



**Drinking Water Quality Management System**

# **Operational Plan**

**Grimsby Water Distribution System**



# **The Corporation of the Town of Grimsby**

Town Hall

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L3M 0J5



**TOWN OF GRIMSBY  
DRINKING WATER QUALITY MANAGEMENT SYSTEM OPERATIONAL PLAN  
Grimsby Water Distribution System**

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**TOWN OF GRIMSBY  
DRINKING WATER QUALITY MANAGEMENT SYSTEM OPERATIONAL PLAN  
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**TOWN OF GRIMSBY  
DRINKING WATER QUALITY MANAGEMENT SYSTEM OPERATIONAL PLAN  
Grimsby Water Distribution System**

**PART 1: DWQMS Operational Plan Summary Report**



# 1.0 Quality Management System

## 1.1 Purpose

The purpose of this Operational Plan is to document the Town of Grimsby’s Drinking Water Quality Management System. The Drinking Water Quality Management System was developed and implemented as part of the Town’s continuing efforts to ensure that clean, safe drinking water is supplied to all of its customers. This Operational Plan was developed to meet the requirements of the Ministry of the Environment, Conservation and Parks’ Drinking Water Quality Management Standard - current revision, February 2017.

## 1.2 Scope

The procedures and processes documented in this Operational Plan are applied to the Grimsby Water Distribution System (WW#260001851). The contents of the Operational Plan include the following:

Part Title	Part
DWQMS Operational Plan Summary Report	Main Report
DWQMS System-Level Procedures & Supporting Documentation	Appendix A
DWQMS Risk Assessment Results	Appendix B
Procedures for Critical Control Point Monitoring and Response	Appendix C
Water Operations - Emergency Response Plan	Appendix D

## 1.3 Definitions

<b>Accreditation Body</b>	Agency appointed by the MECP that conducts accreditation audits and grants management system accreditation to system Owners and Operating Authorities.
<b>DWS</b>	Drinking Water System
<b>DWQMS</b>	This acronym may be used synonymously to describe both the Drinking Water Quality Management Standard (i.e. the standard rules established by the MECP that need to be met) and the Drinking Water Quality Management System (i.e. the quality management system put in place to meet the MECP’s standard).
<b>Hard-Copy</b>	Paper copy of a document.
<b>MECP</b>	Ministry of the Environment, Conservation and Parks. The MECP developed the Drinking Water Quality Management Standard and requires select Ontario municipalities & utilities to develop and implement a Quality Management System as a component of the Municipal Drinking Water Licence Program.





<b>Operator-in-Charge (OIC)</b>	Operator designated by the Owner or Operating Authority to perform duties as outlined in O. Reg. 128/04, s. 25 (SDWA) and as per applicable Town procedures and guidelines.
<b>Overall Responsible Operator (ORO)</b>	Operator designated by the Owner or Operating Authority to perform duties as outlined in O. Reg. 128/04, s. 23 (SDWA) and as per applicable Town procedures and guidelines.
<b>Owner</b>	Legal or beneficial owner of the WDS. For the Town of Grimsby, the Owner is represented by the Mayor and Council. The Town Manager has been identified as an Owner Representative.
<b>QMS or Drinking Water QMS</b>	A Quality Management System put in place with respect to the operation and maintenance of the Town's drinking water system in order to meet the MECP's Drinking Water Quality Management Standard.
<b>Soft-Copy</b>	Electronic copy of a document.
<b>SOG</b>	Standard Operating Guideline
<b>Top Management</b>	Person(s) at the highest level within the Operating Authority that make decisions respecting the Drinking Water QMS and recommend actions to the Owner regarding the WDS. For the Town of Grimsby, the Director of Public Works has been identified as Top Management.
<b>Town</b>	Town of Grimsby
<b>WDS</b>	Water Distribution System.
<b>WDS Vendor</b>	Supplier or service provider that provides a product or service related to the water distribution system

#### 1.4 Operational Plan Revisions

This Operational Plan is reviewed, revised and approved in accordance with the document control process referred to in **Section 5.0**. Changes to the Operational Plan are communicated in accordance with the communications procedure referred to in **Section 12.0**.



## 2.0 Quality Management System Policy

The Town of Grimsby's Drinking Water QMS Policy is as follows:

"The Town of Grimsby owns and operates the Grimsby Water Distribution System. The Town is committed to:

- **P**roviding Town water consumers with safe, clean drinking water;
- **U**pholding all applicable legislative and regulatory requirements;
- **R**eviewing, maintaining and continually improving its Drinking Water Quality Management System;
- **E**stablishing and maintaining open and effective communication with Town water consumers regarding matters of drinking water quality."

The Drinking Water QMS Policy was approved and endorsed by the Owner and Top Management of the WDS on **September 5, 2023** as per Report **DPW 23-21**. A poster of the ***DWQMS Policy (PW-ES-WD-VIS-001-001)*** is posted internally at several Town of Grimsby Operating Authority facilities & locations. The Drinking Water QMS Policy is also communicated to the public through posting on the Town's website.





### 3.0 Commitment and Endorsement

This Operational Plan has been reviewed and approved by the Town of Grimsby’s Mayor, Council and Operating Authority Top Management. A resolution was passed by Council endorsing the Operational Plan and its contents on **September 5, 2023** as per Report **DPW 23-21**. The signatures below further serve as endorsement of the Operational Plan.

***Jeff Jordan***

***Brandon Wartman***

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*Jeff Jordan*  
*Mayor, Town of Grimsby*  
*WDS Owner Representative*

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*Brandon Wartman*  
*Director of Public Works*  
*WDS Top Management Representative*



## 4.0 Quality Management System Representative

The EHS Compliance Advisor has been appointed as the Quality Management System Representative for the Town of Grimsby's Drinking Water QMS, and has been granted the authority to execute all of the responsibilities associated with this role.

In addition to the other aspects of their role, the EHS Compliance Advisor is responsible for:

- Ensuring that processes and procedures required for the Drinking Water QMS are established, implemented and maintained, including leading and performing Management Review, Infrastructure Review, Risk Assessment, and internal and external Auditing processes;
- Reporting to Top Management regarding Drinking Water QMS performance and any need for improvement through the Infrastructure Review and Management Review process;
- Ensuring that only current versions of documentation required by the Drinking Water QMS are in use at all times;
- Ensuring that personnel are aware of all applicable legislative and regulatory requirements that pertain to their duties in the operation of the Town of Grimsby's drinking water system; and
- Promoting awareness of the Drinking Water QMS throughout the Operating Authority.



## 5.0 Document and Records Control

### 5.1 Document Control

A procedure has been developed that outlines document control processes for the Operating Authority. **DWQMS Control of Documents (PW-ES-WD-PRO-002-001 - See Appendix A)** outlines a controlled process for the creation, modification, review, approval, distribution, retrieval and protection of WDS-related documentation.

WDS-related documentation is identified using a unique numbering system specified in **DWQMS Control of Documents (PW-ES-WD-PRO-002-001)**. The task of creating internal WDS-related documentation is delegated to an appropriately-qualified staff member; delegation of this task is dependent on the staff member's level of expertise in the subject matter to be documented.

When a draft document has been prepared, review and approval of the document is completed as specified in **DWQMS Control of Documents (PW-ES-WD-PRO-002-001)**. Document revisions are completed by the Document Author and reviewed by the Author's Supervisor. Final approval of documentation is completed as specified in **DWQMS Control of Documents (PW-ES-WD-PRO-002-001)**.

Master copies of documentation are signed by the Document Author and the Final Approver and provided to the EHS Compliance Advisor. The EHS Compliance Advisor ensures that all hard-copy and soft-copy master documentation is safely stored and protected from damage, deterioration and circulation. As documentation is revised, any old master hard-copies are disposed of and replaced with the new version.

The EHS Compliance Advisor creates a read-only version of the document and saves it to the appropriate storage location on the Town's internal server. Electronic copies of master documentation are controlled by the EHS Compliance Advisor and are protected from distribution or editing.

The EHS Compliance Advisor prints the required number of controlled copies of the document and ensures that they are distributed according to the **DWQMS Document Control Matrix (PW-ES-WD-LM-002-001 - See Appendix A)**. Obsolete versions of documentation are marked as "OBSOLETE", removed from circulation, and archived or shredded.



## 5.2 Records Control

A procedure has been developed that outlines record control processes for the Operating Authority. ***DWQMS Control of Records (PW-ES-WD-PRO-003-001 - See Appendix A)*** specifies processes for the collection, identification, storage, maintenance, protection, retention and disposal of WDS-related records at the Town of Grimsby.

The ***DWQMS Record Control Matrix (PW-ES-WD-LM-003-001 - See Appendix A)*** lists drinking water records managed under this procedure. Each record profile within the Matrix lists the record name, minimum record retention time, record owner (i.e., person responsible for the record), and physical form of storage including the storage location(s). Where required by legislation and/or regulations, WDS records are made available for review by customers and/or stakeholders.

Records may be retained beyond their indicated minimum retention time or destroyed of at the discretion of the Director of Public Works.



## 6.0 Drinking Water System Description

### 6.1 Drinking Water Treatment and Transmission

#### 6.1.1 Grimsby Water Treatment Plant

##### 6.1.1.1 *Description*

The Grimsby Water Treatment Plant (WTP) is owned and operated by the Regional Municipality of Niagara. The Grimsby WTP is a water intake and treatment facility which serves as the single source of drinking water for three stand-alone drinking water distribution systems located within the Town of Grimsby, Beamsville (Town of Lincoln) and Smithville (Township of West Lincoln).

##### 6.1.1.2 *Treatment Process*

The Grimsby WTP obtains all of its water from Lake Ontario via a 1,050mm diameter intake pipe which extends approximately 1.9km offshore.

The water treatment system consists of screening, pre-treatment and flocculation using flash mixing chambers and flocculation tanks. The water then travels through a filter system consisting of four rapid-rate, dual-media gravity type filters, a chlorine contact tank, and a high-lift pumping station and reservoir.

Chemicals used in the Grimsby WTP process include a liquid coagulant in the pre-treatment process and sodium bisulphate for wastewater supernatant de-chlorination. Sodium hypochlorite is used for pre-chlorination for zebra mussel control at the water intake, the low lift pumping well or the raw water surge well. It is also used in the chlorine contact tank and for post chlorination at the high lift discharge header. Other possible injection points include the chlorine contact tank by-pass and the settled water conduit of pre-treatment.

The facility has a gross design capacity of 67ML/day and a maximum treated water capacity of 44ML/day.



## 6.1.2 Grimsby Water System

### 6.1.2.1 Description

The Grimsby Water System (WS) is owned and operated by the Regional Municipality of Niagara. The Grimsby WS conveys drinking water from the Grimsby WTP to three downstream drinking water distribution systems. These three systems, located in Grimsby, Beamsville and Smithville, which in turn distribute the drinking water to individual water customers.

### 6.1.2.2 Storage

The Grimsby WS contains four storage reservoirs and one elevated tank. Two of the reservoirs are located within the Town of Grimsby, one at the Grimsby WTP (10ML capacity) and one at the Park Road Reservoir (15ML capacity). The Hixon Street Reservoir (10ML capacity) is located in Beamsville and the London Road Reservoir (7.7ML capacity) and Smithville Elevated Tank (2.3ML) are located in Smithville.

### 6.1.2.3 Pumping Stations

The Grimsby WS has a number of pumping and re-chlorination stations, two of which are located within the Town of Grimsby.

The Lincoln/Grimsby Booster Pump Station, located on Iroquois Trail, boosts pressure and provides re-chlorination of water being conveyed to Beamsville. The Park Road Reservoir Pumping Station, located adjacent to the Park Road Reservoir, boosts pressure and provides re-chlorination for water being conveyed to Smithville.

## 6.2 Drinking Water Distribution

### 6.2.1 Grimsby Water Distribution System

#### 6.2.1.1 Description

The Grimsby Water Distribution System (WDS) is owned and operated by the Town of Grimsby. The Grimsby WDS is a stand-alone drinking water distribution system which receives 100% of its drinking water from the Grimsby WTP/Grimsby WS. The Grimsby WDS distributes drinking water to approximately 30,035<sup>1</sup> customers and one downstream water system located in Winona (City of Hamilton).

The Grimsby WDS services an area of approximately 1,150ha with a portion of these lands designated as Greenbelt and Niagara Escarpment Commission Controlled areas. The service area is bounded by Lake Ontario to the north, the City of Hamilton to the west, the Town of Lincoln to the east and the mid-to-lower reaches of the Niagara Escarpment to the south.

A schematic of the Grimsby WDS is provided in the ***Town of Grimsby Drinking Water Distribution System Map (PW-ES-WD-VIS-001-002)***.

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<sup>1</sup> As of December 2022.



#### 6.2.1.2 *System Classification*

The Grimsby WDS is defined<sup>2</sup> as a Large Municipal Residential Drinking Water System and is classified as a Class 1 Water Distribution Subsystem, water works ID #260001851.

A more detailed classification of this system is documented in ***Water System Classification - Grimsby WDS (PW-ES-WD-SOG-012-001)***.

#### 6.2.1.3 *System Characteristics*

The Grimsby WDS consists of approximately 136.1 km of watermain, 926 fire hydrants and 1,194 isolation valves. Watermain ranges in size from 100mm to 300mm in diameter. Over half of the watermain is constructed of PVC pipe, with the remaining constructed of cast iron, ductile iron, asbestos cement and polyethylene pipe. The average age of the watermain is 28.9 years<sup>3</sup>.

The Grimsby WDS has an average operating pressure of 70 psi, ranging from 0 psi at the Park Road Reservoir surface, to 110 psi at the Grimsby WTP.

#### 6.2.1.4 *Upstream Connections*

The Grimsby WDS is interconnected with the Grimsby WS (Region of Niagara) at various locations throughout the system.

Two reservoirs are located within the Town of Grimsby (Grimsby WTP, Park Road Reservoir) provide normal storage capacity to the Grimsby WDS. A third reservoir located in Beamsville (Hixon Street Reservoir) has the capability to provide additional storage capacity to the Grimsby WDS if needed. All three reservoirs are owned and operated by the Region of Niagara as part of the Grimsby WTP/Grimsby WS.

Two pumping and re-chlorination stations are located within the Town of Grimsby (Lincoln/Grimsby Booster Pump Station, Park Road Pumping Station). Both of these stations are owned and operated by the Region of Niagara as part of the Grimsby WTP/Grimsby WS. Both stations are connected to the Grimsby WDS, however their primary purpose is to boost system pressure and provide additional chlorination before conveying the water to Beamsville (Lincoln/Grimsby Booster Pump Station) and Smithville (Park Road Pumping Station). Pressure reducing valves are installed on the Grimsby WDS at the connections to both stations.

#### 6.2.1.5 *Downstream Connections*

The Grimsby WDS is connected to the Fifty Road Subsystem at the Town of Grimsby/City of Hamilton boarder on Main Street West. The Fifty Road Subsystem receives all of its water from the Grimsby WDS. The Fifty Road Subsystem is owned and operated by the City of Hamilton and serves approximately 200 persons within Winona.

The connection between the Grimsby WDS/Fifty Road Subsystem includes a single flow meter, which is used for measuring water consumption and for billing, and a single check valve, which prevents water from flowing backwards from the Fifty Road Subsystem into the Grimsby WDS.

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<sup>2</sup> As per O.Reg.170/03 under the Safe Drinking Water Act.

<sup>3</sup> Weighted average based on length.





Both the flow meter and the single check valve are part of the Grimsby WDS. *Areas of the System Outside of Town of Grimsby Boundaries*

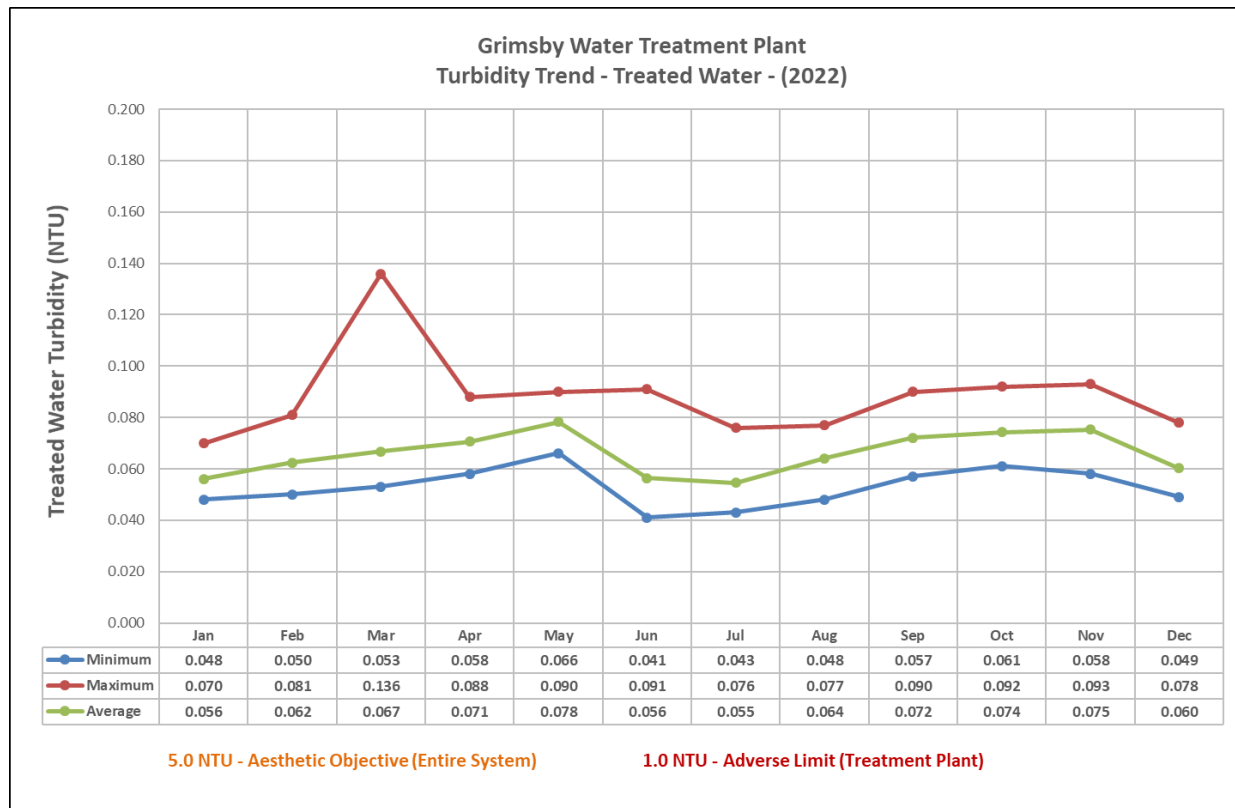
There are two areas of Grimsby WDS which are located outside of the Town of Grimsby municipal boundaries.

The first is on the North Service Road at the Town of Grimsby/Town of Lincoln border. At this location, four residential units located within the Town of Lincoln are serviced by the Grimsby WDS. Each of these units is metered and billed by the Town of Grimsby. There is no physical connection between Lincoln’s water system and the Grimsby WDS.

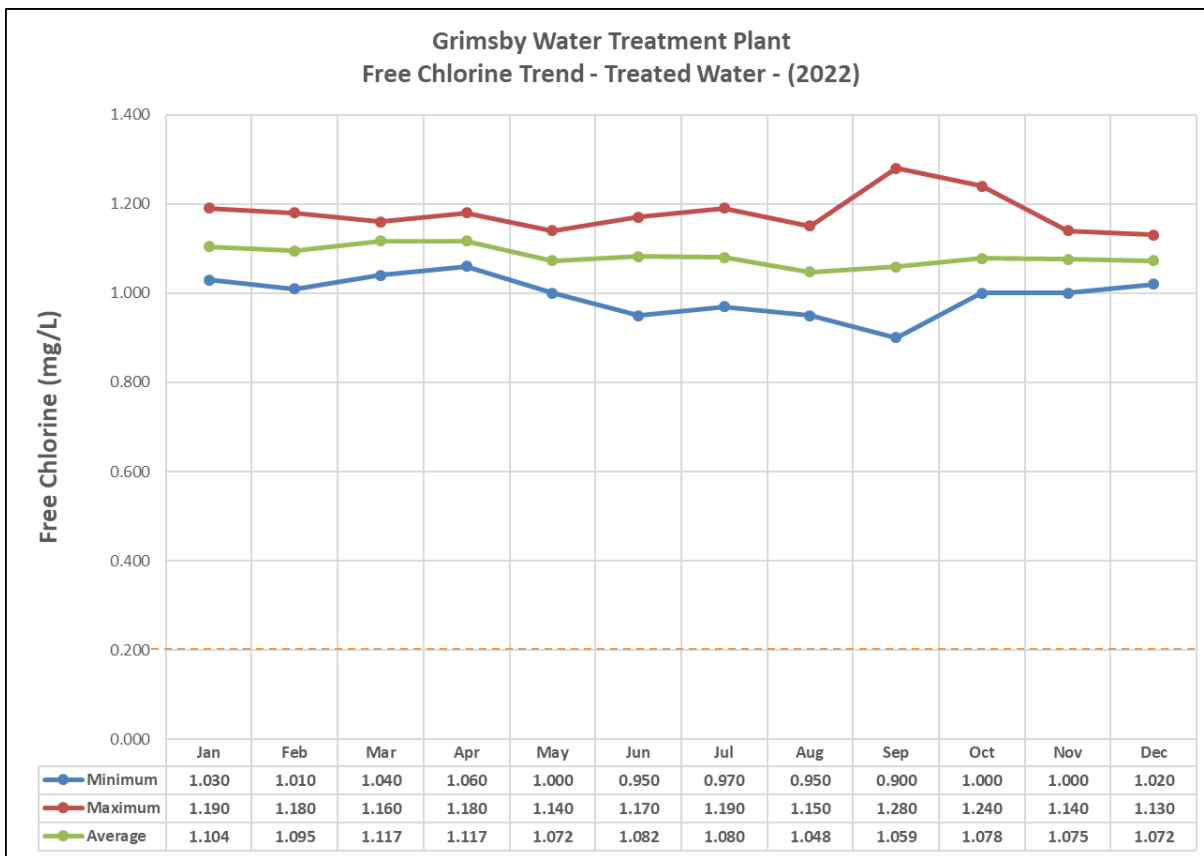
The second is located on the South Service Road at the Town of Grimsby/Town of Lincoln border. At this location, a single residential unit located within the Town of Lincoln is serviced by the Grimsby WDS. This unit is metered and billed by the Town of Grimsby. There is no physical connection between Lincoln’s water system and the Grimsby WDS.

6.2.1.6 Source Water Characteristics

The Grimsby WDS receives all of its water from the Grimsby WTP/Grimsby WS. Water quality is monitored by the Region of Niagara to ensure all regulatory requirements are being met. The Region provides a summary of daily turbidity and free chlorine results (measured at the Grimsby WTP) to the Town of Grimsby on a weekly basis. Trends in turbidity and free chlorine for the year 2022 are seen in **Figure 6-1 Grimsby WTP Treated Water Discharge - Turbidity, 2022**, and **Figure 6-2 Grimsby WTP Treated Water Discharge - Chlorine Residual, 2022** respectively.



**Figure 6-3 Grimsby WTP Treated Water Discharge - Turbidity, 2022**



**Figure 6-4 Grimsby WTP Treated Water Discharge - Chlorine Residual, 2022**

6.2.1.7 *Common Event-Driven Fluctuations*

As the Grimsby WDS receives all of its drinking water from the Grimsby WTP/Grimsby WDS, the system is not directly impacted by fluctuations in raw water quality. Any event-driven fluctuations that affect raw water quality at the Grimsby WTP, do not typically affect the Grimsby WDS as the impacts of these fluctuations are managed by the Region of Niagara at the treatment stage.

Lake Ontario serves as the raw water source for the Grimsby WTP and as lake volumes do not fluctuate to a degree that would compromise WTP operations. The Region of Niagara’s water reservoirs (refer to **Section 6.1.2.2**) do provide a limited supply of storage capacity for the system.

During summer months, the Grimsby WDS occasionally experiences a decrease in levels of residual chlorine in the distribution system; however monitoring practices are in place to ensure that levels do not drop below regulatory limits. These decreases may be attributed to the heat of summer months and may be most significant at the system’s dead ends.

6.2.1.8 *Operational Challenges*

The Niagara Escarpment poses a topographical challenge in water distribution, and the Grimsby WDS is required to operate under high pressures in order to ensure that water can be distributed to customers residing at higher elevations along the slope of the escarpment.



The Grimsby WDS experiences a very low amount of water loss (water that is unaccounted for). The Town’s average annual water loss<sup>4</sup> of 8.10% makes it one of the most water-tight drinking water systems in the Region<sup>5,6</sup>. Significant efforts are put forth to ensure that the integrity of the system is not compromised where water losses & leaks are concerned.

6.2.1.9 *Maintaining Adequate Disinfection*

The Town of Grimsby performs various maintenance and water quality monitoring activities in order to ensure adequate disinfection is maintained with the Grimsby WDS. Activities include but are not necessarily limited to the following programs:

- Hydrant flushing;
- Dead-end watermain flushing;
- Routine chlorine residual monitoring;
- Routine microbiological sampling (including chlorine residuals);
- Maintenance related chlorine residual checks;
- Maintenance related microbiological sampling (including chlorine residuals);
- Watermain replacement/renewal.

The maintenance rehabilitation and renewal programs are further described in **Section 15.0**. The sampling testing and monitoring programs are further described in **Section 16.0**.

6.2.1.10 *Agreements Between Connected Systems*

The Town of Grimsby has two memos/letters of understanding with connected water systems.

The **Niagara Region Public Works Letter of Understanding - Water Servicing (PW-ES-WD-LPA-020-003)** describes the relationship and responsibilities between the Region of Niagara and the Town of Grimsby relating to the Grimsby WTP, Grimsby WS and the Grimsby WDS.

The **Hamilton Memo of Understanding - Water Communications (PW-ES-WD-LPA-020-004)** describes the responsibilities for communicating between the City of Hamilton and the Town of Grimsby relating to the Fifty Road Subsystem and the Grimsby WDS.

6.3 Small Drinking Water Systems and Irrigation Wells

**The Town of Grimsby owns and operates a series of small drinking water systems, irrigation wells and reclaimed water systems. The small drinking water systems, the irrigation wells and the reclaimed water systems are summarized in Table 6-1, Table 6-2 and respectively.**

**Table 6-1: Grimsby Small Drinking Water Systems**

<b>Water System</b>	<b>Description</b>
Alway Community Centre Cistern	Small Municipal DWS (Serving a Public Facility)
Fire Station #2 Cistern	Small Municipal DWS (Serving a Public Facility)
Southward Park Cistern	Small Municipal DWS (Serving a Public Facility)
Grimsby Mountain Cemetery	Small Municipal DWS (Non-Potable water cistern)

<sup>4</sup> Calculated as a 5-year average (2018-2022).

<sup>5</sup> Reference: “Region of Niagara – Regional Water Loss Assessment Project”. June 2007: Veritec Consulting Ltd.

<sup>6</sup> Reference: “Niagara Region – Water and Wastewater Service Delivery Review (Draft)”. April 2012: Stantec



**Table 6-2: Grimsby Irrigation Wells**

<b>Well</b>	<b>Description</b>
Alway Community Centre Irrigation Well	Non-potable water well
Southward Park Irrigation Well	Non-potable water well

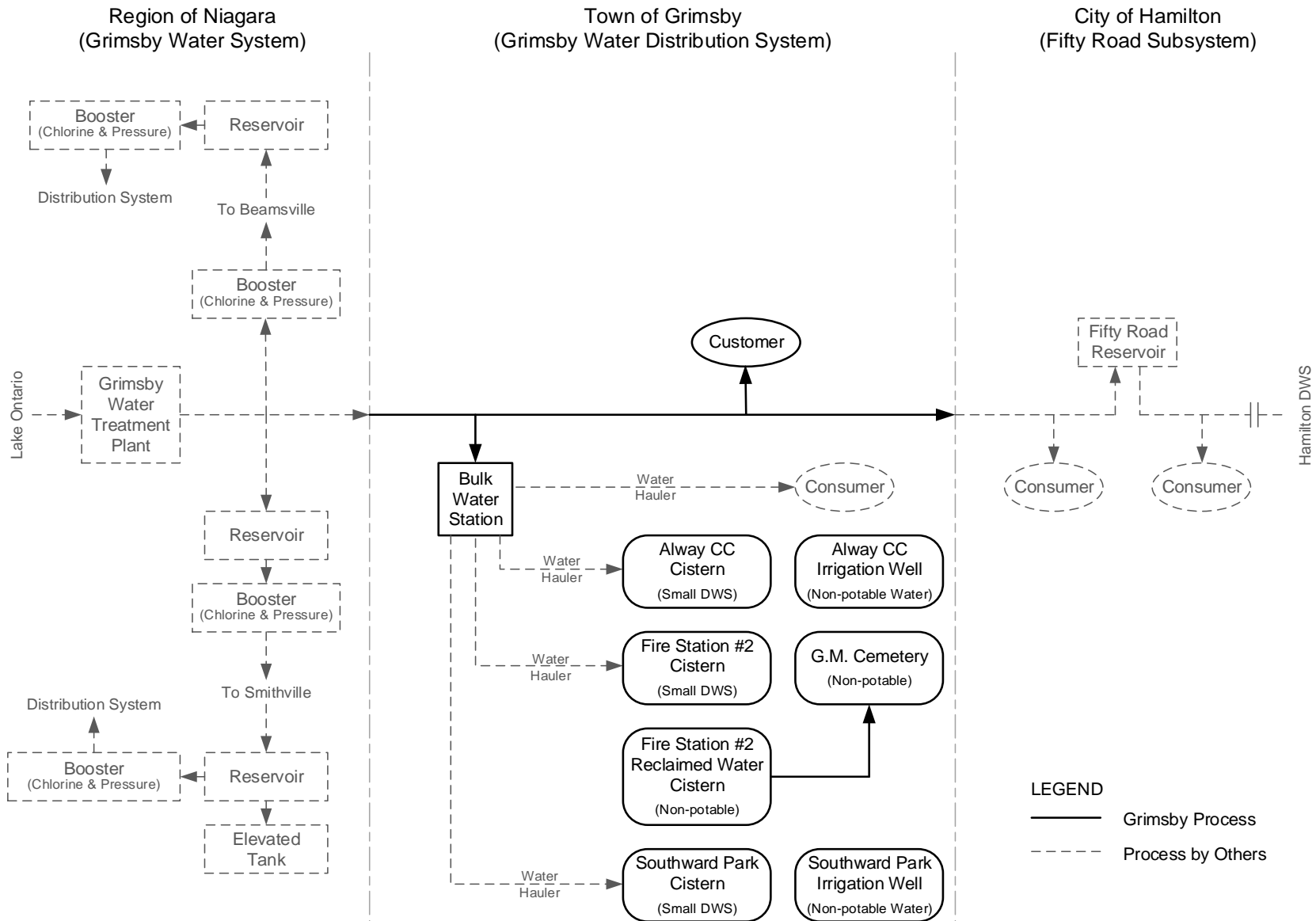
These systems fall outside of the scope of the DWQMS. Descriptions of these systems are documented in ***Water System Classification - Small Systems (PW-ES-WD-SOG-012-002)***.

#### 6.4 Process Flow Chart

The process flow chart shown in Figure 6-5 (page 15) provides a high-level overview of the processes controlled by the Town of Grimsby in operating the Grimsby WDS and the other small water systems. The flow chart also shows upstream water treatment and transmission provided by the Region of Niagara through the Grimsby WTP and Grimsby WDS and the downstream connection to the City of Hamilton's Fifty Road Subsystem.



**Figure 6-5: Grimsby WDS - Process Flow Chart**





## 7.0 Risk Assessment

A procedure has been created to describe the Risk Assessment process. **DWQMS Risk Assessment (PW-ES-WD-PRO-004-001 - See Appendix A)** documents the process for completing the Risk Assessment, including the legislative, regulatory and internal requirements for this risk assessment and the criteria for assessing risk.

Members of the Risk Assessment Team are outlined in **DWQMS Risk Assessment (PW-ES-WD-PRO-004-001)**. Before the risk assessment is initiated, the Risk Assessment Team reviews the description of the drinking water system contained in the Operational Plan and identifies high-risk and/or high quantity users of drinking water in order to ensure their unique requirements are taken into account in completing the risk assessment.

The Risk Assessment Team then examines the Town's drinking water system, including upstream or downstream processes, for potential hazards that could compromise the performance of the system and/or the quality of the drinking water. The Risk Assessment Team evaluates each identified hazard against criteria outlined in **DWQMS Risk Assessment (PW-ES-WD-PRO-004-001)**. The Team assesses the likelihood of the occurrence of the hazard, the consequences of the hazard's effects, and the detectability of the hazard were it to occur. Using these three criteria, a Risk Rating is determined for each hazard. Where applicable, the reliability and redundancy of equipment is taken into consideration when assessing the hazards against the three criteria.

Hazards with greater Risk Ratings are evaluated to determine whether a Critical Control Point (CCP) can be established at the hazard location. Where a CCP is identified, critical control limits and monitoring/response procedures are developed to ensure that rapid action can be taken to eliminate or reduce the hazard when it is identified. Regardless of Risk Rating, any hazards relating to disinfection processes are identified as CCPs.

The DWQMS Risk Assessment is reviewed annually by the Risk Assessment Team. Once every three years, a new Risk Assessment is completed. Details of these reviews and reassessment processes are contained in **DWQMS Risk Assessment (PW-ES-WD-PRO-004-001)**.



## 8.0 Risk Assessment Outcomes

The Drinking Water QMS Risk Assessment was last completed on August 15, 2022. The completed Risk Assessment Matrix (Appendix B) documents the results of this assessment. All hazards were identified, assessed and addressed according to **Section 7.0** of this Operational Plan and the DWQMS **Risk Assessment** procedure (**PW-ES-WD-PRO-004-001** - See **Section 7.0** of this Operational Plan).

The Critical Control Limit Monitoring and Response procedures can be found in Appendix C and include monitoring and response requirements for critical control limit exceedances. These procedures are identified as follows:

- **Watermain Break Repairs - Grimsby WDS**  
(PW-ES-WD-SOG-011-001)
- **Fire Hydrant Flushing - Grimsby WDS**  
(PW-ES-WD-SOG-011-003)
- **Planned Watermain Maintenance - Grimsby WDS**  
(PW-ES-WD-SOG-011-021)
- **Sampling - Microbiological and Organics - Grimsby WDS**  
(PW-ES-WD-SOG-012-005)
- **Sampling - Chlorine Residual - Grimsby WDS**  
(PW-ES-WD-SOG-012-006)
- **AWQI Reporting - Grimsby WDS**  
(PW-ES-WD-SOG-012-008)
- **AWQI Corrective Actions - Grimsby WDS**  
(PW-ES-WD-SOG-012-010)
- **Suspected Intentional Contamination of Water**  
(PW-ES-WD-SOG-014-004)
- **Watermain Design and Review Document Checklist**  
(PW-ES-WD-LM-001-005)
- **Grimsby WDS Legislative Overview**  
(PW-ES-WD-VIS-001-015)
- **DWQMS Receipt and Processing of Customer Calls**  
(PW-ES-WD-SOG-019-001)
- **Commissioning New Water Pipe - Grimsby WDS**  
(PW-ES-WD-SOG-012-013)
- **Backflow Prevention Program**  
(PW-ES-WD-SOG-018-001)
- **Suspected Backflow Event**  
(PW-ES-WD-PRO-014-007)<sup>7</sup>

<sup>7</sup> Refer to Appendix D for this procedure.





## 9.0 Organizational Structure, Roles, Responsibilities & Authorities

### 9.1 Organizational Chart

Figure 9-1 (following page) shows the Drinking Water QMS Organizational Chart for the Town of Grimsby's WDS.

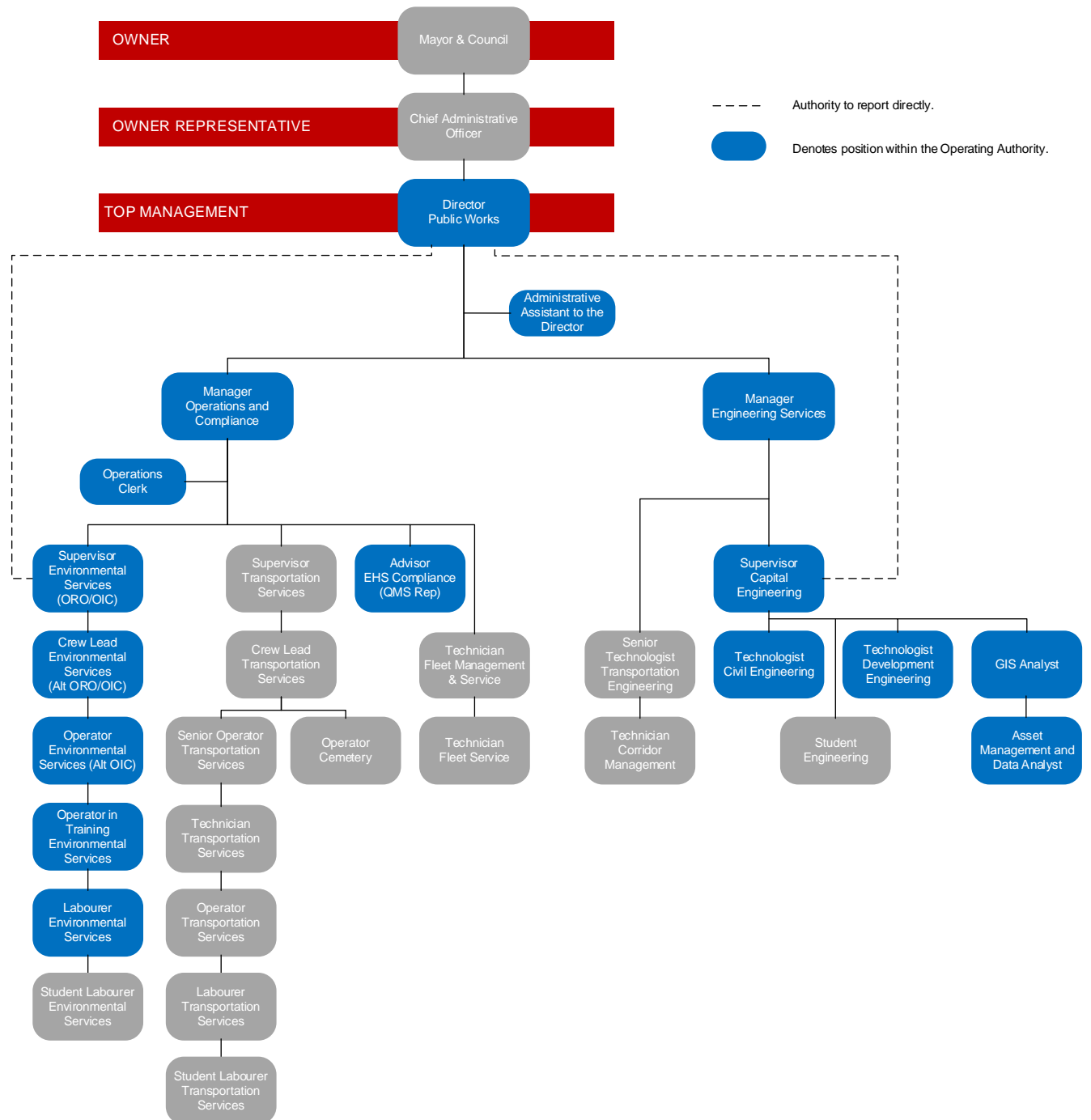
The Drinking Water QMS Organizational Chart is reviewed on an annual basis, and may be reviewed more frequently if significant organizational changes occur within the Operating Authority.

### 9.2 Roles, Responsibilities & Authorities

The ***DWQMS Roles and Responsibilities Matrix (PW-ES-WD-LM-005-001 - See Appendix A)*** defines the roles, responsibilities and authorities of staff within the Town of Grimsby's Operating Authority and includes both general roles as well as Drinking Water QMS-specific responsibilities for each role. The Matrix is reviewed periodically as per the ***DWQMS Document Control Matrix (PW-ES-WD-LM-002-001)*** or as significant organizational changes occur within the Operating Authority. The EHS Compliance Advisor, along with relevant Managers and Supervisors, are responsible for ensuring that staff remains aware of their respective roles, responsibilities and authorities.



Figure 9-1: Organizational Chart





## 10.0 Competencies

### 10.1 Competencies and Training Overview

The **DWQMS Competencies Matrix (PW-ES-WD-LM-006-001 - See Appendix A)** outlines the competencies for Grimsby WDS Operating Authority personnel. The matrix describes only drinking water system related competencies and is not considered to be inclusive of non-water related competencies; job descriptions are to be observed as the primary source of inclusive summaries for the listed positions.

A procedure has been developed to outline training requirements for Grimsby WDS Operating Authority personnel to ensure competencies are maintained. The procedure **DWQMS Operating Authority Personnel Training (PW-ES-WD-PRO-006-001 - See Appendix A)** applies to both licensed water personnel (i.e. Certified Water Operators) and non-licensed personnel (i.e. administrative and engineering staff) working in the Operating Authority.

### 10.2 Training Licensed Water Personnel

The Grimsby Water Distribution System is currently classified as a Class 1 Distribution System under O. Reg. 128/04; as such, all Certified Water Operators must maintain a minimum Class 1 Distribution Operator licence in order to operate and maintain the Grimsby WDS. Certified Water Operators and/or Water Quality Analysts must complete a minimum number of training hours as specified in **DWQMS Operating Authority Personnel Training (PW-ES-WD-PRO-006-001)**.

The Supervisor Environmental Services holds primary responsibility for planning and scheduling training activities for Certified Water Operators, and is assisted by the EHS Compliance Advisor where required.

### 10.3 Training Non-Licensed Water Personnel

Supervisors hold primary responsibility for coordinating training for their respective staff in order to ensure competencies are maintained for each specific job position. The EHS Compliance Advisor may assist in scheduling specific training in consultation with the respective supervisors.

### 10.4 DWQMS Awareness Training

The EHS Compliance Advisor is responsible for coordinating Drinking Water QMS-specific awareness training for all staff (licensed and non-licensed) within the Operating Authority as described in **DWQMS Operating Authority Personnel Training (PW-ES-WD-PRO-006-001)**.

### 10.5 Training Records

The EHS Compliance Advisor is responsible for maintaining relevant training records for Operating Authority, and uses the Town's INFO:HR database for this purpose.



## 11.0 Personnel Coverage

A procedure has been developed to document the processes used by the Town of Grimsby to ensure that adequate staffing & personnel coverage is maintained in order to effectively operate and manage the WDS. **DWQMS Personnel Coverage (PW-ES-WD-PRO-007-001 - See Appendix A)** details coverage measures to be followed during regular business hours as well as evenings, weekends, holidays and in the event of unforeseen circumstances.

The Supervisor Environmental Services is designated as the Overall Responsible Operator (ORO) for the Town of Grimsby's WDS. If the ORO is absent or unable to act, the Environmental Services Lead Hand will assume the ORO responsibilities unless otherwise designated.

The Supervisor Environmental Services is appointed as the Primary Operator-in-Charge (OIC) for the Town of Grimsby's WDS, and fills this role during regular business hours and as per established on-call rotations. If the Supervisor Environmental Services is unavailable during regular business hours, an Alternate OIC will be appointed. Additional OICs may be designated as deemed necessary by the ORO.

The Operating Authority operates one day shift only. Day shift hours of operation are as follows:

- Operations Centre staff:
  - Monday to Thursday: 7:00 am - 4:30 pm
  - Friday, 7:00 am - 3:30pm (half-staff)
- Town Hall staff:
  - Monday to Friday, 8:30am - 4:30 pm

During off-shift hours (including evenings, weekends and holidays), one WDS Operator is assigned "on-call" responsibilities. On-call assignment is scheduled and rotates on a weekly basis. The On-Call Operator is considered to be the OIC during off-shift periods. Call-in processes for additional staff are detailed in **DWQMS Personnel Coverage (PW-ES-WD-PRO-007-001)**. If call-in work is accepted by an Operator, he/she must report to work within 1 hour of receiving the call.

The Supervisor Environmental Services is responsible for coordinating scheduled absences (i.e. vacations, training, etc.) of WDS Operators to ensure an appropriate staff compliment is maintained for day-to day activities. The Supervisor Environmental Services is also responsible for responding to staffing shortages due to unforeseen circumstances (e.g. illnesses, etc.). Both of these processes are described in more detail in the **DWQMS Personnel Coverage (PW-ES-WD-PRO-007-001)** procedure.

Pandemic emergencies are managed in accordance with the **Town of Grimsby Emergency Response Plan (PW-ES-WD-MAN-020-001)**.

As Town staff are not unionized, no strike plan has been developed for Water Operations.



## 12.0 Communications

A procedure, ***DWQMS Communications (PW-ES-WD-PRO-008-001 - See Appendix A)***, has been developed to outline the processes and methods used by the Top Management of the Grimsby WDS's Operating Authority in communicating with the Mayor and Council, Operating Authority staff, WDS Vendors, and the public on matters relating to the Town's drinking water system.

Drinking Water QMS Awareness Training is used as a tool to communicate fundamentals of the Drinking Water QMS to Operating Authority staff, and can be presented to other parties as required.

Top Management communicates the Drinking Water QMS to the Owner through presentations at Council Meetings and/or Public Works Committee meetings, reports to Council or to the Public Works Committee, and informal day-to-day communications. Top Management communicates with Operating Authority staff in the operation and maintenance of the drinking water system through verbal communication, formal and informal written communication, provision of procedures, Drinking Water QMS Awareness Training, meetings, and internal and external audit results.

Typically, Operating Authority staff communicates directly with WDS Vendors. WDS Vendors whose products or services may affect drinking water quality are identified and evaluated on an annual basis (refer to Section 13.0 of this Operational Plan).

Top Management and the Operating Authority communicate with the public about the Drinking Water QMS via the Town of Grimsby's website and social media pages, availability of information at Town offices, media releases and water billing inserts. This Operational Plan, annual WDS reports, and various other water quality reports are available for public viewing as outlined in the ***DWQMS Record Control Matrix (PW-ES-WD-LM-003-001)***. Drinking water customers can communicate with the Town of Grimsby via the Town Hall or Operations Centre during regular business hours, or via the Town's call answering service outside of regular business hours.



## 13.0 Essential Supplies and Services

**DWQMS Essential Supplies and Services (PW-ES-WD-PRO-009-001 - See Appendix A)** describes the processes by which the Town of Grimsby identifies the supplies and services that it deems essential to its water-related operations and verifies the quality of the supplies and services insofar as they impact drinking water quality.

The **DWQMS Essential Supplies and Services List (PW-ES-WD-LM-009-001 - See Appendix A)** identifies the essential water distribution system supplies and services that are subject to the requirements of this procedure. Supplies and services are deemed to be “essential” if they are essential for the delivery of safe drinking water and/or if they relate to disinfection of drinking water or drinking water system infrastructure.

A Quality Assurance Review of all Drinking Water QMS essential supplies and services is undertaken at least once per year. Essential supplies and services are rated as follows:

Rating	Criteria
1 (Good)	<ul style="list-style-type: none"> <li>• Vendor or product has relevant certifications (ANSI-NSF, CSA, AWWA, etc.).</li> <li>• Minimal or no non-conformances have been issued relating to the vendor’s performance or the quality of the supplied good/service.</li> <li>• Vendor response to non-conformances is satisfactory.</li> </ul>
2 (Adequate)	<ul style="list-style-type: none"> <li>• Vendor or product does not have relevant certifications.</li> <li>• Several non-conformances have been issued relating to the Vendor’s performance or the quality of the supplied good/service.</li> <li>• Vendor response to non-conformances requires improvement.</li> </ul>
3 (Action Required)	<ul style="list-style-type: none"> <li>• Multiple non-conformances have been issued relating to the vendor’s performance or the quality/quantity of the supplied good or service.</li> <li>• Vendor response to non-conformances is unsatisfactory.</li> </ul>

Results of the Quality Assurance Review are forwarded to Top Management along with any recommendations for Vendor non-conformances, Vendor continual improvement initiatives or Vendor exclusions. Wherever action is required with respect to a WDS Vendor, Top Management and any other affected Managers/Supervisors must be informed.

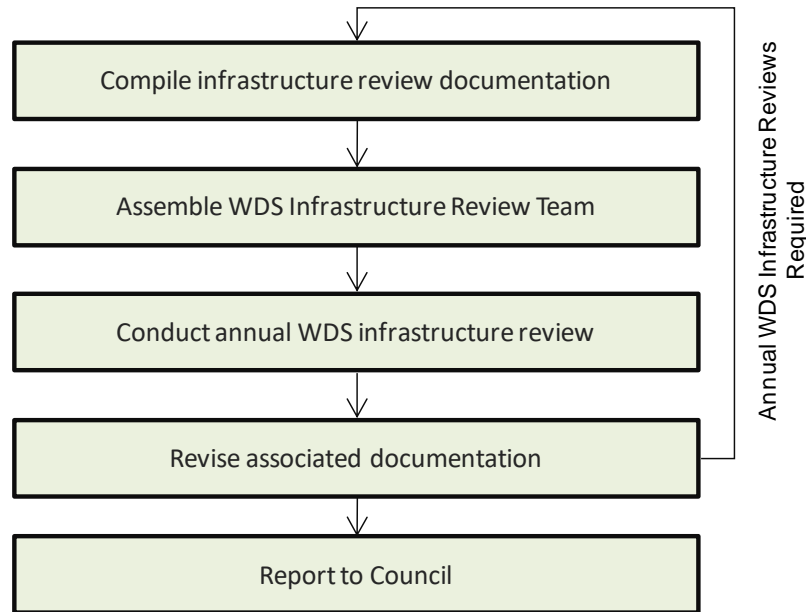
Non-conformances may be issued to WDS Vendors and documented as per the **DWQMS Preventive and Corrective Action procedure (MW-ES-WD-PRO-017-001)** and the requirements of **Section 21.0** of this Operational Plan. Non-conformances are communicated to Vendors with a requested date for response. Vendor non-conformance reports (with corrective actions) are reviewed on an annual basis as part of the Vendor QA Review.



## 14.0 Review and Provision of Infrastructure

The **DWQMS Review and Provision of Infrastructure** procedure (**PW-ES-WD-PRO-010-001 - See Appendix A**) has been developed to outline the process followed for reviewing the adequacy of the drinking water system infrastructure. The WDS infrastructure review process is as follows:

**Figure 14-1: Drinking Water System Infrastructure Review**



Members of the Infrastructure Review Team are identified in **DWQMS Review and Provision of Infrastructure (PW-ES-WD-PRO-010-001)**. The WDS Infrastructure Review Team meets on an annual basis to review the previous year’s operational history and proposed infrastructure rehabilitation plans for the subsequent year.

Selected WDS documentation and records are compiled to be used as inputs to WDS Infrastructure Review. These documents and records provide valuable information about the operational performance and maintenance histories of WDS infrastructure, and are used to assess and prioritize WDS infrastructure-related capital projects, including provision, rehabilitation and renewal initiatives.

The outcome of the annual meeting includes a WDS Infrastructure Review Report for Council. The WDS Infrastructure Review Report describes the conclusions of the infrastructure review and outlines recommendations regarding proposed WDS infrastructure renewal projects for the subsequent year.





## 15.0 Infrastructure, Maintenance, Rehabilitation and Renewal

Several infrastructure maintenance, rehabilitation and renewal programs have been established to protect the integrity of the drinking water distribution system's infrastructure and the quality of its drinking water.

### 15.1 Infrastructure Maintenance Programs

Table 15-1 (following page) summarizes the drinking water system infrastructure maintenance programs that are in place.

Infrastructure maintenance programs are completed according to the Levels of Service (LOS) outlined in Table 15-1. The Supervisor Environmental Services is responsible for administering infrastructure maintenance programs including program scheduling, assigning work tasks, reviewing completed work tasks and ensuring work is being completed as per established operating and maintenance procedures/guidelines.

The Town of Grimsby strives for continuous delivery of clean, safe drinking water; to this end, the Town has established Operational Performance Indicators (OPIs) as a means of ensuring the continued performance of its infrastructure and the effectiveness of its maintenance programs. The table includes a summary of the OPIs which are outlined for each listed infrastructure component. OPIs are established based on unexpected failures in infrastructure, and do not include deficiencies discovered during the completion of routine maintenance programs.

A review of the infrastructure maintenance programs is completed on an annual basis in conjunction the WDS Infrastructure Review (see Section 14.0). The annual review includes an examination of the actual LOS and OPIs achieved for the various infrastructure components during the previous year. Results from the previous year are compared against the LOS and OPI objectives specified in Table 15-1. These comparisons provide a general indication of the effectiveness of the Town's infrastructure maintenance programs as well as an indication of the adequacy of the various types of water system infrastructure.

Generally deficiencies with infrastructure (e.g. valves, curb stops, etc.) are corrected on a priority basis as they are needed. Fire hydrant deficiencies are considered to be of high priority and are repaired as soon as possible. The Town may also establish rehabilitation and renewal programs to concentrate efforts on particular components of infrastructure; the Town's current programs are described in Section 15.2.

Results of the annual maintenance program review are included in the annual WDS Infrastructure Review Report for Council.



**Table 15-1: WDS Infrastructure Maintenance Programs - Town of Grimsby**

Infrastructure Component	Level of Service			Operational Performance Indicator	Tracking Method
	Maintenance Activities	Frequency	Applicable Guidelines		
Watermain	<ul style="list-style-type: none"> <li>Complete emergency watermain break repairs.</li> </ul>	<ul style="list-style-type: none"> <li>As required.</li> </ul>	<ul style="list-style-type: none"> <li>Watermain Break Repairs - Grimsby WDS (PW-ES-WD-SOG-011-001)</li> </ul>	<ul style="list-style-type: none"> <li>Less than <b>15</b> system isolations per year due to watermain breaks.</li> </ul>	<ul style="list-style-type: none"> <li>Watermain Break Reports</li> <li>FieldCrew Application</li> </ul>
	<ul style="list-style-type: none"> <li>Complete Leak Detection program (sonic surveying).</li> </ul>	<ul style="list-style-type: none"> <li>Twice annually.</li> </ul>	<ul style="list-style-type: none"> <li>Leak Detection - Grimsby WDS (PW-ES-WD-SOG-011-002)</li> </ul>	<ul style="list-style-type: none"> <li>Annual Water Loss &lt; <b>5%</b></li> </ul>	<ul style="list-style-type: none"> <li>Database (PW-ES-WD-DBS-011-004)</li> <li>Annual Water Consumption Report</li> </ul>
Valves	<ul style="list-style-type: none"> <li>Exercise main valves.</li> </ul>	<ul style="list-style-type: none"> <li>Every 4 years.</li> </ul>	<ul style="list-style-type: none"> <li>Watermain Valve Maintenance - Grimsby WDS (PW-ES-WD-SOG-011-005)</li> </ul>	<ul style="list-style-type: none"> <li>Less than <b>5</b> valves permitted inoperable at watermain break events per year.</li> </ul>	<ul style="list-style-type: none"> <li>Watermain Break Reports</li> <li>FieldCrew Application</li> </ul>
	<ul style="list-style-type: none"> <li>Inspect valves, manholes &amp; valve boxes for deficiencies.</li> </ul>	<ul style="list-style-type: none"> <li>With valve exercising.</li> </ul>			
	<ul style="list-style-type: none"> <li>Repair or replace.</li> </ul>	<ul style="list-style-type: none"> <li>As needed.</li> </ul>			
Fire Hydrants	<ul style="list-style-type: none"> <li>Flush and inspect hydrants.</li> </ul>	<ul style="list-style-type: none"> <li>Once annually.</li> </ul>	<ul style="list-style-type: none"> <li>Fire Hydrant Flushing - Grimsby WDS (PW-ES-WD-SOG-011-003)</li> </ul>	<ul style="list-style-type: none"> <li><b>Zero</b> AWQIs permitted as a result of low chlorine residuals.</li> <li><b>10</b> water quality complaints (related to separate incidents) permitted per year.</li> </ul>	<ul style="list-style-type: none"> <li>FieldCrew Application</li> <li>Water Quality Complaints</li> </ul>
	<ul style="list-style-type: none"> <li>Paint hydrants (corrosion defence).</li> </ul>	<ul style="list-style-type: none"> <li>Once every 10 years or as needed.</li> </ul>	<ul style="list-style-type: none"> <li>Fire Hydrant Maintenance - Grimsby WDS (PW-ES-WD-SOG-011-004)</li> </ul>	<ul style="list-style-type: none"> <li>None.</li> </ul>	<ul style="list-style-type: none"> <li>FieldCrew Application</li> </ul>
	<ul style="list-style-type: none"> <li>Paint hydrants (colour codes).</li> </ul>	<ul style="list-style-type: none"> <li>Prior to Dec 31, the year after the new hydrant was installed.</li> </ul>	<ul style="list-style-type: none"> <li>Fire Hydrant Maintenance - Grimsby WDS (PW-ES-WD-SOG-011-004)</li> </ul>	<ul style="list-style-type: none"> <li><b>Zero</b> hydrants permitted with unmarked flow rates (after LOS time frame has expired).</li> </ul>	<ul style="list-style-type: none"> <li>FieldCrew Application</li> </ul>



Infrastructure Component	Level of Service			Operational Performance Indicator	Tracking Method
	Maintenance Activities	Frequency	Applicable Guidelines		
Fire Hydrants (continued)	<ul style="list-style-type: none"> <li>Check for operational problems (i.e. freezing).</li> </ul>	<ul style="list-style-type: none"> <li>Self-draining: - With flushing.</li> <li>Non-draining: - Monthly (Nov 1 to Apr 1).</li> </ul>	<ul style="list-style-type: none"> <li>Fire Hydrant Maintenance - Grimsby WDS (PW-ES-WD-SOG-011-004)</li> </ul>	<ul style="list-style-type: none"> <li><b>Zero</b> frozen hydrants permitted at time of use.</li> </ul>	<ul style="list-style-type: none"> <li>FieldCrew Application</li> </ul>
	<ul style="list-style-type: none"> <li>Complete hydrant fire flow testing.</li> </ul>	<ul style="list-style-type: none"> <li>Prior to Dec 31, the year after the new hydrant was installed.</li> </ul>	<ul style="list-style-type: none"> <li>Fire Hydrant Maintenance - Grimsby WDS (PW-ES-WD-SOG-011-004)</li> </ul>	<ul style="list-style-type: none"> <li><b>2</b> bagged hydrants permitted per <b>25,000</b> service population.</li> </ul>	<ul style="list-style-type: none"> <li>FieldCrew Application</li> </ul>
Curb Stops & Boxes	<ul style="list-style-type: none"> <li>Repair curb stops and/or curb boxes.</li> </ul>	<ul style="list-style-type: none"> <li>Water on: - Immediate repair.</li> <li>Water off - Within 2 weeks.</li> </ul>	<ul style="list-style-type: none"> <li>Small Diameter Water Service Maintenance and Tapping - Grimsby WDS (PW-ES-WD-SOG-011-006)</li> </ul>	<ul style="list-style-type: none"> <li><b>100</b> permitted per year.</li> </ul>	<ul style="list-style-type: none"> <li>Database (PW-ES-WD-DBS-011-001)</li> </ul>
Water Services	<ul style="list-style-type: none"> <li>Complete emergency water service repairs.</li> </ul>	<ul style="list-style-type: none"> <li>As needed.</li> </ul>	<ul style="list-style-type: none"> <li>Small Diameter Water Service Maintenance and Tapping - Grimsby WDS (PW-ES-WD-SOG-011-006)</li> </ul>	<ul style="list-style-type: none"> <li><b>10</b> permitted per year.</li> </ul>	<ul style="list-style-type: none"> <li>Database (PW-ES-WD-DBS-011-001)</li> </ul>
Bulk Water Stations	<ul style="list-style-type: none"> <li>Inspect bulk water stations.</li> </ul>	<ul style="list-style-type: none"> <li>Monthly or as otherwise needed.</li> </ul>	<ul style="list-style-type: none"> <li>Bulk Water Station Maintenance - Grimsby WDS (PW-ES-WD-SOG-011-016)</li> </ul>	<ul style="list-style-type: none"> <li>None.</li> </ul>	<ul style="list-style-type: none"> <li>Form (PW-ES-WD-FRM-011-008)</li> </ul>
Dead-end Watermain	<ul style="list-style-type: none"> <li>Flush hydrants &amp; blow-offs at dead-ends.</li> </ul>	<ul style="list-style-type: none"> <li>Monthly (May 1 - Sept 31)</li> </ul>	<ul style="list-style-type: none"> <li>Fire Hydrant Flushing - Grimsby WDS (PW-ES-WD-SOG-011-003)</li> </ul>	<ul style="list-style-type: none"> <li><b>Zero</b> AWQIs permitted as a result of low chlorine residuals.</li> <li><b>10</b> related coloured water and/or turbidity complaints permitted per year.</li> </ul>	<ul style="list-style-type: none"> <li>FieldCrew Application</li> <li>Water Quality Complaints</li> </ul>
Water Meters	<ul style="list-style-type: none"> <li>Inspect/repair Town-owned water meters.</li> </ul>	<ul style="list-style-type: none"> <li>As needed.</li> </ul>	<ul style="list-style-type: none"> <li>Water Meter Maintenance, Testing and Repairs - Grimsby WDS (PW-ES-WD-SOG-011-009).</li> </ul>	<ul style="list-style-type: none"> <li>None.</li> </ul>	<ul style="list-style-type: none"> <li>Database (PW-ES-WD-DBS-011-002)</li> </ul>



Infrastructure Component	Level of Service			Operational Performance Indicator	Tracking Method
	Maintenance Activities	Frequency	Applicable Guidelines		
Water Meters (continued)	<ul style="list-style-type: none"> <li>Calibrate water meters.</li> </ul>	<ul style="list-style-type: none"> <li>As needed:               <ul style="list-style-type: none"> <li>5/8" - 3/4"</li> <li>1" - 1 1/2"</li> <li>2"</li> </ul> </li> <li>5 years:               <ul style="list-style-type: none"> <li>2"-3" compound</li> </ul> </li> <li>1 year:               <ul style="list-style-type: none"> <li>4" or &gt;</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>AWWA Standard</li> <li>Water Meter Maintenance, Testing and Repairs - Grimsby WDS (PW-ES-WD-SOG-011-009).</li> </ul>	<ul style="list-style-type: none"> <li>None.</li> </ul>	<ul style="list-style-type: none"> <li>Outlook Calendar</li> <li>Database (PW-ES-WD-DBS-011-005)</li> <li>Calibration Reports (3<sup>rd</sup> Party)</li> </ul>
Backflow Prevention Devices	<ul style="list-style-type: none"> <li>Inspect and test backflow prevention devices.</li> </ul>	<ul style="list-style-type: none"> <li>Annually or as needed.</li> </ul>	<ul style="list-style-type: none"> <li>Backflow Prevention By-Law 09-73</li> <li>HARP Unit Operation, Calibration and Maintenance (PW-ES-WD-SOG-013-003)</li> </ul>	<ul style="list-style-type: none"> <li>None.</li> </ul>	<ul style="list-style-type: none"> <li>BSI Online</li> <li>Form (PW-ES-WD-FRM-018-007)</li> <li>Form (PW-ES-WD-FRM-018-008)</li> </ul>



## 15.2 Infrastructure Rehabilitation & Renewal Programs

The following sections describe the various drinking water system rehabilitation and renewal programs in place. The status of these programs is discussed as part of the annual DWS Infrastructure Review and information is summarized in the annual WDS Infrastructure Review Report for Council.

### 15.2.1 *Watermain Replacement*

A strategy has been developed for replacing aging watermain which has surpassed or is close to surpassing its useful life. This strategy has targeted the replacement of approximately 31,600m<sup>8</sup> of cast iron watermain over the course of a 25 year period (2009 - 2033). Cast Iron watermain was installed between 1953 and 1973<sup>9</sup> and accounts for approximately 25%<sup>10</sup> of the total length of watermain within the water distribution system. With a life expectancy of approximately 45 years, all cast iron watermain will need to be replaced over the course of the 25 year period.

As part of the annual WDS Infrastructure Review (see **Section 14.0**), the Town reviews and develops a list of cast iron watermain<sup>11</sup> locations to be replaced as part of the annual capital watermain replacement program. This list is used to prioritize the locations of the watermain replacements and to forecast the costs of these replacements within the subsequent 5 year period. A number of factors are used when developing this list:

- Watermain characteristics (e.g. age, pipe material, etc.);
- Watermain break statistics (e.g. location of watermain breaks, frequency of breaks, etc.);
- Water quality characteristics (e.g. dead-end locations, low/high water usage, etc.);
- Water quality complaints (e.g. rusty/dirty water calls, etc.);
- Water system modelling results/data;
- Critical system locations (e.g. highway crossings, areas supplying vital water users, etc.);
- Operational difficulties (e.g. difficulties with the ability to maintain adequate chlorine residuals, difficulties with the ability to complete watermain break repairs, etc.);
- Filed observations from operational staff;
- Logistics of construction (i.e. the location of the watermain in relation to other planned projects);
- Cost of construction (i.e. ability to fit the construction costs within the annual capital replacement budget);
- Future development plans.

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<sup>8</sup> Reference: "Town of Grimsby Water Systems Full Cost Assessment and Recovery". March 2010: DFA Infrastructure Inc.

<sup>9</sup> Ibid.

<sup>10</sup> Ibid.

<sup>11</sup> Other types of pipe material may be replaced at discretion of the Director of Public Works.



### 15.2.2 *Water Meter Replacement*

The Town has completed a replacement initiative to eliminate all imperial (gallon) water meters within the water system and is now concentrating on replacing older metric (m<sup>3</sup>) water meters. Generally these older water meters are replaced on an as needed basis as problems arise, however the Finance Department may identify specific situations/locations of water meters which need to be replaced on a proactive basis.

### 15.2.3 *Backflow Prevention Program*

The Town has implemented a backflow prevention program which requires the installation, testing and inspection of backflow prevention devices at properties considered to have moderate or severe potential backflow hazards.

Property owners are required to have a qualified person inspect and test their backflow preventers on an annual basis. If the inspections or test indicate problems, the backflow device is either repaired or replaced at the cost of the property owner.

The Town owns a number of facilities which require backflow prevention devices to be in place. Similar to private properties, the Town has these devices inspected and tested annually and repairs or replaces these devices as may be required.

The requirements of the backflow prevention program are defined in By-Law No. 09-73 and are further outlined in the standard operating guideline called ***Backflow Prevention Program (PW-ES-WD-SOG-018-001)***.

### 15.2.4 *Other Rehabilitation and Renewal Programs*

Other rehabilitation or renewal programs may be implemented at the discretion of the Director of Public Works. These initiatives may be implemented to address trends with deficiencies in specific types of infrastructure, inefficiencies identified in infrastructure maintenance programs or where maintenance programs are determined to be ineffective for specific infrastructure components. Typically these triggers would be identified during the infrastructure maintenance programs reviews completed annually as part of the WDS Infrastructure Review.



## 16.0 Sampling, Testing and Monitoring

***DWQMS Sampling, Testing and Monitoring (PW-ES-WD-PRO-012-001 - See Appendix A)*** describes the required distribution system sampling, testing and monitoring activities completed by Operating Authority Staff in the operation of the Grimsby drinking water system, including the types and numbers of samples required, frequency of sampling and Standard Operating Guidelines to be followed.

Sampling and monitoring requirements for the Town's drinking water distribution system are identified in ***DWQMS Sampling, Testing and Monitoring (PW-ES-WD-PRO-012-001)***. Select drinking water samples are required to be taken at a point in the system where conditions are most challenging (where applicable). Where this is a requirement for the sample in question, sample location conditions are outlined in the procedure.

Treated water is provided to the Town of Grimsby by the Region of Niagara; as such, the Town's Operating Authority Staff are responsible for distribution system sampling as required by O. Reg 170/03. The Region of Niagara is required to conduct raw water and treated water sampling activities.

The Town's contracted accredited testing laboratory provides immediate verbal notification to the Town in the event of an adverse test result. The Town then provides immediate verbal notification to the Niagara Medical Officer of Health and the Ministry of the Environment Spills Action Centre.

The Drinking water System Annual Report summarizes all drinking water system sampling and testing, including any adverse results. These Reports are provided to the Owner upon completion and are also made available for public review. A copy of the annual report is also provided to the Region of Niagara.





## 17.0 Measurement and Recording Equipment Calibration and Maintenance

***DWQMS Measurement and Recording Equipment Calibration and Maintenance (PW-ES-WD-PRO-013-001*** - See Appendix A) outlines requirements for the calibration and verification of measurement and recording equipment used for sampling, testing and monitoring.

Measurement, monitoring and recording equipment owned by the Town of Grimsby and used in water distribution system operations subject to periodic calibration by Operating Authority staff and/or occasional calibration by the manufacturer, where required. The ***DWQMS Measurement and Recording Equipment Calibration and Maintenance (PW-ES-WD-PRO-013-001)*** procedure lists the measurement and recording equipment used by the Operating Authority with respect to the water distribution system, and the associated calibration requirements and maintenance for each piece of equipment.

Types of equipment used for WDS sampling, testing and monitoring include:

- Pocket Chlorine Colorimeters;
- pH Meters;
- HARP Unit;
- Dial-Reading Pressure Gauges;
- Hydrant Pressure Loggers.

For each equipment type, the ***DWQMS Measurement and Recording Equipment Calibration and Maintenance (PW-ES-WD-PRO-013-001)*** procedure provides information including manufacturer name, equipment model type and serial number, calibration frequency, and any associated calibration SOGs.



## 18.0 Emergency Management

A procedure has been developed to outline the contents and provisions for use of the Town's **Water Operations Emergency Response Plan (PW-ES-WD-MAN-014-001)**. The purpose of the **DWQMS Emergency Management (PW-ES-WD-PRO-014-001 - See Appendix A)** procedure is to identify the Town's **Water Operations Emergency Response Plan (PW-ES-WD-MAN-014-001 - See Appendix D)**, to specify training and testing requirements for this Plan, and to outline emergency communication protocols and emergency contacts.

The **Water Operations Emergency Response Plan (PW-ES-WD-MAN-014-001)** includes detailed emergency response procedures for the following identified emergencies:

- **Contamination of Water - Known Contaminant (PW-ES-WD-PRO-014-002)**
- **Contamination of Water - Unknown Contaminant (PW-ES-WD-PRO-014-003)**
- **Suspected Intentional Contamination of Water (PW-ES-WD-PRO-014-004)**
- **Unexpected Loss of Distribution System Pressure (PW-ES-WD-PRO-014-005)**
- **Natural Disaster (PW-ES-WD-PRO-014-006)**
- **Suspected Backflow Event (PW-ES-WD-PRO-014-007)**
- **Loss of Regional Water Supply (PW-ES-WD-PRO-014-008)**
- **Drinking Water Quality Advisory (PW-ES-WD-PRO-014-009)**

Communication protocols for each emergency scenario are embedded in the respective emergency response procedure.

A list of emergency contacts is found in **Emergency Contact List (PW-ES-WD-LM-014-001 - See Appendix A)**. The Contact List includes contact information for both internal and external Water Operations contacts that may be required in an emergency.

Emergency training and testing requirements are outlined in **DWQMS Emergency Management (PW-ES-WD-PRO-014-001)**. On an annual basis, at least one emergency response procedure is selected for review and testing. The Response Plan is reviewed and updated as required in conjunction with the periodic testing activities.

Responses to Corporate-level emergencies are documented in the **Niagara West Emergency Response Plan (PW-ES-WD-MAN-020-001)**. Emergencies of a major nature that cannot be sufficiently managed by Departmental staff, or that require significant external resources, are understood to fall within the scope of the **Niagara West Emergency Response Plan**. Similarly, emergencies of a Regional nature are managed according to the **Regional Municipality of Niagara Emergency Response Procedures Manual for Water and Wastewater Systems (PW-ES-WD-MAN-020-002)**.



## 19.0 Internal Audits

A procedure has been created to describe the Drinking Water QMS Internal Auditing Program & associated processes. The purpose of the Internal Audit Program is to evaluate the Town of Grimsby's conformance with the Ministry of Environment's Drinking Water Quality Management Standard. The procedure ***DWQMS Internal Auditing (PW-ES-WD-PRO-015-001*** - See *Appendix A*) documents required activities & processes relating to the planning, execution and documentation of Drinking Water QMS Internal Audits, including recording of non-conformances and reporting of results to Top Management and the Owner.

Drinking Water QMS Internal Auditors are appointed to the Internal Audit Team by Top Management, and must achieve and maintain defined competency requirements including the following:

- Internal Auditors must possess an understanding of both the requirements and the intent of the Drinking Water Quality Management Standard;
- Internal Auditors must be competent (i.e., must receive Internal Auditor Training);
- Internal Auditors should have a good knowledge of the drinking water system operation and of drinking water quality requirements;
- Internal Auditors must be familiar with the Public Works Department's Drinking Water QMS auditing procedures and protocols.

The Lead Auditor and EHS Compliance Advisor work together to plan and execute the annual Drinking Water QMS Internal Audit with the assistance of the Internal Audit Team. The role of Lead Auditor can be fulfilled by the EHS Compliance Advisor if desired. Internal Auditors must remain objective and impartial throughout the audit process, and cannot audit their own work or work areas.

Audit conclusions may identify actual or potential non-conformances in current operations or processes, indicating the need for corrective action or preventive action, respectively. Auditors may also suggest potential improvement initiatives. Actual and potential non-conformances must be documented and resolved according to the Operating Authority's defined Continual Improvement process (refer to Section 21.0 of this Operational Plan). Completion and effectiveness of corrective and preventive actions are verified by the Lead Auditor or an Internal Audit Team delegate.

Upon completion of scheduled internal audits, the EHS Compliance Advisor (or designate) reviews audit findings and compiles the information for presentation to Top Management as part of the annual Drinking Water QMS Management Review (refer to Section 20.0 of this Operational Plan). Audit findings must be considered in future relevant audits.

The Town of Grimsby's Drinking Water QMS must be audited in its entirety once every calendar year. All QMS system processes, Standard Operating Guidelines and/or field activities that fall under the scope of the Drinking Water Quality Management Standard may be audited as part of this process.



## 20.0 Management Review

**DWQMS Management Review (PW-ES-WD-PRO-016-001 - See Appendix A)** has been developed to document the process followed by the Operating Authority and Operating Authority Top Management (Director of Public Works) in planning, executing and documenting Drinking Water QMS Management Reviews, including provision of feedback to the Operating Authority and reporting of review results to the Owner. The Management Review process ensures that all levels of the organizational structure are kept informed and aware of the Drinking Water QMS and WDS performance.

The Director of Public Works, as Top Management of the Operating Authority, participates in the Management Review. Other management staff from the Operating Authority participate in the review as members of the Management Review Team.

The EHS Compliance Advisor has a significant role in the Drinking Water QMS Management Review process, compiling all required input data and presenting this information to the Director of Public Works and the Management Review Team. Inputs to Management Review are listed in Section 5.3 of **DWQMS Management Review (PW-ES-WD-PRO-016-001)**.

Other Town staff may be invited to assist in presenting information to the Management Review Team, or in reviewing the information presented, where they offer additional expertise or insight regarding the subject matter.

The Director of Public Works and the Management Review Team are responsible for reviewing the input materials presented and generating outputs as specified in Section 5.4 of **DWQMS Management Review (PW-ES-WD-PRO-016-001)**.

Management Review meetings can be conducted as one meeting per year or split into several smaller meetings over the course of the year. Either method is acceptable as long as all required review inputs and agenda items are reviewed over the course of the calendar year.

Drinking Water QMS Management Review outputs must be documented and retained as proof of completion, and results of the Management Review must be communicated to the Owner.



## 21.0 Continual Improvement

**DWQMS Preventive & Corrective Action (PW-ES-WD-PRO-017-001 - See Appendix A)** was developed to document the process followed to ensure effective resolution of Drinking Water Quality Management non-conformances. This process is used to address both potential and actual non-conformances and includes root cause analysis, identification and implementation of preventive or corrective actions, and verification of their effectiveness.

The handling of Adverse Water Quality Incidents (AWQIs) is not included in the scope of **DWQMS Preventive & Corrective Action (PW-ES-WD-PRO-017-001)**. Separate procedures have been developed to document processes for addressing these occurrences: **Reporting Adverse Water Quality - All Systems (PW-ES-WD-SOG-012-008)** and **Corrective Actions for Adverse Water Quality - Grimsby WDS (PW-ES-WD-SOG-012-010)**.

Potential and actual Drinking Water Quality Management non-conformances are identified through several different means, including but not limited to audits, internal and external communication, monitoring and measurement of Drinking Water QMS performance, employee observations/suggestions, and Drinking Water QMS Management Reviews. The non-conformance is documented on a **DWQMS Preventive & Corrective Action Request Form (PW-ES-WD-FRM-017-001)**, and this form is used to document the Root Cause Analysis, the development & implementation of the Preventive or Corrective Action Plan, and follow-up verification activities. Designated Operating Authority Staff may be delegated to implement preventive or corrective actions. The EHS Compliance Advisor (or designate) verifies the effectiveness of the preventive or corrective action. The Director of Public Works or designate is responsible for approving and closing Preventive and Corrective Requests, and will only do so once the effectiveness of the implemented solution has been verified.

The EHS Compliance Advisor retains completed documentation of Preventive & Corrective Action Requests and generates an annual summary of the status of non-conformances, preventive actions and corrective actions for presentation as an input to Drinking Water QMS Management Reviews.