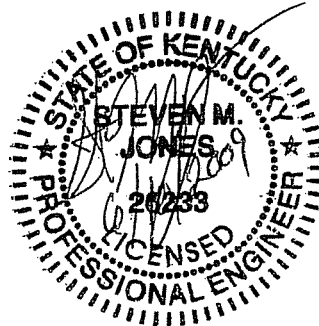


**PRELIMINARY ENGINEERING REPORT
FOR
GREEN RIVER VALLEY WATER DISTRICT**

**ADDITIONS AND MODIFICATIONS
TO
WATER TRANSMISSION AND STORAGE FACILITIES
PROJECTS FUNDED BY THE
FEDERAL SPECIAL APPROPRIATION GRANT PROJECT**



NOVEMBER - 2008

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I INTRODUCTION

A. Background Information

In 1959, provisions of Chapter 74 of the Kentucky Revised Statutes allowed officials to organize the Green River Valley Water District (GRVWD). As originally organized, the service area of the GRVWD included portions of Hart County. In 1960, the County Court of Barren County granted GRVWD permission to annex areas of Barren County. Areas of Green County, Larue County, and Metcalfe County were later included in GRVWD's service area. Enclosed in the appendix of this Report is **Map No. 1**, which indicates the present service area or boundaries of the GRVWD.

KRS 74.120 (2) allows GRVWD to contract water services to other water districts and municipalities. Under this provision of law, GRVWD provides water services to the municipalities of Munfordville and Bonnieville. While these entities purchase wholesale water from the GRVWD, they operate their own water systems.

The municipalities of Cave City and Horse Cave also purchase wholesale water from GRVWD. Until recently, these municipalities also contracted with GRVWD to operate their water systems. After the recent purchase by Caveland Environmental Authority, Inc. (CEA) of the Cave City Water System, CEA operates the Cave City water system, but CEA continues, as contracted, to purchase wholesale water from GRVWD.

Other smaller municipal entities within the service area of GRVWD do not own or operate a water system and, therefore, are within the service area of the GRVWD. These other smaller municipal entities and remaining rural areas of GRVWD's service area depend on GRVWD for water service. In addition to serving the water needs within GRVWD's boundaries, GRVWD also sells water to Larue County Water District, Green - Taylor Water District and Caveland Environmental Authority, Inc.

GRVWD operates under regulations of the Kentucky Public Service Commission (PSC). Management responsibilities rests with the Board of GRVWD, which consists of five (5) commissioners; three (3) from Hart County appointed by the Hart County Judge Executive and two (2) from Barren County appointed by the Barren County Judge Executive.

The catalyst for the formation of the GRVWD was recurring shortages and poor water quality afforded by wells used for both public and private water sources. For the most part, the geology within the GRVWD service area is Karst having numerous sinkholes. Ground water usually consists of underground streams, which use caverns and fissures for flow paths. The source of this ground water is primarily surface water entering underground caverns through opening in sinkholes; thus subjecting these ground water sources to pollutant from various sources. Because of this geology setting, ground water supplies from wells in the GRVWD service area are generally unreliable sources of drinking water.

Because of this topography situation, the primary source of water for the GRVWD water system is the Green River and the Rio Verde Spring. To allow the utilization of these water sources, GRVWD constructed a water treatment facility adjacent to the Green River near the Rio Verde Spring. To distribute this treated water to the GRVWD water system required the construction of a system of water transmission mains and storage facilities. Since the inception of the GRVWD, numerous upgrades and expansions of the treatment facilities and water transmission system have occurred.

Recently, GRVWD completed an expansion of the water treatment facilities. Application for funding for that expansion required an engineering report to examine the short and long-term needs for water treatment facilities including associated transmission and storage facilities. In addition to the expansion of the water treatment facilities, findings of that report determined that an additional upgrade to the water transmission facilities would be required; the timing would be dependent on the growth in water demands.

In addition to these upgrades of existing facilities, there is existing population within the GRVWD's service area that does not have availability to potable water. Because of the previously described Karst topography, such extensions are necessary to provide safe water for public use while maintaining economic stability of GRVWD's service area.

Utilizing federal and state grants whenever available as well as GRVWD funds, either cash reserves or borrowed funds, GRVWD has an active and ongoing construction program to extend water mains to areas without potable water. The Board of GRVWD considers such extensions of potable water as an essential responsibility of GRVWD, limited only by the financial feasibility of such endeavors.

B. Purpose of the Report

A review of the water demands in the Horse Cave and Cave City areas finds that recent increases in peak flows have exceeded the nominal capacity of existing water transmission mains that supply water to these areas. These increases in water demands results from growth in population combined with growth in industrial and commercial water consumptions.

As described later in this Report, there is a need to implement upgrades of transmission mains and water storage facilities. As discussed later, the estimate of probable project cost for an upgrade in water transmission mains and the construction of new water storage facilities is about \$5.4 million. The responsibility of \$3.0 million of this \$5.4 million rests with Horse Cave and CEA. In addition, GRVWD will receive \$0.5 million grant from the Kentucky Infrastructure Authority (KIA) funding assistance in the construction the water storage tank.

For this upgrade of the water transmission mains and water storage facilities, GRVWD requires about \$1.9 million to complete the estimated funding package for this upgrade project. This \$1.9 million will require an increase in revenues to fund this additional bond indebtedness.

In addition to the needed upgrade of water transmission mains and water storage facilities, GRVWD recently received a federal SPAP (Special Appropriation Act Project) matching grant of \$1,000,000 (\$956,000 after deducting state and federal administrative costs) for funding water additions and improvements to GRVWD water system. Qualification for this grant requires, at a minimum, a 45 percent match of the eligible project cost. Therefore, for the \$956,000 SPAP grant, the minimum project cost must be \$1,738,182; thus, a minimum of \$782,182 must be from local funds.

In consideration of the above, the purpose of this Report is to detail the size, capacity, and configuration of water facilities recommended and to summarize the estimate of projects costs for implementing the construction of these facilities. Upon approval of the findings and recommendations of this Report, this Report will accompany documents for justification of needed water rate adjustments. This Report will also accompany the submittal of construction plans and specifications for approval from the Kentucky Division of Water.

II. EVALUATION OF EXISTING WATER DEMANDS

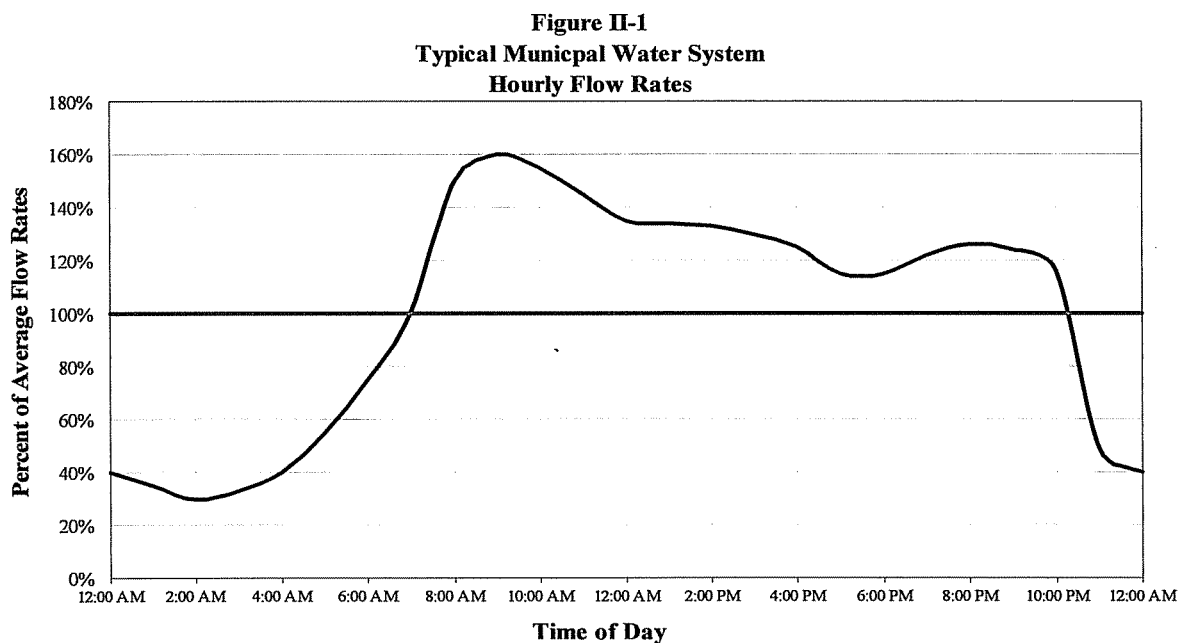
A. General

To meet current water demands in the Horse Cave and Cave City areas results in excessive pump pressures, which limit the outputs of the finished water pumps that are located at the water treatment plant. This limitation in pump output results in difficulties in maintaining adequate water levels in the Horse Cave water storage tank. This condition becomes more critical with the growth in water demands in the Horse Cave area.

All public water systems, including water treatment facilities, finished water pumps, transmission mains, and distribution systems, must have the capacity to meet peak water demands. If the system does not have the capacity to meet peak demands, inadequate water pressures will occur and rationing of water will be necessary.

A review of GRVWD's water consumption records for a recent 15-month period found the average month flow entering Horse Cave was 24,020,000 gallons per month with a peak-month water demand of 32,215,000 gallons. On an average basis, this equates to an average rate of 548 gallons per minute (gpm) for the average month and average rate of 735 gpm for the peak month. These rates are monthly averages and do not reflect peak flow rates that occur on peak days and during peak hours.

Relative to peak hourly rates, **Figure II-1** below is a graph showing fluctuations in water demands typical for a municipal water system. The significance of this graph is that peak



hourly rates of about 1.6 times the daily average 24-hour flow rate will occur on a daily basis. While storage tanks will supply water to meet some of this hourly demand, the high service pumps and transmission mains must have the capability to supply much of the peak hourly water demands.

In addition to fluctuations in peak hourly water demands, there are also fluctuations in daily and monthly water demands. As stated above, the recent review of GRVWD's billing records found that for the period under review the average-month water demand was 548 gpm versus the maximum-month average water demand of 735 gpm. This represents a fluctuation of about 134 percent.

Table II-1 below lists published data for fluctuation between average and maximum days within average and maximum months. Using the typical figures listed below, an estimate of the average day for the maximum month is 822 gpm. An estimate of the maximum day for the maximum month is 986 gpm. Therefore, under current water demand conditions, the capacity of high service pumps and transmission main needs to be at least 986 gpm.

Table II-1
Typical Fluctuations in Water Use ¹

Design Conditions	Percentage of Average Demand	
	Range	Typical
Average Day - Maximum Month	120 - 170	150
Maximum Day - Maximum Month	160 - 220	180

Under current water demands, a summary of current peak flow conditions are as follows:

- Average Day – Average Month – 548 gpm
- Maximum Day – Average Month – 658 gpm
- Average Day – Maximum Month – 822 gpm
- Maximum Day – Maximum Month – 986 gpm

These water demands represent current demands and do not consider added future water demands. Further, these water demands also do not address hourly demands. Without adequate water storage facilities, peak hourly demands would add about 20 percent to the above water demands.

Conservatively, existing water demands in the Horse Cave / Cave City area require a pumping and transmission system with a capacity of about 1,200 gpm.

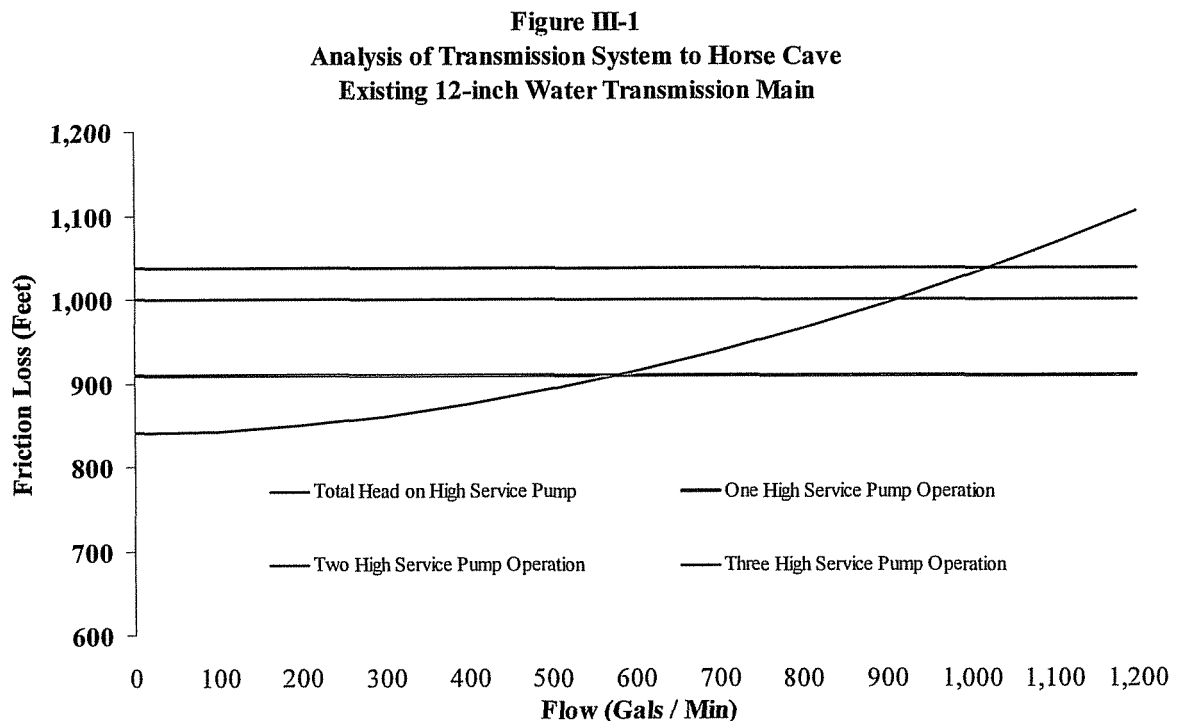
¹ Metcalf & Eddy, Inc., Water and Wastewater Engineering, Third Edition, McGraw-Hill, Inc., New York, 1991.

III. Evaluation of the Water Transmission System

A. Evaluation of the Existing 12-inch Water Transmission Main

Figure III-1 below summarizes a series of computer analyses conducted to evaluate the capacity of the existing 12-inch transmission main supplying water to Horse Cave / Cave City area. As indicated on following **Map 2**, the existing 12-inch transmission main under evaluation begins at the intersection of Jack McGuire Road and State Route 88 and ends inside Horse Cave. **Map 3** contained in the appendix of this Report also shows this transmission main as well as other water mains with the GRVWD service area.

In **Figure III-1**, the blue line represents the hydraulic elevation at the high service pumps needed to deliver various flows through the existing 12-inch transmission main. These analyses find that under average conditions about 84 percent of the water entering Horse Cave / Cave City enters through this existing 12-inch water transmission main. Under average conditions, about 16 percent enters through an existing 8-inch water main routed along Highway 335.



In **Figure III-1** above, the point that the horizontal green line crosses the blue line represents the output of one high service pump. Under this analysis, operation of one high

service pump will deliver about 580 gpm through the existing 12-inch water transmission main and about 110 gpm through the existing 8-inch water main. The rate of water entering Horse Cave with one pump operation is about 690 gpm. This 690-gpm rate represents approximately the daily water demands for the Horse Cave / Cave City area.

Therefore, a finding of these analyses is that a one-pump operation, on a continuous basis, is not sufficient to meet various daily fluctuations in water demands. There are occasions when one pump will meet daily water demands, but water demands require a two-pump operation to meet daily peaks and daily water demands that are above average. This conclusion agrees with actual pumping records experienced at the water treatment plant.

In **Figure III-1**, the point that the red line crosses the blue line represents the output of two high service pumps. Operation of two high service pumps will deliver about 900 gpm through the existing 12-inch water transmission main and about 140 gpm through the existing 8-inch water main. The total entering Horse Cave with a two-pump operation is about 1,040 gpm. This 1,040-gpm rate is less than the suggested 1,200-gpm rate needed to meet existing peak demands. Therefore, while a two-pump operation will meet most existing water demands, the capacity of a two-pump operation is insufficient using prudent design standards.

Finally, the point the black horizontal line crosses the blue line represents the output of operating three identical pumps. Operation of three high service pumps will deliver about 1,020 gpm through the existing 12-inch water transmission main and about 150 gpm through the existing 8-inch water main. The total entering Horse Cave with one pump operation is about 1,170 gpm. This 1,040-gpm rate is slightly less than the suggested 1,200-gpm rate needed to meet existing peak demands.

Therefore, while a three-pump operation will meet existing water demands, the capacity of a three-pump operation will be insufficient when expected future water demands are included. A conclusion of these analyses is that the water transmission mains between the water treatment plant and the Horse Cave / Cave City area are not adequate to meet existing and future water demands and additional pump capacity cannot overcome limitation of the existing transmission mains.

Therefore, based on this conclusion, this Report recommends upgrades and additions to the water transmission and storage facilities.

B. Evaluation of a Parallel 12-inch Transmission Main

As indicated above, the average flow rate of water entering the Horse Cave / Cave City area is about 548 gpm. On the average, Horse Cave and Cave City consume about 78 percent of that amount. The remaining 22 percent, which includes water going to the Mammoth Cave National Park, goes to GRVWD water customers. Therefore, Horse Cave and Cave City currently use a majority (78 percent) of the capacity of the existing water transmission system.

In early 2007, Marzetti began operation of a “salad dressing” manufacturing facility located in the Horse Cave Industrial Park. That event, coupled with recent and proposed expansions of manufacturing facilities of Dart Container Corporation and the construction of the Sister Schubert’s Bakery, has resulted in substantial increases in water demands by “water using” industries, which are located inside Horse Cave.

Marzetti initially projected a water demand of 60,000 gallons per day. However, the actual water demand for the Marzetti facility is more than twice that amount. In additions, Marzetti plans for the additions of more manufacturing lines, which will further increases in their water demands. Estimates are the average water demand could increase to about 180,000 gallons per day with peak days of 270,000 gallons or more.

Dart Container Corporation has expansions underway that also will substantially increase their water demand. Currently, Dart’s water demand totals about 140,000 gallons per day with peak months of about 180,000 gallons per day. Upon completion of proposed expansions, projections of water demands from Dart facilities are more than double current usages.

Sister Schubert’s Bakery began operation in August of 2007. Therefore, the review of GRVWD billing records and estimates of water demands for the Horse Cave did not fully account for this facility. A review of available records suggests that water demands for the Sister Schubert facility will be in the range of 20,000 to 30,000 gallons per day.

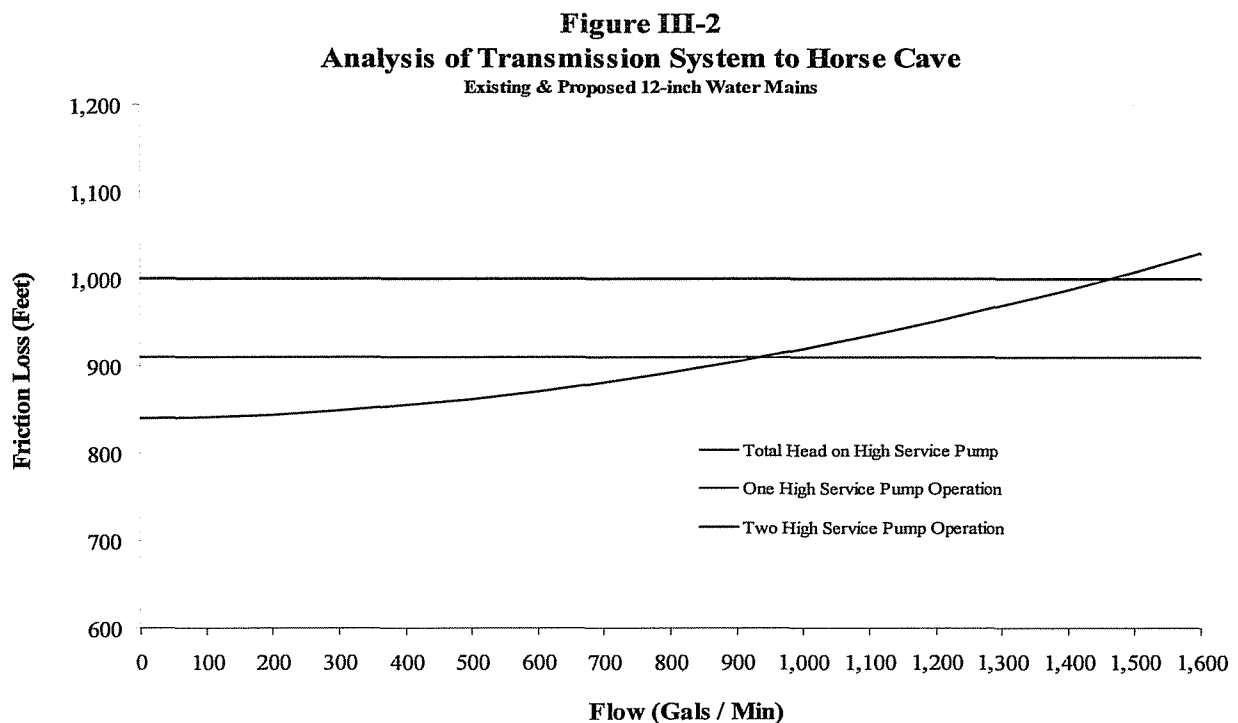
In summary, the combined water demands of Marzetti, Dart Container, and Sister Schubert’s Bakery total nearly 700,000 gallons per day. This water demand represents an

increase of about 450,000 gallons per day, which equates to an increase in average demand rate of about 315 gallons per minute (gpm). Peak demands could be in the range of 500 gpm.

Therefore, the recommended capacity needed by water transmission facilities to accommodate near-term projections of flows is a minimum of 1,600 gpm.

Figure III-2 below summarizes a series of computer analyses conducted to evaluate the capacity of the installation of a 12-inch water transmission main parallel to existing 12-inch transmission main supplying water to Horse Cave. **Map 2** indicates the route configuration of that parallel water transmission main.

Similar as before, the blue line represents the pressures needed to deliver various flow amounts through the existing and proposed parallel 12-inch transmission mains. These analyses find that under average conditions about 90 percent of the water entering Horse Cave / Cave City enters through this existing 12-inch water transmission main. The remaining 10 percent enters through the existing 8-inch water main along Highway 335.



In **Figure III-2**, the point that the horizontal green line crosses the blue line represents the output of one high service pump. Under this analysis, operation of one high service pump will deliver about 940 gpm through the parallel existing and proposed 12-inch water transmission mains and about 100 gpm through the existing 8-inch water main. The total entering Horse Cave with one pump operation is about 1,040 gpm.

The point that the black line crosses the blue line represents the output of two high service pumps. Operation of two high service pumps will deliver about 1,480 gpm through the existing 12-inch water transmission main and about 140 gpm through the existing 8-inch water main. The total entering Horse Cave with two- pump operation is about 1,620 gpm. This 1,620-gpm rate is about equal to the suggested 1,600-gpm rate needed to meet existing and proposed peak demands.

Including capacity of the existing 8-inch along Highway 335, a three-pump operation will exceed 1,700 gpm through the proposed and existing 12-inch transmission mains. While this increase in capacity may meet the needs of Horse Cave and Cave City, the resultant capacity is somewhat limiting considering GRVWD has additional needs in other areas of the remainder of the GRVWD service area.

C. Allocation of Project Costs

Summarizing the above, the construction of a parallel 12-inch water transmission main will serve primarily the needs of Horse Cave and Cave City (Caveland Environmental Authority). Relative to the contractual requirements of such an endeavor, the agreement between GRVWD and the municipalities of Horse Cave and Cave City dated June 15, 1961 contains the following provisions.

“(b) The district agrees that after completion of such facilities (initial facilities), any extension of water lines, installation of meters and service settings, etc., which are made in order to furnish water service to more remote customers of the District itself, will not be relevant to the interests of the cities and shall not have any bearing upon the adequacy of rates charged by the District to the customers of the respective cities under alternative (b) of paragraph X or to the cities under the wholesale alternative (c) of paragraph X. Such extension of District facilities for District customers shall be paid for by the District out of its own Depreciation Fund, for which reasonable allowance is made in the schedule of rate initially agreed upon; and if the District shall require funds for such purposes in excess of that which is available in its own Depreciation Fund, it may issue additional Revenue Bonds in order to provide the same,”

“(c) In corresponding fashion, Horse Cave and Cave City agree with the District that if expansion of the District’s commonly used installations and facilities for obtaining the water supply, treatment the same, conducting the same to the Horse Cave-Cave City area, and providing adequate storage, shall be necessary by increasing demands of customers of both cities, then the costs thereof should not equitably be charged to the District’s own customers. To the extent that the District may find it necessary to provide additional capital funds for such reason, any required rate adjustments shall be made in the rates for services to the cities and cities’ customers, and not in rates charged to customers of the District itself.

“(d) In the event a city shall demand such expansion of commonly used facilities for reasons identifiably its own (e.g., for a new industrial customer using large quantities of water, for example) such city shall have the privilege of electing to either (a) provide the necessary capital funds by issuing its own revenue bonds, or (b) agreeing to a higher level of rates charged by the District to that city or its customers.”

In consideration of the above provisions, **Table III-1** below presents an estimate of probable project costs of installing a parallel 12-inch water transmission main and water storage tank. As shown on **Map 2** and as described below, the divisions of the overall project included five segments.

- Segment 1 – From the intersection of Highway 88 and McGuire Road parallel to the route of the existing 12-inch water main to the Intersection of Highway 31-W with Shortcut Road;
- Segment 2 – Along Shortcut Road to intersection of Highway 218;
- Segment 3 – From the intersection of Shortcut Road and Highway 218 routed along Highway 1846 to the site of the proposed water storage tank;
- Segment 4 – Connection of the proposed water storage tank to the existing 16-inch water main inside Horse Cave that serves the industrial park; and
- Segment 5 – Proposed water storage tank.

Table III-1
Proposed Parallel 12-Inch Water Transmission Main
Estimate of Probable Project Costs

Project Description	Length (ft)	Cost/ft	Estimated Cost
Segment 1 - 12-inch Water Main	39,500	\$45.00	\$1,777,500
Segment 2 - 12-inch Water Main	8,800	\$49.00	\$431,200
Segment 3 - 12-inch Water Main	7,400	\$49.00	\$362,600
Segment 4 - 12-inch Water Main	8,000	\$45.00	\$360,000
Segment 5 - 12-inch Water Main	1,000	\$45.00	\$45,000
Subtotal			\$2,976,300
Other Project Costs @ 20 Percent			\$595,260
Total Project Cost of Transmission System			\$3,571,560
Segment 6 - Water Storage Tank	N/A	N/A	\$822,000
Other Project Costs @ 20 Percent			\$164,400
Total Project Cost of Storage Tank			\$986,400
Total Estimate of Probable Project Costs			\$4,557,960

As stated above, the estimated project costs for the parallel 12-inch water transmission main and water storage tank is about \$4.6 million. Recently, the Kentucky Infrastructure Authority (KIA) notified GRVWD of an award of a \$500,000 grant to assist in the funding of a water storage tank in the Horse Cave / Cave City Area.

Previously, the examination of water demands that occurred during the previously described 15-month period found that about 78 percent of the demand was applicable to Horse Cave and Cave City and remaining 22 percent was applicable to GRVWD.

Table III-2 presents allocation ratios resulting from preliminary discussions between entities. Allowing for future demands applicable mainly to Horse Cave and Cave City, this Report finds it appropriate GRVWD fund entirely the proposed water storage tank. This Report further finds that future water demands by Horse Cave and Cave City would reduce GRVWD's ratio from the previously indicated 22 percent and that the following 16 percent ratio for GRVWD is appropriate.

As indicated below, Horse Cave and CEA combined portions would be \$3.0 million and GRVWD portion would about \$1.6 million with \$0.5 million being from a KIA grant.

Table III-2
Alignment Paralleling Existing 12-inch Water Transmission Main
Preliminary Allocation of Costs Between Entities

Horse Cave Portion	CEA Portion	GRVWD Portion	KIA Grant	Total
Water Transmission Mains				
\$2,000,000	\$1,000,000	\$571,560		\$3,571,560
56.0%	28.0%	16.0%		100.0%
Water Storage Tank				
\$2,000,000	\$1,000,000	<u>\$1,057,960</u>	<u>\$500,000</u>	<u>\$4,557,960</u>

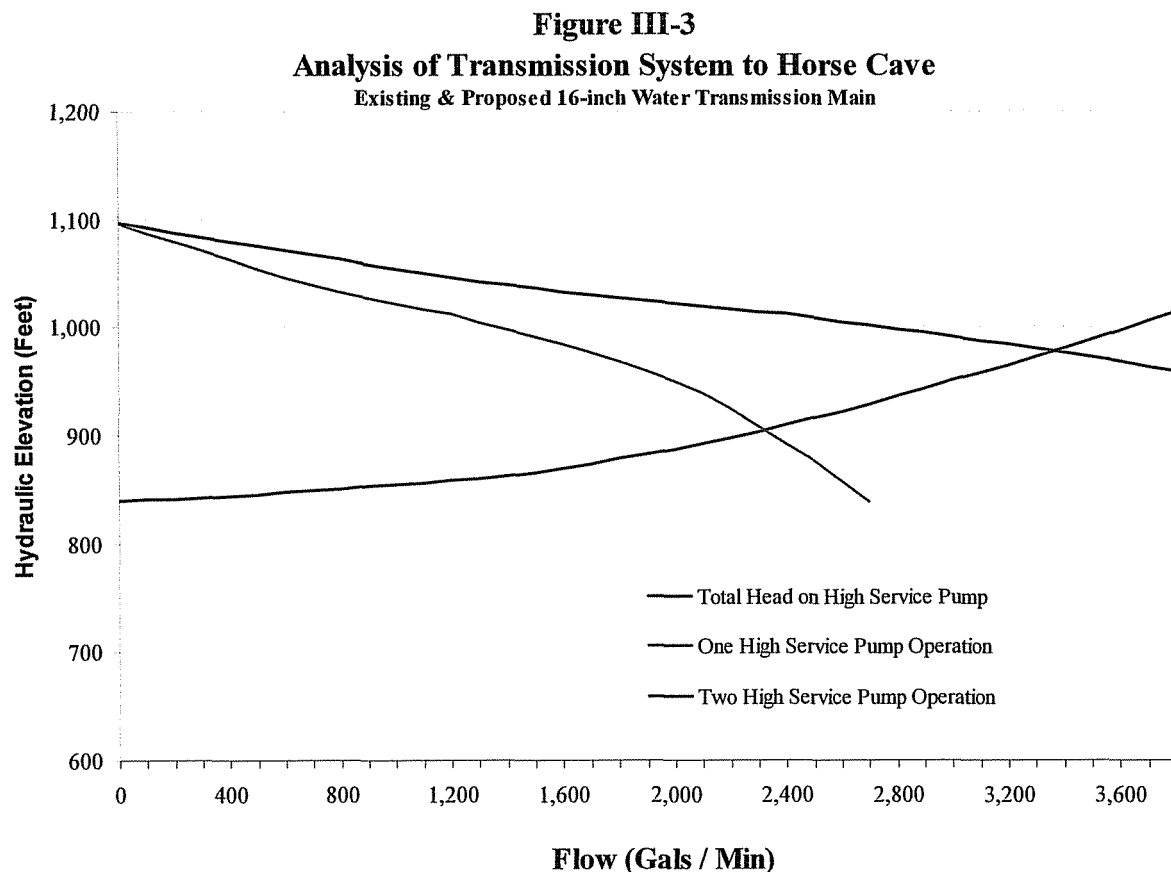
The installation of the parallel 12-inch transmission main does not provide GRVWD with additional capacity needed to serve anticipated growth in GRVWD water customers. In previous engineering reports, a water transmission main routed along Highway 31-E was recommended. Such an alignment would better serve GRVWD water in the southern and eastern portion of the service area.

Recognizing this situation, the purpose of the cost estimate for the parallel 12-inch water transmission main was to establish the cost participation by Horse Cave / Cave City. As indicated above, this participation costs is \$3.0 million dollars.

D. Evaluation of Proposed Highway 31-E Water Transmission Main

Included in appendix of the Report, **Map 3** indicates the routing of the proposed 16-inch water transmission main that would be routed generally along Highway 31-E and Highway 685. As indicated, this routing will result in connections to; 1) a proposed 1.0 million-gallon water storage tank; 2) the existing 16-inch water main located inside the Horse Cave Industrial Park; and 3) an existing 8-inch water main located along Lafferty Road.

Figure III-3 below summarizes the results a series of computer analyses conducted to evaluate the capacity of the installation of the proposed 16-inch water transmission main as described above and as shown on **Map 3** contained in the appendix of this Report.



This above graphic presentation shows the relationship between pump curves for the existing high service pumps and the system head curve for the proposed 16-inch water transmission main combined with the existing 12-inch water transmission main.

The blue line represents the system head curve for the combined proposed and existing transmission mains. Under a no-flow condition, the starting hydraulic elevation for the system head curve is the elevation established by the proposed water storage tank, or about elevation 840. With increasing flows in the transmission mains, the high service pumps at the water treatment plant must increase the hydraulic elevation to overcome friction losses in the transmission mains. A plot of the calculated hydraulic elevations versus flows generates the system head curve as shown above.

The second component of this graphic presentation is a plot of the pump curves for the existing high service pumps. The point that the system head curve (blue line) crosses the pump curve line (red and green) represents the calculated output of the high service pumps. The red line is for a single or one pump operation. The green line is for a two-pump operation.

As indicated, one existing pump will discharge about 2,320 gpm or about 3.3 million gallons per day (MGD). A two-pump operation will discharge nearly 3,400 gpm or about 4.9 MGD. A one-pump operation will meet current peak water demands in the Horse Cave / Cave City area while providing an adequate reserve for growth within the GRVWD service area.

A two-pump operation will provide 1.6 MGD of additional reserve that should meet, for many years, any future reasonably expected water demands.

In addition to the capacity afforded by the existing pumps, the flatness of the system head curve will enable a further increase in capacity by going to a three-pump operation using existing pumps or by going to different high service pumps with greater pumping capacity.

The characteristic of pump curve for the existing high service pump is such that pump head conditions sharply declines after about 2,300 gpm. In the future, when there is more water demand, a change out of the high service pump will enable the continuous of a one-pump operation, if desired.

In **Table III-3** contains the estimate of probable project cost for the construction of the proposed 16-inch water transmission main and 1.0 million gallon water storage tank.

Table III-3
16-inch Transmission System
Alignment Along Highway 31-E & Highway 685
Estimate of Probable Project Costs

Project Description	Length (ft)	Cost/ft	Estimated Cost
Segment 1 - 16-inch Water Main	36,500	\$52.00	\$1,898,000
Segment 2 - 16-inch Water Main	25,000	\$52.00	\$1,300,000
Segment 3 - 16-inch Water Main	3,000	\$52.00	\$156,000
Segment 4 - 16-inch Water Main	5,000	\$52.00	\$260,000
Segment 4 - 12-inch Water Main	1,000	\$45.00	\$45,000
Subtotal			\$3,659,000
Other Project Costs @ 20 Percent			<u>\$731,800</u>
Total Project Cost of Transmission System			\$4,390,800
Segment 6 - Water Storage Tank	N/A	N/A	\$822,000
Other Project Costs @ 20 Percent			<u>\$164,400</u>
Total Project Cost of Storage Tank			\$986,400
Total Estimate of Probable Project Costs			\$5,377,200

Maintaining the contribution amounts by Horse Cave and CEA at a combined \$3,000,000, the allocation percentages become as tabulated below. GRVWD participation increases from \$1,057,960 to \$1,877,200.

Table III-4
16-inch Transmission System
Alignment Along Highway 31-E & Highway 685
Preliminary Allocation of Costs Between Entities

Horse Cave Portion	CEA Portion	GRVWD Portion	KIA Grant	Total
Water Transmission Mains				
\$2,000,000	\$1,000,000	\$1,390,800		\$4,390,800
45.5%	22.8%	31.7%		100.0%
Water Storage Tank				
		<u>\$486,400</u>	<u>\$500,000</u>	<u>\$986,400</u>
\$2,000,000	\$1,000,000	\$1,877,200	\$500,000	\$5,377,200

The above are estimates of costs prepared without the benefit of detailed construction drawings. In consideration therefore, prudent agreements with Horse Cave and CEA would allocate the final project costs based on the percentage listed above for each entity. Therefore, if the project costs were less than estimated, then all parties would share in the savings and, in turn, if the project costs were more, the parties should share in funding of the increased cost.

IV. FEDERAL SPECIAL APPROPRIATION PROJECT GRANT

A. Water Main Extensions

GRVWD recently receive notification of a federal Special Appropriation Project Grant (SPAP) of \$1,000,000 (final \$956,000) for drinking water projects. Qualification for this grant requires, at a minimum, a 45 percent match of the eligible project cost. Therefore, for the \$956,000 SPAP grant, the project cost must be at least \$1,738,182; thus, a minimum of \$782,182 must be from local funds.

The earmark designation for the grant was entitled "The Green River Valley Water District in Hart County for Drinking Water Project". Under this designation, GRVWD can apply these funds for any water project(s). In consideration of the GRVWD's Board desire to extend water to population without public water, the first priority is to use these funds for water main extensions within the service area of GRVWD.

Table IV-1 below contains a listing of proposed water main extensions, length of water mains and estimates of project costs. Signed petitions by property owners requesting water service extensions were the basis of this list.

Table IV-1 Proposed Water Main Extension SPAP Grant Estimate of Probable Construction Costs					
Location	Water Main Size (inch)	Length (Ft)	Cost / Ft.	Lump Sum Item(s)	Total
Green County					
Willie Rice Road	3	5,700	\$9.00	N/A	\$ 51,300
Dewey Kidd Road	3	4,500	\$9.00	N/A	\$ 40,500
Larue County					
Polley Road	3	5,000	\$9.00	N/A	\$ 45,000
	4	6,000	\$10.50	N/A	\$ 63,000
Wheeler Road	3	2,400	\$9.00	N/A	\$ 21,600
Hart County					
Polley Road	3	3,500	\$9.00	N/A	\$ 31,500
Well Road	3	2,800	\$9.00	N/A	\$ 25,200
Francis Gardner Road	3	3,300	\$9.00	N/A	\$ 29,700
Marshall Highbaugh Road	3	2,500	\$9.00	N/A	\$ 22,500
Priceville Road	3	6,300	\$9.00	N/A	\$ 56,700
	3	4,300	\$9.00	N/A	\$ 38,700
Chestnut Grove Road - South	Pump Station			\$50,000	\$ 50,000
Chestnut Grove Road - North		3	\$9.00	N/A	\$ 30,600
	3	8,500	\$9.00	N/A	\$ 76,500
Buckner Hill Road - North	Pump Station			\$50,000	\$ 50,000
Williams Road - East		3	\$9.00	N/A	\$ 14,400
Williams Road - West	3	7,200	\$9.00	N/A	\$ 64,800
W. Walters - Cris Stasel Rd	3	3,800	\$9.00	N/A	\$ 34,200
Hopewell Church Road	3	<u>4,000</u>	\$9.00	N/A	<u>\$ 36,000</u>
	Total	74,800			\$ 782,200

As indicated above, the estimate of probable construction costs for these water main extensions is \$782,200. These water main extensions will serve about 70 to 80 residences. Without this grant assistance, there is no financial incentive to extend water services to these residences.

B. Clearwell Additions

In addition to these water mains, GRVWD has a need to replace two (2) existing steel clearwells located at the water treatment plants. These clearwells, which total 200,000 gallons of water storage, were part of the original water treatment facilities. Because of structural deficiencies, these existing clearwells are not suitable for rehabilitation. After some forty odd years of service, these clearwells have outlived their service life.

The project scope for the SPAP grant identified the construction of new concrete clearwell as part of the overall project to quantify for the 55 percent SPAP grant. **Table IV-2** below contains an estimate of probable construction cost for a 500,000-gallon concrete clearwell.

Since the existing clearwells housed backwash and high service pumps, the proposed clearwell will include a pump chamber. This pump chamber will contain replacements for the pumps housed on top of the existing clearwell. The pump chamber will also contain space for the installation of future high service pumps.

Table IV-2
Estimate of Probable Construction Cost
500,000 Gallon Clearwell Addition

Description	Total
Excavation - Clearwell	\$100,000
Clearwell Concrete Structure	\$900,000
High Service Pumps	\$50,000
Piping	\$350,000
Electrical	\$150,000
Backfill	\$50,000
Total	\$1,600,000

V. SUMMARY AND RECOMMENDATIONS

As discussed in Section III of this Report, one of the recommendations of this Report is the extension of a 16-inch water transmission main from the end of an existing 16-inch water transmission main located at Hardyville. From that starting point, the proposed 16-inch main would extend southward along Highway 331-E to the intersection of Highway 685. From Highway 685, the route of the proposed transmission main would be west with connections the following points; 1) a proposed 1.0 million-gallon water storage tank; 2) the existing 16-inch water main located inside the Horse Cave Industrial Park; and 3) an existing 8-inch water main located along Lafferty Road. **Map 3**, included in the appendix of this Report, shows the route for this proposed transmission main and connection points.

This Report also recommends the addition of some 74,800 feet of mainly 3-inch water mains and two (2) small water booster stations to serve 70 to 80 residences that are without public water. Funding for these water main extensions will be from a federal Special Appropriation Project grant that GRVWD recently received.

Since the Special Appropriation Project Grant requires a 45 percent of local funds, this Report recommends the replacement of two (2) existing steel clearwells at the water treatment plant with a reinforced concrete clearwell.

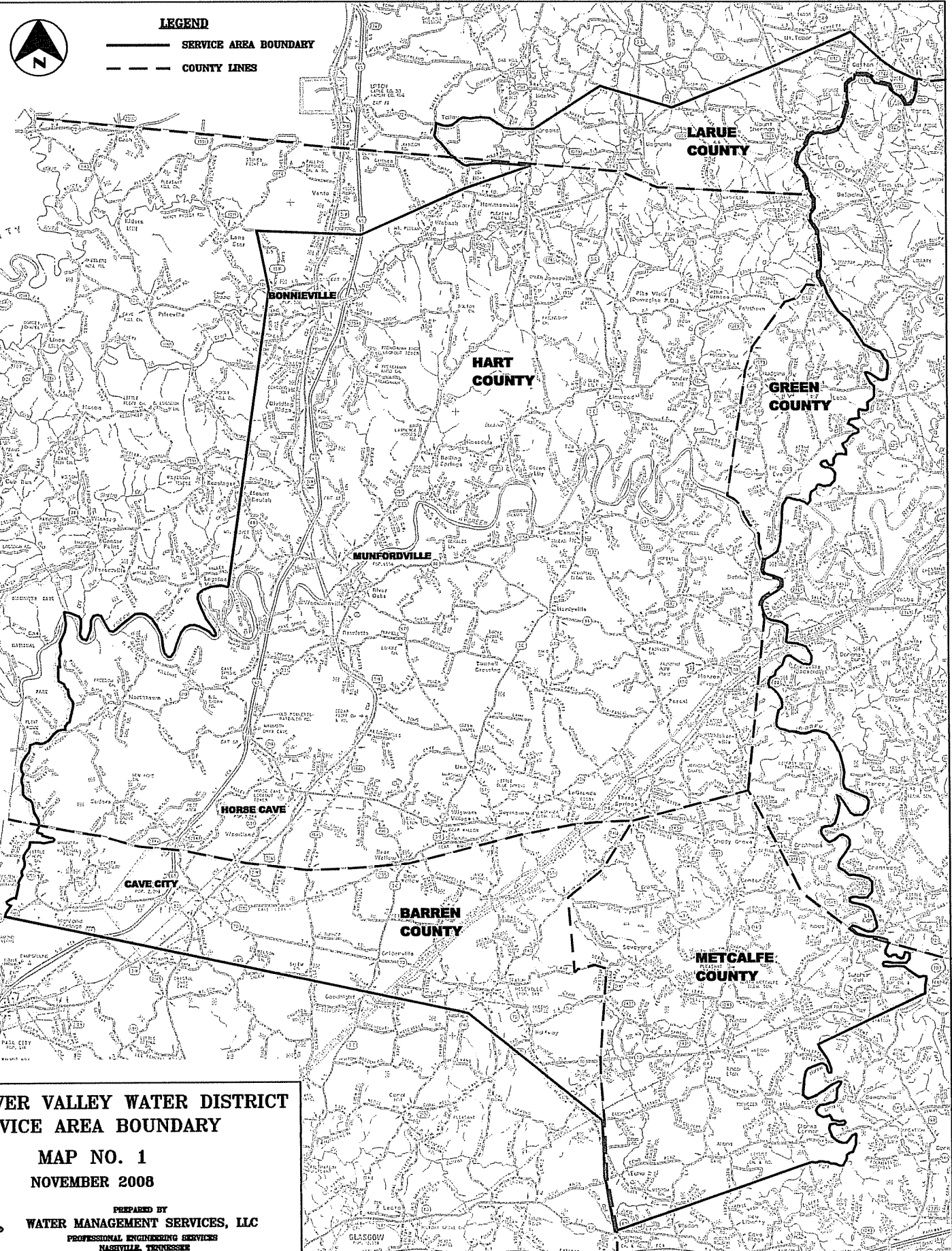
Table V-1
Summary of GRVWD Project Costs
Estimate of GRVWD Net Costs

Water Transmission Main	\$3,659,000
500,000 Gallons Water Storage Tank	\$822,000
Water Distribution Mains	\$782,000
Clearwell	<u>\$1,600,000</u>
	Subtotal
Contingencies & Other Project Costs @ 20 Percent	<u>\$1,372,600</u>
	Total
Less Horse Cave & CEA Shares	\$3,000,000
Less KIA & SPAP Grants	<u>\$1,456,000</u>
Net GRVWD Funding Needs	\$3,779,600



LEGEND

- SERVICE AREA BOUNDARY
- - - COUNTY LINES



**GREEN RIVER VALLEY WATER DISTRICT
SERVICE AREA BOUNDARY**

**MAP NO. 1
NOVEMBER 2008**



PREPARED BY
WATER MANAGEMENT SERVICES, LLC
PROFESSIONAL ENGINEERING SERVICES
NASHVILLE, TENNESSEE



GREEN RIVER VALLEY WATER DISTRICT

MAP 2

NOVEMBER 2008

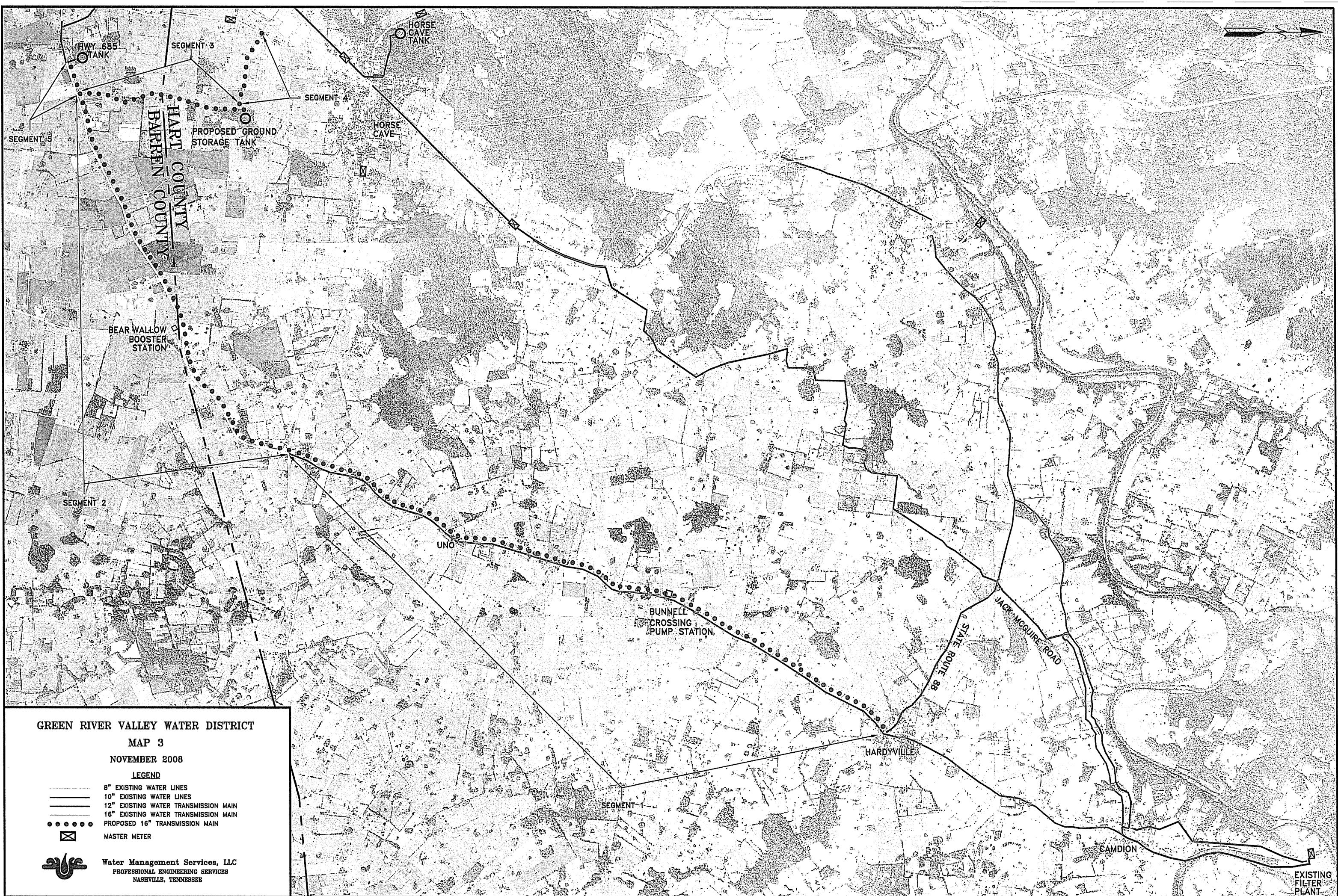
LEGEND

- 8" EXISTING WATER LINES
- 10" EXISTING WATER LINES
- 12" EXISTING WATER TRANSMISSION MAIN
- 16" EXISTING WATER TRANSMISSION MAIN
- PROPOSED PARALLEL 12" TRANSMISSION MAIN
- MASTER METER



Water Management Services, LLC
PROFESSIONAL ENGINEERING SERVICES
NASHVILLE, TENNESSEE

EXISTING
FILTER
PLANT



GREEN RIVER VALLEY WATER DISTRICT

MAP 3

NOVEMBER 2008

LEGEND

- 8" EXISTING WATER LINES
- 10" EXISTING WATER LINES
- 12" EXISTING WATER TRANSMISSION MAIN
- 16" EXISTING WATER TRANSMISSION MAIN
- PROPOSED 16" TRANSMISSION MAIN
- MASTER METER



Water Management Services, LLC
PROFESSIONAL ENGINEERING SERVICES
NASHVILLE, TENNESSEE

EXISTING
FILTER
PLANT