



Making a difference...together

WATER ADVISORY COMMITTEE

Notice of Meeting on **Wednesday, April 6, 2016 @ 9 am**
Goldstream Conference Room, 2nd Floor, 479 Island Highway, Victoria, BC

P. Elworthy (Chair)
B. June
R. Neuman
J. Rogers
M. Williams

B. Moody (Vice-Chair)
R. Machin
C. Nowakowski
F. Schultz
T. Wood

A. Gibson
R. Mersereau
G. Orr
M. Thompson

AGENDA

1. Approval of Agenda
2. Adoption of Minutes of February 3, 2016
3. Chair's Remarks
4. Presentations/Delegations
 - No one has registered to speak
5. Climate Change Adaptation Strategy for the Greater Victoria Water Supply Area (Report #WAC 2016-02)
6. Water Advisory Committee Orientation Material (to be distributed at the meeting)
7. Reports From Working Groups
8. Questions from Committee Members
9. Water Watch
10. New Business
11. Adjournment

To ensure a quorum is present, please call Margaret at 250.474.9606 if you or your alternate cannot attend.



Making a difference...together

MINUTES OF A MEETING OF THE WATER ADVISORY COMMITTEE
Held Wednesday, February 3, 2016 at 10 am in the Goldstream Conference Room,
479 Island Highway, Victoria, BC

PRESENT: P. Elworthy, A. Gibson, B. June, R. Machin, M. Demeulenaere, R. Mersereau, B. Moody, R. Neuman, J. Rogers, M. Thompson, M. Williams, T. Wood
Staff: T. Robbins, M. McCrank, M. Montague (Recorder)

T. Robbins called the meeting to order at 10:07 am.

1. INTRODUCTIONS

Introductions were made around the table.

2. ELECTION OF CHAIR AND VICE-CHAIR

T. Robbins extended his thanks to R. Mersereau for her role as Chair of the Water Advisory Committee in 2015 and M. Thompson for his role as Vice-Chair in 2015.

He called for nominations for the position of Chair of the Water Advisory Committee for 2016.

R. Mersereau nominated P. Elworthy

T. Robbins called for nominations a second and third time and hearing none, declared P. Elworthy elected as Chair of the Water Advisory Committee for 2016 by acclamation. P. Elworthy assumed the chair and called for nominations for Vice Chair of the Water Advisory Committee for 2016.

T. Wood nominated B. Moody

The Chair called for nominations a second and third time and hearing none, declared B. Moody elected as Vice-Chair of the Water Advisory Committee for 2016 by acclamation.

3. APPROVAL OF AGENDA

MOVED by M. Williams and **SECONDED** by T. Woods,
that the Water Advisory Committee approve the agenda.

CARRIED

4. ADOPTION OF MINUTES OF OCTOBER 7, 2015

MOVED by M. Williams and **SECONDED** by R. Mersereau,
that the Water Advisory Committee adopt the minutes of the meeting held October 7, 2015.

CARRIED

5. REGIONAL WATER SUPPLY COMMISSION CHAIR AND VICE-CHAIR APPOINTMENTS

T. Robbins reported that the Regional Water Supply held their first meeting of the year in January and elected M. Lougher-Goodey as Chair for 2016. G. Orr was elected as Vice-Chair for 2016 and, as such, will be the Regional Water Supply Commission representative on the Water Advisory Committee.

6. TERMS OF REFERENCE FOR THE WATER ADVISORY COMMITTEE

T. Robbins spoke to the report and explained the schedule of meetings for the Water Advisory Committee.

MOVED by M. Williams and **SECONDED** by T. Woods,
That the Water Advisory Committee receive the staff report for information.

CARRIED

7. OVERVIEW OF THE PRIORITIES FOR THE REGIONAL WATER SUPPLY COMMISSION

T. Robbins reported on the following priorities for the Regional Water Supply Commission in 2016:

- Upgrading the Japan Gulch Disinfection Facility
- Updating the Greater Victoria Protection Bylaw
- Completing a Traditional Use Access Agreement with T'Sou-ke First Nation
- Updating the Strategic Plan for Water Supply Management
- Updating the Vulnerability Assessment for IWS
- Amending the Cross Connection Control Bylaw and the Water Conservation Bylaw
- Finalizing the TransCanada Trail

MOVED by M. Williams and **SECONDED** by B. Moody,
that the Water Supply Commission supports Integrated Water Services staff in the submission to the Regional Water Supply Commission for installation of standby power at Japan Gulch.

CARRIED

8. APPOINTMENT OF A REPRESENTATIVE TO THE ELK/BEAVER LAKE STEERING COMMITTEE

It was suggested that a member of the Water Advisory Committee be appointed to the Elk/Beaver Lake Steering Committee and M. Thompson was nominated as the Water Advisory Committee representative.

9. WORKING GROUPS

It was suggested that discussion on the current working groups should be held at the next working committee meeting.

10. ADJOURNMENT

MOVED by R. Neuman and **SECONDED** by R. Mersereau,
That the meeting of the Water Advisory Committee be adjourned at 12:02 pm.

CARRIED

**REPORT TO THE WATER ADVISORY COMMITTEE
MEETING OF WEDNESDAY, APRIL 6, 2016**

**SUBJECT CLIMATE CHANGE ADAPTATION STRATEGY FOR THE GREATER
VICTORIA WATER SUPPLY AREA**

ISSUE

Climate change is one of the challenges facing the management of the Greater Victoria Water Supply System (GVWSS). The 2012 Strategic Plan for the GVWSS designated adaptation to climate change as a strategic priority. Adaptation to climate change is also a priority of the CRD Board in the 2015-2018 Corporate Plan. A key step in implementing this priority is the development of a climate change adaptation strategy for the Greater Victoria Water Supply Area (GVWSA). This report provides an overview of this initiative.

BACKGROUND

The *2012 Strategic Plan for the GVWSS* identified the potential for climate change to affect ecosystems, ecological processes, and water supply infrastructure (bridges and culverts) in the 20,000 hectare forested Greater Victoria Water Supply Area. The 2012 Strategic Plan set out the desired results (goals) for climate change adaptation in the GVWSS, with strategies/actions to achieve these results and identified measures of success (see **Attachment 1**). The strategies and actions that relate to the terrestrial and wetland ecosystems and drainage structure infrastructure in the GVWSA have been combined and are being incorporated into an overall climate change adaptation strategy for the area. Where feasible the adaptation strategy will include potential impacts on water quality in the supply reservoirs. The climate change adaptation strategy will be completed in 2016.

The phrase *adapting to climate change* refers to the initiatives and actions required to prepare for the predicted effects of climate change and reduce potential negative impacts on built, natural and social systems. It is generally recognized that adaptation to climate change is a form of risk management, and as such, adaptation measures should be proactive and planned rather than reactive.

In 2015, IWS applied for and received a \$10,000 grant from the Pacific Centre for Climate Solutions to hire a student intern to assist with the review of the large volume of information on climate change and the development of the climate change adaptation strategy. The intern began work in mid-January 2016.

Staff have conducted a preliminary review of the wide range of resources available on climate change adaptation for watersheds, forests, local government, and water utilities. A more detailed review was conducted on specific resources developed to guide the development of adaptation strategies (see **Attachment 2**). These guides for conducting adaptation strategies typically contain similar content and some combination of eight basic steps:

1. Review predicted effects of climate change and consider how weather extremes have affected the system in the past.

2. Identify potential hazards associated with climate change and how they may affect the components of the system(s) being assessed.
3. Identify the vulnerabilities of the system(s) to the potential hazards.
4. Assess the risks to the system(s) from the hazards and vulnerabilities.
5. Identify adaptation (risk management) options and actions.
6. Review and select most effective options.
7. Implement the actions.
8. Monitor and adjust as needed.

Most climate adaptation frameworks are focused on developing a stand-alone climate change adaptation strategy although some recognize that the steps in these adaptation frameworks could be incorporated ('mainstreamed') into existing planning and management processes.

Purpose of the Strategy

The purpose of the climate change adaptation strategy for the GVWSA is to assess the potential effects of climate change on hydrology, terrestrial and wetland ecosystems, related ecological processes, and infrastructure; assess the levels of vulnerability and risk associated with these changes; and set out watershed stewardship (management) actions to prevent or minimize negative effects to identified values and adapt to the predicted new conditions.

Objectives

The objectives for the climate change adaptation strategy for the GVWSA are to:

- develop a detailed understanding of the predicted changes to climate parameters in the GVWSA and the range of variation and level of uncertainty in these predictions;
- review and assess the impacts of past extreme weather events on the hydrology, ecosystems, water supply reservoirs, and infrastructure in the GVWSA;
- review and assess the potential impacts of the predicted changes to climate on the hydrology, ecosystems, processes, and infrastructure affecting water quality and supply in the GVWSA;
- assess the level of vulnerability and risk associated with these changes using appropriate Canadian, BC, and CRD methodologies;
- develop a comprehensive list of potential adaptation strategies or actions for each type of impact that are appropriate to the characteristics of the GVWSA and the mandate and capabilities of CRD Integrated Water Services; and,
- Recommend priority adaptation strategies and actions based on risk and potential benefit.

A proposed table of contents for the climate adaptation strategy for the GVWSA is provided as **Attachment 3**. Work on the strategy is well underway.

DISCUSSION

Key Resources

The Pacific Climate Impacts Consortium (PCIC) at the University of Victoria has developed two sets of projections for how climate change may affect the Capital Regional District. The development of such projections is technical and complex as PCIC needs to choose, and then downscale and average, appropriate global models, and determine which carbon emission scenario(s) to use. The projections given are typically for the years 2020, 2050, 2080 and 2100.

The BC Ministry of Environment and Ministry of Forests, Lands and Natural Resource Operations have developed a wide range of resources to assist with assessing the potential effects of climate change on hydrology and forests in British Columbia. Resources from these ministries, and the Canadian Council of Ministers of the Environment, suggest potential methods for assessing the vulnerability of the biophysical characteristics of a specific area to climate change projections. Many of the provincial resources also suggest approaches and actions to adapt to climate change.

While the 2015 Canadian Council for Ministers of the Environment guide for preparing a climate change adaptation strategy for watersheds is considered the most appropriate model for the strategy for the GVWSA, the content in each of the resources reviewed in **Attachment 2** have something to contribute to the development of the strategy. A number of adaptation strategies prepared by local government in BC (e.g., Saanich, Vancouver, Delta, and Surrey) provide examples for addressing environmental and infrastructure issues associated with climate change. Staff are also searching for examples of climate adaptation strategies for forested watersheds.

Linkages to Other Initiatives

Work on the climate change adaptation strategy for the GVWSA is not being conducted in isolation. Efforts have been made to coordinate the scope and content of the strategy with other initiatives and capital projects being conducted for the GVWSS.

The climate change adaptation strategy is being developed in concert with the update of the watershed assessment for the GVWSA. A watershed assessment is a review of the biophysical characteristics, built features, and land uses in a drinking water supply catchment area and the identification of management issues and risks to water quality and supply. A watershed assessment of the GVWSA was conducted as part of the 1999 Strategic Plan for Water Management. This assessment will be updated to incorporate the Leech Water Supply Area, ecological inventory information collected since 1999, and new information on management issues and risk. Several of the analyses being conducted for the watershed assessment will assist with the vulnerability assessment component of the climate change adaptation strategy.

The climate change adaptation strategy and the update of the watershed assessment will provide information that will support the development of a drinking water safety plan for the GVWSS being carried out by the Water Quality Program in Regional Parks and Environmental Services. Some of this information may also be relevant to the vulnerability assessment of the water supply system being conducted by Infrastructure Engineering.

Work on the climate change adaptation strategy for the GVWSA is being carried out in consultation with the CRD corporate Risk Management and Climate Action programs.

Collaborative Research in the GVWSA Relevant to Climate Change

IWS has entered into several collaborative research agreements with Natural Resources Canada (NRC) to improve the understanding of the potential effects of climate change on the GVWSA. An additional research agreement with NRC is planned for 2016.

The NRC agreements include incorporating existing federal research plots into the network of long-term forest monitoring plots being established by the CRD in the GVWSA. The purpose of these monitoring plots is to track tree recruitment, growth rates, health, and mortality over the long term to help determine if climate change is affecting any of these parameters. The NRC is also using sediment cores from a small water body and Sooke Lake Reservoir to document the history of wildfire and vegetation change in the Sooke Water Supply Area (WSA). In 2016 this study is being expanded to examine the effects of major wildfire events on water quality in these water bodies as indicated by changes in the species of diatoms present in the sediment. An additional NRC study planned for 2016 will test a new model developed to project how tree recruitment, growth, and mortality will be affected by different climate change scenarios and the implications for carbon release and storage. The results of this modelling will be compared to data collected from research and monitoring plots in the GVWSA.

An additional collaborative research agreement with the University of Victoria developed to assist with the update of the watershed assessment also has relevance for the climate adaptation strategy. This study is looking at the change in gaps within the forest canopy between 2009 and 2015 related to tree mortality and tree fall, and how these changes relate to stressed vegetation detected by hyperspectral analysis. The goal is to identify areas of root rot within the GVWSA and gain an understanding of the rate of expansion of these areas. The effects of root rot, and potentially the rate of expansion, are thought to be exacerbated by drought stress, which is predicted to worsen with climate change.

Regular Updates to the Strategy

The climate change adaptation strategy should be considered as a 'living document' that is updated as new information becomes available. This is consistent with the 'adaptive management' approach that is one of the strategic policies for the protection and stewardship of the GVWSA. IWS is working with the CRD Climate Action Group to develop a terms of reference for a new climate change modelling exercise to be conducted for the Capital Region that includes separate projections for different parts of the region utilizing recent advances in model downscaling. These new projections may affect identified impacts, vulnerability and risk, and proposed adaptation measures. Ongoing research and monitoring in southwestern BC, the CRD, and the GVWSA may identify additional issues or modify the types, severity and scale of projected impacts. It will be important that the strategy be updated to incorporate new information as it arises and use this information to refine or change adaptation approaches and actions.

CONCLUSION

The climate change adaptation strategy currently being developed for the GVWSA is a key step in implementing one of the strategic priorities identified in the 2012 Strategic Plan for the GVWSA and the CRD 2015-2018 Corporate Plan. The adaptation strategy is utilizing the best available information on climate change projections and impacts available for the CRD, southwestern BC, and SE Vancouver Island. The adaptation strategy is utilizing a watershed-level approach and is using actual meteorological and biophysical data for the GVWSA to assess potential vulnerability and risk associated with climate change projections. The results of these assessments will be used to develop adaptation approaches and actions to reduce risks to water quality, supply and other identified values in the GVWSA. The strategy is being coordinated with other risk

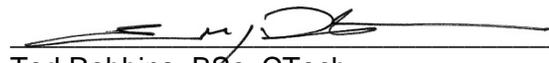
management initiatives being carried out for the GVWSS and with the Risk Management and Climate Action programs of the CRD and will be informed by actual research and monitoring in the GVWSA. The climate change adaptation strategy for the GVWSA will be treated as a living document that is regularly updated to incorporate new information.

RECOMMENDATION

That the Water Advisory Committee receive the staff report for information.


Joel Ussery, MPM
Manager, Resource Planning


Annette Constabel, MSc, RPF, PMP
Senior Manager, Watershed Protection
Concurrence


Ted Robbins, BSc, CTech
General Manager, Integrated Water Services
Concurrence

JU:mm

Attachments:

1. Desired Results, Strategies/Actions and Measures of Success Relating to Climate Change Adaptation
2. Overview of Climate Change Adaptation Frameworks Relevant to the Needs of the Greater Victoria Water Supply System
3. Proposed Table of Contents – Climate Change Adaptation Strategy for the Greater Victoria Water Supply Area

Attachment 1

**Desired Results, Strategies/Actions and Measures of Success
 Relating to Climate Change Adaptation**

2012 Strategic Plan for the Greater Victoria Water Supply System

Given the scope and scale of the predicted effects and potential impacts of climate change on the Greater Victoria Water Supply System, adapting to climate change has been made a key strategic priority for planning and management of the water supply system.

The phrase *adapting to climate change* generally refers to the initiatives and actions required to prepare for the predicted effects of climate change and reduce potential negative impacts on built, natural and social systems.

Table 1 sets out the desired results (goals) for climate change adaptation in the GVWSS, with strategies/actions to achieve these results and identified measures of success. The desired results, strategies and success measures will be refined and expanded over time as more detailed analyses of issues, scenarios, contributing factors and potential consequences are undertaken. The strategic plan also provided direction for including climate change in future analyses of water supply needs and in developing demand management programs.

Table 1. Desired Results, Strategies/Actions and Measures of Success for Adapting to Climate Change

Desired Results	Strategies/Actions	Measures of Success
A consistent framework for analyzing issues relating to climate change and developing adaptation strategies for the Water Supply System	Review analysis frameworks proposed in literature on climate change adaptation Review the potential for applying the existing risk assessment and management framework for the Water Supply Area to climate change adaptation Develop clear criteria for evaluating priorities and trade-offs when developing and evaluating adaptation strategies	Reviews complete and results incorporated into adaptation planning Evaluation criteria in place
Understand the implications of climate change on the ecology and water quality in the source water reservoirs	Conduct a review of the literature relating to aquatic ecosystems and climate change focusing on the effects on coastal lakes Develop collaborative partnerships with government agencies and academic institutions to enhance research and monitoring of the ecology of inflow streams and source water reservoirs Identify and assess possible scenarios associated with the predicted effects of climate change on water quality Prepare a problem analysis of the potential effects of climate change on the ecology and water quality of source water streams and reservoirs	Literature review complete Partnerships in place and functioning Analyses completed and results applied to adaptation planning

Table 1. (continued . . .)

Desired Results	Strategies/Actions	Measures of Success
	Enhance monitoring of the chemistry, nutrients and biota in streams flowing into source water reservoirs	Enhanced monitoring program in place
Improved understanding of the potential types, magnitude, rate, and spatial extent of the potential effects of climate change on terrestrial ecosystems in the GVWSA.	<p>Conduct a review of the extensive literature relating to forest ecosystems, hydrology and climate change, and prepare a summary of predicted effects relevant to the forests in the GVWSA.</p> <p>Conduct landscape level analyses of data on ecosystems and forest types and ages in the GVWSA to assess their relative vulnerability to undesirable effects associated with climate change. Identify and assess possible scenarios associated with the potential effects of climate on terrestrial ecosystems in the GVWSA.</p> <p>Develop a collaborative research and monitoring program with government agencies and academic institutions to assess the effects of climate and disturbance on changes in forest composition and structure.</p> <p>Continue annual landscape-level aerial surveys of tree mortality associated with drought and forest insects and diseases.</p>	<p>Reviews and analyses complete and results used in adaptation planning</p> <p>Collaborative research and monitoring program in place and functioning</p> <p>Surveys completed annually</p>
Knowledge of potential effects of climate change used to develop and implement adaptation strategies and restoration plans.	<p>Develop a strategy to sustain and restore the resilience and health of forest ecosystems in the GVWSA to protect water quality, watershed hydrology, and compatible environmental values</p> <p>Review and adjust standards for tree species and seed sources in reforestation and watershed restoration</p> <p>Continue to plan and expand the program for forest fuel management in and around water supply facilities and the creation of landscape-level fuel break corridors to reduce the potential for a large-scale wildfire in the GVWSA</p>	<p>Strategy in place</p> <p>Reforestation standards are based on climate change projections and trends</p> <p>Forest fuel reduction and fuel break corridors completed in priority areas</p>

Table 1. (continued . . .)

Desired Results	Strategies/Actions	Measures of Success
<p>Understand the carbon sequestration potential of forest ecosystems in the GVWSA</p>	<p>Work with the CRD Climate Action Coordinator to explore requirements for estimating carbon sequestration potential and carbon offset valuation Consider the data requirements of forest carbon sequestration models when developing the terms of reference for the update of forest inventory data for the GVWSA</p> <p>Use the Forestry Canada carbon model and updated forest inventory data to develop an estimate of existing carbon sequestration potential of ecosystems in the GVWSA</p>	<p>Standard methodologies for have been established for the CRD</p> <p>Terms of reference for inventory contains requirements relating to carbon assessment</p> <p>Model results considered in carbon discussions</p>
<p>Improved understanding of changes in precipitation, air temperature, stream flow and changes in watershed yield</p>	<p>Expand hydro-meteorological system to include new stations for monitoring weather and stream flows and sediment transport.</p> <p>Conduct annual analyses of watershed yield, precipitation and air temperature and compare with larger scale climate data to identify any trends which can be related to climate variables or climate change</p> <p>Continually monitor information on climate change predictions and adapt climate change adaptation initiatives as required</p>	<p>Expanded system in place</p> <p>Projected watershed yield and consumption match latest climate change projections and are used to adapt demand management initiatives.</p>
<p>Drainage structures (culverts and bridges) in the GVWSA meet revised design flow criteria</p>	<p>Review criteria for determining the required size of drainage structures in relation to increases in the intensity and duration of precipitation events and increases in stream flows associated with climate change projections</p> <p>Assess implications of changes to criteria for determining the size of drainage structures for the current replacement program</p> <p>Conduct a risk-based assessment of replacement priorities</p> <p>Update drainage structure replacement plan</p>	<p>Drainage structures sized to meet predicted stream flow rates</p> <p>Updated drainage structure replacement plan in place</p>

Overview of Climate Change Adaptation Frameworks Relevant to the Needs of the Greater Victoria Water Supply System

Introduction

The *2012 Strategic Plan for the Greater Victoria Water Supply System (GVWSS)* identified adaptation to climate change as a strategic priority for the water supply system. To assist in linking adaptation planning for the variety of elements of the GVWSS (water supply catchment area, water supply reservoirs, facilities and infrastructure, and emergency preparedness and response) the plan recommended the use of a consistent planning framework.

There are a wide variety of websites and guidance documents to assist with adaptation to climate change. All have slightly different approaches, types of documents, and tools and templates to assist with assessing the effects of climate change, evaluating vulnerability and risk, and developing adaptation options. As such, each has something to contribute to organizations, and water utilities specifically, seeking to explore how best to address adaptation to climate change.

This document provides a review of the climate change adaptation planning frameworks considered most relevant to the needs of the GVWSS. A tabular comparison of the steps and components within each of the frameworks is provided in **Table 1** at the end of the document.

The 2015-2018 CRD Corporate Plan sets out the development of an adaptation framework for the corporation. Work on climate change adaptation for the GVWSS should be consistent with the corporate approach.

Generic Adaptation Planning Framework

1. Pacific Institute for Climate Solutions

The Pacific Institute for Climate Solutions is a consortium of four BC Universities that brings together researchers to study the impacts of climate change and to develop positive approaches in mitigation and adaptation. As part of their education and outreach program, PICS has developed a number of web-based presentations on different aspects of climate change, including predicted effects, impacts, mitigation and adaptation. The presentation on adaptation (http://pics.uvic.ca/education/climate-insights-101#quicktabs-climate_insights_101=1) provides a generalized cycle (framework) for planning adaptation to climate change. The presentation suggests that the planning cycle can be customized to meet the specific needs of an organization. There is no guidance document to accompany the framework.

The PICS Adaptation Planning Cycle has 10 steps (**see Figure 1**):

1. Assess Climate Information
 - Identify historical climate impacts and hazards
 - Consider how local climate conditions are likely to change over the coming decades
2. Identify Exposure
 - Assess exposure to existing and predicted climate hazards
Consider the sites, activities or assets that are already affected by climate and how they could be affected by predicted new or altered events
3. Identify Vulnerability
 - Undertake a preliminary assessment of vulnerability to predicted conditions
Consult with practitioners from many fields (types of hazards and vulnerabilities)
4. Identify Strategic Context
 - Examine:
 - Current trends and development plans
 - Changes in land use and water demand
 - Infrastructure development needs
 - Service requirements
 - Economic strategies
 - Financial plans and forecasts
5. Conduct Detailed Vulnerability and Risk Assessment
 - Compare potential vulnerabilities and current plans to be undertaken to identify gaps, weaknesses, or contradictions
6. Identify Adaptation Measures
 - Identify adaptation measures to reduce exposure and vulnerability
 - Consider how to build capacity to improve quality of and access to information and ensure coordination and incentives for action.
7. Prioritize Adaptation Options
 - Where are the risks highest?
 - What vulnerable services or assets are critical to the community?
 - What can be financed now?
 - Does one alternative cause other negative impacts?

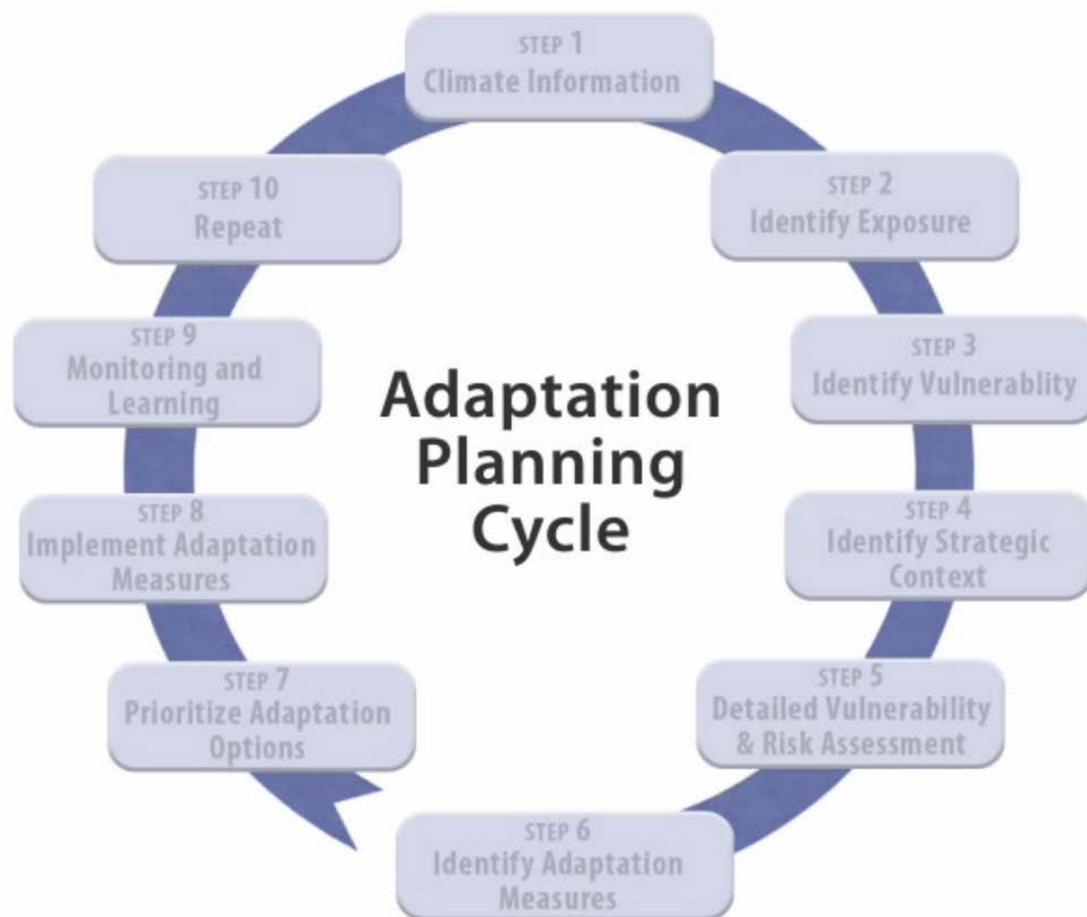


Figure 1. The Ten Steps in the Pacific Institute for Climate Solutions Adaptation Planning Cycle

More complex and costly interventions will require more study to get better risk and cost information.

8. Implement Adaptation Measures
 - Support adaptation
 - Maintain community engagement
9. Monitor and Learn
 - Track experiences with financing, implementing and evaluating adaptation outcomes
 - Share lessons with counterparts.
10. Repeat

Revisit process as:

 - Lessons are learned

- Knowledge of climate science improves
- Local conditions change
- Plans are updated

Adaptation Frameworks for Local Government and Organizations

1. ICLEI Local Governments for Sustainability

ICLEI Local Governments for Sustainability is an international organization “to build and serve a worldwide movement of local and regional governments that are committed to achieving tangible improvements in environmental sustainability.” Website accessed October 1, 2015.

As part of the Building Adaptive and Resilient Communities (BARC) Resources program (<http://www.icleicanada.org/adaptationtool/introduction>) ICLEI Canada has developed a guidebook to assist municipal governments with climate change adaptation planning entitled *Canada’s Changing Climate, Changing Communities: Guide and Workbook for Municipal Climate Adaptation*. The guidebook was developed with the support of the Climate Change Impacts and Adaptation Division of National Resources Canada. The model is based on a process developed by ICLEI-USA and the University of Washington.

The ICLEI Canada adaptation framework has been used by The Corporation of Delta, the City of Vancouver and City of Surrey in BC. The original US framework was used by the District of Saanich in their climate change adaptation strategy.

The process has five steps designated Milestones or steps (see **Figure 2**):

1. Initiate
2. Research
3. Plan
4. Implement
5. Monitor/Review

Each of the steps in the ICLEI process have a list of key subcomponents/tasks (see **Figure 2**).

The comprehensive guidebook includes a description of the components of each step and provides direction on how to carry out these components supplemented with definitions, examples, summaries of issues, and links to useful case studies and other guidance documents. The guidebook also contains worksheets to assist with specific tasks.

The BARC program provides access to additional tools, resources and networks relevant to responding to climate change and will provide access to experts to assist with carrying out climate change adaptation for a fee.

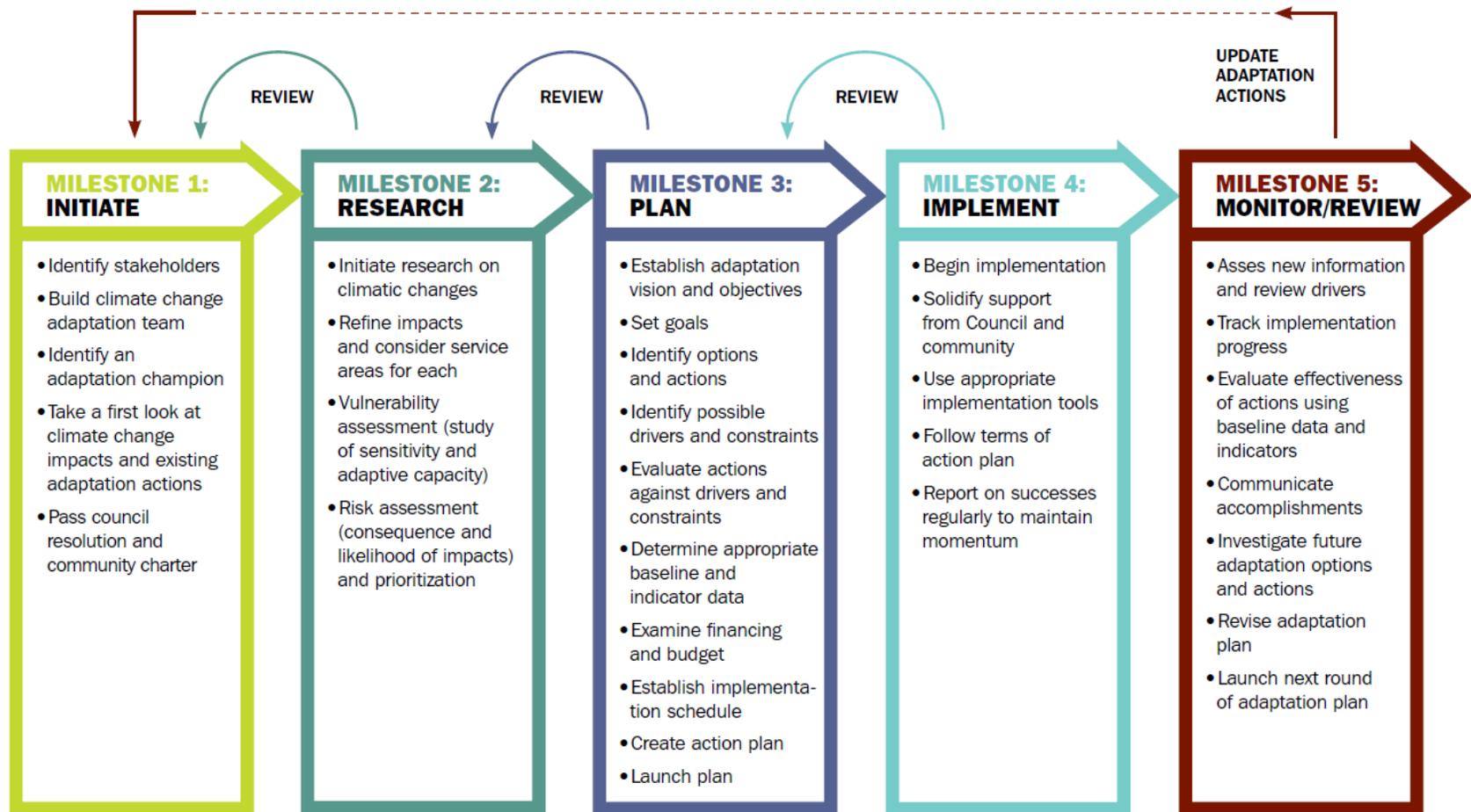


Figure 2. Overview of Milestones (Steps) in the ICLEI Canada Framework for Climate Change Adaptation.

2. Communities Adapting to Climate Change Initiative – Columbia Basin Trust

The Columbia Basin Trust (CBT) was created by provincial legislation to support the people of the region to create a “legacy of social, economic and environmental well-being and self-sufficiency” (http://www.cbt.org/About_Us/). In 2008 the CBT began working with two communities in their region to assist them with climate change adaptation planning. Based on their experience, the CBT developed a six step Community Climate Adaptation planning process (see **Figure 3**). Additional communities in their region followed the approach to develop their own adaptation action plans. One municipality used the approach to incorporate climate adaptation into their Official Community Plan process rather than develop a separate adaptation strategy.

The six steps for successful climate adaptation planning are:

1. Get Started
2. Learn About Climate Change
3. Identify Priorities in Your Community
4. Assess Vulnerability and Risk
5. Develop Adaptation Strategies
6. Implement and Monitor Plans

The components of the six steps are shown in **Figure 3**. The CBT website provides additional information on approaches and methodologies for the components in each step (<http://adaptationresourcekit.squarespace.com/six-step-planning-process/>).

The CBT also developed a Climate Change Adaptation Discovery Tool (CBT 2011) that provides information on climate change projections for the Columbia Basin region and impacts and adaptation actions relevant to:

- Decision-making and communication
- Infrastructure
- Watersheds and water
- Wildfire
- Agriculture and food security
- Tourism and recreation
- Public safety and health
- Transportation
- Forestry and mining
- Transboundary flood control, hydro and energy

Six Steps to Successful Adaptation Planning

Step 1 - Get Started

- Make the commitment
- Establish a local coordinator/consultant
- Establish a local steering committee
- Develop a work plan
- Locate resources

Step 2 - Learn About Climate Change

- Seek out local knowledge and observations
- Research historical and available information
- Obtain future climate projections for your region
- Share ideas with your community

Step 3 - Identify Priorities in Your Community

- Investigate potential impacts
- Identify what is important to the community
- Talk with people about the issues
- Confirm priority issues for further investigation

Step 4 - Assess Vulnerability and Risk

- Complete sensitivity analysis
- Evaluate adaptive capacity
- Determine probability of events
- Establish priority risks and opportunities

Step 5 - Develop Adaptation Strategies and Actions

- Establish goals
- Determine actions
- Assign people to act

Step 6 - Implement and Monitor Plans

- Implement plans
- Monitor progress
- Revise plans with new information

Figure 3. The Six Steps in the Columbia Basin Trust Framework for Successful Climate Change Adaptation Planning.

3. Adapting to Climate Change – A Risk-based Guide for Local Governments

This guide was developed with the support of Natural Resources Canada and the Institute for Catastrophic Loss Reduction to help municipalities understand and manage risks associated with climate change and variability (Black and others 2010). The guide follows the framework for risk management described in the Canadian national standard *Risk Management: Guidelines for Decision-makers* (Canadian Standards Association Q850-10 recently upgraded to CAN/CSA ISO 31000).

There are six steps to the process (see **Figure 4**):

1. Getting Started (identify project team and stakeholders, and develop work plan)
2. Preliminary Analysis (ID hazards and risk scenarios, assess vulnerability and risk)
3. Risk Estimation (more detail on risk scenarios and how perceptions influence risk)
4. Risk Evaluation (ranking of risks and focusing on priorities)
5. Adaptation Measures or Risk Controls (identify, evaluate, and select)
6. Action and Monitoring

The steps in this risk-based guide are similar to the milestones/steps in the ICLEI adaptation framework. However, this approach is more focused on the technical aspects of risk assessment and management and does not incorporate the planning components of vision, goals and objectives. It “focuses on using readily available data and a small risk management or project team” rather than setting out the more comprehensive and inclusive approach to climate change adaptation as in the ICLEI Canada framework.

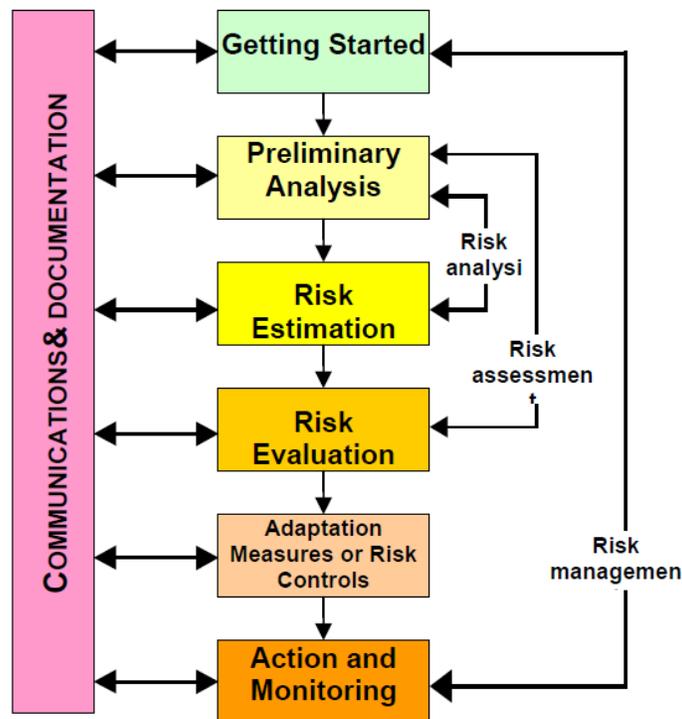


Figure 4. Steps in the Natural Resources Canada Framework for Risk-Based Climate Change Adaptation.

The Risk-based Guide for Local Governments provides thorough direction on working through and documenting the risk assessment process and communicating risk to clients and stakeholders.

4. Climate Change Adaptation Framework – Alberta Sustainable Resource Development

In 2010, Alberta Sustainable Resource Development (SRD) published a guide “to help organizations address climate change risks in a comprehensive and consistent manner”. The manual accompanies a Climate Change Adaptation Framework decision-support tool. The focus of both documents is to assist *organizations* identify and assess their vulnerability to climate change, analyze the risks to achieving organizational objectives and identifying options to adapt and build organizational capacity to respond.

The adaptation framework is linked to the strategic planning function of the organization and its enterprise risk management. An adaptation management team (divided into senior staff responsible for strategic planning and a technical group) is established with a coordinator to facilitate integration.

The Alberta SRD framework has four steps (see **Figure 5**):

1. Scope and Preparation
2. Vulnerability Assessment
3. Risk Assessment
4. Adaptation Options

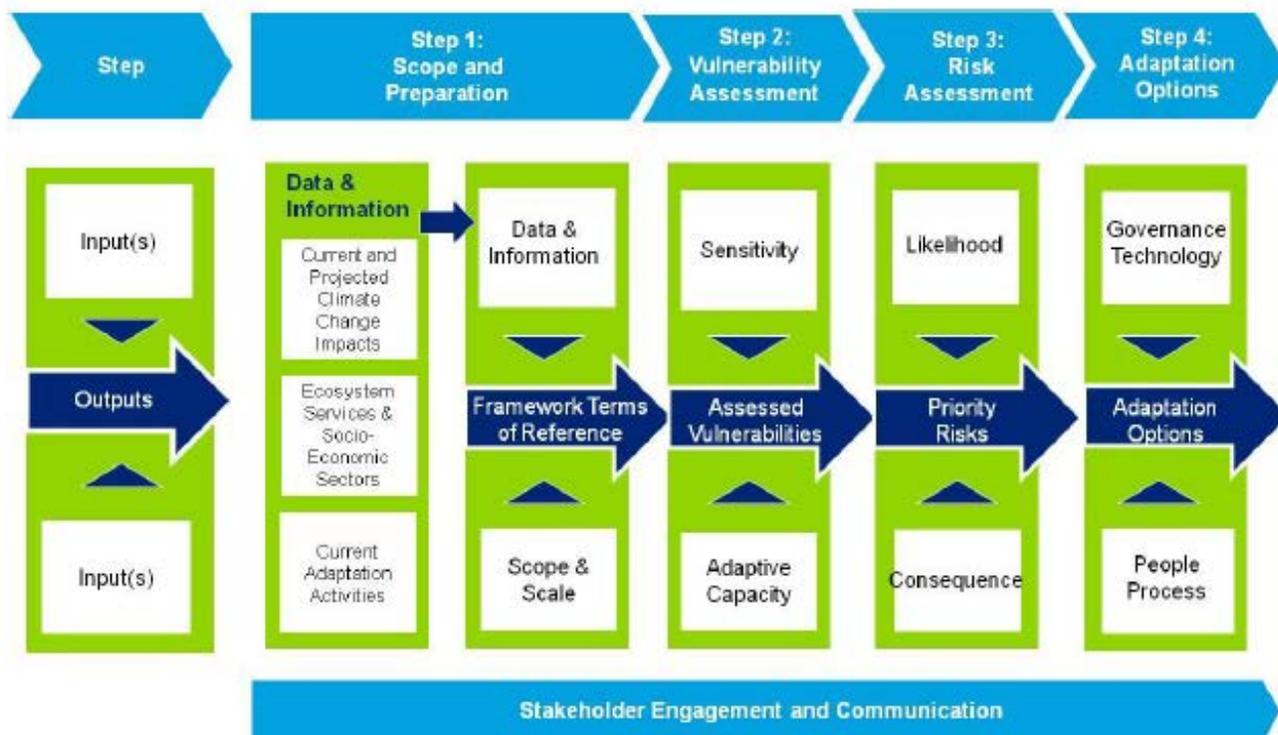


Figure 5. Steps in the Alberta Sustainable Resource Development Framework for Climate Change Adaptation.

Although there is no formal step for prioritizing options and developing a climate change adaptation strategy, there is a description of this process in the manual for the Alberta SRD framework.

While the examples in the guidance manual are focused specifically on the needs of Alberta SRD, the focus of the framework on a public organization makes it a useful framework to consider.

Climate Change Adaptation Frameworks for Water Utilities

1. Adaptation Strategies Guide for Water Utilities – US Environmental Protection Agency (2015)

The Adaptation Strategies Guide is part of a US Environmental Protection Agency (EPA) 'tool kit' to help water utilities become more effective in dealing with the potential effects of climate change. The EPA tool kit includes:

- documents that detail the potential effects of climate change for each region (e.g., Pacific Northwest)
- the potential impacts relating to drought, flood, water quality degradation, ecosystem changes, and service demand and use
- a list of potential adaptation measures associated with each of the five groupings of impacts
- a list of areas where sustainability strategies can be used in concert with adaptation strategies
- a climate resilience evaluation and awareness tool to assess adaptation

A worksheet for adaptation planning is included in the EPA guide.

The EPA document does not provide any guidance on who should be involved in the process of developing a climate change adaptation plan.

The EPA process for adaptation planning has five basic steps (see **Figure 6**):

1. Understand the potential impacts and challenges relating to climate change
2. Identify thresholds for failure or damage
3. Assess risks
4. Determine adaptation options
5. Implement and monitor

To assist with identifying adaptation options the EPA identifies three categories of adaptation:

1. Planning strategies, which includes use of models, research, training, natural resource management, and land use planning
2. Operational strategies which include efficiency improvements, monitoring, inspections, demand management, and flexible operations
3. Capital/infrastructure strategies which include construction, diversification, repairs and retrofits, upgrades, and new technologies

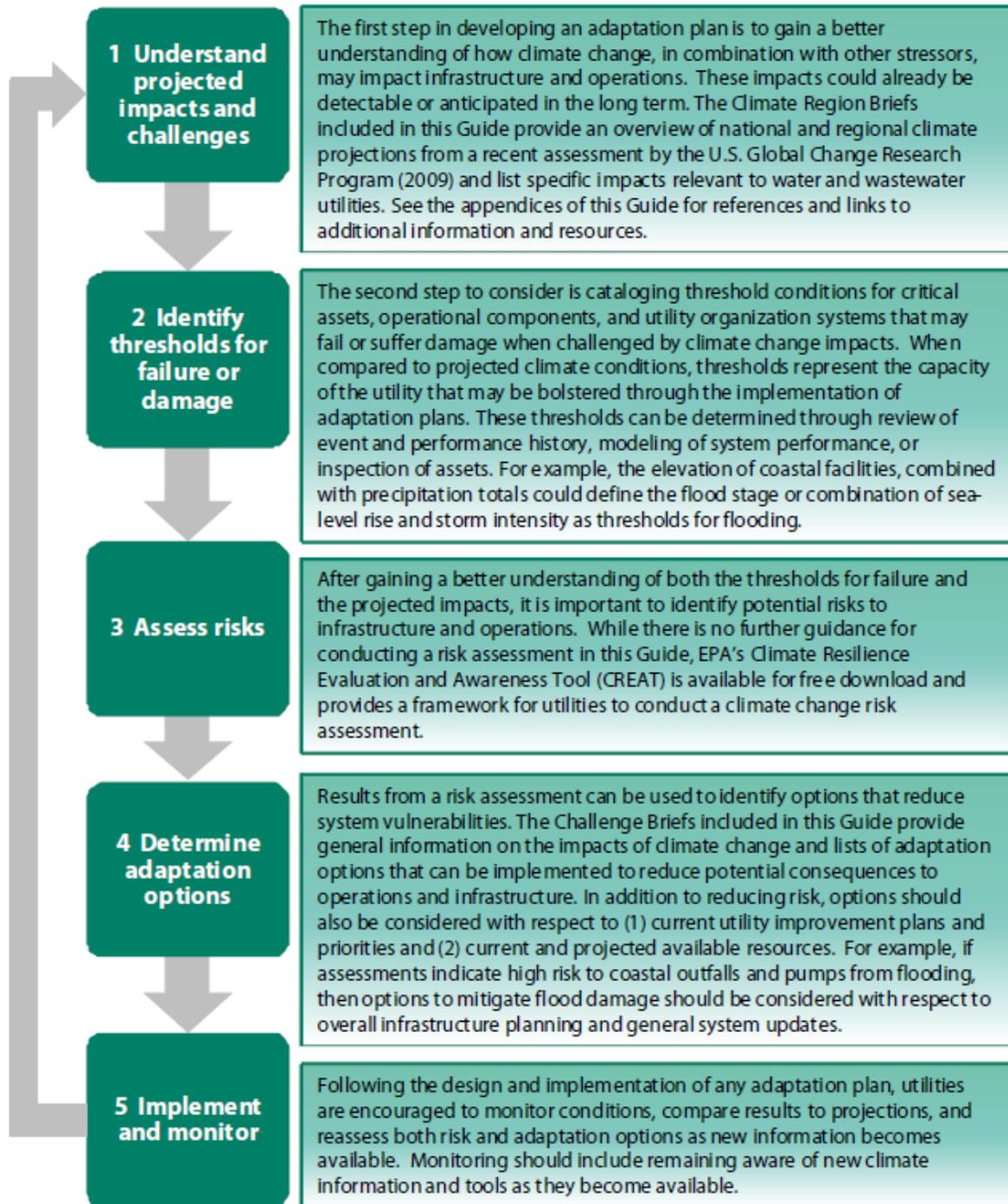


Figure 6. General Steps for Climate Change Adaptation Planning by Water Utilities from the US Environmental Protection Agency.

The manual references other US EPA tools for assessing the effects of climate change on water utilities (www.epa.gov/climate-ready-utilities) such as the Climate Resilience and Awareness Tool (CREAT). This computer-based tool guides users through a process of identifying threats, vulnerable assets, and adaptation options to help reduce risk.

2. Water Utilities and Climate Change – Effective System Adaptation – US Water Research Foundation (2012)

The US Water Research Foundation published a document entitled *Water Utilities and Climate Change: A Research Workshop on Effective System Adaptation* in 2012. Although this document was focused on climate change adaptation for water utilities in the state of Florida, it was based on climate adaptation work done for the New York drinking water supply system. The document sets out an eight step process for climate adaptation planning (see **Figure 7**):

1. Identify Current and Future Climate Hazards
2. Conduct Risk Assessment Inventory of Infrastructure and Assets
3. Characterize Risk of Climate Change on Infrastructure
4. Develop Initial Adaptation Strategies
5. Identify Opportunities for Coordination
6. Link Strategies to Capital Rehabilitation Cycles
7. Prepare and Implement Adaptation Plans
8. Monitor and Re-assess

This approach incorporates risk management relating to climate change into the maintenance and operations and capital planning process of water utilities and identifies and organizes adaptation strategies along the short, mid and long term.

An Adaptation Assessment Guidebook has been developed by the New York City Panel on Climate Change (http://pubs.giss.nasa.gov/docs/2010/2010_Major_OGrady_1.pdf) to provide guidance on using the framework. In addition to providing guidance on each step in the process, the guidebook contains questionnaires to focus thinking on issues relating to different sectors and provide links to other adaptation reports.

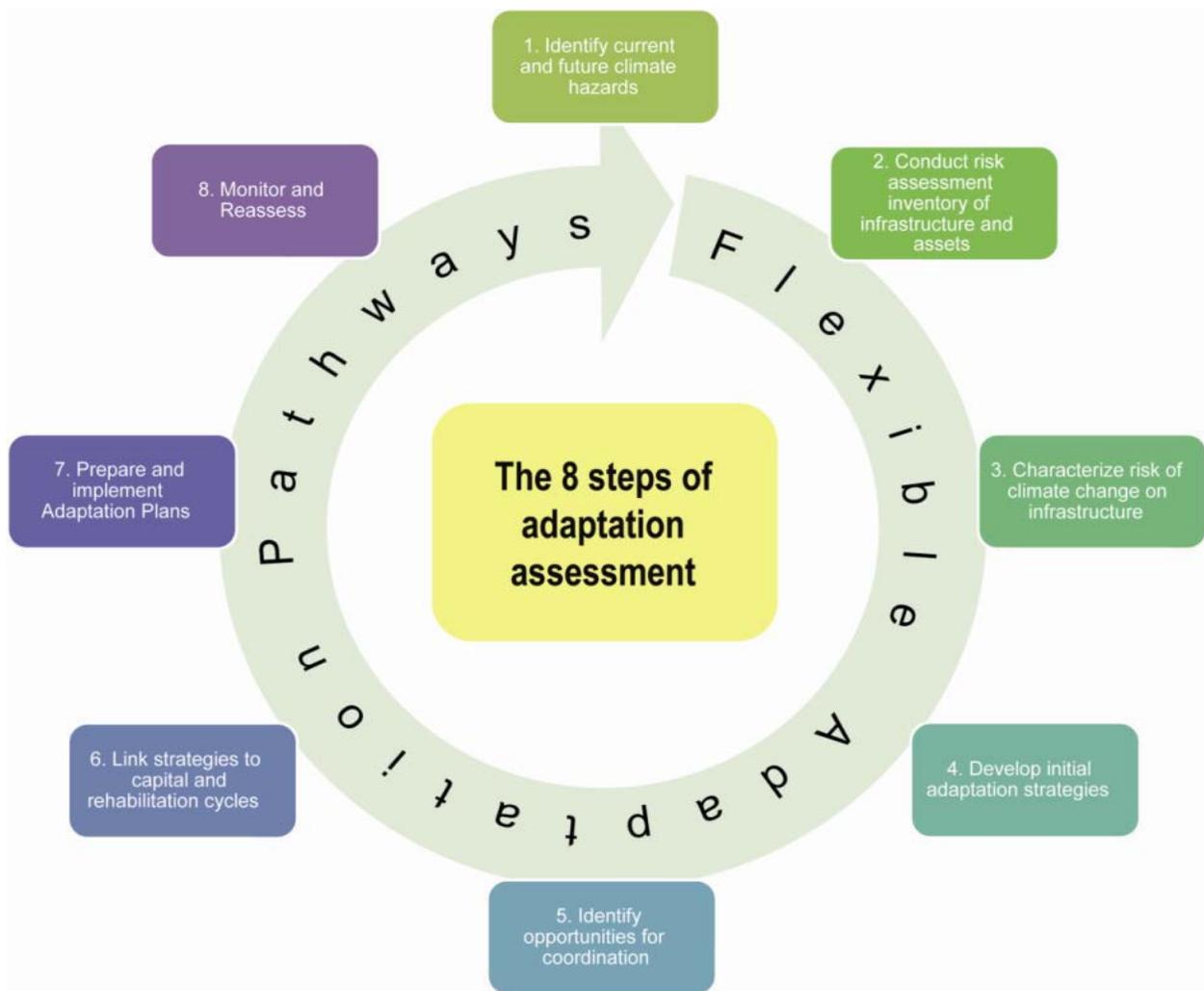


Figure 7. Steps for Climate Change Adaptation 'Assessment'

Climate Change Adaptation at a Watershed Scale

1. Framework for Climate Change Adaptation Planning at a Watershed Scale – Canadian Council of Ministers of the Environment (2015)

In 2015, the Canadian Council for Ministers of the Environment published a document entitled *Implementation Framework for Planning Climate Change Adaptation at a Watershed Scale* (http://www.ccme.ca/files/Resources/climate_change/Climate%20Change%20Adaptation%20Framework%201.0%20PN%201529.pdf). The document provides a structured process to identify and reduce vulnerability and risk relating to climate change at a watershed scale and develop, implement and evaluate actions to build adaptive capacity. The framework was developed after a review of international and domestic climate change adaptation literature and a survey of adaptation practitioners from across Canada.

The framework sets out and describes seven steps for adaptation planning (see **Figure 8**):

1. Build the climate adaptation planning team and set the bounds for the project.
2. Collect the information necessary for the adaptation team to effectively carry out the process.
3. Utilize the data collected to assess the vulnerability of the components of the watershed to climate change.
4. Conduct an assessment of risks relating to climate change in the watershed.
5. Use the results of the analyses to identify and prioritize actions for adaptation.
6. Implement the actions.
7. Monitor their effectiveness.

The process can be used as a stand-alone adaptation framework or incorporated into existing planning processes ('mainstreamed'). It incorporates both top down and bottom up approaches to planning. Results from each step can contribute to climate change adaptation within existing policies or functions. The process also incorporates the concept of adaptive management, which encourages additional iterations of the project as new information becomes available.

The document includes a glossary and a listing and description of climate change indicators.

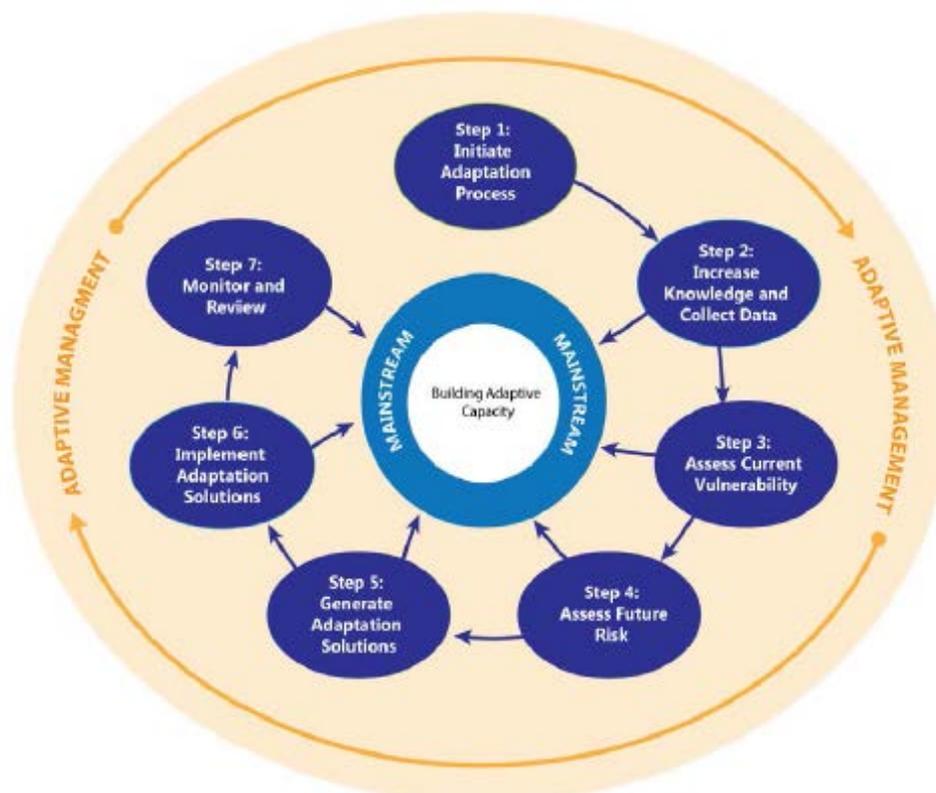


Figure 8. Illustration of the Steps for Climate Change Adaptation Planning at a Watershed Scale

Table 1 –Comparison of the Steps and Elements of Climate Change Adaptation Frameworks Relevant to the Greater Victoria Water Supply System

Pacific Institute for Climate Solutions	Alberta Climate Adaptation Framework	ICLEI Canada	Columbia Basin Trust	Risk-Based Guide for Local Government	US Environmental Protection Agency	US Water Research Foundation	Canadian Council of Ministers of the Environment
No information provided on initiation or who should be involved.	Form Adaptation Management Team Two levels: 1) Strategic Planning 2) Technical Coordinator liaises with both	Initiate <ul style="list-style-type: none"> Identify stakeholders Create adaptation team Identify champion Initial look at impacts and actions Obtain formal authority 	Get Started <ul style="list-style-type: none"> Make the commitment Establish coordinator Establish steering committee Develop a work plan Locate resources 	Get Started <ul style="list-style-type: none"> Identify project team and stakeholders Develop a work plan 	No information provided on initiation or who should be involved.	No information provided on initiation or who should be involved.	Initiate Adaptation Process <ul style="list-style-type: none"> Examine and set the context. Build awareness. Identify a champion or leader Define and build teams Engage Experts Develop a record keeping system
Assess Climate Information <ul style="list-style-type: none"> Identify historical climate impacts and hazards Consider how local climate conditions are likely to change 	Scope and Preparation <ul style="list-style-type: none"> Terms of Reference List of services and sectors affected List of current adaptation activities Predicted climate change Potential impacts on services and sectors 	Research <ul style="list-style-type: none"> Initiate research on impacts Refine impacts and consider service areas 	Learn about Climate Change <ul style="list-style-type: none"> Local knowledge and situation Historic and available information Obtain future climate projections Share ideas with community 	Preliminary Analysis <ul style="list-style-type: none"> Identify hazards Identify risk scenarios 	Understand Projected Impacts and Challenges <ul style="list-style-type: none"> Review projected changes Review potential impacts specific to sector 	Identify Current and Future Climate Hazards	Increase Knowledge and Collect Data <ul style="list-style-type: none"> Evaluate and increase climate change knowledge Gather historic data Develop baseline data and indicators Obtain future climate projections Develop an inventory of climate change impacts
Identify Exposure <ul style="list-style-type: none"> Assess exposure to existing and predicted climate hazards Consider the sites, activities or assets by changes 			Identify Priorities <ul style="list-style-type: none"> Investigate potential impacts ID what is important Talk with stakeholders Confirm priority issues	Identify Thresholds for Failure or Damage <ul style="list-style-type: none"> Review system performance history Model water system Review assets, operational components, organization systems 	Conduct Risk Assessment Inventory of Infrastructure and Assets		
Identify Vulnerability <ul style="list-style-type: none"> Preliminary assessment of vulnerability Consult with practitioners from many fields 							
Identify Strategic Context Examine: <ul style="list-style-type: none"> Current trends and development plans Changes in land use and water demand Infrastructure development needs Service requirements Economic strategies Financial plans and forecasts 							

Pacific Institute for Climate Solutions	Alberta Climate Adaptation Framework	ICLEI Canada	Columbia Basin Trust	Risk-Based Guide for Local Government	US Environmental Protection Agency	US Water Research Foundation	Canadian Council of Ministers of the Environment
Conduct Detailed Vulnerability and Risk Assessment <ul style="list-style-type: none"> Compare potential vulnerabilities and current plans to be undertaken to identify gaps, weaknesses, or contradictions 	Vulnerability Assessment <ul style="list-style-type: none"> Sensitivity to climate change Adaptive capacity of organization Ranked list of vulnerabilities Risk Assessment	Research (continued) <ul style="list-style-type: none"> Vulnerability assessment Risk assessment 	Assess Vulnerability and Risk <ul style="list-style-type: none"> Complete sensitivity analysis Evaluate adaptive capacity Determine probability of events Establish priority risks and opportunities	Preliminary Analysis (continued) <ul style="list-style-type: none"> Assess vulnerability Assess Risk Risk Estimation <ul style="list-style-type: none"> More detail on risk scenarios How do perceptions influence risk 	Assess Risks <ul style="list-style-type: none"> Identify and assess potential risks to infrastructure and operations Tool developed to facilitate risk assessment	Characterize Risk of Climate Change on Infrastructure	Assess Current Vulnerability <ul style="list-style-type: none"> Determine sensitivities and exposure Determine adaptive capacity to historic and current climate impacts Assess vulnerability Review results and communicate findings Update records Assess Future Risk <ul style="list-style-type: none"> Conduct risk analysis Conduct risk evaluation Communicate findings Review results
Prioritize Adaptation Options <ul style="list-style-type: none"> Where are the risks highest? What vulnerable services or assets are critical? What can be financed now? Does one alternative cause other negative impacts? 	Develop Adaptation Options <ul style="list-style-type: none"> Link to organizational capabilities 	Plan <ul style="list-style-type: none"> Establish vision, goals and objectives Identify options and actions Identify possible drivers and constraints Evaluation actions against drivers and constraints Determine appropriate baseline and indicators Examine finance and budget Establish implementation schedule Create action plan 	Develop Adaptation Strategies and Actions <ul style="list-style-type: none"> Establish goals Determine actions Assign resources and responsibilities 	Risk Evaluation Rank risks focusing on priorities	Determine Adaptation Options <ul style="list-style-type: none"> Identify options to reduce vulnerability and risk Consider current improvement plans and priorities and available resources 	Develop Initial Adaptation Options	Generate Adaptation Solutions <ul style="list-style-type: none"> Establish goals and objectives Identify adaptation options Evaluate options Review and communicate results Update records Develop adaptation plan
				Risk Controls and Adaptation Decisions <ul style="list-style-type: none"> Identify feasible options Evaluate effectiveness in relation to cost Select optimal strategies 			
Implement Adaptation Measures <ul style="list-style-type: none"> Support adaptation Maintain community engagement 	Prioritize Options and Develop Adaptation Strategy <ul style="list-style-type: none"> Implement throughout organization 	Launch plan Implement <ul style="list-style-type: none"> Begin Solidify support Use appropriate tools Follow action plan Report on successes 	Implement and Monitor Plans <ul style="list-style-type: none"> Implement Monitor Revise plans given new information 	No Step for Implementation	Implement and Monitor <ul style="list-style-type: none"> Integrate adaptation into existing improvement plans Monitor conditions Compare results to predictions Reassess risk and adaptation options as new information becomes available 	Prepare and Implement Adaptation Plans	Implement Adaptation Solutions <ul style="list-style-type: none"> Develop implementation plan Initiative implementation Update records Communicate solutions
Monitor and Learn <ul style="list-style-type: none"> Track experiences with financing, implementing and evaluating outcomes Share lessons 		Monitor and Review <ul style="list-style-type: none"> Assess new info and drivers Track progress Evaluate effectiveness Communicate success Investigate future options and actions Revise plan Launch next round of plan 		No Step for Monitoring		Monitor and Reassess	Monitor and Review <ul style="list-style-type: none"> Develop monitoring and evaluation plan Assess new information Update adaptation plan Communicate accomplishments Update records
<ul style="list-style-type: none"> Repeat as Necessary 							

Proposed Table of Contents
Climate Change Adaptation Strategy for the Greater Victoria Water Supply Area
March 29, 2016

Introduction/Background

Summary of direction from the 2012 Strategic Plan for the Greater Victoria Water Supply Area and the CRD Corporate Plan for 2016-2019.

Purpose

To assess the potential effects of climate change on the hydrology, ecosystems, processes, and infrastructure affecting water quality and supply in the GVWSA, assess the levels of vulnerability and risk to these changes, and set out watershed stewardship (management) actions to prevent or minimize negative effects to identified values and adapt to the predicted new conditions.

Objectives

Develop a detailed understanding of the predicted changes to climate parameters in the GVWSA and the range of variation and level of uncertainty in these predictions.

Review and assess the impacts of past extreme weather events on the hydrology, ecosystems, water supply reservoirs, and infrastructure in the GVWSA.

Review and assess the potential impacts of the predicted changes to climate on the hydrology, ecosystems, processes, and infrastructure affecting water quality and supply in the GVWSA.

Assess the level of vulnerability and risk associated with these changes using appropriate Canadian, BC, and CRD methodologies.

Develop a comprehensive list of adaptation strategies for each type of impact that are appropriate to the characteristics of the GVWSA and the mandate and capabilities of CRD Integrated Water Services.

Methodology

The development of the climate change adaptation strategy for the GVWSA will be guided by the *Implementation Framework for Planning Climate Change Adaptation at a Watershed Scale* (http://www.ccme.ca/files/Resources/climate_change/Climate%20Change%20Adaptation%20Framework%2010_e%20PN%201529.pdf) published by the Canadian Council for Ministers of the Environment (CCME) in 2015.

Climate change projections will be obtained from the Pacific Climate Impacts Consortium (PCIC) at UVIC and ClimateBC at UBC. CRD staff specializing in climate change will be consulted in the assembly and review of the climate change data.

A list of potential impacts of climate change relevant to the characteristics of the GVWSA will be developed using the PCIC and appropriate BC Government websites, published reports specific to southwestern BC and the US Pacific Northwest and consultations with experts.

The assessment of vulnerability and risk will utilize:

- Detailed information on the characteristics of the GVWSA developed as part of the update of the watershed assessment
- Tools for climate change vulnerability assessments for watersheds (CCME)
- A climate change vulnerability assessment for BC's managed forests produced by the BC Ministry of Forests, Lands, and Natural Resource Operations (includes 3 case studies)
- Pacific Northwest Climate Change Vulnerability Assessment website (ecosystems and species)
- US Environmental Protection Agency Adaptation Strategies Guide for Water Utilities
- Appropriate components of the BC Source to Tap Assessment Guidelines (being used for the update of the watershed assessment for the GVWSA)
- The ecological risk assessment process for the GVWSA (in the 1999 Strategic Plan for Water Management) updated to reflect the CRD standard for risk assessment and management and integrate climate change
- Other relevant reports and publications
- Consultation with experts

A list of adaptation strategies and actions applicable to the GVWSA will be developed from the websites and reports listed above and other appropriate sources. Strategies and actions will be prioritized using the findings of the assessment of vulnerability and risk.

A monitoring and review component will be developed using guidance from the *Implementation Framework for Planning Climate Change Adaptation at a Watershed Scale* (CCME 2015).

Overview of Current Conditions in the GVWSA

Climate and Biogeoclimatic Subzones and Variants

Geology

Terrain

Hydrology

- Streams
- Wetlands
- Water Bodies

Terrestrial Ecosystems

Forest Characteristics

Wildlife

Fish

Built Features

Disturbance Regimes and Agents

Ecosystem Services

Predicted Changes in Climate

Temperature

Precipitation

Snowfall

Growing degree days

Heating degree days

Frost-free days

Type, magnitude, and frequency of storm events

Length and severity of summer droughts

Influence of range of variation and uncertainty

Potential Climate Scenarios

Potential Impacts

Hydrology

- Streams
- Water Bodies
- Wetlands

Terrestrial Ecosystems and Species

Fish

Disturbance Regimes and Agents

Cumulative Effects

Exceeding Thresholds

Assessment of Vulnerability

Review of past effects of extreme weather events

Overview of climate scenarios that form the basis of assessment

Ecosystems and species sensitive to climate change scenarios

Ecosystems, species and areas vulnerable to changes to the frequency, magnitude/severity, and spatial scale of disturbance regimes and agents

Factors contributing to resilience/adaptive capacity

Potential Changes to ecosystem characteristics and functions

Assessment of Risks

Examine likelihood of changes in relation to consequences to identified values

e.g., Water Quality

- Particulates (inorganic and organic)
- Nutrients
- Pathogens (disease causing organisms)

- Colour
- Taste and odour
- Algal toxins

Adaptation Strategies and Actions

Proposed strategies and actions by category (e.g., hydrology, forests) to address vulnerabilities and risks, improve resilience and adapt to predicted conditions

Barriers to adaptation

Implementation

Priorities as a result of vulnerability and risk

Integration into divisional planning, budgets, programs, and activities

Implementation schedule

Monitoring

Indicators of climate change

Potential research projects

Ongoing monitoring of the success of adaptation

Addressing new information

References Cited

Appendices

Glossary

Tables showing the relationships among climate change parameters, impacts, vulnerability/risk, and adaptation strategies and actions

CAPITAL REGIONAL DISTRICT - INTEGRATED WATER SERVICES

Water Watch

Issued: March 29, 2016

Water Supply System Summary:

1. Useable Volume in Storage:

Reservoir	March 31 5 Year Ave		March 31/15		March 27/16		% Existing Full Storage
	ML	MIG	ML	MIG	ML	MIG	
Sooke	92,727	20,400	92,727	20,400	92,727	20,400	100.0%
Goldstream	9,356	2,058	8,723	1,919	8,934	1,965	90.9%
Total	102,083	22,458	101,450	22,319	101,661	22,365	99.1%

2. Average Daily Demand:

For the month of March	97.2 MLD	21.38 MIGD
For week ending March 27, 2016	96.9 MLD	21.32 MIGD
Max. day March 2016, to date:	102.1 MLD	22.47 MIGD

3. Average 5 Year Daily Demand for March

Average (2011 - 2015)	100.9 MLD ¹	22.20 MIGD ²
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¹MLD = Million Litres Per Day ²MIGD = Million Imperial Gallons Per Day

4. Rainfall March:

Average (1914 - 2015):	161.7 mm
Actual Rainfall to Date	256.9 (159% of monthly average)

5. Rainfall: Sep 1 - Mar 27

Average (1914 - 2015):	1398.3 mm
2015/2016	1720.7 (123% of average)

6. Water Conservation Action Required:

If each of us save a little, together we can save a lot.

Check our website at www.crd.bc.ca/water for more information.

If you require further information, please contact:

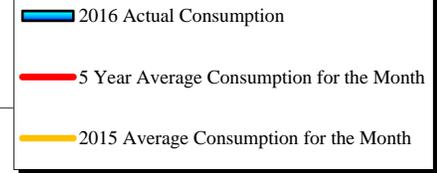
Ted Robbins, B.Sc., C.Tech
General Manager, CRD - Integrated Water Services
or

Deborah Walker
Demand Management Coordinator

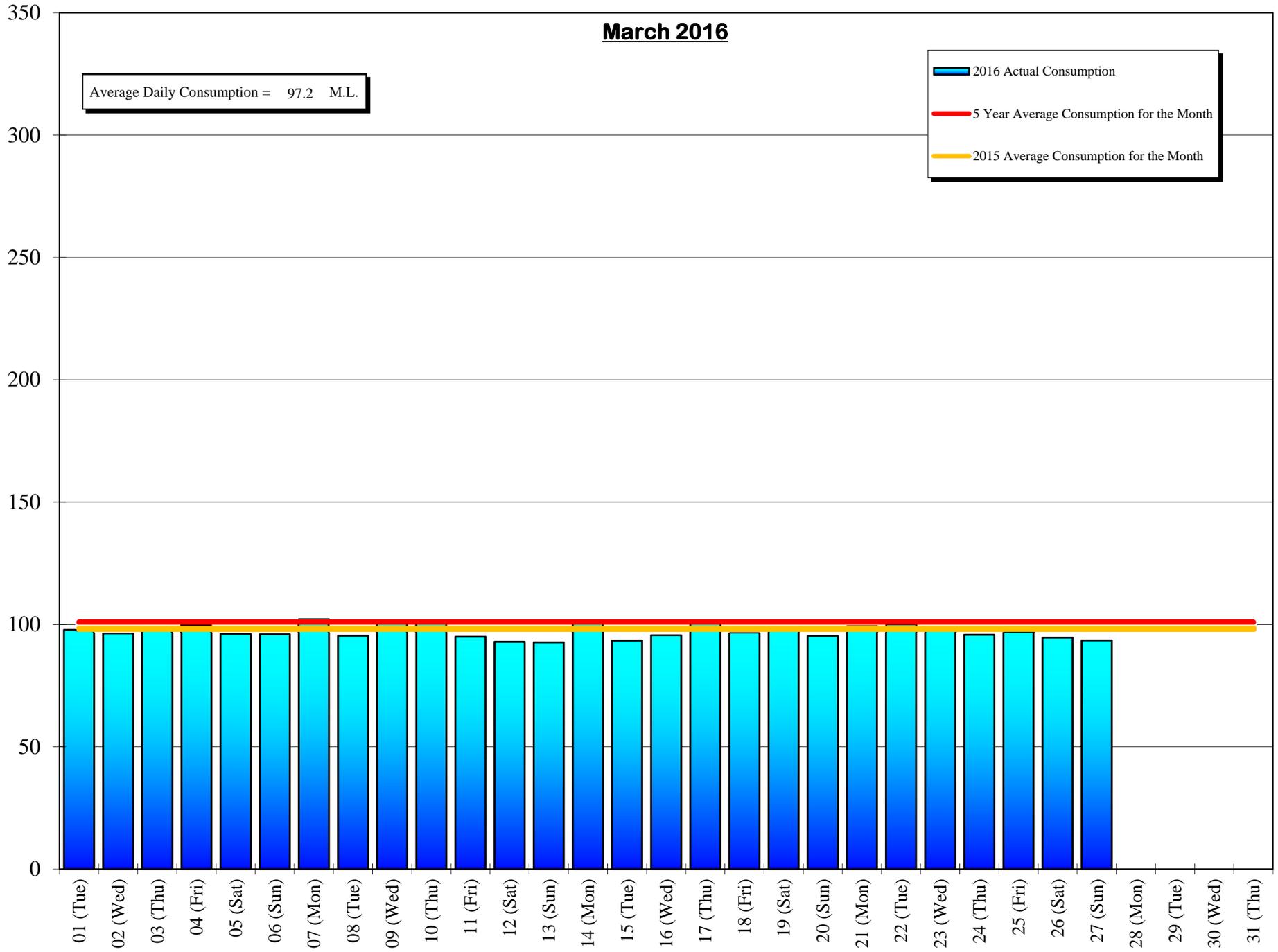
Capital Regional District Integrated Water Services
479 Island Highway
Victoria, BC V9B 1H7
(250) 474-9600

March 2016

Average Daily Consumption = 97.2 M.L.



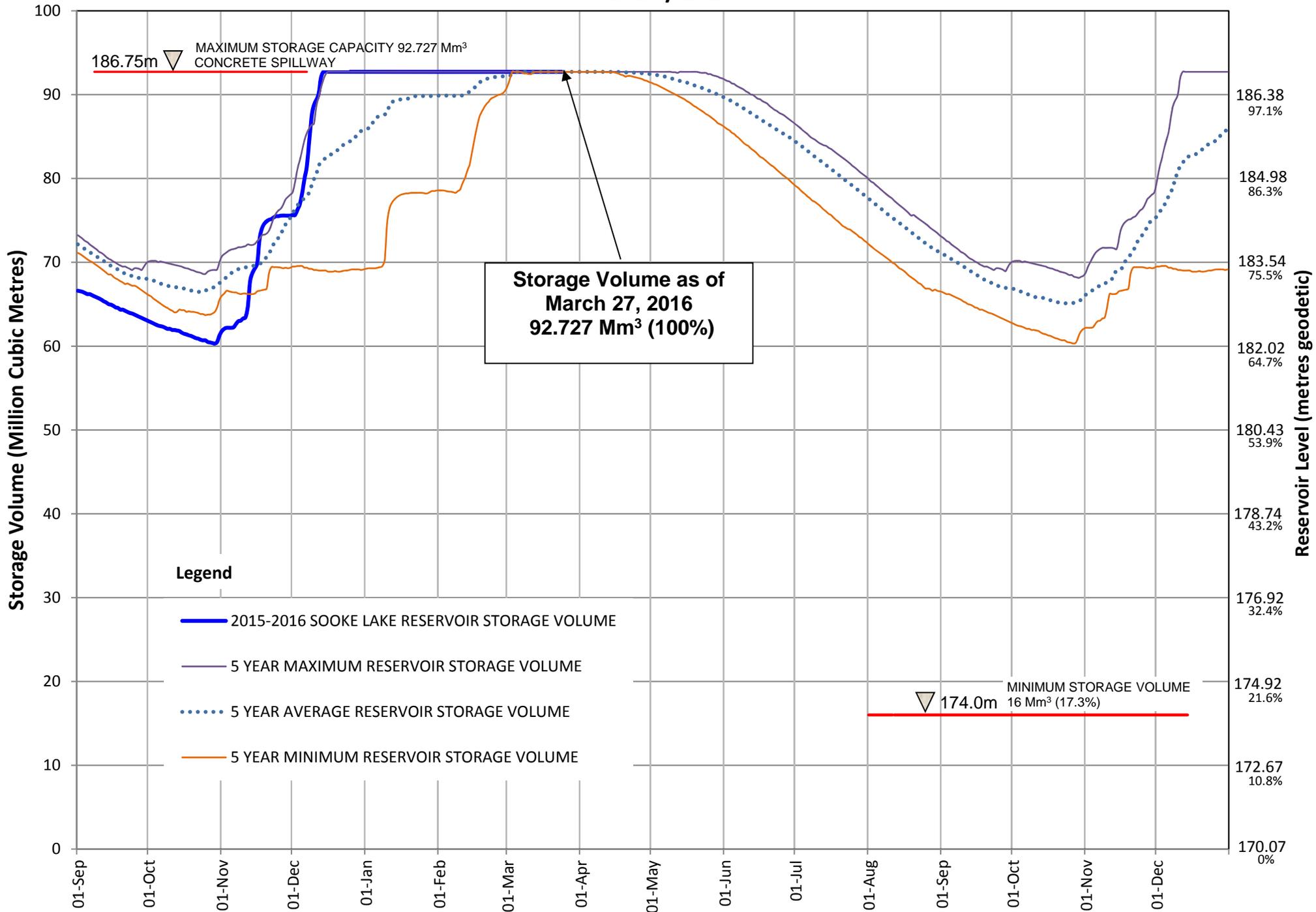
Consumption (Million Litres)



Day

SOOKE LAKE RESERVOIR STORAGE SUMMARY

2015 / 2016



SOOKE LAKE RESERVOIR STORAGE 18 MONTH NORMAL RANGE

