NEOSEP®: Expanding Possibilities

Biological | Case Study

Monteray Shores Wastewater Treatment Plant

The Client

The Monteray Shores Wastewater Treatment Plant is located in Corolla, North Carolina at the northern end of the Outer Banks. The Monteray Shores WWTP faces the challenge of increasing treatment capacity and improving effluent quality to meet new nitrogen and phosphorus limits within the existing constrained facility site.

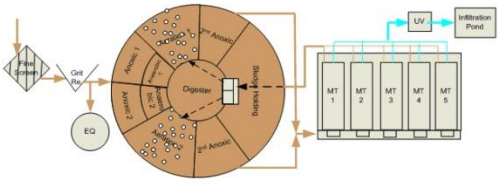
The Benefits

- Increased hydraulic capacity to 0.52 MGD
- Removes total nitrogen (TN) and phosphorus (TP)
- Produces reclaimed quality water

The Client's Needs

In recent years, the robust growth of residential and commercial development in the Outer Banks of North Carolina has put a strain on many of the wastewater services in the area. The Monteray Shores WWTP in Corolla, at the northern end of the Outer Banks, was no exception. The existing treatment facility, though well operated and maintained, was limited to a maximum hydraulic capacity of 180,000 gpd and was originally configured only for BOD, TSS and NH3 removal. Additional capacity and improved capabilities would be required or development would be forced to come to a halt.

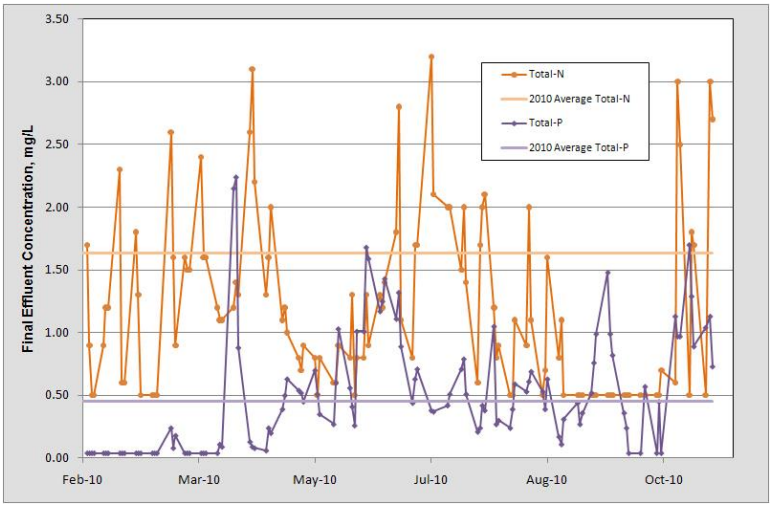
The WWTP is further challenged by substantial swings in influent flows which fluctuate heavily depending on the season in this tourist destination. Combined with the hydraulic and treatment performance limitations of the original plant, this created a unique set of challenges requiring a significant overhaul of the facility.



The original Monteray Shores WWTP consisted of an extended aeration plant using a circular tank with a central clarifier. As is often the case along the NC coast, disposal of the treated effluent is accomplished via Rapid Infiltration Basins (RIBs) which allow the effluent to percolate through the sandy soils into the ground. To properly upgrade the facility, additional RIB area would be needed in addition to the expansion of the treatment facility itself.

Options for expansion were limited because the existing site was restricted by an apartment complex on one side and retail stores on the other. Footprint constraints were further compounded by the setback requirements for RIBs (minimum distance allowed from the RIBs to adjacent property lines). Fortunately, state regulations allowed for reduced setbacks for systems which produce reclaimed quality water and remove total nitrogen (TN) and phosphorus (TP).

The project engineer thoroughly evaluated several options and determined that a membrane bioreactor upgrade was the best alternative for meeting all of the plants requirements. The technology allowed for the plant to utilize much of its existing infrastructure and could be configured with multiple membrane trains that could be brought on-line during the busy tourist season and taken off-line as needed during the low flow seasons. The plant would also use a process that was capable of TN and TP removal to less than 4 mg/L and 2 mg/L, respectively.



The Solution

The existing extended aeration plant was converted to a four stage biological treatment process comprised of anaerobic, primary anoxic, aeration and secondary anoxic zones. This fit well into the existing structure to create two parallel treatment trains, with tank volume left over to utilize for aerobic sludge digestion and storage. The retrofit to create two trains also helped minimize plant downtime for construction, as the system began treating the influent wastewater as soon as the first biological treatment train was complete, while construction took place on the second train.

Prior to converting the existing WWTP, the new head works (rotary drum fine screens and grit removal) and new steel membrane tanks were constructed. The rotary drum screens have perforated openings of 2 mm to prevent items from entering the process that can potentially damage the membranes. Each membrane tank has five membrane modules installed with space for a 6th to be added if future capacity is needed. The membrane modules utilize flat sheet membrane elements with an average pore size of 0.08 µm.

Each membrane tank has a dedicated permeate pump, scour aeration blower and return activated sludge pump. The dedicated pumping and aeration equipment provides needed flexibility to the system, which allows the system to process flows that can vary from 520,000 gpd in the summer down to 50,000 gpd in the winter months.

Results

The expansion of the Monteray Shores WWTP to a new NEOSEP® MBR system has increased the hydraulic capacity to 0.52 MGD while upgrading to a nutrient removal process that consistently achieves very low effluent TN and TP levels. The upgrade also proved very cost effective, thanks in part to the unique retrofit solution that made optimum use of the existing treatment structures. The Monteray Shores WWTP is now very well equipped to handle the many busy tourist seasons to come.

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