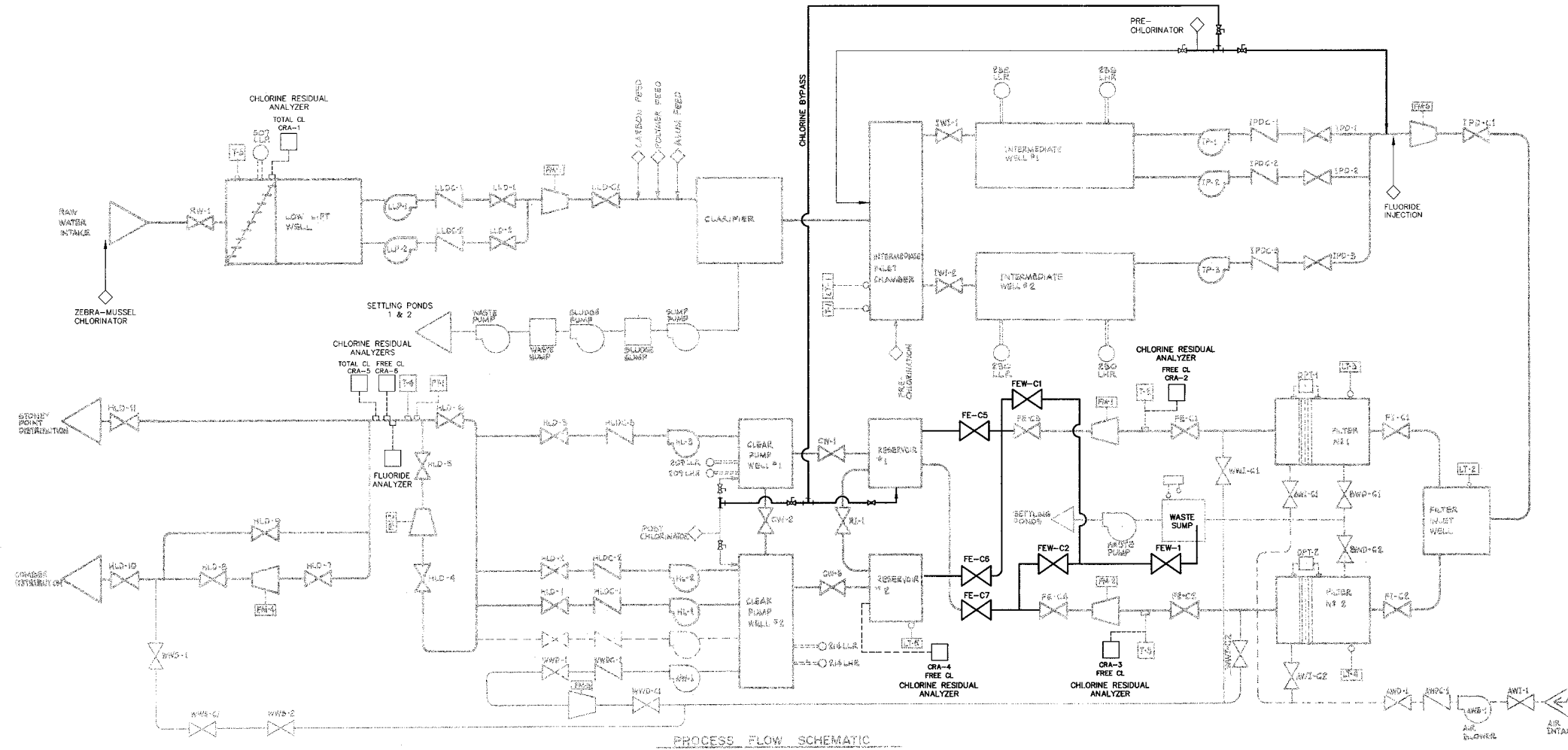
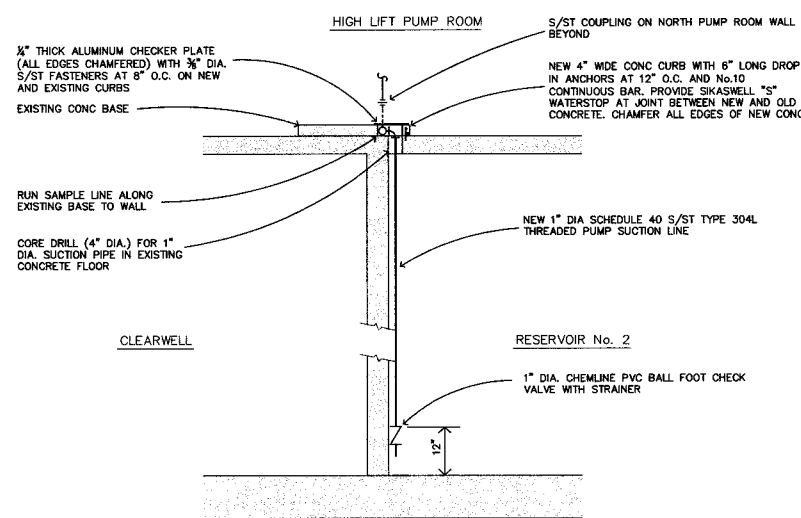


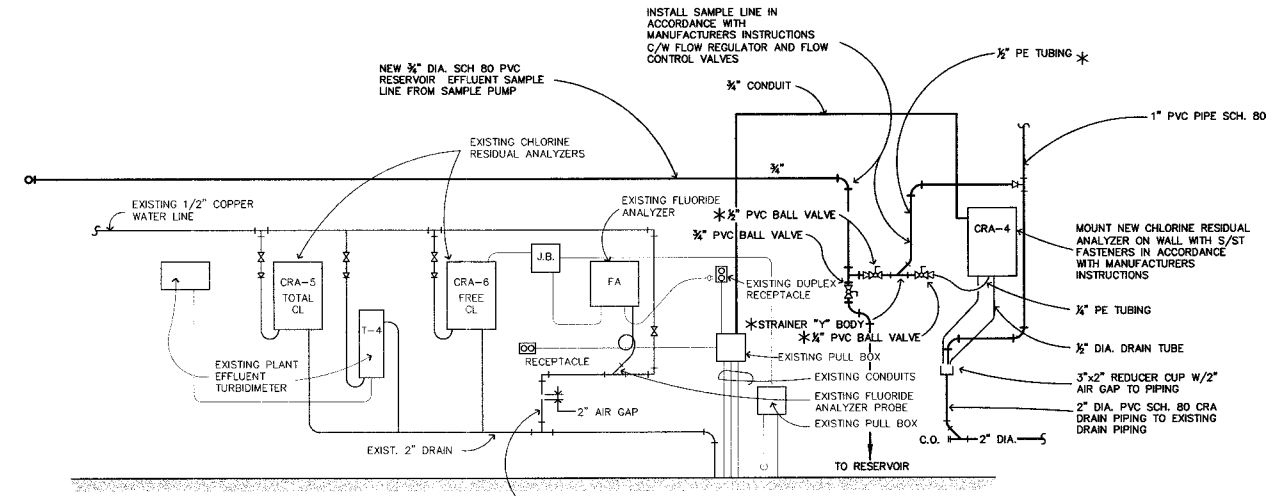
Figure 2 - Stoney Point Water Treatment Plant Schematic



PROCESS FLOW SCHEMATIC



600
715
NOT TO SCALE



NOTES :
 1. REFER TO FLOOR PLAN FOR LOCATION IN WATER TREATMENT PLANT
 2. TO BE SUPPLIED BY MANUFACTURER *
ELEVATION AT NEW CHLORINE RESIDUAL ANALYZER No.4
 N.T.S.



Stantec Consulting Ltd.
 3260 Devon Drive
 Windsor ON Canada
 N8X 4L4
 Tel. 519.966.2250
 Fax. 519.966.5523
 www.stantec.com

Copyright Reserved
 The Contractor shall verify and be responsible for all dimensions. DO NOT scale the drawing - any errors or omissions shall be reported to Stantec without delay.
 The Copyrights to all designs and drawings are the property of Stantec. Reproduction or use for any purpose other than that authorized by Stantec is forbidden.

Legend
 Notes
 THIS RECORD DRAWING HAS BEEN PREPARED, IN PART, BASED UPON INFORMATION FURNISHED BY OTHERS. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, STANTEC CANNOT ASSURE ITS ACCURACY, AND THIS IS NOT RESPONSIBLE FOR THE ACCURACY OF THIS RECORD DRAWING OR FOR ANY ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED INTO IT AS A RESULT. THOSE RELYING ON THIS RECORD DOCUMENT ARE ADVISED TO OBTAIN INDEPENDENT VERIFICATION OF ITS ACCURACY BEFORE APPLYING IT FOR ANY PURPOSE.

Revision	By	Appd.	Date
1. CONSTRUCTION RECORD	CH	TB	2005.01.28
2. TENDER	CAL	T.B.	2003.02.01
3. M.O.E. APPROVAL	CAL	T.B.	2002.12.16
4. OWNERS REVIEW	CAL	T.B.	2002.10.23
Issued		By	Appd.
File Name: 3394-306	P.G.W.	T.B.	C.N.
	Dwn.	Chkd.	Dsgn.
			YY.MM.DD

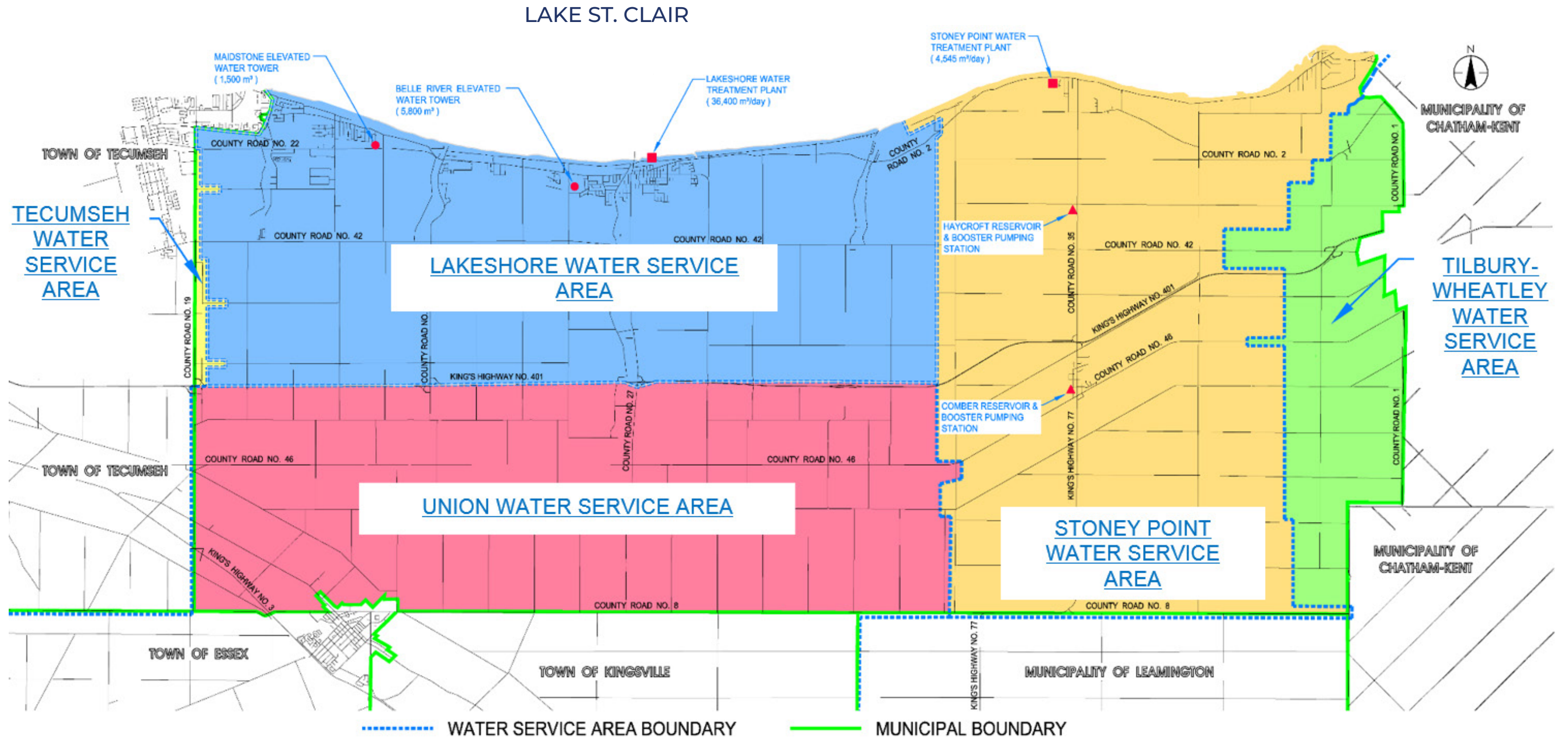
Permit/Seal
ORIGINAL CONSTRUCTION DRAWING
DATED JANUARY 31, 2003
STAMPED AND SIGNED BY
A. BERARDI
 Client/Project
 TOWN OF LAKESHORE
 C of A UPGRADE REQUIREMENTS
 COUNTY RD 35 RESERVOIR, COMBER
 RESERVOIR & STONEY POINT WTP
 TOWN OF LAKESHORE

Title
STONEY POINT WATER TREATMENT PLANT PROCESS FLOW SCHEMATIC

Project No.	Scale
65600615	NONE

Drawing No.	Sheet	Revision
3394	6 of 10	1

Figure 3 - Lakeshore Drinking Water Systems – Distribution Water Service Areas



Element 6 – Drinking Water Systems

Raw Water Source and Characteristics

The raw water source for the Lakeshore Owned Drinking Water Systems is Lake St. Clair.

The raw water characteristics for John George Water Treatment Plant can be found in the below table:

Table 1: Raw water characteristics (based on 2019 John George Water Treatment Plant data)

Characteristic	Minimum	Maximum	Annual Average
Temperature (°C)	0.04	25.47	10.97
Turbidity (NTU)	2.6	245.8	15.7
pH	7.15	8.65	7.91
E.coli (CFU/100ml)	2	18	4.00
Total Coliforms	2	>2000	108.38

Event Driven Fluctuations

Turbidity is variable and is significantly affected by wind strength and direction and by storm event run-off.

Algal blooms can occur under certain seasonal conditions and can result in significant amounts of organic matter in the raw water which could cause odour and taste problems in the finished water.

Operational challenges and threats posed by the event driven fluctuations are as follows:

- Increased requirement for clarifier sludge blowdown, coagulant and polymer dose adjustments;
- Reduced filter run times;
- Decreased UV dosage;
- Increased chlorine demand for primary disinfection (at the Stoney Point WTP); and
- Increased requirement for activated carbon usage leading to possible filter turbidity breakthrough and diminished water quality.

Threats (General)

Potential sources of raw water contamination are run-off and contaminant spills which may occur within the intake protection zones (of both John George and Stoney Point Water Treatment Plants). Spills and discharges from marine vessels traveling near the intakes are also considered a threat.

The intake structures could be damaged if hit directly by a boat or ship.

Element 7 – Risk Assessment

7.1 Purpose

This element outlines the purpose and importance of performing a QMS Risk Assessment to identify potential hazardous events and associated hazards within the Municipality of Lakeshore's Drinking Water Systems.

7.2 Description

Once every calendar year the risk assessment will be reviewed to verify the currency of the information and the validity of the assumptions that are used in the assessment. The risk assessment outcomes assist with the immediate and long-term asset management or capital project plans.

A risk assessment team is compiled of the following Operating Authority members to assess the risks every 36 months:

- Corporate Leader – Operations
- Division Leader – Water Management (QMS Representative)
- Team Leader – Water Management (ORO)
- Lead Hand – Water Distribution (Optional)
- Lead Hand – Water Treatment (Optional)
- Water Compliance Coordinator (Optional)
- Operations Analyst – Water Management (Optional)

Risk Assessment meeting minutes will be approved by all meeting attendees and distributed by the QMS representative. These minutes will be communicated as per DWQMS Element 12 – Communications.

The potential hazardous events and the associated hazards as stated by the MECP, as well as any additional potential hazardous events and associated hazards, can be found in the reference guide at the end of this document.

Element 7 – Risk Assessment

Risk Assessment Scales

Taking into consideration the reliability and redundancy of equipment the identified hazardous events and associated hazards will be assessed and rated using the following scales:

Likelihood:

Rating	DWQMS Meaning
1	May occur in exception circumstances, has not occurred in past
2	Could occur at some time, historically occurs less than 1 every 5-10 years
3	Has occurred or may occur once or more per year
4	Has occurred or may occur on a monthly to quarterly basis
5	One or more occurrences on a monthly or more frequent basis

Consequence:

Rating	DWQMS Meaning
1	Insignificant impact, little public exposure, little or no health risk
2	Limited public exposure, minor health risk
3	Minor public exposure, health impact for small population
4	Large population at risk
5	Major impact for large population, complete failure of systems

Element 7 – Risk Assessment

Detectability:

Rating	DWQMS Meaning
1	VERY DETECTABLE – Easy to detect, on-line monitoring through SCADA
2	MODERATELY DETECTABLE – Alarm present but not in SCADA, might require operator walking by to notice alarm, problem indicated promptly by in-house lab results
3	NORMALLY DETECTABLE – Visually detectable on rounds or regular maintenance
4	POORLY DETECTABLE – Visually detected, but not inspected on a regular basis; not normally detected before problem becomes evident
5	UNDETECTABLE – Cannot detect

The addition of the Consequence, Probability and Detectability ratings will determine the risk ranking of each hazardous event and associated hazard.

Hazardous event rankings, Critical Control Points, Critical Control Limits and control measures will be documented through DWQMS Element 8: Risk Assessment Outcome.

7.3 Reference

This element references the following:

- DWQMS Element 12 - Communication
- Potential Hazardous Events for Municipal Residential Drinking Water Systems
- DWQMS Element 8 - Risk Assessment Outcome
- Risk Assessment Meeting Minutes

Element 8 – Risk Assessment Outcomes

Table 1: Risk Assessment Table for Lakeshore Water Treatment Plant

Activity or Process Step	Potential Hazardous Event	Possible Risks of Potential Hazardous Events	Identified Control Measures	Likelihood	Consequence	Detectability	Risk Value	CCP?
SourceWater	Storm Event/ Extreme Weather Events and Seasonal Fluctuations	Increased turbidity and/or increased biological/chemical load affecting coagulant dosage	No control at source. -On-line monitoring of raw water properties	3	1	1	5	No
SourceWater	Wastewater spill/ chemical material spill	Increased pathogen load on source water, possible poisoning of consumers	-No control at source -On-line monitoring of raw water properties -Electronic notification from environmental agencies	2	4	1	7	No
SourceWater	Algal Blooms	Increased pathogen load on source water, filter flow restrictions and an effect on UV dosage/transmittance and absorbency	-No control at source. -On-line monitoring of raw water, process turbidities and UV dosage set points. -Weekly sampling program	3	3	1	7	No
Raw Water Handling	Failure of intake pipe through breakage and/or blockage	Source water supply shortfall	-No Control at source. -Intake crib and line inspections performed. -On-line monitoring of raw water properties and flows. Follow Contingency or Emergency Response Procedure	1	4	1	6	No
Raw Water Handling	Frazil Ice	Intake crib and line blockage. Loss of water quantity and quality	-On-line monitoring of raw water flows and associated wet well level alarms through the SCADA. -Frazil Ice Control System.	2	1	1	4	No
Raw Water Handling	Travelling screen failure	Loss of water quantity and quality	-On-line monitoring of raw water flows and associated wet well level alarms through the SCADA. -Manual screen by-pass.	2	2	1	5	No
Raw Water Handling	Force main Break	Loss of water quantity	-No control at source. Follow Contingency or Emergency Response Procedure	1	3	1	5	No
Particulate Removal	Coagulation feed failure	Biological contamination, ineffective removal of pathogens and shorter filter runtimes	-Flow and pump operation monitored through SCADA system alarms. -Automatic plant shutdown on loss of coagulant feed. -Daily plant inspections performed by operator. -On-line monitoring of clarifier turbidity. -Redundancy through back up pump.	2	1	1	4	Yes #001
Particulate Removal	PAC feed failure	Potential for taste and odour issues	-Feed system monitored through SCADA system alarms. -Daily plant inspections performed by operator.	3	1	1	5	No
Particulate Removal	Polymer feed failure	Biological contamination, ineffective removal of pathogens.	-Pump operation monitored through SCADA system alarms. -Daily plant inspections performed by operators. -On-line monitoring of clarifier turbidity.	2	1	1	4	No
Particulate Removal	Clarifier turbidity breakthrough	Biological contamination, ineffective removal of pathogens and shorter filter runtimes	-On-line turbidity analyzers. -Analyzers monitored and alarmed through SCADA system. -Clarifier redundancy—clarifier take down or by-pass if required. -Daily plant inspections performed by operators -Analyzers equipped with internal data back-up feature data is transferrable to card	3	2	1	6	No
Particulate Removal	Clarifier blowdown valve failure	Biological contamination, ineffective removal of pathogens.	-Valve operation and flow alarmed through SCADA alarm system. -Clarifier redundancy--valve removal/clarifier taken down if needed. By-Pass capabilities if needed.	1	2	1	4	No

Element 8 – Risk Assessment Outcomes

Table 1: Risk Assessment Table for Lakeshore Water Treatment Plant

Activity or Process Step	Potential Hazardous Event	Possible Risks of Potential Hazardous Events	Identified Control Measures	Likelihood	Consequence	Detectability	Risk Value	CCP?
Particulate Removal	Filter turbidimeter failure	Biological contamination, ineffective removal of pathogens and unknown filter turbidity levels	-On-line turbidity analyzers. Analyzers monitored and alarmed through SCADA system. -Automatic filter to waste ability and filter shutdown. -Filter redundancy. -Analyzers equipped with internal data back-up feature data is transferrable to card.	2	2	1	5	No
Particulate Removal	Filter turbidity breakthrough	Biological contamination, ineffective removal of pathogens	-On-line turbidity analyzers. Analyzers monitored and alarmed through SCADA system. -Automatic filter to waste on turbidity set point. -Filter redundancy--filter shutdown if needed. -Analyzers equipped with internal data back-up feature data is transferrable to card.	2	3	1	6	Yes #002
Particulate Removal	Backwash pump failure	Biological contamination, ineffective removal of pathogens, increased turbidity levels	-Pump operation and flow alarmed through SCADA alarm system. -2nd duty pump if needed.	2	1	1	4	No
Disinfection	UV operating off specification/UV down time	Biological contamination, ineffective inactivation of pathogens, loss of treated water	-UV system monitored through SCADA alarm system. -Disinfection also through chlorination. -Automatic switch-over to standby UV train. -Daily plant inspections performed by operator. -Monthly sensor verification by outside source.	2	3	1	6	Yes #003
Disinfection	UV lamp failure	Biological contamination through ineffective inactivation of pathogens.	-UV system monitored through SCADA alarm system. -Disinfection also through chlorination. -Automatic switch-over to standby UV train. -UV lamp redundancy. -Daily plant inspections performed by operator. -Monthly sensor verification by outside source.	2	3	1	6	No
Disinfection	Chlorinator failure	Low chlorine residual, Biological contamination, inadequate or absent disinfectant residual, ineffective removal of pathogens.	-Chlorinator operation alarmed through SCADA alarm system. -Secondary Disinfection also through UV. -Daily inspections performed by operator -System Redundancy	2	3	1	6	Yes #004
Disinfection	Over chlorination	Chemical contamination, exceedance of disinfectant limit.	-On-line chlorine analyzers. -Analyzers alarmed through SCADA alarm system.	2	1	1	4	No
Disinfection	Chlorine leak	Low Chlorine residual, Biological contamination, inadequate or absent disinfectant residual. Ineffective removal of pathogens	-Chlorine system alarmed through SCADA alarm system. -Supply line inspection and switch over to second bank if needed. -Chlorine Scrubber system activated when leak occurs -Specific audible tone for chlorine leak alarm as well as strobe light activation	2	3	1	6	No
Disinfection	Chlorine leak	Low chlorine residual, Chemical contamination of residential area around plant & at plant itself. Access to plant restricted	-Chlorine system alarmed through SCADA alarm system. -Chlorine scrubber system activated automatically. Follow Contingency or Emergency Response Procedure	1	3	1	5	No

Element 8 – Risk Assessment Outcomes

Table 1: Risk Assessment Table for Lakeshore Water Treatment Plant

Activity or Process Step	Potential Hazardous Event	Possible Risks of Potential Hazardous Events	Identified Control Measures	Likelihood	Consequence	Detectability	Risk Value	CCP?
Power Supply	Power interruption	Loss of power supply	-Power supply grid alarmed through SCADA alarm system. -UPS units on critical process control equipment. -Automatic switch-over to back-up generator power. -Small portable generator to power UPS during extended outages	3	1	1	5	No
Power Supply	Back-up power failure	Decrease in process pressure and decrease in treated water supply	-Back-up power supply alarmed through SCADA alarm system. -Regular maintenance and test run under load performed. -Ability to bring in and utilize portable generator	2	2	1	5	No
Storage & Transmission	Contamination of reservoir by intruder.	Biological contamination through introduction of unknown substance.	-Treatment facility armed and alarmed. -Regular inspections of relief vents, reservoir hatches, & perimeter fencing. -Isolation of cells and if needed BWA. -Installation of security cameras.	1	4	1	6	No
Storage & Transmission	Contamination of reservoir by leak.	Biological contamination through introduction of an unknown substance.	-No control at source. -Isolation of cells and if needed BWA. -Reservoir inspection cycle followed. Follow Contingency or Emergency Response Procedure	1	3	2	6	No
Storage & Transmission	High lift pump failure	Loss of system supply pressure, shortage of water	-Pump operation & header flow alarmed through SCADA alarm system. -Automatic switch-over to stand-by pump. -Pump redundancy.	1	2	1	4	No
Storage & Transmission	Elevated storage tank failure	Loss of system pressure and water supply. Reduced fire protection.	-System monitored and alarmed through SCADA alarm system. -Ability to service water system through direct pressure if needed. -Interconnections with neighbouring systems. -Stand-by generator on-site	1	3	1	5	No
General	Unauthorized access	Process failure, biological/chemical contamination and physical damage/vandalism.	-Treatment facility armed and alarmed. -All operational equipment & process equipment alarmed. -Alarms monitored through SCADA alarm system. -Installation of security cameras. -Installation of additional security cameras.	1	4	1	6	No
General	Railway derailment	Process failure, biological/chemical contamination, physical damage & plant access prevented.	-No Control at source. Follow Contingency or Emergency Response Procedure	1	4	1	6	No
General	SCADA communication failure.	Unable to communicate, operate and monitor system processes	-Communications monitored and alarmed. -Treatment facility can be run in manual mode/ by hand if necessary.	3	2	1	6	No
General	Staff availability - Pandemic.	Lack of certified/licensed operators to run the facilities	-No control available Follow Contingency or Emergency Response Procedure	1	2	1	4	No
General	Failure of Backflow device	Compromised water quality, cross-contamination of water supply	-Annual inspections completed by certified technician. -Daily visual checks by operators. -Enforcement of Backflow prevention by-law.	3	3	3	9	No
General	Terrorism / Cyber Terrorism	Process failure, biological / chemical contamination and physical damage/vandalism.	-Operating systems protected by monitored firewalls etc... Follow Contingency or Emergency Response Procedure	1	5	2	8	No
General	Natural Disaster / Long term effects of climate change	Loss of water supply, compromised water quality, lack of certified staff	Follow Contingency or Emergency Response Procedure	1	5	1	7	No

Element 8 – Risk Assessment Outcomes

Table 1A: Identified Critical Control Points for Lakeshore Water Treatment Plant

Critical Control Points	Critical Control Limits	Monitoring Procedures	Response, Reporting and Recording Procedures
Particulate Removal # 001	Coagulant Feed Pump 5 kg/hr (low alarm)	a) SCADA continuous monitoring with on-line flow metre and alarms b) Daily plant round checks and data recorded by operators c) Daily reviews of process trends	a) visual inspection of equipment and appropriate repairs / maintenance will be performed b) process/operational adjustments made are recorded in daily process log book c) automatic shutdown of plant upon loss of coagulant flow
Particulate Removal # 002	Filter Effluent Turbidity 0.3 NTU (high alarm)	a) SCADA continuous monitoring with on-line analyzer and alarms b) Daily plant round checks and data recorded by operators c) Daily review of process trends	a) additional process testing to verify coagulant dosage—adjustments made if needed b) process / operational adjustments made are recorded in daily process log book c) additional reviews of SCADA system analyzer trends and visual inspection of filter effluent at designated sample point in water treatment plant d) Analyzers equipped with internal data back-up feature data is transferrable to card.
Disinfection—UV operating off specification/down time # 003	UV Dosage 50 mJ/cm2 (low alarm)	a) SCADA continuous monitoring with UV program and alarms b) Daily plant round checks and data recorded by operators c) Daily review of process trends	a) Automatic switch over to stand-by UV train occurs b) There is secondary disinfection through chlorination c) visual inspection of equipment and repairs / maintenance will be performed d) sensor verification by outside source
Disinfection—Chlorinator Failure # 004	Plant Effluent Chlorine Residual 1.00 mg/L (low alarm) 3.00 mg/L (high alarm)	a) SCADA continuous monitoring with on-line chlorinator and alarms b) Daily plant round checks and data recorded by operator c) Daily review of process trends	a) Switch over to alternate chlorinator by switching UV trains b) visual inspection of equipment and repairs / maintenance will be performed c) There is primary disinfection through UV

Table 2: Risk Assessment Table for Stoney Point Water Treatment Plant

Activity or Process Step	Potential Hazardous Event	Possible Risks of Potential Hazardous Events	Identified Control Measures	Likelihood	Consequence	Detectability	Risk Value	CCP?
SourceWater	Storm Event/ Extreme weather event and Seasonal Fluctuations	Increased turbidity and/or increased biological / chemical load affecting coagulant dosage	-No control at source. -On-line monitoring of raw water properties	3	1	1	5	No
SourceWater	Wastewater spill / chemical material spill	Increased pathogen load on source water, possible poisoning of consumers	-No control at source -On-line monitoring of raw water properties	2	4	1	7	No
SourceWater	Algal Blooms	Increased pathogen load on source water, filter flow restrictions and an effect on transmittance and absorbency	-No control at source. -On-line monitoring of raw water, process turbidities. -Weekly sampling programme -Electronic notification by environmental agencies.	3	3	1	7	No
Raw Water Handling	Failure of intake pipe through breakage and/or blockage	Source water supply shortfall	-No Control at source. Intake crib and line inspections performed. -On-line monitoring of raw water properties and flows. Follow Contingency or Emergency Response Procedure	1	4	1	6	No

Element 8 – Risk Assessment Outcomes

Table 2: Risk Assessment Table for Stoney Point Water Treatment Plant

Activity or Process Step	Potential Hazardous Event	Possible Risks of Potential Hazardous Events	Identified Control Measures	Likelihood	Consequence	Detectability	Risk Value	CCP?
Raw Water Handling	Frazil Ice	Intake crib and line blockage. Loss of water quantity and quality	-On-line monitoring of raw water flows and associated wet well level alarms through the SCADA. -Stoney Point WTP—Frazil Ice Control SOP	3	1	1	5	No
Raw Water Handling	Low Lift Pump failure	Loss of water quantity and quality	-On-line monitoring of raw water flows and associated SCADA alarms. -Pump redundancy through stand-by pumps.	1	2	1	4	No
Raw Water Handling	Force main Break	Loss of water quantity	-No control at source. Follow Contingency or Emergency Response Procedure	1	3	1	5	No
Particulate Removal	Coagulant feed failure	Biological contamination, ineffective removal of pathogens and shorter filter runtimes	-Flow and pump operation monitored through SCADA system alarms. -Daily plant inspections performed by operator. -On-line monitoring of clarifier turbidity. -Automatic plant shutdown on loss of coagulant flow.	3	3	2	8	Yes #001
Particulate Removal	Carbon feed failure	Taste and odour issues	-Feed rate verified through manual calculations. -Daily plant inspections performed by operator. -Maintenance checks	3	1	1	5	No
Particulate Removal	Clarifier turbidity breakthrough	Biological contamination, ineffective removal of pathogens and shorter filter runtimes	-On-line turbidity analyzer. -Analyzer monitored and alarmed through SCADA system. -Clarifier by-pass if needed. -Analyzers equipped with internal data back-up feature data is transferrable to card.	3	2	1	6	No
Particulate Removal	Clarifier blowdown pump failure	Biological contamination, ineffective removal of pathogens—solids build up in clarifier.	-Daily pump inspection performed by plant operator. -Visual indication of pump operation on SCADA screen. -Manual replacement of failed pump.	2	2	1	5	No
Particulate Removal	Filter turbidimeter failure	Biological contamination, ineffective removal of pathogens and unknown filter turbidity levels	-On-line turbidity analyzers. -Analyzers monitored and alarmed through SCADA system. -Ability for filter shutdown and filter to waste if needed. -Analyzer repaired or replaced. -Analyzers equipped with internal data back-up feature data is transferrable to card.	2	2	1	5	No
Particulate Removal	Filter turbidity breakthrough	Biological contamination, ineffective removal of pathogens	-On-line turbidity analyzers. -Analyzers monitored and alarmed through SCADA system. -Ability for filter shutdown and filter to waste if needed -Analyzers equipped with internal data back-up feature data is transferable to card.	2	4	1	7	Yes #002
Particulate Removal	Backwash pump failure	Biological contamination, ineffective removal of pathogens, increased filter turbidity	-Pump operation and flow alarmed through SCADA alarm system. -Valve operation possible to use High Lift pump #3 as backwash pump	2	1	1	4	No
Disinfection	Chlorinator failure	Low chlorine residual, Biological contamination, inadequate/absent disinfectant residual ineffective removal of pathogens.	-Chlorinator operation alarmed through SCADA alarm system. -Daily inspections performed by operator -Redundancy of system	2	3	1	6	Yes #003
Disinfection	Over chlorination	Chemical contamination, exceedance of disinfectant limit.	-On-line chlorine analyzers. -Analyzers alarmed through SCADA alarm system.	2	1	1	4	No

Element 8 – Risk Assessment Outcomes

Table 2: Risk Assessment Table for Stoney Point Water Treatment Plant

Activity or Process Step	Potential Hazardous Event	Possible Risks of Potential Hazardous Events	Identified Control Measures	Likelihood	Consequence	Detectability	Risk Value	CCP?
Disinfection	Chlorine leak	Low Chlorine residual, Biological contamination, inadequate or absent disinfectant residual. Ineffective removal of pathogens	-Chlorine system alarmed through SCADA alarm system. -Supply line inspection and switch over to second bank if needed.	2	3	1	6	No
Disinfection	Chlorine leak	Low chlorine residual, Chemical contamination of residential area around plant & at plant itself. Access to plant restricted	-Chlorine system alarmed through SCADA alarm system. Follow Contingency or Emergency Response Procedure	1	3	1	5	No
Power Supply	Power interruption	Loss of power supply	-Power supply grid alarmed through SCADA alarm system. -UPS units on critical process control equipment. -Automatic switch-over to back-up generator power. -Small portable generator to power UPS during extended outages	3	1	1	5	No
Power Supply	Back-up power failure	Decrease in process pressure and decrease in treated water supply	-Back-up power supply alarmed through SCADA alarm system. -Regular maintenance and test runs under load performed. -Ability to utilize portable generator	2	2	1	5	No
Storage & Transmission	Contamination of reservoir by intruder.	Biological contamination through introduction of unknown substance.	-Treatment facility armed and alarmed. -Regular inspections of relief vents, reservoir hatches and perimeter fencing. -Isolation of cells and if needed BWA. -Installation of security cameras.	1	4	2	7	No
Storage & Transmission	Contamination of reservoir by leak.	Biological contamination through introduction of an unknown substance.	-No control at source. -Isolation of cells and if needed BWA Follow Contingency or Emergency Response Procedure	1	3	2	6	No
Storage & Transmission	High lift pump failure	Loss of system supply pressure, shortage of water	-Pump operation & header flow alarmed through SCADA alarm system. -Automatic switch-over to stand-by pump. -Pump redundancy.	1	2	1	4	No
General	Unauthorized access	Process failure, biological / chemical contamination and physical damage/vandalism	-Treatment facility armed and alarmed. -All operational equipment & process equipment alarmed. -Alarms monitored through SCADA alarm system. -Installation of security cameras at sites	1	4	1	6	No
General	SCADA communication failure.	Unable to communicate, operate and monitor system processes	-Communications monitored and alarmed. -Treatment facility can be run in manual mode/ by hand if necessary.	3	2	1	6	No
General	Staff availability - Pandemic.	Lack of certified/licensed operators to run the facilities	-No control available Follow Contingency or Emergency Response Procedure	1	2	1	4	No
General	Failure of Backflow device	Compromised water quality, cross-contamination of water supply	-Annual inspections completed by certified technician. -Daily visual checks by operators. -Enforcement of Backflow prevention by-law.	3	3	3	9	No
General	Terrorism / Cyber Terrorism	Process failure, biological / chemical contamination and physical damage/vandalism.	-Operating systems protected by monitored firewalls etc... Follow Contingency or Emergency Response Procedure	1	5	2	8	No
General	Natural Disaster / Long term effects of climate change	Loss of water supply, compromised water quality, lack of certified staff	Follow Contingency or Emergency Response Procedure	1	5	1	7	No

Element 8 – Risk Assessment Outcomes

Table 2A: Identified Critical Control Points for Stoney Point Water Treatment Plant

Critical Control Points	Critical Control Limits	Monitoring Procedures	Response, Reporting and Recording Procedures
Particulate Removal # 001	Coagulant Feed Pump 5 kg/hr (low alarm)	a) SCADA continuous monitoring with on-line flow meter b) Daily plant round checks and data recorded by operators c) Daily reviews of process trends	a) visual inspection of equipment and appropriate repairs / maintenance will be performed. b) process / operational adjustments made are recorded in daily process log book c) additional reviews of SCADA system analyzer trends. d) automatic plant shutdown upon no coagulant flow.
Particulate Removal # 002	Filter Effluent Turbidity 0.25 NTU (high alarm)	a) SCADA continuous monitoring with on-line analyzer b) Daily plant round checks and data recorded by operators c) Daily review of process trends	a) additional process testing to verify coagulant dosage—adjustments made if needed b) process / operational adjustments made are recorded in daily process log book c) additional reviews of SCADA system analyzer trends and visual inspection of filter effluent at designated sample point in water treatment plant d) Analyzers equipped with internal data back-up feature data is transferrable to card.
Disinfection—Chlorinator Failure # 003	Plant Effluent Chlorine Residual 1.40 mg/L (low alarm) 2.50 mg/L (high alarm)	a) SCADA continuous monitoring with on-line chlorinator b) Daily plant round checks and data recorded by operator c) Daily review of process trends	a) Switch over to alternate chlorinator. b) visual inspection of equipment and repairs / maintenance will be performed

Table 3: Risk Assessment Table for Lakeshore Water Supply System—Distribution Service Areas

Activity or Process Step	Potential Hazardous Event	Possible Risks of Potential Hazardous Events	Identified Control Measures	Likelihood	Consequence	Detectability	Risk Value	CCP?
Distribution	Watermain Break	Unsafe water supply	-Watermain Break: Emergency Repair SOP.					No
Distribution	Low System Pressure	Unsafe water supply	-Low Pressure SOP. -Community Complaints. -SCADA system at Water Treatment Plants					No
Distribution	Supply Loss	Low pressure leading to contamination of water (towers and reservoirs), lack of supply for fire protection	-Low Pressure SOP. -Interconnect valves. -Isolation valves. -SCADA system at Water Treatment Plants					No
Distribution	Failure of Backflow device	Unsafe water supply, infiltration	-Backflow prevention By-Law. Inspected annually by an outside certified source					No
Distribution	Adverse Results, Sampling for chlorine, microbiological /chemical	Unsafe drinking water, BWA	-Regular sampling and testing. System flushing.					No
Distribution	Valve Failure	Loss of supply, lack of supply for fire protection, restriction of flow	-Valve maintenance programme. System flushing. -Manipulation of system flow.					No
Distribution	Staff Availability Pandemic	Lack of certified/licensed operators to run system. Unsafe water supply	Follow Contingency of Emergency Response Procedure					No
Distribution	Cross Connection	Unsafe water supply	-Backflow prevention By-Law Visual inspections, flushing and sampling procedures					No
Distribution	Dead End	Low chlorine residual, unsafe water supply	-Flushing and sampling procedures. -Collecting Samples for Chlorine Residuals SOP					No
Distribution	Dead End	Low pressure, discoloured water, reduced flows	-Flushing procedures. -Colour coding of hydrants Maintenance checks					No
Distribution	Natural Disasters/Long term impacts of climate change	Loss of supply, contamination of supply	Follow Contingency of Emergency Response Procedure					No
Distribution	Terrorism / Vandalism	Unsafe water supply, Loss of supply	Follow Contingency of Emergency Response Procedure					No

Element 8 – Risk Assessment Outcomes

Table 3A: Identified Critical Control Points for Lakeshore Water Supply System – Distribution Service Areas

Critical Control Points	Critical Control Limits	Monitoring Procedures	Response, Reporting and Recording Procedures
Dead Ends # 001	System Chlorine Residual <0.20 mg/L (free)	Onsite Operator to continue to sample residual at 5 min intervals	a) Begin Flushing b) Notify affiliated on call WTP operator c) Notify ORO of CCP trigger d) Note in CCP binder, note in Logbook by WTP Operator e) Refer to Dead-end Flushing SOP and Collecting Samples for Chlorine Residual Testing SOP.

Revision History

Date	Rev. #	Reason for Revision	Name/Title
04-12-17	1	Addition of new header and footer. Addition of Revision History section.	NB/Compliance
04-28-17	2	Complete revision of table format, addition of Control Measures to table, updates made to ratings under Likelihood, Consequence and Detectability. Revision History format changed.	NB/Compliance
05-10-17	3	Creation of Identified Critical Control Point tables for Lakeshore WTP and Stoney Point WTP.	NB/Compliance
06-13-17	4	Revision of Risk Assessment Table for the Lakeshore Water Supply System—Distribution Service Areas	NB/Compliance
07-26-17	5	Addition of hazardous events—algal bloom, terrorism, natural disaster and backflow. Corresponding numbering of CCP’s on Risk Assessment Tables and CCP Tables.	NB/Compliance
09-07-17	6	Correction to Table 2 under particulate removal (clarifier blowdown pump failure) to control measure section and Table 1A—chlorine residual high alarm set to 3 from 2mg/L and Table 2A—clarifier turbidity high alarm set to 3 from 2 NTU.	NB/Compliance
10-11-18	7	Revisions and updates implemented from 36 month risk assessment review meeting. Addition of CCP to distribution system. NOTE: all revisions made are available for review on paper copy of the previous version of element #8.	NB/Compliance
04-11-19	8	Annual review of document. New logo and footer added. In Stoney Point Table under General added statement regarding long term effects of climate change.	NB/Compliance
04-26-19	9	Addition of wording – “by-pass capabilities” to the Lakeshore Table under particulate removal. Change of wording – “Alum to Coagulant” on the Stoney Point Table under particulate removal and addition of wording – “Loss of supply” to the Distribution table under Terrorism/vandalism.	NB/Compliance
07-22-20	10	Annual review of element. Revisions made to LS and SP WTP under particulate removal – clarifier turb. Breakthrough, filter turb failure & filter turb breakthrough. Under Disinfection (LS) – chlorinator failure – word Secondary added to 2nd bullet. Under Power Supply (LS&SP) – power interup – wording adding re small portable generator. Under Elevated Storage Tanks (LS)– added wording re generator. Under General (LS&SP)– unauthorized access – wording added re camera install. Under General (LS&SP) – cyber terrorism – added wording re system firewalls. LS & SP CCP tables updated with wording re turb analyzers data backup	NB/Compliance
02-25-22	11	Update header and footer	KD/Compliance
07-28-22	12	Update Distribution service area CCP related to Management Review Meeting OFI acceptance	KD/Compliance

Element 9 – Organizational Structure, Roles, Responsibilities, and Authorities

9.1 Purpose

This element outlines the organizational structure of the Municipality of Lakeshore’s Drinking Water Systems as well as the associated roles, responsibilities, and authorities that relate to the operation and performance of its Drinking Water Systems.

9.2 Description

The Municipality of Lakeshore is both the Owner and Operating Authority of the drinking water QMS. The Operations Department, and more specifically, the Water Management Division is the designated department for managing water operations.

Documentation outlining the Municipality of Lakeshore Drinking Water Systems organizational structure and the respective roles, responsibilities, and authorities will be maintained by the QMS Representative and found in the following documents:

- Job descriptions; and
- Lakeshore Water Services Personnel DWQMS Responsibilities and Authorities (Appendix 3).

Personnel with managerial responsibilities associated with the Lakeshore Drinking Water Systems are identified as members of Top Management, this includes the Corporate Leader – Operations and the Division Leader – Water Management.

This organizational Structure can be found in Figure 4 – Quality Management System (QMS) Organizational Structure below.

9.2 Reference

This element references the following:

- Job Descriptions
- DWQMS Element 9: Lakeshore Water Services Personnel Responsibilities & Authorities

Figure 4 – Quality Management System (QMS) – Organizational Structure



Element 10 – Competencies

10.1 Purpose

This element identifies how the Municipality of Lakeshore ensures that personnel whose roles and responsibilities affect drinking water quality are competent and maintain their competencies to ensure the ongoing operation of its DWS.

10.2 Description

Identification, Development and Maintenance of Competencies

In order to ensure competent individuals are in place to manage and maintain the drinking water system and the QMS, the Municipality of Lakeshore requires employees to have the appropriate qualifications, training and /or licensing to complete their responsibilities.

The regulation requires the following minimum designations:

- That an Overall-Responsible-Operator (ORO) be designated as set forth by the MECP related to the overall operational responsibility of the DWS;
- That an Operator-in-Charge (OIC) designation be designated as set forth by the MECP related to overseeing the day-to-day operating decisions and instructs other operators on systems procedures; and
- That if required an Operator-in-Training (OIT) is the minimum requirement for working within the drinking water system (under the direction of the ORO or an appropriate licensed Water Operator).

The above specific requirements are outlined in the appropriate job descriptions and are enforced when hiring new employees.

All personnel must be aware of/and are responsible for complying with the regulated requirements for policies and procedures related competencies for the successful operation of the system. DWQMS Element 5: Documents and Records Control will be used to provide employees with access to this documentation (certifications, licenses, etc).

Copies of required certifications are maintained and provided to the Water Compliance Coordinator by the Water Operators.

Element 10 – Competencies

The development and maintenance of competencies is facilitated through scheduled and unscheduled training sessions. Records of completed training and individuals who require training will be tracked through the Compliance Science Software.

Training is provided according to MECP's specifications and may include any training related to an employee's responsibilities. Continuing Education Units (CEU) training and on-the-job training are also provided.

Awareness and understanding of the importance of employee responsibilities and its impact on drinking water quality will be promoted through the following activities:

- Regular review of relevant policies and procedures;
- Communication of relevant legislative and regulatory requirements through formal meetings as outlined in DWQMS Element 12: Communications;
- Communication of roles and responsibilities as outlined in DWQMS Element 9: Organizational Structure, Roles, Responsibilities and Authorities; and
- Internal and external training.

10.3 Reference

This element references the following:

- Job Descriptions
- DWQMS Element 5 - Document and Records Control
- DWQMS Element 9 - Organizational Structure, Roles, Responsibilities, and Authorities
- DWQMS Element 12 - Communications

Element 11 – Personnel Coverage

11.1 Purpose

This element identifies how the Municipality of Lakeshore ensures that competent individuals are available to fulfill the responsibilities needed for the ongoing operation of its Drinking Water System (DWS).

11.2 Description

Establishment of Personnel Coverage

The Municipality of Lakeshore will ensure that competent individuals are always available to fulfill the duties that affect drinking water quality, and the DWS is staffed during normal working hours by full-time personnel Monday through Friday, 7:00am to 3:30pm (Duty Operators).

All after-hours and weekend coverage (On-Call Operators) is documented in current on-call schedules for both the treatment and distribution facilities. The on-call schedules address both after-hours as well as weekend and holiday coverage and are updated on an annual basis.

The Team Leader – Water Management is the designated ORO of the Lakeshore drinking water system.

When in absence of the designated ORO for the DWS, the ORO for the Municipality's systems will be designated (in order, as available) as deemed competent where regulation and license accreditation permits, to the following:

- Lead Hand – Water Distribution and/or Water Treatment;
- Duty/On-Call Operator – Water Distribution and/or Water Treatment;
- Division Leader – Water Management;
- Water Compliance Coordinator; or
- Alternate, as assigned by Top Management.

Element 11 – Personnel Coverage

The Duty/On-Call Operator is deemed to be the designated Operator-in-Charge (OIC) by the Municipality, should license accreditation permit.

The Municipality of Lakeshore utilizes a designated security paging alarm company to ensure that the treatment and distribution facilities are monitored appropriately after hours.

11.3 Reference

This element references the following:

- Duty/ On-Call Schedule - Water Treatment
- Duty/ On-Call Schedule - Water Distribution
- DWQMS Element 9 – Organizational Structure, Roles, Responsibilities, and Authorities

Element 12 - Communications

12.1 Purpose

This element identifies how the Top Management will communicate information relating to the Quality Management System (QMS) to the Owner, the Operating Authority Staff, Essential Suppliers and Essential Service Providers (identified in Element 13), and the Public.

12.2 Description

To ensure complete and accurate information is communicated at all times related to the DWS, the following communication protocols are followed:

Communication of the QMS Policy & Statement of Commitment and Endorsement

Once the Operational Plan is endorsed, the following will be completed:

- Printed copies of the Operational Plan with the Commitment and Endorsement will be posted in the Municipality of Lakeshore's DWS facilities and provided to all relevant staff;
- Postings will occur on the Municipality of Lakeshore's website; and
- Copies will be made available to the public upon request.

Communication to and from the Owner

Communication to and from the Owner should be through Top Management and/or as designated.

The Operating Authority's Top Management will communicate the current status of the QMS to the Owner through:

- Regularly scheduled Council meetings including, but not limited to:
- Endorsement of the QMS Operational Plan
- Annual and Summary reports as noted in O. Reg 170/03
- Management review meeting minutes
- Capital budget summaries / infrastructure review reports;
- Electronic means via email/fax;
- Verbal means; and/or
- Other methods of communication as required during Emergency situations (i.e. Flood Rapid Response Plan (FRRP), Emergency Response Plan (ERP), etc.).

Element 12 - Communications

The Owner can communicate with the Operating Authority through Top Management through:

- Council meetings or during presentation of report;
- E-mails directed to the Top Management (Corporate Leader – Operations and Division Leader – Water Management); and
- Verbal means.

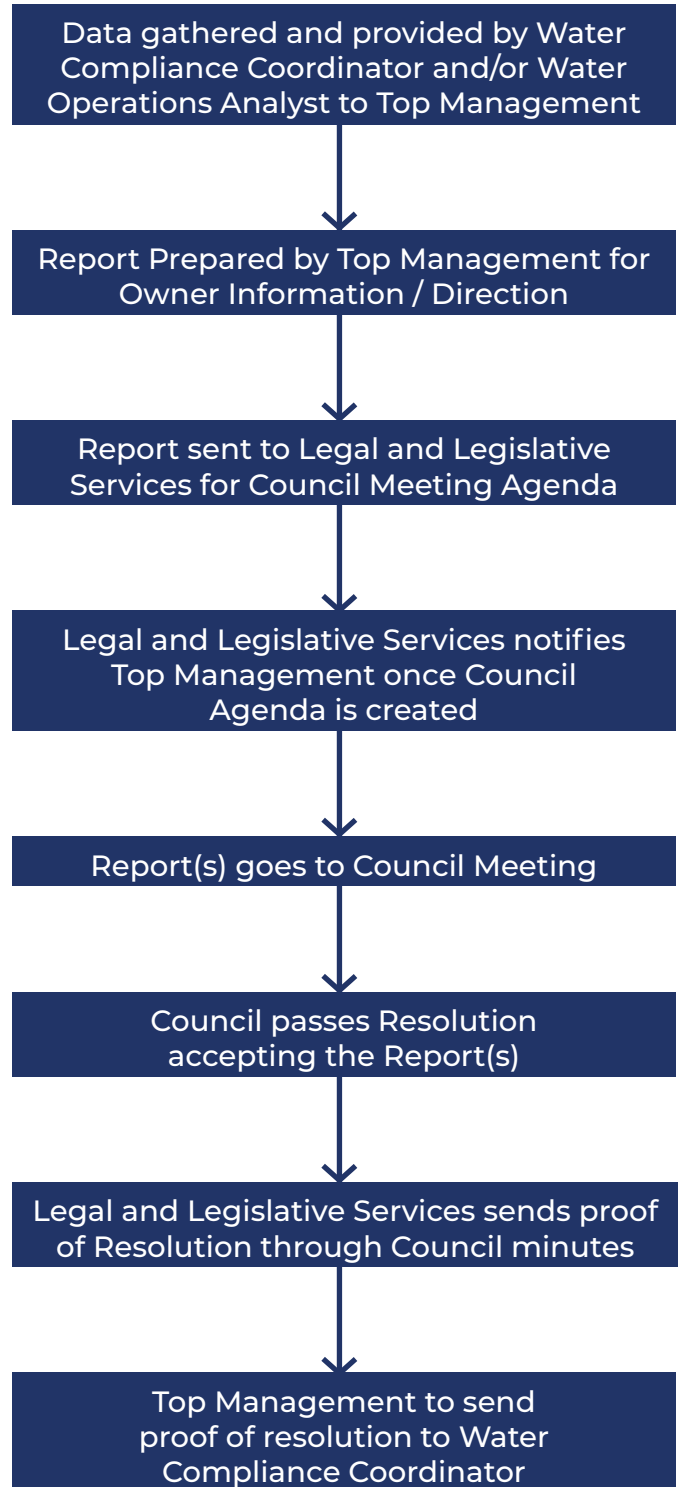
Communication to and from Operating Authority Staff

The Operational Plan will also be made available and reviewed with all operating authority staff within the water treatment and distribution departments. This includes new staff, part-time staff, temporary staff, and students.

- Relevant documents and the status of the QMS will be communicated through:
- Compliance of day-to-day processes and procedures;
- QMS & General Operating Authority staff meetings and minutes;
- Municipality of Lakeshore intranet;
- Internal (QMS) & external (DWQMS) relevant training sessions; and

Document management software, Compliance Science, which provides training, tracking of certifications, expiry and also provides opportunity for comment and feedback on reviewed documents.

The below shows the flow of information reported annually via reports to Council:



Element 12 - Communications

Communication to and from Suppliers

The QMS Policy, the Statement of Commitment and Endorsement and any associated QMS documents will be communicated to essential suppliers and essential service providers through the use of tender packages, contract agreements and the Municipality of Lakeshore's Procurement By-law.

These documents will also be made available when suppliers are retained and/or contracted upon request.

Essential suppliers and essential service providers can communicate with the Operating Authority through:

- Phone calls directed to the Top Management (Corporate Leader – Operations and Division Leader – Water Management) for Capital Projects and to the Team Leader, Water Management (ORO) for Operations and Maintenance Projects in line with the purchasing by-law;
- e-mails directed to the Top Management (Corporate Leader – Operations and Division Leader – Water Management) for Capital Projects and to the Team Leader, Water Management (ORO) for Operations and Maintenance Projects in line with purchasing by-law; and
- written notices submitted to the Water Management Division.

Communication to and from the Public

The following will be standard, regular information that will be communicated to the Public, as provided by Top Management:

- The Statement of Commitment and Endorsement and the QMS Operational Plan are available on the Municipality of Lakeshore's website; and
- Comments and concerns received dealing with drinking water QMS issues will be logged accordingly and directed to the Top Management (Corporate Leader – Operations and Division Leader – Water Management) through:
- e-mails sent to the Municipality of Lakeshore;
- phone calls or e-mails sent to/from Council; and
- written letters addressed to the Water Management Division

Element 12 - Communications

12.3 Reference

This element references the following:

- Yearly Annual / Summary Reports
- Management Review Meeting Minutes
- QMS & General operating authority staff meeting minutes
- Essential Suppliers & essential services contact list
- Municipality of Lakeshore Purchasing By-law
- Municipality of Lakeshore website

Element 13 – Essential Supplies and Services

13.1 Purpose

This element outlines how the Municipality of Lakeshore procures and ensures high quality supplies and services are used to deliver safe drinking water to the consumer.

13.2 Description

The procurement details related to the essential supplies and services for the operation and maintenance of the drinking water system have been identified and documented in the Essential Supplies and Services List.

Suppliers shall be provided a letter by Top Management outlining the Municipality of Lakeshore's procurement requirements for that product or service along with a copy of the Municipality's Drinking Water Works Permit and Municipal Drinking Water License, if required.

Suppliers will return the signed letter, showing their acknowledgement and confirmation of the Municipality's requirements.

Supplies and services for capital, maintenance and daily operations shall be procured in accordance with the current Purchasing By-Law found in the Municipality of Lakeshore's Governing Procurement Policies and Procedures.

Supplies and services shall be in accordance with all associated and relevant legislation and regulatory requirements.

Documentation of supplies and services will be verified prior to the receipt of the product and/or prior to services rendered. Any product received will be reviewed to ensure that what has been received (product or service) is in line with the verified documentation.

Element 13 – Essential Supplies and Services

To ensure the quality of the essential supplies and services received the following quality requirements shall be met:

- Third party laboratories shall be accredited and licenced;
- Calibration services are provided by accredited and qualified personnel;
- Water treatment and distribution components shall have documented verification showing conformance to applicable standards, regulations and industry standards; and
- Water treatment and distribution chemicals shall have documented verification showing conformance to applicable standards, regulations and industry standards.

An approved list of contractors and suppliers is provided for general, afterhours and/or emergency maintenance/repair situations.

13.3 Reference

This element references the following:

- Essential Supplies and Services List
- The Municipality of Lakeshore current Governing Procurement Policies and Procedures
- Laboratory accreditation certification/licence
- Accreditation certification of essential service suppliers performing annual calibrations on in-line equipment

Element 14 – Review and Provisions of Infrastructure

14.1 Purpose

This element outlines how the Municipality of Lakeshore will review the adequacy of the infrastructure necessary to operate and maintain the DWS and considers the risk assessment outcomes (Element 8) for the delivery of safe drinking water.

14.2 Description

Once every calendar year through the Municipality of Lakeshore’s annual budget process, Top Management will conduct a review of the drinking water system’s infrastructure which will include the review of the Watermain Replacement Plan (5-year plan), the Water/Wastewater Master Plan (WWMP) and the Asset Management Plan (AMP).

This review will assess the adequacy of the system’s operation and maintenance with respect to continued service and to accommodate growth.

A summary of maintenance and capital recommendations will be created and reviewed with consideration given to DWQMS Element 8 - Risk Assessment outcomes.

Top Management will include any projects within the budget, as required, to maintain and ensure the infrastructure is being updated/upgraded as required.

Once authorized through budget approvals, timelines and responsibilities for the implementation of items identified will be documented and scheduled.

Top Management will include the results of the recommendations and proposed timelines at the Management Review Meeting

14.3 Reference

This element references the following:

- Watermain Replacement Plan (5-year plan)
- Management Review Minutes
- Municipality of Lakeshore’s Asset Management Plan
- Municipality of Lakeshore’s Water & Wastewater Master Plan
- DWQMS Element 8 - Risk Assessment Outcomes

Element 15 – Infrastructure Maintenance, Rehabilitation and Renewal

15.1 Purpose

This element outlines the infrastructure maintenance, rehabilitation, and capital projects required to maintain the Municipality of Lakeshore's DWS.

15.2 Description

Programs

The infrastructure maintenance, rehabilitation, and capital projects for the Municipality of Lakeshore's DWS is administered by the Operations Department and by the Water Management Division of the Capital Projects Division.

The Division Leader – Water Management, in collaboration with the Division Leader – Capital Projects is responsible for administering the projects related to Lakeshore's DWS infrastructure. The use of accepted contractor/engineering firms will be procured and exercised as needed.

Municipality of Lakeshore undertakes valve maintenance, hydrant flushing, and work order tracking in the operation and monitoring of its DWS infrastructure.

System sampling, infrastructure repair, system flow testing and routine maintenance are performed by certified and licensed personnel according to maintenance schedules which are developed based on manufacturer guidelines and coordinated using maintenance management software programs. Support and assistance from external resources is used when required.

Lakeshore's WWMP lays out recommendations related to rehabilitation and replacement projects to be completed for asset management and to accommodate growth.

The maintenance, rehabilitation and capital projects are communicated to Council by Top Management (Corporate Leader – Operations and Division Leader – Water Management) through budget approvals, council reports and/or emergency procurement guidelines. This communication will be managed in accordance with DWQMS Element 12 – Communications.

The Division Leader – Water Management and Team Leader – Water Management (ORO) are responsible for obtaining final reports that document the occurrence and/or completion of the infrastructure maintenance, rehabilitation, and capital projects.

The effectiveness and efficiency of infrastructure maintenance, rehabilitation and capital projects will be assessed once every calendar year.

Element 15 – Infrastructure Maintenance, Rehabilitation and Renewal

15.3 Reference

This element references the following:

- Equipment Maintenance Procedures/Guidelines
- DWQMS Element 12 - Communications
- Municipality of Lakeshore Water and Wastewater Master Plan
- Final Reports on completed projects (submitted by contractor/engineer)
- Municipality of Lakeshore Council Meeting Minutes

Element 16 – Sampling, Testing, and Monitoring

16.1 Purpose

This element outlines the activities used by the Municipality of Lakeshore to sample, test, and monitor drinking water quality to ensure the delivery of safe drinking water.

16.2 Description

The Municipality of Lakeshore's water treatment and water distribution operators perform sampling, testing, and monitoring activities in accordance with regulatory and legislative requirements to ensure the safety and quality of drinking water for the consumers.

This process is outlined in the Regulatory and Scheduled Sampling Standard Operating Procedure.

Sampling, testing, and monitoring will be increased during times of challenging water conditions and high risk to drinking water quality or as directed by regulating authorities. There is no relevant upstream sampling, testing and monitoring activities that occur for this system.

All collected samples are sent to a certified laboratory for results. The Municipality of Lakeshore will request copies of accreditation licenses from all laboratories that are used.

Results of sampling, testing and monitoring activities are documented in an Annual Summary Report for each system.

Top Management (Corporate Leader – Operations, Division Leader – Water Management) will prepare and submit these reports to the Owner (Council) and the MECP for review.

These reports are also available to the public at the Lakeshore's Municipal Building and on its website:

[Lakeshore Website, Municipal Service Page](#)

16.3 Reference

This element references the following:

- Regulatory and Scheduled Sampling SOP
- Yearly Annual / Summary Reports

Element 17 – Measurement and Recording Equipment Calibration and Maintenance

17.1 Purpose

This element outlines the process by which the Municipality of Lakeshore calibrates and maintains the measurement and recording equipment used as part of its DWS.

17.2 Description

Calibration and Maintenance Activities

The Municipality of Lakeshore's water treatment and water distribution system Water Operators coordinate calibration and maintenance of measurement and recording equipment to ensure their continued effective operation.

The measurement and recording equipment used and the associated calibration and maintenance requirements are outlined in the Index of Calibration and Maintenance (Appendix 4). The Index of Calibration and Maintenance shall be reviewed and revised once every Calendar year.

The Municipality of Lakeshore uses preventive maintenance program software to schedule and track on-going and completed maintenance and calibration activities.

Maintenance activities are performed by internal personnel. If external support is required, calibration and maintenance is performed by the original equipment manufacturer or by a certified or suitably qualified contractor.

The Municipality of Lakeshore requires records documenting calibration and maintenance performed by external resources. These records (Annual Calibration Certificates) are stored onsite at either the John George Water Treatment Plant, the Stoney Point Water Treatment Plant, or at the Operations Center.

17.3 Reference

This element references the following:

- Index of Calibration and Maintenance
- Annual Calibration Certificates

Element 18 – Emergency Management

18.1 Purpose

This element outlines the process by which the Municipality of Lakeshore identifies emergency situations within its DWS and how the Municipality will manage its response to these events.

18.2 Description

The Municipality of Lakeshore has identified potential emergency situations that could result in the loss of the ability to maintain a supply of safe drinking water to consumers.

The Municipality of Lakeshore's Waterworks Emergency Response Plan and Contingency Plans outlines the related responses, recovery actions, contact information details and employee responsibilities specific to the incident. This plan was initially prepared in 2015 and is currently due to be updated.

Employee responsibilities for emergency management are documented in the Waterworks Emergency Response Plan. The Municipality of Lakeshore has an emergency contact list and an essential supplies and services list to ensure that the appropriate individuals will be contacted in the event of an emergency. These lists are kept updated, as required.

Communications during an emergency situation will be conducted as laid out in the Waterworks Emergency Response Plan. Mock emergency tests are reviewed to identify gaps and opportunities for improvement, with corresponding corrective actions.

The individuals in Operations responsible for responding to Lakeshore's Waterworks Emergency Response Plan include:

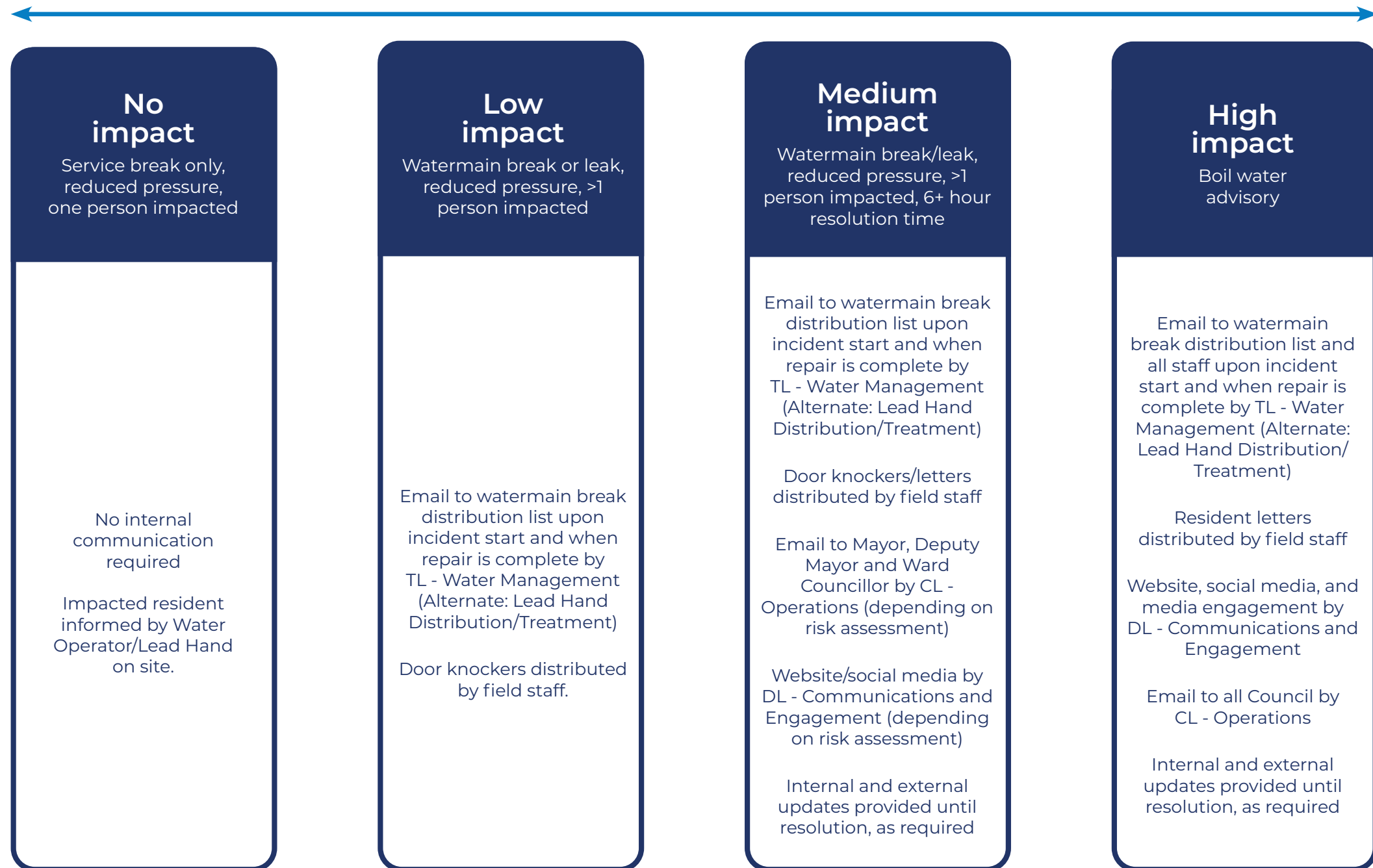
- Corporate Leader - Operations
- Division Leader - Water Management (QMS Representative)
- Team Leader - Water Management (ORO)
- Water Compliance Coordinator
- Lead Hand – Water Treatment
- Lead Hand – Water Distribution
- Water Distribution and Treatment Operators
- Other leadership staff within Operations, as required,

Element 18 – Emergency Management

The emergency event will be recognized based on its impact for the Municipality, and subsequent actions shall be undertaken in accordance with the specified notification flowchart:

Water Interruption Notification

Incident Level



Note:
 TL = Team Leader
 DL = Division Leader
 CL = Corporate Leader

Element 18 – Emergency Management

18.3 Reference

This element references the following:

- Emergency Contact List
- Essential Supplies and Services Contact List
- Lakeshore Water Supply System Operations & Maintenance / Contingency Plan Manual
- Waterworks Emergency Response Plan

Element 19 – Internal Audits

19.1 Purpose

This element outlines the method for performing internal audits of the Municipality of Lakeshore's QMS to ensure that the Operational Plan is being properly implemented and is in conformance with the requirements of the DWQMS.

19.2 Description

The Municipality of Lakeshore will conduct an internal audit of its QMS at least once every calendar year to ensure that it continues to perform according to established policies and procedures. This audit will evaluate the performance of the drinking water QMS against the requirements of the DWQMS.

An Audit Schedule will be defined by the QMS Representative and consist of audit preparation, conducting the audit, reporting on the findings, and follow-up, as required.

Internal Audits will be performed by a third-party independent qualified Auditor with the appropriate training and knowledge.

The internal auditor will follow the Audit schedule as defined, review approved policies and procedures, previous internal and external audit report results and other related DWQMS documentation prior to the audit date.

The internal auditor will compile the results of the audits into a final Audit Report, which will be submitted to Top Management for review.

The Audit Report results will be communicated to the Owner through the Management Review Report presented by Top Management through Regular Council Meetings.

The QMS Representative will communicate the Audit Report results to personnel of the audited area(s).

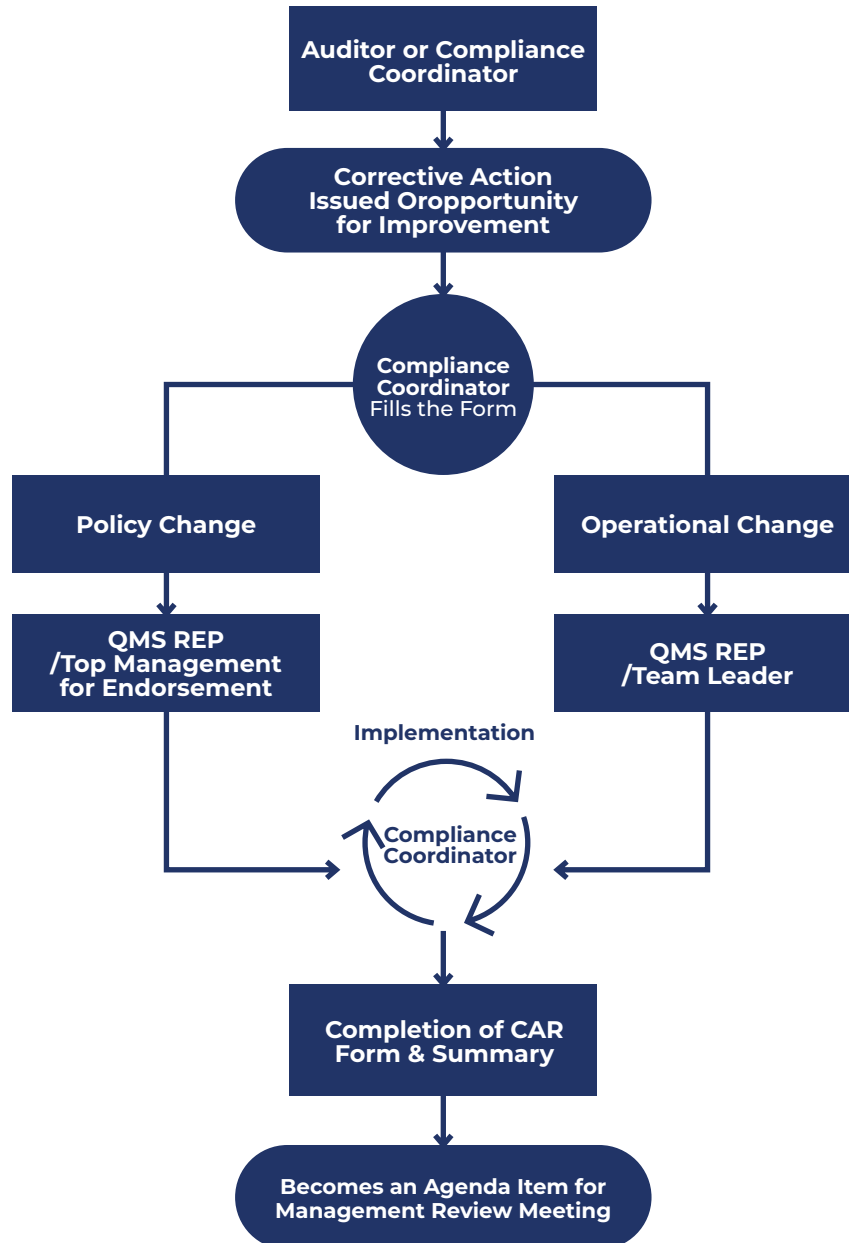
Any non-conformances will be identified in the Audit Report and will indicate where corrective action is needed. A Corrective Action Report (CAR) will be issued with a target resolution date.

The Division Leader – Water Management (QMS Representative) and the Team Leader - Water Management (ORO) will monitor progress and verify the effectiveness of the CAR to the non-conformance until a resolution is complete in accordance with DWQMS.

Element 19 – Internal Audits

Corrective Action Reporting (CAR)

When a CAR is issued by MECP, it will be added to the CAR Summary and Tracking sheet. The following workflow represents the steps to resolving a communicated CAR:



19.3 Reference

This element references the following:

- Management Review Report
- Audit Report
- DWQMS Element 12 - Communications

Element 20 – Management Review

20.1 Purpose

This element identifies the process by which the Municipality of Lakeshore reviews the performance of its QMS.

20.2 Description

Once in a calendar year, members of Top Management will review the appropriate information to evaluate the operation of the drinking water QMS and its continued suitability, adequacy, and effectiveness.

The following items shall be discussed during Management Review meetings to help evaluate the suitability, adequacy and effectiveness of Municipality of Lakeshore's QMS: Incidents of non-compliance with applicable regulations;

- Incidents of adverse drinking water tests;
- Deviations from critical control point limits and corresponding actions taken;
- The effectiveness of the risk assessment process;
- Findings from internal and external audits;
- Review of Corrective Action Reporting (CARs);
- Emergency preparedness and response based on emergency tests;
- Operational performance;
- Discuss and address any issues as per the Director's directions received from the MECP, which includes minimum requirements for the preparation and content of operational plans prepared by owners of municipal residential drinking water systems under SDWA.
- Trends in the quality of raw water supply and drinking water;
- Previous management review meeting action items;
- Updates on action items identified between management review meetings;
- Changes to services, activities, regulations, etc. that could impact the drinking water QMS;
- Review of best practice recommendations;
- Consumer feedback;
- Resources needed for QMS maintenance;
- Results of the infrastructure review;
- The currency of the Operational Plan – content & updates; and
- Comments and suggestions made by personnel

Element 20 – Management Review

Management Review Meeting Minutes will be included as an appendix to the Yearly Summary Report, which is prepared by Top Management and submitted to the owner on an annual basis in accordance with Provincial Regulations. All meeting minutes will be documented and include, at a minimum the following:

- List of attendees
- Summary of deficiencies and action items to address the deficiencies
- Record of new and outstanding action items including an indication of responsibility and proposed timeline.

20.3 Reference

This element references the following:

- Yearly Annual / Summary Reports
- Management Review Meeting Minutes

Element 21 – Continual Improvement

21.1 Purpose

This element identifies the procedure by which the Municipality of Lakeshore will track, measure and identify opportunities for continual improvement in their QMS.

21.2 Description

The Operating Authority shall develop a procedure for tracking and measuring continual improvement through:

- A 36-month review of applicable best management practices including publications from the MECP website;
- The investigation of the cause of an identified non-conformity;
- Documentation of the actions to be taken to rectify and prevent the non-conformance from occurring again;
- Review and verification that the corrective actions implemented were successful in correcting and preventing the non-conformance from re-occurring;
- The identification and review of any potential non-conformances and their possible preventative measures;
- The outcome of the review of potential non-conformances will be documented and contain any actions, if any that were determined to be necessary in the prevention of the potential non-conformance re-occurring; and
- Review and verification that the actions implemented were successful in correcting and preventing the non-conformance from re-occurring.

Element 21 is crucial in continuing to improve the Quality Management System and ensuring to provide safe drinking water to our consumers.

21.3 Reference

This element references the following:

- Audit Reports
- Management Review Minutes
- Corrective Action Forms / Logs
- Operational Logs



TOGETHER WE ARE

Lakeshore

Appendix 1

Municipality of Lakeshore



Drinking Water Quality Management Standard

Quality Management System Policy Statement

That the Municipality of Lakeshore is committed to establishing and maintaining a QMS that is compliant with the DWQMS to facilitate the provision of safe drinking water to all consumers.

That the Municipality of Lakeshore agrees to:

- Ensure that the QMS appropriately addresses all aspects of the drinking water system;
- Comply with all relevant legislative and regulatory requirements for the supply of safe drinking water;
- Maintain and continually improve the drinking water QMS; and
- Communicate pertinent operational and water quality information to the Owner of the drinking water system, consumers, and the public.

That the ongoing compliance and continual improvement of the QMS will be achieved through formalized processes.

That all internal and external communication regarding the QMS will be conducted in accordance with DWQMS Element 12 - Communications.

X

Krystal Kalbol

Corporate Leader - Operations

Appendix 2

TITLE	DOCUMENT OR RECORD	DESIGNATED LOCATION	RETENTION PERIOD
Annual & Summary Municipal (MECP) Reports	Record	E , HC	7 yrs
Applicable Federal & Provincial Legislation	Document	E	current version
Applicable Municipal By-Laws	Document	E	current version
Asset Management Plan	Document	E	current version
AWQI Reports	Record	HC	7 yrs
Capital Budget History and Forecast Spreadsheet	Record	E, HC	renewed annually
Chemical Sampling Results	Record	E , HC	7 y & 15 yrs
Chlorine Sampling / Flushing Logs	Record	HC	7 yrs
Corrective Action Forms	Record	E , HC	7 yrs
Distribution Report Sheet		HC	7 yrs
Drinking Water Works Licence	Document	E , HC	renewal every 5 years
Drinking Water Works Permit	Document	E , HC	renewal every 5 years
DWQMS Operational Plan	Document	E , HC	10 yrs
DWQMS Organizational Flow Chart	Record	E , HC	10 yrs&updated as needed
DWQMS Staff Meeting Minutes	Record	E, HC	7 yrs
Emergency Contact List	Document	HC	current operating version
Engineering Schematics/Plans & Drawings	Document	E , HC	10 yrs
Environmental Services Capital Budget Forecast	Record	E	updated annually
Environmental Services Community Complaint Forms	Record	E	7 yrs
Equipment Calibration Logs	Record	HC	7 yrs
Equipment Operations Manual	Document	E , HC	current operating version
Essential Supplies & Services List	Document	HC	current operating version
Facility Operations Log Book(s)	Record	HC	7 yrs
Index of Calibration and Maintenance	Record	E, HC	7 yrs
In-House Lab Analysis Result Result Tracking Sheet	Record	HC	7 yrs

TITLE	DOCUMENT OR RECORD	DESIGNATED LOCATION	RETENTION PERIOD
Internal & External Audit Reports	Record	E , HC	10 yrs
Job Descriptions	Document	E	current operating version
Laboratory Accreditation Certificate	Record	HC	revelal every 3 years
Maintenance Work Orders / Logs	Record	E , HC	7 yrs
Management Review Meeting Minutes	Record	E , HC	10 yrs
Manufacturer Procedures and Guidelines	Document	E, HC	current operating version
Microbiological Sampling Results	Record	E , HC	7 yrs
On-Call / Duty Schedule	Document	HC , E	current operating version
Operator Certification	Record	E , HC	renewal every 3 years
Permit to Take Water	Document	E , HC	renewal every 10 years
Plant Operational Rounds Tracking Sheets	Record	HC	7 yrs
Plant Operations Manual	Document	HC	10 yrs
Purchase Orders / Proof of Purchase	Record	HC	7 yrs
Risk Assessment Meeting Minutes	Record	E , HC	10 yrs
SCADA Historian Reports	Record	E , HC	7 yrs
Staff Meeting Minutes	Record	E, HC	7 yrs
Standard Operating Procedures	Document	E , HC	current operating version
Town of Lakeshore Water & Wastewater Master Plan	Document	E	10 yrs
Town of Lakeshore Council Meeting Minutes	Document	E	town website
Visitors Log Book	Record	HC	7 yrs
Water Emergency Response Plan	Document	E	10 yrs

NOTE: E (electronic) = Compliance Science System, Town of Lakeshore Server/Website, Ministry Website(e-laws), Work Order Historian Tracking System.

NOTE: HC (hard copy) = Treatment & Distribution Offices, Municipal Offices (town hall, operations center)

Appendix 3

Title / Position	Responsibilities	Authorities
Owner / Council	<ul style="list-style-type: none"> ▪ Endorse the development, implementation and improvement of the DWQMS. ▪ Ensure that all regulatory and legislative obligations are complied with, conformed to and communicated as required. ▪ Provisions of resources to ensure that the drinking water system and infrastructure is maintained in a fit state of repair 	<ul style="list-style-type: none"> ▪ Financial and administrative authority to ensure system sustainability ▪ To accept and implement proposals for improvement of the drinking water facilities and their distribution systems.
Owner Representative (CAO)	<ul style="list-style-type: none"> ▪ Endorse the development, implementation and improvement of the DWQMS. ▪ Ensure that all regulatory and legislative obligations are complied with, conformed to and communicated as required. ▪ Provisions of resources to ensure that the drinking water system and infrastructure is maintained in a fit state of repair. 	<ul style="list-style-type: none"> ▪ Financial and administrative authority to ensure system sustainability ▪ To accept and implement proposals for improvement of the drinking water facilities and their distribution systems.
Corporate Leader - Operations (Top Management)	<ul style="list-style-type: none"> ▪ Reporting to the Owner (Municipality of Lakeshore Council & CAO) information regarding the water treatment & distribution systems ▪ Endorse the development, implementation and maintenance of the DWQMS. ▪ Provide or obtain resources or infrastructure as necessary ▪ Presentation of budget to Council. ▪ Participate in Management Review Meetings as part of DWQMS Top Management 	<ul style="list-style-type: none"> ▪ Recommend changes for improvement of the water treatment facilities and distribution systems. ▪ Financial, administrative and technical authority. ▪ To ensure that prescribed duties are performed, verify assignment of / assign ORO if Division Leader, Team Leader, Working Foreman absent.

Title / Position	Responsibilities	Authorities
Division Leader - Water Management (Top Management)	<ul style="list-style-type: none"> ▪ Responsible for the overall management of the Water Treatment Services, Distribution and pumping systems ▪ Participate in Management Review and Risk Assessment reviews. ▪ Supervision of staff assigned to water treatment & distribution systems and the Team Leader of Water Management. ▪ Contact with MECP representatives, contractors and essential service contacts. ▪ Reporting to Municipality of Lakeshore Council information regarding the water treatment & distribution systems. ▪ Manage water staff through coordination and consultation with the Team Leader of Water Management. ▪ Budget presentation to Council. ▪ Assigns ORO responsibilities in absence of Team Lead. 	<ul style="list-style-type: none"> ▪ Assigns the Representative of the DWQMS & DWQMS or assumes due to absence or vacancy. ▪ Recommending changes for improvement of the water treatment facilities and distribution systems. ▪ Ensure that DWQMS requirements as laid out in operational plan are implemented. ▪ Development, monitoring and administration of budget for capital, operating and life cycle of water treatment & distribution infrastructure and equipment.
Team Leader - Water (ORO)	<ul style="list-style-type: none"> ▪ Under direction of the Division Leader of Water Management, is responsible for the operation of the Drinking Water Treatment and Distribution staff. ▪ Responsible to manage the maintenance, scheduling and lifecycle/renewal requirements of drinking water supply infrastructure. ▪ Participate in Management Review and Risk Assessment reviews. ▪ Provision of daily operational oversight. ▪ Participate in MECP inspections and Audits of the system. ▪ Develop and maintain a key role in emergency plans and procedures. ▪ Contact MECP representatives, MOH, contractors and essential services contacts. ▪ Budget presentation to Council. 	<ul style="list-style-type: none"> ▪ Is Overall Responsible Operator for treatment & distribution or principal to assign other. ▪ Participate as a member of DWQMS Top Management. ▪ Ensure that water treatment & distribution staff follow the DWQMS as presented in the Operational Plan. ▪ Recommend changes for the improvement of water treatment facilities and distribution systems. ▪ Assist in the development, monitoring and administration of the budget relating to equipment and infrastructure life cycles. ▪ Ensure that risk mitigation tools such as CCL's and CCP's are in place and tracked.

Title / Position	Responsibilities	Authorities
<p>Lead Hand (Treatment & Distribution)</p>	<ul style="list-style-type: none"> ▪ Assist Team Leader with overseeing the operation of the water treatment plants and distribution systems in accordance with DWQMS, Municipal Drinking Water Licence and Drinking Water Works Permit. ▪ Participate in Management Review and Risk Assessment reviews. ▪ Maintain operational and administrative records. ▪ Record deviations from critical control limits. ▪ Provide back-up for ORO responsibilities as required. ▪ Participate in MECP inspections and Audits. ▪ Assist in performing regular inspections and operational duties associated with the water treatment facilities and distribution systems. ▪ Maintain operator certification. ▪ If Backup / Temporary Foreman assigned then they assume ORO responsibilities as license permits. 	<ul style="list-style-type: none"> ▪ Ensure that all controls, systems and other related equipment in the operation of water treatment plants, the related pumping stations, water towers and distribution systems are maintained and inspected in accordance with DWQMS, MDWL & DWWP. ▪ Ensure that water treatment & distribution staff follow the DWQMS as presented in the Operational Plan. ▪ Ensure that all sampling, analysis and tests are conducted as per regulations. ▪ Recommend changes for the improvement of water treatment facilities and distribution systems.
<p>QMS Representative</p>	<ul style="list-style-type: none"> ▪ Report to Top Management on the performance of the QMS and any need for improvement within any and all areas of the QMS. ▪ Lead the design, implementation and continual improvement of the Municipality of Lakeshore's drinking water QMS. ▪ Responsible for implementing, monitoring and auditing processes and developing strategies and plans to deal with non-compliance issues. ▪ Administer the QMS by ensuring that processes and procedures needed for the QMS are established and maintained. ▪ Attend all required meetings as laid out in Municipality of Lakeshore Operational Plan. 	<ul style="list-style-type: none"> ▪ Ensure that current versions of documents required by the QMS are being used at all times. ▪ Promote awareness of the QMS throughout the Municipality of Lakeshore Water Supply System. ▪ Ensure that personnel are aware of all applicable legislative and regulatory requirements that pertain to their duties for the operation of the subject system. ▪ Coordinate internal and external audits of QMS.

Title / Position	Responsibilities	Authorities
<p>Water Compliance Coordinator</p>	<ul style="list-style-type: none"> ▪ Lead representative in MECP inspections, internal and external DWQMS audits and communicate with auditors, management and internal staff. ▪ Track operator training hours and coordinate operator training requirements in accordance with regulations. ▪ Assist in the identification, recommendation, adoption and evaluation of the effectiveness of best management practices. ▪ Develop standard operating (SOP's) for the water department. ▪ Operate the water treatment facility if required as license permits. ▪ Liaison for emergencies related to waterworks operations. 	<ul style="list-style-type: none"> ▪ Identify potential problems and recommend solutions. ▪ Set up new employees into DWQMS system and coordinate the training. ▪ Make changes to work instructions and procedures in DWQMS as required. ▪ Ensure that current versions of required documents are being used. ▪ Provide guidance to all water operators on the implementation of the Operational Plan and promote awareness to it. ▪ Ensure that personnel are aware of all applicable legislative & regulatory requirements that pertain to their job.
<p>Water Operator (Treatment & Distribution)</p>	<ul style="list-style-type: none"> ▪ Perform regularly scheduled, unscheduled and emergency inspections and carry out operational duties for all equipment, pump stations and towers. ▪ Inspect process and system control equipment to ensure proper working order. ▪ Record operational data onto specified tracking Log sheets. ▪ Perform preventative maintenance procedures as laid out in work orders, SOP's and operational manuals. ▪ Collection of microbiological samples and chlorine residuals. ▪ Perform routine analyses in order to efficiently and effectively operate the treatment facility and distribution systems. ▪ Provide backup / temporary relief for Treated / Distribution Working Foreman duties. 	<ul style="list-style-type: none"> ▪ Operation and maintenance of the water treatment and distribution systems under the direction of the Team Leader of Water Management and the Waterworks Working Foreman. ▪ Perform security, safety and operational procedures. ▪ Monitor treatment and distribution processes and recommend corrective actions.

Appendix 4

LEGEND: CC = certified contractor CO = certified operator OEM = original equipment manufacturer

FLOW METERS										
Equipment Name	Equipment Type	Manufacturer or Vendor	Serial #	Size	Tag ID#	Calibration / Verification /Maintenance				Performed By
						Annual	Quarterly	Monthly	As needed	
Zebra Mussel	ProMag 53	E&H Hausser	96038816000	1.5"	PSW FIT2	✓	N/A	N/A	N/A	CC / OEM
Coagulant	Promass 83	E&H Hausser	96057F160000		ASP FIT1	✓	N/A	N/A	N/A	CC / OEM
Clarifier #1	ProMAG 53	E&H Hausser	9618D919000	14"	SCU1 FIT1	✓	N/A	N/A	N/A	CC / OEM
Clarifier #2	ProMAG 53	E&H Hausser	9618DA19000	14"	SCU2 FIT1	✓	N/A	N/A	N/A	CC / OEM
Clarifier #3	ProMAG 53	E&H Hausser	9618DB19000	14"	SCU3 FIT1	✓	N/A	N/A	N/A	CC / OEM
Clarifier #4	ProMAG 53	E&H Hausser	9618DC19000	14"	SCU4 FIT1	✓	N/A	N/A	N/A	CC / OEM
Sludge Blowdown	ProMAG 53	E&H Hausser	9603A716000	4"	SCU FIT2	✓	N/A	N/A	N/A	CC / OEM
Filter #1	ProMAG 53	E&H Hausser	9603A316000	12"	FIL1 FIT1	✓	N/A	N/A	N/A	CC / OEM
Filter #2	ProMAG 53	E&H Hausser	9603A416000	12"	FIL2 FIT1	✓	N/A	N/A	N/A	CC / OEM
Filter #3	ProMAG 53	E&H Hausser	9603A516000	12"	FIL3 FIT1	✓	N/A	N/A	N/A	CC / OEM
Filter #4	ProMAG 53	E&H Hausser	9603A616000	12"	FIL4 FIT1	✓	N/A	N/A	N/A	CC / OEM
Backwash	ProMAG 53	E&H Hausser	9618E019000	18"	BWW FIT1	✓	N/A	N/A	N/A	CC / OEM
Daf #1 Influent	ProMag W	E&H Hausser	8A03E716000	4"	DAF1 FIT2	✓	N/A	N/A	N/A	CC / OEM
Daf #1 Effluent	ProMag W	E&H Hausser	8A03E516000	8"	DAF1 FIT1	✓	N/A	N/A	N/A	CC / OEM
Daf #2 Influent	ProMag W	E&H Hausser	8A03E616000	4"	DAF2 FIT2	✓	N/A	N/A	N/A	CC / OEM
Daf #2 Effluent	ProMag W	E&H Hausser	8A03E416000	8"	DAF2 FIT1	✓	N/A	N/A	N/A	CC / OEM
PAC Service Water	ProMag 53	E&H Hausser	96038E16000	2"	PSW FIT3	✓	N/A	N/A	N/A	CC / OEM
UV Reactor #1	ProMag 53	E&H Hausser	9618DD19000	24"	PW FIT1	✓	N/A	N/A	N/A	CC / OEM
UV Reactor #2	ProMag 53	E&H Hausser	9618DE19000	24"	PW FIT2	✓	N/A	N/A	N/A	CC / OEM
High Lift Header	ProMag 53	E&H Hausser	9618DF19000	20"	HLP FIT1	✓	N/A	N/A	N/A	CC / OEM

DIFFERENTIAL PRESSURE SENSORS										
Equipment Name	Equipment Type	Manufacturer or Vendor	Serial #	Size	Tag ID#	Calibration / Verification /Maintenance				Performed By
						Annual	Quarterly	Monthly	As needed	
Filter #1	Delteber S	E&H Hausser	9601A41509D	/	FIL1 DPT1	✓	N/A	N/A	N/A	CC / OEM
Filter #2	Delteber S	E&H Hausser	9601A21509D	/	FIL2 DPT1	✓	N/A	N/A	N/A	CC / OEM

Filter #3	Delteber S	E&H Hausser	9601A51509D	/	FIL3 DPT1	✓	N/A	N/A	N/A	CC / OEM
Filter #4	Delteber S	E&H Hausser	9601A31509D	/	FIL4 DPT1	✓	N/A	N/A	N/A	CC / OEM

TURBIDITY ANALYZERS

Filter #1	TU 5300 sc	HACH	1936003	/	FIL1 AIT1	✓	N/A	✓	✓	CC / OEM / CO
Filter #2	TU 5300 sc	HACH	1936156	/	FIL2 AIT1	✓	N/A	✓	✓	CC / OEM / CO
Filter #3	TU 5300 sc	HACH	1936068	/	FIL3 AIT1	✓	N/A	✓	✓	CC / OEM / CO
Filter #4	TU 5300 sc	HACH	1935804	/	FIL4 AIT1	✓	N/A	✓	✓	CC / OEM / CO
Clarifier #1	TU 5300 sc	HACH	1936523	/	SCU1 AIT1	✓	N/A	✓	✓	CC / OEM / CO
Clarifier #2	TU 5300 sc	HACH	1935469	/	SCU2 AIT1	✓	N/A	✓	✓	CC / OEM / CO
Clarifier #3	TU 5300 sc	HACH	1935467	/	SCU3 AIT1	✓	N/A	✓	✓	CC / OEM / CO
Clarifier #4	TU 5300 sc	HACH	1936070	/	SCU4 AIT1	✓	N/A	✓	✓	CC / OEM / CO
Filter Influent Channel	TU 5300 sc	HACH	1936029	/	SWC AIT1	✓	N/A	✓	✓	CC / OEM / CO
Plant Effluent	TU 5300 sc	HACH		/	PW AIT4	✓	✓	N/A	✓	CC / OEM / CO
Daf Effluent	TU 5300 sc	HACH		/	DAF AIT2	✓	✓	N/A	✓	CC / OEM / CO
Daf Influent	SS7	HACH	110200391968	/	DAF AIT1	✓	✓	N/A	✓	CC / OEM / CO
Raw Water	SS7	HACH	091200342684	/	RW AIT4	✓	✓	✓	✓	CC / OEM / CO

pH METER

Raw Water	Liquisys-M	E&H Hausser	A2001E17G00	/	RW AIT5	✓	N/A	✓	✓	CC / OEM / CO
-----------	------------	-------------	-------------	---	---------	---	-----	---	---	---------------

Equipment Name	Equipment Type	Manufacturer or Vendor	Serial #	Size	Tag ID#	Calibration / Verification / Maintenance				Performed By
						Annual	Quarterly	Monthly	As needed	

CHLORINE ANALYZERS

Reservoir Infl. Free	Dulcometer	Prominent	2010142512	/	PW AIT8	✓	N/A	✓	✓	CC / OEM / CO
Reservoir Infl. pH	Dulcometer	Prominent	2010142512	/	PW AIT8	✓	N/A	✓	✓	CC / OEM / CO
Cell #1 Free	Dulcometer	Prominent	2007124319	/	PW AIT7A	✓	N/A	✓	✓	CC / OEM / CO
Cell #1 pH	Dulcometer	Prominent	2007124319	/	PW AIT7B	✓	N/A	✓	✓	CC / OEM / CO
Cell #1 Total	Dulcometer	Prominent	2007124282	/	PW AIT2	✓	N/A	✓	✓	CC / OEM / CO
Cell #2 Free	Dulcometer	Prominent	2007124315	/	PW AIT6A	✓	N/A	✓	✓	CC / OEM / CO
Cell #2 pH	Dulcometer	Prominent	2007124315	/	PW AIT6B	✓	N/A	✓	✓	CC / OEM / CO
Cell #2 Total	Dulcometer	Prominent	2007124326	/	PW AIT1	✓	N/A	✓	✓	CC / OEM / CO
Plant Effluent Free	Dulcometer	Prominent	2007124314	/	PW AIT9A	✓	N/A	✓	✓	CC / OEM / CO

Plant Effluent pH	Dulcometer	Prominent	2007124314	/	PW AIT9B	✓	N/A	✓	✓	CC / OEM / CO
Plant Effluent Total	Dulcometer	Prominent	2007124327	/	PW AIT3	✓	N/A	✓	✓	CC / OEM / CO
BelleRiver Tower Fre	Dulcometer	Prominent	201300D888	/		✓	N/A	✓	✓	CC / OEM / CO
BelleRiver Tower pH	Dulcometer	Prominent	201300D888	/		✓	N/A	✓	✓	CC / OEM / CO

PORTABLE ANALYZERS

DR 3900		HACH	1727744	/	/	✓	N/A	✓	✓	CC / OEM / CO
Pocket Chlorine #1	ColorimeterII	HACH	09110E13858	/	/	✓	N/A	✓	✓	CC / OEM / CO
Pocket Chlorine #2	ColorimeterII	HACH	16120E316502	/	/	✓	N/A	✓	✓	CC / OEM / CO
Pocket Chlorine #3	Colorimeter	HACH	960152724	/	/	✓	N/A	✓	✓	CC / OEM / CO
DR 820	Colorimeter	HACH	220009704	/	/	✓	N/A	✓	✓	CC / OEM / CO

Equipment Name	Equipment Type	Manufacturer or Vendor	Serial #	Size	Tag ID#	Calibration / Verification/Maintenance				Performed By
						Annual	Quarterly	Monthly	As needed	

PORTABLE ANALYZERS

Turbidimeter #1	2100P	HACH	40600036282	/	/	✓	✓	✓	✓	CC / OEM / CO
Turbidimeter #2	2100P	HACH	08070C030792	/	/	✓	✓	✓	✓	CC / OEM / CO
Turbidimeter DAF	2100P	HACH	06070C017986	/	/	✓	✓	✓	✓	CC / OEM / CO

CHEMICAL FEED PUMPS

DelPAC pump #1	Pulsafeeder	OMNI	B1202240235	/	ASP-1	✓	N/A	N/A	✓	CC / CO
DelPAC pump #2	Pulsafeeder	OMNI	B1404230090	/	ASP-2	✓	N/A	N/A	✓	CC / CO
DelPAC Motor #1		Weg	020803816	/	ASP-1	✓	N/A	N/A	✓	CC / CO
DelPAC Motor #2		Weg	020803816	/	ASP-2	✓	N/A	N/A	✓	CC / CO
Polymer pump #1	Dosing pump	LMI	11023110-555-1	/		✓	N/A	N/A	✓	CC / CO

CHLORINATORS

Chlorine Gas Feeder 1	V10K	Wallace & Tiernan	23400009501-100922	100 lb	CGF-1	✓	N/A	N/A	✓	CO
Chlorine Gas Feeder 2	V10K	Wallace & Tiernan	23400009501-100925	50 lb	CGF-2	✓	N/A	N/A	✓	CO
Chlorine Gas Feeder 3	V10K	Wallace & Tiernan	23400009501-100931	150 lb	CGF-3	✓	N/A	N/A	✓	CO

Chlorine Gas Feeder 4	V10K	Wallace & Tiernan	23400009501-100929	150 lb	CGF-4	✓	N/A	N/A	✓	CO
-----------------------	------	-------------------	--------------------	--------	-------	---	-----	-----	---	----

Equipment Name	Equipment Type	Manufacturer or Vendor	Serial #	Size	Tag ID#	Calibration / Verification /Maintenance				Performed By
						Annual	Quarterly	Monthly	As needed	
UV DISINFECTION SYSTEM										
OptiView	Optical Sensor	TrojanUV	170407193001	/	PW-OPTI	✓	N/A	N/A	✓	CO
UV Train #1	UVSwift 24	TrojanUV	71015-02	8 lamp	UVR-1	✓	✓	✓	✓	CC / CO
UV Train #2	UVSwift 24	TrojanUV	710151-01	8 lamp	UVR-2	✓	✓	✓	✓	CC / CO