

CASE STUDY

Nebula MSABFP Improves Secondary Treatment at Outdated Municipal Plant



Kaumakani, Hawaii Nebula MultiStage Pretreatment System

A small coastal town located in Kauai County, Hawaii, Kaumakani is home to an abundance of protected wildlife and a flourishing tourism industry dependent on maintaining a pristine ecosystem. As a result, conservation efforts have been driving regulations in communities across the state.

As Hawaii moved to ban the use of several outdated treatment methods and tighten wastewater effluent standards, the existing plant found itself in

need of a new secondary treatment system friendly to both Kaumakani's environment and operating budget.

Aquarius Technologies began working with Laulea Engineering in 2017 to design a solution to fulfil Kaumakani's unique needs. A Nebula MultiStage Biofilm System was the obvious choice.

To meet Kaumakani's specifications, a concrete basin was selected and divided into ten



Ten media racks were installed, one per treatment stage. The media provides an ideal growth surface for the discrete microbial populations driving treatment.

independent treatment stages. By design, the plug flow environment through the individual stages facilitates a microbial food chain. Each stage is home to a fixed media rack, providing surface area for microbiology to attach, grow, and form biofilm.

The initial stages have a high food-to-microorganism (FM) ratio, fostering rapid growth of lower life forms. As wastewater flows through the basin, an increasingly lower FM is established, ideal for more complex life forms.

These higher microbes feed on the microbiology lower on the food chain as they are sloughed off the media via air scouring. Since most microbiology ultimately becomes a food source for other organisms, the Nebula MultiStage Biofilm System inherently produces less sludge than competing technologies.



The baffles inside the basin allow for a plug flow through isolated zones of treatment—the key to establishing the microbial food chain responsible for sludge reduction.

The new secondary treatment system was installed and fully operational in 2019.

The NEBULA® MultiStage Biofilm System was successfully integrated into the infrastructure of the existing Kaumakani Village WWTP.

Following primary treatment via a headworks screen and Imhoff tank, influent enters the secondary treatment basin. Wastewater flows through

ten treatment stages before settling in a final clarifier. Effluent from secondary treatment is discharged directly into a nearby pond without chemical disinfection. The Nebula Biofilm System guarantees consistent quality effluent safe for the area's protected wildlife.

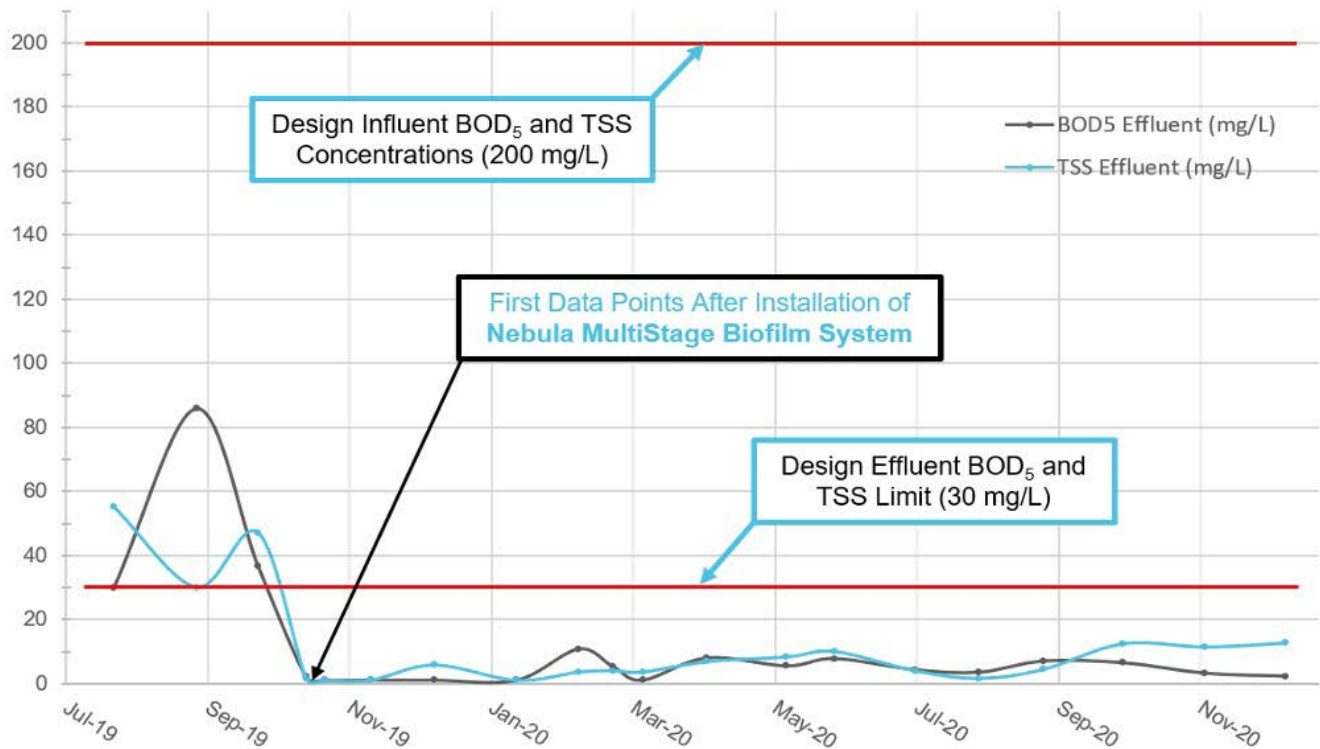
Kaumakani traditionally trucked its excess sludge to larger wastewater treatment plants for disposal, as existing facilities lacked sludge handling capacity. Since the plant's startup in 2019, Kaumakani manages sludge drying on site, resulting in transportation savings. Kaumakani manages sludge drying on site, resulting in thousands of dollars in transportation savings.

The Nebula MultiStage Biofilm System solution provided the Village of Kaumakani the best life cycle cost with an easy-to-operate and environmentally conscious secondary treatment system. Working with Aquarius Technologies, Kaumakani's challenge was met with a solution resulting in the plant achieving improved effluent quality and decreased sludge production.



The ten treatment stages and final clarifier provide improved secondary treatment, integrating perfectly with existing plant infrastructure.

Contact Aquarius to learn how a Nebula MultiStage Biofilm System can meet your municipal wastewater treatment needs.



The Nebula MultiStage Biofilm System installed at Kaumakani is designed for 125,000 gallons of wastewater daily at a hydraulic retention time (HRT) of 10.5 hours. Design influent contaminant concentrations of 200mg/L for BOD₅ and TSS are consistently treated to average effluent levels of 4.2mg/L and 5.5mg/L for BOD₅ and TSS, respectively. Both effluent concentrations are less than one fifth of design and represent over 95% reduction of the 200mg/L influent conditions.



CASE STUDY

NEBULA MULTISTAGE BIOFILM SYSTEM UPGRADES NITRIFICATION AND REDUCES SLUDGE PRODUCTION

©Aquarius Technologies, LLC | 420 W. Technology Way, Suite D, Saukville, WI 53080
 262-268-1500 | info@aquariustechnologies.com | aquariustechnologies.com