Report to/Rapport au :

Environment Committee
Comité de l'environnement

and Council / et au Conseil

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Submitted by/Soumis par :
Steve Kanellakos, Deputy City Manager / Directeur municipal adjoint
City Operations / Opérations municipales

Contact Person / Personne ressource: Dixon Weir, General Manager/Directeur général
Environmental Services/Services environnementaux
(613)580-2424 x22002, Dixon.Weir@ottawa.ca

CITY WIDE / À L'ÉCHELLE DE LA VILLE Ref N°: ACS2012-COS-ESD-0026

SUBJECT: 2011 DRINKING WATER QUALITY MANAGEMENT SYSTEM ANNUAL REPORT

OBJET : RAPPORT ANNUEL 2011 DU SYSTÈME DE GESTION DE LA QUALITÉ DE L'EAU POTABLE

REPORT RECOMMENDATION

That the Environment Committee and Council receive the 2011 Drinking Water Quality Management System Annual Report.

RECOMMANDATION DU RAPPORT

Que le Comité de l'environnement et le Conseil municipal prennent connaissance du rapport annuel 2011 du système de gestion de la qualité de l'eau potable.

EXECUTIVE SUMMARY

The Ontario Drinking Water Quality Management Standard (DWQMS) and the City's Operational Plan require that the Quality Management System (QMS) Representative (Manager of Drinking Water Services) convey the results of the annual management

review to Top Management and the Owner (City Council.) This report fulfills that requirement.

This report contains a summary of information that Top Management must review annually in accordance with the DWQMS.

Drinking Water Services Quality Management System is the key tool that supports and assures Council, as the Owner of the drinking water systems, is meeting its duties and responsibilities under the *Safe Drinking Water Act (2002)* and Standard of Care. It has been inherently designed for continual improvement, which is the foundation of the Management System Policy endorsed by Top Management and Council:

> Quality Management System Policy
>
> The City of Ottawa is committed to consistently delivering drinking water of high quality to the people of Ottawa. In particular, the City makes the following commitments:
> 1. To provide a reliable supply of safe drinking water to the consumer;
> 2. To meet or exceed applicable legislation and regulations;
> 3. To implement, maintain and continually improve the Quality Management System, infrastructure and technology;
> 4. To deliver excellent customer service through responsiveness, accountability and innovation.

The current review considers the entire 2011 calendar year (the "review period") and where appropriate, touches on activities continuing in 2012. The review encompasses all six drinking water systems owned and operated by the City of Ottawa: the central system (Britannia and Lemieux Island Water Purification Plants and central water distribution system), and the Carp, Richmond (Kings Park), Munster Hamlet, Greely (Shadow Ridge[1]) and Vars communal well systems.

The DWQMS sets out a mandatory list of 16 issues to be examined during annual reviews and reports. These are dealt with specifically in the Discussion section of this report.

The detailed results have been reviewed by Top Management in accordance with the Management Review system procedure.

Highlights of the review findings are:

- The City has achieved 100 per cent ratings from the Ministry of the Environment Inspections for all of its seven drinking water production systems for the third consecutive year;
- The City obtained its Operating Authority Accreditation as a "Full-Scope, Entire-DWQMS" of its QMS;
- The water quality testing program continues to meet or exceed regulations

[1] The Shadow Ridge facility is owned by a private developer; the City of Ottawa is the Operating Authority.

- Any shortcomings are minor and addressed in an appropriate and timely manner
- Emergency response processes are well developed and practiced;
- The risk assessment procedure is an effective process to identify and mitigate risks to the drinking water quality; and,
- Staff is following procedures and showing a commitment to continual improvement.

The following are key recommendations that Top Management have committed to as part of the management review:

1. As part of the continual improvement process, enhanced staff training will be delivered in identifying critical control points, limits and deviations associated with the water distribution system;
2. The QMS includes an assessment of Key performance Indicators (KPI) covering a range of operational parameters. Members of Top Management will continue to establish targets and analyze trends; and
3. A working group will be established to develop KPIs for the "Provision of Infrastructure" section for tracking and ease of reporting purposes.

In short, the 2011 Annual Report shows the QMS has been implemented successfully, identified no major issues, and reinforces the fact that the City of Ottawa produces and supplies some of the best-quality and safest drinking water in the world.

Financial Implications
This report has no 2012 financial implications.

Public Consultation/Input
Public consultation or notification is not required.

BACKGROUND

On November 28, 2008, City Council endorsed the City's QMS for Drinking Water Services, which is documented by the Operational Plan (ACS2008-ICS-WWS-0020) and is in conformance with Ministry of Environment standards. The City of Ottawa obtained its Operating Authority accreditation as a "Full-Scope, Entire DWQMS" on October 3, 2011.

A requirement of the Operational Plan is for the QMS Representative to ensure the management review results are conveyed to Top Management and to the Owner (Council). The main purpose of this report is to provide the Owner with an update on the implementation and the performance of the QMS.

As the Owner of the municipal drinking water systems, Council has a number of duties and responsibilities under the *Safe Drinking Water Act (2002)*, which are described in

sections 11, 13, 16 and 17. The duties of the Owner related to the Standard of Care are described under section 19 (expected to come into force January 1, 2013)[2].

One of the primary tools that the Owner (Council) has in place to satisfy the Standard of Care under the *Safe Drinking Water Act (2002)* is by having Municipal Drinking Water Licences in place for all of its drinking water systems[3] . The elements of the Licence include:

1. A permit to take water;
2. A drinking water works permit;
3. An operational plan;
4. A financial plan; and,
5. An accredited operating authority.

The City of Ottawa has obtained licences for all of its drinking water systems.

DISCUSSION

Document 1 provides a description of the QMS management structure and roles and responsibilities.

The following is a summary of information that Top Management must review annually in accordance with the Ontario Drinking Water Quality Management Standard. The current review considers the entire 2011 calendar year (the "review period") and where appropriate, touches on activities continuing in 2012. The detailed results have been reviewed by Top Management in accordance with the DWQMS management review system procedure. The following 16 aspects must be considered in the annual review:

a. Incidents of regulatory non-compliance
b. Incidents of adverse drinking water tests
c. Deviations from critical control point limits and response actions
d. Efficacy of the risk assessment process
e. Results of audits (internal and external)
f. Results of relevant emergency response testing
g. Operational performance
h. Raw water supply and drinking water quality trends
i. Follow-up action items from previous management reviews
j. Status of management action items identified between reviews
k. Changes that could affect the QMS
l. Summary of consumer feedback
m. Resources needed to maintain the QMS
n. Results of the infrastructure review

[2] Environmental Services in conjunction with Legal Services plan to conduct training and awareness sessions for councillors by the end of 2012.

[3] Justice O'Connor commented in his 2002 report of the Walkerton Enquiry that municipalities who had an accredited Operating Authority and an Operational Plan that meets the DWQMS would be a significant step in meeting the Standard of Care.

o. Operational Plan currency, content and updates
p. Summary of staff suggestions

The review of these aspects encompasses all six drinking water systems owned and operated by the City of Ottawa, namely: the central system (Britannia and Lemieux Island Water Purification Plants and central water distribution system) and the Carp, Richmond (Kings Park), Munster Hamlet, Greely (Shadow Ridge) and Vars communal well systems.

The management review encompasses many aspects of the operation, maintenance and renewal of the drinking water systems. The material was reviewed by Top Management on May 24, 31, and June 27, 2012.

Management Review Items

a) Incidents of regulatory non-compliance

i. *Ministry of Environment (MOE) inspection reports:* All waterworks were inspected during 2011 or early 2012 by the MOE. There were no items of regulatory non-compliance and no Best Practice recommendations made. For the 2011 inspection year, each water system received an inspection rating of 100 per cent. This represents a considerable achievement for the Drinking Water Services staff and its business partners. This is the third consecutive year that the City has achieved perfect scores for all its drinking water systems.

ii. *Operator Certification Records:* All of Ottawa's water treatment and distribution systems were operated by certified operators at all times. Considerable management effort and documentation is required to provide training and maintain valid certificates for the 208 certified operators and staff are continuing to streamline and document the certification and renewal process.

iii. *Water Flow Rate Trends:* There were no cases of daily "raw" water taking exceeding the permitted values stipulated in the Permits to Take Water.

iv. *Water Quality Testing Records:* The City of Ottawa water quality testing program has been intentionally designed to provide more than the required amount of water sampling and testing to meet regulations. All Ontario requirements for microbiological, inorganic and organic testing were met with one minor exception: Residual chlorine sampling did not meet the requirements of the regulations on one day (April 12, 2011) in the Shadow Ridge Distribution System; however, the chlorine residual level was maintained at all times in the treatment facility for water entering the distribution network. Procedural changes were made to mitigate a reoccurrence.

v. *Community Lead Testing Regulation:* As required by the lead testing regulation, community lead testing was carried out during the winter and summer of 2008, 2009, 2010 and 2011. The 90^{th} percentile lead concentrations were found to be within the 10.0 µg/L standard for all drinking water systems.

vi. *MOE Orders:* No MOE orders were issued in 2011.

vii. *Annual and Summary Reports:* O.Reg.170/03 requires the Owner and the Operating Authority to prepare Annual Reports and Summary Reports for each of the waterworks. The seven Annual Reports for 2011 were completed within the regulatory timeframe (by February 28, 2012) and were posted on the City of Ottawa's website. In addition, five Annual Reports for the Designated Facilities were prepared and sent to the appropriate Owner/Operators for each facility. A copy of the Britannia and Lemieux Island Annual Reports were sent to the Township of Russell since they receive their water supply from the City of Ottawa. Furthermore, the Summary Reports for 2011 were completed by March 31, 2012 and were distributed to the Mayor and members of Council as required by the regulation.

b) Incidents of adverse drinking water tests

The drinking water regulations identify several Indicators of Adverse Water Quality Incidents (AWQI) for which the Operating Authority must immediately notify health officials and the MOE, and carry out specific corrective actions. From January to December 2011, there were a total of 33 Adverse Water Quality Incidents.

The number of AWQI events increased in 2011, due to a combination of unusual incidents in multiple systems when combined caused the total to increase. Some of the incidents that contributed to this increase in AWQIs are detailed below:

- Unusually high number of samples (8) which were contaminated due to incorrect sampling procedures.
- There was an increase in the number of loss of pressure incidents resulting in precautionary Boil Water Advisories, which were reported as AWQI's. The loss of pressure is not considered an AWQI according to the Ministry of Environment, but these events were reported as a precaution since flushing and bacteriological sampling took place as a result of the Advisory.
- Sodium levels above 20 mg/L were reported for four (4) locations in the distribution system. Sodium exceedances are required to be reported every 60 months (5years), and were last reported in 2006.

For each event, Drinking Water Services staff immediately notified the City of Ottawa Public Health Department and the MOE as required by the regulation. In all cases, written reports were prepared and sent to the MOE and the Public Health Department within 24 hours of the verbal notification, and corrective actions and re-sampling were carried out to resolve the incident. None of the adverse water quality events resulted in any indication of adverse health impacts or illness to the public.

c) Deviations from critical control point limits and response actions

Through the QMS risk assessment process, seven Critical Control Points (CCPs) were identified within Water Production and four CCPs were identified for Water Distribution. Critical Control Limits (CCLs) were subsequently identified for each of these CCPs. The CCLs are self-imposed limits and are typically more stringent than MOE Drinking Water

Standards or Municipal Drinking Water licence requirements. The identification of CCPs and associated CCLs results in a more rigorous screening of potential risks to water quality and is one of the major benefits of the implementation of the DWQMS.

Deviations from CCLs do occur from time to time and do not necessarily mean that unsafe drinking water was delivered to the consumer. However, CCL deviations do require prompt action from water system operators to remediate the problem and prevent the passage of potentially unsafe water. A total of 15 CCL deviations were identified in 2011 at the water purification plants, and 4 CCL deviations were identified in the distribution system. The CCL deviations associated with the water purification plants were related mostly to the filtration systems; and the distribution system CCLs were largely attributed to a localized depressurization. All CCL deviations were promptly dealt with and follow up improvements have been made. At no time was unsafe drinking water delivered to the consumer.

A technical working group met every two months to review production CCL deviations, identify root causes, and assign corrective actions. A similar working group is currently in development to address distribution CCL deviations.

d) Efficacy of the risk assessment process

The currency of the information and validity of the assumptions used in the risk assessment process for the drinking water system was reviewed in 2011. In accordance with the DWQMS, this review is required annually.

The type and number (7) of production CPPs have not changed. Distribution CCPs were reviewed and resulted in some changes. Standard Operating Procedures (SOPs) continue to be developed and revised accordingly for the new CCPs, including identification of Critical Control Limits.

In general, technical staff feel that the most important risks are now captured in the current CCP list. Bi-monthly reviews of CCL deviations are ongoing and continue to produce valuable ideas and corrective actions that should reduce operational risks and better protect the safety of our drinking water supply.

e) Results of audits (internal and external)

The DWQMS requires the Operating Authority to conduct an internal audit at least once every 12 months. As part of the accreditation process, an external audit is conducted by a third-party accreditation body. An on-site verification audit is conducted once every three years; and desktop surveillance audits are conducted in between on-site audits.

Internal Audit: The 2011 audit focused on all 21 elements of the QMS. Eight auditors (four teams) conducted interviews with 29 individuals from Drinking Water Services and zero (0) major non-conformances[4] were identified. Eighteen minor non-conformances

[4] Non-conformances identify elements that are clearly not in compliance with Ontario's Drinking Water Quality Management Standard or the City's Operational Plan. Non-conformances are ranked as "major" or "minor" based on the significance of the finding.

were identified during the audit. These non-conformances deal mostly with documentation issues. Actions are underway to address these non-conformances; however, it is important to note that these non-conformances do not pose risk to drinking water quality.

External Audit: As required by the accreditation process, the accreditation body (CGSB) conducted an on-site verification (external) audit from May 9 to 13, 2011.
On September 13, 2011, Drinking Water Services received notice of two Corrective Action Records (CARs) resulting from two minor non-conformances noted in the external audit. The non-conformances pertained to minor documentation omissions in our Operational Plan. The CARs were completed on September 20 and subsequently closed by the accreditation body on October 3.
The City was awarded its 'Full Scope – Entire DWQMS' accreditation on October 3, 2011 for each of its six systems. It is now subject to a tri-annual re-accreditation process, which includes annual surveillance audits as well as an on-site verification audit.

f) Results of relevant emergency response testing

Early in 2011, a significant watermain break and repair on Woodroffe Avenue triggered a multi-departmental emergency response, which followed established processes and procedures, including that of Drinking Water Services' Incident Escalation and Response Plan (IERP). Rather than conduct a separate training exercise, the Operating Authority conducted a detailed review and assessment of the effectiveness of the IERP in responding to this event.

In the event of a potential system depressurization, a contingency plan was developed involving the implementation of a community-wide outdoor water use ban and the provision of potable drinking water to affected citizens. The contingency plan identified the steps necessary to return the system back to normal operating conditions, and include activities such as, flushing, sampling and testing, boil water advisories, etc.

This event was planned, assessed, and managed displaying overall effective and supportive communication both within the Department and in liaison with the Office of Emergency Management and other city departments. A debrief was held on January 19, 2011 wherein processes and procedures were validated, actions were reviewed and documented, and opportunities for even further refinement of the response according to the IERP were identified.

g) Operational performance

In order to track operational performance, 17 Key Performance Indicators (KPIs) have been developed in the following categories: Customer Services, Water Distribution, Water Production and Water Quality. Trends from 2006-2011 were documented and some analyzed for the management review. Highlights are presented below.

Customer Services KPIs: The number of general water quality investigations increased in 2011 (please refer to section l) for details); however, investigations related to lead

testing was down. The average time taken to resolve customer complaints has been relatively steady; however, improvements were made in the time period to initiate site visits after the initial request was made. Residential water consumption was at its lowest level in the past 6 years and has decreased by almost 12 percent since 2006.

Water Distribution KPIs: The KPIs for Water Distribution give an indication of the effectiveness and the efficiency of the corrective and preventative maintenance programs. The cost of the repair and component renewal decreased in 2011 for all components except for watermain repairs. The Infrastructure Leakage Index has stayed below the City's maximum target of 4 since 2008 and the number of watermain breaks has remained constant.

Water Production KPIs: Water Production performance targets have remained relatively consistent; however, total production costs and hydro costs were slightly elevated in 2011.

Water Quality KPIs: The 2011 performance measures for Water Quality indicate ongoing high quality drinking water. A 100 per cent rating for microbiological quality indicates that the treatment process effectively removed pathogens at all times. Similarly, a 100 per cent rating for chemical water quality indicates that all water quality tests were within the provincial and federal standards for safe drinking water.

h) Raw water supply and drinking water quality trends

The Ottawa River provides a steady and abundant supply of source water for the treatment plants. Raw water quality monitoring for 2011 covered 350 test parameters. Our source water monitoring program greatly exceeds the MOE requirements and is likely one of the most extensive in Canada.

In general, raw water trends were found to show typical levels of variation during 2011. There were no indications of raw water quality that would cause difficulties for the treatment process. However, further work is being conducted to identify the sources and extent of microbial contaminants including bacteriological indicators, Campylobacter, Cryptosporidium, Giardia, E.coli O157, and viruses. Research is also being conducted to evaluate upstream sources of potential fecal contamination and seasonal variations in river quality.

i) Follow up items from previous management review

Of the total number of active actions in response to non-conformances identified in the 2009 and 2010 Management Review Processes, 11 out of a total of 14 are minor issues of non-conformance related to documentation. Most (12 of 13) of the items remaining from the 2010 Internal Audit deal with issues of documentation requiring annual review.

In general, most of the active non-conformances deal with documents, which require updating, such as the Operational Plan and several SOPs. All other remaining items have projects underway to address; however, it is important to note that these outstanding action items pose minimal risk to drinking water quality.

All action items have been prioritized and are being tracked to completion on a continual improvement table.

j) Status of management action items identified between reviews

No additional management items were identified since the last review.

k) Changes that could affect the QMS

In 2011, the Environmental Services Department continued with its SAI (strategic alignment initiative) implementation. This initiative resulted in the development of two additional branches within the Operating Authority; Business Services and Environmental Engineering. As the reorganizational initiatives finalize and roles and responsibilities continue to evolve, members of OTM (operational top management) must ensure that QMS commitments are met and that current documents, such as the Operational Plan, are updated to reflect organizational and operational changes. The next revision of the Operational Plan will be produced by the end of 2012.

l) Summary of consumer feedback

In 2011, the City of Ottawa received 40,143 customer inquiries related to quality and/or quantity of water. This is a significant increase from previous years primarily due to the Ottawa South outdoor water use ban which followed a large watermain break and repair on Woodroffe Avenue. As a direct result of this event, the City received 8,615 customer inquiries and 11,051 rain barrel rebate requests in 2011.

Customer complaints and inquiries are received primarily by telephone calls (24,416 in total) and through emails (2,154 in total) to Info-Water@ottawa.ca and waterwise@ottawa.ca. In addition to these inquiries, customers can apply for various water related services such as the Water Efficiency Program and Lead Pipe Replacement Program. During 2011, there were 13,573 of these application requests received, mostly related to the Water Efficiency Program.

Customer inquiries related to drinking water are typically received and answered by the 3-1-1 Call Centre. The Call Centre forwards more complex questions to the Water and Wastewater Services - Customer Information Centre, at 613-580-2424 (extension 22300). Some of these may then be forwarded to Drinking Water staff based on the complexity of the inquiry.

During 2011, there were 372 customer inquiries that could not be resolved by phone or email and required a site visit to verify water quality. The most common reasons for water quality investigations and customer visits were aesthetic concerns (67%) such as discoloured water or taste and odour. During a customer investigation, a series of on-site tests are performed to verify the quality of their tap water. In addition, a number of samples are taken for more detailed laboratory analysis. For cases involving

discoloured or rusty water only, an operator is dispatched to conduct hydrant flushing as a means of clearing rusty sediments from the affected watermain.

There is no cost to customers for water quality related investigations or customer visits. In fact, the results obtained by water testing provide an important profile of water quality throughout the distribution system and an early detection of potential water quality issues. Additionally, no irregularities were detected as a result of these site visits and all sampling test results were indicative of safe drinking water.

m) Resources needed to maintain the QMS

The addition of a third Water Quality Technologist position is expected to address resourcing concerns associated with the maintenance and calibration of on-line analyzers. Current vacant Water Quality Technologist positions are expected to be filled through 2012 and a revised work-load assessment will be documented in the 2012 Management Review.

Plant Managers continue to assess resources needed to address actions created in response to production CCL deviations. Additionally, DWS managers will further assess the potential increase in resources needed to maintain the significant number of controlled documents. This assessment will be evaluated against a formalized process for the maintenance of QMS controlled documents, which will be developed in 2012.

n) Results of the infrastructure review

The infrastructure review will be conducted in Q3 2012; and will be reported in the 2012 Annual Report.

o) Operational plan currency, content and updates

Revision 0.2 April 16, 2010 is the current version, which was the version submitted to the accreditation body in 2010. An updated revision of the Operational Plan (1.0) is in development and will be finalized in 2012.

p) Summary of staff suggestions

Staff members are invited to offer suggestions that would improve the QMS, reduce the risk of non-compliance or improve drinking water production and distribution operations. The invitation is made informally during normal conversations, meetings, staff training sessions, or internal audit interviews. Staff suggestions that are pertinent to the QMS or Operating Authority operations are recorded in a continual improvement table. Although progress is being made in other higher priority continual improvement areas, it has not yet been possible to fully address staff suggestions made to date.

RURAL IMPLICATIONS

There are no rural implications associated with any of the recommendations in this report.

CONSULTATION

Public consultation or notification is not required.

COMMENTS BY THE WARD COUNCILLOR(S)

This is a City-wide report.

LEGAL IMPLICATIONS

There is no legal impediment to receiving this report.

RISK MANAGEMENT IMPLICATIONS

There are no risk implications.

FINANCIAL IMPLICATIONS

This report has no 2012 or 2013 financial implications. Any immediate resource requirements will be found within the current approved 2012 Operating Budget and FTE complement, and any potential future resource requirements will be included and identified in the 2014 Rate Supported Programs – Drinking Water Services Draft Operating Budget.

ACCESSIBILITY IMPACTS

There are no accessibility impacts associated with this report.

ENVIRONMENTAL IMPLICATIONS

The development of the QMS is provincially legislated under the *Safe Drinking Water Act (2002)*. The QMS has been reviewed by a third-party accreditation body and the City of Ottawa has obtained its Operating Authority Accreditation. This report also fulfills the legislative requirement to report on the Annual Management Review of the QMS to the Owner.

TECHNOLOGY IMPLICATIONS

There are no direct technical implications associated with this report.

TERM OF COUNCIL PRIORITIES

The DWQMS is the key tool that supports and assures Council, as the Owner of the drinking water systems, that it is meeting its duties and responsibilities under the SDWA (*Safe Drinking Water Act (2002)*), and Statutory Standard of Care (Section 19).

The development and continued improvement of the QMS directly supports the Environmental Stewardship Strategic Priority. It is aligned with the Strategic Objective ES2 – Become a greener city.

SUPPORTING DOCUMENTATION

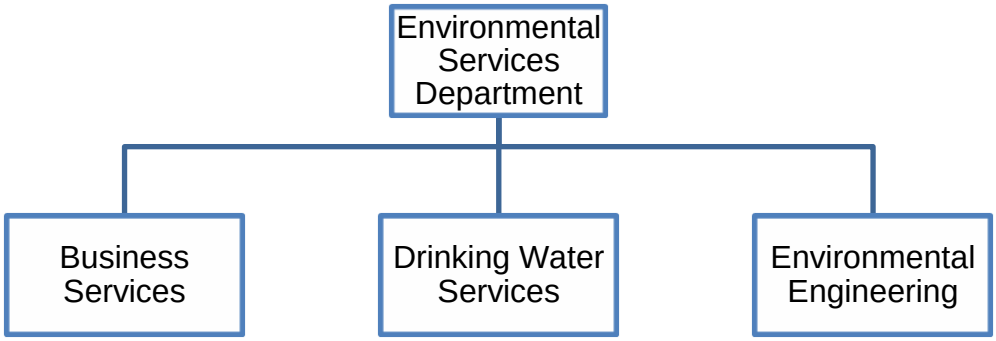
Document 1 – Definitions and organizational charts of the QMS management structure.

DISPOSITION

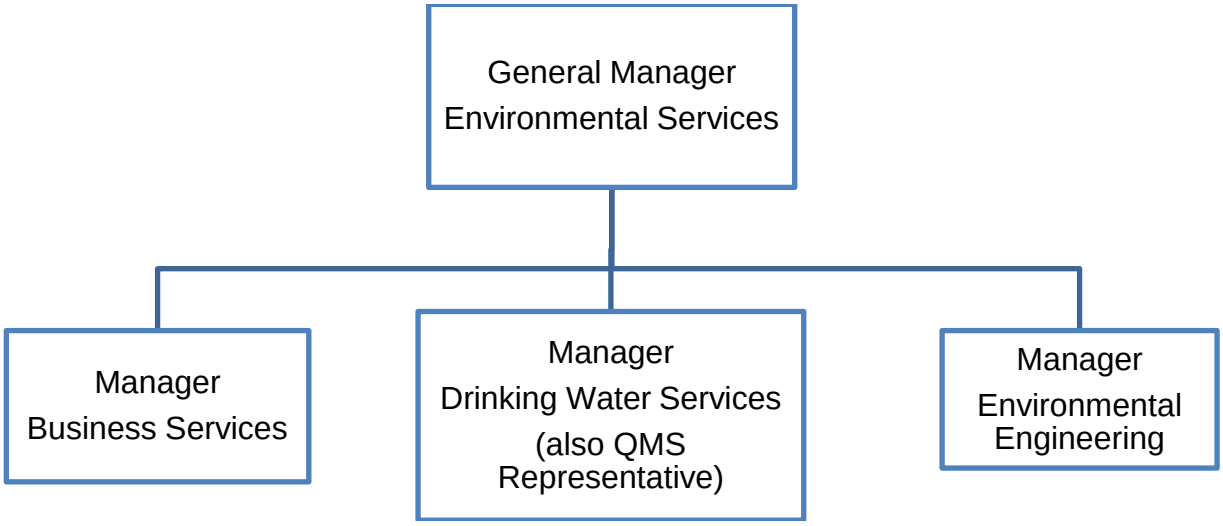
That Committee and Council receive this report for information and to satisfy the regulatory requirement under the *Safe Drinking Water Act (2002)*.

Definitions of the QMS management structure	
Owner	▪ Municipal Drinking Water Licence holder ▪ Endorses the Operational Plan ▪ Ensures that an accredited operating authority operates the municipal drinking water systems ▪ Monitors the QMS and resources needed to support the QMS ▪ Ensures compliance with the Municipal Drinking Water Licences ▪ Submits a Financial Plan ▪ Ensures the use of licenced laboratories for the analyses of drinking water samples ▪ Is aware of its duties and obligations under the *Safe Drinking Water Act (2002)*
Top Management	▪ Person(s) at highest management level within Operating Authority making decisions on the QMS and recommendations to the Owner regarding the system.
Corporate Top Management	▪ Review meeting minutes and summary output from Operational Top Management ▪ Communicate and make recommendations necessary for continual improvement to Council (Owner) ▪ Make decisions related to corporate oversight of the QMS ▪ Ensure the Operational Plan is maintained
Operational Top Management	▪ Complete oversight of the entire drinking water systems and QMS ▪ Provide and/or obtain resources for the QMS and necessary infrastructure and resources to operate and maintain the drinking water system safely and effectively ▪ Ensure the systems are operated in accordance with all applicable legislation and regulations ▪ Ensure internal audits of the QMS are completed ▪ Conduct management reviews ▪ Communicate with Corporate Top Management about the QMS and resource requirements ▪ Make decisions on system-specific aspects of the QMS ▪ Maintain the Operational Plan ▪ Obtain and maintain accreditation from third-party accreditation body
Quality Management Representative	▪ Responsibility and authority for administering the QMS ▪ Reports to Top Management
Operating Authority	▪ Person or entity given responsibility by the Owner for the operation, management, maintenance or alteration of the drinking water system ▪ Must prepare Operational Plan for Owner endorsement

Operating Authority



Corporate Top Management



Operational Top Management