

PRELIMINARY ENGINEERING REPORT

FOR

NORTH MARSHALL WATER DISTRICT

IMPROVEMENT PROJECTS 2020

Paul Cloud Engineering

Benton, Kentucky 42025

December 29, 2019



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North Marshall Water District Improvement Projects 2020

12/29/2019

PROPOSED SYSTEM IMPROVEMENTS

Potential improvement projects are divided into four primary categories: 1) It will upgrade many miles of lines that have been historically undersized. Many of these lines are over 50 years old and the original installation was suspect. The new mains will also provide a means to back feed a large portion of the distribution system in case of an isolated outage. 2) Two new deep wells will be installed to ensure sufficient capacity in the future. 3) Install and inline control valve to automatically balance the distribution system and elevated tower levels. 4) It will replace a steel casing and existing leaking pipe under the Purchase Parkway (Interstate 69). Please see the details below and the estimates on the attached sheet.

1. Line Replacement

Distribution lines were evaluated by the frequency/cost of distribution system repairs on the lines and each line's flow characteristics. By addressing the high cost items in this fashion, the District will gain the most benefits. Many lines are undersized and do not promote a good distribution system.

2. New Deep Wells

New deep wells are proposed to be installed one each at the Briensburg-Tatumsville Pumping Station and the Carter Brien Pumping Station on US Highway 641. These are needed to ensure the District always has an adequate source of water.

3. Inline Control Valve

A new inline control valve will be installed in the system near the Bethel Tank to automatically maintain a balance distribution system and the proper levels in each of the elevated storage tanks. It will be connected to the SCADA to provide efficient operation of the system.

4. Interstate 69 Crossing

A new steel casing will be installed under the Purchase Parkway (Interstate 69). This will replace a partially collapsed corrugated pipe casing and leaking water line. This portion of the system is now valved off due to the leaks significantly affecting the

6. Proposed Project (Recommended Alternative):

- a. This proposed project will upgrade the lines as indicated on the attached map. Most new piping will be 6" PVC. The water will continue to be supplied from the existing two deep well pumping stations. There will not be any changes to the treatment of the raw water. Two additional deep wells will be installed to ensure reliable capacity.
- b. The engineering and design work will commence upon project funding approval. We hope this to be in January. The design package will be completed and submitted to the State Division of Water for approval in February. We hope to have final approval from the State in March. At that time bids will be solicited for the installation of the distribution lines and valves. It is projected that bids will be received by May and all contracts awarded in June. Contractors will then have up to 270 days to execute the project.
- c. The project will have to be reviewed, approved and issued a construction permit by the Kentucky Division of Water prior to commencing work on the project. Contractors will be required to obtain all permits needed for any work on a State of Kentucky Highway.
- d. This project ensures that a safe, reliable potable water system is maintained for many years to come. All applicable sustainability considerations will be evaluated and followed as practical.
- e. Please see the attached cost estimate breakdown for the proposed system upgrades.
- f. The annual operating budget for the District will not be significantly impacted. Operating costs and water supply quantities are indicated on the attached sheets. The project is critical in maintaining a properly operating system while reducing the funds expended on repeated repairs/replacements of high maintenance cost lines.

7. Conclusions and Recommendations:

North Marshall Water District needs the described improvements to maintain a cost-effective distribution system. There are no other recommendations currently.

4. Alternatives Considered:

- a. Distribution line replacement - The lines will also be upgraded to 6" diameter so adequate flow and pressure can be maintained to provide needed fire protection in the project areas. The new elevated water tower on the west side of the Purchase Parkway will benefit from improved flow characteristics as we will be providing a much more balanced system
- b. The control valve and new line sizes were evaluated using Ky Pipe to ensure the most effective means of designing the proposed system were used. It was critical in determining the desired location for the new inline control valve as well as modeling the hydraulic situations throughout the distribution system.
- c. See the attached map of the proposed system upgrades.
- d. There is no known environmental impact due to the proposed alternative.
- e. The new lines will be installed in existing easements or within existing highway right of ways.
- f. We do not anticipate any construction issues other than typical congestion of utilities and homeowner improvements in some locations. These costs have been accounted for in the project estimates.
- g. Appropriate sustainable utility management practices shall be utilized in the renovation of the system.
- h. The construction costs of the system upgrades is attached. The District will save money from the better controlled distribution system and the electronic meters.

5. Selection of an Alternative:

The only alternative acceptable is the one proposed and shown in the attached estimate. This is the only practical means to maintain the mechanical integrity of the distribution system. The upgrades will allow the District to continue to provide a safe, reliable potable water source for the area residents. The water will continue to meet, or exceed, all regulatory requirements for purity. A life cycle comparison analysis is not required due to the singularity of alternatives.

- b. North Marshall Water District has been in existence since 1961. Pumping stations and elevated water storage tanks have been updated and replaced in a consistent, planned approach. The distribution lines have been replaced primarily to upsize the main to provide fire protection and increased population demands. This project will address the replacement of aging lines that have proven to have the highest maintenance costs and outage occurrence during the last 15 years as well as upgrade undersized mains to ensure better distribution.
- c. This project will replace many lines located that are undersized for the current customer usage. This will also allow for proper fire protection in many locations. Seven primary block valves will be replaced that currently do not operate limiting the District's ability to isolate small segments of main in case of a break. A new inline control valve will be installed near the Bethel elevated tank to automatically keep the flow balanced. Two new deep wells will be installed to ensure an abundant water supply in the future. Many more electronic water meters will be installed to expedite meter reading and ensure its accuracy.
- d. Attached you will find a current rate schedule, annual O&M cost, and usage characteristics of the District. The water District currently has \$3,000,000 of debt and \$1,400,000 in reserve.
- e. There are no current water, energy, or waste audits for the system.

3. Need for Project:

- a. This project will allow the District to maintain its high level of health, sanitation, and security for a dependable potable water source in the northern portion of the county.
- b. This project addresses four primary needs: 1) It will upgrade many miles of lines that have been historically undersized. Many of these lines are over 50 years old and the original installation was suspect. The new mains will also provide a means to back feed a large portion of the distribution system in case of an isolated outage. 2) Two new deep wells will be installed to ensure sufficient capacity in the future. 3) Install an inline control valve to automatically balance the distribution system and elevated tower levels. 4) It will replace a steel casing and existing leaking pipe under the Purchase Parkway (I-69).
- c. This work will provide the infrastructure required to support the future growth and commercial expansion throughout the portion of Marshall County served by the District. It will also provide proper fire protection to many areas.

North Marshall Water District Improvement Projects 2020

12/29/2019

Paul Cloud Engineering has performed a preliminary engineering review of the proposed upgrades to the North Marshall Water District. This project will benefit existing and future customers of the district by making continual upgrades to provide a safe, reliable source of potable water at an affordable cost.

1. Project Planning:

- a. North Marshall Water District serves the northern portion of Marshall County (except for the City of Calvert City) in Western Kentucky. There are currently 5,563 existing customers with 348 being commercial and 5,215 being residential. This proposed project will replace many segments of the distribution system in communities along Kentucky Lake. A map showing the proposed improvement areas is attached.
- b. There will not be any known environmental issues created due to the construction of this project. It does not affect any wetlands and it will not extend below the TVA 375' contour line.
- c. The current population of Marshall County is 31,344 based on the 2012 census data. The Kentucky State Data Center, University of Louisville, projects a moderate growth rate of 6.4% through 2030. Marshall County has enjoyed continued growth (87.3%) for the last five decades per the U. S. Census Bureau. The population was 16,736 in 1960; 20,381 in 1970; 25,637 in 1980 and 27,205 in 1990.
- d. North Marshall Water District has been proactive in meeting the communities' needs while seeking their input in all future project plans. Regular open meetings are conducted to allow anyone to express their viewpoints. This project is the result of addressing the most significant problem areas of the system with the goal of supplying a safe, reliable potable water source with adequate pressure and flow to all customers.

2. Existing Facilities:

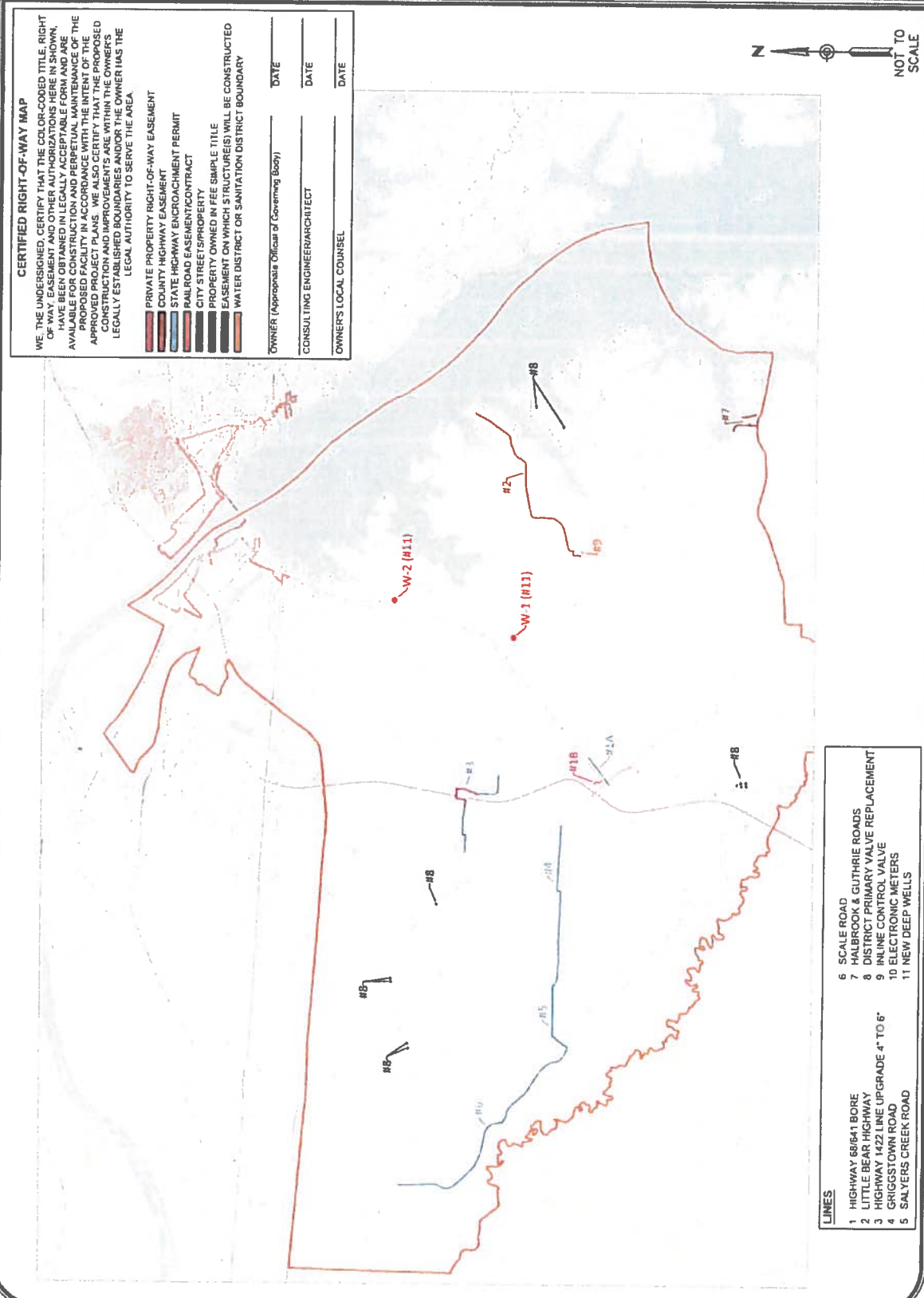
- a. A map is attached showing the existing distribution system. There are two pumping stations with multiple deep wells that consistently provide some of the best water in the State. There is approximately 200 miles of line in the district.

hydraulics of the system and the supply redundancy to a large area of the distribution area.

In summary, this proposed improvement project will allow the District to address potential flow issues and improve distribution capabilities. It also provides for improved fire protection in the areas as needed. The two new deep wells ensure a proper water supply well into the future. The project will result in a much better-balanced distribution system. This improvement project will be vital in the improvement of the North Marshall Water System.

North Marshall Water District
Preliminary Engineering Estimate - 2020 Upgrades
12/29/2019

Item	Name	Approx. Length Ft.	Quantity	Total \$
1	Highway 68/641 Bore	1,070		\$147,686
2	Little Bear Highway	14,800		\$407,770
3	Highway 1422 Line Upgrade 4" to 6"	11,100		\$300,000
4	Griggstown Road	11,600		\$280,974
5	Salyers Creek	5,280		\$122,006
6	Scale Road	21,200		\$441,164
7	Bore Under Purchase Parkway	1,200		\$188,262
8	Halbrook & Guthrie Roads	3,500		\$121,345
9	District Primary Valve Replacement		7	\$107,800
10	Inline Control Valves		1	\$80,000
11	Electronic Meters			\$550,000
12	New Deep Wells		2	\$210,000
13	Engineering			\$230,000
14	NMWD Inspection			\$65,000
15	Administrative & Legal			\$25,000
16	Contingency			\$137,009
	Grand Total			\$3,414,016



CERTIFIED RIGHT-OF-WAY MAP

WE, THE UNDERSIGNED, CERTIFY THAT THE COLOR-CODED TITLE, RIGHT OF WAY EASEMENT AND OTHER AUTHORIZATIONS HEREIN SHOWN, AVAILABLE FOR REVIEW IN LEGALLY ACCEPTABLE FORM AND ARE THE PROPERTY OF THE STATE OF KENTUCKY. THE INTENT OF THIS APPROVED PROJECT PLANS, WE ALSO CERTIFY THAT THE PROPOSED CONSTRUCTION AND IMPROVEMENTS ARE WITHIN THE OWNERS LEGALLY ESTABLISHED BOUNDARIES AND/OR THE OWNER HAS THE LEGAL AUTHORITY TO SERVE THE AREA.

█ PRIVATE PROPERTY RIGHT-OF-WAY EASEMENT
█ COUNTY HIGHWAY EASEMENT
█ STATE HIGHWAY ENCROACHMENT PERMIT
█ RAILROAD EASEMENT/CONTRACT
█ CITY STREET/PROPERTY
█ PROPERTY OWNED IN FEE SIMPLE TITLE
█ EASEMENT ON WHICH STRUCTURE(S) WILL BE CONSTRUCTED
█ WATER DISTRICT OR SANITATION DISTRICT BOUNDARY

OWNER (Appropriate Official of Governing Body) _____ DATE _____

CONSULTING ENGINEER/ARCHITECT _____ DATE _____

OWNER'S LOCAL COUNSEL _____ DATE _____

- LINES**
- 1 HIGHWAY 68/841 BORE
 - 2 LITTLE BEAR HIGHWAY
 - 3 HIGHWAY 1422 LINE UPGRADE 4" TO 6"
 - 4 GRIGGS TOWN ROAD
 - 5 SALVERS CREEK ROAD
 - 6 SCALE ROAD
 - 7 HALBROOK & GUTHRIE ROADS
 - 8 DISTRICT PRIMARY VALVE REPLACEMENT
 - 9 INLINE CONTROL VALVE
 - 10 ELECTRONIC METERS
 - 11 NEW DEEP WELLS

NOT TO SCALE

26800 North Marshall Water District 01/01/2018 - 12/31/2018

Pumping and Water Statistics - part one (Ref Page: 29)

	Water Purchased For Resale (Omit 000's) (b)	Water Pumped from Wells (Omit 000's) (c)	Total Water Pumped and Purchased (Omit 000's) (d)	Water Sold To Customers (Omit 000's) (e)
January	0	38,051	38,051	56
February	0	35,051	35,051	54,110
March	0	35,813	35,813	103
April	0	38,053	38,053	48,922
May	0	41,759	41,759	87
June	0	45,494	45,494	62,680
July	0	41,770	41,770	80
August	0	40,133	40,133	73,851
September	0	32,448	32,448	133
October	0	32,133	32,133	65,051
November	0	30,039	30,039	58
December	0	36,727	36,727	56,151
Total for the year	0	447,471	447,471	361,290