

**Drinking Water  
Management Plan**  
for the GVWD and Member Municipalities

**drinking  
water**  
*quality on tap*



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vancouver**

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# Drinking Water Management Plan

## for the GVWD and Member Municipalities

### 1.

### SUSTAINABILITY

Sustainability encompasses economic prosperity, community well-being and environmental integrity for today's and future generations. It is the core vision for the GVRD. The Sustainable Region Initiative identifies the need for a series of management plans to address delivery of services according to the principles of sustainability. The plans set strategic directions and formalize policies and actions for regional mandates that provide for the health and economic benefit of the region, and that take a long-term view to ensure that resources used today are still available for future generations.

### Sustainability and the DWMP

The Drinking Water Management Plan (DWMP) provides the direction and priority for drinking water initiatives in a sustainable region. It makes connections between a healthy watershed ecosystem as the basis for a secure drinking water supply, investments in infrastructure and conservation to assure community needs for quality and affordability, and improvements in efficiency to create cost-effective alternatives for businesses that may not need potable water for all activities.

The DWMP ensures that our region's water needs will be met affordably and sustainably for at least the next 25 years. This will be done through increased use of the Coquitlam source, while simultaneously increasing water releases to the Coquitlam River to improve its ecosystem health and fisheries resources, and expanding storage in the Seymour and Capilano Watersheds. To secure a clean supply of water today and in the future, the watersheds will be managed to reflect and advance the region's commitment to environmental stewardship, including protecting the watershed lands and their biological diversity. This level of protection also helps to reduce water treatment costs, because it minimizes the chemicals and resources needed to treat water to meet drinking quality standards and consequently minimizes the need to treat residuals.

The investments in treatment, supply and water conservation programs included in this plan will increase the costs of drinking water, but these additional costs are outweighed by consistently higher quality water and improved supply reliability. Through infrastructure management, water pricing, and funding initiatives, the DWMP ensures that future water costs will be predictable and affordable.

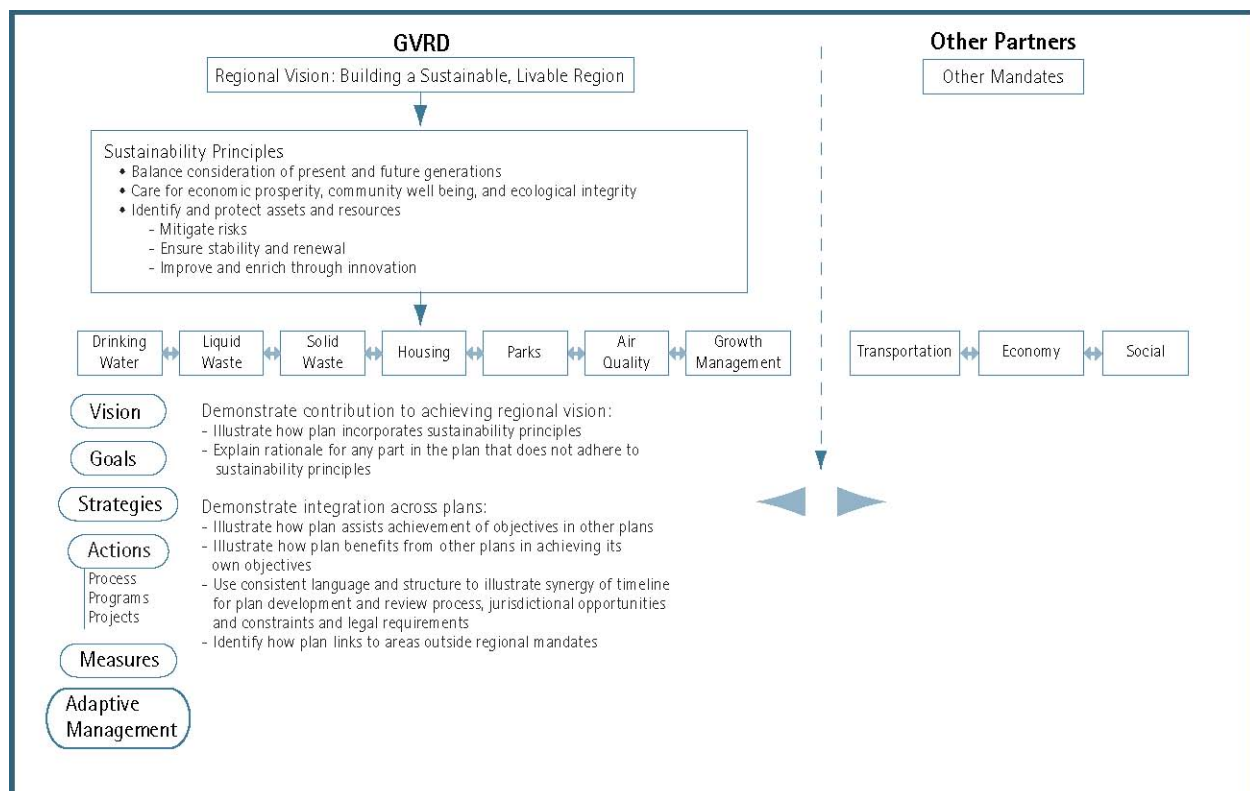
## 1. SUSTAINABILITY

The region is moving toward managing water by encompassing the full water cycle. This means considering the relationships between stormwater, drinking water and liquid waste, which traditionally have been treated as separate aspects of water management. The actions in the DWMP also reflect relationships between water and other resources. For example, although the leakage rates in the water system are reasonably low, the plan takes further action to cost-effectively reduce leakage, thereby lowering energy used for pumping while simultaneously improving service levels. To further reduce resources and energy needed to operate the water treatment and distribution system, the DWMP includes actions to match water quality to usage requirements by assessing alternative sources of water (rainwater, grey water, and wastewater) for non-potable requirements. It also includes actions to eliminate once-through cooling water and to require water efficient fixtures in new construction and renovations.

Our world is constantly changing. To ensure that clean and abundant water remains a legacy of this region, the DWMP will use an adaptive management approach to identify and respond to new challenges and to pursue new opportunities. To this end, the DWMP will assess the potential impacts of climate change and provide updated analyses every two years. It will continue to conduct hazard assessments and improve emergency and security programs. It will consolidate asset management information to facilitate long-range, full life cycle cost assessment and funding decisions.

### LINKS BETWEEN THE DWMP AND OTHER REGIONAL PLANS

The Sustainable Region Initiative provides the framework for linking the DWMP with other regional plans such as the Growth Management Plan, the Solid Waste Management Plan, the Air Quality Management Plan, and the Liquid Waste Management Plan (LWMP). The framework links the regional vision, sustainability principles and the execution of individual plans (chart below). It also establishes links across regionally mandated plans and with other initiatives beyond regional mandates that are executed by other partners.



### Sustainable Region Initiative—Framework for Regional Mandates

## 1. SUSTAINABILITY

The other regional plans benefit drinking water as they reduce pollution of land, air and water so that the GVWD and others can continually use the surface and groundwater resources of the region. By accommodating most of the new population in the existing built-up urban area, as called for in the Growth Management Plan, provision of drinking water services is cost-effective because it builds on existing infrastructure. LWMP and DWMP actions to utilize more stormwater, grey water, and wastewater for outdoor irrigation help to reduce the amount of drinking water used for these purposes. DWMP and LWMP actions to reduce indoor water use decrease the flows to wastewater treatment plants and discharges to the environment.

### **BUILDING A SUSTAINABLE LIVABLE REGION**

Building a sustainable, livable region is the overarching regional vision. Consequently, social, environmental and economic sustainability is a fundamental objective in all GVRD activity, from the corporate level through to the service delivery mandates, and from management plans to partnerships with external agencies for actions beyond the GVRD mandates. The DWMP will contribute to a healthy, sustainable region through wise stewardship of our drinking water resources.

### **GOALS OF THE DWMP**

The Drinking Water Management Plan has three primary goals:

- **Provide Clean, Safe Drinking Water**

Reliable access to adequate quantities of clean, safe drinking water is a basic human right. The GVWD and its member municipalities are committed to providing clean, safe drinking water to the citizens and businesses of Greater Vancouver.

- **Ensure the Sustainable Use of Water**

By ensuring the sustainable use of water, the region can continue to grow and prosper while sustaining our quality of life and our environment.

- **Ensure the Efficient Supply of Water**

Efficient supply of water optimizes capacity and defers the need for new infrastructure and new water supply sources. Equally important is renewing and replacing the region's aging water transmission and distribution systems in an affordable way.

The key strategies and actions to achieve the goals of the DWMP are set out in Section 3. All DWMP actions will be initiated within two years of the plan being approved and substantially complete within five years of plan approval.

## 2.

## DRINKING WATER SUPPLY IN GREATER VANCOUVER

The Greater Vancouver Water District (GVWD) and member municipalities work as partners to supply clean, safe drinking water to two million people and associated businesses. The current sources of water supply are the mountainous Capilano, Seymour and Coquitlam Watersheds. Dams in each watershed impound water and provide releases to the drinking water system and to downstream rivers for fish and wildlife resources. Monitoring water from source to tap ensures that water quality and health protection standards are met. Because of these multiple barriers to the risk of contamination, the water supplied to consumers in Greater Vancouver is generally excellent. Programs currently being implemented such as construction of a filtration plant for the Seymour and Capilano sources will further reduce the risks to water quality.

### Goal 1: Provide Clean, Safe Drinking Water

There are two strategies to achieve this goal: **Use a Risk Management Multi-barrier Approach from Source to Tap**, and **Identify and Secure Additional Water Supplies for the Region**.

#### Strategy #1: Use a Risk Management Multi-barrier Approach from Source to Tap

Beginning with protected source watersheds, the region's water supply system provides multiple barriers to contamination, and programs currently under way such as the Seymour-Capilano Filtration Project, will further reduce the risks to water quality. This strategy has the following actions in bold text:

#### GVWD actions:

- **The GVWD will continue to protect source water quality by managing watersheds in accordance with the Watershed Management Plan.** The GVWD's closed watershed approach minimizes human access and human activity and significantly reduces the risk from microbiological or chemical contamination and fires.
- **The GVWD will complete the Seymour-Capilano Filtration Project.**
- **The GVWD will monitor water quality source to tap and use this information to optimize source water disinfection, operation of the GVWD water system, and rechlorination programs.**
- **The GVWD will continue to preserve water quality in the GVWD system through proactive maintenance programs.**
- **The GVWD will improve the primary disinfection treatment of Coquitlam source water for Cryptosporidium.** The water treatment plant at the Coquitlam source uses ozone for primary disinfection, soda ash for corrosion control and chlorine for secondary disinfection. This treatment addresses the known risks to microbiological water quality (such as giardia). However, this occurs with the awareness that the levels of cryptosporidium in the source water are very low and that ozonation is only partially effective in disinfecting for cryptosporidium. New research suggests that the primary disinfection treatment of Coquitlam source water for cryptosporidium needs to be improved. Therefore, ultraviolet treatment is being added to this source.

#### partner actions:

- **The GVWD will work with municipalities to establish water quality monitoring systems in the municipal distribution system and at the tap and use this information to optimize water quality through operation of the municipal water system.**
- **The GVWD will work with municipalities to preserve water quality in the distribution system through proactive maintenance programs.**

#### assessments:

- **The GVWD and its member municipalities will reassess the secondary disinfection system after completion of the Seymour-Capilano Filtration Project.**
- **The member municipalities and the GVWD will, over the next five years, examine the feasibility of implementing, administering and maintaining backflow prevention and cross-connection control programs to protect the public water system from hazards originating on customers' premises or from temporary connections.**

### Strategy #2: Identify and Secure Additional Water Supplies for the Region

By making greater use of the storage capacity of Coquitlam reservoir, our present sources of water offer a secure supply that will meet our needs until about mid-century. This strategy has the following actions shown in bold text:

#### GVWD actions:

- **The GVWD will implement works to improve water quality, including completion of the Seymour-Capilano Filtration Project, the new Coquitlam intake and other improvements in the 10-year Capital Plan.** Some projects in the GVWD Long-range Plan will increase the supply capacity of the regional water system. These include the following projects:
  - The Capilano pump station that is currently being built as part of the Seymour-Capilano Filtration Project will be completed in 2005 and fully operational by 2009. It will increase the ability to draw down and supply water from the Capilano Reservoir.
  - Increases to the capacity of water treatment from the Coquitlam source starting in 2011.
  - Construction of a new water intake at the Coquitlam source, along with associated intake area transmission improvements will increase the supply capacity of the Coquitlam system.
- **The GVWD will provide for additional capacity by securing full access to the Coquitlam source under the Coquitlam Water Use Plan, and then expanding storage capacity in Seymour and Capilano Watersheds.** A water use planning process has been completed that allocates the majority of Coquitlam Reservoir water to the GVWD. By fully utilizing the increased allocation, the region's water needs should be met until at least mid-century. Beyond mid-century, there are highly ranked options to expand storage capacity in the Seymour and Capilano Watersheds that would extend the supply capacity beyond 2100. These supply options are secured for waterworks purpose by a water reserve under the Water Act.

#### assessment:

- **As new information on the potential impacts of climate change becomes available, the GVWD will provide updates in the DWMP progress reports.** Studies show that climate change could potentially reduce the water supply capacity of the GVWD's watersheds and advance the date when additional supplies are required by up to 10 years in a worst-case scenario. The DWMP will continue to assess the potential impacts of climate change and provide updated analyses in progress reports every two years.



## Goal 2: Ensure the Sustainable Use of Water

There are two strategies to attain this goal—Use Drinking Water Sustainably and Match Water Quality to Usage Requirements.

### Strategy #1: Use Drinking Water Sustainably

The GVRD and its member municipalities are committed to pursuing demand management strategies where using water more sustainably will contribute to economic prosperity, community wellbeing and environmental integrity. This strategy has the following actions shown in bold text:

#### GVWD action:

In developing the DWMP, an economic analysis was used to compare a range of demand management measures with each other and with water supply expansion projects. This analysis concluded that certain demand management measures were cost-effective and sustainable and these have been included as actions in the DWMP.

- **In partnership with member municipalities and non-government organizations, the GVWD will deliver an education program promoting behaviour change and sustainable use of water.** For example, building owners/operators can be informed of measures to improve water efficiency and/or to reduce demand for drinking water as well as for other resources such as energy and thereby reduce costs, wastes, and environmental impacts.

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#### pricing action:

- **The GVWD and its members commit to achieving a retail water rate structure that reflects the long-run marginal cost of regional water supply.**

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#### partner actions:

- **The GVWD will facilitate collective development of consistent municipal bylaws to eliminate once-through cooling water, and require water efficient fixtures in new construction and renovations.**
- **The GVWD will facilitate the collective development of consistent municipal bylaws to improve implementation and enforcement of the Water Shortage Response Plan.**

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#### assessments:

- **In partnership with member municipalities, the GVWD will assess the merits of standardized industrial, commercial and institutional water audits for the largest 25 percent of business water users as the basis for initiating water conservation improvements.**
- **The member municipalities will assess the merits of developing residential water metering programs, and municipal rebate programs for water efficient fixtures and appliances.** Residential water metering is done for three reasons equity in billing, water conservation and improved system information. In this region, achieving better equity in billing is a significant consideration in assessing metering. Analysis indicates that the economic benefits of residential metering are roughly equal to half of the costs on a regional basis. However, the actual costs and benefits for each municipality can vary significantly. Therefore, each municipality should complete its own business case.

### Strategy #2: Match Water Quality to Usage Requirements

Many of the purposes for which drinking water is currently used do not require water of drinking quality. This strategy has the following actions shown in bold text:

#### GVWD action:

- **The GVWD will work with the Greater Vancouver Sewerage and Drainage District to complete the Annacis Wastewater Treatment Plant pilot reclamation project and assess the potential for its expansion.** This pilot project reclaims wastewater for use by nearby industries.

#### partner actions:

- **The GVWD will work with health authorities to request changes to the provincial health regulations to allow specific residential and commercial uses of non-potable water (grey water and rainwater).** About 580 litres per capita of potable water is used by residents and businesses on an average day in this region, but not all of it needs to be of drinking water quality. In households for example, less than 10 percent of the water used is actually for drinking, cooking, washing foods, etc. Potable water, however, is used for virtually all of our daily water use activities. Toilet and urinal flushing, lawn or golf course irrigating and car washing are examples where water of drinking quality may not be necessary. This represents a significant potential opportunity to reduce waste and improve water efficiency.
- **In partnership with business associations and/or non-government organizations, the GVWD will facilitate networking for the reuse of process wastewaters.**

#### assessment:

- **The GVWD will investigate the feasibility of substituting alternatives to drinking water for specific applications (e.g. use of rainwater stored in rooftop cisterns for irrigation) and locations (e.g. river water or sea water for use in waterfront businesses).** Many communities around the world successfully use rainwater, grey water, surface water, and recycled and reclaimed water in place of drinking water. Greater Vancouver is examining the potential for substituting non-potable water for uses that do not require drinking water quality. Examples include buildings that use grey water for toilet flushing and outdoor irrigation.



### Goal 3: Ensure the Efficient Supply of Water

There are two strategies to attain this goal—Manage Infrastructure Proactively, and Optimize Capacity through Effective Partnerships.

#### Strategy #1: Manage Infrastructure Proactively

Managing infrastructure proactively will ensure cost-effective, reliable and sustainable water supply. This strategy has the following actions shown in bold text:

#### GVWD actions:

- **GVWD will undertake the following Operating Plan actions:**
  - **Consolidate databases to optimize decision making on maintaining and funding assets.**
  - **Renew and replace aging infrastructure to provide appropriate service levels and assist in leak reduction.**
  - **Leak identification and repair programs and implementation of operational programs to reduce leakage (such as pressure reduction/management).**
- **The GVWD will continue to conduct hazard assessments and implement emergency and security program improvements.**

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#### pricing actions:

- **Given the water system is aging and infrastructure renewal and replacement costs are projected to increase, the GVWD will use the full life cycle cost of assets to determine infrastructure funding requirements and ensure sustainable infrastructure funding is in place.**
- **GVWD will establish a GVWD asset management reserve fund to ensure appropriate levels of funds are either spent on asset management or set aside in the reserve every year (to help ensure sustainable asset management).**

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#### partner actions:

- **Municipalities will continue leak identification and repair programs and implement operational programs to reduce leakage (such as pressure reduction/management).**
- **Municipalities will renew and replace aging infrastructure to provide appropriate levels of service and to assist in leak reduction.**

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#### assessments:

- **The GVWD will follow sustainability principles in planning and implementing processes, programs and projects.** This action implements the overarching regional vision: building a sustainable, livable region. For example, sustainability principles and social, economic and environmental aspects are being incorporated into the design and construction of the Seymour-Capilano Filtration Project.
- **The GVWD will ascertain the costs and benefits of leak reduction programs specific to the GVWD water system and cost structure, and reassess whenever there are significant changes in the economic value of water or the costs of leak reduction initiatives.**
- **Municipalities will ascertain the costs and benefits of leak reduction programs specific to their water system and municipal setting, and reassess whenever there are significant changes in the economic value of water or the costs of leak reduction initiatives.**

## Strategy #2: Optimize Capacity through Effective Partnerships

Gaining efficiency and optimizing capacity through more effective partnerships enables more to be done with less. This strategy has the following actions shown in bold text:

### GVWD actions:

- **GVWD Operating Plan will include:**
  - **Planning and construction of GVWD facilities to meet the projected growth in population and economic activity in the approved Growth Management Plan.** The GVWD develops its water supply facilities to meet the projected growth set out in the Growth Management Plan. Municipalities need to ensure their regional context statement that defines how their municipality conforms to the Growth Management Plan is kept up to date. The GVWD will only plan and construct facilities and approve connections to serve development consistent with the Growth Management Plan.
  - **A program to identify and implement improvements to the GVWD wholesale water metering system to ensure appropriate levels of service.** Recognizing that the GVWD's budget and water rate will be increasing significantly, additional work is needed to identify and implement improvements to the GVWD wholesale water metering system.
- **To facilitate the efficient planning of the future water system, the GVWD and member municipalities will follow the approved principles defining what facilities will be owned and operated by the GVWD.**

### pricing actions:

- **The GVWD will implement seasonal pricing on its wholesale water sales over a three-year period beginning in the 2006 budget year. In 2008, the summer price will be 1.25 times the price during the remainder of the year (fall/winter/spring).** In the GVWD, the costs of providing water in the peak summer season are relatively higher than at other times of the year. Studies show that pricing GVWD water on a seasonal basis would be a more fair and equitable method of pricing water sales to the municipalities than the current pricing structure and would help to conserve water in the summer.
- **The GVWD to increase its operating reserve to 15 percent of its annual operating budget with a phase-in period.** The current GVWD operating reserve needs to be increased to cover the potential shortfalls in revenue due to the lower than forecasted water sales that occur during an unusually cool and wet summer.

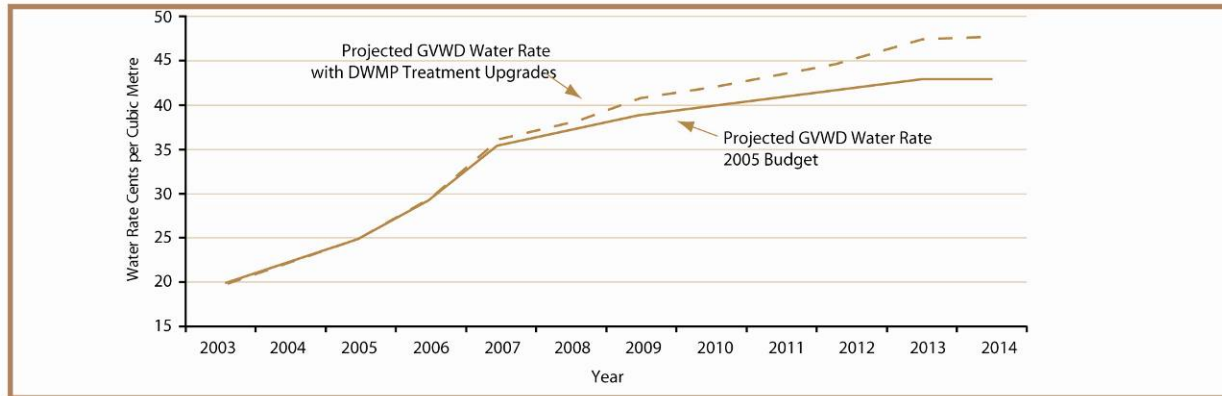
### assessments:

- **The GVWD to establish operating agreements with municipalities to ensure facilities are operated for mutual benefit under normal and emergency conditions and in conformity with the approved Growth Management Plan.**
- **The GVWD and member municipalities to evaluate current sprinkling regulations and options for improvement.** Although the current sprinkling restrictions have contributed to a significant reduction in peak season, peak day and peak hour demands in the GVWD, water usage is highest during the time period that sprinkling is allowed. Studies have shown that a revised sprinkling schedule could reduce the peak day and peak hour flows in the municipal and GVWD water supply systems by about 10 percent. However, further studies are needed to evaluate the practicality and public reaction to any changes.

## 4.

## IMPLICATIONS OF DWMP ACTIONS

Because of the \$600 million cost to construct the Seymour-Capilano Filtration Project, the GVWD's water rate is expected to increase to more than 37 cents per cubic metre in 2008. Except for this filtration project, and the treatment upgrades at the Coquitlam source (to meet new Guidelines for Canadian Drinking Water Quality), the strategies and actions in this plan are not expected to significantly impact the GVWD's budget over the next ten years, but are expected to reduce significantly the long-term demand for water. As these demand reductions are realized and documented, the GVWD and member municipalities will be able to defer or delay the need for additional supply system infrastructure such as pump stations, capacity increases and the development of additional water supplies.



Greater Vancouver Water District—Water Rate Forecasts

## 5.

## PERFORMANCE MEASURES

The following performance measures will monitor progress in achieving the goals of the DWMP. Performance should be considered in the context of industry standards and performance by other utilities in other jurisdictions.

### Goal 1: Provide Clean, Safe Drinking Water

- Percentage of water supplied with optimum primary disinfection despite events such as turbidity, power outage or similar event (striving for 100 percent).
- Treated water samples positive for faecal coliforms (striving for zero).
- Treated water samples positive for total coliforms (striving for low percentages).

### Goal 2: Ensure the Sustainable Use of Water

- Per capita water use by residential customers (trend over time and compare to other jurisdictions).
- Per capita water use by all customers (trend over time and compare to other jurisdictions).
- Peak day per capita water use by all customers (trend over time and compare to other jurisdictions).

### Goal 3: Ensure the Efficient Supply of Water

- GVWD Water Rate (trend over time and compare changes in the GVWD to changes in other jurisdictions).
- GVWD budget (trend over time and compare changes in the GVWD to changes in other jurisdictions).
- Infrastructure Leakage Index (trend over time and compare GVWD levels to levels in other jurisdictions).
- Percentage of water supplied that is subject to unplanned supply interruptions (trend over time and compare GVWD levels to levels in other jurisdictions).

## 6.

## ADAPTIVE MANAGEMENT

As the region grows and changes, the science of water management improves, and public values evolve, the DWMP will be reviewed and revised. An adaptive management approach is proposed with a DWMP progress report every two years and a comprehensive review of the plan every five years.

The August 2005 Drinking Water Management Plan has an action to manage watersheds in accordance with the May 2002 Watershed Management Plan. In 2007, based on a comprehensive review, no significant concerns or issues with the watershed management plan were identified. In July 2007 the GVWD Board amended the 2005 DWMP to fully incorporate watershed management by adding the following new Goal:

**Watersheds that provide clean, safe water and are managed and protected as natural assets.**

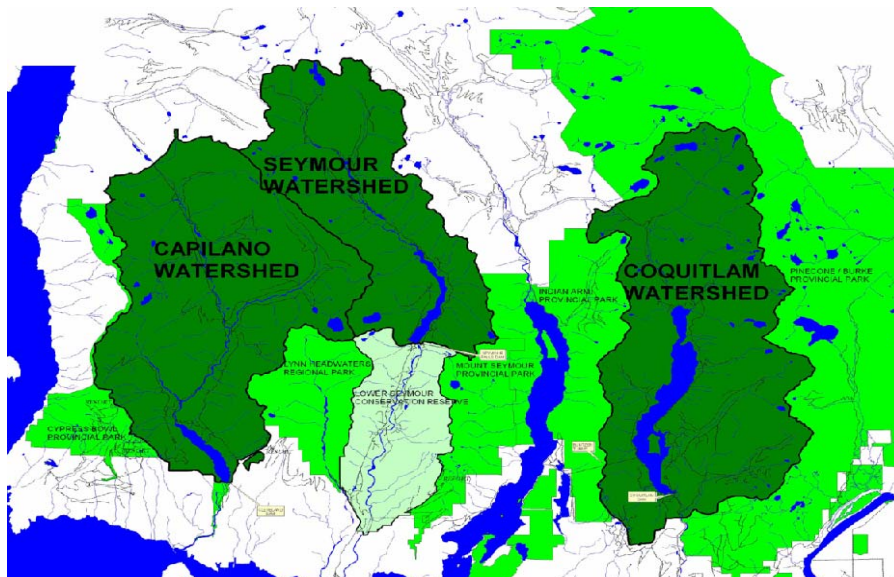
There is one strategy to achieve this goal: *Manage Watersheds to Advance Regional Sustainability.*

**Strategy: Manage Watersheds to Advance Regional Sustainability**

Protecting watershed lands and their biological diversity as part of the regions' green zone significantly advances regional sustainability (Figure - Protected Watersheds and Adjoining Green Zone Areas). This strategy has the following actions:

**GVWD actions:**

- **The GVWD will manage the watersheds with a minimum intervention approach and let natural processes occur.** Human intervention is only necessary for building and operating water infrastructure or if there are risks to human safety or water quality.
- **The GVWD will monitor and manage the watersheds to minimize risks to water quality.** Monitoring improves system management by providing information on watershed stream flows, reservoir water quality, and watershed fire risk.
- **The GVWD will return areas disturbed by human activities as close as possible to the pre-disturbance state.** Watershed roads that are no longer required are deactivated to minimize the risk of landslides, erosion and reduce long-term maintenance costs.



**Protected Watersheds and Adjoining Green Zone Areas**

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