Newberry County
Water and Sewer Authority

Request for Proposals for
Design and Engineering Services

Project Title:
Water Distribution System Upgrades

April 27, 2023

Request for Engineering Proposals

1. Introduction

Newberry County Water and Sewer Authority (NCWSA) is hereby requesting proposals for design and engineering services associated with the Water Distribution System Upgrades project in Prosperity, SC. The proposed project will include the following: pumping upgrades at the Lake Murray Water Treatment Plant (LMWTP) finished water pump station, pumping upgrades at the Macedonia pump station, and a transmission main along Macedonia Church Road (Macedonia pump station to Mt. Pilgrim Church Road). The distribution improvements will provide capacity for residential, commercial, and industrial growth throughout Newberry County. A SC Infrastructure Investment Program (SCIIP) grant and NCWSA reserve funds will be used to fund this project.

NCWSA desires to execute a professional services contract with a qualified engineering firm capable of providing professional engineering services associated with the planning, design, and construction of this project.

2. Background

The LMWTP (875 Hamms Landing Rd / Prosperity, SC) is rated to treat 2.0 MGD. Reliable pumping capacity of the finished water pump station is 1.6 MGD. Finished water is pumped through a 12-inch main to the Macedonia pump station. Reliable pumping capacity of the Macedonia pump station is 1.2 MGD. From the Macedonia pump station, water is pumped to the Gin Tank (control tank) near the intersection of SC Highway 391 and Mt. Pilgrim Church Road. Pumping upgrades (finished water pump station and Macedonia pump station) and a new transmission main are needed to deliver a reliable capacity of 2.0 MGD to the Gin Tank. The new transmission main will be designed to accommodate build-out capacity of the LMWTP (6.0 MGD).

3. Schedule of RFP Events

Release RFP documents	04/27/2023 @ 2:00 PM
Deadline for RFP submission	06/01/2023 @ 2:00 PM
Staff completes RFP review	06/15/2023 @ 2:00 PM
Execute engineering contract	07/13/2023 @ 2:00 PM

4. Proposal Delivery

To be considered for this project, each firm must provide one (1) original, three (3) copies, and a pdf (flash drive) of its proposal. Proposals should be hand delivered. NCWSA assumes no liability for mailed proposals that fail to arrive prior to the submission deadline. Proposals received after the submission deadline will be returned unopened. The proposal shall be addressed and delivered as follows:

> Newberry County Water and Sewer Authority
> Attn: Brent A. Richardson, Manager
> 13903 CR Koon Highway
> Newberry, SC 29108

5. Scope of Work

The firm must plan, design, and oversee construction of the Water Distribution System Upgrades project. The project must be designed to provide a reliable pumping capacity of 2.0 MGD (finished water pump station and Macedonia pump station) and transmission capacity of 6.0 MGD (build-out capacity of the LMWTP). The transmission main (approximately 23,100 LF) will be installed along Macedonia Church Road from the Macedonia pump station to Mt. Pilgrim Church Road. The firm shall coordinate all necessary meetings, public hearings, complete and submit all necessary permit applications, conduct all necessary surveying, obtain all necessary permits (including but not limited to SCDHEC Construction, SCDHEC Stormwater, and SCDOT encroachment), provide construction inspection services, and assist with SCIIP submittals. Land acquisition services are not anticipated. Upon completion of

construction, the firm shall coordinate and schedule testing and start-up services. The firm must provide NCWSA with copies of all test results, start-up reports, a certification letter, and As-Built plans.

The Preliminary Engineering Report and cost estimate used to develop the scope of this project are attached.

6. Proposal Format

Cover Letter (1 Page)
- Introduction - signed by an authorized agent of your firm

Firm's Experience (1 Page)
- Firm's capabilities & resources, descriptions of related projects

Key Staff Experience (1 Page)
- Project manager, key staff member's experience & capabilities

Project Understanding (1 Page)
- Provide a clear understanding of project & objectives

Project Approach (1 Page)
- Clearly define the firm's proposed tasks and activities necessary to meet the objectives of this project. Provide the proposed staff members who will be working on each individual task.

Proposed Cost (1 Page)
- Provide an itemized cost estimate to perform all work from project initiation, detailed design, permitting, bidding, construction administration, and construction inspection.

Schedule (1 Page)
- Estimated time required to complete each task. Allow five (5) working days for each NCWSA review period.

References (1 Page)
- List contact name, title, agency, phone number, e-mail address, and mailing address.

7. Evaluation of Proposals

Evaluation criteria and maximum points will be as follows:

Criteria	Maximum Score
Firm's Experience	10
Key Staff Experience	20
Project Understanding	20
Project Approach	20
Proposed Cost	20
Schedule	10
Total	100

NCWSA may reject any proposal in whole or in part when deemed in the best interest of NCWSA.

Thank you in advance for taking your time to prepare a proposal for this project. If you have any questions, please email Brent A. Richardson at brichardson@newberrycountywsa.com.

FINAL

NCWSA DISTRIBUTION SYSTEM PLANNING STUDY

Preliminary Engineering Report

B&V PROJECT NO. 191144

PREPARED FOR

NCWSA

Newberry County Water & Sewer Authority

15 JUNE 2016

BLACK & VEATCH
Building a world of difference.

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1.0 General

1.1 PROJECT BACKGROUND

The Newberry County Water & Sewer Authority (NCWSA) owns and operates the NCWSA Lake Murray Water Treatment Plant (WTP) and associated booster stations, storage tanks, and water distribution mains serving the unincorporated areas of Newberry County, South Carolina. The NCWSA Lake Murray WTP is located at 875 Hamms Landing Road in Prosperity, South Carolina, and has a current rated capacity of 1.0 million gallons per day (mgd). Raw water is supplied to the plant from a pumping station that is adjacent to Lake Murray. A finished water pumping station is located on the WTP site and pumps finished water from an on-site Clearwell standpipe to the Macedonia Church Road standpipe. The Macedonia Church Road pumping station is adjacent to this standpipe and pumps water from the tank into the distribution system. The Macedonia Church Road standpipe also serves as water supply for filter backwashing at the WTP.

The Lake Murray WTP upgrade project was completed in 2014. The treatment process capacity at the plant was upgraded to 2.0 mgd, but because of financial constraints, the upgrades to the finished water pumping and distribution system were not completed. As a result, the WTP is limited to approximately 1.2 mgd based on the pumping capacity of the Finished Water and Macedonia Church Road pump stations and associated transmission mains.

This preliminary engineering report focuses on the water transmission mains and pumping improvements needed to provide 2.0 mgd from the NCWSA Lake Murray WTP to the Gin Tank and distribution system. In addition, a new elevated storage tank and interconnection to the existing distribution system will be necessary to provide the capacity and pressure needed for Mid-Carolina Commerce Park (MCCP) and the surrounding area.

1.2 PROJECT SCOPE

The preliminary engineering presented in this report is divided into two main projects with components of each project described below.

The Lake Murray WTP transmission main and pump upgrades involve the following:

- Finished water pumping improvements to provide a minimum firm capacity of 2 mgd from the water treatment plant to the Macedonia Church Road standpipe with pumps equipped with variable frequency drives (VFDs).
- Booster pumping improvements at the Macedonia Church Road pump station to provide a minimum firm capacity of 2 mgd from the Macedonia Church Road standpipe to the Gin Tank and distribution system with pumps equipped with VFDs.
- A new finished water transmission main from the Macedonia Church Road pump station to the Gin Tank.
- Development of an estimate of probable construction costs.

The MCCP storage tank and main project involves the following:

- A new elevated storage tank at MCCP near the intersection of Interstate 26 and Highway 773.
- A new transmission main from the existing 16 inch main supplying Georgia Pacific, along Cy Schumpert Road and Highway 773 to the new storage tank.
- Development of an estimate of probable construction costs.

1.3 REFERENCE DATA

The following construction plans and reports were used in preparing this document:

- NCWSA Lake Murray WTP Upgrade 2 and Water Main Replacement Basis of Design Report, Black & Veatch, 2012.
- Lake Murray 1.0 MGD Water Plant Record Drawings, Wilbur Smith Associates, 2004.
- NCWSA Siebert Road Water Line Project, Wilbur Smith Associates, 2001.

1.4 GOVERNING STANDARDS

This design will comply with the following:

- American Concrete Institute (ACI).
- American Water Works Association (AWWA) Standards.
- American National Standards Institute (ANSI)/AWWA C652, Standard for Disinfection of Water-Storage Facilities, 2011.
- ANSI/AWWA D100, Standard for Welded Carbon Steel Tanks for Water Storage, 2011.
- ANSI/AWWA D102, Standard for Coating Steel Water-Storage Tanks, 2014.
- ANSI/AWWA D107, Standard for Composite Elevated Tanks for Water Storage, 2010.
- ANSI/National Sanitation Foundation (NSF) 61, Standard for Drinking Water System Components, 2014.
- International Building Code (IBC), 2012.
- International Fire Code (IFC), 2015.
- International Mechanical Code, 2012 Datum and Site Control.
- National Electrical Code (NEC), 2011 (through June 30, 2016), 2014 (beginning July 1, 2016).
- South Carolina Department of Health and Environmental Control (SCDHEC), State Primary Drinking Water Regulations, as amended in 2014.
- Uniform Fire Code.

1.5 DATUM AND SITE CONTROL

In 2012, site surveying at the Lake Murray WTP was performed by Summit Engineering Group, Inc. Benchmarks for vertical and horizontal control will be established. Surveying work is to be based on North American Vertical Datum of 1988 (NAVD 88) and North American Datum of 1983 (NAD 83)/SC State Plane Coordinates.

1.6 JURISDICTIONAL AGENCIES

Coordination with jurisdictional agencies will be an important part of the project. The following permits are anticipated:

- Newberry County – Local Building Permits.
- SCDHEC Bureau of Water – Preliminary Engineering Report (PER) Approval.
- SCDHEC Bureau of Water – Permit to Construct.
- SCDHEC Bureau of Water – Sediment and Erosion Control.
- SCDHEC Bureau of Water – Approval to Place into Operation.
- SC Department of Transportation – Highway Right of Way Encroachment Permit.

1.6.1 SCDHEC Preliminary Engineering Report Requirements

R.61-58.C (1) General Information

Owner: Newberry County Water & Sewer Authority
13903 C.R. Koon Hwy, Newberry, SC 29108
(803) 276-7020
Mr. Brent Richardson, General Manager

Engineer: Black & Veatch Corporation
1411 Gervais Street, Suite 402, Columbia, SC 29201
(803) 413-4537
Mr. Don Franklin, P.E.

Service Area and Customers: The NCWSA service area includes the unincorporated areas of Newberry County. NCWSA serves approximately 9,612 people through 3,560 residential taps and 239 nonresidential taps. NCWSA also serves a secondary population of approximately 1,814 people through three wholesale connections with the Town of Prosperity.

R.61-58.1.C (3) Water Treatment Plants

- Projected Maximum Volume of Water to be Treated: 2 mgd (6 mgd ultimate future capacity).
- Year when Plant is Expected to Operate at its Maximum Capacity: 2 mgd by year 2020 (peak month demand).
- Present Operating Capacity: 1 mgd.
- Location Map of Plant and Project Sites: Refer to Figure 1-1, NCWSA Location Map (Newberry County, SC).

- Flood Plain: Maps showing the Federal Emergency Management Agency (FEMA) flood zones at the NCWSA WTP site, Macedonia Church pump station, and MCCP are provided on Figure 1-2, Figure 1-3, and Figure 1-4, respectively. The proposed improvements are located outside of FEMA designated flood areas.
- Land Available for Future Plant Expansion: The current WTP property and the Macedonia Church Road pump station property have space available for expansion. A site plan of the WTP is included on Figure 1-5 and a site plan of the pump station property is included on Figure 1-6.
- Proposed Treatment Schematic: The schematic is not applicable as no modifications are being proposed for the treatment plant.
- Proposed Design Criteria: Design criteria for the proposed improvements are presented in Sections 2.0 and 3.0.
- Description of Solids Handling Facilities: The description is not applicable as no modifications are being proposed for the treatment plant.
- Names and Grades of Operators:

Operator	Grade
Bob McGaughey	B 7840
Ronald Johns	C 1675
Gaston Floyd	B 7164
John Zeigler	B 3192
Johnnie Wix	C 7354

- Effect of Modifications on Existing Facilities: Upgrades to existing facilities are required at the Finished Water pump station, Macedonia Church Road pump station, and distribution system transmission mains. The existing facilities and improvements are all described in detail in the following sections.
- Detailed description of any pilot testing to be performed: Not applicable.

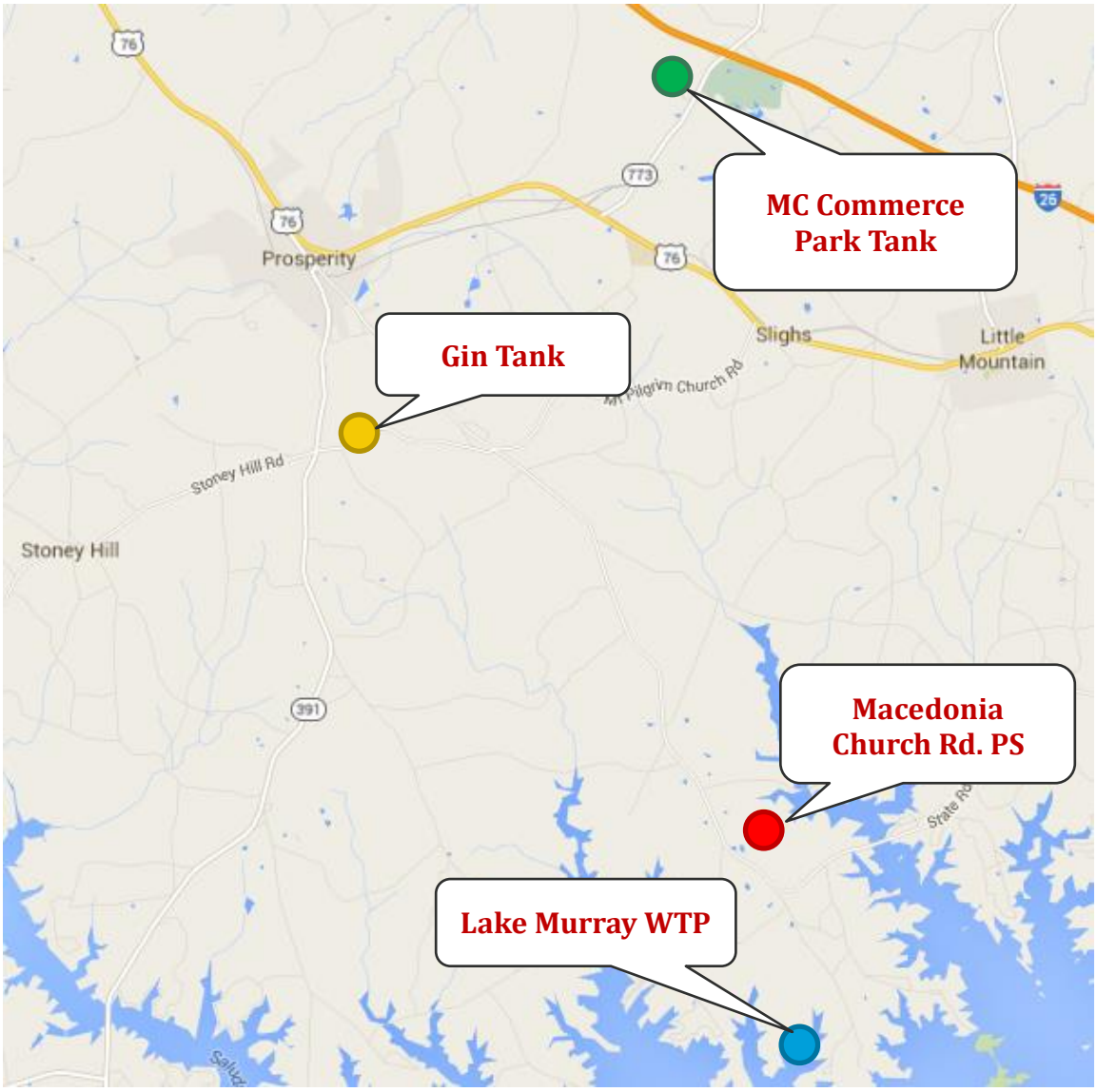


Figure 1-1 NCWSA Location Map (Newberry County, SC)

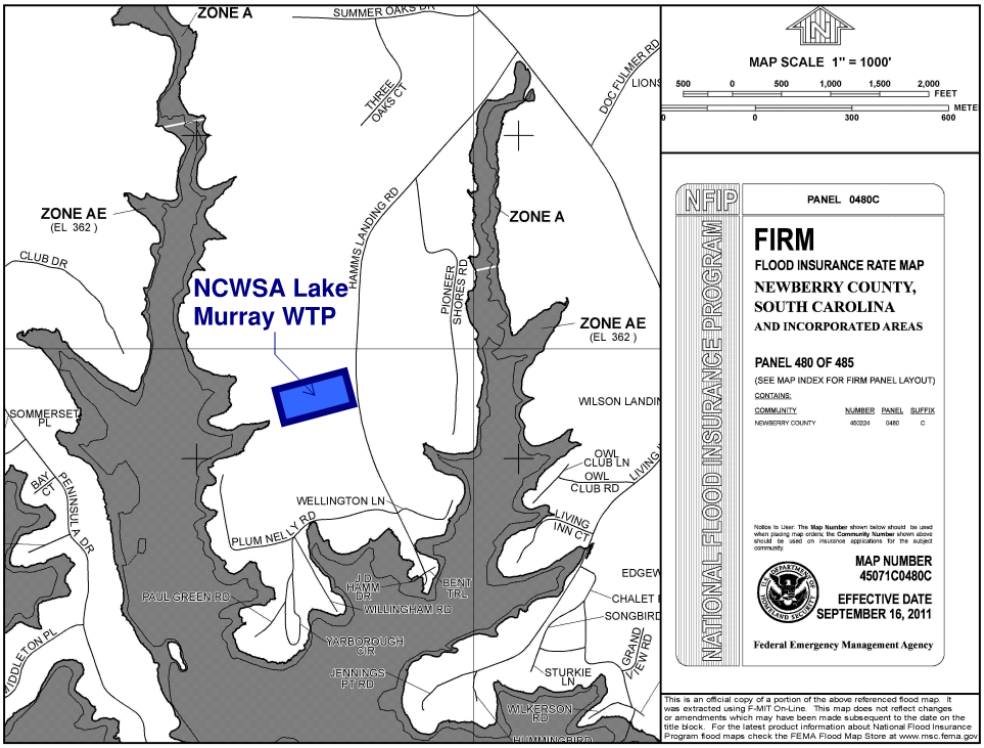


Figure 1-2 FEMA Flood Insurance Rate Map – Lake Murray WTP

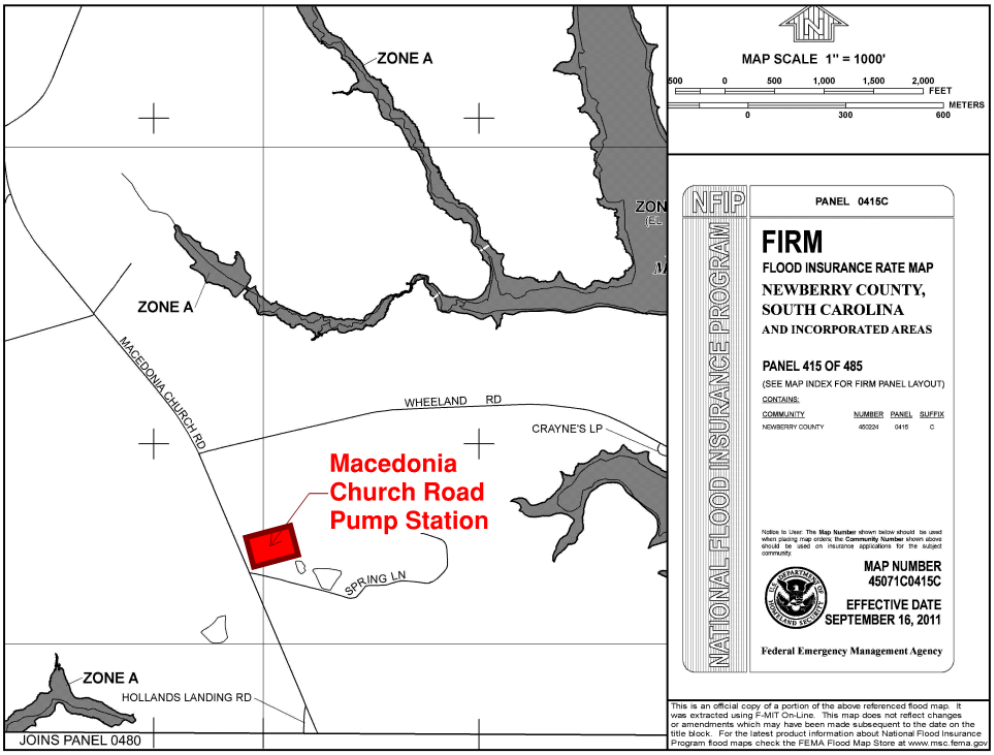


Figure 1-3 FEMA Flood Insurance Rate Map – Macedonia Church Road Pump Station

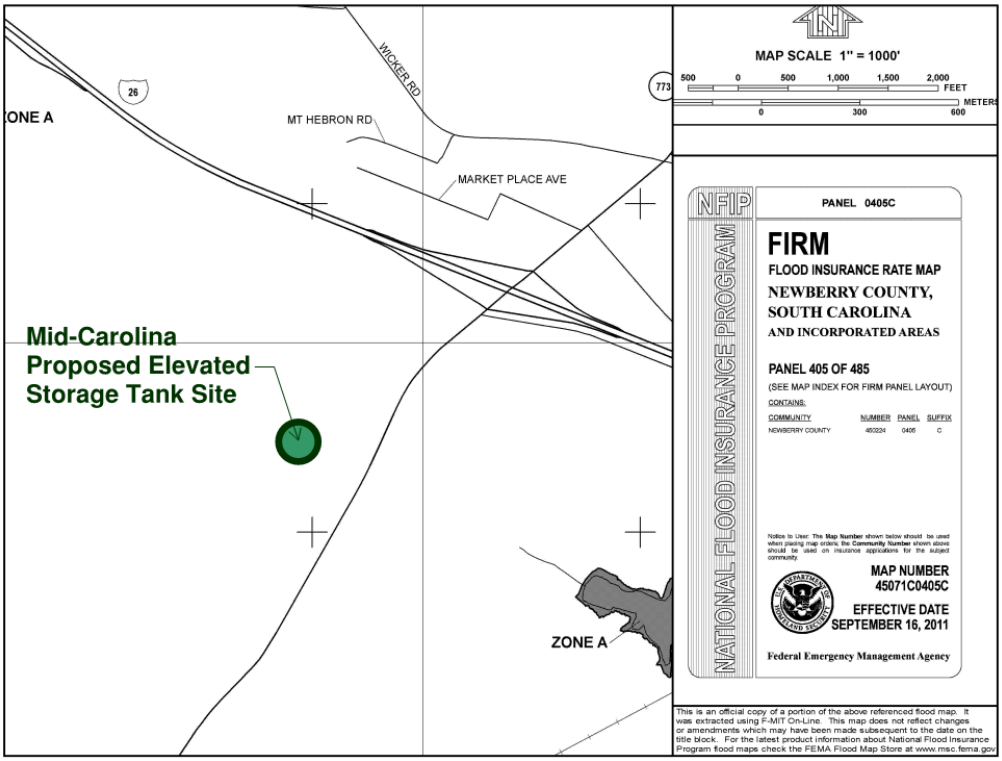
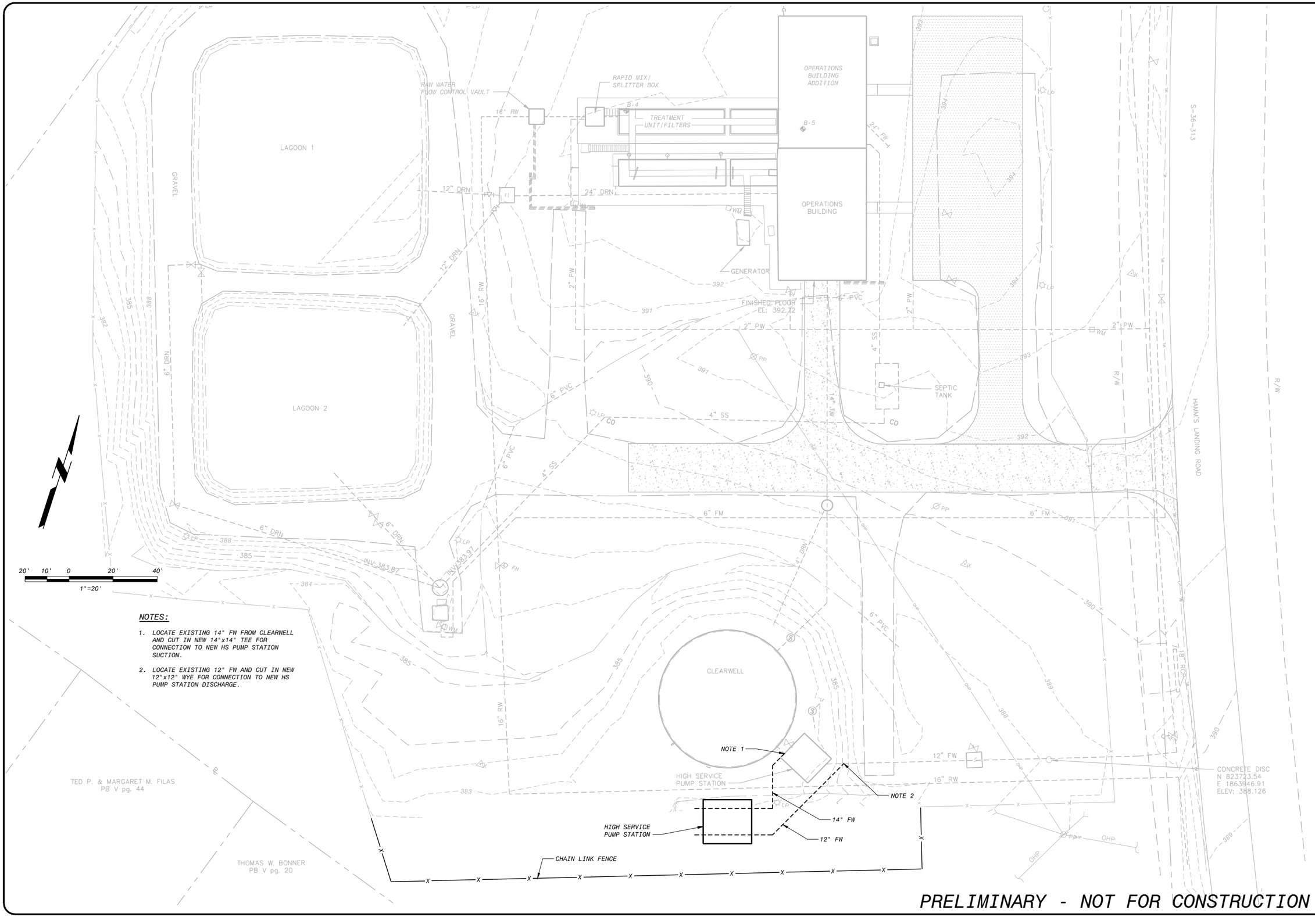


Figure 1-4 FEMA Flood Insurance Rate Map – Mid-Carolina Commerce Park Elevated Tank



NOTES:

1. LOCATE EXISTING 14" FW FROM CLEARWELL AND CUT IN NEW 14"x14" TEE FOR CONNECTION TO NEW HS PUMP STATION SUCTION.
2. LOCATE EXISTING 12" FW AND CUT IN NEW 12"x12" WYE FOR CONNECTION TO NEW HS PUMP STATION DISCHARGE.

PRELIMINARY - NOT FOR CONSTRUCTION

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Black & Veatch Corporation
Greenville, South Carolina

NEWBERRY COUNTY WSA
DISTRIBUTION SYSTEM UPGRADE

HIGH SERVICE PUMP STATION SITE PLAN

DESIGNED: OMI
DETAILED: TLK
CHECKED:
APPROVED:
DATE: 11/12/12

0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PROJECT NO. 191144

FIGURE 1-5
SHEET OF

FD7000_PW
D7024

10' 0 10' 20'
1"=10'

18" RCP
MATCH DITCH GRADE

N 21,171.54
E 16,248.30

N 21,158.60
E 16,253.50

PROPOSED FENCE
2' OFF PROPERTY LINE

N 21,259.63
E 16,447.75

N 21,170.50
E 16,250.87

N 21,183.64
E 16,340.94

N 21,207.09
E 16,373.34

N 21,241.89
E 16,412.52

MATCH LINE STA. 275+00 SEE SHEET 23

2- 10' SWING GATES

PROPOSED 4" CRUSHER RUN SERVICE ROAD

12'-0"

12" 90° MJ BEND W/ MEGALUG RESTRAINT

N 21,192.89
E 16,363.80

N 21,215.11
E 16,393.19

N 21,215.79
E 16,424.04

97 LF OF 12" DIP WATER LINE W/ 4' MIN. COVER

12" GV (OPEN)

10 LF OF 12" DIP WATER LINE

12" 90° MJ BEND SEE NOTE NO. 1

11'-0"

NEW SERVICE POLE & LIGHT

16'x16'x12" FLANGED TEE

SLOPE (6' DEEP) CONC. SPLASH PAD TO DITCH

N 21,151.10
E 16,369.56

12" 90° MJ BEND

PROPOSED FENCE

N 21,158.23
E 16,396.27

EXISTING WOODS

CAP END OF 12" DIP

105 LF OF 12" DIP WATER LINE W/ 4' MIN. COVER

N 21,081.39
E 16,286.73

12" 90° MJ BEND

N 21,134.56
E 16,406.75

12"x12"x12" MJ TEE
N 21,127.36
E 16,353.40

MACEDONIA CHURCH RD. S-36-26

N 21,078.72
E 16,285.65

ALTITUDE VALVE & 12" OS&Y GATE VALVE INSIDE TINDALL PRECAST VAULT W/ 36"x24" HALLIDAY LID.

PROPOSED FENCE
2' OFF PROPERTLY LINE

N 21,167.03
E 16,484.98

PRELIMINARY - NOT FOR CONSTRUCTION

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Black & Veatch Corporation
Greenville, South Carolina

NEWBERRY COUNTY WSA
DISTRIBUTION SYSTEM UPGRADE

MACEDONIA CHURCH ROAD PUMP STATION
SITE PLAN

DESIGNED: OMI
DETAILED: TLK
CHECKED:
APPROVED:
DATE: 11/12/12

0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PROJECT NO.
191144

FIGURE 1-6
SHEET
OF

FD7000_PW
D7024

1.7 PROJECT SCHEDULE

The major milestones for the project are as follows. This schedule is based on a traditional Design-Bid-Build construction approach.

1.7.1 Project Schedule – Lake Murray WTP – Transmission Main and Pump Upgrades

- Request Proposals--January 2017.
- Project Design--March 2017.
- Project Permitting--November 2017.
- Advertise Bid--February 2018.
- Award Bid--March 2018.
- Begin Construction--April 2018.
- Complete Construction--July 2019.
- Permit to Operate--August 2019.

1.7.2 Project Schedule – Mid-Carolina Commerce Park Storage Tank and Main

- Request Proposals--January 2017.
- Project Design--March 2017.
- Project Permitting--November 2017.
- Advertise Bid--February 2018.
- Award Bid--March 2018.
- Begin Construction--April 2018.
- Complete Construction--July 2019.
- Permit to Operate--August 2019.

1.8 ESTIMATE OF PROBABLE COSTS

An estimate of probable construction costs for the proposed improvements is summarized in Tables 1-1 and 1-2.

Table 1-1 Estimate of Probable Construction Costs for Lake Murray WTP – Transmission Main and Pumping

PROJECT COMPONENTS	COST
Macedonia Church Road/Mt. Pilgrim Church Road Transmission Main	$3,865,875
Lake Murray WTP Finished Water Pump Station	$442,290
Macedonia Church Road Pump Station	$432,458
Total Project Construction Cost	**$4,740,623**

Table 1-2 Estimate of Probable Construction Costs for Mid-Carolina Commerce Park Storage Tank and Main

PROJECT COMPONENTS	COST
MCCP Elevated Storage Tank	$3,117,161
MCCP Hwy 773 Water Main	$999,375
Total Project Construction Cost	**$4,116,536**

Probable construction costs include engineering, legal, and administration costs. A more detailed breakdown of the project costs is presented in Section 5.0.

1.9 MAJOR EQUIPMENT LIST

A list of major equipment is provided in Table 1-3.

Table 1-3 Major Equipment List

EQUIPMENT	TYPE	MANUFACTURER
Finished Water Pumps	Horizontal Splitcase	Patterson, Fairbanks-Morse, Floway
Macedonia Church Road Booster Pumps	Horizontal Splitcase	Patterson, Fairbanks-Morse, Floway
Flowmeters	Venturi	Primary Flow Signal, BIF
Elevated Storage Tank	Composite Tank or Leg Tank	Phoenix, Landmark

2.0 Lake Murray Water Treatment Plant – Transmission Main Improvements and Pump Upgrades

2.1 HYDRAULIC MODELING

A hydraulic model was developed using Bentley's WaterGEMS V8i hydraulic modeling software to represent a portion of the current NCWSA distribution system. ArcGIS data provided by NCWSA was imported into WaterGEMS, which included pipe material, diameter, and length information. The data also included tank and valve information, which were imported as shapefiles. Elevated storage tanks (Gin Tank and new Mid-Carolina Commerce Tank) and pumps (Finished Water and Macedonia Church) were added to the model replicating the system's existing conditions. Elevation data obtained from US Geological Survey (USGS), ArcGIS data provided by NCWSA, and Google Earth were used to identify key high and low points in the system. Minor losses were entered into the model based on an estimated number of valves and bends in the system for each modeled pipe section.

Demands were attributed to specified nodes in WaterGEMS to represent the 2016 water usage map provided by NCWSA (Figure 2-1). The demands from the 2016 water usage map were used to model the current and future demands on the system.

The hydraulic model was developed to achieve the following goals:

- Size the transmission main from the Macedonia Church Road pump station to the Gin Tank to create a system loop with the existing 12 inch line along Seibert Road.
- Size the water main needed to convey additional flow to MCCP.
- Develop system head curves from the High Service pump station to the Macedonia standpipe to size the proposed finished water pumps.
- Develop system head curves for the Macedonia Church Road pump station to the distribution system to size the proposed Macedonia pumps.

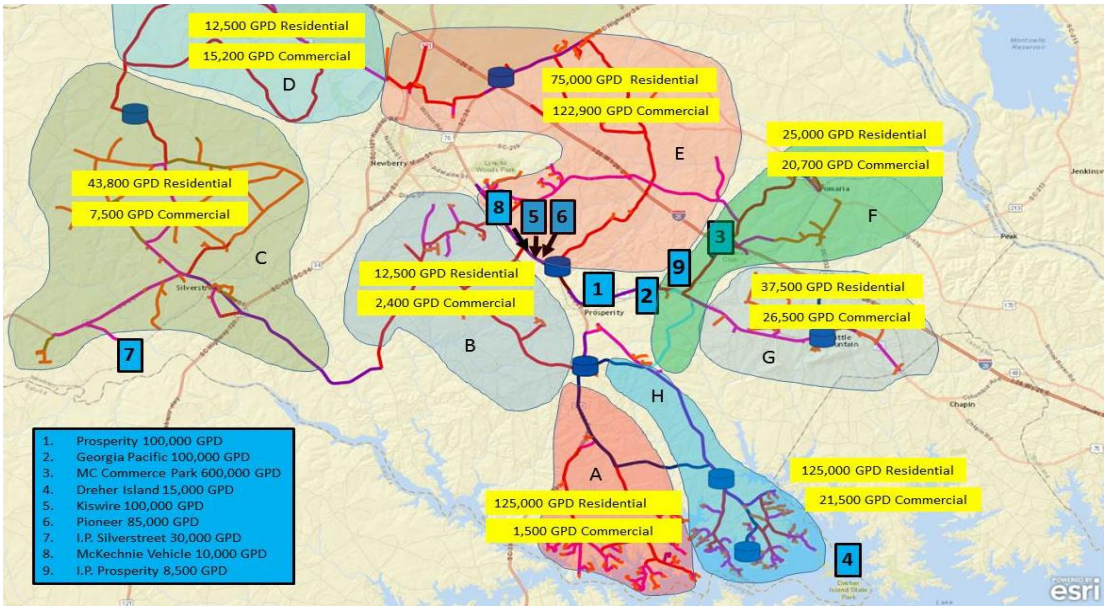

Figure 2-1 NCWSA 2016 Water Usage Map

A steady-state model was developed for the base condition that consisted of the existing distribution system, transmission mains, storage tanks, and current demand conditions. Alternative scenarios were created to represent 2 mgd, 4 mgd, and 6 mgd system demands. These alternatives included modifications to the following:

- Operational settings/capacities for pipes, pumps, and tanks. (Refer to Table 2-1.)
- Sizing of pipes (16 inch, 20 inch, 16 inch and 20 inch, and 24 inch options).
- Current and future demands based on Figure 2-1 (future demands were escalated based on flow from current demands to the respective firm capacities of 2 mgd, 4 mgd, and 6 mgd).
- Pump curves for new 2 mgd pumps with VFDs.

Table 2-1 Pumps in Operation

PUMPS	CURRENT	2 MGD	4 MGD	6 MGD
Pump 1	1 mgd – On	2 mgd – On	2 mgd – On	2 mgd – On
Pump 2	1 mgd – Standby	2 mgd – Standby	2 mgd – On	2 mgd – On
Pump 3			2 mgd – Standby	2 mgd – On
Pump 4				2 mgd – Standby

2.2 TRANSMISSION MAINS

2.2.1 Macedonia Church Road Water Main to Gin Tank

Using the WaterGEMS hydraulic model, the potential pump and piping improvements to the system from the Macedonia Church Road standpipe to the Gin Tank and the proposed MCCP Tank were evaluated. Several scenarios were considered for evaluation, which included the alternatives discussed below. All scenarios assume the installation of approximately 33,000 linear feet (6 miles) of water main along Macedonia Church Road to the Gin Tank with an interconnect to an existing 16 inch at the intersection of Macedonia Church Road and Mt. Pilgrim Church Road. All piping was assumed to have a C-factor of 100.

To size the water transmission main improvements along Macedonia Church Road, the following parameters were utilized in the hydraulic model:

- Ultimate design flow of 6 mgd.
- Minimum distribution pressure of 25 pounds per square inch (psi).
- Existing 12 inch main along Siebert and Bethel Church Road to Gin Tank stays in service.
- Static pump head based on the water surface elevation in the Macedonia Church Road standpipe 5 feet below overflow (WSE equal to 482 feet) while the Gin Tank and MCCP tank water surface elevations were assumed to be at the overflow elevations (WSE equal to 716 feet).

Figure 2-2 illustrates a comparison of system head curves for various diameter transmission main alternatives along Macedonia Church Road to the Gin Tank. The flow from the Macedonia Church Road Pump Station to the Gin Tank will be split between the new water main up Macedonia Church Road and the existing 12 inch supply from Siebert Road along Bethel Church Road to the Gin Tank creating a complete loop to the Gin Tank.

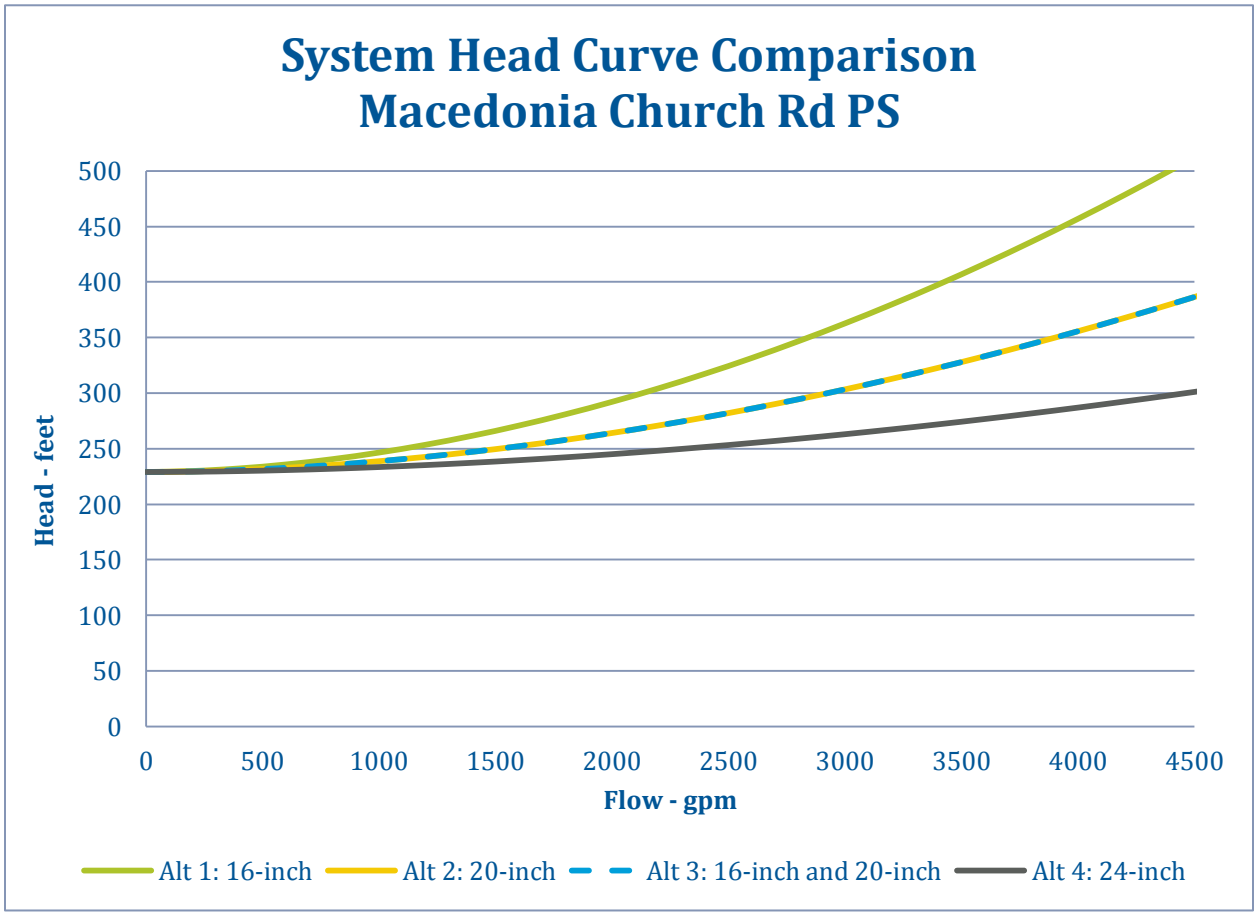

Figure 2-2 System Head Curve Comparison for Transmission Main Diameters

Three alternatives were developed using different pipe sizes. Each of the options and a summary of the model results are described below.

Alternative 1: 16 inch Water Main

Alternative 1 includes routing a new 16 inch main the entire distance from the Macedonia Church Road pump station to the Gin Tank. Modeling results revealed a system head difference of over 200 feet between the 2 mgd and 6 mgd flow scenarios. For this option, the pumps would need to be sized with a design head of 478 feet or 208 psi. Given the extreme range of required system head and high pressures, this alternative is not recommended. Other options with larger pipe sizes that require lower maximum pressures should be considered.

Alternative 2: 20 inch Water Main

Alternative 2 includes routing a new 20 inch main the entire distance from the Macedonia Church Road pump station to the Gin Tank. Modeling results revealed approximately 120 feet of head difference between the 2 mgd and 6 mgd flow scenarios. For this alternative, the pumps would need to be sized with a design head of 368 feet or 159 psi. The head range and maximum pressure is more favorable than Alternative 1.

Alternative 3: 16 inch and 20 inch Water Main

Alternative 3 includes routing a new 20 inch water main from the Macedonia Church Road pump station along Macedonia Church Road to Mount Pilgrim Church Road (approximately 4 miles), then reducing to a 16 inch water main along Mount Pilgrim Church Road to the Gin Tank (approximately 2 miles). A connection to an existing 16 inch water main at the end of the proposed 20 inch water main will allow flow from the Macedonia Church Road pump station to supply two different 16 inch routes; to the Gin tank and toward the Georgia Pacific industry. Modeling results revealed nearly identical system head requirements as compared to Alternative 2. The observed system head results are attributed to having a similar head loss along Mount Pilgrim Church Road to the Gin Tank between a 16 inch and a 20 inch due to the flow split into the two 16 inch mains. Therefore, this scenario is recommended over Alternative 2 since it requires approximately 2 miles of a reduced size and less costly water main without reduced performance.

Alternative 4: 24 inch Water Main

Alternative 4 includes routing a new 24 inch water main from the Macedonia Church Road pump station to the Gin Tank. Modeling of the 24 inch transmission main reveals a system head curve that is flatter with approximately 60 feet of head difference between the 2 mgd and 6 mgd flow scenarios. For this alternative, the pumps would need to be sized with a design head of 292 feet or 159 psi. The larger water main requires less system head and thereby less pump horsepower. However, as discussed further in the pump station portion of this project, flatter system head curves are less favorable for VFD pumps. Pumps are available to meet the operating conditions in Alternatives 2 and 3. Therefore, increasing the line size to 24 inch is not necessary and the expense of the larger pipe size is not recommended.

2.3 MACEDONIA CHURCH ROAD PUMP STATION

The Macedonia Church Road standpipe and pump station includes a 250,000 gallon standpipe with an overflow elevation of 487 feet and a floor elevation of 430 feet. There are currently two constant speed horizontal split case pumps inside the pump station that deliver water from the standpipe to the 1.4 million gallon Gin Tank with an overflow elevation of 716 feet. Typically, the pumps are operated manually based on operator monitoring of the Gin Tank level.

The original design included a 12 inch altitude valve on the tank inlet pipe. However, this altitude valve is currently not in service. Water flows in and out of a single inlet pipe located at the base of the tank. In addition to providing a buffer for the operation of the Macedonia Church Road pumps, the standpipe supplies backwash water to the WTP filters. The existing pumps are listed in Table 2-2.

Table 2-2 Existing Macedonia Church Road Pumps

PUMP NO.	MAKE/MODEL	HP	DESIGN FLOW	DESIGN TDH
1	Fairbanks Morse 4 inch Figure 2876C Split Case	125	1.2 mgd	374 ft
2	Fairbanks Morse 4 inch Figure 2876C Split Case	125	1.2 mgd	374 ft

2.3.1 Hydraulic Evaluation

WaterGEMS was used to evaluate the potential pump and piping improvements to the system between the Macedonia Church Road standpipe and the Gin Tank. Several transmission main options were considered for examination as discussed in Section 2.2. The system head curves developed as part of that analysis are shown on Figure 2-2. The 16 inch and 20 inch transmission main from the Macedonia Church pump station to the Gin Tank is recommended as discussed in Section 2.2 and was used for preliminary sizing and selection of pumps.

To size the Macedonia Church pump station improvements, the following modeling parameters were used:

- Size new 2 mgd pumps based on ultimate pump station design flow of 6 mgd (three active – one standby).
- Static pump head based on the water surface elevation at the Macedonia Church Road standpipe 5 feet below overflow (WSE equal to 482 feet) while the water surface elevations at the Gin Tank and future MCCP Tank were assumed to be at the overflow elevation (WSE equal to 716 feet).
- Pump head based on existing 12 inch supply to the Gin Tank along Bethel Church Road and the new transmission main installed along Macedonia Church Road/Mount Pilgrim Road to the Gin Tank.
- The installation of a new surge relief valve at the pump station.
- The turndown capacity of the new VFDs for the new pumps.

2.3.2 Preliminary Pump Selection

A preliminary pump selection was made to evaluate its range of performance with the developed system head curves. The pump curve used in this report is based on a Fairbanks Nijhuis 1800 1STG SPLIT CASE pump. The performance goal of the pumps is based on three pumps operating in the ultimate buildout of 6 mgd. Each pump would need to provide 2 mgd at the 6 mgd system head and have the ability to turn down to the 2 mgd system head when operating alone. Figure 2-3 shows the system head curve for the combination 16 inch/20 inch transmission main and the 24 inch transmission main. The system head curves are overlaid with preliminary pump curves and the lighter gradation lines indicate the reduced pump speed achievable with the VFDs. The reduced speed curves range from 70 percent to 100 percent speeds. The two outer lines bracket the preferred operating range (POR) of a centrifugal pump, which correlates to a range of flow between 70 percent and 120 percent of the flow at the best efficiency point (BEP). The shaded areas highlight the pump operating boundaries defined by the POR and maximum reduced speed.

As indicated on Figure 2-3, a flow range of 800 gallons per minute (gpm) to 4,250 gpm can be achieved along the 16 inch/20 inch system head curve with various operating scenarios of the three proposed pumps. This meets the performance goal needed and allows the pump station to be upgraded in stages as the capacity of the water system is increased. The preliminary pump design criteria for the Macedonia Church Road pump station are shown in Table 2-3.

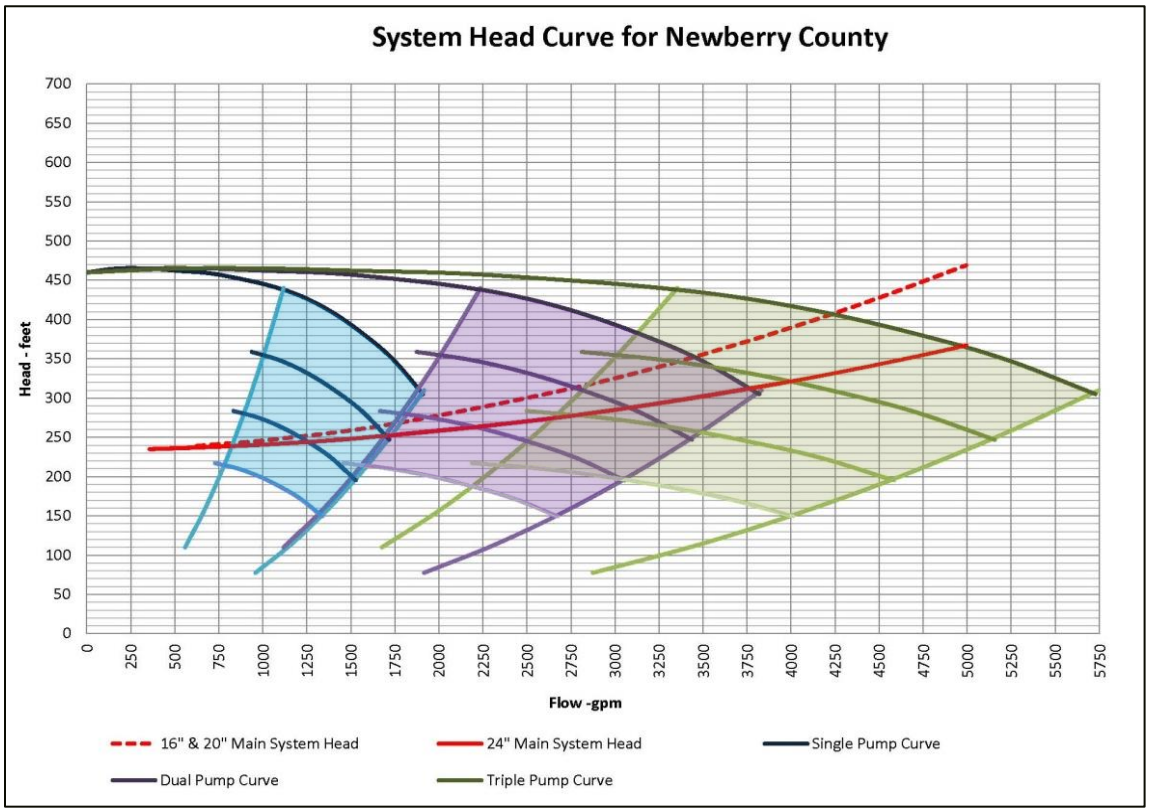

Figure 2-3 Preliminary Pump and Speed Curves

Figure 2-3 demonstrates that with three pumps operating, 6 mgd can be delivered into the 16 inch/20 inch transmission main with a design head of 405 feet. With the same pump operating alone, 1.15 mgd can be delivered at the system head of 240 feet with the pump speed turned down to the minimum 70 percent speed. The selected pump curve is therefore a viable option to provide the needs of the 2 mgd near-term capacity and the ultimate 6 mgd capacity with the addition of similar pumps. The selected pump is indicated in Table 2-3.

Table 2-3 Proposed Macedonia Church Road Pumps

PUMP NO.	PUMPING	HP	DESIGN FLOW	DESIGN TDH
1	Horizontal Split Case Pump	200	2.0 mgd	405 ft
2	Horizontal Split Case Pump	200	2.0 mgd	405 ft

An alternative scenario was also evaluated to determine the flow rate available from the existing Macedonia Church Road pumps if the 16 inch and 20 inch transmission main were installed prior to the pump station improvements. Figure 2-4 indicates the 16 inch/20 inch combination system head curve along with the existing pump curve. The curves indicate the existing pump would deliver approximately 1,180 gpm or 1.7 mgd.

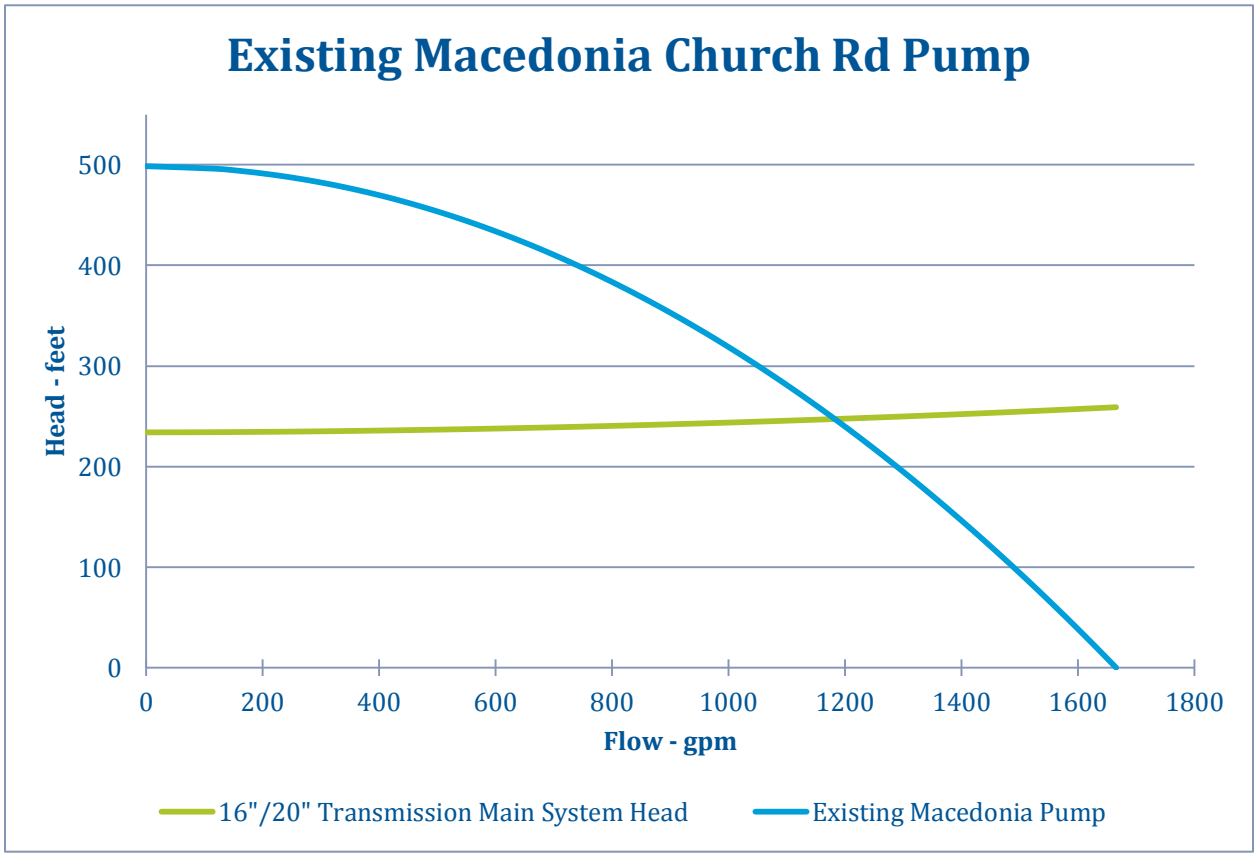

Figure 2-4 Macedonia Church Road Existing Pumps with Transmission Main Upgrade

2.4 FINISHED WATER PUMP STATION

The Lake Murray WTP Finished Water pump station delivers water from the WTP to the Macedonia Church Road standpipe. The original and current design of the pump station includes two 50 horsepower pumps sized to deliver a firm capacity of 1 mgd. The existing pumps are presented in Table 2-4. Improvements are needed to increase the capacity of the pump station to 2 mgd with an ultimate buildout capacity of 6 mgd.

Table 2-4 Existing Finished Water Pumps

PUMP NO.	MAKE/MODEL	HP	DESIGN FLOW	DESIGN TDH
1	Fairbanks Morse 5 inch Figure 2824 Split Case	50	1.0 mgd	142 ft
2	Fairbanks Morse 5 inch Figure 2824 Split Case	50	1.0 mgd	142 ft

2.4.1 Hydraulic Evaluation

Factors used to evaluate the pumping system for upgrade include consideration of existing pumps, pipe capacity/velocity, surge, and phasing. WaterGEMS was used to evaluate the potential pump and piping improvements to the system between the Finished Water pump station and the Macedonia Church Road standpipe. System head curves were generated for the Finished Water system from the model. Based on the calculated results, the existing system head is too great to expand the station using the existing pumps. The existing pumps can only produce approximately 1.2 mgd of flow from the Finished Water pump station to the Macedonia Church Road standpipe (refer to Figure 2-5).

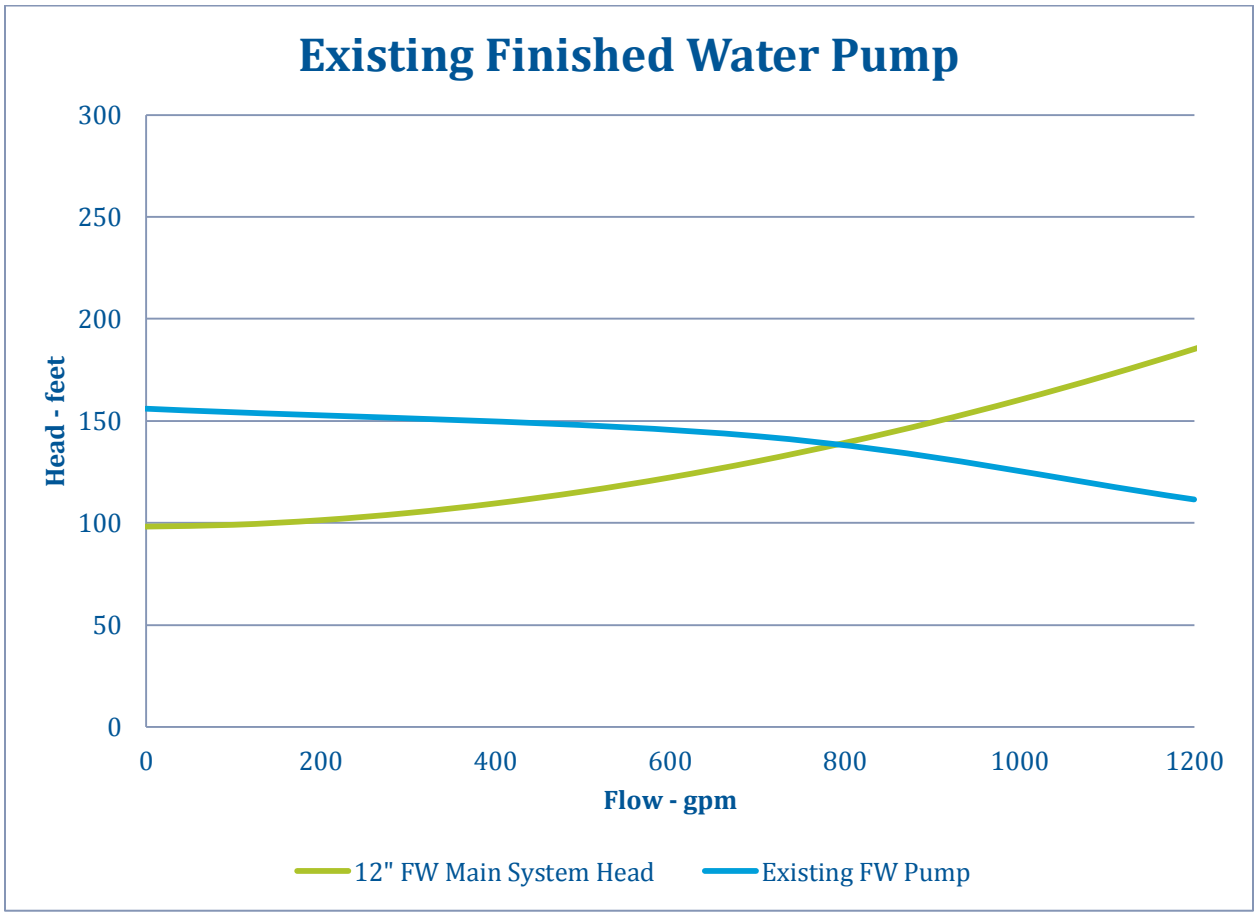

Figure 2-5 Existing Finished Water Pumps

To size the Finished Water pump station improvements, the following modeling parameters were used:

- Size pumps for 2 mgd each.
- Pump head based on Clearwell 5 feet below overflow (WSE equal to 390 feet) and Macedonia Church Road standpipe at overflow (WSE equal to 487 feet).
- Select pump head using existing 12 inch water main to deliver 2 mgd design flow.
- Size a second finished water main to deliver an additional 4 mgd in the future.
- VFDs for pumps.

2.4.2 Preliminary Pump Selection

To expand to a 2.0 mgd firm capacity, the existing pumps require replacement. Two new pumps are proposed to deliver 2 mgd each with one serving as a standby. To utilize the existing 12 inch finished water main, the 2 mgd pump will require a design head of 220 feet. For future capacity expansions beyond 2 mgd, a parallel finished water main will be required. A 16 inch main in parallel with the existing 12 inch will provide the ultimate design flow of 6 mgd at a similar system head of 220 feet. Table 2-5 outlines the proposed pump and pipe phasing for the Finished Water pump station.

Table 2-5 Finished Water Pump Station Phasing

PHASE	PUMPING	TOTAL FIRM CAPACITY	DESIGN HEAD	PIPING IMPROVEMENTS
1	(2) 100 hp Horizontal Split Case Pumps	2.0 mgd	220 ft	None
2	(1 additional) 100 hp Horizontal Split Case Pump	4.0 mgd	220 ft	Install parallel 16 inch finished water main
3	(1 additional) 100 hp Horizontal Split Case Pump	6.0 mgd	220 ft	None

The proposed pumps will be equipped with (VFDs) for operational flexibility. In Phase 2, turndown of the pump as part of normal operation will be anticipated as the pump head is sized to meet high head conditions for Phase 1 and Phase 3. Figure 2-6 compares the system head curve of the existing 12 inch finished water main with the system head curve for a parallel 12 inch and 16 inch finished water main.

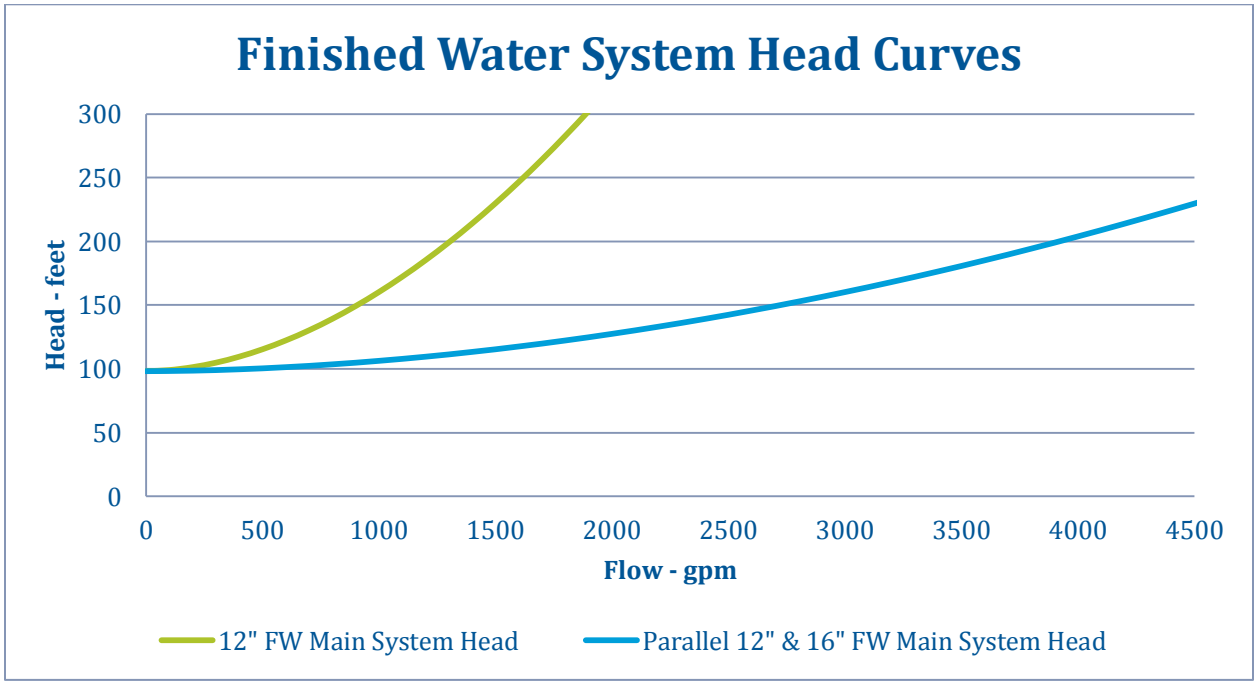

Figure 2-6 Finished Water System Head Curve Comparison

3.0 Lake Murray WTP – Mid-Carolina Commerce Park Storage Tank and Water Main

3.1 INTRODUCTION

The MCCP is located near Highway 773 and I-26 and is supplied by an 8-inch water line along Highway 773 that expands to a 12 inch water line when entering the park area. The MCCP consists of an entrance, paved roads, utilities, and a vacant commercial building. Currently, there are no industrial tenants. NCWSA reserves 600,000 gallons per day of its water supply capacity for the MCCP to maintain its certification as a commerce park. To make the MCCP more attractive to potential industrial prospects, NCWSA's ability to deliver water supply for drinking, process, and fire protection to the park must be improved. This section provides the preliminary sizing of additional water mains and storage improvements recommended to serve the MCCP.

3.1.1 Cy Schumpert Road and Highway 773 Water Main

MCCP is in need of a larger water main along Highway 773 and a localized elevated storage tank to supply drinking water, process water, and fire protection to the park and the surrounding area. Currently, the system has a 16 inch water main from Mt. Pilgrim Road routed along Cy Schumpert Road that serves Georgia Pacific. This 16 inch main is not interconnected with the distribution system northeast of Georgia Pacific because of pipe failures in the past caused by pipe material and age. With the establishment of MCCP, it is recommended that the distribution system be interconnected once again by extending the 16 inch main, beginning at Highway 76 at the isolated section of Cy Schumpert Road up to the intersection of Cy Schumpert Road and Highway 773. From there, a new 12 inch ductile iron pipe (DIP) main along Highway 773 to the MCCP can be used to fill a local storage tank.

3.1.2 Highway 773 Transmission Main Alternative

An alternative route and size for the MCCP transmission main was considered to determine if the storage tank construction could be delayed. In this alternative, a new 16 inch main is connected to the end of the existing 16 inch main located at the end of Cy Schumpert Road and extended to the entrance of the MCCP. Under a near-term maximum day demand of 2 mgd, the WaterGEMS model used for this study indicates a flow rate of up to 1,420 gpm is available to the MCCP at 25 psi. The available flow increases to 1,590 gpm under a 20 psi scenario. It should be noted that the water model used only includes the existing Gin Tank and Macedonia Church Road pump station as a supply to the MCCP. The modeled flow rates could improve if the other water storage tanks were included in the model, particularly under the higher fire flow scenarios. However, even if the flow estimates are improved, the full maximum fire flow of 2,750 gpm estimated in the calculation presented in Subsection 3.2.1 would not be available without the addition of localized water storage.

3.2 ELEVATED STORAGE TANK

3.2.1 General Design

This section presents the sizing criteria and preliminary design for the addition of an elevated storage tank on the NCWSA distribution system to locally serve the MCCP and the surrounding area. The following storage volume calculation represents criteria between the minimum acceptable performance according to federal and state regulations and the highest industry standards.

- Sizing Criteria--The following calculations are used to determine the best size of storage tank:
  - EQ Volume = (Peak Hour Demand - Maximum Day Demand) * 4 hours
  - Fire Reserve = Maximum Fire Flow Rate * 2 hours
  - Emergency Reserve = 1/2 Average Day Demand
  - Storage Volume = EQ Volume + greater of Fire Reserve or Emergency Reserve

  Each of the parameters used in these calculations are further described as follows.

- Maximum Day Demand--According to the South Carolina Site Certification Manual a "Large Park" will need an excess capacity of 600,000 gallons per day (gpd). The NCWSA currently reserves 600,000 gpd for the MCCP to maintain this certification. For the purpose of this study, the maximum day demand for the MCCP is projected to be 600,000 gpd at build-out.

  In addition to the MCCP, the demand from the local area around the MCCP is also considered to be served by the local storage tank. The current average day demand of the local area (refer to Figure 2-1, Zone F) is 154,200 gpd. This represents 13.7 percent of the total current average day demand on the water system. With 6 mgd as the maximum day demand at the water system build-out, and the MCCP using 600,000 gpd, the remaining maximum day capacity of the water system is 5.4 mgd. The maximum day demand of the local Zone F would then project to be 738,800 gpd at future build-out.

  Total Projected Maximum Day Demand = 600,000 gpd + 738,800 gpd = 1,338,800 gpd

- Peak Hour Demand--Maximum day demand is estimated to be 1.5 times the average day demand and peak hour demand is estimated to be 2.5 times average day demand. Therefore, the peak hour demand served by the local storage tank is calculated as follows:

  Peak Hour Demand = (1,338,800 gpd) * 2.5/1.5 = 2,231,333 gpd

- EQ Volume--Using the calculated peak hour demand of 2,231,333 gpd and maximum day demand of 1,338,800 gpd, the EQ volume would be calculated as follows:

  EQ Volume = (2,231,333 gpd – 1,338,800 gpd) * 4 hrs * day/24 hrs = 148,756 gallons

- Fire Reserve--The fire reserve is based on the IFC to estimate the maximum fire flow rate required for a projected industry at the MCCP. Using Table B105.1 in Appendix B of the IFC, a fire flow of 2,750 gpm is required for a Type IIA or IIIA Construction (IBC) with an area of between 33,000 and 39,000 square feet. This fire flow can fluctuate with the estimated size of the future industry/tenants.

  Fire Reserve = 2,750 gpm * 2 hrs * 60 min/hr = 330,000 gallons

- Emergency Reserve--The emergency reserve is calculated based on the average day demand. Using the a maximum day demand previously calculated of 1,338,800 gpd and considering that the maximum day demand is approximately 1.5 times the average day demand, the average day demand served by the local tank becomes 892,533 gpd.

  Emergency Reserve = 1/2 * 892,533 gpd = 446,267 gallons

- Storage Volume--Because the emergency reserve is greater than the fire reserve, the storage volume is calculated as follows:

  Storage Volume: 148,756 gallons + 446,267 gallons = 595,023 gallons

Considering the results of these calculations, a 600,000 gallon storage tank is recommended.

In addition to the aforementioned criteria, the State Primary Drinking Water Regulation R.61-58 (Section 4, Paragraph C.1.a) necessitates that the storage requirement for a water distribution system shall equal one-half of the maximum daily consumption (maximum day demand). For the ultimate build-out flow of 6 mgd, this equates to 3 million gallons of storage for the total system. The NCWSA currently has this storage capacity with existing tanks (Table 3-1). The Gin Stand Pipe storage tank, however, is a ground storage tank and its total storage capacity is included in the total system storage, but because the entire volume is not elevated, the entire volume is not usable. The addition of the recommended 600,000 gallon elevated storage tank will assist with system storage capacity and provide localized pressure and fire protection in the northeastern NCWSA service area around the MCCP.

Table 3-1 NCWSA System Storage Tanks

TANK	LOCATION	CAPACITY
Backman Chapel Elevated	Backman Chapel at US 76	500,000 gallons
Eggoid Elevated	Highway 34 at I-26	500,000 gallons
Bush River Standpipe	Bel Ivy Road at Floyd Road	600,000 gallons
Gin Standpipe	Highway 391 at Mt. Pilgrim Road	1,400,000 gallons
Little Mountain	199 State Road S-36-125	100,000 gallons
Macedonia Church Road Standpipe	3344 Macedonia Church Road	250,000 gallons
Total System Storage		**3,350,000 gallons**

3.2.2 Potential Storage Location

Three location options were evaluated for an elevated storage tank on the basis of the high ground elevations in the MCCP and Georgia Pacific areas along Highway 773. The overflow elevations of the current NCWSA water storage tanks are all 716 feet with the exception of the Little Mountain storage tank, which operates on a higher hydraulic grade. The target hydraulic grade for the proposed storage tank will also be 716 feet, unless a high enough elevation is not available. A lower hydraulic grade can be provided by a shorter storage tank. However, avoiding the creation of another hydraulic zone in the water system is preferred, if possible.

Figure 3-1 shows the three potential storage locations.

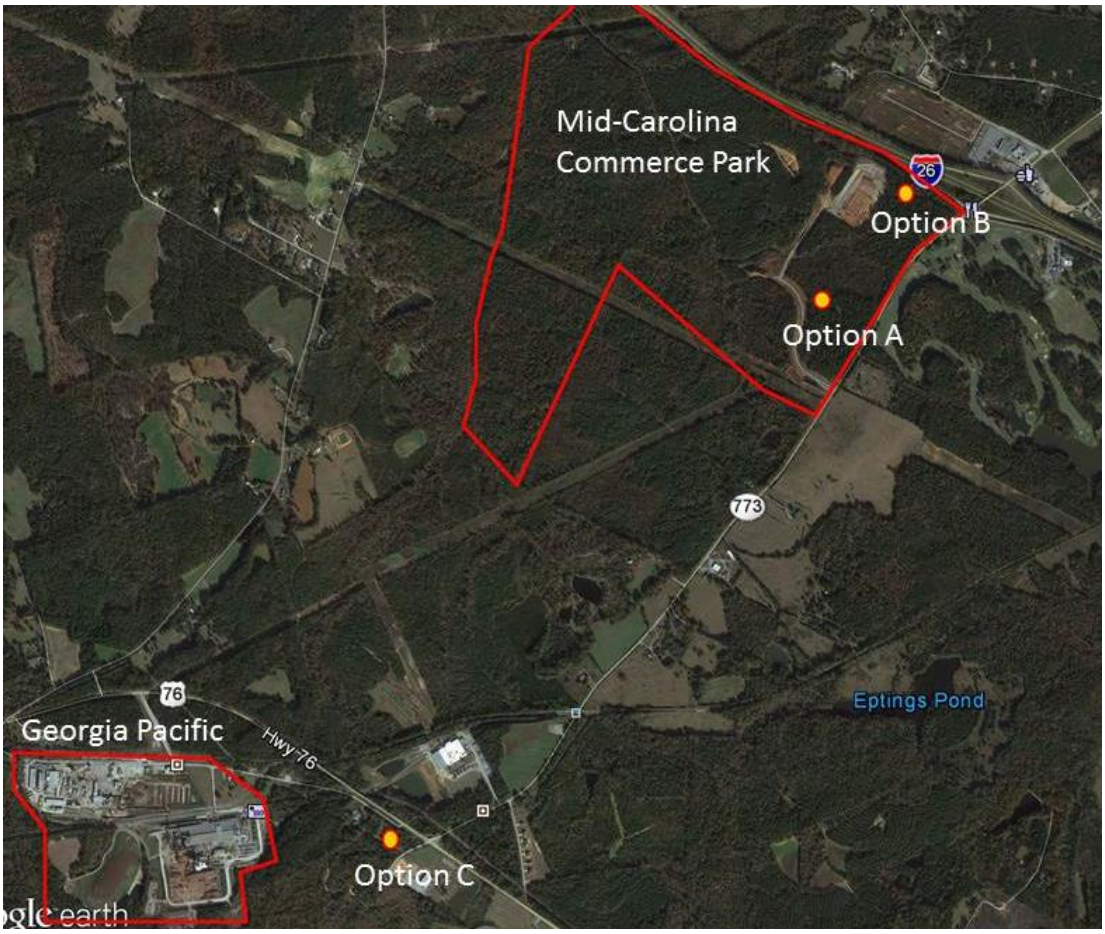

Figure 3-1 Potential Storage Locations

- Option A--The first option is located on the MCCP site, between the entrance road and Highway 773. The grade elevation at this location ranges from 520 to 530 feet with the higher elevations located closer to Highway 773. This site has the highest point in this area among the options considered and is the highest area available within the MCCP. This option would require a tank height of 186 feet to 196 feet to match the current system's hydraulic grade.
- Option B--The second option is also located on the MCCP, near Interstate 26. This location has a maximum grade elevation of 520 feet. This option would allow the tank to be visible from the interstate and provide advertising for the MCCP.
- Option C--The final location evaluated is near the intersection of Highways 76 and 773 near Georgia Pacific and has a maximum grade elevation of 525 feet. This option is not located within the MCCP and would require the procurement of property to build the storage tank. A larger transmission main would be necessary to convey fire flow rates to the MCCP and regular system demands to the northeastern area of the distribution system.

All three of the options can provide the localized storage needed for the commerce park. Option A is the most favorable in regards to having the highest elevation grade available.

3.2.3 Elevated Storage Tank Costs

Elevated storage tank costs are based on the type, volume, and height of the tank. Table 3-2 contains various tank costs using these variables. Composite tanks are more expensive than multi-column tanks but require less maintenance. Water spheroid tanks were not considered because of their similar cost to composite tanks. As highlighted in Table 3-2, the storage tank location will play an important part in the cost of this project. For the purposes of the cost estimates, a composite style tank located at Option B constructed to a 190 foot overflow height was considered.

Table 3-2 Elevated Tank Costs

TYPE OF TANK	TANK SIZE (GAL)	HEIGHT (FT)	COST
Composite	600,000	190 220 270	$1,950,000 $2,100,000 $2,400,000
Composite	750,000	190 220 270	$2,200,000 $2,400,000 $2,700,000
Multi-Column/Leg Tank	600,000	190 220	$1,400,000 $1,800,000
Multi-Column/Leg Tank	750,000	190 220	$1,550,000 $1,950,000

Figure 3-2 presents tank renderings of multi-column style and composite style elevated tanks.

Figure 3-2 Multi-Column and Composite Tank Renderings

4.0 Summary of Improvements

This section includes a summary of the improvements needed to provide the design flow of 2 mgd and the projected improvements needed to provide future flow rates of 4 mgd and 6 mgd. Proposed improvements are described in Table 4-1. The distribution system improvements are shown graphically on Figure 4-1.

Table 4-1 Summary of Improvements

PROCESS DESCRIPTION	2 MGD DESIGN UPGRADES	4 MGD FUTURE UPGRADES	6 MGD ULTIMATE UPGRADES
Finished water pumps	Add two new 2 mgd pumps with 220 foot TDH with VFDs.	Add one new 2 mgd pump with 220 foot TDH with VFD.	Add one new 2 mgd pump with 220 foot TDH with VFD.
Finished water main to Macedonia Church Road pump station	--	Add new 16 inch parallel water main.	--
Macedonia Church Road pumps	Replace two existing 1 mgd pumps with two new 2 mgd pumps with VFDs.	Add one new 2 mgd pump with VFD in new pump building.	Add one new 2 mgd pump with VFD in new pump building.
Water main improvements to Gin Tank	Add 20 inch and 16 inch main from pump station to Gin Tank.	--	--

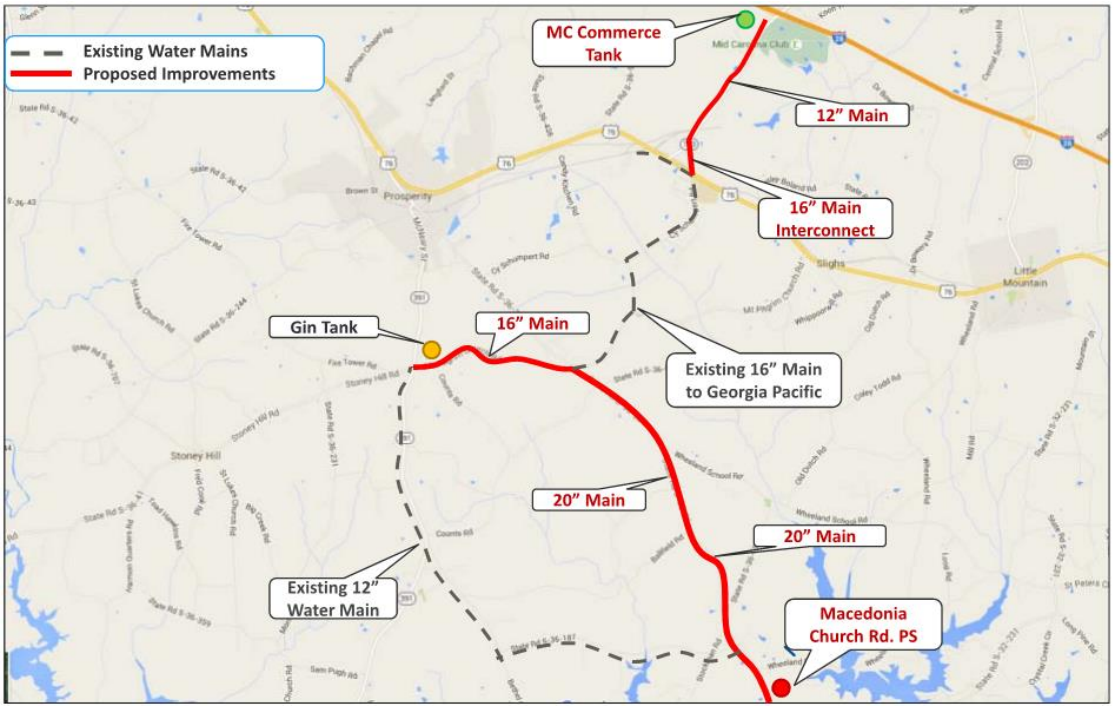

Figure 4-1 Location Map of Improvements

5.0 Estimates of Probable Construction Costs

This section contains a detailed estimate of probable construction costs for each of the projects included in this report. The projects have been divided into the Lake Murray Water Treatment Plant transmission main and pumping upgrades and the MCCP storage tank and main, with subparts for each.

5.1 LAKE MURRAY WATER TREATMENT PLANT – TRANSMISSION MAIN AND PUMPING UPGRADES

Tables 5-1 through 5-4 present the estimated costs for the Lake Murray WTP upgrades.

Table 5-1 Lake Murray Water Treatment Plant - Transmission Main Estimated Costs

PROJECT COMPONENT	QUANTITY	UNIT	UNIT PRICE	TOTAL
20 inch ductile iron pipe (DIP)	18,900	LF	$75.00	$1,417,500
Flushing, pressure testing	18,900	LF	$1.58	$29,800
Seeding	18,900	LF	$1.58	$29,800
Erosion control	18,900	LF	$0.79	$14,900
20 inch, DIP, RJ	4,200	LF	$100.00	$420,000
Flushing, pressure testing	4,200	LF	$2.10	$8,800
Seeding	4,200	LF	$2.10	$8,800
Erosion control	4,200	LF	$1.05	$4,400
16 inch DIP	8,300	LF	$60.00	$498,000
Flushing, pressure testing	8,300	LF	$1.26	$10,500
Seeding	8,300	LF	$1.26	$10,500
Erosion control	8,300	LF	$0.63	$5,200
16 inch, DIP, RJ	1,400	LF	$80.00	$112,000
Flushing, pressure testing	1,400	LF	$1.68	$2,400
Seeding	1,400	LF	$1.68	$2,400
Erosion control	1,400	LF	$0.84	$1,200
Fire hydrant assemblies	10	EA	$5,000.00	$50,000
Air release/vacuum relief valve manholes	8	EA	$7,500.00	$60,000
20 inch BFVs	10	EA	$20,000.00	$200,000
16 inch BFVs	5	EA	$15,000.00	$75,000
Pavement removal and replacement	500	LF	$50.00	$25,000

PROJECT COMPONENT	QUANTITY	UNIT	UNIT PRICE	TOTAL
Miscellaneous concrete	100	CY	$120.00	$12,000
Service connections	41	EA	$1,000.00	$41,000
Bore and jack 30 inch steel casing	200	LF	$160.00	$32,000
Connection to existing water main	3	EA	$6,000.00	$18,000
Abandonment of existing water main	1	EA	$3,500.00	$3,500
Subtotal of construction costs				$3,092,700
Engineering, legal, and administration	15%			$463,905
Contingency	10%			$309,270
Total Transmission Main Project Costs				**$3,865,875**

BFV = butterfly valve
CY = cubic yard
EA = each
LF = linear foot
RJ = restrained-joint

Table 5-2 Lake Murray Water Treatment Plant-Finished Water Pump Station Estimated Costs

PROJECT COMPONENT	QUANTITY	UNIT	UNIT PRICE	TOTAL
Sitework	1	LS	$5,200.00	$5,200
Concrete pad	440	SF	$25.00	$11,000
Equipment base	2	EA	$1,200.00	$2,400
125 hp split case pumps with VFD	2	EA	$65,000.00	$130,000
Equipment installation	1	LS	$22,750.00	$22,800
14 inch suction header	70	LF	$84.00	$5,900
14 inch plug	2	EA	$370.00	$700
14 inch 45 degree bend	1	EA	$1,200.00	$1,200
14 inch 90 degree bend	1	EA	$1,400.00	$1,400
14 inch by 12 inch tee	2	EA	$1,800.00	$3,600
12 inch suction lateral	10	LF	$72.00	$700
12 inch long radius 90 degree bend	2	EA	$1,500.00	$3,000
12 inch dismantling joint	2	EA	$1,500.00	$3,000
12 inch gate valve	2	EA	$2,000.00	$4,000
12 inch by 8 inch reducer	2	EA	$1,000.00	$2,000
12 inch discharge header	90	LF	$72.00	$6,500
12 inch plug	2	EA	$344.26	$700
12 inch 45 degree bend	1	EA	$1,200.00	$1,200
12 inch wye	1	EA	$1,450.00	$1,500
12 inch by 10 inch tee	2	EA	$1,450.00	$2,900
10 inch discharge lateral	10	LF	$60.00	$600
10 inch 90 degree bend	2	EA	$1,000.00	$2,000
10 inch dismantling joint	2	EA	$1,500.00	$3,000
10 inch check valve	2	EA	$3,100.00	$6,200
10 inch gate valve	2	EA	$1,650	$3,300
10 inch by 8 inch reducer	2	EA	$800	$1,600

PROJECT COMPONENT	QUANTITY	UNIT	UNIT PRICE	TOTAL
Electrical building with HVAC for three running drives	1	LS	$30,000	$30,000
Electrical and I&C estimate				$51,280
Contractor general requirements				$46,152
Subtotal of construction costs				$353,832
Engineering, legal, and administration	15%			$53,075
Contingency	10%			$35,383
Total Finished Water Pump Station Project Costs				**$442,290**

HVAC = heating, ventilating, and air conditioning
I&C = instrumentation and control
LS = lump sum
SF = square foot

Table 5-3 Lake Murray Water Treatment Plant - Macedonia Church Road Pump Station Estimated Costs

PROJECT COMPONENT	QUANTITY	UNIT	UNIT PRICE	TOTAL
Sitework	1	LS	$5,200.00	$5,200
Concrete pads	150	SF	$25.00	$3,800
Equipment base	2	EA	$1,200.00	$2,400
200 hp split case pumps with VFD	2	EA	$70,000.00	$140,000
Equipment installation	1	LS	$24,500.00	$24,500
16 inch suction header	40	LF	$96.00	$3,800
16 inch plug	2	EA	$400.00	$800
16 inch tee	2	EA	$1,700.00	$3,400
16 inch by 12 inch reducer	2	EA	$1,200.00	$2,400
12 inch 90 degree bend	1	EA	$1,200.00	$1,200
12 inch suction lateral	10	LF	$75.00	$800
12 inch dismantling joint	2	EA	$1,700.00	$3,400
12 inch gate valve	3	EA	$2,000.00	$6,000
12 inch by 8 inch reducer	2	EA	$1,147.52	$2,300
12 inch discharge header	40	LF	$72.00	$2,900
12 inch plug	2	EA	$350.00	$700
12 inch by 8 inch tee	2	EA	$1,400.00	$2,800
8 inch discharge lateral	10	EA	$48.00	$500
8 inch 90 degree bend	2	EA	$700.00	$1,400
8 inch dismantling joint	2	EA	$1,300.00	$2,600
8 inch check valve	2	LF	$2,800.00	$5,600
8 inch gate valve	2	EA	$1,400.00	$2,800
8 inch by 4 inch reducer	2	EA	$700.00	$1,400
Electrical building with HVAC for three running drives	1	LS	$30,000	$30,000
Electrical and I&C estimate				$50,140
Contractor general requirements				$45,126

PROJECT COMPONENT	QUANTITY	UNIT	UNIT PRICE	TOTAL
Subtotal of construction costs				$345,966
Engineering, legal, and administration	15%			$51,894.90
Contingency	10%			$34,596.60
Total Macedonia Church Road Pump Station Project Costs				**$432,458**

Table 5-4 Lake Murray Water Treatment Plant Cost Summary of Transmission Main and Pumping Upgrades

PROJECT COMPONENTS	COST
Macedonia Church Road/Mt. Pilgrim Church Road Transmission Main	$3,865,875
WTP Finished Water Pump Station	$442,290
Macedonia Church Rd Pump Station	$432,458
Total Project Construction Cost	**$4,740,623**

5.2 MID-CAROLINA COMMERCE PARK – STORAGE TANK AND MAIN

Tables 5-5 through 5-7 present the estimated costs for the MCCP project.

Table 5-5 Mid-Carolina Commerce Park – Storage Tank Estimated Costs

PROJECT COMPONENT	QUANTITY	UNIT	UNIT PRICE	TOTAL
600,000 gallon, 190 foot tall composite elevation storage tank	1	LS	$1,950,000.00	$1,950,000
Tank mixing system (optional)	1	EA	$35,000.00	$35,000
Site piping and valves	1	LS	$30,000.00	$30,000
Grading	1	LS	$15,000.00	$15,000
Sediment and erosion control	1	LS	$10,000.00	$10,000
Fencing	1,000	LF	$20.00	$20,000
Gravel drive	400	SY	$8.00	$3,200
Splash pad	5	CY	$300.00	$1,500
Rip rap	10	SY	$50.00	$500
Electrical and I&C estimate				$103,260
Contractor general requirements				$325,269
Subtotal of construction costs				$2,493,729
Engineering, legal, and administration	15%			$374,059.35
Contingency	10%			$249,372.90
Total MCCP Storage Tank Project Costs				**$3,117,161**

Table 5-6 Mid-Carolina Commerce Park – Water Main Estimated Costs

PROJECT COMPONENT	QUANTITY	UNIT	UNIT PRICE	TOTAL
16 inch DIP	1,300	LF	$60.00	$78,000
Flushing, pressure testing	1,300	LF	$1.26	$1,600
Seeding	1,300	LF	$1.26	$1,600
Erosion control	1,300	LF	$0.63	$800
16 inch, DIP, RJ	200	LF	$80.00	$16,000
Flushing, pressure testing	200	LF	$1.68	$300
Seeding	200	LF	$1.68	$300
Erosion control	200	LF	$0.84	$200
12 inch DIP	8,600	LF	$42.00	$361,200
Flushing, pressure testing	8,600	LF	$0.88	$7,600
Seeding	8,600	LF	$0.88	$7,600
Erosion control	8,600	LF	$0.44	$3,800
12 inch, DIP, RJ	800	LF	$50.00	$40,000
Flushing, pressure testing	800	LF	$1.05	$800
Seeding	800	LF	$1.05	$800
Erosion control	800	LF	$0.53	$400
Fire hydrants	5	EA	$5,000.00	$25,000
Air release/vacuum relief valve manholes	5	EA	$7,500.00	$37,500
16 inch BFVs	2	EA	$15,000.00	$30,000
12 inch BFVs	5	EA	$12,000.00	$60,000
Pavement removal and replacement	250	LF	$6.00	$1,500
Miscellaneous concrete	100	LF	$120.00	$12,000
Service connections	15	EA	$1,000.00	$15,000
Road and railroad crossing 30 inch steel casing	300	LF	$160.00	$48,000
Railroad crossing 24 inch steel casing	150	LF	$140.00	$21,000
Bore and jack 24 inch steel casing	50	LF	$140.00	$7,000

PROJECT COMPONENT	QUANTITY	UNIT	UNIT PRICE	TOTAL
Connection to existing water main	3	EA	$6,000.00	$18,000
Abandonment of existing water main	1	EA	$3,500.00	$3,500
Subtotal of construction costs				$799,500
Engineering, legal, and administration	15%			$119,925
Contingency	10%			$79,950
Total MCCP Water Main Project Costs				**$999,375**

Table 5-7 Mid-Carolina Commerce Park – Alternative Water Main Estimated Costs

ITEM DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
16 inch DIP	9,000	LF	$60.00	$540,000
Flushing, pressure testing	9,000	LF	$1.26	$11,300
Seeding	9,000	LF	$1.26	$11,300
Erosion control	9,000	LF	$0.63	$5,700
16 inch, DIP, RJ	1,600	LF	$80.00	$128,000
Flushing, pressure testing	1,600	LF	$1.68	$2,700
Seeding	1,600	LF	$1.68	$2,700
Erosion control	1,600	LF	$0.84	$1,300
Fire hydrants	5	EA	$5,000.00	$25,000
Air release/vacuum relief valve manholes	5	EA	$7,500.00	$37,500
16 inch BFVs	7	EA	$15,000.00	$105,000
12 inch BFVs	5	EA	$12,000.00	$60,000
Pavement removal and replacement	250	LF	$6.00	$1,500
Miscellaneous concrete	100	LF	$120.00	$12,000
Service connections	10	EA	$1,000.00	$10,000
Road and railroad crossing 30 inch steel casing	500	LF	$160.00	$80,000
Connection to existing water main	3	EA	$6,000.00	$18,000
Abandonment of existing water main	1	EA	$2,500.00	$2,500
Subtotal of construction costs				$994,500
Engineering, legal, and administration	15%			$149,200
Contingency	10%			$99,500
Total MCCP Alternative Water Main Project Costs				**$1,243,200**
Total Project Costs With Inflation (6 Years)				**$1,400,000**

ATTACHMENT 2

PRELIMINARY ENGINEERING COST ESTIMATE 2023 UPDATE

NCWSA

PRELIMINARY COST ESTIMATE FOR NCWSA WATER DISTRIBUTION SYSTEM UPGRADES

	ITEM DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL
MACEDONIA CHURCH ROAD TRANSMISSION MAIN					
	20 Inch, Class 250, Ductile Iron Pipe (DIP)	18,900	LF	$220.00	$4,158,000
	20 Inch, Class 250 Ductile Iron Pipe (DIP), Restrained-Joint (RJ)	4,200	LF	$275.00	$1,155,000
	Fire Hydrant Assembly (Includes 6 inch Gate Valve)	20	EA	$10,000.00	$200,000
	Air Release/ Vacuum Relief Valve (Includes Manhole)	8	EA	$10,000.00	$80,000
	20 inch Gate Valve	11	EA	$35,000.00	$385,000
	16" Tapping Sleeve and Valve	1	EA	$60,000.00	$60,000
	Connect to Existing System	1	EA	$20,000.00	$20,000
	Asphalt Roadway Cut and Repair	240	LF	$370.00	$88,800
	Driveway Cut and Repair	470	SY	$115.00	$54,100
	Bore & Jack Road Crossing (36" Steel Casing)	300	LF	$1,100.00	$330,000
	Contingency 25%				$1,632,725
	Subtotal Transmission Main Construction				**$8,163,625**
MACEDONIA CHURCH ROAD BOOSTER PUMP STATION					
	Demolition	1	LS	$19,200.00	$19,200
	Sitework	1	LS	$20,000.00	$20,000
	200 HP Pump - 2 mgd x 405' (equip only)	2	EA	$70,250.00	$140,500
	Pump Installation	1	LS	$44,960.00	$45,000
	200 HP Variable Frenquency Drive (VFD equip only)	2	EA	$40,450.00	$80,900
	VFD Installation	1	LS	$25,888.00	$25,900
	16" Pipe & Fittings	40	LF	$500.00	$20,000
	12" Pipe & Fittings	40	LF	$450.00	$18,000
	8" Pipe & Fittings	20	LF	$400.00	$8,000
	16" Gate Valve	1	EA	$25,000.00	$25,000
	8" Gate Valve	4	EA	$12,000.00	$48,000
	8" Check Valve	2	EA	$10,000.00	$20,000
	Connect to Existing	1	LS	$15,000.00	$15,000
	Modifications to Existing Building	1	LS	$15,000.00	$15,000
	HVAC addition	1	LS	$45,000.00	$45,000
	Electrical & I&C 30%	1	LS	$163,650.00	$163,700
	General Conditions 15%	1	LS	$106,380.00	$106,400
	Contingency 25%				$177,300
	Subtotal Booster PS Construction				**$992,900**
WTP FINISHED WATER PUMP STATION					
	Sitework	1	LS	$60,000.00	$60,000
	Concrete	90	CY	$985.00	$88,700
	125 HP Pump - 2 mgd x 220' (equip only)	2	EA	$60,000.00	$120,000
	Pump Installation	1	LS	$42,000.00	$42,000
	125 HP Variable Frenquency Drive (VFD equip only)	2	EA	$31,000.00	$62,000
	VFD Installation	1	LS	$21,700.00	$21,700
	16" Pipe & Fittings	60	LF	$500.00	$30,000
	12" Pipe & Fittings	60	LF	$450.00	$27,000
	8" Pipe & Fittings	40	LF	$400.00	$16,000
	12" Gate Valve	2	EA	$19,000.00	$38,000
	8" Gate Valve	2	EA	$12,000.00	$24,000
	8" Check Valve	2	EA	$10,000.00	$20,000
	Connect to Existing	2	LS	$15,000.00	$30,000
	New PEMB Building (40x50)	2,000	SF	$130.00	$260,000
	HVAC addition	1	LS	$55,000.00	$55,000
	Electrical & I&C 30%	1	LS	$268,320.00	$268,300

	General Conditions	15%	1	LS	$174,405.00	$174,400
	Contingency	25%				$334,275
	Subtotal FW PS Construction					**$1,671,375**
	Total Construction Cost					**$10,827,900**
	Non-Construction Cost					
	Engineering, Legal, Administration	10%				$1,082,790
	TOTAL PROJECT COSTS					**$11,910,690**