

Back River Wastewater Treatment Plant (WWTP) Progress Report July 22, 2022

Treatment Plant Overview

- One of the primary concerns at a WWTP is the processing and management of biosolids and the removal of solids from process equipment. The efficacious removal of biosolids is essential to maintaining total nitrogen and phosphorus effluent concentrations within permit limitations. In addition to the solids that are generated on a daily basis, any buildup of solids within the treatment system must be removed. The Maryland Environmental Service (MES) has helped accelerate the timeline of certain maintenance and repair projects to get process operations functioning to the desired levels.

Primary Treatment

- The primary sediment tanks (PSTs) allow the solid material within the wastewater to be easily separated by settling to the bottom or floating to the surface for removal.
 - Schedule:
 - Currently, three PSTs (#1, #8 and #11) of the 11 are functioning.
 - **PST #1 has been repaired and back online on July 18, 2022..**
 - PST #7 is scheduled to be online by August 2022.
 - MES has cleaned PST #7, and awaiting parts to make the repairs.
 - Baltimore City Department of Public Works (DPW) is now focusing on the remaining PSTs.
 - Two PSTs (#2 and #9) are expected to be online by January 2023.
 - PST #10 is expected to be online by April 2023.
 - Two PSTs (#3 and #4) are expected to be online by August 2023.
 - Completion dates for two PSTs (#5 and #6) are to be determined.

Secondary Treatment

- Biological Treatment Activated Sludge.
 - **Newly constructed Activated Sludge Plant #4 is online and performing satisfactorily**
 - The facility is sending 50 to 60% of the flow through the Activator #4 plant due to better treatment performance and efficacy.
 - Currently, influent flows are down so DPW will be taking one of the older activator plants offline to remove the accumulation of solids from the tanks to perform maintenance and equipment repairs. Flow rates are down so this will keep the wastewater flows moving through the plant preventing stagnation of the water.
 - Once completed, this project will improve nitrogen removal and reduce solids concentrations in the biological reactors.
 - Secondary Clarifiers
 - There are 36 secondary clarifiers.
 - Each activated sludge plant has 12 secondary clarifiers.

- A third-party engineering assessment determined that the **Return Activated Sludge (RAS) pumps and wasting pumps require replacement**. RAS pump failure would cause poor performance of the biological reactors and wasting pump failure would cause a buildup of solids in the treatment system.
 - RAS and sludge pumps are being evaluated and repaired in the Activated Sludge Plant #3, and two pumps are on order.
- MES is assessing the secondary clarifiers and making repairs as necessary.
- A third-party contractor is cleaning out the scum pits on the secondary clarifiers.
- **The sludge blankets on the secondary clarifiers have gone from 10 to 2 feet, which signifies a reduction in the amount of solids within the secondary treatment phase.**

Tertiary Treatment

- Denitrification Filters (DNFs)
 - The facility has 52 DNFs designed to achieve effluent nitrogen concentrations at or below 3 milligrams per liter (mg/l) total nitrogen.
 - The Back River WWTP was experiencing problems with the DNFs due to excess solids.
 - **The solids concentration going into the filters have come down since March 2022.** Control system problems due to electrical issues caused some of the filter quads to not function as designed.
 - ProStart, a private contractor hired to operate the DNF system, has temporarily corrected the problem by connecting a portable power supply that will be used until the electrical components are repaired and connected. **As of July 19, 2022, all 52 filters are online.**
 - MES has performed an evaluation of malfunctioning level transducers and control units, and there are plans for more comprehensive evaluations of the DNF system once needs are confirmed.
 - Once completed, the filters can be backwashed frequently to remove solids.
- Sand Filters
 - The treatment system has 48 sand filters. **Currently, 24 of the sand filters are functioning, and the other 24 sand filters are not functioning due to various equipment failures, insufficient sand and mechanical issues.**
 - MES is evaluating the sand filters and their mechanics are replacing and repairing components.
 - There are 10 pumps and isolation valves for the sand filters on order. Repairs to sand filters #17, #19, #42, #31 and #14 are underway.

Biosolids Management

- Sludge dewatering is handled through a centrifuge.
 - **Two of four centrifuges (#1 and #2) are currently operational.**
 - Centrifuge #3 is out for rehabilitation and the other centrifuge is being scavenged for parts (to keep the two operational centrifuges working).
 - A minimum of two centrifuges are required to meet the current average conditions.
 - Reliability and redundancy of centrifuges are necessary to perform dewatering operations. Equipment such as the centrifuge feed pumps, flushing water booster system, and Centrate pumps have operational problems that need to be addressed.

- **Only two of the eight polymer pumps used for polymer addition are functional. The other six need to be replaced.**
 - Trucks are transporting sludge to the Veolia compost facility.
 - MES reported on July 18, 2022 that sludge is now being processed at volumes (65-70 dry tons per day) that have significantly reduced the on-site sludge inventory.
- Gravity Belt Thickeners (GBTs)
 - There are a total of eight GBTs. At the current average daily flow conditions, six GBTs are required.
 - **The July 8, 2022 report showed that only four GBTs were functioning.**
 - Repairs were made to two additional GBTs so **as of July 19, 2022 there are now six GBTs online.**
- Gravity Sludge Thickeners
 - There are six Gravity Sludge Thickeners (GSTs).
 - At the current design average flow of 130 million gallons per day (MGD), only one GST is required.
 - **Two GSTs are fully operational.**
 - The remaining GST's can feed flow and draw solids, but the gravity thickening mechanism is not functional. DPW should achieve reliability and redundancy on GST operation in conjunction with the PSTs brought online.

Staffing

- DPW reviewed staff roles and stressed the necessity for communication, teamwork, and cooperation between MES and DPW.
- DPW is in the process of hiring 10 maintenance technicians. DPW has received resumes and are currently interviewing applicants.

Monitoring Results

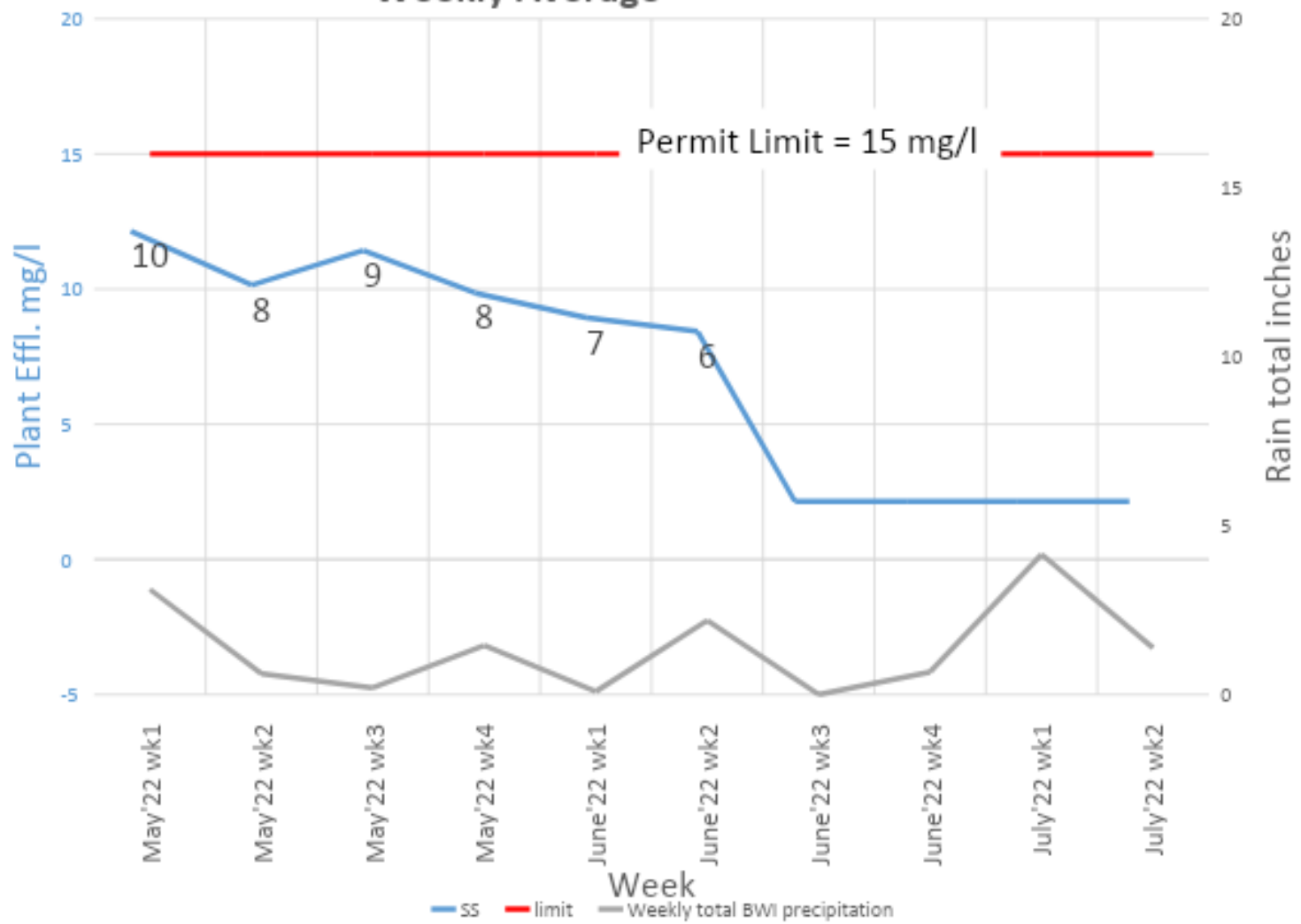
- The analytical data demonstrates that there has been some measured progress made toward getting the Back River WWTP into compliance with its discharge effluent permit limits.
 - The Total Suspended Solids (TSS) concentration has been a factor in creating high nutrient concentrations.
 - Data from June 2022 show that the monthly average TSS concentration at discharge point Outfall 001 is 3.25 mg/L compared to 21 mg/L for January 2022, 17.5 mg/L for February 2022, 14.2 mg/L for March 2022, 7.5 mg/L for April, and 8.75 mg/L for May 2022.
 - **Data indicates progress toward the goal of removing the accumulation of solids from the treatment system.**

Final Effluent Analytical Results

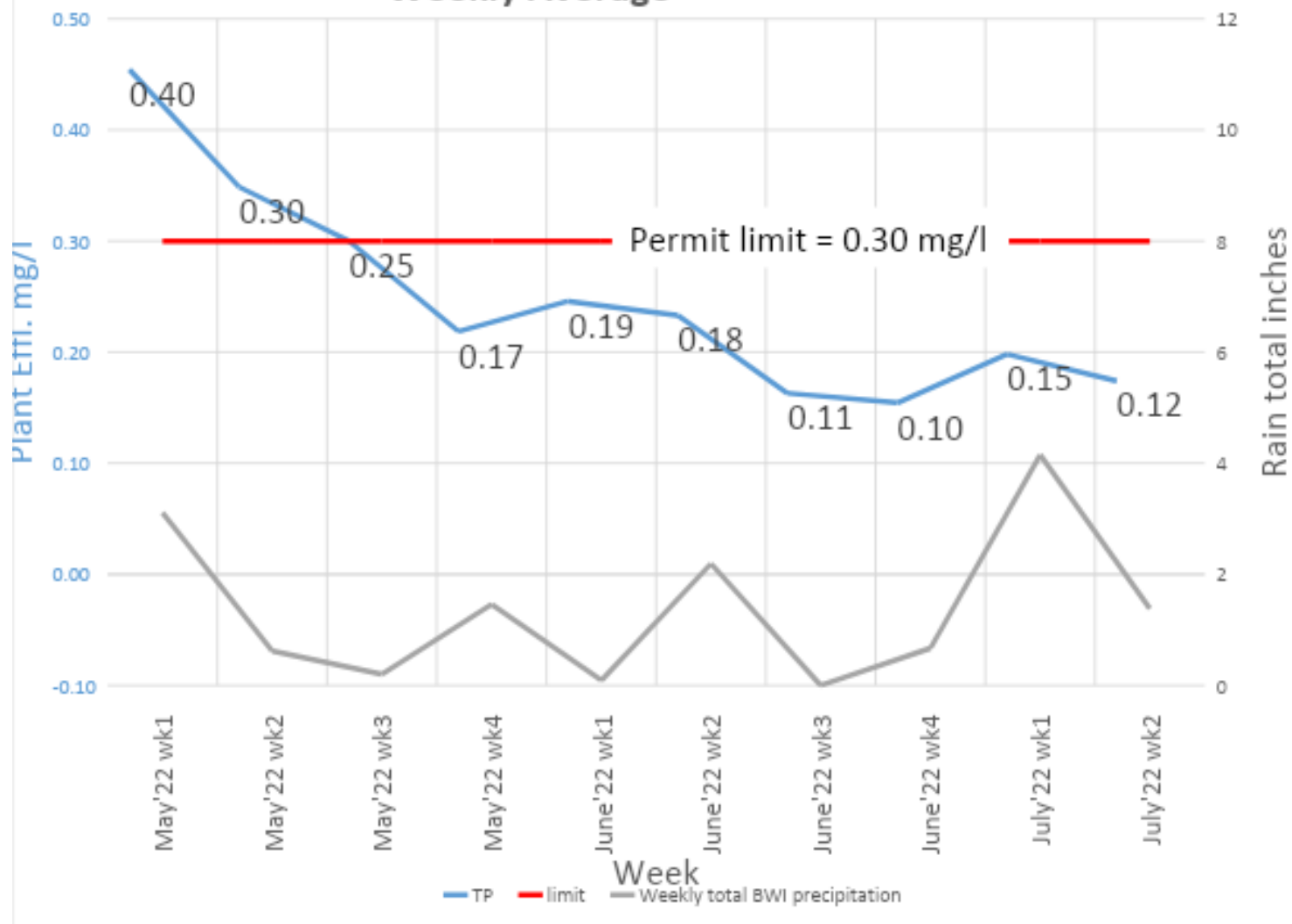
- The results of recent effluent monitoring by the Maryland Department of the Environment (MDE) **show significant improvements in the quality of the final effluent and are comparable** to the analytical results being reported by DPW.

Graphs Showing Reported Final Effluent Concentrations and Loading Performance for 2022

**City of Baltimore, Back River W.W.T.P.
TSS Concentration Outfall 001
Weekly Average**



**City of Baltimore, Back River W.W.T.P.
T.P. Concentration Outfall 001
Weekly Average**



City of Baltimore, Back River W.W.T.P. T.N. Concentration Outfall 001 Weekly Average

