AGLG
AUDIT REPORT
MARCH 2018

AUDITOR GENERAL FOR
LOCAL GOVERNMENT

ACCESSIBILITY • INDEPENDENCE • TRANSPARENCY • PERFORMANCE

LOCAL GOVERNMENT'S ROLE IN

ENSURING CLEAN DRINKING WATER

CITY OF KELOWNA

An independent assurance audit carried out by the
Auditor General for Local Government of British Columbia

MESSAGE FROM THE AUDITOR GENERAL FOR LOCAL GOVERNMENT

To the Mayor and Council of the City of Kelowna:

I am pleased to present this performance audit report on the management of drinking water services by the City of Kelowna.

Our performance audits are independent, unbiased assessments, carried out following professional standards. They aim to determine the extent to which the area being examined has been managed with due regard to economy, efficiency and effectiveness.

We conducted this audit in accordance with the standards for assurance engagements set by the Auditing and Assurance Standards Board of the Chartered Professionals Accountants of Canada and under the authority of the *Auditor General for Local Government Act*.

This report is our second audit on the topic of drinking water services. We carried it out with the same three interconnected audit objectives as our first audit on this topic and the same criteria. Each of these required detailed examination by the performance audit team and a great deal of cooperation by the City of Kelowna and its staff. This report, however, focuses primarily on the findings and recommendations of most significance to Kelowna.

In Kelowna, jurisdiction over drinking water is complex and interrelated, with slightly more than half of local residents getting their water from the City of Kelowna and the others receiving water from one of four improvement/irrigation districts or from a private water supplier. Each of these providers has its own water source, quality, number of connections and cost of water.

At the time we undertook this audit, improvement districts and irrigation districts were not included in the mandate of our office, as set out in the *Auditor General for Local Government Act*. As a result, this audit covers only the City of Kelowna. However, this report does include information about the other water providers in the Kelowna area in order to provide context for some of our findings and recommendations to the City.

Throughout our audit work, we were sensitive to the particular complexities of drinking water governance in Kelowna. We were aware that the City and the four improvement/irrigation districts were engaged in processes during and following the audit period that aimed to interconnect and, potentially amalgamate Kelowna's five largest drinking water systems. We have not offered an opinion on the merits of amalgamation or whether amalgamation is the best way forward in Kelowna.

However, we have reviewed and assessed elements of the City's approach to long-term planning for drinking water, which included its efforts to initiate the development of an amalgamated City-wide water system. We have provided some recommendations relating to the City's governance and management of these initiatives.

This report—like all performance audits—represents a snapshot in time. This is particularly important to note in Kelowna, where broader, city-wide discussions and decisions about drinking water integration and/or amalgamation are ongoing.

This audit focused on how well the City managed its drinking water-related governance structure and activities, drinking water supplies and its treatment and distribution system to ensure the safety and reliability of water today and in the future.

Overall this was a positive audit, where we identified a number of strong practices as well as some areas for improvement. We found that the City had a strategic focus on the provision of clean drinking water for all residents of Kelowna (beyond its own customers), and met most of the expectations included in our audit objectives. Its governance structure and organizational activities supported the provision of clean and safe drinking water. The City used its own and comparative data to assess cost effectiveness for drinking water. Kelowna also had some source water and conservation-related initiatives in place. The City's water system infrastructure was adequate to ensure that drinking water could meet the Guidelines for Canadian Drinking Water Quality and it had trained and credentialed operators in place.

However, Kelowna could be more prepared for the future by regularly updating, testing and practising its emergency response plans and considering the formalization of its risk management processes. Additionally, the City could improve on some of its practices related to its pursuit of an integrated city-wide drinking water system, and enhance water conservation and source water protection strategies.

The result of our performance audit process is this substantial document, which I urge you to read in full, as it identifies solid practices in many areas and some areas where the City could build on the strength of its existing foundation to enhance its management of drinking water into the future. I believe there is a great deal of information here that is relevant to many other local governments across the province that also manage water services.

I want to thank the City of Kelowna for your cooperation during the performance audit process and your action plan in response to our findings and recommendations.

Gordon Ruth, FCPA, FCGA
Auditor General for Local Government
Surrey, B.C.

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EXECUTIVE SUMMARY

1. Water is essential to the well-being of all of us, including individuals and families, businesses and communities. The provision of drinking water is one of the many local governments' most fundamental and vital services. Because of its central importance, the effectiveness of a local government's reliable delivery of clean and safe drinking water is of concern to everyone.

2. We would expect a local government to effectively manage the water systems for which it is responsible to ensure drinking water safety and reliability over the long-term.

WHAT WE EXAMINED

3. The overall purpose of this performance audit was to provide an objective, independent examination of the City of Kelowna's drinking water services. We set out to answer the following specific questions:

- Did the City's governance structure and activities support the provision of clean and safe drinking water where and when needed?
- Did the City manage its drinking water supplies to meet current and expected future demand?
- Did the City ensure the safety and reliability of drinking water provided through its water utility's treatment and distribution systems?

4. The audit did not include an assessment of drinking water services provided by irrigation or improvement districts or private water purveyors in the Kelowna city boundary.

WHAT WE FOUND

5. Overall, the City had a strategic focus on the provision of clean drinking water and was successful in meeting most of the expectations included in our audit objectives. Its governance structure and organizational activities supported the provision of clean and safe drinking water and the City utilized its own and comparative data to assess cost effectiveness.

6. However, Kelowna lacked some processes and had not completed some initiatives that could help ensure successful drinking water management into the future.

GOVERNANCE STRUCTURE AND ACTIVITIES SUPPORTING DRINKING WATER SERVICES

7. The City had a governance structure that supported the provision of clean and safe drinking water and a range of good practices, including its internal management structures, robust process for setting water rates, ethical policy development and advanced use of its Supervisory Control and Data Acquisition (SCADA) system. The City focused its efforts on jointly pursuing opportunities to improve drinking water for Kelowna residents served by other water providers; however the City provided few updates on its water-related planning in open council sessions, and had not updated its own council policy that stated the City's intent not to amalgamate other water systems.

8. While we do not express an opinion of the merits of ongoing efforts to amalgamate water providers in the Kelowna area, we did observe that Kelowna could improve its approach to long-term planning and collaboration relating to water services. Moving forward, the City may benefit from:

- Improving its processes for engaging and communicating with stakeholders and other levels of government, including First Nations, on water-related issues
- Enhancing public transparency by updating outdated policies and reporting out to the public, where appropriate, in open council meetings

MANAGEMENT TO MEET DEMAND

9. The City had many effective management practices that contributed to its water utility functioning effectively in most areas. It had several water conservation-related initiatives and had begun work on drought and demand management, but was not fully prepared to meet future demand for drinking water.

10. Areas where Kelowna could improve its management processes include:

- Further progress on source water protection, including work with local residents and other stakeholders to raise community awareness
- Building on its existing demand management strategies
- Increased attention to drought management

ENSURING SAFETY AND RELIABILITY

11. Kelowna water utility's infrastructure was adequate to ensure that drinking water could meet the Guidelines for Canadian Drinking Water Quality. Its water was tested regularly and its treatment was effective. The City implemented several aspects of the multi-barrier approach and was committed to having trained and credentialed operators in place. It also communicated to the public about the quality, safety and reliability of water from its utility.

12. However, Kelowna's business continuity planning for drinking water services was lacking. The City could enhance its processes relating to safety and reliability by:

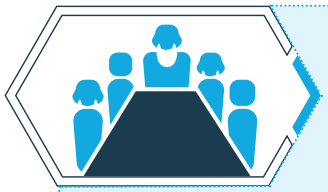
- Ensuring that water quality monitoring matches the monitoring program
- Considering expansion of its preventative maintenance program to include all drinking water-related assets
- Building on its already-strong asset management practices

LOOKING AHEAD

13. The City of Kelowna is well positioned to enhance its management of water services for the future. It could achieve this by taking a more proactive approach, especially in areas such as water-related risk management and emergency management.

14. Kelowna may also benefit from developing an approach that brings together various governments and other stakeholders to collaborate on water-related issues. The City should ensure that its strategies are up-to-date, relevant and include action plans that are implemented and evaluated for effectiveness.

Exhibit 1—SUMMARY OF RECOMMENDATIONS



GOVERNANCE STRUCTURE AND ACTIVITIES SUPPORTING DRINKING WATER SERVICES

1. The City of Kelowna should consider implementing a periodic governance review process to ensure that its governance structure continues to meet its needs.

2. The City of Kelowna should consider aligning its long-term objectives for drinking water and other departmental plans with an updated organization-wide strategic plan.

3. The City of Kelowna should review its drinking water polices to:

- Align its policy on amalgamation with its strategic and operational direction to reflect its current position on water provision in Kelowna
- Develop a water system governance transfer policy that:
  - builds on experience gained from the transition agreement with the South East Kelowna Irrigation District
  - documents actions and timelines for processes that take place during and following an acquisition, which may include updating legacy bylaws, reviewing existing governance and advisory structures and other significant factors

4. The City of Kelowna should improve its processes for engaging and communicating with other levels of government and stakeholders. This could include:

- Developing a policy and process for engaging with other local governments, including First Nations and improvement districts
- Formalizing its process for engaging with other water providers by developing terms of reference for the Kelowna Joint Water Committee or working together to develop an alternate structure
- Increasing engagement with local and regional drinking water stakeholder groups

5. The City of Kelowna should review and consider implementing best practices on closed and open Council meetings, including its documentation of reasons for Council meeting closure.

6. The City of Kelowna should review and update its code of ethics policy.

7. The City of Kelowna should consider developing a formal strategy for risk identification, mitigation and reporting that includes regular re-assessment and reporting of organizational risks—including those associated with drinking water—to senior management and Council.

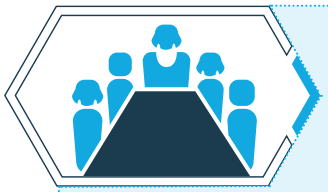
8. The City of Kelowna should further develop its reporting to Council and enhance its reporting to the public on water-related key performance measures and trends.

9. The City of Kelowna should consider formalizing some of its existing good practices for its Supervisory Control and Data Acquisition (SCADA) system by:

- Improving the existing security framework, and considering penetration testing
- Developing relevant Information Technology (IT) and Operational Technology (OT) policies

10. The City of Kelowna should enhance its emergency and business continuity planning by:

- Ensuring that its water utility emergency response plan is regularly updated, tested, made accessible and familiar to all staff
- Completing business continuity planning for its critical services—including drinking water—to ensure the continuation of service and sustainable infrastructure throughout all potential disruptions



SOURCE WATER PROTECTION

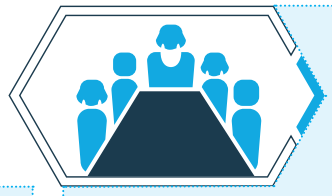
11. The City of Kelowna should improve its approach to source water protection by:

- Reviewing and implementing actions outlined in the April 2017 Drinking Water Source Protection Assessment Response Plan
- Considering the development of a source water protection plan
- Coordinating its source water protection objectives and initiatives with stakeholders

12. The City of Kelowna should consider promoting public awareness of the importance of source water protection and everyone's role in protecting water quality.

13. The City of Kelowna should improve its water conservation and demand-management efforts by developing a long-term approach that:

- Includes a water conservation framework identifying all relevant strategies and objectives and taking into account water conservation objectives
- Includes cost analysis and an implementation strategy that can be evaluated for effectiveness
- Considers the role of variable water rates, pricing and public awareness of the full cost of water services as tools for achieving conservation and demand management goals
- Includes drought management planning to help ensure a consistent water supply in the event of a water shortage
- Increases awareness of water conservation-related requirements, including bylaws, to maximize bylaw compliance



DRINKING WATER TREATMENT AND QUALITY MANAGEMENT

14. The City of Kelowna should ensure alignment between its water quality sampling program specifications and its water quality sampling frequency.

15. The City of Kelowna should consider expanding its scheduled preventative maintenance program to include all drinking water infrastructure assets.

INTRODUCTION

15. We conducted this audit under the authority of the *Auditor General for Local Government (AGLG) Act* and in accordance with the standards for assurance engagements set out by the Chartered Professional Accountants of Canada (CPA) in the CPA Handbook—Assurance and Value-for-Money Auditing in the Public Sector, PS5400, Canadian Standard on Assurance Engagements 3001—Direct Engagements, and Canadian Standard on Quality Control, CSQC 1.

16. We conducted this audit under the audit theme "Environmental Programs and Services." Sound environmental management is of interest to all local governments and the public at large. How local governments use and manage resources for this is a growing area of challenge that affects public health and safety.

17. We initially selected the City of Kelowna and the Regional District of Okanagan-Similkameen to be included in this set of audits and later added the Township of Langley as a third auditee on this topic. These three auditees represent different forms of local government (two municipalities and one regional district), located in two different regions of the province. Some of the water systems in these jurisdictions depend on surface sources, while others depend on groundwater.

18. We may conduct more audits on drinking water services in the future, as this is a major area of local government activity.

19. The overall purpose of this performance audit was to provide an objective, independent examination of the City of Kelowna's drinking water services to determine if the local government provides clean and safe drinking water where and when needed.

20. The audit focused on three separate but connected objectives (see the About the Audit section for detailed information on the audit objectives and criteria). We set out to answer the following questions:

- Did the City's governance structure and activities support the provision of clean and safe drinking water where and when needed?
- Did the City manage its drinking water supplies to meet current and expected future demand?
- Did the City ensure the safety and reliability of drinking water provided through its water utility's treatment and distribution systems?

21. To answer these questions, we examined a range of different factors related to the City's governance, planning and operation of drinking water services. We examined relevant documentation and data and we held discussions with key management staff, elected officials and a range of other stakeholders. We also made observational visits to the City's water utility.

22. The period covered by the audit is January 1, 2014 through December 31, 2016.

WATER CONSUMERS TYPICALLY EXPECT THAT

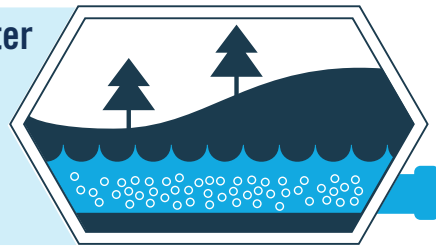
DRINKING WATER:

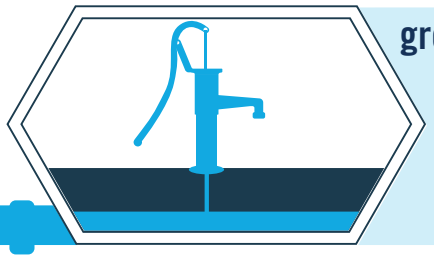
Source: Canadian Council of Ministers of Environment: From Source to Tap

WHY CLEAN DRINKING WATER IS IMPORTANT

surface water

Drinking water can come from reservoirs, lakes, rivers & streams





ground water

Drinking water can also come from aquifers

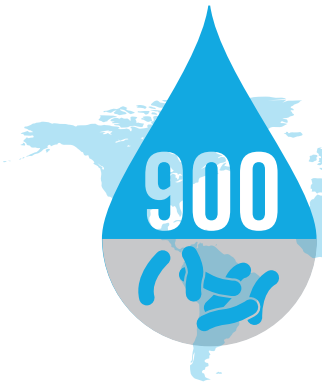
Local services, agriculture and other businesses and industry that employ British Columbians also need a dependable supply of clean water to operate.

20 to 50 liters

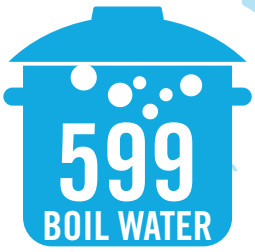
clean water
per day per person

- **DRINKING**
- **COOKING**
- **PERSONAL CARE**

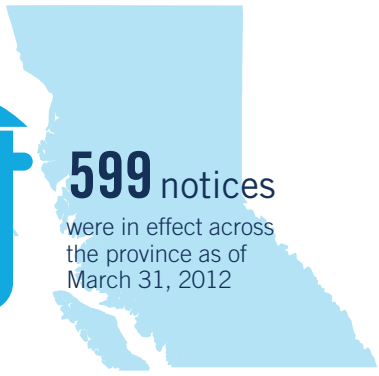
- **AGRICULTURE**
- **BUSINESS/INDUSTRY**
- **LOCAL SERVICES**



Estimated **900 million** people globally face serious health consequences due to polluted drinking water

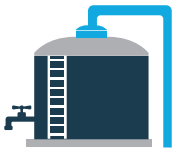


599 notices were in effect across the province as of March 31, 2012



Access to clean drinking water depends on water providers acting appropriately at each stage of the process.

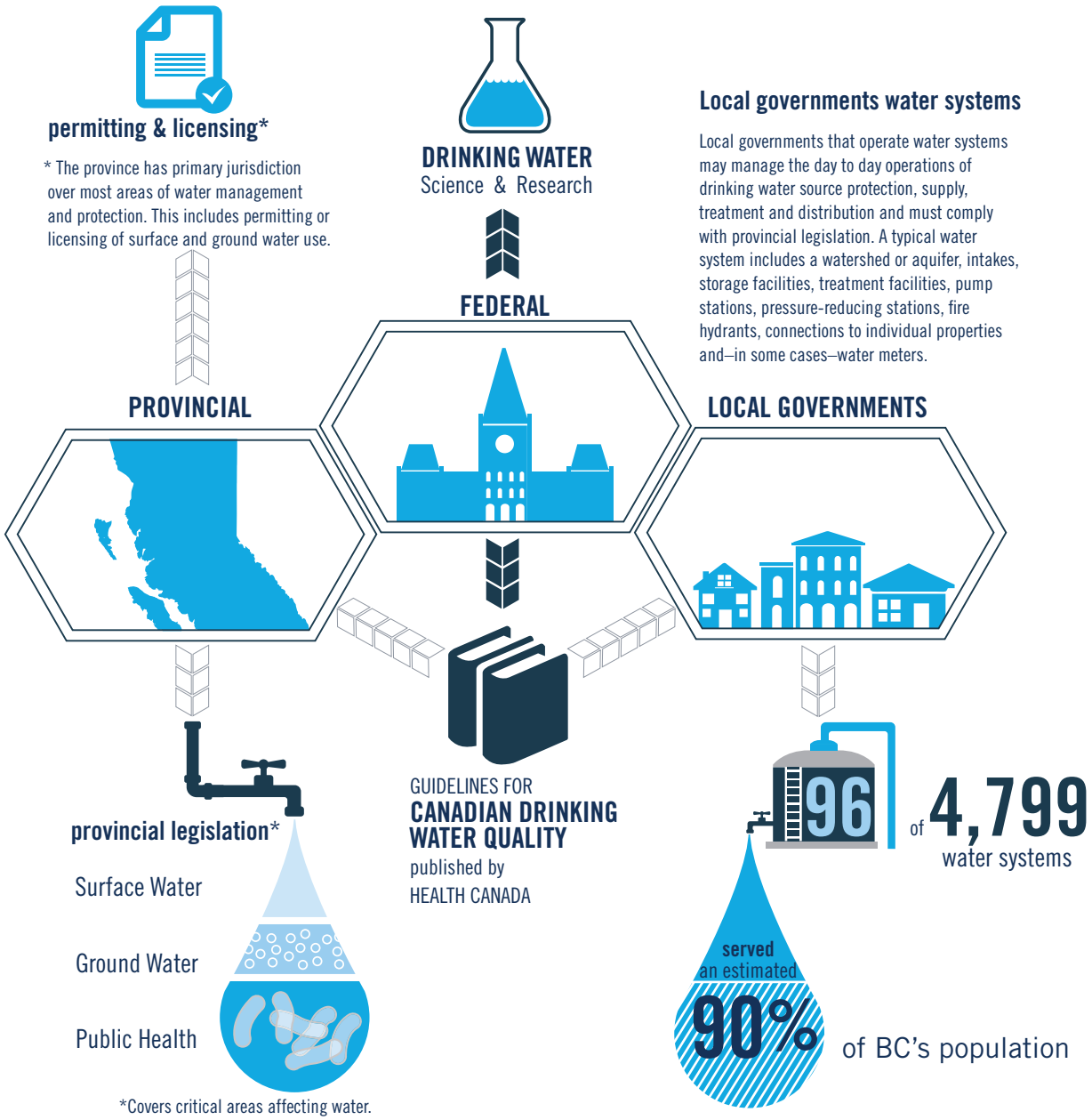
source water protection

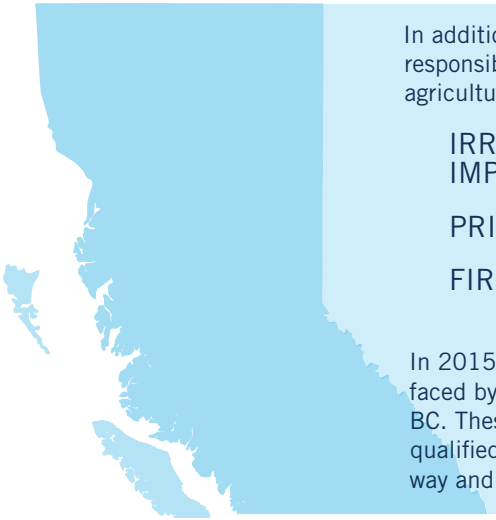


drinking water systems

drinking water quality management

RESPONSIBILITY FOR CLEAN DRINKING WATER





In addition to the BC regional districts and municipalities that are responsible for water systems to provide water for domestic, commercial, agricultural and industrial use, water services are also provided by:

- IRRIGATION AND IMPROVEMENT DISTRICTS
- PRIVATE UTILITIES
- FIRST NATIONS
- WATER USERS' COMMUNITIES
- GOOD NEIGHBOUR SYSTEMS

In 2015, the Provincial Health Officer highlighted particular challenges faced by suppliers of drinking water to small or remote communities in BC. These included inadequate treatment, difficulty attracting and retaining qualified operators, difficulty getting access to lab services in a timely way and inadequate financial resources to upgrade their systems.

REGULATION OF DRINKING WATER IN BRITISH COLUMBIA

British Columbia's Ministry of Health is the lead agency responsible for the Provincial Drinking Water Program. In this role, the Ministry works with the Ministry of Environment, Ministry of Forests, Lands and Natural Resource Operations, other ministries, the province's regional health authorities and water system providers across the province, including many local governments.

The Province also deals with drinking water through the regional health authorities that cover the entire province. The health authorities administer regulations by issuing permits and inspecting water systems, including those operated by local governments. The health authorities have drinking water officers and environmental health officers who inspect water systems and track compliance with provincial legislation. Health authorities also track and request publication of water quality advisories, boil water notices and 'do not use' water notices.

DRINKING WATER PROTECTION ACT

APPOINTMENT OF DRINKING WATER OFFICER

HEALTH HAZARDS

MONITORING WATER QUALITY

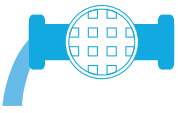
EMERGENCY RESPONSE

CONTINGENCY PLANS

PUBLIC HEALTH ACT

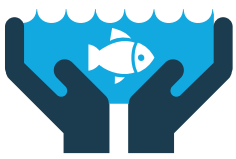
APPOINTMENT OF PROVINCIAL HEALTH OFFICER

COMMUNICABLE DISEASE REGULATION



SEWERAGE SYSTEM REGULATION

HEALTH HAZARDS REGULATION



WATER SUSTAINABILITY ACT
Since February 2016

BC's Water Sustainability Act came into effect in February 2016, focusing on water use and extending the licensing of surface water to include groundwater (wells).

It recognizes the importance of environmental flows to fish and incorporates the idea of water objectives. When the BC Government establishes water objectives for a body of water, local governments must take them into account when planning for regional growth or land use.

OTHER ACTS AND REGULATIONS

There are other Acts and regulations that may apply to drinking water. For example, the Forest and Range Practices Act and Oil Gas and Activities Act and their regulations protect drinking water from the activities of those industries.

OUR EXPECTATIONS

23. We would expect a local government to effectively manage the water systems for which it is responsible to ensure drinking water safety and reliability over the long-term. To achieve this, we would expect a local government to have an appropriate governance structure and overall organizational activities, including:

- A robust governance structure, organizational structure, leadership and culture that support its water systems
- A long-term drinking water strategy that considers affordability and cost-effectiveness in decisions
- Adequate controls to ensure proper operation of systems and to protect access and physical security of operations

24. We would also expect a local government to manage its drinking water supplies to meet current and expected future demand through:

- Adequate infrastructure to meet all requirements
- Business continuity plans that focus on returning water services to full operation during disruptions
- Effective source water protection plans and bylaws, collaborating where appropriate with other organizations and stakeholders
- Rigorous assessment of available water sources, including alternative sources in case of a primary supply interruption
- Sound water conservation strategies, including demand management measures, targets and evaluation of effectiveness
- Drought management plans for all water systems
- The promotion of public awareness and transparency in all aspects of drinking water services

25. We would expect a local government to ensure the safety and reliability of drinking water provided by its treatment and distribution systems through:

- Meeting all permitting and health authority requirements
- Maintaining adequate infrastructure to meet the Drinking Water Treatment Objective, or having plans to achieve this
- Having sufficiently trained operators to meet all requirements, including ongoing training requirements

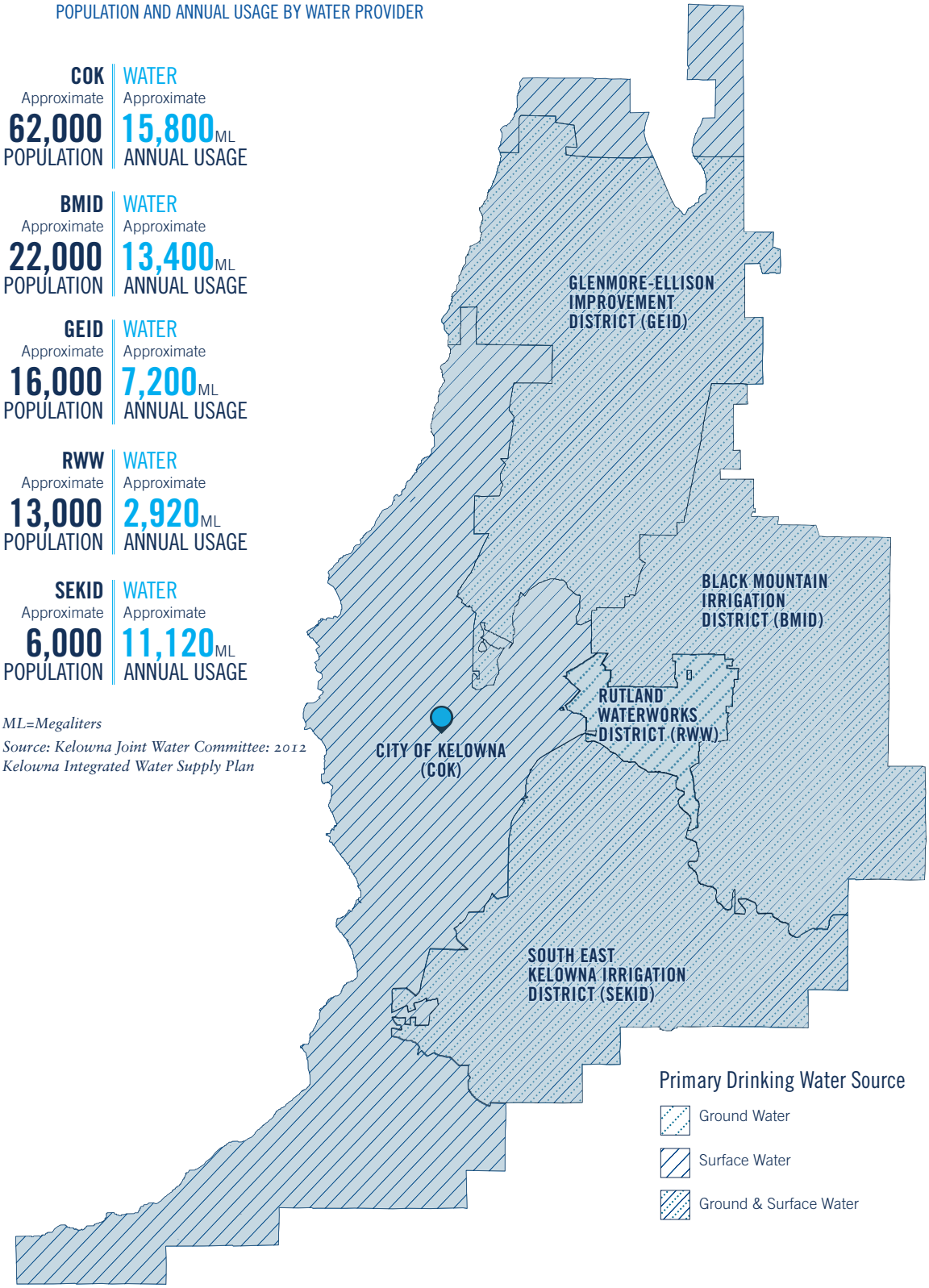
CONTEXT

Exhibit 2 — CITY OF KELOWNA VISUAL FACTS – 2012 APPROXIMATE POPULATION AND ANNUAL USAGE BY WATER PROVIDER

	Approximate POPULATION	WATER Approximate ANNUAL USAGE
COK	62,000	15,800 ML
BMID	22,000	13,400 ML
GEID	16,000	7,200 ML
RWW	13,000	2,920 ML
SEKID	6,000	11,120 ML

ML=Megaliters

Source: Kelowna Joint Water Committee: 2012 Kelowna Integrated Water Supply Plan



CITY OF KELOWNA

OVERVIEW

26. The City of Kelowna is the largest city in British Columbia's Okanagan Valley, with a population of more than 127,000 out of a total metropolitan area population of nearly 195,000 in 2016. It is located in the south-central part of the province, within the Central Okanagan Regional District.

27. Located on the shores of Okanagan Lake, which is 342.5 metres above sea level, the City covers 214 square kilometres of land and 48 square kilometres of water area. Known for its warm summers (the average daily high temperature in July and August is 27.4 degrees) and mild winters (the average daytime high during December and January is -0.3 degrees), Kelowna typically receives more than 2,000 hours of sunshine annually and only 28 centimetres of rain.

28. Kelowna and the rest of the central Okanagan has experienced rapid growth in recent decades, with more than 2,000 housing starts and $800 million in building permits issued in 2016 alone. The area economy is diverse, with particular strength in agriculture, tourism, retail trade, manufacturing, forestry and construction. Areas of rapid growth include information and high technology, film, viticulture and wine production, aviation and health care.

29. Among the amenities available to Kelowna residents are the University of British Columbia Okanagan Campus, Okanagan College, the largest and most comprehensive hospital in the province's southern interior (Kelowna General Hospital), Canada's tenth busiest airport and a wide range of cultural organizations including a symphony orchestra, several theatre groups, museums and numerous art galleries.

30. Kelowna's combination of a relatively dry climate and rapid population and economic growth combine to place pressures on local drinking water systems.

CITY OF KELOWNA'S ROLE WITH DRINKING WATER

31. During the period covered by the audit, the City of Kelowna was one of five major water providers operating within Kelowna's municipal boundaries. The City's water utility provided drinking water service to approximately 70,000 residents—slightly more than half of the City's population, while the rest were serviced by four independent improvement/irrigation districts (Black Mountain Irrigation District, Rutland Waterworks District, Glenmore-Ellison Improvement District and South East Kelowna Irrigation District) and 27 small, private suppliers.

32. The City's water utility included two subsystems as displayed in *Exhibit 3*:

- The main system, which drew water from Poplar Point and Cedar Creek intakes on Okanagan Lake, plus a supplemental intake at Eldorado.
- A small system that drew water from the Swick Road intake, also on Okanagan Lake.

33. Kelowna water utility uses unfiltered Okanagan Lake water for treatment and distribution. Since filtration is the default under the Canadian Guidelines for Drinking Water Quality, and one of three treatment barriers expected by Interior Health Authority, the City is required to annually apply for an exemption from filtration. Filtration exemptions come with certain criteria for managing the higher risk of using unfiltered water. For instance, Kelowna monitors the raw water it draws from Okanagan Lake for total coliforms and E. coli.

34. Of the four other major water providers in Kelowna, only one—Glenmore-Ellison—drew water from Okanagan Lake. The other three drew from upland surface water and/or groundwater. Two of the four other water providers served some areas inside the City and other areas outside its boundaries, while the other two operated entirely inside the City's boundaries. (See *Exhibit 2* Map of Kelowna)

Exhibit 3 — DESCRIPTION OF THE AUDITED WATER SYSTEMS

	POPLAR POINT	CEDAR CREEK	ELDORADO	SWICK ROAD
WATER SOURCE	Okanagan Lake			
WATER TREATMENT	UV, Chlorine gas	UV, Sodium Hypochlorite (generated on site)	UV, Chlorine gas	UV, Sodium Hypochlorite
NUMBER OF CUSTOMERS 2016	Estimated 70,000			Estimated 300
CUSTOMERS (2016)	95% domestic and 5% agricultural by volume (primarily during the growing season)			
KM OF MAINS (2016)	422 km			
INFRASTRUCTURE (2016)	4 pump stations, 17 booster stations, 22 reservoirs, 28 pressure reducing stations, 48 pressure zones			
ANNUAL TOTAL USAGE (2016)	15,513,000 m3 (cubic meters)			
WATER METERS (2016)	17,036 (100% of service connections)			

35. In 2016, Kelowna reported that the City's Poplar Point station accounted for 84 per cent of the overall system's intake. The Cedar Creek, Eldorado and Swick Road pump stations combined to account for the remaining 16 per cent.

36. The City also operated and maintained the Kelowna International Airport Water System. This system received treated water from the Glenmore-Ellison Improvement District. The City added microfiltration as a further form of treatment for when this drinking water was under water quality advisories.

37. During times of peak water demand during the summer, the City of Kelowna water utility delivered about 85,000 cubic meters of water per day to its customers.

38. *Exhibit 4* shows revenue and expenditure information for Kelowna's drinking water system from 2013 through 2016.

Exhibit 4 – AUDITED WATER SYSTEMS REVENUE AND EXPENDITURES

	REVENUE	TOTAL OPERATING EXPENSES	SURPLUS
2013	$11,546,000	$9,758,000	$1,788,000
2014	$15,974,000	$10,151,000	$5,823,000
2015	$13,612,000	$10,343,000	$3,269,000
2016	$13,609,000	$10,699,000	$2,910,000

Source: City of Kelowna: Annual Reports

Note: All surpluses generated by the system were carried forward for future operating expenses, capital expansion or water quality improvement initiatives.

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

SUMMARY OF FINDINGS

39. We set out to determine whether—during the period covered by the audit—the City of Kelowna:

- Had a governance structure and organizational activities that supported the provision of clean and safe drinking water where and when needed
- Managed its drinking water supplies to meet current and expected future demand
- Ensured the safety and reliability of drinking water provided through its treatment and distribution systems

40. The City was successful in meeting most of the expectations included in our audit objectives; however, it lacked some processes and had not completed some initiatives that would help ensure successful drinking water management into the future.

GOVERNANCE

41. The City had a governance structure that supported the provision of clean and safe drinking water by its water utility and a range of good practices such as its internal management structures, robust process for setting water rates, ethical policy development and advanced use of its Supervisory Control and Data Acquisition (SCADA) system.

42. The City focused its efforts during the period covered by the audit on working with various levels of government to take advantage of opportunities to improve drinking water infrastructure for Kelowna residents. It sought to do this through the development of a long-term plan to improve and integrate several of the other drinking water systems within the Kelowna boundary with the City of Kelowna's water utility.

43. In July 2017, the City was successful in securing a $43.9 million grant from the B.C. Government's Clean Water and Wastewater fund. Receipt of this grant was dependent upon an agreement to dissolve and transfer the South East Kelowna Irrigation District and the South Okanagan Mission Improvement District (SEKID and SOMID) into the City of Kelowna.

44. However, some of the City's processes and discussions were not presented in a public forum, which may have limited the opportunity for meaningful participation and contributions from key stakeholders and the public. The City did not undertake a broad relationship-building approach to some of its drinking water planning processes, including:

- The development of plans to amalgamate other drinking water providers into the Kelowna water utility and use a different water source in the future
- Working with others to promote the importance of water protection and the value and cost of water.

45. In addition, the City operated with some outdated policy guidance and had not updated and consolidated some of its strategic documents.

MANAGEMENT TO MEET DEMAND

46. The City had several water conservation-related initiatives and had begun work on drought and demand management through newly-established water restrictions; however, it lacked a conservation framework that set performance targets or objectives.

47. Kelowna was not fully prepared to meet future demand for drinking water or respond to potential crisis situations that might affect its water sources. While the City took steps to reduce pollution, it did not have a strong focus on source water protection and was not ready to respond to previously-assessed hazards.

ENSURING SAFETY AND RELIABILITY

48. Kelowna water utility infrastructure was adequate to ensure that drinking water could meet the Guidelines for Canadian Drinking Water Quality. Its water was tested regularly and its treatment was found to be effective. The City implemented several aspects of the multi-barrier approach and was committed to having trained and credentialed operators in place.

49. The City followed a preventative maintenance schedule for most, but not all, of its water-related infrastructure.

50. The City communicated to the public about the quality, safety and reliability of water from its utility.

51. However, Kelowna's planning for critical service provision was incomplete. Business continuity planning for drinking water services was lacking. While Kelowna had an emergency response plan for its water systems, it was not regularly updated, tested, or practised.

LOOKING AHEAD

52. To be better prepared for the future, the City should consider taking a more proactive approach by prioritizing best practices and applying them, when appropriate, to areas such as relationship building and transparency, risk management and emergency management for its water utility and operations.

53. Though Kelowna had several plans and initiatives related to drinking water, it could benefit from developing a more strategic and engaging approach that brings together various governments and other stakeholders to collaborate on water-related issues such as source protection and water supply. The City should ensure that its plans are up-to-date, relevant and include action plans that are implemented and evaluated for effectiveness.

54. By establishing a regular governance review process, the City may enhance its ability to continue meeting the needs of the organization and its customers. Kelowna could also benefit from creating a governance transfer policy to help identify actions and time lines for processes during and following potential future water system acquisitions. This should include the updating of legacy bylaws and review of existing governance and advisory structures.

GOVERNANCE STRUCTURE AND ACTIVITIES SUPPORTING DRINKING WATER SERVICES

WHAT IS GOVERNANCE

Governance refers to the structures and processes by which an organization is directed, controlled and held to account.

GOOD GOVERNANCE

5 CORE PRINCIPLES:

- ACCOUNTABILITY
- STRONG LEADERSHIP
- INTEGRITY
- STEWARDSHIP
- TRANSPARENCY

Source: Office of the Auditor General of BC: Public Sector Governance

GOVERNANCE AND ORGANIZATIONAL STRUCTURE

55. We would expect the City of Kelowna to have a robust governance and organizational structure, a leadership and organizational culture, and activities that support its water systems, service area and customers. These factors should help the City achieve its drinking water priorities and objectives.

56. In Kelowna, the City's governance structure and activities supported the provision of clean and safe drinking water but we found some gaps in its practices.

57. The City had a structured approach to leadership of its water system. City Council was the top-level decision-maker for Kelowna's water utility. The City's management teams initiated, informed and supported Council's water-related discussions. These management teams reported through the city manager to Council. Each management team focused on a particular area of responsibility. For example, the City had a senior leadership team, an integration team and a utility supervisor team.

58. In this model, City staff were responsible for detailed utility management, while Council dealt with higher-level political decision-making. Overall, the City's management structure supported its water systems, its service area and water customers.

59. Efficient flows of sufficient and appropriate information are critical to support informed decision-making. We would expect the City's structure to effectively support sound decision-making by fostering communication among divisions and levels of staff.

60. The City's management teams were structured to enable information flow between levels of management. The City kept minutes for most team meetings, although minutes were missing for some integration team meetings. Discussion of water-related issues such as value planning strategy took place across management teams and flowed to Council from staff and also from Council to staff. The City's structure for information flow was sufficient to support informed decision-making. Staff felt that they received enough of the right information to fulfill their duties.

61. An organization can benefit from a formal evaluation of governance and organizational structure. Such an evaluation can identify whether governance and organizational structures are the most appropriate for the organization's current leadership processes and strategies and future needs. We would expect the City to periodically review its structures.

62. The City did not undertake a formal review of its governance or organizational structure and processes during the period covered by the audit. However, Kelowna did make a positive change to its water-related organizational structure during this period by making financial services a stand alone division. This enabled enhanced financial governance by including financial services staff at senior leadership meetings.

63. By aligning its structure, strategy and operations, an organization can more efficiently meet its objectives. We would expect the City to organize its structure to support operational efficiency.

64. Before the period covered by the audit, Kelowna had created separate divisions responsible for planning, infrastructure and operations

rather than organizing divisions by infrastructure type. The resulting plan-build-operate structure meant that drinking water was aligned with waste water and utility networks under civic operations. City representatives told us that Kelowna chose this structure to enhance the coordination of projects and resources and reduce workflow inefficiencies. For example, this structure made it easier for the City to coordinate water and wastewater construction projects, thereby avoiding the need to dig up a street twice.

RECOMMENDATION ONE

The City of Kelowna should consider implementing a periodic governance review process to ensure that its governance structure continues to meet its needs.

STRATEGIC PLANNING PROCESS

65. It is important for an organization to have a compelling vision and mission to provide the foundation for its organizational strategy and culture. Identification of organizational core values supports the vision and shapes the culture. We would expect the City of Kelowna's strategic documents to present a compelling vision and mission, and set key goals and targets for the organization including its water utility.

66. In 2015, Kelowna Council identified clean drinking water as one of the City's top priorities. Subsequently, the City shifted resources to focus on strategic planning related to water governance. In addition to utilizing existing management structures, the City established a management team focused on pursuing the integration of water service providers in Kelowna and created the position of an integrated water project manager.

67. The City considered its Official Community Plan to be its guiding strategic document, although that document did not contain organizational mission or vision statements. The City frequently updated the Official Community Plan and produced an annual indicators report, which evaluated and monitored City progress toward the goals outlined in it.

68. The City also developed corporate visioning and strategy mapping documents in 2011, although it considered these to be internal documents, so did not make them publicly available. However, Kelowna did develop a corporate framework in 2015, which was aimed at the general public. This document defined categories of objectives for the City and served as a foundational document for many City publications.

69. Though the City used its Official Community Plan as its primary strategic document, Kelowna also undertook a community visioning process to help develop a new strategic plan. The Imagine Kelowna project used web, print and social media materials as well as an 'upside-down town hall meeting' process to consult with the public on a vision for the community. This process included broad issues that related to drinking water.

70. Over the years, Kelowna produced or commissioned various city-wide, long-term engineering studies. Since 2005, the City participated in the commissioning of ten different reports related to drinking water. The City collaborated with the improvement districts to produce the 2012 Kelowna Integrated Water Supply Plan. In 2014, the City commissioned a review of that plan and, in 2017, released an updated Value Planning Study - Kelowna Integrated Water Supply Plan.

RECOMMENDATION TWO

The City of Kelowna should consider aligning its long-term objectives for drinking water and other departmental plans with an updated organization-wide strategic plan.

PLANNING FOR A CITY-WIDE WATER SYSTEM

71. The City has worked collaboratively for many years with the other main Kelowna water suppliers on a range of planning and operational initiatives. During the period covered by the audit, one of the primary focuses for the City and the other suppliers was planning for the potential of a future integrated water supply network that would address issues of water quality and supply in areas where the need for infrastructure improvements had been identified, and improve redundancy and resiliency of supply in the face of climate change.

72. As noted earlier, this audit covered only the City of Kelowna, so we are not in a position to comment on how well the improvement/irrigation districts or any of the ministries of the B.C. Government managed their contributions to the processes and decisions related to drinking water in Kelowna. The audit did, however, examine the City's approach to governance and management of activities related to its pursuit of a city-wide water system.

POLICY REVIEW

73. As all local governments' operating environments, legal context and technologies change over time, policies require regular review and updating to remain effective. We would expect the City of Kelowna to manage its need for new policies and to revise existing policies so they remain aligned with the City's strategic direction and operationally relevant. This supports clarity for staff and public transparency.

74. The City had a policy—created in 1976 and last reviewed by Council in 2010—prohibiting the City from taking steps to amalgamate improvement /irrigation districts' water systems with the Kelowna water utility. However throughout the period covered by the audit, Kelowna actively pursued amalgamation. The City did not revise the policy to align with this strategic and operational direction, so acted in contravention of its own policy.

75. Over past decades, the City has acquired at least eight formerly independent water systems. We would expect Kelowna to have a policy and documented process in place to manage such governance transfers.

76. The City managed its water system governance transfers on a case-by-case basis. For example, Kelowna recently developed a transition agreement for the South East Kelowna Irrigation District water system. The City lacked a guiding governance transfer policy to guide this process or future water system acquisitions. City representatives told us that the City of Kelowna was developing such a policy.

RECOMMENDATION THREE

The City of Kelowna should review its drinking water polices to:

- Align its policy on amalgamation with its strategic and operational direction to reflect its current position on water provision in Kelowna
- Develop a water system governance transfer policy that:
  - builds on experience gained from the transition agreement with the South East Kelowna Irrigation District
  - documents actions and timelines for processes that take place during and following an acquisition, which may include updating legacy bylaws, reviewing existing governance and advisory structures and other significant factors

ENGAGEMENT, COMMUNICATION, AND COUNCIL MEETINGS

77. We would expect the City of Kelowna to maintain communication channels with the other water operators in the City with the objective of fostering informed decision-making. We would also expect Kelowna to be appropriately transparent by engaging the public, including other levels of government and stakeholders to support meeting its objectives.

KELOWNA JOINT WATER COMMITTEE

78. During the period covered by the audit there was a significant breakdown in relationships between the City of Kelowna and the other main water providers; however we found no evidence that essential communication and coordination between technical staff was negatively affected.

79. For example, the City was a member of the Kelowna Joint Water Committee (KJWC), a voluntary committee formed in 1991 to promote standardization of methods and materials, improve communications and provide an integrated approach to water supply within the City boundaries. The four independent improvement/

irrigation districts were also members of this committee. The KJWC did not have terms of reference and required unanimous agreement on decisions. Its decisions were not binding and representatives took them back to their boards or council as recommendations.

80. During the period covered by the audit, the 'board of the whole' (elected representatives and senior staff) met seven times during 2014/2015 and once in 2016. Subsequently Kelowna determined that these meetings were no longer productive and stopped participating. Instead the City decided to meet with improvement district boards on an individual basis.

81. The City continued to participate on the KJWC's technical committee, which discussed and developed operational policies as well as Kelowna-wide water programs such as cross-connection control, bylaw changes and hydrants. City representatives told us that the technical committee meetings worked well and that operational information continued to flow on an informal basis at the technical level even after June of 2016, when the meetings stopped occurring. We understand that the technical committee reconvened during the summer of 2017.

VALUE PLANNING PROCESS AND ENGAGEMENT WITH FIRST NATIONS AND STAKEHOLDERS

82. In order to make infrastructure improvements necessary to increase drinking water quality in parts of Kelowna, the City and the improvement districts discussed collectively pursuing a Clean Water and Wastewater fund grant. In order to qualify for grant funding the B.C. Government required that a 'value planning' study be completed.

83. The value planning process involved an independent assessment of a plan to establish whether it was the lowest cost, long-term solution. The process began with the participation of all five water suppliers but ended with three of the improvement districts (BMID, RWW and GEID) opting out of the study.

84. In early 2017 the process culminated in the 2017 Kelowna Integrated Water Supply Plan—Value Planning Study. In addition, the process led to an approved grant funding application that required the dissolution of the South East Kelowna Irrigation District and the South Okanagan Mission Improvement District water systems and their transfer to the City of Kelowna. This infrastructure grant yielded $43.9 million in provincial and federal funding for upgrading SEKID's infrastructure.

85. A full assessment of whether the 2017 Kelowna Integrated Water Supply Plan—Value Planning Study plan is the right or best plan to proceed with is out of the scope of this performance audit; however we noted that the City actively communicated with the Province of B.C. but did not engage with the Okanagan Nation Alliance, individual First Nations and some interested stakeholders during the value planning process.

86. The City of Kelowna's view of the process was that it was a technical exercise carried out to meet the Province's requirement and therefore did not require broader participation; however the results of the process were publicly presented by the City of Kelowna as a plan and not just a technical study. This plan could have broader natural resource and governance impacts.

87. Although not required by the Province, inclusion of First Nations and key stakeholders earlier in the process and clearer public communication about the intention, result and next steps of the study would have been more aligned with good practices on transparency and civic engagement.

88. The City has acknowledged the need to work more broadly and collectively with other interested parties on matters affecting water resources. Following the period covered by the audit, Kelowna initiated the development of an 'area water management plan.' Due to its timing, we have not assessed this initiative by Kelowna to move forward in a consultative manner.

RECOMMENDATION FOUR

The City of Kelowna should improve its processes for engaging and communicating with other levels of government and stakeholders. This could include:

- Developing a policy and process for engaging with other local governments, including First Nations and improvement districts
- Formalizing its process for engaging with other water providers by developing terms of reference for the Kelowna Joint Water Committee or working together to develop an alternate structure
- Increasing engagement with local and regional drinking water stakeholder groups

COUNCIL MEETINGS

89. A fundamental component of open and transparent government is ensuring public access to decision-making processes. This is supported by a legislative requirement that all council meetings must be open to the public except under specific circumstances. Public trust is increased when a council provides as much detail as possible about the basis for closing a meeting and it is a good practice to have a process in place to regularly review and release closed meeting content.

90. Good record keeping by local government supports accountability to the public and enables the preservation and future review of decision-making processes. Periodic review of record keeping practices and processes can identify best practices for the documentation of meetings. We would expect the City of Kelowna to regularly review and release information related to closed council meetings and have a strong set of record keeping processes.

91. The City's organizational structure set out the ultimate decision-making body for water was City Council. Management teams focused on water governance would report through the city manager to Council. Over the period covered by the audit there were a number of water-related issues that the City felt warranted discussion in closed council sessions. During this period the proportion of meetings where water issues were discussed in open council decreased while the frequency of water planning discussions in closed session increased. In 2015 58 per cent of closed council meetings included drinking water planning discussions. In 2016 this increased to 79 per cent of closed meetings. Council meetings were closed in accordance with section 90 of the Community Charter but in some cases the reason given for closure was not aligned with the content discussed in the meeting.

92. Following its closed meeting discussions of water issues, the City released few updates in open council meetings, the exception being discussions on water rates. The City chose to communicate public information through media releases and a direct letter campaign to customers of the South East Kelowna Irrigation District (in response to a newsletter produced by the irrigation district).

93. These factors are significant as they can influence the public's perception of the City with regard to transparency, trust and confidence in decision-making processes.

RECOMMENDATION FIVE

The City of Kelowna should review and consider implementing best practices on closed and open Council meetings, including its documentation of reasons for Council meeting closure.

The Importance of Public Trust and Credibility

It is critical that local governments demonstrate openness and transparency by conducting meetings that are open and accessible to the public. When citizens have the opportunity to observe and engage their elected representatives, there is trust and confidence in decision-making processes and it allows for meaningful participation and contribution.

While the Community Charter does not stipulate that each reason for closing a meeting to the public must be included in the resolution, or that the primary reason must be the one that is included, it is recommended that local governments provide as much detail as possible about the basis for closing the meeting without undermining the reason for closing the meeting in the first place. This will help to limit speculation, increase public trust and enhance the credibility of the local government.

WHEN CLOSED MEETINGS ARE APPROPRIATE

It is deemed appropriate to close a meeting where discussion of a subject in an open meeting raises a reasonable and identifiable possibility of damage to the interests of the local government, the public, or a third party.

Best practices with respect to closing and conducting closed meetings include:

- using paragraph 90(1)(n) if there is reason to question whether it is necessary to close a meeting
- providing as much detail as possible about the basis for closing the meeting without undermining the reason for closing the meeting
- including in the resolution to close a meeting a description of each distinct matter to be discussed and the authorizing provision
- reading the resolution to close a meeting aloud
- stating whether council will reconvene in an open meeting at the end of the closed session
- restricting discussion to subjects that were authorized by the resolution to close the meeting
- whenever possible, avoiding passing resolutions in closed meetings
- keeping a detailed record of closed meetings
- considering releasing as much information as possible after the closed meeting, including incomplete information rather than waiting for a time when it will eventually be proper to release all the information

The best practices offered above can help a local government achieve the goal of openness, transparency and accountability without compromising the interests of the local government, the public or a third party.

Source: BC Ombudsperson: Open Meetings: Best Practices Guide for Local Governments

ETHICAL CONDUCT POLICIES

94. Ethical conduct and behaviour policies encourage, empower and enable employees from all departments to handle ethical dilemmas appropriately. Appropriate ethical conduct is essential for those involved in the delivery of services that impact the public, such as the provision of safe drinking water. We would expect the City to have robust ethical conduct policies.

95. Kelowna had a range of ethical conduct policies in place, including a 'no discrimination and harassment' policy, a whistle-blower policy, and a code of ethics. However the City's code of ethics policy had several gaps that should be addressed.

96. The City last revised its 'no discrimination and harassment' policy in 2013 and staff regularly received training on 'unlawful workplace harassment.'

97. Kelowna's whistle-blower policy stated that it was in place to enable employees and citizens to raise concerns free of discrimination, retaliation, threats, or harassment.

98. Though members of Council were required to adhere to the conflict of interest provisions of the Community Charter, the City also maintained a conflict of interest policy for Mayor and Council that clarified legal processes.

99. The City last revised its code of ethics in 2002. The policy covered conflict of interest, expectations around conduct and confidentiality. The policy did not include some other potentially useful content such as a mission statement, statement of key values, possible consequences for code violations, guidance when faced with ethical dilemmas or a list of additional resources.

RECOMMENDATION SIX

The City of Kelowna should review and update its code of ethics policy.

RISK MANAGEMENT

100. A robust enterprise risk management process forms a part of good governance by enabling an organization to manage risk across its operations by implementing a common risk management framework. Such a framework typically establishes rules, processes, tools and key personnel for managing and mitigating risk. We would expect the City of Kelowna to have a system in place to identify and manage risks across the organization, including to its drinking water system.

101. In 2013, the City developed an enterprise risk management framework, but it was not prioritized for implementation. This process included the production of a risk assessment guide. The City continued to use a decentralized risk model where each division managed risks relevant to its operations.

102. Kelowna did develop a risk register that identified 39 risks. Several of these related directly to water services. The City ranked these risks as follows:

CITY RANKED RISKS

MEDIUM	HIGH	VERY HIGH
Water Filtration Requirement	Water Quality Contamination	Aging Infrastructure
IT Failure	Water Utility Amalgamation	Emergency/ Business Continuity

Understanding Risk

Organizations of all types and sizes face internal and external factors and influences that make it uncertain whether and when they will achieve their objectives. The effect this uncertainty has on an organization's objectives is "risk".

All activities of an organization involve risk. Organizations manage risk by identifying it, analysing it and then evaluating whether the risk should be modified by risk treatment in order to satisfy their risk criteria. Throughout this process, they communicate and consult with stakeholders and monitor and review the risk and the controls that are modifying the risk in order to ensure that no further risk treatment is required.

Source: International Organization for Standardization: ISO 31000

103. The City identified aging infrastructure in its utility as a very high risk and created an asset management plan for the water utility to address this risk. The plan identified water system and water network risks and prescribed actions that would reduce these risks to moderate or low.

104. Although the City also identified emergency / business continuity risk as very high, it had not developed a business continuity plan. Additionally, Kelowna did not regularly review and potentially revise the risk register and lacked a formal process for reporting risks to City management or Council. The City's water utility did not maintain its own risk register.

105. Prior to the period covered by the audit, Kelowna did a risk evaluation of identified threats to water quality. As part of its source to tap assessment, the City commissioned a contaminant source inventory and mitigation plan. The City assigned the water utility with responsibility for water risk mitigation, such as through its elevated turbidity response procedure.

106. This procedure said that, in the event of turbid or cloudy water, the utility should refer to the "Decision Tree for Responding to a Turbidity Event in Unfiltered Drinking Water." While this procedure may be useful, it is not a comprehensive risk mitigation strategy.

RECOMMENDATION SEVEN

The City of Kelowna should consider developing a formal strategy for risk identification, mitigation and reporting that includes regular re-assessment and reporting of organizational risks—including those associated with drinking water—to senior management and Council.

CAPITAL PLANNING AND RESERVES

107. The City had a reserve policy and grew its water fund reserve by 43.9 per cent over the period covered by the audit. This reserve was made up of accrued surplus revenue from water fees as well as Kelowna's water quality enhancement fee.

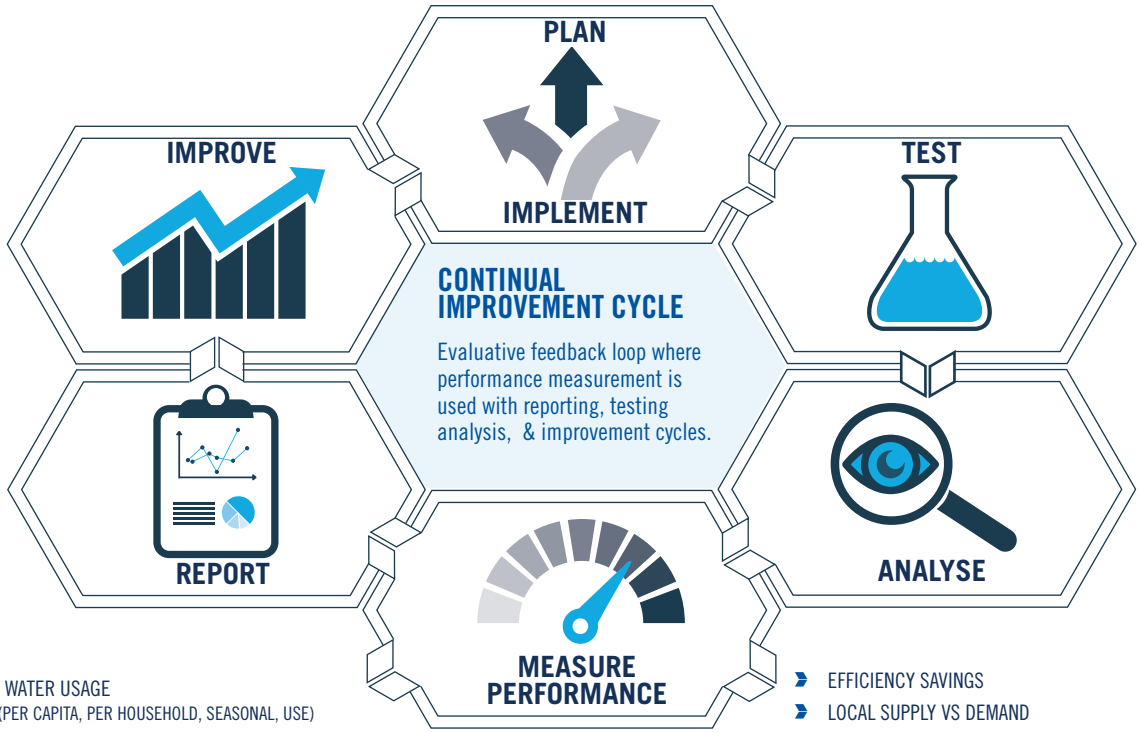
108. The reserve included funds specifically intended for water quality projects. This portion of the fund was to be used to fund filtration or another form of advanced treatment, when required by Interior Health Authority.

109. The water fund reserve was growing by between $3.5 million and $4.6 million per year. However, the City calculated that the depreciation of water assets identified in its asset management plan was outpacing the growth of the reserve. The City of Kelowna Asset Management plan states that water assets are being renewed at 24 per cent of the rate they are being consumed. The City told us it had a long-term vision to increase renewal investment to a higher percentage of the depreciable amount.

WATER RATES-FULL COST

110. It is important for local governments to have a complete understanding of revenue and expenditures associated with the delivery of their services. When setting the price for water, we would expect the City of Kelowna to follow a comprehensive process that considers all of the costs associated with the provision of clean drinking water.

111. The City had a robust process for the annual setting of water rates. The price of water was based on analysis contained within the City's water model. The water model included inputs from the City's 2030 Infrastructure Plan, which provided a 15-year framework for long-term planning and fiscal management. This plan made it possible for the City to anticipate current and future cost pressures. The water model was a comprehensive review document that accounted for all operational costs and sources of revenue for the water utility. In addition, the water model accounted for some of the funding demands as outlined in the City's Asset Management Plan.



- WATER USAGE (PER CAPITA, PER HOUSEHOLD, SEASONAL, USE)
- WATER SERVICE DISRUPTION
- SUPPLY DISRUPTION
- OPERATING AND MAINTENANCE COST PER WATER VOLUME TREATED OR DELIVERED
- NUMBER OF WATER LEAKS REPAIRED
- WATER NOT ACCOUNTED FOR
- EFFICIENCY SAVINGS
- LOCAL SUPPLY VS DEMAND
- BILLING ERRORS PER NUMBER OF ACCOUNTS
- RATIO OF PLANNED MAINTENANCE TO TOTAL MAINTENANCE
- EMPLOYEE TRAINING MEASURES
- COMMUNITY ENGAGEMENT DAYS
- CUSTOMER COMPLAINTS

112. Full cost accounting is a system where user rates and charges generate sufficient revenue to cover the entire cost of providing water services. These include costs associated with operations, maintenance and administration, research and development, financial, capital works (for expansion, upgrade, rehabilitation and renewal including planning, pilot testing, pre-design, design and land acquisition), decommissioning of disused works, water source protection and environmental externalities. During the period covered by the audit, the City did not use full cost accounting for its water utility as it had not yet accounted for some of the costs associated with environmental externalities and infrastructure renewal. The use of full cost pricing is a good practice that can help ensure the long term sustainability of infrastructure and be a tool to manage water demand.

HANDLING COMPLAINTS

113. A well-designed, formal complaints-handling process enhances a local government's accountability and makes it appear approachable, accessible and in communication. We would expect the City of Kelowna to have a system enabling the public to easily communicate complaints in a trackable manner.

114. The City had a well-developed, formal process for handling complaints and requests for service. The service request system was shared between various divisions including the water utility. The City tracked response times and could report on the number of responses and the time it took to respond. The public could track the status of a complaint / service request on the city website. The average response time to close water-related tickets was one to two days.

PERFORMANCE MEASUREMENT AND CONTINUOUS IMPROVEMENT

115. Water suppliers can face significant challenges in trying to maintain or improve the quality of water while maintaining reasonable prices. These challenges may include:

- Customer demand for increased levels of service
- Financial constraints
- Aging infrastructure
- Security and emergency response concerns
- Population growth
- Climate change and pressure to reduce environmental impacts
- Stricter regulatory requirements

116. By measuring its progress toward meeting these challenges, a local government can take on a more strategic approach and focus on continually improving its processes. Performance measurement supports planning, informs decision-making and helps demonstrate accountability. It makes it possible for a council or board and senior management to take oversight of water services beyond budgeting and reviewing reports describing accomplishments. We would expect the City of Kelowna to have processes in place to review, report on and improve organizational performance.

117. During the period covered by the audit, Kelowna regularly collected and reported on key performance indicators. These were reported internally (in the civic operations quarterly report) and externally (in the City's financial plan and Official Community Plan Indicators Report).

118. The City reported water-related performance indicators in civic operations quarterly reports to the divisional director. Tracked performance indicators were accomplishment-based such as number of service requests opened and closed, water produced, number of water quality advisories and others.

119. Prior to, and during the period covered by the audit, Kelowna reported performance indicators confidentially to the National Water and Wastewater Benchmarking Initiative. The Initiative compared the performance of 55 member municipalities and provided reports on each municipality's relative performance.

120. The City used these data to evaluate the cost effectiveness of its water system by comparing its water rates to other communities in benchmarking exercises as well as making adjustments to reduce operational costs where possible. For example, Kelowna staff told us that data from the Initiative indicated that Kelowna could more cost effectively deliver water billing services by handling billing in-house rather than by contract. As a result, the City decided to repatriate billing functions.

121. Although Kelowna collected a range of performance indicators no regular reporting of water utility performance was presented to Council. Additionally, although the City began reporting some water-related performance measures in financial plans in 2016, water utility performance information was not on the City website or prominently reported to the general public.

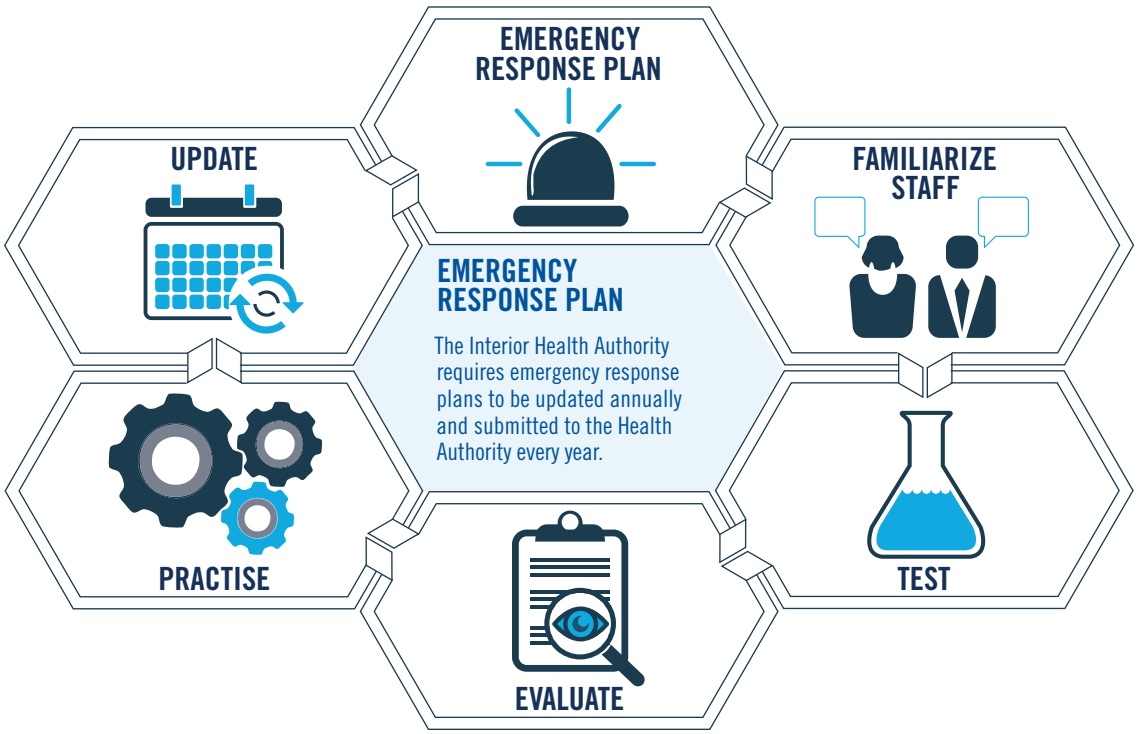
RECOMMENDATION EIGHT

The City of Kelowna should further develop its reporting to Council and enhance its reporting to the public on water-related key performance measures and trends.

INFORMATION TECHNOLOGY CONTROLS

122. The City of Kelowna had a well developed and implemented Supervisory Control and Data Acquisition (SCADA) system for its water system. The SCADA system supported remote access via secure mobile terminals and could automatically dispatch water operators in case of system failures. The SCADA system recorded, displayed, and reported on data collected from 12958 data points from 63 sites in a timely manner. Each site had power and data backup systems and was connected to a SCADA server node via wireless modems. Any one of the SCADA nodes could function as the central control point for the system. This system collected a variety of useful data:

- Water quality, treatment, pressure, temperature data
- Pump health via vibration, power metering and flow sensors
- Reservoir levels
- Facility intrusion
- Other water system data



123. The security of Operational Technology (OT) for SCADA systems uses a multi-layered approach. More layers mean reduced risk and greater protection for a system. Although the City had significant physical, hardware and software-based security measures in place for its SCADA system, the City's security framework was missing some components:

- Device and asset inventory
- Incident response plan
- Network zone definitions to enable risk analysis
- Core framework including five activities—Identify, Protect, Detect, Respond, and Recover
- Security awareness training and role definition

124. The City of Kelowna had not performed a penetration test for its SCADA system to test its security measures as staff were concerned that such a test could pose a risk to the system. Penetration testing and other security analysis tools decrease risk, but must be weighed against possible downtime.

125. The City had some good practices in place including periodic evaluation of potential software updates for their impact on operations, system connectivity and uptime. Kelowna used a testing server environment isolated from the network as a 'sandbox' for testing new hardware and code. However, these and other good practices were not formally documented in its policy framework.

RECOMMENDATION NINE

The City of Kelowna should consider formalizing some of its existing good practices for its Supervisory Control and Data Acquisition (SCADA) system by:

- Improving the existing security framework, and considering penetration testing
- Developing relevant Information Technology (IT) and Operational Technology (OT) policies

BUSINESS CONTINUITY PLANNING

126. We would expect the City of Kelowna to have a process for business continuity to ensure the delivery of safe, clean drinking water would continue uninterrupted in the event of an emergency. The City lacked an all-encompassing business continuity plan as well as one specifically for drinking water. Instead, Kelowna depended on other emergency management processes for drinking water, such as public notification protocols and its elevated turbidity response procedures.

EMERGENCY RESPONSE AND CONTINGENCY PLAN

127. Interior Health Authority required the City to prepare and annually update an emergency response plan for its water utility. During the period covered by the audit, the City did not update its emergency response plan in 2014 or in 2016. While it did update the plan in 2015, it did not test it through exercises such as a mock scenario or tabletop exercise and several of the City's operators had not reviewed it.

RECOMMENDATION TEN

The City of Kelowna should enhance its emergency and business continuity planning by:

- Ensuring that its water utility emergency response plan is regularly updated, tested, made accessible and familiar to all staff
- Completing business continuity planning for its critical services—including drinking water—to ensure the continuation of service and sustainable infrastructure throughout all potential disruptions

128. Although emergency response plans were not regularly tested, an effective emergency management response by City staff took place at one of Kelowna's booster stations in 2016. A leak led to a flood in an underground high voltage area, which shut down the booster pump used to replenish reservoirs. Due to the risk that the reservoirs would be drained within a day, the affected consumers were notified of water restrictions. Stored water from reservoirs flowed to customers while pump capacity was restored within 24 hours. As a result, water services continued uninterrupted.

SOURCE WATER PROTECTION

129. It is important for local governments to protect water sources to ensure that water of sufficient quality and quantity will be available for communities today and in the future. Source water protection strategies can help a local government identify, plan for and mitigate water supply-related issues. Source water protection involves a coordinated approach among stakeholders to develop short and long-term plans to prevent, minimize, or control potential sources of pollution and enhance water quality where necessary. The drinking water source relevant to this audit is Okanagan Lake and in particular, the portions near where the City's four intakes are located—Poplar Point, Eldorado, Cedar Creek and Swick Road.

SOURCE WATER PROTECTION PLANS

130. Source water protection strategies can help eliminate, reduce or manage risks to water sources. Source water protection planning is an ongoing process of periodic review to ensure that the local government is applying the most effective solutions and that the efforts of other groups working toward similar goals are acknowledged and taken into account.

131. We would expect the City of Kelowna to have source water protection strategies and a source water protection plan.

132. The City had implemented some good source water protection strategies including having sewer and sanitary bylaws, pre-treating drainage water and working with community groups to clean up streams. The City also had Foreshore Inventory Mapping, Sensitive Habitat Inventory Mapping (SHIM-creeks) and foreshore and habitat restoration.

133. Kelowna did not have its own source water protection plan, although City representatives told us that it was reviewing options to develop one.

134. In addition, during the period covered by the audit, Kelowna lacked a source water assessment response plan, as recommended by Interior Health Authority. The City did complete this document in 2017, augmenting the assessment it had completed in 2011.

Drinking Water Assessment Response Plans

Under Part 3 of the Drinking Water Protection Act, a drinking water protection officer may order a water supplier to complete a water source and system assessment in order to:

- Assess the drinking water source in relation to land uses within the watershed and activities that may affect the source
- Inventory the water supply system, including treatment options and operational procedures
- Assess the monitoring requirements for the drinking water source and water supply system
- Identify current and potential future threats to drinking water

After reviewing a completed source and system assessment, a drinking water protection officer may also order a water supplier to complete an assessment response plan. These plans are intended to identify measures that can be taken to address identified threats to drinking water.

Source: Fraser Basin Council: Rethinking Our Water Ways

135. Although the City did not have any documented assessment responses addressing the risks identified in the 2011 assessment, its 2017 source water assessment response plan:

- Provided assessment recommendations from 2011
- Identified some source protection activities the City had undertaken since the 2011 assessment
- Provided additional suggestions of actions that could be completed by the City and other stakeholders

136. The City also monitored lake levels to mitigate the impact of flooding on water quality.

The Okanagan Basin Water Board

The Okanagan Basin Water Board (OBWB) is a water governance body responsible for identifying and resolving critical water issues in the Okanagan watershed. This includes maintaining awareness of research and development occurring nationally and internationally.

The OBWB shares information with agencies in the Okanagan that deal with water, allowing each to make its own decisions on how to use it.

The OBWB is supported financially though annual levies contributed by local government in the Okanagan basin. The City of Kelowna also contributed time and expertise through representation on the OBWB board of directors and the Okanagan Water Stewardship Council, OBWB's advisory group.

RECOMMENDATION ELEVEN

The City of Kelowna should improve its approach to source water protection by:

- Reviewing and implementing actions outlined in the April 2017 Drinking Water Source Protection Assessment Response Plan
- Considering the development of a source water protection plan
- Coordinating its source water protection objectives and initiatives with stakeholders

SOURCE WATER PROTECTION IN BYLAWS

137. Bylaws and zoning can be valuable tools for source water protection. They can help protect water supplies by focusing new development away from drinking water sources. Zoning and development bylaws focus on tangible steps that can be taken with new developments to protect water in the future rather than changes to development that has already occurred, which can be difficult and expensive to implement.

138. We would expect the City of Kelowna to incorporate source water protection considerations, where relevant, into land use, development and other bylaws.

139. The City had sewer and sanitary bylaws that facilitated the protection of source water quality through the prevention of contamination and poor-quality water returning to the source. The City required comprehensive stormwater management reports when individuals applied for development permits.

140. Kelowna also required developers applying for permits to follow guidelines from the City's Official Community Plan on the Environmental Development Permit Area. The City had the authority to minimize or limit development within environmentally sensitive areas if development was likely to have negative impacts.

COLLABORATION WITH STAKEHOLDERS

141. Successful collaboration with stakeholders on source water protection can help a local government take into account the bigger picture and make better decisions. In the case of multi-use watersheds such as Okanagan Lake, watershed planning provides a framework for managing water resource quality and quantity. Coordination and collaboration with all stakeholders is particularly critical in ensuring that management actions address watershed problems in a holistic manner that considers all who are impacted.

142. We would expect the City of Kelowna to collaborate with a range of stakeholders on source water protection. For the most part, during the period covered by the audit, the City did collaborate with multiple stakeholders.

143. The City had representation on the Okanagan Basin Water Board through the Okanagan Water Stewardship Council and engaged with various stakeholder groups, including the Kelowna Joint Water Committee (until early 2016), on water issues in the Kelowna area. It collaborated with other local governments and the provincial and federal governments as necessary and also with the health authority in relation to extending its filtration exclusion.

144. Kelowna may benefit from working more closely with local residents and other stakeholders to ensure that community awareness is raised around source water protection near intakes and water facilities. For example, consultants recommended in 2011 that the City be more involved with regional water teams to explore opportunities for source water protection. However, the City did not begin participating on the Source Protection Wetland Committee for water source protection and wetland strategies until 2017.

RECOMMENDATION TWELVE

The City of Kelowna should consider promoting public awareness of the importance of source water protection and everyone's role in protecting water quality.

ASSESSMENT AND SELECTION OF AVAILABLE WATER SOURCES

145. Local governments should assess source water to determine its quantity, reliability, vulnerability, quality and potential for future degradation. If water sources are insufficient or unreliable and water balancing or conservation are not practical, then alternative sources should be considered. Assessments identify the characteristics of the water source, potential health hazards, how these hazards create health risks to those consuming the water and how these health issues can best be managed.

146. The City of Kelowna had a single source of water and if its main water facility at Poplar Point was compromised, the access and distribution of clean drinking water would be affected. As a result, we would expect the City of Kelowna to assess alternative water sources for quantity, reliability, vulnerability, quality and potential for future degradation.

147. Kelowna's water utility drew its water from one primary water source—Okanagan Lake—through four separate intakes. While the City had completed assessments for a filtration deferral application in 2011, its last water source assessments were completed in 2012 as part of the Kelowna Integrated Water Supply Plan. Because the City did not anticipate major changes in lake water quality during the period covered by the audit - and because alternative sources within the city boundary were managed by other providers - it monitored water quality regularly but did not conduct any new studies to assess the quality of neighbouring potential water sources.

148. The City used data from the 2012 assessments to facilitate reports in 2014 (Associated Engineering Review) and 2017 (Value Planning Study) and to provide best low-cost options for water treatment and distribution of drinking water within the city's boundaries.

149. Although Kelowna lacked watershed plans or up-to-date studies or rankings of its water sources, the City recognized the importance of local creeks like Mission Creek on Kelowna aquifers and wrote letters of support for further studies of Mission Creek groundwater to understand the interactions between creek flows and possible extractions from Kelowna aquifers.

150. Based on a value planning study conducted in late 2016 and early 2017, and information drawn from the 2012 integrated water supply plan, Mission Creek was identified as a potential additional main source of drinking water for the Kelowna water utility in the future.

151. City staff informed us that they would consider conducting studies of potential water sources that might be offered in the future by improvement districts located within the city boundaries if and when such sources were made available for integration into the City utility.

WATER CONSERVATION AND DEMAND MANAGEMENT STRATEGIES

152. Sound water conservation strategies can lead to cost savings, environmental benefits, usage efficiency and the preservation of supply. Growing communities need to be aware of the impact of development and population growth on existing water supplies especially if these are limited. Communities located in a semi-arid region are also vulnerable to the impact of extreme weather events such as drought. The Okanagan basin region experienced drought as recently as 2015.

153. While Okanagan Lake is currently the City's only supply source, the City has projected that, based on its current intakes and water source, supplies are sufficient to meet the needs of Kelowna's growing population until 2030.

154. Water demand management is a set of activities aimed at increased water use efficiency. Effective demand management reduces the quantity of water used by customers for particular purposes, increases the ability of a system to withstand drought and reduces losses throughout the system.

155. We would expect the City of Kelowna to have sound water conservation strategies for its water system that included demand management measures and targets and evaluations of the effectiveness of these strategies.

INNOVATION AND WATER CONSERVATION

3 FOUNDATIONAL PRINCIPALS TO A RAINWATER FRIENDLY APPROACH

REDUCE THE AMOUNT OF IMPERMEABLE SURFACES

CONSIDER RAIN TO BE A RESOURCE

THINK WATERSHED-WIDE

INNOVATIONS INCLUDE:

- Conservation planning
- Reduction of impervious surfaces
- Creation of infiltration basins
- Rain gardens
- Rain capture & storage
- Low impact landscaping
- Roof capture
- Runoff management & flow paths
- Slowing runoff
- Improving soil permeability
- Reforestation

Source: University of Victoria's POLIS Water Sustainability Project: Peeling Back the Pavement

GOOD PRACTICE

The City of Kelowna's landscape water use applications required an applicant wanting to install an outdoor landscape irrigation system to provide a landscape water conservation report. Such a report had to include:

- A completed landscape water conservation checklist of basic landscape and irrigation design and installation standards;
- Calculations of estimated landscape water use and a landscape water budget of the proposed outdoor landscape irrigation system

156. During the period covered by the audit, the City did not have an overarching water conservation or demand management plan. As a result, Kelowna lacked an integrated, long-term, forward-looking approach to water conservation.

157. However, the City did have some water conservation and demand management strategies in place prior to and during the period covered by the audit, including:

- Water meters
- Volume-based pricing
- A year-round water restriction bylaw (starting in 2015)

158. In addition, the City contracted out conservation activities during the period covered by the audit, with a consultant administering the following on the City's behalf:

- Customer service requests related to water restriction requirements and irrigation assistance
- Landscape assessments
- Landscape water use applications
- Rebates for water controllers
- Water restriction exemptions

159. The consultant provided annual summary reports of activities in 2015 and 2016. However the City did not evaluate or analyze the effectiveness of these activities or their outcomes and did not suggest improvements to further conservation efforts.

PUBLIC OUTREACH

160. Active and engaging education and outreach programs can play a big role in explaining to the community:

- Why water conservation is important
- The specific benefits of these measures
- How each conservation strategy will promote water savings
- What individuals need to do to participate

161. The City of Kelowna promoted public awareness of its demand management strategies using its website, radio and print advertisements, particularly in 2015 and 2016 when new water restriction bylaws were implemented.

162. Council prioritized clean drinking water in its strategic goals for 2015 to 2018 and City staff focused efforts on water restrictions related to drought response and building awareness of the various water providers in the Kelowna area.

163. The City's water conservation consultant provided some education and outreach through irrigation audits, assessments and permit-issuing for landscaping contractors or homeowners who submitted landscape water conservation reports. It also held outreach events in 2015 and 2016.

164. Kelowna's conservation education and outreach did not target real estate developers, although that industry can have a significant impact on water and the environment. The City also did not run workshops for its customers, the general public nor conduct training programs for any particular industry.

165. However, the City did target the landscaping industry and the conservation consultant discussed with landscaping contractors topics such as landscaping materials, irrigation installation, efficient water use and water restrictions. Between 2014 and 2016, the City reviewed and evaluated its communications plan for notification of the new water restrictions.

WATER CONSERVATION BYLAWS

166. It is important for a local government to have up-to-date, relevant bylaws related to water conservation. Strategically used municipal bylaws such as standards, regulations, water restrictions and building codes can help promote water saving technology or water conservation.

167. The City of Kelowna had several water-related bylaws that encouraged water customers to use landscape design and irrigation technology to manage water consumption and to pay attention to the appropriate times of the day and week to water their gardens:

- Utility Billing Customer Care Bylaw No. 8754—description of how the City operated various public utilities, including a water service system, a sanitary sewer collection system and a streetlight system and how the City entered into a contract for the provision of billing and account services for these public utilities
- Water Regulation Bylaw 10480 - a consolidation of previous bylaws that regulated, prohibited and imposed requirements on the distribution, operation, connection and charge for use of potable water from the City
- Bylaw 10475—designated bylaws that were enforceable under the City's adjudication system and set out the options to either pay the penalty or request dispute adjudication within a specified time period
- Water Restrictions Bylaw 11216—amended Bylaw 10475
- Bylaw 7900 Schedule 4 Design Standards—design standards for subdivision, development and servicing bylaws, which set standards and specifications for works and services, as well as application procedures in connection with the subdivision and development of land within the City

168. The City encouraged bylaw compliance in order to influence water consumer behaviour. It also provided education on water regulations in 2015 and 2016 through outreach events, warnings and discussions between the consultant and water bylaw violators.

169. City staff told us that they had limited bylaw enforcement support for water-related infractions during the period covered by the audit. During this period, they did not request the assistance of bylaw enforcement to further water conservation efforts, instead relying mainly on engaging with the public and contractors to encourage water conservation.

170. Staff believed compliance with irrigation and landscaping bylaws was low. They attributed this to a low level of awareness of bylaw requirements and a lack of enforcement resources.

171. In 2016, the City shifted toward a program that was more focused on enforcement, supported by modifications to bylaw enforcement making it possible to issue fines when individuals violated water use bylaws.

172. In 2017, the City developed a Water Smart communications plan that aimed to inform and educate residents about the relatively new year-round, assigned day-watering restrictions for Kelowna's water utility customers.

DROUGHT MANAGEMENT

173. The B.C. Ministry of Forests, Lands, Natural Resource Operations and Rural Development has summarized climate models and projected that warming levels for the Okanagan region will average between two and five degrees by the 2080s. The resulting increase in periods of drought and potential lower average rainfall could affect communities significantly. One of the results could be reduced availability of water for household and business use.

174. In 2015, the B.C. Government collaborated with Agri-Food Canada to complete the British

Columbia Drought Response Plan. It also encouraged local governments to create plans focusing on actions that can be taken before, during and immediately after a drought to reduce negative impacts.

175. We would expect the City of Kelowna to have a drought response plan that identifies actions to be taken before, during and immediately after a drought to reduce the negative impacts.

176. In 2015, Kelowna experienced drought from July to September. In response, the City coordinated with other water providers within Kelowna's boundaries to develop a drought response plan that defined drought stages and identified specific short-term activities to be undertaken at each stage.

177. While the City's drought response plan provided short-term strategies, Kelowna lacked drought management plans focused on longer-term strategies. Long-term drought management plans are critical to minimizing negative impacts of drought. These tend to focus on demand management, reducing consumption and improving water use efficiency over a longer timeframe.

178. Strategies in a long-term plan could include:

- Building a local drought management team
- Documenting the water system profile
- Evaluating the long-term impacts of drought on the region's economy
- Monitoring water supplies and climate
- Evaluating the drought management plan

179. In the absence of such a long-term strategy, the City did not have ongoing plans for ensuring consistent water supply in the event of water shortage.

180. Kelowna provided information to the public on its water system profile through infrastructure report cards and its website. City staff stayed informed about some of the neighbouring water supplies through commissioned reports and meetings with the Okanagan Water Stewardship Council.

WATER CONSUMPTION TARGETS AND METERING

181. Setting water consumption targets and tracking water consumption and leakage can help a local government reduce water use and loss and maintain long-term cost efficiencies and water supplies. Water meters can be effective tools to facilitate demand management by helping track consumption and detect leaks.

182. We would expect the City of Kelowna to set consumption targets, track consumption and manage leakage to make efficient use of its water supplies.

183. Although the City did not adopt any formal targets or conservation program objectives, it has had water meters installed since 1996. Since 2003, single family dwellers have reduced their consumption by 20 per cent.

184. In 2014, the City developed a Water Smart program proposal. Two of the goals outlined in the proposal were:

- Reducing potable water use by five per cent from 2013 levels
- Reducing peak demand between 2013 and 2016

185. Kelowna did not meet the proposed goal of reducing potable water use, but it did reduce peak demand by almost 13 per cent. Reducing peak demand can sometimes benefit water utilities as these reductions allow utilities to downsize or delay construction of related infrastructure.

186. The City also compiled and tracked consumption data, including estimated water savings from its 2016 rebate program, which provided incentives for replacing old irrigation controllers with more efficient newer ones.

187. Leakage in water distribution networks indicate inefficiency and may add costs such as additional power required to maintain pressure. Proactively applying long-term strategies like system leak detection and repair will conserve water supplies and help maintain water quality by removing points of contamination. This will help a local government to be environmentally and economically sustainable over the long run.

188. Kelowna used several leak detection processes:

- Tracking how much water was pumped and compared this to nationally-established benchmarks
- Water metering of consumer usage
- Watching for incidences of low pressure or high pump hours
- Conducting water audits

CONSERVATION-ORIENTED WATER RATES

189. Water rates can be an effective demand management tool, as price increases tend to be followed by decreased water usage. When a local government sets volume-based rates in order to achieve water conservation, rates are set high enough to reflect the full costs of providing water while also influencing customers' choices about how they use water.

RECOMMENDATION THIRTEEN

The City of Kelowna should improve its water conservation and demand-management efforts by developing a long-term approach that:

- Includes a water conservation framework identifying all relevant strategies and objectives and taking into account water conservation objectives
- Includes cost analysis and an implementation strategy that can be evaluated for effectiveness
- Considers the role of variable water rates, pricing and public awareness of the full cost of water services as tools for achieving conservation and demand management goals
- Includes drought management planning to help ensure a consistent water supply in the event of a water shortage
- Increases awareness of water conservation-related requirements, including bylaws, to maximize bylaw compliance

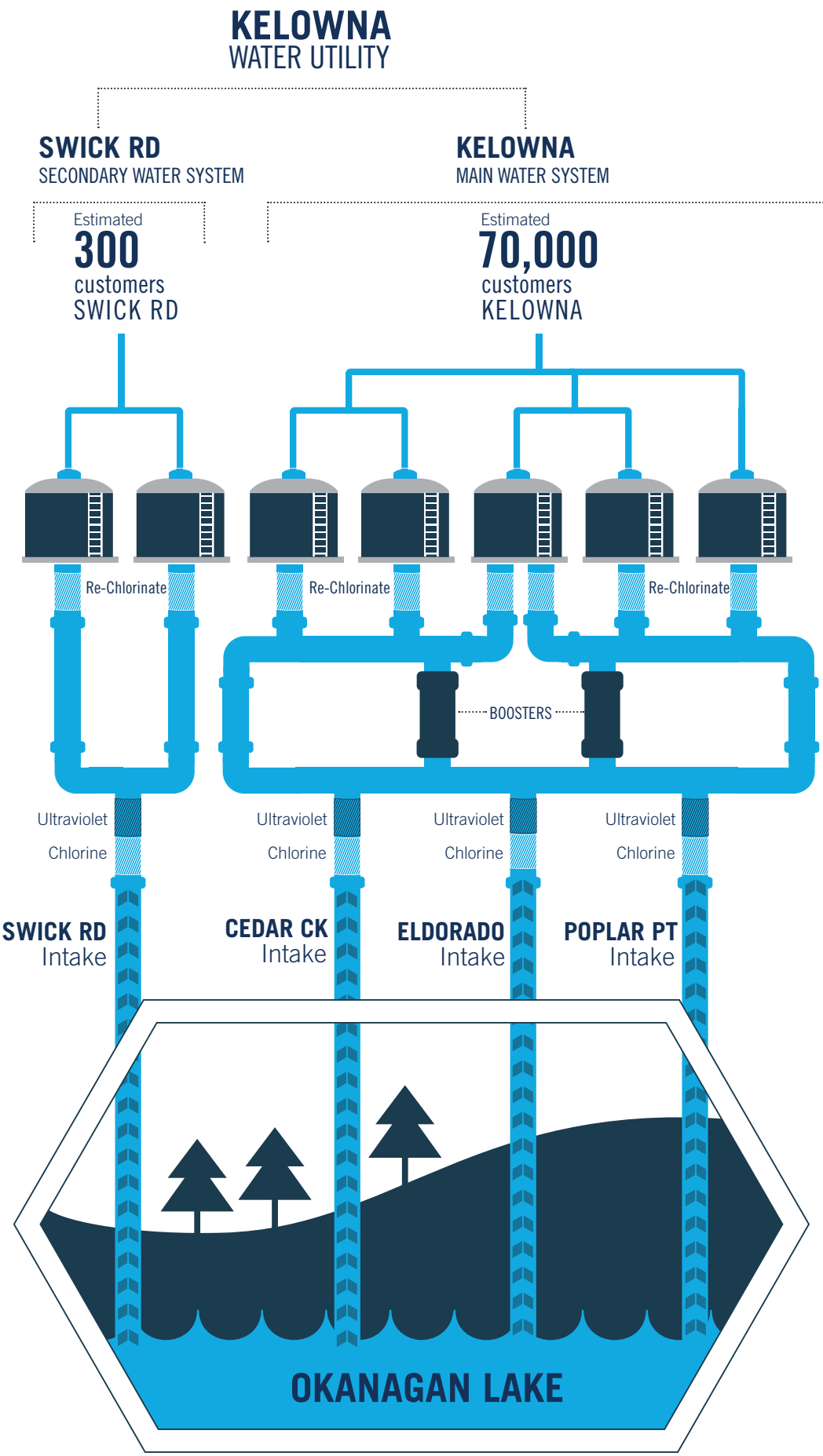
190. During the period covered by the audit, the City charged each customer a fixed amount plus charges based on the amount of water they used. This tiered structure was set up to take a progressive, conservation-oriented approach to water pricing. The City determined each tier's water rate by looking at predicted growth models to anticipate future operational costs and aiming to recover costs for water operations, including maintenance, capital projects and conservation activities. City staff told us that they also tried to ensure equity in rate categories where possible.

191. City staff informed us that they reviewed water rates annually and set water rates for a two-year period. In January 2017, Kelowna compared its water rates with ten other B.C. Municipalities and found that their water rates were the second lowest.

192. During the period covered by the audit, the City altered its pricing twice—in May 2015 and again in 2016. However, these adjustments were not designed to reduce water demand. The rate increases from 2014 to 2016 ranged from one per cent for some block rates to two per cent for the flat rate.

193. Although there were volume-based rates in place and two water rate increases between 2014 and 2016, overall water consumption by single family dwellings remained steady at an average of 378 litres per capita per day during the audit period. The previous 3-year average for single family dwellings was 386 litres per capita per day between 2011 and 2013. There were no significant system-wide drops in consumption in 2014 or 2015. Water use in single family dwellings from April to September 2016 was 3.5% lower than the previous 3-year average.

194. In 2017, City staff told us they were reviewing water rates primarily for agricultural users during the transition period and in preparation of South East Kelowna Irrigation District transferring to the City's water utility. Rate concerns were primarily about ensuring equity in pricing for agricultural users as opposed to water conservation. As this report was being completed, City staff were still finalizing planning for 2018 agricultural rates.


KELOWNA
WATER UTILITY
SWICK RD
SECONDARY WATER SYSTEM
KELOWNA
MAIN WATER SYSTEM
Estimated
300
customers
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Estimated
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BOOSTERS
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DRINKING WATER TREATMENT AND QUALITY MANAGEMENT

195. Managing water quality is complex. In its natural state, water may contain hundreds of organic and inorganic components. Some can be easily seen or tasted, while many others are colourless, tasteless, odourless and impossible to detect without specialized equipment.

196. Human activity can easily—often inadvertently—contaminate water sources. Most contaminants are harmless in small quantities but a few are dangerous, including enteric viruses such as influenza, protozoa such as cryptosporidium and coliforms such as E. coli. There are also many possible commercial, industrial and agricultural contaminants. Pathogens can contaminate water sources as a result of rainfall, floods, surface water movement, backflow, water main breakage or other causes.

197. Piped water for human consumption—generally referred to as drinking water—is usually not delivered separately from water intended for other purposes. As a result, 100 per cent of water in the system must be sourced, treated and managed as drinkable regardless of how it will be used.

PERMIT TO OPERATE

198. We would expect the City of Kelowna's water utility to have a permit to operate granted by Interior Health Authority. The City had a single permit as well as conditions on the permit to operate its water systems. The City met those conditions with two areas, discussed elsewhere in this report, noted as requiring improvement:

- A source water assessment response plan was required
- Emergency response plans had not been updated annually

ALIGNMENT WITH DRINKING WATER GUIDELINES AND PROVINCIAL REGULATIONS

199. The federal Guidelines for Canadian Drinking Water Quality are interpreted by the Province. To meet the provincial Drinking Water Protection Act and its regulations, water providers must manage water quality within strict limitations and conditions. We found that the City of Kelowna followed these provincial regulations.

DRINKING WATER TREATMENT OBJECTIVES AND MULTI-BARRIER APPROACH

200. We would expect the City of Kelowna's water utility infrastructure to be sufficient to meet the Drinking Water Treatment Objectives or to have implementation plans to achieve these. The City followed the B.C. Drinking Water Treatment Objectives (Microbiological) for Surface Water Supplies for unfiltered water.

201. Surface water, including lake water, is prone to pathogens and seasonal contamination. As a result, the Province has adopted the Multi-Barrier Approach, which is an optimal standard requiring, among other things, at least two types of treatment for pathogens. These are chlorine disinfection or ultraviolet deactivation, and filtration.

202. The City used dual processes on all of its water prior to it entering the mains. First, raw water went through ultraviolet (UV) reactors for deactivation. Second, the water was disinfected with chlorine. Re-chlorination was carried out as needed to maintain free and residual chlorine levels.

203. The Drinking Water Treatment Objectives specify that surface water must be filtered unless the water provider is granted a filtration exclusion and meets certain criteria.

204. In 2011, Interior Health Authority granted the City of Kelowna a deferral from having to provide filtration. It provided seven filtration exclusion criteria, which the City has operated under since then: dual disinfection, provision of turbidity trends and bacterial results, protozoa sampling, watershed control program, physical parameters and chemical parameters.

205. In 2016, Interior Health Authority identified two of these criteria for improvement. The City was asked to:

- Update aspects of its watershed control program, particularly its source water assessment response plan
- Report peak values as well as running averages for raw water physical parameters, specifically turbidity (cloudy water), and explain what risk reduction steps it was taking to deal with outlier values)

4-3-2-1-0 DRINKING WATER TREATMENT OBJECTIVE

IS A B.C. GOVERNMENT PERFORMANCE TARGET FOR WATER SUPPLIERS TO ENSURE DELIVERY OF MICROBIOLOGICALLY SAFE WATER. IT IS ENDORSED BY INTERIOR HEALTH AND SPECIFIES:

4 LOG (.9999) REMOVAL OF VIRUSES

3 LOG (.999) REMOVAL OR INACTIVATION OF PROTOZOA

2 TREATMENT PROCESSES FOR ALL SURFACE WATER

1 (MAXIMUM) LEVEL OF NTU (TURBIDITY)

0 TOTAL AND FECAL COLIFORMS AND E. COLI

Source: BC Government: Drinking Water Officer's Guide Part B

206. Kelowna satisfied these requirements after the period covered by the audit.

207. The Multi-Barrier Approach to treatment aligns with the Drinking Water Treatment Objectives (see figure 4-3-2-1-0). These objectives include a maximum permitted level of turbidity (water cloudiness). During the period covered by the audit, the City monitored and maintained water supplies to adjust for the turbidity levels found at the intake.

CERTIFIED OPERATORS

208. Each water system in B.C. is required to have operators certified by the Environmental Operators Certification Program for the particular type of system. We would expect the City of Kelowna to have sufficient trained operators of the appropriate skill levels to meet the certification requirements, regulations and conditions on each system's permit. We also would expect the City to ensure that appropriate operator training is scheduled and tracked.

209. The City had a commitment to the ongoing training and upgrading of its operators to meet all certification requirements. The training levels of the City's chief operators met the program's water system, water distribution and water treatment requirements for a water system of the type operated by Kelowna. The training levels exceeded what was required for the Swick Road Small Water System.

210. Having these qualified operators on-site or available to contact by telephone is a requirement and the City's permit conditions stated that the chief operator must be available at all times. If the chief operator is not on-site when a significant event occurs, for example, an instance of moderate or high turbidity, then the operator on duty must phone the chief operator as required in the Elevated Turbidity Response Procedure.

211. A review of the City of Kelowna's water utility staff schedule during the period covered by the audit indicated that any time the chief operator was on leave, that person was replaced by someone with the same or next lower certification level, as is permitted.

212. In an emergency, while repairs are being made, downstream water quality must be accurately tested in a timely fashion. This was routinely carried out by the water quality technician, who was on call at all times as specified in the Elevated Turbidity Response Procedure. The staff calendar indicated that anytime the water quality technician was on leave, that person was replaced by the water drainage technician, or in rare situations, by one of two cross-trained operators.

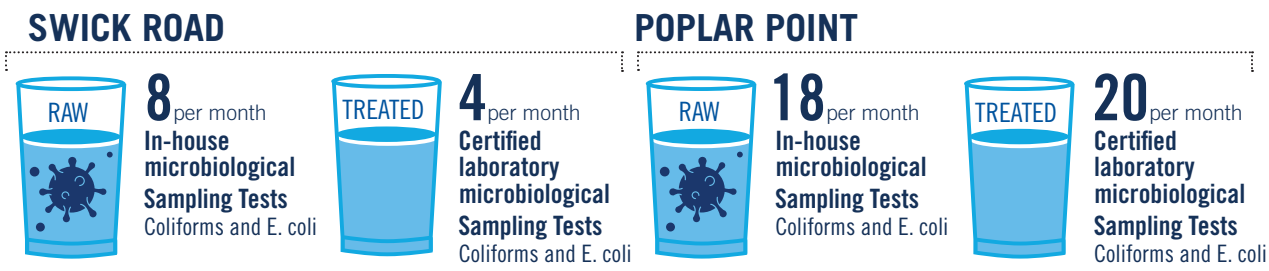
WATER QUALITY MONITORING PROGRAM

213. We would expect the City of Kelowna to follow a water quality monitoring program as specified in the conditions on its permit.

214. The City of Kelowna's water quality monitoring program was approved annually by Interior Health Authority, detailing how each water system was monitored. The City took samples consistent with the Drinking Water Protection Regulations plus additional sampling voluntarily or on request from the City's Supervisor of Water Quality and Customer Care. Sampling tests on raw and treated water were conducted either at the City's laboratory or at a provincially accredited laboratory.

215. The City's water testing laboratory recently received accreditation by the Enhanced Water Quality Assurance Program which allows the City to internally meet its certified laboratory sampling requirements. This was projected to save the City both time and expenses.

Exhibit 5—WATER QUALITY MONITORING PROGRAM 2014-2016



216. The purpose of sampling is to assure Interior Health Authority that Kelowna's raw and treated water meets the Drinking Water Objectives and filtration deferral criteria. Based on the population the Kelowna system served, Interior Health Authority required the City to take a minimum number of water samples per month. During the period covered by the audit, the number of samples taken by the City exceeded the minimum and met Interior Health's regulations. The number varied by season, as winter weather and construction work sometimes reduced the number of sampling sites and accessibility. The water quality monitoring program included the frequency, type of water (raw or treated) and type of tests for the Poplar Point main and Swick Road water systems. Tests covered a wide range of chemical, physical and microbiological parameters. *Exhibit 5* shows the specified tests per month for total coliforms and E. coli.

217. Although the number of samples taken by the City was adequate, the frequency of tests was, in many cases, less than the water quality monitoring program's monthly specification. For example, the specification called for 20 monthly tests at a certified laboratory for E. coli of treated water in the main system (see *Exhibit 5*). In a minority of months (36 per cent) testing did not align with the program; however, the test results were also routinely negative (no contaminant found). At the discretion of the Interior Health Authority's Drinking Water Officer, permits to operate were granted.

218. *Exhibit 6* shows the total frequency of treated water tests for E. coli compared to the monitoring program for in-house and certified laboratory tests. The frequency of tests for total coliforms matched that for E. coli.

219. In Kelowna's main water system, staff collected raw water samples as required to meet the filtration deferral criteria. Staff tested these in-house as is allowed for non-provincially regulated tests. As *Exhibit 7* indicates, the frequency of raw water tests of E. coli varied from month to month and, in a minority of months (39 per cent), did not align with the monitoring program's 18 tests per month. Based on the negative test results, and at the discretion of the Drinking Water Officer, filtration deferrals were granted.

Exhibit 6—TREATED WATER CERTIFIED LABORATORY TESTING FREQUENCY

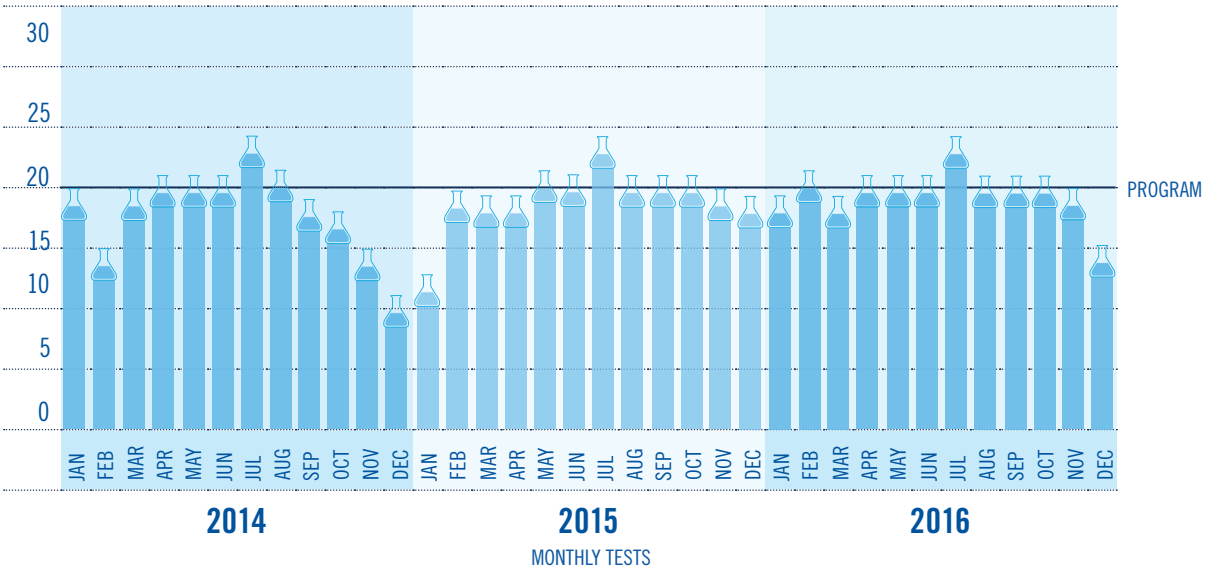
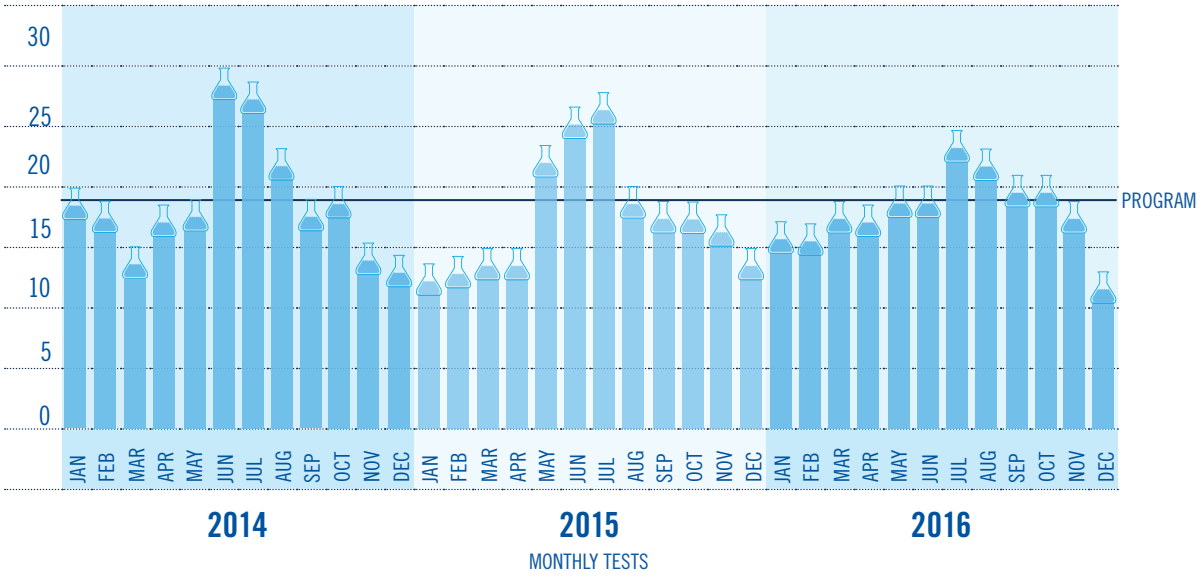


Exhibit 7—RAW WATER IN-HOUSE LABORATORY TESTING FREQUENCY



RECOMMENDATION FOURTEEN

The City of Kelowna should ensure alignment between its water quality sampling program specifications and its water quality sampling frequency.

EFFECTIVENESS OF TREATMENT

220. Water treatment must be proven to be effective at inactivating microorganisms. This is, typically assessed by testing for the absence of E. coli and total coliforms in treated water. Analysis of sample test results from the period covered by the audit shows that Kelowna's treatment was effective. In the Kelowna main water system there were no recorded instances of positive counts for total coliforms or E. coli in treated water.

221. *Exhibit 8* shows that in the Swick Road water system there were no instances of E. coli in tests of treated water during the audit period, but there was one instance of total coliforms in September 2016 and two in October 2016 in the distribution system. However, these counts were within the acceptable provincial limits and did not reoccur.

CALCULATIONS FROM WATERTRAX REPORTS

222. The City used the WaterTrax system for testing, which generated alerts and automatically emailed them to key personnel when a test exceeded a threshold. Five alerts generated during the audit period were from raw water samples sent to the ALS laboratory, collected in September, 2016, from different raw water intakes, including Poplar Point, Cedar Creek, Eldorado and Swick Road. Subsequent microbiological tests of treated water showed no positive results, indicating that treatment was effective.

ASSET MANAGEMENT

223. We would expect the City of Kelowna to have developed a long-term asset management plan for its water utility facilities.

224. During the period covered by the audit, the City engaged in good asset management practices for its water utility. When the City updated its 2014 asset management plan in 2016, it considered current and future water demand and service delivery, utilization of assets and demand management and life cycle management of assets.

Exhibit 8—TESTING – BACTERIAL COUNTS

IN-HOUSE LABORATORY TESTING

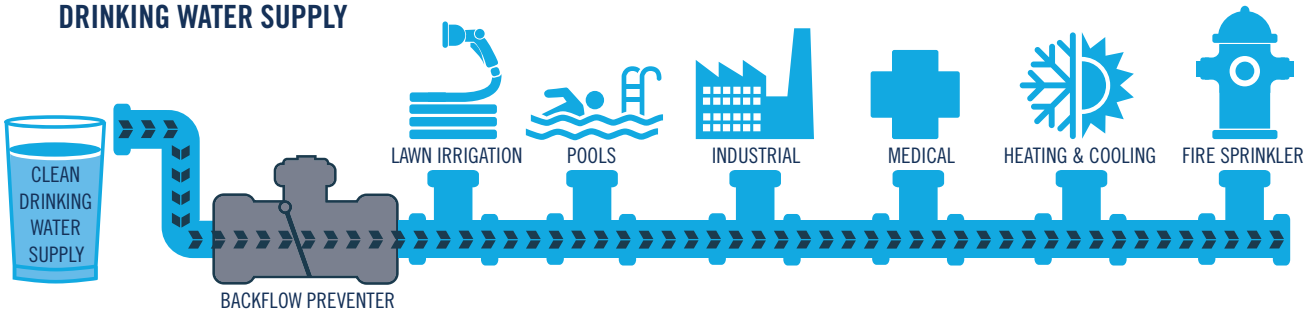
	MAIN SYSTEM	SWICK ROAD
2016	0	1 TC
2015	0	0
2014	0	0

TC=Total Coliforms

ACCREDITED LABORATORY TESTING

	MAIN SYSTEM	SWICK ROAD
2016	0	2 TC
2015	0	0
2014	0	0

TC=Total Coliforms



225. The City, as is typical, based estimates regarding the timing of asset replacement on the theoretical service life of each asset, recognizing actual life may differ. Also, replacement costs were based on estimates, whereas actual replacement costs may vary.

226. The City has developed models for estimating the condition and remaining service life of its capital assets, which is particularly useful for buried assets that cannot be easily inspected on any regular basis.

227. Kelowna plans to undertake more community consultation on service levels and the costs of providing particular levels of service. The City is also working toward the procurement of an integrated asset management maintenance system to combine aspects currently spread across multiple systems.

CROSS-CONNECTION CONTROL PROGRAM

228. One of the conditions of the City's permit was to have a cross-connection control program. Kelowna has had such a program to test and monitor backflow prevention devices since 1998. Without such devices a reduction of pressure in a water main or a higher pressure in a user's pipes could push contaminants through the cross-connection, resulting in distribution system contamination (see figure). The City's Water Regulation Bylaw specified the requirements of the cross-connection program, which covered industrial, commercial, institutional and agricultural customers across the entire city, regardless of whether their water was provided by the City or one of the four improvement districts.

229. During 2016, this program monitored the testing of 4,800 backflow prevention assemblies in 2,080 facilities. This program is an example of good practice because it was coordinated by the Kelowna Joint Water Committee, and provided standardized cross-connection control coverage for the entire city.

DRINKING WATER STORAGE AND DISTRIBUTION

230. The City of Kelowna water utility's treated drinking water was routinely pumped up to and stored in concrete reservoirs from which it was gravity-fed into the network to be delivered to consumers. Although Kelowna had significant water stored in its 22 reservoirs, we would expect the City to have backup generators in case of extended power outage, especially during high-use summer periods.

231. During the period covered by the audit, Kelowna had backup power at its three main pumping facilities, which we were told, was capable of providing at least 60 per cent pumping capacity. This was aimed at maintaining the ability to refill key reservoirs in the event of an extended power outage.

232. The City's drinking water system is under constant demand and water treatment cannot be interrupted for repairs or regular servicing. As a result, Kelowna used redundancy rather than backup for its key treatment and distribution systems. For instance, at one treatment plant, the City had two fully-functional UV reactors, although it needed only one to be operating at a time. In addition, most reservoirs had two cells, allowing water to continue to flow from one while the other was being drained and cleaned.

WATER STORAGE AND DISTRIBUTION INFRASTRUCTURE MAINTENANCE

233. Operation and maintenance procedures for water systems can include inspections, maintenance, monitoring, testing, calibrating, repairing and more. Operational guides, checklists and appropriate record-keeping help ensure that water operations management is consistent, information is available to staff and the risk of human error is minimized.

234. In Kelowna, routine inspections and maintenance were tracked manually on check sheets on a clipboard at each facility, which were compiled annually. These check sheets were constantly used and kept up-to-date, providing hard copies on-site and a backup to information technology systems, in case SCADA should lose records. These check sheets were also used to identify sudden changes in operations and in helping familiarize and educate new and retrained operators on the equipment.

235. We would expect the City of Kelowna water utility to have a program for routine water treatment infrastructure maintenance, inspection and monitoring that is up-to-date and consistently followed.

236. The City had a maintenance management system, which included items such as hydrant servicing, main flushing and reservoir cleaning. Kelowna defined maintenance and repair activities for its water facilities in its maintenance plan, which included planned and actual performance and hours. The City followed a partially complete schedule of preventative maintenance and task completion which did not cover all assets.

237. In order to track its large water systems and mobile workforce, the City used an electronic record keeping system for monitoring operations. This system used activity codes and staff hours to assess whether periodic maintenance, repairs and upgrades had been completed. The system provided details on activities carried out, which could be useful for performance reporting.

RECOMMENDATION FIFTEEN

The City of Kelowna should consider expanding its scheduled preventative maintenance program to include all drinking water infrastructure assets.

MINIMIZING COSTS

238. Generally, a local government's costs of delivering drinking water should be minimized where it does not compromise the Drinking Water Treatment Objective. The City minimized its water infrastructure cost and was able to use unfiltered lake water by obtaining a deferral from Interior Health Authority filtration requirements.

239. City staff estimated that this allowed the City to defer approximately $135 million in expenditures for the installation of filtration, plus annual operating costs for the system. The City is aware of and has assessed the health risks of continuing to defer filtration and expect that filtration or other advanced treatment will ultimately be required.

240. Where feasible, it can be economical for a local government to select water sources located at relatively high elevations in order to avoid or minimize the costs of pumping by allowing gravity to provide some of the water transportation. The City recognized the cost of pumping from Okanagan Lake and considered the higher-elevation Mission Creek as an alternative source. However, Kelowna lacked a connection, water rights or licences to use Mission Creek as a water source, so there was no immediate prospect of using this potential source to reduce pumping costs from the lake.

COMMUNICATION AND PUBLIC AWARENESS

241. We would expect the City of Kelowna to promote public awareness on various aspects of drinking water service and be appropriately transparent by engaging the public and providing information about drinking water systems on infrastructure, costs, quality, water conservation and demand management, improvements and others.

242. We found that the City of Kelowna communicated to its water utility's customers essential information about water quality issues and the various water providers within city boundaries.

243. The City's communication with the public about water services was primarily one-way. It tended to be issue specific, dealing with topics such as planned water main flushing, planned water shutoffs, water conservation, and announcements of turbidity and water parcel taxes.

244. For some water-related matters, the City's Communications Department issued public service announcements, posted to Facebook, and issued Twitter tweets. Kelowna also provided public information in more traditional ways, such as holding open houses, mailing out inserts, going door to door, posting signs and sending out newsletters.

245. During the period covered by the audit, Kelowna placed a range of water utility information on its website. The public could access up-to-date information on water quality, rates, restrictions, asset management and infrastructure plans, and other information about drinking water in the City. The website also included a map to identify which of the local water providers was relevant to a citizen's address.

246. Additionally, Kelowna provided an online method for residents to join a mailing list to learn more about their water systems and placed the onus of water knowledge on customers, expecting them to be informed on water quality issues.

247. Overall, the City had well-developed water quality public notification procedures. The City did not issue any water quality advisories for its main or Swick Road systems during the period covered by the audit and there were no water emergencies requiring immediate notification of the entire community. We did find circumstances where the City was responsive and provided information to the public quickly when water service or quality issues arose, both on its website and via the media.

248. For example, in December 2016 the water utility experienced an electrical problem at the Skyline Pump Station and placed notices on its website as well as with news media and other channels. The City also responded to a significant flooding and turbidity event in May 2017 by issuing a series of water quality advisories within 24 hours and informed the public about changes in water quality and potential health risks.

ABOUT THE AUDIT

OBJECTIVE

249. The overall objective of this performance audit was to provide an objective, independent examination of the local government's drinking water services to determine if the local government provides clean and safe drinking water where and when needed.

PERIOD COVERED BY THE AUDIT

250. The audit covered the period of January 1, 2014 through December 31, 2016. Where relevant materials were developed—or events occurred —prior to this date, we also took them into consideration. When relevant to the audit, any significant events subsequent to the audit period were also considered. We completed our examination work in December 2017.

AUDIT SCOPE AND APPROACH

251. The audit included a review of the City of Kelowna's governance of its drinking water operations. The audit also included a review of the City's management of its drinking water-related infrastructure and operations and its supply and demand management activities. In addition, the audit examined Kelowna's preparedness for future drinking water requirements.

252. The audit did not include the assessment of drinking water services in the City that were provided by irrigation or improvement districts or private water purveyors. The audit also did not include other uses of water services that include fire flows.

AUDIT CRITERIA

253. Performance audit criteria define the expectations against which we assessed the local government's performance. We identify our criteria before we begin assessing a local government. We intend them to be reasonable expectations for the local government's management of the area being audited in order to achieve expected results and outcomes.

254. We used the following criteria to assess the local government:

AUDIT CRITERIA		LINES OF ENQUIRY AND AUDIT CRITERIA
AUDIT OBJECTIVE 1	The local government's governance structure and activities supported the provision of clean and safe drinking water where and when needed.	**1**. Governance and organizational structure 1.1. The local government's governance structure supported its water system(s), service area and customers 1.2. The local government's leadership and organizational culture supported the achievement of drinking water priorities and objectives 1.3. The local government's organizational structure supported communication between water system operators and management for informed decision-making and continuous improvement **2**. Strategic planning and decision-making 2.1. The local government developed a long-term strategy related to its drinking water services 2.2. The local government considered affordability and cost effectiveness in its decisions related to drinking water **3**. Information and decision support 3.1. The local government's information management processes supported staff in meeting drinking water service objectives and accountabilities **4**. Public Reporting 4.1. The local government has been appropriately transparent by engaging the public and providing information about drinking water systems related to infrastructure, costs, quality, conservation and improvements 4.2. The local government developed and reported on key performance indicators related to its drinking water services

AUDIT CRITERIA		LINES OF ENQUIRY AND AUDIT CRITERIA
AUDIT OBJECTIVE 2	The local government managed its drinking water supplies to meet current and expected future demand.	**1**. Assessment of drinking water sources 1.1. The local government assessed available drinking water sources for supply over time 1.2. The local government assessed available drinking water sources for redundancy **2**. Source water protection 2.1. The local government contributed to the development of source water protection management plans 2.2. The local government incorporated source water protection considerations, where relevant, into land use, development and other bylaws 2.3. The local government collaborated with others to protect or enhance source water quality **3**. Water supply infrastructure 3.1. The local government developed a long-term asset management plan for its water supply infrastructure 3.2. The local government maintained its water supply infrastructure (natural and engineered) or developed new infrastructure as required **4**. Demand management strategies 4.1. The local government developed a demand management or water conservation plan or strategies 4.2. The local government developed bylaws to support demand management 4.3. The local government adjusted its pricing strategy when needed to manage demand 4.4. The local government developed a drought management plan **5**. Water usage 5.1. The local government implemented actions identified in its demand management or water conservation plan 5.2. The local government enforced its water related bylaws 5.3. The local government implemented actions identified in its drought management plan 5.4. The local government managed and operated water conservation infrastructure 5.5. The local government contributed to positive results in water conservation **6**. Public awareness 6.1. The local government promoted public awareness of source water protection 6.2. The local government promoted public awareness of water conservation and demand management

AUDIT CRITERIA		LINES OF ENQUIRY AND AUDIT CRITERIA
AUDIT OBJECTIVE 3	The local government ensured the safety and reliability of drinking water provided through its treatment and distribution systems	**1**. Water infrastructure 1.1. The local government's water infrastructure was sufficient to meet drinking water regulations and a multi-barrier approach 1.2. The local government minimized the costs of water infrastructure while meeting regulations and water quality guidelines 1.3. The local government staff kept aware of innovation and research related to water infrastructure 1.4. The local government developed a long-term asset management plan for its water facilities **2**. Water operations 2.1. The local government had sufficient human resources capacity with the right skill level to meet regulations and carry out its multi-barrier approach 2.2. Local government staff completed operational duties as their positions required 2.3. The local government ensured business continuity related to drinking water 2.4. The local government developed and effectively utilized mitigation plans to manage, eliminate, or reduce water operation risks to an acceptable level 2.5. The local government is prepared to respond to water related emergencies and responded effectively to emergencies in the past **3**. Public awareness of water quality 3.1. The local government communicated to its water systems' customers essential information about drinking water safety and reliability

GLOSSARY

Aquifer: Geological formation of permeable rock, sand, or gravel that conducts groundwater and yields significant quantities of water to springs and wells.

Backflow: The flow of water in a direction opposite to normal flow. Backflow refers to water that is returned into the system by backflow, Backflow can introduce contaminants into the purified water.

Business continuity planning: A documented strategy that identifies the threats and risks facing an organization. A business continuity plan defines actions to protect the organization enabling it to continue functioning in adverse circumstances.

Catchment: A surface from which draining water is collected.

Chlorination: The process of adding chlorine to drinking water to disinfect it and kill pathogens.

Coliform bacteria: A group of related bacteria whose presence in drinking water may indicate contamination by disease-causing microorganisms.

Contaminant: Anything found in water that might be harmful to human health.

Continual improvement: An ongoing systematic effort to seek incremental improvements through an evaluative feedback process that includes: planning, implementation, recording, evaluation and revision.

Cryptosporidium: A protozoa commonly found in lakes and rivers, which is highly resistant to disinfection. May cause gastrointestinal illness.

Demand management: A set of strategies by a water utility or consumer to conserve water by influencing demand.

Disinfection: A chemical or physical process that kills microorganisms.

Environmental Operators Certification Program (EOCP): A certification and education program for water operators that focuses on training and standards.

Eschericha coli (E. coli): Coliform bacterium that is often associated with human and animal waste and is found in the intestinal tract.

Emergency response plan: A planned set of procedures designed to mitigate the damage of possible emergency events.

Groundwater: The water found in underground aquifers which supplies wells and springs.

Hazard: A source of danger or harm to the drinking water consumer.

Influenza: Commonly known as “the flu”, is an infectious disease caused by an influenza virus

Irrigation: The artificial supply and application of water to the soil to maintain moisture in crop fields.

Low flow fixtures: Faucets, shower heads, and toilets that use less water per minute than older, traditional models.

Microorganisms: Living organisms that can be seen only with the aid of a microscope.

Multi-barrier approach: An integrated system of procedures that reduce contamination of drinking water from source to tap. Includes source water protection, treatment, supply network, monitoring and preparation for emergencies.

Pathogen: A disease-causing organism.

Private water system: Individual domestic drinking water system used for personal or family needs only.

Programmable Logic Controller (PLC): A rugged industrial computer that has been customized to control processes.

Protozoa: Single-celled organisms. More complex physiology than viruses and bacteria. Average size of 1/100 mm diameter.

Raw water: Water in its natural state, prior to any treatment for drinking.

Reservoir: A pond, lake, or basin, either natural or artificial, for the storage, regulation, and control of water.

SCADA: is an acronym for Supervisory Control and Data Acquisition. A computer system that monitors and controls a process.

Septic system: A small-scale sewage treatment system common in areas that lack connection to main sewage pipes provided by local governments.

Source water: Water in its natural or raw state, prior to being withdrawn for treatment and distribution as a drinking water supply.

Surface water: Water that is on the Earth's surface, such as in a stream, river, lake, or reservoir

Stakeholder: Person or group of people affected by, or who can influence, a decision or action.

Turbidity: The cloudy appearance of water caused by the presence of tiny organic or inorganic particles.

Ultraviolet treatment: System that uses lamps that emit UV light to kill microorganisms.

Uranium treatment plant media: Uranium treatment uses specialized anion exchange resin as a media to exchange and remove undesirable ions.

Water accounting: measures and determines a water balance within a basin by estimating the effects of water usage, storage, environmental flows, and water withdrawals on natural stream flows, groundwater, and lake levels. It can show how water management decisions positively or negatively affect areas of a basin.

Water conservation: Activities designed to increase efficiency of use, decrease demand, and reduce waste of water.

Water quality notification: May be put on a water system by the operator or the Drinking Water Officer and range from least to most serious:

1. Water quality advisory—Some level of threat but not significant enough to require a boil water or do not use advisory

2. Boil water notice—Potential microbial threat to drinking water. The risk can be adequately addressed by boiling the water as a short-term form of treatment.

3. Do not use water notice—Water is not safe for domestic use.

Water system: Water provided to more than one single-family residence.

Waterborne viruses: Pathogenic microorganisms that can cause illness or disease.

Watershed: The area draining naturally from a system of watercourses and leading to one body of water.

Wellhead: The structure built over a well to maintain water protection. The land area surrounding a drinking water well or well field.

Xeriscaping: a method of landscaping that uses plants that are well adapted to the local area and are drought-resistant. Xeriscaping is becoming more popular as a way of saving water at home.

Remarks to the Auditor

March 14,2018

The City of Kelowna is pleased with the positive audit on the City of Kelowna's water utility that provides water services to approximately half of our citizens.

The Audit found:

- the City has many good practices in place, takes a strategic focus on clean drinking water and looks broadly to the interests of the whole City.
- The City's governance supports clean and safe drinking water, has robust processes for setting rates, and works with other levels of government to improve water infrastructure for all residents.
- The City utility meets Canadian Drinking water standards and demonstrates effective management.

In the spirit of continuous improvement, the City accepts many of the auditor's recommendations. We are pleased to note that many of these recommendations are already underway or planned for the near future including an area-wide water management plan that will address recommendations concerning source protection, business continuity and conservation.

We applaud the Auditor's desire to provide a document that would highlight best practices and be a useful resource to other local governments.

Source Protection

The City believes that water sustainability and protection is important but much broader than the borders of our utility or even the municipality. We are working with the Regional District of Central Okanagan, the Okanagan Basin Water Board, local partners and stakeholders on an area-wide approach to water management and a source water protection plan for Okanagan Lake. The City also acknowledges the importance of engagement with First Nations and expects to consult with them specifically as more detailed phases of the Integrated Water supply plan are developed.

While notably not in scope of the audit, the 2017 Kelowna Integrated Water Supply Plan has addressed many of the concerns noted by the Auditor General regarding supply, drought management, business continuity and costs.

Implemented over time, the 2017 plan would see drinking water drawn from two main sources; Okanagan Lake, and from storage off Mission Creek when water quality is good during the remainder of the year.

Integrating these various sources of water will significantly increase the resiliency of our water system, and our ability to manage drought and enhance business continuity by having the ability to draw from different sources of water as required. Drawing from new and existing upland storage when feasible can reduce the cost of pumping water from the lake at different times of the year.

Note: The paragraph numbers identified by the City of Kelowna on page 55 have changed slightly in the report:

PARAGRAPH NUMBERS REFERENCED ON PG 55	92-96	127	148	154	165	183	198
PARAGRAPH NUMBERS IN FINAL REPORT	**89-93**	**124**	**144**	**150**	**161**	**179**	**194**

What the Audit didn't address
Water service delivery in Kelowna is complicated by multiple purveyors and sources of water that operate outside the City Utility's control. The City is disappointed the other water providers serving Kelowna residents were not part of this audit process. The City of Kelowna has always maintained our strength is our multiple sources of water, but our weakness is the lack of a holistic plan that connects these sources for flexibility, redundancy and sustainability.

The City had requested a review of the entire drinking water delivery system in Kelowna to ensure value for taxpayers' dollars. That was denied because Improvement Districts and independent water purveyors do not fall within the current mandate of the Auditor General for Local Government (AGLG), even though almost half of our citizens receive water services from these independent water purveyors.

Improvement Districts
It is important to note that the City has no jurisdiction over Improvement and Irrigation Districts and looks to the Province for leadership and collaboration to ensure all citizens have safe and sustainable drinking water system. The City has spent considerable time and multiple attempts at collaboration with the districts over many years.

In 2017, the City of Kelowna successfully secured an unprecedented grant to help off-set the costs of receiving clean drinking water for the ratepayers of the South East Kelowna Irrigation District (SEKID) and the delivery of a sustainable source of agricultural water for the failing South Okanagan Mission Irrigation District (SOMID). This grant was made possible because of a collaboration between the City and four improvement districts that resulted in the 2012 Kelowna Integrated Water Supply Plan. The subsequent value planning exercise, a requirement of the provincial government, resulted in the updated 2017 Plan that paved the way for the successful grant application.

The City has enjoyed a strong working relationship with Improvement Districts for many years, particularly at a technical level. However, we remain committed to a solution that will ensure clean drinking water for all citizens. This is consistent with Provincial policy, despite the challenges of overlapping jurisdictions.

Reporting out in public meetings
City Council prides itself on being open and transparent and strictly follows the requirements outlined in Community Charter, Section 90(2) for closed meetings.

During the audit, the City was involved in negotiations with the Province, SEKID and SOMID and Council was required to discuss these matters at a closed meeting. These negotiations spanned several months, however, this is not unusual given the complexity of the area.

We appreciate that the main concern from the AGLG is the City's lack of public reporting out on these items when appropriate, not the topics being discussed. In addition to the efforts noted in the audit, the City feels it met its responsibility to report out on the Value Planning exercise outcomes through information published to kelowna.ca, stakeholder and open council meetings, and the public announcement of the $43.9-million grant to integrate SEKID and SOMID into the City's water utility.

We have asked our City Clerk to review current practices to see where improvements can be made.

Further clarifications:

- Para. 92-96: During the three-year audit period, nine closed meetings were identified where the content did not align with the resolution to close the meeting. This occurred when an item was raised during the meeting or added as a late item. Minutes now adequately identify the appropriate reason under the *Community Charter* for each subject or topic raised during the closed session. The *Community Charter* provides reasons for when a Council may [s. 90(1)] or must [s. 90(2)] close a meeting to the public. In each of these nine examples, the reason for closing the meeting fell under Community Charter s. 90(2)(b) for confidential information regarding negotiations involving the provincial government. Council was required to discuss each of these at a closed meeting.
- Para. 127: Penetration testing was completed by City of Kelowna Information Services in 2017. Further testing is planned for 2018.
- Para. 148: The Source Protection Wetland Committee is part of the Okanagan Basin Water Board and is a subcommittee of the Okanagan Water Stewardship Council in which the City has always participated. There are several committees in this Board where the City participates or accepts recommendations.
- Para. 154: New or upgraded storage developed upstream in the Mission Creek watershed were identified as a potential main source for off-peak supply of potable water to City residents in the future. These storage options could also benefit the creek in drought, landslide issues, help maintain minimum flows and temperature, as well as improving conditions for fish management.
- Para. 165: The City of Kelowna also provides funding to the Okanagan Basin Water Board for Okanagan WaterWise, an education and outreach program regarding water conservation.
- Para. 183: Supply during water shortage is a key concern for the City. We have led a number of initiatives to curb water usage and align water restrictions to provincial standards. However, ultimately, ensuring adequate supply for all citizens must be approached from a city-wide perspective and accomplished through integration with the various water sources available in a sustainable manner. This includes providing resiliency for agricultural industries as well.
- Para 198: Agricultural rate design consultation is underway to set agricultural rates for 2020.

ACTION PLAN

AGLG RECOMMENDATION	STEPS TAKEN	RESOURCES NEEDED	RESPONSIBLE	TARGET DATE
GOVERNANCE STRUCTURE AND ACTIVITIES SUPPORTING DRINKING WATER SERVICES				
1. The City of Kelowna should consider implementing a periodic governance review process to ensure that its governance structure continues to meet its needs.	The City will do periodic reviews of the overall governance structure upon integration of additional water purveyors or as required to meet our needs.	TBD	Senior Management	As required
2. The City of Kelowna should consider aligning its long-term objectives for drinking water and other departmental plans with an updated organization-wide strategic plan.	The City will look to align our long-term objectives for drinking water, agricultural water and area-based water management with organizational strategic plans including the OCP.	No new resources needed.	Senior Management	2020
3. The City of Kelowna should review its drinking water polices to:				
◗ Align its policy on amalgamation with its strategic and operational direction to reflect its current position on water provision in Kelowna	Policy drafted for accommodating integration of independent water systems with City Water Utility. Policy will define the requirements for integration including pre-assessment of subject water systems.	No new resources needed.	Senior Management	2018
◗ Develop a water system governance transfer policy that:	Council report drafted on adoption of new strategic direction aligned with outcome of 2017 Value Planning work.			
◗ builds on experience gained from the transition agreement with the South East Kelowna Irrigation District	Staff expects to bring this policy forward for Council consideration in 2018.			
◗ documents actions and timelines for processes that take place during and following an acquisition, which may include updating legacy bylaws, reviewing existing governance and advisory structures and other significant factors	Transition Agreement developed with SEKID.			
4. The City of Kelowna should improve its processes for engaging and communicating with other levels of government and stakeholders. This could include:	The City engages and communicates with stakeholders through Council's Engage Policy (Policy 382). The City acknowledges the importance of consulting with First Nations.	No new resources needed.	Project Managers	N/A
◗ Developing a policy and process for engaging with other local governments, including First Nations and improvement districts	The City is committed to working with the Improvement Districts to develop an alternate structure to the Kelowna Joint Water Committee.			

AGLG RECOMMENDATION	STEPS TAKEN	RESOURCES NEEDED	RESPONSIBLE	TARGET DATE
GOVERNANCE STRUCTURE AND ACTIVITIES SUPPORTING DRINKING WATER SERVICES *continued*				
➤ Formalizing its process for engaging with other water providers by developing terms of reference for the Kelowna Joint Water Committee or working together to develop an alternate structure ➤ Increasing engagement with local and regional drinking water stakeholder groups	The City is increasing engagement with regional water stakeholder groups and is committed to taking on a leadership role in ensuring clean, reliable, safe drinking water for all City of Kelowna citizens. We will continue to work with the Province to engage the Improvement Districts.			
5. The City of Kelowna should review and consider implementing best practices on closed and open Council meetings, including its documentation of reasons for Council meeting closure.	City staff have considered options for ensuring the resolutions adopted in open meetings adequately capture each subject or topic raised during the closed session. As an outcome of this, additional section(s) will be added to resolutions in open meeting minutes to reflect any new items raised during the closed session.	N/A	City Clerk	Completed
6. The City of Kelowna should review and update its code of ethics policy.	The City of Kelowna has a project approved for 2018 to update the City's code of ethics and conduct.	Human Resources and Risk Management staff time. Within operating budget.	Human Resources Divisional Director	Dec. 15, 2018
7. The City of Kelowna should consider developing a formal strategy for risk identification, mitigation and reporting that includes regular re-assessment and reporting of organizational risks—including those associated with drinking water—to senior management and Council.	The City of Kelowna will move forward with implementing the draft risk assessment guideline reviewed by the AGLG during the audit as part of an initiative to implement an enterprise risk management program. In 2018, software solutions to facilitate the system on a corporate wide basis will be investigated and the City will consider the development of an implementation plan for 2019.	Moderate staff time Appropriate budget—TBD .5 FTE addition to manage the system and program.	Risk Manager	Nov. 1, 2019
8. The City of Kelowna should further develop its reporting to Council and enhance its reporting to the public on water-related key performance measures and trends.	Performance metrics related to clean drinking water are currently being enhanced and will be reported to Council and/or public in order to communicate status and establish trends beginning in 2018.	No new resources needed. Already within budget.	Senior Management	2018
9. The City of Kelowna should consider formalizing some of its existing good practices for its Supervisory Control and Data Acquisition (SCADA) system by:		Appropriate budget for consultants in 2019.	Information Services Manager	2019

AGLG RECOMMENDATION	STEPS TAKEN	RESOURCES NEEDED	RESPONSIBLE	TARGET DATE
GOVERNANCE STRUCTURE AND ACTIVITIES SUPPORTING DRINKING WATER SERVICES *continued*				
❱ Improving the existing security framework, and considering penetration testing	The City conducted a security audit in 2017 which included penetration testing of the water utility. More detailed audits are scheduled for 2018.			
❱ Developing relevant Information Technology (IT) and Operational Technology (OT) policies	Staff will consider further security testing of the water utility computer systems in 2019.			
10. The City of Kelowna should enhance its emergency and business continuity planning by:	The water utility emergency response plan was updated in 2017. It will be reviewed and updated annually and made familiar to all staff.	$75,000 to develop Utility Specific Business continuity plan	Utility Services Manager / Risk Manager	Sept. 1, 2018 (for city wide business case and proposal completion)
❱ Ensuring that its water utility emergency response plan is regularly updated, tested, made accessible and familiar to all staff	Testing will be done as resources allow.			
❱ Completing business continuity planning for its critical services—including drinking water—to ensure the continuation of service and sustainable infrastructure throughout all potential disruptions	As part of the 2019 budget development, staff are preparing a proposal to enhance City wide emergency preparedness. However, we don't have ability to implement recommendations for other utilities. The City will work towards integration of the other water utilities to improve emergency preparedness and business continuity.			2019 for Utilit Specific Business Continuity Plan
SOURCE WATER PROTECTION				
11. The City of Kelowna should improve its approach to source water protection by:		No new resources needed	Utility Planning Manager	2018
❱ Reviewing and implementing actions outlined in the April 2017 Drinking Water Source Protection Assessment Response Plan	The City have and will continue to work with the Okanagan Basin Water Board (OBWB) to educate and mitigate water quality risks with Okanagan Lake.			
❱ Considering the development of a source water protection plan	The actions outlined in the April 2017 Drinking Water Source Protection Assessment Response Plan, are being implemented.			
❱ Coordinating its source water protection objectives and initiatives with stakeholders	Development of a Source Water Protection Plan is funded and will be complete in 2018. This is also a component of our proposed area-based water management plan.			

AGLG RECOMMENDATION	STEPS TAKEN	RESOURCES NEEDED	RESPONSIBLE	TARGET DATE
SOURCE WATER PROTECTION *continued*				
12. The City of Kelowna should consider promoting public awareness of the importance of source water protection and everyone's role in protecting water quality.	As protecting Lake Okanagan goes far beyond the City's boundaries and legislative authority. The City is working with the Water Stewardship Council to improve public awareness. In addition, the City will work to improve public awareness through various channels including Kelowna.ca, social media and public events in conjunction with the Source Water Protection Plan. We will consider a policy where we have some ability to minimize source water quality impacts. This includes input to the OCP and Regional Growth Strategy	No new resources needed	Utility Planning Manager, Communications	N/A
13. The City of Kelowna should improve its water conservation and demand-management efforts by developing a long-term approach that: • Includes a water conservation framework identifying all relevant strategies and objectives and taking into account water conservation objectives • Includes cost analysis and an implementation strategy that can be evaluated for effectiveness • Considers the role of variable water rates, pricing and public awareness of the full cost of water services as tools for achieving conservation and demand management goals • Includes drought management planning to help ensure a consistent water supply in the event of a water shortage • Increases awareness of water conservation-related requirements, including bylaws, to maximize bylaw compliance	Kelowna will be working with OBWB and local Improvement District staff to develop a long term water conservation strategy that will take into account cost and effectiveness monitoring. Awareness of conservation related bylaws is done each spring through media campaigns, promotional materials, public events, community monitoring and letters to individual property owners.	The drought management plan and water conservation strategy will require budget. $75,000/each Other awareness programs are within current budgets.	Utility Planning Manager, Communications	2019

AGLG RECOMMENDATION	STEPS TAKEN	RESOURCES NEEDED	RESPONSIBLE	TARGET DATE
DRINKING WATER TREATMENT AND QUALITY MANAGEMENT				
14. The City of Kelowna should ensure alignment between its water quality sampling program specifications and its water quality sampling frequency.	The 2018 water monitoring program has been modified to reflect that we are sampling at a frequency that meets or exceeds B.C. drinking water regulations requirements.	No new resources required	Utility Services Manager	Complete
15. The City of Kelowna should consider expanding its scheduled preventative maintenance program to include all drinking water infrastructure assets.	Staff will consider expanding our scheduled preventative maintenance program with the 2018 implementation of asset and work management software.	No new resources required	Utility Services Manager	2018

AGLG CONTACT INFORMATION

STAY CONNECTED WITH THE AGLG

The AGLG welcomes your feedback and comments. Contact us via email *info@aglg.ca,* our website at *www.aglg.ca* or follow us on Twitter *@BC_AGLG.*

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