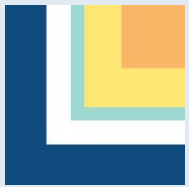
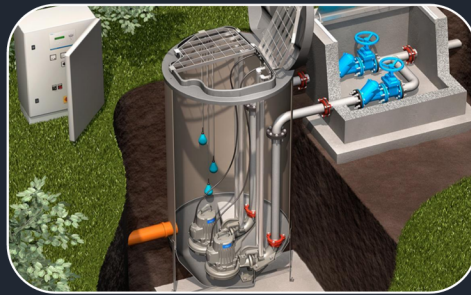
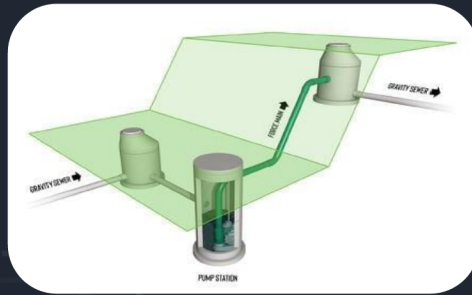
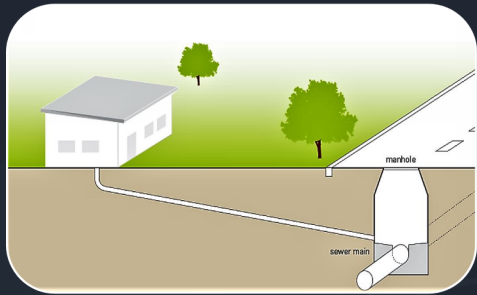


Lynnwood Wastewater Treatment Plant

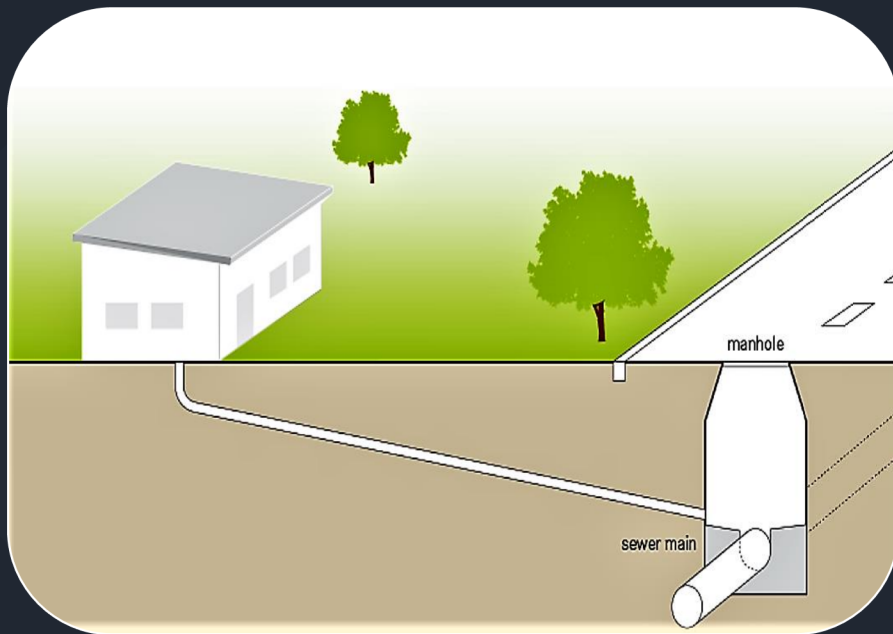




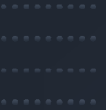
Background

City of Lynnwood owns and operates a sewer system that provides sewer collection and treatment services to Lynnwood residents and the northern area of Edmonds. Lynnwood's sewer system is a complex network of gravity sewer lines, force mains, lift stations, and a wastewater treatment plant.

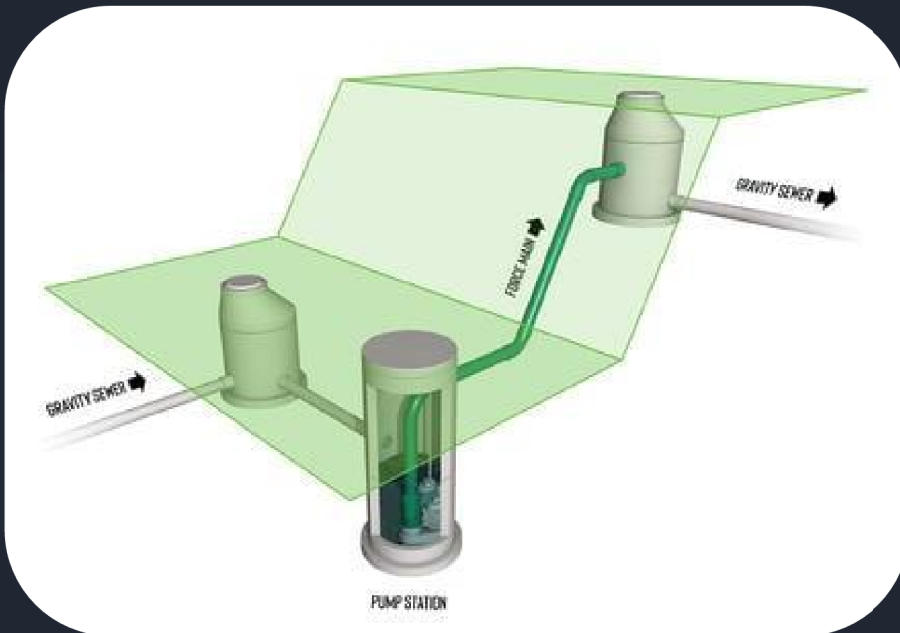
104 Miles of Gravity Sewer Line



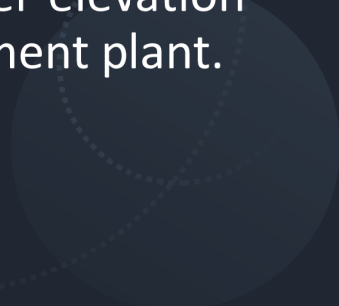
The gravity sewer lines are responsible for transporting wastewater from homes and businesses to the treatment plant through the force of gravity.



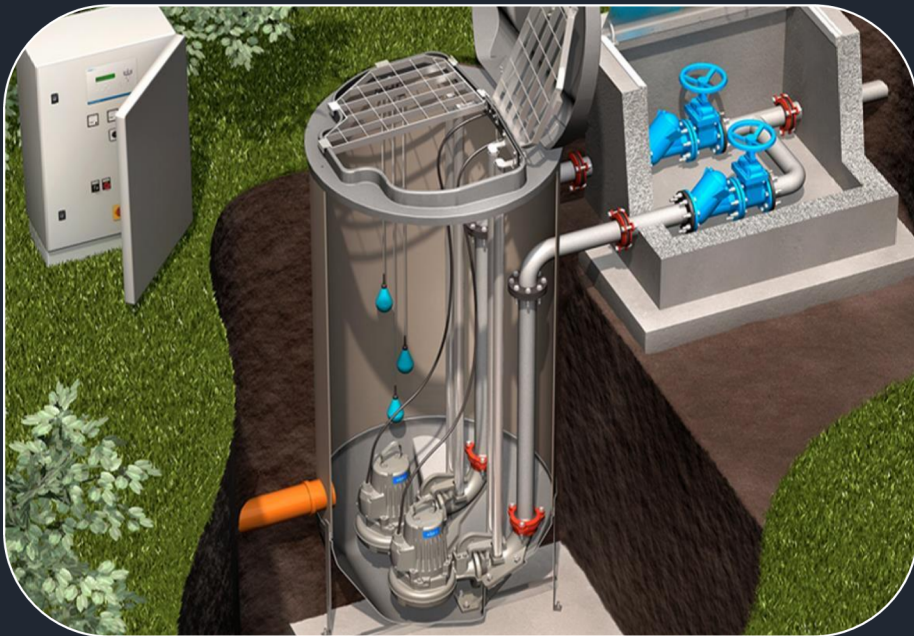
6 Miles of Force Main



The force mains, on the other hand, use pumps to move the wastewater when gravity is not sufficient. Lift stations are strategically placed along the sewer lines to lift the wastewater to a higher elevation before it continues to the treatment plant.



7 Lift Stations



The wastewater treatment plant is where the sewage is processed and cleaned before it is released into the environment. The plant uses a variety of physical, chemical and biological methods to remove pollutants from the wastewater and to make it safe for discharge.

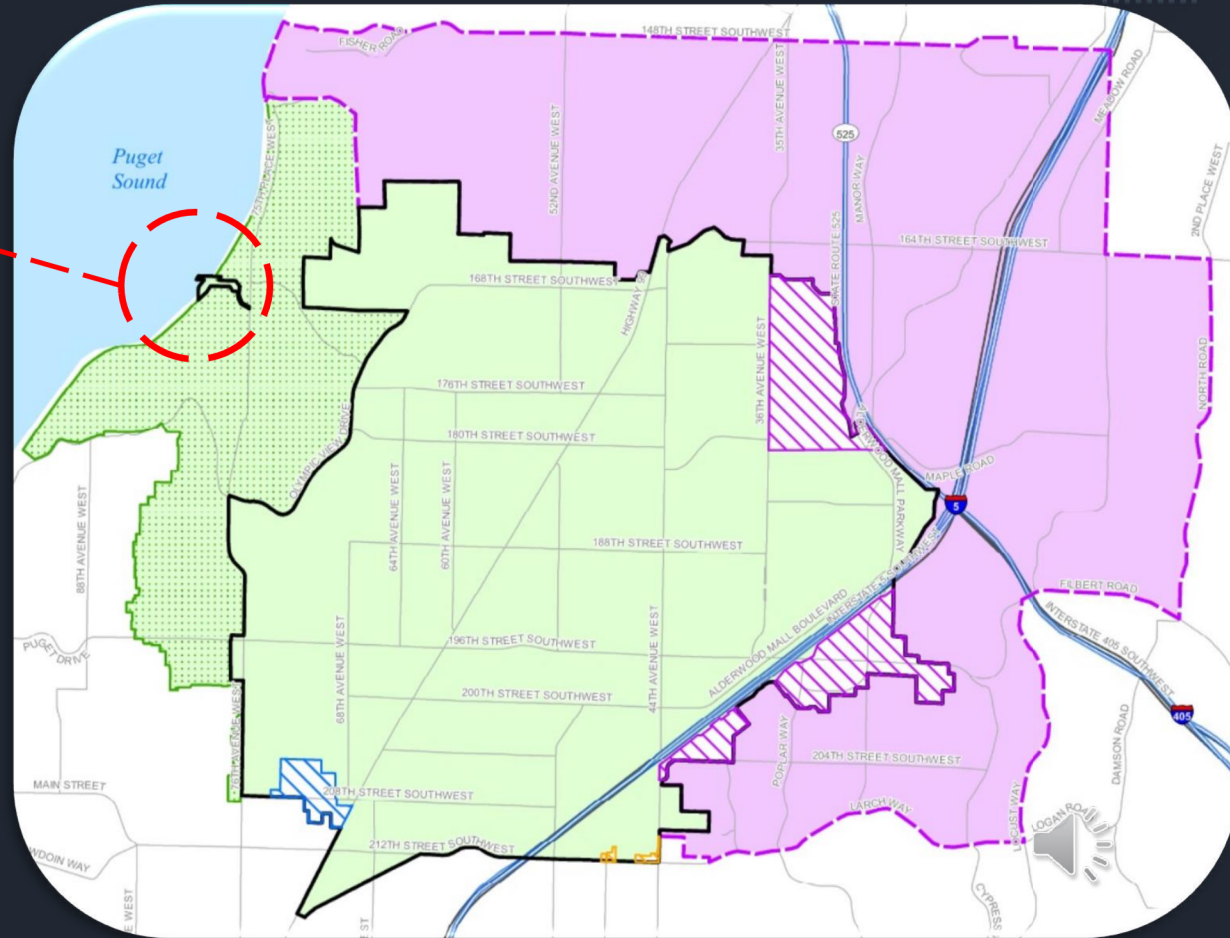
Wastewater Treatment Plant



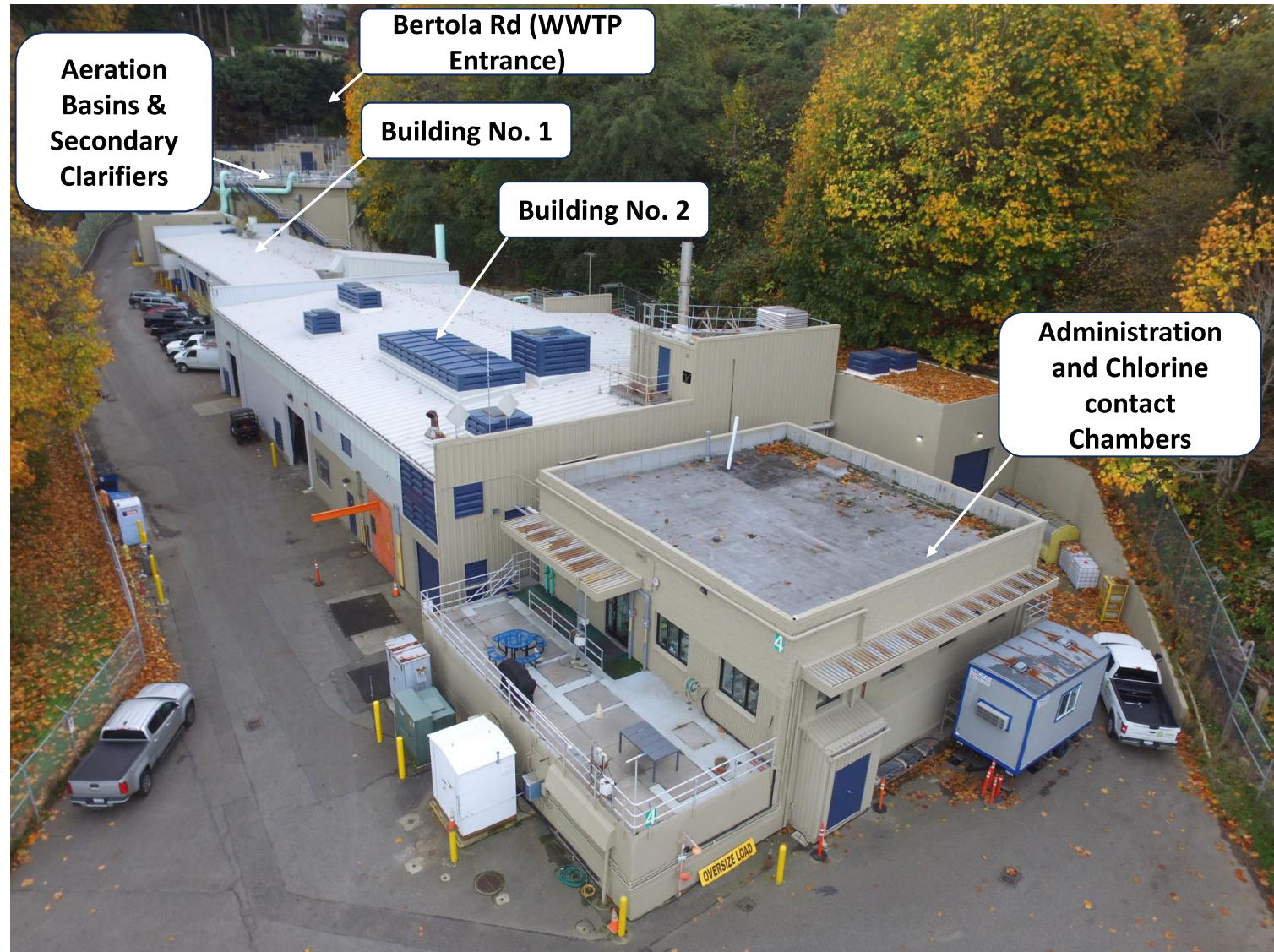
The City's WWTP collects and treats wastewater from a sewer service area of approximately 5,892 acres. Wastewater within this service area is generally conveyed west to the WWTP, located in a City annexed area adjacent to Puget Sound.

Wastewater Treatment Plant

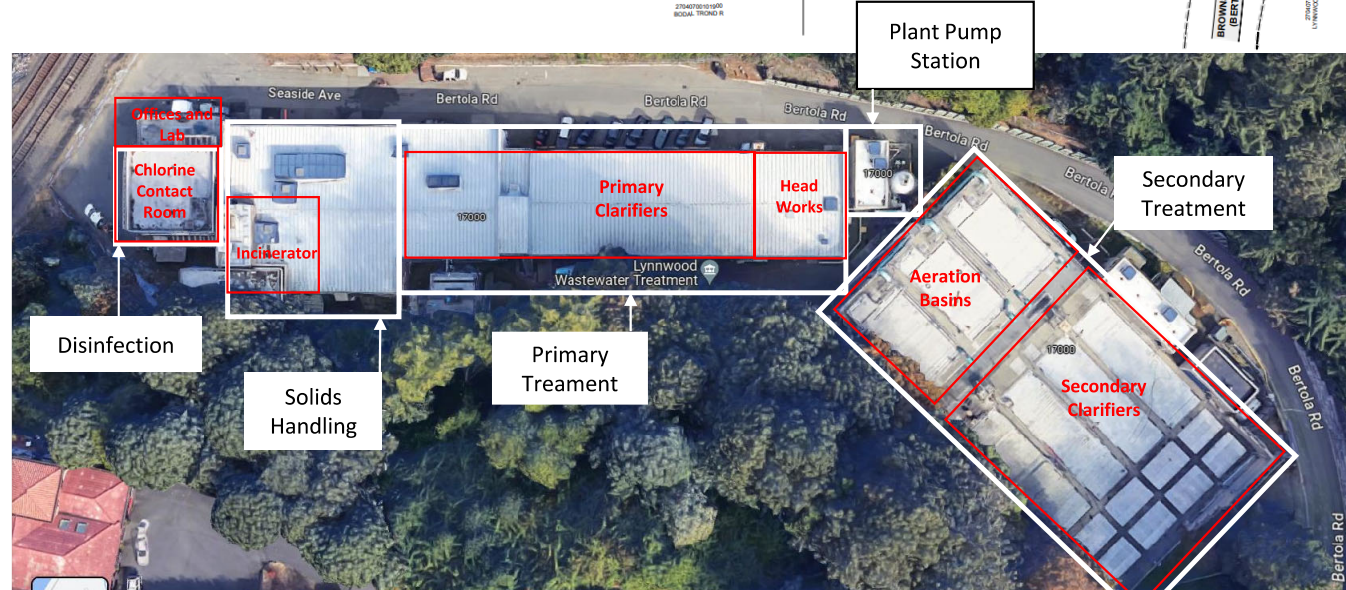
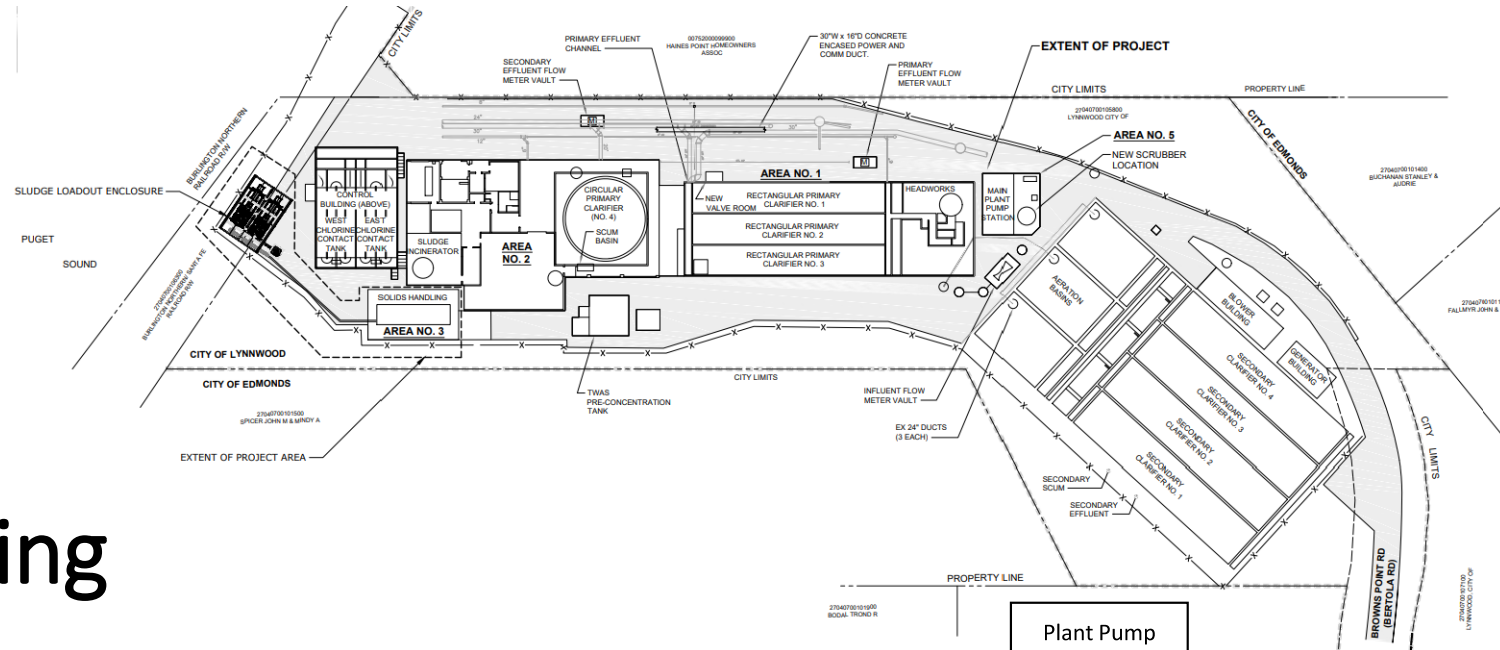
Lynnwood's Wastewater Treatment Plant (WWTP) treats and disinfects wastewater prior to its discharge into the Puget Sound. The original WWTP was initially constructed in 1962 following two major expansions in 1984 and 1989 that formed almost 90% of the existing facility.



WWTP Existing Aerial

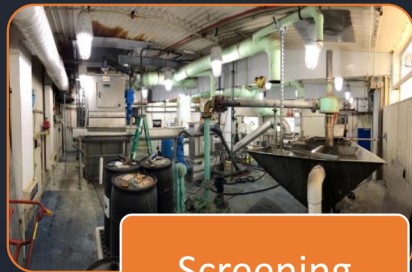


WWTP Existing Site Plan



WWTP Processes

Lynnwood WWTP uses primary and secondary treatment processes to clean wastewater before it is released back into the environment.



Screening



Primary Treatment



Secondary Treatment



Disinfection & Disposal



Screening

A 24-inch influent line originating from the City and a 12-inch influent line from the City of Edmonds converge at the facility. These lines join within a manhole before proceeding into the headworks section. Here, specialized mechanical bar screening and grit removal equipment perform the critical task of extracting large debris and objects, including leaves, plastics, and other solid materials to prevent damage to downstream equipment and to ensure a smoother treatment process.

Primary Treatment

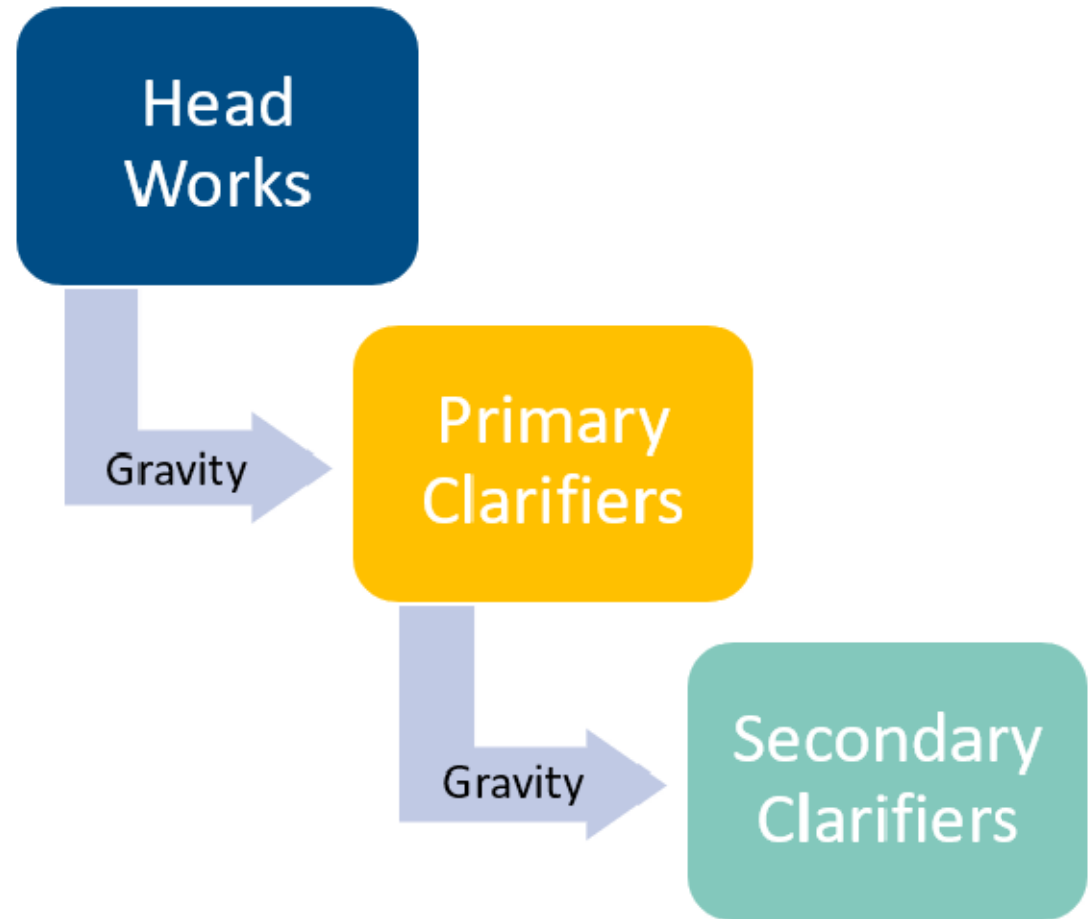
Screened and degritted wastewater from the headworks flows by gravity to the primary clarifiers for primary treatment. In this phase, the flow velocity of the water is reduced, allowing heavier solids (sludge) to settle to the bottom due to gravity. The sludge is then collected and removed for further treatment or disposal. Fats, oils and grease (FOG) are also skimmed from the surface of the wastewater using mechanical skimmers.

Our treatment plant has three rectangular and one circular primary clarifiers.



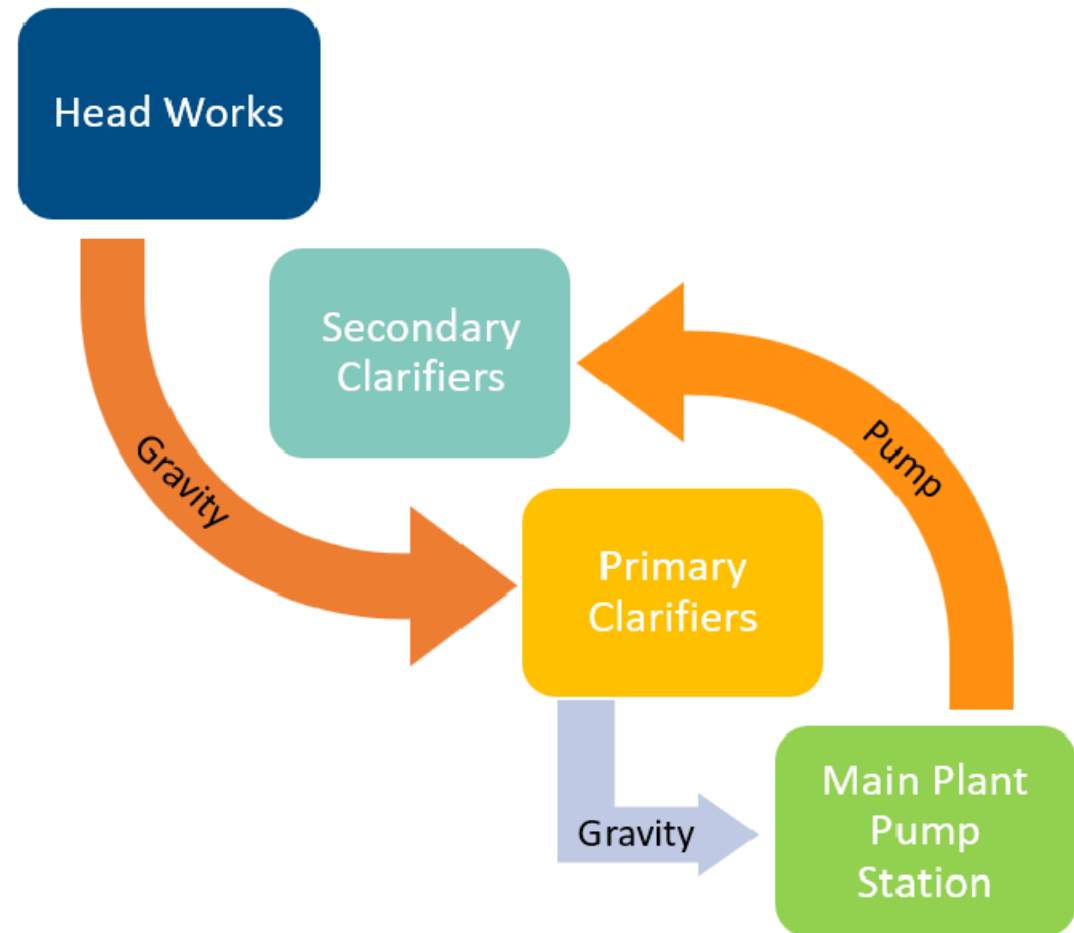
Secondary Treatment

In a conventional wastewater treatment plant, the effluent from the primary clarifiers flows by gravity to the secondary clarifiers for further treatment.



Current Hydraulic Profile

Lynnwood secondary treatment facilities were introduced 27 years after the original plant's construction. To accommodate this addition, the secondary clarifiers were strategically positioned at a higher elevation at the top of the hill, above the primary clarifiers. Consequently, the effluent discharges from the primary clarifiers and flow by gravity to Main Plant Pump Stations (MPPS) and from the MPPS gets pumped up the hill to the aeration basins.



Aeration Basins

Through a secondary biological process in three 309,000-gallon aeration basins, organic matter and pollutants are biologically removed from the wastewater. The oxygen generated by aeration blowers support the growth and activity of aerobic microorganisms, primarily bacteria, that are responsible for breaking down the organic pollutants into simpler, less harmful substances like carbon dioxide and water.

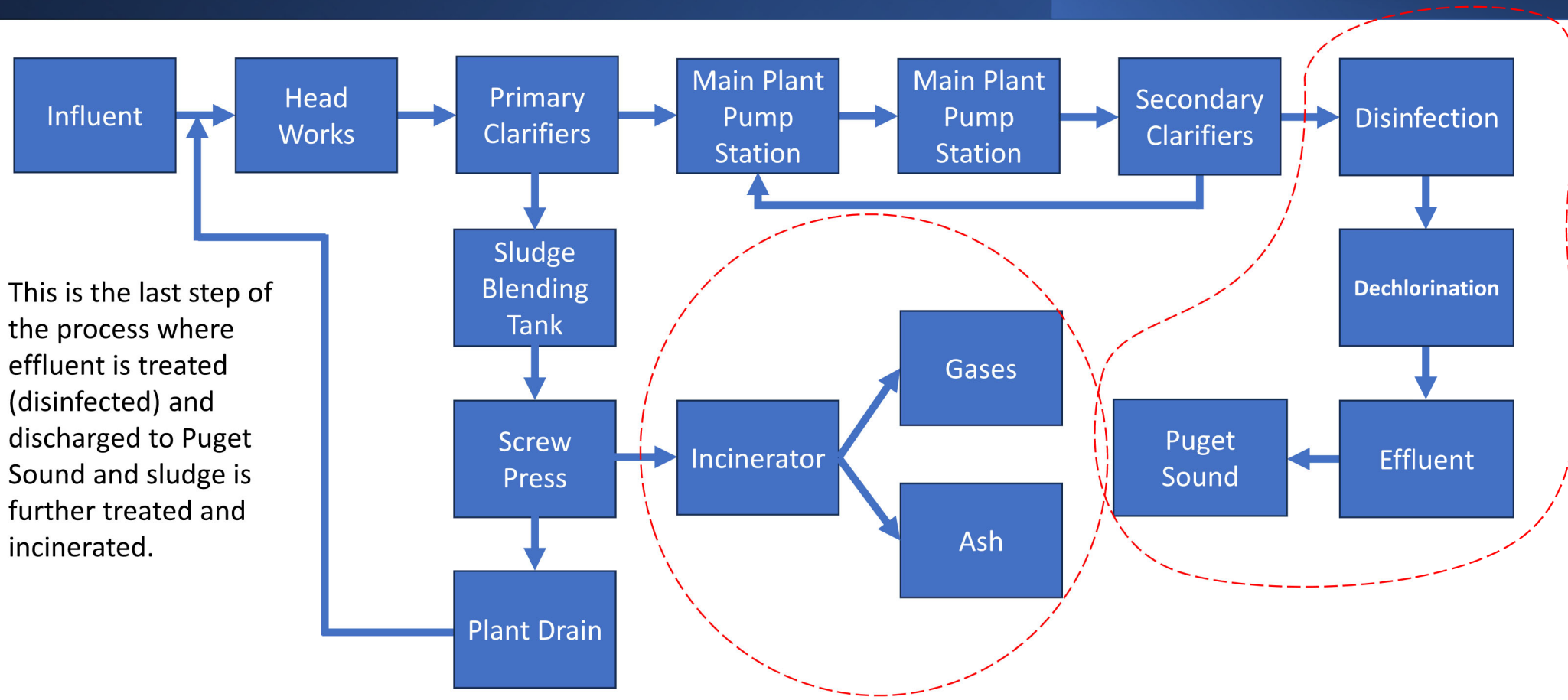


Secondary Clarifiers



The aeration basins effluent flows by gravity to one of the four rectangular secondary clarifiers. Activated sludge (mixture of microorganisms and sludge) settles and collects along the bottom where is either returned to the aeration basins (Returned Activated Sludge or RAS) or wasted (Wasted Activated Sludge or WAS) to the incinerator. Secondary clarifiers effluent flows to the chlorine contact by gravity.

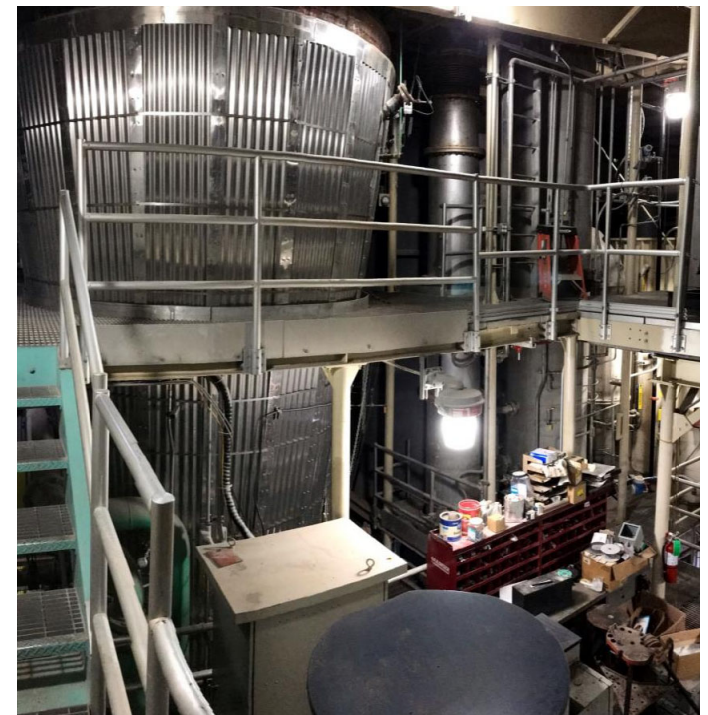
Disinfection and Disposal



This is the last step of the process where effluent is treated (disinfected) and discharged to Puget Sound and sludge is further treated and incinerated.

Solids Handling (Sludge Treatment & Disposal)

The sludge generated from both the primary treatment and secondary treatment processes are blended and thickened and directed to the dewatering room, where a continuously working screw press operates to process around 6 dry tons of sludge daily, reducing its moisture content by approximately 75%. Dewatered sludge from the screw press is pumped to the Sewage Sludge Incinerator (SSI) which is one of the main components of the original treatment plant built in 1962. Once the sludge is introduced into the combustion chamber of the incinerator, the intense heat causes the sludge to combust and break down. During combustion, organic matter in the sludge is oxidized and converted into gases, primarily carbon dioxide (CO₂), water vapor (H₂O) and ash. The gas and ash then pass through a wet Venturi cyclone scrubber for particulate removal, followed by a four-tray wet scrubber where the finer particulate is removed, and the gas is cooled by passing it counter-current to a large quantity of water. The scrubbed gas is re-heated (to prevent a visible steam plume) and released through a stack to the atmosphere. The captured ash, in the form of a slurry, is thickened in a 10-foot diameter gravity thickener with polymer addition. Current operations produce, on average, approximately 6 cubic yards of ash a week for disposal offsite.



Effluent Disinfection & Discharge

The secondary clarifier effluent is disinfected with gaseous chlorine inside a 326,000-gallon chlorine contact tank with a minimum of 60 minutes contact time to achieve the necessary fecal coliform kills. The effluent from the chlorine tank is de-chlorinated, using ORP-probe controlled sodium bisulfite feed, before being discharge to the 36-inch diameter outfall. Treated effluent is discharged through a 36-inch diameter 240-foot-long x 130-foot-deep diffuser that disperses the flow through 98 3-inc ports into Browns Bay of Puget Sound. The outfall extends approximately 1,000-feet into the Puget Sound and is approximately 100 to 120 feet deep.

