OPERATIONAL PLAN

City of Elliot Lake Drinking Water System

Revision 14

This Operational Plan defines and documents the Quality Management System (QMS) for the City of Elliot Lake Drinking Water System. It sets out the policies and procedures with respect to quality management in accordance with the requirements of the Province of Ontario's Drinking Water Quality Management 2.0 Standard (DWQMS).

OPERATIONAL PLAN REVISION HISTORY

Date	Revision#	Reason for Revision
August 8, 2012	2	Operational Plan updated
December 17, 2012	3	Element 15 updated
November 25, 2013	4	Removal of Mechanic for Element 9 & 10
January 19, 2014	5	Reference to ORO responsibility in Element 9
November 25, 2014	6	Change of position – Top Management
February 6, 2015	7	Amendments to Document and Records
January 18, 2016	8	Updated signed commitment
January 18, 2016	8	Job titles and new flow chart
September 20, 2016	9	Job Title Change
September 20, 2016	9	Raw water characteristics updated to 2015
January 8, 2019	10	Updated Table of Contents
January 8, 2019	10	Job Title Changes
January 8, 2019	10	Updated Raw Water Characteristics
January 8, 2019	10	Updated Table and Flowchart in Element 9
January 8, 2019	10	Updated Table in Element 10
January 8, 2019	10	Document re-endorsed
July 25, 2019	10	Updated to DWQMS 2.0 Standard
January 13, 2020	11	Procedures updated
February 1, 2021	12	Updated Raw Water Characteristics
March 1, 2022	13	Updated Raw Water Characteristics
February 7, 2023	14	Operation Plan Updated

TABLE OF CONTENTS

LIST OF APPENDICES

1 Quality Management System (QMS)

The City of Elliot Lake Quality Management System (QMS) is structured and documented with the purpose of:

1. Establishing policy and objectives with respect to the effective management and operation of the Drinking Water System;
2. Understanding and controlling the risks associated with the Drinking Water System's * activities and processes;
3. Achieving continuous improvement of the QMS and the Drinking Water System's performance.

*The Drinking Water System encompasses the Water Treatment Plant (WTP) and the Distribution System.

2 Quality Management System Policy

The Corporation of the City of Elliot Lake, as the owner and the operating authority of the Drinking Water System, is committed to:

1. Managing the treatment, distribution and supply of clean, safe drinking water to its consumers,
2. Ensuring that its drinking water system operation meets or exceeds all applicable legislative and regulatory requirements, through the continual maintenance and improvement of its QMS.

3 Commitment and Endorsement

This Operational Plan supports the overall goal of the City of Elliot Lake to provide safe drinking water.

The Operations Department is responsible for developing, implementing, maintaining and continually improving its QMS and will do so in a manner that ensures compliance with applicable legislation. Through the endorsement of this Operational Plan, the Owner commits to cooperating in any reasonable request of the Operations Department to facilitate this goal.

Top management of the Operating Authority and the Owner represented by Mayor and Chief Administrative Officer (CAO) have approved the QMS for the Drinking Water System as documented in this Operational Plan.

Operating Authority
Endorsement & Approval

Feb 1/23

Bill Goulding Date
Acting Director of Public Works

Feb. 7/23

Bart Doyle Date
Assistant Director of Public Works

Owner
Endorsement & Approval

Feb 2/23

Daniel Gagnon Date
Chief Administrative Officer

FEB 7/23

Andrew Wannan Date
Acting *Mayor*

4 Quality Management System Representative (QMS Rep)

All personnel have a role and associated responsibilities within the QMS.
The QMS Representative for the City of Elliot Lake is the Working Foreman of Operations.

The QMS Rep is responsible for:

- Administering the QMS by ensuring processes and protocol needed for the QMS are established and maintained,
- Reporting on QMS performance and identifying opportunities for improvement,
- Ensuring that current versions of documents related to the QMS are in use,
- Ensuring personnel are aware of all applicable legislative and regulatory requirements that pertain to their operational duties, and
- Promoting awareness of the QMS to Water Systems personnel.

5 Document and Records Control

Refer to Appendix A for QMS Procedure QMSP-01 Document and Records Control.

6 Drinking Water System

Owner and Operating Authority

The City of Elliot Lake is the Owner and the Operating Authority for the Drinking Water System.

System Description

Water Treatment Plant

The WTP is classified as a Class 2 plant located at 200 Spine Road in the City of Elliot Lake. It is a direct filtration plant with the following characteristics:

Intake
- a 295m long, 900 mm diameter high density polyethylene raw water intake pipe with fiberglass intake structure and crib having a capacity of 36,000 m^3/day;

Low-Lift Pumping Station
- A low-lift pumping station having a firm capacity of 28,900 m^3/day, equipped with two (2) removable manually cleaned inlet screens, four (4) vertical turbine low-lift pumps (1 pump at 5,200 m^3/day; 2 pumps, each at 18,100 m^3/day; and 1 pump at 8,200 m^3/day),
- One (1) venturi tube water meter on the raw water main located in the main plant;

Plant Enclosure Building
A plant enclosure building approximately 100 m long by 30 m wide by 8 m high housing laboratory, workshop, garage, office and washroom facilities and process systems equipment as follows:

Mixing
Two (2) cell rapid mix tanks with one (1)15 kW mixer and one 3.75 kW submersible. Total residence time at design flow 5 min.

Flocculation Tanks
Four (4) parallel set of three (3) hydraulic spiral flow flocculation tanks arranged in series;
Three (3) rectangular filters with dual media (anthracite/sand) and hydraulic surface wash rated at 10.0 m/hr at design flow each equipped with filter to waste system,
Two (2) vertical turbine backwash pumps each rated at 250 L/s and capable of providing backwash rate of 45 m/h with both pumps in operation

Clearwell
A 2,300 m^3 capacity baffled Clearwell with a common filter effluent chamber, and two independent storage/chlorine contact tanks each of which can be isolated for service,
High lift pumping station
Four (4) vertical turbine centrifugal high lift pumps as follows:
One (1) pump rated at 3 900 m^3/day
Two (2) pumps rated at 8 600 m^3/day
One (1) pump rated at 18 600 m^3/day
One (1) venturi tube flow meter installed on the high lift pump header.

Disinfection System
A chlorine gas disinfection system consisting of two (2) one ton cylinder weight scales with vacuum regulators and three (3) (1 duty, 2 stand-by) 90 kg/d capacity chlorinators with storage space for seven (7) one-ton cylinders and all associated equipment including gas detector and alarm system, all located in a separate room of the Plant Enclosure Building.
Chlorine solution feed lines to the chlorine solution diffusers located in the raw well and the filter effluent chamber

Chemical Storage and Feed System
Coagulant feed system consisting of one 27,000 L capacity PACl (or alternative liquid alum) storage tank with a remote filling system, two (2) (one duty, one stand-by) chemical feed metering pumps with a flow capacity of 17.6 L/h, and chemical feed line(s) to the rapid mix tank

pH/Alkalinity Adjustment
Pre and post lime feed systems for alkalinity and pH adjustment consisting of:
One thirty ton silo and volumetric feeder into a slurry make-up tank and
two Peristaltic pumps with a flow capacity of 476 L/h.

Also a stand-by hopper, volumetric feeder and feed pump as a complete stand-by to the silo system together with chemical feed lines to raw water pipe just up-stream of the rapid mix tank and to the high lift pump header

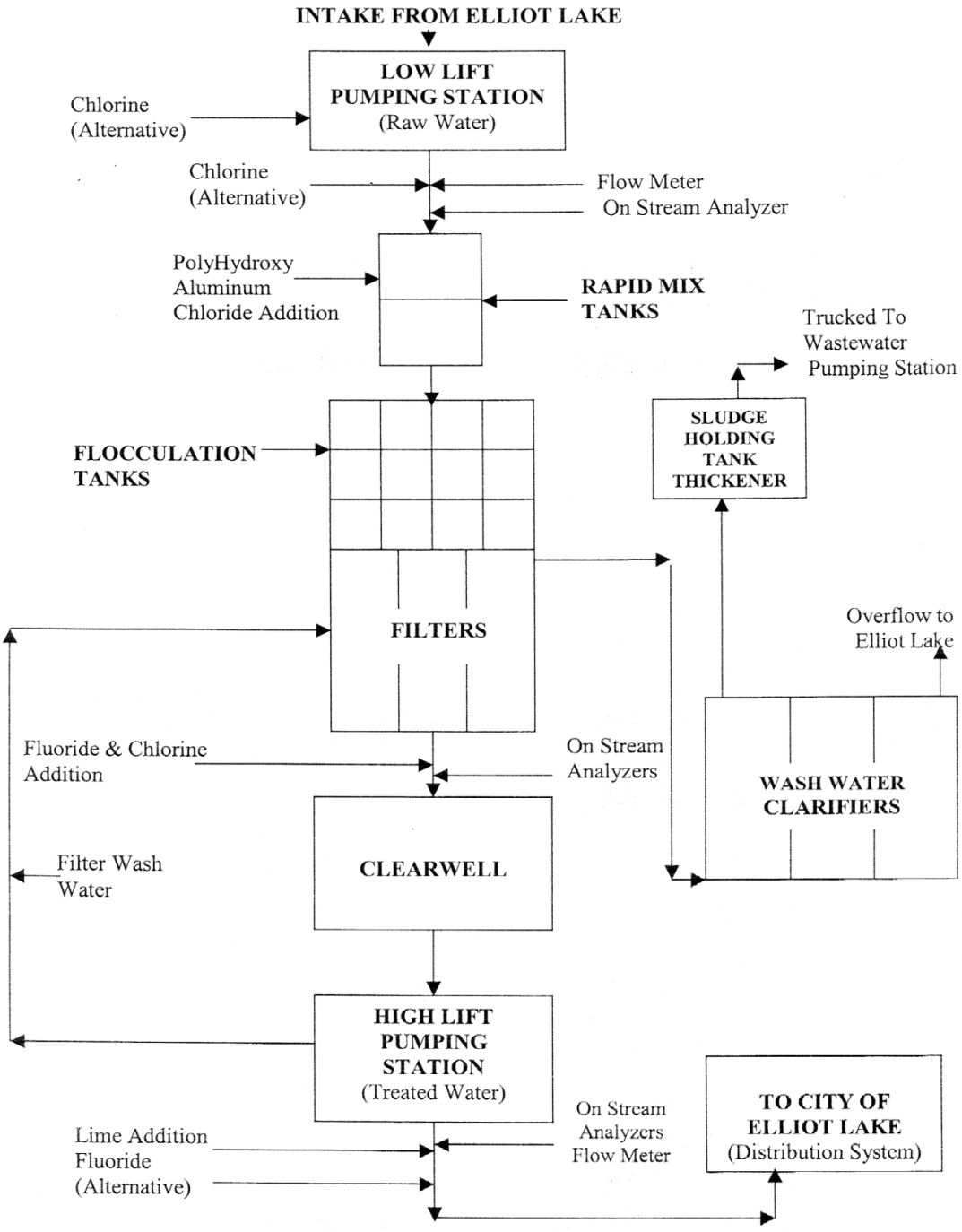
Fluoride
A fluoride feed system consisting of a 1,200 L hydrofluosilicic acid bulk storage tank and one metering pump with a flow capacity of approximately 3.3 L/h

Residue Management System
A filter backwash wastewater settling and disposal facility consisting of:
Three (3) settling surge tanks capacity 235 m^3 each
One (1) sludge holding/thickening tank capacity 60 m^3
Two (2) sludge pumps each rated at a capacity of 4 L/s (one duty one standby) for transfer of sludge from the settling tanks to the sludge holding tank or for tank truck loading
Supernatant is discharged to Elliot Lake

Stand-by Power Facility
A 550 kW diesel engine driven stand-by power generator set and associated equipment, located in a separate room of the Plant Enclosure Building, sized to operate sufficient pumps and systems to produce average day flow from the plant
Together with all associated piping, electrical and mechanical equipment, ventilation, monitoring, control, metering, and alarm systems, and instrumentation.

The process flow schematic for the Water Treatment plant is located on the following page.

ELLIOT LAKE MUNICIPAL WATER TREATMENT PLANT FLOW DIAGRAM



Distribution System

The water distribution system is classified as a Class1 Distribution System, servicing a population of approximately 12,000 with approximately 6,500 service connections. Construction of the system occurred between the 1950's and the 1970's.

The distribution system consists of a total of approximately 60 km of cast iron, ductile iron and plastic pipes of sizes ranging from 150 mm diameter to 600 mm diameter. There are approximately 400 hydrants and two water storage tanks (standpipes) with total storage volume of approximately 9,400 m^3.

A 1,527 m^3 (336,030 gal) standpipe and a 7,870m^3(1,731,490 gal) standpipe are both located on Roman Avenue.

Refer to Appendix N for diagrams of the Distribution System.

Water Source

General Characteristics

The source water is Elliot Lake. The lake is characterized as low in turbidity, low to very low in color and very low alkalinity.

Raw Water Characteristics at Intake (based on 2022 data)

Characteristic	Minimum	Maximum	Annual Average
Temperature (°C)	3.3	14.8	7.61
Colour (TCU)	9	35	16.84
Turbidity (NTU)	0.23	0.74	0.48
pH	5.98	8.41	7.12
Alkalinity	7.30	17	12.42
Hardness	16	41	12.82
E. coli (CFU/100 mL)	0	2	
Total Coliforms	0	19	

Common Fluctuations and Threats
There is no identified fluctuation of the water source, and no threats to the quality of the water source.

Operational Challenges
There are no identified operational challenges resulting from the quality of the water source.

7 Risk Assessment

Refer to Appendix B for QMS Procedure QMSP-02 Risk Assessment and Risk Assessment Outcomes.

8 Risk Assessment Outcomes

Refer to Appendix B for Summary of Risk Assessment Outcomes.

9 Organizational Structure, Roles, Responsibilities and Authorities

Owner and Operating Authority
The Owner of the Water Systems is the City of Elliot Lake, as represented by Mayor and CAO.

The Operating Authority is the City of Elliot Lake as represented by the Operations Department. The Operations Department operates and maintains the drinking water system via the Plants Department and the Public Works Department.

The Plants Department operates and maintains the WTP and Standpipes. The Public Works Department operates and maintains the Distribution System.

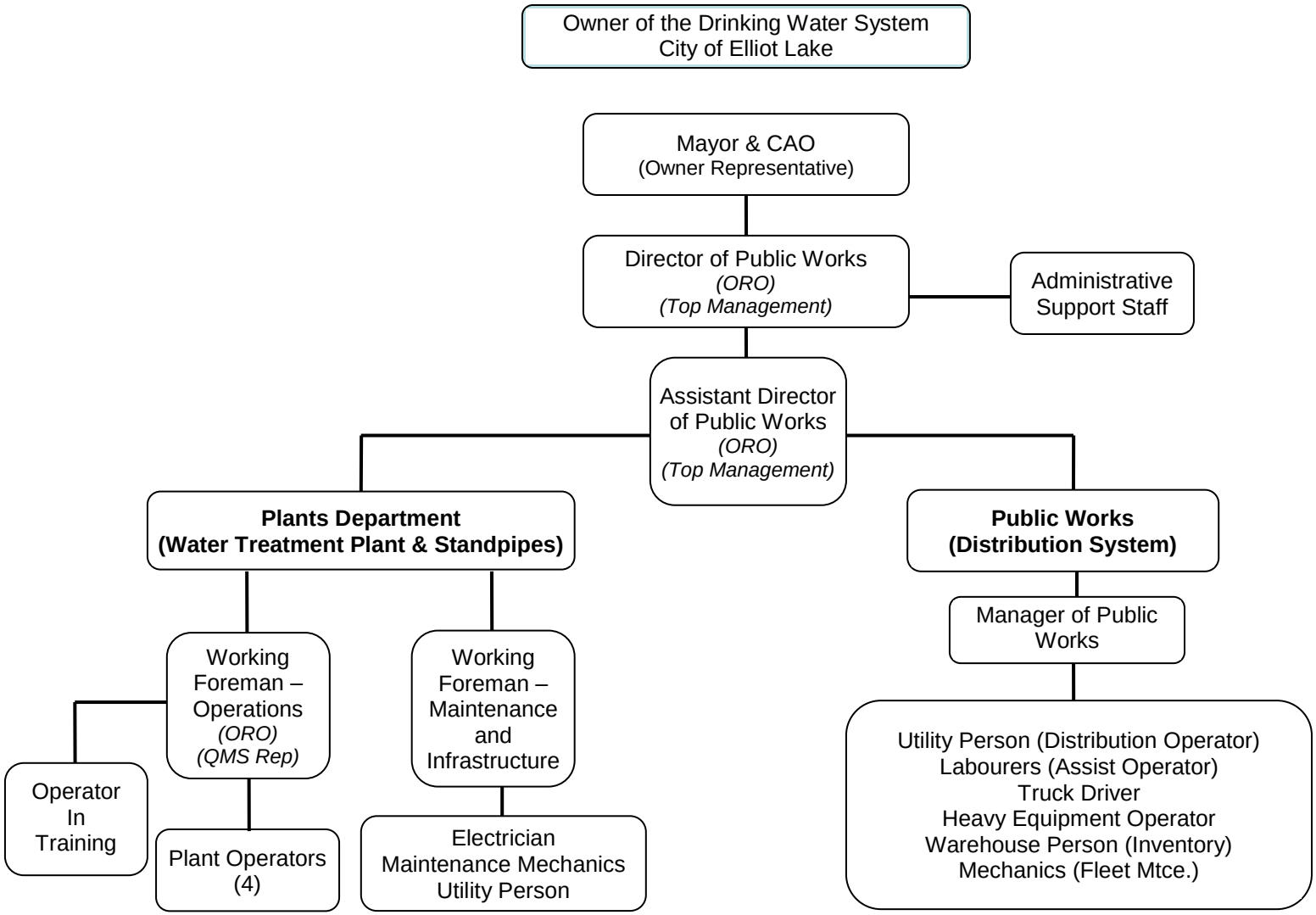
Organizational Structure
The organization flowchart below presents the structure of the Operating Authority.

QMS Roles, Responsibilities and Authorities
Responsibilities for implementing and maintaining individual elements of the QMS are outlined in the QMS Procedures referenced throughout this Operational Plan.

Responsibilities and authorities are outlined below:

Position	**Roles, Responsibilities and Authorities**
Owner / Owner Representatives	▪ Allocate the necessary resources for the safe operation of the drinking water system; ▪ Allocate the necessary resources to maintain the commitment to the QMS Policy; ▪ Establish administrative policies and by-laws for the protection of the drinking water system;
Director of Public Works ***Top Management***	• Act in capacity of ORO as required; • See Appendix L for details on Roles, Responsibilities and Authorities

Position	Roles, Responsibilities and Authorities
Assistant Director of Public Works ***Top Management***	See Appendix L for details on Roles, Responsibilities and Authorities
Working Foreman (Operations) ***QMS Rep***	
Working Foreman (Maintenance & Infrastructure)	
Water Treatment Plant Operators	
Operator In Training	
Maintenance Personnel Electrician Mechanics Utility Person	
Manager of Public Works	
Distribution Operators	
Support Staff	
All Staff	



Organization Structure of the Owner and Operating Authority

10 Competencies

Required competencies

Under SDWA, 2002 the regulation O. Reg. 128/04 outlines the requirement for the certification of Water Treatment and Water Distribution Operators.

The competencies required for personnel whose work directly affects drinking water quality are presented below:

Position	Required Competencies
Owner / Owner Representatives	• DWQMS Awareness
Director of Public Works ***Top Management***	See Appendix L for details on Competencies
Assistant Director of Public Works ***Top Management***	
Working Foreman (Operations) ***QMS Rep***	
Working Foreman (Maintenance and Infrastructure)	
Water Treatment Plant Operators	
Operator In Training	
Maintenance Personnel Electrician Mechanic Utility Person	
Manager of Public Works	
UT 1 Distribution Operator	
Support Staff	
All Staff	

Activities to develop and maintain these competencies

Each operator is responsible for keeping their own certifications current. In addition, certification expiry dates are monitored by the Operations support staff and the Working Foreman (Operations).

Plant staff meetings are held for all Plant staff, at which time competency issues are discussed and training needs planned for. Plant meeting minutes are recorded and kept. The Director of Public Works plans and arranges in-house training for staff to address identified training needs.

Every year operators plan for the training they have to take in order to keep their certification current. A training program is established and documented. Plant operator training is tracked by the Working Foreman (Operations) and records of all training and Continuing Education Units (CEUs) are kept by the Working Foreman (Operations).

Activities to ensure personnel are aware of the relevance of their duties

Further to on-going training, monthly safety meetings are held with Plant staff. In addition, the day to day job functions of each staff provides them with hands on experience of the relevance of their duties. All new staff members are provided orientation.

11 Personnel Coverage

Refer to Appendix C for QMS Procedure QMSP-03 Personnel Coverage.

12 Communications

Refer to Appendix D for QMS Procedure QMSP-04 Communications.

13 Essential Supplies and Services

Refer to Appendix E for QMS Procedure QMSP-05 Essential Supplies and Services.

14 Review and Provision of Infrastructure

Refer to Appendix F for QMS Procedure QMSP-06 Review and Provision of Infrastructure.

15 Infrastructure Maintenance, Rehabilitation and Renewal

The City of Elliot Lake Drinking Water System maintains a program of scheduled inspection and maintenance of infrastructure.

Maintenance plans are developed according to the manufacturer's instructions, regulatory requirements and industry standards. Equipment Operation and Maintenance (O&M) manuals are accessible to staff.

As a minimum, the following Maintenance Activities are conducted:

Water Treatment Plant Planned
- Intake pipe inspection, clean raw water well, testing of back-up diesel generator, calibration of meters/analyzers, valve and pump maintenance.

Water Treatment Plant Unplanned
- Undertake equipment cleaning and repairs as required.

Distribution System Planned
- Fire hydrant inspection and maintenance is done during the fall of each year with some hydrants winterized where required.
- Flushing is done on an annual basis with the most critical areas done on a priority basis.

Distribution System Unplanned
- Repairing of watermain breaks.
- Repairing of water service breaks, valves, and curb boxes.

In addition, service contracts are maintained with specialized service providers for proprietary equipment. These contracts call for the regular servicing of the specialized equipment on a scheduled basis and at any other time as required (see QMS Procedure QMSP-05 Essential Supplies and Services).

Water Treatment Plant planned maintenance is conducted and tracked in accordance with the Monthly/Quarterly/Semi-Annually Maintenance Form maintained by the Working Foreman of Maintenance and Infrastructure. Copies of All Maintenance performed are provided to the Director of Public Works for review.

The effectiveness of the maintenance system is relayed to the owner in the Summary Report required under Section 22 of Ont. Reg 170/03 which is presented to Council in the first quarter of each year.

Records of all maintenance activities are entered into the distribution system logbooks and the water treatment plant logbook.

Development of a Capital project list is devised by the Director of Public Works with information obtained from both a rate study conducted in 2015 and a revised Asset Management Plan completed in 2016, which help prioritize major infrastructure maintenance, rehabilitation and renewal activities throughout Water system.

The Working Foreman(s) communicate feedback, issues and concerns to the Assistant Director of Public Works. The Assistant Director of Public Works, along with the Director of Public Works monitor the effectiveness of the various programs on an ongoing basis and make adjustments as required where feasible. In addition, the effectiveness of the overall maintenance program is discussed at the Management Review meeting.

16 Sampling, Testing and Monitoring

Refer to Appendix G for QMS Procedure QMSP-07 Sampling, Testing and Monitoring.

17 Measurement and Recording Equipment Calibration and Maintenance

Refer to Appendix H for QMS Procedure QMSP-08 Measurement and Recording Equipment Calibration and Maintenance.

18 Emergency Management

Refer to Appendix I for QMS Procedure QMSP-09 Emergency Management.

19 Internal QMS Audits

Refer to Appendix J for QMS Procedure QMSP-10 Internal QMS Audits.

20 Management Review

Refer to Appendix K for QMS Procedure QMSP-11 Management Review.

21 Continual Improvement

Refer to Appendix P for QMS Procedure QMSP-13 Continual Improvement.