

FINAL ENGINEERING REPORT

FOR

HYDEN-LESLIE COUNTY WATER DISTRICT

WATER TREATMENT PLANT AND DISTRIBUTION

SYSTEM IMPROVEMENTS



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October 1, 2009

10/8/09

RECEIVED

SEP 28 2010

PUBLIC SERVICE
COMMISSION

Revised 10/8/2009



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Final Engineering Report
Phase II
Water System Improvements
Hyden – Leslie County Water District
Executive Summary

FINDINGS

The Hyden – Leslie County Water District currently has an existing conventional water treatment plant rated at 1 MGD. The original construction was in approximately 1966 and was expanded in 1992 and 2000. The District is currently operating at approximately 860,000 gallons per day or approximately 86% capacity. The District needs to expand its distribution system to include the service of approximately 600 new customers over the next 5 to 10 years. Due to the existing location and type of construction, the WTP would be very difficult to expand. Therefore, we have decided to construct a new plant near the existing site.

The proposed project will consist of constructing a 2.8 MGD water treatment plant. The proposed plant will utilize Actiflo treatment process with contact tanks and gravity filters. The system will consist of two – 1.4 MGD trains. This will enable the plant to operate and retain redundancy since the total distribution system demand will be approximately 1 MGD at the time of startup.

The proposed clearwell will be 15 % of the design capacity or $2.8 \text{ MGD} \times 15\% = 450,000$ gallons.

We will utilize an existing above ground clearwell with an approximate 120,000 gallon capacity. This clearwell was constructed and put into service in 2000. Therefore, the proposed clearwell will be approximately 330,000 gallon capacity.

The proposed filters will be gravity filters and have a preliminary designed flow rate of 4 gpm/ft².

The proposed filters will contain dual media and will be designed to meet all regulatory requirements.

The proposed water treatment plant will include two gravity fed filter to waste drying beds.

The proposed water treatment plant raw water source will continue to be the Middlefork of the Kentucky River. Its existing intake structure will be upgraded to meet the new WTP usage.

The Hyden – Leslie County Water District currently has approximately 2500 residential customers and 286 commercial customers. The average residential and commercial usage is approximately 4280 gallons per month and 6950 gallons per month respectively. The District anticipates serving approximately 3100 residential customers and 286 commercial customers by 2006. Therefore, the anticipated usage will be approximately 450,000 gallons per day plus 67,000 gpd for the commercial customers. In addition, we will add 10 % (51,700 gallons) system loss and an additional 10 % (85,000 gallons) for WTP process loss. In addition the WTP will produce approximately 700,000 gallons per day for distribution system storage. Therefore, the total anticipated usage will be approximately 1,400,000 gallons per day. Therefore, with redundancy the proposed WTP will be 2.8 MGD.

Recommendations

Based on studies, findings and conclusions and in accordance with other pertinent information contained in this report, it is recommended that the Hyden – Leslie County Water District take the following steps:

- A) Review this report, then direct the Engineer, upon notification of RD to immediately complete necessary documentation to RD for further processing for Loan and Grant funds to construct the extensions and improvements outlined in this Report.
- B) Begin the process of tying down and collecting all other tap fees and funds to complete the project funding.
- C) Direct the Engineer to complete all necessary plans, specifications and contract documents to receive approvals and permission to advertise this project for bids.
- D) Upon completion of the above and receipt of approvals, initiate actions to acquire required permits, fee simple titles and right of way easements for construction areas.
- E) Upon favorable review of RD, CDBG and ARC make necessary petitions and applications, through local and bond counsel, to the Kentucky Public Service Commission for a Certificate of Need and Necessity.

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Hyden – Leslie County Water District
Section 1 – General

I. INTRODUCTION

A. Purpose

The purpose of this report is to investigate and present the feasibility of expanding the Hyden-Leslie County Water Treatment Plant from its current capacity of 1 MGD to 2.8 MGD. The current water treatment plant daily usage is over 80%. Per Kentucky Division of Water Standards, the HLCWD must expand its WTP. In addition, the HLCWD has future distribution expansions that contain the potential of an additional 800 customers. The proposed water treatment plant expansion will contain the ACTIFLO treatment process.

B. Project Area

The proposed project will include the water treatment plant expansion from its current 1 MGD to 2.8 MGD, 1 MGD water storage tank and new transmission line to the distribution system and the water storage tank.

The proposed WTP, water storage tank and transmission main will be located adjacent to existing facilities located at 325 Wendover Road approximately 1 mile south of Hyden, Kentucky.

A. Population Trends

Table 1 shows the population data from the last several decades, along with projected population to the year 2030.

TABLE 1
POPULATION DATA

<u>YEAR</u>	<u>LESLIE CO. POPULATION</u>
1990	13,642
2000	12,401
2010	11,736
2020	11,235
2030	10,735

Source: US Census of Population Urban Studies Center, University of Louisville

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Section 2 – Planning Areas

Leslie County is located in Southeastern Kentucky, bordered to the north and east by Perry County. Clay County to the west, Bell and Harlan County to the south.

Leslie County is separated by US 421 which follows a North – to South direction across the county and Kentucky 80 follows an East – to West direction.

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Section 3 – Existing Facilities

II. EXISTING WATER FACILITIES

The existing water treatment plant (WTP) has a design capacity of 1,000,000 gpd. The WTP is currently operating an average of 20 hours/day at 85% capacity. Therefore, the WTP must be upgraded to be in compliance with Division of Water regulations.

EXISTING CONDITIONS

The Hyden/Leslie County Water District treatment plant withdraws water from the Middle Fork of the Kentucky River (this being the sole source of raw water for this system.) Modifications to the raw water intake are proposed in the project to address the accumulation of sediment. The plant was constructed in 1968 with a plant upgrade in 1990 raising the total plant capacity to 0.792 MGD the WTP was expanded to 1 MGD in 2000.

Water loss figures are fairly high at approximately 35%, largely due to the extensive amounts of asbestos cement (AC) water line in the system coupled with high system pressure in some areas.

The average daily production by the Hyden/Leslie County plant is 0.850 MGD, and the average monthly peak demand is 0.950 MGD. The peak demand period usually occurs during the winter months, December through February, according to the plant operator. The total number of customers is 2,600 with approximately 15% of these classified as commercial. The average residential customer demand is 430 gallons per meter per day. The system also serves five (5) large volume water user industries which range from 1,700 to 9,200 gallons per meter per day. The system manager reports that approximately 35% of the commercial services are serving multi-family dwellings, which he estimates at being equivalent to 25 residential services each. The average peak customer demand is approximately 375 gallons per meter per day.

After completion of this project the plant is expected to have a design capacity of 2.8 MGD with an operation capacity of 1.2 MGD and a peak capacity of 1.50 MGD.

The distribution system is evaluated as being in “good” condition by the system manager.

The total storage capacity of the distribution system is 1,084,000 gallons in nine (9) tanks and the total length of lines serving this system is estimated to be 100 miles, serving approximately 2600 residential and commercial customers.

The management system for the Water District is a Board of Commissioners who directs the activities of a system manager and various administrative and support personnel.

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Water System Improvements

Hyden – Leslie County Water District

Section 4 – Need for Project

NEED FOR THE PROJECT

The citizens of Leslie/Clay Counties not currently on a public water system rely on wells and springs that are severely contaminated with coliform organisms and confluent growth. The amount of mining and blasting in the project area combined with malfunctioning septic systems makes any drilled water supply unsafe to drink without proper treatment. Residents complained at the public hearing at Hayes Lewis Elementary of orange water color, smelly water and water that colors hair or laundry orange. Few residents complained about the taste because almost all residents present stated that they purchased the water they drink and cook with.

Other complained of sickness and related health problems as a result of the unsafe water. But without question, the most repeated complaint was no usable water at all. In some cases as many as 4 or 5 wells have been drilled with the same result, no usable water.

Residents of Leslie/Clay County are heavily dependent on the coal industry for the livelihood. A large portion of the citizens who are currently employed are working for coal companies.

Several citizens even obtain all their water from coal banks running off a hill –hauled in garbage cans no less. However, with the downturn within this industry, the unemployment rates continues to rise. While Counties in this area become poverty stricken, a basic need of safe, potable water continues to be a major issue that needs addressing. The coal industry opportunities have dwindled, but the industry leaves behind chemical contamination from coal mining and oil and gas recovery and processing operations which are this area's major contributors to the groundwater contamination. Only the employed residents can afford purchasing and installing filtering systems that many say does not work anyway. To most, quality of water is the major problem, but to many it's the quantity.

Still, the coal industry contributes to this problem as well. Mining blasts, new development of mines, etc., may sink or alter the water table, causing wells to go dry. For some part, the coal industry has acknowledged its responsibility. Several citizens are using wells which the coal companies have developed for them. But quality and quantity remain an issue for these citizens evidenced by the comments received from the 100+ citizens attending the public hearing.

Design Criteria and Approvals

All water treatment plant facilities will be designed in accordance with Kentucky Natural Resources and Environmental Protection Cabinet, Division of Water, Rural Development, and Kentucky Public Service Commission guidelines.

Design drawings will be submitted for approval to the Division of Water and Rural Development. The Preliminary and Final engineering reports will be filed with the application for a Certificate of Convenience and Necessity form the Kentucky Public Service Commission.

Land and Rights – of – Way

For all lines constructed on private rights – of – way, a construction and permanent easements will be obtained form the property owner prior to constructing the lines. For lines to be constructed on Kentucky State or county highways, all necessary encroachment permits will be obtained before proceeding with waterline construction.

It is anticipated that there will be a requirement for fee simple land acquisition of the water storage tank.

This tank will be fed by the high service pumps located at the new water treatment plant.

Source of Water Supply

The source of water supply to the District will be the new 3.0 mgd water treatment plant located across the county road from its current WTP. The raw water source will continue to be the Middlefork of the Kentucky River.

Total Water Storage

The District upon completion of the Phase II project will have 2,084,000 gallons of storage to serve approximately 2500 residential customers and 286 commercial customers.

The RD, Division of Water and PSC require one (1) day storage based on average daily consumption. The average daily consumption in the Hyden – Leslie County Water District is 150 gallons per day per customer. Therefore, the existing required storage of $(2500 \times 150 \text{ GPD} + 286 \times 8500 \text{ GPD}) = 618,100$ is far exceeded and gives the existing system 3.3 days of storage.

The Hyden/Leslie County Water District proposes the construction of the following: 2.8 MGD water treatment plant with 420,000 clearwell, 1 MGD water storage tank, 16” transmission line and all necessary appurtenances to treat potable water.

Water Demand

The Hyden – Leslie County Water District currently has approximately 2500 residential customers and 286 commercial customers. The average residential and commercial usage is approximately 4500 gallons per month and 8500 gallons per month respectively. The District anticipates serving approximately 3100 residential customers and 286 commercial customers by 2006. Therefore, the anticipated usage will be approximately 450,000 gallons per day plus 67,000 gpd for the commercial customers. In addition, we will add 10 % (51,700 gallons) system loss and an additional 10 % (85,000 gallons) for WTP process loss. In addition the WTP will produce approximately 700,000

gallons per day for distribution system storage. Therefore, the total anticipated usage will be approximately 1,400,000 gallons per day. Therefore, with redundancy the proposed WTP will be 3.0 MGD.

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Section – 5 Proposals Considered

In conjunction with the State and Federal Government's goal of water to all (feasible) **rural** residences, the District has to build a new water treatment plant to supply potable water service its existing customers and proposed water line extensions in the future.

The project will provide the Water District with a new 3.0 MGD water treatment plant, and a 1 million gallon water storage tank with approximately 1 mile of 16" transmission main. Due to the age, location and condition of the existing WTP, the District will not be able to expand the existing WTP.

Construction Problems

The proposed project as presented in Phase II does not anticipate any significant construction problems. All necessary water treatment plant equipment will be constructed above the 100 year – flood plain. The transmission main will cross the Middlefork of the Kentucky River. This crossing is not anticipated to be of a magnitude that will degrade the environment and the construction specifications will require sedimentation control. No significant problems are anticipated to occur on the project involving construction or operational problems. The Phase II project requires only minimal interruption of service to existing customers, therefore, will require minimal existing water user shutdowns in the related areas.

Hydraulic Computations

A simple hydraulic check has been made to assure that the areas of service and preliminary line size can be determined. At the time of final design, a detailed computerized hydraulic analysis will be made.

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Section – 6 Conclusions and Recommendations

Based on studies, findings and conclusions and in accordance with other pertinent information contained in this report, it is recommended that the Hyden – Leslie County Water District take the following steps:

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VII. PROJECT COSTS

2004 WATER TREATMENT PLANT EXPANSION PROJECT

Item	Description	Cost
1	Contract No. 4 – Water Transmission Main	\$ 367,000
	Contract No. 5 – 1 MGD Water Tank	\$ 773,307
	Contract No. 6 – Water Treatment Plant	\$ 7,686,000
2	Acquisition	\$ 10,000
3	Preliminary Engineering	\$ 15,000
3	Engineering Design	\$ 525,700
4	Engineering Inspection	\$ 304,200
5	Additional Engineering Services	\$ 60,500
	a. Permits	
	b. PSC Assistance	
	c. Site Surveys	
	d. Easement Assistance	
6	RD Legal and RD Administration	\$ 25,000
7	Interest during Construction	\$ 25,000
8	CDBG Administrative	\$ 45,000
9	Coal severance grant administrative	\$ 10,000
10	Contingencies	\$ 445,193
Total Project Cost		\$ 10,291,000

VIII. FINANCING

PROPOSED PROJECT FUNDING

HYDEN – LESLIE COUNTY WATER DISTRICT
2004 WATER TREATMENT PLANT EXPANSION PROJECT

RD Grant	\$ 694,000
Additional RD Grant	\$ 1,000,000
RD Loan	\$ 1,000,000
Additional RD Loan	\$ 1,479,000
Coal Severance Grant	\$ 1,000,000
Coal Severance Grant	\$ 600,000
Coal Severance Grant	\$ 1,000,000
Coal Severance Grant	\$ 750,000
Additional ARC Grant	\$ 200,000
ARC Grant	\$ 600,000
CDBG Grant	\$ 1,000,000
Local Funds	\$ <u>967,600</u>
Total Project Cost	\$10,291,000

PHASE II

HYDEN – LESLIE COUNTY WATER DISTRICT

WATER SYSTEM IMPROVEMENTS AND WATER TREATMENT

EXPANSION

SME: 03001

EXISTING RESIDENTIAL RATE SCHEDULE

GALLONAGE BLOCKS FOR EACH MONTHLY RATE FOR EACH
GALLONAGE
METER SIZE BLOCK

5/8 X 3/4 inch Meter

First	2,000 gallons	\$ 17.30 (Minimum Bill)
Next	3,000 gallons	\$ 4.80 per 1,000 gallons
Next	5,000 gallons	\$ 3.80 per 1,000 gallons
Next	15,000 gallons	\$ 3.10 per 1,000 gallons
Next	25,000 gallons	\$ 2.70 per 1,000 gallons
Next	50,000 gallons	\$ 2.30 per 1,000 gallons
Next	100,000 gallons	\$ 1.90 per 1,000 gallons
Over	200,000 gallons	\$ 1.50 per 1,000 gallons

EXISTING COMMERCIAL RATE SCHEDULE

GALLONAGE BLOCKS FOR EACH MONTHLY RATE FOR EACH
GALLONAGE
METER SIZE BLOCK

5/8 X 3/4 inch Meter

First	2,000 gallons	\$ 25.90 (Minimum Bill)
Next	3,000 gallons	\$ 7.20 per 1,000 gallons
Next	5,000 gallons	\$ 5.70 per 1,000 gallons
Next	15,000 gallons	\$ 4.70 per 1,000 gallons
Next	25,000 gallons	\$ 4.10 per 1,000 gallons
Next	50,000 gallons	\$ 3.50 per 1,000 gallons
Next	100,000 gallons	\$ 2.90 per 1,000 gallons
Over	200,000 gallons	\$ 2.30 per 1,000 gallons

EXISTING RATE SCHEDULE

HYDEN – LESLIE COUNTY WATER DISTRICT

(Continued)

CONNECTION FEES BY PSC TARIFF

<u>Meter Size</u>	<u>Service Connection Charge</u>
5/8 inch x 3/4 inch	\$ 300.00
3/4 inch	\$ 600.00
1 inch	\$ 850.00
2 inch	\$ 1,200.00
3 inch	\$ 1,800.00

PROPOSED RESIDENTIAL RATE SCHEDULE

GALLONAGE BLOCKS FOR EACH MONTHLY RATE FOR EACH
GALLONAGE
METER SIZE BLOCK

5/8 X 3/4 inch Meter

First	2,000 gallons	\$ 20.24 (Minimum Bill)
Next	3,000 gallons	\$ 5.62 per 1,000 gallons
Next	5,000 gallons	\$ 4.45 per 1,000 gallons
Next	15,000 gallons	\$ 3.63 per 1,000 gallons
Next	25,000 gallons	\$ 3.16 per 1,000 gallons
All Over	50,000 gallons	\$ 2.69 per 1,000 gallons

PROPOSED COMMERCIAL RATE SCHEDULE

GALLONAGE BLOCKS FOR EACH MONTHLY RATE FOR EACH
GALLONAGE
METER SIZE BLOCK

5/8 X 3/4 inch Meter

First	2,000 gallons	\$ 30.36 (Minimum Bill)
Next	3,000 gallons	\$ 8.43 per 1,000 gallons
Next	5,000 gallons	\$ 6.68 per 1,000 gallons
Next	15,000 gallons	\$ 5.45 per 1,000 gallons
Next	25,000 gallons	\$ 4.74 per 1,000 gallons
All Over	50,000 gallons	\$ 4.04 per 1,000 gallons

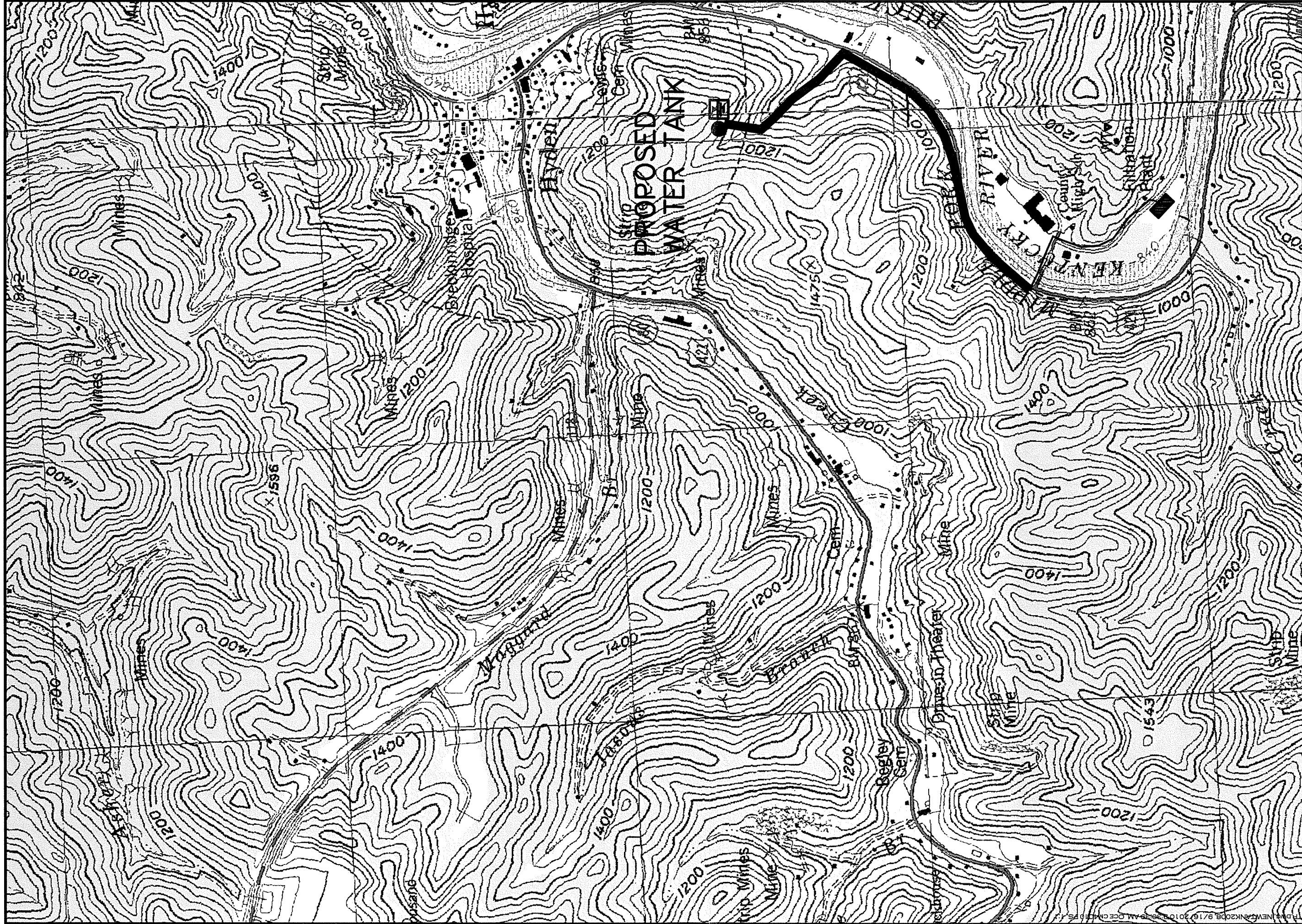
PROPOSED RATE SCHEDULE

HYDEN – LESLIE COUNTY WATER DISTRICT

(Continued)

CONNECTION FEES BY PSC TARIFF

<u>Meter Size</u>	<u>Service Connection Charge</u>
5/8 inch x 3/4 inch	\$ 520.00
3/4 inch	\$ 600.00
1 inch	\$ 850.00
2 inch	\$ 1,200.00
3 inch	\$ 1,800.00



SCALE: 1"=1000'

DATE: 10/07

DRAWN BY: DM

CHECKED BY: M.K.M.

APPROVED BY: J.F.S.

**HYDEN - LESLIE COUNTY WATER DISTRICT
 WATER TREATMENT PLANT EXPANSION
 LESLIE COUNTY, KENTUCKY**



SISLER-MAGGARD ENGINEERING, PLLC
 Engineering - Surveying
 Lexington, Kentucky 40515

PROJECT NO: 03001

DWG NO: 1 OF 1