Title:	***City of Cornwall Drinking Water System DWQMS Operational Plan***		
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DRINKING WATER SYSTEM DWQMS OPERATIONAL PLAN

WATER TREATMENT & WATER DISTRIBUTION
(ENVIRONMENTAL DIVISION & MUNICIPAL WORKS DIVISION)

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1.0 Quality Management System

1.1 Purpose

The purpose of this Operational Plan is to document the City of Cornwall's (the City's) Drinking-Water Quality Management System (DWQMS) as part of the City's efforts to ensure that safe drinking water is supplied to all of its customers. This Operational Plan was developed in order to meet the requirements of the Ministry of the Environment, Climate and Parks' Drinking Water Quality Management Standard 2.0 (February 2017).

1.2 Scope

This DWQMS Operational Plan applies to all drinking-water-related operations at the City of Cornwall. Contents of the DWQMS Operational Plan include the following:

Plan Section Title	
DWQMS Operational Plan Report	Main Report
DWQMS System-Level Procedures & Supporting Documentation	Appendix A
DWQMS Risk Assessment Results	Appendix B
Drinking Water System Contingency Plan	Appendix C

1.3 Definitions

Accreditation Body — Independent, third-party body that has been appointed to conduct DWQMS Accreditation Audits. The Accreditation Body is authorized to make recommendations for certification of a Municipality's DWQMS. For DWQMS accreditation, the Accreditation Body has been identified as the ***NSF Canada.***

Audit — A systematic and documented verification process that involves objectively obtaining and evaluating documents and processes to determine whether a quality management system conforms to the requirements of the DWQMS .

City — City of Cornwall

DWQMS — Drinking Water Quality Management System

DWS — Drinking water system

DWS Operator — Person who conducts operational checks or who adjusts, tests or evaluates a process that controls the effectiveness or efficiency of a DWS, including the flow, pressure or quality of water within the DWS.

DWS Vendor — Supplier or service provider that provides a product or service related to the drinking water system.

Ministry of the Environment, Climate & Parks (MECP) — Provincial Ministry that developed the DWQMS Standard and requires select Ontario municipalities & utilities to develop and implement a DWQMS as a component of the Municipal Drinking-Water License Program.

OA	The operating authority is the person or entity that is given responsibility by the owner for the operation, management, maintenance or alteration of the subject system
OIC	Operator In Charge
ORO	Overall Responsible Operator
Owner	Legal or beneficial owner of the DWS. For the City of Cornwall, the Owner is represented by the Mayor and Council. The Chief Administrative Officer has been identified as an Owner Representative.
Quality Management System (**QMS)**	A system to: • establish policy and objectives, and to achieve those objectives direct and control an organization about quality
Top Management	A person, persons or a group of people at the highest management level within an operating authority that makes decisions respecting the QMS and recommendations to the owner respecting the subject system or subject systems. For the City of Cornwall, Top Management has been identified as the General Manager Department of Infrastructure & Municipal Works, Manager – Environment, and Manager – Municipal Works.

2.0 Quality Management System Policy

The City of Cornwall owns and operates the Cornwall drinking-water system, including treatment and distribution operations.

The City is committed to:

- Continually providing safe and clean drinking-water to customers;
- Legislative compliance with the Safe Drinking Water Act and related regulations;
- Establishing, maintaining, and continually improving its Drinking Water Quality Management System;
- Acting to resolve any issues relating to drinking-water quality and communicating with the Operating Authority, the Owner and the Public; and

Reviewing and improving its drinking-water system infrastructure.

The DWQMS Policy is approved and endorsed by the Owner and Top Management of the DWS as a component of this Operational Plan. The DWQMS Policy ***(IMW-DWS-GEN-VIS-001-001)*** is posted at several Department of Infrastructure and Municipal Works locations, and will also be communicated to the public through posting on the City's website.

3.0 Commitment and Endorsement

This Operational Plan has been reviewed and approved by the City of Cornwall's Mayor, Council, and Operating Authority Top Management. A resolution was passed by Council endorsing the Operational Plan and its contents on August 12th, 2019 (By-Law # 2015-142), following Standard of Care training that was held on July 29th, 2019, the Top Management presented at a Council Meeting and obtained the commitment and written endorsement of the new Council and Mayor.

The Top Management provide evidence of its commitment to an effective Quality Management System by ensuring that it meets the DWQMS requirements, communicating legislative and regulatory requirements to Operating Authority according to the communication procedure while determining, obtaining or providing the resources needed to maintain and continually improve the Quality Management System.

4.0 Quality Management System Representative

The Quality Management System Representative for the City of Cornwall's DWQMS has been authorized to carry out all of the responsibilities associated with this role.

The QMS Representative is tasked with the following responsibilities:

- Ensuring that processes and procedures required for the DWQMS are established, implemented and maintained;
- Reporting to Top Management regarding DWQMS performance and any need for improvement;
- Ensuring that only current versions of documentation required by the DWQMS 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 City of Cornwall's drinking-water system; and
- Promoting awareness of the DWQMS 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 DWQMS. ***QMS Control of Documents*** (***IMW-INT-GEN-PRO-004-001*** – *see Appendix A*) outlines the creation, editing, review, approval, distribution, retrieval, protection and disposing of documents.

Documentation is maintained in hard-copy and soft-copy to ensure that it can be accessed and retrieved by all staff at all required working locations. Soft-copies of master (editable) documentation are controlled by the QMS Representative and are protected from distribution or editing. Obsolete editable versions of master electronic documentation are archived and are similarly protected from distribution.

5.2 Records Control

A procedure has been developed that outlines record control processes for the DWQMS. ***QMS Control of Records*** (***IMW-INT-GEN-PRO-005-001*** – *see Appendix A*) outlines processes for the collection, identification, storage, maintenance, retrieval, protection, retention and disposal of drinking water system records.

The ***DWQMS Record Retention Matrix (IMW-DWS-GEN-LM-005-001)*** lists the relevant 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). Retention times stated are minimum times and are designated in consultation with relevant legislation, where applicable.

6.0 Drinking-Water System

6.1 General

The City of Cornwall owns and operates the Cornwall drinking water system (DWS #220001049), which consists of the Cornwall Water Purification Plant (WPP) (Class 3 Treatment) and distribution system (Class 3 Distribution). The system is classified as a "Large Municipal Residential" drinking water system in the **Subject System Description Form, Schedule "C"** (***IMW-DWS-GEN-VIS-001-002***).

The Owner is represented by the Mayor and Council for the City of Cornwall whereas the Chief Administrative Officer (CAO) has been identified as an Owner Representative. The Operating Authority include General Manager – Infrastructure & Municipal Works, Manager – Environmental Services, Manager – Infrastructure, Manager – Municipal Works, WPP Supervisor, Water and Sewer Supervisor and all the Maintenance and Operations teams. A process flow diagram of the Cornwall drinking water system is provided in ***Figure 6-1.***

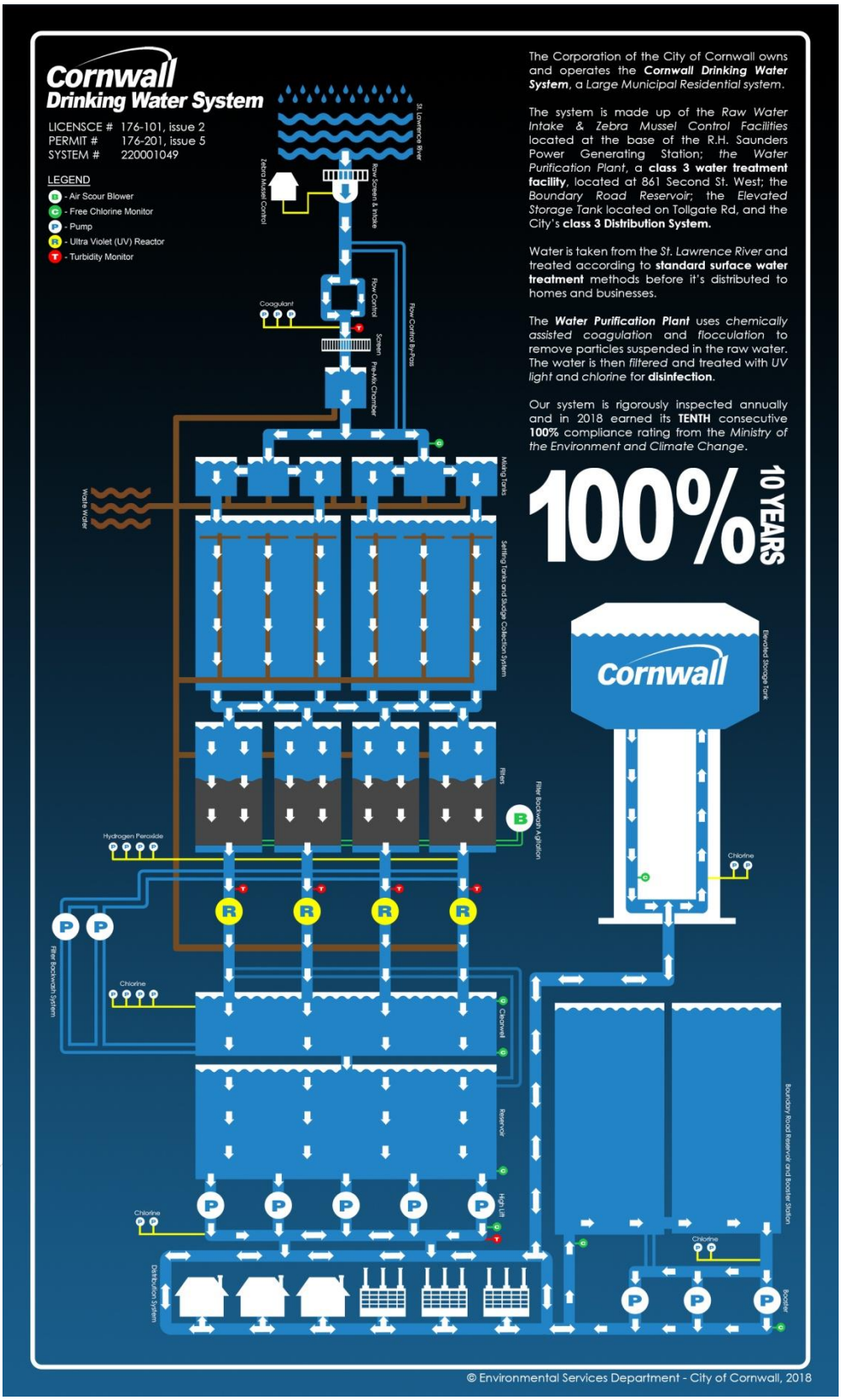


Figure 6-1: City of Cornwall Drinking Water System Diagram

The WPP and distribution system are operated under two separate management structures. The WPP, elevated tower, and reservoir and associated pumps are operated by Water Purification Plant Operations staff (Department of Infrastructure & Municipal Works – Environmental Division). Linear infrastructure in the distribution system is operated by Water Distribution Operations staff (Department of Infrastructure & Municipal Works – Municipal Works Division).

6.2 Drinking Water Source

The source of supply for the Cornwall drinking water system is Lake St. Lawrence. The intake structure is located on the west side of the R.H. Saunders Power Dam.

Lake St. Lawrence is a stable and reliable source of surface water with fairly consistent raw water quality. Turbidity in the river varies between 0.2NTU and 1.5NTU whereas the temperature varies between 0.6°C to 25.4°C.

Raw water sampling is completed on a routine basis. Continuous monitoring is conducted at the WPP for pH, turbidity and temperature, while bacteriological samples are submitted to a licensed laboratory for analysis. Cornwall WPP staff also conducts sampling as part of the MECP's Drinking Water Surveillance Program (DWSP).

The permit to take water (PTTW) for the drinking water system was issued on February 26th, 2013 and expires on June 30th, 2023. It prescribes a maximum water taking of 125,000L/min or 100,000,000L/day. At present, water takings are well below the limits indicated in the PTTW.

6.3 Cornwall Water Purification Plant

The Cornwall WPP intake structure is located at the west-face of the R.H. Saunders Dam, 15m below the level of Lake St. Lawrence. It consists of a vertical flared bell protected by a steel screen. A valve house with a normally open gate valve is situated at the base of the dam, and is connected to the intake structure via a 61m, 1,220mm-diameter pipe.

A zebra mussel control system is housed in an enclosed building located to the east of the valve house and consists of raw water re-circulation pumps, a raw water supply line and gas chlorination equipment (cylinders, weigh scales, chlorinator, gas feeder and associated instrumentation and controls). A chlorine solution is used for zebra mussel control as required; the solution is fed from the building to a diffuser at the raw water intake via a 38mm diameter feed line.

The intake pipe consists of 3.6km of 1,066mm diameter concrete pipe from the zebra mussel control system to the water treatment plant. Raw water pumping is not required as flows in the intake pipe are conveyed due to the hydraulic pressure of Lake St. Lawrence.

Motorized valves are used to regulate flow into the WPP; these valves are modulated by the settling tank level sensors. These motorized valves, with corresponding magnetic flow meters, are installed in the below-grade control chamber. One valve and flow meter is installed on a 900mm diameter pipe and is used in higher flows; the other is installed on a 600mm pipe and is used in lower flows. A manually-controlled by-pass valve has been installed upstream of the motorized valves and can be used to direct raw water to the flocculation tanks in the event of maintenance or failure of the motorized valves.

Coagulant is injected upstream of the raw water chamber. The water then flows through a screen with 20mm openings in order to filter out larger debris. The screen is automatically activated; screen rinsing

is also automated and occurs during rotation. The screen can also be manually operated as required. Wastewater streams from screen rinses are directed to the sanitary sewer.

The water flows through the pre-mix channel, and the flow is subsequently divided between two hydraulic flocculation trains that operate in parallel. Each flocculation train consists of three compartments. The centre compartment is used to achieve additional mixing of coagulant and water. Water from the centre compartment is directed to the outer compartments where the flocculation process is completed.

Water flows from each flocculation tank into one of two settling tanks that operate in parallel. Each tank is fed via a direct gravity supply from the corresponding flocculation chamber. Each settling tank is equipped with a baffle to prevent short circuiting and aid in settling. Sludge from settling tank cleaning is automatically directed to the sanitary sewer via a conveyor system.

Settled water from the settling tanks is combined in a single settled water conduit and directed to the filtration process, where it is arbitrarily divided between four available filters. Filters are equipped with anthracite media, gravel-less lateral style underdrains, and each has a surface area of 82m^2. They are also capable of directing filter flow to waste and air scouring during backwashes. Wastewater streams from filter backwashing are directed to the sanitary sewer.

Ultraviolet (UV) light disinfection units are installed on each of the four filter effluent lines are brought online when the corresponding filter is activated. Each UV system is equipped with an automatic mechanical cleaning system and associated monitoring and control instrumentation.

Filtered water flows into a baffled clearwell with a total capacity of 1,515m^3. A baffled, single-cell reservoir with a total capacity of 3,031m^3 is also located on-site.

Chemical feed systems used at the WPP include:

- Sodium hypochlorite system (for disinfection) consisting of two (2) 11,350L storage tanks and chlorine metering pumps (duty/standby) at pre-chlorination, at back-up primary disinfection (in case UV units fail), and at secondary disinfection.
- Coagulant feed system (for coagulation) consisting of two (2) 15,890L tanks and three (3) metering pumps for coagulant addition to the raw water chamber or into the pre-mix chutes upstream of the flocculation trains.
- Hydrogen peroxide feed system (for advanced oxidation on a seasonal or as-required basis for taste and odour control) consisting of one (1) 18,925L tank and four (4) metering pumps for hydrogen peroxide addition to the filter effluent lines upstream of the UV units.

Treated water is pumped to the distribution system using five (5) centrifugal high lift pumps, two rated at 421L/s at a total dynamic head (TDH) of 49 m and three rated at 263L/s at a TDH of 49m, discharging to a 610mm diameter common (ring) header. Two 610mm (24”) discharge headers transmit treated water to the distribution system.

Standby power is provided by a 1,250kW standby diesel generator located in a separate room of the plant with one (1) 900L diesel fuel day tank and one (1) 12,500L diesel fuel storage tank.

The WPP also has a Supervisory Control and Data Acquisition (SCADA) system, associated electrical and instrumentation components, as well as additional sampling pumps.

6.4 Bulk Water Storage

The Boundary Road Reservoir was constructed in 1973 to provide storage for fire protection and to augment water pressure in the eastern portion of the City. The Reservoir has two compartments with a combined capacity of 9,100m^3 and is equipped with rechlorination equipment using a sodium hypochlorite feed system. Three (3) centrifugal booster pumps, each rated at 95L/s at a TDH of 70m, transfer treated water from the reservoir to the distribution system. Emergency power is provided by a 300kW diesel generator set.

The elevated tank located on Tollgate Road has a total capacity of 4,550m^3 and was built and commissioned in 1991. It provides treated water storage and maintains system pressure. A re-chlorination system using sodium hypochlorite feed equipment is used to ensure adequate free chlorine residuals in the distribution system.

6.5 Cornwall Distribution System

The Cornwall distribution system consists of approximately 273km of watermains, 2043 valves, and 1315 hydrants and blow-offs. The average age of watermains within the system is approximately 44 years. The City maintains a Geographic Information System (GIS) that provides an accurate layout of the water distribution system, along with detailed asset and infrastructure data.

Materials of watermain construction are outlined in ***Table 6-5*** below. Typical distribution system operating pressures range between 50-80psi. Water modeling activities have demonstrated that relining and/or replacement of cast-iron watermains in selected portions of the distribution system is expected to improve drinking water quality and water pressures/fire flows.

Table 6-5: Materials of Watermain Construction

Material of Construction	
Cast-iron	36.9%
PVC	36.6%
Ductile iron	17.9%
Other materials	8.6%

In 1991, water service was extended to St. Andrews/Rosedale Terrace in the Township of South Stormont as per By-law # 2009-027. This distribution subsystem is fed by two underground metered valve chambers located in the City's North end: one is located on Highway 138 at Cornwall Centre Road and the second is located on Cornwall Centre Road at Mack Street.

In 2003, water service was extended to TyoTown Rd. in the Township of South Glengarry. This is fed by an underground main that serves Holy Trinity Catholic School exclusively (City of Cornwall By-law #119-2004). Water service has also been extended to South Glengarry to service the Raisin Region Conservation Authority as per By-Law 142-2007.

6.6 Common Event Driven Fluctuations

Seasonal variations in turbidity, temperature, colour and organic content can occur. The treatment processes at the WPP may be directly impacted by these changes. In addition, seasonal episodes of taste and odour are attributed to the presence of Geosmin and MIB. Advanced oxidation processes have been installed at the WPP to combat this issue.

6.7 Operational Challenges and Threats

The principal operational threat to the drinking water system is the single source of supply as it pertains to the location of the intake structure at the Dam and the single 1,066mm concrete intake line from the Dam to the WPP. It should be noted that access in the vicinity of the intake is limited to Hydro Dam staff and US Border Services Personnel.

Municipal Works staff completes regular flushing programs at locations throughout the city to ensure that adequate levels of residual chlorine are maintained. An automatic flushing device has been installed at the end of the Vincent Massey Drive watermain to assist with these flushing activities. Further distribution system modelling shows that the pockets of low pressure could be significantly reduced if cast-iron watermains in the affected areas were to be relined or replaced. For this reason, the City has been promoting annual cast-iron watermain rehabilitation and renewal projects.

7.0 Risk Assessment

A procedure has been created to describe the City of Cornwall's DWQMS Risk Assessment process. ***QMS Risk Assessment*** *(**IMW-INT-GEN-PRO-006-001** – see Appendix A)* documents the process for completing the City of Cornwall's DWQMS Risk Assessment, including the legislative, regulatory and internal requirements for this risk assessment and the criteria for assessing risk.

Members of the City of Cornwall's DWQMS Risk Assessment Team are identified in ***QMS Risk Assessment*** (***IMW-INT-GEN-PRO-006-001***). 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 DWQMS Risk Assessment Team examines the drinking water system for potential hazards that could compromise the performance of the system and/or the quality of the drinking water. The DWQMS Risk Assessment Team evaluates each identified hazard against criteria outlined in ***QMS Risk Assessment*** (***IMW-INT-GEN-PRO-006-001***). The DWQMS Risk Assessment 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. Results are documented in the ***DWQMS Risk Assessment Matrix (IMW-DWS-GEN-FRM-006-001).*** Risk Assessment outcomes are developed in consideration of equipment reliability and redundancy, where applicable.

Hazards are evaluated to determine whether a Critical Control Point (CCP) should be established at the hazard location. Where a CCP is identified, Critical Control Limits and monitoring or response procedures are developed to ensure that rapid action can be taken to eliminate or reduce the hazard when it is identified. Any hazards relating to disinfection processes are identified as Critical Control Points, regardless of risk rating. Deviations from Critical Control Points are recorded in the ***DWQMS Deviations from Critical Control Points (IMW-DWS-MW-LM-006-001).***

The DWQMS Risk Assessment is reviewed annually by the City's DWQMS Risk Assessment Team. Once every three years, a new Risk Assessment is completed. Details of review and reassessment processes are provided in ***QMS Risk Assessment*** (***IMW-INT-GEN-PRO-006-001***).

8.0 Risk Assessment Outcomes

The initial DWQMS Risk Assessment for the City of Cornwall's DWS was completed on November 11-12, 2008 and was most recently performed on July 5, 2022. The completed DWQMS Risk Assessment Matrix is included as Appendix B of this Operational Plan and documents the results of the DWQMS Risk Assessment. All hazards were identified, assessed and addressed according to Section 7.0 of this Operational Plan and ***QMS Risk Assessment*** (***IMW-INT-GEN-PRO-006-001***).

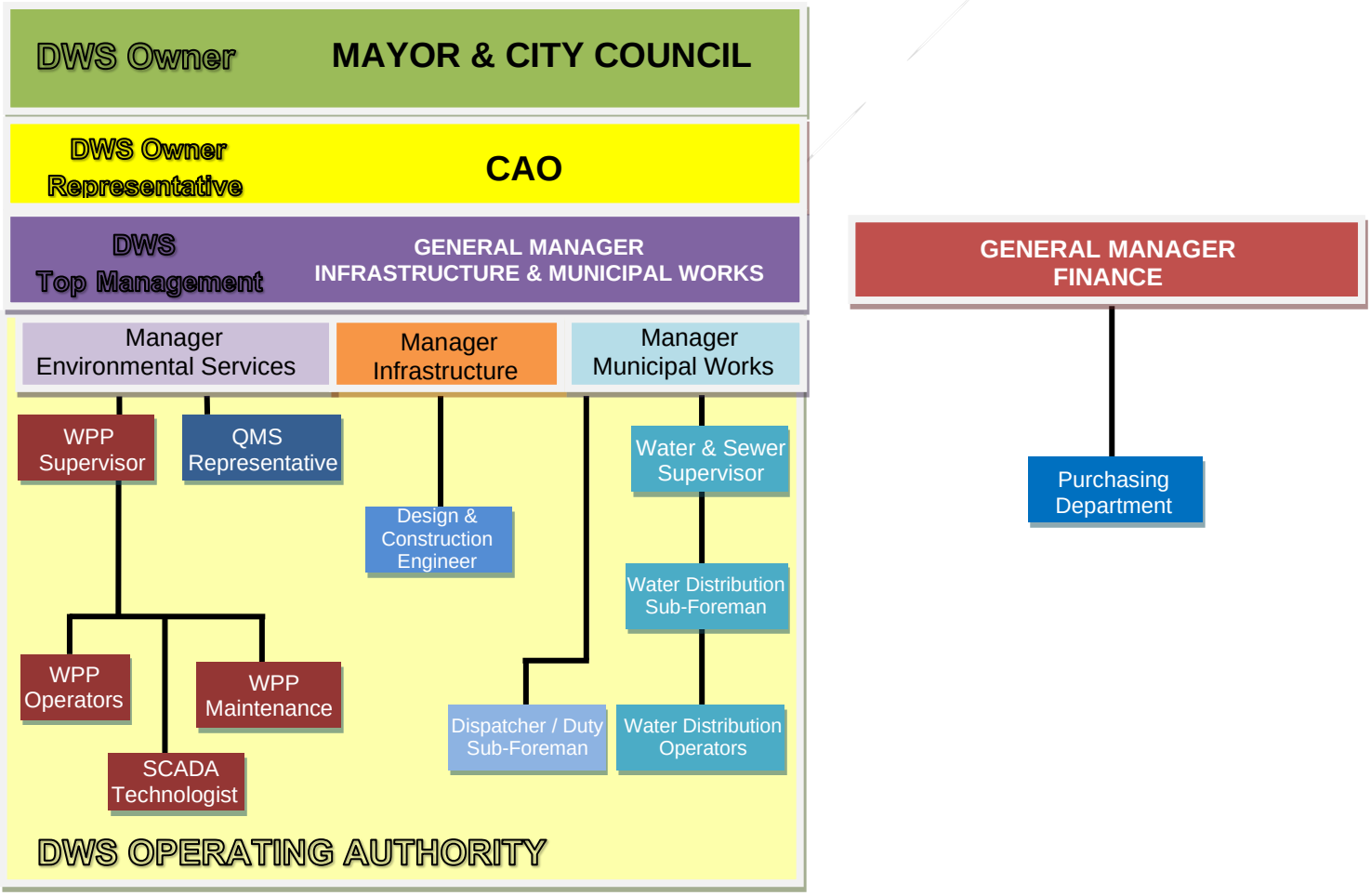
- ***Drinking Water System Contingency Plan (IMW-DWS-GEN-MAN-016-001)***

9.0 Organizational Structure, Roles, Responsibilities and Authorities

9.1 Organizational Structure

The DWQMS Organizational Chart for the City of Cornwall's DWS is shown in ***Figure 9-1***.

Figure 9-1: DWQMS Organizational Structure



9.2 DWQMS Roles, Responsibilities, and Authorities

The ***DWQMS Roles, Responsibilities and Authorities Matrix*** (***IMW-DWS-GEN-LM-007-001*** – *see Appendix A)* defines roles, responsibilities and authorities of staff within the City of Cornwall's DWS Operating Authority. The Matrix provides a general overview of each Operating Authority role as well as

a summary of the DWQMS-specific responsibilities associated with each role[1]. The Matrix is reviewed periodically as specified in the ***DWQMS Document Control Matrix (IMW-DWS-GEN-LM-004-001)*** or as significant organizational changes occur within the Operating Authority. DWQMS Top Management and the QMS Representative are responsible to ensure that staff are made aware of their respective roles, responsibilities and authorities.

10.0 Competencies

A procedure has been developed to outline training requirements for Certified Water Operators at the City of Cornwall. ***DWQMS Competencies & Training*** (***IMW-DWS-GEN-PRO-008-001*** – *see Appendix A)* applies to all Certified Water Operators employed with the City of Cornwall and details processes for planning, scheduling and tracking training activities for DWS Operating Authority staff.

Certification and training requirements for the City of Cornwall's Certified Water Operators are established in accordance with the requirements for a Class 3 Drinking-Water System. All Certified Water Treatment Operators must maintain Drinking-Water Operator Certification – minimum of Treatment Class 1. All Certified Water Distribution Operators must maintain Drinking-Water Operator Certification – minimum of Distribution Class 1.

11.0 Personnel Coverage

A procedure has been developed to outline personnel coverage measures for the City of Cornwall's DWS. ***DWQMS Personnel Coverage*** (***IMW-DWS-GEN-PRO-009-001*** – *see Appendix A*) outlines the process by which the City of Cornwall ensures that adequate staffing & personnel coverage is maintained for its drinking-water system. The procedure details personnel coverage measures followed during regular business hours as well as evenings, weekends and holidays.

12.0 Communications

A procedure has been developed to outline DWS-related communications at the City of Cornwall. ***QMS Communications*** (***IMW-INT-GEN-PRO-010-001*** – *see Appendix A)* outlines the processes and methods used by Top Management of the City of Cornwall's DWS Operating Authority in communicating with the Mayor and Council, the staff and suppliers of the Operating Authority, and the public on matters relating to the City's DWS.

13.0 Essential Supplies and Services

A procedure has been developed that details processes relating to the identification of essential DWS supplies and services. ***QMS Essential Supplies and Services*** (***IMW-INT-GEN-PRO-011-001*** – *see Appendix A*) describes the processes by which the City of Cornwall identifies the supplies and services that it deems essential to DWS operation and verifies the quality of the supplies and services insofar as they impact drinking-water quality.

Supplies and services are deemed to be "essential" if they are essential to the safe delivery of water and/or if they relate to disinfection of drinking-water or drinking water infrastructure. The ***List of Essential Drinking-Water System Supplies and Services*** (***IMW-DWS-GEN-LM-011-001*** – *see Appendix A*) lists essential supplies and services used in the operation & maintenance of the City's DWS. Vendors of

[1] The role descriptions within the Matrix may not include specific position responsibilities related to other aspects of City operations. Job descriptions are to be considered as the primary source for inclusive summaries of the listed roles.

these supplies and services are subject to annual review by the DWS Operating Authority as per ***QMS Essential Supplies and Services (IMW-INT-GEN-PRO-011-001)***.

14.0 Review and Provision of Infrastructure

A procedure has been developed to outline processes for review of DWS infrastructure at the City of Cornwall. ***QMS Review and Provision of Infrastructure*** (***IMW-INT-GEN-PRO-012-001*** – *see Appendix A)* documents the process followed by the City of Cornwall in reviewing the adequacy of its drinking-water system infrastructure.

The DWS infrastructure review process is depicted in ***Figure 14-0*** as follows:

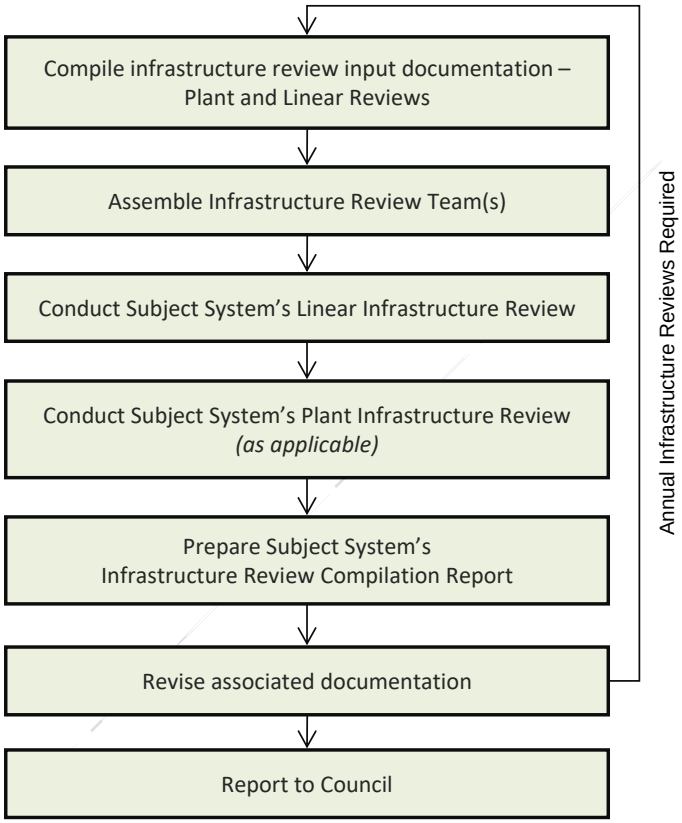


Figure 14-0: Drinking-Water System Infrastructure Review

Members of the City of Cornwall's DWS Infrastructure Review Teams (Plant Review Team and Linear Review Team) are identified in ***QMS Review and Provision of Infrastructure (IMW-INT-GEN-PRO-012-001)***. The two distinct DWS Infrastructure Review Teams each meet on an annual basis to review the previous year's operational history and proposed infrastructure rehabilitation plans for the subsequent year.

15.0 Infrastructure Maintenance, Rehabilitation and Renewal

A procedure has been developed that summarizes DWS maintenance activities at the City of Cornwall. ***DWQMS Infrastructure Maintenance, Rehabilitation and Renewal (IMW-DWS-GEN-PRO-013-001*** – *see Appendix A)* provides a summary of maintenance programs completed in respect of the City of

Cornwall's drinking water system and identifies Operational Performance Indicators for selected maintenance programs of particular significance.

16.0 Sampling, Testing and Monitoring

A procedure has been developed to outline sampling, testing and monitoring activities completed in respect of the City's DWS. ***DWQMS Sampling, Testing and Monitoring*** *(**IMW-DWS-GEN-PRO-014-001** – see Appendix A)* provides details of sampling, testing and monitoring activities, including types and numbers of samples required, frequency of sampling, and relevant procedures to be followed.

17.0 Measurement and Recording Equipment Calibration and Maintenance

A procedure has been developed to outline calibration and verification activities completed in respect of the City's DWS. ***DWQMS Measurement and Recording Equipment Calibration and Maintenance*** (***IMW-DWS-GEN-PRO-015-001*** *– see Appendix A*) outlines requirements for the calibration and verification of measurement and recording equipment used for drinking water sampling, testing and monitoring activities.

The measurement, monitoring and recording devices owned by the City of Cornwall and used in Water Purification and Distribution Operations are subject to periodic calibration checks by Operating Authority Staff and/or to occasional calibration by the manufacturer, as required. ***DWQMS Measurement and Recording Equipment Calibration and Maintenance*** (***IMW-DWS-GEN-PRO-015-001***) lists the measurement and recording equipment used by the Operating Authority in respect of the drinking-water system and specifies calibration requirements for each piece of equipment.

18.0 Emergency Management

The purpose of ***DWQMS Emergency Management (****IMW-DWS-GEN-PRO-016-001* *– see Appendix A)* procedure is to identify the City's ***Drinking Water System Contingency Plan (****IMW-DWS-GEN-MAN-016-001*), to specify training and testing requirements for this Plan, and to outline emergency communication protocols and emergency contacts.

The ***Drinking Water System Contingency Plan (****IMW-DWS-GEN-MAN-016-001* *– see Appendix C)* includes detailed emergency response procedures for identified potential emergency events. The ***Contingency*** Plan is included as Appendix C to this Operational Plan. Communication protocols for each emergency scenario are embedded in the respective emergency response procedures.

The ***Critical Contacts – Drinking Water System Contingency Plan*** (***IMW-DWS-ENV-LM-016-001*** *– see Appendix C*) ***and Roster List (****IMW-DWS-MW-LM-009-001* *– see Appendix C)* provide contact information for DWS Operating Authority personnel who may need to be contacted in an emergency. These lists include contact information for both Operating Authority staff and external parties.

19.0 Internal Audits

A procedure has been created to describe the City of Cornwall's DWQMS Internal Auditing Program. ***QMS Internal Auditing*** (***IMW-INT-GEN-PRO-017-001*** *– see Appendix A*) documents required activities & processes relating to the planning, execution and documentation of DWQMS Internal Audits, including recording of non-conformances and reporting of results to Top Management and the Owner.

DWQMS Internal Auditors are selected by the DWQMS Representative and must achieve and maintain defined competency requirements in order to fulfill this role. Required competencies include the following:

- Internal Auditors must possess an understanding of both the requirements and the intent of the DWQMS Standard;
- Internal Auditors must receive appropriate Internal Auditor Training;
- Internal Auditors should have a good knowledge of drinking-water system operations and of drinking water quality requirements;
- Internal Auditors must be familiar with the Department of Infrastructure & Municipal Work's DWQMS auditing procedures and protocols.

A Lead Auditor is appointed for each internal audit plan. The role of Lead Auditor can be filled by an appropriately-qualified Internal Auditor. Internal Auditors must remain objective and impartial throughout the audit process, and cannot audit their own work or work areas. The DWQMS must be audited in its entirety once in each calendar year.

20.0 Management Review

A procedure has been developed to document the process followed by Top Management in planning, executing and documenting DWQMS Management Reviews, including provision of feedback to the Operating Authority and reporting of review results to the Owner. Please see ***QMS Management Review*** (***IMW-INT-GEN-PRO-018-001***) – *see Appendix A*)

The Management Review process ensures that all levels of the DWQMS organizational structure are kept informed and aware of the DWQMS and DWS performance. The QMS Representative has a significant role in the DWQMS Management Review process, compiling all required input data for presentation to Top Management and attending Management Review meetings as a facilitator.

21.0 Continual Improvement

A procedure has been developed to document the process followed to ensure effective resolution of DWQMS non-conformances. ***QMS Corrective Action, Preventive Action and Continual Improvement*** (***IMW-INT-GEN-PRO-019-001*** – *see Appendix A*) addresses both potential and actual non-conformances and outlines processes for root cause analysis, identification and implementation of preventive or corrective actions, and verification of their effectiveness.

22.0 Revision History

Revision No.:	11
Date of Last Revision:	July 2022
Last Approval Date:	May 6th, 2019
Reason for Change(s):	Changes made to various sections., updating documents links
Summary of Change(s):	Changes to Organizational Structure, updating documents links,.