

TREATMENT PROCESS

On average 275 million gallons of wastewater enters the Hyperion Water Reclamation Plant on a dry weather day. Because the amount of wastewater entering HWRP can double on rainy days, the plant was designed to accommodate both dry and wet weather days with a maximum daily flow of 450 million gallons of water per day (MGD) and peak wet weather flow of 800 MGD.

Despite Los Angeles having a separate sewer system and storm drain system, some rainfall (which normally flows through the storm drain system) flows into the sewer system through one of the 140,000 sewer maintenance hole covers that make up the Los Angeles area collection system. In addition to rainfall, cracked sewer lines damaged by growing tree roots can sometimes become saturated with urban runoff.

Wastewater is processed and treated using some of the most innovative and time tested methods at Hyperion.

Pretreatment

Anything and everything is found in sewage. At the headworks, the largest solids are removed - things as big as branches, plastics and rags - as well as smaller solids like sand and other gritty solids. This is called Preliminary Treatment, the first step in wastewater treatment.

Preliminary Treatment consists of a screening process and sand/grit removal. The screening process involves the use of eight bar screens (large metal racks of steel bars spaced 3/4 inches apart) to remove large objects from entering wastewater. A large mechanical rake removes unwanted materials from the bar screen and deposits the various items into a water trough where they are then dewatered and stored in large silos. Once dewatered, the materials (consisting mostly of rags, wood, and other non-recyclable/non-beneficial materials) are then loaded onto a hauling truck and taken to a landfill for disposal. HWRP has recovered a number of unusual objects over the course of the years such as golf balls, wooden 2x4s, a bowling ball, a 17-foot long telephone pole, and a motorcycle.

After the screening process, wastewater flows to aerated grit chambers for sand/grit removal. Sand can enter sewer lines through the washing of dirt in sinks, showers and washing machines. The sand, if left in wastewater as it is being treated, would act as an abrasive in eroding the various downstream pumps, valves, and pipes. Air is pumped into aeration tanks to keep the light organic material suspended while the heavy sand settles to the bottom of the tank. The sand is removed by a pump and the pump sends the sand to the materials handling tower where it is dewatered, washed, stored in a hopper and loaded into trucks and disposed of in a landfill (similar to the process for the bar screen material). More than 885,000 pounds of solids and organic materials flow into the Hyperion Water Reclamation Plant in a 24-hour period.

After leaving the headworks, the wastewater continues to move by gravity to primary treatment.

Primary Treatment

The second step in treating wastewater is Primary Treatment. Wastewater enters the plant at an average speed of two to five feet per second; however, during Primary Treatment, wastewater is slowed to two to three feet per minute. Underground large primary tanks (roughly 300 feet long and 15 feet deep) hold wastewater for two hours, allowing heavy solids to settle to the bottom while oil and grease float to the top. Sometimes chemicals are added to allow more particles to bind together and settle.

These tanks can remove 70-75% of the solids in wastewater and about 50-55% of the organic material. The heavy solids are then removed and transported to the solids handling area of the plant for further processing.

It is an industry standard to measure the organic strength of wastewater by utilizing sampling, inoculation and incubation methods to determine the amount of oxygen consumed by bacteria already present in the wastewater. This measurement of consumed oxygen is called Biochemical Oxygen Demand (BOD). With a proper BOD measurement, the organic strength of the current wastewater can be determined, allowing plant staff to make any necessary adjustments.

Wastewater is then transported from Primary to Secondary Treatment using an Intermediate Pump Station (IPS). The IPS consists of 10 large 12-foot diameter Archimedes Screw Pumps. Each pump can lift 110 to 125 million gallons per day (MGD).

Secondary Treatment

Secondary Treatment is a two stage process. First, in covered, oxygen rich reactor tanks, bacteria living in the wastewater consume most of the remaining organic particles (solids). These "plumped up" bacteria settle to the bottom of the tanks where they are then sent to the clarifiers for final settling and collection.

Digestion and Solid Handling

Solids removed during primary and secondary treatment are pumped to these huge, egg shaped vessels for further processing. The digesters destroy the disease causing organisms (pathogens) in the biosolids.

The solids that were removed from primary and secondary treatment are now pumped into huge, totally enclosed, egg shaped tanks called digesters. Bacteria and other microorganisms that live without oxygen thrive here. It takes about 15 days for these microorganisms to eat half of the biosolids, destroy the pathogens and release a natural methane gas that has tremendous energy value.