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## Memo

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TO: Aaron Miklosko  
FROM: Darlene Domingos  
DATE: September 10, 2018  
SUBJECT: Maynard WWTP Capacity Evaluation

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Per your request, Veolia has completed a Capacity Evaluation of the Maynard Wastewater Treatment Plant in anticipation of four pending developments.

The wet stream treatment at the Maynard WWTP consists of 3 primary clarifiers followed by 3 parallel trains of Rotating Biological Contactors (RBCs) (each RBC has 4 shafts in series). All 12 RBC units are in operation. RBC effluent is clarified in two parallel secondary clarifiers. Secondary effluent is pumped to the tertiary CoMag system with PACl + polymer + magnetite addition (2 parallel units - 1 online - 1 spare). Tertiary effluent is disinfected by sodium hypochlorite followed by sulfur dioxide dechlorination before discharge.

For solids, waste sludge from the secondary and sludge from tertiary are sent back to the primary influent for co-settling in the primaries.

Primary sludge is thickened in a gravity thickener. The thickened sludge is stored in a storage tank and hauled off site for disposal.

Initially, we performed a flow and loadings analysis comparing the existing conditions and projected conditions to plant design. The projected flow and loadings were calculated assuming multiple developments (Parker St, Powder Mill Place and two new 27 apartment units) are added to the system. The expected concentration of the stream was taken from the influent concentration characteristics indicated in the wastewater plant O&M manual (TSS & BOD = 225 mg/L, TKN = 40 mg/L, Total Phosphorus = 10 mg/l) and the actual design values contained in the plant O&M manual for the flow (1.45 MGD average), TSS loading (1,786 lbs/d) and BOD (1661 lbs/day). The 'design' value for total phosphorus was calculated by multiplying design average flow and typical influent concentration.

Based on our initial analysis of the past four years influent loading for TSS and BOD, the data showed that we were frequently above the influent design values. However, during this same time period, we rarely had problems meeting the NPDES permit limits. That prompted us to conduct a more thorough capacity evaluation.

The RBCs are designed to remove soluble BOD (SBOD). The design average influent BOD load for the plant is 1,661 lbs/day. The O&M Manual RBC section states that the RBC units are designed to treat 71 mg/L SBOD, design capacity to the RBCs at 858 lbs SBOD. (286 lbs SBOD per train.)

For the capacity evaluation we looked at the primary effluent SBOD to see if the RBCs might become overloaded.

We plugged in available information in a Capacity Evaluation spreadsheet to evaluate impact on the RBCs. We evaluated several years of loading conditions for comparison. There were many days in 2015 in which the loading was higher than 3,500 lbs/day and still the final plant effluent BOD was around 5 mg/L. This provided some indication that the existing RBCs may be able to treat additional loading from expected growth. However, please bear in mind that this is occasional maximum day loading and not a continuous daily loading condition.

For the capacity calculation, we used typical removals in the primary clarifiers....30% BOD and 50% TSS removals. From the resulting RBC loading calculation, we note that the max day loading on the RBCs was 1.71 lbs SBOD/1000 sq ft of Media/day. From the EPA RBC Design Report, we note that RBCs are designed for about 4 – 6 lbs SBOD/1000 sq ft of Media/day average. Using 4 to 6 SBOD, and the first stage media area of 300,000 sq ft (3\*100,000), we get 1,200 lbs to 1,800 lbs SBOD/day. The projected Primary Effluent TBOD is about 1,900 at 30% removal and 1,600 at 42.5% removal. So there probably is room for the plant to accept this additional load.

So our conclusion, based on information available, per the O&M Manual the plant cannot accept additional load - but based on operation and available design information in literature it may be feasible. Therefore we recommend that the Town conduct a full scale study to determine breakthrough loads to arrive at plant capacity with respect to organic loading. This will allow you to get a good capacity value for future use. We also recommend that the Town complete a pipe condition assessment of the influent pipe, RBC to secondary, and Dbox to secondary effluent wet well, as well as effluent pipe to the river.

I look forward to discussing this with you.