



Facility Facts

Membrane Filtration

Capacity 21 ML/d

Cost \$16.8 Million

Membrane Cassettes

Number14

Submerged in concrete tanks

System Type

Vacuum, Outside in

System Control

Fully automatic

Membrane Cleaning System

Clean-in-Place (CIP) using sodium hypochlorite (bleach) and citric acid.

Clearwell

Number1

Capacity 2,300,000 litres

..... 22 m diameter

..... 6 m high

Disinfection

Sodium Hypochlorite

Corrosion Control

pH correction and orthophosphate addition.

Standby Generator

Number1

Capacity 400 kW

Fuel Diesel

Eagle Lake Floating Pumps



Operation:

The plant is operated by trained EOCP certified operators who devote their skills and efforts to ensure a safe and dependable water supply.



Placing Generator on Site

Chemical Dosing Tanks

Plant Piping

Filtration Membranes

Project Owner:



District of West Vancouver, BC

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West Vancouver, BC, Canada V7N 3T3
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Main Contractors:



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Consulting Engineers:

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west vancouver

District of
West Vancouver, BC

Eagle Lake Membrane Filtration Facility



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Eagle Lake Membrane Filtration Facility

Water Supply System

The District operates a water supply system that distributes potable water from two sources, namely Eagle Lake and Mottizambert Creek. Treated water is also purchased from Metro Vancouver's Seymour and Capilano sources. By optimizing the Eagle Lake water supply, the District has more control over its water supply operations, reduces its reliance on Metro Vancouver water supply, enhances system operation, improves water quality and saves on water costs in the long term.

Leading-Edge Water Treatment

Owned and operated by the District of West Vancouver, the Eagle Lake Membrane Filtration Facility can process up to 21 ML per day of water. In an effort to provide high quality drinking water with improved taste, this leading-edge water filtration and treatment:

- Removes more waterborne diseases and fine particles than chlorine alone. (99.99% viruses, 99.9% giardia cysts, and 99.9% of cryptosporidium oocysts)
- Virtually eliminates turbidity which is a measure of water clarity.
- Adjusts the pH of our naturally acidic mountain streams to make water less corrosive on household plumbing.
- Reduces chlorine needed while maintaining the same amount of disinfectant protection.
- Reduces the creation of disinfection by-products.
- Minimizes energy consumption in the water treatment process, compared to other filtration technologies, since low head membrane filtration takes advantage of gravity feed through the plant.
- Has more than 99% efficient water filtration, with a two-step membrane filtration system that reduces waste water.

Green Building Features

Several sustainable green building features were included in the building of the Eagle Lake Membrane Treatment Facility:

- An integrated design process reduced the overall building footprint to minimize disturbance to the area.
- Ecosmart concrete with high fly ash content reduces the greenhouse gas emissions associated with the production of the concrete.
- Ultra-low flow plumbing fixtures reduce water use significantly.
- Minimal lighting reduces habitat disturbance.
- Permeable parking areas reduces stormwater runoff.
- Native plant landscaping provides wildlife habitat and eliminates the need for irrigation.
- Blasted rock was crushed into gravel and utilized as trench backfill and in the foundation.
- Excess gravel was used on the Community Centre project.
- Plywood sheets from the construction and membranes packages were donated to Habitat for Humanity for reuse.
- Dedicated hybrid vehicle to be used by the plant operator.

District of West Vancouver

The District of West Vancouver is a waterfront community spanning 89 square kilometers. It is bordered by Howe Sound to the west, the Capilano River to the east and the Coast mountains to the north. The municipality's population is about 45,000.

Water Stewardship Strategy Goals

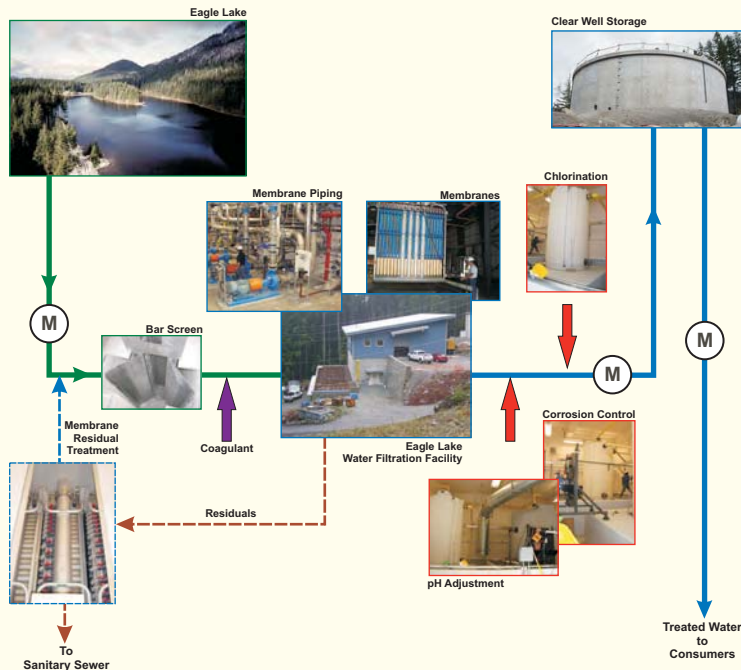
The completion of the Eagle Lake Membrane Filtration Facility is a critical part of the District's long-term water stewardship

plan, which recognizes that water is a valuable commodity and provides a framework for managing this precious resource. Part of the 2006-2008 Sustainable Future Corporate Business, the Water Conservation Strategy is two-fold:

1. Increase supply and control the rising cost of water via Eagle Lake development.
2. Reduce water consumption through water metering and public education.



Process Schematic



The Membrane Filtration Process

The plant's membrane filtration process consists of three concrete tanks in which cassettes of membranes are suspended. Raw water is drawn through the hollow membranes using centrifugal pumps. The treated water is collected in a header pipe from where it travels to the clearwell.

Membranes are essentially filters that permit the passage of water, but hold back anything larger than 0.1 micron. (A human hair has a thickness of between 40 and 120 microns). GE Water and Process Technologies Canada, a Canadian company, supplied the membrane system.

Measures taken to prevent membrane fouling include cyclic agitation using compressed air and backflushing with treated water about four times each hour.

Reject water continuously flows at a controlled rate from each membrane tank and is collected in the backwash holding tank. Backwash water is pumped to the two secondary membranes to be further filtered. Filtered water from the secondary membranes is directed to the head of the plant and mixed with raw water. Reject water from the secondary membranes is directed to the waste holding tank and then discharged to the sanitary sewer.

Over time, the transmembrane pressure required to produce the design flow across the membranes will exceed a pre-selected value. At this point, the membranes are cleaned using a Clean-in-Place, or CIP, system. The membranes are backflushed using citric acid and sodium hypochlorite and left to soak in the chemical solution. The solution is then circulated and neutralized before being slowly discharged to the sanitary system.

The operation of the membrane filtration plant is fully automated. The operator has access to the process using a keyboard and a monitor screen referred to as the human machine interface, or HMI.

The treatment plant is economical to operate. The high elevation means that overall pumping costs are minimized.