

# Wastewater Treatment Plant

The Water Pollution Control Facility, or wastewater treatment plant, uses a sequence of 2 processes to remove pollutants: primary treatment, which physically removes material from the wastewater, and secondary treatment, which uses microorganisms to further purify the treated water.

## Primary treatment

Primary treatment begins when the incoming wastewater flows into the plant at the headworks. (**Note:** By this point human wastes and toilet paper have been reduced to a mostly liquid state.) After pumping, large solids such as rags, branches, and cans are removed by automatic bar screens and taken to a landfill.

Still at the headworks, the wastewater enters grit chambers, where heavy materials such as sand and gravel settle out. As the wastewater enters the primary clarifiers, it slows down to allow the last steps of primary treatment to occur. Oils, grease, and fats rise to the top and are periodically removed. Smaller particles that were not removed by screening or by the grit chambers now have a chance to settle out. At the end of the primary treatment process, 40% to 60% of the pollutants have been removed.

## Secondary treatment

Secondary treatment uses biological processes to remove most of the remaining suspended solids and dissolved substances in the water. In a natural stream, these substances are a source of food for beneficial microorganisms such as protozoa, fungi, algae, and hundreds of varieties of bacteria. The secondary treatment stage is a controlled environment in which these same microorganisms biologically convert the dissolved and lighter solids in the wastewater to heavier suspended solids which will settle out at the end of secondary treatment. These processes remove 85% to 99% of the pollutants.

## Aeration ponds / oxidation pond system

First used by the city in 1960 and later upgraded, the pond treatment system is still running strong today. As wastewater circulates around the smaller, 7-foot-deep aerated ponds, bacteria and other microorganisms break down and consume pollutants in the secondary treatment process. The wastewater then flows to the 130 acre oxidation pond and 25 acre polishing pond. These ponds, easily seen from Interstate 5, are only 5 feet deep to allow plenty of contact with oxygen and sunlight during the secondary treatment process. This helps to promote further biological activity before water is sent to the final step in the treatment process, disinfection.

## Disinfection

Sodium hypochlorite, a chlorine compound commonly known as bleach, is added in a 2-acre contact channel to help kill any harmful microorganisms or pathogens. After this disinfection process, the remaining chlorine is removed and the final effluent is recycled back into the river through a set of 14 diffusing pipes buried in the riverbed. This discharge is done with strict adherence to the National Pollutant Discharge Elimination System (NPDES) permit issued by the Washington Department of Ecology as directed by the Federal Clean Water Act.

## Mechanical treatment system

To treat increased flows caused by population growth, another treatment system, called the Trickling Filter/Solids Contact (TF/SC) Plant, was completed in 1991. Using a much smaller area and considerably

less time, the TF/SC system takes wastewater from the primary clarifiers and/or aerated ponds and trickles it down a biological filter, called a trickling filter, made up of corrugated plastic material stacked inside a tower. The plastic material provides sites where microorganisms can attach and feast on the waste products as the water flows over them. By placing the filter upright, more surface area can be provided in a small space. The microorganisms work more efficiently than in ponds because they are more concentrated, reducing treatment time to 8 hours or less.

### **Process**

Wastewater from the trickling filter flows to the aerated solids contact tank, where more oxygen is added. Here the microorganisms and tiny waste particles form small, dense clumps called floc. Next, large tanks called secondary clarifiers provide calm conditions, allowing the floc particles to separate rapidly from the cleaned water. Some of these settled solids are pumped (recycled) from the secondary clarifiers back to the aeration tank. The microorganisms are re-aerated and mixed with more wastewater, reviving the hard working "bugs" to keep the treatment process going continuously. Those solids not recycled in the treatment process are discharged to the aerated lagoons for further treatment.

### **Disinfection**

The final step, disinfection, is the same as in the pond system. Sodium hypochlorite is added before the effluent is pumped by the South Effluent Pump Station to a deep-water outfall in Port Gardner Bay. This discharge is done with strict adherence to the National Pollutant Discharge Elimination System (NPDES) permit issued by the Washington Department of Ecology as directed by the Federal Clean Water Act.

### **Treatment plant operations**

As part of quality control, the wastewater is monitored as it passes through the various stages of the plant. Samples are taken, and laboratory tests are performed on the water every day. The city is responsible for operations and maintenance around the clock, 365 days a year; wastewater never stops flowing to the plant.

Since the volume and chemical makeup of wastewater arriving at the plant can change, treatment plant operators must know what is going on at each stage of the process so they can adjust the controls to keep the treatment process stable and meet NPDES permit requirements.

### **Process odor**

Even though we cannot promise that the wastewater treatment process will ever be odorless, Everett's Water Pollution Control Facility has taken innovative and expensive steps to suppress the offending odors.

If you detect an odor that you believe may be coming from the Water Pollution Control Facility, please call 425-257-8800 or [email](#) and report the location and time.