



MEMORANDUM

To: Mayor and Members of the City Council

From: Montrè Freeman, City Manager
Dwan Bell, Public Utilities Director

Date: November 23, 2022

Re: Consideration - Infrastructure Improvements -

BACKGROUND:

1. MACU Force Main Repair

Since April 1, 2022, the City discovered and escalated the repair of a damaged 24" ductile iron force main on the riverfront park of Mid-Atlantic Christian University located on N. Poindexter Street caused by abrasion due to buildup and corrosion. The line was capped ascribable to budget constraints; however, remains an immediate, and urgent concern per its volatility and high risk of leaking wastewater. Repair costs have increased by 7.31% from \$144,755.25 to \$156,169.00 excluding tax per inflation plus \$4,300 for preliminary excavation for leak detection.



2. Engineering Alternative Analysis

An Engineering Alternatives Analysis (EAA) is required with any NPDES application for a new or expanding wastewater treatment plant discharge, in accordance with 15A NCAC 2H.0105(c)(2). In order for an NPDES application to be approved, the EAA must provide complete justification for a direct discharge to surface water alternative, and demonstrate that direct discharge is the most environmentally sound alternative selected from all reasonably cost-effective options [per 15A NCAC 2H.0105(c)(2)].

Based on this requirement and the review of two Preliminary Engineering Reports for the Wastewater Treatment Plant and the distribution system – Public Utilities prioritized an EAA (engineering alternatives analysis) governed by [G.S. 143-64.31](#) via the Mini-Brooks Act QBS process (Quality Based Selection). Timmons Group and WithersRavenel is to build upon the analysis for submission as required by North Carolina Division of Water Resources to ultimately obtain relief from 80% threshold at a fee of \$50,000.

3. Infiltration and Inflow

WithersRavenel and Timmons Group have jointly studied the wastewater collection and treatment system to provide a high-level overview of current City needs and recommended next steps to ensure a predictable future for our wastewater infrastructure. Deficiencies in the wastewater collection system cause rainwater and groundwater (infiltration & inflow) to enter the system. The infiltration & inflow have many negative impacts on the City's wastewater system. It is unnecessarily treated at the wastewater treatment plant (WWTP) which increases operational costs and consumes a portion of plant capacity that could otherwise be used for City growth. Infiltration & inflow create high flow rates during rain events that tax both the collection system and WWTP and, on occasion, lead to surface water discharge violations with the North Carolina Department of Environmental Quality. The WWTP was not designed to operate under these sustained, high flow conditions. Based on this analysis, the recommended initial effort to reduce I&I will be in the vicinity of the Main lift station and Pearl Street lift station basins. Additionally, due to the assumed age of the sewer system around the Main lift station and historical discharge into the nearby Pasquotank River, there is an increased potential of direct non-sewer inflow into the sewer system from roof drain connections and stormwater cross connections. **To lower inflow into the system and better detect these non-sewer connections and dilapidated piping, it is recommended to initially perform smoke and dye testing along with Closed Circuit Television inspection in this area at a cost of \$659,000.**

ANALYSIS:

Council's proficient examination, support, and buy-in of the detailed infrastructure improvements above and/or continuation of are merited for resolution. These expenditures are critically required, and both professionally and strongly encouraged to sustain line integrity and the City's long-term methodical CIP investments.

STAFF RECOMMENDATION:

By motion, identify funding sources to repair the MACU force main (\$160,500) award Engineering Alternatives Analysis (EAA) as required with any NPDES application (\$50,000), and conduct Pearl St & Main Street surveys, permitting, testing, and repairs (\$659,000), totaling \$869,500.



ENVIRO-TECH
UNLIMITED CONSTRUCTION
SERVICES LLC

Enviro-Tech Unlimited Construction

License # 63868

Enviro-Tech Unlimited Construction Services, LLC.
PO Box 157, Nags Head, NC 27959

Telephone (252) 564-7995
FAX (252) 862-2790

Proposal 1999
24" Sewer Forcemain Leak Repair

4/28/2022

Enviro-Tech Unlimited Construction Services, LLC, a North Carolina licensed general contractor, is pleased to present the following proposal to repair of the broken 24" Ductile Iron Sewer Forcemain. We propose to provide all labor, equipment, and materials at the following prices unless otherwise noted.

Option 1: \$144,755.25

- Mobilization
- Dewatering/Shoring as Required
- Installation of (2) 24" Linestops with active bypass around affected area
- Provide, Fuse, and Install 18" HDPE Bypass
- Sewer Bypassing of 24" Sewer Forcemain
- Removal of existing 24" Ductile Iron line
- Install 11.25 Degree 24" Ductile Iron Bend
- Install 24" MJ Sleeve on existing Forcemain
- Tie-in to existing Valve with correct orientation to prevent sewer leaking
- Clean-up Demobilization

The following is a list of assumptions made in preparing this Proposal:

- Enviro-Tech will not be responsible for obtaining any state, local or federal permits required by regulating authorities.
- Unforeseen problems may be encountered at the time of installation and will be charged on standard T&M rates. Scope and price subject to change.
- City to Supply Vac Truck as needed
- Line Stop quoted at 21 Day Rental, additional time is @ 1500/Day.

Sincerely,
Nick Brown
Construction Manager

Accepted By: _____

Signature: _____



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Proposal 1999 updated
24" Sewer Forcemain Leak Repair

11/2/2022

Enviro-Tech Unlimited Construction Services, LLC, a North Carolina licensed general contractor, is pleased to present the following proposal to repair of the broken 24" Ductile Iron Sewer Forcemain. We propose to provide all labor, equipment, and materials at the following prices unless otherwise noted.

Option 1: \$156,169.00

- Mobilization
- Dewatering/Shoring as Required
- Installation of (2) 24" Linestops with active bypass around affected area
- Provide, Fuse, and Install 18" HDPE Bypass
- Sewer Bypassing of 24" Sewer Forcemain
- Removal of existing 24" Ductile Iron line
- Install 11.25 Degree 24" Ductile Iron Bend
- Install 24" MJ Sleeve on existing Forcemain
- Tie-in to existing Valve with correct orientation to prevent sewer leaking
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- City to Supply Vac Truck as needed
- Line Stop quoted at 21 Day Rental, additional time is @ 1500/Day.

Sincerely,
Nick Brown
Construction Manager

Accepted By: _____

Signature: _____

November 02, 2022

Dwan Bell
Director of Public Utilities
PO Box 347
Elizabeth City, NC 27909

RE: Elizabeth City Wastewater Treatment Plant EAA – Proposal

Mr. Bell,

Timmons Group is pleased to offer this proposal for Elizabeth City Wastewater Treatment Plant (WWTP) Engineering Alternatives Analysis (EAA). We look forward to working with you to achieve your vision for this project. Proposed Services are outlined as follows:

I. BACKGROUND, UNDERSTANDING AND APPROACH

Elizabeth City WWTP has a current treatment capacity of 4.5 million gallons per day (MGD), serving approximately 6,350 residential properties and 950 commercial properties. The treated wastewater is permitted (NPDES permit number NC0025011) for discharge into the Pasquotank River.

Infiltration and Inflow

WithersRavenel and Timmons Group have jointly studied the wastewater collection and treatment system to provide a high-level overview of current City needs and recommended next steps to ensure a predictable future for your wastewater infrastructure. Deficiencies in the wastewater collection system cause rainwater and groundwater (infiltration & inflow) to enter the system. The infiltration & inflow have many negative impacts on the City's wastewater system. It is unnecessarily treated at the wastewater treatment plant (WWTP) which increases operational costs and consumes a portion of plant capacity that could otherwise be used for City growth. Infiltration & inflow create high flow rates during rain events that tax both the collection system and WWTP and, on occasion, lead to surface water discharge violations with the North Carolina Department of Environmental Quality. The WWTP was not designed to operate under these sustained, high flow conditions.

According to the Discharge Monitoring Reports for the WWTP downloaded off the EPA website for the National Pollutant Discharge Elimination System (NPDES), the annual average flow for the 2020 calendar year was 3.599992 MGD, accounting for 79.99% of the 4.5 MGD design flow. The annual average flow for the 2021 calendar year was 3.367 MGD, accounting for 74.8% of the 4.5 MGD design flow. 2021 flows were lower than 2020 flows due to decreased rainfall. The annual average flow for the 18 consecutive months from January 2020 through June 2021 was 3.71 MGD, accounting for 82.4% of the 4.5 MGD design flow. The annual average flow for the 12 consecutive months from March 2020 through February 2021 was 3.82 MGD, accounting for 84.9% of the 4.5 MGD design flow.

Per regulation 15A NCAC 02T .0118, DEQ may impose sewer moratoriums if the City does not proactively address flows exceeding 80% of the WWTP's permitted hydraulic capacity (based on the

average flow of the last calendar year). Prior to exceeding 90% of capacity, the City must obtain all permits and design plans needed for the expansion WWTP.

PER Recommendation

In addition to the PER prepared by Timmons Group (final version dated April 20, 2022), Timmons Group presented to City Council on January 24, 2022 and recommended the following next steps for the wastewater treatment plant:

Timmons Group is in agreement with WithersRavenel that the first step is to mitigate the infiltration & inflow in the collection system through collection system rehabilitation. While this will reduce peak flows coming to the WWTP, infiltration & inflow will continue to be an issue for any collection system of this age. Therefore, Timmons Group recommends concurrently moving forward Phase I Improvements to the WWTP; Upgrade the Headworks and Implement a 2.0 million gallon Equalization Storage System.

30% Conceptual WWTP Design

The permitting and design timeline to make upgrades to the WWTP is a multi-year process. Therefore, Timmons Group recommends performing due diligence and conceptual design of the four-phase solution presented. Due diligence work and conceptual design will place the City in a better position to gain funding and grants for the project. Due diligence tasks for the WWTP site include topographic survey, environmental delineation, and a geotechnical investigation to confirm soil and sub-surface conditions. These due diligence steps will aid to reduce project risk and confirm project cost. 30% conceptual design of Phase I of improvements (equalization storage system) is recommended to begin to move the project forward. Once complete, the conceptual design may be reviewed by a qualified Contractor to confirm project cost and help set the City's budget.

Engineering Alternatives Analysis

It is understood that this EAA will be performed in support of a NPDES Permit application for improvements to the City's WWTP. An EAA is just one part of many steps necessary to modify or expand a WWTP. NCDEQ's document "Looking Ahead: Planning For An Expansion At Your Wastewater Treatment Plant" dated March 2014 outlines the process, which also requires that the permittee determines needed treatment capacity by forecasting local needs, determines WWTP design targets by obtaining speculative limits, evaluates discharge alternatives by preparing an EAA, evaluates potential environmental impacts by conducting an Environmental Review, obtains a NPDES permit modification, designs WWTP improvements, and obtains an Authorization to Construct (ATC) permit. As some of first steps have been completed or initiated as part of the PER effort, Timmons Group hopes to use that momentum to efficiently complete the EAA. Timmons Group will also complete the EAA and conduct our coordination with NCDEQ in a manner that best prepares the City to complete the remainder of steps necessary towards expanding the City's WWTP. Timmons Group will work towards gaining DEQ approval of the EAA, but Timmons Group will not apply for a modified NPDES permit at this time.

During the October 7, 2021 meeting with the North Carolina Department of Environmental Quality (NCDEQ), Mike Montebello and Doug Dowden with DEQ stated that capacity expansion at the WWTP will not be allowed because of increasing RDII. Therefore, in an effort to progress an EAA for the WWTP, the collection system should also be addressed by the City.

Next Steps

At this stage in the planning process, Timmons Group recommends the development of the WWTP EAA. This proposal document serves to provide the scope, fee, and schedule of such an effort. It is understood that WithersRavenel will be performing infiltration & inflow mitigation planning and design in parallel with the WWTP EAA effort.

Once the EAA has preliminarily been completed, and before submission to NCDEQ, it is recommended to present results to City Council in late August 2022 to gain their approval. Following the City Council meeting, Timmons Group will provide a proposal for the 30% conceptual design for WWTP Improvements, or the alternative that is recommended and approved at that time.

II. SCOPE OF SERVICES**Engineering Alternatives Analysis**

The following task details the efforts to be performed by Timmons Group to complete the EAA.

Task 1 – Engineering Alternatives Analysis (Fixed Fee)

The WWTP capacity improvements studied in the PER will be presented in the manner required by the EAA. To provide additional alternatives to fulfill the requirements of the EAA and deliver a well-rounded study, Timmons Group recommends further evaluating a new WWTP elsewhere in the City. This was evaluated at a cursory level in the PER but deserves more attention. Several sites will be identified near potential high growth areas in the City. A more detailed evaluation of type and layout of the potential new WWTP will be performed. This will aid in determining land area requirements and in developing a cost estimate. During the PER study, it was determined a new outfall is unlikely to be permitted, but that up to 12 MGD may be allowed to be discharged at the existing outfall. Therefore, several alignment alternatives will be studied to convey treated effluent back to the existing WWTP for discharge. Land application of treated effluent from the new WWTP will also be evaluated per the EAA requirements.

The combined cost of a new WWTP and effluent main will be compared against the cost of upgrades at the new WWTP and required upgrades throughout the collection system necessary to convey the increased flow. Required upgrades throughout the collection system, and associated costs, were not studied during the initial PER. It is vital that this part of the alternatives analysis moves forward to provide a holistic comparison of alternatives. One alternative will also explore a new central pump station in the area targeted for growth. A dedicated wastewater force main will convey flow from the growth area to the existing WWTP, bypassing the existing collection system. This alternative may help avoid costly upgrades to the existing collection system infrastructure.

The EAA developed will adhere to the requirements of the guidance document, including the four steps outlined:

1. Determine if the proposed discharge will be allowed,
2. Provide reasonable projections for population and flow,
3. Evaluate technologically feasible alternatives,
4. Evaluate economic feasibility of alternatives.

In summary, the expected list of alternatives to be included in the EAA is as follows. This list may change as the study is prepared.

1. RDII Alternative to Reduce Peak Flows
 - A. Upgrade the Headworks and Implement a 2.0 million gallon Equalization Storage System at the Existing WWTP,
2. WWTP Capacity Expansion Alternatives

- A. Expand Capacity at Existing 4.5 MGD WWTP to 6.0 MGD including Collection System Upgrades to Convey Increased Flows. Collection System Upgrades to be studied include:
 - i. Upgrading Existing Infrastructure,
 - ii. New Pump Station and Force Main Dedicated to Growth Areas and Bypassing Existing Collection System.
- B. New 1.5 MGD WWTP in the City with Effluent Main to Discharge at Existing Outfall,
- C. New 1.5 MGD WWTP in the City with Land Application. Land application alternatives to be studied include:
 - i. Spray Irrigation,
 - ii. High Rate Infiltration.

III. FEE PROPOSAL

Work will be performed in accordance with the following fee schedule on a Lump Sum basis:

Task 1 – Engineering Alternatives Analysis	\$50,000
Project Total	\$50,000

IV. ASSUMPTIONS AND CLARIFICATIONS

Timmons Group provides the following assumptions and clarifications in regard to the Scope of Services.

1. Timmons Group will work towards gaining DEQ approval of the EAA, but Timmons Group will not apply for a modified NPDES permit at this time.
2. This evaluation will not include sampling of the influent wastewater or flow monitoring.
3. It is assumed that the information required to perform an EAA is readily available and will be provided to Timmons Group. Otherwise, sound engineering judgment will be used to make assumptions.
4. Analysis of required collection system upgrades will be brief in nature as the primary focus is the WWTP. Collection system costs and alignments will be estimated to the best of the engineer's ability, given the limited duration of the analysis and limited information available.

V. ANTICIPATED SCHEDULE

The duration to submit the EAA to NCDEQ is estimated at five months as many different sources of information must be tracked down to complete the analysis. One of those include the need to receive speculative limits from NCDEQ which may take several months depending on the availability of NCDEQ's modeling department.

ACKNOWLEDGED AND ACCEPTED:

Thank you for allowing Timmons Group to provide professional services on this project. We will proceed upon receipt of this signed Agreement. Work is to be performed in accordance with all the terms and conditions of the current Annual Services Agreement between Timmons Group and the City of Elizabeth City.

Timmons Group



Proposed By: Chris Petree, P.E.

11/02/2022
Date

Elizabeth City

Accepted By: Printed Name

Accepted By: Signature

Date



WithersRavenel
Our People. Your Success.

July 20, 2022

Dwan Bell- Public Works Director
PO Box 347
Elizabeth City, NC 27907

**RE: Proposal for Professional Services
Elizabeth City EAA PER
Elizabeth City, North Carolina 27907
WR Project No. 03220903.00**

Dear Mr. Bell,

WithersRavenel is pleased to provide this Proposal for Professional Services. We look forward to working with you on this Project. If you have any questions or concerns about this proposal, please do not hesitate to call me at the number listed below.

Sincerely,

WithersRavenel

Leonard McBryde, PE
Utilities Director, Wilmington

lmcbride@withersravenel.com
Ph. 919.238.0424

219 Station Road, Suite 101 | Wilmington, NC 28405

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Asheville | Cary | Charlotte | Greensboro | Pittsboro | Raleigh | Southern Pines |
Wilmington

Task No.	Task Name	Fee for Main LS Basin	Fee for Pearl LS Basin
1	Project Management	\$5,100	\$23,900
2	Flow Monitoring	\$12,000	\$56,000
3	Smoke Testing	\$4,900	\$23,100
4	CCTV and Manhole Assessment	\$58,700	\$223,300
5	Survey	\$2,800	\$13,200
6	Design	\$13,400	\$62,600
7	Permitting		\$8,000
8	Bidding		\$21,000
9	Construction Administration	\$6,500	\$30,500
TOTAL		\$103,400	\$461,600

(Hourly) Denotes hourly tasks. The fee budgets represented with hourly tasks are good faith estimates of what can be reasonably expected during the performance of this contract.

Hourly Fee

Engineer proposes to provide the Scope of Services previously outlined on an hourly basis of \$128 per hour with an estimated budget as described in the following table plus expenses. Compensation shall not exceed the total estimated compensation amount unless approved in writing by Owner.

Task No.	Task Name	*Hourly Fee for Main LS Basin	*Hourly Fee for Pearl LS Basin
10	Construction Observation	\$16,000	\$78,000
TOTAL		\$16,000	\$78,000

1. Invoices will be issued monthly, based on the percentage of completion for each lump sum task and the hourly rate for Consultant personnel in accordance with Exhibit II for hourly tasks, as accomplished during the billing period. Payment is due upon receipt of invoice.
2. The above fees are based on the estimated timelines noted in the Timeline for Services. Any adjustments to those timelines may result in additional fees.
3. Consultant may alter the distribution of compensation between individual Tasks noted herein to be consistent with services rendered but shall not exceed the total Lump Sum amount unless approved in writing by the Client.
4. The attached Exhibit II, Fee & Expense Schedule, is based on Consultant's rates as of the date of this proposal and may be subject to change for hourly tasks and any Additional Services that occur after any adjustments to such rates go into effect.