

GROUNDWATER TREATMENT SYSTEM – CASE STUDY



A pipeline leak was detected in 2011. To prevent contaminants from entering the local creek, dozens of groundwater-extraction wells were installed; the wells are serviced by submersible pumps and a vacuum pump system. The extracted groundwater was fed to a quickly-assembled treatment system consisting of an oil-water separator, air stripper, and media vessels for removal of hydrocarbons, and a settling tank followed by bag filters for removal of suspended solids.

newterra was asked in 2014 to replace the existing treatment system due to high operating costs and equipment fouling issues caused by excessive suspended solids in the raw water. The existing system relied on a settling tank and bag filters for removing suspended solids; during high-flow periods it was necessary to change up to 30 bags per day.

Using our patented longbox clarifier for primary solids removal, **newterra** was able to design a treatment

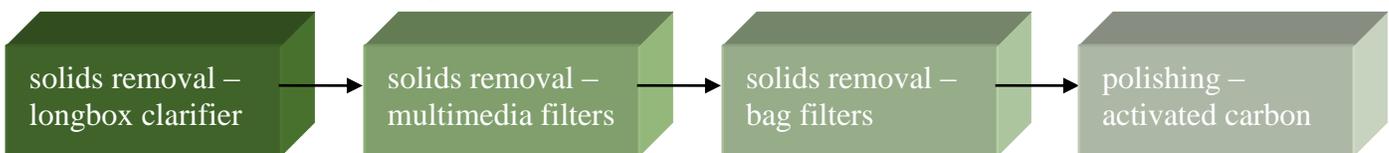
system that has significantly lower operational requirements, has lower capital and operating costs, and still meets and exceeds the discharge requirements.

Raw water from the wells is fed to an inlet tank. This water is then fed to the **newterra** longbox clarifier, a gravity clarifier that uses settling media to improve performance. A typical gravity clarifier easily allows larger, heavier particles to separate from the flow and settle to the bottom. By installing tube settling media in our gravity clarifier, **newterra** is able to dramatically increase the available settling area and reduce the settling distance, which allows the **newterra** longbox clarifier to separate much finer solids. The raw water at this remediation site has a measured total suspended solids (TSS) level of 66 ppm.

The clarified water is gravity fed to an outlet tank, and then pumped through three **newterra** multimedia filters, operating in parallel to further reduce suspended solids. When the multimedia filters become loaded with solids, they are backwashed to the inlet of the clarifier. Currently, the multimedia filters are being backwashed once per week, although the measured pressure drop across the vessels is quite low and backwashing frequency could be further reduced.

For final solids removal the water is fed through parallel bag filters. Suspended solids downstream of the bag filters are being reduced to less than 3 ppm. The clarifier and multimedia filters have been so effective at removing suspended solids that the bag filters are only being changed once per month. This marks an incredible improvement over the operational requirements of the original system.

Figure 1. Treatment Process Implemented



This site presented challenges because of ambient temperature during the winter months. All equipment needed to be insulated and heated to prevent equipment damage and system failure due to freezing. The multimedia vessels, bag filters, and carbon vessels were housed in converted shipping containers, with insulation and heat. Due to the height of the multimedia and carbon vessels, and the need for media change out, the buildings were equipped with roof access hatches. The clarifier presented a more difficult challenge as it is too large to be operated inside any type of building that could have been shipped to site. Consequently, **newterra** designed the clarifier as a standalone unit, with its own insulated shell and heaters. Even with an insulated shell, the clarifier can still be operated as normal; inspections, water sampling, sludge removal, etc. can all be done without disassembling or shutting down the treatment process.

Figure 2. Site Photos



The customer felt that a rental system would better suit their needs, rather than purchasing equipment, so **newterra** was able to provide the complete system as a rental. **newterra** was on site for installation and commissioning, and continues to support the customer with operations. System performance is tested every week to insure the discharge parameters are meeting the regulatory requirements.

Table 1. System Performance

Parameter	System inlet	System discharge
Total Suspended Solids mg/L	66 mg/L	<3 mg/L

Figure 3. Water Quality Photographs

Left: sludge from bottom of clarifier; Middle: system inlet water; Right: system discharge water

