GE
Water & Process Technologies

Case Study

Existing Waste Treatment Facility Undersized to Handle Resort's Water Reuse Demands

Challenge

Point Pleasant Resort is a beautiful villa-style suite resort nestled amid lush hillside flora in St Thomas, U.S. Virgin Islands. (See Figure 1.) From its three intimate pools to a secluded beach at the foot of a nature trail to fabulous views from spacious wrap-around private terraces, the resort is a true tropical paradise.

Figure 1: St. Thomas, U.S. Virgin Islands

The resort, which is extremely environmentally conscious, reuses all of its wastewater for irrigation, landscaping and toilet flushing. The resort found that their wastewater treatment facility was undersized to deal with their wastewater reuse requirements. The water for reuse was gray, sometimes chunky and requiring odor abatement at times. In addition to needing a solution for their waste treatment challenges, the client also had a brackish water RO system which had previously been operated by a local company. They turned to GE Water Process & Technologies for enhanced service and quality, awarding GE a BOO agreement. GE was an ideal supplier for handling both their drinking water and wastewater requirements.

Solution

GE was able to retrofit the client's existing waste treatment equipment to provide better quality water for reuse and allow for greater capacity. The MBR system conversion was done in the existing tanks so there was no need for expensive sludge handling. The waste treatment capacity was more than doubled without requiring additional space or expensive tanks. In addition, the plant continued to process wastewater during the conversion.

From an operating standpoint, whereas the resort previously handled the waste treatment facility themselves, now both the reverse osmosis and MBR plants are being operated and maintained by the GE team, leaving their personnel free to focus on other pressing resort matters.

End-user:	Point Pleasant Resort
Location:	St. Thomas, U.S. Virgin Islands
Commissioned:	October 2001
Application:	Domestic Sewage Treatment for Resort
Feedwater quality:	180 mg/l BOD, 240 mg/l TSS
Product quality:	< 6 mg/l BOD, < 2 mg/l TSS
Capacity:	30,000 gallons per day (114 m^3/day)
Technology:	Membrane BioReactor (MBR)

GE Membrane BioReactor

System Description

MBRs replace the sedimentation and tertiary filtration processes in conventional wastewater treatment by removing the suspended materials with a microfiltration (MF) membrane. (Figure 2 shows the MBR system.) The membranes are submerged in an aeration tank with the water being drawn through the membranes under vacuum and

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leaving the suspended biomass (activated sludge) material in the aeration tank.

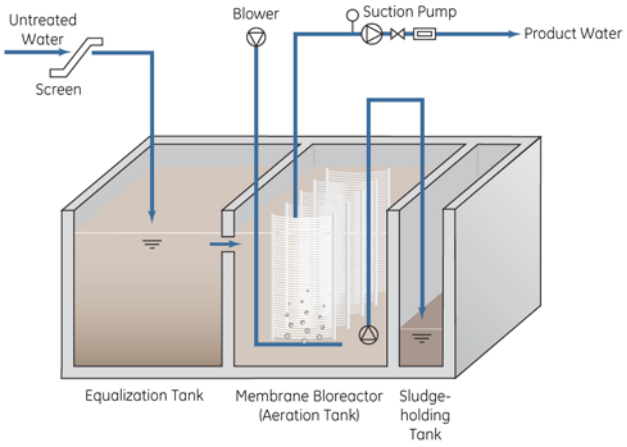

Figure 2: MBR System: The MBR system combines activated sludge treatment with microfiltration to produce water that is crystal clear and virtually odor free.

The MBR can produce less sludge than conventional wastewater systems due to high sludge retention times (SRT) of up to 45 days and high mixed liquor suspended solids (MLSS) concentrations up to 12,000 mg/l. They can produce a larger amount of clean water in the same footprint size as a conventional system because the microfiltration membrane allows the wastewater system to operate at high MLSS concentrations and short hydraulic retention times (HRT) without concerns of settling that a secondary clarifier would have.

Table 1: Water Quality Data/Operating Conditions

Parameter:	Influent	Effluent
BOD (mg/l):	180	< 6
TSS (mg/l):	240	< 2
SRT (days):	12	
HRT (hours):	8	
MLSS (mg/l):	10,900	

The membranes remain clean by operating the vacuum (product) pumps for 8 minutes and stopping them for 2 minutes while running the aeration system. The bubbling action from the aerator scour the membranes and keep them from fouling.