



Town of Pittsboro, North Carolina

Utilities Department &
Engineering Department

Memorandum

To: Mayor Randy Voller and the Town Board of Commissioners

From: Randy Heard, Plant Superintendent
Fred Royal, PE, Town Engineer

Subject: FYI: Wastewater Treatment Plant Status Report

Date: November 25, 2013

Background

Due to the many improved systems of the existing WWTP, the potential demand increases in the future and the Town's funding challenges in the near term, please find this status report as an informational document to bring to you. As more information is known, we will prepare another status report for you. The wastewater plant is currently permitted to collect, treat, and discharge up to 750,000 gallons per day of wastewater. The treatment capability of the plant in terms of hydraulic loading, organic loading, clarification, filtration, and disinfection is comfortably at or above 750,000 gallons per day. We are currently receiving 400,000 gallons per day and discharging 340,000 gallons per day. We have approximately 190,000 gallons per day balance allocation to sell. We are in good shape for the foreseeable future.

The Town has corresponded and met with DENR on several occasions to discuss a limited and affordable effluent discharge increase into Robeson Creek. Based on their feedback, we believe that DENR will approve a limited effluent increase request of 0.499 MGD for a total discharge into Robeson Creek of 1.249 MGD.

Staff has been working to make improvements for efficiency, cost savings and improved water quality (re-use water) over the past several years. Highlights of these improvements are summarized below.

Discussion

Emergency Back-up Power Generator Project

The WWTP will receive a new generator to replace the original, (1977 model), and Kohler model (2010) generator currently providing emergency power to the plant. It is scheduled for delivery in mid-January of 2014, and should be in service shortly thereafter. Through this process we sized a single generator to carry the full plant load including the reclaimed water system and other plant equipment previously not on emergency power. Also through this process, the 2010 Kohler model generator will now be transferred to the Water Treatment Plant to provide much needed back-up power. The automatic transfer switch working in conjunction with the generator may have to be replaced depending upon the amperage load at the WTP. In looking at future expenses at the WTP, this project resulted in a savings to the Town of approximately \$50,000.00.

Energy and Cost Reduction Efforts

In April of 2012, Progress Energy replaced a defective transformer and upsized our plant power from 150KVA to a 300KVA transformer bank at zero cost to the Town! This has provided an improved “balance” with 3 phase power, and also reduces voltage drop to the outer reaches of the plant. A more balanced power and increased voltage reduces amperage, improves motor efficiency, and reduces cost. For Example: A 40HP motor running at 70% efficiency, 12 hours per day, 365 days per year, at our \$.075kwh, costs \$ 14,003 per year to operate. The same motor now running at 80% efficiency costs \$12,253 per year to operate. A savings of \$1,750 per year for (1) motor. The WWTP has 22 electrical motors ranging from 0.75HP to 40 HP.

Thanks goes out to Roscoe for this work!

We recently completed an Energy Audit, thanks to the work (no charge to the Town) of Waste Reduction Partners. They identified several areas where we can save energy costs, some of which we are implementing now. One outcome of this study is that we implemented operations procedures to run our reclaimed water system during “off peak” hours and other recommendations to implement with a plant up-grade. This report will be posted on the Engineering Department website for review.

In May of 2012, after an in depth analysis of our sludge digestion process, we found that our process could eliminate the use of one 20 HP blower operating 24 hrs. per day, 365 days per year. The calculated energy savings is equal to \$12,253.00 annually. Actual savings will be verified with our utility records.

Inflow & Infiltration (I&I)

In 2010 the Town completed a sewer main rehabilitation project referred to as the “Credle Street Project” with a Rural Center Grant valued at approximately \$2.2M. Approximately 5200 linear feet of sewer line and 112 manholes were refurbished. This project has had a significant impact in reducing infiltration to the plant. The table below shows the average daily flow of wastewater to the plant “prior to” and “after” the project:

Calendar Year	*Average Daily Flow (gallons)	Annual Rainfall
2009	396,000	40"
2010	412,000	36"
2011	328,000	43"
Credle Street Complete 09/2011	Credle Street Complete 09/2011	
2012	335,000	40"
2013 (Through October)	320,000	43"

*The average daily flow figures include reclaimed water sold to 3M.
Example: In 2012, the 335,000 gpd includes 62,000 gpd sold to 3M
and 273,000 gallons per day discharged to Robeson Creek.

2010 Wet Weather Improvement Project

In 2010 the plant received an upgrade to the facility including (2) 330,000 gallon EQ/Storage basins, a UV disinfection system, RAS pumps, and other plant improvements. This project was funded with an interest free stimulus loan in the amount of approximately \$1.426M The additions of the EQ/Storage basins were designed for temporary storage of excessive water during rain events. These have proven to be effective in times that would have previously “washed out” the plant due to a hydraulic overload. Also, with the addition of some control features, they are now used on a daily basis to provide 24 hour flow equalization to the plant. The UV system has performed well and an important part of achieving reclaimed water compliance.

The RAS pumps and control equipment were to provide an alternate and more precise delivery of return activated sludge to the biological process. Unfortunately, the pumps and piping that were installed did not meet the hydraulic specifications or operating parameters to perform consistently. There were many attempts and alterations made to the system to achieve success. None of these proved to be effective. The plant encountered many process upsets throughout this process and it was decided the pumps brought more of a detriment than any benefit to the plant. The Town has since sold these pumps via public surplus.

Reclaimed Water

Also in 2010, the Town received a permit and began to sell reclaimed water to our neighbor industry 3M. In 2011 the Town applied for, and received a modified permit to allow for expanded use providing reclaimed standards were met. The plant has since maintained compliance for the production of Class “B” reclaimed water. Our future plans for reuse water include the achievement of Class “A” reclaimed water now approved for selective food crops.

Also, we have discussed other potential users, such as the installation of a Bulk Reclaimed Water Station and delivery system expansion to increase our customer base, (ie: construction, irrigation, light industrial, institutions, and other markets to be identified). This will reduce our effluent

discharge into Robeson Creek and could help with further delay of costly plant capacity upgrades. It will also generate a modest income back to the Town to help off-set costs to construct system expansions.

The plant currently uses reclaimed water for certain housekeeping procedures and will install the plumbing needed to utilize reclaimed water for our bio solids processing.

Calendar Year	Average Daily Flow to 3M
2010	46,000
2011	63,000
2012	62,000
2013 (through October)	59,000

Nutrient Limits Update (Nitrogen and Phosphorus)

Phosphorus- The plant is currently required to meet an annual TMDL (Total Mass Daily Load), for pounds of phosphorus discharged to Robeson Creek. By far the biggest challenge is achieving compliance during the permit specified “summer season”, from April through October of each year. The limits are load based; meaning the higher the flow, the lower the level has to be. There are two methods of removing phosphorus, chemical & biological. Since the biological method would require a large capital expenditure in additional tanks, pumps, mixers, and control equipment, our plant utilizes the chemical method.

With the implementation of a new chemical process at the plant, initiated and designed by staff, we are in full compliance at current flow rates, and have the supporting data to achieve compliance up to our permitted flow and beyond. It is commonly recognized that the “limit of technology” in phosphorus removal is 0.10 mg/l. Pittsboro’s plant has shown test results as low as 0.04 mg/l. This is the lowest phosphorus level (a new record) for the WWTP!

Nitrogen- the plant is not currently required to meet a TMDL for pounds of nitrogen discharged to Robeson Creek. This limit was previously scheduled to take effect January 1st, of 2016. This date has now been extended by the Department of Water Resources to 2019. The 2019 deadline can be extended to 2021 with an ATC, “Authorization to Construct” issued from DWR. The removal of nitrogen, unlike phosphorus, is most economically achieved biologically. There are many different process configurations being used successfully. The Town of Pittsboro will have to evaluate these and choose the best solution.

Biosolids Processing

Our plant currently is under contract with Synagro, Inc. through August 31st, 2015 for the removal and land application of biosolids. A number of negative issues are related to this method of sludge disposal including: Availability and longevity of land application sites, regulatory issues, chemical costs, public perception, weather constraints, storage capacity, and odor.

An alternate method benefiting the Town would be to contract with a composting facility such as McGill, Inc. The sludge is processed and pumped directly to a roll off container provided and changed out monthly. This method of sludge disposal would virtually eliminate all of the negative issues with land application described above. There would be an upfront capital expense to purchase a sludge pump, piping, and valves at approximately \$20,000. The chemical cost savings at approximately \$10,000 per year would provide a 2 year pay back on this equipment.

Financial Condition

The Town continues to have Enterprise Fund financial strain for financing utility system operations and maintenance and for capital projects. Significant debt service will be paid off in 2016, thereby allowing for some flexibility for new loans and grants as needed for CIP projects. By planning and focusing on cost-savings and process efficiencies now, the Town will be in much better financial shape in the coming years to make further capital improvements using a variety of financing methods, including low interest or no interest revolving loan funds, grants and other financing options.

Next Steps

An affordable, phased capacity up-grade is recommended to meet our near term demand projections. Based on current demand and projected WWTP demand for the foreseeable future, the Town is in good shape to continue operating the current plant. However, as the demand increases, we will have a modified permit to up-grade to 1.249 MGD in our existing footprint. In order to plan for an eventual phased up-grade, the Town is preparing documents to apply to DENR for a major permit modification for the WWTP to increase its effluent into Robeson Creek from 0.75 MGD to 1.249 MGD. We believe this level of increase will not require an EIS and it will not cost the Town other than staff time to prepare the permit and pay the fee of approximately \$1,100. Our understanding from DENR is that this limited permit increase will not require a lengthy or expensive SEPA requirement. With this permit, the Town will have the flexibility to make phased capacity up-upgrades within the existing plant footprint and at a significant cost savings to constructing a new plant elsewhere of any size or capacity.

The current 3.22 MGD permit (*valid until April 30th, 2016*) would be modified only by increasing the discharge into Robeson Creek at the same amount of decreasing the discharge into the Haw River. The Town will retain the full 3.22 MGD discharge permit. Our balance will be 1.97 MGD permit to discharge into the Haw River in the future. This scale of a project will need to be looked at carefully with the cost of construction and the cost of long-term operations and maintenance. By delaying this type of approach, the Town can concentrate on more immediate needs such as limited up-upgrades to the WWTP, distribution system condition assessment and lift station operations.

Other competing, yet critical capital improvement program (CIP) cost items in the nearer term may be a new Water Treatment Plant for increased capacity and treatment technology improvements and increased improvements to the distribution system as a part of a *Water Efficiency Plan*. This plan is required by the Jordan Lake Allocation Partnership for the Town of

Pittsboro's Allocation Application, due on January 24, 2104. Our non-revenue water losses described in a previous report will require more effort and expense to reduce these losses.

With an increase to 1.249 MGD into Robeson Creek, the Town will have more flexibility and time to consider optimal design alternatives and associated costs to develop engineering plans for the ATC process all while meeting the daily demands of the Town's WWTP users.

Finally, the Town is currently planning to enlist the resources of the Rural Water Association as a free service to assist with the sewer collection system condition assessment and prioritization of further system improvements and associated costs. Past system studies will also be reviewed. The Town will also look at programmed improvements designed to further reduce infiltration, inspect for illicit dischargers into the system.

Summary

The WWTP has been continuously modified and improved upon by large capital projects and by small system improvements by staff for maximum efficiencies in biological treatment and energy/cost savings. The Town cost to operate the plant is approximately \$650,000 per year or \$4.56/ 1000 treated gallons of effluent. The current and near-term projected capacity demands on the plant appears to allow time for the Town to plan for a phased capacity increase, with the first increase up to 1.249 MGD at a more affordable cost. Demand is lower than previous projections and our re-use system will provide an increased market over time. These factors point to slower capacity growth requirements and lower costs to the Town. The NPDES permit for 3.22 MGD can be modified to shift effluent from the Haw River into Robeson Creek at a more affordable cost to the Town. Staff is poised to submit the permit modification to DENR.

Other wastewater system (CIP) programs the Town will need to address for growth and for NPDES permit compliance include:

1. Lift station program (Operations and Maintenance, emergency generator management, grease program, etc.)
2. Collection system modeling and selected up-grade programming based on past reports and new findings. (ie: 15-501 gravity main from the north, etc.)
3. Proactive compliance inspections and education, as required by permits and the Town Sewer Use Ordinance (ie: inspections for waste discharge compliance, grease trap inspections, etc.)