

Date: January 17, 2018

TO: Victor Lay, City Administrator

FROM: Philip Stuckert, P.E., Infrastructure Director
Travis Massey, Wastewater Treatment Plant Superintendent

SUBJECT: Professional Services Agreement with O'Brien and Gere

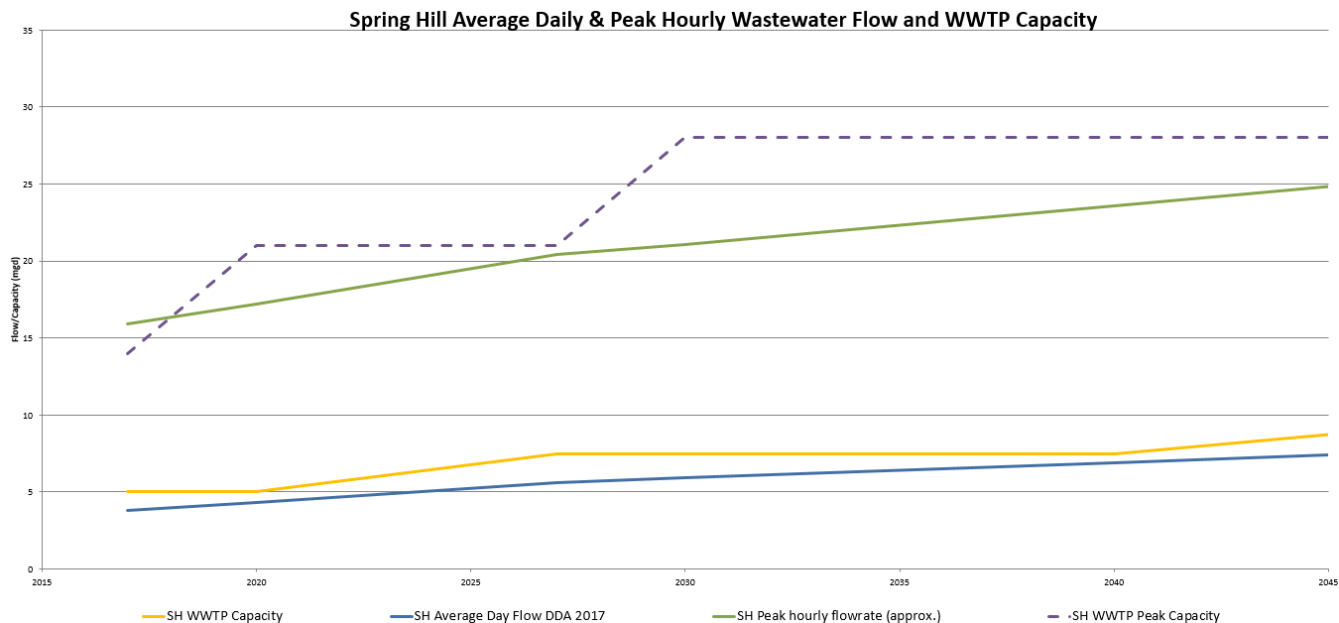
Recommendation:

Request the Board of Mayor and Aldermen to review this memorandum concerning Spring Hill's immediate and future needs for wastewater treatment and then consider authorizing O'Brien and Gere (OBG) along with their subconsultant Dempsey Dilling, Inc. (DDA) to prepare a Wastewater Treatment Plant (WWTP) Facilities Plan report and, to support the City's NPDES Permit reapplication process, which will involve the development of a Rutherford Creek water quality model that will evaluate various flow tiers and stream assimilative capacity in the amount of Four-Hundred Twenty-One Thousand One-Hundred One Dollars (\$421,101.00). Monies for this work will come from the Sewer Reserve Fund.

The report will address proposed expansion / re-rating of the Spring Hill WWTP from 5.0 Million Gallons per Day (MGD) (current design capacity) to potentially up to 7.5 MGD facility, also addressing current peak flow capacity restraints, with the understanding that the plant may be expanded in the future up to 10 MGD if TDEC approves the expansion and NPDES Permit for increased discharge to Rutherford Creek. (Spring Hill's current NPDES Permit is for 5.0 MGD average day and peak hourly flow capacity of 14 MGD.) The facility plan and water quality modeling will be coordinated with, and submitted to, TDEC for review and approval consideration.

Summary:

This memo provides an update regarding Spring Hill's wastewater (WW) treatment and disposal options, and a preliminary outline and timeline for activities related to accommodating the projected growth to meet Spring Hill's needs through 2037. The Water & Sewer Capacity Study analysis generated the following wastewater flow and growth projections, tributary to the Spring Hill WWTP:



The above graph shows that Spring Hill requires more than 5 MGD average daily flow (ADF) capacity by 2024, and more than 14 MGD peak hour flow (PHF) capacity in the immediate (2018-2023) and near-term (through 2028).

The WWTP has already experienced peak hour flows in excess of the plant's 14 MGD capacity. The proposed stepping (yellow line) to 7.5-MGD is preliminary, a function of TDEC regulatory approval and review of cost and technical feasibility. To meet projected 2037 needs, further peak capacity would be required, as well as additional ADF capacity if the initial phased expansion is capped based on feasibility and nutrient loading restrictions.

Nutrient loading restrictions are subject to the amount of ammonia, total nitrogen, and total phosphorus discharged into the receiving waters of Rutherford Creek. As the ADF discharges increase, nutrients concentrations must be reduced to prevent additional loadings to the receiving stream – unless new water quality modeling and regulatory approval results in loading cap increases. The 2013 NPDES Permit includes discharge wasteload caps for BOD, Ammonia, Total Nitrogen, and Total Phosphorus, which could limit potential expansion.

The 5-MGD WWTP (5 years old) is performing well for current ADF loads. A portion of the original facilities (20 years old) remains. Older treatment facilities need equipment replacement and asset renewal in the near-term. Actual peak flowrates have, on occasion, reached or exceeded the current WWTP PHF design capacity (14-MGD). The current seasonal average is 3.7-MGD (2015 & 2017). TDEC requires cities to undertake a facility plan when the seasonal average reaches 80 percent of the permitted ADF. The City's WWTP permit expires in September 2018 and its renewal comes into play as the plant reaches this threshold and a facility plan addresses plant expansion.

Further WWTP upgrades are necessary to allow for Immediate & Near-Term growth, subject to successful 2018 NPDES Permit renewal. Further reuse and exporting treated effluent may be required for initial expansion or buildout.

Structural repairs to the Oxidation Ditches & Filter Basins are currently being planned by the City. These repairs do not increase the capacity of the WWTP. Peak capacity increase is needed for current flows and near-term growth. Denitrification treatment is needed to achieve the Total Nitrogen load cap to accommodate growth.

WWTP Facility Plan and NPDES Permit 2018 Reapplication

With respect to accommodating immediate & near-term growth and providing a wastewater management plan for capacity study implementation, City staff recommends the start of a WWTP Facilities Plan for Phase 1 Improvements in conjunction with the City's NPDES Permit 2018 reapplication process. As part of the reapplication process and facility plan the effluent discharge requirements will be refined by developing a new water quality model of Rutherford Creek.

The modeling would be performed by a specialized subconsultant, in a phased approach, and coordinated with representatives from TDEC. TDEC's current model information will be utilized and revised with the new proposed model to determine actual feasible loadings to Rutherford Creek.

As noted above, the findings to-date from the ongoing Water & Sewer Capacity Study indicate that immediate / near-term "Phase 1 Improvements" are needed at the Spring Hill WWTP to handle the planned growth of ADF and PHF wastewater flows, which include wet weather contributions to the sewers. Further discussion of peak flow rates will be part of the facilities planning process, as part of confirming basis-of-design flows and loadings.

Phase 1 Improvements include:

- Peak Hydraulic Improvements (Immediate, 21-MGD PHF Influent)
 - Influent PS new pumps, parallel force main, generator upgrade
 - Headworks third screen, peak bypass of grit removal
 - Consider converting old sludge storage tank to initial Offline Equalization (2-MG)
 - Coagulant Storage & Feed, Modifications to Distribution Boxes
 - New Sludge Storage facilities (2.5-MG)
- Average Day Flow Expansion (Near-Term, by 2022-2024, up to 7.5-MGD ADF Rating,)
 - Oxidation Ditches upgrade, Carbon Storage & Feed, Filters #5-6, UV #3, Piping
 - Sidestream treatment if needed (2018 NPDES)
 - Evaluate feasibility for additional reuse.

Longer-term "Phase 2 Improvements" (2027-2037) will be needed at the Spring Hill WWTP to handle wastewater flows through buildout (8.9 to 10-MGD ADF, up to 28-MGD PHF (forecasted to be the 2028-2045 time period, a function of growth and actual peaks)). Two major alternatives were initially identified: 1) 50-100% expansion of all existing unit processes which may require Public Works Facility relocation; or 2) Plug Flow retrofit of the ditches, 50-100% expansion of remaining unit

processes. These longer-term solutions should be evaluated further in establishing Phase 1 Improvements.

Objectives

The objectives of the proposed WWTP Facilities Plan & Water Quality Modeling project are to:

- Assess the potential limitations of the existing WWTP to accept and treat additional wastewater, both average and peak.
- Provide regulatory assistance to the City regarding the WWTP NPDES Permit renewal (by September 2018), and permit conditions to align with Phase 1 Improvements. This includes assessing potential benefits of an alternative discharge point downstream, impact of applicable TDEC regulations, potential value of producing additional reclaimed water for reuse in the City, and longer-term plans for City growth as part of the Water & Sewer Capacity Study.
- Develop facilities plan-level preliminary engineering, initial process modeling, and conceptual design and layout for the recommended solution, updating the implementation approach schedule and project cost estimates for: Phase 1: up to 7.5-MGD near-term, and future Phase 2 expansion to 8.9 to 10-MGD. Advancing the engineering will include initial inputs from supporting disciplines (civil, structural & architectural, HVAC / plumbing, instrumentation & control, and electrical). Physical survey and geotechnical investigation are not proposed as part of the facility plan.
- Implementation approaches will also be identified for the City's consideration as it advances its water and sewer plans.

PROPOSED TIMELINE

City staff recommends 2018 activities to include supplementing NPDES Permit reapplication with facilities planning, engineering, and water quality modeling – with certain activities completed before the current permit's September 2018 expiration date. The WWTP Facilities Planning & Engineering in 2018 will address peak capacity needs, NPDES Permit renewal, and near-term growth – considering Phase 2 / Buildout needs in the Phase 1 project review and scoping. Rutherford Creek water quality modeling consists of reviewing the stream's assimilative capacity for treated effluent (namely, BOD, Ammonia, Nutrients), given the immediate and near-term growth projections. The City plans to submit the NPDES Permit reapplication package prior to September 2018, with amendments and updates to TDEC before the NPDES Permit is renewed.

It is unclear if water quality modeling can be completed before the permit's expiration date, a function of the start date and the degree of field work and modeling required by TDEC. If the modeling is not completed in time for the September, 2018 renewal, the City can request an administrative extension, or propose to renew the permit as it is written currently and then revise once all associated work is completed.

January 2018

1. Present this summary memo to BOMA addressing the need to prepare a facility plan to summarize existing and future capacity of the WWTP in terms of hydraulic loading and nutrient reduction; waste discharges to Rutherford Creek as part of the WWTP Expansion; and renewal

of the 2018 NPDES Permit Renewal. Request BOMA authorize City staff to seek professional engineering proposals from Dempsey Dilling Associates and O'Brien & Gere to perform the above services.

2. City and DDA/OBG negotiate contract for NPDES Reapplication Work, WWTP Facilities Plan & Water Quality Modeling.

February 2018

1. BOMA considers contract with DDA and OBG to proceed with NPDES Reapplication Work, WWTP Facilities Plan & Water Quality Modeling.
2. Initiate the first phase of water quality modeling assessment, reviewing prior TDEC modeling.

March 2018

1. Complete the first phase of modeling, review second phase modeling options with City and TDEC. Determine the course of action.
2. Initiate aspects of facilities planning not directly tied to water quality assessment.
3. Begin work on NPDES Permit Reapplication.

April - August 2018

1. Initiate second phase modeling, and associated data analysis and field work if or where required.
2. Complete the majority of the facilities plan engineering based on preliminary wasteload allocations and/or certain levels of wastewater and solids treatment.
3. Determine if a NPDES Permit administrative extension request is needed, if not initiated by TDEC itself.

September 2018 - TBD

1. Complete water quality modeling and submit for TDEC review, approval, and use in finalizing the NPDES Permit renewal process.
2. Complete WWTP facilities plan, preparing the City to move forward with immediate / near-term average and peak capacity needs (design, bidding, construction).

2028 – 2045 (TBD)

1. Based on actual growth rates and I&I removal success, assess when a Phase 2 Improvements project is needed to address remaining aging infrastructure as well as average & peak wastewater treatment capacity needs.