NUVODA

MOB Process

CASE STUDY: SETTLEABILITY

CHARLOTTE, NORTH CAROLINA

THE CHALLENGE:

Seasonal changes in the Charlotte Water region always bring foaming and shifting settleability, and Sugar Creek WWTP feels it every time. Poor settling and high clarifier blankets are common during these swings. With one third of the flow sent to four secondary clarifiers built in the 1970's with 8-foot side-water depths, the plant has limited buffer to absorb erratic settling behavior before risking blanket carryover. The MLSS inventory required for nutrient removal has long pushed these clarifiers to their limits, and during seasonal upsets the facility is routinely forced to divert flow to a neighboring plant.

Sugar Creek is rated for 20 MGD and typically targets 16 MGD, sending anything above that to the bypass facility. With the planned expansion to 28 MGD in 2030, the demand for both clarification and treatment capacity will only increase. The existing footprint presents real constraints on how that additional capacity can be achieved, making a new construction approach difficult to justify both logistically and financially. The challenge is straightforward: increase clarification capacity inside the fence to prepare for 28 MGD and minimize bypass flows to the other facility that is also experiencing growth of its own.

WHAT WAS ACHIEVED:

- Successfully operated with 33% less clarifier area
- Increased flows to facility from 16 MGD to 20 MGD, peaking at 24 MGD, while maintaining excellent performance
- Reduced backwash frequency on tertiary filters
- Sustained, complete, year-round nitrification
- Retrofit installation without facility downtime. Read more about overall treatment performance here: link

WHAT THE MOB PROCESS CAN DO FOR YOU:

- Increased Clarifier Capacity
- Stabilized Settling Performance
- High Loading Process Stability
- Full-Scale Demonstrations and Retrofits

WHY THE MOB PROCESS WAS CHOSEN:

The Mobile Organic Biofilm Process is a hybrid biofilm technology in which mobile carriers circulate between the reactors and clarifiers with the flocculant sludge. Upon startup at Sugar Creek, the carriers served as an immediate ballast in the secondary clarifier, improving the settling of otherwise uncooperative sludge. As the mobile biofilms matured, they began to enmesh with the suspended growth dragging the entire sludge blanket down as one cohesive mass. This transition of a portion of suspended growth to attached growth reduced the suspended solids inventory and enabled the facility to push clarifier loading rates further.

Figure 1

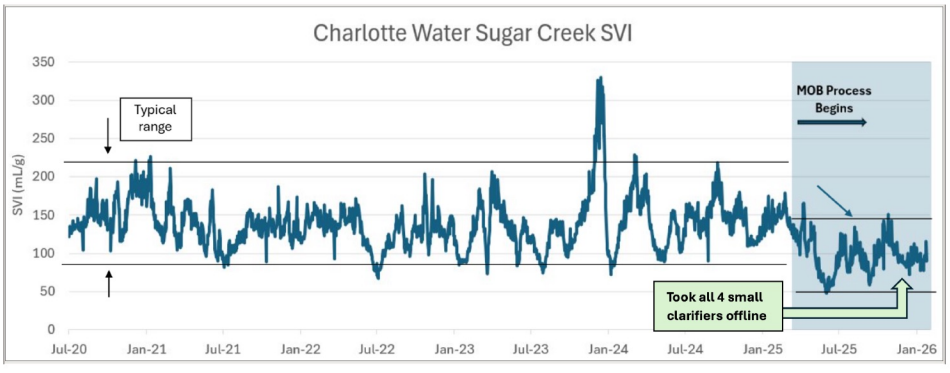

Figure 1: Sugar Creek SVI data before and during the MOB Process. Stabilizing settleability from SVIs of over 150 to less than 100 mL/g allowed the facility to take their four small clarifiers offline in winter of 2025.

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FACILITY OVERVIEW:

Facility Flows	▪ 16.2 MGD (61.3 MLD) Average ▪ 20 MGD (75.7 MLD) Achieved
Effluent Targets	▪ Summer: NH3 <1.0 mg/L ▪ Winter: NH3 <2.0 mg/L
Project Goals	▪ Improve settleability ▪ Reduce bypass flows to neighboring facility ▪ Complete, cold weather nitrification

WHY THE MOB PROCESS WAS CHOSEN (CONT.):

At Sugar Creek, SVI dropped from 150 to 100 mL/g immediately after media addition and stabilized below 90 mL/g as biofilms matured. This improvement enabled the plant to reliably treat its full 20 MGD rated flow in summer 2025. When winter, historically a period of poor settling, arrived, operators were confident enough to shut down all four small clarifiers, reducing clarifier surface area by 33% while maintaining performance. Sugar Creek operated like this for the entirety of winter 2025-2026, demonstrating that with the MOB Process, the plant can unlock significant additional clarifier capacity entirely within its existing infrastructure, reducing the need for physical expansion and preserving this green space for future upgrades.

PROCESS FLOW:

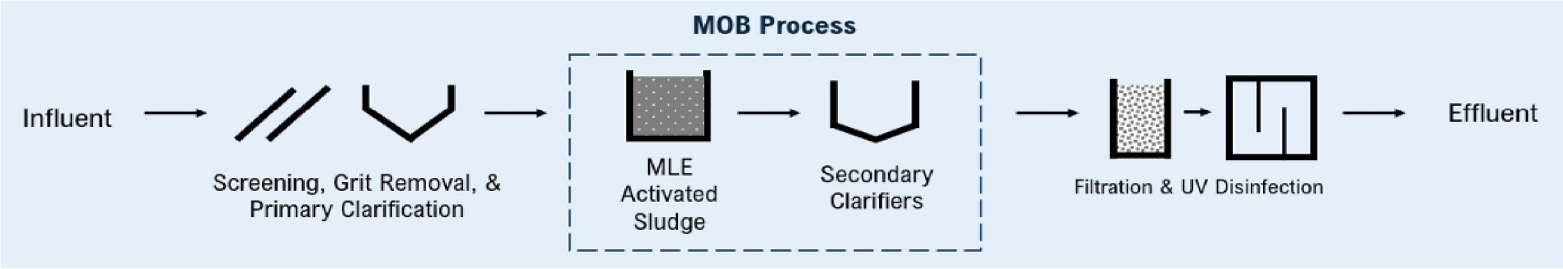

Figure 2

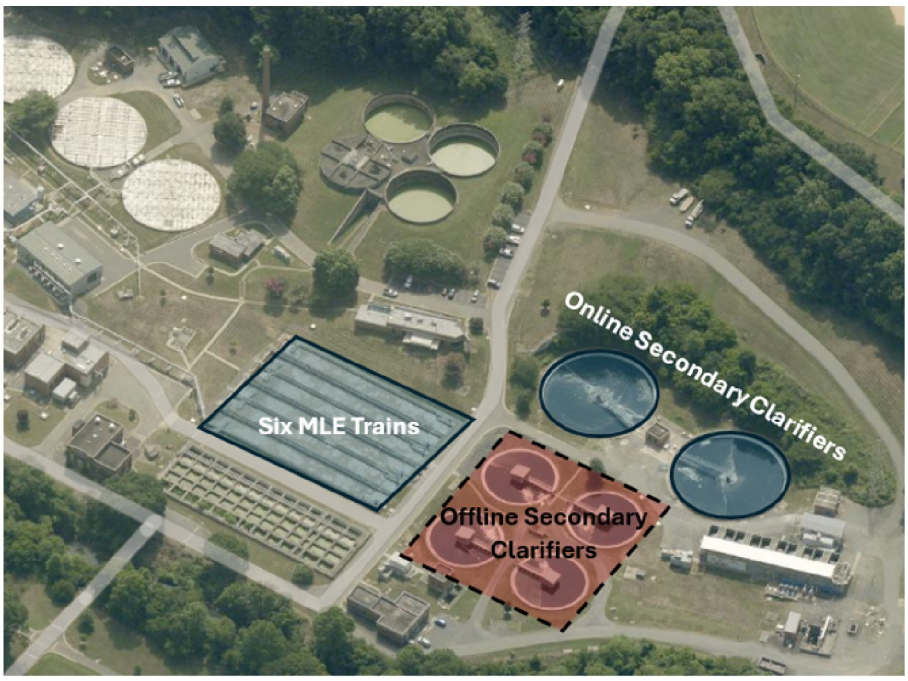

Figure 2: Plant diagram of Charlotte Water's Sugar Creek Wastewater Treatment Plant featuring the six Modified Ludzack-Ettinger trains. The six clarifiers are also highlighted with the two larger clarifiers that remained online shaded in blue, and the four clarifiers that were brought offline in red.

Figure 3

Figure 3: Media addition point for the MOB Process at Sugar Creek. A wooden funnel was constructed and placed over a manhole where RAS and aeration tank influent combine. This location was an easy and very well mixed location for media addition.