



#257833

# Transmittal

Date: Wednesday, December 09, 2015

Project: Lyon County Water District PSC Application – KRS 278.023  
CASE NO. 2015-00376

To: Mr. Jonathan Beyer  
Public Service Commission  
211 Sower Blvd.  
Frankfort, KY 40602-0615

From: Mark Stephens

Subject: Preliminary Engineering Report

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Copy to: HDR File (Trans Only)  
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Signed: Mark Stephens  
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**Preliminary Engineering Report**  
**Lyon County Water District Project**  
**“Water Quality and System Improvements”**  
**Prepared in Support of USDA Rural Development**  
**Application for Financing**

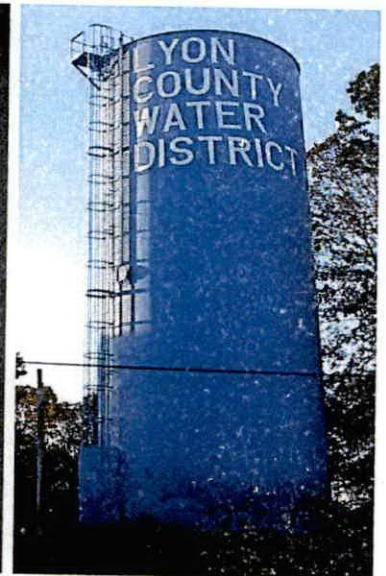
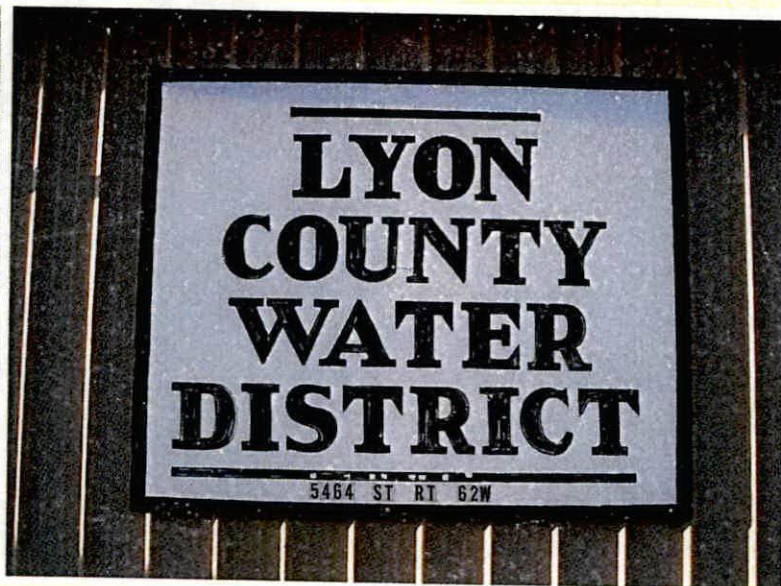
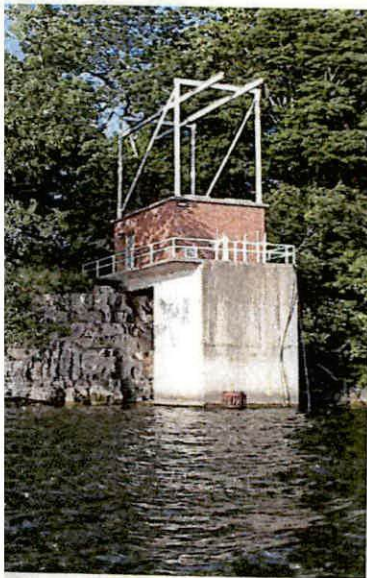
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Prepared By:

**Florence & Hutcheson**

CONSULTING ENGINEERS



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**Preliminary Engineering Report  
for the  
Lyon County Water District Project  
“Water Quality and System Improvements”**

**August 20, 2010**

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CONSULTING ENGINEERS

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### EXHIBIT A - (MAP FOLDER) SYSTEM MAP WITH PROJECT LOCATIONS



## INTRODUCTION

This Preliminary Engineering Report is being prepared in support of an application for Rural Development financing to improve the water system of the Lyon County Water District located in Lyon County, Kentucky. This Preliminary Engineering Report describes the water system operated by the Lyon County Water District, the project planning area, and the proposed improvements to the water system. The report also describes the operating expenses and revenues of the water system and the current rate structure. A proposed new rate structure is described that will generate the additional revenue necessary to pay for the proposed improvements.

## PROJECT PLANNING AREA

Lyon County is located in the lakes region of Western Kentucky. The Water District serves the entire county with potable water except for the sizeable portion that lies within the Land Between the Lakes National Recreational Area. Lake Barkley lies within the county and constitutes a significant recreational resource. A significant portion of the housing within Lyon County lies adjacent to Lake Barkley. The Cumberland River below Barkley Dam borders the western portion of the county. Exhibit A is a map of the Water District service area showing the existing system and the locations of the projects proposed for funding by Rural Development financing. Map 1 also shows the project areas envisioned for funding with Rural Development financing. These projects are scattered throughout the Lyon County and are described in detail later in this report.

The Water District also operates a small wastewater system in the Suwanee area serving approximately 40 customers. In addition, it operates two on-site treatment systems currently serving three customers.

The environmental resources in Lyon County outside of the national recreational area consist mainly of floodplains along the lower Cumberland River, cattle grazing lands, some row crop land for corn and soy beans, and scattered wood lots. Some small scattered wetlands, archaeological and cultural resources, and critical habitats exist in the county; however, the proposed new facilities will generally be in existing rights-of-way that have been previously disturbed.

The Water District serves the rural areas of the county outside the cities of Eddyville and Kuttawa. The main areas of population concentrations in the county are in scattered subdivisions along and in the area of Lake Barkley. Population projections have been made for the county by the Kentucky State Data Center and are shown in Table 1. The 2008 estimated population in the county was 8,245 with 3,063 of those being within Eddyville and Kuttawa. Generally, residents of the two prisons located in Lyon County are counted in the population. One of these facilities is served by the City of Eddyville and the other is served with an on-



site water system. Based on the projected information, the population of Lyon County is projected to increase by slightly over 200 persons over the next 20 years.

Lyon County	2010-2015	2015-2020	2020-2025	2025-2030	2030-2035	2035-2040	2040-2045	2045-2050
Population Growth	131	114	88	2	-54	-98	-126	-150
Percent Change	1.57	1.35	1.03	0.02	-0.62	-1.14	-1.48	-1.79
Births	322	327	324	326	336	349	356	358
Deaths	517	542	563	612	643	667	671	661
Net Migration	326	329	327	287	252	220	189	153

Source: Kentucky State Data Center, 2009

## EXISTING FACILITIES

**History and Location:** The Lyon County Water District began operation in the early 1970's and progressively extended water lines and constructed water storage facilities throughout Lyon County. The Water District was one of the first water districts in Kentucky to offer service to all customers that desired to be served.

**Condition of Facilities:** The Lyon County Water District operates a water distribution system comprised of one elevated water storage tank, two water storage standpipes, one pump station, and approximately 200 miles of water distribution main. The Water District serves approximately 2,500 customers, primarily in Lyon County. The Water District purchases water for resale primarily from the City of Princeton and the City of Kuttawa. Smaller amounts are purchased from the Crittenden Livingston Water District, the Barkley Lake Water District, and the City of Eddyville. Table 2 lists the volume of water purchased from the various sources for the period January 1 through December 31, 2009.

Source	Gallons Purchased	Percentage Purchased
City of Princeton	49,917,000	42.3
City of Kuttawa	46,804,200	39.7
Crittenden Livingston Water District	13,799,200	11.7
City of Eddyville	7,149,200	6.1
Barkley Lake Water District	212,800	0.2

Most of the facilities were constructed by the Water District after they began operation in the 1970's. In these areas the water pipes are made of PVC and are in relatively good condition. The water storage tanks have all been constructed since 1970. They have recently been inspected and are in need of some maintenance and rehabilitation. There are a couple of

areas where the Water District purchased older small systems that are not in as good a condition as the facilities constructed by the Water District. Rehabilitation in the next few years will be necessary in these areas.

The Water District purchases all its water and is reliant on its suppliers to generally maintain compliance with the Safe Drinking Water Act. On occasion, Kuttawa has had problems meeting disinfection by-products standards and the Water District has had to inform its customers that their water was not in compliance with Safe Drinking Water standards. The Water District does routine flushing of dead end lines to maintain good water quality throughout the system. Kuttawa is currently addressing its water quality problems and should become more consistent in its compliance with water quality standards.

The Water District sells about 70 percent of the water it purchases. About 10 percent of the unsold water can be accounted for from tank overflows, fire hydrant flows, system flushing, and leaks. The Water District is in the process of developing a program to minimize the unaccounted for water loss.

**Financial Status of Existing Facilities:** The current rate schedule of the Lyon County Water District is shown in Table 3. Annual operations and maintenance costs are shown in Table 4, and a tabulation of users by monthly usage categories is shown in Table 5. The status of existing debt is shown in Table 6. Table 7 lists the schedule of principal maturity and annual debt service for the Water District.

	5/8" Meter		3/4" Meter		1" Meter	
	Tier	Rate per 1,000 gals	Tier	Rate per 1,000 gals	Tier	Rate per 1,000 gal
First/Min	2,000	\$19.12	4,000	\$23.38	15,000	\$75.44
Next	3,000	\$8.05	1,000	\$5.32	5,000	\$3.26
Next	5,000	\$6.02	5,000	\$3.92	-	-
Next	10,000	\$3.99	10,000	\$2.52	-	-
Over	20,000	\$3.49	20,000	\$2.17	20,000	\$2.86
	1 1/2" Meter		2" Meter			
	Tier	Rate per 1,000 gals	Tier	Rate per 1,000 gals		
First/Min	25,000	\$106.00	45,000	\$163.11		
Over	25,000	\$2.86	45,000	\$2.86		





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Item	Cost	Item	Cost
Depreciation	\$186,196	Materials and Supplies	64,181
Amortization	1,089	Office Supplies	17,256
Payroll Tax Expense	8,179	Replacement to Lines	8,353
PSC Assessment	1,283	Contract Services	3,763
Interest Expense	91,915	Contract Labor	1,872
Salaries	131,734	Professional Fees - Legal	7,440
Employee Pension Plan	14,697	Professional Fees - Accounting	64,180
Employee Health Insurance	12,885	Rent	14,265
Purchased Water	259,841	Insurance and Bonds	13,441
Utilities and Phone	10,140	Miscellaneous	23,092
Small Tools	-	Total Operating Expenses	\$935,802

Source: Lyon County Water District 2009 Financial Statement

**Table 5 Tabulation of Users by Monthly Usage Category for Various Sized Meters**

			First	Next	Next	Next	Over	Total
	Level	Bills	2,000	3,000	5,000	10,000	20,000	Usage
First/Min	2,000	15,214	10,297,600					10,297,600
Next	3,000	10,066	20,132,000	13,278,900				33,410,900
Next	5,000	2,892	5,784,000	8,676,000	4,620,100			19,080,100
Next	10,000	477	954,000	1,431,000	2,385,000	1,537,200		6,307,200
Over	20,000	132	264,000	396,000	660,000	1,320,000	2,342,200	4,982,200
Total		28,781	37,431,600	23,781,900	7,665,100	2,857,200	2,342,200	74,078,000

			First	Next	Next	Next	Over	Total
	Level	Bills	4,000	1,000	5,000	10,000	20,000	Usage
First/Min	4,000	0	0					0
Next	1,000	0	0	0				0
Next	5,000	3	12,000	3,000	12,700			27,700
Next	10,000	7	28,000	7,000	35,000	25,200		95,200
Over	20,000	2	8,000	2,000	10,000	20,000	23,700	63,700
Total		12	48,000	12,000	57,700	45,200	23,700	186,600



Table 5c - 1" Meter						
			First	Next	Over	Total
	Level	Bills	15,000	5,000	20,000	Usage
First/Min	15,000	52	308,000			308,000
Next	5,000	5	75,000	8,900		83,900
Over	20,000	13	195,000	65,000	402,900	662,900
Total		70	578,000	73,900	402,900	1,054,800

Table 5d - 1 1/2" Meter					
			First	Over	Total
	Level	Bills	25,000	25,000	Usage
First/Min	25,000	34	314,700		314,700
Over	25,000	26	650,000	507,300	1,157,300
Total		60	964,700	507,300	1,472,000

Table 5e - 2" Meter					
			First	Over	Total
	Level	Bills	45,000	45,000	Usage
First/Min	45,000	54	806,100		806,100
Over	45,000	32	1,440,000	6,451,700	7,891,700
Total		86	2,246,100	6,451,700	8,697,800

Source: Lyon County Water District Computerized Billing System



Holder	Terms	Amount
Kentucky Infrastructure Authority	Note Payable bearing interest at 2.5 to 5.25%, Due June 1, 2014. Principal and interest due monthly	\$407,500
Kentucky Association of Counties	Note Payable to leasing trust bearing interest at 6.31% before Commonwealth of Kentucky offset producing an effective rate of 5.31% due January 1, 2016. Interest due monthly and principal due annually on January 1.	53,000
Rural Development	Water Revenue Bond Series 1995 bearing interest at 4.875% due January 1, 2035. Interest due semi-annually on January 1 and July 1 and principal due annually on January 1.	855,000
Rural Development	Water Revenue Bond Series 2002 bearing interest at 4.50% due January 1, 2023. Interest due semi-annually on January 1 and July 1 and principal due annually on January 1.	563,500
Less current portion		77,500
<b>Total</b>		<b>\$1,801,500</b>

Source: Lyon County Water District 2009 Financial Statement

Year	Principal Amount	Total Interest	Total Debt Service
2010	77,500	87,099	164,599
2011	76,500	85,067	161,567
2012	33,000	80,537	113,537
2013	192,500	78,958	271,458
2014	194,000	68,750	262,750
2015-2019	182,000	275,445	458,445
2020-2024	212,500	234,632	447,132
2025-2029	274,000	181,600	455,600
2030-2034	351,500	113,269	464,769
2035-2039	190,000	42,480	232,480
2040-2042	95,500	8,708	104,208
<b>Total</b>	<b>1,879,000</b>	<b>1,257,545</b>	<b>3,136,545</b>

Source: Lyon County Water District 2009 Financial Statement



The Lyon County Water District maintains a depreciation reserve account that can be used for expenditures for unusual and extra-ordinary maintenance, repairs, renewal, or replacements, and the cost of constructing addition and improvements to the system. The Water District is required to make \$510 monthly deposits to this account under the 1995 Rural Development Bond and \$295 monthly deposits under the 2002 Rural Development Bond. On December 31, 2009 the amount in the depreciation reserve account was \$57,377.

### NEED FOR PROJECT

**Health, Sanitation and Security:** As seen from the system map, the southern end of the Lyon County service area is supplied by a pump station and water storage standpipe. Interstate Highway I-24 bisects this service area in an east/west direction and the Eddy Creek embayment of Lake Barkley bisects the area in a north/south direction. There is only one water line that crosses I-24 to serve the entire area south of the interstate highway and east of the embayment. If service were lost in this line, a large number of customers would be without water. In addition, the long travel distance of the water under the current flow scheme provides the opportunity for the dissipation of chlorine and the chance of low chlorine residuals and violation of standards under the Safe Drinking Water Act.

Two projects are proposed to improve water flow to this area. One of the projects is the completion of a loop under I-24 and the other is the completion of a major loop across the Eddy Creek embayment with the upsizing of water lines that are part of the loop. These projects should greatly improve the reliability of service and the protection of health in this area by allowing Safe Drinking Water Act standards to be met. An additional side benefit of these projects will be improved flow of water than can be used for fighting fires, an important asset to support a new fire station being constructed in the area as part of a new fire protection district.

**System O&M:** Two of the projects address system operations and maintenance. The first project involves the purchase and installation of an automated water meter reading system and the retrofit of water meter registers to provide radio transmitted meter readings. The radio read meter system will allow increased efficiency in the meter reading part of the Water District's operations. The data that is accumulated by the meters will also assist the Water District in identifying and eliminating leaks, thereby helping the Water District eliminate lost water.

The second project involves maintenance and rehabilitation of the water storage tanks. The Lamasco tank needs improvements to its interior to mitigate a rust problem that was observed during the last inspection. The Jack Thompson tank also needs coating improvements.



## PROJECTS AND ALTERNATIVES CONSIDERED

### 1. Automated Meter Reading System

**Description:** This project is for the purchase of an automated drive-by meter reading system and the supporting radio transmitting equipment for the water meters. It includes the purchase of computer software, hand held equipment to receive the radio signal from the meters, and the registers to be installed on existing meters to send a radio signal with the meter reading. The only alternatives to drive-by technology are fixed network technology and touch read technology. Touch read technology will not give the increased operational improvement as the meter reader still must leave the vehicle, find the meter, and touch the top of the meter. Fixed network technology is not feasible for a rural area due to the lack of concentration of meters within an area served by a fixed tower. The number of fixed towers necessary and the resulting cost of the towers make this alternative not feasible. Therefore, fixed network technology and touch read technology are not evaluated further in this preliminary engineering report.

**Design Criteria:** The design criteria for the radio read water meters are shown below.

Item 1: 5/8" X 3/4" Radio Read Connection Free Water Meter, U.S. Gallons-Mechanical Register

Item 2: 1" Radio Read Water Meter, U.S. Gallons, 50gpm flow rating, 3-50gpm flow range, 3/8" gpm low flow, 10 3/4" lay length

Item 3: 1-1/2" Radio Read Water Meter, U.S. Gallons, 100gpm flow rate, 5-100gpm normal range, 1 1/2 gpm low flow, 13" lay length

Item 4: 2" Radio Read Water Meter, U.S. Gallons, 160 flow rating, 2-160gpm flow range, 17" lay length

Item 5: Radio Meter Reading System with Receiver and Notebook computer, Vehicle Reading Software, minimum two (2) days of training, minimum one full year-software maintenance agreement, all hardware/wiring for components, and rugged storage case, minimum 2 days training

**Map:** The system will be used for all meters in the Water District system.

**Environmental Impacts:** There are envisioned to be no significant environmental impacts from the use of radio technology to read the water meters.

**Land Requirements:** There will be no additional land required as a result of implementing automated meter reading.

**Construction Problems:** There are envisioned to be no problems in swapping out existing meters, changing registers on existing meters, or installing signal boosters where necessary in meter box lids.



**Cost Estimates:** The estimated costs are:

Item 1: 2,400, 5/8" Meter Registers @ \$170 = \$408,000

Item 2: 6, 1" Radio Read Meters @ \$350 = \$2,100

Item 3: 5, 1 ½" Radio Read Meters @ \$500 = \$2,500

Item 4: 1, 2" Radio Read Meter @ \$600 = \$600.00

Item 5: 1, Radio Meter Read System @ \$20,000 = \$20,000

Item 6: Labor for meter and register installation 2,400 @ \$26 = \$62,400

Total for equipment and installation = \$496,000

**Advantages/Disadvantages:** The implementation of drive by meter reading technology increases the operational efficiency of the Water District's staff. It also will help with the detection of leaks to the advantage of the water system's customers.

## 2. Water Storage Tanks Maintenance and Rehabilitation

**Description:** The water storage tank project involves maintenance and rehabilitation of the water storage tanks. The Lamasco glass lined standpipe needs coating on the interior to mitigate a rust problem that was observed during the last inspection. The last inspection of the Jack Thompson 100,000 gallon elevated tank showed that it also needs interior and exterior coating improvements.

**Design Criteria:** The design criterion for a coating system is the provision of a system that will be corrosion free for a 20 year life.

**Map:** The location of the two water storage tanks is shown on Exhibit A.

**Environmental Impacts:** There are no lead based paints involved and no environmental impacts are envisioned.

**Land Requirements:** No additional land will be required.

**Construction Problems:** The only construction problem envisioned is in improving the coating in the glass lined tank. The rusting areas are along the seams in the tank and removing the rust and replacing the coating will be a somewhat tedious process.

**Cost Estimates:** The cost estimate for the coating improvements to the Lamasco standpipe is \$70,000 and the cost estimate for the Jack Thompson elevated tank is \$30,000.



**Advantages/Disadvantages:** The maintenance of the coating systems on the water storage tanks is necessary to extend the life of the tanks. The only alternative is to let the coating systems fail to the point where the tanks are unusable and replace them.

### 3. KY 903 Loop

**Description:** The KY 903 loop is a project to provide a redundant line under I-24 in the southern part of the Water District's service area. The project also loops a dead end line. There is only one water line that crosses I-24 to serve the entire area south of the interstate highway. If service were lost in this line, a large number of customers would be without water. In addition, the long travel distance of the water under the current flow scheme provides the opportunity for the dissipation of chlorine and the chance of low chlorine residuals and violation of standards under the Safe Drinking Water Act. This project should improve the flow and enhance water quality.

**Design Criteria:** The project includes 3,500 linear feet of 8" PVC water main with a 420 linear feet bore under I-24 with steel encasement and PVC pipe within the encasement. Gasketed joint SDR-21 PVC pipe will be used for the trenching and Certa-Lok (DR14) C900 PVC pipe for the restrained joint PVC bores. All PVC pipe will be pressure class 200 with ductile iron fittings. The water line will be connected to a 6 inch line on the northern end and an 8 inch line on the southern end. The bore under I-24 will be done in accordance with Kentucky Transportation Cabinet design criteria.

**Map:** Map 1 shows the location of the KY 903 Loop project.

**Environmental Impacts:** The water line will be laid in existing road right of way where possible. Where that is not possible it will be laid on private easements in agricultural fields next to the right of way. Therefore, no environmental impacts are envisioned.

**Land Requirements:** The only land required will be the easements where it is not possible to lay the water line in public right of way.

**Construction Problems:** The only construction challenge will be the bore under I-24. The area where the bore will be made is relatively amenable to boring and no significant problems are envisioned.

**Cost Estimates:** The estimated cost for the project is \$493,000. A detailed cost estimate is shown in Table A-1.

**Advantages/Disadvantages:** One alternative considered was to provide the redundant line along Wynn Road instead of KY 903. The Wynn Road loop would have a more difficult bore under I-24 and would result in an existing section of 4 inch water line being a part of the loop. The KY 903 loop had the advantages of easier construction resulting in lower costs. It also would result in a larger water line for the entire length of the loop. A cost estimate for the Wynn Road alternate is shown in Table A-2.



## 4. KY 93 South Loop

**Description:** The KY 93 South Loop project is a major loop across the Eddy Creek embayment with the upsizing of water lines that are part of the loop. This project should greatly improve the reliability of service and the protection of health in the area south of I-24 and east of the Eddy Creek Embayment by allowing a redundant pump station to provide backup in the event of an outage at the Lamasco pump station. It will allow increase the circulation of water in the area and thereby improve water quality. An additional side benefit of this project will be improved flow of water than can be used for fighting fires, an important asset to support a new fire station being constructed in the area as part of a new fire protection district.

**Design Criteria:** The project will include the replacement of approximately 1,000 linear feet of 4 inch pipe with 8 inch PVC pipe and approximately 6,000 linear feet of new 8 inch PVC pipe. Gasketed joint SDR-21 PVC will be used for the trenching and Certa-Lok (DR14) C900 for the restrained joint PVC bores. Fusible C-900 PVC was used for the alternative containing the directional drill under the lake. All PVC pipe will be pressure class 200 with ductile iron fittings. The project also includes approximately 4,100 of 8 inch Class 350 ductile iron pipe in steel encasement in the road embankment crossing the Eddy Creek Embayment. A short section of this pipe will be suspended from the highway bridge crossing the embayment. Construction of the pipe in the vicinity of the embankment and bridge will be in accordance with Kentucky Transportation Cabinet design criteria. A new pump station will be constructed along this new line. The pump station will be designed to be a similar to the Lamasco pump station and will provide a maximum 400 gallons per minute pumping rate like the Lamasco station.

**Map:** Map 2 shows the location of the KY 93 South Loop project.

**Environmental Impacts:** The water line to be constructed will be in highway right of way or adjacent to an existing power line right of way. No significant environmental impacts are envisioned from the construction.

**Land Requirements:** The land required will be the easement adjacent to the power line and land for the pump station. The pump station will be sited on property owned by a County Fire District and being used for construction of the new fire station or on a small private tract.

**Construction Problems:** The construction problems to be overcome include some shallow rock in areas near the Eddy Creek Embayment. Constructing the water line in the road embankment across the Eddy Creek Embayment between the guard rail and the pavement will require good traffic control and possibly construction during off peak recreational periods.

**Cost Estimates:** The estimated cost of this project is \$1,385,000. A detailed cost estimate is shown in Table A-3.

**Advantages/Disadvantages:** An alternative considered for crossing the Eddy Creek Embayment was to do a directional drill under the embayment. This alternative's estimated





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cost was approximately \$175,000 more than placing the water line in the road embankment. In addition, this alternative would have resulted in more permitting and potentially greater environmental impacts. A cost estimate for this alternate is shown in Table A-4.

Another alternative considered was to construct the water line without a pump station. However, the water line alone would not supply enough water during peak demands if the Lamasco pump station were out of service and the Princeton Water Treatment Plant high service pumps were not operating.

### Summary of Project Costs

Table 8 summarizes the estimated costs for the selected alternatives for the four projects described above. The estimated design and construction period is one year. Interest was calculated based on the total amount of the project financed for a 6 month period.

Cost Element	Project				Total
	Automated Meter Reading	Water Storage Tank Maintenance and Rehabilitation	KY 903 Loop	KY 93 South Loop	
Equipment	\$433,200	-	-	-	\$433,200
Construction	62,400	90,000	\$360,000	1,061,100	1,573,500
Engineering- Preliminary	1,000	1,000	4,000	9,000	15,000
Engineering-Design	4,000	4,000	33,400	78,600	120,000
Engineering-Inspection	1,000	5,000	23,100	50,900	80,000
Engineering Other	-	-	22,700	49,300	72,000
Admin/Legal	6,00	1,000	6,000	17,000	30,000
Lands/Rights	-	-	2,000	3,000	5,000
Contingencies	6,200	9,000	36,000	106,100	157,300
Interest*	12,800	2,800	12,200	34,400	62,200
Other	-	-	-	-	-
<b>Total Costs</b>	<b>\$526,600</b>	<b>\$112,800</b>	<b>\$499,400</b>	<b>\$1,409,400</b>	<b>\$2,548,200</b>

\*Interest at 5.0% for 1/2 year

## ANNUAL OPERATING BUDGET

### 1. Income

Table 5 showed the tabulation of monthly usage in 2009 for the various sized meters. Table 9 shows the current rate and the proposed rate schedule. Table 10 shows the 2009 revenue and the projected revenue using the proposed rates based on the 2009 water sales. Table 10 shows the proposed rates will generate approximately \$150,000 in new revenue each year.

<b>Table 9 Current and Proposed Rate Schedule</b>			
<b>5/8"</b>		<b>Current Rate</b>	<b>Proposed Rate</b>
<b>Meter</b>	<b>Tier</b>	<b>(per 1,000 gals)</b>	<b>(per 1,000 gals)</b>
First/Min	2,000	\$9.56	\$10.71
Next	3,000	\$8.05	\$9.02
Next	5,000	\$6.02	\$6.74
Next	10,000	\$3.99	\$5.99
Over	20,000	\$3.49	\$5.24
<b>3/4"</b>		<b>Current Rate</b>	<b>Proposed Rate</b>
<b>Meter</b>	<b>Tier</b>	<b>(per 1,000 gals)</b>	<b>(per 1,000 gals)</b>
First/Min	4,000	\$5.85	\$9.94
Next	1,000	\$5.32	\$8.78
Next	5,000	\$3.92	\$6.86
Next	10,000	\$2.52	\$6.05
Over	20,000	\$2.17	\$5.21
<b>1"</b>		<b>Current Rate</b>	<b>Proposed Rate</b>
<b>Meter</b>	<b>Tier</b>	<b>(per 1,000 gals)</b>	<b>(per 1,000 gals)</b>
First/Min	15,000	\$5.03	\$8.05
Next	5,000	\$3.26	\$6.03
Over	20,000	\$2.86	\$5.29
<b>1 1/2 "</b>		<b>Current Rate</b>	<b>Proposed Rate</b>
<b>Meter</b>	<b>Tier</b>	<b>(per 1,000 gals)</b>	<b>(per 1,000 gals)</b>
25,000	25,000	\$4.24	\$8.27
Over	25,000	\$2.86	\$5.29
<b>2 "</b>		<b>Current Rate</b>	<b>Proposed Rate</b>
<b>Meter</b>	<b>Tier</b>	<b>(per 1,000 gals)</b>	<b>(per 1,000 gals)</b>
First/Min	45,000	\$3.62	\$8.34
Over	45,000	\$2.86	\$5.29



Meter Size	Current Revenue	Proposed Revenue
5/8"	\$ 807,455	\$ 911,788
3/4"	736	1,375
1"	6,674	11,027
1 1/2"	7,811	15,086
2"	32,479	66,399
<b>Total</b>	<b>\$ 855,156</b>	<b>\$ 1,005,675</b>

The wastewater system revenue is estimated to be \$12,000 per year and miscellaneous income is estimated at \$5,000 per year for a total income of \$1,022,675

## 2. Operations and Maintenance (O&M) Costs

Table 11 shows the 2009 actual operations and maintenance expenses, the 2010 budget, and the projection of these expenses for a 5-year period.

Item	2009 Actual	2010 Budget	5 Year Projected
Purchased Water	\$259,841	\$284,000	\$284,000
Taxes and Licenses	9,462	8,000	10,000
Wages	131,734	112,700	129,600
Retirement and Health Benefits	27,582	28,000	36,400
Consulting	63,620	64,500	70,000
Audit and Additional Accounting	8,000	8,000	10,000
Rent, Utilities, and Telephone	24,405	23,500	25,900
Supplies - Sewer	8,945	16,900	18,600
Supplies - Water	17,256	17,500	19,300
Insurance	13,441	14,000	15,400
Line Repairs	78,169	80,500	88,600
Miscellaneous	23,092	28,500	31,400
<b>Total</b>	<b>\$665,547</b>	<b>\$686,100</b>	<b>\$739,200</b>



### 3. Debt Repayment

Table 6 and Table 7 show the current debt of the Water District and the combined principal and interest payments for this debt. The current principal and interest payment on the existing debt from Table 7 is approximately \$165,000 each year. Since there are approximately \$525,000 in short-lived assets (the automated meter system), the proposed RD financing has been broken down into a 15 year component of \$525,000 and a 40 year component of \$2,025,000. The principal and interest on new Rural Development loans for these amounts and terms at 3.5% interest would be approximately \$140,000 each year. Therefore, the combination of existing and proposed debt service would be approximately \$305,000 each year assuming there were no Rural Development grant funds. A \$600,000 Rural Development grant (30% of the \$2,025,000) would reduce the annual debt service payment by approximately \$28,000 each year. A Rural Development grant of \$1,000,000 (50% of the \$2,025,000) would reduce the annual debt service payment by \$47,000 each year. For the entire financing of \$2,550,000, the \$600,000 grant would be a 24% grant and the \$1,000,000 grant would be a 39% grant.

### 4. Reserves

Debt Service Reserve - The debt service reserve payment for the proposed Rural Development loan would be 10 percent of the yearly principal payment or approximately \$6,000 each year.

Short-Lived Asset Reserve - The proposed project contains approximately \$500,000 of short-lived assets. These assets are proposed to be financed with a 15 year loan to match the life of the assets. Therefore, no short-lived asset reserve would be necessary.

### 5. Summary of Annual Operating Budget

Table 12 provides a summary of the proposed annual operating budget for the Water District including the financing for this project at three funding levels; (1) all new funds coming from a Rural Development loan, (2) a combination 76% Rural Development loan and a \$600,000 (24%) grant, and (3) a combination 61% Rural Development loan and a \$1,000,000 (39%) grant.

PROPOSED INCOME		ESTIMATED EXPENSES			
Item	Amount	Item	100% Loan	76% Loan	61% Loan
Water Revenue	\$1,005,700	Operating Expense	\$739,200	\$739,200	\$739,200
Sewer Revenue	12,000	Debt Service	305,000	277,000	258,000
Miscellaneous	5,000	Debt Service Reserve	6,000	6,000	6,000
Total	\$1,022,700	Total	\$1,050,200	\$1,022,200	\$1,003,200



The Water District has proposed a rate adjustment, reflected in Table 12, projected to generate approximately additional revenue of \$150,500 or 18 percent each year. As shown by Table 12, even this large an increase is not sufficient to allow the Water District's projected revenue to exceed the projected 5-year expenses without the receipt of some grant funding. With a \$600,000 grant Table 12 shows that the projected income and expenses are almost the same. This means that the Water District would not be generating any excess funds each year to do other small new growth projects or provide for unanticipated emergencies. In essence, the Water District would not be funding any of their depreciation on their existing assets. Table 12 shows that with a grant of \$1,000,000 the Water District would be able to fund its operational expenses plus a very small amount of its depreciation, but still less than 10 percent.

## **SUMMARY AND CONCLUSIONS**

The Lyon County Water District needs to construct several projects to improve its system to be able to provide reliable service and good water quality to its customers. The projects discussed in this preliminary engineering report are the four top priority projects. The estimated costs for these projects total approximately \$2,550,000.

The Water District has proposed a significant increase in their water rates to fund these projects. The Rural Development funding preferred by the Water District would be a 15 year loan of \$525,000, a 40 year loan of \$1,025,000 and a grant of \$1,000,000. This financing would allow the Water District's to complete these much needed projects and still capture a small portion of its depreciation for at least the first five years of the loan.



## Appendix A Detailed Cost Estimates



# Preliminary Engineering Report

Table A-1 Cost Estimate PROJECT ID 3A: KY 903 Interconnect					
ITEM	DESCRIPTION	UNITS	QTY.	UNIT PRICE	ESTIMATED COST
1	4" PVC Water Main (Trenched)	l.f.	80	\$ 12	\$ 960
2	6" PVC Water Main (Trenched)	l.f.	20	\$ 18	\$ 360
3	8" PVC Water Main (Trenched)	l.f.	3,500	\$ 20	\$ 70,000
4	8" RJ/PVC Water Main (Unencased Bore)	l.f.	40	\$ 45	\$ 1,800
5	8" RJ/PVC Water Main (Within Encasement)	l.f.	420	\$ 18	\$ 7,560
6	16" Steel Encasement (Bore & Jack)	l.f.	420	\$ 450	\$ 189,000
7	4" MJ Ductile Iron Fittings	each	4	\$ 120	\$ 480
8	6" MJ Ductile Iron Fittings	each	2	\$ 150	\$ 300
9	8" MJ Ductile Iron Fittings	each	20	\$ 160	\$ 3,200
10	4" Thrust Restraint Glands	each	8	\$ 110	\$ 880
11	6" Thrust Restraint Glands	each	4	\$ 115	\$ 460
12	8" Thrust Restraint Glands	each	60	\$ 120	\$ 7,200
13	Tie to Existing 4" Water Main	each	1	\$ 500	\$ 500
14	Tie to Existing 6" Water Main	each	1	\$ 1,000	\$ 1,000
15	Tie to Existing 8" Water Main	each	1	\$ 1,000	\$ 1,000
16	Fire Hydrant Assembly	each	5	\$ 3,500	\$ 17,500
17	8" MJ Gate Valve & Box	each	10	\$ 1,600	\$ 16,000
18	Reconnect Existing Water Services	each	9	\$ 300	\$ 2,700
19	Concrete Class "B" Thrust Blocking	c.y.	44	\$ 125	\$ 5,500
20	Compacted DGA Backfill	ton	130	\$ 25	\$ 3,250
21	Asphalt Paving	ton	10	\$ 150	\$ 1,500
22	Landscaping & Seeding	s.y.	6,900	\$ 2	\$ 13,800
23	Traffic Control	l.sum	1	\$ 10,000	\$ 10,000
24	Erosion Control	l.sum	1	\$ 5,000	\$ 5,000
		Subtotal Construction			\$ 360,000
		Preliminary Engineering			\$ 4,000
		Design ( 9.28% )			\$ 33,400
		Inspection ( 6.42% )			\$ 23,100
		Other Engineering			\$ 18,000
		Lands/Rights			\$ 2,000
		Legal Expenses			\$ 4,000
		Interest			\$ 12,000
		Contingencies (10.00%)			\$ 36,000
		<b>Total Cost</b>			<b>\$ 492,500</b>



# Preliminary Engineering Report

Table A-2 Cost Estimate PROJECT ID 3B: Wynn Road Loop					
ITEM	DESCRIPTION	UNITS	QTY.	UNIT PRICE	ESTIMATED COST
1	4" PVC Water Main (Trenched)	l.f.	20	\$ 12	\$ 240
2	8" PVC Water Main (Trenched)	l.f.	4,300	\$ 20	\$ 86,000
3	8" RJ/PVC Water Main (Within Encasement)	l.f.	500	\$ 18	\$ 9,000
4	16" Steel Encasement (Bore & Jack)	l.f.	400	\$ 450	\$ 180,000
5	16" Steel Encasement (Open Cut)	l.f.	100	\$ 175	\$ 17,500
6	4" MJ Ductile Iron Fittings	each	2	\$ 120	\$ 240
7	8" MJ Ductile Iron Fittings	each	15	\$ 160	\$ 2,400
8	4" Thrust Restraint Glands	each	4	\$ 110	\$ 440
9	8" Thrust Restraint Glands	each	50	\$ 120	\$ 6,000
10	8" Field Lok Gaskets	each	41	\$ 150	\$ 6,150
11	Tie to Existing 4" Water Main	each	1	\$ 500	\$ 500
12	Tie to Existing 8" Water Main	each	1	\$ 1,000	\$ 1,000
13	Fire Hydrant Assembly	each	5	\$ 3,500	\$ 17,500
14	8" MJ Gate Valve & Box	each	10	\$ 1,600	\$ 16,000
15	1" Air Release Valve & Vault	each	1	\$ 4,000	\$ 4,000
16	Concrete Class "B" Thrust Blocking	c.y.	34	\$ 125	\$ 4,250
17	Compacted DGA Backfill	ton	240	\$ 25	\$ 6,000
18	Asphalt Paving	ton	20	\$ 150	\$ 3,000
19	Landscaping & Seeding	s.y.	8,300	\$ 2	\$ 16,600
20	Traffic Control - Access to Divided Section of I-24	l.sum	1	\$ 50,000	\$ 50,000
21	Erosion Control	l.sum	1	\$ 15,000	\$ 15,000
		Subtotal Construction			\$ 441,800
		Preliminary Engineering			\$ 4,000
		Design ( 7.56% )			\$ 33,400
		Inspection ( 5.23% )			\$ 23,100
		Other Engineering			\$ 18,000
		Lands/Rights			\$ 2,000
		Legal Expenses			\$ 4,000
		Interest			\$ 12,000
		Contingencies (10.00%)			\$ 44,200
		<b>Total Cost</b>			<b>\$ 582,500</b>





## Preliminary Engineering Report

Table A-3 Cost Estimate					
PROJECT 4: Alternative 1 - KY 93 South Loop, Palisades Drive to Friendship Drive					
ITEM	DESCRIPTION	UNIT	QTY.	UNIT PRICE	ESTIMATED COST
1	4" PVC Water Main (Trenched)	l.f.	300	\$ 17	\$ 5,100
2	6" PVC Water Main (Trenched)	l.f.	50	\$ 23	\$ 1,150
3	6" RJ/PVC Water Main (Within Encasement)	l.f.	60	\$ 16	\$ 960
4	8" Restrained Joint DIP Water Main (Across Barkley Lake)	l.f.	4,100	\$ 45	\$ 184,500
5	8" DIP Water Main (Within Encasement)	l.f.	300	\$ 40	\$ 12,000
6	8" PVC Water Main (Trenched)	l.f.	7,000	\$ 25	\$ 175,000
7	8" RJ/PVC Water Main (Unencased Bore)	l.f.	200	\$ 50	\$ 10,000
8	8" RJ/PVC Water Main (Within Encasement)	l.f.	60	\$ 18	\$ 1,080
9	12" Steel Encasement (Bore & Jack)	l.f.	60	\$ 350	\$ 21,000
10	16" Steel Encasement (Bore & Jack)	l.f.	60	\$ 450	\$ 27,000
11	16" Steel Encasement (Bridge Span Section)	l.f.	300	\$ 275	\$ 82,500
12	4" MJ Ductile Iron Fittings	each	5	\$ 120	\$ 600
13	6" MJ Ductile Iron Fittings	each	5	\$ 150	\$ 750
14	8" MJ Ductile Iron Fittings	each	20	\$ 160	\$ 3,200
15	8" MJ Gate Valve & Box	each	18	\$ 1,600	\$ 28,800
16	4" Thrust Restraint Glands	each	10	\$ 110	\$ 1,100
17	6" Thrust Restraint Glands	each	10	\$ 115	\$ 1,150
18	8" Thrust Restraint Glands	each	76	\$ 120	\$ 9,120
19	8" Field Lok Gaskets	each	20	\$ 150	\$ 3,000
20	Cut & Cap Existing 4" Water Main	each	2	\$ 1,000	\$ 2,000
21	Tie to Existing 4" Water Main	each	2	\$ 500	\$ 1,000
22	Tie to Existing 6" Water Main	each	2	\$ 1,000	\$ 2,000
23	Tie to Existing 8" Water Main	each	1	\$ 1,000	\$ 1,000
24	Fire Hydrant Assembly	each	8	\$ 3,750	\$ 30,000
25	1" Air Release Valve & Vault	each	5	\$ 4,000	\$ 20,000
26	Core Drill Existing Bridge Abutment Wall	each	2	\$ 10,000	\$ 20,000
27	8 mil Polyethylene Wrap (for DIP)	l.f.	4,100	\$ 1.50	\$ 6,150
28	1" Fiberglass Pipe Insulation	l.f.	300	\$ 15	\$ 4,500
29	Cantilever Pipe Supports	each	25	\$ 500	\$ 12,500
30	Concrete Class "B" Thrust Blocking	c.y.	100	\$ 125	\$ 12,500
31	Compacted DGA Backfill	ton	5,300	\$ 25	\$ 132,500
32	Asphalt Paving - Shoulder	ton	400	\$ 150	\$ 60,000
33	Landscaping & Seeding	s.y.	13,475	\$ 2	\$ 26,950
34	Traffic Control	l.sum	1	\$ 50,000	\$ 50,000
35	Erosion Control	l.sum	1	\$ 15,000	\$ 15,000
<b>Pump Station</b>					
1	24'x13.5' Vinyl Sided Building w/	l.sum	1	\$ 20,000	\$ 20,000



## Preliminary Engineering Report

	asphalt shingle roof and 1 double door				
2	24'x13.5' Concrete Slab	l.sum	1	\$ 5,500	\$ 5,500
3	Duplex Grundfos CR90-1 End Suction, Flexibly Coupled Pumps	each	2	\$ 7,500	\$ 15,000
4	Ductile Iron Piping	l.sum	1	\$ 4,500	\$ 4,500
5	Check Valves (3 ea.)	each	3	\$ 2,500	\$ 7,500
6	Butterfly Valves (6 ea.)	each	6	\$ 2,000	\$ 12,000
7	Misc. (expansion & dismantling joints, supports, painting, etc.)	l.sum	1	\$ 5,000	\$ 5,000
8	Compacted DGA Backfill	l.sum	1	\$ 2,000	\$ 2,000
9	Compacted DGA Drive	l.sum	1	\$ 1,000	\$ 1,000
10	Fencing	l.sum	1	\$ 4,500	\$ 4,500
11	Electrical, Instrumentation, and SCADA	l.sum	1	\$ 20,000	\$ 20,000
Subtotal Construction					\$ 1,061,100
Preliminary Engineering					\$ 9,000
Design ( 8.15% )					\$ 78,600
Inspection ( 5.28% )					\$ 50,900
Other Engineering					\$ 39,000
Lands/Rights					\$ 3,000
Legal					\$ 4,000
Interest					\$ 33,800
Contingencies ( 10.00% )					\$ 106,100
<b>Total Cost</b>					<b>\$ 1,385,500</b>



## Preliminary Engineering Report

Table A-4 Cost Estimate					
PROJECT 4: Alternative 2 - KY 93 South Loop, Palisades Drive to Friendship Road					
ITEM	DESCRIPTION	UNIT	QTY.	UNIT PRICE	ESTIMATED COST
1	4" PVC Water Main (Trenched)	l.f.	300	\$ 17	\$ 5,100
2	6" PVC Water Main (Trenched)	l.f.	50	\$ 23	\$ 1,150
3	8" Fusible PVC Water main (Directional Drill)	l.f.	4,200	\$ 120	\$ 504,000
4	8" PVC Water Main (Trenched)	l.f.	8,900	\$ 25	\$ 222,500
5	8" RJ/PVC Water Main (Unencased Bore)	l.f.	200	\$ 50	\$ 10,000
6	8" RJ/PVC Water Main (Within Encasement)	l.f.	180	\$ 18	\$ 3,240
7	16" Steel Encasement (Bore & Jack)	l.f.	180	\$ 450	\$ 81,000
8	4" MJ Ductile Iron Fittings	each	5	\$ 120	\$ 600
9	6" MJ Ductile Iron Fittings	each	5	\$ 150	\$ 750
10	8" MJ Ductile Iron Fittings	each	20	\$ 160	\$ 3,200
11	8" MJ Gate Valve & Box	each	18	\$ 1,600	\$ 28,800
12	4" Thrust Restraint Glands	each	10	\$ 110	\$ 1,100
13	6" Thrust Restraint Glands	each	10	\$ 115	\$ 1,150
14	8" Thrust Restraint Glands	each	76	\$ 120	\$ 9,120
15	Cut & Cap Existing 4" Water Main	each	2	\$ 1,000	\$ 2,000
16	Tie to Existing 4" Water Main	each	2	\$ 500	\$ 1,000
17	Tie to Existing 6" Water Main	each	2	\$ 1,000	\$ 2,000
18	Tie to Existing 8" Water Main	each	1	\$ 1,000	\$ 1,000
19	Fire Hydrant Assembly	each	8	\$ 3,750	\$ 30,000
20	1" Air Release Valve & Vault	each	5	\$ 4,000	\$ 20,000
21	Concrete Class "B" Thrust blocking	c.y.	100	\$ 125	\$ 12,500
22	Compacted DGA Backfill	ton	3,100	\$ 25	\$ 77,500
23	Asphalt Paving - Eddy Creek Marina Road	ton	200	\$ 150	\$ 30,000
24	Landscaping & Seeding	s.y.	13,200	\$ 2	\$ 26,400
25	Traffic Control	l.sum	1	\$ 50,000	\$ 30,000
26	Erosion Control	l.sum	1	\$ 15,000	\$ 15,000
<b>Pump Station</b>					
1	24'x13.5' Vinyl Sided Building w/ asphalt shingle roof and 1 double door	l.sum	1	\$ 20,000	\$ 20,000
2	24'x13.5' Concrete Slab	l.sum	1	\$ 5,500	\$ 5,500
3	Duplex Grundfos CR90-1 End Suction, Flexibly Coupled Pumps	each	2	\$ 7,500	\$ 15,000
4	Ductile Iron Piping	l.sum	1	\$ 4,500	\$ 4,500
5	Check Valves (3 ea.)	each	3	\$ 2,500	\$ 7,500
6	Butterfly Valves (6 ea.)	each	6	\$ 2,000	\$ 12,000



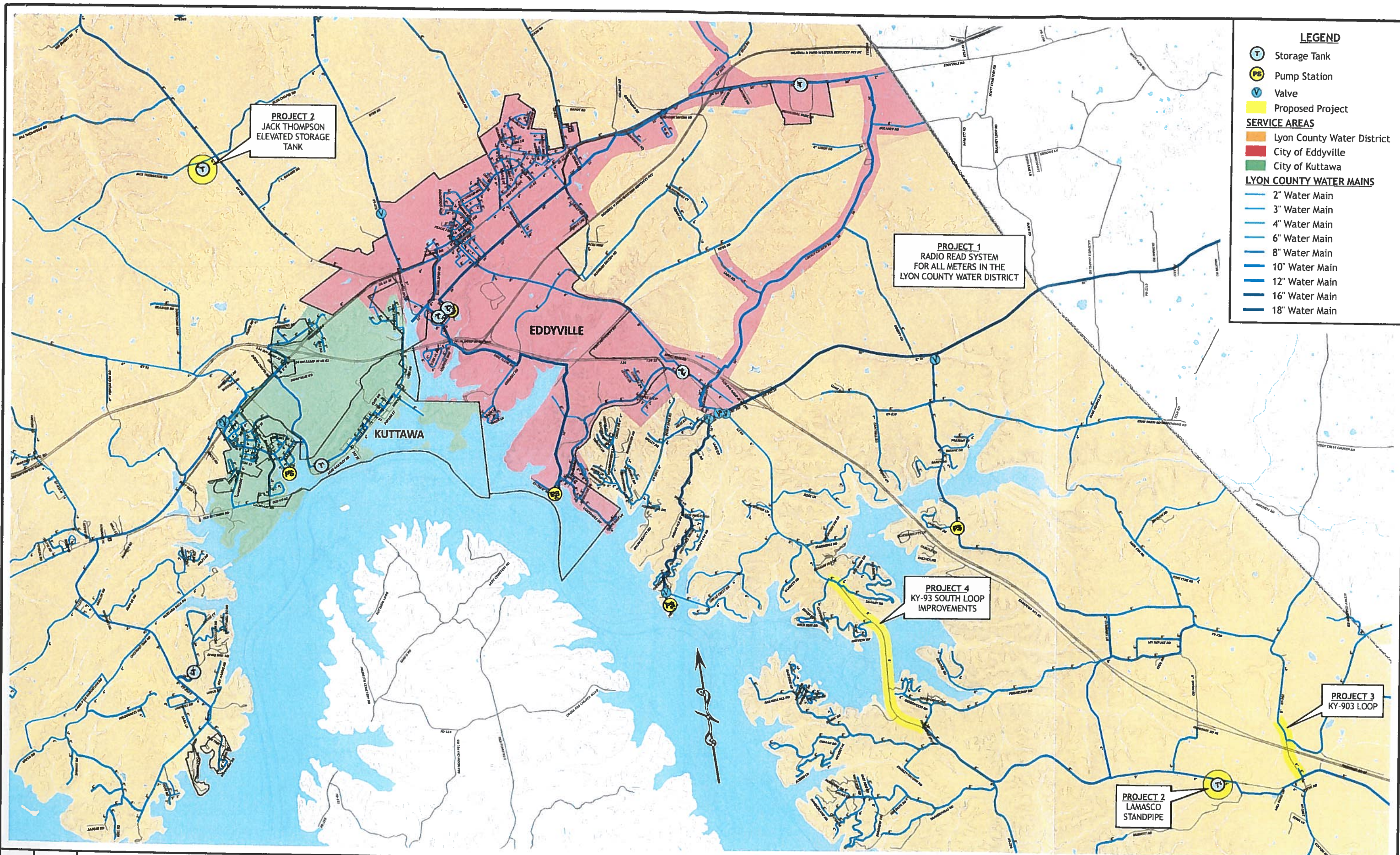
## Preliminary Engineering Report

7	Misc. (expansion & dismantling joints, supports, painting, etc.)	l.sum	1	\$ 5,000	\$ 5,000
8	Compacted DGA Backfill	l.sum	1	\$ 2,000	\$ 2,000
9	Compacted DGA Drive	l.sum	1	\$ 1,000	\$ 1,000
10	Fencing	l.sum	1	\$ 4,500	\$ 4,500
11	Electrical, Instrumentation, and SCADA	l.sum	1	\$ 20,000	\$ 20,000
		Subtotal Construction			\$ 1,216,100
		Preliminary Engineering			\$ 9,000
		Design ( 7.02% )			\$ 78,600
		Inspection ( 4.55% )			\$ 50,900
		Other Engineering			\$ 39,000
		Lands/Rights			\$ 3,000
		Legal			\$ 4,000
		Interest			\$ 38,100
		Contingencies ( 10.00% )			\$ 121,600
		<b>Total Cost</b>			<b>\$ 1,560,300</b>



## Appendix B

### Maps



**LEGEND**

- T Storage Tank
- PS Pump Station
- V Valve
- Proposed Project

**SERVICE AREAS**

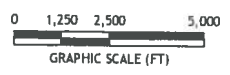
- Lyon County Water District
- City of Eddyville
- City of Kuttawa

**LYON COUNTY WATER MAINS**

- 2" Water Main
- 3" Water Main
- 4" Water Main
- 6" Water Main
- 8" Water Main
- 10" Water Main
- 12" Water Main
- 16" Water Main
- 18" Water Main

ISSUE	DATE	DESCRIPTION

FBH JOB NO.:	10115
DESIGNED BY:	MWR
DRAWN BY:	MWR
CHECKED BY:	MWR

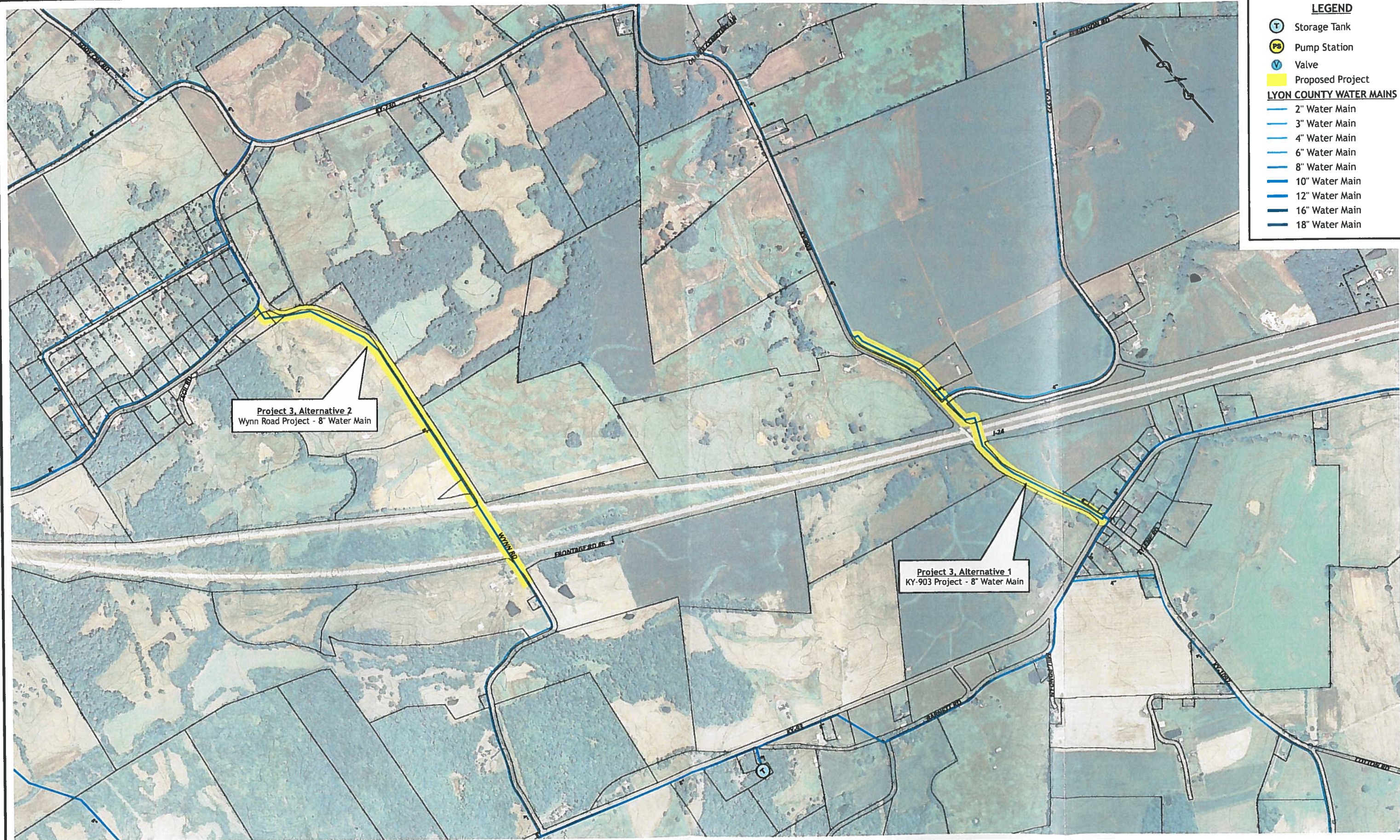


**LYON COUNTY WATER DISTRICT**



2550 IRVIN COBB DRIVE  
PADUCAH, KY 42003  
(270) 444-9691

PROJECT:	PRELIMINARY ENGINEERING REPORT	MAP NO.:	1
TITLE:	PROJECT LOCATIONS		



**LEGEND**

- Storage Tank
- Pump Station
- Valve
- Proposed Project

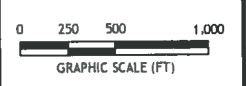
**LYON COUNTY WATER MAINS**

- 2" Water Main
- 3" Water Main
- 4" Water Main
- 6" Water Main
- 8" Water Main
- 10" Water Main
- 12" Water Main
- 16" Water Main
- 18" Water Main

**Project 3, Alternative 2**  
Wynn Road Project - 8" Water Main

**Project 3, Alternative 1**  
KY-903 Project - 8" Water Main

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DESIGNED BY:	MWR
DRAWN BY:	MWR
CHECKED BY:	MWR

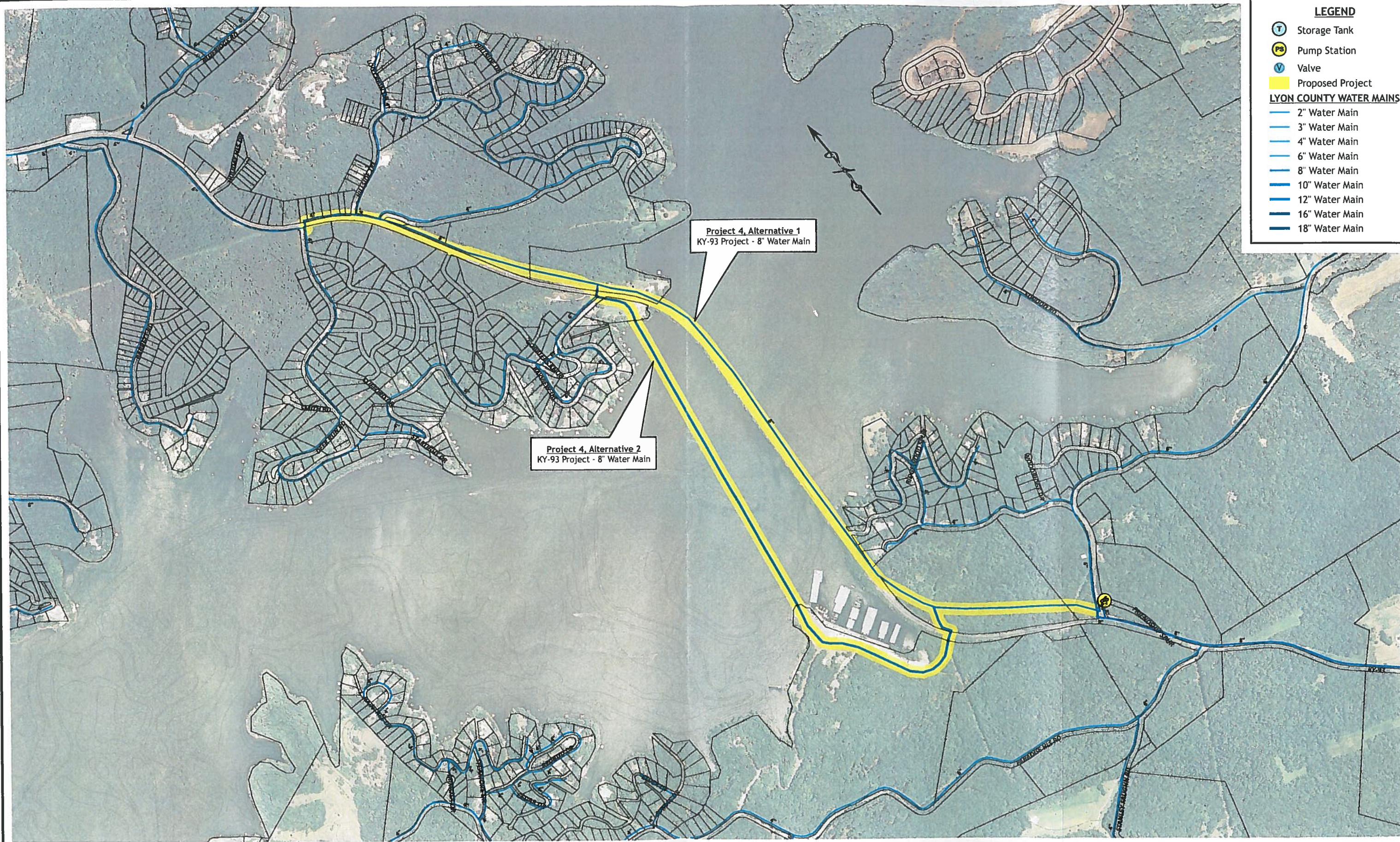


**LYON COUNTY WATER DISTRICT**

**Florence & Hutcheson**  
CONSULTING ENGINEERS

2550 IRVIN COBB DRIVE  
PADUCAH, KY 42003  
(270) 444-9691

PROJECT:	PRELIMINARY ENGINEERING REPORT	MAP NO.:	2
TITLE:	PROJECT 3		



**LEGEND**

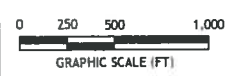
- Storage Tank
- Pump Station
- Valve
- Proposed Project

**LYON COUNTY WATER MAINS**

- 2" Water Main
- 3" Water Main
- 4" Water Main
- 6" Water Main
- 8" Water Main
- 10" Water Main
- 12" Water Main
- 16" Water Main
- 18" Water Main

ISSUE	DATE	DESCRIPTION

FBH JOB NO.: 10115  
 DESIGNED BY: MWR  
 DRAWN BY: MWR  
 CHECKED BY: MWR



**LYON COUNTY WATER DISTRICT**

**Florence & Hutcheson**  
 CONSULTING ENGINEERS  
 2550 IRVIN COBB DRIVE  
 PADUCAH, KY 42003  
 (270) 444-7691

PROJECT: PRELIMINARY ENGINEERING REPORT  
 TITLE: PROJECT 4



2015-376

CONTAINS

LARGE OR OVERSIZED

MAPS

RECEIVED ON:

Dec. 10<sup>th</sup>, 2015