PRELIMINARY ENGINEERING REPORT

FOR THE PROPOSED

SANITARY BOARD OF BLUEFIELD

NICHOLS ROAD EXTENSION AND THOMPSON PUMPING STATION

UPGRADE PROJECT

MERCER COUNTY, WV

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DRAFT

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I. INTRODUCTION

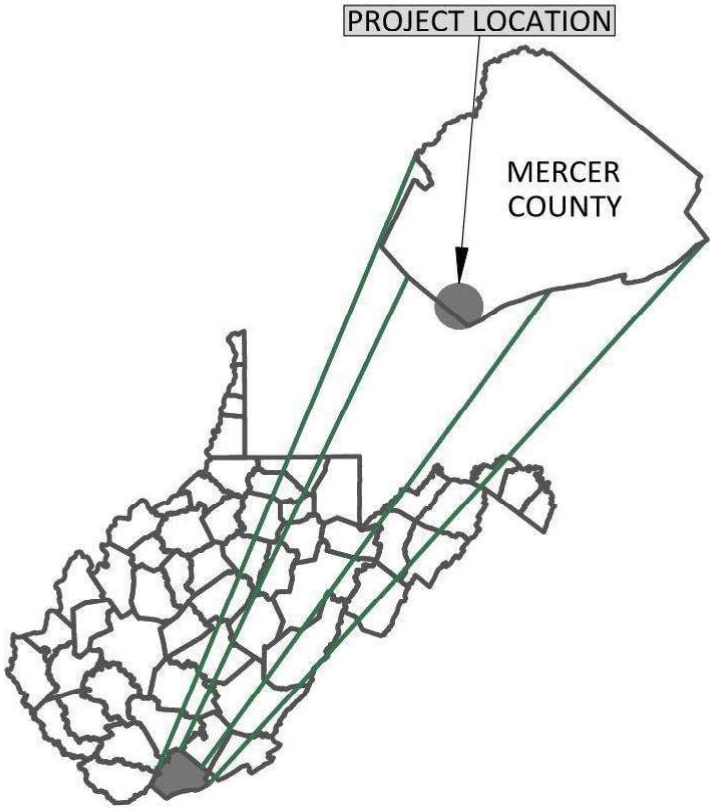
This Preliminary Engineering Report (PER) was prepared for the Sanitary Board of Bluefield (SBB) to propose a replacement and relocation of the Thompson pumping station, and a sewer extension for the residents of Nichols Road and Dime Drive. The scope of the PER includes the following:

- Evaluation of Current Wastewater Collection System
- Evaluation of Current and Future Population / Wastewater Demand
- Proposed Upgrades / Improvements

The proposed Nichols Road Extension and Thompson Pumping Station Upgrade Project is being implemented by the Sanitary Board of Bluefield and is necessary to upgrade and replace the failing Thompson pumping station and associated forcemain pipeline and provide sanitary sewer connections to residents that have aged and deteriorated private sewer facilities along the Nichols Road area and north of Brushfork Road. The project will also include the installation of a mechanical bar screen and replacement of an emergency standby generator at the Brushfork pumping station. This project is located primarily along Brushfork Road and Nichols Road.

The SBB has the authority to implement the recommendations contained herein.

Figure 1: Mercer County Project Location Map



II. CURRENT SITUATION

The SBB owns and operates a wastewater treatment and collection system throughout parts of Bluefield in Mercer County, West Virginia and Bluefield in Tazewell County, Virginia. The system consists of approximately 250 miles of gravity collection mains, 18 miles of force collection mains (force mains), 10 pumping stations, 11 grinder pumping stations, 2 wastewater treatment plants and other related appurtenances.

A. Customers

The Sanitary Board of Bluefield currently owns and operates a wastewater collection and treatment system serving approximately 7,690 residential customers. This information can be found in the 2022 Public Service Commission (PSC) Annual Report located in **Appendix A**. The average residential wastewater produced provided by the 2022 PSC Annual Report is approximately 4,271 gallons per month.

The Median Household Income (MHI) for The City of Bluefield, West Virginia was **$35,650** in 2020. This information was found on the US Census Data website. This website uses the US Census data from the American Community Survey 5-year estimate. This information can be found in **Appendix B**.

B. Collection

The 250 miles of collection lines extend sanitary sewer service to the communities of Bluefield WV, Bluefield VA, Brush Fork, Cumberland heights and the surrounding areas. The area of interest for the proposed extension is Nichols Road and Dime Drive located off of Brushfork Road, northwest of Bluefield. The locations of these areas are shown on the Project Drawings located in **Appendix C**, and on Figure 2 below.

D. Treatment

The SBB operates two treatment plants. The Westside Treatment Plant is located on Parsley Street and the Ada Treatment Plant is located on Rt 112. The Westside Treatment Plant is designed to treat approximately 8.3 million gallons day (MGD). The Ada Treatment Plant has a capacity of 1.2 MGD. Together the SBB has a combined treatment capacity of approximately 9.5 MGD.

WVDEP Permit I.D.: WV0023141

E. Need for Project

Health and Sanitation

The existing Thompson pumping station serves approximately 700 customers, including residential, schools, churches, industrial, retail, and tourism (ATV Parks and the Armory). The existing pumping station and forcemains were installed in 1969 and have not since been upgraded or replaced. The aging station is experiencing more frequent downtimes due to mechanical failures and parts have become nearly obsolete for repairs. Due to this station pumping all the Brushfork sewer, the Consequence of Failure (COF) is extremely high. On average, this station pumps around 105,000 gallons of raw sewage per day. A catastrophic failure would result in sewage being discharged directly into Brushfork Creek and ending up in the Bluestone River.

Currently, there are approximately 46 customers in the project area that do not have access to public sewer. Many of these along the Nichols Road and Dime Drive area are suffering from failing privately owned septic systems. There are reports of raw sewage being visible in yards in ditches in the area due to these failing systems. Residents have indicated that local soil conditions do not allow for adequate drainfields, and some residents need to have their septic systems pumped frequently to prevent backups and spillage. Supplying this community with access to public sewer will promote a cleaner environment along Brushfork Creek and establish a happier and healthier community.

The existing Thompson pumping station is located approximately 30 feet upstream of the Packing Plant Road bridge which crosses Brush Fork Creek. The bridge abutments cause a rise in backwater upstream of the bridge during large precipitation events. As such, the existing Thompson pumping station is in the FEMA 100-year floodplain, with the ground elevation being approximately 9 feet below the 100-year flood elevation. Relocation of the Thompson pumping station to a location downstream will mitigate high backwater issues caused by the Packing Plant Road bridge.

The SBB has encountered issues of rags, wipes and other non-flushable materials clogging the system's pumps near the Brushfork area. This causes increased O&M costs and ties up SBB's workers. Installation of a vertical mechanical bar screen at the Brushfork pumping station would address this problem and is expected to provide a quick ROI (Return on Investment). Additionally, the emergency standby generator for the Brushfork pumping station has recently experienced mechanical failure. Replacing this generator would allow the pumping station to continue to operate in the event of a power outage, without risking spillage or discharge from the pumping station.

III. FUTURE SITUATION

A. Population Projections

Table 1 contains a summary of the population trends and projections in Mercer County from 2020 to 2040. The information was obtained from the West Virginia University College of Business and Economics and is contained in **Appendix D**.

Table 1 - Mercer County Population Projections 2020-2040

Mercer County Population Projections 2020-2040					
Year	2020	2025	2030	2035	2040
Population	59,664	58,332	57,131	55,716	54,453
% Growth (From 2020)	-	-2.23	-4.25	-6.61	-8.73
Released October 2022 by The West Virginia University College of Business and Economics					

The West Virginia University College of Business and Economics has developed population projections for the state (2020-2040). According to their projections, the population of Mercer County is expected to decrease by 8.73% from 2020 to 2040. For this project it was assumed that the population of Bluefield and surrounding areas would remain constant.

B. Flow Projections

The addition of 46 customers will add approximately 7,374 gallons per day. This is calculated from the West Virginia Department of Health and Human Resources (WVDHHR) design regulations of 70 gallons per capita daily, and the US Census Data for Bluefield of 2.29 persons per household.

C. Permits / Certifications Required

The agencies that are expected to require approved permits or environmental clearances for the proposed project are the following:

- West Virginia Department of Health and Human Resources
- West Virginia Public Service Commission
- West Virginia Department of Highways
- West Virginia Department of Environmental Protection
- United States Army Corps of Engineers
- West Virginia Division of Natural Resources
- United States Fish & Wildlife Service
- West Virginia Division of Culture & History

IV. ALTERNATIVES

The items evaluated in this study can be classified into the following general categories:

i. Improvements/Changes to the Sewer Collection System
ii. Determination of project costs, including operation and maintenance (O&M)
iii. Number of customers served

Please see the following pages for Alternative information.

*Alternative 2 includes the relocation of the Thompson pumping station.

A. Alternative #1 – Do Nothing

i. Improvements/Changes to the Wastewater System

This alternative will involve no changes to the existing wastewater pumping system. The Thompson pumping station will continue to have repeated failures that will require maintenance and bypass pumping. Due to the age of the system the frequency of issues is expected to increase as the system continues to age. The unserved residents along Nichols Road and the rest of the project area will continue to be unserved and will continue to have issues with inadequate wastewater treatment.

ii. Determination of project costs, including operation and maintenance (O&M)

This alternative would not involve any additional project cost. The SBB will continue to incur increased O&M costs associated with making repairs to the station and using a portable pump to provide bypass pumping around the pumping station. O&M costs are assumed to increase as the system continues to age.

iii. Number of customers served.

This alternative would not serve any additional customers.

B. Alternative #2 – Upgrade and Relocation of Existing Pumping Station

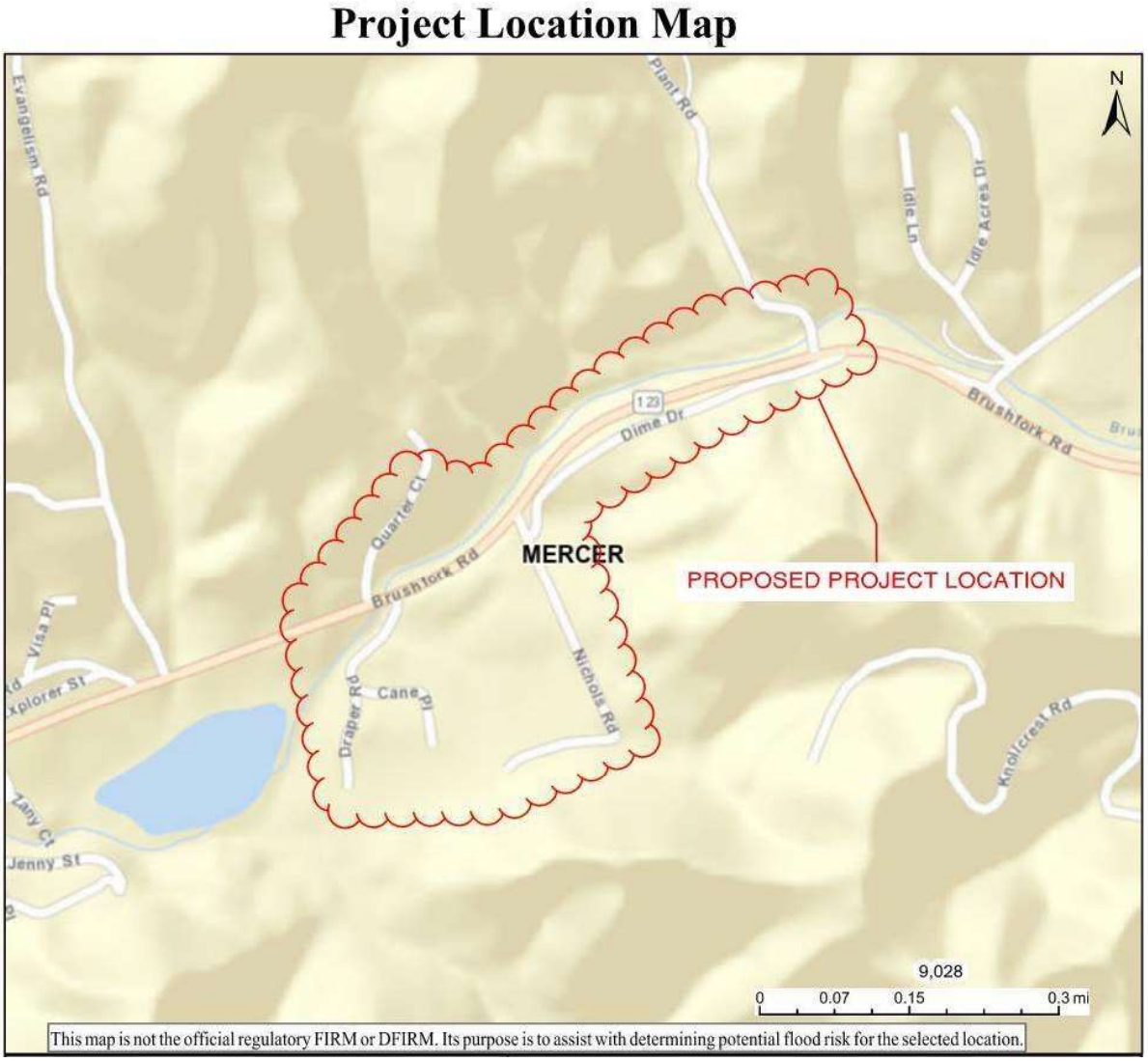


Figure 2: Map of Alternative #2 Project Location

i. Improvements/Changes to the Wastewater Collection System

This alternative would consist of replacing and relocating the Thompson pumping station, installation of a mechanical bar screen and emergency standby generator at the Brushfork pumping station, installation of 9,150 linear feet (LF) of 10-inch and smaller gravity sewer line, 2,050 LF of forcemain sewer line, and the related appurtenances. Relocation of the Thompson pumping station to the proposed downstream location would help mitigate high water issues caused by the Thompson Road Bridge's restrictions of Brushfork Creek. The proposed location will be more accessible during high water events.

ii. Determination of project costs, including operation and maintenance (O&M)

With the addition of 46 customers, O&M costs are expected to increase by approximately $5,811 per year. However, with a new lift station and mechanical bar screen, the amount of time spent by SBB maintaining the system in this area is expected to be greatly reduced.

The operation and maintenance cost calculations are provided in **Appendix E**. Present Worth Analysis calculations are provided in **Appendix F.**

iii. Number of customers served.

This alternative would serve approximately 46 new customers. There are approximately 25 along Nichols Road and Dime Drive, and 21 others located on the north side of Brushfork Road that will have access to the proposed sewer extension. The construction cost per customer for this alternative is approximately $62,760.

C. Alternative #3 – Replace Existing Pumping Station

i. Improvements/Changes to the Wastewater Collection System

This alternative would consist of replacing the existing Thompson pump station, the installation of 4,570 linear feet (LF) of 8-inch and smaller gravity sewer line, 4,065 LF of forcemain sewer line, installing a mechanical bar screen and the related appurtenances. Not relocating the Thompson pumping station will leave components of the pumping station at risk during high water events.

ii. Determination of project costs, including operation and maintenance (O&M)

With the addition of 25 customers, O&M costs are expected to increase by approximately $3,159 per year. However, with a new lift station and mechanical bar screen, the amount of time spent by SBB maintaining the system in this area is expected to be greatly reduced.

The operation and maintenance cost calculations are provided in **Appendix E**. Present Worth Analysis calculations are provided in **Appendix F.**

iii. Number of customers served.

This alternative would serve approximately 25 new customers along Nichols Road and Dime Drive. The construction cost per customer for this alternative is approximately $94,360.

V. PLAN SELECTION AND PUBLIC PARTICIPATION

The SBB's regularly scheduled meetings are public meetings, and this project will be discussed with the citizens in attendance as the project progresses. Items discussed include helping the community understand the need for the projects, the funding package, and other pertinent information.

Citizen participation and public input for the project will be obtained in accordance with state and federal funding agency requirements. Additional public meetings will be held during the various stages of the project.

The following criteria was used to help evaluate the alternatives in the previous section:

- Construction Cost
- O&M Cost
- Present Worth Analysis
- Addressed Problems
- Cost Per Customer

Table 2 - Plan Selection Summary Table

-	Construction Cost	Annual O&M Cost	Present Worth Analysis	Construction Cost Per Customer	Addressed Problems
Alternative #1	None	-	-	-	Does not address existing issues
Alternative #2	$2,887,000	($5,811)	$2,998,671 ($74,967 per year)	$62,760	Will address existing issues
Alternative #3	$2,359,000	($3,159)	$2,419,707 ($60,493 per year)	$94,360	Will address some existing issues

Alternative #2 was chosen as the proposed project. Implementing this project will address the issues discussed in Section II-E. The proposed alternative was determined to be the best option in terms of cost per customer, and the number of new customers served.

VI. ENVIRONMENTAL INFORMATION

An environmental review of the study area will be performed by contacting the state and federal agencies that provide environmental overviews concerning archaeological and historical sites, endangered species, wetlands, and other related items. A copy of the environmental responses will be provided once they are received.

The results of these contacts are to be determined. The list of agencies can be found below:

- US Fish and Wildlife Service
- WV Division of Culture and History
- Army Corps of Engineers, Huntington District
- WV Division of Natural Resources
- WV DEP – Division of Air Quality

Adverse environmental impacts of the projects will be minimal. Unavoidable adverse impacts such as erosion and sedimentation will be minimized using silt fence and other sediment control devices. Disturbed areas will be graded, seeded, and mulched as soon as practical after construction. Dust, mud, and other conditions will be minimized by regularly sweeping and damping roadways. Noise pollution will be controlled as much as possible through the proper operation and maintenance of equipment and scheduling of work.

No flood sensitive components will be in the flood plain. Components such as sewer lines and manholes which may be located within the flood plain will be of such a design that potential flood damage will be minimal if not non-existent.

VII. PROJECT SUMMARIES

A. ENGINEERING SUMMARY

The proposed project includes replacing and relocating the Thompson pumping station, installation of a mechanical bar screen and emergency standby generator at the Brushfork pumping station, and extending a new gravity collection system to connect new customers to the system. The proposed collection system includes 2,440 LF of 10-inch sewer pipe, 1,100 LF of 8-inch sewer pipe, 5,690 LF of 6-inch sewer pipe, 1,150 LF of 4-inch sewer pipe, 260 LF of 1-1/4-inch sewer pipe, 560 LF of 1 ½-inch sewer pipe , 45 manholes, 46 lateral connections and the related appurtenances.

The proposed project intends to be in WVDOH rights-of-way were feasible, however due to topography and the location of customers to be served additional easements will be required to maximize accessibility.

A preliminary layout of the proposed project can be found in the proposed project drawings in **Appendix C**.

B. COST SUMMARY

i. Project Costs

Please see the table below and **Appendix H** for Project Cost Information.

Table 3 - Project Cost Estimate Summary

Construction Cost	$2,510,568
Construction Contingency	$376,432
Engineering	$420,000
Project Coordination	$70,000
Accounting	$25,000
Legal	$20,000
Permits	$20,000
Easements	$20,000
Bond Council	$15,000
Project Contingency	$23,000
TOTAL	**$3,500,000**

ii. Operation and Maintenance Costs

Existing O&M Cost: **$4,578,176 per year**
Estimated Additional O&M Cost: **$5,811 per year**

As stated above, O&M costs are expected to increase slightly over the current O&M cost of approximately $4,578,000 per year. The increase in O&M costs is due to the addition of new customers to the system, and not a result of continuing to service and maintain aged and failing system components. The O&M cost calculations are included in **Appendix E**.

iii. Existing Debt

Existing Debt: $12,890,187 ($964,150 per year)

Currently, the SBB has three (3) long-term debt items identified in section 221 of the 2021 Annual Report. Please see below for the existing debt information:

Table 4 - Existing Debt Information

Debt Holder	Date of Maturity	Outstanding per Balance Sheet	Total Funding Required (Yearly)
Series 2013A	**2044**	**$1,016,223**	**$50,094**
Series 2020B	**2041**	**$9,082,357**	**$682,948**
Series 2020A	**2040**	**$2,802,283**	**$231,108**
Less Current Portion		**($10,676)**	

iv. Proposed Project Financing

The proposed funding sources and amounts for the Sanitary Board of Bluefield – Thompson Nichols Road Sewer Project can be found below:

American Rescue Plan (ARP) Grant	$875,000
IJDC Grant	$500,000
CWSRF Loan	$2,125,000
TOTAL	**$3,500,000**

v. User Rates Projected

The present wastewater tariff for the SBB was issued on January 30, 2023.

Table 5 - Existing Sewer Rate Information

Bluefield Sanitary Board Tariff	
Usage	**Rate**
First 10,000	$13.50 per 1,000 Gallons
Next 115,000	$12.25 per 1,000 Gallons
Next 375,000	$12.25 per 1,000 Gallons
All over 500,000	$8.00 per 1,000 Gallons

Example of Tariff Application: A customer that has used 3,400 gallons in one month will be charged $45.90 for that month. The minimum charge for connected users is $27 per month.

A copy of the current tariff is included in **Appendix I.**

C. PROJECT SCHEDULE

Please see **Appendix J** for the Project Schedule.

D. LANDS AND RIGHT-OF-WAY

Currently, no land or right-of-way acquisitions have been obtained, but no problems are expected from this aspect of the project. The project will be constructed in WVDOH rights-of-way where feasible however due to topography and Brushfork Creek additional easements will be necessary. The exact number of easements is not yet known but will be kept to the minimum amount required for construction of the project.

E. PUBLIC HEALTH BENEFITS

Public health is an important aspect when considering any wastewater project. Replacing the Thompson pumping station will provide mitigation against spillage due to the failing existing pumping station and eliminate the need for bypass pumping. Relocation of the Thompson pumping station will remove the station from the FEMA floodplain, or move the station to a location where the depth of backwater is greatly reduced, thereby reducing the risk of high-water events infiltrating the system, reducing the risk of damage to electrical controls, and providing for better maintenance access. Extending sewer service to customers who are currently unserved will help clean up the community and minimize the risk of raw sewage in yards and ditches and will provide a cleaner watershed and healthier environment in the Brushfork area of Bluefield.