

A Case Study

Sewage Treatment Works for Yas Island - Abu Dhabi



Introduction

ALDAR Properties, Abu Dhabi's premier real estate development, management and investment company, is undertaking multi-billion Dollar civic projects to help develop the capital emirate of the United Arab Emirates into an international business magnet and tourist

destination. ALDAR's vision is to establish Abu Dhabi as the UAE's most dynamic forward-thinking real estate market by creating unique and prestigious developments that can be used as a benchmark of quality, whilst adhering to the cultural and natural

heritage of the city. As its partner for success, ALDAR chose Metito to construct, execute and put into operation a new sewage treatment works (STW) located on Yas Island to serve the Formula One Abu Dhabi Grand Prix track. The plant will also serve Warner Brothers Movie World, Ferrari World, a cluster of hotels including Yas Marina Hotel, a water park, and Yas Mall. A parkland golf course, marinas, a polo club, apartments, villas and food and beverage outlets would also benefit from the project.

In view of the prestigious type of the project, and the nature of the development, The Membrane Bioreactor process was chosen. This process produces high quality effluent that can be safely used in open irrigation with no health hazard. Treated and disinfected effluent from STW is discharged to an irrigation network to be re-used for landscape irrigation.

Scope of Work

The scope of the STW includes treatment facilities split into three equal streams 19,000 m³/day each. The STW treats flows equivalent to two thirds of the ultimate population, and it is anticipated that the third module of the plant will be operational at a later stage.

Process Flow

Pretreatment

Raw sewage gravitates at an elevation approximately 12 m below ground level through a sewerage network to the main lift station which is equipped with two vertical mechanical coarse bar screens having a bar spacing of 20 mm. The material trapped by the screens is automatically raked based on timer control through programmable PLC system.

Three submersible non clog pumps lift raw sewage up to the Inlet headworks, which is a composite structure comprising fine screens with 1.5 mm bar spacing and grit & grease removal systems. The material trapped by the fine screen is automatically discharged by the specially designed screw fitted to the system.

Two grit and grease removal units are provided for separating high density sand/grit, as well as scum and grease from the raw sewage before biological treatment. Grit is removed by an air lift pump and is transferred to the grit classifier where the it is separated, collected in the skip and removed in trucks whenever required.





Sewage then flows to a three-compartment equalization tank, where it is stabilized and distributed to the MBR. Air Diffusers are provided to aerate the sewage and prevent it from going septic.

Biological treatment

From the equalization tank, sewage flows to the anoxic tank, where baffles create a Plug flow pattern in order to facilitate the removal of nitrogen. Submersible mixers are provided to ensure homogeneous mixing of dilute raw sewage with the high solids concentration flow returned from the MBR tank.

There are a total of eight MBR tanks, each containing 24 modules of 200 sheets. Air is supplied to the MBR units on continuous basis except during chemical cleaning. The MBR coarse bubble diffusers are flushed once in a day, and the sequence of flushing is controlled by a SCADA system. The MBR tanks have GRP covers with a connection to the odor control system.

Two Anoxic recycle pumps are provided in each MBR tank to transfer liquid from the MBR basin back into the anoxic tank, and waste excess sludge through a main header to the sludge holding tanks.

Treated sewage effluent is transferred to the TSE tank by

means of permeate pumps, from where it goes to the Irrigation Pumping Station that feeds the irrigation network of YAS Island.

The TSE tank is divided into two compartments: Chlorine Contact tank (CCT) and Treated Effluent tank (TET). Permeate pumps feed the CCT from where the effluent flows to the TET Tank. In the CCT, water will have sufficient contact time to mix with chlorine.

Excess Sludge and Sludge Handling

Surplus Activated Sludge is pumped from the MBR tank to the sludge holding tank (SHT). The tank is provided with an aeration system in order to keep the contents of sludge homogeneous and prevent occurrence of septic conditions. Sludge is then pumped from the SHT tank to the Belt Press where a solid cake is produced. The sludge cake is collected in skips and then removed by trucks.

Odor Control Unit

Foul air from the inlet lift station, MBR units, equalization tanks, SHT tank and dewatering building is withdrawn by air ducts through an odor control system at a rate of 36,000 m³/h.

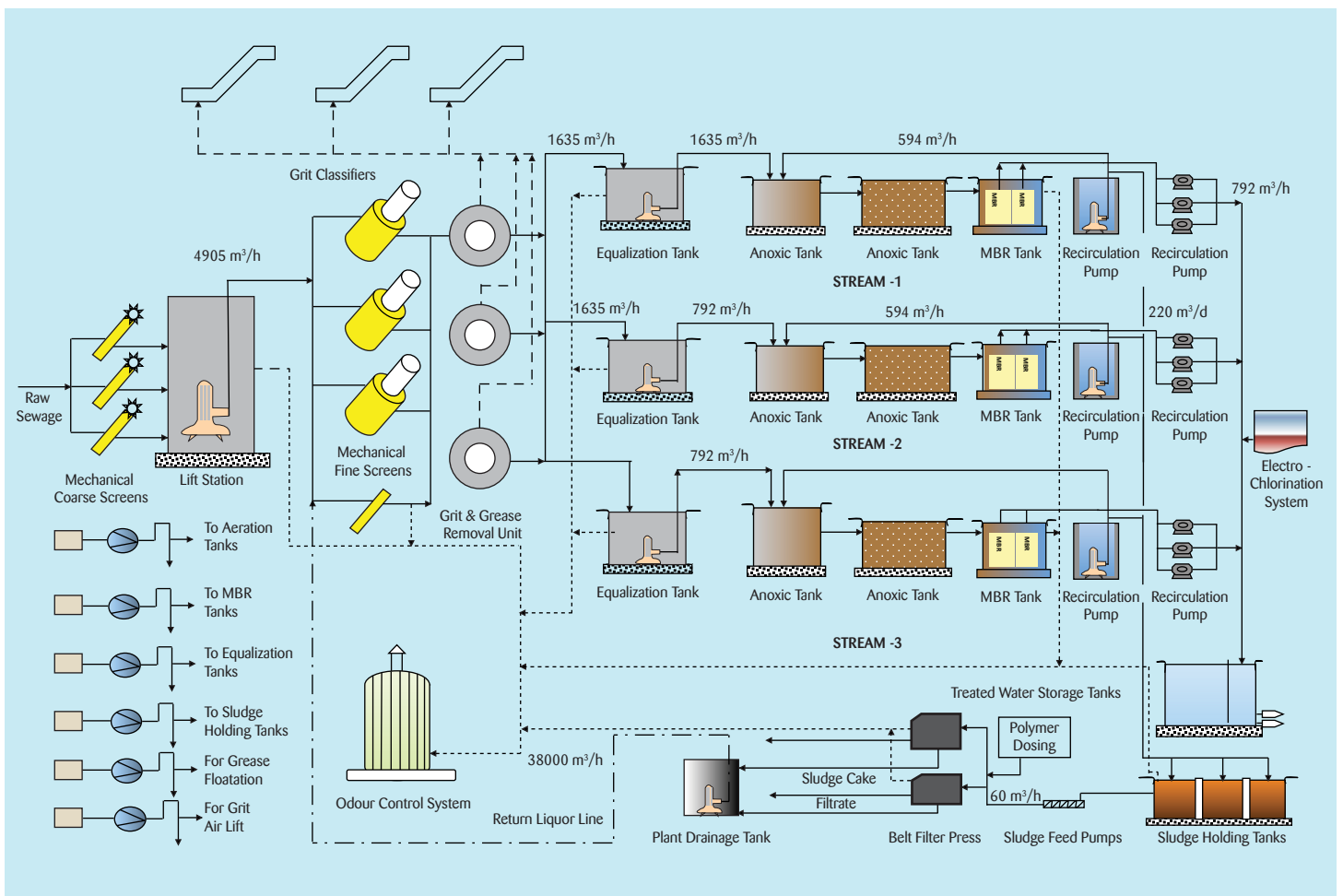


Onsite Electro-Chlorination System

The STW includes an onsite hypochlorite generation system that is designed to produce a 0.8% sodium hypochlorite solution by electrolyzing a brine solution and filling a storage tank through a batch process. Hypochlorite is used for disinfecting the TSE before it is pumped to the irrigation network.

Yas island has no access to the main drainage system in

Abu Dhabi, therefore the constructed STP helped ALDAR to serve both the domestic and commercial districts. Also the produced TSE serves for the irrigation of the entire landscaping on the island, which saves the use of potable water for irrigation purposes, thus ensuring that the Green Concept is maintained throughout the development.



Schematic Flow Diagram