

# Seymour - Capilano Filtration Project

Metro Vancouver and its member municipalities are committed to providing clean, safe drinking water to the citizens and businesses of the Lower Mainland at a reasonable cost. By ensuring the sustainable use of water, the region can continue to grow and prosper while maintaining our quality of life and our environment.

Key components to regional drinking water treatment are: **protecting the source (watersheds); treating water at the source and disinfecting at further points in the distribution system; cleaning and maintaining the distribution system; and monitoring water quality at all stages.**

Most water treatment facilities in the Lower Mainland are owned and operated by Metro Vancouver.

## Drinking Water Filtration Project

Metro Vancouver's drinking water comes from reservoirs in three watersheds – Capilano, Seymour and Coquitlam. From there it is conveyed by regional water mains to member municipalities for distribution to homes, businesses and industry.

The Seymour-Capilano Filtration Plant will treat water from both the Seymour and Capilano sources. The plant is located in the Lower Seymour Conservation Reserve (LSCR). In order to treat water from both sources at one plant, water will be conveyed between Capilano and Seymour through underground twin tunnels.

## Drinking water treatment

Treating water in the distribution system further ensures the high quality of our region's drinking water. Metro Vancouver uses drinking water treatment suitable for the water quality in each watershed.

## Protecting the source

Protecting our three watersheds (Capilano, Seymour and Coquitlam) is crucial to ensuring the quality of our drinking water. Metro Vancouver's closed watershed policy provides a barrier against water contamination from human sources.

## Why Filtration?

Filtration improves drinking water by removing turbidity and micro-organisms, and by reducing the amount of chlorine required to maintain water quality. More details are on the back of this fact sheet.

## Schedule of Activities

Construction of pumping station, energy recovery facility and break head tank (Capilano)	Complete
Construction and commissioning of filtration plant (Seymour)	Complete
Turbine supply and installation	2012
Construction of twin tunnels	2013

Metro Vancouver gratefully acknowledges the Government of Canada and the Province of British Columbia for the financial support provided to the Seymour-Capilano Filtration Plant Project through the Canada/British Columbia Infrastructure Program.

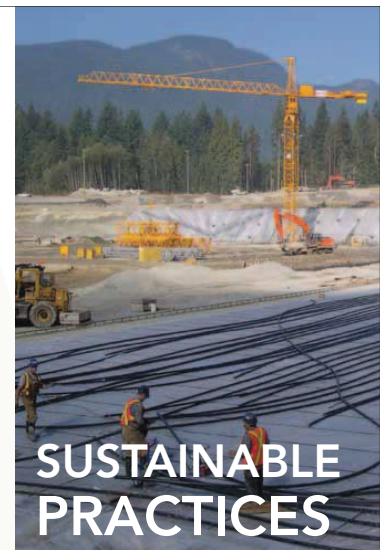
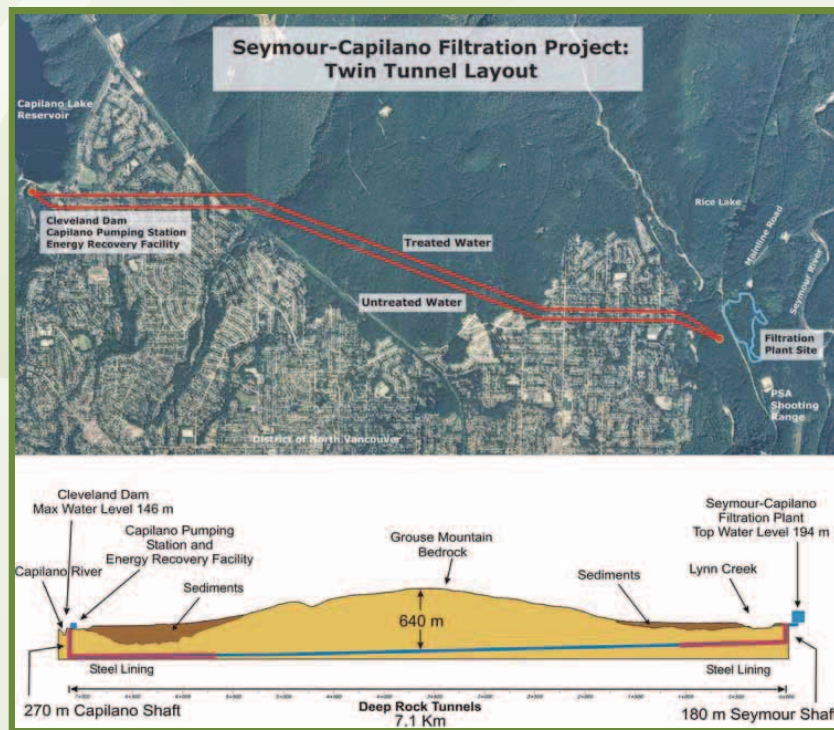


Tour of the SCFP – Flocculation area

# Water quality concerns, causes and solutions

Metro Vancouver serves a large population (2.3 million and growing) with high quality drinking water by successfully addressing the following concerns:

CONCERN	CAUSE	SOLUTIONS
<b>Turbidity:</b> Cloudy, coloured or dirty water from fine particles like clay or silt	Heavy rainfall causes landslides and erosion of stream banks in the watershed	Filtration of Seymour and Capilano source water will reduce turbidity  Draw water from unaffected sources until turbidity levels have reduced
<b>Waterborne parasites:</b> Giardia and cryptosporidium	Parasites from animals in watersheds occur naturally in surface waters, at low levels	Watersheds are kept closed to the public  Primary disinfection at source
<b>Bacteria regrowth:</b> in the distribution system between treatment plants and homes and businesses	Chlorine depletes along the distribution system  Sediments settle out of water, creating an environment for bacteria to grow	Additional chlorine is added along the distribution system  Flushing and cleaning programs of pipes and reservoirs eliminate silt
<b>Corrosion:</b> Staining of plumbing fixtures, health and environmental concerns, and economic impact	Natural acidity in water corrodes metal plumbing and piping and leaches copper into the water system	pH* adjustment (corrosion control) at facilities for all three water sources  * where pH is a measure of acidity
<b>Chlorination:</b> Chlorination disinfection by-products	Produced by chlorine reacting with organic matter (e.g. tiny plant particles) in the water	Filter the water to reduce the level of organic matter.  Use ozone and UV to reduce use of chlorine for treatment



## SUSTAINABLE PRACTICES

In accordance with Metro Vancouver's Sustainable Region Initiative, the project used sustainable building and environmental technologies and practices.

They include:

- Protecting sensitive habitat – including nesting surveys prior to construction to ensure minimal impact
- Using EcoSmart™ concrete to reduce greenhouse gases related to cement production
- Managing stormwater by using best practices for reducing run-off
- Using green roof technologies for the roof of the clearwells and for the Filtration Plant Operations and Maintenance Centre
- Using ground source energy to heat and cool the facility (geothermal installation pictured above)
- Taking advantage of natural processes such as daylight and a natural ventilation system
- Recycling construction materials
- Managing traffic – performing brake inspections on loaded trucks leaving the site, and improving signage and intersection control
- Reducing truck traffic by over 75,000 trips through the reuse of excavated gravel from a nearby pit in the LSCR, along with on-site batching of concrete, which minimizes air quality impacts on North Vancouver roads
- Conserving energy and water
- Re-vegetating the site with native plant species post-construction
- Creating additional opportunities for recreation and education.



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2004



2006



2008



2010

## How does the water filtration plant work?

Water from the Seymour Reservoir is piped via an existing 2.3 metre-diameter water main to the filtration plant. The reservoir is approximately 11 kilometres north of the plant.

At Capilano, a new pump station will pump water from the Capilano Reservoir, through the untreated water tunnel, to the filtration plant in the LSCR.

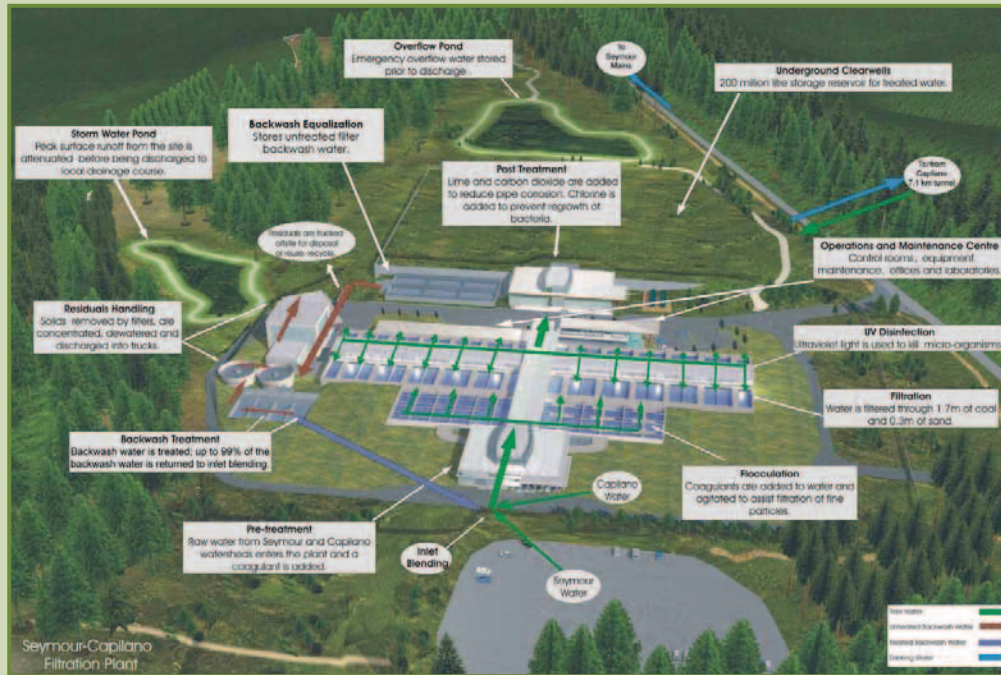
When water enters the filtration plant, it is filtered, disinfected with ultraviolet (UV) light and chlorine, and temporarily stored in the clearwells (see plant layout on the right). The plant is designed to treat water from both the Seymour and Capilano sources.

At Capilano, an energy recovery facility and break head tank (located near the Capilano River Regional Park public parking lot) will recover excess energy from the treated water in the gravity-fed tunnel (Seymour is at a higher elevation than Capilano) and reduce the pressure of the water before it enters the Capilano distribution system. The recovered energy will produce electricity, which will be used by Metro Vancouver to offset power required for the Capilano pumping station.

All construction sites have been, or will be, replanted with native vegetation.

### The twin tunnels

Water from the Capilano Reservoir will be pumped through a 3.8 metre-diameter tunnel to the filtration plant in the LSCR. From there, the water will be filtered and disinfected, and returned to Capilano by gravity through a parallel tunnel of the same size. The twin tunnels are being constructed and when complete will be approximately 7.1 kilometers long and 180-640 metres underground. (See back page for diagram.)



## Filtration Plant

The Seymour-Capilano Filtration Plant will filter up to 1.8 billion litres of water per day, from both the Seymour and Capilano sources. The filtration plant facilities at Seymour, together with the adjacent clearwells (underground water storage reservoirs), the overflow pond and two stormwater ponds, encompasses a space of approximately nine hectares. When the project is completed, all construction sites will be fully restored. For example, approximately 75 per cent of the filtration plant site in the LSCR has been replanted with native species.

Facilities related to the filtration plant are required at both sources. They include:

### Seymour side

- filtration plant, located in the LSCR near the Rice Lake gate off Lillooet Road, treats water from Seymour, and by 2013 from the Capilano source
- clearwells, located adjacent to the plant, store treated water for distribution
- twin tunnels (access shaft), located across Lillooet Road from the filtration plant, deep in the rock under Lynn Canyon Park, will convey Capilano water to and from the plant.

### Capilano side

- 16,000 horsepower pumping station located directly below Cleveland Dam will pump Capilano source water to the filtration plant
- energy recovery facility and break head tank located directly north of the parking lot will reduce pressure of water returning to Capilano from the filtration plant, and recover energy (1.7 MW) in the process
- electrical substation, located west of Cleveland Dam, will power the pumping station
- twin tunnels will convey Capilano source water to and from the filtration plant in the LSCR.



UV Unit in Filter gallery

### Sustainable Region Initiative and drinking water treatment

Sustainability at Metro Vancouver means development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It's a balance of environment, social and economic factors.

Sustainability is embedded in the Drinking Water Treatment Program. Some examples include protecting watershed lands, reducing chemical use by using filtration, ozone and ultraviolet light as treatment, designing new facilities using green-building technology, and regular flushing and cleaning of pipes and reservoirs.

### Changes in drinking water quality requirements

The region's Medical Health Officers require that more stringent turbidity standards be met. Turbidity is the level of suspended matter (organic and silt particles) in drinking water. The filtration project is necessary to meet federal and provincial water quality standards which include the Medical Health Officers' requirements.

Metro Vancouver's plan for treating the Seymour and Capilano water sources is to use filtration and UV light as the alternative primary disinfectant to chlorine. Secondary disinfection with chlorine will continue to be used after filtration to safeguard our drinking water as it travels through the distribution system.



Twin tunnels