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QMS Representative:	Director of Water/Wastewater

Drinking Water Quality Management System Operational Plan Manual



The Township of South Glengarry
6 Oak Street, Lancaster, ON K0C 1N0

www.southglengarry.com

This Operational Plan Manual applies to the following municipal systems:

- The Glen Walter Drinking Water System,
- The Lancaster Drinking Water System, and
- The Redwood Estates Drinking Water System.

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1. Quality Management System

The Township of South Glengarry has developed this QMS Operational Plan Manual in response to the requirements of the Municipal Drinking Water Licensing Program under the Safe Drinking Water Act.

This manual, along with the procedures and other documents to which it refers, forms the basis of South Glengarry's Drinking Water Quality Management System (QMS). The scope of the operations covered by this Plan includes the following operational subsystems:

1. **The Glen Walter Drinking Water System,**
2. **The Lancaster Drinking Water System, and**
3. **The Redwood Estates Drinking Water System.**

Even though the facilities listed above are distinct operational subsystems as defined by the DWQMS, the Township of South Glengarry has included these facilities in a single Plan because they share common:

- Top Management,
- Operations Management,
- Operations Staff, and
- Ownership.

Where appropriate, this Operational Plan and its associated procedures make explicitly clear those areas where facility-specific information is being provided.

2. QMS System Policy

The following policy is recognized by the Township of South Glengarry as being an important foundational element of its Quality Management System. It will be communicated to the Owner (represented by the Mayor and Council of South Glengarry), operating authority personnel, goods and services providers and the public according to the QMS Communications Procedure (QMS SYS-P9) found in the Appendices of this document.

Drinking Water Quality Management System Policy

The Township of South Glengarry is committed to:

- Providing a safe and reliable supply of drinking water to all of its customers,
- Meeting or exceeding the requirements of all legislation and regulations applicable to drinking water, and
- Maintaining and continually improving its Quality Management System.

3. Commitment and Endorsement

This Operational Plan is endorsed by the system Owner and Operating Authority, the Township of South Glengarry.

The Mayor and Councilors of South Glengarry, representing the Owner, acknowledge their responsibility to ensure the provision of all necessary resources for the maintenance of:

- The waterworks infrastructure, and
- The Quality Management System.

Top Management of the Operating Authority commits to:

- Ensure a Quality Management System is in place that meets the requirements of the Drinking Water Quality Management Standard,
- Ensure that the Operating Authority is aware of all applicable legislative and regulatory requirements,
- Effectively communicate the Quality Management System according to the communications procedure in this Operational Plan, and
- Determine, obtain or provide the resources needed to maintain and continually improve the Quality Management System.

The DWQMS Representative, appointed by Top Management of the Operating Authority, understands and acknowledges the responsibilities inherent to the role, and commits to:

- Administer the Quality Management System by ensuring that processes and procedures needed for the Quality Management System are established and maintained,
- Report to Top Management on the performance of the Quality Management System and any need for improvement,
- Ensure that current versions of documents required by the Quality Management System are being used at all times,
- 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
- Promote awareness of the Quality Management System throughout the Operating Authority.

Signed, on behalf of the Owner

2019-10-22
Date

Frank Prewost
Mayor

2019-10-22
Date

Keel Campbell
Clerk

Signed, on behalf of the Operating Authority

2019-10-24
Date

Erin McDoned
General Manager - Infrastructure Services
(QMS Top Management)

2019-10-25
Date

A. G.
Director of Water/Wastewater Operations
(QMS Representative)

4. QMS Representative

Top Management of the Township of South Glengarry has appointed and authorized its Director of Water/Wastewater Operations, designate, as QMS Representative.

In addition to the commitment made in Element 3, Commitment and Endorsement, and the responsibilities detailed in Element 9, Organizational Structure, Roles, Responsibilities and Authorities, the Director of Water/Wastewater Operations acknowledges that the role of QMS Representative requires he/she to:

- Be familiar with the drinking-water system of the Township of South Glengarry,
- Have knowledge of best practices for drinking-water systems,
- Have a thorough understanding of the DWQMS,
- Demonstrate his understanding of the importance of management commitment,
- Be familiar with audit principles and what is needed to demonstrate that DWQMS requirements have been met to an auditor,
- Be familiar with applicable legislative and regulatory requirements, and
- Understand the importance of developing and maintaining good, open communication with Top Management.

5. Document and Records Control

The Township of South Glengarry recognizes effective document and records control as being a key element in the successful implementation and maintenance of its drinking water quality management system. With this in mind, comprehensive procedures for control of both documents (QMS SYS-P1) and records (QMS SYS-P2) have been developed and are included in the Appendices of this Plan.

The acknowledged benefits of the implementation of these procedures include:

- The integrity of the information contained in the Operational Plan is ensured.
- Training of new personnel is facilitated.
- Procedures are consistent in content, format, and currency, and are more likely to be correctly followed.
- The most up-to-date versions of documents are easily retrievable by the people who need them.
- Conformance audits and compliance inspections are facilitated.
- Due diligence is demonstrated.
- Owner and consumer confidence is promoted.
- Internal and external communications are facilitated.
- Decision making is made more focused and consistent.

Over time, the QMS Operational Plan and its associated procedures will change. Recognizing this, the QMS Representative will ensure that training of existing personnel and new hires includes these fundamental instructions to staff with respect to document control:

- Documents can be changed (by following the appropriate process) but records cannot,
- Always check that the version of the document you are using is the most current, and
- Always communicate changes that affect your drinking water system to the QMS Representative so that timely updates to the QMS can be made.

Document: includes a sound recording, video tape, film, photograph, chart, graph, map, plan, survey, book of account, and information recorded or stored by means of any device.

Record: a document stating results achieved or providing proof of activities performed.

6. Drinking Water System

As introduced earlier in this Operational Plan, the portfolio of drinking water assets owned and operated by the Township of South Glengarry and applicable under the Municipal Drinking Water Licensing Program includes three distinct operational subsystems:

1. **The Glen Walter Drinking Water System,**
2. **The Lancaster Drinking Water System, and**
3. **The Redwood Estates Drinking Water System.**

6.1 The Glen Walter Drinking Water System

System description:	Surface water filtered and conventionally treated
Capacity:	995 m3/day
Service area:	Glen Walter, ON
Service population:	1,080
Raw water source:	St. Lawrence River
Disinfection method:	Liquid Chlorine
Director of Water/ Wastewater Operations:	Designate

6.1.1 System Description

The Township Of South Glengarry Glen Walter Water Treatment Plant is located approximately two kilometres east of Cornwall along County Road 2. The water plant is a surface water treatment facility serving the community of Glen Walter. It has a rated capacity of 995 cubic meters of water per day for a design population of 1,080 people.

Raw water is consumed through a 300 millimeter intake pipe and intake crib approximately 390 meters off shore into the St. Lawrence River at a depth of approximately 12 meters. The water plant consist of two low lift pumps rated at 11.52 liters per second, one flocculation tank, two rapid sand filters, two carbon contactors, three compartment clear well reservoir, one backwash pump and two high lift pumps rated at 16.44 liters per second together with all associated piping, electrical and mechanical equipment, control and alarm systems all housed in a common building.

6.1.2 Owner and Operating Authority

- Owner: The Township of South Glengarry.
- Operating Authority: The Township of South Glengarry.

6.1.3 Description of Water Source

Raw Water Characteristics (2018 data)			
	Temperature °C	pH	Turbidity (NTU)
Average	8.9	7.93	0.84
Normal Range	1.43-22.47	7.74-8.03	0.29-0.97

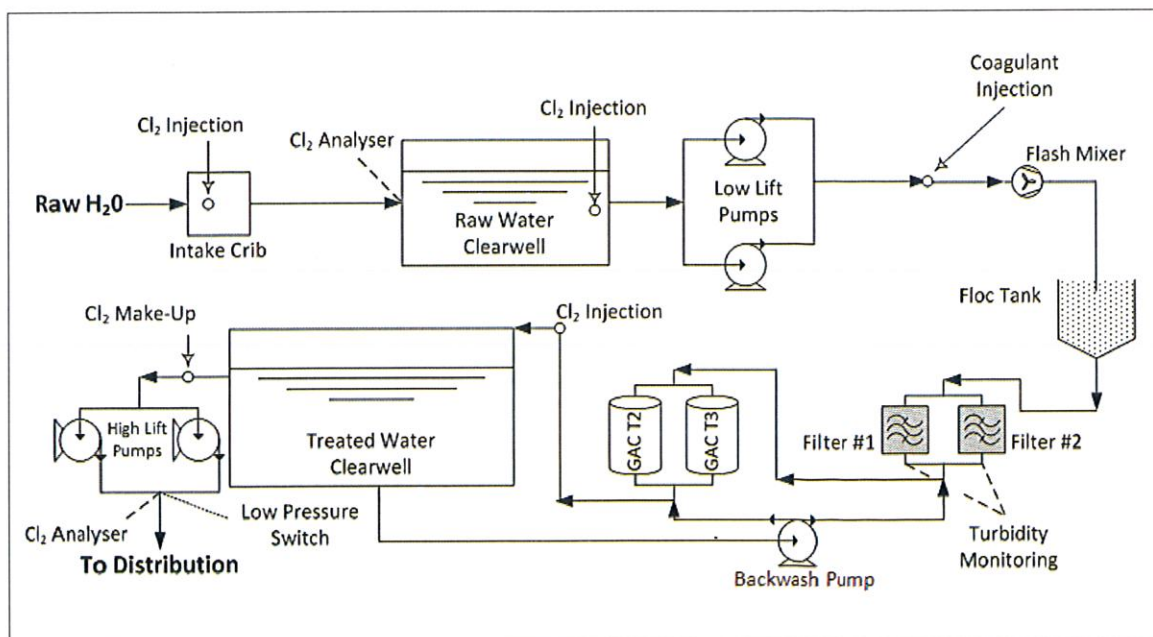
The raw water source is the St. Lawrence River. Raw water data demonstrates that the quality of the water is good and also stable. Temperature is the parameter that varies most widely (and predictably) and this impacts the CT of the treatment facility. Beyond that, there are no consistent and predictable operational challenges presented by the raw water.

6.1.4 Treatment Process

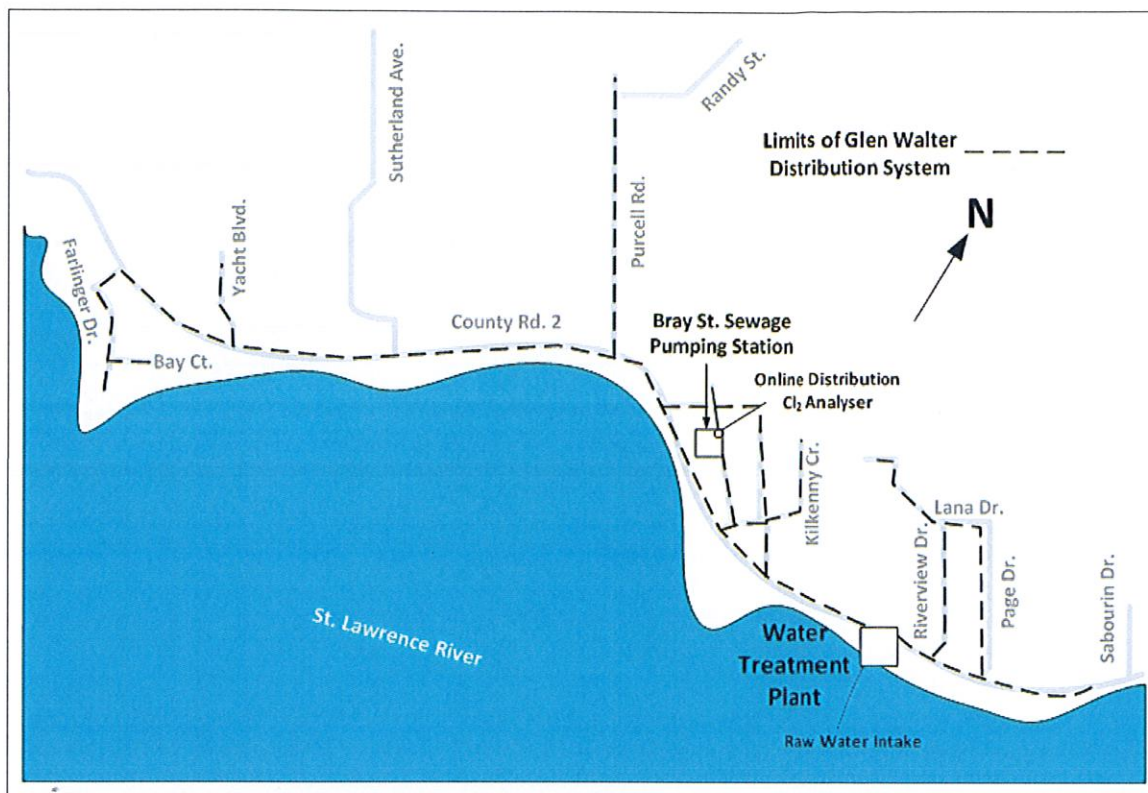
Raw water is pumped from the low lift pumping chamber, which is pre-chlorinated. A liquid coagulant is introduced into an in line flash mixer, then flows under pressure into a flocculation tank. When the coagulation flocculation process is complete, the water flows through rapid sand filters in parallel, and then through the carbon contactor series which removes any taste and odour in the drinking water.

Chlorine is added after the carbon contactors for post disinfection. The chlorinated (potable) water enters the three compartment storage reservoir and is then pumped to the distribution system via high lift pumps.

6.1.5 Process Flow Chart



6.1.6 Distribution System Schematic



6.2 The Lancaster Drinking Water System

System description:	Surface water conventionally treated, with elevated storage tank
Capacity:	1,440 m ³ per day
Service area:	Lancaster, ON
Service population:	1,218
Raw water source:	Lake St. Francis
Disinfection method:	Sodium Hypochlorite
Director of Water/ Wastewater Operations:	Designate

6.2.1 System Description

The Township Of South Glengarry, Lancaster Water Treatment Plant is located at 20523 Old Montreal Road in South Lancaster. The water treatment plant is

a surface water treatment facility serving the village of Lancaster and the Hamlet of South Lancaster. It has a rated capacity of 1,440 cubic meters of water per day for a design population of 1,218 people.

Raw water is consumed through a 450 mm intake pipe and wooden intake crib off the shore of Lake St. Francis at a depth of approximately 12 metres. The plant consist of three low lift pumps rated at 8.33 l/s one dual media anthracite sand gravity filter, one gravity granular activated carbon filter, three high lift pumps (two rated at 15.9 l/s and the third at 6.3 l/s) and two backwash pumps together with all associated piping, electrical equipment, controls and alarm systems all housed in a common building.

6.2.2 Owner and Operating Authority

- Owner: The Township of South Glengarry.
- Operating Authority: The Township of South Glengarry.

6.2.3 Description of Water Source

Raw Water Characteristics (2018 data)				
	Temperature °C	pH	Colour	Turbidity (NTU)
Average	10.8	8.3	0	0.47
Normal Range	2-21	7.23-8.22	0.33-1	0.2-.56

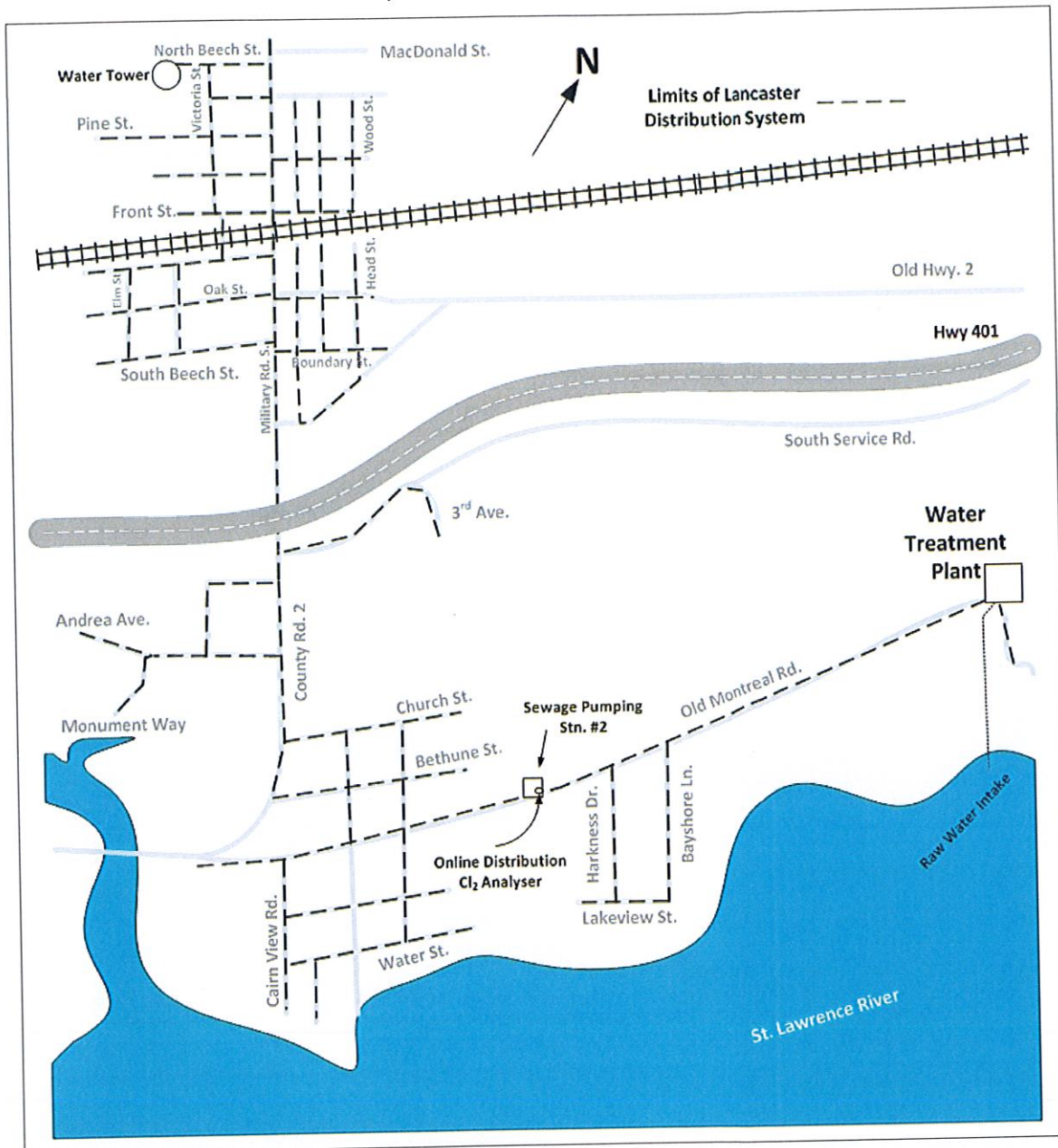
As with the Glen Walter Treatment Plant, the Lancaster Facility also draws its water from the St. Lawrence River. Also like Glen Walter, the seasonal swings in temperature are the only predictable challenges relating to the raw water supply.

6.2.4 Treatment Process

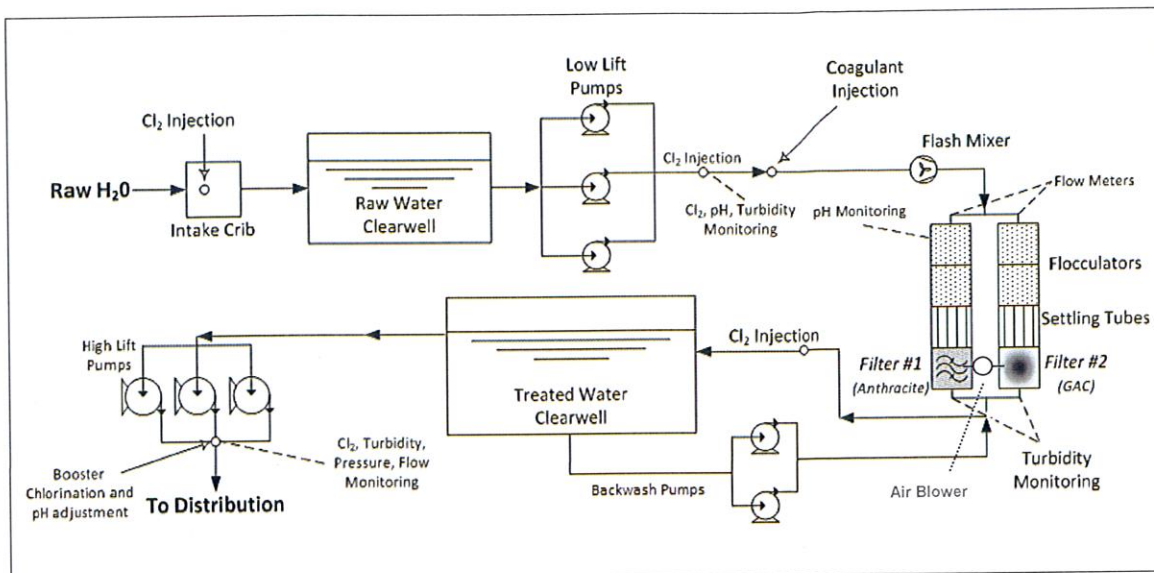
Raw water is pumped from the low lift chamber, which is pre chlorinated. A liquid coagulant is introduced into an in line flash mixer and then process water flows to two sets of coagulant/flocculators; clarifiers and filters each rated at 720 cubic meters per day.

The filtered water is then post chlorinated before it enters the twin celled reservoir. The treated (potable) water is pumped to the distribution system and also feeds an elevated storage tank located on North Beech Street.

6.2.5 Distribution System Schematic



6.2.6 Process Flow Chart



6.3 The Redwood Estates Drinking Water System

System description:	Ground water filtered and treated with liquid chlorine
Capacity:	151 m ³ per day
Service area:	Redwood Estates – east of Lancaster, ON
Service population:	140
Raw water source:	Ground water
Disinfection method:	Sodium Hypochlorite
Director of Water/ Wastewater Operations:	Designate

6.3.1 System Description

The Township Of South Glengarry, Redwood Estates Water Treatment Facility is located approximately 5 kilometres east of the Village of Lancaster. The water treatment plant is a ground water system serving the Redwood Estates subdivision. It has a rated capacity of 151 m³/day for a design population of 140 people.

Raw water is drawn from a single well located within the pump house with a submersible pump capable of delivering 118 l/min. The water treatment plant

consist of two Manganese greensand pressure filters, two hydro-pneumatic tanks, two high lift pumps, one booster pump and one backwash pump. All pumps have a rated capacity of 303 l/min and together with all associated piping, electrical equipment, controls and alarm systems are all housed in a common building.

6.3.2 Owner and Operating Authority

- Owner: The Township of South Glengarry.
- Operating Authority: The Township of South Glengarry.

6.3.3 Description of Water Source

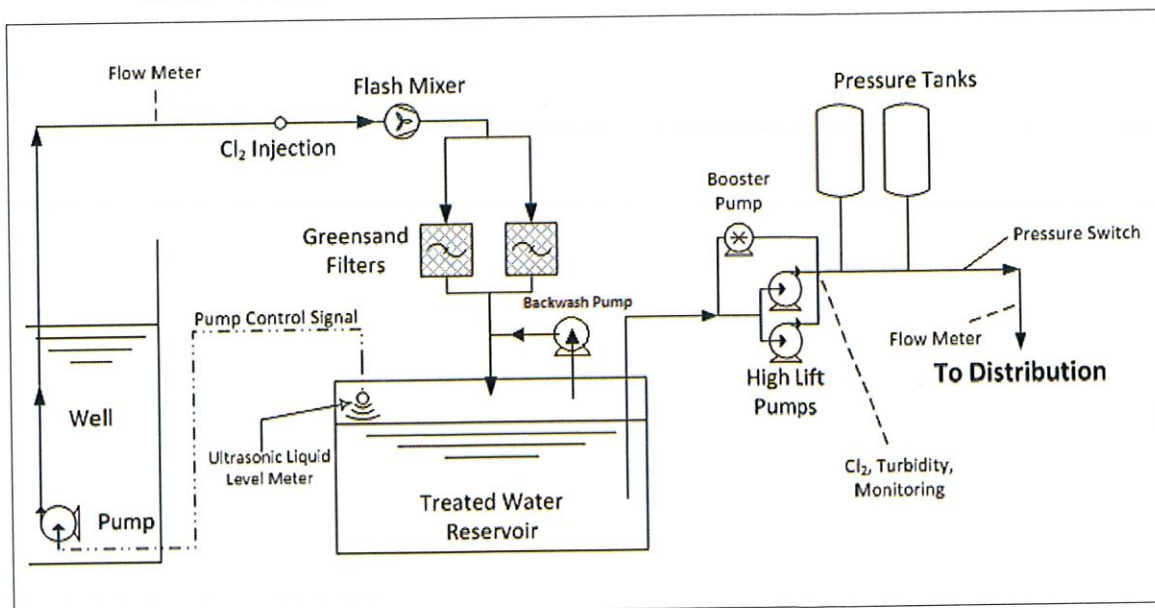
Raw Water Characteristics (2018 data)				
	Temperature °C	pH	Colour	Turbidity (NTU)
Average	9.5	7.58	0	0.71
Normal Range	8-9.75	7.5-7.73	0.07-0.5	0.31-1.02

The quality and quantity of water from the well that supplies the Redwood Estates Water Treatment Facility is good and stable. Agricultural land in the vicinity is the only predictable threat relating to source water, as the naturally variable drinking water parameters are quite steady throughout the year.

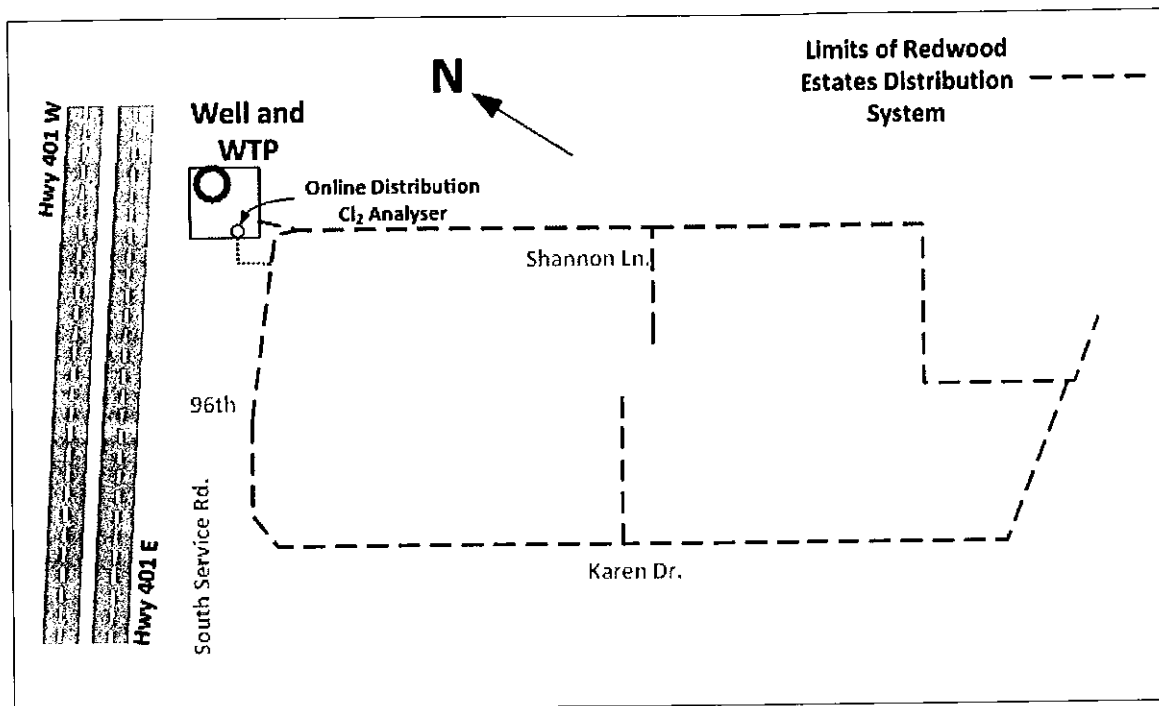
6.3.4 Treatment Process

Raw water is drawn from the single well where Sodium Hypochlorite is introduced and flash mixed for disinfection. Following the disinfection period water then flows through the Greensand filters removing all other impurities. Water then flows to a 25 cubic meter underground storage reservoir to be pumped to the distribution system.

6.3.5 Process Flow Chart



6.3.6 Distribution System Schematic



7. Risk Assessment

The Township of South Glengarry recognizes that one of the key purposes of the QMS standard is to encourage system operators to identify, assess, manage and communicate the risks inherent to drinking water systems. In keeping with this purpose and its requirements, the Township of South Glengarry has developed a QMS Risk Assessment Procedure (QMS SYS-P8) and included it in the Appendices of this Operational Plan. The procedure provides a means for consistently assessing risk, and presents an opportunity for management to focus its drinking water resources more effectively based on the results of the Risk Assessment process.

The outcomes of the most recent Risk Assessment process are discussed and summarized in Element 8 of this document.

8. Risk Assessment Outcomes

Using the QMS Risk Assessment Procedure (QMS SYS-P8), the Township of South Glengarry's drinking water facilities have been evaluated to identify and quantify potential risks to drinking water quality.

As described in the procedure, complete risk assessments are conducted separately for each individual subsystem. What appears in this section of the Operational Plan are the risk assessment outcomes summarized by drinking water system. Again, the systems are:

1. **The Glen Walter Drinking Water System,**
2. **The Lancaster Drinking Water System, and**
3. **The Redwood Estates Drinking Water System.**

The Drinking Water Quality Management Standard (DWQMS) requires that the following outcomes of the risk assessment be documented:

- Potential hazardous events and associated hazards,
- Assessed risks associated with the occurrence of hazardous events,
- A ranking of the hazardous events that have been identified,
- The identified control measures to address the potential hazards and hazardous events,
- The identified critical control points and their respective critical control limits,
- Procedures and/or processes to monitor the critical control limits,
- Procedures to respond to deviations from the critical control limits, and
- Procedures for reporting and recording deviations from the critical control limits.

For ease of reading and to facilitate simpler updating of this document, each operational subsystem's comprehensive risk assessment outcomes (completed QMS SYS-F4 forms) are included in the Appendices of this document, as are the relevant procedures relating to critical control points (CCPs) and limits. Tables of ranked hazards and a list of identified CCPs are included in this section of the Operational Plan, summarized by subsystem.

8.1 The Glen Walter Drinking Water System

8.1.1 Ranked Hazards Table *(presented in declining order of risk)*

Process Step	Hazard/Hazardous Event	Result	Detectability	Severity	Likelihood	Total	CCP?
Distribution	Cross connection	Possible contamination	5	5	5	15	No
Distribution	Backflow	Possible contamination	5	5	4	14	No
Raw Water	Contamination/Chemical spill	Contamination of raw water supply	5	5	2	12	No
Clearwell	Reservoir contamination	Contamination of treated water	5	5	1	11	No
System	Terrorism	Possible contamination or loss of potable water	5	5	1	11	No
Distribution	Sustained pressure loss (water main break)	Loss of pressure, possible contamination	1	5	2	8	No
Primary Chlorination	Chlorine feed system failure	Loss of disinfection, loss of ct value	1	5	1	7	Yes
Primary Chlorination	General mechanical failures: chlorine failure, piping water supply	Loss of disinfection	1	5	1	7	No
Entire System	Power failure	Total loss of treated water (if generator is not functional)	1	5	1	7	No
Entire System	Extreme weather events	Damaged equipment	1	5	1	7	No
System	Vandalism	Possible contamination or loss of potable water	1	5	1	7	No
System	Manpower shortage	Loss of treatment	1	5	1	7	No
Distribution	Loss of chlorine residual	Possible loss of potable water	1	5	1	7	Yes
Raw Water	Water supply shortfall	Loss of raw water	1	5	1	7	No
Filtration - GAC	Filter clogging (taste and odour)	Filter clogging	4	1	1	6	No
Backwash	Pump failure	Filter blockage	1	2	2	5	No
Filtration	Filter vessel failure	Loss of process water	3	1	1	5	No
High Lift	Chlorine Analyzer failure	Loss of potable water (distribution of possibly un-chlorinated water)	1	2	1	4	No
Filtration	Piping failure	Loss of process water	2	1	1	4	No
Entire System	Long term impacts of climate change	Loss of raw water supply	1	2	1	4	No
Raw Water	Screen plugging, raw water intake line crushed, intake plugged or broken, zebra mussel build-up	Loss of raw water supply	1	1	1	3	No

Process Step	Hazard/Hazardous Event	Result	Detectability	Severity	Likelihood	Total	CCP?
Raw Water	WTP screens plugging	Loss of raw water supply	1	1	1	3	No
Raw Water	Algal Blooms	Filter Clogging	1	1	1	3	No
Raw Water	Sudden changes to raw water characteristics	Treatment deficiency	1	1	1	3	No
Low Lift	Pump failure	Loss of raw water supply	1	1	1	3	No
Low Lift	PLC failure	Loss of raw water supply	1	1	1	3	No
Filtration	Valve or actuator failure	Loss of process water	1	1	1	3	No
Filtration	PLC failure	Loss of process water	1	1	1	3	No
Filtration	Coagulant pump failure	Loss of coagulation	1	1	1	3	No
Filtration	Filter media loss	High turbidity	1	1	1	3	Yes
Backwash	PLC failures	Failure to backwash	1	1	1	3	No
Backwash	Valve actuator failure	Fail to backwash, filter plugging, high turbidity	1	1	1	3	No
High Lift	Pump failure	Loss of potable water	1	1	1	3	No
High Lift	Pressure regulating valve failure	System pressure loss	1	1	1	3	No
Entire System	Sustained extreme temperatures	Damaged equipment	1	1	1	3	No
Control Systems	Loss of PLC	Filtration system shut down	1	1	1	3	No

8.1.2 Critical Control Points (CCPs)

The critical threshold was set at “7”. In this case, a number of hazards identified whose total risk met or exceeded the threshold were contingency situations and offered little operator opportunity to monitor, control or mitigate the hazard in real time. They are discussed in the following section under “Exclusions”.

Two points exceeded the risk threshold, but offered operators an opportunity to monitor, control or mitigate the hazard:

- **Primary Chlorination** (chlorine feed system failure), and
- **Distribution** (loss of chlorine residual).

The procedures that address how these points are monitored and controlled are included with the Appendices of this Plan as the QMS Primary Chlorination CCP Procedure (QMS OP-P1), and the QMS Distribution Systems Chlorine Residual CCP Procedure (QMS OP-P3).

8.1.3 Rationale for Inclusion/Exclusion of CCPs

Exclusions

Several hazards/hazardous events exceeded the risk threshold, but the process steps to which they belong were not deemed to be CCPs:

- **Cross Connection** (Distribution),
- **Contamination** (Raw Water),
- **Reservoir Contamination** (Clear Well),
- **Terrorism** (System),
- **Break in Distribution** (Distribution),
- **General Mechanical Failure** (Primary Chlorination),
- **Power Failure** (Entire System),
- **Vandalism** (System),
- **Manpower Shortage** (System), and
- **Fire** (Entire System).

These events were excluded from consideration as critical control points as no effective and timely controls are in place to prevent or mitigate them. As such, they have been classified as *emergency* situations, and included for discussion in the QMS Emergency Management Procedure (QMS SYS-P10).

Inclusions

Filtered Water Turbidity was included for discussion as a critical control point as it meets the MOECP's requirements for a minimum CCP. The procedure that addresses how turbidity is monitored and controlled is included with the Appendices of this Plan as the QMS Filtered Water Turbidity CCP Procedure (QMS OP-P2).

8.2 The Lancaster Drinking Water System

8.2.1 Ranked Hazards Table (*presented in declining order of risk*)

Process Step	Hazard/Hazardous Event	Result	Detectability	Severity	Likelihood	Total	CCP?
Distribution	Cross connection	Possible contamination	5	5	5	15	No
Distribution	Backflow	Possible contamination	5	5	4	14	No
Raw Water	Contamination/Chemical spill	Contamination of raw water supply	5	5	2	12	No
Clearwell	Reservoir contamination	Contamination of treated water, loss of potable water	5	5	1	11	No
System	Terrorism	Possible contamination or loss of potable water	5	5	1	11	No
Water Tower	Possible contamination from birds, animals, or vandalism	Possible contamination	5	5	1	11	No
Distribution	Sustained pressure loss (water main)	Loss of pressure, possible	1	5	3	9	No

Process Step	Hazard/Hazardous Event	Result	Detectability	Severity	Likelihood	Total	CCP?
	break)	contamination					
Primary Cl ₂	Chlorine feed system failure	Loss of disinfection, loss of ct value	2	5	2	9	Yes
High Lift	Pressure regulating valve failure	System pressure loss, if Tower out of service	1	5	1	7	No
Raw Water	Water supply shortfall	Loss of water supply	1	5	1	7	No
Entire System	Fire	Loss of treated water	1	5	1	7	No
Entire System	Extreme weather events	Damaged equipment	1	5	1	7	No
System	Vandalism	Possible contamination or loss of potable water	1	5	1	7	No
System	Manpower shortage	Loss of treatment	1	5	1	7	No
Distribution	Loss of chlorine residual	Possible loss of potable water	1	5	1	7	Yes
Water Tower	Water line break	Loss of treated water	1	5	1	7	No
Water Tower	Structural fault	Loss of water pressure and ability to fight fires	1	5	1	7	No
Entire System	Power failure	Loss of transmission of treated water and ability to process water	1	3	2	6	No
Filtration	Filter vessel failure	Loss of process water	3	1	1	5	No
Entire System	Long term impacts of climate change	Loss of raw water supply	1	2	1	4	No
Raw Water	Screen plugging, raw water intake line crushed, intake plugged or broken, zebra mussel chlorination system failure	Loss of raw water supply	1	1	1	3	No
Raw Water	Algal blooms	Filter clogging	1	1	1	3	No
Raw Water	Sudden changes to raw water characteristics	Treatment deficiency	1	1	1	3	No
Raw Water	WTP screens plugging	Loss of raw water supply	1	1	1	3	No
Low Lift	Pump failure	Loss of raw water supply	1	1	1	3	No
Low Lift	PLC failure	Loss of raw water supply	1	1	1	3	No
Filtration	Piping failure	Loss of process water	1	1	1	3	No
Filtration	Valve or actuator failure	Loss of process water	1	1	1	3	No

Process Step	Hazard/Hazardous Event	Result	Detectability	Severity	Likelihood	Total	CCP?
Filtration	PLC failure	Loss of process water	1	1	1	3	No
Filtration	Coagulant pump or piping failure	Loss of coagulation	1	1	1	3	No
Filtration	Flocculator failure	Loss of proper mixing	1	1	1	3	No
Filtration	Filter media loss	High turbidity	1	1	1	3	Yes
Filtration	Filter clogging (taste and odour process step) or filter out of service	Filter clogging	1	1	1	3	No
Backwash	Pump failure	Filter clogging or blockage	1	1	1	3	No
Backwash	PLC failures	Failure to backwash	1	1	1	3	No
Backwash	Valve actuator failure	Fail to backwash, filter plugging, high turbidity	1	1	1	3	No
Primary Chlorination	Pump failure	Loss of disinfection	1	1	1	3	No
High Lift	Pump failure	Loss of potable water	1	1	1	3	No
High Lift	Chlorine Analyzer failure	Possible loss of potable water (distribution of possibly unchlorinated water)	1	1	1	3	No
Entire System	Sustained extreme temperatures	Damaged equipment	1	1	1	3	No
Control Systems	Loss of PLC	Loss of WTP abilities	1	1	1	3	No
Control Systems	Loss of SCADA	Loss of filtration process	1	1	1	3	No

8.2.2 Critical Control Points (CCPs)

The critical threshold was set at “7”. In this case, a number of hazards identified whose total risk met or exceeded the threshold were contingency situations and offered little operator opportunity to monitor, control or mitigate the hazard in real time. They are discussed in the following section under “Exclusions”.

Two points exceeded the risk threshold, but offered operators an opportunity to monitor, control or mitigate the hazard:

- **Primary Chlorination** (chlorine feed system failure), and
- **Distribution** (loss of chlorine residual).

The procedures that address how these points are monitored and controlled are included with the Appendices of this Plan as the QMS Primary

Chlorination CCP Procedure (QMS OP-P1), and the QMS Distribution Systems Chlorine Residual CCP Procedure (QMS OP-P3).

8.2.3 Rationale for Inclusion/Exclusion of CCPs

Exclusions

Several hazards/hazardous events exceeded the risk threshold, but the process steps to which they belong were not deemed to be a CCPs:

- **Cross Connection** (Distribution),
- **Contamination** (Raw Water),
- **Reservoir Contamination** (Clear Well),
- **Terrorism** (System),
- **Contamination** (Water Tower),
- **Break in Distribution** (Distribution),
- **Pressure Regulating Valve Failure** (High Lift),
- **Fire** (Entire System),
- **Vandalism** (System),
- **Manpower Shortage** (System),
- **Water Line Break** (Water Tower), and
- **Structural Fault** (Water Tower).

Inclusions

Filtered Water Turbidity was included for discussion as a critical control point as it meets the MOECP's requirements for a minimum CCP. The procedure that addresses how turbidity is monitored and controlled is included with the Appendices of this Plan as the QMS Filtered Water Turbidity CCP Procedure (QMS OP-P2).

8.3 The Redwood Estates Drinking Water System

8.3.1 Ranked Hazards Table *(presented in declining order of risk)*

Process Step	Hazard/Hazardous Event	Result	Detectability	Severity	Likelihood	Total	CCP?
Distribution	Cross connection	Possible contamination of treated water	5	5	5	15	No
Distribution	Backflow	Possible contamination of treated water	5	5	4	14	No
Raw Water	Source water contamination	Contamination of source supply	5	5	1	11	No
Clearwell	Contamination/Chemical spill	Loss of potable water	5	5	1	11	No
Security	Terrorism	Possible loss of treated water, contamination of treated water, loss of WTP	5	5	1	11	No
Raw Water	Low level well	Loss of supply	1	5	1	7	No

Process Step	Hazard/Hazardous Event	Result	Detectability	Severity	Likelihood	Total	CCP?
Chlorination	Chlorine feed system failure	Loss of disinfection	1	5	1	7	Yes
Clearwell	Chlorine analyzer failure	Possible distribution of unchlorinated water, loss of potable water	1	5	1	7	No
Distribution	Loss of chlorine residual	Possible contamination of potable water	1	5	1	7	Yes
Distribution	Sustained pressure loss	Loss of pressure, possible contamination of water	1	5	1	7	No
Security	Vandalism	Possible contamination	1	5	1	7	No
Security	Building damaged by vehicle	Loss of WTP	1	5	1	7	No
Entire System	Extreme weather events	Damaged equipment	1	5	1	7	No
Manpower	Personnel shortage	Loss of treated water	1	5	1	7	No
Raw Water	Well pump failure	Loss of raw water supply	1	3	2	6	No
Entire System	Power failure	Loss of treated water	1	2	2	5	No
Entire System	Treatment system piping failure	Loss of treated water	1	2	1	4	No
Entire System	Long term impacts of climate change	Loss of water supply	1	2	1	4	No
Raw Water	Raw water feed line break	Loss of raw water supply	1	1	2	4	No
Raw Water	Check valve failure	Loss of raw water supply	1	1	2	4	No
Raw Water	Communication failure between WTP and well	Loss of raw water supply	1	1	1	3	No
Raw Water	Sudden changes to raw water characteristics	Treatment deficiency	1	1	1	3	No
Filtration	Valve failure	Loss of process water	1	1	1	3	No
Filtration	Piping failure	Loss of process water	1	1	1	3	No
Backwash	Power failure	Filter clogging, increased turbidity	1	1	1	3	No
High Lift	Power failure	Loss of pumps, loss of treated water	1	1	1	3	No
High Lift	Pump failure	Loss of treated water	1	1	1	3	No
High Lift	Pump failure (pumps #2 and #3)	Loss of back-up water supply	1	1	1	3	No
High Lift	Power failure (pumps #2 and #3)	Loss of back-up water supply	1	1	1	3	No
Entire System	Sustained extreme temperatures	Damaged equipment	1	1	1	3	No
Bladder Tanks	Failure of piping, bladder tanks	Loss of pressure control	1	1	1	3	No
Pressure Controls	Pressure tanks or pressure line burst	Loss of pressure	1	1	1	3	No
Control Systems	Power failure	Loss of process water	1	1	1	3	No

8.3.2 Critical Control Points (CCPs)

The critical threshold was set at “7”. In this case, a number of hazards identified whose total risk met or exceeded the threshold were contingency situations and offered little operator opportunity to monitor, control or mitigate the hazard in real time. They are discussed in the following section under “Exclusions”.

Two points exceeded the risk threshold, but offered operators an opportunity to monitor, control or mitigate the hazard:

- **Primary Chlorination** (chlorine feed system failure), and
- **Distribution** (loss of chlorine residual).

The procedures that address how these points are monitored and controlled are included with the Appendices of this Plan as the QMS Primary Chlorination CCP Procedure (QMS OP-P1), and the QMS Distribution Systems Chlorine Residual CCP Procedure (QMS OP-P3).

8.3.3 Rationale for Inclusion/Exclusion of CCPs

Exclusions

Several hazards/hazardous events exceeded the risk threshold, but the process steps to which they belong were not deemed to be a CCPs:

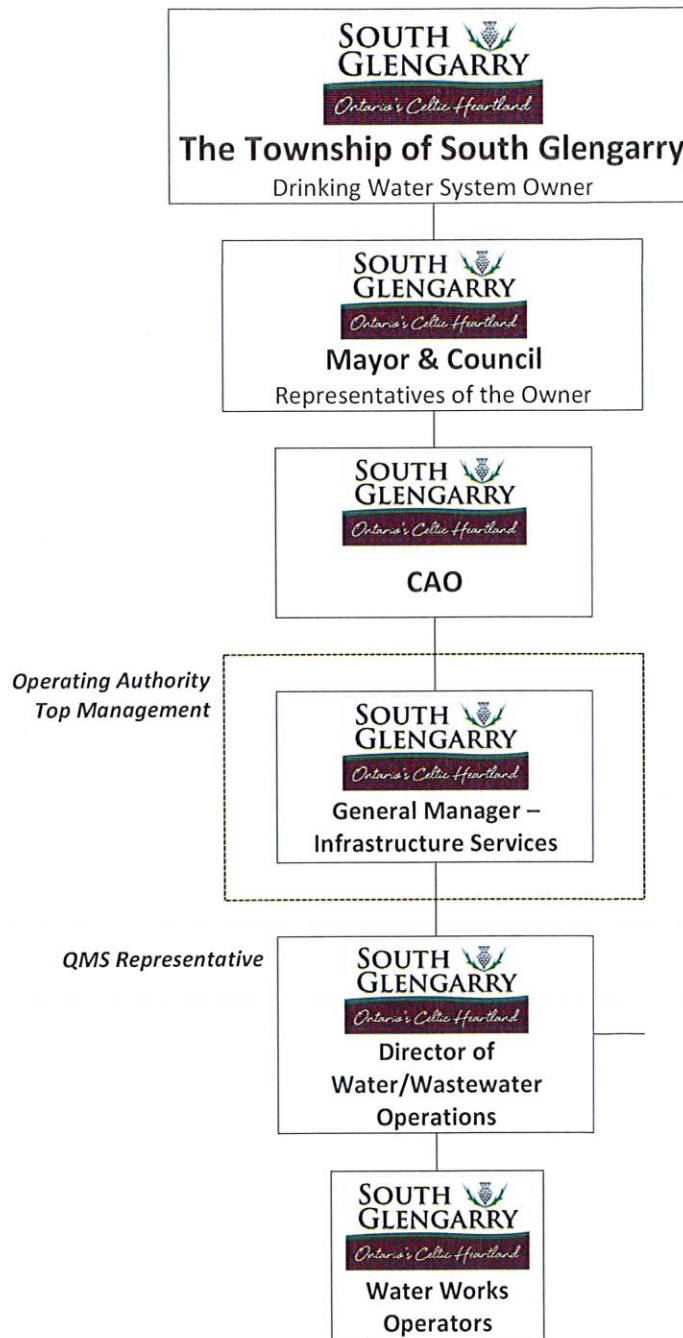
- **Cross Connection** (Distribution),
- **Source Water Contamination** (Raw Water),
- **Contamination** (Clear Well),
- **Terrorism** (Security),
- **Low Level Well** (Raw Water),
- **Chlorine Analyser Failure** (Clearwell),
- **Distribution Line Break** (Distribution),
- **Vandalism** (Security),
- **Building Damaged by Vehicle** (Security), and
- **Personnel Shortage** (Manpower).

Inclusions

Filtered Water Turbidity was included for discussion as a critical control point as it meets the MOECP’s requirements for a minimum CCP. The procedure that addresses how turbidity is monitored and controlled is included with the Appendices of this Plan as the QMS Filtered Water Turbidity CCP Procedure (QMS OP-P2).

9. Organizational Structure, Roles, Responsibilities and Authorities

9.1 Organizational Structure



9.2 Drinking Water System Owner

The Township of South Glengarry is the Drinking Water System Owner.

9.3 Top Management

The DWQMS defines Top Management by the following criteria:

- They work within the Operating Authority,
- They will make decisions about the QMS,
- They will make recommendations to the Owner about the subject system or subject systems, and
- They are at the highest level of management within the Operating Authority making these decisions and recommendations.

In South Glengarry, Drinking Water Top Management team is a position held solely by the General Manager – Infrastructure Services.

9.4 Responsibility for Management Review

The Management Review process is described in the QMS Management Review Procedure (QMS SYS-P12). Key responsibilities pertaining to this process are detailed below and are also contained within the procedure.

9.4.1 Top Management

Top Management responsible for:

- Ensuring that a Management Review is conducted at least once every twelve months,
- Selecting participants for the management review,
- Leading the Review, and
- Communicating the Review's outcomes to the System Owner, represented by the Township's Mayor and Councillors.

9.4.2 QMS Representative

With respect to the Management Review, the QMS Representative is responsible for:

- Ensuring that all information required for the Review is made available to the Review participants as per the QMS Management Review Procedure (QMS SYS-P12), and
- Participating in the Management Review itself.

9.5 Roles, Responsibilities and Authorities

9.5.1 The Township of South Glengarry (Owner), represented by Mayor and Council

Responsibilities	Authorities
<p>Overall responsibility to provide safe and reliable drinking water to the customers of South Glengarry.</p> <p>Ensure the provision of all necessary resources for the maintenance of the waterworks infrastructure and the Quality Management System.</p> <p>Endorse the QMS Operational Plan.</p> <p>Ensure that an accredited Operating Authority is in place for each Operational Subsystem within its drinking water portfolio.</p>	<p>Delegate the management of the drinking water system to qualified staff.</p> <p>Overall administrative and financial authority relating to the drinking water system.</p> <p>Recommend changes to the Operating Authority's QMS Operational Plan.</p>

9.5.2 Top Management

Responsibilities	Authorities
<p>Ensure that the Drinking Water Operational Subsystems are being operated in compliance with current regulations and that a safe and reliable supply of water is being provided to customers of South Glengarry.</p> <p>Ensure a Quality Management System is in place that meets the requirements of the Drinking Water Quality Management Standard.</p> <p>To ensure a QMS Representative is in place.</p> <p>Effectively communicate the Quality Management System according to the QMS Communications Procedure (QMS SYS-P9).</p> <p>Determine, obtain or provide the resources needed to maintain and continually improve the Quality Management System and communicate these needs to the Owner.</p> <p>Lead the Management Review of the QMS and communicate its outcomes to the Owner according to the QMS Management Review Procedure (QMS SYS-P12).</p> <p>Lead the annual Infrastructure Review using the QMS Review and Provision of Infrastructure Procedure (QMS SYS-P3) and the QMS Infrastructure Maintenance, Rehabilitation & Renewal Procedure (QMS SYS-P4).</p>	<p>To act as financial and administrative authority relating to the drinking water system(s).</p> <p>Ensure that staff is in place to effectively manage the Operational Subsystems and the QMS.</p> <p>To appoint a QMS Representative.</p> <p>To communicate with regulatory bodies on legal and compliance issues relating to drinking water.</p> <p>To conduct the QMS Management Review.</p> <p>To recommend changes to the QMS Operational Plan.</p> <p>To Lead, conduct, or commission analysis of the Operational Subsystems to enable effective long term planning and budgeting relating to staffing and infrastructure, maintenance and capital work, and communicate the outcomes of these reviews to the Owner.</p>

9.5.3 Director of Water/Wastewater Operations (see also: QMS Representative)

Responsibilities	Authorities
<p>Directs the overall planning, co-ordination and control of the technical activities and business affairs of the Water Operations Department.</p> <p>Ensure that bylaws, policies and procedures of the Township are complied with by Staff.</p> <p>Ensure adequate staffing levels of competent Operators.</p> <p>Adhere to current regulations, record and report system conditions to Top Management as required.</p> <p>Ensure that Staff is aware of all applicable legislative and regulatory requirements that pertain to their duties for the operation of the subject systems.</p> <p>Conduct, at a minimum, annual assessments of operator competency.</p> <p>Ensure a Quality Management System is in place that meets the requirements of the Drinking Water Quality Management Standard.</p> <p>Promote awareness of the Quality Management System throughout the Operating Authority.</p> <p>Determine, obtain or provide the resources needed to maintain and continually improve the Quality Management System and communicate these needs to Top Management.</p>	<p>To assume command of emergency situations in the Operational Subsystems.</p> <p>To prepare responses to regulatory bodies on legal and compliance issues relating to drinking water.</p> <p>To direct the activities of Operators in day to day operations and maintenance.</p> <p>To communicate with regulatory bodies on legal and compliance issues relating to drinking water.</p> <p>To make changes to the QMS Operational Plan.</p> <p>To hire, train and discipline operators.</p>

9.5.4 QMS Representative

Responsibilities	Authorities
<p>Administer the Quality Management System by ensuring that processes and procedures needed for the Quality Management System are established and maintained.</p> <p>Report to Top Management on the performance of the Quality Management System and any need for improvement.</p> <p>Identify and communicate (to Top Management) resources needed for the continued operation and improvement of the QMS.</p> <p>Promote awareness of the Quality Management System throughout the Operating Authority.</p> <p>Ensure that current versions of documents required by the Quality Management System are being used at all</p>	<p>To change, update and improve the QMS Operational Plan and to approve QMS documents.</p>

Responsibilities	Authorities
<p>times as per the QMS Document Control Procedure (QMS SYS-P1).</p> <p>Participate in the annual Infrastructure Review, led by Top Management, in keeping with QMS SYS-P3 and QMS SYS-P4.</p> <p>Collect and provide information to Top Management for use in the Management Review and participate in the Review itself according to QMS SYS-P12.</p> <p>Schedule annual reviews of operator competency.</p> <p>Additional responsibilities as specified by QMS procedures. This includes overall responsibility for the Risk Assessment and Internal Audit processes.</p>	

9.5.5 Operators

Responsibilities	Authorities
<p>Operate, monitor and maintain the water works system.</p> <p>Collect samples, perform testing and adjust treatment processes as required.</p> <p>Maintain required certification for Treatment & Distribution System Operation (as applicable), as per the Ministry of the Environment regulations.</p> <p>Conduct daily operational duties in compliance with current regulations.</p> <p>Act upon, record and report incidents of non-compliance with regulations as per O. Reg 170/03 and O. Reg 128/04.</p> <p>Ensure that the documents (procedures, forms) used in day-to-day operations are the appropriate version as described in the QMS Document Control Procedure (QMS SYS-P1).</p> <p>Report document errors and omissions to the QMS Representative.</p> <p>Understand the QMS and be able to describe their role within it to auditors and inspectors.</p> <p>Attend training as required and scheduled by QMS Representative to maintain licenses. Obtain records of training and provide these records to the QMS Representative.</p>	<p>Collect samples and perform testing within the Operational Subsystems to ensure the provision of safe and reliable drinking water.</p> <p>Respond to water-related issues raised by customers as required.</p> <p>Recommend changes to the QMS Operational Plan.</p>

10. Competencies

Competence: the combination of observable and measurable knowledge, skills, and abilities which are required for a person to carry out assigned responsibilities.

10.1 Identifying Required Competencies

The following table identifies the minimum competencies of Staff whose roles directly impact the provision of safe and reliable drinking water in South Glengarry.

Role	Required Competencies
General Manager – Infrastructure Services (Top Management)	An advanced theoretical and working knowledge of the Safe Drinking Water Act and applicable regulations. Ability to effectively communicate QMS and Regulatory issues to staff, Council and external agencies.
Director of Water/Wastewater Operations (see also: QMS Representative)	An advanced theoretical and working knowledge of the Safe Drinking Water Act and applicable regulations. Ability to effectively communicate QMS and Regulatory issues to staff, Council and external agencies. High level of knowledge of the Safe Drinking Water Act and applicable regulations sufficient to identify, report, and respond to adverse drinking water conditions when they occur. High level of technical knowledge of the Township's drinking water systems sufficient to prevent and/or mitigate hazards to drinking water safety. Thorough understanding of the DWQMS and QMS Operational Plan. Minimum Class 2 Treatment License. Minimum Class 2 Distribution License. Valid driver's license.
QMS Representative	Thorough understanding of DWQMS and QMS Operational Plan. QMS and QMS Internal Audit Training. A working knowledge of the Safe Drinking Water Act and applicable regulations sufficient to interpret, understand and communicate, as required, all QMS references to them. High level of administrative capabilities, strong written communication abilities and computer skills.

Role	Required Competencies
Operators	<p>A working knowledge of the Safe Drinking Water Act and applicable regulations sufficient to identify, report, and respond to adverse drinking water conditions when they occur.</p> <p>Technical knowledge of the drinking water systems operated by the Township sufficient to prevent and/or mitigate hazards to drinking water safety.</p> <p>Strong understanding of what is required to operate and maintain the drinking water facilities that the Township operates. Operators must know how to keep the plants running, and keep them clean.</p> <p>Ability to follow QMS and Operational procedures.</p> <p>Minimum OIT Treatment Certificate while working towards the highest level attainable.</p> <p>Minimum OIT Distribution Certificate while working towards the highest level attainable.</p> <p>Valid driver's license.</p>

10.2 Satisfying Competencies

Competence can be defined as the “demonstrated ability to apply knowledge and skills”. In order to assess competence, an organization must consider an employee’s education, training, skills and experience.

The QMS Representative maintains an ongoing, electronic record of training hours, including:

- License details and expiry dates for each operator,
- Director approved training required and completed, and
- On-the-job training required and completed.

The methods used by the Township to ensure competence of the personnel directly involved in the production of safe drinking water are summarized in the following table.

Role	Methods for Satisfying Competency
General Manager – Infrastructure Services (Top Management)	<p>Monthly, the General Manager is briefed on operating conditions by the Director of Water/Wastewater Operations. The Director of Water/Wastewater Operations notifies the General Manager of any relevant changes to drinking water regulations.</p> <p>Annually, as part of the Management Review, the General Manager is provided information which allows him to stay up-to-date on the functioning of the QMS.</p>
Director of Water/Wastewater Operations (see also: QMS Representative)	<p>Maintenance of the required licenses demonstrates competency.</p> <p>The Director of Water/Wastewater Operations schedules his own training and provides records of this training to the QMS Representative.</p> <p>Annually, the General Manager conducts an assessment of the Director of Water/Wastewater Operations' competency and completed training hours in the current license cycle. The General Manager provides a record of this review to the QMS Representative for retention as per the QMS Records Control Procedure (QMS SYS-P2).</p>
QMS Representative	<p>The QMS Representative schedules his own training relating to the QMS and associated standards and regulations.</p> <p>Annually, Top Management assesses the competency of the QMS Representative as part of the QMS Management Review Process described in QMS SYS-P12.</p> <p>The QMS Representative receives an assessment of all of his responsibilities (as he is also the Director of Water/Wastewater Operations) on an annual basis, conducted by the General Manager. This assessment includes a review of completed and scheduled training hours in the current license cycle. The record of this review, as with all others, is retained by the QMS Representative as per QMS SYS-P2.</p>
Operators	<p>Maintenance of required licenses demonstrates competency.</p> <p>Director will assist the Operators to schedule their own training and provide records of this training to the QMS Representative.</p> <p>The Director of Water/Wastewater Operations is responsible for regularly assessing and ensuring the competency of operators. This is conducted informally using a variety of means.</p> <p>Annually, the Director of Water/Wastewater Operations conducts an assessment of each Operator's competency and provides a record of this review to the QMS Representative for retention as per the QMS Records Control Procedure (QMS SYS-P2). This assessment includes a review of completed and scheduled training hours in the current license cycle.</p> <p>Staff receive training at regularly scheduled meetings.</p>

11. Personnel Coverage

11.1 General Information

The Township of South Glengarry manages its drinking water systems with a minimum three full-time operators who are led and managed by the Director of Water/Wastewater Operations. These same personnel also manage the wastewater systems in the Township. During morning meetings, the Director of Water/Wastewater Operations provides all personnel with their assignments for the day.

The full-time operators are unionized, and work a 7am to 4:30pm schedule, Monday to Thursday, and 7am to 11am on Friday.

The ORO for all systems is the Director of Water/Wastewater Operations. In situations whereby the ORO is away for an extended period, each facility's contingency manual describes how the role of ORO will be assigned.

11.2 Emergency and Back-Up Scheduling and Response

After-hours and emergency coverage is ensured by the on-call schedule, set by the ORO. Full-time operators fulfil the role of on-call operator on a weekly, rotating basis. The schedule is generally set and posted quarterly. Any scheduling conflicts or revisions are handled between the operators, with the ORO requiring notification of adjustments and providing final judgment on the schedule.

11.3 In the Event of a Walk-Out or Strike

Water and Wastewater has been deemed an essential service as per the collective agreement.

12. Communications

The Township of South Glengarry acknowledges that if a QMS is not effectively communicated, it is not implemented.

The DWQMS standard requires a procedure that describes how relevant aspects of the QMS are communicated between Top Management and:

- The Owner,
- Operating Authority Personnel,
- Suppliers, and
- The Public.

Additionally, the standard calls for a procedure to describe how QMS-related information is fed back to Operating Authority Top Management.

Through the QMS Communications Procedure (QMS SYS-P9), the Township seeks to ensure that all stakeholders of the Drinking Water System are aware of the QMS and its importance. Further, it aims to make certain that all who share responsibility for the production of safe and reliable drinking water understand their roles, the responsibilities and authorities that come with those roles, and the QMS processes and procedures that are relevant to those roles.

The QMS Communications Procedure (QMS SYS-P9) is attached in the Appendices of this document.

13. Essential Supplies and Services

Products and services used in a drinking water operation can introduce risk. By documenting the level of quality expected, and by continuing to assess whether or not supplies and services consistently meet these requirements after they have been selected, an operating authority demonstrates due diligence in minimizing the risk to drinking water quality. The tabular summary below is taken from the QMS Essential Supplies and Services List (QMS SYS-T3).

Current Listing of Essential Supplies and Services				
Essential Product/Service	Procurement Process	Quality Requirements	Primary Supplier	Secondary Supplier
Accredited Laboratory Services	As required	MOECP licensed (CALA certification)	Caduceon (613) 526-0123	SGS Envrionmental (705) 652-2124
Analytical Supplies	As required	Township satisfaction	Hach 1-905-290-9580	
Calibration	Annual schedule	ISA certified control systems technician	Tower Electronics Canada 613-847-7623	ISI Controls (613)843-0026 Cell(613)-795-0027
Chlorination Equipment	As required	Township satisfaction	Metcon (905)738-2355	SPD (905) 678-2882
Chlorine	As required	NSF/ANSI 60 certification	Brenntag 1-888-852-8793	
Coagulant	As required	NSF certification	Kemira 1-800-465-6171(1)	
Distribution Repair Parts	As required	AWWA Standard, as applicable	Crane Supply (613) 932-1116 (613) 932-6225	Noble (613) 933-5600
Distribution Vacuum Digging	As required	Township satisfaction	DBC (613)5343861 (613)537-8561	Capital Steam Clean (613) 932-3108
Electrical Supplies	As required	CSA, as applicable	Guillevin Int. (613) 938-8433	Westburne (613) 933-1075
Ultrasonic Level Controls	As required	CSA, as applicable	Milltronics (705) 745-2431	Grey Line (613) 938-8956

The Township of South Glengarry has developed a procedure that describes how it ensures the quality and availability of supplies and services deemed essential to the drinking water systems it operates. The document is called the QMS Essential Supplies and Services Procedure (QMS SYS-P7) and it is included with the Appendices of this Operational Plan.

14. Review and Provision of Infrastructure

The Township of South Glengarry has developed a procedure for the annual review of the infrastructure necessary to safely and effectively operate and maintain the drinking water systems belonging to and operated by the Township.

The procedure ensures a consistent, regular review of the condition and capacity of the drinking water systems that are operated by the Township of South Glengarry. A thoughtful, effective, and reliable review that is effectively communicated to the Owner ensures that infrastructure needs are appropriately communicated to those who can provide them.

The QMS Review and Provision of Infrastructure Procedure (QMS SYS-P3) is included with the Appendices of this Operational Plan Manual.

15. Infrastructure Maintenance, Rehabilitation and Renewal

Effective maintenance programs help to safeguard the reliability and performance of a drinking water system, protect the investment of the Owner, and minimize risks to drinking water supply and quality.

A procedure has been created and implemented detailing how these functions are to take place. It is the QMS Infrastructure Maintenance, Rehabilitation and Renewal Procedure (QMS SYS-P4) and is included with the Appendices of this Operational Plan.

By following this procedure, the Township of South Glengarry is ensuring that a regular review of its maintenance programs and their effectiveness is conducted, and the results are communicated to the Owner. In this way, requests for resources originating from the Operating Authority will be accompanied with context and analysis when it comes time for the Owner to review and make decisions about them.

Unplanned Maintenance

Unplanned maintenance is conducted as soon as possible after an issue is discovered. For each facility, repair and replacement activity is recorded in the facility log book.

Frequency and impact of equipment failure is included in the annual discussion of the Township's maintenance programs, as described in QMS SYS-P4.

Rehabilitation and Renewal

Planning for rehabilitation and renewal now takes place annually, and follows the QMS Review and Provision of Infrastructure Procedure (QMS SYS-P3). Infrastructure condition and capacity are evaluated during these reviews, and the outcomes are communicated to the Owner in a consistent format.

Drinking water infrastructure annual reviews fit within the framework of the Township's *Capital Planning Study* (2019). As discussed in QMS SYS-P3, the General Manager – Infrastructure Services and the Director of Water/Wastewater Operations use the *Capital Planning Study* to guide their annual capital budget requests of Council. Actual rehabilitation and renewal that occurs in each budget cycle is dependent on Council's authorization.

Summaries

The following tables detail the Township's existing programs for planned maintenance of the drinking water systems it operates.

The Township recognizes the importance of keeping these summaries current, communicating the programs and any modifications of them to the Owner, and periodically reviewing the effectiveness of its maintenance programs.

15.1 The Glen Walter Drinking Water System

Planned Maintenance			
System	Element	Activity	Timing/Frequency
Raw Water Transmission	1. Screens at crib	Check/Clean	Every 5 years by diver
	2. Screens in WTP	Check/Clean	Annually
	3. Zebra Mussel Control (Cl ₂ application)	Check and monitor	Ongoing
Water Treatment Plant	1. Low lift pumps	Greasing and cleaning of parts	Annually
	2. Filters	Visual inspection and physical measurement of media depth	Annually
	3. Filters	Visual inspection for faults	Ongoing
	4. Primary Cl ₂ injectors and rotameters	Cleaning and visual checks	Annually and ongoing
	5. Flow meters	Calibration/verification	Annually
	6. Turbidity Analysers	Cleaning	Monthly
	7. High Lift Pumps	Greasing and cleaning of parts	Annually
	8. Coagulant Pumps	Cleaning	Annually
	9. Turbidity Analysers	Calibration	Annually or as needed
	10. Backwash Pump	Monitor Efficiency	Ongoing
	11. Building	Visual check of doors and structure for faults	Ongoing
	12. Building Alarms	Ensure entry alarm activates	Ongoing
	13. Building Alarms Cl ₂ Room – fire alarms, etc.	Ensure alarms are operational	Ongoing
	14. Security Fencing	Visual inspection for faults	Ongoing
	15. Generator	Test run	Monthly
	16. Generator	Oil change/performance review	Semi-Annually/Annually

Planned Maintenance			
System	Element	Activity	Timing/Frequency
	17. Communication Systems – Telephone and Monitoring Centre	Ensure lines of communication are active	Ongoing
Distribution	1. Entire System	Visual inspection for water distribution leaks	Daily (ongoing)
	2. Distribution chlorine analyser	Verifying calibration with pocket colorimeter	Every 72 hours
	3. Dead end water mains	Flushing	Quarterly
	4. Valves	Exercising	Annually
	5. Hydrants	Lubricating ears	Annually
	6. Hydrants	Greasing of operating nut	Annually
	7. Hydrants	Ensure markers are in place, paint hydrants as needed	Annually
	8. Hydrants	Inspect outside of barrel for cracks or deterioration of bolts	Annually
	9. Hydrants and water mains	Flushing	Annually
	10. Hydrants	Pumping of hydrant barrels	Annually – late fall

15.2 The Lancaster Drinking Water System

Planned Maintenance			
System	Element	Activity	Timing/Frequency
Raw Water Transmission	1. Screens at crib	Check/Clean	Every 5 years by diver
	2. Screens in WTP	Check/Clean	Annually
	3. Zebra Mussel Control (Cl ₂ application)	Check and monitor	Ongoing
Water Treatment	1. Low lift pumps	Monitor efficiency	Ongoing
	2. Coagulant feed system	Cleaning	Annually

Planned Maintenance			
System	Element	Activity	Timing/Frequency
Plant	3. Filters	Visual inspection of moving parts	Ongoing
	4. Filters	Physical measurement of media depth	Annually
	5. Primary Cl ₂ feed system	Visual checks for liquid leaks	Ongoing
	6. Primary Cl ₂ pumps	Cleaning	Annually
	7. Flow meters	Calibration	Annually or as needed
	8. Turbidity Analysers	Cleaning	Monthly
	9. Turbidity Analysers	Calibration	Annually or as needed
	10. High Lift Pumps	Monitor efficiency	Ongoing
	11. Backwash Pumps	Monitor Efficiency	Ongoing
	12. Building	Visual check of doors and structure for faults	Ongoing
	13. Building Alarms	Ensure entry alarm activates	Ongoing
	14. Building Alarms Cl ₂ Room – fire alarms, etc.	Ensure alarms are operational	Ongoing
	15. Security Fencing	Visual inspection for faults	Ongoing
	16. Generator	Test run	Monthly
	17. Generator	Oil change/performance review	Semi-Annually/Annually
	18. Communication Systems – Telephone and Monitoring Centre	Ensure lines of communication are active	Ongoing
Distribution	1. Entire System	Visual inspection for water distribution leaks	Daily (ongoing)
	2. Distribution chlorine analyser	Verifying calibration with pocket colorimeter	Every 72 hours
	3. Dead end water mains	Flushing	Quarterly
	4. Valves	Exercising	Annually
	5. Hydrants	Lubricating ears	Annually

Planned Maintenance			
System	Element	Activity	Timing/Frequency
	6. Hydrants	Greasing of operating nut	Annually
	7. Hydrants	Ensure markers are in place, paint hydrants as needed	Annually
	8. Hydrants	Inspect outside of barrel for cracks or deterioration of bolts	Annually
	9. Hydrants and water mains	Flushing	Annually
	10. Hydrants	Pumping of hydrant barrels	Annually -- late fall

15.3 The Redwood Estates Drinking Water System

Planned Maintenance			
System	Element	Activity	Timing/Frequency
Water Treatment Plant	1. High Lift Pumps	Grease	Annually
	2. Turbidity Analysers	Calibrate and clean	Annually or as needed
	3. Primary Cl ₂ feed system	Check for liquid leaks	Ongoing
	4. Filters	Physical measurement of media depth	Annually
	5. Cl ₂ bench top analyser	Verification with Pocket Colorimeter	Weekly
Distribution	1. Entire System	Visual inspection for water distribution leaks	Daily (ongoing)
	2. Distribution chlorine analyser	Verifying calibration with pocket colorimeter	Ongoing
	3. Alarm System	Verification of set points and communication with monitoring command post	Ongoing
	4. Generator	Test run	Weekly "auto"
	5. Generator	Oil change and maintenance	Annually
Building and Perimeter	1. Doors, locks and fencing lights	Visual check	Ongoing



16. Sampling, Testing and Monitoring

This element of the QMS Operational Plan addresses how measurements are taken within the drinking water system to monitor what is happening, the Operating Authority's level of control, and the quality of treated drinking water.

The Township of South Glengarry understands the focus of the sampling, testing and monitoring component of the DWQMS as being to ensure:

- The reliability of the sampling, testing and monitoring performed to meet legislated requirements,
- That adequate operational sampling, testing and monitoring are undertaken to maintain the Treatment process and identify potential problems early, and
- That sampling, testing and monitoring activities are planned, consistently performed, documented and communicated.

Regulatory requirements determine what is to be sampled and set minimum requirements for frequency. The DWQMS requires that the following additional information be described by the Operating Authority:

- Details about how sampling, testing and monitoring is performed on the conditions most challenging to the drinking water system,
- Relevant sampling, testing, and monitoring activities that are performed upstream of the subject system (even if they are not carried out by the Operating Authority), and
- How the Owner and Operating Authority share sampling, testing and monitoring results.

A procedure to address these requirements has been implemented. It is called the QMS Sampling, Testing and Monitoring Procedure (QMS SYS-P5) and is included in the Appendices of this Operational Plan.

17. Measurement and Recording Equipment Calibration and Maintenance

If measurement and recording devices are used to inform and guide an operator's actions within a drinking water system, those devices must be appropriately maintained and calibrated.

A procedure has been written and implemented that documents how the measurement and recording equipment used by the Township of South Glengarry is calibrated and maintained, who is responsible for scheduling the calibrations and how the calibration results are recorded.

The document is included in the Appendices of this Operational Plan Manual as the QMS Measurement and Recording Equipment Calibration and Maintenance Procedure (QMS SYS-P6).

18. Emergency Management

The development, implementation and maintenance of procedures to ensure emergency preparedness are recognized by the Township of South Glengarry as an important facet of the QMS. Emergencies, as defined in the MOECP's Implementation Guide and as used in this document, are:

- o Potential situations or service interruptions that may result in the loss of the ability to maintain a supply of safe drinking water to customers.

By effectively anticipating and planning for emergency situations, the consequences of emergencies, when they occur, can be mitigated.

The Township of South Glengarry maintains emergency preparedness as described in its QMS Emergency Management Procedure (QMS SYS-P10). This procedure describes how the Operating Authority maintains, communicates, and tests the robustness of its emergency preparedness. Additionally, this document lists the emergency situations that are a natural outcome of the QMS Risk Assessment process (described by QMS SYS-P8), describes how responsibility for response and communication is delineated, refers to applicable operations procedures and provides a general list of emergency contacts.

The QMS Emergency Management Procedure (QMS SYS-P10) is included in the Appendices of this Operational Plan Manual. Specific operations procedures relating to the list of potential emergencies identified by the Township will be included in the QMS as they are developed.

19. Internal Audits

An internal audit of the Township's QMS is conducted annually to ensure that:

- The QMS Operational Plan Manual (QMS SYS-OP PLAN) and its associated procedures meet or exceed the standard of the DWQMS for each element, and
- The Operating Authority is functioning in conformance with its own Operational Plan.

An effective internal audit program, conducted by positive internal auditors and supported by interested and involved management and personnel at various levels, is a useful tool for testing and improving the robustness of a QMS. High quality internal audits lead to continual improvement, a requirement of the DWQMS.

Additionally, internal audits serve a valuable purpose by providing feedback on the effectiveness of the QMS, and by informing and focusing the Management Review Process.

The output of the audit process is an audit report which includes:

- A completed audit checklist,
- Corrective action request (CAR) forms for each issue of non-conformance,
- A brief summary detailing the outcomes of the audit, including areas of strong performance and areas of non-conformance, and
- A list of suggested improvements to the audit process and audit checklist.

The Township of South Glengarry has described the process used to conduct internal audits in its QMS Internal Audit Procedure (QMS SYS-P11). This procedure is included as part of the Appendices of this document.

20. Management Review

The Township of South Glengarry recognizes that support and oversight of the drinking water QMS is an important role fulfilled by Top Management. The Management Review process supports a high level of connection and familiarity between Top Management and the QMS, and enables focused and effective decision making regarding how to best improve and maintain the quality management system.

The Township has prepared a procedure that describes how QMS Management Reviews are to be conducted. The document is called the QMS Management Review Procedure (QMS SYS-P12) and it is included in the Appendices of this Operational Plan Manual.

In following the Management Review procedure, Top Management ensures that the Owner receives consistent, timely, and focused information about how the QMS is functioning. Additionally, the process affords an opportunity to reinforce with the Owner the resources that are required to continue to maintain and improve the quality management system.

21. Continual Improvement

A QMS cycle is described as PLAN, DO, CHECK, and IMPROVE.

The Township of South Glengarry recognizes that this Operational Plan is simply a beginning. The element of Continual Improvement, while it has no PLAN requirement, is a reminder that the Township is obligated to continually strengthen and improve its QMS.

The Township expects that the processes it has described, both in this document and its associated procedures, will change and evolve over time as the QMS matures. It believes that this evolution will be initiated by the corrective action processes built into the Plan, and, in particular, described in the areas relating to Internal Audit and Management Review.

List of Appendices

Appendix A	QMS Document Control Procedure	QMS SYS-P1
Appendix B	QMS Records Control Procedure	QMS SYS-P2
Appendix C	QMS Review and Provision of Infrastructure Procedure	QMS SYS-P3
Appendix D	QMS Infrastructure Maintenance, Rehabilitation and Renewal Procedure	QMS SYS-P4
Appendix E	QMS Sampling, Testing and Monitoring Procedure	QMS SYS-P5
Appendix F	QMS Measurement and Recording Equipment Calibration and Maintenance Procedure	QMS SYS-P6
Appendix G	QMS Essential Supplies and Services Procedure	QMS SYS-P7
Appendix H	QMS Risk Assessment Procedure	QMS SYS-P8
Appendix I	QMS Communications Procedure	QMS SYS-P9
Appendix J	QMS Emergency Management Procedure	QMS SYS-P10
Appendix K	QMS Internal Audit Procedure	QMS SYS-P11
Appendix L	QMS Management Review Procedure	QMS SYS-P12
Appendix M	Comprehensive Risk Assessment Outcomes – <i>Glen Walter (Sept 15, 2009)</i>	QMS SYS-F4 (completed form)
Appendix N	Comprehensive Risk Assessment Outcomes – <i>Lancaster (Sept 16, 2009)</i>	QMS SYS-F4 (completed form)
Appendix O	Comprehensive Risk Assessment Outcomes – <i>Redwood Estates (Sept 16, 2009)</i>	QMS SYS-F4 (completed form)
Appendix P	QMS Primary Chlorination CCP Procedure	QMS OP-P1
Appendix Q	QMS Filtered Water Turbidity CCP Procedure	QMS OP-P2
Appendix R	QMS Distribution Systems Chlorine Residual CCP Procedure	QMS OP-P3