

The City of Boulder

75th Street Wastewater Treatment Facility



Wastewater Collection and Treatment

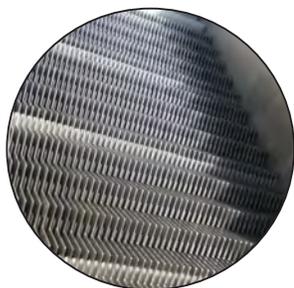
The Foundation of Public Health

Wastewater Collection

Boulder's wastewater collection system, also known as the sanitary sewer system, consists of underground pipes that utilize gravity to transport untreated wastewater from residential, commercial and industrial properties to the city's Wastewater Treatment Facility (WWTF), located on 75th Street near Boulder Creek. Wastewater collected from smaller pipes throughout the city flows downhill into larger pipes known as "interceptors." Several large-diameter pipes convey the city's wastewater to a primary interceptor that delivers the majority of flow to the WWTF.

Wastewater Treatment

Once the collected wastewater is delivered to the WWTF, it is sent through a 12- to 24-hour, multi-stage treatment process to disinfect potentially harmful bacteria, viruses and protozoa. This complex industrial facility utilizes three primary techniques to treat wastewater.



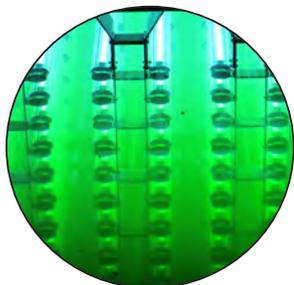
Physical/Mechanical

At the beginning of the treatment process, the physical/mechanical treatment removes about 50 percent of the solids and organic material from the wastewater. Trash and debris, such as rags and plastics, are removed from the wastewater using mechanical screens and then hauled to a landfill. The remaining grease, liquids and solids continue through the treatment process.



Microbiological

The liquid wastewater then goes through the "heart" of the treatment process, an activated sludge system where millions of microorganisms feed on organic materials and other pollutants in the wastewater. This process removes the vast majority of carbon-based compounds and approximately 50 percent of nitrogen compounds. Solids removed during the liquid treatment are combined and consolidated in anaerobic digester tanks, where bacteria that can live without free oxygen use the sludge organics for food. The bacteria produce methane, carbon dioxide and trace amounts of other gases as byproducts of anaerobic digestion.



Ultraviolet (UV) Light

Next, the liquid wastewater is disinfected with ultraviolet (UV) light energy that renders potentially harmful bacteria and other microorganisms unable to reproduce.

REMEMBER DON'T TRASH THE TOILET

Did you know trash like rags and plastics should never get flushed down the toilet? Trash can clog private drains and cause sewer blockages, overflows, or damage equipment at the city's WWTF. What can you flush? Pee, poo and paper-that's it.

Recycled End Products for Reuse

The treatment process converts wastewater into three end products that are then recycled for other uses.

Treated Liquid Water (Effluent)

After completing the entire process, treated liquid water (known as effluent) is discharged back into Boulder Creek so that it can be used by other communities downstream. The WWTF recycles Boulder's used water and returns it to the natural environment.

Biosolids

In the anaerobic digestion process, solids are mixed and heated to treat and stabilize the material. After digestion, mechanical dewatering produces an end product called "biosolids" that has considerable value as a fertilizer and soil conditioner. Then, the dewatered biosolids are transported and applied to agricultural fields or used as compost to enrich lawns and gardens.

Gas Emissions

The gas byproducts produced by the anaerobic digestion of biosolids are used to fuel two engine generators that produce electricity and reuse waste heat through a process known as cogeneration.

Cogeneration

Electricity generated by the cogeneration system is used to power and heat the WWTF, offsetting the amount of grid energy required and reducing operational costs and greenhouse gas emissions.

HOW MUCH DO SOLAR AND COGENERATION SAVE?

The WWTF is the largest energy consumer among municipal facilities, using approximately 30,000 kilowatt-hours per day. Approximately 35 percent of the WWTF's power is produced by renewable energy from cogeneration and solar power. Since 1987, cogeneration at the WWTF has produced more than 50 million kilowatt-hours of electricity. Since 2010, the one megawatt solar photovoltaic system at the WWTF has generated more than six million kilowatt-hours of electricity; saving Boulder ratepayers approximately \$200,000.



To learn more, visit www.boulderwater.net.



● Wastewater Treatment Process (Liquid Pathway)

1. Influent goes to the headworks;
2. Moves to the primary clarifiers;
3. Is pushed by secondary pumps;
4. Enters the A-Basins;
5. Goes through solids contact;
6. Enters the secondary clarifiers;
7. Enters the ultraviolet (UV) light disinfection;
8. The treated effluent goes to Boulder Creek;



● Biosolids/Dewatering Process (Solids Pathway)

- A. Solids are removed from the wastewater.
- B. The solids are concentrated either by settling materials out in the gravity thickeners or by using dissolved air flotation thickeners (DAFT).
- C. Anaerobic digestion breaks down and treats solids, which are further concentrated.
- D. Solids are then dewatered to 25 percent solids by weight before being trucked off as biosolids.

Schematic of Electrical Power Sources and Uses

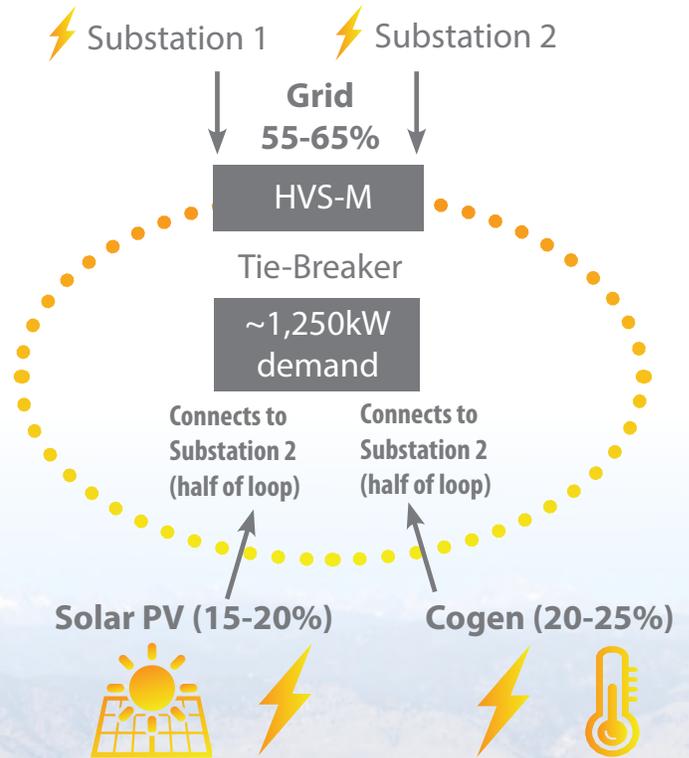
The schematic below shows how different energy sources come together to provide power that WWTF machinery and equipment can use. High voltage energy from the grid enters the circuit protective center, the High Voltage Switch Main (HVS-M), travels through a number of different load centers and then to the equipment. Other sources of energy generated at the 75th Street WWTF like solar biogas from cogeneration (cogen) helps decrease the total energy the WWTF needs to purchase from outside sources which reduces energy costs and reliance for energy generated from coal.

Electrical Power Sources

- **Substation 1 - Grid Utility Feed**
- **Substation 2 - Grid Utility Feed**
- **Cogeneration System (Cogen); Biogas or Natural Gas**
 - Engine generator 1 to 300 kW rating, nominal output of 220 kW
 - Engine generator 2 to 300 kW rating, nominal output of 240 kW
- **Emergency Backup Generator (Propane)**
 - 500 kW rating, nominal output of 350 kW
 - This generator feeds into the system via cogen (rarely used)
- **Solar Photovoltaic (PV) System**
 - Nameplate rating of 1,002 kW (1.0 megawatt)
 - Peak delivery of ~900 kW (optimum sun angle, temperature, etc.)

Electrical Power Uses

- **Approximately 30,000 kWh per day**
 - Equates to an average demand of approximately 1,250 kW



A Brief History of Boulder's Wastewater Treatment

In 1934, the City of Boulder built its first wastewater treatment plant (WWTP) near 30th Street and Arapahoe Avenue. Due to ineffectiveness and a population boom, a new WWTP was built on east Pearl Street in 1957. As the population continued to grow and more effective treatment was needed, the city built a new WWTP on 75th Street in 1968. The city continued to maintain both WWTPs until 1980, when the east Pearl Street location was decommissioned.

As federal water quality regulations advanced (after the passage of the Clean Water Act in 1972), minimum secondary treatment standards and point-source discharge permits (for WWTPs) were required to meet the new standards. As regulations continued to increase, WWTP upgrades were a reoccurring need that ultimately lead to a forward thinking investment of \$45 million into the 75th street WWTP, including biosolids dewatering improvements. The new 75th Wastewater Treatment Facility (WWTF) was designed to accommodate future population growth, with a maximum treatment capacity of 25 million gallons per day (mgd). The WWTF treats an average of 12 mgd, but infiltration and inflow during the 2013 flood caused the WWTF to test its maximum capacity, treating more than 50 mgd for several days.

The WWTF works closely with the city's Industrial Pretreatment Program (established in 1983), Water Quality laboratory and Stormwater Quality Program (established in 1989) to monitor water quality coming into and leaving the WWTF. In 2008, WWTF upgrades added a microbiological process called "activated sludge," which aimed to remove ammonia-nitrogen to comply with regulatory requirements. New regulations will require increasingly more stringent water quality standards to reduce the amount of nutrients (nitrogen and phosphorous) and other potentially harmful constituents from going back into Boulder Creek. Forward-thinking investments and plans for the WWTF will allow the city to continue to adapt and advance treatment processes.



City's first waste water treatment facility circa 1935.

**Want a
Tour?**

Call 303-413-7340 or
visit www.boulder-colorado.gov/water/wastewater-treatment-facility-tours.

FOLLOW THE DROPS!

The City of Boulder's 75th Street Wastewater Treatment Facility (WWTF) treats an average of 12 million gallons of water each day and meets all regulatory requirements to return that water safely to Boulder Creek. To learn more, visit www.boulderwater.net and select "Wastewater."



*treatment
process*



1.5 gallons per minute



Flush Fact

Pee, poo and paper- that's it!
Flushing anything else can damage equipment and/or cause treatment problems.

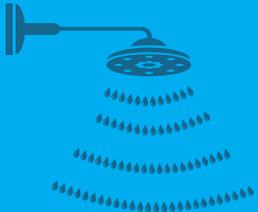
75th St.
wastewater



8 glasses of water per day



Be sure to properly dispose of prescription drugs - don't flush them.



2 gallons per minute



Flush Fact

Flushed children's toys get caught in WWTF screens but they can damage equipment.

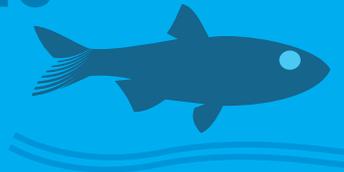


During the September 2013 flood, the WWTF received flows of **50 million** gallons of wastewater and floodwater a day.



20 gallons per load

Boulder
Colorado



WWTF upgrades have helped improve water quality for aquatic life.

75th Street Wastewater Treatment Facility

"Treating your wastewater since 1968"