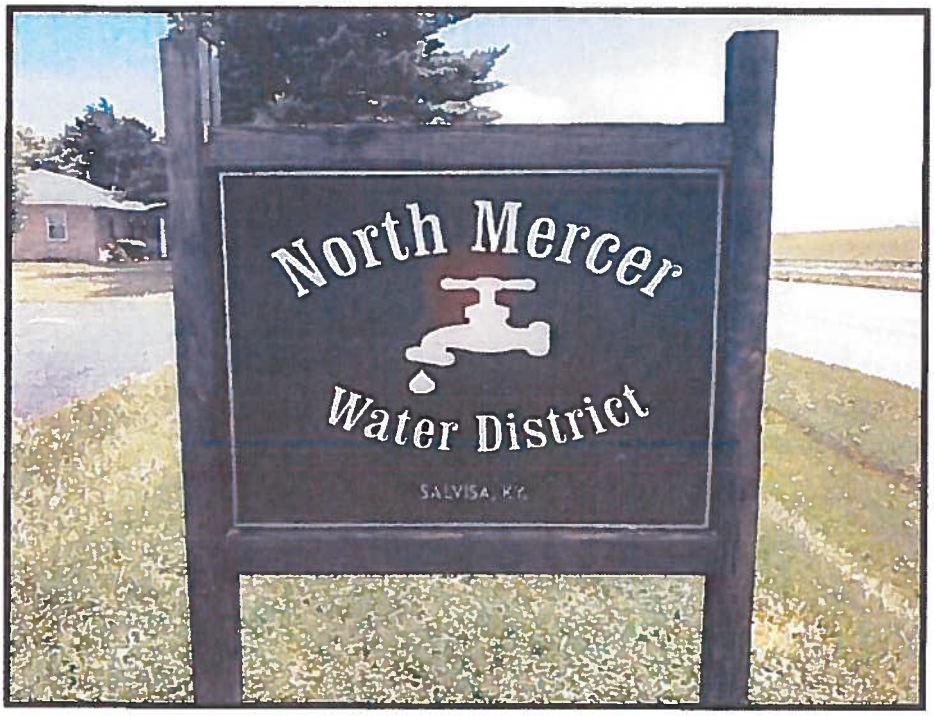
NORTH MERCER WATER DISTRICT

2019 WATER SYSTEM IMPROVEMENTS

PRELIMINARY ENGINEERING REPORT



NORTH MERCER WATER DISTRICT

4795 Louisville Road

Salvisa, KY 40372

October 2019

SECTION 1 PROJECT PLANNING

1.01 LOCATION

The North Mercer Water District (NMWD) was formed in 1964. The existing system consists of approximately 340 miles of water lines with five distribution water storage tanks and six booster pump stations that serve approximately 4,524 customers in Anderson, Boyle, Mercer and Washington Counties.

The NMWD is located in Central Kentucky in the City of Salvisa in Mercer County. The NMWD serves the majority of northern, western and southern Mercer County and parts of Anderson, Boyle and Washington Counties including the communities of Salvisa, Cornishville, Mackville, McAfee, Mayo and Bohon.

The topography of Mercer County is gently rolling to hilly, with the steepest slopes and greatest local relief being in the eastern edge of the county near the deeply incised valleys of the Dix and Kentucky Rivers. The area of lowest local relief is in the vicinity of Harrodsburg. Ridgetop elevations generally range between 900 and 950. The highest elevation in the county, 1,000 feet, is found on a ridge just south of Kentucky 152 about 2.5 miles east of the center of Harrodsburg. Elevations of communities within the NMWD service area include Bohon at 897 feet, Cornishville at 733 feet, Mayo at 900 feet and Salvisa at 785 feet.

1.02 ENVIRONMENTAL RESOURCES PRESENT

The major environmental features within the proposed area feature a variety of landforms and topographic changes from extremely steep to relatively flat terrain. The gradual undulating terrain allows for potable water to be transported with limited booster stations. Water pressures range from 30 psi to over 185 psi in sections of the system. Many of the hollows are in floodplains in particular along the Dix River and Kentucky River along the eastern boundary of the county. No known historic sites are noted in the planning area.

1.03 POPULATION TRENDS

The census information reviewed shows a slight decrease in the population projections over the next twenty years. Since the establishment of the NMWD the population of Mercer County has continued to grow. The growth of the North Mercer Water District's system can be attributed to numerous water distribution expansion projects. The population projections for Mercer County are shown below.

	2020	2025	2030	2035	2040
Population	21,260	21,255	20,831	20,407	19,907

1.04 COMMUNITY ENGAGEMENT

The NMWD will be holding a public meeting inviting all individuals affected by this project. This meeting will communicate the need for the project and the resulting system improvements that will be accomplished through the project.

SECTION 2 EXISTING FACILITIES

2.01 LOCATION

The NMWD is located in Central Kentucky in the City of Salvisa in Mercer County. The NMWD serves the majority of northern, western and southern Mercer County and parts of Anderson, Boyle and Washington Counties including the communities of Salvisa, Cornishville, Mackville, McAfee, Mayo and Bohon. Maps of the project showing the extent of the water system improvements is located at the end of this report (Appendix A).

2.02 HISTORY

The NMWD system was originally built in the 1960's. The NMWD purchases its water from the City of Harrodsburg and the South Anderson Water District. Numerous water line extension projects have been developed over the past 60 years to establish the current NMWD customer base which serves approximately 97% of potential customers in the service area of Mercer County.

2.03 CONDITION OF EXISTING FACILITIES

NMWD currently purchases an average of 800,000 gallons a day to serve its customers. The system is in good to fair condition and work continues to improve the older, undersized sections of the NMWD.

Several of the original transmission water mains that transport water to the NMWD customers are of asbestos cement material. Additional transmission mains transport water via older problematic PVC Class 160 water mains. Due to the age and condition of these mains the NMWD can experience underserved water supply/pressure to areas of the system due to failure of these water mains.

2.04 FINANCIAL STATUS OF ANY EXISTING FACILITIES

Annual audits will be submitted to Rural Development as required by the RD bond issue. A customer breakdown will be provided in the Summary Addendum.

As with the majority of utilities across the country, the NMWD has seen its operating expenses rise over the past several years. Electric costs and health insurance are the expenses that have seen the largest increase.

SECTION 3 NEED FOR PROJECT

3.01 HEALTH, SANITATION, AND SECURITY

The proposed project will replace approximately 22.5 miles of distribution mains that are approximately 50% of asbestos cement material and 50% of older problematic PVC Class 160 water main. The project will also include replacing service line to approximately 500 customer service meters. Improving water turnover/water age by eliminating older, problematic distribution mains and removing dead ends by looping some of the existing water lines will improve the quality of water for residents in these particular areas and also provide alternatives for service during emergency outages.

Many of the families within the project areas currently receive their potable water via asbestos cement distribution water mains. Due to the age and material of these mains, breaks are more common and have led to issues with continuity of service. This exposes some families to poor quality water and limits the amount of water available to them.

The proposed project will help to improve the overall service from a water quality and reliability standpoint to the NMWD customers.

3.02 AGING INFRASTRUCTURE

The existing water mains to be replaced with this project are anywhere from 35 to 55 years old. Due to the age of these water mains the District has experienced continued operational issues that only become worse as time goes on. These issues include breaks and leaks of the water mains which create financial strains on the District through the allocation of its resources. Additionally, this aging infrastructure adds to the District's burden of maintaining a low water loss rate in its distribution system.

3.03 REASONABLE GROWTH

Growth has been considered a significant factor in the need for the proposed project. As the District's customer base has increased significantly in the last 35 to 55 years the need to replace these older water mains to offer sustained water service to its customer base is a priority.

SECTION 4 ALTERNATIVES CONSIDERED

4.01 Description

Alternatives considered included replacing asbestos cement distribution mains with smaller size distribution mains but this does not provide NMWD with any hydraulic improvements which in turn help to reduce operation and maintenance expenses. An additional alternative considered was to only replace the lines as they deteriorate to the point of failure. This is cost prohibitive for the NMWD and does not benefit the customers by providing a safe, dependable, high quality product.

4.02 Design Criteria

The design criteria that will be used on the project include hydraulic analysis of the existing system to determine that adequate pressures are realized throughout the distribution system along with examining flushing velocities. By properly sizing the distribution mains to be installed the District will provide improved service to its customer base while also maintaining potable water of high quality.

4.03 Map

Maps of the project showing the extent of the water system improvements are located at the end of this report (Appendix A).

4.04 Environmental Impacts

An environmental report detailing the potential impacts of the project is being undertaken with this project. Once the report is finalized any potential impacts will be taken into consideration and any necessary remediation measures will be taken to avoid any negative impact to the environment.

4.05 Land Requirements

Land requirements associated with this project will include the need for easements and encroachment permits, both public and private, for the installation of water main. Those easements and permits will be obtained prior to any construction beginning.

4.06 Potential Construction Problems

With any water main replacement project one of the main potential construction problems occur with the existing infrastructure that is in place. It is imperative to

maintain existing water service to all customers during construction and avoid the existing water main during construction. This problem is considered during the design of the project and all precautions are taken to limit this potential risk.

4.07 Cost Estimates

A preliminary project cost estimate is included at the end of this report (Appendix B).

SECTION 5 SELECTION OF AN ALTERNATIVE

5.01 Life Cycle Cost Analysis

In the selection of the preferred alternative for this project the life cycle cost of the materials to be utilized has been considered. The main material to be utilized is the water main. The water main will be of PVC material and recent studies estimate a service life of up to 100 years. This length of service life provides for lower operating and maintenance costs to be realized by the District.

5.02 Non-Monetary Factors

The non-monetary factors considered are the ability to provide service to the existing customer base. With new water mains the existing customer base will have improved service and a higher quality product due to the elimination of existing asbestos cement water mains.

SECTION 6 PROPOSED PROJECT (RECOMMENDED ALTERNATIVE)

6.01 Preliminary Project Design

The proposed project and recommended alternative will replace approximately 22.5 miles of distribution mains that are approximately 50% of asbestos cement material and 50% of older problematic PVC Class 160 water main. The project will also include replacing service line to approximately 500 customer service meters. Improving water turnover/water age by eliminating older, problematic distribution mains and removing dead ends by looping some of the existing water lines will improve the quality of water for residents in these particular areas and also provide alternatives for service during emergency outages.

Additionally, should project funds be available the project will include the installation of automatic flush hydrants, the replacement of a control valve in an existing pump station (US 127), additional chlorinators throughout the distribution system, well testing to examine the potential for additional sources of water, building improvements for the existing maintenance building, security equipment at the main office and equipment purchases, such as a dump truck.

A summary of the proposed project is as follows:

		Approximate Year in Service	Approximate Age (in years)
Replacement of 22.5 miles of distribution main	Perryville Road	1962	55
	McCouns Ferry Road	1962	55
	Old Louisville Road	1962	55
	Cummins Ferry	1962	55
	Kirkwood/Bondville Road	1962	55
	Garriott Lane	1962	55
	McAfee Road	1982	37
	Mackville Road	1982	37
	Louisville Road	1982	37
	Rose Lane	1983	36
	Edgewood Drive	1983	36
	Catlett Lane	1983	36
	Oakland Lane	1983	36
	Rose Hill Lane	1983	36

6.02 Project Schedule

The proposed project schedule is:

1. Secure Letter of Conditions from USDA RD – March 2020
2. Secure Land/Easement/Encroachment Permits – March 2020
3. Division of Water Submittal – January 2020
4. Advertise for Bids – April 2020
5. Contract Award/Initiate Construction – July 2020
6. Substantial Completion – February 2021
7. Final Completion/Initiation of Operation – March 2021

6.03 Permit Requirements

The project will include the need for Division of Water Approval and other potential permits to be identified within the environmental report.

6.04 Total Project Cost Estimate (Engineer's Opinion of Probable Cost)

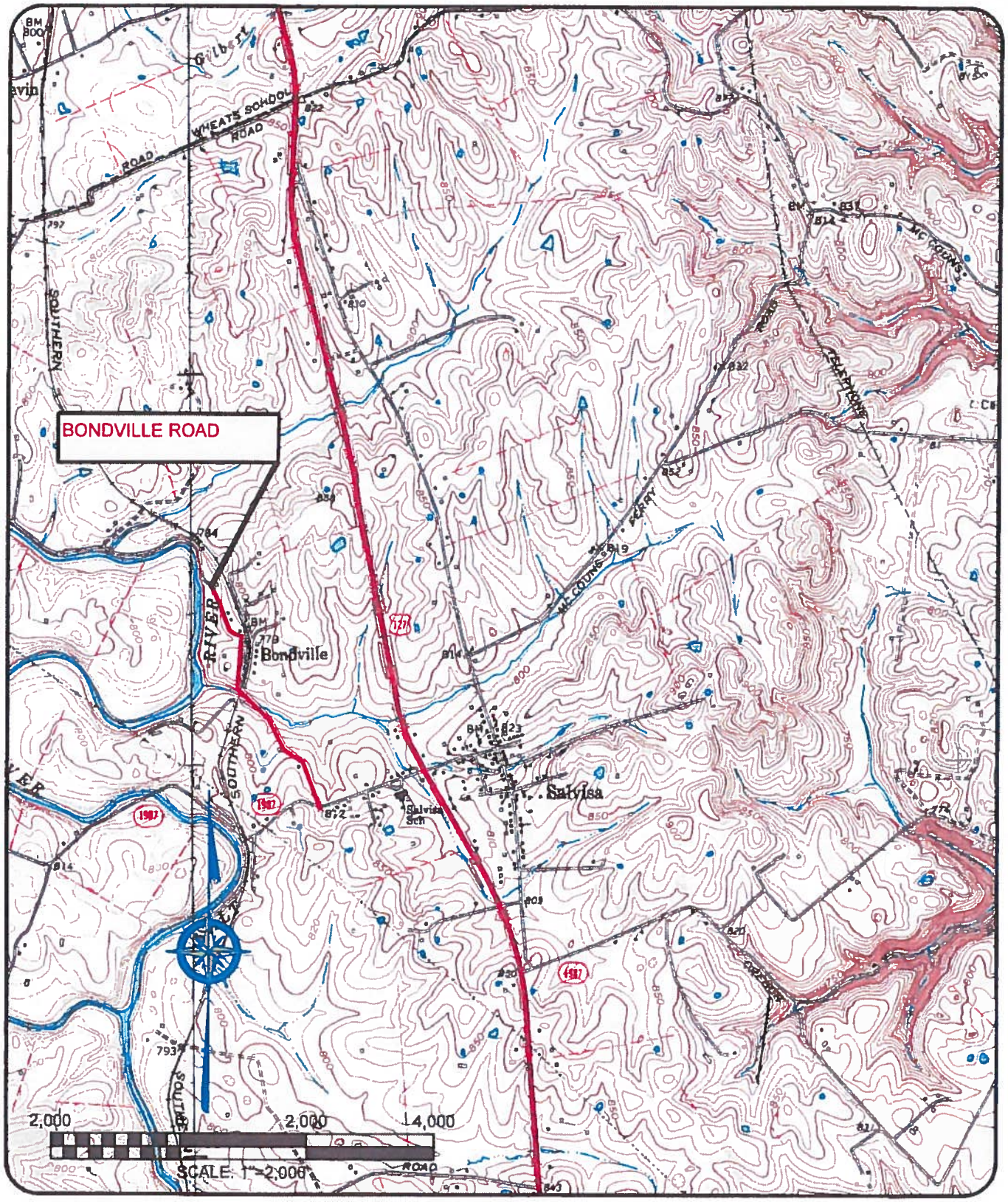
A preliminary project cost estimate is included at the end of this report (Appendix B).

6.05 Annual Operating Budget

A Summary Addendum will be prepared for the project which will examine the District's current and future financial position. Included within the Summary Addendum will be an analysis of the District's current income, annual O & M costs, current and future debt repayments and current reserves. This Summary Addendum will propose a suggested rate for the District in order to meet its current and future debt obligations.

APPENDIX A PROJECT MAPS

APPENDIX A



B:\PROJECTS\North Mercer Water District\18029 - 2019 Water System Improvments\Drawings\DOW Exhibit.dwg BE 10/28/19

BLUEGRASS ENGINEERING PLLC
222 East Main Street Ste 1 Georgetown KY 40324

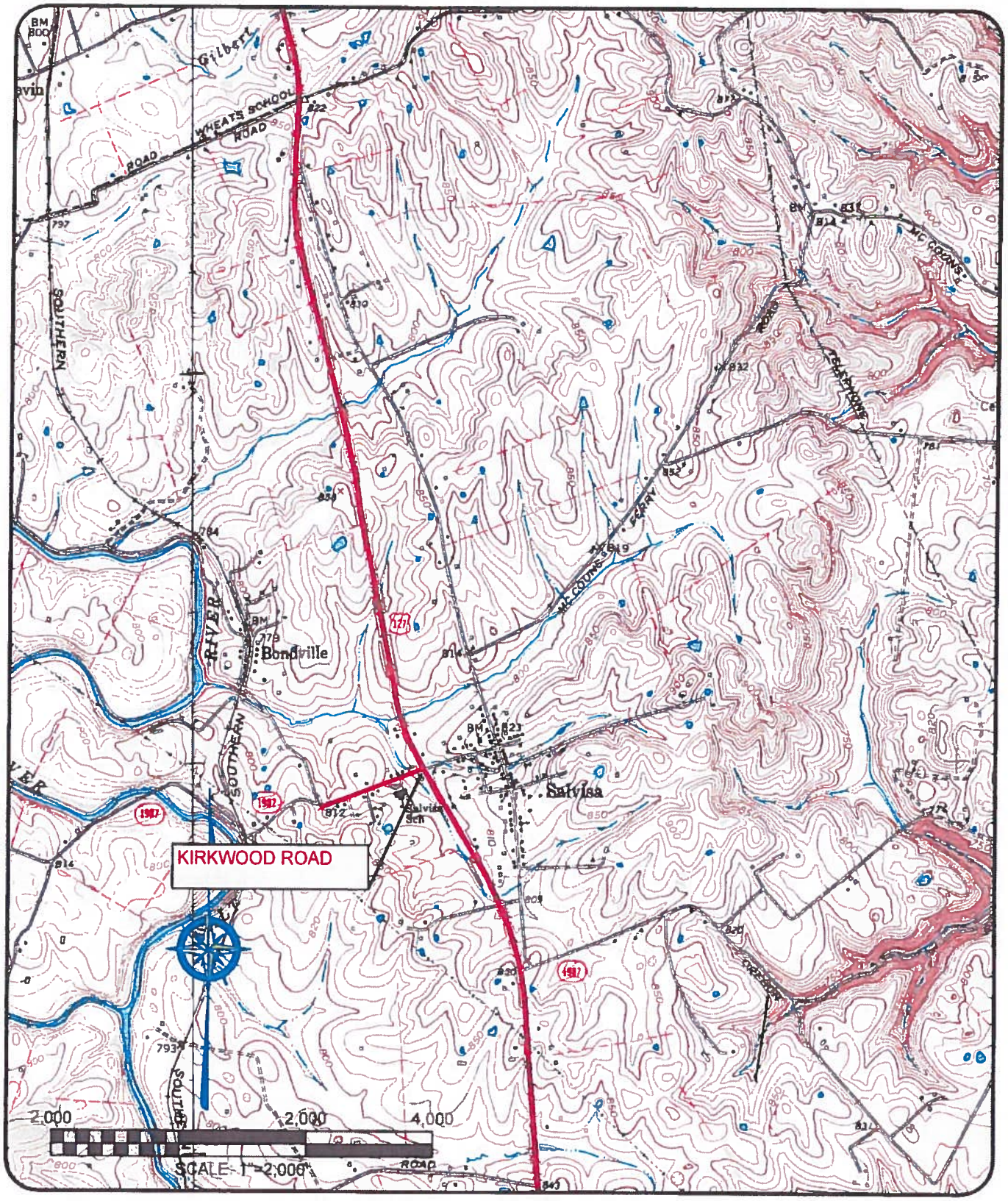
2019 WATER SYSTEM IMPROVEMENTS PROJECT

FOR

NORTH MERCER WATER DISTRICT

BONDVILLE ROAD

Project No	18029
Date	10/2019
Dwg No	1



B:\PROJECTS\North Mercer Water District\18029 - 2019 Water System Improvements\Drawings\IDOW Exhibit.dwg BE 10/28/19

BLUEGRASS ENGINEERING PLLC
222 East Main Street Ste 1 · Georgetown KY 40324

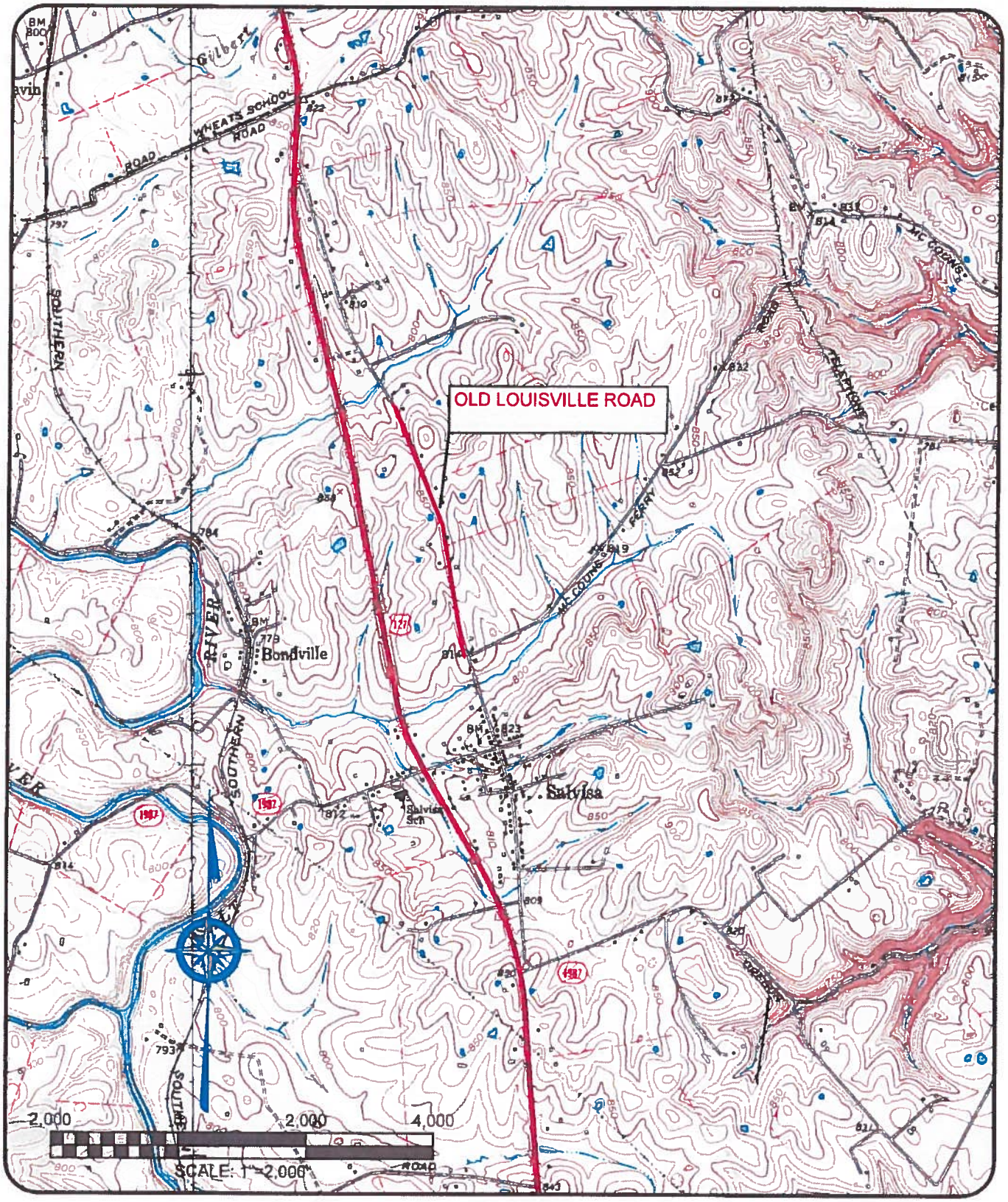
2019 WATER SYSTEM IMPROVEMENTS PROJECT

FOR

NORTH MERCER WATER DISTRICT

KIRKWOOD ROAD

Project No	18029
Date	10/2019
Dwg No	2



B:\PROJECTS\North Mercer Water District\18029 - 2019 Water System Improvments\Drawings\DOW Exhibit.dwg BE 10/28/19

BLUEGRASS ENGINEERING PLLC
222 East Main Street Ste 1 · Georgetown KY 40324

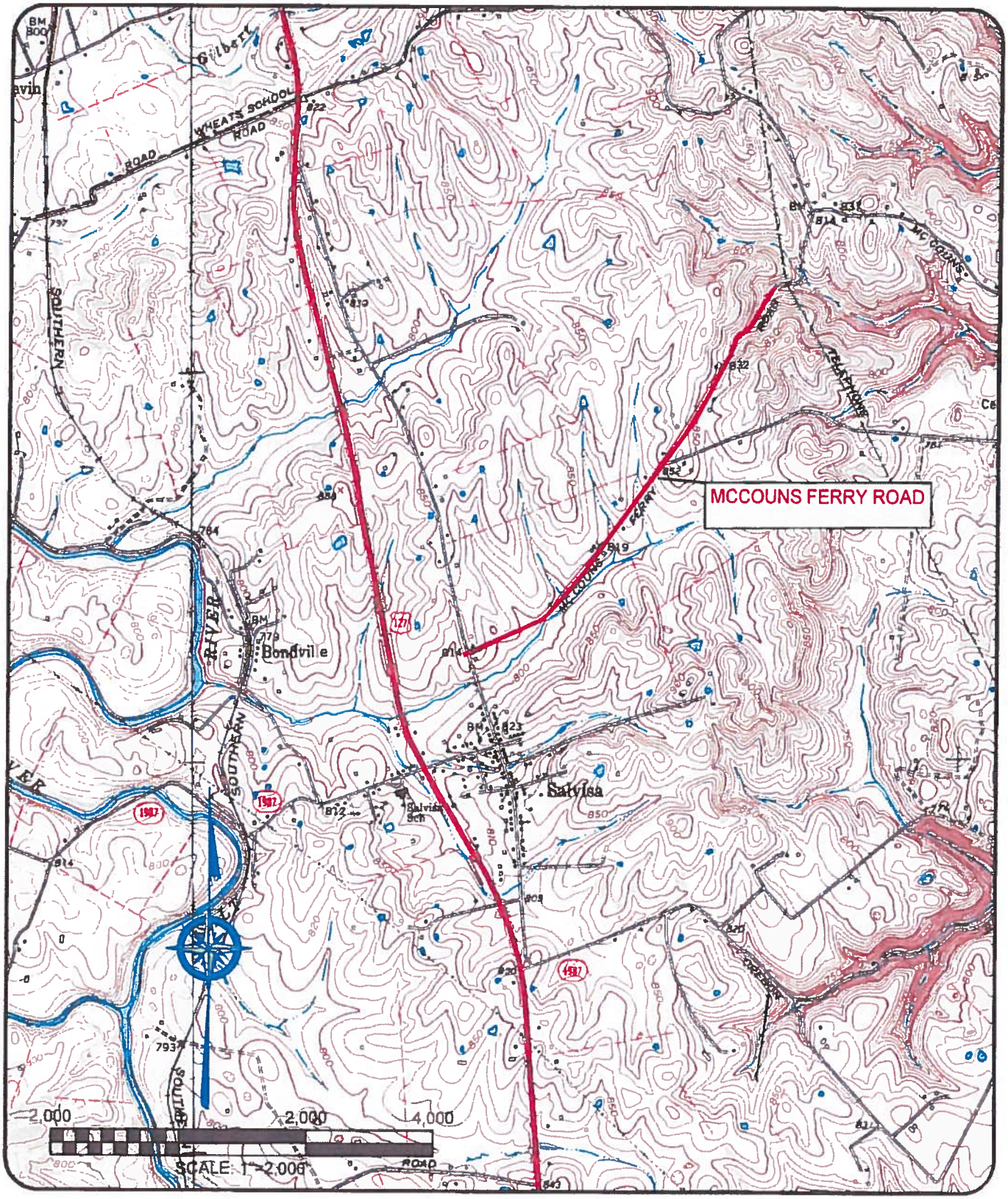
2019 WATER SYSTEM IMPROVEMENTS PROJECT

FOR

NORTH MERCER WATER DISTRICT

OLD LOUISVILLE ROAD

Project No	18029
Date	10/2019
Dwg No	3

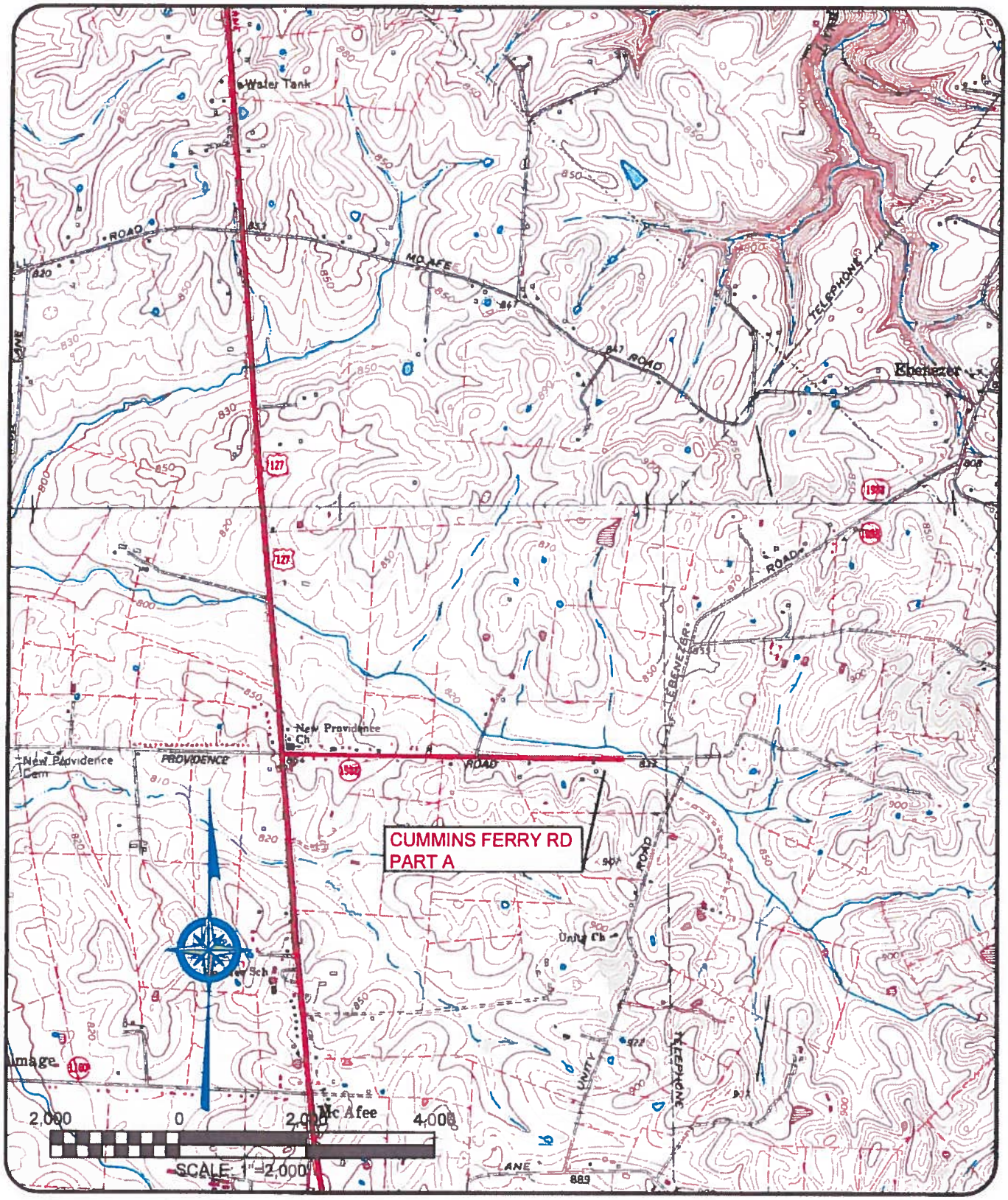


B:\PROJECTS\North Mercer Water District\18029 - 2019 Water System Improvments\Drawings\DOW Exhibit.dwg BE 10/28/19

BLUEGRASS ENGINEERING PLLC
222 East Main Street Ste 1 · Georgetown KY 40324

2019 WATER SYSTEM IMPROVEMENTS PROJECT
FOR
NORTH MERCER WATER DISTRICT
MCCOUNS FERRY ROAD

Project No	18029
Date	10/2019
Dwg No	4



B:\PROJECTS\North Mercer Water District\18029 - 2019 Water System Improvments\Drawings\DOW Exhibit.dwg BE 10/28/19

BLUEGRASS ENGINEERING PLLC
222 East Main Street Ste 1 · Georgetown KY 40324

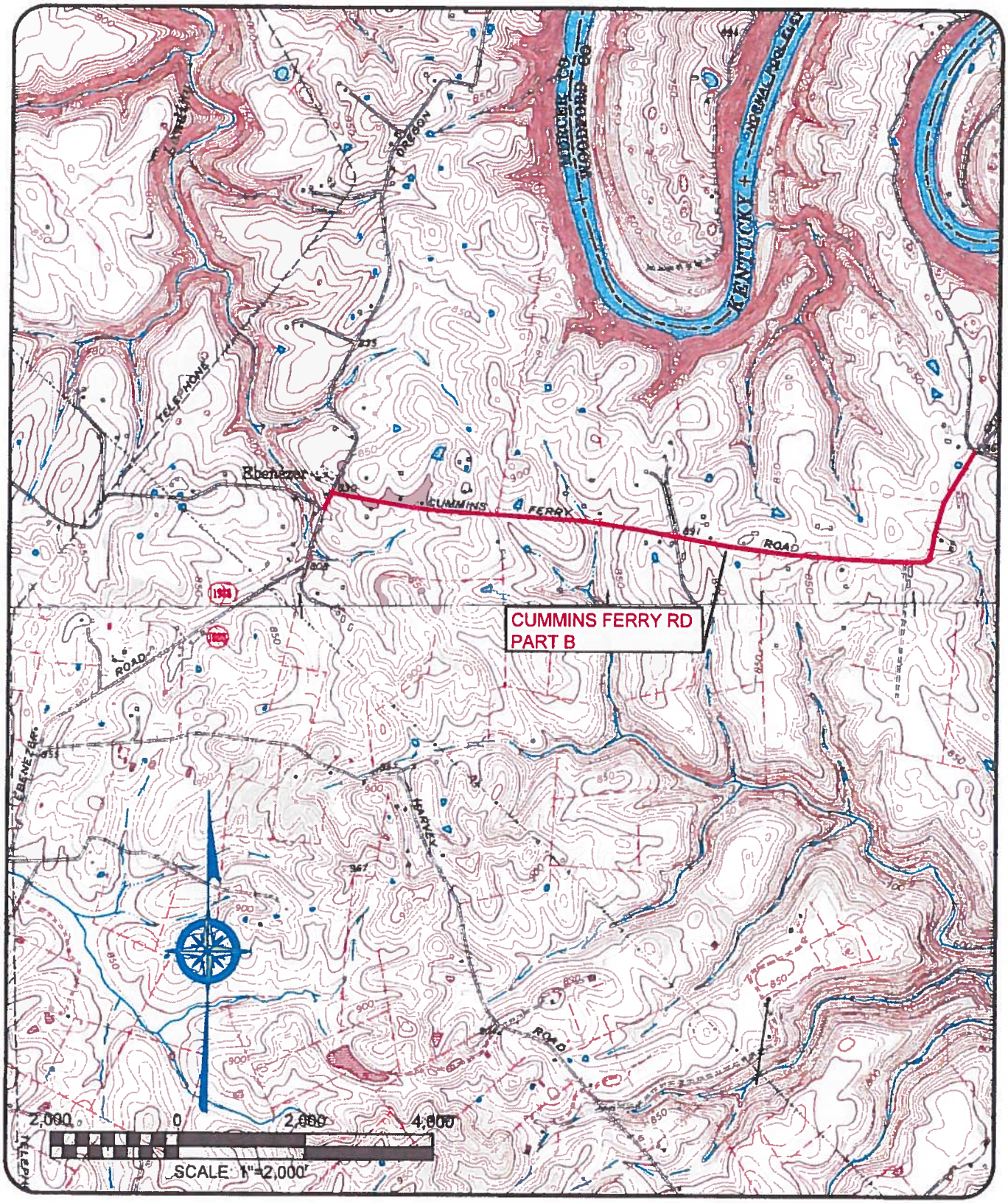
2019 WATER SYSTEM IMPROVEMENTS PROJECT

FOR

NORTH MERCER WATER DISTRICT

CUMMINS FERRY ROAD - PART A

Project No	18029
Date	10/2019
Dwg No	5



B:\PROJECTS\North Mercer Water District\18029 - 2019 Water System Improvments\Drawings\DOW Exhibit.dwg BE 10/28/19

BLUEGRASS ENGINEERING PLLC
222 East Main Street Ste 1 · Georgetown KY 40324

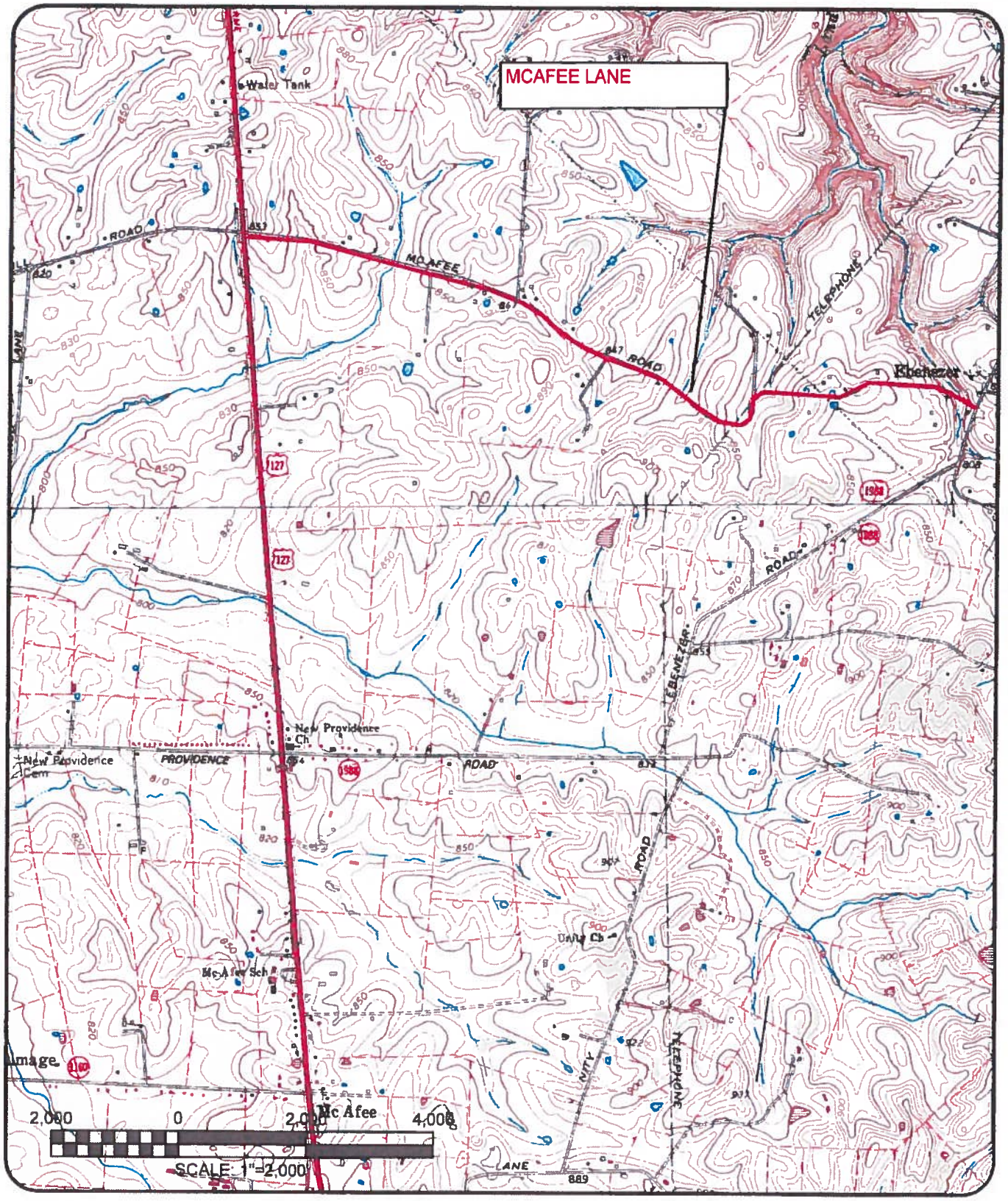
2019 WATER SYSTEM IMPROVEMENTS PROJECT

FOR

NORTH MERCER WATER DISTRICT

CUMMINS FERRY ROAD - PART B

Project No	18029
Date	10/2019
Dwg No	6

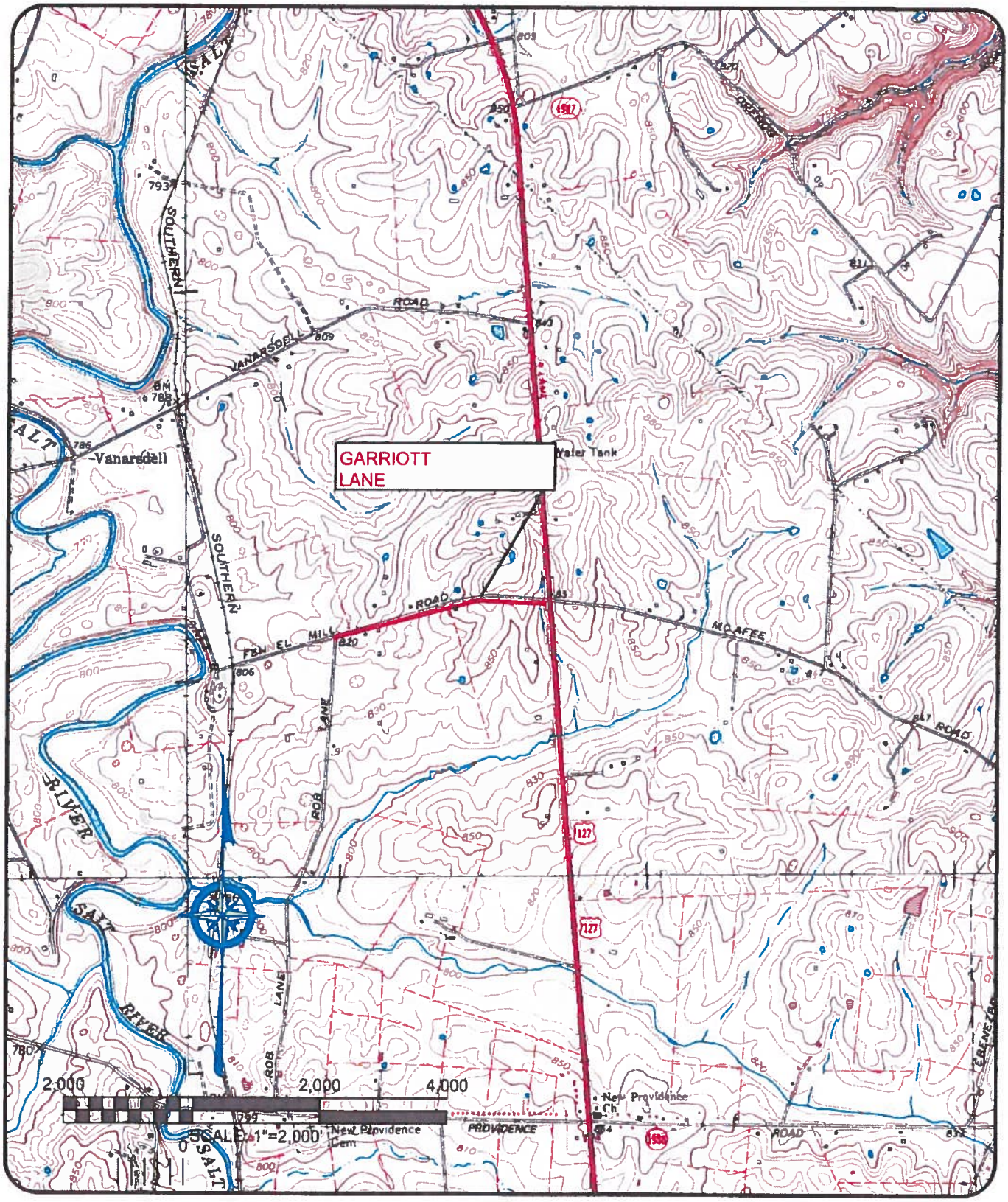


B:\PROJECTS\North Mercer Water District\18029 - 2019 Water System Improvments\Drawings\DOW Exhibit.dwg BE 10/28/19

BLUEGRASS ENGINEERING PLLC
222 East Main Street Ste 1 · Georgetown KY 40324

2019 WATER SYSTEM IMPROVEMENTS PROJECT
FOR
NORTH MERCER WATER DISTRICT
MCAFEE LANE

Project No	18029
Date	10/2019
Dwg No	7



B:\PROJECTS\North Mercer Water District\18029 - 2019 Water System Improvments\Drawings\DOW Exhibit.dwg BE 10/28/19

BLUEGRASS ENGINEERING PLLC
222 East Main Street Ste 1 · Georgetown KY 40324

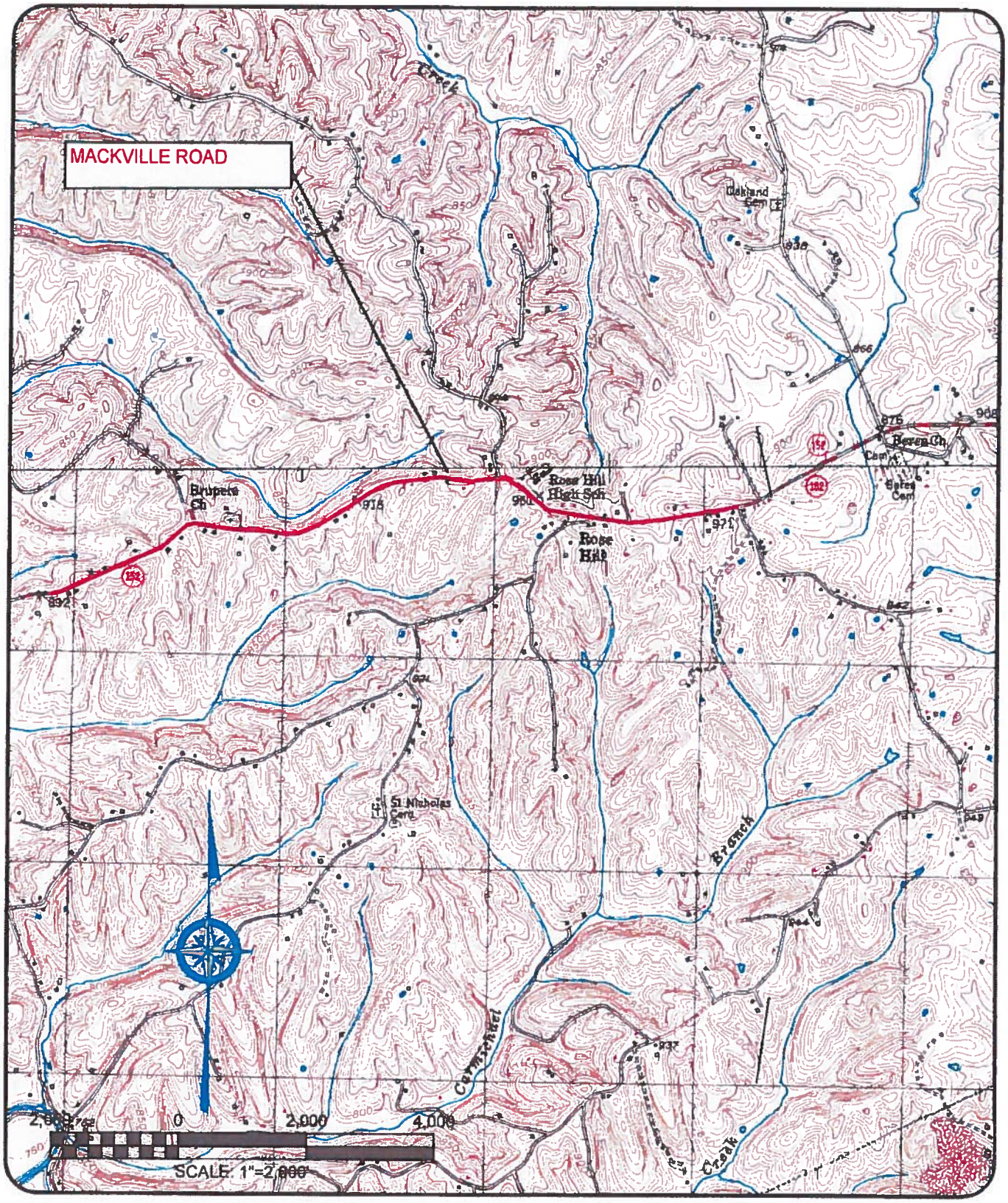
2019 WATER SYSTEM IMPROVEMENTS PROJECT

FOR

NORTH MERCER WATER DISTRICT

GARRIOTT LANE

Project No	18029
Date	10/2019
Dwg No	8



B:\PROJECTS\North Mercer Water District\18029 - 2019 Water System Improvments\Drawings\DOW Exhibit.dwg BE 10/28/19

BLUEGRASS ENGINEERING PLLC
222 East Main Street Ste 1 • Georgetown KY 40324

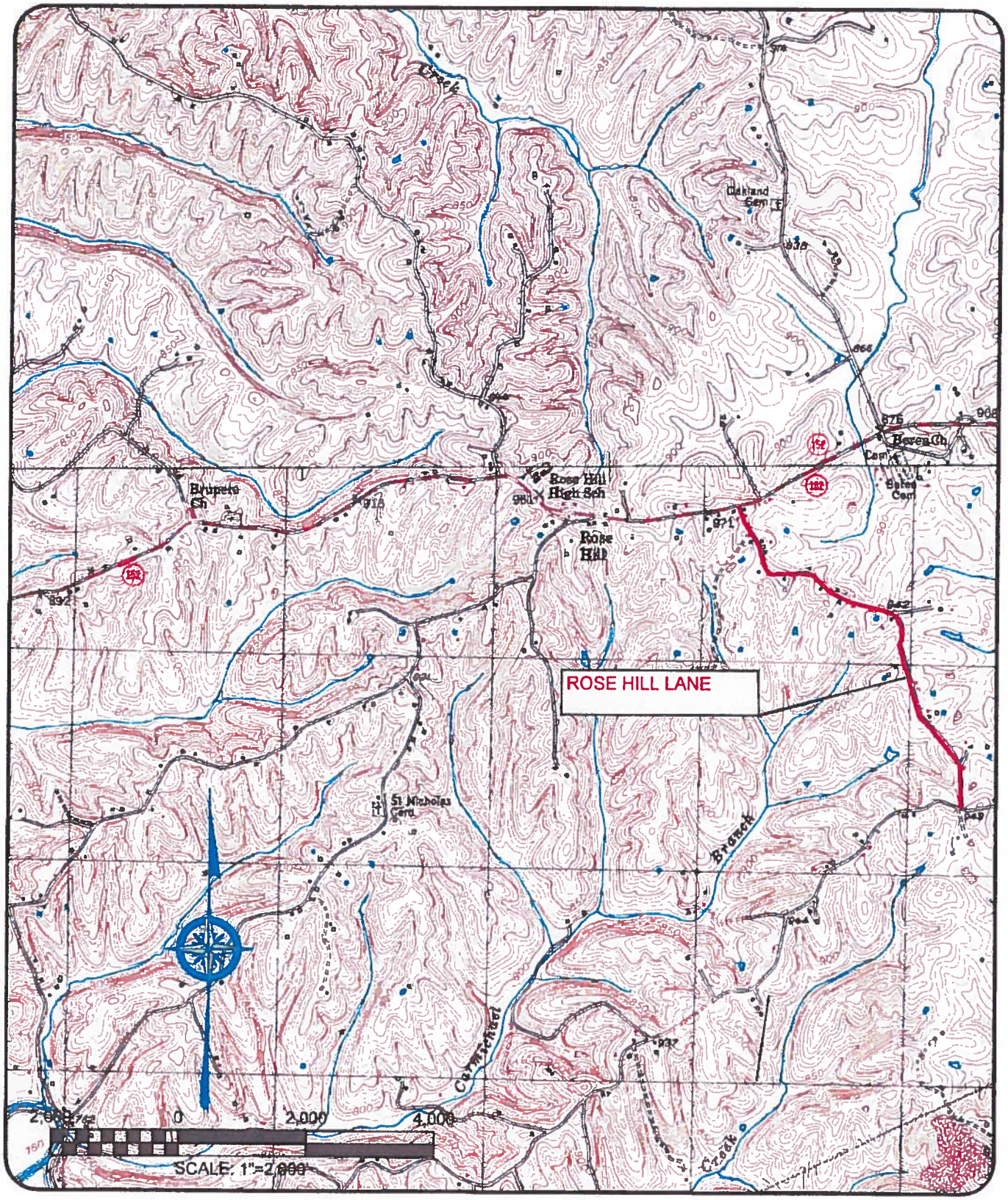
2019 WATER SYSTEM IMPROVEMENTS PROJECT

FOR

NORTH MERCER WATER DISTRICT

MACKVILLE ROAD

Project No	18029
Date	10/2019
Dwg No	9



B:\PROJECTS\North Mercer Water District\18029 - 2019 Water System Improvments\Drawings\DOW Exhibit.dwg BE 10/28/19

BLUEGRASS ENGINEERING PLLC
222 East Main Street Ste 1 · Georgetown KY 40324

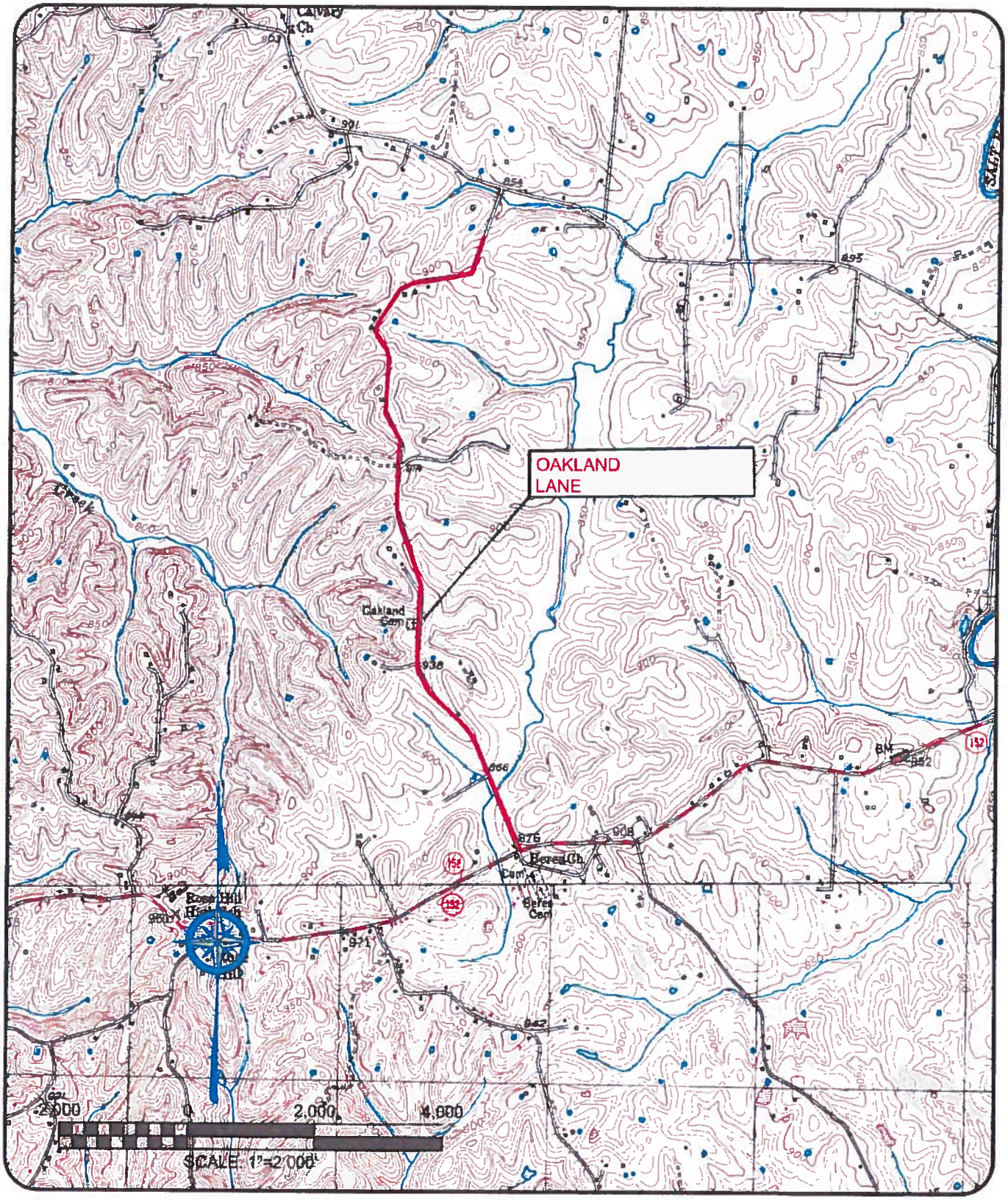
2019 WATER SYSTEM IMPROVEMENTS PROJECT

FOR

NORTH MERCER WATER DISTRICT

ROSE HILL LANE

Project No	18029
Date	10/2019
Dwg No	10



B:\PROJECTS\North Mercer Water District\18029 - 2019 Water System Improvments\Drawings\DOW Exhibit.dwg BE 10/28/19

BLUEGRASS ENGINEERING PLLC
222 East Main Street Ste 1 • Georgetown KY 40324

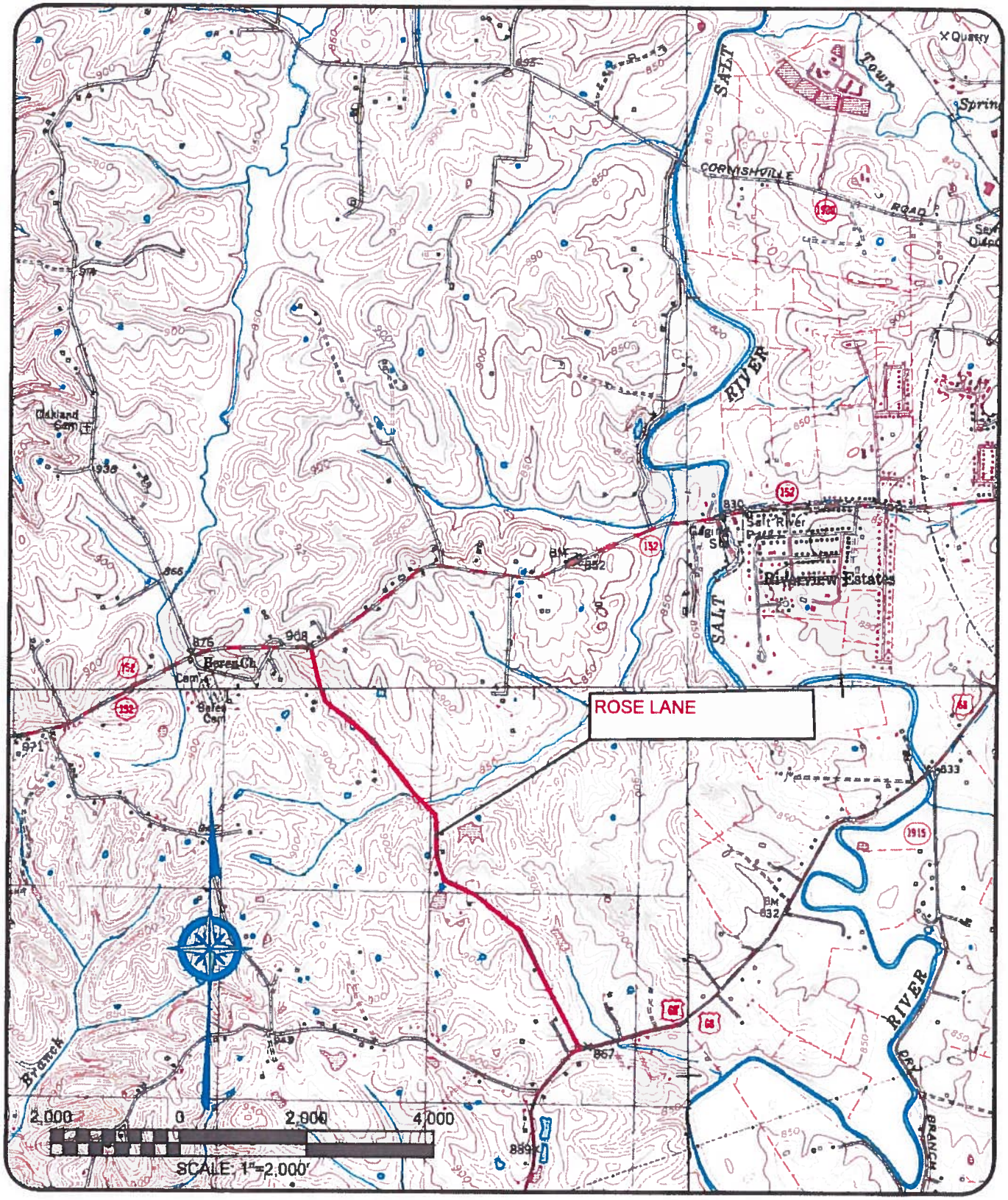
2019 WATER SYSTEM IMPROVEMENTS PROJECT

FOR

NORTH MERCER WATER DISTRICT

OAKLAND LANE

Project No	18029
Date	10/2019
Dwg No	11



B:\PROJECTS\North Mercer Water District\18029 - 2019 Water System Improvments\Drawings\DOW Exhibit.dwg BE 10/28/19

BLUEGRASS ENGINEERING PLLC
222 East Main Street Ste 1 • Georgetown KY 40324

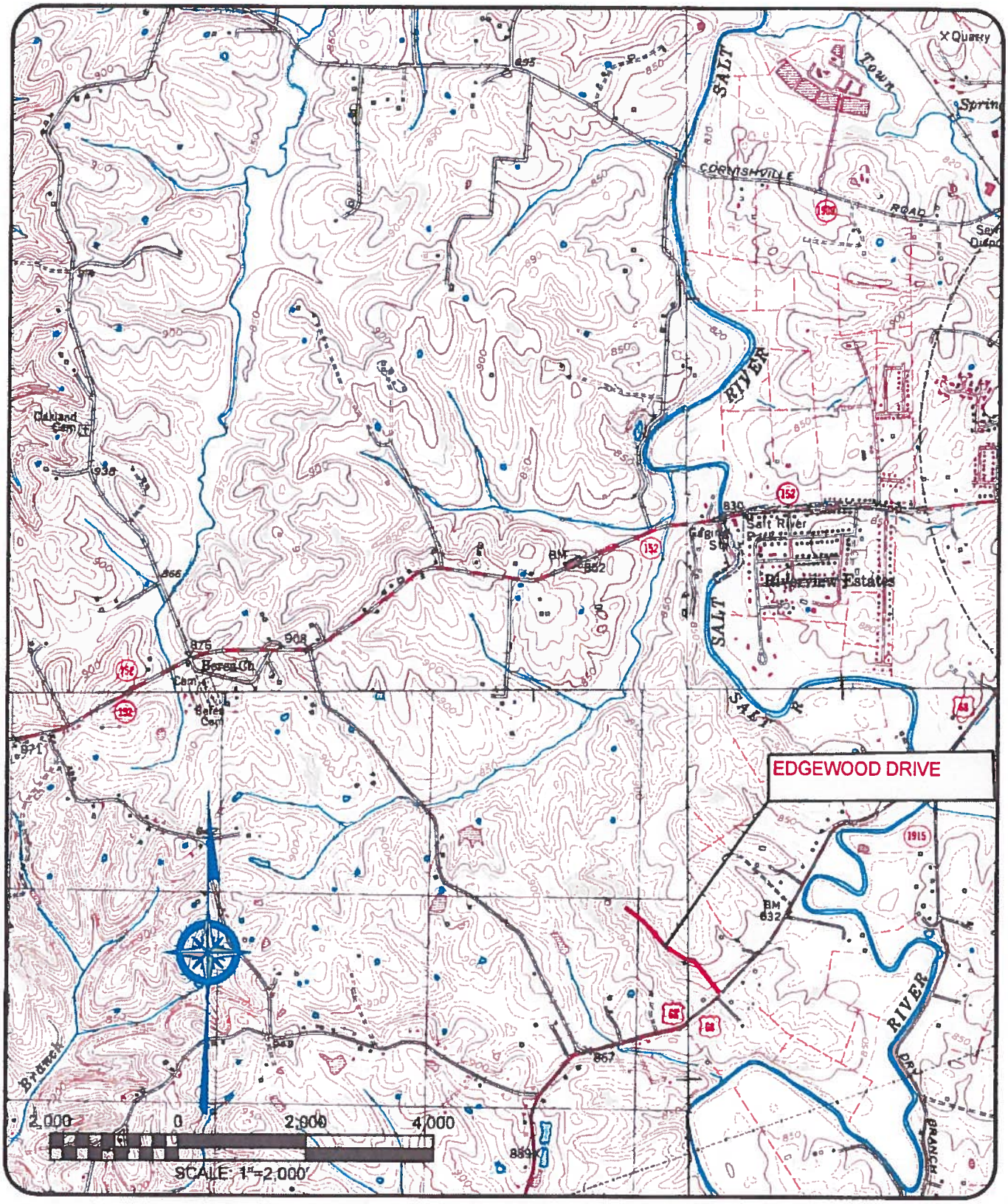
2019 WATER SYSTEM IMPROVEMENTS PROJECT

FOR

NORTH MERCER WATER DISTRICT

ROSE LANE

Project No	18029
Date	10/2019
Dwg No	12



B:\PROJECTS\North Mercer Water District\18029 - 2019 Water System Improvments\Drawings\DOW Exhibit.dwg BE 10/28/19

BLUEGRASS ENGINEERING PLLC
222 East Main Street Ste 1 · Georgetown KY 40324

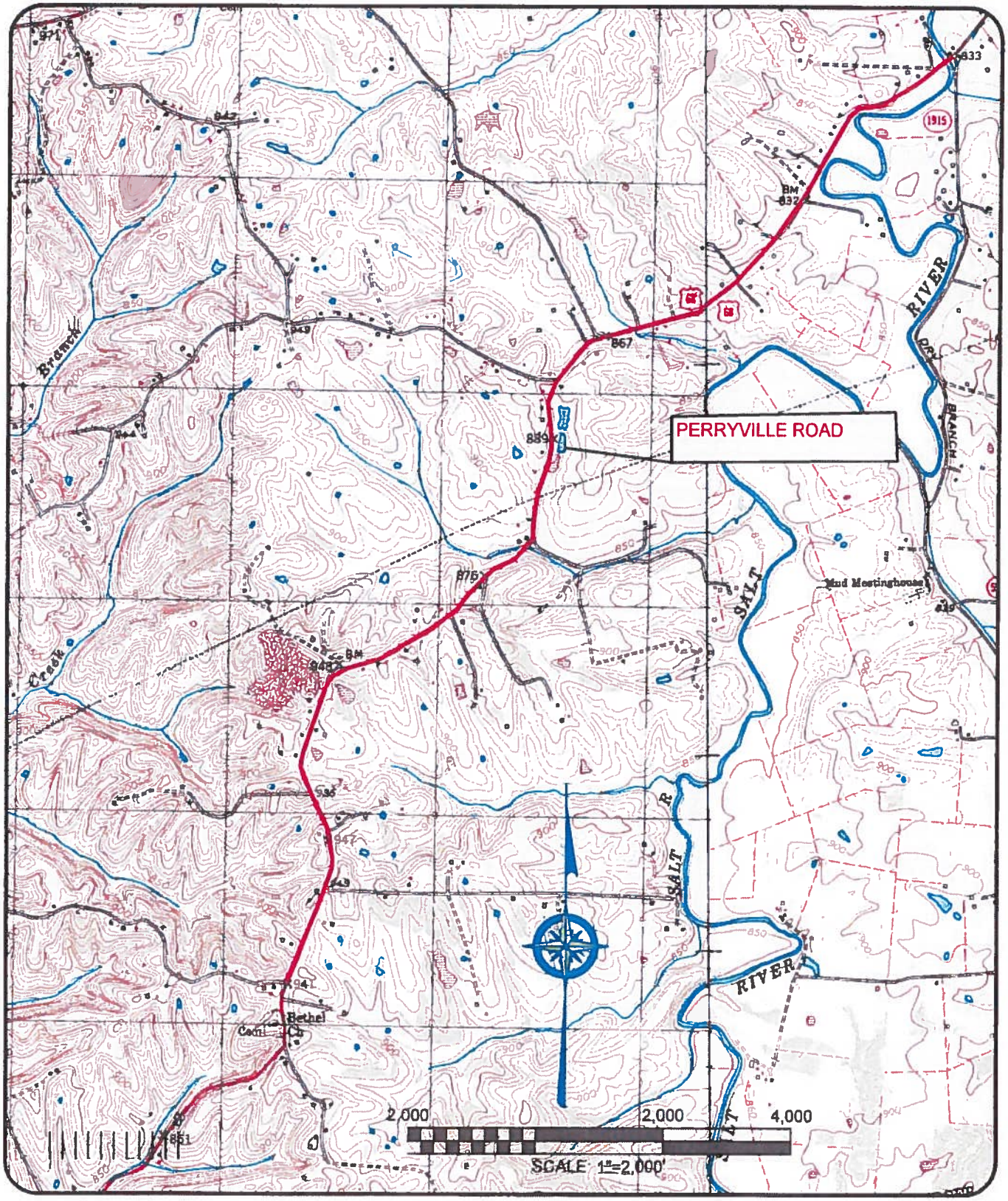
2019 WATER SYSTEM IMPROVEMENTS PROJECT

FOR

NORTH MERCER WATER DISTRICT

EDGEWOOD DRIVE

Project No	18029
Date	10/2019
Dwg No	13



B:\PROJECTS\North Mercer Water Distinct\18029 - 2019 Water System Improvments\Drawings\DOW Exhibit.dwg BE 10/28/19

BLUEGRASS ENGINEERING PLLC
222 East Main Street Ste 1 · Georgetown KY 40324

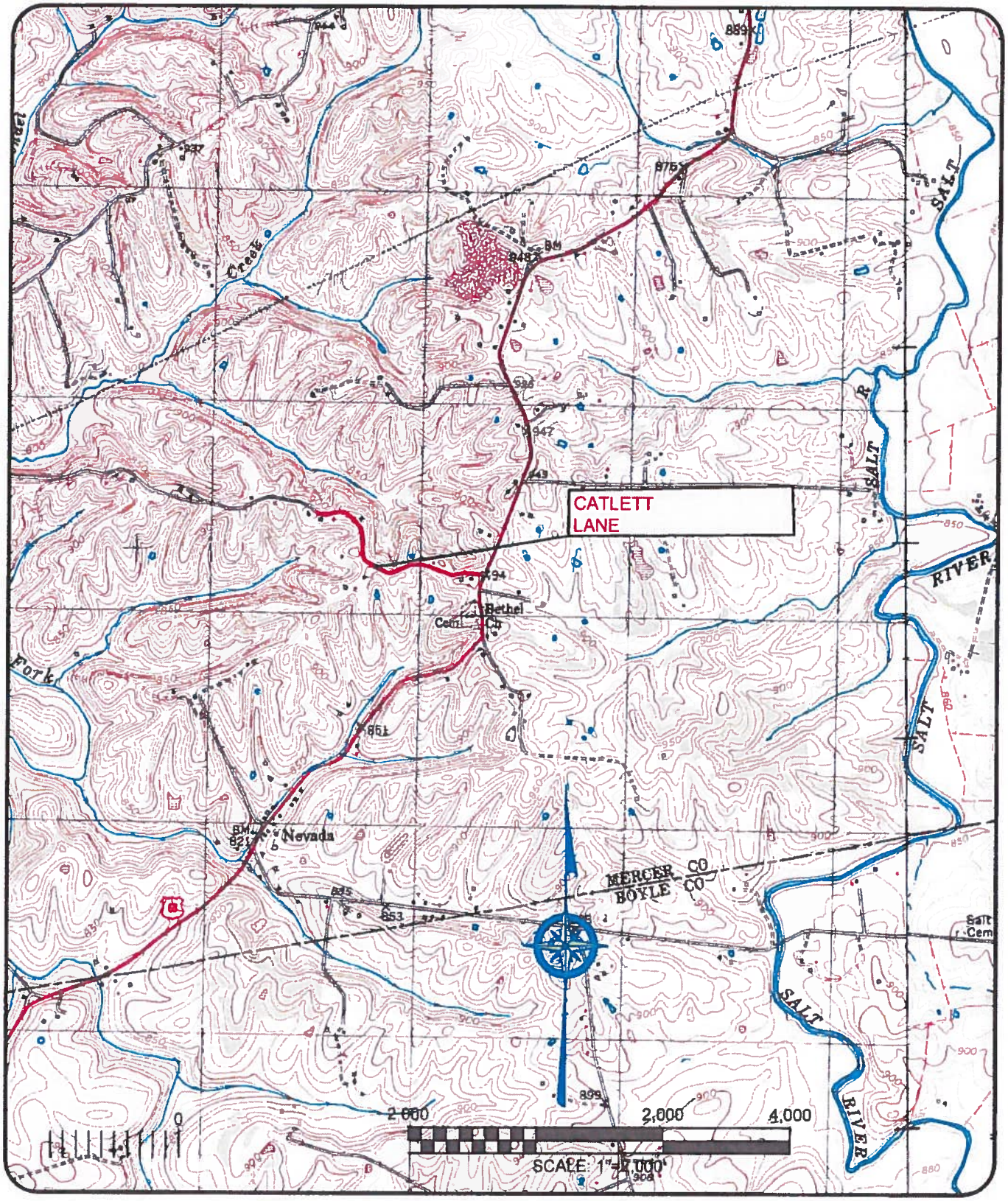
2019 WATER SYSTEM IMPROVEMENTS PROJECT

FOR

NORTH MERCER WATER DISTRICT

PERRYVILLE ROAD

Project No	18029
Date	10/2019
Dwg No	14



B:\PROJECTS\North Mercer Water District\18029 - 2019 Water System Improvments\Drawings\DOW Exhibit.dwg BE 10/28/19

BLUEGRASS ENGINEERING PLLC
222 East Main Street Ste 1 · Georgetown KY 40324

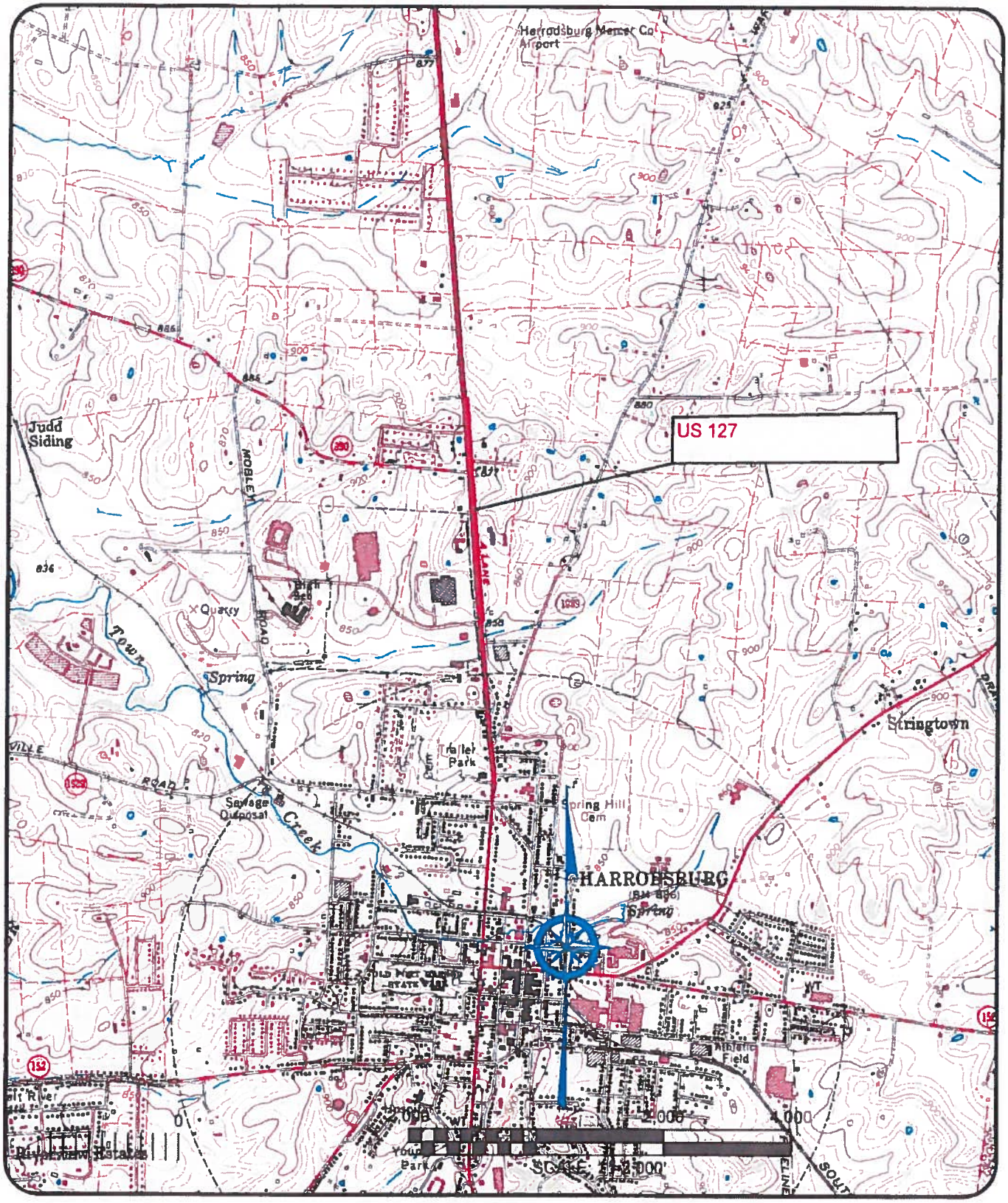
2019 WATER SYSTEM IMPROVEMENTS PROJECT

FOR

NORTH MERCER WATER DISTRICT

CATLETT LANE

Project No	18029
Date	10/2019
Dwg No	15



B:\PROJECTS\North Mercer Water District\18029 - 2019 Water System Improvments\Drawings\DOW Exhibit.dwg BE 10/28/19

BLUEGRASS ENGINEERING PLLC
222 East Main Street Ste 1 · Georgetown KY 40324

2019 WATER SYSTEM IMPROVEMENTS PROJECT

FOR

NORTH MERCER WATER DISTRICT

US 127

Project No	18029
Date	10/2019
Dwg No	16

APPENDIX B PRELIMINARY PROJECT COST ESTIMATE

APPENDIX B

NORTH MERCER WATER DISTRICT

2019 WATER MAIN REPLACEMENT PROJECT

October, 2019

ROAD NAME	Pipe Type	Pipe Size	Cost Estimate	Meters	Footage
Perryville Road	PVC	6"	$ 476,000	85	21700
McCouns Ferry Road	PVC	6"	$ 161,000	21	7800
Old Louisville Road (Salvisa)	AC	6"	$147,000	36	3900
Cummins Ferry	AC	4"	$ 118,000	30	6000
Kirkwood/Bondville	AC	4"	$ 128,000	33	6200
Garriott Lane	AC	3"	$ 55,000	7	3400
McAfee Road	AC	6"4"3"	$ 438,000	74	24,600
Mackville road	AC	4"	$ 205,000	32	9200
Louisville Road MM	AC	8"	$ 172,000	13	6000
Rose Lane	PVC	6"	$ 190,000	25	8200
Edgewood Drive	PVC	6"	$ 84,000	19	2900
Catlett Lane	PVC	6"	$ 52,000	8	2200
Oakland Lane	PVC	6"	$ 285,000	58	10800
Rose Hill Lane	PVC	6"	$ 145,000	29	7200
ESTIMATED TOTAL			$2,656,000	470	120,100/22.7 m