

WASTEWATER SYSTEM COMPONENTS

There are a wide range of terminologies used to classify the levels of wastewater treatment, but for the purpose of this overview the key terms referred to are primary, secondary, and tertiary treatment. In general, the more stages of treatment wastewater undergoes, the less of an adverse effect it will have upon re-entering the environment.

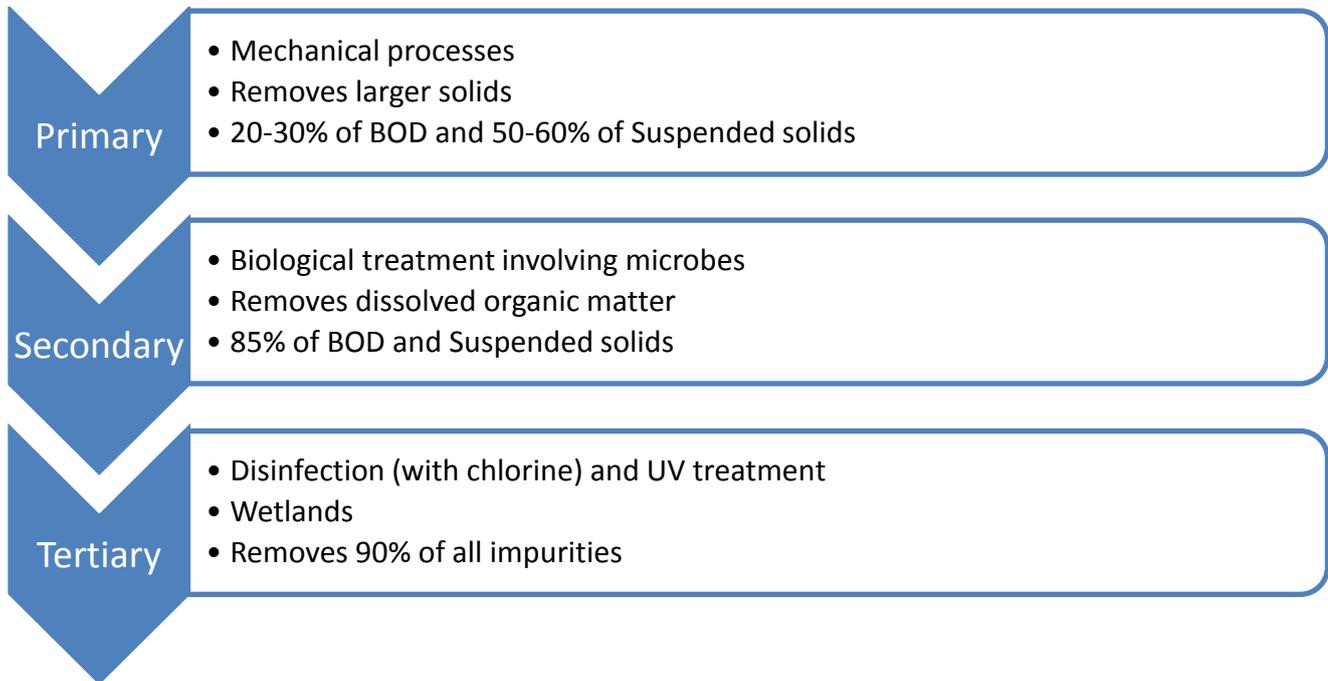


Figure 1: Primary, secondary and tertiary treatment processes.

PRIMARY TREATMENT (MECHANICAL)

Primary (mechanical) treatment removes the larger, floating solids from the raw wastewater. This is achieved through the use of grates and screens that trap and separate solid objects from the bulk wastewater. It can reduce the biological oxygen demand (BOD) of the incoming sewage water by twenty to thirty percent.

Biochemical oxygen demand (BOD) is the amount of dissolved oxygen needed by aerobic biological organisms in a body of water to break down organic material present in a given water sample at certain temperature over a specific time period.

Suspended solids refer to small solid particles which remain in suspension in water as a colloid or due to the motion of the water.

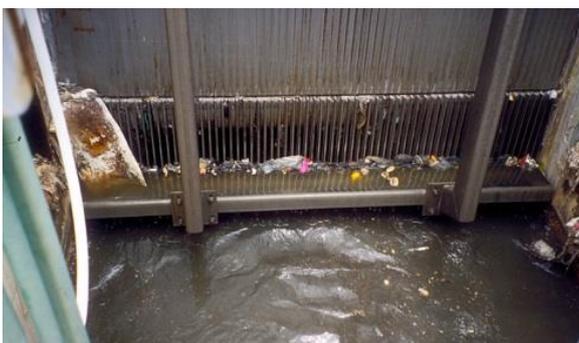


Figure 2: Primary Screen

A Primary Screen (left) allows removal of solid non-biodegradable material prior to wastewater entering the lagoon.

SECONDARY TREATMENT (BIOLOGICAL)

Secondary (biological) treatment aims to remove the dissolved organic matter that is too fine to be removed by the primary mechanical treatment processes. Biological content in wastewater sourced from human and food waste is removed via the use of microbes and aerobic biological processes. Microbes are dependent on sufficient oxygen and food (in the form of biodegradable components in the wastewater) to be effective. Settling sediment and solids from the wastewater follows the biological processes. Combined, these two processes can remove about eighty-five percent of the suspended solids and biological oxygen demand can be entirely removed with an efficient and effective secondary treatment system.



Figure 3: Curtains

Curtains guide the flow of wastewater through the lagoon and reduce 'tracking' where wastewater can short cut across the lagoon to the outfall. Curtains increase the residence time of wastewater in the lagoons to improve biological treatment process and provides more surface area for bugs to adhere to.

TERTIARY TREATMENT

Tertiary treatment is defined as any treatment beyond secondary (either chemical or physical) and is often used where discharge environments are highly sensitive. Significant amounts of nitrogen and phosphorous can be removed, that are often attributed to an overgrowth of cyanobacteria, weeds and algae in discharge areas. Heavy metals, bacteria and viruses may also be removed. Disinfection, with chlorine or by UV treatment, is most commonly used and can remove most of the impurities left in the wastewater. Wetlands, where treated wastewater passes through a plant or gravel system prior to being released into the environment, also offer a form of tertiary treatment.



Figure 4: UV Treatment

UV disinfection is a physical process that instantaneously neutralizes microorganisms (bacteria and protozoa) as they pass by ultraviolet lamps submerged in the effluent. The process adds nothing to the water but UV light, and therefore, has no impact on the chemical composition or the dissolved oxygen content of the water.



Figure 5: Wetlands

Plants (or gravel) provide contact with treated wastewater and act as a low level filter, removing algal colour and suspended solids. Plant wetlands are thought to provide some nutrient removal, although this is poorly understood.