

# Rivershore Estates

Kamloops, BC

June, 2011

BI Pure Water (Canada) Inc. has completed an ultrafiltration-based water treatment plant for Rivershore Estates and Golf Links. Rivershore Estates located just east of Kamloops, a community of 200 lots, is part of the world-class Rivershore Estates Golf Course.

Rivershore Estates draws their water supply from the South Thompson River. Fluctuating turbidity levels, especially during spring freshet, along with river-borne contaminants has meant concerns about the water quality for years.

Rivershore retained BI Pure Water (Canada) Inc. (BIPW) to conduct a pilot test, prepare a water treatment plant design and apply for a construction permit for this new water system.

A pilot plant was installed at the site in the summer of 2010 to validate the use of ultrafiltration as an effective means of reducing turbidity and contaminants. The pilot plant used 50 micron pre-filtration, followed by ultrafiltration (UF) and chlorination. The results were positive.

The BIPW water treatment plant was designed to treat a flow of 17.66 LPS (280 USGPM) of river water using coarse disk filtration, settling in a

sump, ultrafiltration, ultraviolet and chlorine disinfection. The facility needed to meet the 4-3-2-1-0 objectives established by Interior Health for drinking water. This refers to the following:

- 4 log (99.99%) reduction in viruses
- 3 log (99.9%) reduction in cysts like Giardia and Crypto.
- 2 methods of treatment for redundancy
- <1 nephelometric turbidity unit (NTU) (a measure of water cloudiness)
- 0 coliforms

An Arkal self-cleaning disc filter unit removes particles above the disc size of 70 microns. A 30 Cu M (8000 USG) sump holds raw water until some of the sediment settles. The injection of poly-aluminum chloride (PAC) can take place (if required) from a chemical storage tank. This injection system will be utilized only when warranted by very high raw water turbidity.



*View of Rivershore Estates Golf Course from the east*

Three 8.83 LPS (140 USGPM) pumps are available to supply the UF membranes with raw water, with one of these on standby.

Norit X flow SXL-55 low energy membranes are utilized in this system in two UF trains of 10 membrane housings each (Train 1 and Train 2). Single element membrane assemblies—Norit Aquaflex 0.8 mm diameter hollow fiber—are installed vertically and connected directly to central feed, permeate, backwash and concentrate headers (ie “dead-end” ultrafiltration). The UF membranes effectively remove suspended solids and pathogens. UF train 3 is used to

recycle the backwash water that has been collected in the sumps.

Systems for the maintenance and testing of the UF membrane modules are in place such as the Automatic Backwash (AB) (forward flush + forward flush/backwash) and Membrane Air Integrity Testing (AIT), all of which are automatically controlled by the control panel’s PLC. A Clean-in-Place (CIP) system is used to clean the membranes when required.

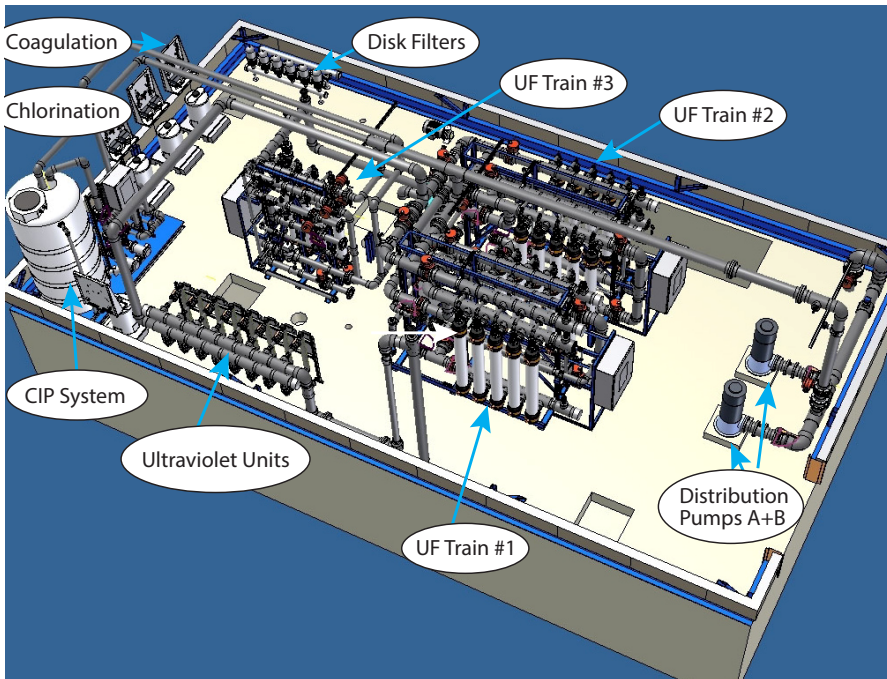
The filtered water then passes through a high power ultraviolet disinfection system, acting as primary disinfection. Eight 3.2 LPS (50 USGPM) NSF approved ultraviolet disinfection units are installed in parallel. This system works as a back-up to the ultrafiltration system.

Further protection of the drinking water is achieved by injection of a chlorine solution to provide a disinfection residual in the water. The treated water is then held in storage tanks until sufficient chlorine contact time is achieved. The water is then pumped to the distribution system at a constant pressure with the use of pump variable frequency drives (VFD). These VFDs save considerable power costs as a bonus.

A 660 M3 (174,000 Gal) water reservoir, located above the community, helps to supply peak demand periods. The flow to the distribution system is by gravity.

This ultrafiltration system is unique in that it is able to be cleaned with only a sodium hypochlorite solution in the backwash water, without needing costly acid and caustic injection during backwash.

The control panel touch screen indicates system status and provides means for complete operator control as well as alarm indicators, alarm history, alarm delays and means for entering set points. System monitoring and alarms are provided for both local and remote access through the BI Pure Water “Remote Monitoring and Trending System”. This allows BI Pure Water to assist operators in the diagnosis of any potential problems.

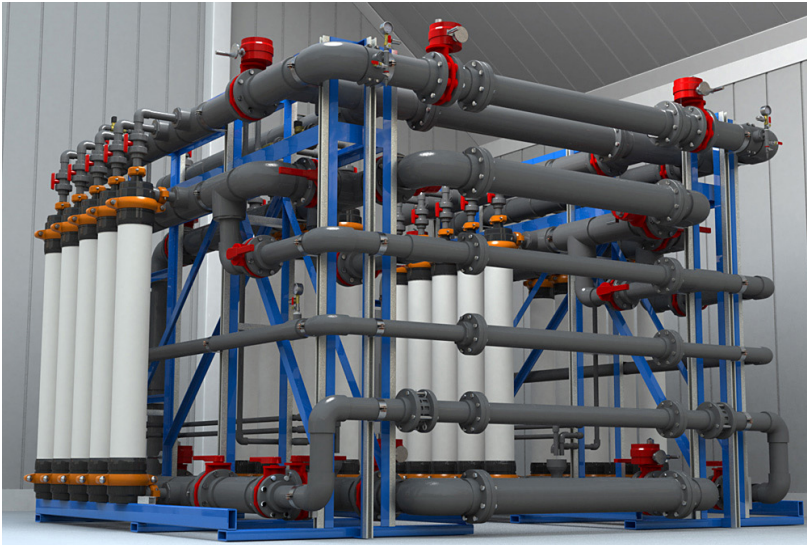


*3D view of the water treatment equipment from the southeast corner*



## CASE STUDY

The Rivershore community decided to invest the extra money necessary to create an environmentally superior system. The goal of the community was to design and build a “green” water treatment plant within the allocated budget. Elimination of cartridge filter purchase and maintenance costs was top of the list. The higher capital cost of the ultrafiltration plant is paid out many times through the plant’s life cycle when operation and maintenance costs are added in. There is a significant monetary incentive to operate an energy efficient water treatment plant. With all of the added features, the plant could be registered for at least LEED gold.



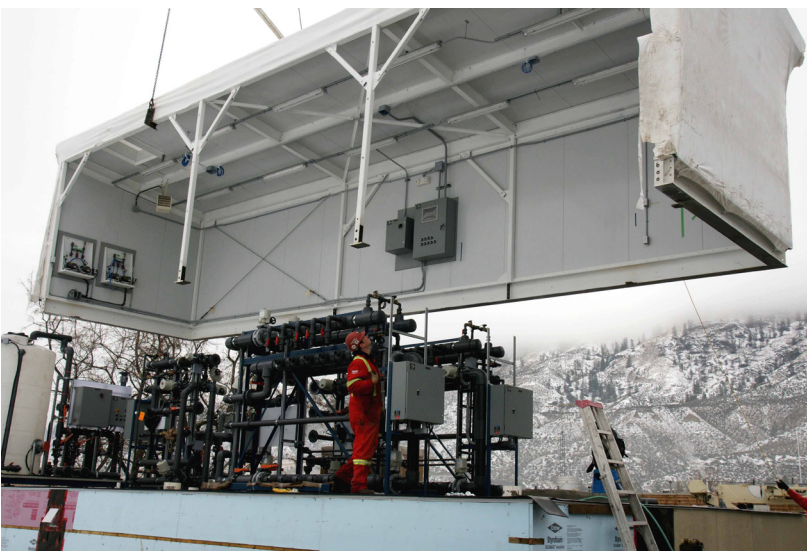
*3D Rendering of the ultrafiltration trains*

Many energy saving items were included in this plant including R40 structural insulated panel ceilings, R24 walls, energy efficient lighting, high efficiency electrical motors, VFDs installed for efficient flow control, water treatment at off-peak hours, and gravity feed to the distribution system.

Rivershore Estates representative Lorne Ebenstiner commented, “Our team was able to provide cost-effective potable water and achieve our sustainability goals of reducing GHG emissions and our carbon footprint.”

BI Pure Water (BIPW) specializes in reviewing water quality test results and prescribing the most cost-effective solution. BIPW engineers pilot, design, manufacture, install, start-up and commission package water treatment plants. The operators are then trained and the plants can be serviced on a regular basis. BIPW provides small and medium-sized water treatment plants for federal, provincial and municipal government, industry, remote camps, private water systems, resorts and First Nations communities.

The package water treatment building is lowered onto the concrete sumps



*The package water treatment building is lowered onto the concrete sumps*



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