

Wastewater and Types of Wastewater

- It is used water originating from domestic, industrial, agricultural, and medical or transport activities. Used water becomes wastewater upon the change of its quality, composition and/or temperature.

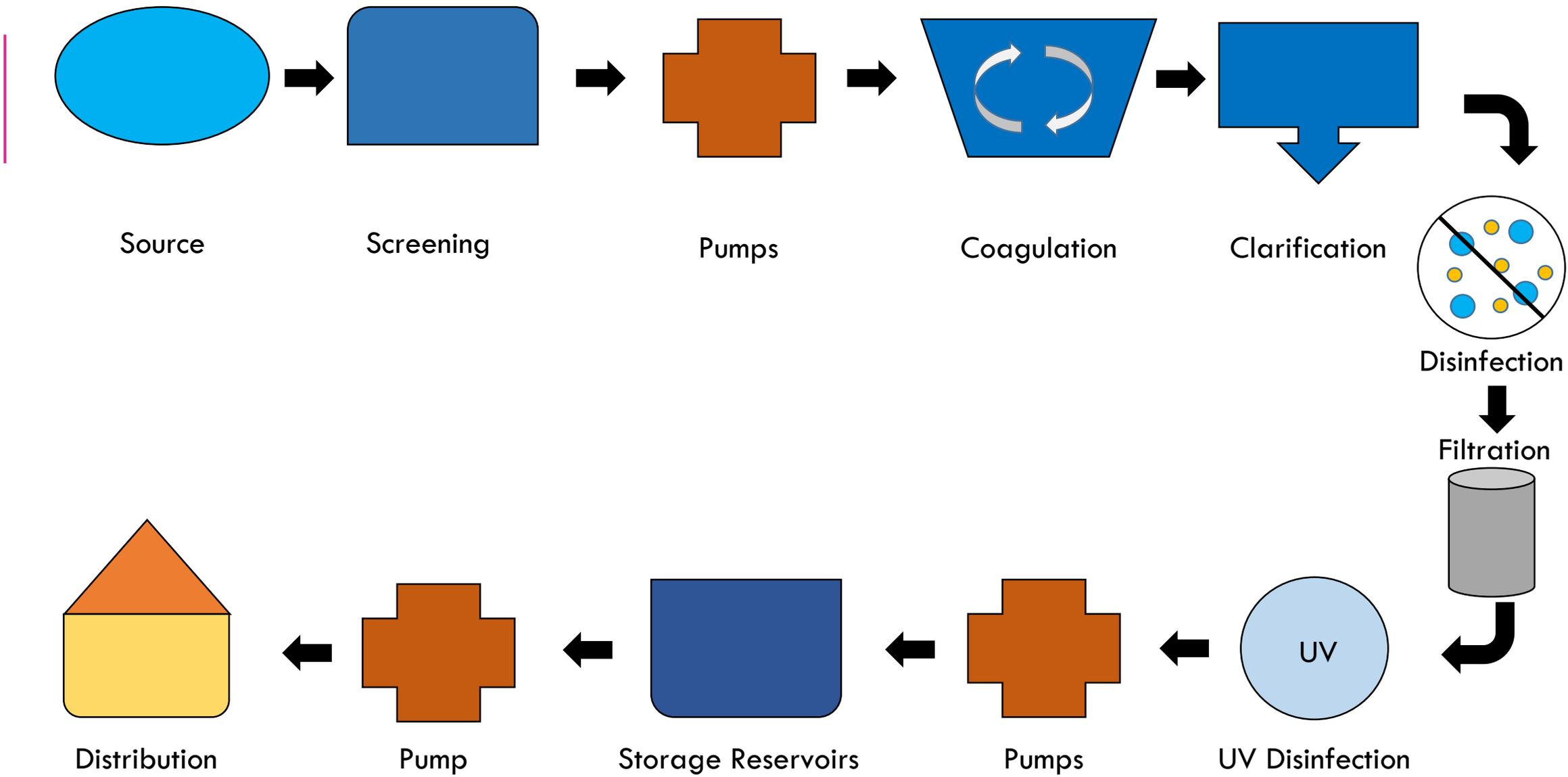
- Wastewater can be divided into two major groups:

Sewage water is all wastewater used in domestic dwellings.

Industrial wastewater originates from production, industrial and commercial activities, and has a different chemical composition to sewage water.

Wastewater Treatment and Wastewater Treatment Plant

- *Wastewater treatment* is a process used to convert wastewater into an effluent that can be returned to the water cycle with minimum impact on the environment, or directly reused.
- There are several techniques, which are used in treatment of drinking and wastewater.
- The treatment process takes place in a wastewater treatment plant (WWTP).



Source

Screening

Pumps

Coagulation

Clarification

Disinfection

Filtration

UV Disinfection

Pumps

Storage Reservoirs

Pump

Distribution

1. **Intake:** Firstly, water flows through intake tunnels to the WWTP by gravity.

Intake: Water is taken from a source such as a lake or river.

2. **Screening:** The water then enters the Water Treatment Plant, passing through screens, which filter the water of larger debris before entering the treatment process. A screen exists to stop large items that get caught in the pump and cannot complete the treatment process.

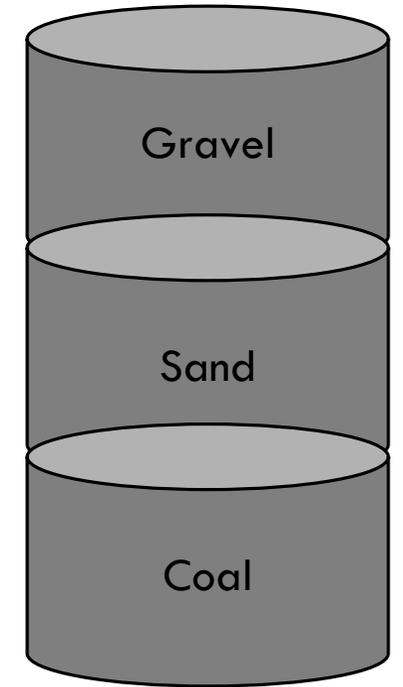
3. **Coagulation:** The water flows through rapid mixers. The mixer allows for coagulation to occur, which is the addition of approved water treatment chemicals (exp: Polyaluminum chloride) to convert microscopic particles and other contaminants into larger and heavier particles.

- i. Polyaluminum chloride
- ii. Polymers – organic polyelectrolytes
- iii. Alum (Aluminum Sulfate)

4. **Clarification (Sedimentation):** Clarifiers are settling tanks; clarifiers use sedimentation, a process that removes the majority of the larger particles from the mixer by settling them in tanks. Activated Carbon is added at this point of the treatment process.

5. **Filtration:** Filtration of the "settled" water, from the clarifier, removes most of the remaining particles to thousandths of a mm.

The partially treated water flows to the filter beds. The water flows through layers of sand, gravel, and anthracite coal. The filters remove particles, such as viruses, cysts, bacteria and any remaining floc.



6. **Disinfection:** Disinfection is the addition of chlorine, which disinfects the water so it is safe for drinking. Chlorine is added after the filtration treatment process.

Chlorination: Chlorine disinfects the water so that it is safe for drinking purposes.



Ozonation: Ozone, which is a strong oxidant is often used as a disinfectant.

7. **Ultraviolet (UV) disinfection:** Ultraviolet (UV) disinfection of the water with chlorine is a way to protect public health from disease causing organisms that can be found in the river. The risk to public health is reduced further by treatment with UV light. Before the water leaves the treatment plant, the chlorine is combined with ammonia to form chloramine. This reduces the formation of disinfection by-products, and ensures a long-lasting "residual" to protect our water against bacteria or other organisms on its journey to your home tap.

- i. Addition of Ammonia and Fluoride
- ii. Ammonia - Ammonium Hydroxide
- iii. Fluoride - Hydrofluorosilicic Acid

8. **Storage reservoir:** Reservoir where treated water is stored.

9. **Distribution:** Water is pumped into the distribution system of the underground pipes, where it is sent to homes and businesses throughout the city and to surrounding communities.

