Kenora Area Drinking Water System

DWQMS Operational Plan

DWS # 220001423
MDWL # 228-101
DWWP # 228-201

DOCUMENT TITLE: Index Page
QMS REFERENCE:
TO BE REVIEWED: Annually or when QMS changes
QMS REPRESENTATIVE:

Operational Plan Table of Contents

Operational Plan revision prepared on: Jan 5, 2026

Element 1 – Quality Management System Introduction

Quality Management can be defined as the policy and associated organizational structures, procedures, responsibilities, and evaluation measures that ensure the capability of delivering a product to specified standards. The use of Quality Management systems by modern industry has steadily increased since the development of the first ISO standard in 1986. Whether implemented voluntarily or as a requirement of suppliers to larger manufacturers, Quality Management has repeatedly proven beneficial in terms of accountability, quality control, efficiency, and productivity. The idea of mandated province-wide implementation of a Quality Management Standard by drinking water system owners originated as a recommendation in the Part Two Report of the Walkerton Inquiry. In brief, Recommendations 51 through 57 from the report state the following:

- Drinking water systems should be operated by authorities that are accredited based on successful third party audits conducted by a certified accrediting body.
- The Ministry of the Environment, Conservation and Parks in partnership with other relevant stakeholders, should develop a Drinking Water Quality Management Standard against which the third party audits will be conducted.
- All municipalities should prepare Operational Plans describing how the requirements of the Quality Management Standard are achieved.

The Provincial Government has committed to implementing all recommendations tabled by the report author, The Honorable Dennis R. O'Connor.
In accordance with those recommendations, this Operational Plan serves as a Quality Management System Guidance Manual that describes the methods by which the City of Kenora implements Quality Management. The Plan is written to meet or exceed the requirements of the Ministry of the Environment, Conservation and Park's (MECP's)

prescribed standard and is applicable to the management and operation of those works described in Section 6 of this Plan.

Element 2 – Quality Management System Policy

The Mayor, Council, and employees of the City of Kenora are dedicated to the operation and maintenance of a potable drinking water system that will provide the residents of Kenora with clean and safe drinking water. The system shall be operated in such a manner that it meets the requirements of all applicable governing legislation and regulations.

The City of Kenora shall implement a Quality Management System, which will assist in the management, operation and maintenance of the drinking water system, and will identify any potential hazards, risks or gaps through the internal auditing process.

Internal audits shall be conducted to:

- Confirm the QMS has been effectively communicated throughout the organization;
- Identify any sources of variation;
- Promote awareness of the requirements for quality;
- Ensure the “controls” for quality are in the hands of the process owners;
- Identify any shortfalls in the management, operation and maintenance of the system; and
- Provide the foundation for continual improvement to the Quality Management System and the Drinking Water System.

The QMS shall meet all requirements of the Ministry of the Environment, Conservation and Park’s (MECP) Drinking Water Quality Management Standard and the Operational Plan shall be available online on the City of Kenora website.

Element 3 – Commitment and Endorsement

The Corporation of the City of Kenora, being the Owner and Operating Authority of the Kenora Area Drinking Water System, is committed to the implementation, maintenance, and continual improvement of the Quality Management System. Mayor, Councilors and Top Management recognize the need for sufficient funding and resources to maintain and make continual improvements to the Quality Management System.

Signed — Date: 03/03/26 — Andrew Poirier, Mayor

Signed — Date: 03/03/26 — Greg Breen, Director, Infrastructure and Operations

Element 4 – Quality Management System Representative

The **Quality Management System Representative** shall:

a) Administer the Quality Management System by ensuring that processes and procedures needed for the Quality Management System are established and maintained;
b) Report to Top Management on the performance of the Quality Management System and any need for improvement:
c) Ensure that current versions of documents required by the Quality Management System are being used at all times;
d) Ensure that personnel are aware of all applicable legislative and regulatory requirements that pertain to their duties for the operation of the subject system; and
e) Promote awareness of the Quality Management System throughout the Operating Authority.

The WTP Chief Operator has been appointed and authorized to the QMS Representative role by Top Management.

The QMS Representative will conduct annual refresher training with frontline Operating Authority staff, reviewing the Operational Plan and how it relates to their job duties. The QMS Representative will also communicate with the QMS Coordinators from both the Treatment and Distribution to ensure that any changes to existing procedures or the addition of new procedures are incorporated into the Operational Plan and that all associated documents are updated accordingly.

The QMS Representative is responsible for coordinating the Internal Audit, and ensuring it is completed by a person or team with the appropriate training and qualifications as detailed in Element 19.

The QMS Representative is responsible for coordinating and scheduling the External Audit with a chosen MECP approved Accreditation Body.

The **QMS Coordinator – Water Treatment** is responsible to ensure that the Quality Management System is incorporated into the daily operation of the Water Treatment Plant as specified in the Operational Plan. The QMS Coordinator – Water Treatment will ensure that current versions of documents required by the Quality Management System are being used at all times and will communicate to the QMS Representative any changes to existing procedures or the addition of new procedures so that they can be incorporated into the Operational Plan. The QMS Coordinator – Water Treatment will assist with the planning and conducting of internal audits of the Quality Management System as required by the DWQMS and will participate in external audits as a key contact for the Water Treatment portion of the City of Kenora Drinking Water System. The QMS Coordinator – Water Treatment will act as an alternate QMS Representative when necessary.

The **QMS Coordinator – Water Distribution** is responsible to ensure that the Quality Management System is incorporated into the daily operation of the Water Distribution System as specified in the Operational Plan. The QMS Coordinator – Water Distribution will ensure that current versions of documents required by the Quality Management System are being used at all times and will communicate to the QMS Representative any changes to existing procedures or the addition of new procedures so that they can be incorporated into the Operational Plan. The QMS Coordinator – Water Distribution will assist with the planning and conducting of internal audits of the Quality Management System as required by the DWQMS and will participate in external audits as a key contact for the Water Distribution portion of the City of Kenora Drinking Water System. The QMS Coordinator – Distribution will act as an alternate QMS Representative when necessary.

The QMS Coordinators are as listed below:
QMS Coordinator – Water Treatment: Blair McCallum
QMS Coordinator – Water Distribution: Dave King

Element 5 – Document and Records Control

5.1 Introduction

The Documents and Records Control Procedures described below contain details for managing documents and records required by the Quality Management System (QMS). The procedures address how documents and records are: made readily identifiable; kept current; protected; kept legible; made available at all times; and ultimately disposed of.

5.2 Documents Control Procedure

Procedure Description

This procedure outlines the methods used by City of Kenora employees to control the creation, approval, distribution, revision, and protection of all documents related to the Quality Management System (QMS).

Reason for Procedure

Consistent control ensures the currency, accuracy, and ease of retrieval of each QMS document. Proper maintenance of documents is critical for conformance with the Drinking Water Quality Management Standard (DWQMS), and also for compliance with drinking water legislation.

Responsibility

The QMS Representative shall be responsible for the control of all QMS documents.

Procedure

a) Documents requiring control by the QMS include:

Internal Documents

- Operational Plan
- Standard Operating Procedures
- Emergency Response Procedures
- Management Review Documentation
- Emergency Contact List
- Watermain Repair Form and Records

- Continual Improvement Forms and Records
- OTJ Training Forms and Records
- Distribution Chlorine Residual Forms and Records
- Operator Logbooks and Logbook Forms

External Documents

- Applicable Drinking Water Regulations
- Applicable Industry Standards
- Equipment Manuals

b) The QMS Representative shall maintain all internal and external documents.

c) Internal Documents

1) A standard header shall identify all QMS internal documents. This header contains the title of the document, QMS element reference, indication of revision frequency, and signature of approval from the QMS Representative.
2) A standard footer shall identify all QMS internal documents. The footer will include the revision number and date as well as the words “Uncontrolled Printed Copy”.
3) All original (electronic) QMS internal documentation shall be stored on the City’s central computer. The electronic version shall be password protected to restrict access to the QMS Representative.
4) New or changed internal documents will be presented to all affected employees.
5) Old revisions of internal documents will be removed from circulation when a new revision is released.

d) External Documents

1) Each external document affected by the QMS shall be clearly marked as “Controlled Copy” and initialed by the QMS Representative.

2) Controlled copies of external QMS documents shall be stored in the Water and Sewer Shop at the Operations Centre or in the Water Treatment Plant.

3) Current equipment manuals shall be indicated on the Equipment Manual Index Form located on the bookshelf in the Water Treatment Plant office. On an annual basis the QMS Representative will confirm that all equipment manuals on hand represent the most up-to-date versions available, and that manuals for new equipment have been incorporated. If a newer version is available the QMS Representative will obtain a copy and replace the outdated one in the manual binder.

e) Communication of Changes or Updates to Documents

When a new internal or external document is created or when an existing one is changed or updated, the Manager of Underground Services will communicate this information to all affected staff during a crew meeting and this communication shall be documented as part of the meeting minutes.

f) Internal and external documents shall be reviewed at least annually, as a component of the annual internal audit and management review. A review may also take place when a significant change occurs in operations, such as a change in the type of process chemical or a change of equipment. Obsolete or out-of-date documents will be disposed of promptly.

5.3 Records Control Procedure

Procedure Description

This procedure provides guidance for the identification, use, retention, storage, protection, and disposal of all records generated that are related to the Quality Management System (QMS).

Reason for Procedure

Consistent control ensures the ease of retrieval of each record generated by City of Kenora employees. Proper maintenance of records is critical for conformance with the Drinking Water Quality Management Standard (DWQMS) and also for compliance with drinking water legislation and regulations.

Responsibility

The QMS Team shall be responsible for ensuring that an effective method for controlling all QMS records exists.

Procedure

1) Records may be retained electronically and/or in hard copy, but always according to the Document and Records Control master list included below at 5.6.
2) All Ministry of the Environment required records shall be maintained as per the relevant regulations at a minimum.
3) Filing and storage of paper records shall be such that they are protected from damage and are readily retrievable. Active records are kept in filing cabinets in the Water Treatment Plant office or at the Water and Wastewater Shop. Older records are stored in banker's boxes, clearly marked with the types of records contained within and the dates those records pertain to. These banker's boxes will be stored either at the Water Treatment Plant or in the Water and Wastewater Shop at the Operations Centre.
4) Records from the Document and Records Control master list that are identified as electronic are stored on the City of Kenora central computer and are backed up each day. When an electronic record is required to be produced it will be uploaded to its identified storage location within two weeks.
5) Records shall be made available to the public where required by legislation.

5.4 Security and Protection of Documents and Records

An electronic copy of the Operational Plan is maintained by the QMS Representative and is password protected and backed up on a regular basis on the City's computer network.

Any document or record identified as being electronic is stored on the City's network.

Any document or record identified as being hard copy at the Water Treatment Plant is stored in filing cabinets and/or bankers boxes in the office or blower room. These are retained at minimum for as long as required by legislation.

Any document or record identified as being hard copy for the Distribution System is stored in filing cabinets and/or bankers boxes in the Water and Wastewater Shop at the Operations Centre. These are retained at minimum for long as required by legislation.

5.6 Document and Record Master List

The Table below identifies the documents and records associated with the DWQMS program.

Document and Records Control – Document List

Document Title	Document Format	Document Location	Document Source	Treatment Or Distribution
Operational Plan	Electronic	www.kenora.ca Living Here> Water and Sewer> Water Reports> Operational Plan	Internally Created	Treatment and Distribution
WTP Standard Operating Procedures	Electronic Hardcopy	S:\Water Plant\My Documents\SOPs. Shortcut also on operators' desktops. Hardcopies are located in the SOP/ERP binder in the WTP office.	Internally Created	Treatment
Distribution Standard Operating Procedures	Electronic Hardcopy	S:\Operations\Water and Wastewater Division\QMS Controlled Documents\Distribution SOPs. Hardcopies are located in binder in SOP drawer in the Water and Wastewater Office.	Internally Created	Distribution
Emergency Response Procedures	Electronic Hardcopy	S:\Operations\Water and Wastewater Division\QMS Controlled Documents\Emergency Response Procedures. Hardcopies are located in the SOP/ERP binder in the WTP office.	Internally Created	Treatment and Distribution
Emergency Contact List	Electronic	S:\Operations\Water and Wastewater Division\QMS Controlled Documents	Internally Created	Treatment and Distribution
Watermain Repair Form	Electronic	S:\Operations\Water and Wastewater Division\QMS Controlled Documents	Internally Created	Distribution
Continual Improvement Form	Electronic	S:\Operations\Water and Wastewater Division\QMS Controlled Documents	Internally Created	Treatment and Distribution
On the Job Training Form	Electronic	S:\Operations\Water and Wastewater Division\QMS Controlled Documents	Internally Created	Treatment and Distribution

Document Title	Document Format	Document Location	Document Source	Treatment Or Distribution
Operator Logbook Forms	Electronic	S:\Operations\Water and Wastewater Division\QMS Controlled Documents	Internally Created	Treatment and Distribution
Distribution Chlorine Residual Form	Electronic	S:\Operations\Water and Wastewater Division\QMS Controlled Documents	Internally Created	Treatment
Legislation	Electronic	Shortcut to applicable acts and regulations are on each operator's desktop.	E-Laws	Treatment and Distribution
Procedure for Disinfection of Drinking Water in Ontario	Electronic Hardcopy	Shortcuts are on each operator's desktop. Hardcopy is located on the bookshelf in WTP office.	MECP	Treatment
Practices for the Collection and Handling of Drinking Water Samples	Electronic Hardcopy	Shortcuts are on each operator's desktop. Hardcopy is located on the bookshelf in WTP office.	MECP	Treatment
Permit to Take Water	Electronic	S:\Water Plant\My Documents\Permits and Licenses	MECP	Treatment
Municipal Drinking Water License	Electronic	S:\Water Plant\My Documents\Permits and Licenses	MECP	Treatment and Distribution
Drinking Water Works Permit	Electronic	S:\Water Plant\My Documents\Permits and Licenses	MECP	Treatment and Distribution
Operator's Certificates	Hardcopy	WT Certificates are displayed in the WTP lobby. WD certificates are displayed in the Water and Wastewater shop.	MECP / OWWCO	Treatment and Distribution
Maintenance Manuals (See manual index page on WTP office bookshelf for current list)	Hardcopy	Manuals are located on the bookshelf in the WTP office.	Manufacturer	Treatment

Document and Records Control – Record List

Name	Format	Location	Required Retention Time	Actual Retention Time	Treatment or Distribution
Laboratory Analysis Results	Electronic	Electronic files are in the ALS, SGS and Testmark folders in the WTP email account.	Microbiological – 2 years Chemical – 6 years Sodium – 15 years	At minimum as required by regulation	Treatment
On-Site Lab Test Results	Electronic Hardcopy	S:\Water Plant\My Documents\Water Plant Database Files Hardcopy daily entry pads are filed in banker boxes in the blower room when completed.	2 years	At minimum as required by regulation	Treatment
Distribution Chlorine Residual Record	Electronic Hardcopy	S:\Water Plant\My Documents\Distribution Bacti Results and Chlorine Residuals. Working hardcopy sheets are kept on the lab desk in the Distribution Residual Chlorine Tests binder. Completed sheets are filed in banker boxes in the WTP blower room.	2 years	At minimum as required by regulation	Treatment
Operator Logbooks	Hardcopy	Working WT logbook is located on the lab computer desk. Completed logbooks are filed in banker boxes in the WTP blower room. Working WD logbooks are kept in the Water and Sewer shop. Completed logbooks are kept in the Water and Wastewater Office. Older logbooks are stored in the Operations file room.	5 years	At minimum as required by regulation	Treatment and Distribution
Online Monitoring Records	Electronic	SCADA Logs on the WTP SCADA computer, accessed through trends screen.	2 years	At minimum as required by regulation	Treatment
Raw Water Quality	Electronic Hardcopy	S:\Water Plant\My Documents\Water Plant Database Files Hardcopy daily entry pads are filed in banker boxes in the blower room when completed.	2 years	At minimum as required by regulation	Treatment

Name	Format	Location	Required Retention Time	Actual Retention Time	Treatment or Distribution
Internal Instrument Calibrations	Hardcopy	Recorded in Calibration and Maintenance binder stored on lab computer desk.	2 years	At minimum as required by regulation	Treatment
Third Party Instrumentation Calibrations	Electronic	S:\Water Plant\My Documents\Calibration Reports	2 years	At minimum as required by regulation	Treatment
Adverse Records	Electronic	S:\Water Plant\My Documents\AWQIs	2 years	At minimum as required by regulation	Treatment
Training Records	Electronic Hardcopy	S:\Operations\Water and Wastewater Division\Training Records CEU certificates are kept in each operator's personnel file.	Minimum of three years for Certificate or License renewals	At minimum as required by regulation	Treatment and Distribution
Internal Audits	Electronic	N:\DWQMS Documents\Internal Audits	Minimum of three years to match audit cycle	At minimum as required by regulation	Treatment and Distribution
External Audits	Electronic	N:\DWQMS Documents\External Audits	Minimum of three years to match audit cycle	At minimum as required by regulation	Treatment and Distribution
Management Reviews	Electronic	N:\DWQMS Documents\Management Review Agendas and Minutes	Minimum of three years to match audit cycle	At minimum as required by regulation	Treatment and Distribution
Annual Reports	Electronic	www.kenora.ca Living Here> Water and Sewer> Water Reports	6 years	At minimum as required by regulation	Treatment and Distribution
Form 1's	Electronic Hardcopy	S:\Operations\Water and Wastewater Division\Form 1 Hardcopies are kept in the Engineering Department at the Operations building.	10 years	At minimum as required by regulation	Distribution
Form 2's	Electronic Hardcopy	S:\Water Plant\My Documents\Form 2's Hardcopies are stored in the filing cabinet in the office at the WTP.	10 years	At minimum as required by regulation	Treatment and Distribution
Form 3's	Electronic Hardcopy	S:\Water Plant\My Documents\Form 3's Hardcopies are stored in the filing cabinet in the office at the WTP.	10 years	At minimum as required by regulation	Treatment and Distribution
Watermain Repair Records	Electronic Hardcopy	S:\Operations\Water and Wastewater Division\Dig Reports Hardcopies are kept in the Water and Wastewater office.	5 years	At minimum as required by regulation	Distribution

Name	Format	Location	Required Retention Time	Actual Retention Time	Treatment or Distribution
On the Job Training Records	Hardcopy	WT records are stored in the WTP office filing cabinet. WD records are stored in the Water and Wastewater office.	5 years	At minimum as required by regulation	Treatment and Distribution
Continual Improvement Records	Electronic	N:\DWQMS Documents\Continual Improvement Records	N/A	Currently indefinite	Treatment and Distribution

Element 6 – Drinking Water System

General

The City of Kenora Water Supply System provides a potable water supply to the residents and businesses of the City of Kenora. In addition, an agreement is in place to supply water to Wauzhushk Onigum Nation. The facilities, consisting of an MECP Class III conventional water treatment plant having an approved capacity of 25,270 m^3/d, and a Class II water distribution system, are owned and operated by the City of Kenora. Water for the treatment process is drawn from a surface water source (Lake of the Woods) located adjacent to the City through a 900 mm (36”) HDPE intake approximately 275 m (900 feet) southwest of the plant. Potentially pathogenic organisms in the raw water are removed by the following processes:

1. Coagulation/flocculation/sedimentation
2. Filtration
3. Post-chlorination (primary disinfection)
4. Trim Chlorination/Ammonium Sulphate addition for Chloramination (secondary disinfection)

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

Raw Water Supply

Water is drawn from Lake of the Woods into the plant low-lift pumping well eventually being pumped through the plant to the clarifiers.

Coagulation / Flocculation / Sedimentation

Water flows from the low-lift pumping well through the raw water pipeline to a baffled mixing chamber located on the uppermost floor of the water treatment plant. Alum (aluminum sulphate) is added to the incoming raw water upstream from the clarifiers in the raw water pipeline to promote settling and enhance filtration. Rapid mixing of the alum with the raw water occurs as the raw water passes through an in-line static mixer. Polymer is added to the alum-water solution in the baffled mixing chamber on the uppermost floor. The alum-water-polymer solution enters the clarifiers where gentle

mixing promotes the formation of floc masses which attract and gather debris present in the source raw water. The process water and floc remain in the clarifiers. The floc is suspended by incoming water. Excess floc is disposed of by an automatic extraction system. Supernatant (the clear liquid above the suspended floc) flows from the clarifiers via open channels to the top of the dual media filters. Most of the particulate matter that was present in the raw water is captured by the floc particles and removed by gravity/extraction in the clarifiers, however, during normal operation, some floc passes from the clarifiers to the top of the filters.

Filtration

The water treatment plant has four units of dual media filters. The top layer of the filter is anthracite while the filter media below the anthracite layer is sand. The anthracite/sand combination is effective in removing residual particulate matter (floc) carried over from the clarifiers. As debris accumulates in the filters and limits flow, the filters must be cleaned by reversing the flow (referred to as backwashing) and directing the backwash to a wastewater tank. Turbidity, a measure of the cloudiness of water, is measured continuously in the effluent from each filter to monitor the effectiveness of the filtration process. If the turbidity rises above a set point value, an alarm warns staff that corrective actions are needed.

Filtered water passes through the filter under-drain into the clear-well. The clear-well is a baffled tank with three sections located beneath the filters that are used to store filtered water and to provide disinfectant contact time.

Disinfection (Chlorination)

Primary disinfection (post-chlorination) occurs immediately following filtration, after the filter effluent enters the clear-well. Primary chlorination disinfects the filtered water, ensuring that any potentially pathogenic organisms that may remain after clarification and filtration are rendered harmless. Consistent disinfection is ensured by continuous monitoring of the chlorine residual in the treated water leaving the clear-well. If the residual drops to a predetermined level, an alarm is initiated and an operator is notified prior to levels becoming unacceptable and being allowed to enter the distribution

system. If the residual drops further to a predetermined level, the plant will automatically shut down.

Secondary disinfection is accomplished by adding sufficient trim chlorine and ammonium sulphate at the water treatment plant creating chloramines (combined chlorine), to maintain a residual throughout the entire distribution system. Secondary disinfection prevents re-growth of micro-organisms within the distribution system.

Process Waste Residuals Management

Filter backwash water and extracted alum floc from the clarifiers is directed to the wastewater storage tank where it is allowed to settle out where it is then pumped to the municipal sanitary sewer.

Distribution System and Elevated Storage Tanks

Treated water is pumped from the clearwell into the distribution system. The distribution system contains approximately 133 kilometers of piping, with size and length broken down as follows:

Pipe diameter (mm)	Length in system (m)
100	7,295
150	54,094
200	25,864
250	4,660
280	4,875
300	13,495
350	2,575
400	3,098
Miscellaneous or unknown	17,236

Pipe material may consist of cast iron, ductile iron, concrete, or PVC, depending on the location and time of installation. Six pressure zones exist in the DWS. Three of the pressure zones are regulated by a booster station and standpipe, while the other three are regulated by a booster station only. These pressure zones are used to ensure

adequate system pressure in areas of higher elevation or locations significantly remote from the plant or standpipes. A seventh pressure zone exists on Wauzhushk Onigum Nation, who are supplied water through an agreement. A leak in their pressure zone could potentially impact pressures in the Kenora DWS. Typical system pressure ranges from 315 kPa (45 Psi) to 560 kPa (80 Psi). Standpipes in three different locations (Fourth Street North, Valley Drive, and Keewatin) are an integral component of the distribution system to maintain relatively consistent system pressure and a reserve volume of water for community for fire protection and other emergency situations.

Sample Analysis

Provincial regulations dictate the sampling and monitoring requirements for the system. Water quality is tested throughout the treatment process and from various locations throughout the distribution system. Where required by regulation, samples are submitted to an MECP accredited laboratory for analysis.

Source Water Overview

General

The raw water source for the treatment plant is Lake of the Woods. The water from Lake of the Woods is typically low in turbidity (1.6 - 4.0 NTU), low in color (28-49 apparent unit), slightly basic, and very soft (~54 mg/L as $CaCO_3$). Temperature fluctuates significantly throughout the seasons ranging from approximately 2^0 Celsius in the winter to as high as 25^0 Celsius during the summer. Chemical and bacteriological analysis of the raw water indicates a source of relatively good quality.

Events

Seasonal changes in raw water temperatures cause vertical turnover of the lake water during spring and fall. Turnover typically takes place over a relatively short duration (~2 – 7 days). During that period, settled solids from the lakebed are re-suspended, resulting in increased raw water turbidity. Operators must be prepared to make appropriate plant adjustments to respond to changing turbidity levels experienced throughout the year. Changes in water temperature will also impact treatment process

performance (settling and disinfection). Optimal treatment requires adjustments to treatment chemical dosages (disinfectants and coagulants) in response to temperature fluctuations.

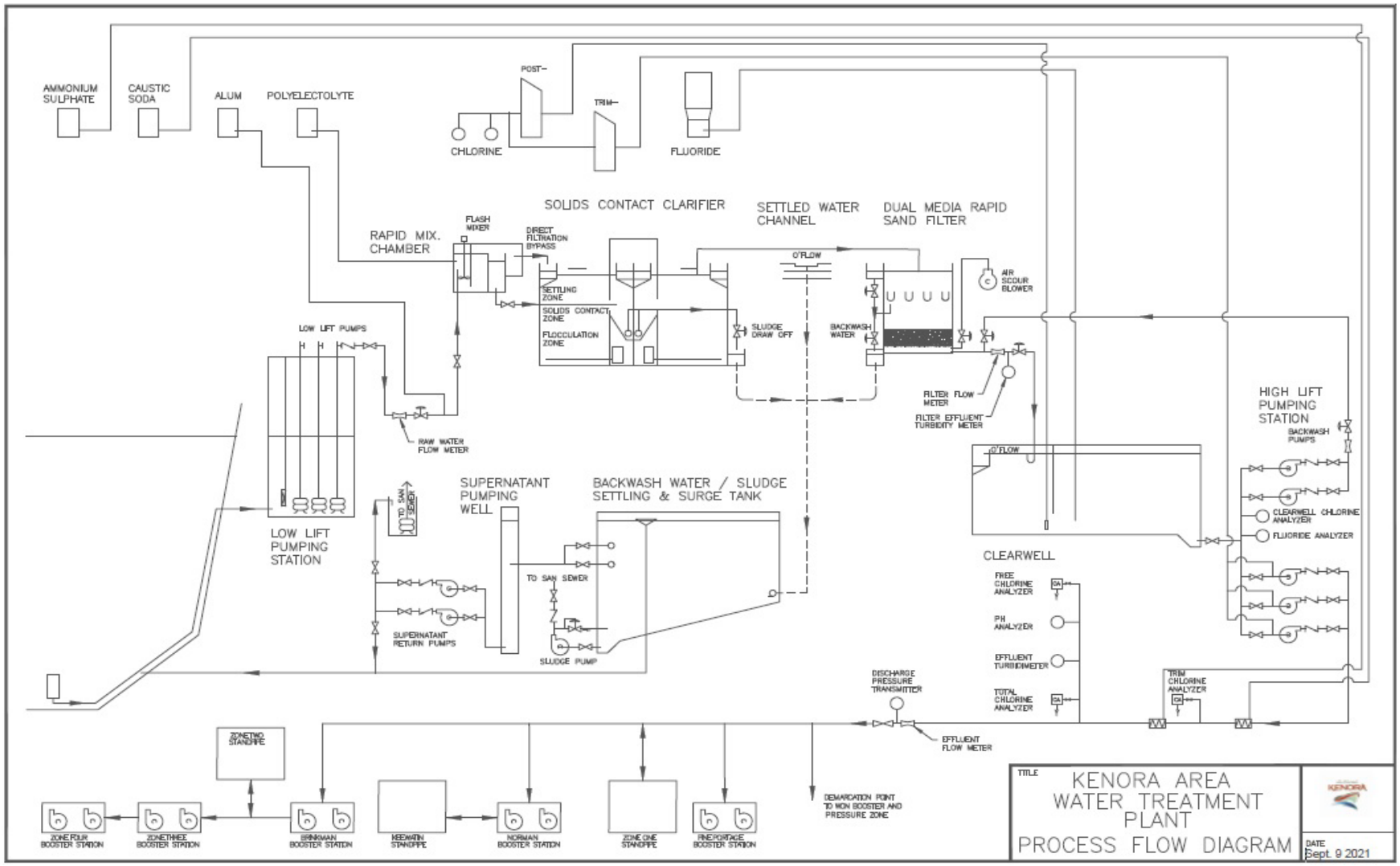
Threats

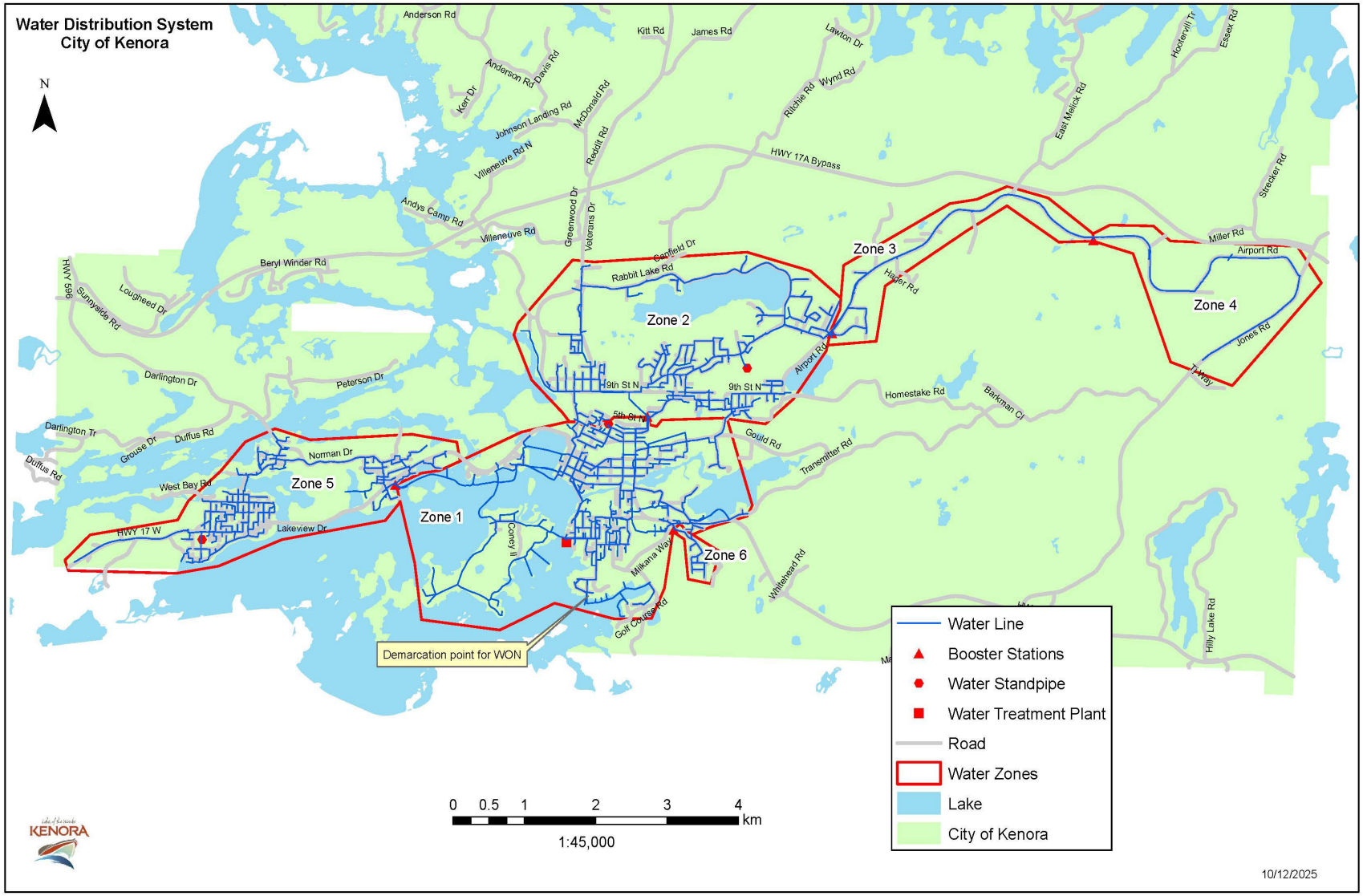
Potential sources of raw water contamination include spills from nearby settling ponds, lake traffic mishaps, and waste from recreational watercraft. Lake of the Woods is susceptible to seasonal algal blooms, including blue green algae events.

Operational Challenges

Lake of the Woods provides high quality source water, which for the most part is consistently low in bacteriological contamination and turbidity. Operator response is needed for seasonal changes to organic levels, turbidity and temperature.

6.1) Drinking Water System Process




Water Distribution System
City of Kenora
N
Zone 1
Zone 2
Zone 3
Zone 4
Zone 5
Zone 6
Demarcation point for WON
Water Line
Booster Stations
Water Standpipe
Water Treatment Plant
Road
Water Zones
Lake
City of Kenora
0 0.5 1 2 3 4
km
1:45,000
10/12/2025

Element 7 – Risk Assessment

The procedure below describes the method of hazard identification, risk assessment, and critical control point determination for the City of Kenora Water System. The procedure consists of hazard identification, risk assessment, critical control point determination, and critical limit identification. The results of the Risk Assessment are incorporated in the table entitled Risk Assessment Outcomes which is included in Element 8. An annual review will be conducted to ensure the currency of the information and the validity of the assumptions used in the risk assessment. A risk assessment will be completed as often as is deemed necessary or at least once every thirty-six months whichever is less. The risk assessment will consider all hazards listed in the most recent version of the Potential Hazardous Events for Municipal Drinking Water Systems to Consider in the DWQMS Risk Assessment document, published by the MECP.

1.0 Procedure Description

This procedure describes the method of hazard identification, risk assessment, and critical control point determination used by the City of Kenora. The procedure consists of hazard identification, risk assessment, critical control point determination, and critical limit identification. Each exercise is described in detail below.

2.0 Reason for Procedure

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

3.0 Responsibility

The QMS Representative, with the assistance of the Manager of Underground Services and Manager of Water and Wastewater, will complete the Risk Assessment and Risk Assessment Reviews. If available, an operator from each subsystem familiar with the facilities should be included in the process. The same team is responsible for

identifying all actual and potential hazards, assessing the associated risks, determining critical control points, and setting critical limits.

4.0 Procedure

The hazard analysis procedure is reviewed at least annually, prior to the annual management review. These exercises may also be completed when a significant change occurs in operations, such as a change in the type of process chemical or a change of equipment.

4.1 Hazard Identification and Control Measures

Using a process flow diagram as a guide, the team studies the water treatment process from the raw water intake to the point of customer use. While studying the diagram, it also reviews the existing list of hazards and identifies any new potential hazards. Special attention is given to areas within the process where changes have occurred since conducting the previous hazard identification exercise. All hazards identified will be recorded in the *Description of Hazardous Event/Hazard Column* of the Risk Assessment Outcomes Table.

Once all of the hazards have been identified, the committee identifies measures in place to control the hazards and those are recorded in the *Control Measures Column* of the Risk Assessment Outcomes Table. The reliability and redundancy of equipment is considered during this exercise.

4.2 Risk Assessment

A risk assessment is performed for all events that are deemed to be controllable and the hazardous results of which are measurable. Controllable events are those that may be prevented through the actions of an operator. All other events are considered “emergency situations” and require the development of an Emergency Response Plan. Each controllable event is assigned a numeric value ranging from 1 to 5 in three different categories: likelihood, consequence, and detectability (see Table 1). The three assigned numbers for each event are then multiplied to determine the overall risk value.

Table 1: Likelihood, consequence, and detectability rating system.

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

Description	Consequence of Hazardous Event Occurring	Rating
	Insignificant impact, little public exposure, little or no health risk.	1
Minor	Limited public exposure, minor health risk.	2
Moderate	Minor public exposure, health impact on small part of the population.	3
Major	Large part of population at risk.	4
Catastrophic	Major impact for large part of the population, complete failure of systems.	5

Description	Detectability of Hazardous Event	Rating
Very detectable	Easy to detect, on-line monitoring through SCADA	1
Moderately detectable	Alarm present but not in SCADA, may require operator to walk by and notice alarm; problem is indicated promptly by in-house lab test results.	2
Normally detectable	Visually detectable on rounds or through regular maintenance.	3
Poorly detectable	Visually detectable but not inspected on a regular basis; not normally detected before problem becomes evident; lab tests are not done on a regular basis (e.g. quarterly).	4
Undetectable	Cannot be detected.	5

The highest overall risk values are typically indicators of critical events. Based on a review of the overall risk values and the associated events, a threshold number of 18

was chosen. All events associated with risk values which are equivalent to or greater than the threshold number are considered critical. Discretion may be used when determining which events are indeed critical, regardless of the calculated risk. Careful evaluation is required for each hazard event.

In the case where an event having a higher calculated risk value is not determined by the committee to be critical, an explanation of the reasoning for this distinction is required. An explanation of the reasoning is also required when the committee deems an event with a lower calculated risk critical.

Note that there are three events that are always critically hazardous to water quality: high turbidity, inadequate primary disinfection, and low system pressure.

A risk assessment will be completed as often as is deemed necessary or at least once every thirty-six months whichever is less.

4.3 Critical Control Point Determination

From the identified critical events, the committee then traces backwards through the water treatment process to determine the specific points where each critically hazardous event originates. These points then become control points. The final point in a series that leads to a critical event is identified as the critical control point. Critical control points require the establishment of controlled conditions, including: critical control limits, equipment redundancy, and control and recovery procedures.

4.4 Critical Limits

Critical limits are established for values that measure critical events. The limits provide operators with a range of acceptable values within which no preventive or corrective actions are required. Critical limits define the point at which an operator must take action to prevent escalation of the critical event or to correct the critical event. Critical limits are determined based on regulatory requirements, process monitoring capabilities, off-hours response time, and historical plant performance. Process alarms (if available) are normally set at, or near critical limits. Responses to breached critical limits are detailed in Critical Control Limit Response SOPs.

Element 8 – Risk Assessment Outcomes

The following tables present the results of the Risk Assessment Outcomes exercise that was conducted subsequent to the Hazard Identification exercise completed as part of Element 7.

Activity or Process Step	Description of Hazardous Event / Hazard	Control/Response Measures	Likelihood	Consequence	Detectability	Total	CCP?	Critical Control Limits	Monitoring Procedures and Processes	Associated Procedures
Source	Chemical spill impacting source water - Contamination from accident on water related to vessel, vehicle over ice, airplane, etc. **MECP designated hazard*	Potential to pause production for up to 8 hours. Some contaminants may be removed by treatment process.	1	5	2	10	No.	None.	Visual and/or notification from authorities. SCADA alarm on low clearwell chlorine (only if contaminant has an effect on chlorine residual, otherwise undetectable).	ERP #8 – Chemical Spill Impacting Source Water.
Source	Chemical spill impacting source water - Railcar spill. **MECP designated hazard*	Potential to pause production for up to 8 hours. Some contaminants may be removed by treatment process.	2	5	1	10	No.	None.	Visual and/or notification from authorities. SCADA alarm on low clearwell chlorine (only if contaminant has an effect on chlorine residual, otherwise undetectable).	ERP #8 – Chemical Spill Impacting Source Water.
Source	Contamination from forest fires.	Potential adjustment to coagulant dosage.	2	5	1	10	No.	None.	Potential change to raw pH and color. Raw color tested weekly, raw pH monitored online and grab sample tested weekly.	None.

Activity or Process Step	Description of Hazardous Event / Hazard	Control/Response Measures	Likelihood	Consequence	Detectability	Total	CCP?	Critical Control Limits	Monitoring Procedures and Processes	Associated Procedures
Source	Marine sewer main break.	Isolate leaking main when identified. Potential to pause production for up to 8 hours. Increase post chlorine if necessary to maintain effective CT.	2	1	4	16	No.	None.	Reduced flow at WON receiving meter chamber (monitored at WWTP), reduced effectiveness of post chlorination, weekly raw bacteriological sampling.	Distribution SOP #34 – Sewage Spills
Source	Algal blooms – Blue green algae blooms – microcystin passes through treatment process. **MECP designated hazard*	None. Treatment process has been able to remove microcystin at levels detected in raw water to date.	2	5	2	20	Yes.	Detectable microcystin in raw or treated water samples.	Weekly microcystin sampling during algae season, visual monitoring of source water.	WTP SOP #18 – Harmful Algal Bloom Monitoring Plan
Source	Algal blooms – Green algal blooms. **MECP designated hazard*	Adjust coagulant dosage as needed.	5	1	1	5	No.	None.	Raw turbidity monitored online and weekly grab samples. Channel turbidity monitored online and weekly grab samples. Visual monitoring of source water.	None.
Source	Source water supply shortfall. **MECP designated hazard*	None. Develop procedure if future trends show an increased likelihood of occurrence.	1	5	1	5	No.	None.	Visual monitoring of lake level. Wetwell low level alarm.	None.
Source	Long term impacts of climate change – eutrophication. **MECP designated hazard*	Potential changes to coagulant and disinfectant requirements.	3	3	1	9	No.	None.	Visual monitoring of raw water. Quarterly DOC sampling, temperature and turbidity changes.	None.
Source	Sudden changes to raw water characteristics – pH, turbidity, DOC. **MECP designated hazard*	Adjust coagulant dosage as needed.	3	1	1	3	No.	None.	Online monitoring of raw pH and turbidity, weekly grab samples of raw pH and turbidity, quarterly sampling for raw DOC.	None.

Activity or Process Step	Description of Hazardous Event / Hazard	Control/Response Measures	Likelihood	Consequence	Detectability	Total	CCP?	Critical Control Limits	Monitoring Procedures and Processes	Associated Procedures
Intake	Intake collapse, damage to intake structure (anchor, etc.).	None.	1	4	1	4	No.	None.	Online monitoring of raw flow rate, low wetwell level alarm, online raw turbidity monitoring, Diver inspection of intake every fifth year.	None.
General WTP Process	Piping failure in treatment plant.	None.	1	5	1	5	No.	None.	Visual monitoring during daily rounds.	None.
General WTP Process	Generator failure – unable to run plant during power outage.	Contact mechanic or electrician for repair as needed. Spare parts in generator room.	2	5	1	10	Yes (professional judgement).	None.	PLC failure alarm.	ERP #9 – Generator Failure During Power Outage
Coagulation and Flocculation	Wetwell structural failure.	None.	1	2	3	6	No.	None.	Annual lowlift cleaning/inspections, low wetwell level alarm	None.
Coagulation and Flocculation	Lowlift Pump/VFD failure – inability to pump water to clarifer.	Pump/VFD redundancy – Three pumps available, Two VFDs. One pump and VFD can satisfy process requirements. Replace and repair as needed.	3	2	1	6	No.	None.	VFD/Pump fault alarms, low clarifier channel alarm.	None.
Coagulation and Flocculation	Influent flow transmitter failure – inability to control raw flow rate, dose coagulant.	Redundancy – Spare transmitter on shelf. Shut down process and replace and repair as needed.	2	3	1	6	No.	None.	Low influent flow alarm, high or low channel level alarms.	None.
Coagulation and Flocculation	Alum pump failure – Loss of coagulant flow. **MECP designated hazard*	Redundancy – Two pumps available, one required to satisfy process. Automatic shutdown when alum flow is lost. Switch to other pump and replace or repair as required.	4	4	1	16	Yes (Recommended minimum CCP).	Production without coagulant addition.	Pump fault alarm, Low alum flow alarm, automatic plant shutdown.	WTP SOP #29 – Reporting an AWQI
Coagulation and Flocculation	Polymer pump failure – Loss of coagulant aid flow.	Redundancy – Two pumps available, one required to satisfy	4	3	1	12	No.	None.	Pump fault alarm.	None.

Activity or Process Step	Description of Hazardous Event / Hazard	Control/Response Measures	Likelihood	Consequence	Detectability	Total	CCP?	Critical Control Limits	Monitoring Procedures and Processes	Associated Procedures
		process. Switch to other pump and replace or repair as required.								
Coagulation and Flocculation	Flash mixer failure – inadequate mixing of coagulant or coagulant aid in chamber.	None. Historically process has not been negatively impacted with flash mixer out of service. Replace or repair as needed.	1	2	3	6	No.	None.	Visual monitoring during daily rounds.	None.
Coagulation and Flocculation	Vacuum pump failure – loss of sludge blanket lift in a clarifier.	Redundancy – Three pumps available installed, and a fourth spare in storage. Two pumps required to satisfy process. Repair or replace as needed.	2	2	3	12	No.	None.	Visual monitoring during daily rounds. Filter turbidity / loss of head alarms.	None.
Coagulation and Flocculation	Extractor failure in open position – high wastewater tank, potential low clarifier level.	Close extractor isolation valve. Repair or replace extractor valve/actuator/solenoid. Increase extraction from second extractor while failed extractor is out of service.	1	2	1	2	No.	None.	Low channel alarm, high wastewater alarm.	None.
Coagulation and Flocculation	Extractor failure in closed position – reduced sludge extraction from clarifier.	Repair or replace extractor valve/actuator/solenoid. Increase extraction from second extractor while failed extractor is out of service.	2	2	2	8	No.	None.	Visual monitoring of clarifier bed.	None.
Coagulation and Flocculation	Roof drain failure above clarifier – water runoff from roof into process.	None. Consider repair or replacement.	2	2	3	12	No .	None.	Visual monitoring.	None.
Coagulation and flocculation	Air compressor failure – loss of pressure in pneumatic extractor lines and wastewater	Redundancy – Two compressors available, only on required to satisfy process. Repair and replace as necessary.	2	1	3	6	No.	None.	Visual monitoring of compressor, extractors, clarifier bed.	None.

Activity or Process Step	Description of Hazardous Event / Hazard	Control/Response Measures	Likelihood	Consequence	Detectability	Total	CCP?	Critical Control Limits	Monitoring Procedures and Processes	Associated Procedures
	level measurement system.									
Coagulation and flocculation	Channel level transmitter failure – unable to control clarifier level properly.	Redundancy – Spare transmitter in storage room. Repair or replace as needed. Manual control of lowlift flowrate may be required during repair.	2	2	1	4	No.	None.	Low channel level alarm.	None.
Filtration	Filter underdrain failure – unfiltered water enters clearwell. **MECP designated hazard*	Automatic shutdown of filter on high turbidity at 0.5 NTU, following a high turbidity alarm set to a maximum of 0.25 NTU.	1	5	1	5	Yes (Recommended minimum CCP).	0.25 NTU (alarm setpoint may be adjusted lower to indicate process issues earlier. CCP procedure response isn't required until 0.25 NTU regardless of alarm setpoint).	Online monitoring of filter effluent turbidities, high filter effluent turbidity alarms.	WTP SOP #48 – CCL Deviation – Filter Effluent Turbidity
Filtration	Filter breakthrough – process failure leading to unfiltered water entering clearwell **MECP designated hazard*	Routine backwashing of filters. Automatic filter shutdown on high loss of head. Automatic shutdown of filter on high turbidity at 0.5 NTU, following a high turbidity alarm set to a maximum of 0.25 NTU.	1	5	1	5	Yes (Recommended minimum CCP).	0.25 NTU (alarm setpoint may be adjusted lower to indicate process issues earlier. CCP procedure response isn't required until 0.25 NTU regardless of alarm setpoint).	Online monitoring of filter effluent turbidities, high filter effluent turbidity alarms. High filter loss of head alarms.	WTP SOP #48 – CCL Deviation – Filter Effluent Turbidity
Filtration	Tubidimeter failure – unable to measure filter turbidity	Automatic filter shutdown on turbidimeter fault alarm. Repair or replace turbidimeter while filter is out of service. Process can run indefinitely on three filters.	2	2	1	4	No.	None.	Turbidimeter fault alarm.	None.
Filtration	Filter controller failure – actuator stops responding properly to flow signal.	Redundancy – spare controller in storage room. Repair or replace as needed. Process can run indefinitely on three filters.	2	1	3	6	No.	None.	Filter effluent flow value trending, possible clearwell or clarifier level impacts	None.

Activity or Process Step	Description of Hazardous Event / Hazard	Control/Response Measures	Likelihood	Consequence	Detectability	Total	CCP?	Critical Control Limits	Monitoring Procedures and Processes	Associated Procedures
									dependent on manner of failure.	
Filtration	Adder subtractor failure – issues with combined filter flow rate and associated chemical feeds.	Redundancy – spare adder/subtractor in storage room. Repair or replace as needed.	1	1	1	1	No.	None.	Low clearwell influent chlorine alarm, low clearwell effluent chlorine alarm, low fluoride alarm.	None.
Backwash	Backwash pump failure – unable to pump backwash water to filters	Redundancy – Two pumps available, only one required (two pumps used during high flow in summer, but one would suffice during repairs).	2	4	1	8	No.	None.	Low flow alarm during backwash, backwash sequence fault.	None.
Backwash	Air scour blower failure – unable to properly backwash filter	No redundancy. Repair as needed. Backwashes without air scour have not been tested and may or may not be effective in the short-term during repairs.	2	5	1	10	No.	None.	Air scour fail to start alarm, backwash sequence fault.	None.
Backwash	Backwash valve system leakage – process short circuiting	Semi-annual testing of the backwash control valve seat, Manual isolation valves. Repair and report to MECP as required.	2	4	2	16	No.	None.	Clearwell effluent chlorine low alarm, online fluoride monitoring.	None.
Primary Disinfection	Clearwell contamination – surface contamination enters clearwell	Some contaminants may be removed by disinfection process. Consider security upgrade.	1	4	3	12	No.	None.	Visual monitoring during daily rounds, potential low clearwell effluent chlorine alarm dependent on contaminant.	None.

Activity or Process Step	Description of Hazardous Event / Hazard	Control/Response Measures	Likelihood	Consequence	Detectability	Total	CCP?	Critical Control Limits	Monitoring Procedures and Processes	Associated Procedures
Primary Disinfection	Clearwell structural failure – concrete issues, groundwater infiltration, overflow protection	None.	1	4	4	16	No.	None.	Periodic inspection of clearwell.	None.
Primary Disinfection	Post chlorinator failure – unable to add chlorine for primary disinfection.. **MECP designated hazard*	Redundancy – standby chlorinator and spare parts for repair available. Repair as needed. Automatic plant shutdown on low clearwell influent and effluent chlorine alarms.	2	3	1	6	Yes (Recommended minimum CCP).	0.90 mg/L. A second alarm at 0.60 mg/L shuts down the plant to ensure CT is maintained.	Clearwell influent low chlorine alarm (shutdown), clearwell effluent low chlorine alarm (warning), clearwell effluent low low alarm (shutdown).	WTP SOP #47 – CCL Deviation – Clearwell Effluent Chlorine Residual
Primary Disinfection	Clearwell effluent chlorine analyzer failure – unable to monitor residual online for CT calculation	Spare parts in storage room. Repair as needed. Automatic shutdown on analyzer fault. Consider redundancy in the future – analyzer on each clearwell	2	3	1	6	No.	None.	Clearwell effluent chlorine low low alarm (shutdown).	None.
Secondary Disinfection	Ammonium pump failure – loss of nitrogen for chloramination process.	Redundancy – Two pumps available, one required to satisfy process. Switch to other pump and replace or repair as required.	3	1	1	3	No.	None.	High effluent free chlorine alarm.	None.
Secondary Disinfection	Trim chlorinator failure – loss of chlorine residual top up for chloramination process.	Redundancy – standby chlorinator and spare parts for repair available. Repair as needed.	2	2	1	4	No.	None.	Low trim chlorine alarm.	None.
Secondary Disinfection	Highlift checkvalve failure on closing – backflow with ammonium sulphate into clearwell	Redundancy – Three pumps available, switch to other highlift and repair as required. Potential flushing of clearwell required to restore free chlorine residual.	3	2	1	6	No.	None.	Low clearwell effluent chlorine alarm, low discharge pressure alarm, high clearwell level alarm.	None.

Activity or Process Step	Description of Hazardous Event / Hazard	Control/Response Measures	Likelihood	Consequence	Detectability	Total	CCP?	Critical Control Limits	Monitoring Procedures and Processes	Associated Procedures
Secondary Disinfection	Sodium hydroxide pump failure – unable to adjust pH for chloramination	Redundancy – two pumps available. Switch to other pump and repair as required.	2	1	1	2	No.	None.	Effluent low pH alarm.	None.
Secondary Disinfection	Effluent flow transmitter failure – unable to properly dose sodium hydroxide, trim chlorine and ammonium sulphate.	Redundancy – Spare transmitter on shelf. Shut down process and replace and repair as needed.	1	2	1	2	No.	None.	Low effluent pH alarm, high effluent free chlorine alarm.	None.
Secondary Disinfection	Effluent pH analyzer failure – unable to monitor pH for chloramination	Spare parts in storage room. Repair as needed.	2	1	1	2	No.	None.	Low effluent pH alarm.	None.
Waste Management	Wastewater pump failure – unable to remove wastewater to sewer system.	Redundancy – Spare pump in storage room. Repair or replace as needed. Use supernatant pumps to transfer wastewater to lowlift sump pit while wastewater pump is out of service.	2	2	1	4	No.	None.	High wastewater tank level alarm.	None.
Waste Management	1st Ave/MNR lift station failure – unable to effectively remove waste from treatment process.	Redundancy – spare pump. Distribution crew repair and replace as needed.	2	2	1	4	No.	None.	High station level alarm for distribution operators.	None.
Waste Management	Lowlift sump pump failure – unable to pump supernatant to sewer.	No redundancy. Not required for routine operation. Repair or replace prior to projects requiring use. Consider vac truck if required.	1	2	1	2	No.	None.	Visual monitoring during pumpover process.	None.
Waste Management	Supernatant pump failure – unable to pump supernatant to lowlift sump.	Redundancy – Two pumps available, only one required	2	1	2	4	No.	None.	Visual monitoring during pumpover process.	None.

Activity or Process Step	Description of Hazardous Event / Hazard	Control/Response Measures	Likelihood	Consequence	Detectability	Total	CCP?	Critical Control Limits	Monitoring Procedures and Processes	Associated Procedures
		when using pumpover system. Repair or replace as necessary.								
Waste Management	Highlift sump pump failure – potential for flooding in highlift area.	Redundancy – spare pump kept in highlift area. Repair or replace as necessary. Backup pump will activate on high sump level alarm from float switch.	3	1	1	3	No.	None.	High sump level alarm.	None.
Treated Water	Highlift checkvalve failure on opening – eventual loss of system pressure	Redundancy – Three pumps available. Switch to other highlift and repair as required.	3	1	2	6	No.	None.	Zone 1 low level alarm, eventual low discharge pressure alarm.	None.
Treated Water	Highlift pump failure – unable to pump water to distribution system	Redundancy – Three pumps available. Switch to other highlift and repair as required.	2	1	1	2	No.	None.	Zone 1 low level alarm, eventual low discharge pressure alarm.	None.
Distribution	Cross contamination – backflow into system. **MECP designated hazard*	Enforcement of applicable bylaws, backflow preventers, elimination of cross connections when they are discovered.	1	3	4	12	No.	None.	Customer complaints, water quality issues, sample results, visual inspections.	None.
Distribution	Major watermain break resulting in negative pressure - possibility of contamination.	Isolate and repair leak, report as per SOP.	2	4	1	8	No.	None.	Customer complaints, pressure monitoring at booster stations, level monitoring at standpipes, visual observation.	Distribution SOP #22 – Watermain Breaks and Repair
Distribution	Fire suppression in areas of low system pressure/capacity – negative system pressure and possibility of contamination.	Firefighter training, communication between fire department and WT/WD staff. Report low pressure to health unit if necessary.	1	3	4	12	No.	None.	Customer complaints, pressure monitoring at booster stations, level monitoring at standpipes.	WTP SOP #13 – Maintaining Distribution Pressure and Flow During Fire Event.

Activity or Process Step	Description of Hazardous Event / Hazard	Control/Response Measures	Likelihood	Consequence	Detectability	Total	CCP?	Critical Control Limits	Monitoring Procedures and Processes	Associated Procedures
Distribution	Low chlorine residual – loss of secondary disinfection, potential for bacteriological regrowth. **MECP designated hazard*	Flushing, bleeder installation.	2	3	2	12	Yes (Recommended minimum CCP).	0.50 mg/L combined chlorine.	Distribution chlorine monitoring, customer complaints.	WTP SOP #49 – CCL Deviation – Distribution Chlorine Residual
Distribution	Sustained extreme temperatures – deep freeze causing frozen water mains **MECP designated hazard*	Thaw affected mains and services with DBH or Pulsator. Bleeders installed in areas with frequent freezing issues.	2	3	1	6	No.	None.	Customer water pressure complaints.	None.
Distribution	Booster station pump failure – unable to maintain level in standpipe	Redundancy – Two or three pumps at each booster station, only one required to satisfy system. Switch to alternate pump and repair/replace as necessary.	2	3	1	6	No.	None.	Online monitoring and alarming of standpipe levels, booster station low discharge pressure alarms.	None.
Distribution	Booster pump stoppage while standpipe out of service – loss of system pressure	None.	2	4	1	8	No.	None.	Online monitoring of booster station pressures.	None.
Storage	Standpipe failure – unable to maintain system pressure	Isolate standpipe so booster station can maintain system pressure. Repair as required.	1	5	1	5	No.	None.	Online monitoring and alarming of standpipe levels, visual observation.	None.
Storage	Standpipe contamination – overflow, venting protection	Isolate and drain standpipe, flush affected portions of distribution system.	1	5	3	15	No.	None.	Weekly bacteriological sampling, standpipe inspections.	None.

Activity or Process Step	Description of Hazardous Event / Hazard	Control/Response Measures	Likelihood	Consequence	Detectability	Total	CCP?	Critical Control Limits	Monitoring Procedures and Processes	Associated Procedures
Entire System	PLC failure – unable to control process.	Repair or replace using PLC spare parts inventory. Contact electrician or automation provider as needed. Manual control of some processes may be required while PLC is out of service.	3	3	1	9	No.	None.	PLC failure alarms, communication alarms.	None.
Entire System	HMI Failure – unable to adjust process, view trending or alarm data.	Redundancy – Two HMI's are available. Troubleshoot, repair or replace utilizing IT provider and/or automation provider as necessary. Consider collaborating with IT for better detectability.	3	1	3	9	No.	None.	Visual monitoring.	None.
Entire System	Communication – loss of communication between locations, unable to control pumps to maintain system pressure.	Contact IT provider to troubleshoot, repair. May need to run portions or all of the system manually to maintain system operation.	2	3	1	6	No.	None.	Communication alarms.	None.
Entire System	Sustained pressure loss – major water main break or pump failure. **MECP designated hazard*	Replacement program of aging watermains and infrastructure.	2	3	1	6	No.	None.	Customer complaints, pressure monitoring at booster stations, level monitoring at standpipes, visual observation.	None.
Entire System	Extreme weather events – ice storm, extreme weather leading to extended power outages. **MECP designated hazard*	WTP and critical booster stations have automatic backup generators.	2	2	1	4	No.	None.	Power failure alarms.	None.

Activity or Process Step	Description of Hazardous Event / Hazard	Control/Response Measures	Likelihood	Consequence	Detectability	Total	CCP?	Critical Control Limits	Monitoring Procedures and Processes	Associated Procedures
Entire System	Terrorist threats – sabotaging vulnerable equipment, intrusion into infrastructure. **MECP designated hazard*	Buildings are locked and gated, cellular dialer alarms, intrusion alarms.	1	3	1	3	No.	None.	Intrusion alarms, other alarms dependent on equipment damaged, visual observation.	ERP #5 – Security Breach, Vandalism, Acts of Terrorism
Entire System	Vandalism – deliberate damaging of infrastructure. **MECP designated hazard*	Buildings are locked and gated, surveillance video at some locations.	3	2	2	12	No.	None.	Visual observation, video recording.	ERP #5 – Security Breach, Vandalism, Acts of Terrorism
Entire System	Cyber threats – Hacking of WTP of remote PLCs, SCADA system. **MECP designated hazard*	Contact IT and automation providers as needed. Any commercial internet supplier has a physical firewall, passwords required for remote access to SCADA.	2	3	2	12	No.	None.	Visual monitoring of SCADA system.	None.

Element 9 – Organizational Structure, Roles, Responsibilities and Authorities

Figure 9.1 – City of Kenora QMS Organizational Chart

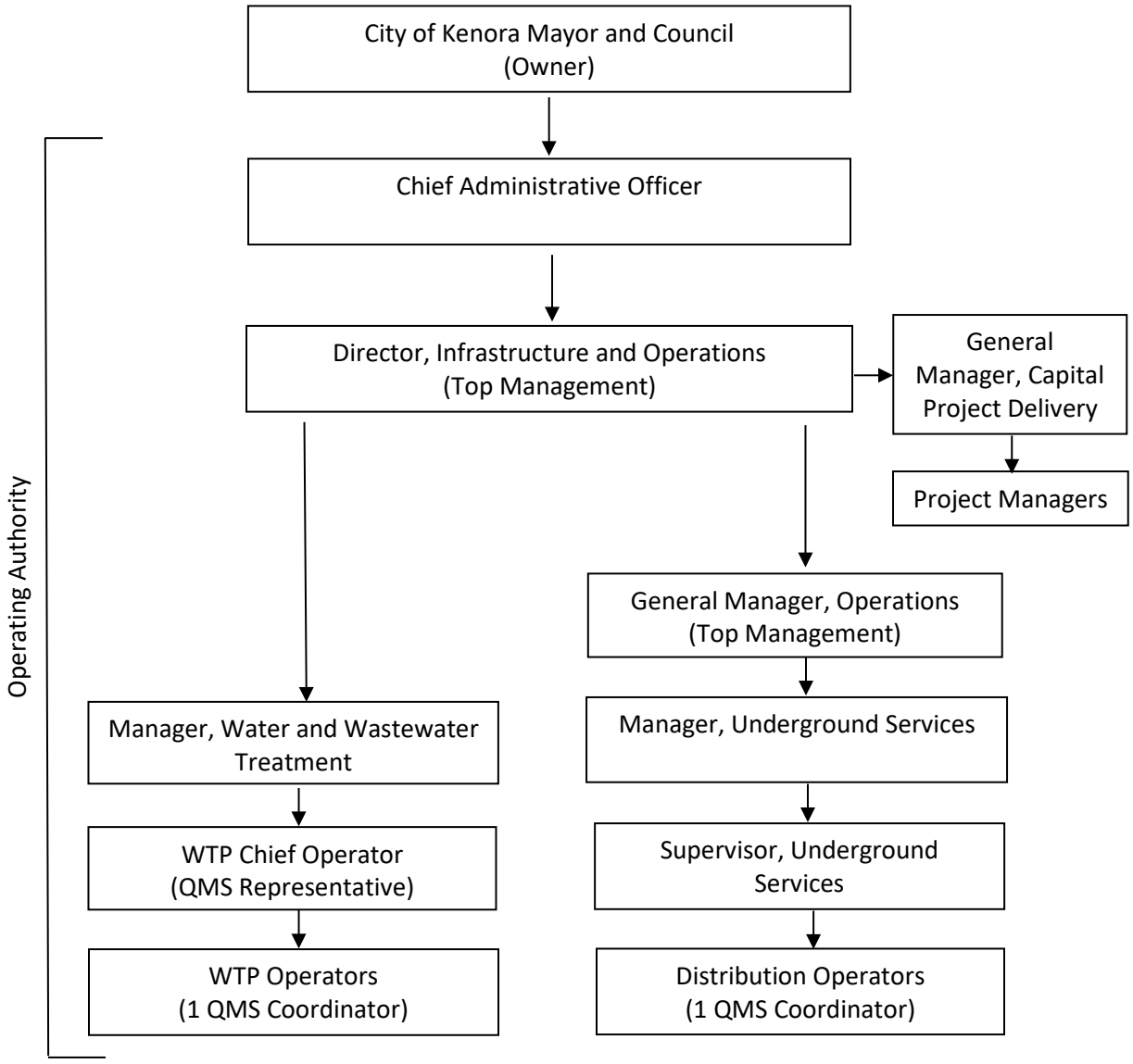


Table 9.2 – QMS Roles, Responsibilities, and Authorities

Title/Role	Responsibilities	Authorities
Mayor and Council (Owner)	-Provide safe drinking water to consumers -Ensure accreditation of Operating Authority (OA) -Endorse Operational Plan (OP) within one year of new council term -Ensure a Quality Management System (QMS) is in place -Ensure compliance with applicable regulations -Review Drinking Water System (DWS) reports -Allocate the necessary resources for the maintenance and safe operation of the DWS -Participate in Standard of Care training within one year of new term	-Review and approve by-laws, user fees and taxation rates -Approve QMS and OP -Approve budget requests -Approve staffing level requests -Authorize the resources needed to continually improve the DWS and QMS
Chief Administrative Officer	-Bring concerns from Mayor and Council to the Director of Infrastructure and Operations -Ensure concerns are addressed in an appropriate manner -Receive complaints or concerns raised by members of the public -Participate in Management Review as needed	-Give direction to the Director of Infrastructure and Operations

Title/Role	Responsibilities	Authorities
Director of Infrastructure and Operations (Top Management)	-Direct oversight of Infrastructure and Operations Department -Ensure QMS is implemented -Endorse OP within one year of new council term -Appoint and authorize QMS Representative -Present to Owner requests and recommendations for the allocation of resources via budgeting process -Ensure compliance with the Municipal Drinking Water License (MDWL) and Drinking Water Works Permit (DWWP) -Participate in the Management Review -Report the results of the Management Review to the Owner -Communicate the findings of the Infrastructure Review to the Owner -Communicate the infrastructure maintenance, rehabilitation and renewal programs to the Owner	-Report to council and the public -Prepare and submit budget requests to council for approval -Recommend improvements or changes to the QMS -Provide the resources necessary to continually improve the DWS and QMS -Verify Part 4 on MECP Form 1 -Verify Part 3 on MECP Form 2 -Verify Part 3 on MECP Form 3

Title/Role	Responsibilities	Authorities
General Manager of Operations (Top Management)	-Direct oversight of the Operations Division -Endorse OP within one year of new council term -Appoint and authorize QMS Representative -Ensure compliance with the MDWL and DWWP -Ensure compliance with the Safe Drinking Water Act (SDWA) and its associated regulations and procedures -Ensure Water Distribution (WD) operators are properly certified and trained -Develop operational and capital budgets for water distribution infrastructure maintenance, rehabilitation and renewal -Participate in the Infrastructure Review -Participate in Management Review	-Approve training for WD operators -Submit budget and staffing level requests -Receive and delegate follow-up on customer complaints -Provide the resources necessary to continually improve the DWS and QMS -Participate in annual MECP inspection as needed
General Manager of Capital Project Delivery	-Participate in the Infrastructure Review -Participate in Infrastructure Maintenance, Rehabilitation and Renewal planning	-Prioritize capital rehabilitation and renewal projects based on risk levels determined within the Asset Management Plan and the outcome of the Infrastructure Review -Verify Part 4 on MECP Form 1 -Verify Part 3 on MECP Form 3

Title/Role	Responsibilities	Authorities
Manager of Water and Wastewater Treatment	-Direct oversight of the Water Treatment (WT) subsystem -Ensure compliance with the MDWL and DWWP -Ensure compliance with the Safe Drinking Water Act (SDWA) and its associated regulations and procedures -Ensure WT operators are properly certified and trained -Develop operational and capital budgets for water treatment infrastructure maintenance, rehabilitation and renewal -Participate in the Infrastructure Review -Participate in Management Review -Participate in Risk Assessment process	-Approve training for WT operators -Submit budget and staffing level requests -Receive and delegate follow-up on customer complaints -Provide the resources necessary to continually improve the DWS and QMS -Participate in annual MECP inspection as needed -Verify Part 3 on MECP Form 2
Manager of Underground Services	-Direct oversight of the WD subsystem -Ensure the distribution system is operated in compliance with the SDWA and its associated regulations and procedures -assigning appropriate staff (in terms of numbers and qualifications) to facilitate the distribution of safe drinking water -Make capital project recommendations to General Manager of Utilities -Participate in the Management Review -Organize training opportunities for distribution staff -Participate in Risk Assessment process	-Give direction to supervisor and distribution staff -Participate in annual MECP inspection -Utilize the resources provided to continually improve the DWS and QMS -Report AWQIs -Develop Standard Operating Procedures (SOPs) for tasks in the distribution system -Utilize the resources provided to continually improve the DWS and QMS -Approve training for WD operators

Title/Role	Responsibilities	Authorities
Project Manager	-Manage capital renewal projects in the WT and WD subsystems	-Verify Part 4 on MECP Form 1 -Verify Part 3 on MECP Form 3
WTP Chief Operator	-Fulfill the role of QMS Representative -Ensure the treatment plant is operated in compliance with the MDWL and DWWP -Ensure the treatment plant is operated in compliance with the SDWA and its associated regulations and procedures -Maintain certification and complete all required training -Scheduling of water treatment staff, ensuring adequate plant coverage -Procurement of essential chemicals and supplies -Ensure Operations Manual is up to date -Make capital project recommendations to General Manager of Utilities -Participate in the Management Review -Assign priority to maintenance work in the water treatment plant -Direct, instruct and work with treatment operators -Organize training opportunities for water treatment staff	-Give direction to staff at the water treatment plant -Participate in annual MECP inspection -Utilize the resources provided to continually improve the DWS and QMS -Report Adverse Water Quality Incidents (AWQIs) -Develop Standard Operating Procedures (SOPs) for tasks in the water treatment plant -Verify Part 3 on MECP Form 2
Supervisor of Underground Services	-Assign priority to maintenance work in the distribution system -Assign and delegate work to distribution staff	-Give direction to distribution staff -Utilize the resources provided to continually improve the DWS and QMS

Title/Role	Responsibilities	Authorities
Water Treatment Operators	-Maintain their certification -Work in accordance with applicable legislation and the QMS -Follow applicable SOPs -Complete required training hours -Keep records of all activities in logbook and other applicable forms	-Suggest improvements to the QMS -Utilize the resources provided to continually improve the DWS and QMS
Distribution Operators	-Maintain their certification -Work in accordance with applicable legislation and the QMS -Follow applicable SOPs -Complete required training hours -Keep records of all activities in logbook or other applicable forms	-Suggest improvements to the QMS -Utilize the resources provided to continually improve the DWS and QMS
Designated QMS Representative	-Establish, maintain and develop the QMS in accordance with applicable legislative and regulatory requirements -Ensure QMS documentation is prepared and maintained -Promote awareness of the QMS throughout the OA -Review and approve QMS documentation -Schedule internal audit and assign auditor(s) -Arrange external audit -Facilitate and participate in Management Review -Facilitate and participate in Risk Assessment process	-Approve changes to the QMS and incorporate changes into the QMS and OP

Title/Role	Responsibilities	Authorities
QMS Coordinator Treatment	-Ensure that the QMS is in place and is used in the treatment portion of the DWS -Assist with the development of water treatment SOPs -Promote awareness of the QMS to water treatment operators	-Suggest improvements to the QMS -Act as alternate QMS Representative when necessary
QMS Coordinator Distribution	-Ensure that the QMS is in place and is used in the distribution portion of the DWS -Assist with the development of distribution SOPs -Promote awareness of the QMS to distribution operators	-Suggest improvements to the QMS -Act as alternate QMS Representative when necessary

Element 10 – Competencies

Water Treatment Plant

The Kenora Water Treatment Plant is a Class 3 subsystem. To operate in this system an operator is required to have at minimum their OIT certificate. To work alone, respond to after-hours call-outs, and provide OIC coverage an operator is required to have at minimum a Class 1 certificate. To provide ORO coverage for the subsystem, an operator is required to have at minimum a Class 3 certificate.

Distribution System

The Kenora Area Distribution System is a Class 2 subsystem. To operate in this system an operator is required to have at minimum their OIT certificate. To work alone, respond to after-hours call-outs, and provide OIC coverage an operator is required to have at minimum a Class 1 certificate. To provide ORO coverage for the subsystem, an operator is required to have at minimum a Class 2 certificate.

Satisfying Competencies

- New employees undergo an onboarding process involving a departmental tour from their supervisor, SOP and ERP review, and are introduced to their job duties by an experienced staff member.
- On the job training is provided to all operators, conducted and documented by experienced staff. Training files are maintained for all City of Kenora staff.
- WTP staff receive a minimum of 40 hours training annually, while distribution operators receive a minimum of 35 hours, as required by O. Reg. 128. Typical topics include safety, treatment process operations, contingency plans, regulatory requirements, equipment operation, and new technologies. The

training is provided by experienced City of Kenora staff, technical experts, or contracted professional trainers. 14 hours of the annual training for WTP operators, and 12 hours of the annual training for distribution operators must be Director approved CEU training. Training hours and license renewal cycles are tracked and managed utilizing the Water and Wastewater Training Records spreadsheet.

- The City of Kenora staff are briefed on operating conditions and provided regulatory updates with management staff. Employees are informed of training opportunities, such as relevant conferences and seminars.
- The City of Kenora provides funding to staff for required training provided the training is related to water system duties.

Element 11 – Personnel Coverage

The City of Kenora employs MECP certified operators, all of whom are required to hold operator certification for either water treatment or water distribution corresponding to their position. The Water Treatment Plant is staffed by four (4) Water Treatment Operators, who either have or are working to attain their Class 3 certificate or higher, and in distribution there are twelve (12) Water and Wastewater Operators who either have or are working to attain their Class 2 certificate. Unionized positions include Chief Operator, Water Treatment Operator, and Water and Wastewater Operator. In the event of a staffing shortage, operators may be sourced from a contracted service provider, or the Owner may consider utilizing options provided by the Emergency Situations provisions contained within O. Reg. 128/04 sections 32-35 if they are applicable in the circumstances.

Water Treatment Plant

The Water Treatment Plant is staffed seven days per week from 7:00 to 17:30. During the week there are typically three or four operators on shift depending on the schedule. Water Treatment Operators work under the direction of the Chief Operator in the operation and maintenance of the plant.

On weekends and holidays it is staffed by one operator, and weekend shifts are alternated amongst qualified (class 1 minimum) employees on a two week rotation. Weekend operators are responsible for the basic operation and monitoring of the WTP, boosters and standpipes. During routine weekend operations one operator is normally sufficient, but if the need arises a second operator can be called in for assistance.

When on shift the Chief Operator is automatically designated ORO, and when the Chief Operator is not present ORO coverage is designated to another operator on shift with a class 3 certificate. When no operator on shift has a class 3 certificate or higher, a designated ORO will be available by telephone to the operator for assistance and to come in if needed. After hours ORO coverage is rotated amongst qualified operators. ORO coverage is scheduled on the ORO calendar, and is documented in the log book. The ORO cell phone is always carried by the operator designated as ORO.

After hours alarms are addressed by a rotating call out system activated by both fixed alarm outputs and adjustable alarm set points. An alarm from the SCADA system triggers a cellular dialer which has a rotating call list comprised of all qualified (class 1 or higher) operators cellphone numbers, including the ORO. The operator called in can call in another operator for assistance if needed, and the ORO is available for either on-site or telephone support. The acceptable response time for after-hours alarms is 30 minutes. This response time is considered reasonable based on alarm set points with conservative valves, and automatic shutdowns associated with alarms which are an immediate emergency.

Water Distribution

Water and Wastewater Operators with a Class 1 certificate or higher are rotated on a weekly on-call schedule. One operator is assigned on-call per week. These operators respond to alarms as well as trouble calls, and provide OIC coverage during work done outside of business hours. They are able to call in additional operators for assistance as needed. The on-call schedule is posted on the bulletin board in the Water and Sewer shop. Residents can report a trouble call by phoning the Water and Sewer standby phone, carried by the on-call distribution operator. This phone number is published on the City of Kenora website. ORO Coverage is provided by the Manager of Underground Services. If the Manager of Underground Services is unavailable to act as ORO, they can delegate the responsibility to an Operator holding a Class 2 Certificate.

Element 12 – Communications

Communication is a key aspect of the QMS. Information about the QMS must be communicated to the owner, all operating authority personnel, suppliers, and members of the public. This includes communicating the QMS itself, as well as any changes or updates that are made to the QMS from time to time. The Director of Infrastructure and Operations for the City of Kenora has been identified as Top Management as it relates to QMS communication responsibilities. The Director of Infrastructure and Operations may delegate or assign specific QMS communications responsibilities to any member of the QMS team including the QMS Representative, the QMS Coordinators from Treatment and Distribution, the General Manager of Operations, the Manager of Water and Wastewater Treatment, and the Manager of Underground Services. The table below identifies the various target audiences who require QMS communications, the type of information those audiences require, and the means of conveying the required information to the target audiences, and the member of the QMS team responsible for the communication.

Target Audience	Information to Communicate and Means of Communication
Mayor and Council as **Owner**	The Mayor and Council need to be aware of the status of the City's QMS Program including the results of audits as well as management reviews. The Mayor and Council will review the QMS Policy Statement and renew their commitment to and endorsement of the QMS Program at minimum within one year of a new Council term. The methods of communication will be primarily via e-mail and when necessary, reports will be presented at Council meetings. The Director of Infrastructure and Operations or General Manager of Operations, as Top Management, will be responsible for communicating QMS information to the Mayor and Council.

Water Treatment Operators, Water and Sewer Operators as **Operating Authority**	To ensure that all operating personnel are aware of the requirements of the QMS, information sessions will be held to review the QMS and the Operational Plan. Information about the QMS and the Operational Plan will be communicated at Staff Meetings and will be posted on bulletin boards at the Treatment Plant and the Operations Centre. The QMS Representative, Manager of Underground Services or the QMS Coordinators from Treatment and Distribution will be responsible for communicating QMS information to operating personnel.
Suppliers	Pertinent information from the QMS will be communicated to suppliers as needed. Chemical suppliers will be made aware that they are considered to be essential suppliers as designated in the Operational Plan. The QMS Representative, Manager of Underground Services or the QMS Coordinators from Treatment and Distribution will be responsible for communicating QMS information to suppliers.
Public	The DWQMS Operational Plan will be posted electronically on the City of Kenora website. The QMS Representative will be responsible for ensuring that the current version of the Operational Plan is posted on the website. If a member of the public has questions about the QMS it will be the responsibility of the Director of Infrastructure and Operations or General Manager of Operations to provide a response.

Element 13 – Essential Supplies and Services

The following table identifies critical equipment and suppliers for the Water Treatment Plant and water distribution. The left-hand column identifies the critical equipment, the center column identifies the primary supplier for that piece of equipment, and the right-hand column identifies the manufacturer of the equipment. When a piece of equipment is needed the primary supplier is the first point of contact to provide said equipment. If for some reason the primary supplier is unable to provide the required equipment, the manufacturer of that equipment must be contacted to discuss alternate means of obtaining the required equipment. Essential Supplies and Services list will be reviewed prior to any Operational Plan revision to ensure it is current.

Low Lift Pumping Station	Supplier	Manufacturer
Low Lift Pumps Three (3) single stage, submersible, vertical turbine	Mid Continental Pump Supply Ltd 1641 Dublin Ave Winnipeg, MB , R3H0G9	FMC Pump Division Peerless Pumps Indianapolis, Indiana
Filter System	**Supplier**	**Manufacturer**
Filters Three(3) rapid gravity dual media and Partilok under drain system	ECODYNE Limited 4475 Corporate Drive Burlington, Ontario L7L 5T9 Canada	ECODYNE Limited 4475 Corporate Drive Burlington, Ontario L7L 5T9 Canada
Filters One(1) rapid gravity dual media and Orthos Monolithic Flat Panel underdrain system	ORTHOS Liquid Systems, Inc. PO Box 1267 Bluffton, SC 29910	ORTHOS Liquid Systems, Inc. PO Box 1267 Bluffton, SC 29910
Backwash Pumps Two (2) single stage, double suction, horizontal centrifugal	Aurora Pump A Unit of General Signal Ltd. 387 Humberline Dr Rexdale, ON M9W 5T5 Ph: (416) 675-1675	Aurora Pump 800 Airport Road North Aurora IL. 60542 U.S.A. Phone: 630-859-7000 Fax: 630-859-7060 (Domestic) 630-859-1226 (International)
Air Blower One (1) multi-stage centrifugal	Hoffman Industries of Canada Limited 58 Bertal Rd Toronto, ON Ph: (416) 763-3528	Hoffman Industries of Canada Limited 58 Bertal Rd Toronto, ON Ph: (416) 763-3528

Wastewater Disposal System	Supplier	Manufacturer
Sludge Pump One (1) SSP Series D Rotating Lobe Pump Model D5-0200-H05	KGO Group Ltd. 1200 Speers Rd., Unit 52 Oakville, ON L6L2X4 (905)-847-1544	SSP Pumps Alfa Laval Eastourne Ltd. +44 1323 414627
Supernatant Pumps Two (2) submersible, with dry pit configuration	Process Flow Systems Ltd. 700 Norah Crescent Thunder Bay, ON P7C 4T8 Ph: (807) 623-1144	Flygt Canada Limited 108 Skyway Ave Rexdale, ON M9W 4Y9 Ph: (416) 675-3630
High Lift Pumping and Storage	**Supplier**	**Manufacturer**
High Lift Pumps Three (3) single stage, double suction, horizontal configuration	Industrial Fluid Consultants Inc. 74 Durand Road Winnipeg, MB R2J 3T2 Phone: 204-632-8311	Allis-Chalmers Industrial Pump Division Cincinnati, Ohio
Chemical System	**Supplier**	**Manufacturer**
Alum Metering Pump Two (2) Blue-White Series M4 Peristaltic Pumps	Synergy Controls Corp. 1065 Lorne St. Sudbury, ON P3C 4S6 (705) 674-2875	Blue-White Industries 5300 Business Drive Huntington Beach, CA 92649 (714) 893-8529
Polymer Metering Pump Two (2) Blue-White Series M4 Peristaltic Pumps	Synergy Controls Corp. 1065 Lorne St. Sudbury, ON P3C 4S6 (705) 674-2875	Blue-White Industries 5300 Business Drive Huntington Beach, CA 92649 (714) 893-8529
Polymer Transfer Pump One (1) Viking Series 115 Model: H	Industrial Pump Systems 1148 Lorne St Sudbury, ON P3C 4S9 (705) 675-7867	Viking Pump of Canada Inc. 661 Grove Ave Windsor, ON N9A 6M3 (519) 256-5438
Caustic Soda Transfer Pump One (1) Sethco Model PM-1040NT	Vissers Sales Corp. 20-220 Industrial Parkway South Aurora, ON L4G3V6 (905) 841-4073	Sethco 700 Emlen Way Telford, Pennsylvania 18969 800-392-7621
Caustic Soda Metering Pumps Two (2) Prominent Sigma 2 Motor Driven Metering Pumps Model# S2CAHM12130PVTS070UD3000C	SCG Process 15 Connie Crescent Concord, ON L4K 1L3 (866) 924-7802	Prominent Fluid Controls 490 Southgate Drive Guelph, ON N1G 4P5 (519) 836-5692
Ammonium Sulphate Transfer Pump One (1) Finish Thompson Model DB7P-2-M226	Cleartech 1500 Quebec Ave Saskatoon, SK S7K 1V7 (800) 387-7503	Finish Thompson Inc. 921 Greengarden Road Erie, PA 16501 (800) 934-9384

Ammonium Sulphate Metering Pumps Two (2) Pulsafeeder Pulsatron MP Series Model: LMG4TA-VTC1-500	Vissers Sales Corp. 20-220 Industrial Parkway South Aurora, ON L4G3V6 (905) 841-4073	Pulsafeeder 2883 Brighton-Henrietta Townline Road Rochester, NY 14623 (585) 292-8000

The following table identifies Essential Supplies or Services required for the Water Treatment Plant and water distribution. The left-hand column lists the supply or service, the centre column identifies the primary supplier for that supply or service, and the right-hand column identifies a contingency supplier for the supply or service. When supplies or services are needed the primary supplier is the first point of contact to provide said supply or service. In the event that the primary supplier is unable to provide the needed supply or service, the contingency supplier must be contacted to make alternative arrangements for the provision of the needed supply or service.

Supply or Service	Primary Supplier	Contingency Supplier
Accredited Laboratory Services (Bacteriological and general chemistry)	ALS Laboratories 1081 Barton St Thunder Bay, ON P7B 5N3 (807) 623-6463 (Phone) (807) 624-4482 (After Hours) (800) 668-9878 (Toll Free) (807) 623-7598 (Fax)	Testmark Laboratories 1131 Central Ave, Unit #2 Thunder Bay, ON P7B 7C9 (807) 333-0921 (Phone) (807) 333-0924 (Fax)
Accredited Laboratory Services (Specialized organic parameters – Mycrocystin, NDMA)	SGS Canada Inc. 185 Concession St Lakefield, ON K0L 2H0 (705) 652-2000	Testmark Laboratories 1131 Central Ave, Unit #2 Thunder Bay, ON P7B 7C9 (807) 333-0921 (Phone) (807) 333-0924 (Fax)
Disinfectant (Chlorine)	Brenntag 681 Plinquet St Winnipeg, MB R2J 2X2 (800) 563-3013 (Toll Free) (204) 233-3416 (Phone) (204) 233-7005 (Fax)	General Chemical Canada Ltd. 145 MacDougall St Thunder Bay ON P7B 6T9 (800) 585-6844 (Toll Free) (807) 345-7643 (Phone)
Coagulant (Aluminum Sulphate)	Border Chemical 104 Regent Ave West Winnipeg, MB (204) 222-3276 (Phone)	General Chemical Canada Ltd. 145 MacDougall St Thunder Bay ON P7B 6T9 (800) 585-6844 (Toll Free) (807) 345-7643 (Phone)

Coagulant Aid (Northland – Norfloc 122) (Brenntag – Praestol DW22S KF-NC)	Northland Chemical Inc. 2460 Anson Dr., Unit #9 Mississauga ON L5S 1G7 (416)410-1918	Brenntag 681 Plinquet St Winnipeg, MB R2J 2X2 (800) 563-3013 (Toll Free) (204) 233-3416 (Phone) (204) 233-7005 (Fax)
pH Control (Sodium Hydroxide)	Brenntag 681 Plinquet St Winnipeg, MB R2J 2X2 (800) 563-3013 (Toll Free) (204) 233-3416 (Phone) (204) 233-7005 (Fax)	UNIVAR Canada 99 Lowson Crescent Winnipeg, MB R3P0T3 (204) 928-7246
Chloramination (Ammonium Sulphate)	Univar Canada 99 Lowson Crescent Winnipeg, MB R3P0T3 (204) 928-7246	Brenntag 681 Plinquet St Winnipeg, MB R2J 2X2 (800) 563-3013 (Toll Free) (204) 233-3416 (Phone) (204) 233-7005 (Fax)
Fluoridation (Sodium Silicofluoride)	Univar Canada 99 Lowson Crescent Winnipeg, MB R3P0T3 (204) 928-7246	Brenntag 681 Plinquet St Winnipeg, MB R2J 2X2 (800) 563-3013 (Toll Free) (204) 233-3416 (Phone) (204) 233-7005 (Fax)
Wallace and Tiernan Products (Chlorinators, Chlorine Analyzers)	Clearwater Controls Inc. 256 Lampard Cres Red Deer AB T4R 2W5 Ph: (403) 304-4334	Evoqua Water Technologies Alpharetta, Georgia (866) 926-8420
Hach Products	Hach Sales and Service Canada Ltd. 400 Britannia Rd. E. Unit #1 Mississauga ON L4S 1X9 (800)665-7635	Klearwater Equipment 46 Masters Ave SE Calgary AB T3M 2B1 David Rushka (431) 336-1735
Underwater Services (Water Intake, Marine Line Repairs)	Dominion Divers 19 Archibald Street Winnipeg, MB R2J 0V7 (800) 599-4933 (Toll Free) (204) 237-8639 (Phone) (204) 233-1258 (Fax)	Galcon Marine 7 Alden Avenue Toronto, ON M8Z 1C4 (416) 255-9607 (Phone) (416) 255-0517

Laboratory Supplies	VWR International 2360 Argentia Road Mississauga, ON L5N5Z7 1-800-932-5000 (phone) 1-800-668-6348 (fax)	Cole-Parmer Canada 210-5101 Buchan St Montreal QC H4P 2R9 (800) 363-5900 (888) 281-8109 (Fax)
Instrumentation Calibration	Lakeside Process Controls Ltd. 7 Sylvan Way Winnipeg, MB R2R2B9 (204) 633-9197	Summa Engineering 6423 Northam Drive Mississauga, ON L4V 1J2 (905) 678-3388 (Phone) (905) 678-0444 (Fax)
Electrical Work	City of Kenora Electricians	Lake of the Woods Electric P.O. Box 81 Kenora ON (807) 548-5158
Electrical Supplies	Eecol 1027 Railway Street Kenora, ON P9N 3W8 (807) 468-5070	Westburne Unit 4 – 1 Dennis Place Kenora, ON P9N 3X9 (807) 548-4266 (Phone) (807) 548-5445 (Fax)
Plumbing Supplies	B.A. Robinson Unit 5 – 1051 Railway St Kenora, ON P9N 3W8 (807) 468-9237 (Phone) (807) 468-4434 (Fax)	Wolseley Unit 5 – 1 Dennis Place Kenora, ON P9N 3X9 (807) 548-2177 (Phone)
Golden Anderson Products	Conval Equipment Ltd. 1111 Finch Avenue West, Unit 39 Toronto, ON M3J2E5 (416) 665-8960	Pumps and Systems 1112 Russell Street, Unit 1 Thunder Bay, ON P7B 5N2 (807) 622-3767 (Phone) (807) 622-3804 (Fax) (888) 690-2203 (Toll Free)
Automation and SCADA Services	Automation Now 1131 Central Ave. Suite A Thunder Bay ON P7B 7C9 (807)626-5590	Eramosa 300-6815 8 St NE Calgary AB T2E 7H7 (403) 208-7447
Engineering Services	Stantec Consulting Ltd. 500-311 Portage Avenue Winnipeg MB R3B 2B9 (204) 489-5900	TBT Engineering Consulting Group 815 Ottawa St Kenora ON P0V 3G0 (807) 547-4445

Pump Supply and Service	Mid-Continental Pump Supply 73 Airport Road Winnipeg, MB R3H 0V5 (204) 783-8619 (Phone) (204) 783-6085 (Fax)	Industrial Fluid Consultants 585 Plinguet Street Winnipeg, MB R2J 0G3 (204) 661-8029 (Phone) (204) 663-3270 (Fax)
Mechanical Contractors	A.K. Contracting P.O. Box 1830 Kenora, ON P9N 3X8 (807) 543-2493	Kipper Mechanical Ltd. PO Box 67 Longbow Lake, ON P0X 0A3 (807) 548-5762
Seals	EDA Environmental 180 Wyatt Road Winnipeg MB R2X 2X6 (204) 632-9154	Kepco Sealing Supplies 1560 Orange Street Winnipeg, MB R3E 3H5 (204) 783-9617
Motors	IPS 633 Tyne Avenue Winnipeg, MB R2L1J5 (204) 237-6066	Del's Electric Motor Supply 54 Princess St Winnipeg MB R3B 1K2 (204) 947-1391
Dewatering Contractor	A1 Rentals Steve Bell 610 Norman Drive Kenora ON P9N 3T4 (807) 444-3299	Bell's Septic Kenora Inc. 1523 Agur Street, Kenora ON P9N1M4 (807) 468-7251 (Phone) (807) 468-3660 (Fax)
Safety Equipment	Grainger Canada 1199 St James St Winnipeg MB R3H 0K8 (866) 762-3305	Macmor Industries 1175 Sherwin Road Winnipeg, MB R3H 0V1 (204) 786-5891 (Phone)
Pipe, Hydrants, Fittings and other equipment	FLOCOR Inc. 470 Seaman Street Stoney Creek, ON L8E 2V9 (905) 664-9230 Flo-Crest Equipment 48 Stevenson Road Winnipeg, MB R3H 0W7 (204) 633-0682 (Phone) (204) 632-5461 (Fax)	Wolseley Plumbing 1 Dennis St Unit #5 Kenora, ON P9N 3W8 (807) 548-2177

Quality of Supplier Products and Services

The above list identifies all suppliers and services deemed essential for the production and delivery of safe drinking water. All chemical supplies must meet ANSI and NSF standards. Appropriate paper work must be provided upon chemical delivery to confirm the product being delivered, as per WTP SOP #16. All laboratories must be accredited by MECP to test the parameters for all samples that are submitted to them.

Element 14 – Review and Provision of Infrastructure

An infrastructure review ensures the periodic evaluation of the condition and capacity of the City of Kenora's drinking water system's infrastructure components. The results of the review are to be used in consideration to prioritize future resource allocation.

The Infrastructure Review Procedure

1. Procedure Description

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

2. Meetings and Meeting Records

2.1. At least once per year, the General Manager of Operations, General Manager of Capital Project Delivery and the Manager of Water and Wastewater Treatment will meet to conduct an infrastructure review.

2.2. Minutes or a summary of the meeting(s) and records of attendance will be documented and distributed to the QMS Representative, Director of Infrastructure and Operations and all those attending the meeting within 30 calendar days of the conclusion of the meeting(s).

3. Infrastructure Review Procedure

3.1. The General Manager of Operations, General Manager of Capital Project Delivery and the Manager of Water and Wastewater Treatment will consider:

3.1.1. The outcomes of the risk assessment documented under Element 8 and ensure that the adequacy of the infrastructure necessary to operate and maintain the City of Kenora's municipal drinking water and distribution system is reviewed.

3.1.2. New infrastructure required in the upcoming year (due to regulations, growth, or unforeseen circumstances)

3.1.3. Recommended infrastructure maintenance, rehabilitation, replacement or renewal for the upcoming fiscal year and looking forward five years.

3.1.4. Other items that may be received to determine priority and needs:

- Input from Operating Staff.
- Future Infrastructure projects.
- MECP Compliance Inspection reports.
- Water consumption and production trends.
- Asset risk levels as identified through the City of Kenora asset management plan.

4. Notification to Owners

4.1. The Director of Infrastructure and Operations will provide a report of the review to the Owner, including a summary of findings from Section 3.

Element 15 – Infrastructure Maintenance, Rehabilitation and Renewal

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

Planned Maintenance:

Planned maintenance on the water distribution system is scheduled by the Manager of Underground Services. Maintenance works are documented in the distribution log book. The Chief Operator is responsible for scheduled maintenance at the Water Treatment Plant. Scheduled tasks are typically defined by manufacturer's literature when available. Tasks may be revised or created as needed based on operators' experience and observations. Planned maintenance tasks are communicated to the person responsible by the Chief Operator. Completed maintenance is documented in the appropriate log book.

Unplanned Maintenance:

Unplanned maintenance tasks result from equipment malfunction or breakage. Unplanned maintenance is authorized by the Supervisor of Underground Services, Manager of Underground Services, Manager of Water and Wastewater Treatment, General Manager of Operations, Director of Infrastructure and Operations, or Overall Responsible Operator of the affected facility. The Overall Responsible Operator typically responds to unplanned maintenance during normal working hours while the rotational on-call operator responds during off-hours. Documentation of unplanned maintenance tasks is documented in the appropriate log book.

Measures to prepare for and expedite unplanned maintenance include equipment redundancy (back-up units), spare parts inventory, availability of updated plans / drawings and maps as well as documented repair and safety procedures.

Renewal / Capital Upgrades:

Replacement of aging fixed heavy equipment, as well as upgrades, expansions, and in-ground systems improvements are planned by the Manager of Underground Services, Manager of Water and Wastewater Treatment, General Manager of Capital Project Delivery and General Manager of Operations. Experience of the operators in Water

Treatment Plant and Water Distribution is taken into consideration before formulating any major replacement and/or rehabilitation plan. All major expenses are identified in the Capital budget and require approval by City of Kenora Mayor and Council.
Where practical, replacement of aging in-ground infrastructure is coordinated with road reconstruction activity conducted by contractor or City Departments.

Infrastructure Maintenance, Rehabilitation and Renewal Procedure

1.0 Procedure Description

This procedure describes the maintenance activities performed within the drinking water systems operated by the City of Kenora, including preventative maintenance, unscheduled maintenance, and system rehabilitation and renewal.

2.0 Reason for Procedure

Maintenance activities may significantly impact the quality of drinking water produced and/or delivered to the customers. Pre-planning and a documented systematic approach to addressing maintenance activities, where possible, can minimize this impact.

3.0 Responsibility

The following are responsible for maintenance and renewal activities depending on the urgency of the task, risk to public health, and financial requirements:

- All concerned departments at the City of Kenora
- Director of Infrastructure and Operations
- Manager of Underground Services
- Manager of Water and Wastewater Treatment
- General Manager of Utilities
- General Manager of Engineering
- Overall Responsible Operators for treatment and distribution systems

4.0 Procedure

4.1 All maintenance activities shall be in accordance with the manufacturer's O&M manuals and shall be logged in the appropriate log book.

4.2 Routine system rehabilitation and renewal shall be addressed annually during budget preparation. A list of required replacement or desired new equipment is compiled and prioritized by the City of Kenora's management team, typically including the General Manager of Operations, General Manager of Capital Project Delivery and Manager of Water and Wastewater Treatment. The Asset Management Plan is used as a guiding document, with asset conditions and risk ratings obtained from life cycle analysis, maintenance schedules and condition assessments tracked within the City's Asset Management Software and its Geographic Information System. A proposed budget is presented by the Director of Infrastructure Operations to the Senior Leadership Team with justification provided for the requested maintenance and capital projects. If the proposed budget is not approved, the management team prepares a revised, reduced version by deferring lower priority items.

4.3 Major upgrades and expansion are addressed as needed based on regulatory requirements, assessment of risk to public health, development review, reserve account balances, and grant or loan availability.

4.4 If feasible, rehabilitation or replacement of underground water installations is coordinated with the Capital Project Delivery Department to coincide with scheduled road resurfacing projects.

4.5 The Director of Infrastructure and Operations will provide a report to Council containing a summary of the Cities infrastructure maintenance, rehabilitation and renewal programs annually.

5.0 Monitoring for Effectiveness

5.1 The effectiveness of the maintenance and rehabilitation program will be monitored by reviewing the incidents of unplanned or unexpected equipment failure, premature failure of treatment and distribution infrastructure, and customer complaints.

5.2 Regular preventive maintenance is a key contributor to a system that runs effectively and efficiently. When equipment fails unexpectedly it may be an indication that preventive maintenance activities are inadequate or absent. All incidents of unplanned or unexpected equipment failure will trigger a review of the preventive

maintenance records for that equipment to determine if the preventive maintenance was performed according to the manufacturer's recommendations or as determined by the Operators responsible.

5.3 Customer complaints will often trigger maintenance activities and may cause additional maintenance activities to be planned for a particular area or piece of the infrastructure. When repeated customer complaints are received that all relate to a similar concern, maintenance records will be reviewed to ensure that planned maintenance was indeed carried out. In the event that all the planned maintenance was completed and there are still customer complaints, the maintenance plan will be amended or the infrastructure may be replaced.

Element 16 – Sampling, Testing and Monitoring

The City of Kenora uses a sampling program for the Kenora Area Drinking Water System based on legislative requirements. This program is described in detail in the procedure entitled Sampling, Monitoring and Analysis. Operators sample according to the applicable AWWA Standards and MECP water main disinfection procedure for disinfecting water mains throughout any maintenance project undertaken within the City of Kenora water distribution system.

Specific sampling and monitoring procedures are established for operating the Kenora Area Drinking Water System under abnormal circumstances.

Laboratory results are acquired from in-house analyses, as well as from accredited laboratories. In-house laboratory results are entered into an annual spreadsheet by a plant operator and then stored at the WTP. Bacteriological and chemical results from the accredited laboratory are stored at the WTP.

Copies of bacteriological and chemical analytical results are provided to members of the public upon request. In-house laboratory results may also be provided upon request. All analytical results are reviewed and stored at the WTP. The Annual Report which is provided to Mayor and Council, the Ministry of the Environment, Conservation and Parks (MECP), and any water systems supplied with water from the City of Kenora system also includes lab results as per Ontario Regulation 170/03. The Annual Report is also available free of charge to anyone who requests a copy. An electronic copy is available on the City of Kenora website, and anyone wanting to be provided a paper copy can make arrangements to pick one up from the Water Treatment Plant. Staff at the Water Treatment Plant can be contacted to assist in the interpretation of this report if required.

Sampling, Monitoring and Analysis Procedures

1. Procedure Description

This procedure describes the sampling schedule and analytical program used for monitoring water quality in throughout the Kenora Area Drinking Water System. It also outlines the responsibilities of operators and outside agencies in regards to analyses performed and reporting duties.

2. Reason for Procedure

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

3. Responsibility

Only those operators who currently possess a valid Drinking Water Operator Certificate or are authorized due to other levels of license are permitted to carry out drinking water sampling and conduct laboratory analyses. The operator on duty performs all drinking water sampling, as well as the daily analyses. All other analyses must be performed by the staff of an accredited laboratory.

4. Procedures

4.1 Continuous Monitoring

4.1.1 The following parameters are monitored continuously with online analyzers with local displays and with HMI/SCADA system displays located in the plant laboratory.

- Filter Effluent Turbidity
- Effluent Fluoride
- Effluent pH
- Effluent Turbidity
- Clearwell Effluent Free Chlorine Residual
- Trim Chlorine Residual
- Effluent Total Chlorine Residual

- Effluent Free Chlorine Residual
- Raw Turbidity
- Raw pH
- Raw Temperature
- East Clarifier Channel Turbidity
- East Clarifier Channel pH
- West Clarifier Channel Turbidity

4.1.2 The operator on duty shall verify online monitoring readings daily by comparison to bench-top results (see section 4.2 Daily Sampling and Analysis). The bench-top results are recorded on the Water Plant Database Spreadsheet and analyzer readings are recorded by the SCADA system.

4.1.3 Chlorine analyzers shall be adjusted when necessary per manufacturer's instructions.

4.1.4 Turbidity analyzers shall be verified at minimum quarterly as per manufacturer's instructions.

4.2 Daily Sampling and Analysis

4.2.1 Routine laboratory tests shall be conducted daily at the plant by the operators on duty to confirm online analyzer readings, as well as to check additional parameters that aid in water quality monitoring and process control.

4.2.2 Data shall be recorded on the Water Plant Database Spreadsheet, and filed in bankers boxes in the blower room.

4.2.3 Samples are taken daily at the following analyzers to verify their reading and adjust if necessary.

- Clearwell Effluent Chlorine Analyzer
- Trim Chlorine Analyzer
- Effluent Total Chlorine Analyzer
- Effluent Free Chlorine Analyzer

4.2.4 The following parameters are tested daily from the treated sample tap in the lab.

- Effluent Turbidity

- Effluent pH
- Fluoride

4.3 Weekly Sampling and Analysis

4.3.1 Weekly bacteriological analysis is performed on raw water, treated water and distribution system water from various points in the distribution system.

The raw water is tested for the following:

- E. coli (quantitative)
- Total Coliform (quantitative)

The treated water is tested for the following:

- E. coli (presence/absence)
- Total Coliform (presence/absence)
- Heterotrophic Plate Count (HPC)

The distribution samples are tested for the following:

- E. coli (presence/absence)
- Total Coliform (presence/absence)
- HPC on at least 25% of samples submitted to lab.

4.3.2 Weekly samples collected for bacteriological testing shall include non-chlorinated raw water, treated water, and distribution samples. Bacteriological Sampling shall be conducted in accordance with the requirements of Ontario Regulation 170/03.

4.3.3 Non-chlorinated raw water shall be collected from the low lift pump discharge sampling point.

4.3.5 Distribution samples shall be collected from several points throughout the distribution system to meet the requirements of Ontario Regulation 170/03.

4.3.6 Three total chlorine samples shall be taken weekly in the distribution system a minimum of seventy-two hours after weekly bacteriological samples are taken. These analyses are performed at various locations in the distribution system in order to confirm that there is adequate secondary disinfection.

4.3.7 A Chain of Custody form, including the sample details and total chlorine residual of the samples, shall be completed and submitted to the laboratory with the samples. One copy of this form is retained for filing at the plant.

4.3.8 Sampling procedures for operators are documented in WTP SOP #35.

4.4 Quarterly Sampling and Analysis

Every three months (normally in January, April, July and October), drinking water from the distribution system shall be tested for Trihalomethanes (THM's) and Haloacetic Acids (HAA's). THM samples must be collected from the farthest point in the distribution system (Sewer Lift #961), which is located on Jones Road. HAA's are required to be collected from a location in the distribution system that is likely to have an elevated potential for the formation of HAA's, and are taken from the Keewatin Standpipe. Nitrates/Nitrites samples are collected from the treated water sample tap on the high lift discharge header. Sampling procedures for operators are documented in WTP SOP #36.

4.5 Annual Sampling and Analysis

Samples are collected every 12 months (normally in January) and must be analyzed for organics and inorganics as per Schedule 23 and 24 of Reg. 170/03. Samples to be analyzed under Schedule 23 and 24 shall be collected from the treated water sample tap located on the high lift discharge header. Sampling procedures for operators are documented in WTP SOP #36.

4.6 Sampling and Analysis Required Every Five Years

Samples are collected every five years to be analyzed for sodium. Samples are collected from the treated water sample tap on the high lift discharge header.

4.7 Lead Sampling Requirements

Under the Lead Sampling Program, samples are collected twice annually from the distribution system as per Schedule 15.1 of Reg. 170/03. Sample locations and quantities vary per year, dependent on a cycle determined in Schedule 15.1. Sampling procedures for operators are documented in WTP SOP #37.

5. Associated Documents

Instructions for testing of: chlorine residuals, fluoride, color

- Hach TU5300 SC User Manual.
- Hach TU5200 User Manual
- Hach SC10 User Manual
- Hach DR 900 User Manual
- Hach Pocket Colorimeter User Manual

Ontario Regulation 170/03 - Refer to Large Municipal Residential schedules for sampling and reporting requirements as well as adverse procedures.

Element 17 – Measurement and Recording Equipment Calibration and Maintenance

Methods of measurement and recording equipment calibration and maintenance are described in detail in the following procedure.

1.0 Procedure Description

This procedure describes the method used by the Kenora Area Water Treatment Plant and Distribution System to ensure that all measurement and recording equipment is calibrated and maintained.

2.0 Reason for Procedure

Accuracy of measurement and recording equipment is essential to providing quality drinking water to the consumer with confidence that the characteristics of the water meet or exceed the legislated requirements and internal targets set by the City of Kenora.

3.0 Responsibility

The operator shall conduct the calibration and maintenance of all continuous monitoring equipment. Recording equipment maintenance and repair will be outsourced as necessary. The operators shall ensure that all calibration and maintenance for bench-top equipment is performed at the required frequency. Calibration records are kept as described in our document and records control list.

4.0 Procedure

In House Equipment Calibration and Maintenance

4.1 The following pieces of equipment in use at facilities operated by the City of Kenora are calibrated and maintained by City of Kenora employees:

- Hach SC10 online chlorine analyzer
- Hach TU5300 SC process turbidimeter
- Hach TU5200 laboratory turbidimeter
- Hach DR 900 spectrophotometer

- Hach Pocket Colorimeter
- Hach CL-17 chlorine analyzer

4.2 The outlook maintenance task list shall be used to indicate that the calibration and maintenance of continuous monitoring equipment is required.

4.3 The frequency of calibration and maintenance shall be maintained as is required by O. Reg.170/03, or as recommended by the manufacturer, whichever is more frequent.

4.4 All calibration and maintenance shall be performed according to the manufacturer's instructions.

4.5 All calibration and maintenance shall be recorded in the maintenance record binder at the water treatment plant.

Third Party Calibration and Maintenance

4.6 The following pieces of equipment in use at facilities operated by the City of Kenora are calibrated and maintained by outside service providers:

- Filter effluent flow meters
- Filter loss of head transmitters
- Influent flow meter
- Effluent flow meter
- Backwash flow meter
- Discharge Pressure Transmitter
- Standpipe level transmitters
- Booster station flow meters
- Booster station pressure transmitters

4.7 The outlook maintenance task list shall be used to indicate that the calibration and maintenance of equipment is required. A reminder prompt will be scheduled for approximately two months prior to the required calibration and maintenance dates to allow time for the outside service provider to arrange and schedule their visit.

4.8 All calibration and maintenance shall be performed according to the manufacturer's instructions.

4.9 Upon completion of the calibration and maintenance by the outside service provider, a Calibration Report will be sent to the City of Kenora. This report will be kept on file at the Water Treatment Plant.

5.0 Associated Documents

The following documents are used to assist with the In House calibration and maintenance:

- Hach TU5300 SC User Manual.
- Hach TU5200 User Manual
- Hach SC10 User Manual
- Hach DR 900 User Manual
- Hach Pocket Colorimeter User Manual

Element 18 – Emergency Management

The procedure entitled Emergency Conditions outlines the conditions at the City of Kenora Water Supply System that are considered to be major emergencies. This procedure also lists those persons responsible for initiating the response and recovery measures, as well as the process to be followed as emergencies escalate. Specific instructions for responding to emergencies, including emergency situations that have the potential to result in acute drinking water health risks, are included in the plant and distribution system operations manuals. Each operator is required to review the written emergency response plans annually. Emergency procedures are tested on an annual basis, except when required staff are unavailable to participate due to unexpected extenuating circumstances. Training will be provided to all individuals involved in the emergency response procedures so that roles and responsibilities are clearly understood.

Emergency Procedures

1.0 Procedure Description

This procedure describes conditions associated with the City of Kenora Water Supply System that are considered to be emergencies, as well as those persons responsible for initiating the response and recovery measures.

2.0 Reason for Procedure

Establishing a procedure for emergency conditions indicates a level of preparedness, promotes an efficient response, and supports a rapid recovery.

3.0 Responsibility

The certified operator on duty must be capable of identifying and be prepared for responding to any emergency condition that may arise at the water treatment plant or within the distribution system. Operator training is conducted regularly to ensure the safe and timely response to emergencies.

4.0 Procedure

4.1 Potential Emergency Situations

- Breakdown or malfunction of critical treatment process equipment
- Break down or malfunctioning PLC and/or SCADA.
- Major Power Failure
- Insufficient Operators available at Water Treatment Plant
- Loss of essential supplier/chemical shortage
- Security breach/vandalism/acts of terrorism
- Microcystin present in treated water
- Chemical Spill Impacting Source Water

4.2 Response

Refer to Emergency Response Binder for response procedures for each of the emergency situations referred to above.

4.3 Testing and Training

When practical, emergency procedures are tested on an annual basis. Training will be provided to all individuals involved in the emergency response procedures so that roles and responsibilities are clearly understood. All testing and training will be documented.

Element 19 – Internal Audits

Internal Audits will be conducted at least once every calendar year to determine the effectiveness of the QMS, and to explore opportunities for improvement. All findings from Internal Audits will be reported to Top Management and any recommended changes will be discussed with Top Management.

Detailed Procedures for Conducting Internal Audits

1.0 Procedure Description

This procedure defines the process used by the City of Kenora to conduct internal audits of the Quality Management System (QMS) for the City of Kenora Drinking Water System.

2.0 Reason for Procedure

Internal audits are conducted to confirm that the QMS is effectively implemented and meets or exceeds the requirements of the Ministry of the Environment's Drinking Water Quality Management Standard (DWQMS).

3.0 Responsibility

Internal audits shall only be conducted by persons having following qualifications and approved by the QMS Representative:

- City of Kenora employees who have completed internal audit training.
- Employees of other operating authorities who have completed internal audit training and who have completed at least one internal audit of quality management systems within their own organizations.
- Third party auditing/consulting companies that offer DWQMS auditing services.

4.0 Procedure

4.1 Internal audits are conducted at least once every calendar year.

4.2 Internal auditors will be selected by the QMS Representative.

4.3 Internal auditors shall review the DWQMS and previous internal and external audit reports in preparation for the audit.

4.4 The audit checklist shall be used by the internal auditor as a guideline and for record-keeping purposes for conducting the interviews and document review during the audit.

4.5 The audit report shall be in the form of a completed audit checklist.

4.6 Where a non-conformance to the DWQMS is found during the internal audit, this shall be communicated within the audit report by attaching the Corrective Action Request (CAR) form *(GEN-F7)*. It is the responsibility of the QMS Representative to ensure that all CARs are followed up and responses to the CARs are provided to the internal auditor within 45 days of the internal audit.

4.7 When all CARs have been responded to, the CAR forms are submitted to the Internal Auditor. If the Internal Auditor is satisfied with the responses to the CARs, a clearance letter is issued to the QMS Representative. The internal audit shall be considered closed when this is complete.

5.0 Associated Documents

Internal Audit Checklist

CAR Form

Drinking Water Quality Management Standard Operational Plan

Element 20 – Management Review

A Management Review will be conducted at least once every calendar year with representatives from Top Management, and the QMS Representative. The purpose of the Management Review is to evaluate and ensure the continued suitability, adequacy and effectiveness of the QMS.

Detailed Procedures for Conducting Management Reviews

1.0 Procedure Description

This procedure defines the process for the review of the effectiveness of the Quality Management System (QMS) by the Management Review Committee.

2.0 Reason for Procedure

Management reviews are conducted to assess and ensure the continuing suitability, adequacy, and effectiveness of the QMS.

3.0 Responsibility

Management reviews shall be conducted during a meeting of the following participants that make up the Management Review Committee:

- Director of Infrastructure and Operations
- General Manager of Operations
- Manager of Water and Wastewater Treatment
- Manager of Underground Services
- QMS Representative

The meeting is chaired by the QMS Representative. Additional staff may be present if available.

4.0 Procedure

4.1 A Management Review will be conducted at least once every calendar year.

4.2 Prior to the Management Review Meeting, the QMS Representative shall provide a meeting agenda and summaries of the following information to the Management Review Committee:

a) incidents of regulatory non-compliance

b) incidents of adverse drinking-water tests

c) deviations from critical control point limits and response actions

d) the efficacy of the risk assessment process

e) internal and third-party audits results

f) results of emergency response testing

g) operational performance

h) raw water supply and drinking water quality trends

i) follow-up on action-items from previous management reviews

j) the status of management action items identified between reviews

k) changes that could affect the Quality Management System

l) customer feedback

m) the resources needed to maintain the Quality Management System

n) the results of the infrastructure review

o) Operational Plan currency, content and updates, and

p) staff suggestions

4.3 The Management Review Committee shall review and discuss all information presented. The Committee shall make recommendations and develop action items, as appropriate, to improve the content and implementation of the Operational Plan and related procedures, and to ensure the provision of adequate resources. The action items will detail the personnel responsible for completing tasks, and the proposed timelines for the implementation.

4.4 Minutes of management review meetings shall be maintained by the QMS Representative. The minutes shall document all new and outstanding action items as well as any decisions made by the Committee.

4.5 The QMS Representative shall be responsible for the communication of Management Review action items and follow up on their progress. The QMS Representative will provide the minutes of the Management Review to the Director of Infrastructure and Operations, who will prepare a report to council detailing the results of the Management Review.

Element 21 – Continual Improvement

The Operating Authority will work to continually improve the effectiveness of its Quality Management System (QMS), and will track and measure its continual improvement using the following procedure.

Procedure Description

Sources of continual improvement can include:

- Corrective Actions identified through internal and external audits
- Opportunities for Improvement identified through internal and external audits
- Staff suggestions
- Management Review Process
- Best Management Practices
    - Any BMP's published by the MECP available on ontario.ca/drinkingwater
    - Drinking Water Update emails from the MECP which are sent to the Water and Wastewater Manager and the WTP.
    - Publications by professional organizations.

Responsibility

The QMS Representative and QMS Coordinators are responsible for ensuring identified Corrective Actions are implemented, and to review and incorporate OFI's and other possibilities for continual improvement as identified in Continual Improvement Log Forms.

Considering and Implementing BMP's

Published BMP's will be discussed and reviewed annually as part of the Management Review process. BMP's to be implemented into the QMS will be documented on a Continual Improvement Log Form.

Identifying and Managing Corrective Actions

Non-conformities identified in an internal audit will be managed by completing the steps contained on the Corrective Action Request Form within 45 days, prior to a clearance letter being issued. Non-conformities identified during an external audit will be managed as per the requirements of the Corrective Action provided by the auditor. Non-conformities identified will be discussed during Management Review Meetings.

Identifying and Implementing Preventative Actions

All OFI's identified through internal and external audits will be recorded on a Continual Improvement Log Form for consideration and implementation into the QMS. Other sources of preventative actions such as staff suggestions or considerations for a routine review or the management review process can also be recorded on the Continual Improvement Log form for consideration and implementation. Continual Improvement Log Forms will be discussed during Management Review Meetings.

Associated Documents:

Continual Improvement Log