WASTEWATER TREATMENT PROCESS
VIRTUAL TOUR

Think for a moment about all the ways you use water around the house. Water keeps things clean and flushes waste. Dirty or used water is called wastewater. Wastewater is 99% clean, but contains pollutants that can harm the environment. Treating wastewater helps to preserve the environment and prevent the spread of disease among humans.

There are two broad categories of wastewater treatment: the liquid process and the solids process. Annually, the Burlington Water Pollution Control Facility (treatment plant) treats over 1 billion gallons of liquid wastewater. The solids process removes, reduces and stabilizes solids in the waste. The end product of the solid reduction process is an environmentally-useful material called sludge. Each year the plant recycles over 550 tons of sludge to the agricultural community.

To aid in understanding wastewater treatment, a simplified walk through these two processes is presented below. The liquids process, which begins when wastewater enters the treatment plant, is completed when treated water is discharged into the Fox River. The solids process is mainly digestion and stabilization of organic material. It is completed when the biosolids are pumped to the holding tank for application to farm fields.

Liquids Process

Preliminary Treatment

Wastewater is transported from homes and industries by a network of underground sewer pipes that is over 40 miles long. The wastewater contains large pieces of debris that can damage a treatment plant's equipment, so a bar screen is used to remove this debris. Wastewater enters a bar screen at the main lift station where anything over three-quarters of an inch long is removed. After screening, the raw sewage is pumped to the treatment plant, located 1.5 miles away.

The next step in preliminary treatment is to remove grit, which is material much like sand or eggshells that is abrasive to equipment. This is done by sending the wastewater through a Pista Grit system. Here the velocity of the wastewater flow is significantly reduced so that heavy material can fall to the bottom and be removed. After grit has been removed, the wastewater flow enters the primary treatment process.

Grit Chamber

Primary Treatment

The primary treatment process removes over 80% of the total suspended solids in the wastewater. This is accomplished with two primary clarifiers at the treatment plant. In these huge tanks, the flow is nearly stopped, allowing almost all of the suspended solids to settle on the bottom. Solids that settle on the bottom are called "primary sludge" and are sent to the anaerobic digester for further treatment. The liquid portion of the wastewater is sent on to secondary treatment.

2 Clarifiers:	50 foot diameter, 10 feet deep
Volume:	150,000 gallons each
Detention Time:	1.5 hours
6 Aereation Basins:	15' X 90' X 15' deep
Volume:	150,000 each
Detention Time:	6 - 8 hours

Primary Clarifier

Secondary Treatment

Secondary treatment is a biological process that utilizes thousands of pounds of microorganisms to consume organic matter and pollutants in three phases. Biological treatment begins in the biofilters, which are towers packed with plastic particles (media) on which microorganisms, such as amoebae, protozoa, and stalk ciliates, grow. Wastewater enters at the top of the tower and as it flows down over the media, the attached microorganisms degrade and consume the organic matter in the wastewater.

Towers

The wastewater flow is then routed to six aeration tanks, each of which is 15 feet wide and 90 feet long. Wastewater is blended with a second culture of the microorganisms and compressed air is released from the bottom of the tanks. Over a period of approximately six hours the microorganisms consume the remaining pollutants.

6 Aereation Basins:	15' X 90' X 15' deep
Volume:	150,000 each
Detention Time:	6 - 8 hours

Aeration Tanks

The liquid mixture leaving the aeration tanks enters the secondary clarifiers. Here the microorganisms are separated from the treated water. The low flow rates in these tanks allow the microorganisms to cling together and settle to the bottom of the tank. This material is pumped off the tank floor and sent back to the aeration tanks where it is re-used in the aeration and clarification processes. The clear water, now called "effluent", flows into the ultraviolet room for disinfection.

Secondary Clarifier

Ultraviolet Disinfection

The effluent flows under a bank of high-intensity ultraviolet lights before it is discharged into the Fox River. Ultraviolet light kills most disease-causing bacteria and viruses. The City of Burlington disinfects effluent from May 1st to September 30th, as required by the Wisconsin Department of Natural Resources.

Solids Process

Solids Process Building

Anaerobic Digestion

Anaerobic digestion is another biological process that utilizes microbes. These organisms stabilize the sludges from the gravity belt thickener, which removes much of the water, and primary treatment. The thickened sludges are pumped to the Primary Digester, a covered tank where the contents are heated and mixed, producing the proper conditions for bacteria to consume some of the sludge. From there it is pumped to the Secondary Digester, where the bacterial action continues. The sludge from the Secondary Digester is a stabilized product, rich in organic material and good for use as a soil conditioner for farm fields. Processed sludge is stored in a separate tank until it can be distributed.