The Rock Creek Water Resource Recovery Facility, located in Hillsboro near Hillsboro High School, is an award-winning, state-of-the-art facility serving Washington County residents in Hillsboro, portions of Beaverton, Aloha, and unincorporated Washington County.

Today, the facility cleans 37 million gallons of wastewater on an average day to among the highest safety and quality standards in the nation. Through innovative, advanced technology and processes, the Rock Creek facility treats and removes valuable resources from water collected from homes and businesses, as well as excess flows from the Forest Grove and Hillsboro facilities, sent by pipeline during the wetter winter months. This water flows through a strategic process of liquids and solids recovery. The water is then returned to Washington County’s only river – the Tualatin – so clean, it actually improves water quality.

Cleaned water is also used for local irrigation, and natural byproducts of the treatment process are converted to electricity, heat and used as soil amendments. Captured methane gas, a byproduct of anaerobic digestion, supplies electrical power for the facility. A nutrient recovery facility in the nation was built at Rock Creek through a partnership with Ostara Nutrient Recovery Technologies in Canada. The facility captures 80% of the phosphorus from the recycled wastewater stream and converts it into a premium, slow-release fertilizer used in agriculture and nurseries.

Rock Creek began operations in 1978 to reverse decades of severe water pollution in the Tualatin River and its tributaries, and to meet the demands of a growing population. The facility centralized a scattered system of inefficient wastewater treatment plants, creating one of the most efficient and advanced facilities in the world.
Liquids Recovery
At the Rock Creek Water Resource Recovery Facility, used water flows through the plant through a series of processes: preliminary, primary, secondary, tertiary, disinfection and effluent discharge.

1 Preliminary Process
Flow from homes and industry eventually comes to the Rock Creek Influent Pump Station. The flow is measured and pumped to the Headworks Building. Headworks prepares the incoming flow for downstream treatment by screening out larger debris and garbage and allowing heavy materials to drop out prior to Primary Treatment.

2 Primary Treatment
Flow from Headworks is sent to up to four separate primary clarifiers. Primary clarifiers are large tanks that allow the flow to slow down. This lets particles settle to the bottom of the tank while fats, oils, and grease float to the surface. A skimming arm skims the water surface to remove buildup while sludge pumps remove sludge from the bottom of the clarifiers. The organic solids removed from these tanks are sent to solids handling for further treatment and the inorganic solids are dewatered and taken to the landfill.

3 Secondary Treatment
There are many types of secondary treatment. The Rock Creek Facility employs activated sludge with an enhanced biological nutrient removal configuration. This means an environment is created in aeration basins that allows the natural bacteria in wastewater to grow and thrive. The bacteria incorporates contaminants and phosphorus in the

Solids Recovery
The first half of the job at a water resource recovery facility is to remove foreign constituents from the liquid flow stream. Those foreign constituents, or solids, are resources that can be reclaimed. The solids treatment process consists of thickening, digestion, dewatering and phosphorus recovery.

A Thickening
The main purpose of thickening is to concentrate the solids by removing a large volume of water. We are able do this by gravity thickening the primary sludge. The UFAT® process, created at Durham, captures the volatile fatty acids in the primary sludge and returns those acids to the aeration basin to aid in nutrient removal.

The secondary sludge goes through a process invented by CWS called WASSTRI®. It goes through a
water. The bacteria can also convert the nitrogen in the water into nitrogen gas. As the flow leaves the aeration basin, secondary clarifiers slow the water down similar to primary clarifiers. As the bacteria sink to the bottom, sludge pumps return the bacteria to the front to meet the incoming flow and remove further contaminants. A portion of the bacteria are removed (wasted), along with contaminants and nutrients in the bacteria, and sent to solids handling to maintain a stable aeration basin population.

**Tertiary Treatment – Chemical Clarification**

At Rock Creek, tertiary treatment is accomplished by chemical clarification. Alum is added to the secondary effluent to allow smaller particles to clump together and form a “floc” of particles. These larger clumps are easier to settle in the chemical clarifiers, where they are removed and sent to solids handling.

**Tertiary Treatment - Filtration**

The filters contain a mixture of sand and anthracite media to capture fine particles that were unable to settle out in the primary and secondary treatment processes. This is the same process that occurs at drinking water plants for purifying the water and is a final step to reduce phosphorus concentrations to extremely low levels.

**Disinfection**

Disinfection inactivates harmful microorganisms and Durham accomplishes this with chlorine. The flow is dosed with sodium hypochlorite, a more concentrated form of bleach, and held in serpentine tanks called chlorine contact basins to allow sufficient contact time to disinfect the flow. As the flow leaves the chlorine contact basins, it passes through filters.

**Effluent Discharge**

As the flow prepares to leave the plant, sodium bisulfite is added to neutralize any remaining chlorine in the water. The resulting water is such high quality, it actually improves the health of the river and is close to drinking water quality. In the summer, a portion of the water is not returned to the river, but is instead used onsite or pumped offsite as Class A recycled water for irrigation. The recycled water is not dechlorinated so that the chlorine can prevent a recurrence of contamination.

** Digestion**

Anaerobic digesters function much like a human stomach. They consume what they’re fed and turn that “food” into water and biogas, which is high in methane. The biogas is captured and fed to engine generators, which produce electricity used to help run the plant. They also provide heat to keep the digesters at a healthy temperature and space heating for much of the Rock Creek campus. During the digestion process the solids are stabilized to meet Class B biosolids criteria. Any solids left are sent to dewatering.

**Dewatering and Phosphorus Recovery**

Water in the sludge from the anaerobic digesters is removed using high-speed dewatering centrifuges. This liquid has a high content of phosphorus and ammonia, so it’s sent the phosphorus recovery center to make a high quality fertilizer.
Nutrient Recovery

In 2009, Clean Water Services Durham Advanced Wastewater Treatment Facility was the first facility in the United States to recover fertilizer using the Ostara struvite recovery system. Clean Water Services then opened the world’s largest municipal Nutrient Recovery Facility at the Rock Creek Advanced Wastewater Treatment Facility on May 8, 2012 in Hillsboro.

Ostara Nutrient Recovery Technologies Inc. developed a technology that simplifies the treatment process by directly removing phosphorus and ammonia from wastewater. Traditional methods involve sending water through multiple cycles, which increases operating costs and takes up capacity while also forming struvite that can coat pipes, valves and other equipment. This proprietary technology, called the PEARL™ process, diverts the phosphorus and other nutrients to a reactor that converts them into a premium, slow-release, environmentally-friendly commercial fertilizer called Crystal Green® instead. This product is made from a renewable resource — wastewater — and is the most environmentally responsible source of phosphorus available.

In addition to the benefits to our wastewater facilities, it takes one-seventh the amount of energy to create Crystal Green® as it takes to create an equal amount of conventional fertilizer. Crystal Green® is certified by the Oregon State Department of Agriculture. Its unique slow-release characteristics provide a steady, season-long supply of phosphorus and magnesium that is always available to the plants, when they need it. It’s also a key ingredient in Clean Water Grow® All-Purpose Plant Food, our retail fertilizer product.

Benefits

• Pollution reduction and reduced greenhouse gas emissions through reduced energy usage

• Reduced chemical use

• Potential for revenue generation from the sale of Crystal Green® fertilizer

• Increased wastewater treatment facility reliability and capacity

• Reduced operations and maintenance costs

• Potential generation of carbon credits