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Technical Analysis of Options for Wastewater Treatment System

Fairfield Joint Water and Sewer System

2023

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Executive Summary

The Fairfield Joint Water and Sewer System (FJWSS), Fairfield County, Winnsboro, and Ridgeway all desire to attract and allow growth in Fairfield County, particularly industrial growth in the southern part of the County together with the resulting residential and commercial development that may follow. They want to be in a position to provide a viable wastewater treatment system at the lowest possible cost in a financially independent manner as quickly as possible.

Part of implementing the FJWSS system is a plan for Winnsboro to provide interim wastewater treatment up to about 500,000 gallons per day until the flow in the FJWSS system is sufficient to sustain treatment at a new wastewater treatment plant. This project is known as the Winnsboro Connector project and creates a new regional pump station located at Fairfield County's new industrial park on Peach Road to deliver wastewater to the Winnsboro WWTP that will be largely funded by the recent SCIIP grant award.

A new FJWSS treatment plant will allow them the ability to offer 2 MGD of treatment initially to serve industrial, commercial, and residential customers in the area. Two primary alternatives are viable for the discharge of the new plant, Big Cedar Creek and the Broad River. The Big Cedar Creek, a tributary of the Broad River, is located in central Fairfield County and is only a few miles from the Regional pump station near I-77. The Broad River is a major river located approximately 14 miles from the regional pump station.

Both discharge locations will require submission for a 208 Water Quality Plan modification and an NPDES permit among others before a construction permit for a treatment plant can be obtained. The permitting process needs to begin for FJWSS to be in a position to have the new plant operational before the 500,000 gallons of capacity available at Winnsboro is exhausted. FJWSS needs to finalize a decision on the location for the new wastewater treatment facility before any permitting can begin. To aid in that decision, FJWSS requested an alternatives analysis that focused on understanding of the issues that impact the discharge being located at either Big Cedar Creek or the Broad River.

Both the Big Cedar Creek location and the Broad River location will require pump stations and forcemain to access the treatment facilities which will likely create septicity and hydrogen sulfide gas formation which will be in proportion to the length of the forcemain. Septicity in wastewater systems is common and the hydrogen sulfide gas production can be addressed. To mitigate the formation of the sewer gas, calcium hydroxide (lime) can be added to the wastewater to raise the pH to 8.0 or above. The amount of lime needed does not depend on the amount of gas, but merely on the pH of the wastewater and provides benefits for treatment as well.

Wasteload allocations for both Big Cedar Creek and the Broad River have been obtained that give an indication of the limits that placed in an NPDES permit for the facility. The WLA for Big Cedar Creek has oxygen limits that are more stringent than the limits given for the Broad River discharge. As a result, the Big Cedar Creek discharge will require a higher level of treatment and more energy costs than the Broad River discharge option. The Big Cedar Creek WLA also requires that the dilution for toxicity testing be at 100% treatment plant effluent. Lack of dilution in testing creates a concern for a plant that is going to receive a large portion of its flow from industries that typically discharge metals and toxic organics. The Broad River WLA lists the limits for some of the common metals while the Big Cedar Creek WLA requires that samples be submitted as part of the NPDES application so that a reasonable potential analysis of Big Cedar Creek can be completed, and the metals limits established. A mixing zone study for the Broad River

is anticipated to yield a substantial dilution factor for toxicity testing of the effluent which makes it easier to meet toxicity requirements while having industrial customers.

The two treatment options under consideration would be to use a Carousel Biological Nutrient Removal (BNR) plant or a Membrane Biological Reactor (MBR) plant. The BNR process is an advanced secondary treatment process that uses a minimum amount of equipment, uses less energy, has a higher efficiency, and is much simpler to operate compared to the MBR at the cost of having a larger physical footprint. Since the BNR uses more concrete and steel tankage and considerably less manufactured equipment, the depreciation of the plant can be extended much longer because those parts of a wastewater plant will last much longer compared to equipment that will need to be replaced more often.

The MBR is a tertiary treatment process containing filters and generating a high-quality effluent. Due to the limitations of peak flows through the filters, the MBR system will also need an equalization tank to store the raw sewerage during peak flow events. The MBR is an equipment intensive process, uses more energy, is less efficient, and more complex to operate with the benefit of discharging re-use quality water and having a smaller physical footprint. Therefore, the depreciation of the MBR plant must be at a higher rate because more of the capital cost is used for manufactured equipment that will need to be replaced more often than the concrete tanks.

The BNR process is capable of meeting the limits given in WLAs for either the Broad River or the Big Cedar Creek, however, given the tighter limits at Big Cedar Creek, the use of the MBR would be required at that location. Since there is no benefit of using a tertiary treatment system if an advanced secondary treatment system will suffice, it is understood that MBR treatment will be employed on the Big Cedar Creek and BNR treatment will be employed at the Broad River discharge location.

The costs for construction of a BNR plant is substantially less than the costs for the construction of a MBR plant. However, to utilize the BNR plant, a forcemain will need to be built to the Broad River which is much more expensive than the line that would need to be built to the Big Cedar Creek. The estimated cost of the MBR and an 18” PVC forcemain capable of a 2 MGD initial capacity is approximately $41.9 Million dollars. This compares to the cost of the BNR plant and the 18” forcemain to the Broad River whose cost is estimated to be about $42.3 Million. If the plant is going to be ultimately expanded to greater than 2 MGD, then the 18” forcemain should be increased to a 24” line which would be capable of handling up to at least 5 MGD without further expansion. For the MBR plant at Big Cedar Creek, if the forcemain were increased to 24”, the initial cost for the 2 MGD plant would be $42.2 Million. For the BNR plant on the Broad River, if the forcemain were increased to a 24” line capable of handling 5 MGD or more, the initial cost of the 2 MGD plant and 24” line would be $45.8 Million.

When considering the expansion of the project in the future from 2 MGD to 4 MGD, the costs of the two options begin to diverge. The cost to increase the MBR plant from 2 MGD to 4 MGD would require an additional $30.3 Million in investment by FJWSS for a total cost of $72.54 Million for the 4 MGD plant and the corresponding linework. Expanding the BNR plant from 2 MGD to 4 MGD would cost an additional $19.6 Million for a total investment of $65.43 Million for a 4 MGD plant and the necessary linework. This represents about a $7 Million net savings to construct a 4 MGD BNR plant at the Broad River over building the MBR on Big Cedar Creek. When expanding beyond 4 MGD to 6 MGD, there are concerns over the ability to expand the NPDES permit to 6 MGD at Big Cedar Creek that does not exist on the Broad River. Nonetheless, assuming it were possible, the Broad River option would save about $20 Million over expanding the plant at Big Cedar Creek.

It is anticipated that it will take a minimum of 18 months to complete the 208 modifications and obtain an NPDES permit for either the Big Cedar Creek or the Broad River option. While under normal conditions the plant should be able to be constructed in 18 months or less, given the current supply chain issues and delivery delays, it is estimated that construction will require a minimum of two (2) years. The construction duration for either type of treatment plant is the same. The construction time for the forcemain would occur concurrent with construction of the plant and does not delay the completion of the treatment facility. If the issues regarding discharge location and service area were resolved so that the 208 plan modifications were ready to submit to the CMCOG in August, then it is anticipated that construction would not be complete until at least November 2027.

Given the information presented in this analysis, either option is possible if the FJWSS wastewater treatment facility will be limited to 2 MGD. Limiting the flow to 2 MGD would preclude the possibility of a future connection to the system by Winnsboro since there would not be sufficient capacity to handle their flow in addition to the anticipated industrial flow. The Broad River plant option was contemplated in Fairfield County's master plan which was done several years ago. The obstacle for its construction has been the available funding for construction. The Dominion settlement and the SCIIP grant has provided much needed funding to move FJWSS forward. If FJWSS desires to be able to easily expand beyond 2 MGD to 4 or 6 MGD then the Broad River discharge and BNR plant will provide FJWSS a better more cost-effective option.

1.0 Introduction

Fairfield County and the State of South Carolina have recognized the potential for residential, commercial, and industrial growth along the I-77 corridor, the area around Lake Monticello, Jenkinsville, and in the southern portions of Fairfield County. The 1997 208 Water Quality Management Plan for the Central Midlands Region documents a need for a wastewater treatment facility to support growth in those areas of Fairfield County, however, there is no authorization under the plan for the construction of another wastewater plant to serve them other than the small facilities at the Town of Ridgeway and the Town of Winnsboro. A long-term wastewater solution for the unincorporated areas of the County has been sought and studied for many years but the obstacles of logistics and financing have presented challenges to stand up a new wastewater utility.

The industrial growth in Fairfield County is projected to occur from the Fairfield County-Richland County border line along I-77 north to Exit 41 (Old River Road), approximately 11 miles, and will include existing interchanges like Exit 34 (SC Highway 34) and Exit 32 (Peach Road). This corridor includes established industrial sites such as the Fairfield Commerce Center, Walter B. Brown Industrial Park, Ridgeway Interstate Site and the Highway 34 Ridgeway Rail Site.

Additionally, the Fairfield County Economic Development Authority (FCEDA) is proposing to construct a new industrial park site that will accommodate approximately 9.2 million square feet of industrial and manufacturing buildings/businesses. The proposed site, which is known as the Fairfield County Industrial Park, I-77 International Megasite (Megasite), utilizes approximately 1,500 acres of property. The site borders Interstate-77, approximately 2.5 miles north of Ridgeway, SC. It is anticipated that the construction of the Megasite will result in an increase in residential, commercial, and industrial growth due to the associated population growth in this area of the County. The FCEDA is also planning another new industrial park on Peach Road near the intersection with Devils Racetrack Road. Beyond the industrial development, it is anticipated that residential and commercial development will benefit from the employment opportunities provided by these new industries. Areas around Exit 32, and Lake Monticello would be prime candidates for such residential development.

The existing industrial parks in the County are currently served by the Town of Winnsboro and have limited sewer capacity available to them. Substantial additional capacity is not available without significant investment in wastewater utility infrastructure. When sewer capacity is limited in an industrial park, the development is restricted to warehousing or other “dry” industries that only use water and wastewater for limited purposes and not generally as part of their manufacturing processes. These types of development often do not provide large numbers of jobs and may not maximize the tax base to the county. Water and wastewater availability to an industry at a reasonable cost is the gold standard for industrial development. To open Fairfield County to additional types of industrial development and compete with other counties in South Carolina also vying for industrial manufacturing development that are heavy users of water, Fairfield must find a solution for wastewater treatment.

1.1 Background

The Fairfield Joint Water and Sewer System (FJWSS) was created in March of 2019 as part of a joint effort between Fairfield County and the Town of Winnsboro to provide water and sewer within unincorporated areas of Fairfield County, specifically to create and expand wastewater service along the I-77 corridor and southern portions of Fairfield County. In August 2022, the Town of Ridgeway became a member of the FJWSS. The County and each of the two municipalities have two seats and there is one at-large seat which is appointed.

In a 2015 Hazen and Sawyer Wastewater System Analysis for Fairfield County, many options were laid out including connecting to the City of Columbia's system; however, the ultimate and preferred goal was constructing a wastewater treatment plant to be discharged to the Broad River as shown in the master plan at Table 1-1. This option required the construction of a system of gravity sewer lines across the county and a pump station and forcemain to serve the I-77 corridor that would pump to the treatment plant located on the Broad River. At the time, Fairfield County could not afford to implement the full plan.

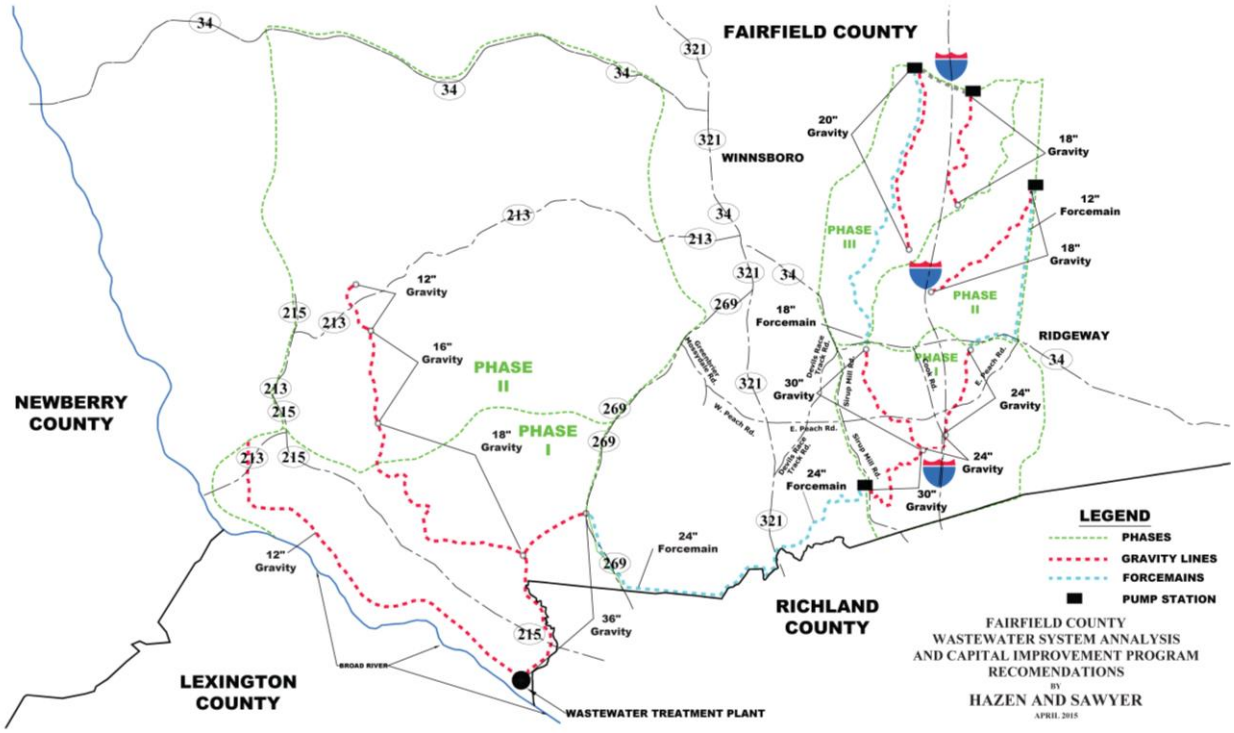


Table 1-1 Hazen and Sawyer Capital Improvement Plan Recommendations

In 2017, Louis Berger developed a plan for a wastewater treatment plant to be located near the Megasite which would pump the effluent to the Broad River for discharge through approximately 140,000 feet of forcemain as shown in Table 1-2 Fairfield Master Plan - Louis Berger. While this plan provided the treatment necessary for the Megasite, the plan did not support providing sewer service in other parts of the County because the discharge line from the treatment plant would not be usable for anything else as it traversed across Fairfield County to the Broad River.

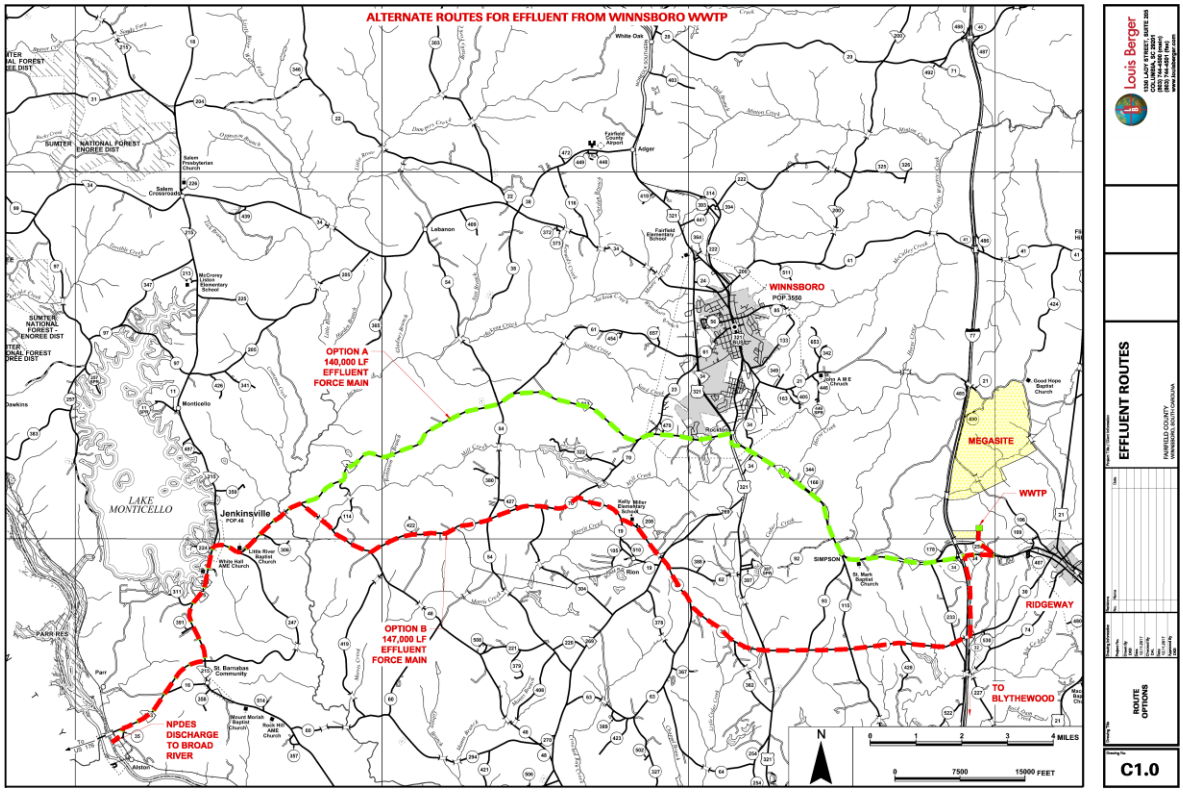


Table 1-2 Fairfield Master Plan - Louis Berger

Additionally, in 2019-2020 Thomas and Hutton proposed constructing a wastewater reclamation facility to serve only the industrial corridor discharging into the Big Cedar Creek. The construction of a treatment facility on Big Cedar Creek raised many questions concerning the efficacy of discharging into the Big Cedar Creek which flows through Richland County and gave rise to questions from property owners in the area of Cedar Creek concerning other potential sources for discharging the wastewater for Fairfield County. Richland County also took formal action to oppose the construction of a wastewater plant on Big Cedar Creek.

In September 2020, American Engineering Consultants, Inc (AEC) was engaged by FJWSS to create a Preliminary Engineering Report (PER) suitable to submit to the Central Midlands Council of Governments (CMCOG) requesting a modification of service area boundaries and specifying a new wastewater plant for Fairfield County in the 208 Water Quality Management plan. Cost estimates were prepared at that time that compared the various alternatives for the discharge of treated wastewater for an initial 1 MGD construction, with an expansion to 2 MGD, and finally with a further expansion to 4 MGD. The cost estimates were a part of the request for modification of the 208 Water Quality Plan that was going to be presented to the CMCOG Environmental Planning Advisory Committee (EPAC) at their April 2021 meeting.

One of the options included pumping stations to serve the Megasite and a forcemain that would transport 2 million gallons per day of wastewater to be treated at a treatment plant located near and discharging to the Broad River. The benefit of this as opposed to the Louis Berger plan was that additional users could connect to the forcemain all along its path so serve more areas of the County. This plan also allowed for

the further development of the County west of I-77, as initially proposed in the 2015 Hazen and Sawyer study.

At a series of meetings in March and April of 2021, those cost estimates were shared with Fairfield/FJWSS staff for consideration. A decision was made to postpone the request for modification of the 208 plan and to consider the costs for a larger force main that would carry 4 million gallons per day to a wastewater treatment plant located on the Broad River, primarily using the forcemain route as shown in the Louis Bergen plan designated as "Route B". In April 2021, those costs for a wastewater plant on the Broad River and a forcemain in the amount of $46 million dollars were used as a part of a settlement between Fairfield County and Dominion Energy to fund wastewater infrastructure.

In September 2021, AEC was engaged by FJWSS to perform the preliminary engineering work for a plant on the Broad River and the pump stations necessary to serve the Megasite. Part of the work included evaluating the most cost-effective route for a wastewater transmission line to get the wastewater to the plant and assisting with the site selection for the new wastewater treatment plant on the Broad River. Recommendations for potential sites were presented to Fairfield County in August 2022 to begin negotiations with property owners and determine if any of the owners were willing to sell any of the recommended properties.

During this timeframe, Fairfield County expressed its desire to develop a plan to provide wastewater treatment capacity to support growth, primarily industrial growth, on an interim basis while plans for a new wastewater treatment plant progressed. The wastewater capacity in Fairfield County's existing industrial parks is exhausted and is limiting Fairfield's ability to market the industrial parks effectively. Even though the Town of Winnsboro has approximately 500,000 gallons per day of wastewater treatment capacity available, the pump station and line infrastructure to get wastewater to the Winnsboro Treatment Plant is severely limited in available capacity. Fairfield County wanted a means to access available capacity in the Winnsboro Treatment Plant until the FJWSS could get a wastewater plant permitted, constructed, and operating.

Fairfield County requested that AEC evaluate options for getting additional plant capacity available quickly so that the existing industrial parks have more capacity as soon as possible. In June 2022, AEC was engaged by Fairfield County to design a system of pumping stations and forcemains that would be able to access Winnsboro's available treatment capacity and that could be utilized later to interconnect the Town of Winnsboro and the Town of Ridgeway to the FJWSS system and the planned treatment plant to be constructed on the Broad River. These plans were ultimately incorporated into applications for grants under the South Carolina Rural Infrastructure Authority's South Carolina Infrastructure Investment Program (SCIIP).

1.2 Objective

The purpose of this report is to provide an all-encompassing evaluation of the alternatives and options that are available for Fairfield County for the treatment and disposal of its wastewater. While this report includes some consideration of all the options, it will primarily focus on the two main considerations of a discharge on the Big Cedar Creek or the Broad River. The information contained herein provides the background and context necessary to understand the complexities of the decisions being made and compare and contrast the various options. This report will allow the FJWSS to make an informed decision on the best course of action going forward given all of the circumstances and considerations. Once a final

decision is made regarding how FJWSS wants to move forward, a Preliminary Engineering Report (PER) will be prepared to submit to the CMCOG to request that they modify the existing 208 Water Quality Management Plan to incorporate the discharge from a new wastewater facility in Fairfield County as part of the plan. The analysis set forth in this report will provide a valuable basis for the discussion in the PER of alternative solutions.

In order to accommodate the industrial and municipal wastewater needs for the anticipated development outlined above and of 9.2 million SF of building space for the proposed Industrial Park Megasite, Fairfield County needs a viable alternative for the disposal of wastewater from this area. Any alternative chosen will need to be able to provide disposal of treated wastewater that meets the requirements of the South Carolina Department of Health and Environmental Control (DHEC) regulations.

It is anticipated that any solution for providing wastewater treatment capacity in the near and mid-term will have a minimum of three or more phases of expansion to facilitate the expected industrial, commercial, and residential growth. The initial Phase I, anticipates the need for the treatment and disposal of an average daily flow (ADF) capacity of 0.5 million gallons per day to be treated at the Winnsboro Treatment Plant to provide time for the construction of the FJWSS treatment facility. Phase II would be the need for 1.0 million gallons per day (MGD) at the FJWSS treatment facility with the potential in a Phase III to quickly expand the capabilities for wastewater to 2.0 MGD ADF as the development for the industrial parks and other development occurs.

While the quantity of water and wastewater needed based on the land area served for residential and commercial development of property is more predictable, industrial development can tax the capacity of a small system with only one or two developments. As a real-world example, a solar cell manufacturing facility could be located on approximately 150 acres of land. By planning standards, using 1000 to 1500 gallons per day per acre, that 150 acres anticipates approximately 150,000 to 225,000 gallons of water and wastewater used per day. However, that one single facility requires 2,000,000 gallons of water and wastewater treatment per day, representing a 10-fold increase over the planned discharge from that industrial land area. As a result, any planning for industrial wastewater treatment must be flexible and anticipate the potential need for future capacity.

As development continues or if the Town of Ridgeway or Town of Winnsboro decides to interconnect to the FJWSS system for wastewater treatment, further expansion is likely needed to accommodate a total of 4.0 MGD wastewater flow, representing a doubling of capacity. Depending on the derivative growth in the Ridgeway, Winnsboro, Jenkinsville, and unincorporated areas of Fairfield County, consideration must also be given to a potential expansion to 6 MGD or 8 MGD in a 30-year time horizon and its long-term feasibility as part of any of the alternatives. The challenge of a project of this type, and the ultimate objective, is developing a system that is financial and operationally feasible in the short and near-term, while also having the capability to accommodate future growth, by building the system with as much initial capacity as possible and keeping the system financially viable at low initial flow to the system until the anticipated growth occurs.

1.3 Goals and Governing Assumptions

AEC believes that FJWSS, Fairfield County, Winnsboro, and Ridgeway share the following goals in connection with the construction of a new wastewater treatment plant:

1. Attracting and allowing for growth in Fairfield County, particularly industrial growth in the southern part of the County, and residential and commercial development that may follow.
2. Providing wastewater treatment service at the lowest possible cost, while simultaneously paying all operational and maintenance costs and building capital reserves for system maintenance, replacement, and expansion.
3. Achieve financial independence, viability, and sustainability for FJWSS and its system as soon as possible.

AEC has also considered the following assumptions in evaluating the alternatives discussed in this report:

1. Provide new capacity to support growth as quickly as possible, using a phased approach, if necessary,
2. Use of existing capacity in Winnsboro's wastewater treatment plant on an interim basis, as discussed in greater detail below,
3. Rely on solutions that do not exceed funds on hand, if at all possible,
4. Necessary permits will be reasonably attainable,
5. Independence from other utility systems/control over rates,
6. Ability to provide wholesale service to Winnsboro and Ridgeway when needed,
7. Ability to expand to at least 4 MGD, and ideally 6 MGD to accommodate future growth,
8. Avoid interbasin transfers,
9. As discussed below, the only truly viable sites, once the assumptions above are factored in, are Cedar Creek and the Broad River.
10. As discussed below based on anticipated discharge limits, we assume that Cedar Creek will require an MBR plant, and the Broad River will allow for a BNR plant.

1.4 Interim Treatment using Winnsboro WWTP

1.4.1 Current Plan

Several years ago, Fairfield County was constructing Fairfield Commerce Park. Since the FJWSS had no facilities to accept wastewater at the time, Fairfield County partnered with the Town of Winnsboro to provide wastewater treatment for Fairfield Commerce Park until such time as the FJWSS was able to take over the treatment. Therefore, the Commerce Park pump station was originally constructed with its discharge connected to the Walter Brown II Industrial Park pump station which is part of the Town of Winnsboro's wastewater infrastructure, but with the understanding that it will need to connect to the FJWSS once they have treatment capacity and other infrastructure in place for Commerce Park to reach its full potential. Winnsboro's Walter Brown II pump station is pumped through a series of other pumping stations to the Town of Winnsboro WWTP where it is treated. Wastewater from Commerce Park pumps to Walter Brown II Industrial Park, Walter Brown II then pumps to Walter Brown I Industrial Park, Walter Brown I pumps to the Ramada Inn Pump station at Hwy 34 and I-77 which pumps to the Winnsboro treatment plant through some additional pump stations. The actual flow from all three industrial parks is limited to a total of about 219,000 gpd discharged over a 24-hour period.

Another fact of permitting in the wastewater industry is that even if an industry is permitted for a specified flow, that flow is not constant throughout the day, week, or month. As such, an industry may have 35,000 gpd permitted flow, but is really only flowing 10,000 gpd on average currently. This could be because they are reserving capacity for future expansion or because they are discharging at a rate of 30,000 gpd but

only for an 8-hour period and thus in a day it will only supply 10,000 gallons of wastewater per day to be treated. It could also be because they do not operate on weekends when their flow is zero. So, just because a pump station or line has a permitted flow of 219,000 gpd, they may not really be flowing at that rate all the time.

The capacity of a wastewater treatment plant is the maximum amount of wastewater it is capable of treating on an average day during the maximum month of the year. A wastewater treatment plant can be built in any size desired within reason. However, over a reasonable planning period, it was determined that FJWSS needs to be able to treat 2 MGD. For a plant built to treat 2 MGD, it will be impossible to operate satisfactorily at less than about 250,000 gpd every day. Unless there is sufficient flow, there will not be enough food and nutrients to grow the biological organisms. Furthermore, the scalability of the electrical and other operating costs for a treatment plant are limited. Regardless of treatment plant location or technology used, the plant will need a minimum flow before it can begin operating. Based on 2 MGD, using 2 treatment trains, the minimum flow needed is about 250,000 gallons per day, although more would be better.

With the currently connected customer base, Winnsboro's existing wastewater pump stations have limited additional capacity available without major upgrades. Fairfield County has estimated that that due to the constraints described above, they only have about 50,000 GPD available to offer industrial development even though they have space available in their industrial parks and the pump stations are not operating at capacity. This condition limits the availability of sites in Commerce Park to those "dry" industries which utilize small amounts of water and wastewater only as necessary to serve restroom facilities for their employees.

Fairfield County receives numerous inquiries into their industrial park areas from "wet" industries that use water and wastewater as a part of their manufacturing process which have subsequently been rejected due to the lack of wastewater available. The Town of Winnsboro has approximately 500,000 gallons per day of treatment capacity currently available at their WWTP, but it is inaccessible without additional transport infrastructure. As it is today, Fairfield County does not have the capacity available to offer these industries that will satisfy their needs.

Fairfield County has been focused on finding a solution that will allow them to tap into Winnsboro's unused capacity in the interim until the FJWSS system can be completed. To upgrade the series of existing pumping stations and forcemains that connect Commerce Park to the Winnsboro WWTP would be a costly endeavor. Furthermore, once the FJWSS system was in place and Commerce Park connected to that system, the increased capacity in the upgraded Winnsboro collection system would be of no value to FJWSS. The current plan for the FJWSS encompasses three (3) phases of work for different purposes, but ultimately integrates into a final regional wastewater system for Fairfield County.

Phase I is more specifically being described as the Winnsboro Connector Project and provides the needed short-term treatment capacity for Fairfield County to serve their new Peach Road industrial park. The capacity will be obtained by building a new pump station (Regional Pump Station) sited near the intersection of Peach Road and Hwy 321 and constructing a forcemain line to the Town of Winnsboro Wastewater Treatment Plant (WWTP). Once the Regional pump station and line are operational, it will immediately provide an available wastewater treatment capacity of 500,000 gallons per day at the new Peach Road Industrial Park. The Regional pump station constructed as a part of Phase I is designed so that it will receive the wastewater generated by Commerce Industrial Park, the Walter Brown II Industrial Park,

the new I-77 Megasite, and the Town of Ridgeway in addition to providing service for the Peach Road Industrial Park. The pump station will also be designed to utilize the forcemain that will be constructed as part of Phase III of the master plan, conveying wastewater to the proposed FJWSS wastewater treatment plant adjacent to the Broad River without needing to be upgraded.

The components of Phase I of the project includes the aforementioned new 0.5 million gallons per day (MGD) Regional Pump Station to transfer flows to the Winnsboro WWTP initially. The Regional Pump Station will also have a secondary design capability to be able to pump up to 2.0 MGD to the FJWSS Regional WWTP using the regional forcemain constructed as a part of Phase III once it is complete. In addition, Phase I will include the installation of approximately 2,200 lineal feet of 24" force main and approximately 41,400 lineal feet of 16" forcemain. Although 0.5 MGD is not a tremendous amount of flow for a heavy industrial wastewater user, it will provide a bridge to allow Fairfield to market its industrial corridor while additional treatment capacity is under construction. It is anticipated that this project will be ready for bid at the end of 2023. This will make capacity available at least 2-3 years before Phase III can possibly be completed.

Phase II is more specifically described as the Ridgeway Connector and includes the construction of a wastewater forcemain from the Regional Pump Station, where it will discharge, along Peach Road past Commerce Park and continuing all the way to the Town of Ridgeway WWTP. Phase II is designed to primarily serve the existing unincorporated areas in the Ridgeway service territory located east of I-77 including the Megasite. A new pump station would be constructed at the Ridgeway WWTP that will provide additional capacity for wastewater that otherwise would not be able to be treated at the existing Ridgeway WWTP, and for the Town of Ridgeway's use should they decide to close their WWTP and connect to the FJWSS system in the future. The Peach Road forcemain will also include a stub-out for a future connection by the Megasite to the FJWSS system. Phase II also contemplates the necessary upgrades to the existing Commerce pump station to disconnect from the Walter Brown II pump station and connect to the new line along Peach Road. Once connected, Fairfield Commerce Park will also have access to the 500,000 GPD treatment capacity available at Winnsboro. This also opens the potential for reconnecting the Walter Brown I and Walter Brown II Industrial Parks to the Commerce Park pump station to provide additional capacity at those locations as well. By removing the Walter Browns from the Ramada Inn pump station which is currently at capacity, it would also create available capacity at the Ramada Inn pump station for use by Winnsboro in development near the I-77 and Hwy 34 interchange that would go to Winnsboro. The phase II system would operate until the actual flow in the Winnsboro Connector system reaches about 400,000 to 500,000 gallons per day. At that point, there would be sufficient wastewater volume to prevent excessive durations in the forcemain to the treatment facilities and also sufficient volume for the plant to operate satisfactorily.

Phase III will increase the wastewater treatment capacity available in Fairfield County by an additional 2 MGD and bring to fruition the much-anticipated goal of having a regional wastewater system for Fairfield County and the capability to provide wastewater to the entire southern region of Fairfield County. Phase III includes the construction of a 2 MGD Biological Nutrient Removal (BNR) WWTP on a site within Fairfield County near the Broad River, and a 24" forcemain line from the intersection of East Peach Road and US Highway 321 to the proposed FJWSS WWTP site. The effluent from the treatment facility will be discharged to the Broad River. Phase III also will allow the Winnsboro Connector forcemain to be reversed and allow any connections along the Hwy 321 corridor outside the Town of Winnsboro to be able to connect back to the Regional Pump Station for transport to the FJWSS WWTP. Once the Winnsboro connector has been

reversed, it will allow access to at least 1.5 MGD of wastewater capacity in the FJWSS system for any connections along the Hwy 321 corridor or for the Town of Winnsboro's use should they decide to connect to the FJWSS system in the future.

1.4.2 SCIIP Grant Funding

FJWSS submitted two grant applications for consideration under the South Carolina Infrastructure Investment Program (SCIIP) in October 2022. The two projects submitted were for the Winnsboro Connector project on behalf of Fairfield County and the Ridgeway Connector project as described in the current plan above. On April 24, 2023, the recipients of the SCIIP grants were posted on the RIA website. Fairfield County as a subrecipient of FJWSS received $10 Million dollars toward the construction cost of the Winnsboro Connector project. The Ridgeway Connector project did not receive any funding. Award letters and notifications were mailed to all recipients during the subsequent days after the awards were announced. There was a mandatory meeting held on May 31, 2023 with representatives of the grant recipients to discuss the grant requirements and administrative procedures.

Both grant applications laid out the case for regionalization of wastewater services for Fairfield County and contained the rationale that by funding the grant for the Winnsboro Connector would allow the plant to be placed on the Broad River as part of Phase III of the master plan. It describes the previous issues with resistance to discharging on the Big Cedar Creek and the decision by Fairfield County and FJWSS to discharge to the Broad River so that they would become a regional plant. A copy of the narrative description submitted to justify the grant application is attached in Appendix - B-1. Any change in the location of the discharge other than the Broad River could potentially jeopardize the SCIIP grant funding for the Winnsboro Connector since that specific representation was made as part of the justification and basis for the grant application.

1.5 Big Cedar Creek vs Broad River Discharge Alternatives

FJWSS requested an alternatives analysis that focused on understanding of the issues that impact the discharge being located at either Big Cedar Creek or the Broad River. In each of the following sections, the analysis will provide the background for the issues that must be considered for the system regardless of the discharge location. The end of each section will address the similarities and differences between the two discharge alternatives if any and how those factors might impact the decision on the location.

Regardless of the plant's discharge location, the first phase of the current plan and a portion of the second phase would be necessary because the operation of a new treatment plant is not feasible until the flow into the plant will be sufficient to sustain biological growth in the treatment system.

The Winnsboro Connector is vital to provide interim wastewater treatment until the flow in the FJWSS system reaches about 400,000 gallons per day at which point is sufficient to divert from Winnsboro WWTP and start up a new facility. This is the portion that has received SCIIP grant funds to cover $10 Million of the cost of this work. The portion of the second phase that also must be constructed includes the improvements to Commerce Park pump station and the line from Commerce Park to the Regional Pump Station that is part of Phase I is critical. This will allow Commerce Park access to the additional interim capacity and allow the redirection of Walter Brown I and II to Commerce Park so that the additional capacity will be available in those industrial parks as well. Once that is accomplished, the capacity that has been freed at the Ramada Inn pump station by removing the Water Brown parks will be available for

the Town of Winnsboro's use. The part of phase II that extends across I-77 to Ridgeway can be delayed until there is sufficient need for capacity in that region of the County to justify its construction.

In Section 2.0 - Regulatory and Permitting Processes are described in detail. For the construction of a new wastewater treatment plant, it will require at a minimum a 208 Water Quality Plan modification, an NPDES permit, an Antidegradation Analysis, a SCDHEC Construction Permit, and an approved National Pretreatment Program. Section 3.0 - Service Area and Customer Base provides information regarding the differences between Designated Management Agency status and Service Provider Status under the 208 Water Quality Plan and how that may impact the operation of the FJWSS system. Both of these sections provide valuable information that FJWSS should understand and will apply equally to either the Big Cedar Creek or the Broad River discharge alternatives.

Section 4.0 - Wastewater Description and Characteristics describes the various components found in wastewater and explains the terminology used when describing wastewater parameters. This section also discusses the impact of the various pollutants on discharges into receiving waters and how that applies to each of the two discharge alternatives. Section 5.0 - Logistics and Transport of Wastewater offers an understanding of the difference between gravity sewer lines , pump stations, and force mains along with a discussion of septicity and how it impacts sewer systems and how that varies depending on the discharge location.

In Section 6.0 the BNR and the MBR process options are described in detail, highlighting the similarities and differences between the processes. Section 7.0 explains the biological treatment of wastewater and the impacts to that treatment from changes in the influent and industrial discharges which apply to either discharge location or process chosen equally.

Section 8.0 details the financial risks that exist for the project from supply chain disruption and construction cost escalation regardless of the discharge location. The justification for selection of the Big Cedar Creek or Broad River alternatives as the two most viable alternatives are included in Section 9.0 below. This section also details the corresponding costs for all of the alternatives addressed in the Antidegradation Analysis that will be required as part of the NPDES permit submittal.

Section 10.0 gives a detailed project schedule for completion of the project which will apply equally to either discharge option. Both alternatives will have the same permitting schedule and the same construction schedule. And finally in Section 11.0 the financial viability and funding of the Big Cedar Creek and the Broad River alternatives are presented in the form of Operational Financial Projections demonstrating how each of these projects may be implemented and how that will affect cash flow and borrowing as the FJWSS system grows and the wastewater plant will need to be expanded from 2 MGD to 4 MGD.

The costs for Phase I and the portion of Phase II described above in the current plan will be necessary regardless of whether the plant is located at Big Cedar Creek or at the Broad River. Due to the anticipated discharge limits at each respective location and the information provided in the subsequent sections, it is assumed that the Big Cedar Creek location would require a tertiary wastewater treatment plant (MBR) to meet the limits and the Broad River discharge location would require an advanced secondary wastewater treatment plant (BNR) to meet the limits.

2.0 Regulatory and Permitting Processes

2.1 General

In 1972, the United States Congress enacted legislation that provided a national strategy for cleaning up the nation's waters. This legislation, known as the Federal Clean Water Act (33 U.S. Code §§ 1251 et seq.), created a goal of "fishable-swimmable waters" in the United States and provides the basis for almost all of the permitting required for a wastewater treatment plant.

South Carolina enacted the Pollution Control Act (PCA), S.C. Code Ann. Section 48-1-10 et seq. (1987), and any subsequent amendments to establish the laws and regulations to comply with the requirements for states contained in the Clean Water Act. Under Section 48-1-30 of the Code of Laws of South Carolina (1976 as amended), SCDHEC is authorized to adopt such rules and regulations as may be necessary to implement the PCA. With the statutory authority granted under Sections 44-1-50, 48-1-30, and 48-1-110 the South Carolina Department of Health and Environmental Control (DHEC) has promulgated regulations for the design and construction of wastewater infrastructure (Regulation 61-67).

Permitting wastewater facilities can be a complicated process requiring multiple permits of different types that depend on the area and type of work being performed. At a minimum, it will require a DHEC Construction Permit, an NPDES permit, and a land disturbance permit. To apply for these permits, it will also be necessary to first modify the 208 Water Quality Management Plan (208 Plan) for the Central Midlands region to, at a minimum, allow for an additional wastewater discharge in the County. Other factors that may affect the permits/permissions required are conditions placed on the permits themselves, wetlands, navigable waters, endangered species, archeological areas, and water quality management plans. In addition, easements from the State Budget and Control Board will be needed for any discharge to waters of the State of South Carolina and local codes may require a building permit or electrical permit. While there may be differences in the conditions on a permit that depend on the discharge location, the permitting process for a wastewater treatment plant is identical regardless of its discharge location or the type of process being proposed.

2.2 SCDHEC Construction Permit

South Carolina Section 48-1-110 of the PCA and DHEC Regulation 61-67 require that no new construction or modification of any wastewater infrastructure can begin until it has been approved by the South Carolina Department of Health and Environmental Control (DHEC) through the issuance of a wastewater construction permit by the Department. This includes sewer lines, pumping stations, and treatment facilities.

Once submitted, DHEC staff will review the application package to determine compliance with the provisions of Regulation 61-67. All engineering reports and construction permit applications will be reviewed by DHEC to determine if they conflict with the applicable 208 Plan which is managed by the CMCOG. DHEC regulations specifically state that "Engineering reports will not be approved, and construction permits will not be issued if it is determined that they conflict with the 208 Plan."

In addition, permits for all wastewater projects that discharge to an existing wastewater treatment plant must have a letter from that facility agreeing to accept the wastewater for treatment as part of the submittal package. If the permit is for the construction of a wastewater treatment plant, then the project

submittal must demonstrate that the design of the facility is such that it will comply with the discharge requirements for the facility. The discharge requirements will be promulgated through either a No Direct Discharge (ND) permit for land application and spray field discharges or a National Pollutant Discharge Elimination System (NPDES) permit for surface water discharges. ND permits are state land application permits that are issued by DHEC under the requirements of Section 48-1-100 and SC Regulation 61-67 and are not regulated by the EPA. NPDES permits are issued by DHEC after approval of the permit by the United States Environmental Protection Agency (EPA). Without a discharge permit, a wastewater facility does not have permission to discharge and thus an application for construction permit will be denied. When filing an application for an ND or an NPDES permit, DHEC will first confirm that the proposed project conforms with the 208 plan and if it does not, this permit application will also be rejected.

2.3 National Pollutant Discharge Elimination System Permit

2.3.1 Introduction

The Clean Water Act prohibits anybody from discharging "pollutants" through a "point source" into a "water of the United States" unless they have an NPDES permit. The permit will contain limits on what you are allowed to discharge and contain monitoring and reporting requirements and other provisions to ensure that the discharge does not degrade water quality or negatively impact people's health. In essence, the permit translates general requirements of the Clean Water Act into specific provisions tailored to the operations of each person discharging pollutants into the water. The term pollutant is defined very broadly in the Clean Water Act and includes any type of industrial, municipal, and agricultural waste discharged into water. Some examples are dredged soil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste. Therefore, if you discharge from a point source into the waters of the United States, you need an NPDES permit.

2.3.2 Wasteload Allocation

For planning purposes, a potential permittee may request a wasteload allocation (WLA). The WLA is the portion of a stream's assimilative capacity for particular pollutants of concern by regulators such as ammonia, BOD, phosphorus, nitrogen, copper, zinc, and suspended solids. Any pollutants of concern are allocated to an existing or proposed point source discharge. New WLAs are developed for proposed projects seeking a discharge permit or for existing discharges proposing to increase their effluent loading at the time of application. Wasteload allocations for oxygen demanding parameters and nutrients are developed by DHEC's modeling staff, and WLAs for toxic pollutants and metals are developed by the appropriate permitting division.

The ability of a stream to assimilate a particular pollutant is directly related to its physical and chemical characteristics. Various techniques are used to estimate this capacity. Simple mass balance/dilution calculations may be used for a particular conservative (nondecaying) pollutant while complex models may be used to determine the fate of nonconservative pollutants that degrade in the environment. Waste characteristics, available dilution, and the number of discharges in an area may, along with existing water quality, dictate the use of a simple or complex method of analysis.

2.3.3 NPDES Permitting

A WLA does not replace the requirement of obtaining an NPDES permit, it is for preliminary design work only. The final design must comply with the NPDES permit. An NPDES permit is required to authorize the discharge of wastewater into a stream and establish the legal discharge parameters. The Water Facilities Permitting Division at DHEC is responsible for drafting and issuing NPDES permits. Facilities are defined as either major or minor. For municipal permits, a facility is considered major if it has a permitted flow of 1 MGD (million gallons per day) or more and is not a private facility.

An NPDES permit will generally specify an acceptable level of a pollutant or pollutant parameter in a discharge. For example, the permit may specify the level of bacteria, biological oxygen demand, toxicity, ammonia, nitrogen, phosphorus, and metals as well as other conditions on the discharge such as dissolved oxygen and pH. The permittee may choose which technologies to use to achieve the level of treatment required to comply with the NPDES permit. NPDES permits make sure that a state's mandatory standards for clean water and the federal minimums are being met. NPDES permits are issued by the United States Environmental Protection Agency (EPA) or authorized states. In South Carolina, DHEC was delegated authority by the EPA for implementation and enforcement of the NPDES program in 1975, however, for major NPDES permits the permits must be sent to the EPA for review and comments. Therefore, even though SCDHEC issues the permits, the EPA is involved in the decision-making process.

For new or expanded wastewater discharges to a waterbody, the Federal Water quality Standards Regulation 40 CFR 131.12(a)(1)-(3) also require that states have an antidegradation policy in their water quality standards that comply with Federal policy which represents a three-tiered approach to maintaining and protecting various levels of water quality and uses. South Carolina incorporated the levels of protection in its water quality standards in Regulation 61-68 to reflect the requirements of the Federal Regulation. This regulation stipulates that an antidegradation analysis must be conducted for all new or expanded discharges as a part of NPDES permitting.

The NPDES administrative procedures require that the public be notified and allowed to comment on NPDES permit applications. When EPA authorizes a state to issue NPDES permits, EPA requires that the state provide the public with this same access. Therefore, once an NPDES permit has been proposed to the applicant, it will be placed on public notice for a minimum of 30 days to allow comments. If the comments are substantial, then DHEC will hold a Public Hearing which requires another 30-day notice. After the hearing, DHEC and EPA staff will prepare their comments and will decide on whether they will issue the NPDES permit as drafted, issue a modified permit with conditions, or deny the permit request. After DHEC/EPA makes their final determination, that decision may be appealed in accordance with R.61-72 and the rules of the Administrative Law Court of South Carolina. The outcome of the appeals process is final and will ultimately determine the outcome of the permit. There have been several submissions for NPDES permits recently that are taking longer than 18 months to receive final agency decision.

Fairfield has requested preliminary WLAs from SCDHEC for a number of different discharge locations to evaluate the best alternative for wastewater treatment. The wasteload allocations are for Big Cedar Creek which flows to the Broad River through Richland County, Sawney's Creek which flows to the Wateree River through Kershaw County, and the Broad River at the boundary of Fairfield County. Copies of all of the wasteload allocation summary letters are provided in Appendix - A. The WLAs provide the anticipated limits that would likely be contained in the NPDES permit for the TDML constituents identified.

The NPDES permit requirements and the corresponding timeline will be the same for the two discharge alternatives as both are major facilities. However, the amount of BOD and Ammonia anticipated to be allowed in the NPDES permit for each location is significant as shown in the summary below.

	BROAD RIVER WLA LIMITS		CEDAR CREEK WLA LIMITS	
Constituent/Parameter	**Monthly Average**	**Monthly Average**	**Monthly Average**	**Monthly Average**
Flow	2 MGD	4 MGD	2 MGD	4 MGD
Biochemical Oxygen Demand – 5 Day (BOD5)	30 mg/l	30 mg/l	22.9 mg/l	10 mg/l
Total Suspended Solids (TSS)	30 mg/l	30 mg/l	30 mg/l	30 mg/l
NH_3-N mg/L (Ammonia)	7.83 mg/l	7.83 mg/l	2.0 mg/l	2.0 mg/l
UOD	1723 lbs/d	3446 lbs/d	--	850.6 lbs/d
Fecal Coliform MPN	126/100 ml	126/100 ml	126/100 ml	126/100 ml
Total Residual Chlorine (TRC)	0.011 mg/l	0.011 mg/l	0.011 mg/l	0.011 mg/l
Dissolved Oxygen (DO)	5.0 mg/l	5.0 mg/l	6.0 mg/l	6.0 mg/l
pH	6.0 – 8.5 Standard Units	6.0 – 8.5 Standard Units	6.0 – 8.5 Standard Units	6.0 – 8.5 Standard Units
Total Phosphorus	1.0 mg/l	1.0 mg/l	To be determined*	To be determined*
Total Nitrogen	MR mg/l	MR mg/l	MR mg/l	MR mg/l
Total Cadmium	0.29 mg/l	0.14 mg/l	To be determined*	To be determined*
Total Lead	MR mg/l	MR mg/l	To be determined*	To be determined*
Total Copper	.0057 mg/l	.0057 mg/l	To be determined*	To be determined*
Total Zinc	19.11 mg/l	9.59 mg/l	To be determined*	To be determined*
Mercury	51.0 ng/l	51.0 ng/l	To be determined*	To be determined*

While these limits are preliminary and subject to the final NPDES permit limitations, the Cedar Creek discharge is more stringent than the Broad River discharge for BOD and Ammonia. It should be noticed that the BOD limits decrease as the plant increases flow from 2 MGD to 4 MGD on the Cedar Creek while at the Broad River, the limits stay at 30 mg/L. It should also be noted that the ammonia limits for Cedar Creek are almost one third of the limits at the Broad River. And finally, the UOD limits on Cedar Creek at 4 MGD are less than 25% of the Broad River UOD limits at 4 MGD. Additionally, the discharge dissolved oxygen requirement at Cedar Creek is also higher than the Broad River requirements. All of these parameters affect the oxygen requirements inside the treatment facility and will necessitate that the Cedar Creek option will have a higher operational cost than the Broad River to be able to meet those limits. It should also be noted that the Broad River WLA lists the metals limits while the Cedar Creek WLA limits indicate that testing data will need to be submitted with the NPDES application so that they can determine a reasonable potential. Once samples are submitted containing metals, they will complete the reasonable potential analysis for Cedar Creek and then metals limits will be imposed. The Cedar Creek WLA also contains a statement that the CTC % is 100% which means that toxicity testing will be based on the plant effluent without dilution.

Expansion of the treatment plant on Big Cedar Creek beyond 4 MGD will be very difficult because the treatment requirements will become more and more strict.

NPDES Permitting Administrative Process

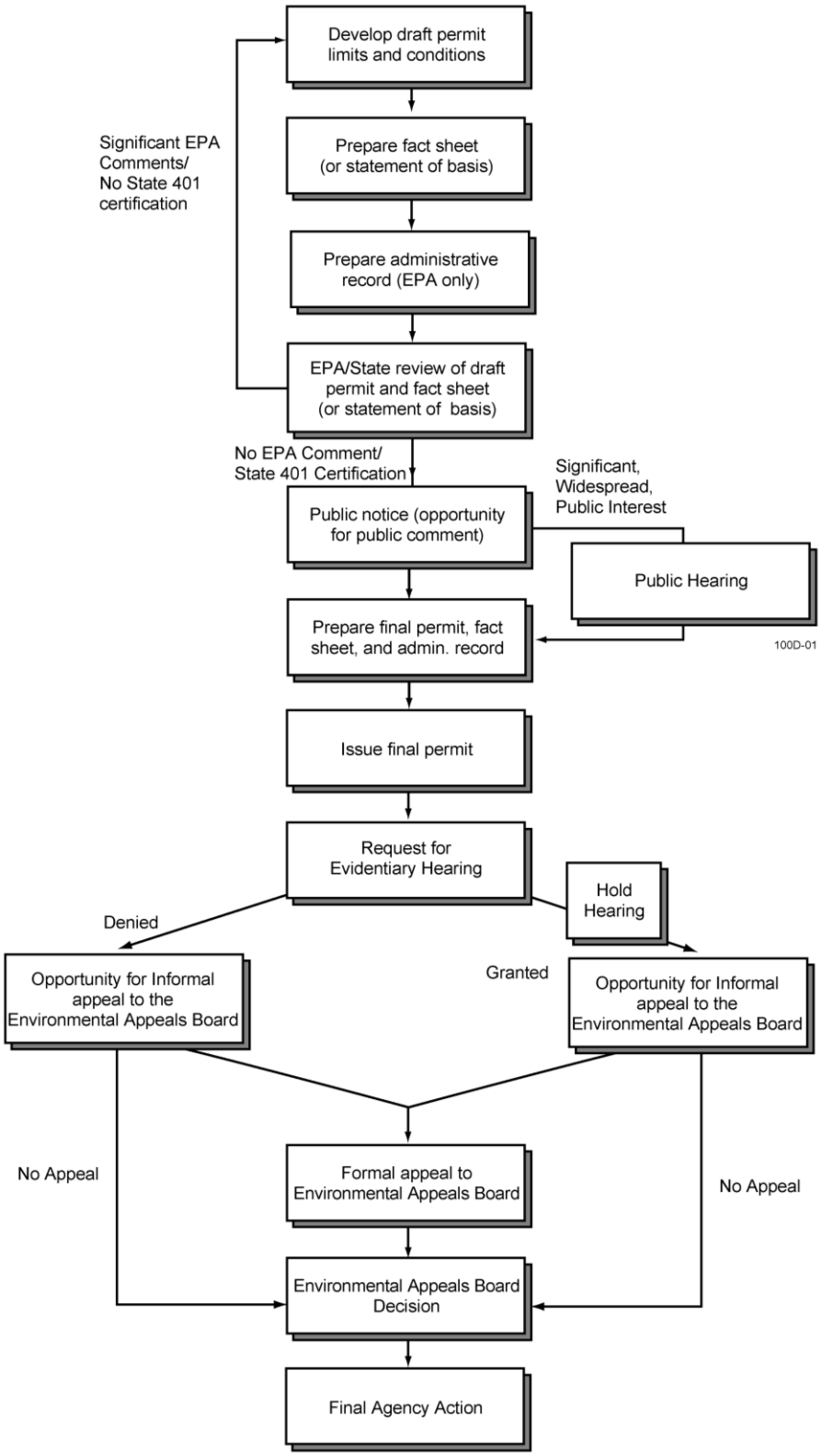


Table 2-1 - NPDES Permit Process

2.3.4 National Pretreatment Program Requirements

2.3.4.1 Regulating Industrial Discharges

In addition to the many other regulations contained within, the CWA established a regulatory program to address indirect discharges from industries to publicly owned treatment works (POTWs) through the National Pretreatment Program, a component of the NPDES Permit Program. Unlike other environmental programs that rely on federal or state governments to implement and enforce specific requirements, under the National Pretreatment Program most of the responsibility rests on local municipalities. The National Pretreatment Program requires industrial and commercial dischargers, called industrial users (IUs), to obtain permits or other control mechanisms to discharge wastewater to the POTW from the local POTW authority after review by DHEC pretreatment permitting section. Such a permit may specify the effluent quality that necessitates that an IU pretreat or otherwise control pollutants in its wastewater before discharging it to a POTW.

Certain industrial discharge practices can interfere with the operation of POTWs, leading to the discharge of untreated or inadequately treated wastewater into rivers, lakes, and other waters of the United States. A discharge that causes interference inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use, or disposal and therefore causes a violation of any requirement of the POTW's NPDES permit. Some pollutants are not amenable to biological wastewater treatment at POTWs and can pass through the treatment plant untreated. This pass through of pollutants affects the receiving water and might cause fish kills or other deleterious effects. Even when a POTW has the capability to remove toxic pollutants from wastewater, the pollutants can end up in the POTW's sewage sludge, which might then be processed into a fertilizer or soil conditioner that is land-applied to food crops, parks, or golf courses or elsewhere.

A POTW is responsible for ensuring that discharges by industrial and commercial facilities that discharge into its collection system do not cause problems at the POTW or result in deleterious impacts on receiving stream water quality. Any POTW (or combination of POTWs operated by the same authority) with a total design flow greater than 5 million gallons per day (mgd) and receiving from Industrial Users pollutants which Pass Through or Interfere with the operation of the POTW or are otherwise subject to Pretreatment Standards is required to establish a POTW Pretreatment Program. In addition, DHEC stipulates that any POTW that has significant industrial users are required to administer a local pretreatment program.

A Significant Industrial User (SIU) [40 CFR 403.3(v)] is defined as :

1. All users subject to categorical pretreatment standards under 40 CFR 403.6 and 40 CFR chapter I, subchapter N, except those designated as NSCIUs (see definition above); and
2. any other IU that discharges an average of 25,000 gpd or more of process wastewater to the POTW (excluding sanitary, noncontact cooling, and boiler blowdown wastewater);
3. contributes a process wastestream that makes up 5 percent or more of the average dry-weather hydraulic or organic capacity of the POTW treatment plant; or
4. is designated as such by the POTW on the basis that the IU has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement [in accordance with 40 CFR 403.8(f)(6)].

Since one of the main purposes of the new wastewater treatment facility in Fairfield is to be able to provide industrial wastewater treatment for new development, the NPDES permit will likely contain a

requirement to establish a National Pretreatment Program which requires approval of DHEC and EPA. Given FJWSS responsibility to regulate industrial discharges and the composition and volume of industrial wastewater anticipated, FJWSS should establish a Local Pretreatment Program modeled after the National Program even if the EPA or DHEC does not initially require it as part of the NPDES permit. If the Town of Winnsboro has an industrial pretreatment program for its existing plant, that program may be able to be expanded to include the new wastewater treatment facility at the FJWSS since Winnsboro will provide operation of the new facility.

2.3.4.2 Purpose of Pretreatment Program

POTWs are not designed to treat most toxic or non-conventional pollutants that are present in industrial waste. Consequently, discharges from both industrial and commercial sources can cause problems at POTWs and can have detrimental effects on the water quality of the receiving waterbody. The undesirable effects of those discharges can be prevented by using treatment techniques or management practices to reduce or eliminate the discharge of the contaminants. The act of treating wastewater before discharge to a POTW is commonly referred to as pretreatment. The National Pretreatment Program (NPP), published in 40 CFR Part 403, provides the regulatory basis to require nondomestic dischargers to comply with pretreatment standards to ensure that the goals of the Clean Water Act (CWA) are attained. The objectives of the National Pretreatment Program are stated in 40 CFR 403.2, as follows:

- Prevent the introduction of pollutants into a POTW that will interfere with the operation of the POTW, including interference with its use or disposal of municipal sludge
- Prevent the introduction of pollutants into a POTW that will pass through the treatment works or otherwise be incompatible with such works
- Improve opportunities to recycle and reclaim municipal and industrial wastewaters and sludges.

The two key terms used in EPA's objectives for the National Pretreatment Program, interference and pass through, are defined in 40 CFR 403.3(k) and (p):

Interference: A discharge which, alone or in conjunction with a discharge or discharges from other sources, both:

- Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal, and
- Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent state or local regulations): CWA section 405; the Solid Waste Disposal Act (including the Resource Conservation and Recovery Act and state regulations contained in any state sludge management plan prepared pursuant to subtitle D of the Solid Waste Disposal Act); the Clean Air Act; the Toxic Substances Control Act; and the Marine Protection, Research and Sanctuaries Act.

Pass Through: A discharge that exits the POTW into waters of the United States in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation).

Some industrial users have specific regulations contained in the NPP categorized by the nature of the type of manufacturing at the facility. Those users are Categorical Industrial Users (CIU). For those users, the discharge limits from their facility are established by the EPA and they are not allowed to discharge into a POTW at a rate higher than listed within the NPP even if the POTW has the capacity to remove the pollutants being discharged from the industrial discharger.

2.3.4.3 Establishment of a Pretreatment Program

POTW pretreatment programs must contain six minimum elements, Legal Authority, Procedures, Funding, Local Limits, Enforcement Response Plan, and a list of Significant Industrial Users (SIUs). In addition to these six elements, statutes, ordinances, regulations, agreements, and other items that the POTW relies upon to administer the pretreatment program must be either established or modified accordingly.

The CWA contained a Toxic Pollutant list for the purpose of establishing effluent guidelines for non-domestic users. However, EPA has developed the Priority Pollutants List which made implementation of the CWA more practical for POTWs. Priority Pollutants are a set of chemical pollutants that EPA regulates and for which EPA has published analytical test methods. Currently the priority pollutants list contains 126 pollutants that fall into two categories:

- Metals—including lead, mercury, chromium, and cadmium—cannot be destroyed or broken down through treatment or environmental degradation. Toxic metals can cause a number of human health problems, such as lead poisoning and cancer. In addition, the consumption of contaminated seafood and agricultural food crops can result in exposures exceeding recommended safe levels.
- Toxic organics—including solvents, pesticides, dioxins, and polychlorinated biphenyls (PCBs) — can be cancer-causing and lead to other serious ailments, such as kidney and liver damage, anemia, and heart failure. As of 2008, EPA identified 4,249 waterbodies as having unsafe levels of toxic organics in fish and wildlife.

The NPP helps to prevent excess loadings of any of the Priority Pollutants that would cause harm to the operation of the treatment facility or to the environment. A plant “headworks” analysis is developed and establishes the total mass and concentration of each of the Priority Pollutants that the plant is capable of treating and how much of each pollutant is available for non-residential use. The Headworks Analysis is the basis of the rationale for limits contained in local discharge permits issued to non-domestic dischargers by the POTW. If the non-domestic user exceeds the capacity provided in the local discharge permit, the POTW takes action to enforce the provisions of the local permit.

As non-domestic discharge permits are written by the POTW, the pollutant database established by the Headworks Analysis is adjusted to reduce the amount of pollutant available for other non-domestic users as some of the capacity has been taken by one of the other non-domestic users. As the treatment capacity of a particular pollutant has been expended, the POTW will need to either add additional unit processes to remove that particular pollutant, decrease the availability of that pollutant to all non-domestic users, or put a moratorium on accepting any more of that pollutant into the POTW. Without the ability to accept the additional pollutant, the POTW would be forced to require that the industrial users install pretreatment to remove the pollutant prior to discharging to the POTW. The installation of additional pretreatment to meet more stringent limits on a particular pollutant may be a disincentive to industries considering locating within Fairfield County.

The Headworks analysis also helps prevent excess loadings of the conventional pollutants biochemical oxygen demand (BOD), total suspended solids (TSS), fecal coliform bacteria, oil and grease, and pH. Although POTWs are designed to treat conventional pollutants, these pollutants have caused violations or operational problems at the POTWs. Many POTWs have ongoing problems with excessive loadings of BOD and TSS from industrial and commercial sources causing pass through or interference and problems in the collection system. Keeping track of the entire pollutant inventory of a POTW through the Headworks Analysis database is important to the treatment plant's safe and reliable operation.

A nonconventional pollutant is any pollutant that is neither a toxic pollutant nor a conventional pollutant. DHEC has sought to reduce the volume of nonconventional pollutants such as nutrients (e.g., ammonia, nitrogen, phosphorus) and other chemicals discharged from POTWs. Excess nutrients in surface waters can cause excessive algal growth, reduce dissolved oxygen, and impair aquatic life. The impetus for phosphorus limits in the Broad River Basin is the algal growth in the Santee lakes and as such, DHEC has imposed phosphorus limits on all discharges from POTWs that flow into the Santee Basin. Another example of nonconventional pollutants is molybdenum, which can be introduced to the wastestream from the use of corrosion inhibitors at IUs that add cooling water and boiler water corrosion control additives.

To achieve the industrial growth that Fairfield desires, understanding the application of pretreatment requirements and well managing a pretreatment program is crucial. Many industries desire to avoid having to install pretreatment systems prior to discharge into the POTW and many have wastewater discharges that contain high concentrations of Priority Pollutants. It is generally much more cost effective to remove high concentrations of a priority pollutant at the source rather than having to remove that pollutant once it has been diluted into the main POTW wastestream. Reductions in pollutants discharged can ensure that industrial development vital to the economic well-being of Fairfield County is compatible with a healthy environment.

While the establishment of the industrial pretreatment program will be required regardless of the discharge location, the discharge limits at each location will control how much constraint will be necessary for the industrial discharges to meet those limits as determined by the Headworks Analysis which will be different for each location. Toxicity from metals and organics is of primary concern for any industrial discharges. Due to the limitations on effluent dilution at the Big Cedar Creek and its lower assimilative capacity, that discharge location will correspondingly have more stringent pretreatment requirements for toxicity, metals, and organics than the discharge at the Broad River, which will be more costly for the industrial users. While the Broad River will have the same concerns, it will be easier to meet the discharge requirements at that location.

2.4 208 Water Quality Plan

2.4.1 Role of the Central Midlands Council of Governments

Among the other planning activities contained within the Clean Water Act, Section 208 of the Act was developed for the purpose of encouraging and facilitating the development and implementation of area-wide wastewater management plans. It required the governors for each state to identify areas with water quality problems and designate an entity to develop management plans to address those problems.

The purpose of the 208 plan is to facilitate a systematic, regional approach to protecting water quality by:

1. Identifying water quality management areas

2. Documenting current and future wastewater infrastructure needs
3. Outlining policies that guide the wastewater infrastructure permitting process
4. Providing administrative procedures to document plan modifications and allow for transparency and public involvement.

The Governor of South Carolina has designated six Councils of Governments (COGs) as planning agencies for six regions of the State, which, as a result of urbanization, among other factors, had substantial water quality issues. These six COGs are responsible for planning in 24 of the State's 46 counties. The South Carolina Department of Health and Environmental Control (DHEC) is the planning agency for the remaining 22 counties known as the non-designated area of the State, most of which were in rural, more undeveloped counties. The CMCOG is the planning agency for the central-midlands region, which includes Fairfield County, Richland County, Lexington County, and Newberry County.

In 1997 and again in 2004, the CMCOG updated their 208 plan. As the State water quality management planning agency, DHEC is also responsible for certifying, approving, and submitting to EPA any Water Quality Management Plans and updates prepared by other designated regional planning agencies in accordance with the Act (40 CFR 130.10(b)(4)). DHEC refused to certify and approve the 2004 amendments to the CMCOG 208 plan. Therefore, the current plan for the CMCOG Water Quality Management Plan is dated October 1997 and incorporates any planning activities that are currently being used for facilities planning.

2.4.2 Role of the Designated Management Agencies

The provisions of water quality management plans, after approval by EPA, are carried out by designated management agencies. These agencies are responsible for constructing, operating, and maintaining publicly owned wastewater treatment facilities and have the legal authorities necessary to implement the plans. Management agencies or combinations of agencies must have certain authorities and operational capabilities and be willing to accept the responsibilities associated with designation. A principal part of the 208 Plan is the identification of each management agency and its respective management boundary.

According to the Clean Water Act in Section 208 (c)(2), each designated management agency must have adequate legal authority to:

A. Carry out appropriate portions of an area-wide waste treatment management plan,

B. Effectively manage waste treatment works and related facilities serving such an area,

C. Directly or by contract, design and construct new works, and operate and maintain new and existing works as required by the plan,

D. Accept and utilize grants, or other funds from any source, for waste treatment purposes,

E. Raise revenues, including the assessment of waste treatment charges,

F. Incur short and long-term indebtedness,

G. Assure in the implementation of an area-wide waste treatment management plan that each participating community pays its proportionate share of waste treatment,

H. Refuse to receive any wastes from any municipality or subdivision which does not comply with any provision of an approved plan, and

I. Accept industrial waste for treatment.

Each designated management agency agrees to accept certain responsibilities, usually by signing a Willingness and Implementation Statement. Except as noted in the individual Willingness and Implementation Statement, the agencies listed in section VII are responsible for:

A. Establishment or continued implementation of a regulatory program to control:

1. Location of public and private domestic waste treatment facilities (this is to be accomplished before award of an SRF loan).

2. Appropriate waste treatment policies and procedures to include:

a) A schedule of fair user charges,
b) Pretreatment standards for industrial wastes (if needed) and regulatory controls to accept or refuse municipal and/or industrial waste,
c) Such other policies and procedures as may be appropriate.

3. Implementation of the state and EPA approved area wide facilities waste treatment plan and updating the facilities plan periodically as necessary and appropriate.

B. Development or continued implementation of an effective series of administrative management procedures and a personnel system appropriate to staff the agency for the discharge of its duties and responsibilities.

The EPA approved a determination by the S.C. Attorney General that all incorporated municipalities, counties, and special purpose districts in South Carolina are legally capable of performing the duties of a designated management agency. If the entity agrees to execute responsibilities as described above, it may be designated as a management agency. The designation must first be certified by DHEC and submitted to the EPA by the Governor of South Carolina for approval.

If a designated management agency desires to provide wastewater service within another management agency's jurisdiction, the boundaries of the designated management agencies must be modified. Modifications are more easily made when all affected parties agree, and sufficient documentation of the agreement can be provided. Modifications to management agency designations must be submitted to CMCOG and DHEC for review. Once approved, the CMCOG will amend the plan in accordance with the procedures outlined in the plan.

The location and sizing of wastewater treatment plants and their accompanying collection lines are typically initiated by the designated management agencies. The management agency provides its own decisions concerning the need to expand, consolidate, and otherwise direct its own program.

The need for phasing of wastewater treatment capacity is determined by the management agencies and may be dependent on their local needs and ability to finance wastewater facilities. Phasing may be necessary when additional quality of treatment is required by DHEC and the provider needs time for engineering, financing, or technology development. Phasing may also be a result of postponing construction until the anticipated need for wastewater facilities actually exists.

It is important for FJWSS to be designated as a management agency and have control of its own territory for two important reasons:

1 FJWSS should have the ability to seek amendments of the 208 Plan on its own behalf for future upgrades and capacity increases to the plant
2 FJWSS should have the ability to qualify for SRF Loans and EPA Federal grants.

2.4.3 Modification of the 208 Water Quality Plan

The 208 Plan is usually modified for one of two reasons. One is to comprehensively update the Plan, or a portion of it, to reflect changing conditions or needs. Updates usually cover the entire planning area. A Plan update has no specific information requirements, although 40 CFR Part 130.6 discusses several priority elements including implementation measures, municipal and industrial waste treatment needs, management agencies, total maximum daily loads, effluent limitations, basin plans, and nonpoint source management and control. For administrative purposes, plan updates are considered major amendments and therefore require public input and EPA approval as described below.

The other reason for 208 plan modification is to enact an amendment that is focused on a particular project. An amendment is usually narrower in scope and based on changing conditions in a smaller area rather than conditions or policies that affect the entire planning region. As mentioned previously, the current 208 plan does not address a new wastewater treatment facility in Fairfield County, nor does the CMCOG recognize the FJWSS as having any management agency authority in Fairfield County. The 208 plan contains service area maps that show which entities are allowed to manage wastewater facilities in each area of the county. Since the first step toward permitting a new wastewater plant is to assure that the proposed project is in conformance with the 208 Plan, the 208 Plan will have to be modified to address a new wastewater plant for Fairfield County and any management agency area that will be controlled by FJWSS.

The Total Maximum Daily Load (TMDL) for pollutants in the Broad River Basin have already been established which will apply to any part of the Broad River and its tributaries which includes Big Cedar Creek. The CMCOG assists DHEC to establish how much of each TMDL is allocated to the individual discharge permits and how the pollutant load is shared between the various dischargers throughout the watershed. The amount of TMDL allocated to a discharge is important for determining the level of treatment required. The more stringent the limits, the higher the level of treatment required, and the more treatment of the effluent will cost to meet those limits. It is beneficial for a discharger to have as much of the basin's TMDLs as possible to keep capital and operating costs down.

It is important to note that the policy of the CMCOG has been that they do not withhold any of the TMDL loading for future capacity or expanded facilities. Instead, the TMDL of the basin is distributed amongst the existing dischargers. As a result, for a new discharge to have any portion of the TMDL, the existing dischargers will be required to relinquish some of their current existing loading into the waterbody. Over the years, this has caused great angst at the CMCOG as some utilities who have enjoyed having the vast majority of the TMDLs have been forced to relinquish some of their loading so that others could expand their discharge. Therefore, even though the wasteload allocation from DHEC indicates limits based on a pro-rate share of the TMDL based on flowrate in the basin, it contains a caveat that the actual pollutant loading that may be on the final permit requires negotiation with other dischargers to give up some of their loading. In this case, Richland County, Columbia, Cayce, and East Richland would have to relinquish

pollutant loading for Fairfield to have any pollutant loading at any location in the Broad River basin. FJWSS will need to be mindful of this as they request 208 Plan amendments.

2.4.4 Amendment of the 208 Water Quality Plan

An application to amend the 208 Plan may be made by a designated management agency to CMCOG. Amendments are classified as either major or minor. CMCOG shall determine whether a request is either a major or minor amendment. All amendments must be sponsored by a Designated Management Agency or the CMCOG Board.

Major amendments are defined as the following:

1. New wastewater treatment facilities with a design flow of 1.0 MGD, or >:
2. Existing WWTFs, which will be expanded by at least 50% of the current design capacity with respect to flow;
3. Changes in management agency status, condition or geographic management area such that the change significantly alters the provision of wastewater collection, transportation, treatment or potentially impairs water quality.
4. Proposed projects which conflict with the goals and objectives of the WQMP, such as those listed below, or specifically stated plan policies would require a plan amendment.

The applicant must request an amendment in writing to initiate the amendment process. The applicant is responsible for all initial submission requirements and any additional information or studies requested during the amendment process by the Environmental Planning Advisory Committee (EPAC) or CMCOG. Unless otherwise directed by the Chairman of EPAC with concurrence from the Chairman of CMCOG Board, the EPAC will review all proposed major amendments and submit recommendations to the CMCOG Board for final action. The applicant should be present during the EPAC or Board meetings to discuss or present the amendment and respond to questions. Recommendations from EPAC to the CMCOG are to be one the following:

1. Approval;
2. Approval with Conditions;
3. Denial - In cases of denial, the applicant may choose to revise their application to conform with the plan.

An advertised public information meeting will be held for the plan amendment as determined by CMCOG, and will be scheduled following an EPAC recommendation. The meeting may be held in the applicant's jurisdiction or at the offices of the CMCOG. The meeting must be scheduled for a weekday evening and held in a handicapped accessible public building.

Public notice for such meetings will be published in the newspaper of general circulation in the region at least fifteen (15) days prior to the meeting. The applicant will provide a review copy of the proposal to the CMCOG. The proposal and supporting documentation will be made available for public review during normal business hours. The advertisement will state where these copies are available for review.

The public information meeting will be conducted by the Chairman of EPAC or his designee and staff of the Council. The applicant must attend the public meeting to assist in responding to questions concerning the proposed amendment. Verbal and written comments will be received at the public meeting.

Additional written comments may be submitted up to seven (7) days following the public meeting or prior to the next regularly scheduled CMCOG Board meeting.

After the public information meeting, all proposed amendments will be placed on the agenda of the CMCOG Board. The EPAC Chairman, assisted by staff, will present the proposed amendment, recommendation of EPAC, and a summary of public comments. The applicant and other parties may be invited to attend the meeting and may address the issue at the discretion of the Board. Action by the CMCOG will take one of the following forms:

1. Approval;
2. Approval with Conditions;
3. Denial; or
4. Referred back to EPAC for further study.

At a minimum, before an application can receive consideration by CMCOG, the applicant may be required to provide information which, at a minimum where it applies, addresses the following:

1. Detailed description and scope of the project;
2. Preliminary engineering data regarding facility design and cost;
3. Financing strategy and/or feasibility analysis;
4. Potential fiscal or engineering impact on existing facilities, if any;
5. Associated environmental risks or impacts;
6. Project justification or need;
7. Summary examination of alternative options, where appropriate;
8. Timing and phasing of the project or proposal.

It is important to note that the burden of demonstrating the facts and merits of any plan amendment lies solely with applicant and is subject to whatever level of review is required by the CMCOG staff, EPAC or CMCOG Board. DHEC and EPA, where required, must approve all amendments before they become part of the Regional Water Quality Management Plan. Decisions of the Board of the CMCOG are considered final and are given to DHEC for concurrence.

With regard to the plant being located on the Big Cedar Creek or the Broad River, both discharge options will require substantially the same 208 Amendment processes.

2.5 Antidegradation Regulatory Requirements

Antidegradation Implementation is initiated by an application to DHEC for a new or expanded discharge for an NPDES permit. DHEC requires that an antidegradation analysis be completed to evaluate the socioeconomic impact and alternatives to discharging to waters of the State. The antidegradation analysis must be prepared in accordance with SC DHEC Antidegradation Rules. The antidegradation section of the PER must present results and discussions of an alternatives analysis, and an economic & social development analysis for the proposed wastewater discharge to accommodate Fairfield County.

In the context of concern over lowering water quality, the terms "new" or "expanding" includes the addition of pollutants in type or magnitude and not just an increase in flow. The analysis must provide a written statement that alternatives for the elimination or minimization of the proposed discharge have

been evaluated by the project's consulting engineer as part of DHEC's antidegradation implementation process.

For each alternative listed, the analysis must address whether it is economically or technologically reasonable to eliminate or minimize the discharge that would lower water quality.

Options that must be considered as part of an antidegradation analysis are:

1. Water recycle or reuse
2. Use of other discharge location
3. Connection to other WWTPs
4. Land application
5. Product or raw material substitution
6. Other treatment options/alternatives

Other activities requiring non-point source controls through permits or certifications, such as stormwater permits, are also subject to the State's Antidegradation Implementation. DHEC uses a parameter-by-parameter approach for implementation of the antidegradation rules and will review each parameter separately as it evaluates an application for a new or expanded discharge. All waters of the State will be provided with a minimum of at least one of four levels of antidegradation protection as contained in R.61-68.D as described below. All waters of the State are considered high quality waters where the water quality exceeds levels necessary to support classified and existing uses or have available assimilative capacity for some constituents. Most of the waterbodies that have impaired water quality are limited for only one parameter.

All waters in South Carolina are classified. The classifications of the waters consist of two parts: the best uses to be made of a waterbody and instream water quality standards which are stringent enough to protect the classified and existing uses. Existing uses are defined in R.61-68 as those uses actually being attained in or on the water regardless of the classified uses. Existing uses also apply to those waterbodies with water quality suitable to allow the uses to be attained in and on the water in accordance with Section 303(a) of the CWA. This section of the Act established existing State water quality standards for uses that were in effect prior to the enactment of the CWA as a "starting point" for water quality standards.

Section D.1 of R.61-68 requires the protection of existing uses and the level of water quality to protect those uses for all waters of the State. There are four tiers or levels of protection. Tier 1 applies a minimum level of protection to all waters. Tier 2 applies to high quality water where the water quality exceeds the mandatory minimum levels and Tier 3 applies to Outstanding National Resource Water (ONRW) and do not allow for any permitted discharges. There is also a Tier 2 ½ which provide for a higher level of protection than Tier 2 but do not meet the criteria for Tier 3. Tier 1 implementation would be as follows:

1. To implement Tier 1 antidegradation, DHEC determines if a planned discharge would lower water quality to the extent that it would no longer be sufficient to protect and maintain the existing uses of that waterbody. Any discharge which would remove an existing use is inconsistent with the State's Antidegradation Rules which assert that existing uses are to be maintained and protected. In such a circumstance, the planned discharge must be avoided or adequate mitigation or preventive measures must be taken to ensure that the existing uses and the water quality to protect them will be maintained.

2. DHEC has initiated water quality assessment and protection on a watershed basis in order to emphasize a coordinated approach to basin management and water quality maintenance or improvements. This also better addresses congressional and legislative mandates, better utilizes current resources, and better informs the public and the regulated community of existing and future water quality issues. The watershed management process focuses DHEC's resources and enables staff to target work efforts in order to maximize useful results. Development of the watershed strategies includes wasteload allocations and Total Maximum Daily Loads (TMDLs) for specific waterbodies that may not be fully supporting all the uses of the waterbody. DHEC defines total load allocations as a wasteload(s) for point source discharges and load(s) for nonpoint sources. The total load allocation of a waterbody incorporates both point and nonpoint sources where applicable.

   In anticipation of the development of a TMDL for a specific waterbody, the Department may conclude that a proposed discharge will not cause or contribute to an impairment of the waterbody based upon the specifics of a total load reallocation that has been agreed to by the project applicant(s) in accordance with areawide planning agencies pursuant to Section 208 of the CWA. The reallocation is allowed as an interim measure until a TMDL pursuant to Section 303 of the CWA can be developed. The Department will ensure that the public health and welfare will not be endangered if reallocation is allowed. Since all waters of the State are considered high quality in that they possess assimilative capacity for some constituents, any proposed discharge will be subject to an alternatives analysis as required by R.61-67.200.D.1.k and Section 208 of the CWA.

   The following examples (not inclusive) describe how the Antidegradation Rules are implemented for Tier 1 protection:

   i. When the available assimilative capacity of a waterbody is not sufficient to ensure maintenance of water quality standards for a parameter of concern with an additional load to the waterbody, then the Department will not allow a permitted net increase of loading for the parameter of concern or pollutants affecting the parameter of concern. This no net increase will be achieved by the reallocation of existing total load(s) or by meeting the applicable water quality standard(s) at the end-of-pipe. Until such time that a TMDL is developed for the parameter of concern for the waterbody, no discharge will be allowed to cause or contribute to further degradation of the waterbody.

   ii. When applying narrative standards included in R.61-68, if nutrient loadings caused a waterbody to be on the impaired waters list in accordance with Section 303(d) of the CWA, then the Department will not allow a permitted net increase of loading for the appropriate nutrient(s) until such time as a TMDL is developed for the parameter of concern for the waterbody. No discharge will be allowed to cause or contribute to further degradation of the waterbody.

   iii. When applying numeric standards included in R.61-68 for human health, aquatic life, and organoleptic protection, if a waterbody has been affected by a parameter of concern causing it to be on the impaired waters list in accordance with Section 303(d) of the CWA, then the Department will not allow a permitted net increase of loading for the parameter

of concern unless the concentration of the parameter of concern will not cause a violation of water quality standard(s). This no net increase will be achieved by reallocation of existing total load(s) or by meeting applicable water quality standard(s) at the end-of-pipe. Until such time as a TMDL is developed for the parameter of concern, no discharge will be allowed to cause or contribute to further degradation of the waterbody.

3. Any allowed permit would proceed through the permitting process and allow for public participation. DHEC fulfills its remaining requirements of public participation by notifying individuals who have expressed concern about the proposed conditions of the specific permit. A Public Notice containing a statement that the proposed NPDES permit will address antidegradation concerns is issued and comments are requested from the public on the matter. Further, DHEC complies with requirements in its permitting regulations that require public notices of permitting actions and uses many methods for addressing the posting of notices such as displaying the notice in prominent locations.

4. Once the Tier 1 antidegradation review is completed by the Department, documentation of its final decision will be included in the rationale for the permit. The Bureau of Water will maintain a database that will include the Department's evaluation and final decision of all permits that have been reviewed under these conditions.

As described, the regulations for 208 Plan modifications, antidegradation analysis, NPDES permitting, and DHEC construction permitting provide many opportunities for public input during the entire permitting process.

The 208 Plan amendment process will be the same regardless of whether the discharge location is on Big Cedar Creek or the Broad River. However, negotiations with the other dischargers for loading in the river may affect which discharge is more favorable from their perspective than the other. Public participation may also affect the decision of various CMCOG members as well.

3.0 Service Area and Customer Base

3.1 Management Agency vs Service Provider Status

As described in 2.4.2 above, all incorporated municipalities, counties, and special purpose districts in South Carolina are legally capable of performing the duties of a designated management agency. The designated management agency (DMA) has an important duty because the DMA for an area controls the location and sizing of wastewater treatment plants and their accompanying collection lines.

The DMA for an area can contract or designate a provider for wastewater service in a portion of their DMA area, however, the DMA still controls the area being served by the wastewater service provider. The designated management area is distinguished from a sewer service area where a service provider actually supplies wastewater collection and/or treatment services but has no authority. The DMA also provides its own decisions concerning the need to expand, consolidate, and otherwise direct its own wastewater program within its area to the COG in the 208-planning process. This includes the need for phasing of wastewater projects and the ability to finance wastewater facilities.

According to DHEC's 208 Plan for non-designated areas of SC, only designated management agencies are eligible for loans from the SRF program for construction or repair of wastewater systems. This appears to be derived from requirements contained in the CWA. Section 208(d) of the CWA states that:

> "After a waste treatment management agency having the authority required by subsection (c) has been designated under such subsection for an area and a plan for such area has been approved under subsection (b) of this section, the Administrator shall not make any grant for construction of a publicly owned treatment works under section 201(g)(1) within such area except to such designated agency and for works in conformity with such plan."

The State Revolving Fund (SRF) loan program is a federally capitalized loan program by the EPA through a grant to each state. In South Carolina the SRF loan program is jointly administered by DHEC and the SC Rural Infrastructure Authority (RIA). The SRF provides low interest rate loans for wastewater utilities under the Clean Water SRF program. These loans are available for the construction or repair of wastewater systems to municipalities, counties, and special purpose districts.

Provided that these provisions apply to Fairfield Joint Water and Sewer System, without designated management agency authority over the area of Fairfield County that they intend to serve, they would be ineligible for SRF low interest loans.

The current designated management agency map for Fairfield County is shown in Table 3-1 - Existing 208 Management Areas. Since FJWSS has not been designated as a management agency in Fairfield County, if they wish to make an application for DMA status, it will require a modification of the 208 Maps for them

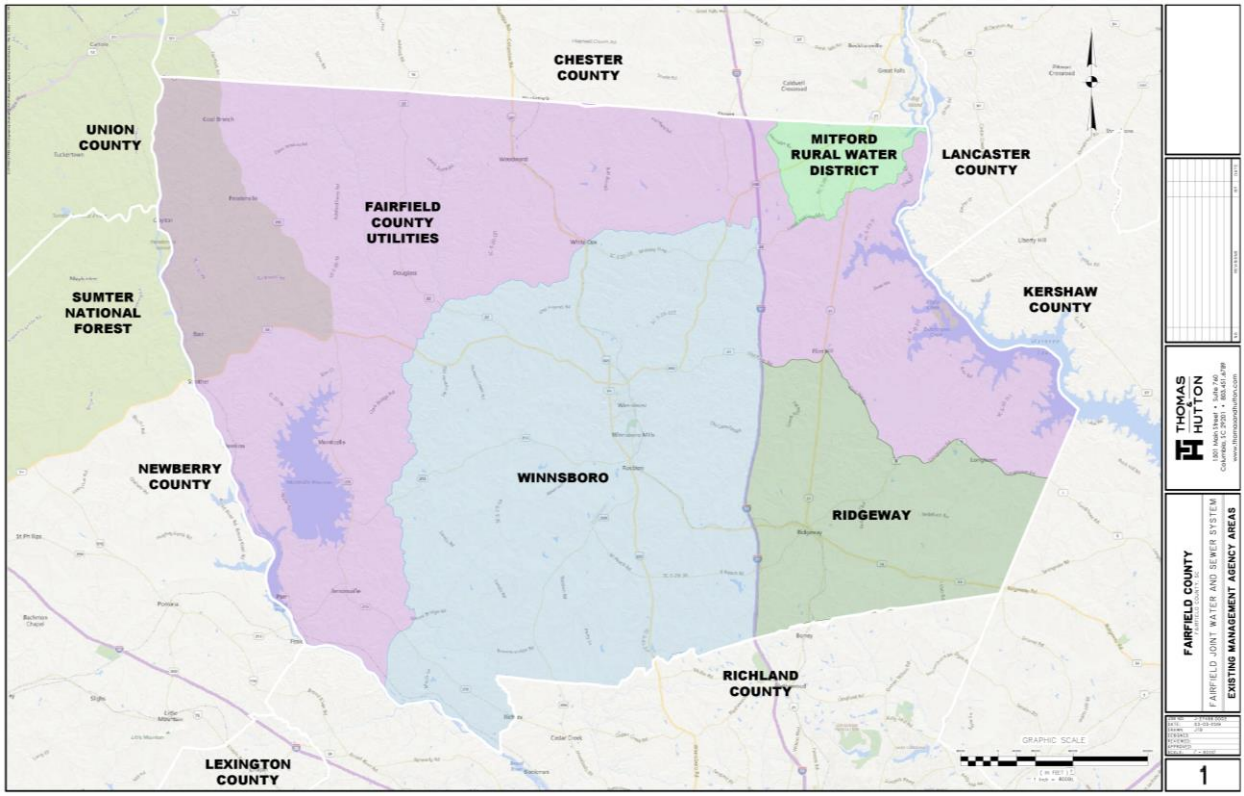


Table 3-1 - Existing 208 Management Areas

to become a DMA for a portion of Fairfield County. The CMCOG 208-plan requires that new management agency applicants must be eligible and meet the criteria given in 2.4.2 above, obtain approval of a 208-plan amendment, and receive a favorable recommendation from the Governor. In addition, management agencies may be de-designated if they no longer satisfy the requirements or if they request de-designation.

Since the area proposed to be served by FJWSS are within portions of the Winnsboro and Ridgeway designated areas, these two municipalities would need to relinquish a portion of their area to FJWSS if FJWSS is to be designated as a management agency within these areas. When a DMA desires to provide wastewater service within another management agency's jurisdiction it is beneficial that all of the affected entities agree to the modified boundary. Modifications can be made much easier when all affected parties are in agreement and sufficient documentation of the agreement can be provided.

Both of the considered alternatives at Big Cedar Creek and the Broad River will require 208 amendments in order to make FJWSS a Designated Management Agency.

3.2 Wholesale vs Retail Customer Base

A requirement in structuring rates is that the total revenue generated must cover the cost of providing sewer service to customers. Another key component in structuring rates is to ensure that the cost of providing service to the various customer classes is equitable. An important part of establishing sewer rates is to identify the cost of service by customer class. The method used is generally recognized by courts of law as an acceptable means of setting rates and it helps in creating a rate structure that is

defensible and in accordance with the Water Environment Federation Manual of Practice 27. The cost-of-service process includes the following steps:

1. Allocation of all expenses and assets that should be accounted for in the sewer rate
2. Identification of the revenue requirements by functional categories using general expenses
3. Allocation of the functional costs to appropriate cost components
4. Development of units of service by customer class for each cost component
5. Development of unit costs of service by dividing the total costs for each cost component by the respective total system units of service
6. Distribution of costs to customer classes based on the unit costs of service and class's units of service for each cost component

Each of the sewer operational functions can be further allocated to the specific service requirements that are imposed by customers. The sewer facilities must support not only the total volume of sewer discharged by customers, but also consider how the flow is discharged, the strength or pollutant load of the sewerage in several different categories, and customer services required which all have an impact on the treatment costs. In allocating the annual costs of service to cost components, a functional cost allocation methodology is generally used for a sewer system.

In this method, expense categories allocate costs across the primary cost components for wastewater operation and maintenance as well as sewer assets. For sewer, the following components are widely used – volume, capacity, wastewater strength, and customer costs. The Volume category is for items whose cost is dependent exclusively on the volume of wastewater treated. Items in that category would be items such as disinfection costs at the wastewater treatment plant where the amount of chlorine used or effluent pumping costs are purely dependent on the flow actually received. The Capacity category is for items whose costs are dependent on the peak capacity of the wastewater system. Items in that category may include items such as a pumping station that is designed based on the peak flow and not an average flow or an equalization basin that is needed to accommodate peaks. The wastewater strength component includes a breakdown of Total Suspended Solids (TSS), Biochemical Oxygen Demand (BOD), and Ammonia (NH3). The strength components affect the cost of operating the biological portion of the treatment plant. Items in that category include aeration basins, sludge digestors, and sludge dewatering and disposal. The higher the strength of the wastewater, the more electricity, chemicals, and landfill costs for a given volume. The customer costs component includes meters and services, and billing and collection.

The rate making process is identical whether or not the customers are "retail" or "wholesale". The main difference whether or not the customer is retail or wholesale is on the end user of the system and who determines the final rate for service. If a customer is a wholesale user, then that implies that the customer is buying sewer treatment from FJWSS and reselling the treatment in that customer's service area. The end user will be a retail customer to the wholesale user and will pay rates to the wholesaler that have been determined by the wholesaler based on how the wholesaler decides to allocate their costs to their customer base. A retail customer is the end user of the service and pays rates directly to FJWSS that have been determined by FJWSS. Regardless of the customer type, FJWSS must set their rates to recover all of its costs of service.

The purpose for the formation of the FJWSS was to provide wastewater service that will support growth in Fairfield County. That mission requires that the end user rates for providing the wastewater service are sufficient to cover all costs, support expansion of the wastewater system to serve growth, and be competitive with other utilities in the state that are competing for the same industrial base as Fairfield County. For the retail customer base, FJWSS would have the responsibility of determining the end user's rates. For all wholesale customers, FJWSS would still be responsible for setting rates for the wholesale customer but would otherwise relinquish the rate setting responsibilities to the wholesaler to determine the end user's rate. To be able to control the wastewater rates charged, it would be best if FJWSS had a retail customer base in their service area. FJWSS could also establish bulk rates for high volume customers as well.

One goal of the members of FJWSS is to provide wastewater service at rates that are as low as possible, based upon the cost to provide service and maintain adequate reserves and depreciation. To achieve this goal, and for FJWSS customers to benefit from the Dominion settlement funds paying for much of its initial capital costs, retail and wholesale rates should be set strictly on the basis of these costs. FJWSS should set forth policies and procedures that keep all generated funds in the system for growth of the system or for keeping rates and capacity fees down. They should also set forth operating procedures to keep all costs and expenses directly attributable to the cost of service. Everything should be verifiable and audited regularly.

3.3 Acceptance of Winnsboro and Ridgeway as Wholesale Customers

The ability to accept Winnsboro and Ridgeway should they choose to become wholesale customers to the FJWSS will depend on the available capacity and need for discharge into the new wastewater treatment plant. In the case of Ridgeway, since their existing facility is less than 120,000 gallons per day, FJWSS would be in a position to accept all of Ridgeway's wastewater initially with a 2 MGD wastewater treatment plant and still retain sufficient capacity in the new wastewater plant for the anticipated industrial growth. However, Winnsboro's system is much larger and FJWSS would not be in a position to accept all of Winnsboro's wastewater initially and still have sufficient treatment capacity to offer new industrial development. It is estimated that the existing industrial parks and the future Megasite will need at least 2 MGD of capacity in the new wastewater treatment plant meaning that the expansion of the wastewater treatment facility from its initial capacity of 2 MGD to 4 MGD or more would be necessary to be able to accept all of Winnsboro's flow in the future.

The choice of discharge location does not directly affect the ability of FJWSS to accept Winnsboro and Ridgeway as wholesale customers, provided that there is no issue with further expanding the discharge. Based on previous resistance to a potential discharge into the Big Cedar Creek, there may be even more resistance to expanding the discharge from 2MGD to 4 MGD than there may be with a discharge at the Broad River.

4.0 Wastewater Description and Characteristics

4.1 Description

Wastewater is a combination of liquid or water-carried wastes removed from residences, institutions, commercial, and industrial establishments. There are many terms used for the individual constituents of

concern in wastewater. Engineers often use the terms contaminants, impurities, and pollutants interchangeably to describe the constituents of concern. Characteristics refer to a group of constituents and may be physical, chemical, or biological in nature. The residuals produced by wastewater treatment are primarily organic solid products that are generally referred to interchangeably as sludge, solids, or biosolids.

4.2 Wastewater Flow and Sources

The components that make up wastewater flow from most systems are domestic, industrial, and inflow/infiltration. The domestic component is the wastewater that is discharged from residences, commercial, institutional, and similar types of facilities. This component is primarily from human related activities such as human waste, washing clothes, cooking, cleaning, and other such activities. Industrial wastewater predominately contains waste from industrial processing and manufacturing. Inflow/infiltration (I/I) describes water that is entering the wastewater collection system either directly or indirectly. Infiltration enters through either leaking pipe joints, cracks, and breaks in the system. Inflow is generated from roof vents, basement drains, or manhole covers.

The amount of flow from various sources is constantly changing from one minute to another. When describing the permitted flow of a facility, it is generally given that it describes the average daily flow (ADF) of the system. At any given time, the flow in the system will be higher or lower than the average meaning that there are peaks in the flow that must be addressed. Therefore, it is important to understand the timing of receiving wastewater in addition to the amount of wastewater received. An industry that needs 100,000 gallons per day but is discharging that amount during the normal workday would be discharging at a 300,000 gallon per day rate. In general, for the design of wastewater systems, DHEC requires that systems be designed to handle flows that are 2.5 times the average daily flow for the system during the peak month of the year. The difference in average and peak design conditions is the cause for confusion among many non-engineers, especially when being asked about the “capacity” of a pump station or a sewer line.

These peaks in the flow rate must be considered for all of the wastewater infrastructure, but these peaks require that the plant at the Big Cedar Creek discharge location will include a 2 MGD equalization tank to hold the raw sewerage so that it can store the peak flow and then treat it when the flow drops below the average. This contrasts with the Broad River discharge option that is able to handle peaks of 2.5 times the average flow and still meet treatment limits due to its flow-through characteristics. This is discussed in greater detail in Section 6.0 - Wastewater Treatment Process Options.

4.3 Characteristics of Wastewater

The physical, chemical, and biological constituents of wastewater also vary throughout the day. Typical wastewater constituents are found in Table 4-1 - Typical Wastewater Characteristics. There are many constituents that must be considered in the design of wastewater facilities, but the ones that are most discussed are BOD, TSS, Ammonia, UOD, and Phosphorus. Perhaps the least understood of these is BOD, which is biochemical oxygen demand. Wastewater contains a variety of organic matter, most notably proteins, carbohydrates, fats, oils, and grease. The most widely used way to measure the strength of the organic matter has been to use the 5-day BOD test (BOD_5) which measures the amount of dissolved oxygen that is used by microorganisms to oxidize the matter over a 5-day period. As in the name, it takes

5 days to run this test, so it is difficult to use the results for process control as the results are for wastewater that was sampled 5 days ago, not what is being experienced at the moment.

TSS stands for total suspended solids and can be a mix of both suspended organic matter and non-organic particles suspended in the wastewater. Urea, the major constituent of urine, is also an organic compound

TYPICAL WASTEWATER INFLUENT FLOW CHARACTERISTICS				
Contaminant	Units	Low Strength	Medium Strength	High Strength
Solids, total (TS)	mg/L	390	720	1220
Dissolved, total (TDS)	mg/L	270	500	860
Fixed	mg/L	160	300	520
Volatile	mg/L	110	200	340
Suspended solids, total (TSS)	mg/L	120	210	400
Fixed	mg/L	25	50	85
Volatile	mg/L	95	160	315
Settleable solids	mg/L	5	10	20
Biochemical oxygen demand – BOD5	mg/L	110	190	350
Total organic carbon (TOC)	mg/L	80	140	260
Chemical oxygen demand (COD)	mg/L	250	430	800
Nitrogen (total as N)	mg/L	20	40	70
Organic	mg/L	8	15	25
Free ammonia	mg/L	12	25	45
Nitrites	mg/L	0	0	0
Nitrates	mg/L	0	0	0
Phosphorus (total as P)	mg/L	4	7	12
Organic	mg/L	1	2	4
Inorganic	mg/L	3	5	10
Chlorides	mg/L	30	50	90
Sulfate	mg/L	20	30	50
Oil and grease	mg/L	50	90	100
Volatile organic compounds (VOCs)	mg/L	<100	100-400	>400
Total coliform	No./100 mL	10^6-10^8	10^7-10^9	10^7-10^10
Fecal coliform	No./100 mL	10^3-10^5	10^4-10^6	10^5-10^8
Cryptosporidum oocysts	No./100 mL	10^-1-10^0	10^-1-10^1	10^-1-10^2
Giardia lamblia cysts	No./100 mL	10^-1-10^1	10^-1-=10^2	10^-1-10^3

Source: Metcalf & Eddy. Wastewater Engineering Treatment and Reuse." 4th ed. Boston: McGraw Hill, 2003

Table 4-1 - Typical Wastewater Characteristics

in the wastewater that will break down from enzymes inside the sewer pipes into ammonia. The ammonia also exerts an oxygen demand that is part of the results of the BOD_5 test. The complete oxidation of ammonia requires about 4.53 pounds of oxygen per pound of ammonia. UOD is the ultimate oxygen

demand and is the measure of the ultimate oxygen demand created by both the BOD and Ammonia. For a plant with a high industrial flow component, the UOD may actually govern the discharge limits, requiring that the BOD and Ammonia combined must be less than the levels specified individually for those components. These measures of oxygen determine how much of the pollutant must be removed to meet the criteria set forth in the NPDES permit. These parameters drive the design of the treatment plant. The more BOD and Ammonia that is in the influent and the lower the allowed BOD, Ammonia, and UOD that is allowed in the effluent dictate that the plant must remove a larger amount of the pollutants. The lower effluent limits of the Big Cedar Creek discharge location will dictate that a higher removal rate of the pollutants is required to meet the discharge limits. As the plant is expanded from 2 MGD to 4 MGD at Big Cedar Creek, the level of treatment at that location must also increase to meet the discharge limits which become more and more strict as the flow increases. In effect, the total pollutant load remains constant even though the flow in the plant has doubled thus requiring a higher level of treatment. As noted previously, the UOD at Big Cedar Creek is less than 25% of the UOD allowed on the Broad River. As the plant is expanded at the Broad River, the concentration-based limits stay the same, meaning that the total pollutant load will double when the plant flow is doubled from 2 MGD to 4 MGD. Thus, for the plant on the Big Cedar Creek, the design will have to anticipate the plant being able to meet the discharge limit requirements for 4 MGD even though it may only be 2 MGD initially. Otherwise, the upgrade from 2 MGD to 4 MGD will be more expensive due to retrofits that may be necessary to improve the treatment levels.

4.4 Impact of Discharge on Receiving Waters – Waste Load Allocation

A Total Maximum Daily Load (TMDL) is the calculated maximum allowable pollutant loading to a waterbody at which water quality standards are maintained. A TMDL is made up of two main components, a load allocation and a wasteload allocation (WLA). A load allocation is the portion of the receiving water's loading capacity attributed to existing or future nonpoint sources or to natural background sources. The WLA is the portion of a receiving water's loading capacity allocated to an existing or future point source. A TMDL is a means for recommending controls needed to meet water quality standards in a particular water or watershed. Historically, the typical TMDL has been developed as a wasteload allocation, considering a particular waterbody segment, for a particular point source, to support setting effluent limitations. In order to address the combined cumulative impacts of all sources, broad watershed based TMDLs have been developed.

The TMDL process is linked to all other State water quality activities. Water quality impairments are identified through monitoring and assessment. Watershed-based investigations result in source identification and TMDL development. TMDLs form links between water quality standards and point and nonpoint source controls. Where TMDLs are established, they constitute the basis for NPDES permits and for strategies to reduce nonpoint source pollution. For the Midlands area, the Central Midlands Council of Governments has the responsibility of making recommendations for the allocation of the TMDL into the rivers for the dischargers into the system.

In the WLAs for both Big Cedar Creek and the Broad River it should be noted that DHEC has indicated that the loading contained in the WLA will require relinquishment from other dischargers for Fairfield to be able to have those limits. The parameters of most concern in this regard are phosphorus and UOD. This is a consequence of the CMCOG having a policy of distributing all available pollutant loads to the existing dischargers in the waterbody. The CMCOG is responsible for working with all of the dischargers to develop a workable solution, but it will require negotiation by FJWSS, nonetheless.

It should be noted that the WLAs contain several notations that are of paramount importance regarding obtaining an NPDES permit. The Cedar Creek WLA has a CTC of 100%. This means that toxicity testing will be based on using 100% of the treatment plant effluent and not diluted with water from the stream.

While they do note that the CTC may change depending upon the outcome of a mixing zone study, since Cedar Creek has a 7Q10 flow (the lowest seven-day average flow that occurs once every 10 years) of 0.02 CFS or about 12,900 gallons per day, it is doubtful that any dilution of effluent with creek water will be allowed for toxicity testing. With the baseline flow in Cedar Creek so low, the flow in the creek will virtually be 100% wastewater treatment plant effluent. Having no dilution for toxicity testing makes the likelihood of failing toxicity tests much greater, especially for a treatment facility that has a large percentage of industrial waste that may contain metals and volatile organics.

The Broad River WLA discharge does not contain a CTC % limit for toxicity testing. The toxicity requirement will be determined once a mixing zone study for the discharge has been completed. The mixing zone study establishes how much a treatment plant's effluent may be diluted with river water to perform the toxicity testing. This dilution greatly improves the ability of a plant to have a higher toxicity level in the discharge but not violate the toxicity in the river in a way that would be detrimental to aquatic species. Since the Broad River has a 7Q10 flow of about 724.6 CFS, or a flow of 468 million gallons per day, mixing zone dilution should be of great benefit. The FJWSS discharge will represent only a fraction over 1% of the minimum Broad River flow even when expanded to 6 MGD. The higher dilution factor at the Broad River discharge will have a positive impact on the ability of the treatment facility to serve industrial dischargers without violations and potentially reduce the pretreatment requirements for some industries.

In addition to the organic constituents, there are also metallic constituents in the wastewater. All living organisms require varying amounts of metallic elements such as iron, chromium, copper, zinc, and cobalt for proper growth. However, the same metals can be toxic when present in elevated concentrations. As an example, the limit for copper in drinking water is 1.3 mg/l. However, if drinking water with that amount of copper in it were discharged at either of these two locations, the water would be toxic. Metals can be found in residential and commercial discharges, but heavy metals such as cadmium, chromium, lead, and mercury are often found in industrial discharges. For plants that receive industrial waste, it is common for the discharge to have metals limits in addition to toxicity.

The Cedar Creek WLA shows that testing data must be submitted as a part of the NPDES permit application. Part D of Form 2A requests expanded effluent testing data for metals, volatile organic compounds, acid- extractable compounds, and base-neutral compounds. This provision is not stipulated in the discharge to the Broad River, presumably because the reasonable potentials for the Broad River are established and additional parameters are contained in the WLS.

Since wastewater testing information for a new NPDES permit will be limited at the time of NPDES permit application, the reasonable potential analysis for Cedar Creek of the priority pollutants that may ultimately be in the wastewater cannot be completed. After the final permit is issued, the permit may still need to be modified or revoked prior to the expiration date as a result of a new industry proposing to connect to the POTW. Modifications differ from revocations and reissuance. In a permit modification, only the conditions subject to change are reconsidered while all other permit conditions remain in effect. Conversely, the entire permit may be reconsidered when it is revoked and reissued. A permit modification may be triggered in several ways. For example, a representative of DHEC may conduct an inspection of

the facility that indicated a need for the modification (i.e., the improper classification of an industry), or information submitted by the permittee may suggest the need for a change, such as a new industry proposing to connect to the WWTP. This is considered a major modification of the NDPES permit and will necessitate going back through the NPDES permitting process.

The limits on the Broad River are known, have been well vetted, and have a low likelihood of changing from those given in the WLA and is capable of expanding the plant well beyond the current 4 MGD WLA. Conversely, given the conditions of the WLA on the Big Cedar Creek, reasonable potential has not been evaluated and there is a high probability that additional parameters will be added to the NPDES permit concerning metals or other priority pollutants for industrial users. Furthermore, future growth of the facility beyond 4 MGD will be difficult since the limits will get more and more strict as the flow increases.

5.0 Logistics and Transport of Wastewater

5.1 Introduction

Wastewater needs to be collected throughout a sewer system and delivered to a wastewater treatment facility for processing of the wastewater into clean water that is safe for discharge to a water body. The wastewater collection is achieved through a combination of gravity sewers, pump stations, and forcemains. DHEC regulates the design and construction of all wastewater infrastructure and has specific regulations regarding the design parameters for gravity sewer lines, pumping stations, and forcemains.

5.2 Septicity of Sewer

In wastewater, without oxygen, anaerobic conditions develop, and bacteria reduce the organic compounds to sulfur and sulfide. Then sulfate-reducing bacteria utilize sulfates to form sulfides. This condition is referred to as "septicity." It results in foul odors and corrosion of the sewer pipes due to hydrogen sulfide. The amount of hydrogen sulfide (H_2S) which will escape to the sewage atmosphere and cause corrosion depends on the sewage pH. H_2S is a toxic gas, heavier than air with a characteristic smell of rotten eggs. Levels of hydrogen sulfide in wastewater have increased over the years. Sulfides have risen steadily from the 1980's to today due to longer retention times caused by urban sprawl with centralized treatment and change in wastewater biochemistry due to pretreatment legislation. To protect public health, the Environmental Protection Agency's (EPA) 1983 Categorical Pretreatment Act severely reduced metals limits for industrial dischargers. Heavy metals react with dissolved sulfide in wastewater and render it insoluble. However, in the absence of metals, the dissolved sulfide concentration has increased over the last 40 years. With longer retention times through the sanitary sewer system, the wastewater becomes anaerobic which favors sulfate reducing bacteria (SRB).

H_2S corrodes copper and copper-based alloys, silver, and even cast-iron and stainless steel. It affects electrical equipment as well. If H_2S is dissolved and oxidized the products are harmless. Sulphur is produced if the oxidation happens at pH 6-7 and at higher values 7-9 H2S is oxidized to sulfurous compounds and then to sulfate. However, since the sewer is damp and warm, it is full of autotrophic thiobacilli which will oxidize H_2S to sulfuric acid. The sulfuric acid formed in the pipe depresses the pH which shifts the wastewater equilibrium to accelerate gas-phase corrosion. The amount of sulfide formed in a sewer line will be directly proportional to the retention time of the sewage in the main. Septicity occurs in wastewater regardless of whether the transport pipeline is a gravity sewer or a forcemain. The

longer the time, the greater the amount formed. Therefore, the longer the sewer line, the higher the potential for hydrogen sulfide gas formation.

The forcemain to the Broad River will have a high potential for hydrogen sulfide gas formation because of its length until the volume of flow increases. Conversely, wastewater transmitted from Lake Monticello or Jenkinsville to Big Cedar Creek would also be subject to a high potential for hydrogen sulfide gas formation because of the long length of line and initial low flow conditions. Hydrogen sulfide gas formation is an issue to be addressed in all large wastewater systems. The fact that the wastewater will be anerobic upon arrival at the treatment facility does not create an issue with the biological treatment of the wastewater but rather is a benefit. The only concern for the septicity is the corrosion and odor created by the sulfates.

In order to reduce H_2S, the pH of the wastewater can be increased by the addition of an alkaline material that will raise the pH. Successful inhibition in the release of H2S has been achieved by the addition of sodium hydroxide (caustic), calcium hydroxide (lime), or magnesium hydroxide (milk of magnesia) to the wastewater subject to H_2S formation. When the pH of wastewater stays above 8.0, the hydrogen sulfide shifts to a soluble form and reduces the H2S gas production and its corrosion rate by about 90%. Raising the pH in the wastewater has the secondary benefits of increasing the alkalinity in the wastewater and reducing fats, oils, and grease (FOG). Sufficient alkalinity in the wastewater is required to nitrify the ammonia in the wastewater as that process consumes alkalinity. This method of H_2S control is symbiotic with biological nutrient removal at the treatment plant.

Other means of controlling hydrogen sulfide involve oxygenation of the wastewater, to keep it aerobic and not allow it to be anerobic. However, since the nutrient removal aspect of the treatment plant requires anerobic conversion of volatile fatty acids (VFA) in the wastewater, oxygenation negates the VFA formation. Also, there are H_2S control products that use nitrates to inhibit the formation of the H_2S. However, adding nitrate to the wastewater adds to the amount of nitrogen that must be removed at the wastewater treatment plant. This would be especially critical if Total Nitrogen limits were imposed on the discharge instead of the Monitor & Report conditions contained in the WLA.

The amount of hydroxide chemical needed depends only on the pH of the wastewater and its alkalinity and is independent of the volume of sulfides in the wastewater. The higher the pH of the wastewater and the higher the alkalinity, the less hydroxide would need to be added. For a wastewater having a pH of about 6.5 the addition of about 100 to 200 gallons of calcium hydroxide per million gallons of wastewater would be typically sufficient to raise the pH of the wastewater and hold it above 8.0. At this level of chemical addition, given that the lime costs approximately $1.00 per gallon, it would cost less than $0.20 per 1000 gallons to address the septicity concerns. This cost is independent of the volume of wastewater being treated at the plant.

5.3 Gravity Sewers

Gravity sewer systems are a network of straight underground pipes that use gravity to move raw wastewater to a regional wastewater treatment plant. The underground pipes slope downward and away from the source. A constant downhill gradient is required to maintain a velocity in the pipe of 2 feet per second, minimum. The downward slope causes the wastewater to flow freely down the pipes due to gravity. Sewer access manholes are located at every change in direction of the sewer line and no more than 400 feet apart. Manholes extend from the sewer line up to the ground surface. They are used for

routine inspection and cleaning of the sewers and require periodic maintenance. As the length of the gravity sewer gets longer, the elevation continues to get deeper and deeper. Once the required excavation depth is not practical, then a pump station and forcemain is constructed to pump the sewer up and over a hill.

If the terrain is sloping downhill, then potentially the gravity sewer line could go on as long as the terrain is still sloping down greater than the minimum slope of the pipe. While gravity sewers do not require mechanical devices and the wastewater flow is by gravity due to the downward sloped pipes, their construction could be costly due to the need for deep excavation, installation of many manhole structures, and also the need to maintain manholes. Maintenance and repair of gravity sewer lines can be challenging because of the deep excavation required. Wastewater in gravity sewer lines can have low oxygen concentration. Due to sulfides in the wastewater, sulfurous gases will be released to the top of the sewer pipes and that can cause corrosion unless the proper materials of construction are employed or additives are used, as discussed above.

Advantages: High flow capacity, No pumping required, forcemain or gravity connections may be made at any point along the line

Disadvantages: Very High Capital Cost, risks of infiltration and inflow during heavy rain events, high risk of clogging and tree root intrusion, many manholes to maintain and more potential points of odors exiting to the atmosphere and rainwater entering this system, especially in turbulent conditions off-gassing of hydrogen sulfide will cause excessive corrosion of manholes and odors.

5.4 Pumping Stations

A pump station or lift station is a structure that has two main parts. The first is a holding chamber or tank for wastewater to enter. This chamber is typically referred to as a “wetwell”. The second part of the pump station is the transfer pumps. Pump stations are used when liquid is unable to flow under the force of gravity between two points. The pumps are designed to “lift” the wastewater over a hill so that it can get to the next section of gravity line. Pump stations can range in size from small single home models to stations that are capable of pumping hundreds of millions of gallons per day. Pump stations are an ideal solution for transferring wastewater cost effectively when gravity sewer is not a feasible option or is not possible to be used at all. All municipal wastewater systems contain pump stations and most have complex systems of pump stations. In a pump station system, generally there are several pump stations that are designed to handle wastewater from specific parts of the system. These pump stations are often referred to as regional pump stations. Typically, subdivision or industrial developers will construct a series of gravity sewer lines within their development and construct a single pump station and forcemain to connect to the utility system. Depending on the terrain and its proximity, it may be possible for one subdivision to connect to another subdivision’s gravity sewer system.

Having a system of regional pump stations and forcemains that transfer wastewater to the treatment facility has been employed successfully for years. In fact, Lexington County has consolidated wastewater treatment around one WWTP at the City of Cayce. This facility treats all of the wastewater in Lexington County and some from Calhoun County as well. The system is comprised of a large system of pump stations and forcemains throughout Lexington County that is capable of transferring up to about 25 MGD of wastewater on an average daily flow basis. The system is currently handling about 12 MGD of flow on average, but it did not start with that much flow. The Town of Lexington currently operates a 24”

forcemain that transfers its wastewater from a location on 12/14 Mile creek near Corley Mill Road and Hwy 6 to the treatment plant on Old State Road near the Cayce Boat Landing on the Congaree River, traversing over 19 miles through forcemain piping. This line was constructed in 1997 with an average daily flow of less than .5 MGD but with the plan of eventually serving 5.0 MGD in the future. Several years ago, a second pump station was constructed along the 24" line to increase the line's capacity from 5 MGD to about 8 MGD. Today, the 24" line is flowing at about 6.0 MGD and another 30" line, parallel to the 24" line has been designed and portions are already under construction. The addition of the 30" line will allow the Town of Lexington to pump over 12.5 MGD of wastewater to the treatment plant at Cayce.

5.5 Forcemains

Force main sewers are used in areas where gravity sewers are not possible or practical and/or it is necessary for the wastewater flow to overcome gravity. A force main sewer is a closed pipe system that moves wastewater via a pump that carries the wastewater over the topographic height or propels it to where it can continuously flow under the effects of gravity through the sewer system to the wastewater treatment plant.

Force mains can have pressure surges and corrosion caused by the gases in the wastewater if not properly accounted for in the design. Wastewater in force main systems has a low oxygen concentration or lacks it entirely. The sulfurous gases can cause corrosion unless the proper materials of construction are employed or additives are used, as discussed above. Fortunately, the corrosion of the gases in a forcemain is limited to areas in the pipeline where the pipe is not full of wastewater. In a forcemain, the areas that are not full of wastewater are generally found only at the high points in a pipeline or in a long downhill section of the pipe where the forcemain is effectively a gravity sewer line with no manholes.

The diameter and the wall thickness of the pipes in the force main system are determined by the minimum flow rate of the wastewater, the operating pressure, and also by the trench conditions. Force main pipes are commonly made from ductile iron, PVC, and polyethylene. Ductile iron has a high strength and can handle high flow capacity but is highly corrosive. While PVC and polyethylene are not corrosive but have thicker pipe walls to achieve the strength required. PVC is more rigid and stiffer than high-density polyethylene (HDPE). As a result, HDPE pipe walls are much thicker than PVC pipe walls which makes it more expensive. When ductile-iron piping is used in wastewater applications, it is necessary to consider corrosion protection of the interior of the pipe. In most circumstances, the ductile-iron pipe manufacturers recommend coating the inside of the piping with a "Protecto 401" coating which is a very expensive ceramic epoxy coating that helps to prevent corrosion of iron in wastewater. As a result, PVC is used quite often because it is generally less expensive than ductile iron and performs without fear of corrosion of the pipe.

Advantages: Lower Capital Costs, moves wastewater up a slope, repairs are much easier with minimal excavation, limits inflow and infiltration into the wastewater system to points upstream from the pumping stations, forcemain connections can be made at any point along the line

Disadvantages: Requires construction of a pumping station, odors and corrosion must be addressed, gravity sewer may only be connected to forcemains by installing a pump station.

The use of pump stations and forcemains to connect to either Big Cedar Creek or the Broad River is dictated by the tremendous cost of the installation of gravity sewer lines to serve either location.

Regardless of the discharge location, in order to provide wastewater treatment for the County, the use of gravity sewer, pump stations, and force mains will be required, and septicity may occur. The difference between the Big Cedar Creek location and the Broad River discharge initially is the construction of about 14 miles of PVC forcemain to reach the Broad River compared to about 1 mile of PVC forcemain construction to connect to Big Cedar Creek. If the plant is located at Big Cedar Creek, the wastewater system will still be comprised of pump stations and force mains to serve the areas. However, even if septicity is an issue, it can be addressed through the addition of calcium hydroxide to keep the pH above 8.0 regardless of whether it is a gravity sewer system, a forcemain system, or a combination of both.

6.0 Wastewater Treatment Process Options

6.1 General Discussion

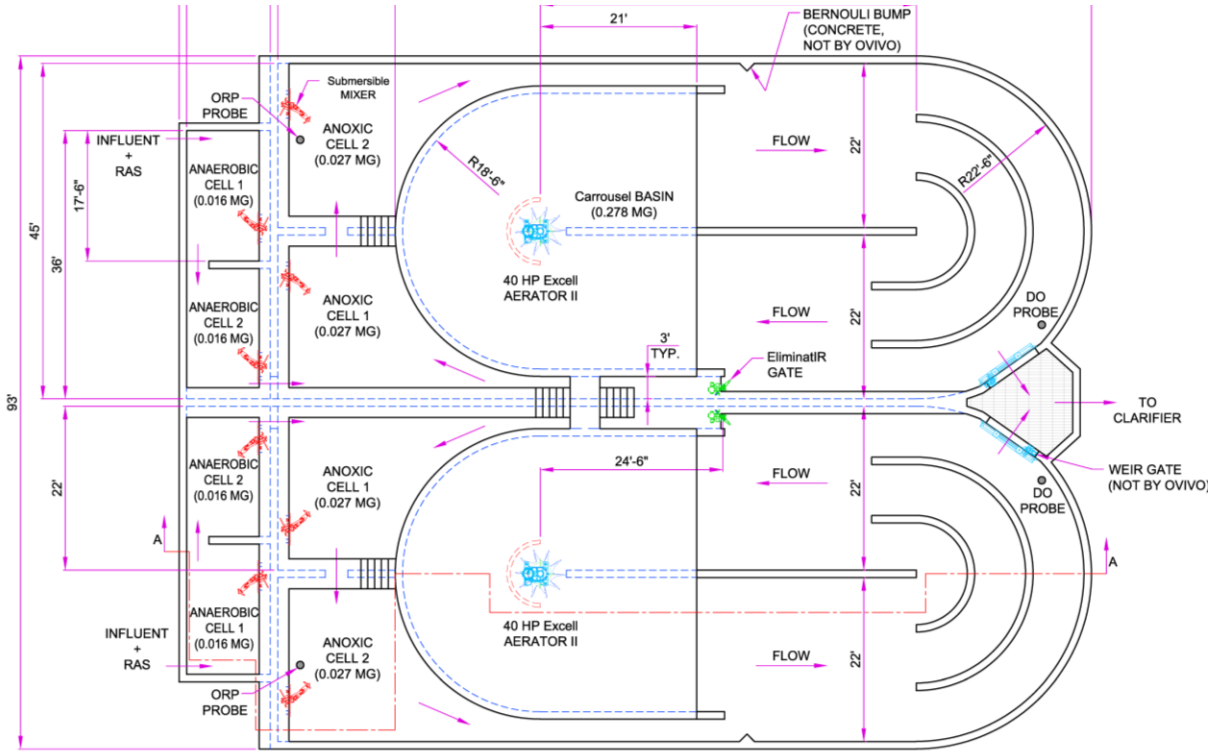
The use of biological nutrient removal is going to be the most cost-effective way to treat the waste from a municipal utility that contains between 25% and 50% industrial waste. Without biological nutrient removal, the only option would be to chemically treat the waste to remove the nutrients. Chemical augmentation for the removal of nitrates and phosphorus is an expensive endeavor. In addition to the cost of the chemicals to treat the wastewater, it would create over double the amount of waste sludge and its corresponding disposal costs than the biological alternative. To achieve biological nutrient removal (BNR) as described previously, it will require multiple reactors in the treatment plant that are anaerobic, anoxic, and aerobic. This is referred to as A^2O process. The process dictates requirements for flows into, out of, and between the various reactors. Therefore, regardless of the discharge location, the activated sludge biological process will be the same A^2O process with different design configurations.

The two design options considered for this analysis have been a Carousel or Oxidation Ditch advanced secondary treatment design and a Membrane Biological Reactor tertiary treatment design. Tertiary treatment adds filtration to the advanced secondary stage of treatment and provides a physical barrier to prevent suspended solids from passing into the effluent. Since the filters require energy to push the water through them and the filters require maintenance and replacement, tertiary treatment of wastewater costs more to construct and operate than advanced secondary treatment. Therefore, there is no reason to use tertiary treatment if advanced secondary treatment suffices. Given the discharge limits provided in the WLA for the Broad River, the BNR design is more than capable of meeting the criteria and would be the recommended solution for that discharge location. In contrast, while the BNR is capable of meeting the limits specified, the strict limits specified for the Big Cedar Creek leave no cushion for operation and suggest that an MBR should be used at that location.

6.2 A^2O -Carousel -Biological Nutrient Removal (BNR) Treatment System

The oxidation ditch or carousel configuration is a modified, extended air, activated sludge biological treatment system that uses long solids retention times to remove biodegradable organics from the wastewater including ammonia. They are often referred to as racetrack type reactors because the wastewater travels around and around the basin. Surface aerators are used on either end of the basin to circulate the mixed liquor. The aerator performs two tasks critical to activated sludge waste treatment, imparting oxygen to the wastewater and keeping the biomass suspended by mixing.

The ingenuity of this design is in the geometry of the basin and its simplicity to operate. The aerator sharply increases the dissolved oxygen (DO) in the wastewater and the mixing energy imparted by the aerator keeps the solids in suspension until it travels around the track and gets back to the aerator for another trip. To achieve the denitrification of the wastewater from the aerobic reactor, the wastewater must move to an anoxic basin. In the absence of oxygen, the biomass will consume the oxygen from the nitrates in the waste and leave the nitrogen to off-gas harmlessly into the atmosphere.

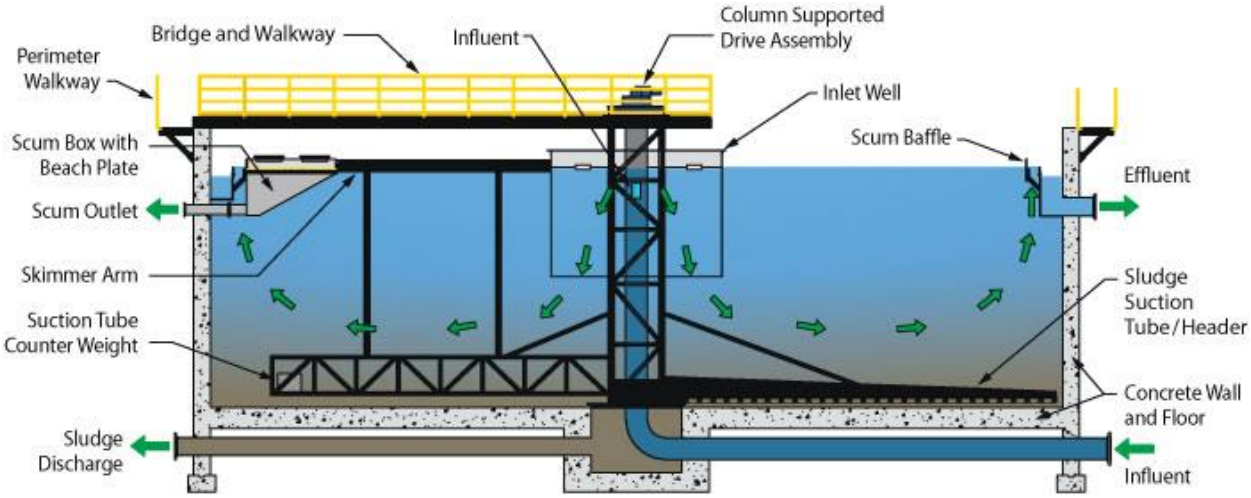


In the carousel basin, the tank is configured so that as the wastewater moves around the tank, a portion of the wastewater is allowed to enter the anoxic basin and push the wastewater in the anoxic basin out of the other side of the basin. In effect, the energy used to move the water around the ditch is used to provide the energy to move the wastewater to and from the anoxic reactor with no recycle pumping involved. The only equipment in carousel basins are the aerators and mixers which are all easily accessible from the top of the tank. This BNR system is more energy efficient than the MBR because the speed of the aerators can be adjusted to provide the correct amount of oxygen without over-oxygenating the wastewater and wasting energy without sacrificing mixing energy. This makes the BNR more energy efficient when operating in an under-loaded or lower than design capacity condition. The same is not possible in an MBR plant.

The anoxic and anaerobic basins have submersible mixers that are similar to submersible pumps. They are easily installed and removable from the top of the basin. These mixers are fundamentally a submersible motor coupled with a small impeller that will keep the basin “stirred” or mixed to keep the solid suspended since there is no aeration in these basins to achieve that task.

The system is fully automated and operated without operator attendance or any other personnel. Generally surface aerators are preferred over diffused air systems because of their operational reliability with no clogging or ragging and relatively low level of investment. Surface aerators have only a few basic parts, a motor, a gear box, and an impeller that is fabricated from miscellaneous metals. Repair of the aerator equipment is simple and can be sourced locally from a welding shop, machine shop, or motor repair shop. All maintenance is from a clean concrete deck above the tank.

As a part of the activated sludge process, once the waste has been treated, it is necessary to separate the biomass from the liquid. This function is achieved in the BNR system through the use of a settling tank also known as a clarifier or sometimes "final clarifier". The MBR replaces the clarifiers with membrane filters to separate the solids from the liquid. A clarifier is a simple structure that uses the effects of gravity to separate the biosolids from the treated wastewater liquids. When the activated sludge mixed liquor of the aeration basin is placed into a container and allowed to sit, the solids will settle to the bottoms and clear water will be at the top of the container. Similar to that container, the flow in the clarifier is very slow and it is designed to encourage the gravity settlement of the solids.



Clarifiers can be circular, or rectangular, but circular designs use less equipment, are easier to repair, and are more popular. The circular clarifier contains a surface collector arm to catch scum and other floatables and a bottom scraper arm that helps collect the sludge that has settled to the bottom of the tank. These arms are attached to a center pier structure and are propelled by a small motor with a gear box using very little energy. The mechanism moves very slowly, at speeds of less than 1 revolution per minute. All of the clarifier internal mechanisms are made of fabricated metals. Clarifier equipment is also fully automated without operator attendance. Clarifiers are very reliable, and repairs can be locally sourced from a welding shop, machine shop, or motor repair shop.

As the solids are settled to the bottom of the clarifier tank, they are recirculated back to the anaerobic basin at the influent of the biological process to continue to oxidize organic matter and reproduce using a Return Activated Sludge (RAS) pump. Waste activated sludge would be processed similarly regardless of the use of the BNR or the MBR.

Unlike the MBR filters, the Carousel BNR design does not require the wastewater to be pumped to travel through the process to the effluent. All the wastewater flow through the plant is achieved using gravity in a "flow-through" design. This means that if the wastewater comes into the plant, it will flow through

the plant treated even if there are failures in the equipment. The flow-through design allows up to 2.5 times the average daily design flow for an extended period without the use of equalization tanks or pumping equipment. For the 2 MGD plant, it will easily pass a 5 MGD influent flow without creating a potential for sanitary sewer overflows (SSOs). Clear effluent from the clarifiers moves to the disinfection facility and post aeration before discharge which is identical regardless of the biological treatment system employed.

This Carousel BNR is a state of the art, advanced secondary wastewater treatment plant that has been under development for forty years and produces effluent quality that is suitable for discharge to most streams and rivers without tertiary filters being installed. It should be noted that the Carousel BNR design does not preclude the addition of effluent membrane filters in the future in the event that reuse quality

water is desired. Supervisory Control and Data Acquisition (SCADA) systems allow operators to monitor and control any portion of the system, if desired, from a remote location. The system will alert operators when something is out of typical ranges of operation. Operators, if desired, can use a smartphone or an iPad to view the system and change operating parameters. The carousel process is easily operated, requiring minor operator attention and low maintenance costs compared to other treatment technologies. There is always a tradeoff between land use and equipment costs. The BNR process uses much less equipment and is much simpler to operate than the MBR system. The tradeoff to using less equipment is that the process takes up a little more land area and uses more concrete and steel that will

provide many more years of service as opposed to equipment that will need to be replaced much more often. The Carousel BNR system is capable of meeting effluent limits with BOD < 5 mg/L, NH3-N <0.5 mg/L, Total Phosphorus <0.3 mg/L, and Total Nitrogen <5 mg/L which is sufficient to meet the discharge limitations specified in the WLA for the Broad River easily. The lower energy costs and ease of operation coupled with the flow-through design make the BNR the obvious choice for the discharge at the Broad River.

All the other components of the proposed BNR wastewater system for screening, disinfection, and sludge handling are the same as would be included in an MBR system.

6.3 Membrane Biological Reactor MBR Treatment System

The main difference between the membrane biological reactor (MBR) and Carousel BNR plant is that the MBR is a tertiary treatment process as opposed to an advanced secondary removal process. Tertiary means that it includes filtration after the biological secondary treatment of the wastewater. The previously described Carousel BNR plant could become a tertiary treatment plant if filters were added after the basin before disinfection and discharge. The purpose for the filter is to remove more solids than settling might allow, providing a physical barrier so that solids cannot pass through to the effluent. Tertiary treatment is required if reuse quality water is desired or when the discharge limits are low. The use of membrane filtration is a very equipment intensive process and allows the construction of a wastewater plant in a smaller footprint than would otherwise be possible using the BNR design.

In an MBR process, the biological reactor (bioreactor) uses the same biology as the BNR plant in the Carousel basin, but in a different geometric configuration. In lieu of a racetrack design, the MBR uses a series of tanks for the anaerobic, anoxic, and aerobic reactors. The recycle flows required between the tanks are all achieved by pumping systems moving wastewater from one tank to another. In addition, the aeration basin uses diffused aeration. A diffused aeration system requires a system of aeration pipes to be installed at the bottom of the aeration tank with piping to a blower system. The blowers pressurize the air so that it can be pushed to the bottom of the aeration tank and released in the diffusers. There is an array of diffusers across the entire bottom of the tank to distribute the air equally. For wastewater, these diffusers typically have an elastomeric membrane over its surface to keep the solids in the tank from getting into the air piping and creating clogs.

Aeration represents one of the most energy intensive operations in municipal wastewater treatment, accounting for between 50-90% of a treatment facility's total energy costs. In a diffused aeration application, air is delivered by aeration blowers which are usually positive displacement blowers through a diffused aeration system which shears the air into relatively small bubbles. The small bubbles provide both the transfer of oxygen needed for treatment and complete mixing of the tank's contents, keeping the microorganisms or solids suspended.

The primary uses of aeration in wastewater treatment are in activated sludge bioreactors, aerobic digestors, and post-aeration tanks, where the function of the diffused aeration system is to satisfy the oxygen demand for biological treatment or raise the dissolved oxygen content before being discharged to the stream or river. In many cases in aeration bioreactors, the application is what is known as mixing limited or mixing controlled, whereby the amount of air needed is controlled by the amount needed to keep the tank mixed instead of by the amount necessary to increase the oxygen level in the wastewater. This is very true in an underloaded facility. Underloading in the sense that a 1 MGD treatment process is

only operating at 0.25 MGD or underloaded in the sense that the influent BOD is only 100 mg/L and not 300 mg/L that the design may be based on.

Utilizing diffused aeration to transfer oxygen capitalizes on the strength of the technology because this is what that technology does best. Though diffused aeration can also mix effectively, it does so at relatively high energy cost and is therefore not the best technology for mixing limited applications. When using diffused aeration in a mixing limited application generally results in the following issues:

- Excess aeration, resulting in high energy consumption.
- Diffuser fouling and plugging, resulting in high maintenance costs and downtime.
- Hair accumulation and ragging, resulting in labor costs and manpower.
- High air volume, resulting in high air handling requirements for odor control.

The MBR uses membrane filters to replace the need for a clarifier and a conventional filter if the situation is warranted. The membranes act as a solids-liquid separation device keeping the biomass with the membrane tank and allowing the liquid to pass through the membranes while keeping the solids in the membrane tank. The liquid that flows through the membrane is referred to as the permeate and the liquid containing the solids that remains is called the retentate. The retentate is recirculated back to the digester in the same way that the RAS works on a clarifier. The permeate is either used as “re-use” quality or “non-potable” water or returned to the carousel.

The membranes can be either microfiltration membranes or ultrafiltration membranes and the main difference between them is simply pore size. Microfiltration (MF) has a pore size from 0.1 µm to 10 µm and will prevent suspended solids, bacteria, and fat globules from passing through while ultrafiltration having a pore size of 0.01 µm to 0.1 µm blocks everything that the microfiltration can in addition to proteins, fats, viruses, and polysaccharides. Both of these types of membranes will allow salts, sugars, organic acids, monovalent ions, multivalent ions, and smaller peptides to pass through. Since it is intended for the plant to have a large industrial waste component, it is important to understand that even ultrafiltration will not remove dissolved metals from water. Because the pore sizes are smaller, UF requires a higher pressure than MF to force the liquid through the pores to the effluent. The use of small pore sizes in the membranes will produce a higher quality effluent that considered re-use quality that can be used for irrigation.

The rate of flow of the permeate through the membranes is called the flux. Flux is a system design parameter that has a direct correlation with membrane fouling rate. As flux is increased, so is the fouling rate. In simple terms, the higher volume of dirty water pumped through the membrane the more clogged or fouled the filter gets. Transmembrane Pressure (TMP) is the net driving pressure needed on the membrane to force the permeate through the small pores and translates to the amount of energy used to push water through the membranes. The higher the volume of water passing through the membrane, the higher the TMP and energy consumption. Also, the more fouling of the membranes, the higher the TMP and energy consumption. The flux rate in membranes is usually expressed in gallons per square foot per day and the TMP is usually expressed in pounds per square inch.

Air scour systems are located in the bottom of the membrane tanks that force air underneath the membrane cartridges. The purpose for the air is to help clean the solids clinging to the face of the membrane sheets and move them back into the retentate stream. The air scour system helps to reduce fouling of the membranes. The air necessary for mixing in the membrane tanks is controlled by the air needed to keep the tank mixed and scouring the membranes and not by the need for oxygenation of the activated sludge. This is another operational inefficiency for underloaded facilities using MBRs.

Once the membranes have been wet, they must remain in service and cannot be put back into dry storage and their life cycle begins whether they are running or not. Also, once the membranes have been wet, the air scour system must run at a minimum level to prevent fouling, even if there is no flow. Maximum efficiency of the membrane system requires that the membranes run continuously at their design flux rate. Operating at lower flow rates will reduce their efficiency because the air scour blowers will still need to operate and the life of the membranes and their corresponding replacement costs are based more on how long it has been in operation than how much flow has passed through the membranes

The flux rate may be increased for a short duration by as much as 1.5 times the average design flow, but doing so will result in more fouling of the membranes and higher TMP. Because of the high cost of these membranes and the fact that they must be kept wet at all times, it is not economically feasible to install membranes in a quantity that would be able to pass the peak flows throughout the day. Wastewater plants must be able to handle up to 2.5 times the influent flow as a daily peak.

Therefore, a properly sized equalization tank and slightly larger than required biotreatment system, particularly tanks, storage units and basins are always encouraged for dealing with peaks in flow and pollutants loads. There might be occasional spikes in pollutants primarily due to some process destabilization, unexpected leakages, start-up or shutdown of some facilities, and other transient cases in

wastewater-producing industries. Such spikes can be dampened in the equalization tank and the larger biotreatment basins. This increased size and construction of an equalization tank, mixing, and pumping system offset some of the benefits of a small footprint for the main facility.

Membranes are an operator intensive operation and as such require that operators at a MBR plant must have a Class A license. The amount of equipment and the care that must be taken to prevent fouling of the membranes are of great concern. Operators for wastewater treatment facilities are becoming more and more difficult to hire as the talent pool is diminishing. Having to find Class A operators that are proficient in using membranes may prove difficult. Especially given that there are only a couple of membrane plants in the entire state. The pool of Class B wastewater operators is much larger than the pool of Class A licensees.

Replacement of membranes may be necessary at least every 10 years, but in order to keep them operating optimally for as long as possible they will require cleaning at least 4 times per year. Even with stellar cleaning, there will be a time when the membrane filters will need to be replaced. The membrane filters are proprietary equipment, and all replacement membranes and other parts must be sourced from the original membrane manufacturer.

The high cost for membrane replacement gives rise to concerns and risks that must be considered when making the choice to employ membranes for the main treatment.

- incompatible chemicals in the wastewater may have detrimental effects on the membranes
- After initial wetting, the membranes must be kept moist at all times.
- If the operating specifications are not strictly followed, the membranes will be damaged and may have to be replaced
- To prevent biological growth during system shutdowns, membranes should be immersed in a protective solution.
- To avoid destroying membranes, prevent permeate back pressure at all times. This can be caused by a permeate valve being closed during a cleaning operation or as the result of a failed check valve on the permeate line.

6.4 Key Distinctions between BNR & MBR

There are several key distinctions between the use of a Carousel BNR and an MBR as detailed above.

The Carousel aeration process that decouples the aeration and mixing energy requirements and allows the system to provide sufficient mixing energy without raising the oxygen in the tank. In that case, the amount of oxygen in the wastewater can be accurately controlled. As a result, the energy costs for an underloaded plant using the Carousel process are reasonably constant per thousand gallons of flow treated. Conversely, in the diffused aeration process, the costs are the same as if the plant were fully loaded. For a plant that might be flowing at one-half of its designed capacity, the cost on a per thousand basis would be almost double the cost if the plant were flowing at 1 MGD. This is because the “turn down” ratio of diffused air systems is not as good as it is for the Carousel systems.

One of the things that is learned quickly in the wastewater business is that the incoming wastewater flow never stops at a treatment plant. You cannot tell customers to quit flushing or stop using water. The MBR

has a physical barrier that will prevent wastewater from passing through it at greater than the design rate which will not accommodate peak flow into the plant. In addition, if the membranes are fouled for any reason the flow cannot pass through to be discharged. The equalization tank is an effort to mitigate some of that risk, but once the equalization tank is full, there is nowhere for the wastewater to go if something is amiss with the membranes. The sizing of the equalization tank musts be able to hold the average daily flow of the facility or 2 MGD. During heavy rain events, it is not uncommon for treatment plants to experience influent flows that are 2 times or more than the average flow for several days thereafter. If the flow into a 2 MGD plant is 4 MGD for more than one day, there will be no place to put influent because the equalization tank will be full. Or, if something happened and a large number of membranes were fouled and needed to be replaced, the equalization could easily be filled. Once the equalization basin is filled, the only option is for the plant flow to drop below the 2 MGD flow so that the wastewater held in the tank can be processed. These are important to consider, because if this happens, the only option will be an SSO.

The BNR process uses a minimum amount of equipment, uses less energy, has a higher efficiency, and is much simpler to operate compared to the MBR at the cost of having a larger physical footprint. As such, since the BNR uses more concrete and steel tankage and considerably less equipment. The depreciation of the plant can be extended much longer because those parts of a wastewater plant will last much longer compared to equipment that will need to be replaced more often. The MBR is an equipment intensive process, uses more energy, is less efficient, and more complex to operate with the benefit of discharging re-use quality water and having a smaller physical footprint. Therefore, the depreciation of the MBR plant must be at a higher rate because more of the money is used for equipment that will need to be replaced more often.

7.0 Treatment of Wastewater

7.1 Biological Wastewater Treatment

The basic function of biological wastewater treatment is to speed up the natural biological processes by which water is purified in the streams and rivers. As flow enters the wastewater plant, it flows through a screen to remove large objects from the wastewater such as rags and sticks that might clog pipes and damage treatment equipment. Then the wastewater passes into a grit chamber where sand and small stones are removed to prevent damage and accumulation of grit in the treatment tanks. The unit processes that are designed to screen and remove grit from the wastewater influent are part of what is commonly referred to as the “Head Works” of the plant because it is preparing the wastewater for biological treatment at the head of the plant or the influent. After screening and grit removal, the wastewater still contains both organic and inorganic matter along with other minute particles called suspended solids which must be treated to be able to meet the discharge limits to the stream contained in the NPDES permit. To this point, the MBR and the BNR will be the same.

When discharged to a natural waterbody the organic and inorganic matter will create an oxygen demand on the stream and deplete the waterbody of oxygen required for fish and other aquatic species to survive. This organic and inorganic matter can be comprised of a tremendous number of different compounds, however, regardless of the compound, the effect on the waterbody is the same. To simplify the discharge limits imposed on the stream for this potential multitude of pollutants, the pollutant load is commonly

referred to a biochemical oxygen demand (BOD) which is the collective measurement of the oxygen demand that will be exerted on a natural waterbody by the discharge.

There are three basic stages of the treatment of waste that can be in a treatment facility to remove both suspended solids and BOD: primary, secondary, and tertiary. Which stages that a treatment plant may have is dependent on the level of treatment desired. In the primary stage, suspended solids are allowed to settle and removed from wastewater. Primary treatment alone can remove about 60 percent of suspended solids from wastewater but only about 25-30% of the BOD. This treatment may also involve aerating (stirring up) the wastewater, to put oxygen back in. Primary treatment technologies alone such as Imhoff tanks and aerated lagoons are not sufficient to meet today's discharge standards.

The secondary stage treatment uses biological processes to further purify wastewater. Secondary treatment removes more than 90 percent of suspended solids and organic matter using microorganisms. Sometimes, these two stages are combined into one operation, where one system is responsible for both primary and secondary treatment. In addition to pollutants, advanced secondary stage biological processes used today will also remove nutrients such as nitrogen and phosphorus. And finally, if the water needs further purification because of stringent discharge limits or the desire to prepare the wastewater for reclamation use, a third or tertiary stage is added which is to filter the water.

The Carousel BNR process is an advanced stage secondary treatment process while the MBR is a tertiary treatment process. However, both processes use the same biology to achieve advanced secondary treatment. The difference from a treatment point of view is that the MBR uses filtration in addition to a secondary treatment system instead of having a clarifier for solid-liquid separation.

After the pollutants have been removed from the wastewater by either the advanced secondary or tertiary treatment process, the effluent must be disinfected before being discharged to the stream. Disinfection is the partial destruction of disease-causing or pathogenic organisms in the wastewater before discharge. All organisms are not destroyed which differentiates disinfection from sterilization. In wastewater treatment, disinfection can be accomplished by the use of either chemical agents, or physical agents. The most common chemical agent traditionally used in wastewater treatment is chlorine although ozone, bromine, and iodine have been used. Physical agents used are heat and light. The most common physical means for treating wastewater is the use of ultraviolet (UV) radiation using special light bulbs that emit ultraviolet rays. Since the chlorine limits are the same in the WLA for the Big Cedar Creek and the Broad River, the means of disinfection for both processes will use UV radiation.

The amount of biomass and solids in the plant will accumulate and must be "wasted" on a regular basis. This wasted sludge must be dewatered and disposed of properly. The sludge digestion and dewatering facilities will be similar regardless of whether the MBR or BNR process is employed.

Once the wastewater has been disinfected, it is almost ready for entry into the discharge stream or recycling. The WLAs contain a requirement that the discharge shall have a dissolved oxygen content in excess of 6 mg/L for Big Cedar Creek and 5 mg/L for the Broad River. As a result, either design will need to have a post aeration chamber immediately before the treated wastewater is discharged. This chamber will inject oxygen into the treated waste using aeration equipment to raise the oxygen level in the water above the discharge requirement contained in the NPDES permit. The amount of energy expended for this process is proportional to the level of DO that must be achieved.

In SC, direct potable reuse of wastewater is not permitted but the recycling of water for irrigation is allowed with the proper land permitting. Standards for recycled water require that it must contain less than 5 mg/L of BOD and less than 5 mg/L of TSS. It must also contain some detectable level of chlorine in the water. Therefore, if the water is going to be recycled and if UV were used as the disinfection method, chlorine would have to be added to the water to prevent bacterial regrowth in the recycled water system.

7.2 Influent Challenges

A wastewater treatment plant is a sophisticated combination of physical, chemical, and biological processes. No treatment plant can treat all wastewater. To have a successful wastewater treatment process design requires correctly identifying the anticipated influent parameters and then design the unit processes to appropriately remove the anticipated constituents. As previously discussed, wastewater is an ever-changing mixture of chemical compounds and organic matter.

Sewer transport systems are required to provide the capacity to handle flows that are 2.5 times the average daily flow. Therefore, if the design of a pump station, forcemain, or treatment plant is to handle a 2 MGD average, they will need to be able to function appropriately if the influent flow is up to 5 MGD under a peak condition. This provides the context for the importance of the MBR having an equalization tank to store the peak flow since the flux rate for the membranes are designed to only pass the average flow are not capable of passing the peak flow. The BNR plant design is capable of passing the peak flow through the process and providing treatment.

The amount of food for the microorganisms in the wastewater plant also varies daily depending on who and what is being discharged. Just as a chicken farmer must supply a certain amount of food each day to raise healthy chickens for egg production, it is equally important that the wastewater operator verifies that the correct amount of food each day is being supplied to the bugs for them to be healthy and oxidize pollutants. In wastewater, this is measured by the food to mass ration (F/M). The amount of food required is based on the mass of bugs that are in the plant that need to be fed. If the amount of food is too little, then the bugs will stop reproducing and become unhealthy. Just as people can become sick with an upset stomach if they eat much more than they are accustomed to, so it is with the biomass in a treatment plant. Plant upsets can occur if the bugs are fed too much for an extended period of time.

For a new treatment plant located at either Big Cedar Creek or the Broad River, there must be sufficient actual flow on a daily basis to provide the food needed to grow the microorganisms required for treatment before the facility can be started up. This reinforces the need for the initial connection to the Winnsboro WWTP during the startup of the FJWSS system. Once the actual flow in the Winnsboro Connector (not permitted flow) reaches more than 250,000 gallons per day on a sustained basis, sufficient actual flow is available to properly supply the microorganisms with the requisite food to thrive.

7.3 Industrial Discharges

Industrial wastewater can be a major source of environmental pollution. Proper treatment is necessary for any type of industrial wastewater before reuse, re-application (such as irrigation, agriculture, etc.) or discharge to the environment. Many industrial manufacturers discharge wastewater with significant levels of metals and impurities such as lead, mercury, cadmium and chromium, toxic materials (arsenic, selenium, etc.), nitrogen compounds (nitrates and nitrites), solids including various dissolved salts, debris, various organic and inorganic matters, oils, petroleum products, lubricants, chemicals, and others.

Nowadays, air pollution controls such as wet scrubbers have been extensively used in various plants and facilities as well. These can transfer the captured pollutants to the wastewater stream, which must be properly treated.

Municipal wastewater treatment and industrial wastewater treatment are not the same. Compared to municipal wastewater, industrial wastewater contains different pollutants and is often more variable, concentrated, and toxic. The nature of the design, procurement, construction, operation, and economics are also different. Unfortunately, treatment systems for industrial waste are still analyzed, designed, procured, and operated like municipal systems treating domestic waste. Industrial wastewater conveys many toxic and hazardous materials and there are federal, state, and local standards imposed on these industrial wastewater streams and their discharge limits. This complicates the treatment of industrial wastewater, making these facilities potentially far more complicated than municipal wastewater treatment units unless proper care is taken during design. These plants are more comparable to industrial process plants than to municipal wastewater treatment plants.

Regardless of the wastewater treatment system, it is imperative to understand the constituents that will be in the wastewater. For all previous WLA requests for FJWSS for discharges into the Broad River and Cedar Creek, there has been an assumption that the content of industrial waste compared to domestic waste is between 25% and 50% of the total flow. This means that the anticipated wastewater plant will treat at least a majority 50% or more of domestic waste. For a 2 MGD plant, the industrial component is between 500,000 and 1 MGD.

Varying composition of wastewater from different industries should be considered as this usually results in dilution of contamination and lower risks. This can lead to a realistic and optimum arrangement between different industrial dischargers. Systems that receive wastewater streams from different industries also need particular care that they do not interfere with each other. The discharge from each industrial facility may not be an issue singularly. But, when the two facilities discharges are combined, the results can be toxic to the wastewater plant and the discharge stream. Analysis of both historical and current wastewater data should also be considered before allowing connection to the FJWSS system.

Industrial wastewater treatment plants are even more complex than municipal facilities. There is always the risk that a treatment plant cannot operate as expected and treated wastewater at discharge does not meet the required limits. This risk is applicable to both discharge locations but not necessarily the same. Two important considerations for design are the pollutants in the incoming wastewater and the allowable discharge limits of the treated water. This gives rise to the concerns over the WLAs for the Big Cedar Creek compared with the Broad River. Due to the dilution issues discussed previously there is no margin for error should the plant experience unsatisfactory operation.

8.0 Financial Risks

8.1 Supply Chain Disruption

The construction industry thrives on predictability, and periods of uncertainty and volatility make estimating and managing costs more difficult and planning for new projects demanding. Not only was COVID-19 an unforeseeable Black Swan event, but the resulting market impacts over the past three years have altered many of the typical approaches used to control costs. The result from the pandemic has been unprecedented spikes in construction costs.

As a result of the nationwide lockdown order, manufacturers shut down operations unless they were deemed necessary. With the uncertainty of how long the lockdowns would last, manufacturers around the world suspended orders for the materials they needed as they had no warehouses to stockpile them and no income to pay for them. As soon as the lockdown ended, manufacturers started production lines again but when they re-ordered their raw materials, they discovered that supplies were not available as the stockpiles of raw materials were exhausted during the lockdowns.

Due to the high demand many of the port facilities were backup up with hundreds of ships and thousands of containers waiting in line to bring goods and materials into the US. By the end of 2020, all industries were all crippled by a lack of supply of materials which caused prices to skyrocket. Most pricing peaked in early 2022. Since then, as the supply chain is returning to normal for those sectors of the economy, pricing has dropped significantly from their peak. Consumer demand for goods is easing and it is expected that over the next couple of years pricing will return to normal adjusted for typical inflation since the pandemic. For some sectors of the economy, pricing has already returned to normal but for others the escalated pricing is still lingering.

8.2 Impacts to Construction Costs

Pent-up demand for all types of construction projects in the aftermath of the initial pandemic lockdowns, as many people spent more time at home, drove an uptick in construction activity. However, the construction industry, like manufacturing, distribution, and other sectors, was understaffed amid COVID-related layoffs due to the lack of new projects as a result of the lockdowns and illnesses or deaths due to the virus.

The result is a perfect storm of interconnected factors that has pressured construction costs to rise exponentially. Rising demand after the pandemic has contractors taking on more jobs and boosting their profit margins. Material manufacturers are taking on more orders, increasing backlog and delivery time, and creating shortages. Extended schedules due to material delays are increasing labor, equipment, and overhead costs that must be supported by the project. Labor shortages are requiring higher wages to attract and retain new talent and existing workers are being paid overtime. The material shortages have caused panic buying and hoarding for reasonably priced options, causing substitution with more expensive products to accomplish the same job and further increases demand to replenish the supply. Transport delays have increased energy prices for fuel and equipment creating disruptions all along the logistics chain. Spiking material costs and long material deliveries have led to an overbuying of the required quantity of materials for a project to mitigate the effects of getting to the end of a project and not having quite enough material to finish. Project costs have to absorb this overbuying, and this leads to increased shortages as the extra manufacturing capacity to produce materials that are not needed was wasted.

Concrete, steel, lumber, piping, energy, and equipment are the key materials driving wastewater construction costs. Labor shortages and the inability to hire workers are driving short-staffed contractors to use overtime pay to complete jobs. Margins fluctuate heavily based on market demand and when jobs are plentiful, contractors command higher profit margins. Since contractors have limited resources, in a excess demand market they are quite selective about the work that they are willing to pursue.

Before the global pandemic turned supply chains upside-down and interrupted stable cost trends, engineers and contractors could reasonably predict the costs for large capital projects. In mid-2022, predicting project costs became so much more uncertain due to supply chain disruption and rapidly fluctuating equipment and material costs affecting the construction industry.

The delay or outright unavailability of construction equipment and materials contributes to the current project delays. Contractors are reporting that lead times for equipment and materials have doubled since 2021, a trend that continues to impact the water and wastewater construction sector in particular. Ductile iron piping has almost a one-year delivery time after the receipt of an order. PVC pipe delivery had gotten up to 9 months after an order but currently delivery times are projected at about 4 months. However, large generators such as the one that will be required for the wastewater treatment plant have an estimated delivery of two years after the receipt of approved shop drawings.

The main implications of supply chain disruption and cost escalation to owners and contractors are the uncertainties of cost targets and schedule milestones. Regardless of which discharge option FJWSS decides to proceed with, it will be important to be flexible with the planned construction and be ready to pivot and adjust based on market conditions. Total construction spending in the US since the pandemic rose from 1.4 trillion to 1.8 trillion dollars. However, during the last recession, construction spending dropped from 1.2 trillion to .8 trillion.

Historically, from a cost perspective, the best time to contract for infrastructure projects is during a recession. While the construction cost trend is upward right now, many of the destabilizing costs for materials in construction are returning to normal. In April 2023, lumber costs have dropped to pre-pandemic levels, PVC raw materials are lower than pre-pandemic costs, and steel is still about 25% higher than pre-pandemic but has been steadily declining and is down over 28% from its cost one year ago. As material supplies stabilize over the next year, it is expected that construction costs will settle at about 20-25% higher than their pre-pandemic costs. The best strategy for FJWSS right now is to have projects designed and permitted as soon as possible and be ready to bid and build them when the market has stabilized, and contractors are available and interested which will result in more favorable pricing.

Cost estimates for each of the options presented herein are based on recent material and equipment pricing and contractor pricing which have eased from the 2022 highs. However, they are drastically higher than estimates from two years ago due to all the aforementioned issues with the pandemic, supply chain disruption, and Ukraine war. In addition to using higher pricing for the estimates, a 10% construction contingency has been used and engineering fees have been included in all estimates. Construction cost escalation has affected all utility construction costs whether it is an MBR plant or a BNR plant and is the same for either discharge location.

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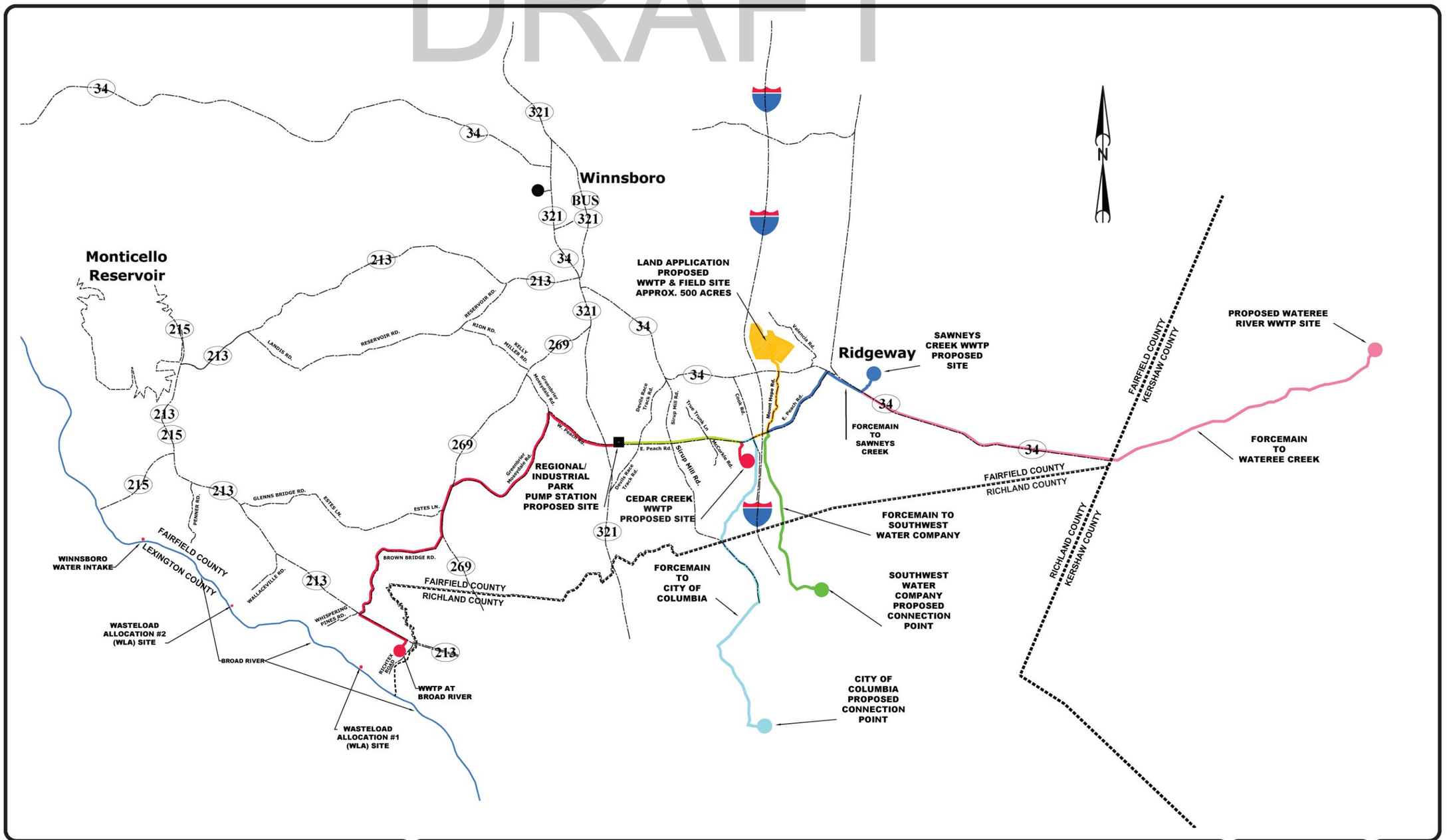

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PREPARED FOR
FAIRFIELD JOINT WATER &SEWER SYSTEM
Fairfield County, South Carolina

DATE 04–29–2021
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JOB NO. 20–054
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DRAWING NO. 1 OF 1

Table 8-1 Discharge Alternatives for FJWSS

9.0 Discharge Alternatives

9.1 Basis of Comparison

The 208 Plan identifies both the I-77 corridor and the area around Lake Monticello as potential growth areas as discussed previously. Additionally, it is the ultimate desire of Fairfield County to provide wastewater treatment availability to all areas and towns in the southern portion of the county. Some of the alternatives considered are better suited than others based on the ultimate goal. However, to compare the costs of various alternatives, the area to be served must also be considered. If the treatment alternative is in the middle of the county, then a line from the western portion of the county would be needed to transport wastewater from the western area to the treatment facility. Conversely, if the treatment plant is located on the western side of the county, then a line from the mid-portion of the county would be required to transport the wastewater to the west. Therefore, the line work necessary to serve the same overall areas is included in the cost comparisons to make the alternatives equivalent considerations to meet the goals and objectives of Fairfield County. The map shown in Table 9-1 displays all of the options considered for discharge of the FJWSS wastewater system.

9.2 Connection to Other Wastewater Treatment Plants

9.2.1 Discharge to Ridgeway WWTP

The Town of Ridgeway owns and operates a wastewater treatment facility that is permitted for 120,000 gpd discharge to Big Cedar Creek under NPDES permit #SC0022900. The facility is located on Peach Road several miles east of I-77. The DHEC Flow Inventory for this facility shows that the plant has been over permitted by 157 gallons per day. At this time, expansion of an aging facility that treats only 120,000 gallons per day to be able to treat 4.12 million gallons per day is not technologically feasible. The site that the existing treatment plant is too small to locate a 4 MGD facility. A new facility would have to be constructed adjacent to the existing facility and then the existing facility would need to be demolished. A 4 MGD expansion of the NPDES permit would also be required to increase the discharge into Big Cedar Creek. Therefore, the Ridgeway WWTP is not a feasible solution for treating the wastewater in Fairfield County and there are no projected costs for this alternative.

9.2.2 Discharge to Winnsboro WWTP

The Town of Winnsboro lacks the capability or willingness to expand its wastewater service within the southern portion of their designated management agency area. Winnsboro, SC does operate a wastewater treatment facility that discharges to Jackson Creek on the west side of the Town of Winnsboro. Their treatment facility is located approximately 7.5 miles from the proposed Industrial Park Megasite and approximately 12 miles from the Commerce Industrial Park. The Jackson Creek Plant currently has a design capacity of 1.6 MGD and based on a recent reallocation of their flow inventory, Winnsboro has permitted about 1.1 MGD of their capacity. This leaves approximately 500,000 GPD of capacity remaining in the existing treatment plant. This remaining capacity is only 12.5% of the needed capacity for the proposed Industrial Megasite and the associated growth in Fairfield County. Expanding the existing Jackson Creek Plant to ultimately accommodate the anticipated 4.0 MGD of additional flow would also require a new NPDES permit on Jackson Creek and expand the existing facility from 1.6 MGD to 5.6 MGD. The existing facility could not be expanded to meet new discharge requirements that would

be contained in an expanded NPDES permit for Jackson Creek. As a result, a new 5.6 MGD wastewater treatment plant would need to be constructed that could handle both Winnsboro's existing capacity and FJWSS needs to meet the discharge limits. The existing Winnsboro WWTP would then be demolished. In effect, FJWSS would have to construct a 5.6 MGD wastewater treatment plant to have 4.0 MGD of capacity available for their use. Since Winnsboro already has a plant that will handle treatment capacity, it is expected that FJWSS would have to fund the entire cost of the new plant to replace the Winnsboro capacity. This option would be technically difficult and financially impractical. Therefore, the Winnsboro WWTP is not a feasible solution for treating the wastewater in Fairfield County and there are no projected costs for this alternative.

9.2.3 Discharge to Southwest Water Company Collection System

Southwest Water Company's (SWWC) wholly owned subsidiary, South Carolina Utility Systems, Inc. is an investor-owned utility that serves approximately 30,000 wastewater customers in Richland and Kershaw Counties including customers in the Blythewood area. As shown in Appendix XX SWWC's wastewater collection infrastructure stretches across northern Richland County and Southwestern Kershaw County from the Blythewood Town Park Pump Station to SWWC's 12-MGD Spears Creek WWTP. At its closest point near Blythewood, the SWWC collection system reaches within approximately 2-miles of the Fairfield County line. Beginning with a meeting with SWWC in February 2021 and subsequent correspondence the feasibility of Fairfield County discharging wastewater to the SWWC collection system was evaluated and the closest discharge point was identified as the Blythewood Town Park Pump Station which is located near Doko Meadows Park in Blythewood. SWWC has indicated that 1-MGD of capacity is available immediately; 2-MGD of capacity is available once upgrades are made to the Town Park Pump Station, and 4-MGD of capacity may be available if FJWSS pays for an additional booster pump station to be constructed within the downstream forcemain in Kershaw County. Depending on how quickly FJWSS secures the needed WWTP plant capacity, FJWSS may also need to pay them to upgrade their treatment plant as well.

9.2.3.1 Privately Owned Treatment Works

Privately Owned Treatment Works (PVOTW) are also addressed in the CWA under 40 CFR 122.44(m)which requires:

> For a privately owned treatment works, any conditions expressly applicable to any user, as a limited co-permittee, that may be necessary in the permit issued to the treatment works to ensure compliance with applicable requirements under this part. Alternatively, the Director may issue separate permits to the treatment works and to its users, or may require a separate permit application from any user. The Director's decision to issue a permit with no conditions applicable to any user, to impose conditions on one or more users, to issue separate permits, or to require separate applications, and the basis for that decision, shall be stated in the fact sheet for the draft permit for the treatment works.

This provision is an important consideration for FJWSS as it would affect how industrial users and categorical industrial users are treated under the NPP. For PVOTWs, the significant industrial users and categorical users would only be allowed to discharge to a PVOTW as a "co-permittee" under the NPDES permit. This means that the industrial users would be equally responsible for discharge violations in the stream as the PVOTW. This provision is required due to the inability of the PVOTW to comply with the

Legal Authority requirements of the NPP as stated in 2.3.4.3 above. As a co-permittee with a PVOTW, the industrial user would be governed under the legal authority of the federal government with EPA as the Pretreatment Control Authority to comply with the NPDES permit. This means that if a PVOTW has a discharge violation of their NPDES permit, the industrial user would be involved in any legal actions and potentially could be held responsible for that violation.

The corporations that own large industrial manufacturing facilities are risk averse and attuned to environmental permitting requirements. Industrial users always have an option to acquire their own NPDES permit and construct their own wastewater treatment plant to serve their facility if wastewater is not available. However, it is rare that these industries will elect to do that because of the costs and they do not want to be subject to the liabilities that exist by discharging their treated waste directly to the stream. Unlike directly discharging their waste, the dilution of mixing an industry's wastewater with other wastewater in the system can prevent issues in the environment, even if the discharge violates their local discharge permit. Industrial users much prefer to have the insulating or buffering effects of discharging to a POTW where they are only held accountable for complying with the limits contained in their discharge pretreatment permit. Industrial users also prefer dealing with the local POTW and DHEC for permit modifications rather than having to interact with EPA for any changes to their industrial discharge permit.

For FJWSS, these considerations concerning the industrial pretreatment permitting should preclude the use of a privately owned treatment works for treatment of wastewater from Fairfield County because it would severely limit the availability of wastewater treatment to the industrial customer base anticipated in the I-77 corridor of the county.

9.2.3.2 Wastewater Collection and Transport

The SWWC discharge option includes the following infrastructure: a 2-MGD pump station, 47,000-LF of 18" diameter sewer forcemain, and upgrades to SWWC's Town Park pump station. This infrastructure would provide immediate sewer service availability to southern Fairfield County in the vicinity of Commerce Park. If FJWSS desires to allow for the Towns of Jenkinsville, Winnsboro, and Ridgeway to potentially discharge flow via this connection in the future if more capacity if acquired this 18" line would have to be increased to a 24" line. It is proposed that the FJWSS regional pump station site would be used to transport the wastewater to SWWC and that the forcemain be located within private easements (16-acres total) parallel to the following roads: Van Exum Road (S-256), Highway 34, Mt. Hope Road, E. Peach Road (S-30), I-77 Exit 32 Off-Ramp, Boney Road (S-227), Oakhurst Road (S-1143), McLean Road (S-1143). For the Towns of Jenkinsville and Winnsboro to connect to the SWWC, a forcemain from Jenkinsville to the regional pump station on Peach Road would need to be constructed as well.

9.2.3.3 Fees and Charges

As an investor-owned utility, the cost to connect and secure capacity within SWWC's collection system is regulated by the South Carolina Public Service Commission (PSC). The current rate schedule attached in Appendix - C-1 lists a $250/REU sewer tap fee, an $800/REU plant impact fee, and an REU value of 300-gallons/day. Unlike a publicly owned wastewater treatment works (POTW) investor-owned utilities do not have the police powers that are required to enforce an NPDES Permit pretreatment program for categorical industrial dischargers. Therefore, they are prohibited from accepting wastewater from categorical dischargers to their collection system unless the individual discharger is a co-permittee with the utility, or the utility obtains an NPDES permit modification for an alternate enforcement arrangement.

As detailed in Article 3 of their rate schedule, SWWC has previously obtained approval from SCDHEC and the PSC to provide bulk treatment to the County of Richland with the following provisions:

- The County shall insure that all commercial customers comply with the Utility's (SWWC) toxic and pretreatment effluent guidelines and refrain from discharging any toxic or hazardous materials or substances into the collection system.

- The County will maintain the authority to interrupt service immediately where customers violate the Utility's toxicity or pretreatment effluent standards of discharge prohibited wastes into the sewer system. The Utility shall have the unfettered right to interrupt bulk service to the County if it determines that forbidden wastes are being or are about to be discharged into the Utility's sewer system.

It is assumed that Fairfield County could obtain approval for a similar arrangement, but it is important to note the differences between this arrangement and typical bulk discharge to a POTW. Fairfield County would be a bulk wastewater discharger, which would require the construction of a metering and sampling station in order to establish the wastewater quantity and strength being discharged to SWWC. The metering station could either be incorporated into the proposed pump station or be located along the forcemain route prior to the outfall point. Under this arrangement FJWSS would become a co-permittee on the SWWC NPDES Permit and assume the responsibility of complying with that NPDES permit. FJWSS would also be responsible for providing an approved pretreatment program together with its administration and enforcement of industrial discharges.

It is important to note that this arrangement is part of SWWC's Spears Creek WWTP NPDES Permit which must be renewed on a five-year basis. In the event that SCDHEC declines to renew this specific provision of SWWC's NPDES Permit, the County would no longer have the ability to provide wastewater service to categorical dischargers. This poses a substantial risk to the significant and categorical users of the FJWSS system as industries could not afford to invest millions of dollars in building a facility and then have that investment nullified because they were no longer allowed to discharge their wastewater.

Since it is anticipated that a large portion of the wastewater capacity needed will be for industrial facilities, the SWWC option is a substantial business risk because of the aforementioned issues regarding the liabilities that FJWSS would incur as a co-permittee with SWWC in their facility and is not a recommended alternative.

Project Cost – As shown in Appendix - D-3, the total estimated project cost for this option is $14.9M, which includes the 18" diameter sewer forcemain, upgrades to SWWC's Town Park pump station, property acquisition, tap fees, plant impact fees, and engineering costs. In addition to the capital costs that will need to be paid for the infrastructure, the rates for treatment will be about $10.00 per thousand gallons. This would result in excessively high wastewater rates for FJWSS customers once the costs were added to the SWWC rates. This would make Fairfield non-competitive for wastewater treatment.

9.2.4 Discharge to City of Columbia Collection System

The City of Columbia operates a wastewater collection, transport, and treatment system serving customers within Richland and Lexington Counties. The City's wastewater system includes over 1,000-miles of pipe and a 60-MGD wastewater treatment facility that discharges to the Congaree River. As shown in Appendix XX the City's 208 Management Area stretches into northern Richland County and

reaches within approximately 3-miles of the Fairfield County line. The option for Fairfield County to discharge wastewater to the City of Columbia collection system was previously explored within the 2015 Hazen and Sawyer study, although the discharge point proposed herein differs from that evaluation. Based upon the City of Columbia's Utility Asset GIS it appears that the closest potential discharge point to the Columbia system is an 18" diameter gravity line that runs along Beasley Creek. If this option is selected, further evaluation of the capacity of this line would be required to determine whether it in fact has sufficient reserve capacity for the proposed flow.

In recent developments, the City of Columbia has agreed to serve wastewater for the new SCOUT facility in northern Fairfield County. As a result, the available capacity in the 18" gravity line is no longer available. Since that capacity has been used, to connect to the City of Columbia would require a much longer line to get to any available capacity in the City of Columbia system.

9.2.4.1 Wastewater Collection and Transport

As shown in Table 9-1, the Columbia discharge option to the 18" gravity line connection includes 57,000-LF of 18" diameter sewer forcemain and appurtenances. This infrastructure would provide immediate sewer service availability to southern Fairfield County in the area of Commerce Park. To allow for the Towns of Jenkinsville, Winnsboro, and Ridgeway to potentially discharge flow via this connection in the future it would need to be increased to a 24" line and it would also require that the line be extended to Jenkinsville as well.

9.2.4.2 Fees and Charges

The cost to connect and secure capacity within the City of Columbia's wastewater system is detailed within Article 5 of the City of Columbia's Ordinances, which lists a $300/REU sewer tap fee, a $2,640/REU sewer plant expansion fee, and an REU value of 300-gallons/day. As a result of the large size of its wastewater system and POTW, the City of Columbia is required to administer a pretreatment program for its categorical industrial dischargers. Therefore, Columbia would provide pretreatment administration for any categorical dischargers to the FJWSS collection system. In order to establish the quantity and strength of wastewater discharged from the FJWSS collection system to the City, a metering and sampling station must be constructed as a part of this option. The metering and sampling station could either be incorporated into the proposed regional pump station or be located along the forcemain route at the Fairfield County line prior to the outfall point.

Project Cost – Even though this option is no longer available – the costs have been included in Appendix - D-4. In addition to the capital costs the Columbia outside city rate for wastewater treatment is also $10.00 per thousand. Columbia rates are listed based on 100 cubic feet which is equivalent to 748 gallons instead of 1000 gallons. This rate with the necessary cost components added to the rate would also make Fairfield non-competitive in the region.

9.3 Land Application (WWTF and Spray Field)

In the event that an NPDES permit is not attainable, discharges may be issued using ND permits instead. An ND permit is a "No Discharge" permit, meaning that the discharge from a WWTP is not discharged to waters of the United States. Instead, the wastewater discharge is land applied. Usually, to land apply, there is a crop that will uptake any remaining pollutants in the wastewater before the water percolates down through the soil and into the ground water. The crops can be trees, grass, or any other vegetative

product that is removed from the food chain. The crop cannot be used to feed livestock for human consumption. Land application is not a substitute for treatment, it is only a means of discharging the water instead of a creek or river.

To land apply, once the water is treated, the effluent is pumped to a land application site. This involves the construction of holding basins for the wastewater until it can be spray irrigated onto the land. Depending on the crop selected and the percolation rate of the soil the amount of land required can be determined. In this case, it is assumed that land application would require at least 500 acres of land. The cost for the forcemain to pump to the land application site and the preparation of the land for the system is anticipated to be about $41 Million dollars in addition to the costs for the construction of an MBR wastewater treatment plant. This would bring the cost to approximately $71 Million dollars for a 2 MGD facility. Given the large amount of land required for this option, it is not practical to expand this system to 4 MGD or 6 MGD therefore, no further cost considerations for this option were explored.

9.4 Use of Other Discharge Locations

9.4.1 WWTF and Discharge at Wateree River

In South Carolina, the transfer of water from one river basin to another is prohibited by law. The Interbasin Transfer Act of 1985 (§ 49-21-10 et seq.) states that "no person shall withdraw, divert, pump, or cause directly the transfer of either five percent of the seven day, ten-year low flow, or one million gallons or more of water a day on any day, whichever is less, from one river basin and use or discharge all or any part of the water in a different river basin unless the person shall first obtain a permit from the SC Department of Health and Environmental Control (DHEC)." DHEC, using the Interbasin Transfer Act, protects the water quality of the state by regulating natural stream flows that, if altered, could impair a waterbody's natural assimilative capacity.

Since it is anticipated that the water used by the area that will be served by the FJWSS will be supplied by the Town of Winnsboro, the water source will be from the Broad River Basin. Potential sources of discharge considered that discharge to the Wateree River Basin, would require an Interbasin Transfer Permit because water would be withdrawn from the Broad to supply the customers and then discharged into the Wateree.

While the Wateree River is adjacent to Fairfield County in the norther portion of county, wastewater cannot be discharged at that location because it would be above Lake Wateree. As such a discharge to the Wateree in lower Fairfield Count would require that the line be constructed through a large portion of Kershaw County to reach the Wateree River. A BNR plant would be sufficient to meet limits that would be imposed on the Wateree River as well. The Wateree eventually converges with the Congaree, so it is ultimately a part of the same river system as it reaches the Santee. However, the length of line to access the Wateree is longer that the line to the Broad, therefore this option is not as cost effective as the Broad River Option. The cost for a 2 MGD plant and 18" line to the Wateree would be approximately $48.1 Million. As it is more expensive than the Broad River option, no further costs for expansion have been considered.

9.4.2 WWTF and Discharge at Sawneys Creek

Sawney's creek is a tributary of the Wateree River that flows through the eastern portion of Fairfield County from Ridgeway through Kershaw County. In addition to the concerns cited above for Cedar Creek,

the Sawney's creek option is further restricted because Sawney's Creek is on the 303d list for fecal coliform. The 303d list is published by DHEC and the EPA to identify "impaired waterways". As such, DHEC may not view a discharge into Sawney's Creek favorably. For the same reasons as Cedar Creek, the Sawney's Creek option would most likely require an MBR treatment system. Costs have been provided to show that even if it were feasible, it is not the most cost effective. For just a 2 MGD discharge, it is estimated that the costs would be about $46.1 Million which exceeds the Cedar Creek Option by $5 Million. No further cost estimates were conducted for the Sawney's Creek option to expand to 4 or 6 MGD.

9.4.3 WWTF and Discharge at Cedar Creek

The Town of Ridgeway discharges to Big Cedar Creek in lower Fairfield County. Big Cedar Creek flows through Richland County and eventually discharges to the Broad River. WLA for Big Cedar Creek were obtained and as expected, the limits on the creek for BOD, TSS, and ammonia are restricted, but attainable. Of more concern is the fact that the creek has a 7Q10 flow of 0.02 CFS. This means that the flow in the creek will be 99.9% effluent from the treatment plant. Since this is the case, the wasteload allocation indicates a CTC of 100% unless a mixing zone study proves otherwise. This means that all toxicity testing on the effluent, must be done without any dilution factor.

This is of particular concern since the plan is for the FJWSS system to have a significant industrial component of the flow in the plant. This industrial flow typically contains metals, organic acids, and other components that will not be removed in a municipal wastewater treatment plant. There are currently no metals listed on the WLA for Cedar Creek, however, there is a condition that section D of Form 2A must be completed as part of the NDPES permit application. This note means that they want sample data of the industries that are going to be using the treatment facility and know which of the 126 priority pollutants are expected to be in the influent. Part of the NPDES process is performing a reasonable potential analysis to determine if any of those 126 pollutants will need to be added to the NPDES permit. If they determine that the amount of any pollutant in a plant's influent has the potential to violate the maximum amount of a pollutant, then they will add those parameters to the NPDES permit, with limits, and require regular sampling to ensure that the amount discharged is less than the permitted level.

Even if none of the parameters are listed on the NPDES application, then the second way this can be problematic is the toxicity of the effluent. All of these metals and industrial pollutants are quite toxic to aquatic species. The requirement that toxicity tests be conducted on 100% effluent will make it difficult to pass these tests if even small amounts of these pollutants are in the wastewater.

While the BNR plant would be able to meet the limits contained in the WLA, because of the low limits and the risk of permit violations into Cedar Creek having no dilution for toxicity testing, it would be advisable to install the MBR system if the discharge will be into Cedar Creek. Regardless of the treatment system, the final disposition of limits will need to be negotiated at the CMCOG since there is no pollutant load available without relinquishment of some pollutants from other dischargers in the area as previously discussed.

The costs for construction of an MBR facility on the Big Cedar Creek are given in Appendix - D-1. These costs have been given for three phases of potential expansion. The first is for the construction of 2 MGD of capacity, Phase II is for an expansion from 2 MGD to 4 MGD, and Phase III is for the expansion from 4 MGD to 6 MGD. It is assumed that once the plant is expanded from 2 to 4 MGD it would be the desire to

install a line from Jenkinsville and Lake Monticello to the FJWSS pump station to serve that area of the county in accordance with the 208 plan.

The costs for Phase I and a 2 MGD plant is approximately $41.9 Million which includes the cost of an 18" forcemain from the 24" line near Commerce Park PS to the plant which would be necessary to get the flow to the plant and the cost of the MBR treatment plant. The cost of the 18" line was upgraded to a 24" line which would be necessary to handle 4 MGD in the future would bring the total to $42.2 Milliion.

The cost for Phase II to expand the MBR plant from 2 MGD to 4 MGD is approximately $30.4 Million. This equates to a total of $72.54 Million to construct an MBR plant on Big Cedar Creek for 4 MGD.

The cost for a Phase III to expand the MBR plant from 4 MGD to 6 MGD is approximately $38.3 Million.

The cost to install a line from Jenkinsville/Lake Monticello to the Regional pump station for treatment at Cedar Creek would be approximately $11.0 Million.

All costs are given in today's dollars and anticipated that those costs will increase due to inflation over time. The Total Cost for the MBR option on Cedar Creek is estimated to be $121.8 Million in today's dollars. These costs do not include the cost of the Winnsboro Connector or the portion of the Ridgeway Connector that will be required to transport the flow from the Regional Pump Station to Big Cedar Creek and the upgrade of the Commerce Park pump station since those costs will be necessary for both a discharge located at Big Cedar Creek or at Broad River.

9.4.4 WWTF and Discharge at Broad River

The Broad River is located on the boundary of Fairfield County and is the river system that virtually all utilities in the region use for their discharges. The Broad River has a 7Q10 flow of almost 500 Million gallons per day. The WLA allocation for the Broad River has been requested so that Fairfield County would be given an equal share of the pollutant load in the river based on the flow in the FJWSS plant vs the flow in all of the other plants discharging to the river. The limits for BOD, TSS, and Ammonia are much more lenient that the WLA limits for Cedar Creek or Sawney's Creek. Having these limits with some cushion now will be important for Fairfield as it expands in the future. As a plant expands, the limits generally become stricter. In some cases, a plant will double its capacity but must increase its treatment level because the mass of pollutants may not increase. In effect, the initial pollutant load of a plant can set the ceiling for the limits. Having extra pollutant load is important for multiple reasons. It provides cushion to the treatment plant operators in meeting their limits and it may make the case for an industry more favorable if they do not have to pre-treat to a higher standard.

On the Broad River, the major dischargers are Richland County, City of Columbia, East Richland Public Service District, and City of Cayce which all use secondary wastewater treatment. Of those, only the Richland County Broad River facility and the Cayce facility have a nutrient removal system. The City of Cayce has a 25 MGD BNR facility that is designed exactly as proposed for FJWSS on the Broad River. Their facility consistently produces effluent quality with BOD, TSS, in the single digits. The discharge also has low levels of ammonia and phosphorus that exceed their permit limits. The City of Columbia does not currently have any kind of nutrient removal system or even a system for nitrification of their ammonia to nitrate. As such, you see that Columbia's ammonia discharge is quite high in comparison to all other dischargers.

We have compared the same three phases of expansion for the Broad River Option as was proposed for the Big Cedar Creek Option. The costs for construction of an BNR facility on the Broad River are given in Appendix - D-2. These costs have been given for three phases of potential expansion. The first is for the construction of 2 MGD of capacity, Phase II is for an expansion from 2 MGD to 4 MGD, and Phase III is for the expansion from 4 MGD to 6 MGD. It is assumed that once the plant is expanded from 2 to 4 MGD it would be the desire to install a line from Jenkinsville and Lake Monticello directly to the Broad River treatment plant to serve that area of the county in accordance with the 208 plan. Since the Lake and Jenkinsville are in the western part of the County, it is assumed that the connection to the BNR plant would be along Monticello Road.

The cost for Phase I which includes a 2 MGD BNR plant and an 18" PVC forcemain that would be capable of transporting 2 MGD to the Broad River is approximately $42.3 Million. However, installation of a 24" PVC forcemain that would be capable of carrying up to 5 MGD to the Broad River treatment plant would be a better option so that once the forcemain has been installed, no additional pipeline would be required to increase the plant from 2 MGD to 4 MGD. The cost to construct the 2 MGD BNR plant initially with a 24" line to the Broad River would be approximately $45.8 Million.

The cost for Phase II to expand the BNR plant from 2 MGD to 4 MGD is approximately $19.6 Million.

The cost for Phase III to expand the BNR plant from 4 MGD to 6 MGD is approximately $27.9 Million.

The cost to install a line from Jenkinsville/Lake Monticello to the BNR treatment plant on the Broad River would be approximately $8.0 Million.

All costs are given in today's dollars and anticipated that those costs will increase due to inflation over time. The Total Cost for the BNR option on Broad River is estimated to be $101.5 Million in today's dollars. These costs do not include the cost of the Winnsboro Connector or the portion of the Ridgeway Connector that will be required to transport the flow from the Commerce Park pump station to the Regional Pump Station and the upgrade of the Commerce Park pump station since those costs will be necessary for both a discharge located at Big Cedar Creek or at Broad River.

This option assumes that if the plant is going to be ultimately expanded to greater than 2 MGD, that the 18" line would be increased to a 24" line. Once a 24" line has been installed, that would be able to handle up to 5 MGD without any further construction. By installing a 24" line, the initial cost of construction would increase to $45.8 Million. However, the additional $4.8 million will be offset in future savings of $11.8 Million for a net savings on the 4 MGD facility of $7 Million dollars.

9.5 Cost Summary

Detailed opinions of probable costs are given in Appendix - D for all of the discharge options. A summary of those cost estimates for each segment evaluated are shown in Table 10-1 - Budget Cost Summary of Options. While the costs for the MBR plant on Cedar Creek are slightly less in initial cost than installing a BNR plant on the Broad River using an 18" line, the costs for expanding the plant anything beyond the initial 2 MGD flow significantly favor the Broad River discharge option. The one-time installation of the 24" forcemain allows FJWSS to take advantage of the lower cost of construction of a BNR plant in the expansion from 2 MGD to 4 MGD and 6 MGD which more than offsets the cost of the installation of the forcemain to the Broad River.

Table 9-1 - Budget Cost Summary of Options

For Budgetary Use Only

** The following preliminary opinion of probable cost is based on the estimated quantities for the project. This estimate does not include any wetlands mitigation, easement acquisition, or engineering fees related to these activities. Since it is impossible to control the cost of labor, materials, or contractor's means and methods of determining price or competitive bidding, proposals or bids cannot be guaranteed and may vary from the following opinion of probable cost.

	ITEM	COST	NOTES
#1	1.2 MGD Jenkinsville Forcemain to Broad River	8,055,959	C900 DR25 PIPE 18" USED TO CARRY 2 MGD 24" USED TO CARRY 4 MGD
#2	1.2 MGD Jenkinsville Forcemain to Cedar Creek	10,995,102	
#3	2 MGD Forcemain to Broad River	12,604,079	
#4	2 MGD Forcemain Cedar Creek	1,463,569	
#5	2 MGD Forcemain to the City of Columbia System	30,135,519	
#6	2 MGD Forcemain to and Land Application System	41,349,136	
#7	2 MGD Forcemain to Sawneys Creek	5,694,838	
#8	2 MGD Forcemain to Southwest Water Co. Sysyem	14,932,898	
#9	2 MGD Forcemain to Wateree River	18,442,457	
#10	4 MGD Forcemain to Broad River	16,075,500	
#11	4 MGD Forcemain Cedar Creek	1,698,125	
#12	Phase I - 2 MGD BNR WWTP	29,722,125	BUDGET COST BASED ON A 2 MGD PLANT
#13	Phase I - 2 MGD MBR WWTP	40,456,639	
#14	Phase II - Additional 2 MGD BNR WWTP	19,638,506	BUDGET COST BASED ON ADDITIONAL 2 MGD FOR A TOTAL OF 4 MGD OF TRETMENT
#15	Phase II - Additional 2 MGD MBR WWTP	30,390,095	
#16	Phase III - Additional 2 MGD BNR WWTP	27,983,356	BUDGET COST BASED ON ADDITIONAL 2 MGD FOR A TOTAL OF 6 MGD OF TRETMENT
#17	Phase III - Additional 2 MGD MBR WWTP	38,284,287	

In order to calculate the final probable cost of an option, add the applicable items.
The Land application option, the WWTP is assumed to be built at the application site.
The cost shown of each item inculdes, Construction, Land Cost, 10% contingency, and 10% Engineering

		2 MGD WWTP - 18" FM	2 MGD WWTP - 24" FM
2/4 MGD FORCEMAINS ROUTE/LOCATION WITH A 2 MGD WWTP OPTIONS COMPARISON	**Discharging at Southwest Water Co. (item #8) =**	$14,932,897.53	NOT USED
	Discharging at City of Columbia (item #5) =	$30,135,519.33	NOT USED
	Forcemain and Land Application System (items #6 + #12) =	$71,071,260.36	NOT USED
	MBR WWTP at Sawneys (items #7 + #13) =	$46,151,476.71	NOT USED
	BNR WWTP at Wateree River (items #9 + #12) =	$48,164,581.21	NOT USED
	MBR WWTP at Cedar Creek (item #4 or #11 +#13) =	$41,920,208.16	$42,154,763.63
	BNR WWTP at Broad River (items #3 or #10 + #12) =	$42,326,203.13	$45,797,624.16
		4 MGD WWTP - 4 MGD 24" FM	
SELECTED OPTIONS USING 4 MGD WWTP AS BASES OF COMPARISON	**MBR WWTP at Cedar Creek 24" (item #11 + #13 + #15) =**	$72,544,859.04	
	BNR WWTP at Broad River 24" (items #10 + #12 + #14) =	$65,436,130.45	
		6 MGD WWTP - 5 MGD 24" FM	
SELECTED OPTIONS USING 6 MGD WWTP AS BASES OF COMPARISON	**MBR WWTP at Cedar Creek 24" (item #2 + #11 + #13 + #15 + #17) =**	$121,824,248.04	
	BNR WWTP at Broad River 24" (items #1 + #10 + #12 + #14 + #16) =	$101,475,444.92	

10.0 Project Schedule Comparison

Regardless of the method of treatment or the location of the wastewater plant, there should be no difference in the time that it will take to permit and construct this project. Currently, it is anticipated that it will take at least 18 months to get CMCOG approval of the 208 plan and get an NPDES permit approved. Currently, NPDES permitting is taking longer than one year. In addition, DHEC has already warned that SCIIP projects will take precedence over all others. Since the NPDES application process is not part of the SCIIP grant, that could create delays as well.

The project cannot be submitted for a construction permit until the NPDES permit has been approved. Assuming that FJWSS moves forward with the design of the project prior to obtaining the NPDES permit, the design could be complete and ready for submission to DHEC for a construction permit upon receipt of the NPDES permit. The approval process for a treatment plant will take a minimum of 60 days for issuance of a construction permit provided that SCIIP projects do not again take precedence.

Normally for this type of project, it is anticipated that a construction contract time of about 15-18 months would be ample. However, given the current supply chain and equipment delays, regardless of the type of treatment plant, the construction time will be at least 2 years or more. Currently, generator manufacturers indicate that if a 1 Megawatt generator was ordered today, the delivery would be 2 years after they received the engineer approved shop drawings. Usually, shop drawings for this type of equipment are not submitted for approval until about 4 to 6 months after the award of a construction contract. A 1 megawatt generator is the size that is required for the MBR plant.

The construction schedule shown in Table 11-1 is the same for either a plant on Cedar Creek or a plant on the Broad River. If the issues regarding submission of the 208 plan modifications were resolved and FJWSS was ready to submit to the CMCOG in August, then it is anticipated that construction would not be complete until November 2027. The construction time of the forcemain would occur concurrent with construction of the plant and does not delay the completion time for the facility.

Table 10-1 Anticipated Construction Schedule

Fairfield Wastewater with Winnsboro & Ridgeway

Project Lead: American Engineering Consultants, Inc.

WBS	Task	Start	Finish	Duration
1	**Preliminary Engineering Phase for WWTP**	**Wed 01-Jun-22**	**Wed 26-Feb-25**	**1002**
1.1	Fairfield Cty Intergovernmental Agreement	Wed 01-Jun-22	Thu 31-Aug-23	457
1.2	PER Completion	Fri 01-Sep-23	Mon 30-Oct-23	60
1.3	208 Submittal	Tue 31-Oct-23	Tue 27-Feb-24	120
1.4	NPDES Permit Application	Wed 28-Feb-24	Wed 26-Feb-25	365
1.5	WWTP & Pump Station Site Selection	Thu 01-Sep-22	Sun 30-Oct-22	60
1.6	WWTP and Pump Station Site Boundary Survey	Mon 31-Oct-22	Thu 27-Jul-23	270
1.7	WWTP Preliminary Design	Mon 31-Oct-22	Thu 27-Jul-23	270
1.8	Preliminary Forcemain Route Selection	Mon 31-Oct-22	Thu 29-Dec-22	60
1.9	Pump Station Preliminary Design	Sat 29-Apr-23	Tue 27-Jun-23	60
1.10	Wetlands Delineation of WWTP Site & PS Site	Fri 28-Jul-23	Sat 26-Aug-23	30
2	**Ridgeway & Winnsboro Connector Projects**	**Sat 25-Jun-22**	**Wed 28-May-25**	**1069**
2.1	**Design Phase**	**Sat 25-Jun-22**	**Fri 24-Nov-23**	**518**
2.1.1	Contract for Design - W & R Connector	Sat 25-Jun-22	Sat 09-Jul-22	15
2.1.2	W & R Force Main Route Surveying	Sat 25-Jun-22	Sun 19-Feb-23	240
2.1.3	Wetlands Delineation- W & R Forcemain	Sat 21-Jan-23	Sun 19-Feb-23	30
2.1.4	Final Design of W & R Forcemain	Mon 31-Oct-22	Tue 27-Jun-23	240
2.1.5	Final Design of W & R Pump Stations	Sat 29-Apr-23	Mon 25-Sep-23	150
2.1.6	Easement Acquisition- W & R Connector	Sat 21-Jan-23	Sun 17-Sep-23	240
2.1.7	USACE Wetlands Permitting - W & R Connector	Sun 27-Aug-23	Fri 24-Nov-23	90
2.1.8	SCDOT/County Encroachment Permitting	Mon 29-May-23	Mon 25-Sep-23	120
2.1.9	DHEC Construction Permitting	Sun 27-Aug-23	Tue 10-Oct-23	45
2.1.10	SCDHEC/County Land Disturbance Permitting	Sun 27-Aug-23	Tue 10-Oct-23	45
2.2	**SCIIP Grant Funding**	**Mon 12-Sep-22**	**Sat 25-Nov-23**	**440**
2.2.1	SCIIP Grant Applications	Mon 12-Sep-22	Sun 30-Apr-23	231
2.2.2	SCIIP Grant Awards	Mon 01-May-23	Sat 29-Jul-23	90
2.2.3	SCIIP Grant Review of Contract Documents	Tue 26-Sep-23	Sat 25-Nov-23	61
2.3	**Bid Phase**	**Sun 26-Nov-23**	**Sun 25-Feb-24**	**92**
2.3.1	Advertisement for Bids W&R Connectors	Sun 26-Nov-23	Tue 26-Dec-23	31
2.3.2	Project Bid Date	Wed 27-Dec-23	Wed 27-Dec-23	1
2.3.3	Evaluation of Bid Packages	Thu 28-Dec-23	Thu 11-Jan-24	15
2.3.4	Award of Bid Approval	Fri 12-Jan-24	Fri 26-Jan-24	15
2.3.5	Execution of Contract Documents	Sat 27-Jan-24	Sun 25-Feb-24	30
2.4	**Construction Phase**	**Mon 26-Feb-24**	**Mon 05-May-25**	**435**
2.4.1	PreConstruction Conference	Mon 26-Feb-24	Wed 06-Mar-24	10
2.4.2	Construction of W&R Forcemain	Thu 07-Mar-24	Mon 05-May-25	425
2.4.3	Construction of W&R Pump Stations	Thu 07-Mar-24	Mon 05-May-25	425
2.5	**Commissioning Phase**	**Tue 06-May-25**	**Tue 27-May-25**	**22**
2.5.1	SCDHEC Permit to Operate	Tue 06-May-25	Tue 20-May-25	15
2.5.2	Pump Station Commissioning	Wed 21-May-25	Tue 27-May-25	7
2.6	Ridgeway & Winnsboro Connector Complete	Wed 28-May-25	Wed 28-May-25	0
3	**WWTP & Broad River Discharge Project**	**Mon 31-Jul-23**	**Mon 13-Dec-27**	**1597**
3.1	**Authorization for WWTP Final Design**	**Mon 31-Jul-23**	**Tue 07-Nov-23**	**100**
3.1.1	Approval of Final Contract for WWTP Design	Mon 31-Jul-23	Sat 28-Oct-23	90
3.1.2	Execute Contract for Final WWTP Design	Sun 29-Oct-23	Tue 07-Nov-23	10
3.2	**WWTP & FM Final Engineering Phase**	**Sat 18-Nov-23**	**Tue 27-May-25**	**557**
3.2.1	Begin Final Engineering Design & Permitting	Sat 18-Nov-23	Sat 18-Nov-23	1
3.2.2	WWTP Topographic Surveying	Tue 19-Dec-23	Thu 01-Feb-24	45
3.2.3	Forcemain Route Surveying	Tue 19-Dec-23	Sat 15-Jun-24	180
3.2.4	Final Design of WWTP	Fri 02-Feb-24	Wed 27-Nov-24	300
3.2.5	Final Design of Forcemain	Mon 18-Mar-24	Fri 13-Sep-24	180
3.2.6	Easement Acquisition	Sun 16-Jun-24	Thu 12-Dec-24	180
3.2.7	Wetlands Delineation of Selected Forcemain Route	Sun 16-Jun-24	Mon 15-Jul-24	30
3.2.8	USACE Wetlands Permitting	Tue 16-Jul-24	Tue 12-Nov-24	120
3.2.9	SCDOT/County Encroachment Permitting	Sat 14-Sep-24	Sat 11-Jan-25	120
3.2.10	DHEC Construction Permitting	Sat 29-Mar-25	Tue 27-May-25	60
3.2.11	SCDHEC/County Land Disturbance Permitting	Tue 29-Oct-24	Sun 26-Jan-25	90
3.3	**WWTP Bid Phase**	**Thu 12-Jun-25**	**Fri 10-Oct-25**	**121**
3.3.1	Advertising for Project Bids	Thu 12-Jun-25	Sat 26-Jul-25	45
3.3.2	Project Bid Date	Sun 27-Jul-25	Sun 27-Jul-25	1
3.3.3	Evaluation of Bid Packages	Mon 28-Jul-25	Tue 26-Aug-25	30
3.3.4	Award of Bid Approval	Wed 27-Aug-25	Wed 10-Sep-25	15
3.3.5	Execution of Contract Documents	Thu 11-Sep-25	Fri 10-Oct-25	30
3.4	**WWTP Construction Phase**	**Sat 11-Oct-25**	**Wed 20-Oct-27**	**740**
3.4.1	PreConstruction Conference	Sat 11-Oct-25	Mon 20-Oct-25	10
3.4.2	Construction of WWTP	Tue 21-Oct-25	Wed 20-Oct-27	730
3.4.3	Constuction of Forcemain	Tue 21-Oct-25	Tue 13-Apr-27	540
3.4.4	Construction of Pump Station	Tue 21-Oct-25	Tue 13-Apr-27	540
3.5	**Wastewater System Commissioning**	**Thu 21-Oct-27**	**Sun 12-Dec-27**	**53**
3.5.1	Permit to Operate	Thu 21-Oct-27	Thu 21-Oct-27	1
3.5.2	Pump Station Commissioning	Fri 22-Oct-27	Thu 28-Oct-27	7
3.5.3	WWTP Commissioning	Fri 29-Oct-27	Sat 27-Nov-27	30
3.5.4	WWTP Training	Sat 13-Nov-27	Sun 12-Dec-27	30
3.6	Project Complete	Mon 13-Dec-27	Mon 13-Dec-27	0

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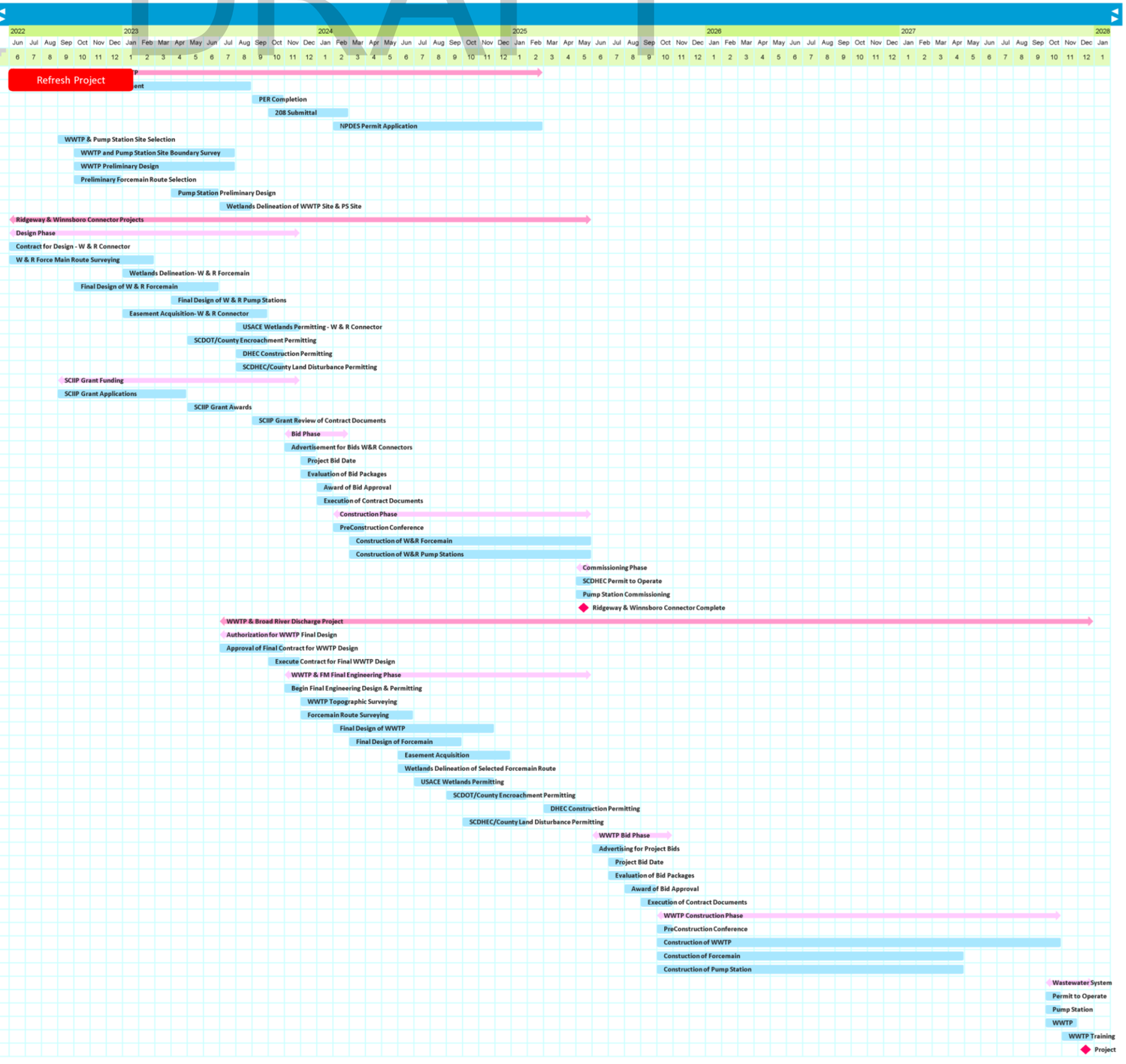

11.0 System Viability

11.1 Viability

There are numerous examples of wastewater systems throughout the state which are not well operated and in extreme distress. This is true for both private and municipal wastewater systems. These entities have systems that are no longer viable, and the entity does not have the managerial skills or the financial ability to correct all of the deficiencies of their systems. This is especially true for small towns that are losing population. As a result of these small, non-viable systems being in operation, regulations were put in place to verify the capabilities of these new systems before they are allowed to start a wastewater system.

DHEC Regulation R.61-9 governs the issuance of water pollution control permits, including NPDES permits. Section 61-9.600 of that regulation applies to owners of wastewater systems, including facilities to collect, transport, treat and discharge wastewater and wastewater residuals, excluding permits under R.61-56 and service connections as defined by R.61-67. It requires that prior to issuance of a wastewater permit under R.61-9 or R.61-67, including a transfer of an NPDES or Land Application permit, the proposed owner must demonstrate viability per the definition of "Viable wastewater system owner." The term is defined as an owner who has demonstrated the financial, technical, and managerial capability to handle all aspects of operation, maintenance, and replacement of wastewater systems to reasonably assure compliance with SC laws and DHEC regulations.

For new wastewater systems, if the proposed wastewater system owner does not own other wastewater systems in South Carolina, the viability must include the submission of a business plan which demonstrates how the system will be self-sustaining and that the owner has the commitment and the capabilities from a financial, managerial, and technical viewpoint to consistently comply with applicable laws and regulations governing wastewater collection, treatment, and disposal.

11.2 FJWSS Financial

11.2.1 Funding

Initially it was anticipated that the majority of the funding for the wastewater utility would derive from a "penny sales tax" referendum that was on the ballot in November 2020 and the balance would be provided by Fairfield County. The sales tax referendum on the ballot was defeated and there was concern over how the wastewater system could be funded and be viable. In April of 2021, Fairfield County settled a lawsuit with Dominion and received approximately $46 Million dollars that was earmarked for a wastewater treatment facility and sewer lines in Fairfield County. In addition, Fairfield County has received $10 Million dollars in SCIIP grant funds for the construction of the Winnsboro Connector project which includes the FJWSS Regional pump station.

11.3 Operational Financial Projections for FJWSS – BNR & MBR

Financial projections based on some assumptions have been provided for both the BNR option on the Broad River and the MBR option on Cedar Creek. The assumptions made are not recommendations of the wastewater rates or the capacity fees. This is merely for demonstration purposes to help FJWSS understand how the construction may be able to move forward and the borrowing that it may require

over time. Obviously, there are many variables on how the financials may ultimately transpire, but this is a realistic look at how the projects and rates could potentially be integrated. Both financial projections show the $10 Million SCIIP grant and $17.5 Million for construction cost of the Winnsboro Connector and the portion of the Ridgeway Connector project that will be necessary to transport the wastewater from the Commerce Park and Walter Brown Industrial parks to Winnsboro for interim treatment.

For the BNR financials, it shows that when the plant is constructed, a borrowing of approximately $5.3 Million dollars would be necessary to fully fund construction and could be repaid over about 7 years while maintaining excellent debt service coverage and cash flow. It also demonstrates that the expansion of the plant from 2 MGD to 4 MGD in the future would only require about $5 Million in debt to fully fund construction of that upgrade assuming that construction costs escalate 4% per year from current cost estimates.

The financials for the MBR use the same assumptions and those financial projections show that when the 2 MGD plant is constructed, a borrowing of about $1.5 Million would be necessary to fully fund the construction and it would be repaid over about 7 years while maintaining excellent debt service coverage and cash flow. However, when the plant expands from 2 MGD to 4 MGD in the future, it would be necessary to incur approximately $20 Million in debt to be able to fund the construction of the upgrade assuming that construction costs escalate 4% per year from current cost estimates.

These financials are based on an assumed growth of the system. Receiving flow is of paramount importance in the financial analysis. Just because an industry has been permitted there is no revenue until that industry is actually using the system. It is assumed that if an industry is permitted then it will be at least a year after that before flow will be discharged from that industry. That may be too aggressive or

FJWSS Flow Projections

Year	Actual Flow (GPD)	Capacity Sold	REU Sold	REU Cumulative	Flow to New Plant
2023	150,000				
2024	150,000	100,000	333.33	333.33	0
2025	250,000	100,000	333.33	666.67	0
2026	350,000	100,000	333.33	1,000.00	0
2027	450,000	100,000	333.33	1,333.33	450,000
2028	550,000	100,000	333.33	1,666.67	550,000
2029	650,000	100,000	333.33	2,000.00	650,000
2030	750,000	100,000	333.33	2,333.33	750,000
2031	850,000	100,000	333.33	2,666.67	850,000
2032	950,000	100,000	333.33	3,000.00	950,000
2033	1,050,000	100,000	333.33	3,333.33	1,050,000
2034	1,150,000	100,000	333.33	3,666.67	1,150,000
2035	1,250,000	100,000	333.33	4,000.00	1,250,000
2036	1,350,000	100,000	333.33	4,333.33	1,350,000
2037	1,450,000	100,000	333.33	4,666.67	1,450,000
2038	1,550,000	100,000	333.33	5,000.00	1,550,000

Table 11-1- FJWSS Flow Projections

conservative. That will be left to be decided by FJWSS along with the wastewater rates, capacity fees, treatment plant location, and service territory.

The flow projections are shown in Table 12-1- FJWSS Flow Projections. It is assumed that the new treatment plant will not begin operations until the actual flow reaches at least 400,000-500,000 gallons per day.

These flow projections were used with an assumed rate of $7.00 per thousand gallons and a capacity fee of $3000. These rates and fees are a competitive rate. Actual rates and fees will need to be determined based on the actual cost of operation of the system.

Estimated plant operational costs have been provided in Table 12-2- FJWSS Operational Costs. These costs are assuming that the plant will start with about 500,000 gallons per day of flow and increase over time. These costs do not include any costs that may be incurred due to administrative and billings costs for FJWSS or system wide maintenance costs. These costs will depend on how the wastewater collection system develops once wastewater treatment is available to the system.

FJWSS Operational Costs		
	BNR Carousel	MBR
Salaries Regular	$ 174,000.00	$ 195,000.00
Overtime Pay	$ 43,500.00	$ 48,750.00
Retirement	$ 26,100.00	$ 29,250.00
Social Security	$ 18,487.50	$ 20,718.75
Workmen's Compensation	$ 6,525.00	$ 7,312.50
Health & Life Insurance	$ 21,750.00	$ 24,375.00
Printing And Office Supplies	$ 1,200.00	$ 1,200.00
Postage	$ 100.00	$ 100.00
Membership And Dues	$ 500.00	$ 500.00
Travel And Hotel Expense	$ 2,500.00	$ 2,500.00
Gas And Oil	$ 7,000.00	$ 7,000.00
Tires And Repairs	$ 500.00	$ 500.00
Telephone & Internet	$ 3,000.00	$ 3,000.00
Maint. & Service Contract	$ 3,000.00	$ 3,000.00
Machinery & Equipment Repairs	$ 10,000.00	$ 10,000.00
Building Repairs	$ 2,000.00	$ 2,000.00
Small Hand Tools	$ 500.00	$ 500.00
Painting Supplies	$ 500.00	$ 500.00
Uniforms	$ 2,000.00	$ 2,000.00
Cleaning & Sanitation Supplies	$ 1,000.00	$ 1,000.00
Laboratory Supplies	$ 12,000.00	$ 12,000.00
Insurance - Plant	$ 10,000.00	$ 10,000.00
Insurance - Auto	$ 2,500.00	$ 2,500.00
Tort Liability Insurance	$ 5,000.00	$ 5,000.00
Employee Training	$ 1,500.00	$ 1,500.00
Professional Services	$ -	$ -
Toxicity Testing	$ 13,000.00	$ 13,000.00
Contract Lab Fees	$ 8,000.00	$ 8,000.00
DHEC Fees	$ 4,000.00	$ 4,000.00
Pretreatment Costs	$ 20,000.00	$ 20,000.00
Miscellaneous Expenses		
Building & Fixed Equipment	$ 10,000.00	$ 10,000.00
Furniture & Fixed Assets	$ 2,000.00	$ 2,000.00
Machine Equipment	$ 120,000.00	$ 120,000.00
Computer Software	$ 1,200.00	$ 1,200.00
Electric And Gas	$ 144,000.00	$ 244,000.00
Chemicals	$ 19,428.00	$ 19,428.00
Sludge Disposal	$ 38,000.00	$ 38,000.00
A2O Membrane Replacement	$ -	$ 80,000.00
Digestor Membrane Replacement	$ 40,000.00	$ 40,000.00
Total Direct O&M Expenses	**$ 774,790.50**	**$ 989,834.25**

Table 11-2- FJWSS Operational Costs

Rate Revenue BNR Scenario Financial Projections
Fairfield Joint Water and Sewer System
Summary of Sewer Revenue Projections

Interest Rate	2.00%																
O&M Inflation Rate		3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Sewer Rate /1000	$7.00																
Capacity Fees/REU	$3,000.00																
Construction Inflation	4%																

	Current Year	10 Year Projection -After Plant Startup														
	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031	FY 2032	FY 2033	FY 2034	FY 2035	FY 2036	FY 2037	FY 2038
Revenues																
Sewer Revenues		$ -	$ -	$ -		$ 1,405,250.00	$ 1,660,750.00	$ 1,916,250.00	$ 2,171,750.00	$ 2,427,250.00	$ 2,682,750.00	$ 2,938,250.00	$ 3,193,750.00	$ 3,449,250.00	$ 3,704,750.00	$ 3,960,250.00
Capacity Fees		$ -	$ -	$ -		$ 1,000,000.00	$ 1,000,000.00	$ 1,000,000.00	$ 1,000,000.00	$ 1,000,000.00	$ 1,000,000.00	$ 1,000,000.00	$ 1,000,000.00	$ 1,000,000.00	$ 1,000,000.00	$ 1,000,000.00
Accumulated Capacity Fees from Winnsboro		$ -	$ -	$ -	$ -	$ 4,000,000.00										
Other Revenues (Late Fees, etc)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Revenues	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 6,405,250.00**	**$ 2,660,750.00**	**$ 2,916,250.00**	**$ 3,171,750.00**	**$ 3,427,250.00**	**$ 3,682,750.00**	**$ 3,938,250.00**	**$ 4,193,750.00**	**$ 4,449,250.00**	**$ 4,704,750.00**	**$ 4,960,250.00**
Expenses																
O&M WWTP & System	**$ -**	**$ 150,000.00**	**$ 154,500.00**	**$ 159,135.00**	**$ 163,909.05**	**$ 774,790.50**	**$ 798,034.22**	**$ 821,975.24**	**$ 846,634.50**	**$ 872,033.53**	**$ 898,194.54**	**$ 925,140.38**	**$ 952,894.59**	**$ 981,481.42**	**$ 1,010,925.87**	**$ 1,041,253.64**
Depreciation	$ -	$ -	$ -	$ -	$ -	$ 2,055,833.39	$ 2,055,833.39	$ 2,055,833.39	$ 2,055,833.39	$ 2,055,833.39	$ 2,055,833.39	$ 2,055,833.39	$ 2,055,833.39	$ 2,055,833.39	$ 2,055,833.39	$ 2,222,500.05
Total Expenses	**$ -**	**$ 150,000.00**	**$ 154,500.00**	**$ 159,135.00**	**$ 163,909.05**	**$ 2,830,623.89**	**$ 2,853,867.60**	**$ 2,877,808.63**	**$ 2,902,467.89**	**$ 2,927,866.92**	**$ 2,954,027.93**	**$ 2,980,973.76**	**$ 3,008,727.97**	**$ 3,037,314.81**	**$ 3,066,759.25**	**$ 3,263,753.70**
Operating Income	**$ -**	**$ (150,000.00)**	**$ (154,500.00)**	**$ (159,135.00)**	**$ (163,909.05)**	**$ 3,574,626.11**	**$ (193,117.60)**	**$ 38,441.37**	**$ 269,282.11**	**$ 499,383.08**	**$ 728,722.07**	**$ 957,276.24**	**$ 1,185,022.03**	**$ 1,411,935.19**	**$ 1,637,990.75**	**$ 1,696,496.30**
Non-Operating Revenues (Expenses)																
Interest Income	$ -	$ 920,000.00	$ 908,400.00	$ 810,478.00	$ 365,528.62	$ 17,584.77	$ 112,885.03	$ 134,736.43	$ 161,656.04	$ 193,730.85	$ 231,049.18	$ 273,700.65	$ 321,776.24	$ 393,028.87	$ 255,826.01	$ 20,400.20
Interest Expense - New Debt	$ -	$ -	$ -	$ -	$ -	$ (212,000.00)	$ (185,158.76)	$ (157,243.87)	$ (128,212.39)	$ (98,019.65)	$ (66,619.20)	$ (33,962.73)	$ -	$ -	$ -	$ (250,000.00)
Total Non-Operating Revenues (Expenses)	**$ -**	**$ 920,000.00**	**$ 908,400.00**	**$ 810,478.00**	**$ 365,528.62**	**$ (194,415.23)**	**$ (72,273.73)**	**$ (22,507.44)**	**$ 33,443.64**	**$ 95,711.20**	**$ 164,429.98**	**$ 239,737.92**	**$ 321,776.24**	**$ 393,028.87**	**$ 255,826.01**	**$ (229,599.80)**
Income (Loss) Before Contributions & Transfers	**$ -**	**$ 770,000.00**	**$ 753,900.00**	**$ 651,343.00**	**$ 201,619.57**	**$ 3,380,210.88**	**$ (265,391.33)**	**$ 15,933.93**	**$ 302,725.76**	**$ 595,094.28**	**$ 893,152.05**	**$ 1,197,014.16**	**$ 1,506,798.26**	**$ 1,804,964.06**	**$ 1,893,816.75**	**$ 1,466,896.50**
Cash Flow Projections																
ADD:																
Depreciation - New	$ -	$ -	$ -	$ -	$ -	$ 2,055,833.39	$ 2,055,833.39	$ 2,055,833.39	$ 2,055,833.39	$ 2,055,833.39	$ 2,055,833.39	$ 2,055,833.39	$ 2,055,833.39	$ 2,055,833.39	$ 2,055,833.39	$ 2,222,500.05
Proceeds from New Debt	$ -	$ -	$ -	$ -	$ 5,300,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,000,000.00	$ -	$ -
Proceeds from Dominion Settlement	$ 46,000,000.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.00
Proceeds from SCIIP Grant	$ -	$ 7,650,000.00	$ 2,350,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1.00
Total Funds Available	**$ 46,000,000.00**	**$ 8,420,000.00**	**$ 3,103,900.00**	**$ 651,343.00**	**$ 5,501,619.57**	**$ 5,436,044.27**	**$ 1,790,442.06**	**$ 2,071,767.32**	**$ 2,358,559.15**	**$ 2,650,927.67**	**$ 2,948,985.44**	**$ 3,252,847.55**	**$ 3,562,631.65**	**$ 8,860,797.45**	**$ 3,949,650.14**	**$ 3,689,398.55**
Equipment Purchases	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Acqusition/Construction Fixed Assets	$ -	Winnsboro Connector		BNR WWTP & 24" FM for 5 MGD										BNR WWTP - 4 MGD Expansion-w/ Esc.		
Project Cost		$17,500,000		$45,797,624.16										$31,441,881.29		
Capital Improvement Projects	$ -	$ (9,000,000.00)	$ (8,000,000.00)	$ (22,898,812.08)	$ (22,898,812.08)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ (15,720,940.65)	$ (15,720,940.65)	$ -
Other Reductions from Revenue	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Debt Service Cash Reserve	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Debt Principal - New Debt	$ -	$ -	$ -	$ -	$ -	$ (671,030.94)	$ (697,872.18)	$ (725,787.07)	$ (754,818.55)	$ (785,011.29)	$ (816,411.75)	$ (849,068.22)	$ -	$ -	$ -	$ (104,762.29)
Transfers Out	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cash Increase (Decrease)	**$ 46,000,000.00**	**$ (580,000.00)**	**$ (4,896,100.00)**	**$ (22,247,469.08)**	**$ (17,397,192.51)**	**$ 4,765,013.32**	**$ 1,092,569.88**	**$ 1,345,980.25**	**$ 1,603,740.59**	**$ 1,865,916.37**	**$ 2,132,573.69**	**$ 2,403,779.33**	**$ 3,562,631.65**	**$ (6,860,143.20)**	**$ (11,771,290.51)**	**$ 3,584,636.27**
Beginning Cash - July 1	$ -	$ 46,000,000.00	$ 45,420,000.00	$ 40,523,900.00	$ 18,276,430.92	$ 879,238.41	$ 5,644,251.74	$ 6,736,821.61	$ 8,082,801.86	$ 9,686,542.45	$ 11,552,458.83	$ 13,685,032.52	$ 16,088,811.85	$ 19,651,443.50	$ 12,791,300.30	$ 1,020,009.79
Ending Cash - June 30	**$ 46,000,000.00**	**$ 45,420,000.00**	**$ 40,523,900.00**	**$ 18,276,430.92**	**$ 879,238.41**	**$ 5,644,251.74**	**$ 6,736,821.61**	**$ 8,082,801.86**	**$ 9,686,542.45**	**$ 11,552,458.83**	**$ 13,685,032.52**	**$ 16,088,811.85**	**$ 19,651,443.50**	**$ 12,791,300.30**	**$ 1,020,009.79**	**$ 4,604,646.05**
Accumulated Capacity Fees Collected		$ -	$ -	$ -	$ -	$ 5,000,000.00	$ 6,000,000.00	$ 7,000,000.00	$ 8,000,000.00	$ 9,000,000.00	$ 10,000,000.00	$ 11,000,000.00	$ 12,000,000.00	$ 13,000,000.00	$ 14,000,000.00	$ 15,000,000.00
Bond Covenant Requirements																
Debt Service - Proposed		$ -	$ -	$ -	$ -	$ 883,030.94	$ 883,030.94	$ 883,030.94	$ 883,030.94	$ 883,030.94	$ 883,030.94	$ 883,030.94	$ -	$ -	$ -	$ 354,762.29
Total Debt Service (Annual)	$ -	$ -	$ -	$ -	$ -	$ 883,030.94	$ 883,030.94	$ 883,030.94	$ 883,030.94	$ 883,030.94	$ 883,030.94	$ 883,030.94	$ -	$ -	$ -	$ 354,762.29
Debt Service Coverage	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**6.38**	**2.11**	**2.37**	**2.63**	**2.89**	**3.15**	**3.41**	**N/A**	**N/A**	**N/A**	**11.05**
Accumulated Depreciation	$ -	$ -	$ -	$ -	$ -	$ 2,055,833.39	$ 4,111,666.77	$ 6,167,500.16	$ 8,223,333.55	$ 10,279,166.93	$ 12,335,000.32	$ 14,390,833.70	$ 16,446,667.09	$ 18,502,500.48	$ 20,558,333.86	$ 22,780,833.92

Rate Revenue MBR Scenario Financial Projections
Fairfield Joint Water and Sewer System
Summary of Sewer Revenue Projections

Interest Rate	2.00%																
O&M Inflation Rate		3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Sewer Rate /1000	$7.00																
Capacity Fees/REU	$3,000.00																
Construction Inflation	4%																

	Current Year	10 Year Projection - After Plant Startup														
	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031	FY 2032	FY 2033	FY 2034	FY 2035	FY 2036	FY 2037	FY 2038
Revenues																
Sewer Revenues		$ -	$ -	$ -		$ 1,405,250.00	$ 1,660,750.00	$ 1,916,250.00	$ 2,171,750.00	$ 2,427,250.00	$ 2,682,750.00	$ 2,938,250.00	$ 3,193,750.00	$ 3,449,250.00	$ 3,704,750.00	$ 3,960,250.00
Capacity Fees		$ -	$ -	$ -		$ 1,000,000.00	$ 1,000,000.00	$ 1,000,000.00	$ 1,000,000.00	$ 1,000,000.00	$ 1,000,000.00	$ 1,000,000.00	$ 1,000,000.00	$ 1,000,000.00	$ 1,000,000.00	$ 1,000,000.00
Accumulated Capacity Fees from Winnsboro		$ -	$ -	$ -		$ 4,000,000.00										
Other Revenues (Late Fees, etc)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Revenues	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 6,405,250.00**	**$ 2,660,750.00**	**$ 2,916,250.00**	**$ 3,171,750.00**	**$ 3,427,250.00**	**$ 3,682,750.00**	**$ 3,938,250.00**	**$ 4,193,750.00**	**$ 4,449,250.00**	**$ 4,704,750.00**	**$ 4,960,250.00**
Expenses																
O&M WWTP & System	**$ -**	**$ 150,000.00**	**$ 154,500.00**	**$ 159,135.00**	**$ 163,909.05**	**$ 989,834.25**	**$ 1,019,529.28**	**$ 1,050,115.16**	**$ 1,081,618.61**	**$ 1,114,067.17**	**$ 1,147,489.18**	**$ 1,181,913.86**	**$ 1,217,371.28**	**$ 1,253,892.41**	**$ 1,291,509.19**	**$ 1,330,254.46**
Depreciation	$ -	$ -	$ -	$ -	$ -	$ 2,206,666.68	$ 2,206,666.68	$ 2,206,666.68	$ 2,206,666.68	$ 2,206,666.68	$ 2,206,666.68	$ 2,206,666.68	$ 2,206,666.68	$ 2,206,666.68	$ 2,206,666.68	$ 2,873,333.35
Total Expenses	**$ -**	**$ 150,000.00**	**$ 154,500.00**	**$ 159,135.00**	**$ 163,909.05**	**$ 3,196,500.93**	**$ 3,226,195.96**	**$ 3,256,781.84**	**$ 3,288,285.29**	**$ 3,320,733.85**	**$ 3,354,155.87**	**$ 3,388,580.54**	**$ 3,424,037.96**	**$ 3,460,559.10**	**$ 3,498,175.87**	**$ 4,203,587.81**
Operating Income	**$ -**	**$ (150,000.00)**	**$ (154,500.00)**	**$ (159,135.00)**	**$ (163,909.05)**	**$ 3,208,749.07**	**$ (565,445.96)**	**$ (340,531.84)**	**$ (116,535.29)**	**$ 106,516.15**	**$ 328,594.13**	**$ 549,669.46**	**$ 769,712.04**	**$ 988,690.90**	**$ 1,206,574.13**	**$ 756,662.19**
Non-Operating Revenues (Expenses)																
Interest Income	$ -	$ 920,000.00	$ 908,400.00	$ 810,478.00	$ 401,957.22	$ 15,170.55	$ 118,783.99	$ 148,985.79	$ 184,289.92	$ 224,780.06	$ 270,541.03	$ 321,658.77	$ 378,220.38	$ 445,312.37	$ 431,570.55	$ 21,911.56
Interest Expense - New Debt	$ -	$ -	$ -	$ -	$ -	$ (60,000.00)	$ (52,403.42)	$ (44,502.98)	$ (36,286.53)	$ (27,741.41)	$ (18,854.49)	$ (9,612.09)	$ -	$ -	$ -	$ (1,000,000.00)
Total Non-Operating Revenues (Expenses)	**$ -**	**$ 920,000.00**	**$ 908,400.00**	**$ 810,478.00**	**$ 401,957.22**	**$ (44,829.45)**	**$ 66,380.57**	**$ 104,482.81**	**$ 148,003.39**	**$ 197,038.65**	**$ 251,686.54**	**$ 312,046.68**	**$ 378,220.38**	**$ 445,312.37**	**$ 431,570.55**	**$ (978,088.44)**
Income (Loss) Before Contributions & Transfers	**$ -**	**$ 770,000.00**	**$ 753,900.00**	**$ 651,343.00**	**$ 238,048.17**	**$ 3,163,919.62**	**$ (499,065.39)**	**$ (236,049.03)**	**$ 31,468.10**	**$ 303,554.80**	**$ 580,280.67**	**$ 861,716.14**	**$ 1,147,932.43**	**$ 1,434,003.27**	**$ 1,638,144.68**	**$ (221,426.25)**
Cash Flow Projections																
ADD:																
Depreciation - New	$ -	$ -	$ -	$ -	$ -	$ 2,206,666.68	$ 2,206,666.68	$ 2,206,666.68	$ 2,206,666.68	$ 2,206,666.68	$ 2,206,666.68	$ 2,206,666.68	$ 2,206,666.68	$ 2,206,666.68	$ 2,206,666.68	$ 2,873,333.35
Proceeds from New Debt	$ -	$ -	$ -	$ -	$ 1,500,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 20,000,000.00	$ -	$ -
Proceeds from Dominion Settlement	$ 46,000,000.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Proceeds from SCIIP Grant	$ -	$ 7,650,000.00	$ 2,350,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Funds Available	**$ 46,000,000.00**	**$ 8,420,000.00**	**$ 3,103,900.00**	**$ 651,343.00**	**$ 1,738,048.17**	**$ 5,370,586.30**	**$ 1,707,601.29**	**$ 1,970,617.66**	**$ 2,238,134.78**	**$ 2,510,221.48**	**$ 2,786,947.35**	**$ 3,068,382.82**	**$ 3,354,599.11**	**$ 23,640,669.95**	**$ 3,844,811.36**	**$ 2,651,907.09**
Equipment Purchases	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Acqusition/Construction Description	$ -	Winnsboro Connector		MBR WWTP Cedar Creek										MBR WWTP - 4 MGD Expansion w/ Esc.		
Project Cost		$17,500,000		$42,154,763.63										$48,655,521.88		
Capital Improvement Projects	$ -	$ (9,000,000.00)	$ (8,000,000.00)	$ (21,077,381.82)	$ (21,077,381.82)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ (24,327,760.94)	$ (24,327,760.94)	$ -
Other Reductions from Revenue	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Debt Service Cash Reserve	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Debt Principal - New Debt	$ -	$ -	$ -	$ -	$ -	$ (189,914.42)	$ (197,510.99)	$ (205,411.43)	$ (213,627.89)	$ (222,173.01)	$ (231,059.93)	$ (240,302.33)	$ -	$ -	$ -	$ (419,049.15)
Transfers Out	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cash Increase (Decrease)	**$ 46,000,000.00**	**$ (580,000.00)**	**$ (4,896,100.00)**	**$ (20,426,038.82)**	**$ (19,339,333.64)**	**$ 5,180,671.88**	**$ 1,510,090.29**	**$ 1,765,206.22**	**$ 2,024,506.89**	**$ 2,288,048.47**	**$ 2,555,887.42**	**$ 2,828,080.50**	**$ 3,354,599.11**	**$ (687,090.99)**	**$ (20,482,949.58)**	**$ 2,232,857.95**
Beginning Cash - July 1	$ -	$ 46,000,000.00	$ 45,420,000.00	$ 40,523,900.00	$ 20,097,861.19	$ 758,527.54	$ 5,939,199.43	$ 7,449,289.72	$ 9,214,495.94	$ 11,239,002.83	$ 13,527,051.30	$ 16,082,938.72	$ 18,911,019.22	$ 22,265,618.33	$ 21,578,527.35	$ 1,095,577.77
Ending Cash - June 30	**$ 46,000,000.00**	**$ 45,420,000.00**	**$ 40,523,900.00**	**$ 20,097,861.19**	**$ 758,527.54**	**$ 5,939,199.43**	**$ 7,449,289.72**	**$ 9,214,495.94**	**$ 11,239,002.83**	**$ 13,527,051.30**	**$ 16,082,938.72**	**$ 18,911,019.22**	**$ 22,265,618.33**	**$ 21,578,527.35**	**$ 1,095,577.77**	**$ 3,328,435.72**
Accumulated Capacity Fees Collected		$ -	$ -	$ -	$ -	$ 5,000,000.00	$ 6,000,000.00	$ 7,000,000.00	$ 8,000,000.00	$ 9,000,000.00	$ 10,000,000.00	$ 11,000,000.00	$ 12,000,000.00	$ 13,000,000.00	$ 14,000,000.00	$ 15,000,000.00
Bond Covenant Requirements																
Debt Service - Proposed	$ -	$ -	$ -	$ -	$ -	$ 249,914.42	$ 249,914.42	$ 249,914.42	$ 249,914.42	$ 249,914.42	$ 249,914.42	$ 249,914.42	$ -	$ -	$ -	$ 1,419,049.15
Total Debt Service (Annual)	$ -	$ -	$ -	$ -	$ -	$ 249,914.42	$ 249,914.42	$ 249,914.42	$ 249,914.42	$ 249,914.42	$ 249,914.42	$ 249,914.42	$ -	$ -	$ -	$ 1,419,049.15
Debt Service Coverage	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**21.67**	**6.57**	**7.47**	**8.36**	**9.26**	**10.14**	**11.03**	**N/A**	**N/A**	**N/A**	**2.56**
Accumulated Depreciation	$ -	$ -	$ -	$ -	$ -	$ 2,206,666.68	$ 4,413,333.36	$ 6,620,000.05	$ 8,826,666.73	$ 11,033,333.41	$ 13,240,000.09	$ 15,446,666.77	$ 17,653,333.45	$ 19,860,000.14	$ 22,066,666.82	$ 24,940,000.17

12.0 Conclusion

Given the information presented in this analysis, either a discharge at the Big Cedar Creek or at the Broad River is possible. The Big Cedar Creek option requires a higher level of treatment and a more expensive MBR treatment plant process than locating at the Broad River and using a BNR plant. The cost of the installation of the forcemain to transport wastewater to the Broad River offsets the lower cost of the BNR initially for a 2 MGD plant. Limiting the flow to 2 MGD in the FJWSS facility would preclude the possibility of a future connection to the system by Winnsboro since there would not be sufficient capacity to handle their flow in addition to the anticipated industrial flow. This would also limit industrial growth if more than 2 MGD of capacity were needed.

Hazen and Sawyer prepared a master plan for Fairfield County that contemplated the treatment plant being located along the Broad River with the flow from the industrial corridor being pumped to the Broad River location. The obstacle to its implementation has been the available funding for construction and how to make the plant financially solvent as quickly as possible. The Dominion settlement and the SCIIP grant have provided the necessary funding to move FJWSS forward in this endeavor. Provided that FJWSS desires to be able to easily expand the treatment plant beyond 2 MGD to 4 or 6 MGD and serve the Lake Monticello and Jenkinsville areas of the County, then the Broad River discharge and BNR plant will provide FJWSS a better more cost-effective option.

Appendix - A Wasteload Allocations

Appendix - A-1 Sawney's Creek

Healthy People. Healthy Communities

April 2, 2018

Mr. Ty Davenport, Director
Fairfield County Economic Development
PO Drawer 60
Winnsboro, SC 29180

RE: Fairfield County - Wasteload Allocation
Proposed NPDES Discharge to Sawneys Creek and Broad River
Fairfield County

Dear Mr. Davenport:

At your request, wasteload allocations have been obtained for Fairfield County at the proposed flows of 2.0 and 4.0 MGD to Sawneys Creek and Broad River. This wasteload information will replace or supersede all previous wasteload information provided based on new information presented by the Water Quality Modeling Section.

Based on the wasteload allocation, the NPDES limits can be expected to be as follows (these are generally monthly average values unless noted, additional limits with weekly average and daily maximum concentrations may also be included):

Parameter	Proposed Limits @ 2.0 MGD			Proposed Limits @ 4.0 MGD		
	Monthly Average	Weekly Average	Daily Maximum	Monthly Average	Weekly Average	Daily Maximum
BOD_5, mg/L	10	15	---	10	15	---
TSS, mg/L	30	45	---	30	45	---
NH_3-N, mg/L	2	3	---	2	3	---
TRC (Sawneys Creek discharge)[1]	0.011	---	0.019	0.011	---	0.019
TRC (Broad River discharge)[1]	0.5	---	1.0	0.5	---	1.0
Dissolved Oxygen, mg/L	6.0 (Minimum at all times)			6.0 (Minimum at all times)		
E.Coli, MPN/100 mL	126	---	349	126	---	349
pH (Standard Units)	6.0 – 8.5			6.0 – 8.5		
Total Phosphorus, lbs/day[2,3]	16.7	25.0	---	33.4	50.0	---

1. Note that the difference in TRC limits is based upon which discharge location is chosen; discharge limits for other parameters in the table are the same for either discharge location.
2. Assumes Total Phosphorus Concentration of 1 mg/L in discharge
3. See Condition 9 below

S.C. Department of Health and Environmental Control
2600 Bull Street, Columbia, SC 29201 (803) 898-3432 www.scdhec.gov

The following conditions should be noted. The wasteload is informational purposes only until the following actions occur:

1. A determination whether the project is consistent with the applicable 208 Water Quality Plan must be made on the discharge prior to the NPDES permit decision.

2. Because this would be a new discharge into surface waters whose quality is greater than water quality standards (i.e., higher quality waters), an alternatives analysis shall be included in the engineering report. The report should also show that the proposal is necessary to important social and economic development in the area of the receiving waters such that the discharge should be allowed under the anti-degradation provisions of Regulation 61-68 (Water Quality Standards). The alternatives analysis shall demonstrate that none of the following applicable alternatives are economically and technologically reasonable:

   (a) Reuse that would minimize or eliminate the need to lower water quality;
   (b) Use of other discharge locations;
   (c) Connection to other wastewater treatment facilities;
   (d) Use of land application;
   (e) Product or raw material substitution; and
   (f) Any other treatment option or alternative, which would minimize or eliminate the need to lower water quality.

3. An NPDES permit application and preliminary engineering report (which may also help address a 208 review) is provided on the proposal. Please note that the NPDES permitting action must be completed in accordance with Regulation 61-9, before a Construction Permit could be considered for this project.

4. The selected wasteload allocation is subject to EPA Region IV review since this is a major facility.

5. Additional metals testing and/or requirements may be necessary subject to information provided with the NPDES application and/or PER. Submission of future effluent metals data may result in specific pollutants to be added or deleted from the limits.

6. Please note that the applicant must comply with the provisions of R61-9.600 (Viability Requirements) that address entities owning wastewater systems have the technical, managerial and financial means to comply with the regulations as a prerequisite for receiving a wastewater discharge permit (NPDES). As part of the NPDES process, the permittee may be required to provide additional information (as described in R61-9.600) to document compliance with this condition. Please refer to R61-9.600, to determine if additional information is needed.

7. Sawneys Creek Discharge: Monthly Average Discharge Limits of BOD_5 of 10 mg/l and NH_3-N of 2 mg/l result in a UOD of 466.0 lbs/day at 2.0 MGD and 932.1 lbs/day at 4.0 MGD at the discharge location. The assimilative capacity of UOD along Sawneys Creek will lessen the amount of UOD that enters the Wateree River. The following table displays the amount of UOD remaining at the end of Sawneys Creek as it enters the Wateree River (as simulated by the Qual2e model) for three different f-ratios.

Flow (MGD)	UOD (lbs/day)		
	0% Industrial flow	25% Industrial flow	50% Industrial flow
2.0	100.1	111.2	117.9
4.0	293.0	319.1	336.4

The total UOD loading to the Wateree River is capped at 11,024 lbs/day per the agreement between SCDHEC, Central Midlands COG, et. al. 5/2006. The UOD loading to the Wateree River of 11,024 lbs/day has already been distributed to existing permitted dischargers. Therefore, for the 111.2 lbs/day UOD resulting from this proposed discharge (e.g., 2.0 MGD, 25% industrial flow) would need to be reallocated from an existing discharger(s) in the agreement. The exact UOD that must be reallocated will depend on the percentage of industrial flow to the proposed facility.

8. Broad River Discharge: Monthly Average Discharge Limits of BOD_5 of 10 mg/l and NH_3-N of 2 mg/l result in a UOD of 466.0 lbs/day at 2.0 MGD and 932.1 lbs/day at 4.0 MGD discharged directly into the Broad River. The following table displays the amount of UOD discharged into the Broad River for three different f-ratios.

Flow (MGD)	UOD (lbs/day)		
	0% Industrial flow	25% Industrial flow	50% Industrial flow
2.0	402.7	466.0	527.8
4.0	805.3	932.1	1,055.5

The UOD in the BLSC model area has already been allocated by the Central Midlands COG to the existing 13 dischargers. Therefore, up to 466 lbs/day UOD resulting from this proposed discharge (e.g., 2.0 MGD, 25% industrial flow), depending on the outfall location, must be reallocated to the proposed facility from one or more of the 13 dischargers in the current allocation. Based on assimilative capacity of the Broad and Congaree Rivers upstream of the critical dissolved oxygen location, the amount of UOD that must be reallocated may be less if the UOD is reallocated from a discharger closer the critical dissolved oxygen location. The exact UOD that must be reallocated will also depend on the percentage of industrial flow to the proposed facility.

9. Due to phosphorus impairment in Lake Marion, no net additional Total Phosphorus can be introduced into the basin. Therefore, the 16.7 lbs/day at 2.0 MGD and 33.4 lbs/day at 4.0 MGD from the proposed discharge would need to be reallocated from an existing discharger(s) in the basin (Congaree or Wateree).

10. The 7Q10 and Average Annual Flow (AAF) in Sawneys Creek at the proposed discharge location are 0.006 cfs and 0.15 cfs, respectively. The 7Q10 and AAF in Broad River at the proposed discharge location are 713.8 cfs and 5,171 cfs, respectively. The higher critical flows in the Broad River may provide for a larger dilution allowance for other parameters (e.g., metals) than would be available in Sawneys Creek.

If you have any questions, please do not hesitate to call me at (803) 898-4228.

Sincerely,

Kyle Maurer Sr, PhD, PE, Manager
Domestic Wastewater Permitting Section

cc: Veronica Barringer, BEHS Midlands Region
Central Midland COG
Jeff deBessonet, Director, Water Facilities Permitting Division
Wade Cantrell, Manager, Water Quality Modeling Section
Jason Taylor, Fairfield County

Encl: Wasteload Allocation for Sawneys Creek (2.0 & 4.0 MGD)
Wasteload Allocation for Broad River (2.0 MGD)
Wasteload Allocation for Broad River (4.0 MGD)

August 13, 2020

Katie McCoy, P.E.
Thomas & Hutton
1501 Main Street, Suite 760
Columbia, SC 29201

RE: Wasteload Allocation
New Proposed Fairfield County's WWTP
NPDES Permit No. SC00proposed
Fairfield, SC

Dear Ms. McCoy:

At your request, preliminary wasteload allocations have been obtained for Fairfield County's proposed 2.0 MGD and 4.0 MGD discharge to the Big Cedar Creek at the proposed outfall location.

The following NPDES permit limits may be expected to be as follows (these are generally monthly average values unless noted, additional limits with weekly average and daily maximum concentrations may also be included):

Parameters	Proposed Limits ***with*** existing Town of Ridgeway Discharge		Proposed Limits ***without*** existing Town of Ridgeway Discharge	
Flow, MGD	2.0	4.0	2.0	4.0
BOD_5, mg/l	22.9	10	19.7	10
TSS, mg/l	30	30	30	30
NH_3-N, mg/l	2.0	2.0	2.29	2.0
TRC, mg/l	0.011/0.019	0.011/0.019	0.011/0.020	0.011/0.020
Dissolved Oxygen, mg/l	6.0[1]	6.0[1]	6.0[1]	6.0[1]
E. Coli, /100ml	126/349	126/349	126/349	126/349
UOD, lbs/d - Critical	---	850.6[2]	---	875.6[2]
Total Nitrogen	MR	MR	MR	MR
Total Phosphorus, mg/l	MR or To be determined[3]	MR or To be determined[3]	MR or To be determined[3]	MR or To be determined[3]
Total Phosphorus – Monthly Loading	To be determined[3]	To be determined[3]	To be determined[3]	To be determined[3]
Total Phosphorus – Annual Loading	To be determined[3]	To be determined[3]	To be determined[3]	To be determined[3]
Whole Effluent Toxicity **Chronic** Test	CTC = 100%[4]	CTC = 100%[4]	CTC = 100%[4]	CTC = 100%[4]
Pollutants in Part D, Form 2A "Expanded Effluent Testing Data"	Testing Data needs to be submitted with NPDES application[5]	Testing Data needs to be submitted with NPDES application[5]	Testing Data needs to be submitted with NPDES application[5]	Testing Data needs to be submitted with NPDES application[5]

[1] Minimum at all times.
[2] See note in the WLA
[3] See note in the WLA
[4] Toxicity test concentrations can be changed subject to a Mixing Zone Evaluation.

[5.] Reasonable potential has yet been evaluated since sampling data is not available for these future Discharge.

The following conditions should be noted. The wasteload is informational only until the following actions occur:

1. A determination whether the project is consistent with the applicable 208 Water Quality Plan must be made on the proposed expansions during the NPDES permit process.

2. In situations where a permittee proposes a new or expanded discharge into surface waters whose quality is greater than water quality standards (i.e., higher quality waters), an alternatives analysis shall be included in the engineering report. The report should also show that the proposal is necessary to important social and economic development in the area of the receiving waters such that the discharge should be allowed under the anti-degradation provisions of Regulation 61-68 (Water Quality Standards). The alternatives analysis shall demonstrate that none of the following applicable alternatives are economically and technologically reasonable:

    (a) Reuse that would minimize or eliminate the need to lower water quality;
    (b) Use of other discharge locations;
    (c) Connection to other wastewater treatment facilities;
    (d) Use of land application;
    (e) Product or raw material substitution; and
    (f) Any other treatment option or alternative, which would minimize or eliminate the need to lower water quality.

3. An NPDES permit application and preliminary engineering report is provided on the proposed expansion. Please note that the NPDES permitting action must be completed in accordance with Regulation 61-9, and no appeals filed, before a Construction Permit could be considered for this project.

4. Additional metals testing and/or requirements may be necessary subject to information provided with the NPDES application and/or PER. Submission of available effluent metals data may result in specific pollutants to be added or deleted from the limits.

If you have any questions, please do not hesitate to call me at (803) 898-4228.

Sincerely,

Brenda Green

Brenda Green, Manager
Domestic Wastewater Permitting Section
Bureau of Water

cc: Veronica Barringer, EA Central Midlands Region – BEHS Columbia
Shawn M Clarke, Director, Water Facilities Permitting Division
Wade Cantrell, Water Quality Modeling Section
Susan Waldner, Water Quality Modeling Section
Weijia Hu, Domestic Wastewater Permitting Section (w/original attachment)

Attachment: Wasteload Allocation

March 4, 2022

Angel M. Rivas, Project Manager
American Engineering Consultants, Inc.
P.O Box 2299
Cayce, SC 29171

RE: Speculative Wasteload Allocation Request – Proposed
Fairfield Joint Water & Sewer System (Proposed Surface Water Discharge)
Fairfield County

Dear Mr. Angel M. Rivas,

At your request, a wasteload allocation has been obtained for two proposed discharge locations for 2 MGD and 4 MGD to Broad River for Fairfield County Joint Water and Sewer System. The first proposed discharge is regarded as Option No. 1. Option No. 1 is located at (-81.195808885, 34.186614582), which is 3.7 miles downstream of the Chapin WWTP NPDES No. SC0040631 discharge near the South corner of Fairfield County. The second proposed discharge is regarded as Option No. 2. Option No. 2 is located at (-81.25982785, 34.211722714), which is approximately 3.1 miles downstream of the 2018 Fairfield WLA location, and 0.84 miles upstream of the Chapin WWTP NPDES No. SC0040631 discharge.

The UOD is based on an F-ratio of 2.25 and it is assumed that the discharge will be 50% industrial and 50% domestic. The UOD may be recalculated upon reallocation of the UOD among some of the discharges. The Central Midlands COG should be notified if the speculative discharge for Fairfield moves forward. The recommended critical UOD is equivalent to 65% of secondary treatment UOD, which was the general reallocation to the 13 dischargers in the model area.

Based on the wasteload allocation the NPDES limits can be expected to be as follows (these are generally monthly average values unless noted, additional limits with weekly average and daily maximum concentrations may also be included):

S.C. Department of Health and Environmental Control
2600 Bull Street, Columbia, SC 29201 (803) 898-3432 www.scdhec.gov

Option No. 1

Table 1 Option No. 1 - 2 MGD

Parameter	Mass Limits (lbs./day)			Concentration Limits (mg/L)		
	Mo Avg	Weekly Avg	Daily Max	Mo Avg	Weekly Avg	Daily Max
BOD_5	500	751	---	30*	45	---
TSS	500	751	---	30	45	---
NH_3-N	131	196	---	7.83*	11.75	---
UOD	1723*	---	---	--	---	---
TRC	0.183	---	0.634	0.011	---	0.019
E. Coli	---	---	---	126/100 ml	----	349/100 ml
pH	---	---	---	6.0 – 8.5	Standard	Units
Dissolved Oxygen	---	---	---	5.0 mg/l	Minimum at	all times
Total Nitrogen	MR	MR	---	MR	MR	---
Total Phosphorus	17**	25.02	---	1.0	1.5	---
Total Cadmium	4.96	---	9.61	0.29	---	0.58
Total Lead	MR	---	MR	MR	---	MR
Total Copper	0.10	---	0.12	0.0057	---	0.0074
Total Zinc	319	---	319	19.11	---	19.11
Mercury	0.00085	---	0.00124	51.0 ng/l	---	74.4 ng/l

*This parameter may be recalculated upon the determination of the final UOD allocation limit for this proposed Wastewater Treatment Facility.

**Due to the Phosphorus impairment in Lake Marion, no net additional Total Phosphorus (TP).

Table 2 Option No. 1 - 4 MGD

Parameter	Mass Limits (lbs./day)			Concentration Limits (mg/L)		
	Mo Avg	Weekly Avg	Daily Max	Mo Avg	Weekly Avg	Daily Max
BOD_5	1001	1501	---	30*	45	---
TSS	1001	1501	---	30	45	---
NH_3-N	261	392	---	7.83*	11.75	---
UOD	3446*	---	---	---	---	---
TRC	0.367	---	0.634	0.011	---	0.019
E. Coli	---	---	---	126/100 ml	---	349/100 ml
pH	---	---	---	6.0 – 8.5	Standard	Units
Dissolved Oxygen	---	---	---	5.0 mg/l	Minimum at	all times
Total Nitrogen	MR	MR	---	MR	MR	---
Total Phosphorus	33**	50.04	---	1.0	1.5	---
Total Cadmium	4.98	---	9.65	0.14	---	0.29
Total Lead	MR	---	MR	MR	---	MR
Total Copper	0.19	---	0.25	0.0057	---	0.0074
Total Zinc	320	---	320	9.59	---	9.59
Mercury	0.00170	---	0.00248	51.0 ng/l	---	74.4 ng/l

*This parameter may be recalculated upon the determination of the final UOD allocation limit for this proposed Wastewater Treatment Facility.

**Due to the Phosphorus impairment in Lake Marion, no net additional Total Phosphorus (TP).

Option No. 2

Table 3 Option No. 2 - 2 MGD

Parameter	Mass Limits (lbs./day)			Concentration Limits (mg/L)		
	Mo Avg	Weekly Avg	Daily Max	Mo Avg	Weekly Avg	Daily Max
BOD_5	500	751	---	30*	45	---
TSS	500	751	---	30	45	---
NH_3-N	131	196	---	7.83*	11.75	---
UOD	1723*	---	---	---	---	---
TRC	0.183	---	3.17	0.011	---	0.019
E. Coli	---	---	---	126/100 ml	---	349/100 ml
pH	---	---	---	6.0 – 8.5	Standard	Units
Dissolved Oxygen	---	---	---	5.0 mg/l	Minimum at	all times
Total Nitrogen	MR	MR	---	MR	MR	---
Total Phosphorus	17**	25.02	---	1.0	1.5	---
Total Cadmium	4.83	---	9.36	0.28	---	0.56
Total Lead	MR	---	MR	MR	---	MR
Total Copper	0.10	---	0.12	0.0057	---	0.0074
Total Zinc	311	---	311	18.62	---	18.62
Mercury	0.00085	---	0.00124	51.0 ng/l	---	74.4 ng/l

*This parameter may be recalculated upon the determination of the final UOD allocation limit for this proposed Wastewater Treatment Facility.

**Due to the Phosphorus impairment in Lake Marion, no net additional Total Phosphorus (TP).

Table 4 Option No. 2 - 4 MGD

Parameter	Mass Limits (lbs./day)			Concentration Limits (mg/L)		
	Mo Avg	Weekly Avg	Daily Max	Mo Avg	Weekly Avg	Daily Max
BOD_5	1001	1501	---	30*	45	---
TSS	1001	1501	---	30	45	---
NH_3-N	261.2	392	---	7.83*	11.75	---
UOD	3446*	---	---	---	---	---
TRC	0.367	---	0.634	0.011	---	0.019
E. Coli	---	---	---	126/100 ml	---	349/100 ml
pH	---	---	---	6.0 – 8.5	Standard	Units
Dissolved Oxygen	---	---	---	5.0 mg/l	Minimum at	all times
Total Nitrogen	MR	MR	---	MR	MR	---
Total Phosphorus	33**	50.04	---	1.0	1.5	---
Total Cadmium	4.85	---	9.40	0.15	---	0.28
Total Lead	MR	---	MR	MR	---	MR
Total Copper	0.19	---	0.25	0.0057	---	0.0074
Total Zinc	312	---	312	9.35	---	9.35
Mercury	0.00170	---	0.00248	51.0 ng/l	---	74.4 ng/l

*This parameter may be recalculated upon the determination of the final UOD allocation limit for this proposed Wastewater Treatment Facility.

**Due to the Phosphorus impairment in Lake Marion, no net additional Total Phosphorus (TP).

The following conditions should be noted. The wasteload is informational/speculative only until the following occur:

1. A 208 Water Quality Plan certification must be provided on the proposed selected alternative.

2. In situations where a permitted proposes a new or expanded discharge into surface waters whose quality is greater than water quality standards (i.e., higher quality waters), an alternative analysis shall be included in the engineering report. The report should also show that the proposal is necessary to important social and economic development in the area of the receiving waters such that the discharge should be allowed under the anti-degradation provisions of 61-68 (Water Quality Standards). The alternatives analysis shall demonstrate that none of the following applicable alternatives are economically and technologically reasonable.

    a. Reuse that would minimize or eliminate the need to lower water quality;
    b. Use of other discharge locations;
    c. Connection to other wastewater treatment facilities;
    d. Use of land application;
    e. Product or raw material substitution; and
    f. Any other treatment option or alternative, which would minimize or eliminate the need to lower water quality.

3. An NPDES permit application and preliminary engineering report is provided on the proposed expansion. Please note that the NPDES permitting action must be completed in accordance with Regulation 61-9, and no appeals filed, before a Construction Permit could be considered for this project.

4. The selected wasteload allocation is subject to EPA Region IV certification since this is a major facility.

5. Additional metals testing and/or requirements may be necessary subject to information provided with the NPDES application and/or PER. Submission of available effluent metals data may result in specific pollutants to be added or deleted from the limits. Additional analysis of the pollutants listed on the over page would be helpful in this assessment.

6. Seasonal limits may be requested by the permittee and considered by the Department based upon, final determination of critical limits, the design of the wastewater treatment facility and performance needs for the seasonal period.

If you have any questions, please do not hesitate to contact Tyra Foulks of my staff at (803) 898-1904 or email at Foulkstn@dhec.sc.gov.

Sincerely,

Brenda A. Green, Manager,
Domestic Wastewater Permitting Section
Water Facilities Permitting Division

CC: EPA Region IV
Gregory Sprouse, Central Midlands COG

William H. Bingham, Jr., P.E., President, American Engineering Consultants, Inc.
Wade Cantrell, Manager, 303 (d), WQ Modeling & TMDL Section
Heather Rizzuti, EHM II, 303 (d), WQ Modeling & TMDL Section
Samuel Jones, Orangeburg EQC Office
Tyra N. Foulks, Domestic Wastewater Permitting Section

(Attachments: WLA Worksheets, Fairfield Joint Water and Sewer System WLA Request Letter dated 09/2/2021, Memo)

WINNSBORO CONNECTOR
FAIRFIELD COUNTY
APPLICATION NARRATIVE

NEED

Fairfield County and the State of South Carolina have recognized the immense potential for residential, commercial, and industrial growth along the I-77 corridor and in the southern portions of Fairfield County. The 1997 208 Water Quality Management Plan for the Central Midlands Region documents a need for a wastewater treatment facility to support growth in the area. In a 2015 Hazen and Sawyer Wastewater System Analysis for Fairfield County, many options were laid out including connecting to the City of Columbia's system and constructing a wastewater treatment plant to be discharged to the Broad River. A long-term wastewater solution for the area has been sought and studied for many years but without any solution until now.

The Fairfield Joint Water and Sewer System (FJWSS) was created in March of 2019 to provide water and sewer within unincorporated areas of Fairfield County, specifically to create and expand wastewater service along the I-77 corridor and southern portions of the County. The commission was initially comprised of five members: two members from Fairfield County, two members from the Town of Winnsboro, and one at-large member that is jointly selected by the County and the Town. In mid-2022, the FJWSS added two new members from the Town of Ridgeway bringing the FJWSS to a seven-member board.

The industrial growth in Fairfield County is projected to occur from the Fairfield County-Richland County border line along I-77 north to Exit 41 (Old River Road) approximately 11 miles, and will include the existing interchanges such as Exit 34 (SC Highway 34) and Exit 32 (Peach Road). This corridor includes established industrial sites such as the Fairfield Commerce Center, Walter B. Brown I and II Industrial Parks, Ridgeway Interstate Site and the Highway 34 Ridgeway Rail Site. Since its creation, it has always been the intention of Fairfield County to have the Fairfield Joint Water and Sewer System provide wastewater treatment for all the unincorporated areas within Fairfield County that are not currently served by the Town of Winnsboro or the Town of Ridgeway. The obstacle for the FJWSS was how to get the funds to start a new wastewater system from the ground up and not create an untenable rate structure.

In 2019-2020 Thomas and Hutton evaluated the potential for constructing a wastewater reclamation facility discharging into the Big Cedar Creek. However, the construction of a

treatment facility on Big Cedar Creek raised many questions concerning the efficacy of discharging into the Big Cedar Creek and has given rise to questions concerning other potential sources for discharging the wastewater for Fairfield County. Funding the treatment system was going to require a passage of a penny sales tax for Fairfield County to support the construction. After the strong resistance from many that live in Fairfield and Richland County regarding having a wastewater plant discharge on Big Cedar Creek and a failed sales tax referendum, the potential for serving the current and long-term future needs of the county were reevaluated. Moreover, politically there was palpable resistance from the CMCOG and SCDHEC over allowing a discharge to the Bid Cedar Creek. After careful consideration of the alternatives, a decision was made to forgo the plan to discharge to Big Cedar Creek and instead pursue building a new wastewater plant and discharge to the Broad River.

Several years ago, Fairfield County was constructing Fairfield Commerce Park. Since the FJWSS had no facilities to accept wastewater at the time, Fairfield County partnered with the Town of Winnsboro to provide wastewater treatment for Fairfield Commerce Park until such time as the FJWSS was able to take over the treatment. Therefore, the Commerce Park pump station was originally constructed with its discharge connected to the Walter Brown II Industrial Park pump station which is part of the Town of Winnsboro's wastewater infrastructure, but with the understanding that it will need to connect to the FJWSS once they have treatment capacity and other infrastructure in place for Commerce Park to reach its full potential. Winnsboro's Walter Brown II pump station is pumped through a series of other pumping stations to the Town of Winnsboro WWTP where it is treated.

With the currently connected customer base, Winnsboro's existing wastewater pump stations have limited additional capacity available without major upgrades. Fairfield County has estimated that they only have about 50,000 GPD available to offer industrial development. As such, there is severely constrained capacity available at the Commerce Park pump station for additional flow to serve the constructed sites within Fairfield Commerce Park until FJWSS has constructed their facilities and are prepared to provide wastewater service to the area. This condition limits the availability of sites in Commerce Park to those "dry" industries which utilize small amounts of water and wastewater only as necessary to serve facilities for their employees.

Fairfield County receives numerous inquiries into their industrial park areas from "wet" industries that use water and wastewater as a part of their manufacturing process which have subsequently been rejected due to the lack of wastewater available. The Town of Winnsboro has approximately 500,000 gallons per day of treatment capacity currently available at their WWTP, but it is inaccessible without additional transport infrastructure. As it is today, Fairfield County does not have capacity available to offer these industries that will satisfy their needs. Fairfield County has been focused on finding a solution that will allow them to tap into Winnsboro's unused capacity in the interim until the FJWSS system can be completed. To upgrade the series of existing pumping stations and

forcemains that connect Commerce Park to the Winnsboro WWTP would be a costly endeavor. Furthermore, once the FJWSS system was in place and Commerce Park connected to that system, the increased capacity in the upgraded Winnsboro collection system would be of no value.

Additionally, the Fairfield County Economic Development Authority is proposing to construct a new industrial park site that will accommodate approximately 9.2 million square feet of industrial and manufacturing buildings/businesses. The proposed site, which is known as the Fairfield County Industrial Park, I-77 International Megasite (Megasite), utilizes approximately 1,500 acres of property. The site borders along Interstate-77, approximately 2.5 miles north of Ridgeway, SC and preliminary work at the site has already started.

The Fairfield County Economic Development Authority is also proposing a second new industrial park located along East Peach Road at the intersection with Devils Race Track Road on both sides of East Peach Road. The proposed site, known as the Peach Road Site will utilize approximately 450 acres of property but needs wastewater service to be a viable option for industry. It is anticipated that the construction of these two (2) Industrial Parks will also result in an increase in residential, and commercial growth to support the workforce necessary for the industrial manufacturing facilities.

Concurrently with the exploration of a wastewater treatment facility with a discharge to the Broad River, Fairfield County was in litigation against Dominion Energy (SCE&G) over the failed expansion of their V.C. Summer Nuclear Reactors at Jenkinsville. However, in mid-2021, Dominion Energy settled with Fairfield County. The settlement included terms for Dominion to provide approximately $46 million in cash settlement funds that was specifically targeted for the establishment of a wastewater treatment plant and sewer infrastructure to serve Fairfield County. Under the terms of the settlement, those funds cannot be used for any other purpose, otherwise, Dominion could reclaim the money. Finally, FJWSS through Fairfield County has a large portion of the funds needed to forge ahead with providing regional wastewater capacity to the County.

In order to accommodate the industrial and municipal wastewater needs for the anticipated development outlined above, Fairfield County needs a viable alternative for the disposal of wastewater from this area. The goal is to develop a long-term solution that will ultimately regionalize wastewater treatment in Fairfield County in an economically feasible manner. While a long-term solution is the ultimate goal, there needs to also be a short-term solution to the treatment constraints for wastewater in this area of the county as quickly as possible. Fairfield County and the FJWSS have adopted a master plan that is designed to achieve both goals without incurring unnecessary expense or constructing infrastructure that will ultimately be unusable or abandoned.

The plan provides disposal of treated wastewater that meets the requirements of the South Carolina Department of Health and Environmental Control (SC DHEC) regulations

with limits as outlined in the Wasteload Allocation for the Broad River Discharge **(See Attachment 6.3)**. This plan addresses the short-term lack of availability of wastewater treatment in the area, but it also addresses part of the long-term solution which allows the FJWSS to ultimately become the regional sewer system provider for the area with a treated wastewater discharge to the Broad River that will serve Fairfield County for many decades to come.

The master plan is divided into three distinct phases of work. The first phase will connect the new Peach Road Industrial Park to the Town of Winnsboro WWTP using a new regional pump station near the intersection of Hwy 321 and Peach Road with a forcemain along Hwy 321 to the Winnsboro WWTP. The second phase of the work will construct a line along Peach Road from the Regional pump station to Commerce Park, under I-77 and all the way to the Town of Ridgeway WWTP. The third and final phase of the project will include the construction of a regional forcemain from the new regional pump station in Phase I to the new FJWSS Regional Wastewater Treatment Plant which will be located near, and discharge to, the Broad River. By siting the treatment plant near the discharge location, it will allow future development connections all along the forcemain route covering a large portion of southern Fairfield County. **(See Attachment 3 for System Map)**

SERVICE AREA

The area to be served by the proposed sewer system in the Central Midlands Council of Governments 208 Wastewater Management Plan are portions of areas currently designated to Fairfield County, Winnsboro, and Ridgeway. Though there is not a determined service area for FJWSS yet, Fairfield County, the Town of Winnsboro, and the Town of Ridgeway are all in negotiations with FJWSS to finalize an operating agreement for a definitive wastewater service territory.

PROJECT DESCRIPTION

As previously described, the master plan encompasses three (3) phases of work for different purposes, but ultimately integrates into a final regional wastewater system for Fairfield County. The request being made under this SCIIP grant application is for the funds to cover the construction for Phase I of the project, but a description of the entire master plan and all phases is being provided for clarity.

Phase I is more specifically being described as the Winnsboro Connector Project and will provide the needed short-term treatment capacity for Fairfield County to serve their new Peach Road industrial park. The capacity will be obtained by building a new pump station (Regional Pump Station) sited near the intersection of Peach Road and Hwy 321, and constructing a forcemain line to the Town of Winnsboro Wastewater Treatment Plant (WWTP). Once the Regional pump station and line are operational, it will immediately provide an available wastewater treatment capacity of 500,000 gallons per day at the new

Peach Road Industrial Park. The Regional pump station constructed as a part of Phase I will be designed so that it will receive the wastewater generated by Commerce Industrial Park, the Walter Brown II Industrial Park, the new I-77 Megasite, and the Town of Ridgeway in addition to providing service for the Peach Road Industrial Park. The pump station will also be designed to utilize the forcemain that will be constructed as part of Phase III of the master plan, conveying wastewater to the proposed FJWSS wastewater treatment plant adjacent to the Broad River.

The components of Phase I of the project includes the aforementioned new 0.5 million gallons per day (MGD) Regional Pump Station to transfer flows to the Winnsboro WWTP initially. The Regional Pump Station will also have a secondary design capability to be able to pump up to 2.0 MGD to the FJWSS Regional WWTP using the regional forcemain constructed as a part of Phase III once it is complete. In addition, Phase I will include the installation of approximately 2,200 lineal feet of 24" force main and approximately 41,400 lineal feet of 16" forcemain. Although 0.5 MGD is not a tremendous amount of flow for a heavy industrial wastewater user, it will provide a bridge to allow Fairfield to market its industrial corridor while additional treatment capacity is under construction. It is anticipated that this bridge of 0.5 MGD can be made available at least 18-24 months before Phase III can be completed.

Phase II is more specifically described as the Ridgeway Connector and will include the construction of a wastewater forcemain from the Regional Pump Station, where it will discharge, along Peach Road past Commerce Park and continuing all the way to the Town of Ridgeway WWTP. Currently, Ridgeway's WWTP is a domestic only treatment facility permitted for 120,000 GPD and does not have the ability to treat industrial waste. Phase II is designed to primarily serve the existing unincorporated areas in the Ridgeway service territory located east of I-77 including the Megasite. A new pump station would be constructed at the Ridgeway WWTP that will provide additional capacity for wastewater that otherwise would not be able to be treated at the existing Ridgeway WWTP, and for the Town of Ridgeway's use should they decide to close their WWTP and connect to the FJWSS system in the future. The Peach Road forcemain will also include a stub-out for a future connection by the Megasite to the FJWSS system. Phase II also contemplates the necessary upgrades to the existing Commerce pump station to disconnect from the Walter Brown II pump station and connect to the new line along Peach Road. Once connected, Fairfield Commerce Park will also have access to the 500,000 GPD treatment capacity available at Winnsboro. This also opens the potential for reconnecting the Walter Brown II Industrial Park to the Commerce Park pump station if additional capacity were needed in that industrial park.

Phase III will increase the wastewater treatment capacity available in Fairfield County by an additional 2 MGD and bring to fruition the much-anticipated goal of having a regional wastewater system for Fairfield County and the capability to provide wastewater to the entire southern region of Fairfield County. Phase III includes the construction of a 2 MGD Biological Nutrient Removal (BNR) WWTP on a site within Fairfield County near the Broad

River, and a 24" forcemain line from the intersection of East Peach Road and US Highway 321 to the proposed FJWSS WWTP site. The effluent from the treatment facility will be discharged to the Broad River. While it had been contemplated to site the WWTP near I-77 and pump the effluent to the Broad River, it is much more beneficial to site the treatment plant near its discharge point. This arrangement allows wastewater connections to the system all along the forcemain corridor which would have been impossible otherwise. Phase III also will reverse the Winnsboro Connector forcemain to allow connections along the Hwy 321 corridor outside the Town of Winnsboro to connect back to the Regional Pump Station for transport to the FJWSS WWTP. Once the Winnsboro connector has been reversed, it will allow access to at least 1.5 MGD of wastewater capacity in the FJWSS system for any connections along the Hwy 321 corridor or for the Town of Winnsboro's use should they decide to connect to the FJWSS system in the future.

FEASIBILITY

The creation of a wastewater system is imperative to the Fairfield County residents, businesses, and industries along the I-77 corridor and southern portions of the County. The completion of this project will be transformational for Fairfield County as it will become a major destination in the Southeastern United States for industries and businesses to locate. The feasibility of the project is the potential to meet the desired goals without encountering insurmountable obstacles that would ultimately prevent the project from being completed. Fairfield County, the Town of Winnsboro, the Town of Ridgeway and the FJWSS have worked diligently to find a regional solution for wastewater treatment that will meet all of their needs. As such, they have come together to forge several agreements that demonstrate that they are working as a team. The Town of Winnsboro and Fairfield County have reached an agreement on the framework for an operating agreement for the connections in the Winnsboro Connector and the Ridgeway Connector **(See Attachment 4.4 for Intergovernmental Agreement)**. Recently, the Town of Ridgeway has joined the FJWSS solidifying the structure of the Joint System **(See Attachment 4.5 for Resolution)**. All of the entities are currently in negotiations to finalize an operating agreement between the parties by the time the decision on the grant award has been made. Since Phase I is a pump station and forcemain project, there are no anticipated obstacles that would create a problem for this endeavor.

<u>Alternatives & Ability</u>

A wastewater solution for the area has been sought and studied for many years. In 2015, a consultant prepared a Wastewater System Analysis Study, where many options were laid out including connecting to the City of Columbia's system. Additionally, in 2019-2020 another consultant evaluated the potential for constructing a wastewater reclamation facility discharging into the Big Cedar Creek. The construction of a treatment facility on Big Cedar Creek raised many questions concerning the efficacy of discharging into the Big Cedar Creek and has given rise to questions concerning other potential sources for

discharging the wastewater for Fairfield County. The chosen master plan is the best suited for growth of the region.

Schedule

To expedite the projects, Fairfield County authorized the engineering design of Phase I and Phase II in June 2022 so that both phases would be ready to bid soon after the announcement of the award of the SCIIP grants. From a permitting perspective, the only permits that will be required are a SCHDEC land disturbance permit and a SCDHEC construction permit which are both very straightforward. Neither of these types of permits would pose any major delay in starting construction for the project.

Surveying and design of the project is underway, and it is anticipated to be completed including the necessary permitting by Mid-2023. Although, it is anticipated that the forcemain will be installed predominantly within the existing road right of ways, any additional easement acquisition and/ or land purchasing is estimated to be completed by the middle of 2023 as well. The bid phase for the project is expected to take about three (3) months once the decision from the SCIIP officials have been made regarding the award of the grant funds. It is contemplated that bids can be received and the contracts ready to award by September 2023.

The construction phase of the project including delivery of piping and equipment is projected to last fourteen (14) months and includes a six-month delay in receipt of piping and equipment for the pump station. We anticipate that the construction contract would start in October 2023 and that the project should be completed by December 2024. While this schedule is somewhat aggressive, Fairfield needs the wastewater capacity as quickly as possible. Nonetheless, it will be finished well ahead of the December 2026 deadline for expending the grant award. The uncertainty and impacts of COVID-19 are certainly out of FJWSS and Fairfield County's control and the future cannot be predicted. However, the schedule provided is based on the best information available at this time. A complete schedule of the entire project has been provided with this application **(See Attachment 6.2)**.

Cost

The total Opinion of Probable project Cost for Phase I of the project is **$12,729,858**. This cost includes the required twenty five percent (25%) construction contingency, as well as engineering design fees. A breakdown of each portion of this phase opinion of probable cost is included in the application **(See Attachment2)**. FJWSS is making the local financial commitment based on Fairfield County's commitment to provide FJWSS the matching funds. Fairfield County has formalized that commitment through a resolution setting aside a portion of the Dominion settlement funds in an amount of approximately $5.1 Million to use for the FJWSS local match for this project and the Phase II project.

They have also provided a letter of financial commitment to FJWSS to confirm the funding. **(See Attachments 4.1 and 4.3).**

The Fairfield Joint Water and Sewer System is respectfully requesting SCIIP grant funds on behalf of the Fairfield County to assist in the funding of Phase I of the overall project in order to provide short term treatment capacity to the service area's residents, businesses, and industries, as well as for the construction of a regional pump station.

To demonstrate the feasibility that the master plan project can be completed if Phase I is funded, a cost estimate to complete Phase III of the master plan has been developed. Using the same requirements of a twenty five percent (25%) construction contingency and including engineering design fees, the opinion of probable cost for the Phase III project is **$41,270,208**. Phase III of the overall project will be funded by Fairfield County using the Dominion settlement funds. **(See Attachment 6.1 for Phase III Cost Estimate)**. After setting aside $5.1 Million from the Dominion funds for the 15% local match for Phase I and Phase II, Fairfield County would have approximately $41 Million available to fully fund Phase III of the master plan. The FJWSS has already advertised for an RFQ to design Phase III of the master plan so that construction can begin on that phase as quickly as possible. It is anticipated that the design work for Phase III will begin by December 2022 and the FJWSS will submit for their NPDES permit to discharge to the Broad River in the first quarter of 2023. Included in the schedule for Phase I and Phase II is the schedule for completion of Phase III.

Since FJWSS will be the owner of the facilities contemplated, they are making the grant application for Phase I on behalf of Fairfield County, who is an eligible applicant but cannot apply themselves since they will not own the facilities. However, FJWSS will depend on the resources of Fairfield County to provide grant administration services for this project. Fairfield County has the manpower and financial resources necessary to provide the grant support that will be necessary for this project. Obviously, Fairfield County will work in close collaboration with FJWSS to administer this grant and bring the project to a successful conclusion.

<u>"DIG ONCE"</u>

Any opportunity to comply with the "dig once" plan will be considered. Fairfield County and FJWSS are willing to work with the State should the County be considered a candidate for the installation of broadband fiber optic cable as part of this undertaking. The "Dig Once" installation of the conduit in conjunction with the forcemains presents the opportunity for significant operational and financial savings for installation of conduits for broadband that may otherwise not be financially feasible.

BENEFITS/IMPACT

Completing Phase I of the master plan will provide access to 0.5 MGD of wastewater treatment to the industrial corridor along I-77 by connecting to the Winnsboro WWTP in the short-term and ultimately to the new FJWSS WWTP that will discharge to the Broad River. Once completed, Fairfield County will have the ability to complete the master plan and deliver wastewater treatment capacity for the area in a manner that will avoid controversial discharges to the water bodies of the county and the community. This master plan centralizes the flow generated in all of southern Fairfield County and ensures a superb economic impact to the whole area for generations.

Regionalization

Regionalization does not happen instantaneously; it requires staying focused with a long-term vision on how to bring facilities together systematically without causing undue financial burden on any of the parties involved. While contemplated for years, the Fairfield regional sewer system has always been a bridge too far because of the financial considerations necessary to move forward. The Dominion settlement has removed that obstacle. Municipalities with existing systems find it difficult to bear the costs of connecting to another system and abandon the value of any of those capital assets, especially when they have outstanding debt on their current facilities. The best way to achieve regionalization is to have facilities available and be ready to accept the wastewater when the municipality is ready to connect to the regional system. The completed project will provide the opportunity for both the Town of Ridgeway and the Town of Winnsboro to connect to the FJWSS regional system in the future should they desire to do so. But without the regional system being in-place, that will once again be a bridge too far. This plan provides the necessary first step to attain a fully regionalized system for Fairfield County in the future.

Water Quality

Since a large portion of the wastewater treated by the FJWSS system is anticipated to originate from industrial waste, it is imperative to provide state-of-the-art treatment facilities to protect the environment. Once all phases of the master plan have been completed, the new wastewater treatment plant will provide superior wastewater treatment thereby maintaining the quality of the receiving water body.

Aging Infrastructure

While this project does not immediately replace any existing aging infrastructure, it does set forth a path for the future connection of the Town of Winnsboro and the Town of Ridgeway wastewater system to the regional system should they decide that it is beneficial for them in the future. Without this project, it will assure that those existing treatment plants will stay in service as there would be no other alternative.

Capacity

Upon completion of Phase I of the master plan, the project will provide 0.5 MGD of wastewater treatment capacity from the Winnsboro WWTP to the Regional Pump Station near Peach Road Park. Once Phase III of the plan has been completed, it will provide 2.0 MGD of wastewater capacity to the area and allow connections from Winnsboro to the FJWSS should they desire.

Consolidation

The consolidation of wastewater treatment in Fairfield County is a long-term goal of the master plan. Eventually, it is possible that the Town of Winnsboro and the Town of Ridgeway, both members of the FJWSS, will decide that they may be better served to connect to the regional system than continuing to operate and maintain their existing aging facilities.

PALMETTO UTILITIES, INC.
DOCKET NO. 2019-281-S

SEWER RATE SCHEDULE
Effective Date: September 20, 2020

1. **MONTHLY CHARGE**

a.	Residential - Monthly charge per single-family house, condominium, villa or apartment unit	$59.87*
b.	Commercial - Monthly charge per single-family equivalent	$59.87*

c. The monthly charges listed above are minimum charges and shall apply even if the equivalency rating is less than one (1). If the equivalency rating is greater than one (1), then the monthly commercial charges may be calculated by multiplying the equivalency rating by the monthly charge of $59.87*. The monthly residential charge shall be $59.87* regardless of the equivalency rating.

Commercial customers are those not included in the residential category above and include, but are not limited to, hotels, stores, restaurants, offices, industry, etc.

The Utility may, for the convenience of the owner, bill a tenant in a multi-unit building, consisting of four or more residential units which is served by a master sewer meter or a single sewer connection. However, in such cases all arrearages must be satisfied before service will be provided to a new tenant or before interrupted service will be restored. Failure of an owner to pay for services rendered to a tenant in these circumstances may result in service interruptions.

*This rate shall not apply during the period following the Effective Date as specified in the Decrement Rider set out in Sewer Rate Schedule Section 14 below, but shall be reduced to $54.93 for such period of time as is necessary to give effect to the Decrement Rider..

2. **NONRECURRING CHARGES AND TAX MULTIPLIER**

a.	Sewer service connection charge per single-family equivalent	$250.00
b.	Plant Impact fee per single-family equivalent	$800.00

c. The nonrecurring charges listed above are minimum charges and apply even if the equivalency rating is less than one (1). If the equivalency rating is greater than one (1), then the proper charge may be obtained by multiplying the equivalency rating by the appropriate fee. These charges apply and are due at the time new service is applied for, or at the time connection to the sewer system is requested.

Except as otherwise provided by contract approved by the Commission, amounts paid or transferred to the Utility by customers, builders, developers or others, either in the form of cash or property, shall be increased by a cash payment in an amount equal to the income taxes owed on the cash or property transferred to the Utility by customers, builders, developers or others and properly classified as a contribution or advance in aid of construction in accordance with the Uniform System of Accounts. Included in this classification are sewer service connection charges and plant impact fees. The method used by the Utility to collect the tax multiplier from all contributors of such cash or property, shall be the "present value" method approved by the Commission in Order No. 88-237 issued March 18, 1988, in Docket No. 87-456-W/S. Should Federal tax law change in the future such that depreciation on contributed property becomes non-deductible for income tax purposes, the Utility shall have no obligation to reduce the tax multiplier amount by the present value of the future tax benefit from depreciation of contributed property. Should Federal or South Carolina tax law change in the future such that the Utility's total effective Federal and South Carolina tax rate ("effective tax rate") changes, the tax multiplier will be adjusted as appropriate to reflect the Utility's then-current effective tax rate. Should Federal tax law change in the future such that CIAC is no longer considered income for purposes of taxation, the Companies will cease charging and collecting the tax multiplier as of the effective date of any such change in law. For property contributions, the Company shall utilize its capital structure as approved by the Commission in determining the net present value tax multiplier percentage.

3. **BULK TREATMENT SERVICES**

The utility will provide bulk treatment services to Richland County ("County") upon request by the County in the portion of the service territory for which the utility acts as the County's contractual agent for purposes of discharging the County's designated management agency function under the Federal Clean Water Act Section 208 water quality management plan adopted by the Central Midlands Council of Governments. The rates for such bulk treatment services shall be as set forth above for both monthly charges and nonrecurring charges per single-family equivalent. The County shall certify to the Utility the number of units or taps (residential and commercial) which discharge wastewater into the County's collection system and shall provide all other information required by the Utility in order that the Utility may accurately determine the proper charges to be made to the County. The County shall insure that all commercial customers comply with the Utility's toxic and pretreatment effluent guidelines and refrain from discharging any toxic or hazardous materials or substances into the collection system. The County will maintain the authority to interrupt service immediately where customers

violate the Utility's toxic or pretreatment effluent standards of discharge prohibited wastes into the sewer system. The Utility shall have the unfettered right to interrupt bulk service to the County if it determines that forbidden wastes are being or are about to be discharged into the Utility's sewer system.

The County shall pay for all costs of connecting its collection lines into the Utility's mains, installing a meter of quality acceptable to the Utility to measure flows, and constructing a sampling station according to the Utility's construction requirements.

4. **NOTIFICATION, ACCOUNT SET-UP AND RECONNECTION CHARGES**

a. Notification Fee: A fee of $25.00 shall be charged each customer to whom the Utility mails the notice as required by Commission Rule R.103-535.1 prior to service being discontinued. This fee assesses a portion of the clerical and mailing costs of such notices to the customers creating that cost.

b. Customer Account Charge: A fee of $20.00 shall be charged as a one-time fee to defray the costs of initiating service.

c. Reconnection charges: In addition to any other charges that may be due, a reconnection fee of $250.00 shall be due prior to the Utility reconnecting service which has been disconnected for any reason set forth in Commission Rule R.103-532.4. Where an elder valve has been previously installed, a reconnection charge of thirty-five dollars ($35.00) shall be due. The amount of the reconnection fee shall be in accordance with R.103-532.4 and shall be changed to conform with said rule as the rule is amended from time to time.

5. **BILLING CYCLE**

Recurring charges will be billed monthly in arrears. Nonrecurring charges will be billed and collected in advance of service being provided.

6. **LATE PAYMENT CHARGES**

Any balance unpaid within twenty-five (25) days of the billing date shall be assessed a late payment charge of one and one-half (1½%) percent.

7. **TOXIC AND PRETREATMENT EFFLUENT GUIDELINES**

The Utility will not accept or treat any substance or material that has been defined by the United States Environmental Protection Agency ("EPA") or the South Carolina Department of Health and Environmental Control ("DHEC") as a toxic pollutant, hazardous waste, or hazardous substance, including pollutants falling within the provisions of 40 CFR §§ 129.4 and 401.15. Additionally, pollutants or pollutant properties subject to 40 CFR §§ 403.5 and 403.6 are to be processed according to the pretreatment standards applicable to such pollutants or pollutant properties, and such

standards constitute the Utility's minimum pretreatment standards. Any person or entity introducing any such prohibited or untreated materials into the Company's sewer system may have service interrupted without notice until such discharges cease, and shall be liable to the Utility for all damages and costs, including reasonable attorney's fees, incurred by the Utility as a result thereof.

8. **REQUIREMENTS AND CHARGES PERTAINING TO SATELLITE SYSTEMS**

a. Where there is connected to the Utility's system a satellite system, as defined in DHEC Regulation 61-9.505.8 or other pertinent law, rule or regulation, the owner or operator of such satellite system shall operate and maintain same in accordance with all applicable laws, rules or regulations.

b. The owner or operator of a satellite system shall construct, maintain, and operate such satellite system in a manner that the prohibited or untreated materials referred to in Section 6 of this rate schedule (including but not limited to Fats, Oils, Sand or Grease), stormwater, and groundwater are not introduced into the Utility's system.

c. The owner or operator of a satellite system shall provide Utility with access to such satellite system and the property upon which it is situated in accordance with the requirements of Commission Regulation 103-537.

d. The owner or operator of a satellite system shall not less than annually inspect such satellite system and make such repairs, replacements, modifications, cleanings, or other undertakings necessary to meet the requirements of this Section 7 of the rate schedule. Such inspection shall be documented by written reports and video recordings of television inspections of lines and a copy of the inspection report received by the owner or operator of a satellite system, including video of the inspection, shall be provided to Utility. Should the owner or operator fail to undertake such inspection, Utility shall have the right to arrange for such inspection and to recover the cost of same, without mark-up, from the owner or operator of the satellite system.

e. Should Utility determine that the owner or operator of a satellite system has failed to comply with the requirements of this Section 8 of the rate schedule, with the exception of the requirement that a satellite system be cleaned, the Utility may initiate disconnection of the satellite system in accordance with the Commission's regulations, said disconnection to endure until such time as said requirements are met and all charges, costs and expenses to which Utility is entitled are paid. With respect to the cleaning of a satellite system, the owner or operator of a satellite system shall have the option of cleaning same within five (5) business days after receiving written notice from Utility that an inspection reveals that a cleaning is required. Should the owner or operator of such a satellite system fail to have the necessary cleaning performed within that time frame, Utility may arrange for cleaning by a qualified contractor and

the cost of same, without mark-up, may be billed to the owner or operator of said system.

9. **CONSTRUCTION STANDARDS**

The Utility requires all construction to be performed in accordance with generally accepted engineering standards, at a minimum. The Utility from time to time may require that more stringent construction standards be followed in constructing parts of the system.

10. **EXTENSION OF UTILITY SERVICE LINES AND MAINS**

The Utility shall have no obligation at its expense to extend its utility service lines or mains in order to permit any customer to discharge acceptable wastewater into its sewer system. However, anyone or any entity which is willing to pay all costs associated with extending an appropriately sized and constructed main or utility service line from his/her/its premises to an appropriate connection point on the Utility's sewer system may receive service, subject to paying the appropriate fees and charges set forth in this rate schedule, complying with the guidelines and standards hereof, and, where appropriate, agreeing to pay an acceptable amount for multi-tap capacity.

11. **CONTRACTS FOR MULTI-TAP CAPACITY**

The Utility shall have no obligation to modify or expand its plant, other facilities or mains to treat the sewerage of any person or entity requesting multi-taps (a commitment for five or more taps) unless such person or entity first agrees to pay an acceptable amount to the Utility to defray all or a portion of the Utility's costs to make modifications or expansions thereto.

12. **SINGLE FAMILY EQUIVALENT**

A single family equivalent (SFE) shall be determined by using the South Carolina Department of Environmental Control Guidelines for Unit Contributory Loading for Domestic Wastewater Treatment Facilities --6 S.C. Code Ann. Regs. 61-67 Appendix A (Supp. 2016). Where the Utility has reason to suspect that a person or entity is exceeding design loadings established by the Guidelines for Unit Contributory Loadings for Domestic Wastewater Treatment Facilities, the Utility shall have the right to request and receive water usage records from the provider of water to such person or entity. Also, the Utility shall have the right to conduct an "on premises" inspection of the customer's premises. If it is determined that actual flows or loadings are greater than the design flows or loadings, then the Utility shall recalculate the customer's equivalency rating based on actual flows or loadings and thereafter bill for its services in accordance with such recalculated loadings.

13. **TAMPERING CHARGE**

In the event the Utility's equipment, mains, service lines, elder valves, or other plant or facilities have been damaged or tampered with by a customer, the Utility may charge the customer responsible for the damage the actual cost of repairing the Utility's equipment, plant or facilities not to exceed $250.00. The tampering charge shall be paid in full prior to the Utility re-connecting service or continuing the provision of service. This charge shall be in addition to any notification, reconnection, or similar charges that the Utility is entitled to impose under this rate schedule or under Commission orders, rules, and regulations.

14. **ORDER NO. 2020-561 DECREMENT RIDER**

In accordance with the requirements of Commission Order No. 2020-561, issued August 20, 2020, the monthly service rate per residential customer and per commercial customer SFE shown in Sewer Rate Schedule Section 1 above shall be reduced to $54.93 until such time as the $2,032,146 regulatory liability referenced in that Order is reduced to zero ($0.00) dollars. Once that regulatory liability amount is reduced to $0.00, the monthly service rate listed in Sewer Rate Schedule Section 1 above shall apply to all subsequent billing periods and may be applied on a partial basis in the first such subsequent billing period to the extent necessary.

Appendix - D Project Opinions of Probable Costs

Appendix - D-1 Cedar Creek Option

Appendix - D.1.1 20" Force Main Option – 2 MGD

Preliminary Opinion of Probable Cost

FAIRFIELD JOINT WATER AND SEWER SYSTEM

Wastewater System

2 MGD Forcemain to Cedar Creek		
For Budgetary Purposes Only		
		Construction
18" FORCEMAIN		$ 1,209,561
Construction Sub-Total		$ 1,209,561
Construction Contingency	10%	$ 120,956
Total Opinion of Probable Construction Cost		$ 1,330,518
Engineering Costs		$ 133,052
Total Estimated Project Cost		$ 1,463,569

Notes:
* This opinion of probable cost is based on a preliminary design and the estimated quantities for the project only. Since it is impossible to control the parameters of the final design, market forces, cost of labor, materials, and means and methods, this estimate is not a guarantee of the project cost, and the actual project cost may vary from this estimate.

Fairfield Joint Water and Sewer System - Wastewater System

Opinion of Probable Cost - For Budgetary Purposes Only

18" FORCEMAIN			
to Cedar Creek	2 MGD		
ITEM OF WORK	QUANTITY	UNIT	TOTAL
GENERAL CONDITIONS			
Bond & Insurance (2.5%)	1	LS	$28,937
General Conditions/Mobilization (2%)	1	LS	$23,150
Subtotal for GENERAL CONDITIONS			**$52,086**
PIPING			
18" C905 PVC DR25 Forcemain Piping Installed includes joint restraint	5000	LF	$496,000
18" Plug Valves	2	EA	$33,000
Air Release Valves	3	EA	$19,800
Fittings	15	TON	$179,250
36" bore and jack including DI Piping	500	LF	$372,875
Cut and Replace Asphalt Road	500	LF	$33,000
Restoration/Grassing/Erosion Control	1	LS	$23,550
Subtotal for PIPING			**$1,157,475**
FORCEMAIN CONSTRUCTION TOTAL			**$1,209,561**

Notes:

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Fairfield Joint Water and Sewer System

Phase I - MBR WWTP

Opinion of Probable Cost - For Budgetary Purposes Only

				Construction
2 MGD				$ 33,435,239
Construction Sub-Total				**$ 33,435,239**
Construction Contingency	**10%**			**$ 3,343,524**
Total Opinion of Probable Construction Cost				**$ 36,778,763**
Engineering Costs				**$ 3,677,876**
Total Estimated Project Cost				**$ 40,456,639**

Notes:

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Fairfield County Wastewater System
PHASE I - MBR WWTP
Opinion of Probable Cost - For Budgetary Purposes Only

2 MGD			
ITEM OF WORK	**QUANTITY**	**UNIT**	**TOTAL**
GENERAL CONDITIONS			
Bond & Insurance (2.5%)	1	LS	$835,881
General Conditions / Mobilization (2.5%)	1	LS	$835,881
Subtotal for GENERAL CONDITIONS			**$ 1,671,762**
SITE WORK			
Clearing & Grubbing only	10	AC	$107,000
Erosion Control	12	AC	$37,680
Excavation, Earth Moving, Backfilling and Grading	55000	CY	$1,432,750
Fine Grading, Base Course & Asphalt Paving	5000	SY	$422,750
Storm Drainage System - Catch Basins, Piping, etc.	1	LS	$132,000
Sidewalk & Misc. Concrete	2000	FT^2	$94,900
Seeding-Grassing-Landscaping	5	AC	$39,250
Fencing (Standard 6' Barbed Wire Galvanized Fence)	2200	LF	$92,620
Subtotal for SITE WORK			**$ 2,358,950**
PLANT PIPING & VALVES			
18" DI Piping	200	LF	$39,250
16" DI Piping	200	LF	$39,250
4" DI Piping	500	LF	$23,550
8" DI Piping	200	LF	$11,880
10" DI Piping	750	LF	$54,450
6" DI Piping	150	LF	$8,243
Pipe Fittings	5	Tons	$165,000
Misc. Valves, Hydrants & Small Piping not Included elsewhere, etc.	1	LS	$39,250
Water System	1	LS	$528,000
Subtotal for PLANT PIPING & VALVES			**$ 908,873**
CONTROL/LAB BUILDING			
Building Construction	2000	SF	$521,000
Additional Equipment & Accessories for Lab	1	EA	$66,000
Miscellaneous Items	1	LS	$46,200
Subtotal for Control/Lab Building			**$ 633,200**

ITEM OF WORK	QUANTITY	UNIT	TOTAL
HEADWORKS & EQUALIZATION BASIN			
Concrete Structure	250	CY	$311,375
Grout	10	CY	$1,820
Mechanical Screen (Screens, SS screw compactor & controls)	2	EA	$528,000
Grit removal	1	LS	$594,000
Slide Plates (alum) - Screens & Effluent	12	EA	$396,000
Handrails	150	LF	$11,775
Aluminum grating	300	SF	$18,840
24" Magnetic Flowmeter	1	EA	$47,100
Aluminum Stairs	1	EA	$23,550
Concrete Lining & Misc. Painting	1	LS	$33,000
Miscellaneous Metals (weirs)	1	LS	$26,400
Refridgerated Sampling Equipment	1	LS	$33,000
Miscellanous Equipment	1	LS	$26,400
Equallization Tank	1	LS	$2,376,000
Equalization Tank Equipment & Pumps	1	LS	$1,056,000
Dumpsters	1	EA	$3,300
Subtotal for Headworks & Equalization Basin			**$ 5,486,560**
A2O & MBR PROCESS TRAIN			
Concrete Basins For A2O & MBR Process	1335	CY	$1,662,743
Concrete Lining & Misc. Painting	1	LS	$264,000
A2O & MBR System Equipment (Including VFDs, Control System & Piping))	2	LS	$8,844,000
Aluminum Stairs	2	LS	$39,600
Handrails	650	LF	$51,025
Grating (Aluminum)	500	FT^2	$31,400
Paint	0	LS	$0
Safety Equip. & Other Misc. Equip.	1	LS	$13,200
Subtotal for MBR Process Trains			**$ 10,905,968**
EFFLUENT JUNCTION BOX & PUMP STATION			
Concrete Structure	30	CY	$34,260
Concrete Lining & Misc. Painting	1	LS	$13,200
Aluminum Stairs	1	LS	$11,775
Slide Gates (SS)	2	EA	$13,200
Grating (Aluminum)	100	FT^2	$3,925
Painting	1	LS	$11,775
Handrail	50	LF	$3,925
Pump Station	1	LS	$528,000
Effluent 24" DIP	2600	LF	$339,560
Subtotal for EFFLUENT JUNCTION BOX & PS			**$ 959,620**
DISINFECTION (UV) & ALUM SYSTEMS			
Alum Building	200	FT^2	$62,800
Alum Concrete Containment Structure and Miscellaneous	30	CY	$37,365
Alum Feed Equipment, controls & Tanks	1	LS	$264,000
Effluent UV Concrete Structure	50	CY	$62,275
UV Equipment, Piping, Miscellaneous	2	LS	$471,000
Painting	1	LS	$16,500
Subtotal for DISINFECTION & CHEMICAL SYSTEMS			**$ 913,940**

ITEM OF WORK	QUANTITY	UNIT	TOTAL
POST AERATION			
Concrete Structures	100	CY	$124,550
Equipment (Blowers, Membranes, Diffusers, Piping, Valves, Etc.)	1	LS	$165,000
Internal Valves, Piping, Etc, Not By Equipment Supplier	1	LS	$15,700
Aluminun Stairs	1	EA	$6,600
Painting	1	LS	$9,900
Refridgerated Sampling Station	1	LS	$26,400
Effluent Flow Metering	1	LS	$47,100
Misc. Metals and stairs	1	LS	$9,900
Subtotal for POST AERATION			**$ 405,150**
AEROBIC DIGESTERS			
Concrete Structures	350	CY	$435,925
Walking Bridges steel/aluminum	1	LS	$99,000
Miscellaneous Valving and Piping	1	LS	$33,000
Digester Equipment (Blowers, Membranes, Diffusers, Piping, Valves, Etc.)	1	LS	$928,550
Sludge Pumps & Piping	1	EA	$264,000
Aluminun Stairs	1	EA	$5,940
Painting	1	LS	$26,400
Misc. Metals	1	LS	$8,250
Subtotal for AEROBIC DIGESTERS			**$ 1,801,065**
SLUDGE DEWATERING FACILITY			
2 Meter Belt Filter Press	1	LS	$640,200
Conveyor System	1	LS	$99,000
Polymer Feed Equipment & tanks	1	LS	$66,000
Dewatering Building	2500	FT^2	$392,500
Ventilation	1	LS	$125,600
Painting	1	LS	$19,800
Miscellaneous	1	LS	$26,400
Subtotal for SLUDGE DEWATERING FACILITY			**$ 1,369,500**
ELECTRICAL & SWITCHGEAR	1	LS	**$ 4,854,797**
GENERATOR			
Equipment	1	LS	$660,000
Concrete Structures	20	CY	$24,910
Aluminun Platform and Stairs	1	EA	$19,800
Misc. Metals	1	LS	$19,800
Subtotal for GENERATOR			**$ 724,510**
SCADA SYSTEM, MISC. INSTRUMENTATION & CONTROLS	1	LS	**$ 441,345**
WASTEWATER TREATMENT PLANT CONSTRUCTION TOTAL			**$ 33,435,239**

Notes:

* This opinion of probable cost is based on a preliminary design and the estimated quantities for the project only. Since it is impossible to control the parameters of the final design, market forces, cost of labor, materials, and means and methods, this estimate is not a guarantee of the project cost, and the actual project cost may vary from this estimate.

Preliminary Opinion of Probable Cost

FAIRFIELD JOINT WATER AND SEWER SYSTEM

Wastewater System

4 MGD Forcemain to Cedar Creek		
For Budgetary Purposes Only		Construction
24" FORCEMAIN		$ 1,403,409
Construction Sub-Total		**$ 1,403,409**
Construction Contingency	**10%**	**$ 140,341**
Total Opinion of Probable Construction Cost		**$ 1,543,750**
Engineering Costs		**$ 154,375**
Total Estimated Project Cost		**$ 1,698,125**

Notes:
* This opinion of probable cost is based on a preliminary design and the estimated quantities for the project only. Since it is impossible to control the parameters of the final design, market forces, cost of labor, materials, and means and methods, this estimate is not a guarantee of the project cost, and the actual project cost may vary from this estimate.

Fairfield Joint Water and Sewer System - Wastewater System

Opinion of Probable Cost - For Budgetary Purposes Only

24" FORCEMAIN			
to Cedar Creek	4 MGD		
ITEM OF WORK	QUANTITY	UNIT	TOTAL
GENERAL CONDITIONS			
Bond & Insurance (2.5%)	1	LS	$33,574
General Conditions/Mobilization (2%)	1	LS	$26,860
Subtotal for GENERAL CONDITIONS			**$60,434**
PIPING			
24" C905 PVC DR25 Forcemain Piping Installed includes joint restraint	5000	LF	$681,500
24" Plug Valves	2	EA	$33,000
Air Release Valves	3	EA	$19,800
Fittings	15	TON	$179,250
36" bore and jack including DI Piping	500	LF	$372,875
Cut and Replace Asphalt Road	500	LF	$33,000
Restoration/Grassing/Erosion Control	1	LS	$23,550
Subtotal for PIPING			**$1,342,975**
FORCEMAIN CONSTRUCTION TOTAL			**$1,403,409**

Notes:

* This opinion of probable cost is based on a preliminary design and the estimated quantities for the project only. Since it is impossible to control the parameters of the final design, market forces, cost of labor, materials, and means and methods, this estimate is not a guarantee of the project cost, and the actual project cost may vary from this estimate.

Fairfield Joint Water and Sewer System

Phase II - MBR WWTP

Opinion of Probable Cost - For Budgetary Purposes Only

				Construction
ADDITIONAL 2 MGD FOR A TOTAL OF 4 MGD				$ 25,115,781
Construction Sub-Total				**$ 25,115,781**
Construction Contingency	**10%**			**$ 2,511,578**
Total Opinion of Probable Construction Cost				**$ 27,627,359**
Engineering Costs				**$ 2,762,736**
Total Estimated Project Cost				**$ 30,390,095**

Notes:

* This opinion of probable cost is based on a preliminary design and the estimated quantities for the project only. Since it is impossible to control the parameters of the final design, market forces, cost of labor, materials, and means and methods, this estimate is not a guarantee of the project cost, and the actual project cost may vary from this estimate.

Fairfield County Wastewater System
PHASE II - MBR WWTP
Opinion of Probable Cost - For Budgetary Purposes Only

ADDITIONAL 2 MGD FOR A TOTAL OF 4 MGD			
ITEM OF WORK	**QUANTITY**	**UNIT**	**TOTAL**
GENERAL CONDITIONS			
Bond & Insurance (2.5%)	1	LS	$627,895
General Conditions / Mobilization (2.5%)	1	LS	$627,895
Subtotal for GENERAL CONDITIONS			**$ 1,255,789**
SITE WORK			
Clearing & Grubbing only	0	AC	$0
Erosion Control	4	AC	$12,560
Excavation, Earth Moving, Backfilling and Grading	20000	CY	$521,000
Fine Grading, Base Course & Asphalt Paving	1000	SY	$84,550
Storm Drainage System - Catch Basins, Piping, etc.	0	LS	$0
Sidewalk & Misc. Concrete	500	FT^2	$23,725
Seeding-Grassing-Landscaping	2	AC	$15,700
Fencing (Standard 6' Barbed Wire Galvanized Fence)	0	LF	$0
Subtotal for SITE WORK			**$ 657,535**
PLANT PIPING & VALVES			
18" DI Piping	200	LF	$39,250
16" DI Piping	200	LF	$39,250
4" DI Piping	500	LF	$23,550
8" DI Piping	200	LF	$11,880
10" DI Piping	750	LF	$54,450
6" DI Piping	150	LF	$8,243
Pipe Fittings	5	Tons	$165,000
Misc. Valves, Hydrants & Small Piping not Included elsewhere, etc.	1	LS	$39,250
Water System	1	LS	$132,000
Subtotal for PLANT PIPING & VALVES			**$ 512,873**
CONTROL/LAB BUILDING			
Building Construction	0	SF	$0
Additional Equipment & Accessories for Lab	0	EA	$0
Miscellaneous Items	0	LS	$0
Subtotal for Control/Lab Building			**$ -**

ITEM OF WORK	QUANTITY	UNIT	TOTAL
HEADWORKS & EQUALIZATION BASIN			
Concrete Structure	0	CY	$0
Grout	0	CY	$0
Mechanical Screen (Screens, SS screw compactor & controls)	1	EA	$264,000
Grit removal	1	LS	$594,000
Slide Plates (alum) - Screens & Effluent	3	EA	$99,000
Handrails	25	LF	$1,963
Aluminum grating	50	SF	$3,140
24" Magnetic Flowmeter	0	EA	$0
Aluminum Stairs	0	EA	$0
Concrete Lining & Misc. Painting	0	LS	$0
Miscellaneous Metals (weirs)	1	LS	$26,400
Refridgerated Sampling Equipment	0	LS	$0
Miscellanous Equipment	1	LS	$26,400
Equallization Tank	1	LS	$2,376,000
Equalization Tank Equipment & Pumps	1	LS	$1,056,000
Dumpsters	1	EA	$3,300
Subtotal for Headworks & Equalization Basin			**$ 4,450,203**
A2O & MBR PROCESS TRAIN			
Concrete Basins For A2O & MBR Process	1335	CY	$1,662,743
Concrete Lining & Misc. Painting	1	LS	$264,000
A2O & MBR System Equipment (Including VFDs, Control System & Piping))	2	LS	$8,844,000
Aluminum Stairs	2	LS	$39,600
Handrails	650	LF	$51,025
Grating (Aluminum)	500	FT^2	$31,400
Paint	0	LS	$0
Safety Equip. & Other Misc. Equip.	1	LS	$13,200
Subtotal for MBR Process Trains			**$ 10,905,968**
EFFLUENT JUNCTION BOX & PUMP STATION			
Concrete Structure	0	CY	$0
Concrete Lining & Misc. Painting	0	LS	$0
Aluminum Stairs	0	LS	$0
Slide Gates (SS)	0	EA	$0
Grating (Aluminum)	0	FT^2	$0
Painting	0	LS	$0
Handrail	0	LF	$0
Pump Station	1	LS	$198,000
Effluent 24" DIP	0	LF	$0
Subtotal for EFFLUENT JUNCTION BOX & PS			**$ 198,000**
DISINFECTION (UV) & ALUM SYSTEMS			
Alum Building	0	FT^2	$0
Alum Concrete Containment Structure and Miscellaneous	0	CY	$0
Alum Feed Equipment, controls & Tanks	1	LS	$132,000
Effluent UV Concrete Structure	0	CY	$0
UV Equipment, Piping, Miscellaneous	1	LS	$235,500
Painting	0	LS	$0
Subtotal for DISINFECTION & CHEMICAL SYSTEMS			**$ 367,500**

ITEM OF WORK	QUANTITY	UNIT	TOTAL
POST AERATION			
Concrete Structures	0	CY	$0
Equipment (Blowers, Membranes, Diffusers, Piping, Valves, Etc.)	0	LS	$0
Internal Valves, Piping, Etc, Not By Equipment Supplier	0	LS	$0
Aluminun Stairs	0	EA	$0
Painting	0	LS	$0
Refridgerated Sampling Station	0	LS	$0
Effluent Flow Metering	0	LS	$0
Misc. Metals and stairs	0	LS	$0
Subtotal for POST AERATION			**$ -**
AEROBIC DIGESTERS			
Concrete Structures	350	CY	$435,925
Walking Bridges steel/aluminum	1	LS	$99,000
Miscellaneous Valving and Piping	1	LS	$33,000
Digester Equipment (Blowers, Membranes, Diffusers, Piping, Valves, Etc.)	1	LS	$928,550
Sludge Pumps & Piping	1	EA	$264,000
Aluminun Stairs	1	EA	$5,940
Painting	1	LS	$26,400
Misc. Metals	1	LS	$8,250
Subtotal for AEROBIC DIGESTERS			**$ 1,801,065**
SLUDGE DEWATERING FACILITY			
2 Meter Belt Filter Press	0	LS	$0
Conveyor System	0	LS	$0
Polymer Feed Equipment & tanks	1	LS	$66,000
Dewatering Building	0	FT^2	$0
Ventilation	0	LS	$0
Painting	0	LS	$0
Miscellaneous	0	LS	$0
Subtotal for SLUDGE DEWATERING FACILITY			**$ 66,000**
ELECTRICAL & SWITCHGEAR	1	LS	**$ 3,646,811**
GENERATOR			
Equipment	1	LS	$858,000
Concrete Structures	20	CY	$24,910
Aluminun Platform and Stairs	1	EA	$19,800
Misc. Metals	1	LS	$19,800
Subtotal for GENERATOR			**$ 922,510**
SCADA SYSTEM, MISC. INSTRUMENTATION & CONTROLS	1	LS	**$ 331,528**
WASTEWATER TREATMENT PLANT CONSTRUCTION TOTAL			**$ 25,115,781**

Notes:

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Preliminary Opinion of Probable Cost

FAIRFIELD JOINT WATER AND SEWER SYSTEM

Wastewater System

2 MGD Jenkinsville Forcemain to Cedar Creek				
For Budgetary Purposes Only				
				Construction
14" FORCEMAIN				$ 8,781,407
Construction Sub-Total				**$ 8,781,407**
Construction Contingency	**10%**			**$ 878,141**
	Qty	Unit	Unit Cost	Total
Forcemain Easement Acquisition	28	AC	$ 12,000	$ 336,000
Total Land Acquisition Cost				**$ 336,000**
Total Opinion of Probable Construction Cost				**$ 9,995,547**
Engineering Costs				**$ 999,555**
Total Estimated Project Cost				**$ 10,995,102**

Notes:
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Fairfield Joint Water and Sewer System - Wastewater System

Opinion of Probable Cost - For Budgetary Purposes Only

14" Jenkinsville Forcemain to Cedar Creek	2 MGD		
ITEM OF WORK	QUANTITY	UNIT	TOTAL
GENERAL CONDITIONS			
Bond & Insurance (2.5%)	1	LS	$210,082
General Conditions/Mobilization (2%)	1	LS	$168,065
Subtotal for GENERAL CONDITIONS			**$378,147**
PIPING			
14" C905 PVC DR25 Forcemain Piping Installed includes joint restraint	79000	LF	$5,778,850
14" Plug Valves	16	EA	$158,400
Air Release Valves	30	EA	$198,000
Fittings	100	TON	$1,195,000
Bore and jack including DI Piping	1000	LF	$745,750
Cut and Replace Asphalt Road	1200	LF	$79,200
Restoration/Grassing/Erosion Control	1	LS	$248,060
Subtotal for PIPING			**$8,403,260**
FORCEMAIN CONSTRUCTION TOTAL			**$8,781,407**

Notes:

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Fairfield Joint Water and Sewer System

Phase III - MBR WWTP

Opinion of Probable Cost - For Budgetary Purposes Only

				Construction
ADDITIONAL 2 MGD FOR A TOTAL OF 6 MGD				$ 31,639,907
Construction Sub-Total				**$ 31,639,907**
Construction Contingency	**10%**			**$ 3,163,991**
Total Opinion of Probable Construction Cost				**$ 34,803,897**
Engineering Costs				**$ 3,480,390**
Total Estimated Project Cost				**$ 38,284,287**

Notes:
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Fairfield County Wastewater System
PHASE III
Opinion of Probable Cost - For Budgetary Purposes Only

2 MGD MBR WWTP			
ITEM OF WORK	**QUANTITY**	**UNIT**	**TOTAL**
GENERAL CONDITIONS			
Bond & Insurance (2.5%)	1	LS	$790,998
General Conditions / Mobilization (2.5%)	1	LS	$790,998
Subtotal for GENERAL CONDITIONS			**$ 1,581,995**
SITE WORK			
Clearing & Grubbing only	4	AC	$42,800
Erosion Control	6	AC	$18,840
Excavation, Earth Moving, Backfilling and Grading	15000	CY	$390,750
Fine Grading, Base Course & Asphalt Paving	2500	SY	$211,375
Storm Drainage System - Catch Basins, Piping, etc.	1	LS	$132,000
Sidewalk & Misc. Concrete	1000	FT^2	$47,450
Seeding-Grassing-Landscaping	4	AC	$31,400
Fencing (Standard 6' Barbed Wire Galvanized Fence)	1500	LF	$63,150
Subtotal for SITE WORK			**$ 937,765**
PLANT PIPING & VALVES			
18" DI Piping	200	LF	$39,250
16" DI Piping	200	LF	$39,250
4" DI Piping	500	LF	$23,550
8" DI Piping	200	LF	$11,880
10" DI Piping	750	LF	$54,450
6" DI Piping	150	LF	$8,243
Pipe Fittings	5	Tons	$165,000
Misc. Valves, Hydrants & Small Piping not Included elsewhere, etc.	1	LS	$39,250
Water System	1	LS	$528,000
Subtotal for PLANT PIPING & VALVES			**$ 908,873**
CONTROL/LAB BUILDING			
Building Construction	2000	SF	$521,000
Additional Equipment & Accessories for Lab	1	EA	$66,000
Miscellaneous Items	1	LS	$46,200
Subtotal for Control/Lab Building			**$ 633,200**

ITEM OF WORK	QUANTITY	UNIT	TOTAL
HEADWORKS & EQUALIZATION BASIN			
Concrete Structure	250	CY	$311,375
Grout	10	CY	$1,820
Mechanical Screen (Screens, SS screw compactor & controls)	2	EA	$528,000
Grit removal	1	LS	$594,000
Slide Plates (alum) - Screens & Effluent	12	EA	$396,000
Handrails	150	LF	$11,775
Aluminum grating	300	SF	$18,840
24" Magnetic Flowmeter	1	EA	$47,100
Aluminum Stairs	1	EA	$23,550
Concrete Lining & Misc. Painting	1	LS	$33,000
Miscellaneous Metals (weirs)	1	LS	$26,400
Refridgerated Sampling Equipment	1	LS	$33,000
Miscellanous Equipment	1	LS	$26,400
Equallization Tank	1	LS	$2,376,000
Equalization Tank Equipment & Pumps	1	LS	$1,056,000
Dumpsters	1	EA	$3,300
Subtotal for Headworks & Equalization Basin			**$ 5,486,560**
A2O & MBR PROCESS TRAIN			
Concrete Basins For A2O & MBR Process	1335	CY	$1,662,743
Concrete Lining & Misc. Painting	1	LS	$264,000
A2O & MBR System Equipment (Including VFDs, Control System & Piping))	2	LS	$8,844,000
Aluminum Stairs	2	LS	$39,600
Handrails	650	LF	$51,025
Grating (Aluminum)	500	FT^2	$31,400
Paint	0	LS	$0
Safety Equip. & Other Misc. Equip.	1	LS	$13,200
Subtotal for MBR Process Trains			**$ 10,905,968**
EFFLUENT JUNCTION BOX & PUMP STATION			
Concrete Structure	30	CY	$34,260
Concrete Lining & Misc. Painting	1	LS	$13,200
Aluminum Stairs	1	LS	$11,775
Slide Gates (SS)	2	EA	$13,200
Grating (Aluminum)	100	FT^2	$3,925
Painting	1	LS	$11,775
Handrail	50	LF	$3,925
Pump Station	1	LS	$528,000
Effluent 24" DIP	2600	LF	$339,560
Subtotal for EFFLUENT JUNCTION BOX & PS			**$ 959,620**
DISINFECTION (UV) & ALUM SYSTEMS			
Alum Building	200	FT^2	$62,800
Alum Concrete Containment Structure and Miscellaneous	30	CY	$37,365
Alum Feed Equipment, controls & Tanks	1	LS	$264,000
Effluent UV Concrete Structure	50	CY	$62,275
UV Equipment, Piping, Miscellaneous	2	LS	$471,000
Painting	1	LS	$16,500
Subtotal for DISINFECTION & CHEMICAL SYSTEMS			**$ 913,940**

ITEM OF WORK	QUANTITY	UNIT	TOTAL
POST AERATION			
Concrete Structures	100	CY	$124,550
Equipment (Blowers, Membranes, Diffusers, Piping, Valves, Etc.)	1	LS	$165,000
Internal Valves, Piping, Etc, Not By Equipment Supplier	1	LS	$15,700
Aluminun Stairs	1	EA	$6,600
Painting	1	LS	$9,900
Refridgerated Sampling Station	1	LS	$26,400
Effluent Flow Metering	1	LS	$47,100
Misc. Metals and stairs	1	LS	$9,900
Subtotal for POST AERATION			**$ 405,150**
AEROBIC DIGESTERS			
Concrete Structures	350	CY	$435,925
Walking Bridges steel/aluminum	1	LS	$99,000
Miscellaneous Valving and Piping	1	LS	$33,000
Digester Equipment (Blowers, Membranes, Diffusers, Piping, Valves, Etc.)	1	LS	$928,550
Sludge Pumps & Piping	1	EA	$264,000
Aluminun Stairs	1	EA	$5,940
Painting	1	LS	$26,400
Misc. Metals	1	LS	$8,250
Subtotal for AEROBIC DIGESTERS			**$ 1,801,065**
SLUDGE DEWATERING FACILITY			
2 Meter Belt Filter Press	1	LS	$640,200
Conveyor System	1	LS	$99,000
Polymer Feed Equipment & tanks	1	LS	$66,000
Dewatering Building	2500	FT^2	$392,500
Ventilation	1	LS	$125,600
Painting	1	LS	$19,800
Miscellaneous	1	LS	$26,400
Subtotal for SLUDGE DEWATERING FACILITY			**$ 1,369,500**
ELECTRICAL & SWITCHGEAR	1	LS	**$ 4,594,114**
GENERATOR			
Equipment	1	LS	$660,000
Concrete Structures	20	CY	$24,910
Aluminun Platform and Stairs	1	EA	$19,800
Misc. Metals	1	LS	$19,800
Subtotal for GENERATOR			**$ 724,510**
SCADA SYSTEM, MISC. INSTRUMENTATION & CONTROLS	1	LS	**$ 417,647**
WASTEWATER TREATMENT PLANT CONSTRUCTION TOTAL			**$ 31,639,907**

Notes:

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Preliminary Opinion of Probable Cost

FAIRFIELD JOINT WATER AND SEWER SYSTEM

Wastewater System

2 MGD Forcemain to Broad River					
For Budgetary Purposes Only					
					Construction
18" FORCEMAIN					$ 10,132,957
Construction Sub-Total					**$ 10,132,957**
Construction Contingency	**10%**				**$ 1,013,296**
	Qty	Unit	Unit Cost		Total
Forcemain Easement Acquisition	26	AC	$	12,000	$ 312,000
Total Land Acquisition Cost					**$ 312,000**
Total Opinion of Probable Construction Cost					**$ 11,458,253**
Engineering Costs					**$ 1,145,825**
Total Estimated Project Cost					**$ 12,604,079**

Notes:
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Fairfield Joint Water and Sewer System - Wastewater System

Opinion of Probable Cost - For Budgetary Purposes Only

18" FORCEMAIN			
to Broad River	2 MGD		
ITEM OF WORK	QUANTITY	UNIT	TOTAL
GENERAL CONDITIONS			
Bond & Insurance (2.5%)	1	LS	$242,415
General Conditions/Mobilization (2%)	1	LS	$193,932
Subtotal for GENERAL CONDITIONS			**$436,347**
PIPING			
18" C905 PVC DR25 Forcemain Piping Installed includes joint restraint	74000	LF	$7,340,800
18" Plug Valves	16	EA	$264,000
Air Release Valves	30	EA	$198,000
Fittings	70	TON	$836,500
36" bore and jack including DI Piping	1000	LF	$745,750
Cut and Replace Asphalt Road	1200	LF	$79,200
Restoration/Grassing/Erosion Control	1	LS	$232,360
Subtotal for PIPING			**$9,696,610**
FORCEMAIN CONSTRUCTION TOTAL			**$10,132,957**

Notes:

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Fairfield Joint Water and Sewer System

Phase I - BNR WWTP

Opinion of Probable Cost - For Budgetary Purposes Only

				Construction
2 MGD				$ 24,291,012
Construction Sub-Total				**$ 24,291,012**
Construction Contingency	**10%**			**$ 2,429,101**
	Qty	Unit	Unit Cost	Total
WWTP Land Acquisition	25	AC	$ 12,000	$ 300,000
Total Land Acquisition Cost				**$ 300,000**
Total Opinion of Probable Construction Cost				**$ 27,020,113**
Engineering Costs				**$ 2,702,011**
Total Estimated Project Cost				**$ 29,722,125**

Notes:

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Fairfield County Wastewater System
PHASE I
Opinion of Probable Cost - For Budgetary Purposes Only

2 MGD			
ITEM OF WORK	**QUANTITY**	**UNIT**	**TOTAL**
GENERAL CONDITIONS			
Bond & Insurance (2.5%)	1	LS	$607,275
General Conditions / Mobilization (2.5%)	1	LS	$607,275
Subtotal for GENERAL CONDITIONS			**$ 1,214,551**
SITE WORK			
Clearing & Grubbing only	8	AC	$85,600
Erosion Control	12	AC	$37,680
Excavation, Earth Moving, Backfilling and Grading	20000	CY	$521,000
Fine Grading, Base Course & Asphalt Paving	4500	SY	$380,475
Storm Drainage System - Catch Basins, Piping, etc.	1	LS	$132,000
Sidewalk & Misc. Concrete	2000	FT^2	$94,900
Seeding-Grassing-Landscaping	5	AC	$39,250
Fencing (Standard 6' Barbed Wire Galvanized Fence)	2200	LF	$92,620
Subtotal for SITE WORK			**$ 1,383,525**
PLANT PIPING & VALVES			
16" DI Piping	200	LF	$39,250
16" DI Piping	200	LF	$39,250
4" DI Piping	500	LF	$23,550
8" DI Piping	200	LF	$11,880
10" DI Piping	750	LF	$54,450
6" DI Piping	150	LF	$8,243
Pipe Fittings	5	Tons	$165,000
Misc. Valves, Hydrants & Small Piping not Included elsewhere, etc.	1	LS	$39,250
Potable Water System	1	LS	$561,000
Subtotal for PLANT PIPING & VALVES			**$ 941,873**
CONTROL/LAB BUILDING			
Building Construction	2000	SF	$521,000
Additional Equipment & Accessories for Lab	1	EA	$66,000
Miscellaneous Items	1	LS	$46,200
Subtotal for Control/Lab Building			**$ 633,200**
HEADWORKS			
Concrete Structure	250	CY	$311,375
Grout	10	CY	$1,820
Mechanical Screen (Screens, SS screw compactor & controls)	2	EA	$528,000
Grit removal	1	LS	$594,000
Slide Plates (alum) - Screens & Effluent	12	EA	$396,000
Handrails	150	LF	$11,775
Aluminum grating	300	SF	$18,840
24" Magnetic Flowmeter	1	EA	$47,100
Aluminum Stairs	1	EA	$23,550
Concrete Lining & Misc. Painting	1	LS	$33,000
Miscellaneous Metals (weirs)	1	LS	$26,400
Refridgerated Sampling Equipment	1	LS	$33,000
Miscellanous Equipment	1	LS	$26,400
Dumpsters	1	EA	$3,300
Subtotal for Headworks			**$ 2,054,560**

ITEM OF WORK	QUANTITY	UNIT	TOTAL
A^2O BNR Process Trains			
Concrete Basins For A2O Process	2100	CY	$2,615,550
Concrete Lining & Misc. Painting	1	LS	$314,000
A^2O System Equipment (Including VFDs & Control System)	2	LS	$1,755,000
Aluminum Stairs	2	LS	$39,600
Handrails	650	LF	$51,025
Grating (Aluminum)	500	FT^2	$31,400
Paint	0	LS	$0
Safety Equip. & Other Misc. Equip.	1	LS	$13,200
Subtotal for A^2O BNR Process Trains			**$ 4,819,775**
CLARIFIERS & RAS/WAS PS			
2 - 45' Diameter Concrete Tanks	350	CY	$435,925
1 - 65' Diameter Concrete Tanks	340	CY	$424,174
Concrete Lining & Misc. Painting	1	LS	$78,500
Clarifier Equipment	1	LS	$1,281,000
RAS/WAS Pump Station - Pumps, Control Panel & Accessories	1	LS	$264,000
RAS PS - 10" Mag Meters	2	EA	$47,100
RAS/WAS - 8" Mag Meter	2	EA	$31,400
8" Swing Check Valve	3	EA	$23,550
8" Plug Valve	3	EA	$25,905
Aluminum Stairs	2	LS	$39,600
Painting	0	LS	$0
Misc. Valves & Piping Not Listed Separately (Drain MHs)	1	LS	$46,200
Subtotal for CLARIFIERS & RAS/WAS PS			**$ 2,697,354**
SCUM PUMP STATION			
Scum Pumps	1	EA	$99,000
4" Swing Check Valve	2	EA	$9,420
4" Plug Valve	2	EA	$10,990
4" DI Piping	400	LF	$12,560
6' Concrete Wet Well	1	EA	$23,550
Painting and Wet Well Coating	1	LS	$47,100
Misc. Valves & Piping Not Listed Separately	1	LS	$15,700
Subtotal for SCUM PUMP STATION			**$ 218,320**
EFFLUENT JUNCTION BOX & PUMP STATION			
Concrete Structure	30	CY	$34,260
Concrete Lining & Misc. Painting	1	LS	$13,200
Aluminum Stairs	1	LS	$11,775
Slide Gates (SS)	2	EA	$13,200
Grating (Aluminum)	100	FT^2	$3,925
Painting	1	LS	$11,775
Handrail	50	LF	$3,925
Pump Station	1	LS	$528,000
Effluent 24" DIP	2600	LF	$340,470
Subtotal for EFFLUENT JUNCTION BOX & PS			**$ 960,530**
DISINFECTION (UV) & ALUM SYSTEMS			
Alum Building	200	FT^2	$62,800
Alum Concrete Containment Structure and Miscellaneous	30	CY	$37,365
Alum Feed Equipment, controls & Tanks	1	LS	$264,000
Effluent UV Concrete Structure	50	CY	$62,275
UV Equipment, Piping, Miscellaneous	2	LS	$471,000
Painting	1	LS	$16,500
Subtotal for DISINFECTION & CHEMICAL SYSTEMS			**$ 913,940**

ITEM OF WORK	QUANTITY	UNIT	TOTAL
POST AERATION			
Concrete Structures	100	CY	$124,550
Equipment (Blowers, Diffusers, Piping, Valves, Etc.)	1	LS	$165,000
Internal Valves, Piping, Etc, Not By Equipment Supplier	1	LS	$15,700
Aluminun Stairs	1	EA	$6,600
Painting	1	LS	$9,900
Refridgerated Sampling Station	1	LS	$26,400
Effluent Flow Metering	1	LS	$47,100
Misc. Metals and stairs	1	LS	$9,900
Subtotal for POST AERATION			**$ 405,150**
AEROBIC DIGESTERS			
Concrete Structures	350	CY	$435,925
Walking Bridges steel/aluminum	1	LS	$99,000
Miscellaneous Valving and Piping	1	LS	$33,000
Digester Equipment (Blowers, Membranes, Diffusers, Piping, Valves, Etc.)	1	LS	$1,051,600
Sludge Pumps & Piping	1	EA	$264,000
Aluminun Stairs	1	EA	$5,940
Painting	1	LS	$26,400
Misc. Metals	1	LS	$8,250
Subtotal for AEROBIC DIGESTERS			**$ 1,924,115**
SLUDGE DEWATERING FACILITY			
2 Meter Belt Filter Press	1	LS	$640,200
Conveyor System	1	LS	$99,000
Polymer Feed Equipment & tanks	1	LS	$66,000
Dewatering Building	2500	FT^2	$392,500
Ventilation	1	LS	$125,600
Painting	1	LS	$19,800
Miscellaneous	1	LS	$26,400
Subtotal for SLUDGE DEWATERING FACILITY			**$ 1,369,500**
ELECTRICAL & SWITCHGEAR	1	LS	**$ 3,847,696**
GENERATOR			
Equipment	1	LS	$528,000
Concrete Structures	15	CY	$18,683
Aluminun Platform and Stairs	1	EA	$19,800
Misc. Metals	1	LS	$19,800
Subtotal for GENERATOR			**$ 586,283**
SCADA SYSTEM, MISC. INSTRUMENTATION & CONTROLS	1	LS	**$ 320,641**
WASTEWATER TREATMENT PLANT CONSTRUCTION TOTAL			**$ 24,291,012**

Notes:

* This opinion of probable cost is based on a preliminary design and the estimated quantities for the project only. Since it is impossible to control the parameters of the final design, market forces, cost of labor, materials, and means and methods, this estimate is not a guarantee of the project cost, and the actual project cost may vary from this estimate.

Preliminary Opinion of Probable Cost

FAIRFIELD JOINT WATER AND SEWER SYSTEM

Wastewater System

4 MGD Forcemain to Broad River					
For Budgetary Purposes Only					
					Construction
24" FORCEMAIN					$ 13,001,900
Construction Sub-Total					**$ 13,001,900**
Construction Contingency	**10%**				**$ 1,300,190**
	Qty	Unit	Unit Cost		Total
Forcemain Easement Acquisition	26	AC	$	12,000	$ 312,000
Total Land Acquisition Cost					**$ 312,000**
Total Opinion of Probable Construction Cost					**$ 14,614,090**
Engineering Costs					**$ 1,461,409**
Total Estimated Project Cost					**$ 16,075,500**

Notes:
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Fairfield Joint Water and Sewer System - Wastewater System

Opinion of Probable Cost - For Budgetary Purposes Only

24" FORCEMAIN			
to Broad River	4 MGD		
ITEM OF WORK	QUANTITY	UNIT	TOTAL
GENERAL CONDITIONS			
Bond & Insurance (2.5%)	1	LS	$311,050
General Conditions/Mobilization (2%)	1	LS	$248,840
Subtotal for GENERAL CONDITIONS			**$559,890**
PIPING			
24" C905 PVC DR25 Forcemain Piping Installed includes joint restraint	74000	LF	$10,086,200
24" Plug Valves	16	EA	$264,000
Air Release Valves	30	EA	$198,000
Fittings	70	TON	$836,500
36" bore and jack including DI Piping	1000	LF	$745,750
Cut and Replace Asphalt Road	1200	LF	$79,200
Restoration/Grassing/Erosion Control	1	LS	$232,360
Subtotal for PIPING			**$12,442,010**
FORCEMAIN CONSTRUCTION TOTAL			**$13,001,900**

Notes:

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Fairfield Joint Water and Sewer System

Phase II - BNR WWTP

Opinion of Probable Cost - For Budgetary Purposes Only

				Construction
ADDITIONAL 2 MGD FOR A TOTAL OF 4 MGD				$ 15,957,443
Construction Sub-Total				**$ 15,957,443**
Construction Contingency	**10%**			**$ 1,595,744**
	Qty	Unit	Unit Cost	Total
WWTP Land Acquisition	25	AC	$ 12,000	$ 300,000
Total Land Acquisition Cost				**$ 300,000**
Total Opinion of Probable Construction Cost				**$ 17,853,188**
Engineering Costs				**$ 1,785,319**
Total Estimated Project Cost				**$ 19,638,506**

Notes:
* This opinion of probable cost is based on a preliminary design and the estimated quantities for the project only. Since it is impossible to control the parameters of the final design, market forces, cost of labor, materials, and means and methods, this estimate is not a guarantee of the project cost, and the actual project cost may vary from this estimate.

Fairfield County Wastewater System
PHASE II - BNR WWTP
Opinion of Probable Cost - For Budgetary Purposes Only

ADDITIONAL 2 MGD FOR A TOTAL OF 4 MGD			
ITEM OF WORK	**QUANTITY**	**UNIT**	**TOTAL**
GENERAL CONDITIONS			
Bond & Insurance (2.5%)	1	LS	$398,936
General Conditions / Mobilization (2.5%)	1	LS	$398,936
Subtotal for GENERAL CONDITIONS			**$ 797,872**
SITE WORK			
Clearing & Grubbing only	0	AC	$0
Erosion Control	4	AC	$12,560
Excavation, Earth Moving, Backfilling and Grading	10000	CY	$260,500
Fine Grading, Base Course & Asphalt Paving	3000	SY	$253,650
Storm Drainage System - Catch Basins, Piping, etc.	0	LS	$0
Sidewalk & Misc. Concrete	500	FT^2	$23,725
Seeding-Grassing-Landscaping	2	AC	$15,700
Fencing (Standard 6' Barbed Wire Galvanized Fence)	0	LF	$0
Subtotal for SITE WORK			**$ 566,135**
PLANT PIPING & VALVES			
16" DI Piping	200	LF	$39,250
16" DI Piping	200	LF	$39,250
4" DI Piping	500	LF	$23,550
8" DI Piping	200	LF	$11,880
10" DI Piping	750	LF	$54,450
6" DI Piping	150	LF	$8,243
Pipe Fittings	5	Tons	$165,000
Misc. Valves, Hydrants & Small Piping not Included elsewhere, etc.	1	LS	$39,250
Potable Water System	1	LS	$132,000
Subtotal for PLANT PIPING & VALVES			**$ 512,873**
CONTROL/LAB BUILDING			
Building Construction	0	SF	$0
Additional Equipment & Accessories for Lab	0	EA	$0
Miscellaneous Items	0	LS	$0
Subtotal for Control/Lab Building			**$ -**
HEADWORKS			
Concrete Structure	0	CY	$0
Grout	0	CY	$0
Mechanical Screen (Screens, SS screw compactor & controls)	1	EA	$264,000
Grit removal	1	LS	$594,000
Slide Plates (alum) - Screens & Effluent	3	EA	$99,000
Handrails	25	LF	$1,963
Aluminum grating	50	SF	$3,140
24" Magnetic Flowmeter	0	EA	$0
Aluminum Stairs	0	EA	$0
Concrete Lining & Misc. Painting	0	LS	$0
Miscellaneous Metals (weirs)	1	LS	$26,400
Refridgerated Sampling Equipment	0	LS	$0
Miscellanous Equipment	1	LS	$26,400
Dumpsters	1	EA	$3,300
Subtotal for Headworks			**$ 1,018,203**

ITEM OF WORK	QUANTITY	UNIT	TOTAL
A^{2}O BNR Process Trains			
Concrete Basins For A2O Process	2100	CY	$2,615,550
Concrete Lining & Misc. Painting	1	LS	$314,000
A^{2}O System Equipment (Including VFDs & Control System)	2	LS	$1,755,000
Aluminum Stairs	2	LS	$39,600
Handrails	650	LF	$51,025
Grating (Aluminum)	500	FT^2	$31,400
Paint	0	LS	$0
Safety Equip. & Other Misc. Equip.	1	LS	$13,200
Subtotal for A^{2}O BNR Process Trains			**$ 4,819,775**
CLARIFIERS & RAS/WAS PS			
2 - 45' Diameter Concrete Tanks	350	CY	$435,925
1 - 65' Diameter Concrete Tanks	340	CY	$424,174
Concrete Lining & Misc. Painting	1	LS	$78,500
Clarifier Equipment	1	LS	$1,281,000
RAS/WAS Pump Station - Pumps, Control Panel & Accessories	1	LS	$264,000
RAS PS - 10" Mag Meters	2	EA	$47,100
RAS/WAS - 8" Mag Meter	2	EA	$31,400
8" Swing Check Valve	3	EA	$23,550
8" Plug Valve	3	EA	$25,905
Aluminum Stairs	2	LS	$39,600
Painting	0	LS	$0
Misc. Valves & Piping Not Listed Separately (Drain MHs)	1	LS	$46,200
Subtotal for CLARIFIERS & RAS/WAS PS			**$ 2,697,354**
SCUM PUMP STATION			
Scum Pumps	1	EA	$132,000
4" Swing Check Valve	2	EA	$9,420
4" Plug Valve	2	EA	$10,990
4" DI Piping	400	LF	$12,560
6' Concrete Wet Well	1	EA	$23,550
Painting and Wet Well Coating	1	LS	$47,100
Misc. Valves & Piping Not Listed Separately	1	LS	$15,700
Subtotal for SCUM PUMP STATION			**$ 251,320**
EFFLUENT JUNCTION BOX & PUMP STATION			
Concrete Structure	0	CY	$0
Concrete Lining & Misc. Painting	0	LS	$0
Aluminum Stairs	0	LS	$0
Slide Gates (SS)	0	EA	$0
Grating (Aluminum)	0	FT^2	$0
Painting	0	LS	$0
Handrail	0	LF	$0
Pump Station	1	LS	$198,000
Effluent 24" DIP	0	LF	$0
Subtotal for EFFLUENT JUNCTION BOX & PS			**$ 198,000**
DISINFECTION (UV) & ALUM SYSTEMS			
Alum Building	0	FT^2	$0
Alum Concrete Containment Structure and Miscellaneous	0	CY	$0
Alum Feed Equipment, controls & Tanks	1	LS	$132,000
Effluent UV Concrete Structure	0	CY	$0
UV Equipment, Piping, Miscellaneous	1	LS	$235,500
Painting	0	LS	$0
Subtotal for DISINFECTION & CHEMICAL SYSTEMS			**$ 367,500**

ITEM OF WORK	QUANTITY	UNIT	TOTAL
POST AERATION			
Concrete Structures	0	CY	$0
Equipment (Blowers, Diffusers, Piping, Valves, Etc.)	0	LS	$0
Internal Valves, Piping, Etc, Not By Equipment Supplier	0	LS	$0
Aluminun Stairs	0	EA	$0
Painting	0	LS	$0
Refridgerated Sampling Station	0	LS	$0
Effluent Flow Metering	0	LS	$0
Misc. Metals and stairs	0	LS	$0
Subtotal for POST AERATION			$ -
AEROBIC DIGESTERS			
Concrete Structures	350	CY	$435,925
Walking Bridges steel/aluminum	1	LS	$99,000
Miscellaneous Valving and Piping	1	LS	$33,000
Digester Equipment (Blowers, Membranes, Diffusers, Piping, Valves, Etc.)	1	LS	$1,051,600
Sludge Pumps & Piping	1	EA	$264,000
Aluminun Stairs	1	EA	$5,940
Painting	1	LS	$26,400
Misc. Metals	1	LS	$8,250
Subtotal for AEROBIC DIGESTERS			**$ 1,924,115**
SLUDGE DEWATERING FACILITY			
2 Meter Belt Filter Press	0	LS	$0
Conveyor System	0	LS	$0
Polymer Feed Equipment & tanks	1	LS	$66,000
Dewatering Building	0	FT^2	$0
Ventilation	0	LS	$0
Painting	0	LS	$0
Miscellaneous	0	LS	$0
Subtotal for SLUDGE DEWATERING FACILITY			**$ 66,000**
ELECTRICAL & SWITCHGEAR	1	LS	**$ 2,527,659**
GENERATOR			
Equipment	0	LS	$0
Concrete Structures	0	CY	$0
Aluminun Platform and Stairs	0	EA	$0
Misc. Metals	0	LS	$0
Subtotal for GENERATOR			**$ -**
SCADA SYSTEM, MISC. INSTRUMENTATION & CONTROLS	1	LS	**$ 210,638**
WASTEWATER TREATMENT PLANT CONSTRUCTION TOTAL			**$ 15,957,443**

Notes:

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Preliminary Opinion of Probable Cost

FAIRFIELD JOINT WATER AND SEWER SYSTEM

Wastewater System

2 MGD Jenkinsville Forcemain to Broad River					
For Budgetary Purposes Only					
					Construction
14" FORCEMAIN					$ 6,461,453
Construction Sub-Total					**$ 6,461,453**
Construction Contingency	**10%**				**$ 646,145**
	Qty	Unit	Unit Cost		Total
Forcemain Easement Acquisition	18	AC	$ 12,000		$ 216,000
Total Land Acquisition Cost					**$ 216,000**
Total Opinion of Probable Construction Cost					**$ 7,323,599**
Engineering Costs					**$ 732,360**
Total Estimated Project Cost					**$ 8,055,959**

Notes:
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Fairfield Joint Water and Sewer System - Wastewater System

Opinion of Probable Cost - For Budgetary Purposes Only

14" Jenkinsville Forcemain			
to Broad River	2 MGD		
ITEM OF WORK	QUANTITY	UNIT	TOTAL
GENERAL CONDITIONS			
Bond & Insurance (2.5%)	1	LS	$154,580
General Conditions/Mobilization (2%)	1	LS	$123,664
Subtotal for GENERAL CONDITIONS			**$278,244**
PIPING			
14" C905 PVC DR25 Forcemain Piping Installed includes joint restraint	53150	LF	$3,887,923
14" Plug Valves	10	EA	$99,000
Air Release Valves	25	EA	$165,000
Fittings	80	TON	$956,000
Bore and jack including DI Piping	1000	LF	$745,750
Cut and Replace Asphalt Road	1200	LF	$79,200
Restoration/Grassing/Erosion Control	1	LS	$250,337
Subtotal for PIPING			**$6,183,209**
FORCEMAIN CONSTRUCTION TOTAL			**$6,461,453**

Notes:

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Fairfield Joint Water and Sewer System

Phase III - BNR WWTP

Opinion of Probable Cost - For Budgetary Purposes Only

				Construction
ADDITIONAL 2 MGD FOR A TOTAL OF 6 MGD				$ 22,854,013
Construction Sub-Total				**$ 22,854,013**
Construction Contingency	**10%**			**$ 2,285,401**
	Qty	Unit	Unit Cost	Total
WWTP Land Acquisition	25	AC	$ 12,000	$ 300,000
Total Land Acquisition Cost				**$ 300,000**
Total Opinion of Probable Construction Cost				**$ 25,439,414**
Engineering Costs				**$ 2,543,941**
Total Estimated Project Cost				**$ 27,983,356**

Notes:
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Fairfield County Wastewater System
PHASE III - BNR WWTP
Opinion of Probable Cost - For Budgetary Purposes Only

ADDITIONAL 2 MGD FOR A TOTAL OF 6 MGD			
ITEM OF WORK	**QUANTITY**	**UNIT**	**TOTAL**
GENERAL CONDITIONS			
Bond & Insurance (2.5%)	1	LS	$571,350
General Conditions / Mobilization (2.5%)	1	LS	$571,350
Subtotal for GENERAL CONDITIONS			**$ 1,142,701**
SITE WORK			
Clearing & Grubbing only	4	AC	$42,800
Erosion Control	6	AC	$18,840
Excavation, Earth Moving, Backfilling and Grading	1000	CY	$26,050
Fine Grading, Base Course & Asphalt Paving	2400	SY	$202,920
Storm Drainage System - Catch Basins, Piping, etc.	1	LS	$132,000
Sidewalk & Misc. Concrete	1000	FT^2	$47,450
Seeding-Grassing-Landscaping	4	AC	$31,400
Fencing (Standard 6' Barbed Wire Galvanized Fence)	1500	LF	$63,150
Subtotal for SITE WORK			**$ 564,610**
PLANT PIPING & VALVES			
16" DI Piping	200	LF	$39,250
16" DI Piping	200	LF	$39,250
4" DI Piping	500	LF	$23,550
8" DI Piping	200	LF	$11,880
10" DI Piping	750	LF	$54,450
6" DI Piping	150	LF	$8,243
Pipe Fittings	5	Tons	$165,000
Misc. Valves, Hydrants & Small Piping not Included elsewhere, etc.	1	LS	$39,250
Potable Water System	1	LS	$561,000
Subtotal for PLANT PIPING & VALVES			**$ 941,873**
CONTROL/LAB BUILDING			
Building Construction	0	SF	$0
Additional Equipment & Accessories for Lab	0	EA	$0
Miscellaneous Items	0	LS	$0
Subtotal for Control/Lab Building			**$ -**
HEADWORKS			
Concrete Structure	250	CY	$311,375
Grout	10	CY	$1,820
Mechanical Screen (Screens, SS screw compactor & controls)	2	EA	$528,000
Grit removal	1	LS	$594,000
Slide Plates (alum) - Screens & Effluent	12	EA	$396,000
Handrails	150	LF	$11,775
Aluminum grating	300	SF	$18,840
24" Magnetic Flowmeter	1	EA	$47,100
Aluminum Stairs	1	EA	$23,550
Concrete Lining & Misc. Painting	1	LS	$33,000
Miscellaneous Metals (weirs)	1	LS	$26,400
Refridgerated Sampling Equipment	1	LS	$33,000
Miscellanous Equipment	1	LS	$26,400
Dumpsters	1	EA	$3,300
Subtotal for Headworks			**$ 2,054,560**

ITEM OF WORK	QUANTITY	UNIT	TOTAL
A^{2}O BNR Process Trains			
Concrete Basins For A2O Process	2100	CY	$2,615,550
Concrete Lining & Misc. Painting	1	LS	$314,000
A^{2}O System Equipment (Including VFDs & Control System)	2	LS	$1,755,000
Aluminum Stairs	2	LS	$39,600
Handrails	650	LF	$51,025
Grating (Aluminum)	500	FT^2	$31,400
Paint	0	LS	$0
Safety Equip. & Other Misc. Equip.	1	LS	$13,200
Subtotal for A^{2}O BNR Process Trains			**$ 4,819,775**
CLARIFIERS & RAS/WAS PS			
2 - 45' Diameter Concrete Tanks	350	CY	$435,925
1 - 65' Diameter Concrete Tanks	340	CY	$424,174
Concrete Lining & Misc. Painting	1	LS	$78,500
Clarifier Equipment	1	LS	$1,281,000
RAS/WAS Pump Station - Pumps, Control Panel & Accessories	1	LS	$264,000
RAS PS - 10" Mag Meters	2	EA	$47,100
RAS/WAS - 8" Mag Meter	2	EA	$31,400
8" Swing Check Valve	3	EA	$23,550
8" Plug Valve	3	EA	$25,905
Aluminum Stairs	2	LS	$39,600
Painting	0	LS	$0
Misc. Valves & Piping Not Listed Separately (Drain MHs)	1	LS	$46,200
Subtotal for CLARIFIERS & RAS/WAS PS			**$ 2,697,354**
SCUM PUMP STATION			
Scum Pumps	1	EA	$132,000
4" Swing Check Valve	2	EA	$9,420
4" Plug Valve	2	EA	$10,990
4" DI Piping	400	LF	$12,560
6' Concrete Wet Well	1	EA	$23,550
Painting and Wet Well Coating	1	LS	$47,100
Misc. Valves & Piping Not Listed Separately	1	LS	$15,700
Subtotal for SCUM PUMP STATION			**$ 251,320**
EFFLUENT JUNCTION BOX & PUMP STATION			
Concrete Structure	30	CY	$34,260
Concrete Lining & Misc. Painting	1	LS	$13,200
Aluminum Stairs	1	LS	$11,775
Slide Gates (SS)	2	EA	$13,200
Grating (Aluminum)	100	FT^2	$3,925
Painting	1	LS	$11,775
Handrail	50	LF	$3,925
Pump Station	1	LS	$528,000
Effluent 24" DIP	7500	LF	$982,125
Subtotal for EFFLUENT JUNCTION BOX & PS			**$ 1,602,185**
DISINFECTION (UV) & ALUM SYSTEMS			
Alum Building	200	FT^2	$62,800
Alum Concrete Containment Structure and Miscellaneous	30	CY	$37,365
Alum Feed Equipment, controls & Tanks	1	LS	$264,000
Effluent UV Concrete Structure	50	CY	$62,275
UV Equipment, Piping, Miscellaneous	1	LS	$235,500
Painting	1	LS	$16,500
Subtotal for DISINFECTION & CHEMICAL SYSTEMS			**$ 678,440**

ITEM OF WORK	QUANTITY	UNIT	TOTAL
POST AERATION			
Concrete Structures	100	CY	$124,550
Equipment (Blowers, Diffusers, Piping, Valves, Etc.)	1	LS	$165,000
Internal Valves, Piping, Etc, Not By Equipment Supplier	1	LS	$15,700
Aluminun Stairs	1	EA	$6,600
Painting	1	LS	$9,900
Refridgerated Sampling Station	1	LS	$26,400
Effluent Flow Metering	1	LS	$47,100
Misc. Metals and stairs	1	LS	$9,900
Subtotal for POST AERATION			**$ 405,150**
AEROBIC DIGESTERS			
Concrete Structures	350	CY	$435,925
Walking Bridges steel/aluminum	1	LS	$99,000
Miscellaneous Valving and Piping	1	LS	$33,000
Digester Equipment (Blowers, Membranes, Diffusers, Piping, Valves, Etc.)	1	LS	$1,051,600
Sludge Pumps & Piping	1	EA	$264,000
Aluminun Stairs	1	EA	$5,940
Painting	1	LS	$26,400
Misc. Metals	1	LS	$8,250
Subtotal for AEROBIC DIGESTERS			**$ 1,924,115**
SLUDGE DEWATERING FACILITY			
2 Meter Belt Filter Press	1	LS	$640,200
Conveyor System	1	LS	$99,000
Polymer Feed Equipment & tanks	1	LS	$66,000
Dewatering Building	2500	FT^2	$392,500
Ventilation	1	LS	$125,600
Painting	1	LS	$19,800
Miscellaneous	1	LS	$26,400
Subtotal for SLUDGE DEWATERING FACILITY			**$ 1,369,500**
ELECTRICAL & SWITCHGEAR	1	LS	**$ 3,620,076**
GENERATOR			
Equipment	1	LS	$422,400
Concrete Structures	15	CY	$18,683
Aluminun Platform and Stairs	1	EA	$19,800
Misc. Metals	1	LS	$19,800
Subtotal for GENERATOR			**$ 480,683**
SCADA SYSTEM, MISC. INSTRUMENTATION & CONTROLS	1	LS	**$ 301,673**
WASTEWATER TREATMENT PLANT CONSTRUCTION TOTAL			**$ 22,854,013**

Notes:

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Preliminary Opinion of Probable Cost

FAIRFIELD JOINT WATER AND SEWER SYSTEM

Wastewater System

2 MGD Forcemain to Southwest Water Company Collection Sysytem					
For Budgetary Purposes Only					
					Construction
18" FORCEMAIN					$ 5,414,295
UPGRADE SWWC PUMP STATION					$ 1,000,000
Construction Sub-Total					**$ 6,414,295**
Construction Contingency	**10%**				**$ 641,429.55**
	Qty	Unit		Unit Cost	Total
Forcemain Easement Acquisition	13	AC	$	12,000	$ 156,000
Total Land Acquisition Cost					**$ 156,000**
Total Opinion of Probable Construction Cost					**$ 7,211,725**
SWWC TAP FEES					**$ 7,000,000**
Engineering Costs					**$ 721,173**
Total Estimated Project Cost					**$ 14,932,898**

Notes:
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Fairfield Joint Water and Sewer System - Wastewater System

Opinion of Probable Cost - For Budgetary Purposes Only

18" FORCEMAIN			
to Southwest Water Co. Collection System	2 MGD		
ITEM OF WORK	QUANTITY	UNIT	TOTAL
GENERAL CONDITIONS			
Bond & Insurance (2.5%)	1	LS	$129,529
General Conditions/Mobilization (2%)	1	LS	$103,623
Subtotal for GENERAL CONDITIONS			**$233,151**
PIPING			
18" C905 PVC DR25 Forcemain Piping Installed includes joint restraint	35300	LF	$3,501,760
18" Plug Valves	7	EA	$115,500
Air Release Valves	15	EA	$99,000
Fittings	35	TON	$418,250
36" bore and jack including DI Piping	1000	LF	$745,750
Cut and Replace Asphalt Road	1200	LF	$79,200
Restoration/Grassing/Erosion Control	1	LS	$221,684
Subtotal for PIPING			**$5,181,144**
FORCEMAIN CONSTRUCTION TOTAL			**$5,414,295**

Notes:

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Fairfield Joint Water and Sewer System - Wastewater System

Opinion of Probable Cost - For Budgetary Purposes Only

18" FORCEMAIN			
to Southwest Water Co. Collection System	2 MGD		
ITEM OF WORK	QUANTITY	UNIT	TOTAL
GENERAL CONDITIONS			
Bond & Insurance (2.5%)	1	LS	$129,529
General Conditions/Mobilization (2%)	1	LS	$103,623
Subtotal for GENERAL CONDITIONS			**$233,151**
PIPING			
18" C905 PVC DR25 Forcemain Piping Installed includes joint restraint	35300	LF	$3,501,760
18" Plug Valves	7	EA	$115,500
Air Release Valves	15	EA	$99,000
Fittings	35	TON	$418,250
36" bore and jack including DI Piping	1000	LF	$745,750
Cut and Replace Asphalt Road	1200	LF	$79,200
Restoration/Grassing/Erosion Control	1	LS	$221,684
Subtotal for PIPING			**$5,181,144**
FORCEMAIN CONSTRUCTION TOTAL			**$5,414,295**

Notes:

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Confidential

Preliminary Opinion of Probable Cost

FAIRFIELD JOINT WATER AND SEWER SYSTEM

Wastewater System

2 MGD Forcemain to the City of Columbia Collection System					
For Budgetary Purposes Only					
					Construction
18" FORCEMAIN					$ 8,488,859
Construction Sub-Total					**$ 8,488,859**
Construction Contingency	**10%**				**$ 848,885.90**
	Qty	Unit	Unit Cost		Total
Forcemain Easement Acquisition	20	AC	$ 12,000		$ 240,000
Total Land Acquisition Cost					**$ 240,000**
Total Opinion of Probable Construction Cost					**$ 9,577,745**
CITY OF COLUMBIA TAP FEES					**$ 19,600,000**
Engineering Costs					**$ 957,774**
Total Estimated Project Cost					**$ 30,135,519**

Notes:
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Fairfield Joint Water and Sewer System - Wastewater System

Opinion of Probable Cost - For Budgetary Purposes Only

18" FORCEMAIN			
to City of Columbia Collection System	2 MGD		
ITEM OF WORK	QUANTITY	UNIT	TOTAL
GENERAL CONDITIONS			
Bond & Insurance (2.5%)	1	LS	$203,083
General Conditions/Mobilization (2%)	1	LS	$162,466
Subtotal for GENERAL CONDITIONS			**$365,549**
PIPING			
18" C905 PVC DR25 Forcemain Piping Installed includes joint restraint	57000	LF	$5,654,400
18" Plug Valves	10	EA	$165,000
Air Release Valves	25	EA	$165,000
Fittings	80	TON	$956,000
36" bore and jack including DI Piping	1000	LF	$745,750
Cut and Replace Asphalt Road	1200	LF	$79,200
Restoration/Grassing/Erosion Control	1	LS	$357,960
Subtotal for PIPING			**$8,123,310**
FORCEMAIN CONSTRUCTION TOTAL			**$8,488,859**

Notes:

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Preliminary Opinion of Probable Cost

FAIRFIELD JOINT WATER AND SEWER SYSTEM

Wastewater System

2 MGD Forcemain to and Land Application System					
For Budgetary Purposes Only					
					Construction
18" FORCEMAIN					$ 3,971,773
2 MGD LAND APPLICATION SYSTEM					$ 24,670,157
Construction Sub-Total					**$ 28,641,930**
Construction Contingency	**10%**				**$ 2,864,193**
	Qty	Unit	Unit Cost		Total
Forcemain Easement Acquisition	7	AC	$	12,000	$ 84,000
Land Application land Acquisition	500	AC	$	12,000	$ 6,000,000
Total Land Acquisition Cost					**$ 6,084,000**
Total Opinion of Probable Construction Cost					**$ 37,590,123**
Engineering Costs					**$ 3,759,012**
Total Estimated Project Cost					**$ 41,349,136**

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Fairfield County Wastewater System

Opinion of Probable Cost - For Budgetary Purposes Only

2 MGD Land Application System			
ITEM OF WORK	QUANTITY	UNIT	TOTAL
GENERAL CONDITIONS			
Bond & Insurance (2.5%)	1	LS	$616,754
General Conditions / Mobilization (2.0%)	1	LS	$493,403
Subtotal for GENERAL CONDITIONS			**$ 1,110,157**
Clearing & Grubbing only	400	AC	$6,420,000
Erosion Control	400	AC	$1,056,000
Holding Pond - Lined (7 Million Gallons)	2	LS	$7,920,000
Subtotal for SITE WORK			**$ 15,396,000**
PLANT PIPING & VALVES			
Effluent Distribution System (piping, valves, fittings, irrigation heads, etc.)	400	AC	$8,164,000
Subtotal for PLANT PIPING & VALVES			**$ 8,164,000**
WASTEWATER TREATMENT PLANT CONSTRUCTION TOTAL			**$24,670,157**

Notes:

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Fairfield Joint Water and Sewer System - Wastewater System

Opinion of Probable Cost - For Budgetary Purposes Only

18" Forcemain to Land Application Site	2 MGD		
ITEM OF WORK	QUANTITY	UNIT	TOTAL
GENERAL CONDITIONS			
Bond & Insurance (2.5%)	1	LS	$95,019
General Conditions/Mobilization (2%)	1	LS	$76,015
Subtotal for GENERAL CONDITIONS			**$171,033**
PIPING			
18" C905 PVC DR25 Forcemain Piping Installed includes joint restraint	19000	LF	$1,884,800
18" Plug Valves	4	EA	$66,000
Air Release Valves	15	EA	$99,000
Fittings	70	TON	$836,500
Bore and jack including DI Piping	1000	LF	$745,750
Cut and Replace Asphalt Road	1200	LF	$79,200
Restoration/Grassing/Erosion Control	1	LS	$89,490
Subtotal for PIPING			**$3,800,740**
FORCEMAIN CONSTRUCTION TOTAL			**$3,971,773**

Notes:

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Preliminary Opinion of Probable Cost

FAIRFIELD JOINT WATER AND SEWER SYSTEM

Wastewater System

2 MGD Forcemain to Sawneys Creek

For Budgetary Purposes Only

					Construction
18" FORCEMAIN					$ 4,324,659
Construction Sub-Total					**$ 4,324,659**
Construction Contingency	**10%**				**$ 432,466**
	Qty	Unit	Unit Cost		Total
WWTP Land Acquisition	25	AC	$ 12,000		$ 300,000
Forcemain Easement Acquisition	10	AC	$ 12,000		$ 120,000
Total Land Acquisition Cost					**$ 420,000**
Total Opinion of Probable Construction Cost					**$ 5,177,125**
Engineering Costs					**$ 517,713**
Total Estimated Project Cost					**$ 5,694,838**

Notes:
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Fairfield Joint Water and Sewer System - Wastewater System

Opinion of Probable Cost - For Budgetary Purposes Only

18" FORCEMAIN			
to Sawneys Creek	2 MGD		
ITEM OF WORK	QUANTITY	UNIT	TOTAL
GENERAL CONDITIONS			
Bond & Insurance (2.5%)	1	LS	$103,461
General Conditions/Mobilization (2%)	1	LS	$82,769
Subtotal for GENERAL CONDITIONS			**$186,229**
PIPING			
18" C905 PVC DR25 Forcemain Piping Installed includes joint restraint	28000	LF	$2,777,600
18" Plug Valves	6	EA	$99,000
Air Release Valves	10	EA	$66,000
Fittings	20	TON	$239,000
36" bore and jack including DI Piping	1000	LF	$745,750
Cut and Replace Asphalt Road	1200	LF	$79,200
Restoration/Grassing/Erosion Control	1	LS	$131,880
Subtotal for PIPING			**$4,138,430**
FORCEMAIN CONSTRUCTION TOTAL			**$4,324,659**

Notes:

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Preliminary Opinion of Probable Cost

FAIRFIELD JOINT WATER AND SEWER SYSTEM

Wastewater System

2 MGD Forcemain to Wateree River					
For Budgetary Purposes Only					
					Construction
18" FORCEMAIN					$ 14,816,245
Construction Sub-Total					**$ 14,816,245**
Construction Contingency	**10%**				**$ 1,481,625**
	Qty	Unit	Unit Cost		Total
Forcemain Easement Acquisition	39	AC	$ 12,000		$ 468,000
Total Land Acquisition Cost					**$ 468,000**
Total Opinion of Probable Construction Cost					**$ 16,765,870**
Engineering Costs					**$ 1,676,587**
Total Estimated Project Cost					**$ 18,442,457**

Notes:
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Fairfield Joint Water and Sewer System - Wastewater System

Opinion of Probable Cost - For Budgetary Purposes Only

18" FORCEMAIN			
to Wateree River	2 MGD		
ITEM OF WORK	QUANTITY	UNIT	TOTAL
GENERAL CONDITIONS			
Bond & Insurance (2.5%)	1	LS	$354,456
General Conditions/Mobilization (2%)	1	LS	$283,565
Subtotal for GENERAL CONDITIONS			**$638,020**
PIPING			
18" C905 PVC DR25 Forcemain Piping Installed includes joint restraint	110000	LF	$10,912,000
18" Plug Valves	22	EA	$363,000
Air Release Valves	25	EA	$165,000
Fittings	100	TON	$1,195,000
36" bore and jack including DI Piping	1500	LF	$1,118,625
Cut and Replace Asphalt Road	1200	LF	$79,200
Restoration/Grassing/Erosion Control	1	LS	$345,400
Subtotal for PIPING			**$14,178,225**
FORCEMAIN CONSTRUCTION TOTAL			**$14,816,245**

Notes:

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