



## **County of Prince George, Virginia**

*"A global community where families thrive and businesses prosper"*

### **Memorandum**

To: Percy Ashcraft, County Administrator

From: Frank Haltom, Director of Engineering & Utilities *FAN*

Date: August 4, 2021

Subject: **Wastewater Solution**

Mr. Ashcraft

This memo provides some additional insights and explanation of the options presented to provide additional wastewater capacity at Southpoint Business Park (SBP). The master plan identified deficiencies in the wastewater collection and disposal capacities that serve SBP. To date, there have been 3 reports provided that have offered potential solutions to address this deficiency, which are: the SBP Utility Study (Dewberry, 2018), a preliminary engineering report (PER) for a new pump station and force main that would convey wastewater to Hopewell's WWTP (Dewberry, 2021), and a PER for a new WWTP (WW Associates, 2021).

The SBP Utility Study evaluated options for providing an additional 2 million gallons per day (MGD) of wastewater capacity at the Park. Options evaluated included a pump station and force main to Hopewell or a new WWTP. The types of WWTPs evaluated include a traditional continuous flow bioreactor, a sequencing batch reactor, and an oxidation ditch. The study recommended a Sequencing Batch Reactor (SBR) Plant based on lowest life cycle cost and greater flexibility to operate at lower initial flow rates.

The PER to further evaluate the option of a new pump station and force main to Hopewell provided a conceptual design and layout of the facilities and an updated estimate of costs. This estimate resulted in significantly less capital costs than shown in the SBP Utility Study. The projected savings are due to a revised location of the pump station and a more direct route of the force main. This reduced the amount of underground infrastructure for this option. However, it places the pump station within SBP at the rear of the former Ace Hardware property, which may not be a desirable location. Placing the pump station back on the Yancey property will increase capital costs close to those identified in the SBP Utility study, a potential increase of \$6-8 million.

The PER provided by WW Associates provides an analysis of the same three WWTP options as the SBP utility study with a detailed layout and estimate of the recommended option. WW Associates recommends a traditional continuous flow bioreactor plant, which differs from the SBP utility study recommendation of a sequencing batch reactor plant. The difference in the estimated capital costs appears to be the primary reason for this recommendation.

### Other Considerations

Potential cost savings - Cost to convey wastewater through Petersburg and for treatment at SCWWA are significantly less than the costs for treatment at Hopewell's WWTP. Therefore, diverting flows from SCWWA to Hopewell will increase current conveyance and treatments costs by more than 5 times for the equivalent flows. In comparison, diverting flows from SCWWA to a new PG WWTP eliminates these costs. Furthermore, future extensions of the sewer throughout the County will offer more opportunities for savings by diverting additional flows from SCWWA to a new PG WWTP. The initial flows diverted from SCWWA will save approximately \$150,000 per year (\$3M saving over 20 years). As improvements/extensions identified in the master plan are constructed, the savings could increase to approximately \$400,000 per year (\$8M over 20 years).

Environmental Impacts – Impacts on the environment are primarily the flow of treated wastewater from a treatment plant into a water source such as the James River, Appomattox River or Blackwater Swamp. The Hopewell and SCWWA plants discharge into the James River and Appomattox River, respectively. Ultimately, they both discharge into the Chesapeake Bay watershed, an economic resource under a watchful eye by regulators to ensure aquatic species of concern are not impacted. Costs to mitigate these impacts have proven costly and regulators continue to apply pressure to reduce and eliminate impacts. In comparison, the Blackwater Swamp discharges into the Blackwater/Chowan River watershed, where the same flows have less impact on the environment and thereby avoids significant mitigation costs.

Odor Emissions –There is a perception that pump stations will have less odor than a plant. Each option will have odor emission at some level. Every pump station will emit odors, which is evident at all other PG sewer stations. There are measures that can assist to reduce odors at pump stations. However, if the stations are located in an area with an adequate buffer to allow the odor to dissipate, these measures typically are not installed. WWTPs are very similar. With an adequate buffer and odor control measures, emissions can be maintained at similar levels. Wastewater at an SBR plant has less exposure to the atmosphere allowing better ability to control odor emission than the traditional plant. Odor control measures are included in the estimates provided for every potential solution. Site location of each option was also considered to provide the largest buffer to reduce the nuisance.

Thank you

Matrix for Wastewater Solution Options						
	PS and FM to Hopewell	Traditional WWTP	SBR WWTP	Comments		
Initial Capital Costs (up to 4 MGD)	\$17,710,000	\$27,428,000	\$32,470,000	SBR plants can more easily contain odors versus the traditional continuous flow plants		
Phase 2 Capital Costs (up to 6 MGD)	\$1,650,000	\$12,500,000	\$12,000,000	Phase 2 costs of WWTPs not provided in PER. Values based on Southpoint Utility Study.		
Annual Operating Costs	\$2,243,357	\$1,000,000	\$1,000,000			
20-year Life-Cycle Costs	\$62,577,140	\$47,428,000	\$52,470,000			
20-year Life-Cycle Costs with Phase 2	\$64,227,140	\$59,928,000	\$64,470,000	Includes only initial capital investment plus annual cost for 20 years.		
Level Debt Service Amortization on Initial Capital Cost	\$823,740	\$1,275,750	\$1,510,267	Capital investment to achieve 6 MGD plus annual cost for 20 years.		
Level Debt Service Amortization on Phase 2	\$76,746	\$581,409	\$558,152	30-yr term at 2.3% (Phase 2 capital costs)		
Capital Cost	\$7,558,800	\$10,616,000	\$10,616,000	Trunk main to PS or WWTP		
Level Debt Service Amortization on Conveyance Sewer Cost	\$491,711	\$690,586	\$690,586	30-yr term at 5%		
<b>Total Annual Costs</b>	<b>\$3,558,808</b>	<b>\$2,966,336</b>	<b>\$3,200,853</b>	<b>Initial capital only: Debt Service for selected option + Annual cost + Debt service for Conveyance sewer. This is not a present worth value.</b>		
<b>Total Annual Costs with Phase 2</b>	<b>\$3,635,554</b>	<b>\$3,547,745</b>	<b>\$3,759,005</b>	<b>Initial + Phase 2: Debt Service for selected option + Annual cost + Debt service for Conveyance sewer. This is not a present worth value.</b>		
Requires Operator with License	No	Yes	Yes	A Class 2 licensed wastewater works operator for the 2-4 MGD facility;		
Reduces flows to CBPA	No	Yes	Yes	A Class 1 licensed wastewater works operator for the 4+ MGD facility.		
Potential savings to redirect flows from SCWWA	No	Yes	Yes	Reducing flows to CBPA may allow greater opportunity for grants.		
Allows for potential reuse of grey water	No	Yes	Yes	Initial savings of approx. \$150,000 annually to redirect flow from SCWWA to WWTP.		
Permitting or Reporting Requirements	No	Yes	Yes	Additional savings realized as Southpoint Business Park & surrounding area grows, and as more sewer projects are completed to reroute flows. Redirecting flows from SCWWA to Hopewell would be negligible or cost more as rates increase.		
Time to Design, Permit and Construct	4 years	4 years	4 years	Discharge from WWTP can be used for manufacturing/process water. Potential revenue source		
Ability to Control Odor Emissions	Yes	Yes	Yes	WWTP requires monthly reporting with 10-year Permit cycle		
				Initial phase only		
				See ranking below		
				Staff Ranking Analysis		
Criteria	PS & FM	Traditional WWTP	SBR WWTP	Weighted	Comments	
Capital Cost	4	2	1	25%		
Annual O&M Cost	1	5	5	25%	Due to Hopewell fees	
Environmental Impacts	2	4	4	20%	WWTP reduces flow to CBPA	
Public Perception	4	1	2	20%		
Odor Control	3	2	3	5%		
Potential for Grants	2	4	4	3%	Primarily due to ability to remove flow from CBPA	
Long Term Feasibility	2	4	4	2%	Ability to control rates and add future flows	
<b>Total Score</b>	<b>18</b>	<b>22</b>	<b>23</b>	<b>100%</b>		
<b>Weighted Score</b>	<b>2.7</b>	<b>3.05</b>	<b>3.05</b>			

1 - 5 Ranking System

- 1 Negatively Favored over or Significantly worse than the other
- 2
- 3 Equal Impact
- 4
- 5 Positively Favored over or Significantly Better than the other