LCWSC Trust in Every Drop

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May 11, 2020

LCCC
Attention: CPST Commission
291 Professional Park Road
Clinton SC 29325

RE: Laurens County Water and Sewer Commission (LCWSC)
Hickory Tavern Elevated Water Tank Project

Dear Commission Members:

The Laurens County Water and Sewer Commission (LCWSC) is respectfully requesting the CPST Commission consideration for the above referenced project to be funded per SC Code of Laws 4-10-330 (A) (1)(d), *water and sewer projects for Special Purpose Districts*. The project is estimated at $1,994,755 and LCWSC is willing and able to fund any cost overruns from its capital reserve funds should the project come in higher when bids are received. Once the elevated tank is constructed, the LCWSC will own, operate and maintain it for its useful life. The enclosed preliminary engineering report (PER) provides more detail regarding the cost and benefits of this project.

The project is important to the County because it will allow the LCWSC to replace an undersized and under-utilized elevated tank in the Hickory Tavern community. The tank is original to the water system and now stands too low as the County wide water system has developed around the community. Given Laurens County's position in the Upstate, the Hickory Tavern community and surrounding area is poised to grow as people look to this area as a perfect place to raise a family. The existing Hickory Tavern tank needs to be replaced with a larger tank at the correct elevation so it can operate in tandem with other elevated tanks in the area and meet this demand in western Laurens County.

The LCWSC is grateful for the opportunity to submit this project for the CPST Commission's consideration. We hope that the Commission sees the merit of this project and will recommend it for funding. If you have any questions regarding this request or the attached preliminary engineering report, please give me a call at 864-682-6516.

Sincerely,

Jeff Field, P.E.
Executive Director
LCWSC

Preliminary Engineering Report Update

HICKORY TAVERN ELEVATED WATER TANK

LAURENS COUNTY, SOUTH CAROLINA

for

LAURENS COUNTY WATER AND SEWER COMMISSION

MAY 2020

Prepared By

GMC

Goodwyn, Mills and Cawood, Inc.
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Greenville, SC 29601
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GMC PROJECT NUMBER: CGREXX00XX

EXECUTIVE SUMMARY

Goodwyn Mills and Cawood (GMC) has been retained by the Laurens County Water & Sewer Commission (LCWSC) to complete a Preliminary Engineering Report (PER) investigating the construction of an elevated storage tank in Hickory Tavern to replace the existing elevated tank that is now too small and not tall enough to operate properly now that the county wide water system has become more interconnected.

This report demonstrates the need for a new elevated storage tank as well as the benefits of removing the existing tank. Currently the tank operates under the direct influence of booster pumps at the base which are required to circulate the water in the tank to maintain water quality. The existing water tower provides no additional hydraulic stability which has led to large swings in pressure, as much as 30 PSI throughout the day. This adds stress to distribution pipes and domestic plumbing.

By constructing a new tower at a high water elevation of 880-ft MSL and a volume of 250,000 gallons the community of Hickory Tavern and surrounding area can expect high quality water and better water pressure from an unassisted cycling of water in a tank with future proof capacity. LCWSC will also gain operational efficiency through reduced maintenance costs associated with a complex booster pump system, and the current aging tank as well as increased lifespan of infrastructure currently stressed by large pressure swings.

The Project is estimated at $1,994,755. This LCWSC is requesting funding generated by the Capital Project Sales Tax per SC Code of Laws, Section 4-10-330 (A) (1) (d), *projects for Special Purpose District to include water and sewer projects*. Any cost overrun will be funded by the LCWSC from their capital reserve funds.

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SYMBOLS AND ABBREVIATIONS

Terms used throughout this report are defined as follows:

BMW	Baverian Motor Works
DMA	District Metered Areas
ECV	Electronic Control Valve
EWT	Elevated Water Tank
FHA	Farmers Home Administration
GMC	Goodwyn Mills and Cawood
GPD	Gallons Per Day
GPM	Gallons Per Minute
GW	Greenville Water
HGL	Hydraulic Grade Line
LCPW	Laurens City Commission of Public Works
LCWSC	Laurens County Water & Sewer Commission
MSL	Mean Sea Level
MGD	Million Gallons Per Day
NIMBY	Not in My Backyard
PER	Preliminary Engineering Report
PRV	Pressure Reducing Valve
PSI	Pounds Per Square Inch
sq mi	Square Miles
WTP	Water Treatment Plant

1 INTRODUCTION

1.1 General

Laurens County Water and Sewer Commission (LCWSC) is the largest water provider in Laurens County and serves approximately 40,000 residents. LCWSC supplies water for all unincorporated areas of Laurens County as well as parts of southern Greenville County and manages the Town of Gray Court water system. LCWSC recently began construction on a new 4 MGD Water Treatment plant

LCWSC's mission is as follows:

"The mission of the Laurens County Water & Sewer Commission (LCWSC) is to ensure that our customers are provided with a sustainable supply of safe, quality drinking water and to provide environmentally sound wastewater collection and treatment services. Our dedication to our industry, customers and community will be evident through our operations, outreach initiatives and efficiency of services while maintaining a continued focus on supporting the infrastructure for effective economic growth."

1.2 Scope

The goals of this PER include:

- Evaluate options for a new elevated water tank at the site of the existing Hickory Tavern Elevated Water Tank (EWT) site under current and future demand scenarios and the necessary improvements required. The new tank will operate at a higher hydraulic grade line (HGL) than the existing tank thus, allowing it to operate in tandem with other tanks in the area.

The current tank in the unincorporated area of Hickory Tavern has reached the end of its useful life. The tank holds a small volume of water and has a lower elevation than surrounding tanks, making water system operation very difficult. This has prompted LCWSC to study the possibility of replacing this EWT with one that can meet current and future operational requirements; as well as, support growth in the area.

1.3 Owner

Laurens County Water & Sewer Commission
Mr. Jeff Field, Executive Director
3850 Hwy 221 S.
Laurens, SC 29360

1.4 Engineer

Goodwyn Mills and Cawood
617 East McBee Avenue Suite 200
Greenville, SC 29601
864-527-0460

2 EXISTING ELEVATED WATER TOWER AND SERVICE AREA

2.1 General

This section describes the current conditions of the Hickory Tavern Tank; background information regarding Laurens County, Hickory Tavern, LCWSC, control schemes, as well as current and future demands.

2.2 Background

Laurens County is in upstate South Carolina in the Greenville-Anderson-Mauldin metropolitan area. The County, formed in 1785, encompasses 724 sq. miles, named after the fifth president of the Continental Congress, Henry Laurens, and is one of nine modern counties of the Colonial Ninety-Six District. The County is bordered on the west by the Saluda River and Lake Greenwood. The City of Laurens serves as the county seat.

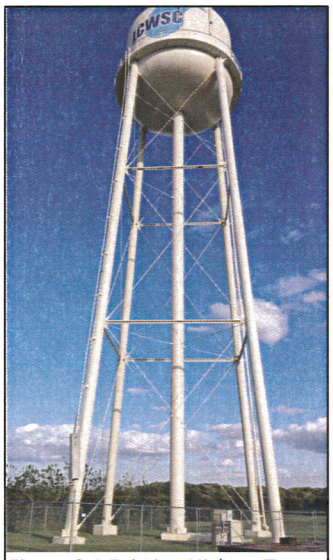


Figure 2.1 Existing Hickory Tavern EWT

LCWSC began providing public water to unincorporated areas in Laurens County in 1972 as Rabon Creek Rural Water District. The first infrastructure installed were small lines adequate to provide drinking water to existing homes at that time, as required by the lending agency, Farmers Home Administration (FHA). This installation allowed LCWSC to serve many homes with limited funding. Since that time, LCWSC has continued to expand its distribution system to serve over 40,000 people.

Hickory Tavern is one such unincorporated community in Laurens County named after a tavern in a nearby hickory grove as cited in the Last Will and Testament of Joseph Sullivan in 1849. The area is semi-rural with a combined elementary and middle school and an EWT, seen in Figure 2.1.

2.3 Existing Demand

The Hickory Tavern Area is approximately 140 sq mi and split between several district metered areas (DMA) as seen in Figure 2.2 below. The area has 4,300 residents with an approximate demand of 354,000 gallons per day (GPD).

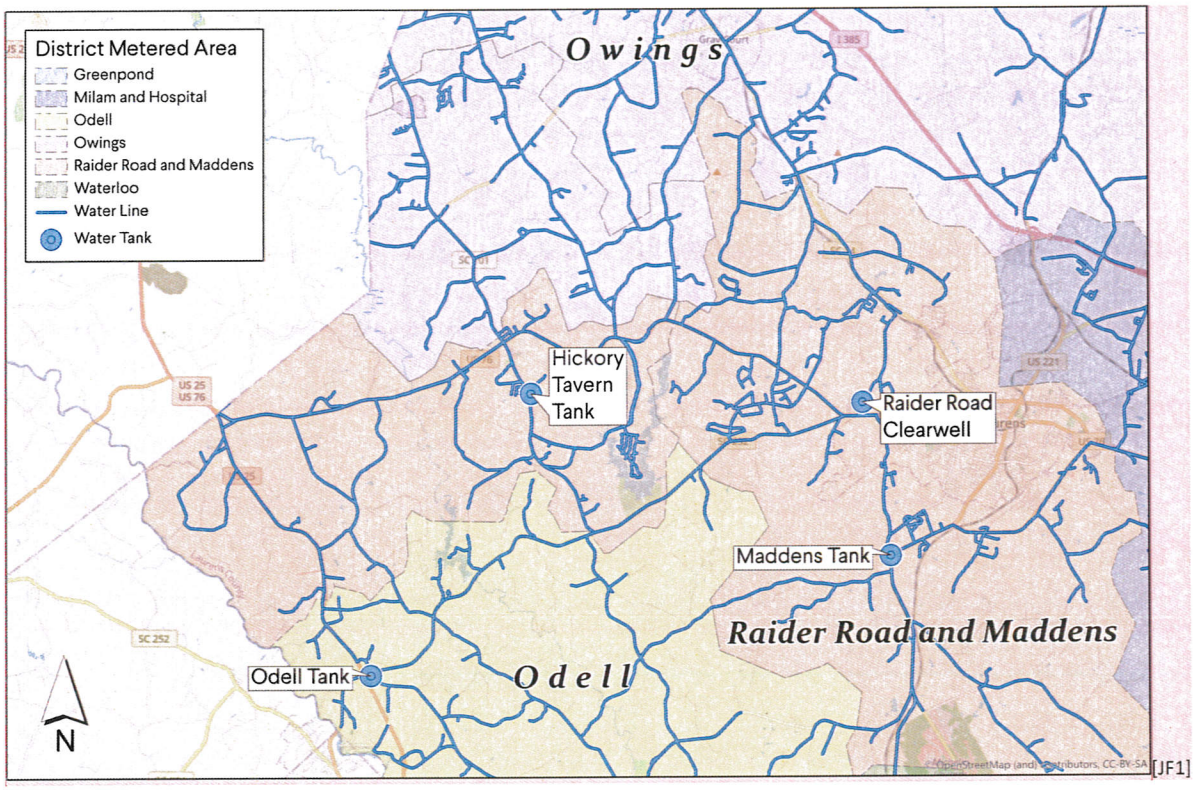


Figure 2.2 Current DMA Map

2.4 Current Control Scheme

The Hickory Tavern EWT stands at 140 ft with an operational range of 25 ft and a volume of 150,000 gallons. This tank is original to the water system when it was formed in 1972. As the County-wide water system has developed over the years, the current elevation of 140 ft is no longer adequate to provide pressures required for the community of Hickory Tavern. At its current height, the EWT has a maximum elevation of 855 ft MSL. The remainder of the surrounding system operates at an elevation of 880 feet MSL or higher. The existing tank therefore requires a pump station at its base to maintain acceptable water pressures by pumping into the area when not being supplied directly by the Raider Road Booster Pump Station. The dependence on pumps is an unreliable method of operating, susceptible to power and pump failures.

In addition to providing water storage for emergencies, an EWT's biggest benefit is stabilizing pressure swings from pumps and cycles in demand throughout the day. In the area northwest of Hickory Tavern there are no other nearby EWTs which has resulted in complaints about drops in pressure throughout the day.

2.5 Future Demand

Laurens County expects to grow throughout the county, particularly in areas near Greenville County. Commercial and industrial growth around US I-385, including tier one suppliers for BMW, has made Gray Court and Hickory Tavern attractive bedroom communities. This interest is only expected to grow over the next 20 years as the Upstate in general grows. The county service area is expected to increase in demand from 3.5 MGD in 2015 to 5.5 MGD over the next 20 years. As growth occurs there will be an increased reliance and strain on the existing Hickory Tavern booster pump station. This will increase the frequency of pressure swings on the distribution system and reduce the effect age of PVC waterlines in the area. This could lead to more leaks and intermittent disruption in water service when these leaks occur.

3 PROPOSED PROJECT

3.1 General

The proposed project consists of a new elevated water tank and waterline improvements. The effects of this project were evaluated through hydraulic modeling. The entire LCWSC water distribution system has been robustly modelled in Bentley WaterGEMS Software and the results of simulating existing and the future scenarios are discussed below.

3.2 Elevated Water Tank

The proposed EWT would stand approximately 170 ft with a base elevation of 715 ft MSL and a useable water elevation of 880 ft MSL. The current tower has a storage of 150,000 gallons however for future demand the new tower will increase to 250,000 gallons. The most common style EWT for a tank of this size is referred to as a multi-column elevated storage tank or leg tank. A cost estimate for a leg type EWT is proved in Section 4.

3.2.1 Constructability

The current tank site is too small to build a second tank without removing the existing tank first. This method could extend the tank outage to upwards of 18 months depending on construction schedules however it can minimize external costs such as land acquisition, site work, and public relations related "*NIMBY*" complaints. It is unlikely in a rural and otherwise unpopulated area to run into large backlash at the acquisition of property for an EWT.

3.2.2 Land Acquisition and New Construction

One alternative is to purchase land within the vicinity of the existing tank, build the new EWT then decommission and remove the existing tank. See proposed site in Appendix A. This method allows for the possibility of no outage period or simultaneous construction and removal which typically reduces construction management costs. This additionally reduces the design constraints of the existing tank and the structural unknowns, both which can extend a project's design lifespan and increase engineering costs.

3.3 System Benefits

With the proposed EWT, several benefits will be realized by LCWSC and its customers. Namely stabilizing pressures, increasing system reliability and resiliency, and improving water age (water quality) for many customers in western Laurens County. It would also allow LCWSC to create a dedicated District Metered Area for Hickory Tavern. Currently LCWSC has implemented District Metered Areas in accordance with American Water Works Association guidance to monitor water usage within the distribution system. With the proposed tank's higher elevation its hydraulic influence can be increased to cover more area.

In order to maximize the hydraulic influence of the new tank, valving will have to be installed at the following locations (Valves that are currently in service but not necessarily utilized are noted "Exist"):

Table 3.1 DMA Valving

Valve	Location	Function
Exist. GV12	Hwy 76 & Hwy 101	Isolate Prop. DMA
Exist. GV1506	Greenpond Rd & HWY 76	Isolate Prop. DMA
Prop. Gate Valve	Mount Bethel & Davis Rd.	Isolate Prop. DMA
Prop. Gate Valve	Wham Lawn & Fairview Roads	Isolate Prop. DMA
Prop. Electronic Control Valve (ECV)	HWY 76 & Georgia Road	Fill the EWT from the Raider Road Pump Station
Prop. Pressure Reducing Valve	Along Greenpond Road, North of Deck Road	Reduce low pressures during peak demand or emergencies.
Exist. PRV013	Along Highway 25, North of Harmony Rd	Allow Hickory Tavern and Odell EWTs to float together
Prop. Flow Meter	Installed inline or downstream of PRV013	Maintain DMA integrity

The existing PRV013 will be active in order to keep Odell and Hickory Tavern EWT floating together at the same elevation. A flow meter can be installed here to maintain the integrity of the two DMAs. As mentioned, these changes will stabilize pressures, increase system reliability and resiliency, and improve water quality, but they will also reduce operational costs within the new Hickory Tavern DMA and several of the surrounding DMA's. The new DMA configuration is shown in Figure 3.1 on the next page.

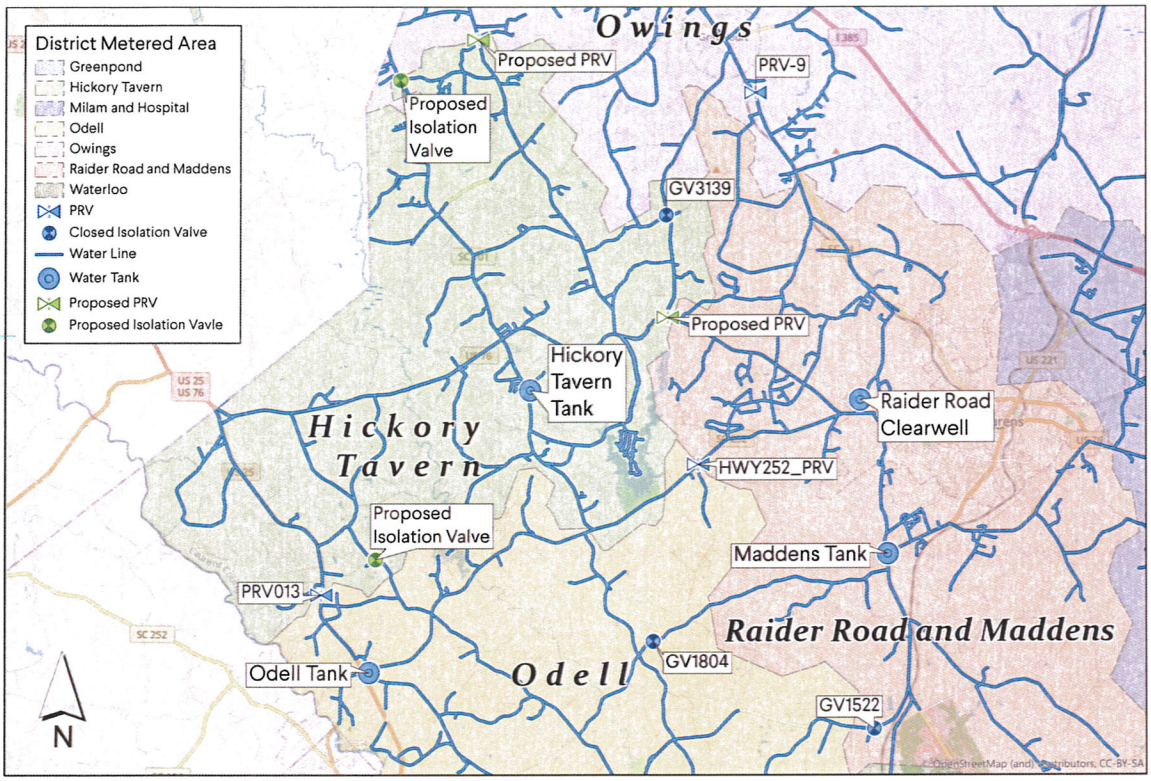


Figure 3.1 Proposed Hickory Tavern DMA

3.4 Hydraulic Modeling Results

For the purposes of vetting this proposed project, the current model of the LCWSC system with a 3.5 MGD demand was compared to a model of a new tank, PRVs and necessary valve controls. The results are discussed below.

3.4.1 Future Demand Scenario

An important issue described by residents of Hickory Tavern is that they experience drastic shifts in pressure throughout the day. This is a result of pumps turning on and off in the system. The full results can be found in Appendix A and a summary of the results are in the table below.

Table 3.2 Model Results

	Current Scenario	Proposed EWT
Average Pressure (PSI)	88.83	78.36
Min Pressure (PSI)	21.00	30.40
Max Pressure (PSI)	161.30	148.80
Average change in Pressure (PSI)	34.39	8.84

As seen in Table 3.1, pressures are much more stable with this new configuration. A maximum pressure of 148.8 PSI is recorded along the low-lying area along Highway 76 and a minimum pressure of 30.4 PSI in the Scott Road area off Highway 25. The new EWT increased the minimum pressure in the system by approximately 9 PSI.

By reducing the maximum pressures and the severity of the pressure swings, the life of the distribution system can be extended significantly. This is due to the reduction of fatigue stress to the PVC pipe. Stabilized pressures will reduce the amount of line failures the community experiences in the future.

Water age will also be improved as the new EWT will be able to cycle independently of Raider Road Pump Station. Currently the tank can only turn over when Raider Road is not operating. As the pump station is anticipated to operate for 18 hours under future demand scenarios, water age in the existing tank will continue to increase without these improvements.

4 PROJECT COSTS

GMC has prepared an Engineer's Opinion of Probably Project Cost based upon discussions with tank manufacturers, recently bids on similar projects and other factors. This Cost Opinion is given below:

Table 4.1 Engineer's Probable Cost Opinion

Item No.	Description	QTY	Unit	Unit Price	Total Cost
1	Mobilization	1	LS	$ 53,900	$ 53,900
2	Grading	1	LS	$ 15,000	$ 15,000
3	Demolition of Existing Hickory Tavern Tank	1	LS	$ 50,000	$ 50,000
4	250,000 Elevated Water Tank	1	LS	$ 750,000	$ 750,000
5	6" Waterline & Appurtenances	1,150	LF	$ 180	$ 207,000
6	Electronic Control Valve	1	LS	$ 35,000	$ 35,000
7	Altitude Valve	1	EA	$ 14,000	$ 14,000
8	Check Valve	1	EA	$ 10,000	$ 10,000
9	Gate Valves	16	EA	$ 3,000	$ 48,000
10	Pressure reducing valve	1	EA	$ 35,000	$ 35,000
11	Flow Meter	1	EA	$ 25,000	$ 25,000
12	Concrete Vaults	6	EA	$ 14,000	$ 84,000
13	Site Fencing	850	LF	$ 25	$ 21,250
14	Seeding and Restoration	1	LS	$ 5,000	$ 5,000
15	Sediment and Erosion Control	1	LS	$ 8,000	$ 8,000
16	Electrical and SCADA	1	LS	$ 105,900	$ 105,900
17	Connect to Existing System	6	EA	$ 7,500	$ 45,000
				Construction Sub-Total:	**$ 1,512,050**
				Contingency (10%):	$ 151,205
				Construction Total:	**$ 1,663,255**
				Special Inspections	$ 23,500
				Permitting:	$ 5,000
				Engineering:	$ 150,000
				Geotechnical Exploration:	$ 20,000
				Construction Administration & Inspection:	$ 100,000
				Materials Testing:	$ 33,000
				TOTAL PROJECT ESTIMATE:	**$ 1,994,755**
				CAPITAL PROJECT SALES TAX FUNDING:	**$1,994,755**

5 CONCLUSIONS AND RECOMMENDATIONS

The following summarizes the results of the analysis:

- Replacing the existing Hickory Tavern Tank with a taller EWT (max HGL 880) was modeled.
- A new District Metered Area to serve the Hickory Tavern area and the required control valve schema was identified.
- The effects of the new tank on system operations, Fire protection, pressure swings, and water quality were evaluated.
    - Maximum pressures were decreased by 10 psi decreasing stress on the system and extend the useful life of current infrastructure.
    - Minimum pressures on the ends of the DMA were increased from 22 to 30 psi.
    - Pressure swings were reduced from 34 psi to under 10 psi per day.
    - Tank cycling is based upon system demand and gravity rather than operation of the Hickory Tavern pump station to cycle the tank improving both water quality and system reliability.
    - Water quality was improved by decreasing water age.
    - Increased system reliability and redundancy as the Odell and Hickory Tavern tanks operate (float) together, and independent of the status of the Raider Road pump station.
    - The minimum pressure floor is raised through pressure control valves.
    - More storage for fire protection is now available in the area.

Based upon the above analyses GMC has the following recommendations:

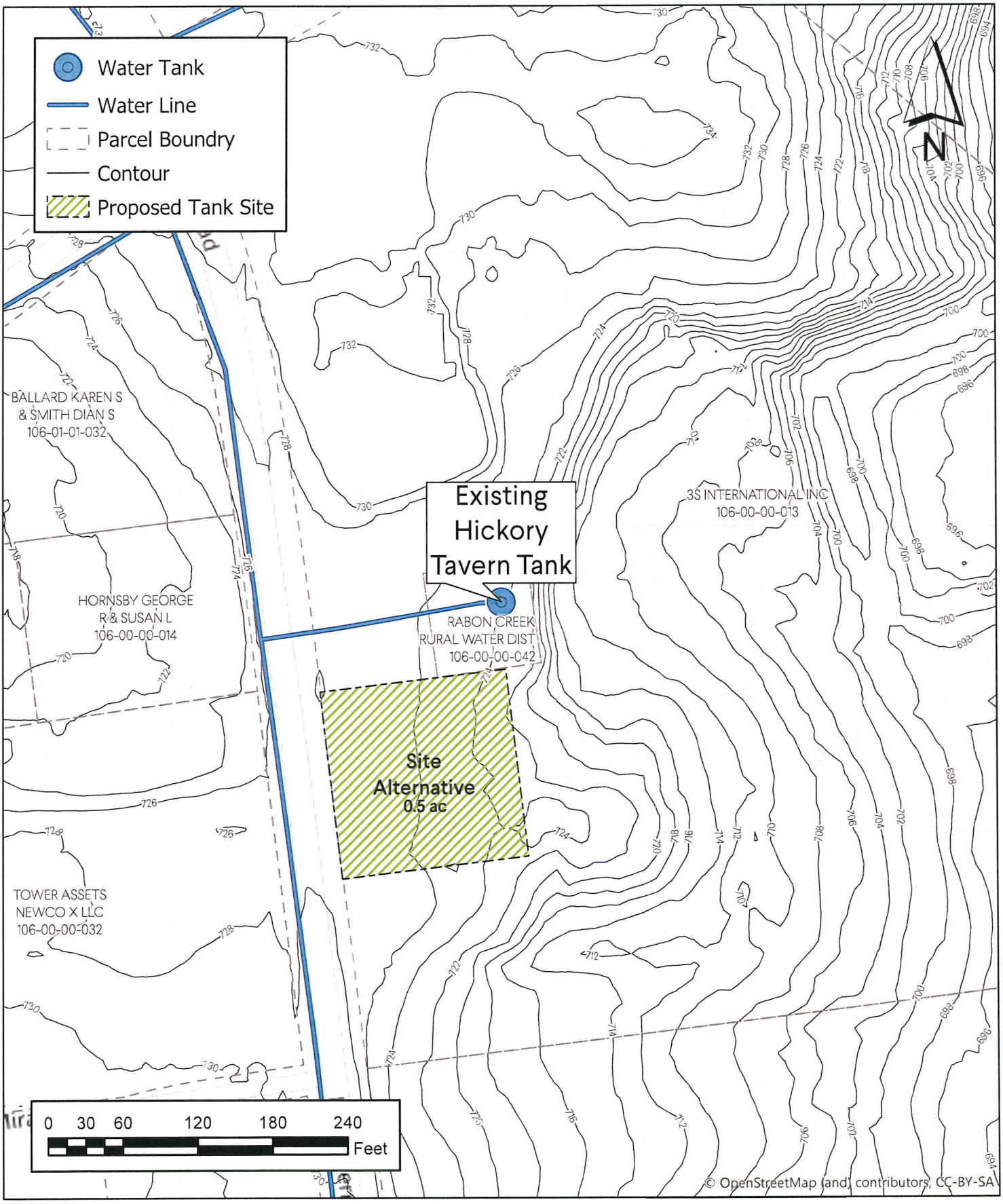
- Construct a new 250,000-gallon elevated tank at or near the existing Hickory Tavern EWT with an overflow elevation of 880 feet.
- Implement the District Metered Area and control valve schema presented in this report.

GMC has prepared a cost opinion for this project of $1,994,755.

APPENDICES

Appendix A – Alternative Site Location

Appendix A – Approximate Site Layout



Hickory Tavern Elevated Water Tank

Hickory Tavern, SC

GMC# CGREXXXXXX
05/07/2020
DRAWN BY: MAK

LCWSC Trust in Every Drop

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