

Water-Resource Development: A Strategic Plan

Governor's Water Resource Development Commission

October 1999

Water-Resource Development: a Strategic Plan

Water Resource Development Commission

CONTENTS

CONTENTS	2
LIST OF FIGURES	3
EXECUTIVE SUMMARY	4
PURPOSE.....	9
ACKNOWLEDGMENTS.....	10
INTRODUCTION	11
OVERVIEW OF PUBLIC WATER SYSTEMS IN KENTUCKY	12
WATER SOURCES	13
WATER TREATMENT	13
WATER PLANT AND DISTRIBUTION.....	14
UNIVERSAL JURISDICTION.....	14
PRIVATE DOMESTIC WATER SYSTEMS.....	15
WATER SYSTEM PROBLEMS	16
VERY SMALL SYSTEMS	16
FINANCES	17
WATER SUPPLY	17
UNACCOUNTED-FOR WATER.....	18
IMPACT OF WATER-LINE EXTENSION ON HEALTH.....	18
RURAL FIRE PROTECTION.....	19
MANAGEMENT ISSUES	20
NEW REGULATIONS	20
PLANNING AND MANAGEMENT DATA.....	21
UNIFORM SYSTEM OF ACCOUNTING.....	21
RATE REVIEW AND REGULATION	21
INSTITUTIONAL BARRIERS	22
FUNDING.....	22
FUNDING ISSUES	22
INFRASTRUCTURE FUNDING NEEDS	24
FUNDING SOURCES	26
OVERVIEW OF RECOMMENDATIONS.....	29
RECOMMENDATIONS.....	30
GLOSSARY	41
END NOTES.....	43
REFERENCES	44
APPENDIX A.....	45

APPENDIX B	46
WATER SYSTEMS	46
B-1 Southeastern Region.....	46
Big Sandy Area Development District	46
Cumberland Valley Area Development District	46
Kentucky River Area Development District	46
B-2 Northeastern Region	46
Buffalo Trace Area Development District.....	46
Gateway Area Development District	46
FIVCO Area Development District	46
B-3 Central Region	46
Bluegrass Area Development District.....	46
KIPDA Area Development District	46
Northern Kentucky Area Development District.....	46
B-4 West-central Region.....	46
Barren River Area Development District.....	46
Lake Cumberland Area Development District.....	46
Lincoln Trail Area Development District.....	46
B-5 Western Region	46
Green River Area Development District	46
Pennyrile Area Development District.....	46
Purchase Area Development District	46
APPENDIX C.....	47
INFRASTRUCTURE FUNDING NEEDS	47
Public Water Projects 2000-2005	47
Public Water Projects 2006-2020	50
APPENDIX D.....	53
1999 DROUGHT SUMMARY	53

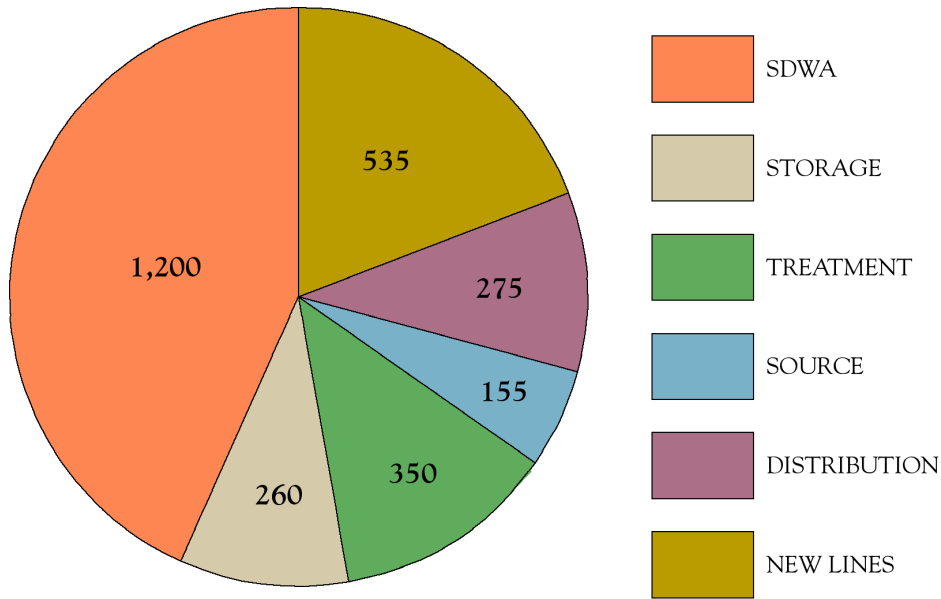
LIST OF FIGURES

Estimated Infrastructure Investment, in Millions of Dollars	4
Kentuckians on Public Water 1990-2020	4
PUBLIC WATER NEEDS: 2000-2020	6
Classes and Types of Public Water Systems (KRWA, 1999)	12
Public Water Projects (2000-2020), in Millions of Dollars	24
Percent of Infrastructure Investment Required for Locally Identified Projects.....	25
Water System Funding Sources	28

EXECUTIVE SUMMARY

An investment of at least \$2.8 billion dollars in Kentucky's public water supply infrastructure will be needed during the next 20 years. This estimate is based on locally identified needs to expand, upgrade, and replace infrastructure, and also includes estimated needs to meet the requirements of the Safe Drinking Water Act (SDWA).

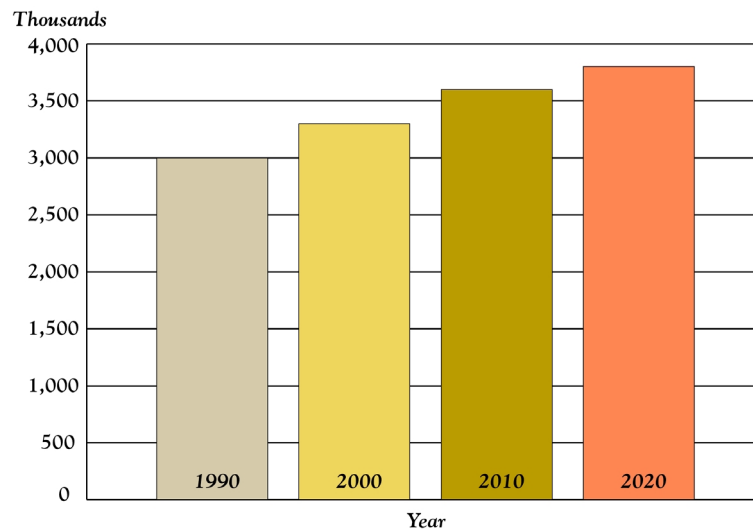
Estimated Infrastructure Investment, in Millions of Dollars



\$million

More and more Kentuckians have access to safe, reliable water at an affordable price. The average monthly residential water bill is \$20. Needed investments represent an additional \$6.25 per month per household.

Kentuckians on Public Water 1990-2020



An additional 500,000 Kentuckians are projected to be on public water by the year 2020. Proposed projects would provide 12,000 miles of new water lines to previously unserved areas. We must ensure, however, that adequate sewage treatment is also available in those areas.

Kentucky must effectively target its investment in public water. This will require a regional approach to planning and development. New, regional management strategies must be developed. Funding of public water projects must be efficient and effective. New sources of funding must be developed.

An estimated 400,000 Kentuckians will still rely on private, domestic water systems in the year 2020. We must ensure that those supplies are safe and reliable.

The following recommendations were developed through the efforts of more than 40 state, regional, and local groups:

1. Maintain and expand the Water Resource Information System to provide a comprehensive database for each public water system.
2. Increase planning, management, technical, financial, reporting and rate-setting assistance for small systems.
3. Establish a statewide water-loss audit and a leak-detection and repair program.
4. Promote and encourage water-system regionalization. Barriers to regionalization—real or imagined—should be removed or reduced where improvements in service, operations and economies of scale can be realized.
5. Identify appropriate mergers of water systems. Encourage such mergers with incentives.
6. Provide assistance to "unattractive" merger candidates.
7. Encourage rates for water systems that are based on cost-of-service principles.
8. Establish uniform accounting and reporting procedures applicable to all public water systems.
9. Improve the effectiveness of baseline funding requirements for water projects. Establish and promulgate system development standards as to materials, quality, size specifications, and installation inspection.
10. Establish a centralized review process for funding water projects. Establish a centralized review and approval process for development plans.
11. Increase the use of technology in the process of funding water projects.
12. Provide quality- and quantity-assurance support for small private water systems such as homeowner wells.
13. Require adequate on-site sewage treatment before allowing hookup to public water.
14. Promote "universal jurisdiction," in which a local management agency is responsible for *all* water service within its geographic jurisdiction or service area. Establish certified service territories, in which a water service system is responsible for making reasonable extensions of service to all persons within its service area.
15. Develop potential water supplies in eastern Kentucky for small community systems.
16. Examine alternatives to improve fire protection in rural areas.
17. Develop new sources of funding.

The following table summarizes the estimated costs for locally-identified public water infrastructure improvements for the period 2000-2020.

PUBLIC WATER NEEDS: 2000-2020¹

COUNTY	NEW LINES (miles)	NEW HOUSE HOLDS	NEW LINES (\$1,000)	DISTRIBUTION (\$1,000)	SOURCE (\$1,000)	TREATMENT (\$1,000)	STORAGE (\$1,000)	TOTAL (1,000)
Adair	223.6	2,993	9,858	0	0	0	0	\$9,858
Allen	0.2	100		0	0	0	0	\$10
Anderson	154.5	607	6,696	1,452	0	2,150	1,590	\$11,888
Ballard	45.1	293	1,173	201	0	0	0	\$1,374
Barren	144.1	368		0	0	0	0	\$5,220
Bath	12.0	67	1,045	2,000	2,000	4,000	755	\$9,800
Bell	108.2	803	5,540	6,000	0	4,000	1,040	\$16,580
Boone	0.0	0		4,000	0	0	0	\$4,000
Bourbon	111.5	380	4,458	2,830	0	3,580	1,030	\$11,898
Boyd	17.0	111	885	500	0	0	300	\$1,685
Boyle	68.0	374	2,600	3,558	0	2,000	2,825	\$10,983
Bracken	121.2	583	4,872	0	0	1,350	850	\$7,072
Breathitt	243.9	2,720	12,755	500	5,000	11,700	2,700	\$32,655
Breckinridge	34.0	440	1,900	0	0	0	0	\$1,900
Bullitt	56.0	1,559	7,210	1,000	0	0	1,750	\$9,960
Butler	23.6	50	850	1,195	0	2,000	0	\$4,045
Caldwell	43.0	410	1,725	590	0	3,800	1,370	\$7,485
Calloway	214.4	2,157	5,574	0	0	0	1,275	\$6,849
Campbell	138.8	1,250	7,000	0	0	0	730	\$7,730
Carlisle	12.8	98	334	0	0	1,000	850	\$2,184
Carroll	20.8	63	705	250	0	0	0	\$955
Carter	179.0	1,350	8,200	500	6,000	16,000	3,000	\$33,700
Casey	45.1	530	1,977	0	0	0	425	\$2,402
Christian	317.0	280	10,469	1,296	0	12,680	2,084	\$26,529
Clark	66.2	362	2,970	980	1,700	4,000	1,200	\$10,850
Clay	351.7	2,033	20,436	0	22,000	2,000	5,150	\$49,586
Clinton	9.6	44	497	0	0	0	0	\$497
Crittenden	248.0	867	7,326	0	0	0	3,000	\$10,326
Cumberland	10.9	109	568	0	0	0	0	\$568
Daviess	1.0	5	530	270	3,400	0	10,650	\$14,850
Edmonson	10.0	37	88	3,610	0	4,000	800	\$8,498
Elliott	47.0	429	1,700	0	3,000	4,000	600	\$9,300
Estill	77.5	183	3,331	840	0	2,900	1,560	\$8,631
Fayette	33.2	162	0			0	0	\$0
Fleming	13.7	69		0	0	0	0	\$548
Floyd	179.2	3,489	9,110	4,700	1,600	2,000	2,750	\$20,160
Franklin	30.5	84	1,274	9,662	404	2,000	6,400	\$19,740
Fulton	9.8	86	256	338	0	2,000	1,275	\$3,869
Gallatin	12.0	90	360	600	1,500	0	0	\$2,460

¹ As identified by local officials. Does not include direct needs of the SDWA. Does not include the needs of privately-owned water utilities.

COUNTY	NEW LINES (miles)	NEW HOUSE HOLDS	NEW LINES (\$1,000)	DISTRIBUTION (\$1,000)	SOURCE (\$1,000)	TREATMENT (\$1,000)	STORAGE (\$1,000)	TOTAL (1,000)
Garrard	40.5	261	1,176	1,987	2,200	0	50	\$5,413
Grant	79.7	705	2,990	2,000	0	0	1,300	\$6,290
Graves	96.6	1,366	2,512	200	0	0	1,700	\$4,412
Grayson	28.0	97		0	0	0	850	\$1,850
Green	37.8	345	1,640	0	0	0	0	\$1,640
Greenup	138.0	697	5,592	2,800	4,000	12,000	2,900	\$27,292
Hancock	3.0	16	80	54	0	3,200	1,185	\$4,519
Hardin	130.0	1,263	7,968	7,400	300	800	2,100	\$18,568
Harlan	295.0	3,647	15,300	0	20,000	10,000	8,000	\$53,300
Harrison	66.0	246	2,875	3,032	0	800	700	\$7,407
Hart	49.4	286	1,700	305	0	585	865	\$3,455
Henderson	55.0	120	1,724	9,530	0	24,562	3,843	\$39,659
Henry	0.0	0		9,500	920	1,600	2,690	\$14,710
Hickman	11.9	70	310	0	0	0	0	\$310
Hopkins	25.0	141		493	0	0	1,303	\$3,105
Jackson	339.0	1,874	17,250	0	2,000	2,000	12,150	\$33,400
Jefferson	23.0	1,866	7,169			0	0	\$0
Jessamine	56.0	304	2,722	3,933	200	7,600	3,050	\$17,505
Johnson	223.0	3,120	11,100	1,625	2,000	4,000	0	\$18,725
Kenton	105.7	2,023	4,230	12,000	3,000	5,700	1,700	\$26,630
Knott	294.1	3,155	17,588	0	3,000	11,000	3,200	\$34,788
Knox	321.5	2,731	17,320	0	0	0	5,830	\$23,150
Larue	0.0	0	0	0	0	0	0	\$0
Laurel	256.0	753	12,860	3,453	0	3,570	5,360	\$25,243
Lawrence	25.0	184		500	0	0	300	\$1,800
Lee	51.7	320	2,091	0	7,000	2,000	600	\$11,691
Leslie	147.2	1,694	7,000	250	3,000	5,000	1,100	\$16,350
Letcher	301.6	5,256	21,875	0	8,000	15,000	4,500	\$49,375
Lewis	161.3	957	7,682	0	418	0	2,275	\$10,375
Lincoln	90.0	351	4,185	2,645	0	2,800	460	\$10,090
Livingston	112.0	461	3,398	60	0	0	295	\$3,753
Logan	109.4	883	3,849	28,104	3,000	8,647	3,583	\$47,183
Lyon	30.0	120		0	0	4,000	0	\$4,795
Madison	95.5	459	4,385	12,470	3,000	20,900	9,500	\$50,255
Magoffin	167.0	941	8,400	2,000	5,000	3,000	2,000	\$20,400
Marion	0.0	0	0	0	0	0	0	\$0
Marshall	119.1	1,334	2,687	0	0	0	0	\$2,687
Martin	42.0	602	2,100	1,000	2,000	2,000	5,506	\$12,606
Mason	56.4	282	2,258	0	0	0	45	\$2,303
McCracken	137.6	917	3,577	32	0	0	850	\$4,459
McCreary	39.9	238	1,554	0	0	0	0	\$1,554
McLean	27.0	195	873	685	300	3,250	2,800	\$7,908
Meade	118.0	1,586	5,800	0	0	0	2,000	\$7,800
Menifee	28.0	194	1,400	0	0	8,000	1,000	\$10,400

COUNTY	NEW LINES (miles)	NEW HOUSE HOLDS	NEW LINES (\$1,000)	DISTRIBUTION (\$1,000)	SOURCE (\$1,000)	TREATMENT (\$1,000)	STORAGE (\$1,000)	TOTAL (1,000)
Mercer	90.0	262	3,865	5,830	500	4,100	820	\$15,115
Metcalfe	46.2	228	1,753	0	0	0	0	\$1,753
Monroe	13.2	99	458	413	1,000	0	375	\$2,246
Montgomery	10.4	50	530	0	2,000	8,000	220	\$10,750
Morgan	185.0	1,898	9,250	0	0	0	3,000	\$12,250
Muhlenberg	6.0	6	100	630	0	0	3,825	\$4,555
Nelson	50.0	323	1,660	0	0	0	850	\$2,510
Nicholas	76.5	228	3,163	530	250	2,100	0	\$6,043
Ohio	130.0	345	7,524	5,753	50	0	3,700	\$17,027
Oldham	13.0	28	599	54	0	0	2,000	\$2,653
Owsley	43.0	267		0	2,000	2,000	1,000	\$6,500
Owen	318.8	1,328	8,260	0	4,000	0	1,300	\$13,560
Pendleton	168.1	1,223	6,730	0	5,000	0	1,200	\$12,930
Perry	215.6	3,429	11,550	0	3,000	4,000	300	\$18,850
Pike	437.0	9,206	23,000	2,000	0	16,000	7,000	\$48,000
Powell	29.5	82	1,385	1,603	700	700	430	\$4,818
Pulaski	333.2	3,052	14,766	0	0	0	4,580	\$19,346
Robertson	23.2	149	1,000	0	0	0	0	\$1,000
Rockcastle	219.0	2,373	11,080	0	0	0	8,660	\$19,740
Rowan	22.0	89	1,150	0	0	11,000	0	\$12,150
Russell	41.3	908	1,865	0	0	0	0	\$1,865
Scott	27.0	269	1,540	1,787	0	1,000	1,500	\$5,827
Shelby	69.0	633	3,421	1,439	1,375	0	0	\$6,235
Simpson	35.2	16	837	8,175	6,000	550	13,232	\$28,794
Spencer	46.0	312	1,303	2,000	0	0	1,000	\$4,303
Taylor	89.7	331	3,883	0	0	0	1,700	\$5,583
Todd	191.0	94	2,756	247	0	252	2,000	\$5,255
Trigg	50.0	86	1,896	105	0	1,200	800	\$4,001
Trimble	2.0	1	50	2,225	2,588	0	425	\$5,288
Union	1.0	1	10	70	500	0	1,090	\$1,670
Warren	43.1	39	835	84,881	0	30,000	19,246	\$134,962
Washington	110.0	700	3,400	0	0	0	2,100	\$5,500
Wayne	63.7	485	4,476	0	0	0	1,100	\$5,576
Webster	68.0	227	3,446	564	0	0	624	\$4,634
Whitley	562.0	4,369	28,500	0	0	10,000	21,600	\$60,100
Wolfe	95.0	700	5,000	0	8,000	5,000	1,500	\$19,500
Woodford	47.5	228	2,189	1,830	0	3,800	1,175	\$8,994
TOTAL	11,938	101,759	534,722	273,066	152,905	348,876	259,901	\$1,573,683

PURPOSE

Governor Paul Patton's Executive Order 96-1339 directed the Water Resource Development Commission (WRDC) to prepare a strategic plan for water-resource development in Kentucky. The goal of the plan is to provide the best available water and sewer service to every Kentuckian by the year 2020.

This document presents a strategic plan for water systems. A strategic plan for sewer systems will be presented in a separate document.

In order to provide the best available water service to all Kentuckians, whether they live in an urban area served by a public water system treating tens of millions of gallons a day, or in a remote, rural area of the state relying on private wells, cisterns, or hauled water, the plan must evaluate and make recommendations for all systems—both public and private domestic. The objectives of this initial plan are to:

- Inventory all water systems in Kentucky and assess their respective strengths and weaknesses.
- Develop recommendations to build on the strengths and eliminate the weaknesses of Kentucky's water systems.
- Develop strategies to improve the level of water service for Kentucky.

The objectives of the plan were achieved by using existing data and information to complete the following tasks:

- Characterize the physical plant, finances, and management of existing systems.
- Identify areas where immediate and long-term extension of public water service is indicated, together with estimated costs and any improvements to existing systems to accommodate expansion.
- Identify areas where extension of public water service is not indicated, and develop recommendations for the improvement of water systems in those areas.
- Identify areas where there are health and safety concerns about drinking water and wastewater treatment, and develop recommendations for addressing those concerns.
- Develop recommendations and strategies for operation, maintenance, and management of water systems to enhance the use, efficiency, and effectiveness of resources in different regions of the state.
- Develop recommendations and strategies to improve the regulatory and funding environment for water development.

ACKNOWLEDGMENTS

In developing the this plan, the WRDC made every effort not to constrain, conflict with, or impede any ongoing water planning efforts and activities by other agencies and entities in the state, but to complement those efforts. To this end, the WRDC worked closely with the following agencies, entities, and persons:

- Appalachian Regional Commission
- AquaSource, Inc.
- Earthtech, Inc.
- GRW Engineers, Inc.
- Kentucky-American Water Company
- Kentucky Area Development Districts
- Kentucky Cabinet for Health Services
- Kentucky Department for Local Government
- Kentucky Division of Water—Drinking Water Branch
- Kentucky Division of Water—Facilities Construction Branch
- Kentucky Division of Water—Ground Water Branch
- Kentucky Division of Water—Water Resources Branch
- Kentucky Economic Development Cabinet
- Kentucky Geological Survey
- Kentucky Ground Water Association
- Kentucky Infrastructure Authority
- Kentucky League of Cities
- Kentucky Natural Resources and Environmental Protection Cabinet
- Kentucky Office of Geographic Information Systems
- Kentucky Public Service Commission
- Kentucky Rural Water Association
- Kentucky Transportation Cabinet
- Kenvirons, Inc.
- Louisville Water Company
- PDR Engineers, Inc.
- Professional Services Group, Inc.
- U.S. Department of Agriculture, Rural Development

The Interagency Group of Financing/Regulatory Agencies, an *ad hoc* committee consisting of representatives from the Division of Water, Department for Local Government, Kentucky Infrastructure Authority, Public Service Commission, and Rural Development, which meets periodically to discuss funding and regulatory issues, also identified and analyzed issues in the area of funding mechanisms and related topics.

INTRODUCTION

Soon after work began on this water-resource development plan, one fact became clear: improving the effectiveness and realizing economies of scale for Kentucky's public water systems cannot occur unless relevant planning information is available for each and every system. It was also clear that this information did not exist—information for some systems was relatively complete, but information for a majority of the systems was incomplete or nonexistent. A mechanism to ensure that the needed information would be available in the future was developed as part of this plan.

Notwithstanding these deficiencies, a coherent picture of the drinking-water systems in Kentucky had to be prepared. To do this, public water-system information was gathered from a variety of sources: the Division of Water—Drinking Water Branch, the Public Service Commission, the Water Resource Development Commission, Area Development Districts, University of Louisville—Kentucky State Data Center, and, in short, anyone that had reliable data. It is inevitable that inconsistencies will arise when information from a variety of sources is pooled, interpolated, and extrapolated; every effort was made to minimize those inconsistencies.

In the end, we felt that a reasonable picture of Kentucky's water systems had been developed. We identified water-system needs and projected service extensions, both in the near and long term, together with estimated costs. We identified issues related to funding, management of water systems, and ways to provide more efficient and cost-effective drinking-water services, and made recommendations addressing those issues.

Recommendations were also made for institutional arrangements that would provide timely solutions to water-system problems, and would enhance planning and management to ensure the highest quality drinking-water service to all Kentuckians.

OVERVIEW OF PUBLIC WATER SYSTEMS IN KENTUCKY

In 1999 nearly 3.3 million Kentuckians, or almost 85 percent of the Commonwealth's residents, received water from public drinking-water systems^a. Of the remainder, about 420,000 (11 percent of the total population) used private domestic wells, and 175,000 (4 percent) relied on cisterns, hauled water, or other sources^b.

Six hundred seventy-eight public water systems^c served Kentuckians in 1999: 479 community systems, and 199 noncommunity systems. Of the noncommunity systems, 95 were nontransient and 104 were transient.

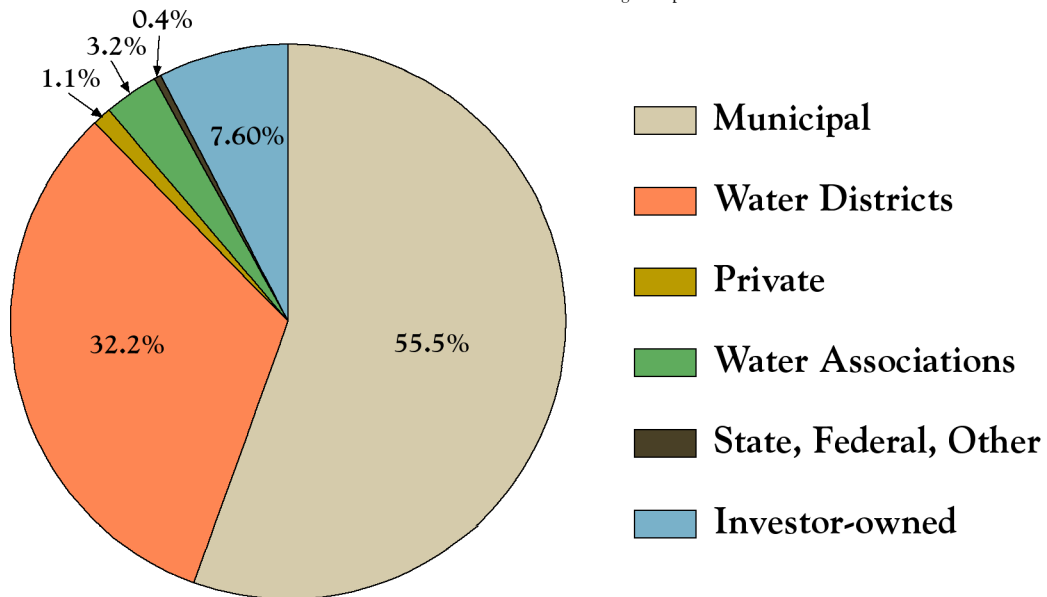
Classes and Types of Public Water Systems (KRWA, 1999)

Community Water Systems

- Municipal systems and public water utilities
- Water districts
- Water associations
- Private water systems
- Residential institutions and schools, including hospitals, nursing homes, homes for the aged, colleges, etc.
- Housing developments (public and private)
- Condominiums
- Multi-family housing complexes (all varieties)
- Mobile home parks

Noncommunity Water Systems

- Motels, hotels, resort areas
- Restaurants and other food-service places
- Parks and recreation areas
- Migrant labor and construction camps
- Camps for children and adults
- Gasoline service stations
- Schools (non-resident)
- Social and recreation clubs
- Industries
- Churches
- Campgrounds, swimming pools and beaches
- Marinas
- Airports
- Medical care facilities
- Shopping centers, office and commercial buildings
- Public buildings and public assemblies



Percent of all Customers

The Public Service Commission (PSC) regulates the rates and service of water districts, associations, and private companies serving about 530,000 customers.

According to the Kentucky Division of Water:

- Community systems served about 99.6 percent of those on public water, while noncommunity systems served 0.4 percent of the population and millions of tourists.
- Community systems served, on average, just over 2,500 customers. Half the community systems served fewer than 916 customers.
- The five largest systems served nearly one-third of all customers.
- 33 percent of the public water systems served 91 percent of those on public water.
- Four hundred fifty-one small (serving 501 to 3,300 people) and very small (serving 500 or fewer people) community water systems served 9 percent of those on public water.

WATER SOURCES

Streams, lakes, and reservoirs provided a source of water for about 2,870,000 Kentuckians, and wells, springs, mines, cisterns, and other sources provided water sources for the remaining 1 million residents, according to the DOW.

- More than 450 million gallons of treated water is produced each day by public water systems^c, about 90 percent is from surface-water sources, and 10 percent from ground-water sources.
- Two hundred eighty-six public water systems serving approximately 118,000 customers rely on ground-water sources.
- Three hundred ninety-two systems serving approximately 1,090,000 customers rely on surface-water sources.
- Fifty systems require an investment of \$153 million to develop new sources and intake facilities for raw water.

WATER TREATMENT

Community water systems provide about 160 billion gallons of drinking water to Kentuckians annually. The total treatment capacity of Kentucky' public water systems is 942 million gallons per day (MGD). The average daily production is 453 MGD or 48 percent of capacity.

- Community water systems have a combined treatment capacity of about 925 MGD and produce about 437 MGD (47 percent of capacity).
- Noncommunity systems have a treatment capacity of 17 MGD and produce about 15.7 MGD (94 percent of capacity).
- Total permanent capacity for 119 community systems treating ground water is 103 MGD. Average treatment plant capacity is 0.9 MGD.

- Total permanent capacity for 170 community water systems treating surface water is 822 MGD. Average treatment plant capacity is 4.8 MGD.
- Average treatment capacity per Kentuckian on public water is about 280 gallons per day.
- Average daily production per Kentuckian on public water is about 130 gallons.
- Average residential water usage is 65 gallons per capita per day^e.
- One hundred two community systems (35 percent of producers) have average daily production greater than 60 percent of treatment capacity.
- Seventy-one systems plan to expand their treatment capacity at an estimated cost of \$349 million^d.

WATER PLANT AND DISTRIBUTION

A conservative estimate extrapolated from PSC data^g reveals that Kentucky has at least \$3 billion dollars invested in plant and equipment needed to provide public water. About one-third of that investment has been depreciated.

- Annual gross revenues from the sale of water are about \$500 million.^h
- The average residential water rate is \$4 per 1,000 gallons. The average monthly residential water bill^e is about \$20.

Kentucky's public water systems provide:

- Storage capacity of 485 million gallons (MG) in 1,500 tanks.^f
- More than 40,000 miles of water lines.^f
- About 18,000 miles of water lines less than 6 inches in diameter.^f
- About 133 billion gallons (BG) of treated water each year sold by public water systems.^g
- About 32 BG^h (19 percent) of treated water that are unaccounted for each year.

In addition, 164 water-line rehabilitation projects are planned at an estimated cost of \$273 million, and 216 projects are planned to expand storage capacity at an estimated cost of \$260 million^d.

UNIVERSAL JURISDICTION

Safe and reliable drinking water should be available to all Kentuckians. Every Kentuckian should be within the service area of an existing water system. This is not to say that public water will be available to every Kentuckian, but that every Kentuckian will have the same assurance that drinkable water will be available.

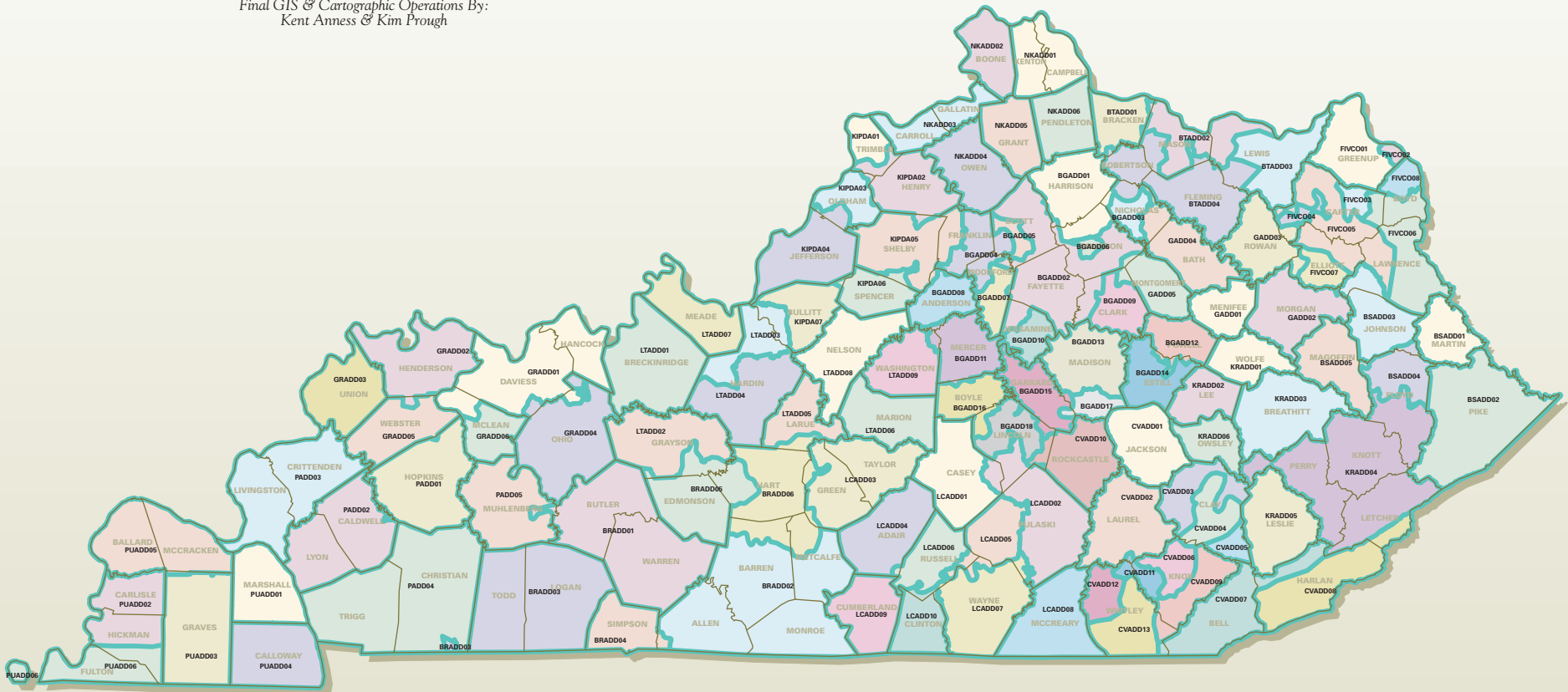
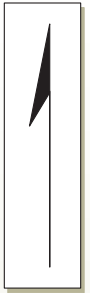
Proposed Water Service Delivery Districts Commonwealth of Kentucky

Prepared By:
Water Resource Development Commission

Department for Local Government
1024 Capital Center Drive, Suite 340
Frankfort, Kentucky 40601-8204
502-573-2382 -- 502-573-2939 fax
<http://dlgnt1.state.ky.us/wrdc/>

Bob Arnold, Chairman
Lawrence Wetherby, Executive Director

Final GIS & Cartographic Operations By:
Kent Anness & Kim Prough



LIMITATION OF LIABILITY: The Water Resource Development Commission has no reason to believe that there are any inaccuracies or defects in information incorporated in this work and make no representations of any kind, including, but not limited to, the warranties of merchantability or fitness for a particular use, nor any such warranties to be implied, with respect to the information or data furnished herein.



Percent of Households on Well Water in 1999

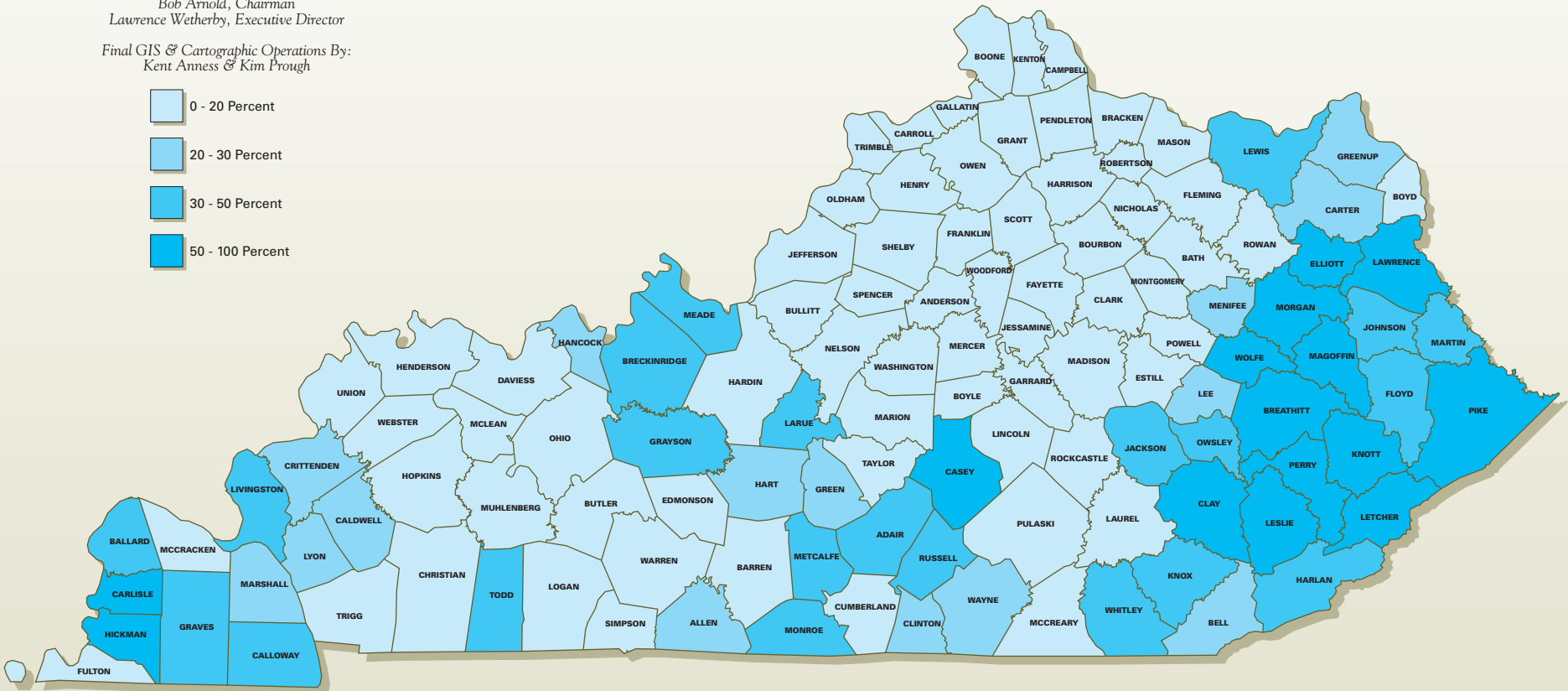
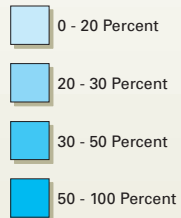
Commonwealth of Kentucky

Prepared By:
Water Resource Development Commission

Department for Local Government
1024 Capital Center Drive, Suite 340
Frankfort, Kentucky 40601-8204
502-573-2382 -- 502-573-2939 fax
<http://dlgnt1.state.ky.us/wrdc/>

Bob Arnold, Chairman
Lawrence Wetherby, Executive Director

Final GIS & Cartographic Operations By:
Kent Anness & Kim Prough



LIMITATION OF LIABILITY: The Water Resource Development Commission has no reason to believe that there are any inaccuracies or defects in information incorporated in this work and make no representations of any kind, including, but not limited to, the warranties of merchantability or fitness for a particular use, nor any such warranties to be implied, with respect to the information or data furnished herein.

Percent of Households on Other Water Systems in 1999

Commonwealth of Kentucky

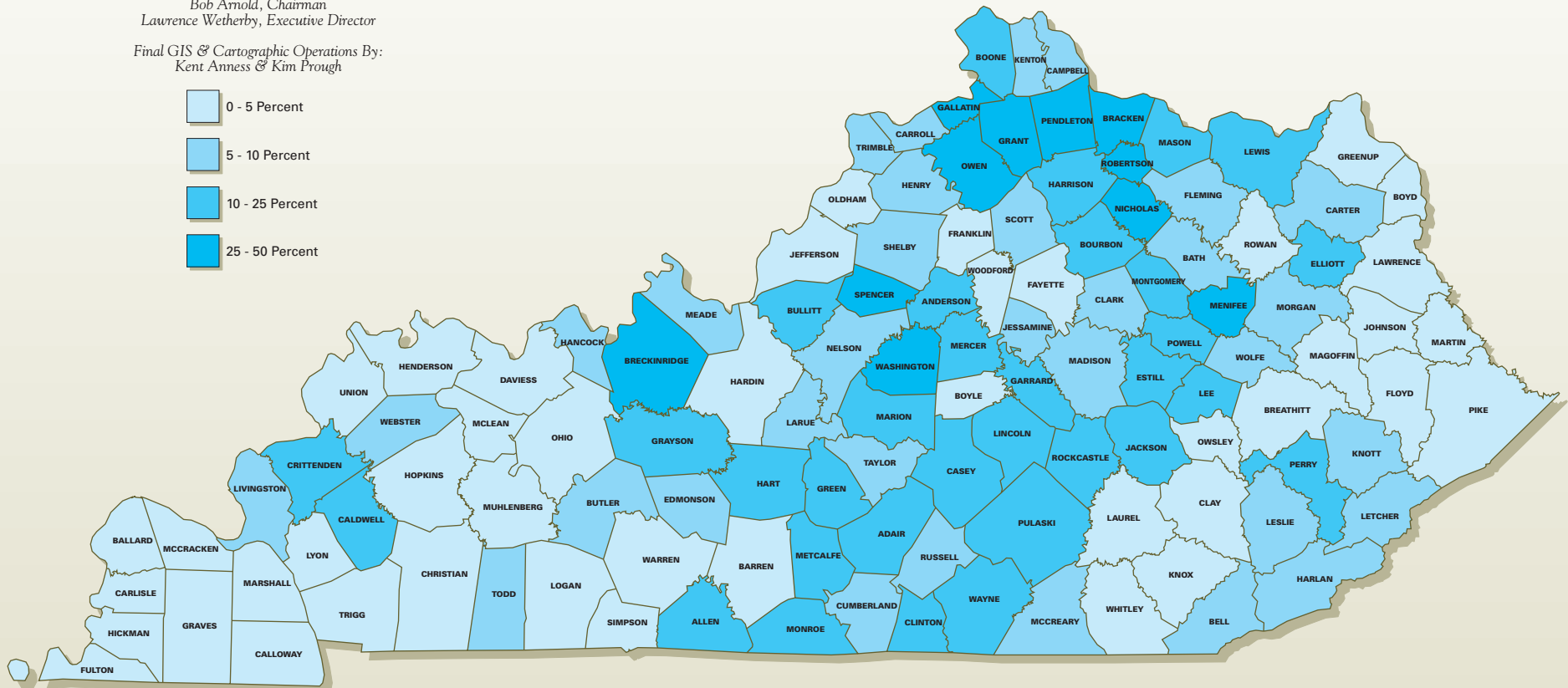
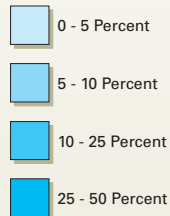
Prepared By:

Water Resource Development Commission

Department for Local Government
1024 Capital Center Drive, Suite 340
Frankfort, Kentucky 40601-8204
502-573-2382 -- 502-573-2939 fax
<http://dlgnt1.state.ky.us/wrdc/>

Bob Arnold, Chairman
Lawrence Wetherby, Executive Director

Final GIS & Cartographic Operations By:
Kent Anness & Kim Prough



LIMITATION OF LIABILITY: The Water Resource Development Commission has no reason to believe that there are any inaccuracies or defects in information incorporated in this work and make no representations of any kind, including, but not limited to, the warranties of merchantability or fitness for a particular use, nor any such warranties to be implied, with respect to the information or data furnished herein.

A preliminary identification of "water-service areas" has begun. We anticipate that a local management entity will be responsible for all water service within its geographic jurisdiction or service area.

PRIVATE DOMESTIC WATER SYSTEMS

Nearly 600,000 Kentuckians relied on private domestic water supplies in 1999. Private domestic supplies are predominant in many parts of eastern Kentucky and in the far western Purchase region. Private wells provided drinking water for 420,000 residents, primarily in the Jackson Purchase and Eastern Coal Field Regions. The remaining 175,000 residents, primarily in the outer Blue Grass Region and south-central Kentucky, relied on cisterns, hauled water, springs, or other sources.

The Eastern Kentucky Coal Field and the Jackson Purchase Region represent two very different environments in which ground water may have significant advantages over surface water supplies and distribution systems. The Eastern Kentucky Coal Field is characterized by rugged topography. Population density is low at the county scale, but businesses and houses are concentrated along valley bottoms. Domestic wells in valley bottoms generally produce sufficient water for single-home use, but not for larger users such as communities or school systems. Recent efforts to locate high-yield wells and use water stored in mined-out coal seams have been relatively successful, and development of these sources may provide reliable, high-quality water to small communities in the Eastern Kentucky Coal Field.

In the Jackson Purchase Region, aquifers yield water of sufficient quality and quantity to supply communities, industries, and households. In areas where ground water is plentiful, it may have significant advantages over surface water. Wells can be located close to the point of use, thereby reducing distribution costs. Ground water generally does not contain suspended sediments or contaminants from human activities, and is therefore simpler to treat for human consumption. And finally, ground-water supplies are less vulnerable to disasters such as flooding, earthquakes, landslides, and accidental chemical spills.

Ground water has sometimes suffered from a bad image with regard to bacterial contamination, but investigations have revealed that usually it is not the ground water that is contaminated, but that contamination results from improperly handled samples, an

improper distribution system, or improper well maintenance. Bacterial contamination generally occurs in hand-dug wells, improperly constructed wells, or poorly maintained wells, not in the aquifer. Properly constructed and maintained wells should provide a water source free of bacterial contamination.

WATER SYSTEM PROBLEMS

Many public water systems in Kentucky provide high-quality, dependable-quantity water and other services at reasonable prices. For these systems, revenues cover operations, debt service and reserve requirements; water losses are less than 15 percent; emergency and future capital project plans are in place; and they are rarely out of compliance with the Safe Drinking Water Act (SDWA). For a significant number of public water systems in Kentucky, however, this is not the case:

- Thirty-eight percent of public water systems are very small^c (serving fewer than 500 people), and unlikely to meet SDWA requirements on a consistent basis.
- Forty-two percent of systems regulated by the Public Service Commission had total revenues which failed to cover operating expenses (including depreciation) in 1997^e. (The only systems for which such data is available. The percentage may be higher or lower for municipal systems, which are not regulated by the PSC.)
- One hundred fourteen public systems operated in water-shortage response phases during the drought of 1999^f.
- Nearly one-third of systems regulated by the Public Service Commission had excessive water losses^e (greater than 15%). (Again, municipal systems are not included since the data is not available.)
- Twenty-seven systems are persistent violators of bacteria and turbidity standards^f.
- At least 335,000 households are not within 1,000 feet of a fire hydrant^f.

VERY SMALL SYSTEMS

Two hundred fifty-seven very small systems—80 community and 177 noncommunity—each serve an average of 153 people. These systems generally have very limited resources for capital investments, a small customer base, and serve lower-income customers who are often unable or unwilling to finance the higher rates necessary to sustain a viable system. Two-thirds of the very small water systems are privately-owned, making them ineligible for public financial assistance.

An additional major problem facing smaller systems is a lack of planning and accountability, which leads to inadequate or improper operation and little programmed maintenance. This

environment fosters and accelerates the trend of poor customer service, regulatory non-compliance, poor-quality drinking water and rapid deterioration of the physical plant. Unsatisfied customers and apathy soon follow, which results in further cycles of deterioration and system decline.

FINANCES

The lack of financial planning—establishing and maintaining an adequate budget and rate structure—for some water utilities has been an ongoing problem. Indeed, some decision-makers in charge of these deteriorating systems often boast that rates have not increased in 10, 15, or 20 years. To maintain such rate stability, expenditures for proper operation and maintenance are usually sacrificed. Unfortunately, this results in costly replacement and, eventually, complete system breakdown. Ironically, the current funding priority scheme rewards poor management and lack of attention to operation and maintenance. These systems are often given top priority for funding (typically a 100 percent grant is requested so that rates will not have to be increased) over systems that are among the better-managed and better-maintained. Thus, the cycle continues.

WATER SUPPLY

By late summer of 1999, western Kentucky was in severe drought conditions, and central and eastern Kentucky were in extreme drought conditions. At that time 114 public water systems operated under a water-shortage response that affected 52 counties: 77 systems were in the advisory phase— (voluntary conservation), 36 were in the alert phase— (voluntary conservation and banning of non-essential uses such as fountains, watering lawns and golf courses, washing sidewalks and buildings), and one system was in the critical, or emergency, phase— (banning all non-essential uses and socially or economically important uses such as commercial car washes, laundromats, restaurants, agricultural irrigation, schools, churches, and motels). About 40 percent of the affected systems had inadequate supply sources, and 60 percent had inadequate treatment facilities to meet the demands of the drought. The full drought summary is given in Appendix D.

UNACCOUNTED-FOR WATER

Unaccounted-for water is the gallons of water treated minus the gallons of water delivered and billed to the user, less fire protection and plant use. About \$28 million a year is lost because of unaccounted-for water. As a rule, the relative percentage of unaccounted-for water should not exceed 15 percent of the water treated. Higher losses in some areas may be unavoidable due to topography or man-made conditions (areas of mine subsidence, for example). A goal for most municipal systems would be no more than 5 to 10 percent unaccounted-for water, and for most rural systems no more than 10 to 15 percent. Actual gallons of lost water must also be considered, of course. Unaccounted-for water is typically a result of poor installation, lack of accurate metering, corrosion, and poor operation and maintenance of the distribution systems. Over time, distribution lines leak and lose more and more water. In essence, water is wasted, unavailable to customers, and is not billable. Water loss, in turn, requires excessive treatment-plant capacity and an accompanying increase in operation costs, higher water bills and lost revenues. If water losses are not considered when funding infrastructure projects, excessive capital expenditures can result, as well as increased operating and maintenance costs. Unless a leak-detection and repair program is established by or available to the system, the unaccounted-for percentage always increases over time. In some cases, the operating costs saved by elimination of the water loss could generate some of the capital needed to finance infrastructure development to serve other customers.

IMPACT OF WATER-LINE EXTENSION ON HEALTH

Providing safe drinking water has been the single most significant improvement in the protection of the health of Kentucky's citizens in this century. Epidemics of cholera, typhoid, and other waterborne diseases were common in Kentucky even into the 1940's. Deaths resulting from these diseases were not uncommon in the early part of this century. The extension of safe drinking water has made these diseases uncommon in today's society. If not carefully planned, however, the extension of water lines can *create* health risks. Water line extensions will in most cases extend into areas not served by a collector sewer system.

Existing Sewerlines and Proposed Waterline Extensions through 2020

Commonwealth of Kentucky

Prepared By:
Water Resource Development Commission

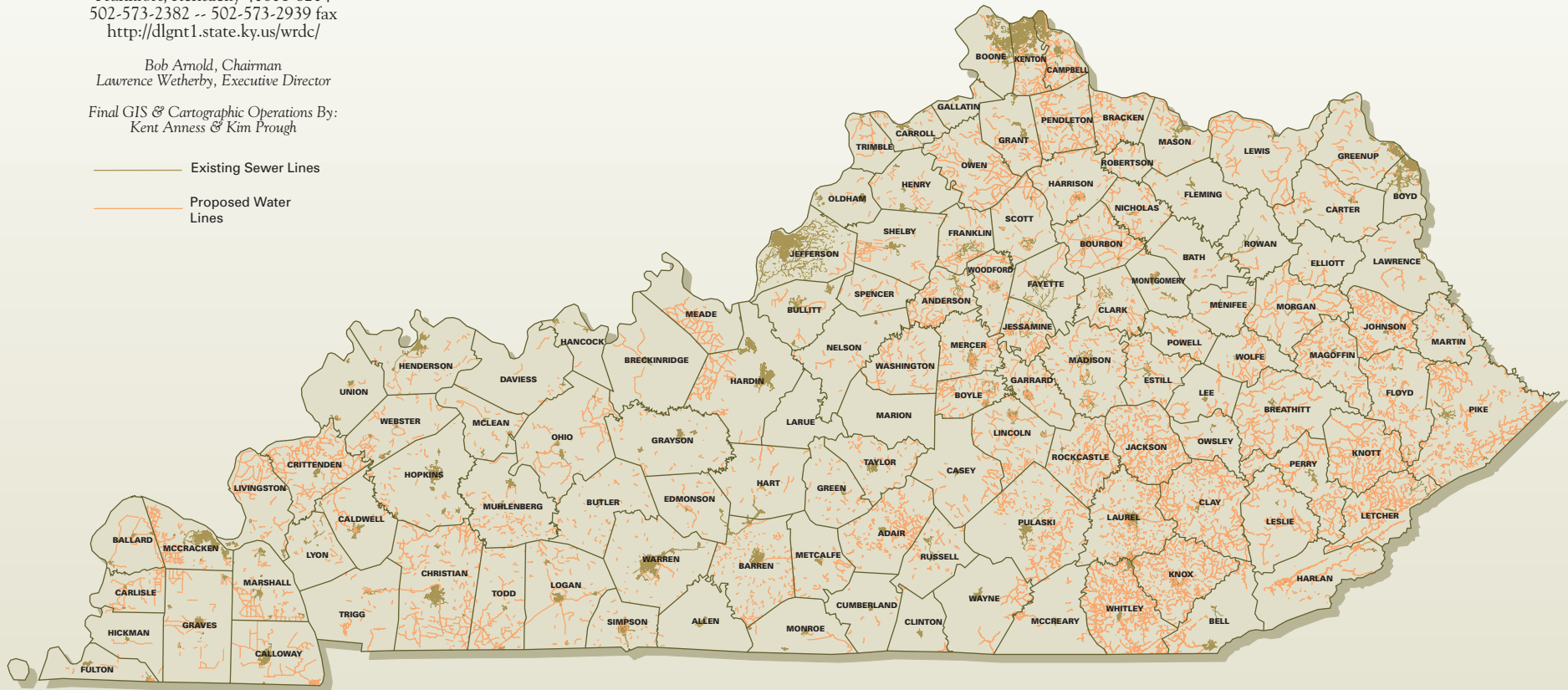
Department for Local Government
1024 Capital Center Drive, Suite 340
Frankfort, Kentucky 40601-8204
502-573-2382 -- 502-573-2939 fax
<http://dlgnt1.state.ky.us/wrdc/>

Bob Arnold, Chairman
Lawrence Wetherby, Executive Director

Final GIS & Cartographic Operations By:
Kent Anness & Kim Prough



- Existing Sewer Lines
- Proposed Water Lines



LIMITATION OF LIABILITY: The Water Resource Development Commission has no reason to believe that there are any inaccuracies or defects in information incorporated in this work and make no representations of any kind, including, but not limited to, the warranties of merchantability or fitness for a particular use, nor any such warranties to be implied, with respect to the information or data furnished herein.



Kentucky's local health departments have found that failure of existing septic systems is common in some areas when the buildings they serve are disconnected from wells or cisterns and connected to new water lines. These failures have been attributed to an increase in water consumption, which is common when a relatively unlimited supply of water (public water) is made available. In these cases the existing septic systems are not properly sized or sited to be able to handle the increased use.

In some cases there are no septic systems, and the amount of sewage discharged directly into streams or onto the surface of the ground is increased. This increases the public's risk of being exposed to waterborne diseases. The impact of inadequate septic systems and straight-pipe sewage discharges must be addressed to keep from losing the health benefits of water-line extensions.

RURAL FIRE PROTECTION

At least 335,000 Kentucky homes were further than 1,000 feet from the nearest fire hydrant in 1999. Ninety thousand of those homes were served by public water. Providing high-level fire protection to those homes would require replacing about 18,000 miles of small water lines with 6 inch lines and installing fire hydrants. The estimated cost for this upgrade is \$800 million. Estimated benefits represented by fire insurance rate reductions are \$300 million (\$27 million a year for 20 years at 6 percent). This does not imply that system upgrades for fire protection are not economically justified in all cases, but rather that the issue must be examined on a case by case basis.

In some rural areas the distance to the nearest hydrant is greater than three miles. For these areas, and areas where line replacements are not viable, alternative solutions must be sought. Dry hydrants—nonpressurized pipe systems that are permanently installed in existing lakes, ponds and streams and that provide means of suction supply of water to a tank truck—have been used in rural areas in other parts of the country and could reduce insurance rates by 45 to 50 percent.

Even with suitable water supplies for fire fighting, however, having an adequately equipped and trained fire department is also necessary.

MANAGEMENT ISSUES

The following issues have a significant impact on the effective and efficient provision of water service in Kentucky:

- New Federal regulations.
- Insufficient data upon which to base statewide and regional management decisions.
- No uniform system of accounting for public water systems.
- Institutional barriers to cooperative and coordinated management.

NEW REGULATIONS

In the future, the Federal government will be regulating more contaminants, based on research into adverse health effects. This means more costly and sophisticated treatment will be needed, higher water-quality standards will have to be met, more highly-trained operating personnel will be needed, and extensive and expensive testing for contaminants will be necessary. Under the SDWA alone, public water systems are subject to the following federal rules:

total coliform	surface water treatment
lead and copper	Phases II-V contaminants
lead ban	information collection
ground-water disinfection	interim enhanced surface-water
disinfection by-products	treatment
radiological contaminants	public notification, reporting and record-keeping

Rules to be promulgated cover:

- Operator certification
- Enhanced surface water treatment (long-term)
- Groundwater.
- Radon.
- Unregulated contaminants.
- Filter backwash/recycling.

These rules are complex and require systems to be well engineered, well operated, well maintained, and well managed. In addition, routine testing for contaminants, as well as reporting and record keeping, is mandatory and costly.

The growing requirements of the SDWA will force very small systems and their customers to evaluate the cost of “going it alone” versus the cost of other management alternatives.

Economies of scale will have to be considered.

PLANNING AND MANAGEMENT DATA

Planning for and managing Kentucky's public water systems cannot occur without relevant information for each and every system. The development of the GIS-based Water Resource Information System (WRIS), a component of the Water Resource Development Commission's planning process, is a benchmark in the use of technology that places Kentucky in the forefront nationwide. The data contained in the system will be universally available and beneficial to all levels of government, down to individual system operators. The database must be kept current to retain its usefulness, however.

Information for some systems is relatively complete, but for a majority of the systems is incomplete or non-existent. Various pieces of public water-system information are kept in different agency databases—the Division of Water—Drinking Water Branch, the Public Service Commission, the Water Resource Development Commission, Area Development Districts, and the University of Louisville—Kentucky State Data Center—according to different agencies' needs.

A mechanism for the regular collection of complete and comprehensive data for every public water system in Kentucky must be established if the WRIS is to achieve its full potential as a tool to support water and sewer development planning in Kentucky.

UNIFORM SYSTEM OF ACCOUNTING

The lack of relevant financial data for all water systems, based on uniform accounting procedures, creates problems. Without universal adherence to uniform accounting principles the true cost of providing water service is difficult, if not impossible, to determine, and sound fiscal management is impossible. The lack of common, uniform accounting standards currently prevents policy makers, funding agencies, and regulators from comparing the operations and management of different water systems.

RATE REVIEW AND REGULATION

The lack of a comprehensive system of rate review and regulation discourages the formation of wholesale regional water suppliers and retail regional water suppliers, and also discourages municipal utilities from providing wholesale water service to water districts and associations

(in order to avoid any involvement with the Public Service Commission). The lack of a rate-review system also complicates the formation of countywide or regional systems because of mistrust or lack of confidence in the rates charged to residents outside the municipal area.

INSTITUTIONAL BARRIERS

Institutional barriers, often created or imposed by legislation, impede cooperative and coordinated management. Territorial and parochial attitudes tend to make municipalities, districts, and associations feel obligated to provide service only within their territorial boundaries or within municipal limits. Specifically, municipalities often view annexation and service as the same issue, rather than two separate issues. Some municipal governments are reluctant to provide retail service to un-annexed areas; residents often want the service but do not want to be annexed. Conversely, in some situations municipalities are not interested in annexing an area and, therefore, not interested in providing service to the area.

In addition, county lines serve as an arbitrary hindrance to service: a water system in a neighboring county may be a citizen's closest, most feasible provider of service, but the water system is not willing to cross county lines to provide the service. Limits to system boundaries—real or imagined—should be removed or lessened where improvements in service, operations and economies of scale can be realized.

FUNDING

FUNDING ISSUES

Until 1960, nearly all water infrastructure was developed by cities, and most of the development was funded through one type of bond mechanism or another. After 1960, the Federal government began investing in safe drinking water and wastewater treatment for community economic development. Through the years, a wide array of Federal aid programs with varying missions became available to communities for repairing and expanding their systems. These grants and low-interest loan programs typically benefit rural or low-income communities. The legislation creating the Kentucky Infrastructure Authority gave small

Existing & Proposed Waterlines through 2020 Commonwealth of Kentucky

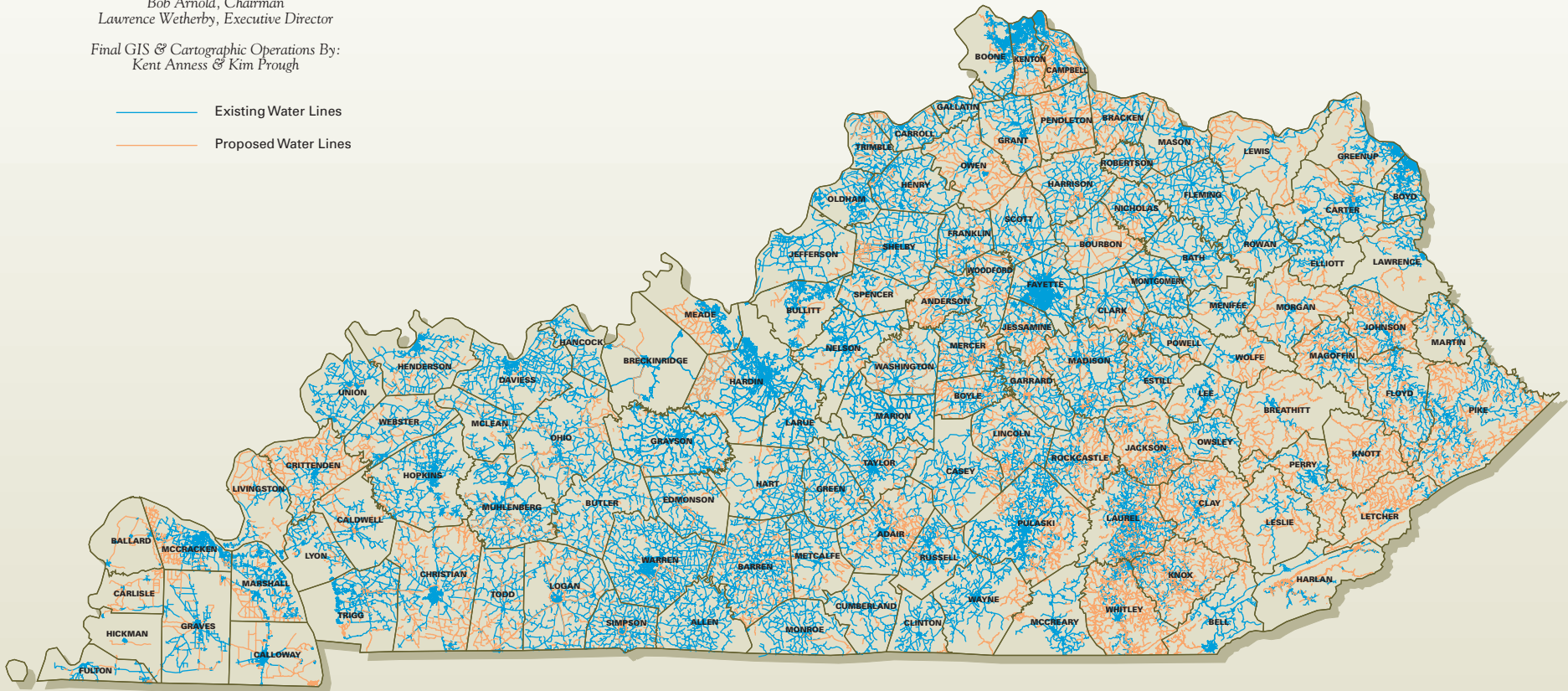
Prepared By:
Water Resource Development Commission

Department for Local Government
1024 Capital Center Drive, Suite 340
Frankfort, Kentucky 40601-8204
502-573-2382 -- 502-573-2939 fax
<http://dlgnt1.state.ky.us/wrdc/>

Bob Arnold, Chairman
Lawrence Wetherby, Executive Director

Final GIS & Cartographic Operations By:
Kent Anness & Kim Prough

- Existing Water Lines
- Proposed Water Lines



LIMITATION OF LIABILITY: The Water Resource Development Commission has no reason to believe that there are any inaccuracies or defects in information incorporated in this work and make no representations of any kind, including, but not limited to, the warranties of merchantability or fitness for a particular use, nor any such warranties to be implied, with respect to the information or data furnished herein.



Percent Growth by Proposed Waterline Extension Projects through 2020

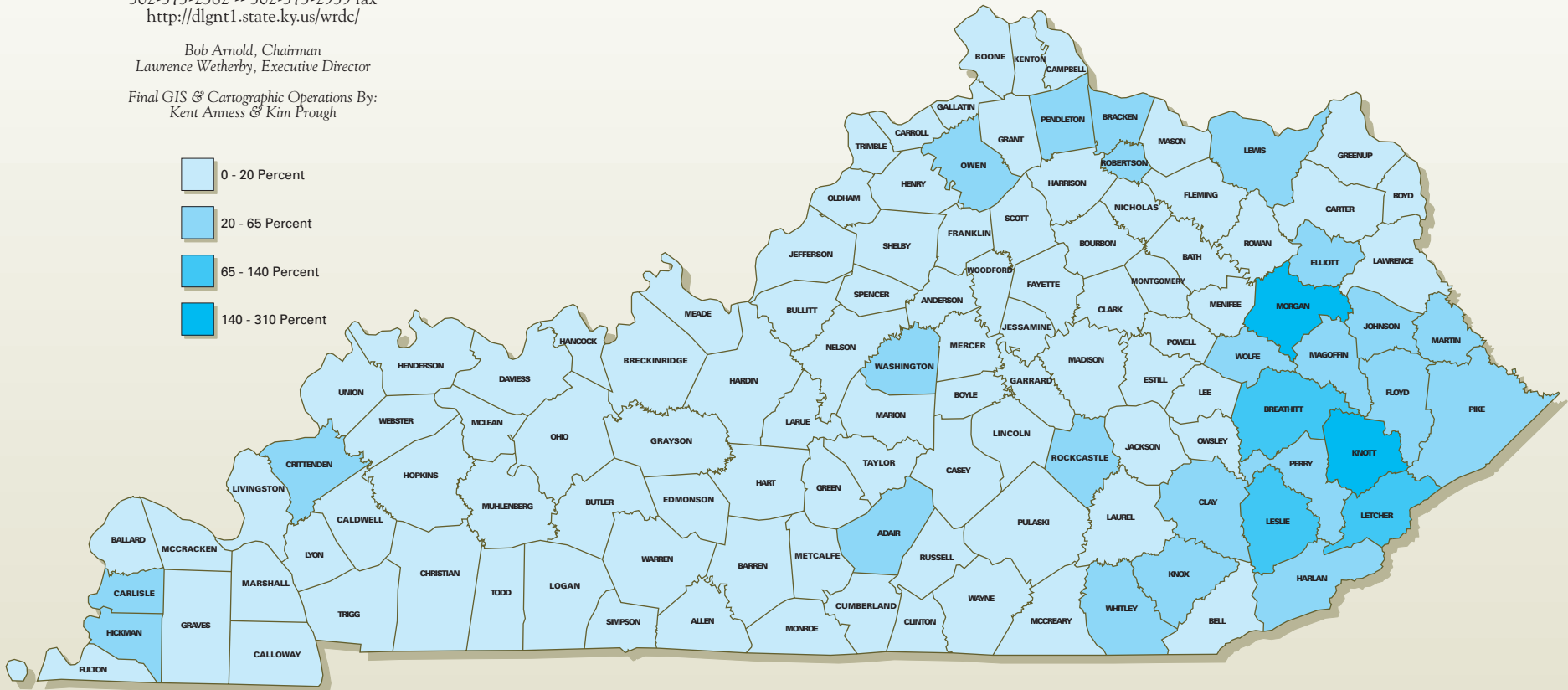
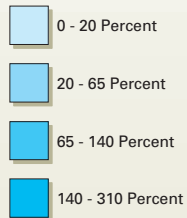
Commonwealth of Kentucky

Prepared By:
Water Resource Development Commission

Department for Local Government
1024 Capital Center Drive, Suite 340
Frankfort, Kentucky 40601-8204
502-573-2382 -- 502-573-2939 fax
<http://dlgnt1.state.ky.us/wrdc/>

Bob Arnold, Chairman
Lawrence Wetherby, Executive Director

Final GIS & Cartographic Operations By:
Kent Anness & Kim Prough



LIMITATION OF LIABILITY: The Water Resource Development Commission has no reason to believe that there are any inaccuracies or defects in information incorporated in this work and make no representations of any kind, including, but not limited to, the warranties of merchantability or fitness for a particular use, nor any such warranties to be implied, with respect to the information or data furnished herein.



Percent of Households on Public Water Systems in 2020

Commonwealth of Kentucky

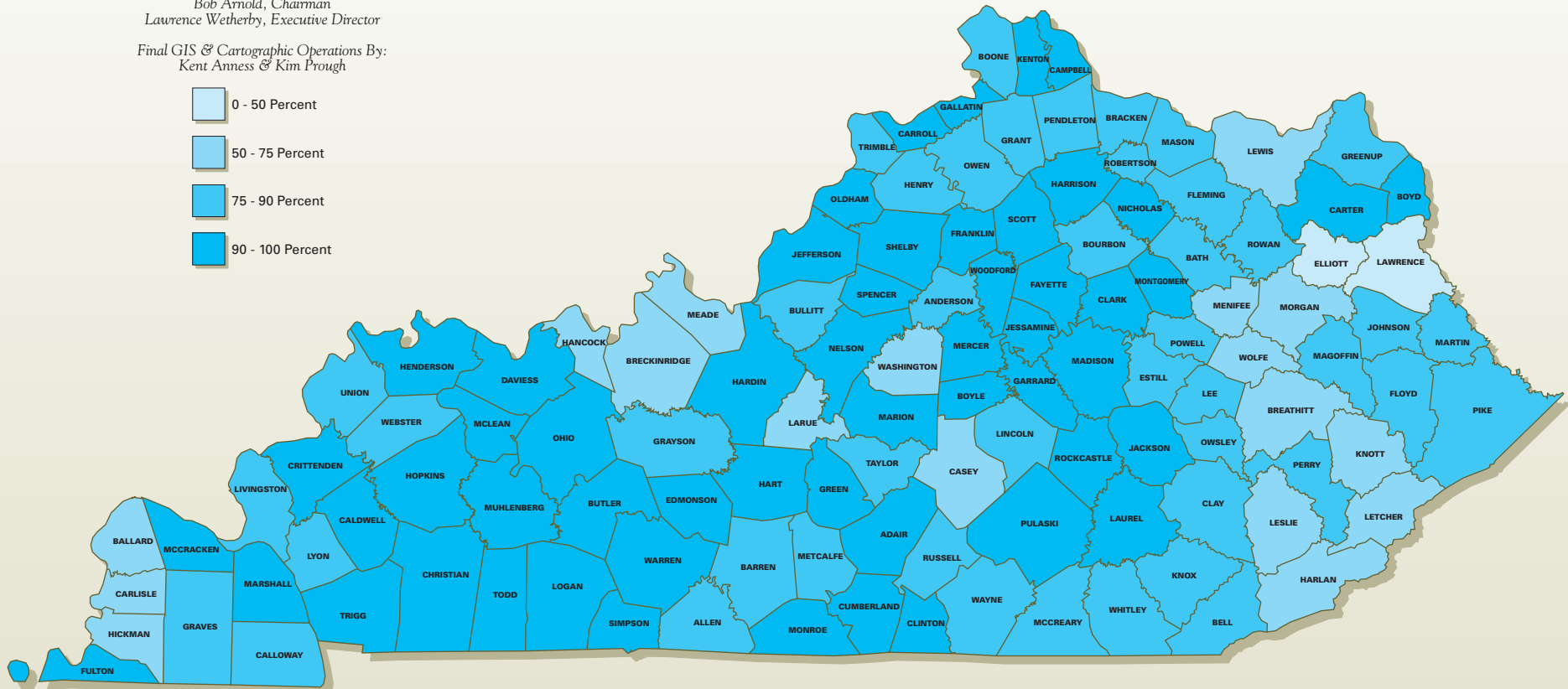
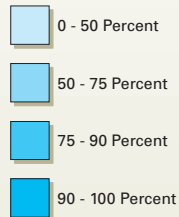
Prepared By:

Water Resource Development Commission

Department for Local Government
1024 Capital Center Drive, Suite 340
Frankfort, Kentucky 40601-8204
502-573-2382 -- 502-573-2939 fax
<http://dlgnt1.state.ky.us/wrdc/>

Bob Arnold, Chairman
Lawrence Wetherby, Executive Director

Final GIS & Cartographic Operations By:
Kent Anness & Kim Prough



LIMITATION OF LIABILITY: The Water Resource Development Commission has no reason to believe that there are any inaccuracies or defects in information incorporated in this work and make no representations of any kind, including, but not limited to, the warranties of merchantability or fitness for a particular use, nor any such warranties to be implied, with respect to the information or data furnished herein.



communities all across Kentucky a new source of low-interest money with which to 'match' Federal grant money.

At present, virtually no water-systems development project is able to garner 100 percent grant funding, and nearly every project requires the participation of several Federal and State funding programs. Consequently, the need for integration and coordination is critical.

State and Federal funding and regulatory agencies recognize and generally acknowledge that there are inefficiencies within the funding review process for water projects. The members of the Interagency Group of Financing/Regulatory Agencies identified the following issues:

- Baseline funding requirements are different for different funding agencies, creating problems in project screening and ranking.
- Confusion, delay, and increased costs are caused by lack of a centralized funding review process.

The baseline funding requirements of agencies can affect project planning at an early stage. Agencies determine what constitutes a project that will be accepted for funding review. Structuring projects to meet these threshold requirements will determine project scope and effectiveness. Such requirements vary from agency to agency, however, and do not always screen out inappropriate projects, or facilitate those most needed.

Historically, capital utility projects in Kentucky have been conceived, developed and funded in an environment defined by several major State and Federal funding agencies pursuing various mandates, each with its own priorities, requirements, and procedures. Agency personnel have attempted to minimize the resulting problems by coordinating project funding and administration with one another; nevertheless, the overall funding process remains a rather ad hoc and disjointed "system" with well-recognized drawbacks.

Requirements and funding cycles vary. Applicants apply to inappropriate agencies or do not know where to apply, while agencies are asked to consider many proposals that are ill-matched to their program goals. Applicants hire consultants to help them navigate the maze, who are then sometimes perceived by the funding agencies as playing them one against another. Projects based on overly complex funding packages must sometimes acquire three or more funding approvals, often in a particular order. Confusion, delays and increased costs are inevitable. In summary, the system can be manipulated by those who understand it well, and

poses a daunting barrier to those who do not. At the same time, funding agencies miss an opportunity to jointly promote policy objectives on which all could agree.

INFRASTRUCTURE FUNDING NEEDS

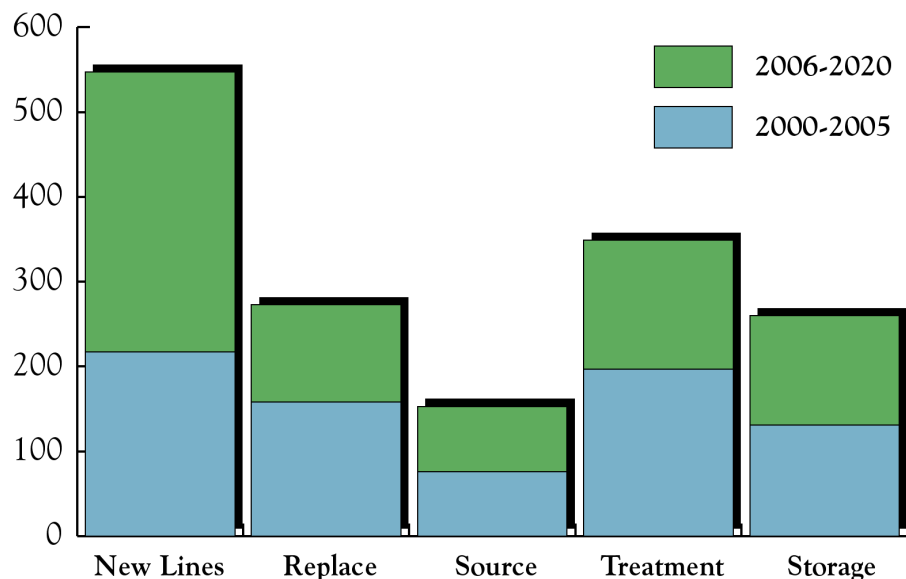
Area Development Districts, working with local governments and water officials, identified public projects to extend water service throughout the state. Projects necessary to support water-line extensions were also identified, including:

- Replacing old lines.
- Developing new sources.
- Providing additional treatment.
- Providing additional storage and pumping.

Projects were identified for immediate priority (2000-2005) and for long-term priority (2006-2020)^d. Project costs were estimated at \$1999 and are summarized in the following table:

Public Water Projects	New Miles of Line	New Households Served	Estimated Cost in \$1000	Line Rehab Estimated Cost in \$1000	Source Improvement in \$1000	Treatment Needs In \$1000	Tanks & Pumps in \$1000	TOTAL NEEDS In \$1000
2000-2005	5,117	42,530	216,535	158,165	76,355	197,124	130,800	778,979
2006-2020	6,822	59,229	329,569	114,901	76,550	151,752	129,101	801,873
TOTAL	11,939	101,759	546,104	273,066	152,905	349,876	259,901	1,580,852

Public Water Projects (2000-2020), in Millions of Dollars



Proposed Waterline Extension Cost through 2020

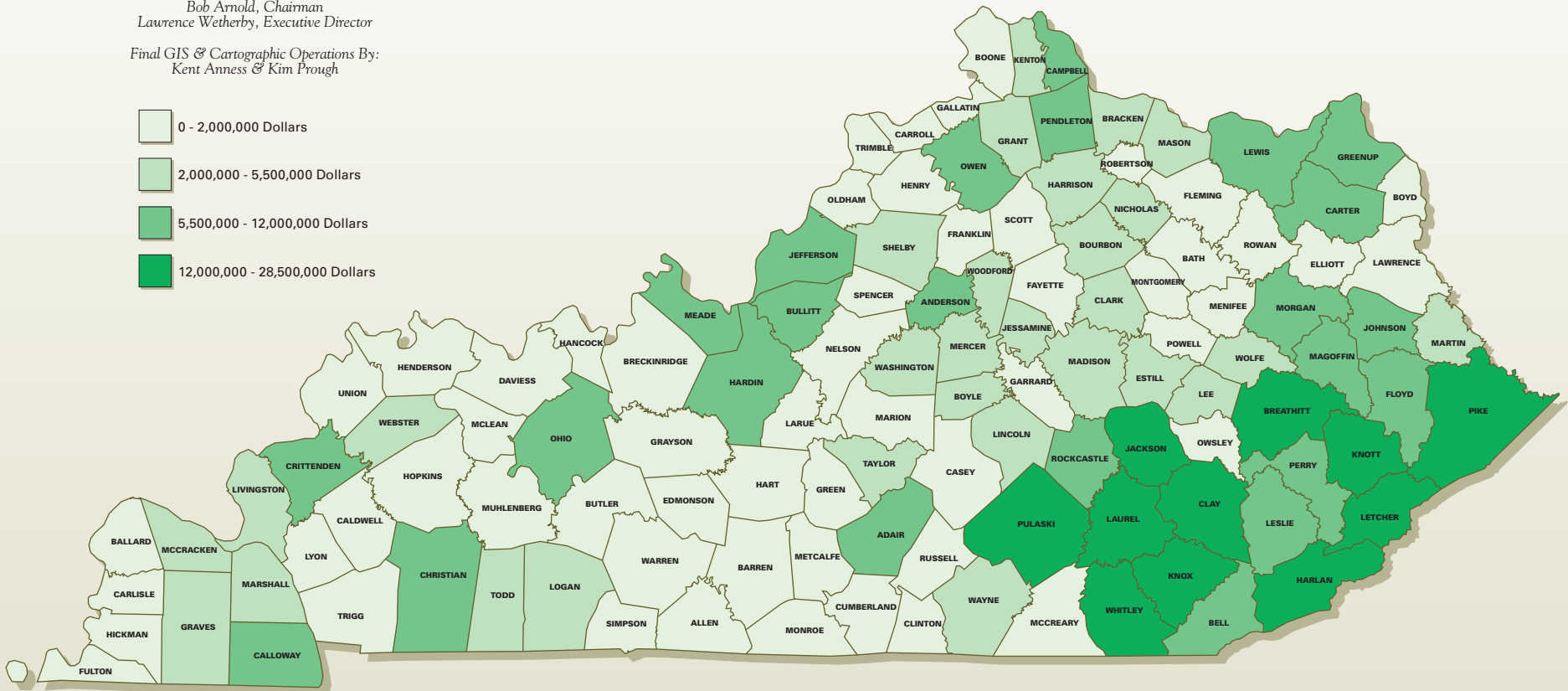
Commonwealth of Kentucky

Prepared By:
Water Resource Development Commission

Department for Local Government
1024 Capital Center Drive, Suite 340
Frankfort, Kentucky 40601-8204
502-573-2382 -- 502-573-2939 fax
<http://dlgnt1.state.ky.us/wrdc/>

Bob Arnold, Chairman
Lawrence Wetherby, Executive Director

Final GIS & Cartographic Operations By:
Kent Anness & Kim Prough



LIMITATION OF LIABILITY: The Water Resource Development Commission has no reason to believe that there are any inaccuracies or defects in information incorporated in this work and make no representations of any kind, including, but not limited to, the warranties of merchantability or fitness for a particular use, nor any such warranties to be implied, with respect to the information or data furnished herein.



Proposed Source Development Cost through 2020

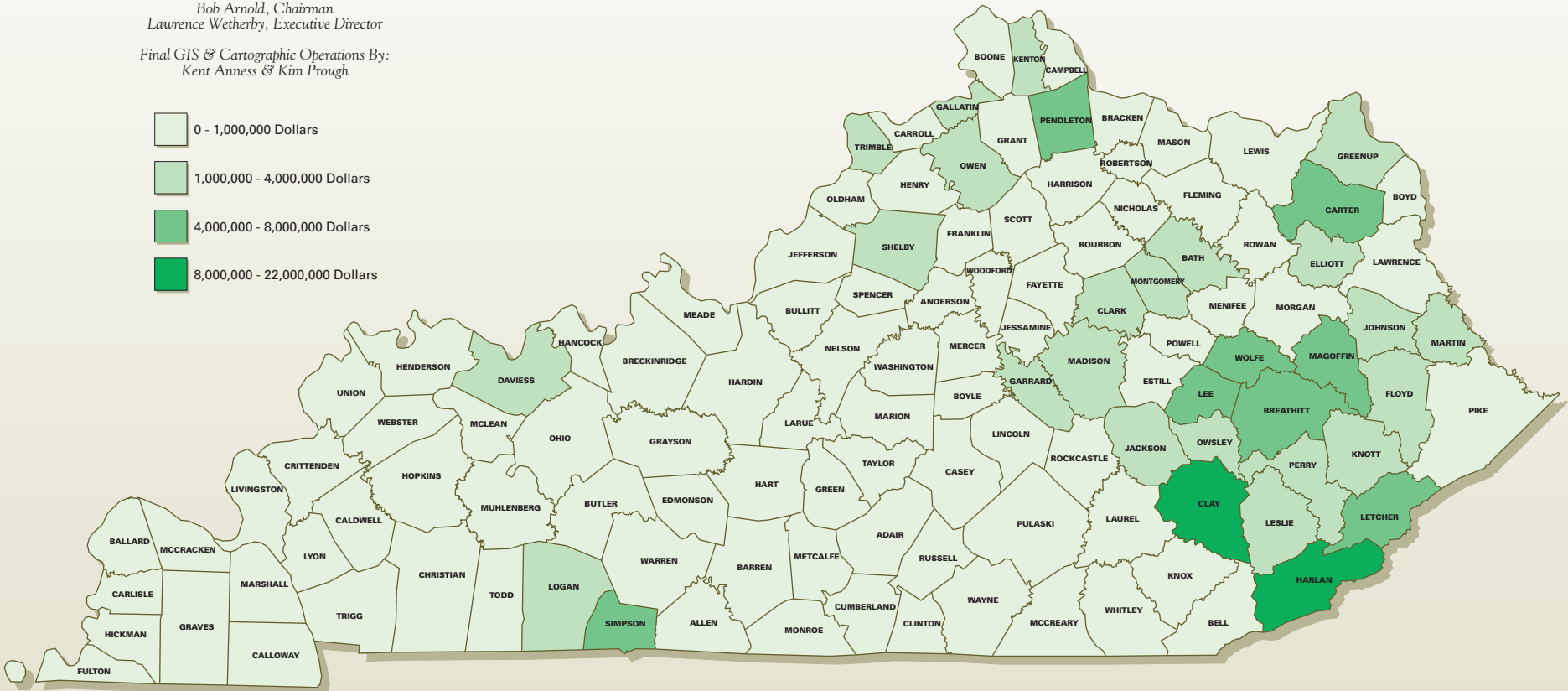
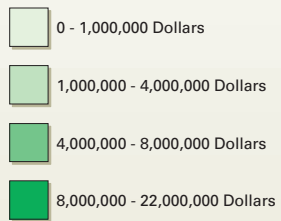
Commonwealth of Kentucky

Prepared By:
Water Resource Development Commission

Department for Local Government
1024 Capital Center Drive, Suite 340
Frankfort, Kentucky 40601-8204
502-573-2382 -- 502-573-2939 fax
<http://dlgnt1.state.ky.us/wrdc/>

Bob Arnold, Chairman
Lawrence Wetherby, Executive Director

Final GIS & Cartographic Operations By:
Kent Anness & Kim Prough



LIMITATION OF LIABILITY: The Water Resource Development Commission has no reason to believe that there are any inaccuracies or defects in information incorporated in this work and make no representations of any kind, including, but not limited to, the warranties of merchantability or fitness for a particular use, nor any such warranties to be implied, with respect to the information or data furnished herein.

Proposed Water Treatment Plant Upgrade Cost through 2020

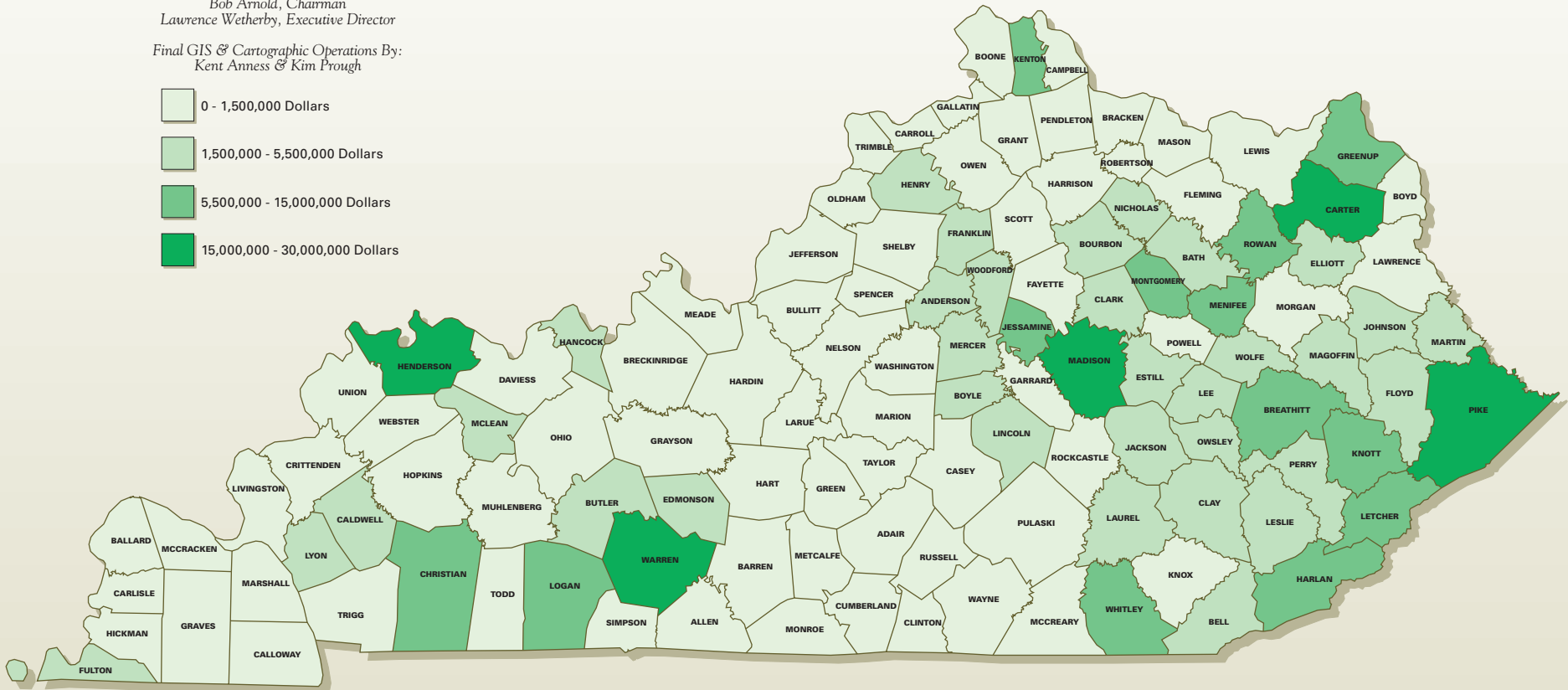
Commonwealth of Kentucky

Prepared By:
Water Resource Development Commission

Department for Local Government
1024 Capital Center Drive, Suite 340
Frankfort, Kentucky 40601-8204
502-573-2382 -- 502-573-2939 fax
<http://dlgnt1.state.ky.us/wrdc/>

Bob Arnold, Chairman
Lawrence Wetherby, Executive Director

Final GIS & Cartographic Operations By:
Kent Anness & Kim Prough



LIMITATION OF LIABILITY: The Water Resource Development Commission has no reason to believe that there are any inaccuracies or defects in information incorporated in this work and make no representations of any kind, including, but not limited to, the warranties of merchantability or fitness for a particular use, nor any such warranties to be implied, with respect to the information or data furnished herein.

Two hundred eighty-three community water systems identified 1,080 projects to extend water service; 12,000 miles of water lines would be added to accommodate areas not currently served. Significant growth will occur in eastern Kentucky due to line extensions. Throughout the state the projects would add 59,000 households from 2000 to 2005, and 43,000 households from 2006 to 2020. Ninety-one percent of Kentucky’s residents would be served by public water service after planned expansions were completed. Of those not on public water, 6 percent would be served by private wells, and 3 percent would rely on cisterns, hauled water, springs and other sources.

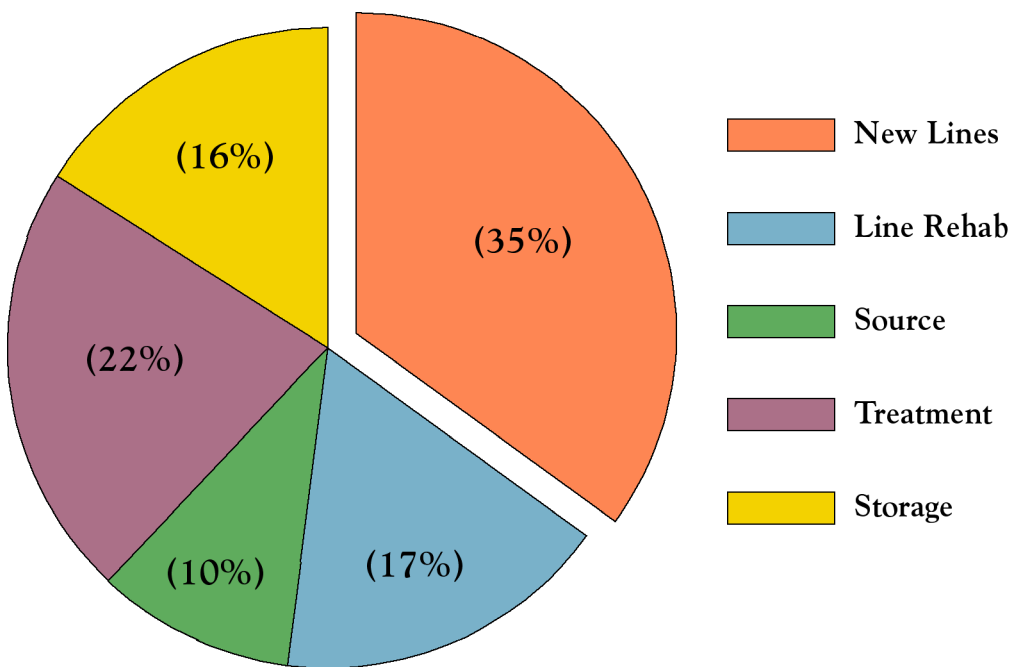
Infrastructure needs were also identified:

- Fifty systems require an investment of \$153 million to develop new sources and raw-water intake facilities.
- Seventy-one systems plan to expand their treatment capacity, at an estimated cost of \$349 million.
- One hundred sixty-four water-line rehabilitation projects are planned at an estimated cost of \$273 million.
- Two hundred sixteen projects are planned to expand storage capacity, at an estimated cost of \$260 million.

In all, about \$1.6 billion would be needed from 2000 to 2020 to fund the projects.

Investment varies significantly by county.

Percent of Infrastructure Investment Required for Locally Identified Projects



The projects identified do not represent all the investment in public water infrastructure that will be needed during the next 20 years, but do represent our best estimate of perceived needs by local officials and water-system administrators.

Based on estimates of the Environmental Protection Agency (1997), it is calculated that an additional \$1.2 billion will be required in Kentucky to meet existing and proposed regulations of the Safe Drinking Water Act and associated infrastructure needs. The EPA estimates were based on sample surveys of representative water systems across the United States.

Combining the SDWA requirements with locally identified needs indicates that the investment in public-water infrastructure needed over the next 20 years will be at least \$2.8 billion, or about the equivalent of the capital equity in the existing infrastructure. Amortized over 20 years at 5%, the investment is \$156 million per year. Based on the projected number of customers, and on uniformly-adjusted rates (residential, commercial, industrial, other), this represents \$75 per year per household, or about \$6.25 per month. The current average household monthly bill is \$20.

FUNDING SOURCES

Options for obtaining financial assistance for a water-system project fall into two categories: public funds and private funds. Public funds are either grants or loans. Competition for these funds is very keen. Agencies that provide funding to Kentucky's water systems and the typical annual funding amount are:

	Funding
USDA Rural Development	\$24,260,000 grant
USDA Rural Development	14,380,000 loan
Community Development Block Grant (CDBG)	11,805,000 grant
Kentucky Infrastructure Authority (KIA)	12,000,000 loan
Appalachian Regional Commission (ARC)	2,630,000 grant
Economic Development Administration (EDA)	1,600,000 grant
Abandoned Mine Lands Trust Fund (AML)	3,500,000 grant
Kentucky Association of Counties (KACO) CoLT Program	1,100,000 loan
Kentucky League of Cities (KLC)	15,000,000 loan
Kentucky Area Development District (ADD) Small Issuer Loan Program	250,000 loan
Total	\$86,525,000

Note: KACO, KLC and ADD funds are sometimes used for interim financing.

Each of these programs has specific goals, eligibility requirements, application procedures, and selection criteria. These are summarized in the table below. Additional information may be obtained from the respective agencies, the Kentucky Rural Water Association, or the Area Development Districts.

Private funds are obtained by issuing revenue bonds, borrowing from commercial lending institutions, or customer contributions. Bond financing is not feasible for most small water systems. In many cases, projects to be financed are relatively small. Certain issuance costs are fixed, and for small bond issues this effectively increases the interest rate, consuming an unacceptably high percentage of revenues. In addition, the credit rating of most water systems would be less than "investment grade" because they have neither the size nor the stability to service their debt with the reliability demanded by financial markets. There would, therefore, be few or no buyers for bonds of a small, low-income community.

Generally, bond issues need to be in excess of a million dollars to be attractive to buyers. Therefore, a water system must have good, established credit before it will be beneficial to go to the open market to sell bonds.

Another method, though not commonly used and applies only to water districts and 1st class cities, is assessing property owners for the cost of water lines and facilities crossing and benefiting their properties. Most systems have elected to finance their projects through other methods because of political considerations or economic reasons. For more information refer to KRS 74.130-74.250 and KRS 96.230-96.310.

Current funding sources will not meet the infrastructure investment needs of the next 20 years. New sources of funding will be required.

Water System Funding Sources

Source of Funds	Eligibility	Type of Assistance	Criteria
USDA Rural Development (formerly FmHA)	Cities, counties, and special purpose districts with population of 10,000 or less	Loans, grants	Restore, improve, and expand water and wastewater facilities in low income communities. Projects that truly serve rural areas receive priority in project selection.
Community Development Block Grant (CBDG)	Cities of at least 50,000 residents and counties of at least 200,000 residents	Grants, maximum \$750,000	Complex formula based on population, poverty level, housing conditions and local economic growth. Benefit low to moderate income, prevention or elimination of blight or slum, water and sewer projects, etc.
Kentucky Infrastructure Authority (KIA)	Governmental agencies	Loans	Three programs currently offer financing for planning, design and construction of water systems. Criteria vary by program. Most support a goal of either safe drinking water, environmental protection or economic development.
Economic Development Administration (EDA)	State and local governments, economic development districts, regional planning districts, etc.	Grants, Loans	Water and wastewater facilities serving industries, access roads serving industrial parks, improvements, etc. Priority given to improve opportunities to attract and/or retain industry; assist in creating or retaining jobs; benefit long-term unemployed and low-income families.
Area Development Fund (ADF)	Political subdivisions, special districts, etc.	Grants	Capital projects eligible are extension and installation of water to public facilities; construction of public facilities; and purchase of major equipment items.
Abandoned Mine Land Reclamation Program (AML)	Political subdivisions of the Commonwealth	Grants	Water line extensions may qualify for funding if degradation of water supply is linked to pre-1977 coal mining impacts.
Appalachian Regional Commission (ARC)	Units of local government, not-for-profit corporations in 49-county area	Matching Grants Up to 80%	Projects must either create and retain jobs, or provide basic public facilities in 36 ARC-designated "distressed" counties.
Kentucky Association of Counties (KACO) CoLT Program	Counties, special districts over 5,000 population.	Loans	Supports many kinds of capital projects including waterline and other utility projects. Criteria of financial and demographic stability apply. KACO temporarily acquires title to the item or facility financed and leases it back to the project sponsor during loan payback.
Kentucky League of Cities (KLC) Financial services	Municipal-ities	Loans	Analogue to the KACO program above, with a similar lease-back arrangement. Fixed or variable market-based rates, short- or long-term. Finances leases, purchases, general-obligation debt for many purposes. Approval based on analysis of repayment ability.
Council of Area Development Districts(ADDs) Small Issuer	Cities, counties, special districts	Loans	Can finance virtually any public project or purchase. Lease-back arrangement. Fixed interest rates based on market rates. Loan Program Applicants can have no more than \$5 million in tax-exempt debt in the current calendar year.

OVERVIEW OF RECOMMENDATIONS

Based on the information gathered by the Water Resource Development Commission for the Water Resource Information System, and on the management and funding issues that emerged as a result of meetings and discussions with the Technical Advisory Committee and all the participants recognized in the Acknowledgments, the following recommendations are made.

1. Maintain and expand the Water Resource Information System to provide a comprehensive database for each public water system.
2. Increase planning, management, technical, financial, reporting and rate-setting assistance for small systems.
3. Establish statewide water-loss audit, leak-detection and repair program.
4. Promote and encourage water-system regionalization. Barriers to regionalization—real or imagined—should be removed or reduced where improvements in service, operations and economies of scale can be realized.
5. Identify appropriate mergers of water systems. Encourage such mergers with incentives.
6. Provide assistance to "unattractive" merger candidates.
7. Encourage rates for water systems that are based on cost-of-service principles.
8. Establish uniform accounting and reporting procedures applicable to all public water systems.
9. Improve the effectiveness of baseline funding requirements for water projects. Establish and promulgate system development standards as to materials, quality, size specifications, and installation inspection.
10. Establish a centralized review process for funding water projects. Establish a centralized review and approval process for development plans.
11. Increase the use of technology in the process of funding water projects.
12. Provide quality- and quantity-assurance support for small private water systems such as homeowner wells.
13. Require adequate on-site sewage treatment before allowing hookup to public water.
14. Promote "universal jurisdiction," in which a local management agency is responsible for *all* water service within its geographic jurisdiction or service area. Establish certified service territories, in which a water service system is responsible for making reasonable extensions of service to all persons within its service area.
15. Develop potential water supplies in eastern Kentucky for small community systems.
16. Examine alternatives to improve fire protection in rural areas.
17. Develop new sources of funding.

RECOMMENDATIONS

1. *Maintain and expand the Water Resource Information System to provide a comprehensive database for each public water system.*

The Water Resource Development Commission should continue to develop of the Water Resource Information System. The Commission should aggressively expand, update, and verify data and information in its GIS system—and seek to continually improve and make its mapping and database available to all potential users. The Commission should continue to work with the various State agencies and water systems to ensure that the WRIS meets the needs of those agencies and those systems. The WRIS should be a resource of increasing value for all the agencies, while eliminating multiple reporting requirements and wasteful duplication of piecemeal database maintenance systems.

The mechanism for the collection, maintenance, analysis, and reporting of planning and management data for all public water systems must be more firmly established. The WRIS must be afforded increased financial and stakeholder buy-in so as to provide:

- One central source of information for all water systems. All agencies and water systems would participate in, support, and share in this database. Data would be used to assist water systems with the resolution of problems and to become sustainable.
- A central source with state-of-the-art database software for maintenance, analysis, and reporting capabilities.
- A drinking-water database supported by mandatory annual reporting for every public water system. Different water-system categories may have different levels of reporting requirements.

The WRDC should provide for an annual update of the WRIS, integrated with all relevant information sources.

2. *Increase planning, management, technical, financial, reporting and rate-setting assistance for small systems.*

A water resource management entity to work with the Water Resource Development Commission should be established. The function of the entity would be to:

- Establish and enforce system development standards, uniform accounting and reporting formats, and other related functions.
- Mediate and/or arbitrate intra- or inter-system disputes.
- Identify problem systems, empanel a community-peer group, and initiate investigations for remedial procedures.

In carrying out its responsibilities, the management entity would use the services of such groups as the Kentucky Rural Water Association (KRWA) with its Circuit Rider Program, the Kentucky League of Cities, the KRWA-Kentucky Association of Counties Peer Review Program, the Rural Community Assistance Program (RCAP),

private water-management companies, State agencies, universities, and non-profit corporations.

3. Establish a statewide water-loss audit and a leak-detection and repair program.

A water-loss audit and leak detection and repair program, particularly tailored to small systems with high water losses, should be established as part of an overall support program for small systems. Financial support for the program could come through a special fund established by setting aside a percentage of recovered revenues from each system serviced by the program.

4. Promote and encourage water-system regionalization. Barriers to regionalization—real or imagined—should be removed or reduced where improvements in service, operations and economies of scale can be realized.

There are various concepts of "regionalization," depending on context, and the resulting working definitions and operational models are not always compatible. Accordingly, regionalization is defined here as:

- The creation of expanded service areas which take in a large geographic area or multi-service systems;
- The creation of regional water commissions; or
- The regional operation of cluster systems, and/or management of multiple systems, where it is not feasible to connect to a regional system; or
- The combination of two or more existing facilities into a new or selected regional treatment facility; or
- The elimination of a treatment facility connected to another public water-systems treatment facility; or
- The prevention of new withdrawals by requiring connection to an existing facility.

Given the demands of the Safe Drinking Water Act and the need to replace aging infrastructure, as well as the need to expand service into areas not currently served, the Commonwealth should promote the development of regional water systems where such systems will achieve greater economies of scale, improve the quality of service, and make water service more affordable. Regionalism should not be viewed as an end, but rather as a means to an end—better service at affordable prices.

Funding agencies should continue trying to incorporate the concept of regionalization into their policies and should be encouraged to provide even greater emphasis to funding regional projects.

To the extent possible, implementation of regional concepts in drinking-water supplies should be at the community level, and be supported by legislative and regulatory mandates. Existing authorities (for example, capacity-development and

local water-supply plans) should encourage local solutions to drinking-water problems. Similar programs should be established for wastewater treatment.

County water supply plans and the proposed public water projects listed in the Water Resource Information System should serve as the first step in identifying the need for any project that involves treatment facilities (rehabilitation, expansion, or new facilities) or has an impact on more than one public water system. This is the best way to integrate regional concepts prior to the actual design of individual projects.

The development of regional water systems currently suffers from the lack of any review of the economic need for water plant projects. No agency currently reviews *all* proposed projects to determine if such projects are consistent with the public convenience and necessity, nor does any agency have the power to prevent those projects that are not. Legislation should be considered that provides for review of the economics of *all* new construction.

5. Identify appropriate mergers of water systems. Encourage such mergers with incentives.

Regionalization could be greatly promoted through more aggressive use of the PSC's statutory authority to order merges of water districts. (See KRS 74.361). The PSC has exercised such power sparingly.

The PSC should review those instances where two or more water systems are located within a single planning area and determine whether the merger of such systems would "eliminate wasteful duplication of costs and efforts, result in a sounder and more businesslike degree of management" and result "in greater economies, less cost, and a higher degree of service to the general public." Where a merger would achieve those results, merger proceedings should be initiated.

While the PSC has the authority to merge water districts and water associations, no agency has the authority to require the merger of other water systems. Unless the power to require such mergers, when appropriate, is conferred, regionalization efforts will have limited results. Consideration should be given to vesting an appropriate agency with the authority to merge *any* public, non-private, water system when such merger clearly promotes the public interest.

To encourage voluntary mergers whenever possible, statutory regulatory obstacles to merger should be identified and removed. For example, KRS 106.200 requires a special election be held to obtain voter approval of the sale or lease of a municipal

water system². Such requirements delay and impede regionalization. This provision should be changed to allow approval of such action by the local legislative body.

6. Provide assistance to "unattractive" merger candidates.

To further encourage voluntary mergers, the Commonwealth should provide financial and technical assistance to unattractive merger candidates. Struggling water and sewer systems often have debt service or old, poorly maintained lines that make them unattractive candidates for mergers. Other systems are reluctant to take over these struggling systems because they do not want to pass along this additional burden to their existing customers.

To remedy this situation, a special fund should be created to provide grant assistance for debt reduction or necessary capital improvements. This would make mergers more financially feasible and therefore more attractive. Initial funding of \$1 million is recommended, and it should be reevaluated after the first year of availability.

7. Encourage rates for water systems that are based on cost-of-service principles.

At present, the PSC has authority to set or review rates of districts, associations and private systems under its jurisdiction. No entity has comprehensive authority to set or review rates for all public water or wastewater systems, or to arbitrate disputes between all water and/or sewer systems.

The lack of a comprehensive system of rate regulation poses an obstacle to regionalization efforts. Municipal utilities are established and operated by city officials without additional oversight, which can result in a variety of aberrant situations. Municipal utilities commonly charge higher rates to non-resident customers than resident customers. Although this often reflects real differences in the cost of providing service, sometimes the difference generates a subsidy to the respective city. Some municipal utilities use this subsidy to fund other city services such as garbage collection or public works projects. Differential rates may also be deployed as an inducement for non-residents to agree to annexation in order to receive lower rates. An overall rate structure that is kept artificially low for reasons of political expediency may endanger the financial stability of the system and its ability to make needed improvements.

² In the case of sixth-class cities, if two-thirds of the petitioned customers approve, a sale or lease is allowed in an emergency under KRS 96.5405.

Non-resident customers have no recourse in the face of arbitrary rate structures. They cannot vote in municipal elections, and courts have shied away from reviewing municipal rate-making practices.

The lack of legal authority by a single entity to review and approve all systems' rates creates the following problems:

- *Discourages the formation of wholesale regional water suppliers.* In some instances, local government entities could retain their individual identities, but serve as regional providers. For example, a municipal water system would provide treated water within a countywide area, but not operate the countywide distribution system; a county or special district would operate the distribution system. The fear that a municipal utility would exercise its monopoly power and impose excessive charges on county residents discourages the formation of regional systems, and leads county governments to construct additional drinking-water treatment plants rather than rely upon municipal utility facilities.
- *Discourages the formation of direct regional service suppliers.* Where a municipal utility could efficiently serve as the regional distributor of water or sewer services, county residents oppose such arrangements because of fears of excessive rates and the lack of any recourse when such rates are proposed.
- *Discourages municipal utilities from providing wholesale water service to water districts and associations, in order to avoid any involvement with PSC.*

Any attempt to promote regionalization must therefore consider the lack of comprehensive rate regulation. It must further consider whether changes in the present system of rate regulation are required, or whether alternatives are available that will afford protection against unreasonable rates and promote customer confidence that a regional system will have fair, just, and reasonable rates.

The following alternatives are suggested:

- Place systems under the jurisdiction of a single entity for economic regulation. This would also allow the establishment of a uniform system of accounts to be used by all systems (see Issue 8 below). This action would require legislation.
- All grant and loan agencies should require systems receiving funds to establish and maintain adequate, cost-based rates as a condition of receiving funding. Some lending agencies currently do require this, but enforcement has often been inconsistent and therefore ineffective. Effective use of this option presupposes that all major funding agencies could acquire and exercise the authority to impose penalties for failure to comply.

Another significant determining factor for customer rates, in addition to operation and maintenance costs and the factors discussed above, is the utility system's history of success (or lack of success) in obtaining grants and low-interest loans to finance capital expenditures. Partly as a result of this, rates sometimes vary dramatically among otherwise similar systems. Funding agencies can lessen such inequalities by considering the current level of rates, along with community or household income, in their priority formulas.

8. Establish uniform accounting and reporting procedures applicable to all public water systems.

Water systems account for operations in various formats and reports to different agencies. At present, water districts, associations, and private companies are required to use the PSC's uniform accounting system⁴ and report annually. Unless a water district seeks Federal or State financial assistance, an audit by an independent accounting firm is not conducted.

Municipal water systems are not required to account for their water operations in a uniform manner, and vary with regard to their reporting requirements. Neither are those systems required to account for their operations as separate and distinct entities from other municipal operations, which often leads to a co-mingling of utility revenues and expenses with other municipal activities. Potential problems are:

- Other municipal activities are subsidized with water or wastewater revenues.
- The true cost of providing water service is difficult to determine, and the cost, if determined, is often viewed with skepticism by the ratepayers (both retail and wholesale).
- Unless the water utility is separately accounted for, the municipality not be able to determine if it is self-supporting.
- Unless the water utility is separately accounted for, municipalities have difficulty developing cost-based rates for end users. This could, and presumably often does, result in one class of customers subsidizing another.
- Combined accounting prevents ready comparison of financial information between utilities. This includes comparing utilities regulated by the PSC to utilities *not* regulated by the PSC, and comparing utilities not regulated by the PSC to each other.

All municipally owned or operated utility systems should be required to adopt a uniform system of accounting for water operations as separate and distinct entities. In addition to alleviating the above problems, this will help those systems plan and control the operations of the water system. It will also provide the leadership of local, State, and Federal agencies with a tool to aid in planning, and better assure high-quality service to the customers.

- Because of the cost and difficulty that systems may have in converting to a different method of accounting, the shift to a uniform system should be phased in.
- Given that the PSC lacks jurisdiction over the municipally owned systems, the funding agencies should make adopting a uniform system a requirement for obtaining funds. Failure to comply with that requirement should result in the forfeiture of the funds or the ineligibility of the system to obtain funds in the future. This may require the funding agencies to acquire definite legal authority to impose penalties.

⁴ PSC requires all public water utilities to use the uniform system of accounts established by the National Association of Regulatory Utility Commissioners. These standards were developed by the National Council of Government Accounting.

9. Improve the effectiveness of baseline funding requirements for water projects.

We have an opportunity to improve the effectiveness of baseline funding requirements for capital construction projects. This can be done by rationalizing these requirements where they vary significantly among funding agencies, and extending their scope in certain areas to reflect across-the-board priorities for coordinated regional planning, capacity development, and cost-effective solutions to problems.

- Applicants should be required to obtain certification from the Division of Water that all relevant planning requirements have been met (for example, facility plans for wastewater; county water-supply plans for drinking water; preliminary engineering reports for all treatment facilities) prior to filing for State clearinghouse comments and funding assistance.
- For areas without public sewers, applicants should be required to obtain certification from the local health department that existing on-site sewage disposal is adequate to treat the additional wasteload resulting from connection to a public water supply. If sewage disposal is found to be inadequate, then the application should address what actions are to be taken to upgrade the sewage disposal to an adequate level. The certification or corrective action plan should be obtained *prior to* filing for State clearinghouse comments and funding assistance.
- Applications for funding should include the following information:
 - How the project promotes the efficient use of limited natural and financial resources.
 - What impact the project will have on the utility's operational, financial and managerial capacity.
 - If the utility does not have capacity, an explanation of how it plans to achieve capacity.
 - What other options have been considered in addition to the proposed project.
 - Why those options were rejected.
 - Whether the least-cost option was selected, and if not, why.

All of these items would be included in the planning requirements listed above, and would either be transferred to, or referenced in, the application for funding.

- As a condition for funding a project with either loans or grants, require the utility to (through the appropriate procedures) establish and/or maintain rates that will, at a minimum, cover all of its operating expenses (excluding depreciation) and its total annual debt service plus any additional required coverage.

10. Establish a centralized review process for funding water projects.

Better arrangements are possible for the centralized review and funding of water projects, as has been demonstrated by other states that have more streamlined and efficient systems. Some groundwork for positive change has been laid by the Interagency Group of Financing/Regulatory Agencies. This group has met informally during the past 3 years to discuss the issues outlined in this report. The WRDC should assist the participating agencies to evolve this group into a more formal, permanent coordinating mechanism with defined responsibilities. The desired result, which is well within the range of possibility, would be a system that offers much

easier access to applicants, more efficient use of resources, and a useful mechanism for implementing uniform policy.

- The State should build upon and accelerate the work that has been done to date by the interagency group, further developing that group to serve as a "gateway" or "single point of entry" for applicants that would make recommendations on funding eligibility. The more formalized group would, as now, include representatives of all relevant funding agencies. Among its initial tasks should be to coordinate the development and use of a uniform funding application and application checklist, and develop a clear schedule of what types of projects qualify for what types of funding and the criteria for ranking those projects. Continuing responsibilities would include reviewing all funding requests for baseline compliance with State policy, referring proposals to the most appropriate funding source, and recommending the most feasible combination of technology and funding to solve a given problem.
- Either through the interagency group or other venues, the funding agencies should jointly address the following additional goals:
 - Use funding leverage to help systems establish or maintain capacity and promote compliance with the SDWA.
 - Combine environmental review processes from all agencies into one process.
 - Develop consistent and reasonable standards for project engineering fees.
 - Coordinate more cross-agency policy training to promote mutual awareness of unavoidable differences in mandates, priorities and requirements.
- The State clearinghouse review process is a well-established mechanism that could serve as a vehicle to achieve additional policy goals. As the Division of Water develops the "capacity development" strategy, the possibility of incorporating the objectives of that program into the clearinghouse project review process should be explored.
- Kentucky should identify states that currently operate successful integrated grant- and loan-processing systems for utility-system capital funding, and seek to incorporate the desirable features of those systems into such a system in Kentucky.

11. Increase the use of technology in the process of funding water projects.

Generating consistent GIS-based data by project sponsors would help to maintain the WRDC database and enable the funding agencies to use this technology in support of their project evaluation and review processes.

- The funding agencies should collaborate in the development and use of a common electronic project application.
- Project sponsors should be required to electronically file digital as-built plans with DOW, PSC, or WRDC as a condition of a grant or loan.
- All project plans should be incorporated into the WRDC database. Consideration should be given to having reviewing agencies require submission of digital plans, and filing with the WRDC. The reviewing agencies would promulgate new regulations on this point.

12. Provide quality- and quantity-assurance support for small, private water systems such as homeowner wells.

Some citizens of the Commonwealth have not been able to benefit from public water service because of economics or simple geographical constraints. Others are pleased

with the water provided by their existing wells or other systems. For the long-term health and economic well-being of the public, we propose that, as a first step in implementing the concept of "universal jurisdiction", a local management entity (city, water district, private company) be designated to provide a voluntary, fee-based service for the systematic, periodic inspection, testing, and servicing of private, small, domestic water systems. The goal is to raise the level of quality assurance for these systems to that of public water systems. Objectives of the program would be to:

- Provide cost-effective periodic water sampling and water-system inspections to owners of private water supplies.
- Provide results of water testing and system inspections to the owners so that they understand the current condition of their water systems.
- Provide practical advice on the best and most cost-efficient solutions to water-quality and water-quantity problems.
- Make follow-up visits to determine if the solution appears to be successful.
- Advise homeowners on the installation of new private water supplies.

KRS 211.345 already requires the Cabinet for Health Services to provide these services. They are provided through local health departments acting as the Cabinet's agent. These services are not as available as they need to be, however, since there is no funding source other than scarce local health tax dollars. Therefore, local health departments are hesitant to promote these services. If these services were provided on a cost-reimbursement basis, the cost would be around \$65 to \$70. This cost estimate would address issues that currently exist with test result validity. We therefore **recommend that the WRDC ask for the statutory authority to allow local health departments to charge a fee for these services, and request an appropriation to subsidize the cost.**

In the case of private, domestic water wells, we recommend that continued support be provided so that training courses and educational programs can be developed by such groups as the DOW--Groundwater Branch, the Kentucky Ground Water Association, and others, to assist certified water-well drillers in their well-servicing activities.

13. Require adequate on-site sewage treatment before allowing hookup to public water.

Areas without sewers should not be funded for public water until applicants obtain certification from their local health departments that existing sewage disposal is adequate to treat the additional waste load that could be expected to result from connection to a public water supply. The certification or corrective action plan should be obtained *prior to* filing for State clearinghouse comments and funding assistance.

For areas with individual on-site treatment systems, each on-site system should be serviced and inspected prior to hookup to public water, to ensure that the system functions properly and will continue to function properly under anticipated future load increases.

14. Promote "universal jurisdiction," in which a local management agency is responsible for all water service within its geographic jurisdiction or service area. Establish certified service territories, in which a water service system is responsible for making reasonable extensions of service to all persons within its service area.

Safe and reliable drinking water should be available to all Kentuckians. Every Kentuckian should be within the service area of an existing water system. This is not to say that public water will be available to every Kentuckian, but that every Kentuckian will have the same level of assurance that drinkable water will be available.

15. Develop potential water supplies in eastern Kentucky for small community systems.

Lack of water supplies is a major problem that inhibits diversified economic development in Appalachia, principally the Eastern Kentucky Coal Field. City and county governments, and Area Development Districts have struggled to develop adequate water supplies for individual households, small communities, larger population centers, and industry for many years. Much of this region of the state is characterized by steep terrain and highly dissected topography that limit the occurrence and distribution of surface water, and make adequate ground water difficult to locate.

Ongoing efforts to develop water supplies for communities in this region having known water-supply problems should be supported. In particular, potential water supplies from abandoned, underground coal mines and high-yield water wells located along linear features in the earth's surface should be identified. Both of these techniques have great potential to enhance water supplies in the region.

16. Examine alternatives to improve fire protection in rural areas.

Dry hydrants have been used in many rural areas of the United States to improve fire protection. Dry hydrants are non-pressurized pipe systems permanently installed in existing lakes, ponds and streams that provide means of supply of water to a tank truck. The benefits of dry hydrants are several.

- Fire insurance rates may be reduced 45 to 50 percent.

- Energy savings are realized by fire departments.
- Economic development is promoted.
- Road maintenance is improved.
- Treated water supply is conserved.

The use of dry hydrants should be examined in areas where conventional protection with treated public water is not feasible.

17. Develop new sources of funding.

Existing funding sources will not meet current requirements to replace aging infrastructure and to comply with the Safe Drinking Water Act, much less expand service areas. New sources of funding must be developed.

A part of the funding solution could be to permanently authorize the Infrastructure Revolving Fund, the Kentucky Infrastructure Authority's Fund B, to be used for construction of drinking water projects without regard to economic development aspects of projects. The 1998-2000 budget allows the Authority to utilize such funds to develop a program for construction of drinking water projects, but that authorization will expire at the end of the biennium.

GLOSSARY

Capacity Development - The technical, managerial, and financial ability to meet each rule promulgated under the Safe Drinking Water Act. States are required to establish strategies to assist systems in developing and maintaining this capacity. States must have the authority to prevent the formation of new systems without capacity. The Natural Resources and Environmental Protection Cabinet has this authority in Kentucky and is responsible for promulgating administrative regulations. States without this authority or that do not develop and implement a strategy will have up to 20 percent of their Drinking Water State Revolving Fund allotment withheld.

Community water system - A public water system that serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents. Water districts, water associations, and municipally-owned systems are the most common forms of community water systems (401 KAR 8:010, Section 1, Subsection 71a).

Customer - A billable entity (residential, commercial, industrial, water system, other) purchasing water. Not to be confused with an individual person or resident.

Domestic water supply - Household water supply.

Large water system - Public water system serving 10,001-50,000 people.

Medium-sized water system - Public water system serving 3,301-10,000 people.

Municipal system - A city-owned system. Such systems are not regulated by the Public Service Commission. See KRS 278.010 (3).

Non-community water system - A public water system that serves at least 15 service connections used by people for a period less than year-round or that serves an average of at least 25 individuals daily at least 60 days of the year, but less than year-round. A seasonal campground that operates water-distribution or water-treatment facilities is a typical example of a non-community water system (401 KAR 8:010, Section 1, Subsection 71b).

Non-transient non-community water system - A non-community water system that serves at least 25 of the same people over 6 months of the year.

Potable - drinkable

Public water system - A system for the provision of water for human consumption to the public, having at least 15 service connections or regularly serves an average of at least 25 people daily at least 60 days of the year. There are two types of public water systems: community and non-community (401 KAR 8:010, Section 1, Subsection 71).

Reconnaissance level cost estimates - Project cost estimates based on the known cost of other similar projects in similar areas.

Reconnaissance level plan - Generalized plan to achieve a specific goal based on actual project(s) in a similar area.

Semi-public water system - A water system made available for drinking or domestic use that serves more than three families but does not qualify as a public water system.

Small water system - A public water system serving 501 to 3,300 people.

Transient non-community water system - A non-community water system that does not regularly serve at least 25 of the same people over 6 months of the year.

Very large water system - A public water system serving more than 50,000 people.

Very small water system - A public water system serving fewer than 500 people.

Water association - A non-profit corporation created pursuant to Kentucky's corporation laws. Chapters 273 and 74 of the Kentucky Revised Statutes control the creation and organization of a water association. An Association is administered by a board of trustees or board of directors elected by the association members. It is created by filing articles of incorporation with the Kentucky Secretary of State in Frankfort after obtaining format approval of the PSC.

Water district - A special district created by the county fiscal court pursuant to Chapters 65 and 74 of the Kentucky Revised Statutes. A water district is a legal entity similar to a corporation. KRS Chapter 74 outlines the powers granted to a water district and its organization. It is administered by a three- or five-member board of commissioners appointed by the county judge-executive. The commissioners serve 4-year terms. For most purposes, a water district is considered a quasi-governmental entity or political subdivision. A water district is regulated by the DOW and the PSC.

END NOTES

- a. Data derived from the Kentucky Division of Water, by multiplying the number of connections by 2.6. Population estimates from the Kentucky State Data Center
- b. Estimates based on 1990 census of non-public water supplies.
- c. Data from DOW -- Drinking Water Branch, July, 1999.
- d. Data from Area Development Districts, June, 1999.
- e. Compiled from annual reports (1997) submitted by the Public Service Commission.
- f. Data derived from GIS on public water systems maintained by the Water Resource Development Commission, 1999.
- g. Extrapolated from PSC data. PSC does not regulate municipal systems. Differences between municipal systems and those regulated by PSC would introduce a source of error in extrapolated data.
- h. PSC and DOW data.
- i. Environmental Quality Commission, 1999.
- j. Data from DOW -- Water Quantity Branch, September, 1999.

REFERENCES

- Andrews, R.E. and J.S. Dinger, 1999, Water Supply Assistance for Communities in the Upper Kentucky River Basin: Hydrogeologic evaluation of high-yield well potential in the Upper Kentucky River Basin, Final Contract Report to the Kentucky River Authority, Kentucky Geological Survey.
- Bluegrass Area Development District, 1998, Water and Sewer Plan Update.
- Cumbie, D.H. and J.S. Dinger, 1999, Water Supply Assistance for Communities in the Upper Kentucky River Basin: Water supplies from abandoned underground coal mines in the Eastern Kentucky Coal Field, Final Contract Report to the Kentucky River Authority, Kentucky Geological Survey.
- Grinnell, D.J. and Kochanek, R.F., 1980, Water utility accounting [2nd ed.]: American Water Works Association, pp. 4,5,59.
- Kansas Rural Water Association, 1995, The Water Board Bible: The handbook of modern water utility management.
- Kentucky Division of Water--Water Quantity Branch, 1992-99, County water supply plans.
- Louisiana Department of Natural Resources, 1999, Final Report--Statewide dry hydrants program.
- National Council of Governmental Accounting, 1979, Statement 1: Governmental accounting and financial reporting principles: Municipal Finance Officers Association, p. 2.
- Public Service Commission, 1997, Utility annual reports.
- Public Service Commission, Department of Local Government, Division of Water, and Kentucky Rural Water Association, 1990, Kentucky Rural Water Assistance Manual
- U.S. Environmental Protection Agency, 1997, Drinking water infrastructure needs survey: First Report to Congress.
- Wunsch, D. R., Andrews, R. E., Dinger, J. S., and Graham, D. G., 1998, Hydrogeologic evaluation of high-yield well potential in the Eastern Kentucky Coal Field: Final Report, Robinson Forest Trust, 18 p., November 15, 1998.

APPENDIX A

APPENDIX B

WATER SYSTEMS

- B-1 Southeastern Region**
 - Big Sandy Area Development District
 - Cumberland Valley Area Development District
 - Kentucky River Area Development District

- B-2 Northeastern Region**
 - Buffalo Trace Area Development District
 - Gateway Area Development District
 - FIVCO Area Development District

- B-3 Central Region**
 - Bluegrass Area Development District
 - KIPDA Area Development District
 - Northern Kentucky Area Development District

- B-4 West-central Region**
 - Barren River Area Development District
 - Lake Cumberland Area Development District
 - Lincoln Trail Area Development District

- B-5 Western Region**
 - Green River Area Development District
 - Pennyrile Area Development District
 - Purchase Area Development District

APPENDIX C

INFRASTRUCTURE FUNDING NEEDS⁵

Public Water Projects 2000-2005

County	New Miles of Line	New Customers Served	New Lines in \$1000	Line Rehab in \$1000	Sources in \$1000	Treatment in \$1000	Tanks & Pumps in \$1000	TOTAL NEEDS IN \$1000
Adair	76.3	1,088	3,966					3,966
Allen	0.2	100	10					10
Anderson	100.0	393	4,352	1,452		2,150	1,350	9,304
Ballard	10.7	60	278	201				479
Barren	144.1	368	5,220					5,220
Bath	1.0	16	50	2,000	2,000	4,000		8,050
Bell	29.0	96	1,500			4,000		5,500
Boone				4,000				4,000
Bourbon	58.5	237	2,528	780		680	180	4,168
Boyd	1.0	8	35	300				335
Boyle	33.0	166	1,060	1,558		500	275	3,393
Bracken	57.5	300	2,300			1,350	850	4,500
Breathitt	52.1	793	2,900	500		5,700	900	10,000
Breckinridge	24.0	237	1,000					1,000
Bullitt	40.0	909	2,460	1,000			1,750	5,210
Butler	23.6	50	850					850
Caldwell	43.0	410	1,725	590		3,800	1,370	7,485
Calloway	90.6	947	2,356				1,275	3,631
Campbell	9.8	150	500					500
Carlisle	12.8	98	334			1,000	850	2,184
Carroll				250				250
Carter	29.0	275	1,400	500	6,000	16,000	3,000	26,900
Casey	28.2	336	1,467					1,467
Christian	87.0	280	3,569	1,296		12,680	584	18,129
Clark	42.7	251	1,920		1,700	4,000	1,200	8,820
Clay	231.0	1,353	12,845		20,000		2,800	35,645
Clinton	9.6	44	497					497
Crittenden	248.0	867	7,326				3,000	10,326
Cumberland								-
Daviess	1.0	5	530	270			5,650	6,450
Edmonson	10.0	37	88	3,110				3,198
Elliott	47.0	429	1,700		3,000	4,000	600	9,300
Estill	18.0	51	823	300			810	1,933
Fayette	25.8	110		private	system			-
		New					Tanks &	TOTAL

⁵ Projects identified by Area Development Districts and local officials. Not including needs identified by EPA to meet SDWA requirements.

County	New Miles of Line	Customers Served	New Lines in \$1000	Line Rehab in \$1000	Sources in \$1000	Treatment in \$1000	Pumps in \$1000	NEEDS IN \$1000
Fleming	13.7	69	548					548
Floyd	68.2	1,793	3,410	4,500	1,000		1,250	10,160
Franklin	9.5	35	337	2,500	404	2,000	2,500	7,741
Fulton	7.3	61	190			2,000	1,275	3,465
Gallatin	12.0	90	360	600	1,500			2,460
Garrard	16.5	46	196	200	1,800		50	2,246
Grant	60.7	549	2,290	2,000			1,300	5,590
Graves	64.6	789	1,681	200			1,700	3,581
Grayson	28.0	97	1,000				850	1,850
Green	21.7	191	1,000					1,000
Greenup	9	72	400	2,500	4,000	8,000	1,100	16,000
Hancock	2.0	6	50	54		3,200	1,185	4,489
Hardin	85.0	961	5,968				850	6,818
Harlan	36.0	490	1,900				1,600	3,500
Harrison	15.5	68	667	1,032			200	1,899
Hart	46.4	286	1,600	305		585	865	3,355
Henderson	55.0	120	1,724	7,980		18,207	3,843	31,754
Henry				2,100	620	800	1,440	4,960
Hickman								-
Hopkins	25.0	141	1,309	493			1,303	3,105
Jackson	5.0	22	250				150	400
Jefferson								-
Jessamine	39.0	247	1,978	1,570	200	2,100	1,950	7,798
Johnson	41.0	1,200	2,000	1,625	2,000	4,000		9,625
Kenton	14.7	308	590	12,000	3,000	5,700		21,290
Knott	124.1	1,635	8,088		3,000	6,000	1,400	18,488
Knox								-
Larue								-
Laurel	41.0	261	2,010	686		3,570	1,600	7,866
Lawrence	25.0	184	1,000				300	1,300
Lee	47.0	270	1,841				600	2,441
Leslie	86.2	1,176	4,600	250		1,000	500	6,350
Letcher	98.4	2,307	8,875		2,000	5,000	2,700	18,575
Lewis	113.4	717	5,287		418		1,275	6,980
Lincoln	44.5	188	2,015	1,340		2,800		6,155
Livingston	112.0	461	3,398	60			295	3,753
Logan	79.4	633	2,450	23,830		3,500	3,030	32,810
Lyon	30.0	120	795			4,000		4,795
Madison	23.0	109	1,000	1,000		2,300	2,350	6,650
Magoffin	44.0	378	2,200	1,000	5,000		500	8,700
Marion								-
Marshall	99.4	1,146	2,175					2,175
Martin	6.0	200	300	1,000	2,000	2,000	5,506	10,806
Mason	19.6	98	784				45	829

County	New Miles of Line	New Customers Served	New Lines in \$1000	Line Rehab in \$1000	Sources in \$1000	Treatment in \$1000	Tanks & Pumps in \$1000	TOTAL NEEDS IN \$1000
McCracken	38.7	533	1,006	32			850	1,888
McCreary	39.9	238	1,554					1,554
McLean	18.0	195	373	665	250	3,250	800	5,338
Meade	90.0	1,040	4,000				2,000	6,000
Menifee						8,000		8,000
Mercer	40.0	138	1,830	5,000			820	7,650
Metcalfe	40.8	228	1,500					1,500
Monroe	13.2	99	458	375			375	1,208
Montgomery	3.0	14	200		2,000	8,000		10,200
Morgan	61.0	756	3,050				1,200	4,250
Muhlenberg	6.0	6	100	630			3,825	4,555
Nelson	45.0	317	1,370				850	2,220
Nicholas	22.0	94	920	30	250	2,100		3,300
Ohio	130.0	345	7,524	5,753	50		3,700	17,027
Oldham	8.0	18	463	54			2,000	2,517
Owsley	43.0	267	1,500				1,000	2,500
Owen	137.4	378	1,860				1,300	3,160
Pendleton	22.1	216	840					840
Perry	77.1	1,220	4,150		3,000			7,150
Pike	117.0	2,616	7,000	1,000		8,000	3,000	19,000
Powell	6.0	28	343	1,146	700	700	180	3,069
Pulaski	214.5	2,448	10,308				4,580	14,888
Robertson	23.2	149	1,000					1,000
Rockcastle								-
Rowan	6.0	38	350			11,000		11,350
Russell	18.0	615	933					933
Scott	14.0	218	730	1,093		1,000		2,823
Shelby	62.0	316	3,018	1,439	1,375			5,832
Simpson	13.5	16	472	1,025	6,000		10,975	18,472
Spencer	46.0	312	1,303	2,000			1,000	4,303
Taylor	44.2	151	2,063				850	2,913
Todd	144.0	94	1,352	247		252	1,500	3,351
Trigg	50.0	86	1,896	105		1,200	800	4,001
Trimble	2.0	1	50	2,225	2,588		425	5,288
Union	1.0	1	10	70	500		1,090	1,670
Warren	20.9	39	735	47,000		17,000	13,000	77,735
Washington	110.0	700	3,400				2,100	5,500
Wayne	63.7	350	3,313				1,100	4,413
Webster	68.0	227	3,446	514			624	4,584
Whitley								-
Wolfe								-
Woodford	6.0	35	260	830			900	1,990
Total	5,117	42,530	216,535	158,165	76,355	197,124	130,800	778,979

Public Water Projects 2006-2020

County	New Miles of Line	New Customers Served	New Lines in \$1000	Line Rehab in \$1000	Sources in \$1000	Treatment in \$1000	Tanks & Pumps in \$1000	TOTAL NEEDS IN \$1000
Adair	147.3	1905	5,892					5,892
Allen								-
Anderson	54.5	214	2,344				240	2,584
Ballard	34.4	233	895					895
Barren								-
Bath	11.0	51	995				755	1,750
Bell	79.2	707	4,040	6,000			1,040	11,080
Boone								-
Bourbon	53.0	143	1,930	2,050		2,900	850	7,730
Boyd	16	103	850	200			300	1,350
Boyle	35.0	208	1,540	2,000		1,500	2,550	7,590
Bracken	63.7	283	2,572					2,572
Breathitt	191.8	1,927	9,855		5,000	6,000	1,800	22,655
Breckinridge	10.0	203	900					900
Bullitt	16.0	650	4,750					4,750
Butler				1,195		2,000		3,195
Caldwell								
Calloway	123.8	1,210	3,218					3,218
Campbell	129.0	1,100	6,500				730	7,230
Carlisle								-
Carroll	20.8	63	705					705
Carter	150.0	1,075	6,800					6,800
Casey	16.9	194	510				425	935
Christian	230.0		6,900				1,500	8,400
Clark	23.5	111	1,050	980				2,030
Clay	120.7	680	7,591		2,000	2,000	2,350	13,941
Clinton								-
Crittenden								-
Cumberland	10.9	109	568					568
Daviess					3400		5,000	8,400
Edmonson				500		4,000	800	5,300
Elliott								-
Estill	59.5	132	2,508	540		2,900	750	6,698
Fayette	7.4	52		private	system			-
Fleming								-
Floyd	111.0	1,696	5,700	200	600	2,000	1,500	10,000
Franklin	21.0	49	937	7,162			3,900	11,999
Fulton	2.5	25	66	338				404
Gallatin								-
Garrard	24.0	215	980	1,787	400			3,167
Grant	19.0	156	700					700

County	New Miles of Line	New Customers Served	New Lines in \$1000	Line Rehab in \$1000	Sources in \$1000	Treatment in \$1000	Tanks & Pumps in \$1000	TOTAL NEEDS IN \$1000
Graves	32.0	577	831					831
Grayson								-
Green	16.1	154	640					640
Greenup	131.0	625	5,192	300		4,000	1,800	11,292
Hancock	1.0	10	30					30
Hardin	45.0	302	2,000	7,400	300	800	1,250	11,750
Harlan	259.0	3,157	13,400		20,000	10,000	6,400	49,800
Harrison	50.5	178	2,208	2,000		800	500	5,508
Hart	3.0		100					100
Henderson				1,550		6,355		7,905
Henry				7,400	300	800	1,250	9,750
Hickman	11.9	70	310					310
Hopkins								-
Jackson	334.0	1,852	17,000		2,000	2,000	12,000	33,000
Jefferson	23.0	1,866	7,169	internal	funding			
Jessamine	17.0	57	744	2,363		5,500	1,100	9,707
Johnson	182.0	1,920	9,100					9,100
Kenton	91.0	1,715	3,640				1,700	5,340
Knott	170.0	1,520	9,500			5,000	1,800	16,300
Knox	321.5	2,731	17,320				5,830	23,150
Larue								-
Laurel	215.0	492	10,850	2,767			3,760	17,377
Lawrence				500				500
Lee	4.7	50	250		7,000	2,000		9,250
Leslie	61.0	518	2,400		3,000	4,000	600	10,000
Letcher	203.2	2,949	13,000		6,000	10,000	1,800	30,800
Lewis	47.9	240	2,395				1,000	3,395
Lincoln	45.5	163	2,170	1,305			460	3,935
Livingston								-
Logan	30.0	250	1,399	4,274	3,000	5,147	553	14,373
Lyon								-
Madison	72.5	350	3,385	11,470	3,000	18,600	7,150	43,605
Magoffin	123.0	563	6,200	1,000		3,000	1,500	11,700
Marion								-
Marshall	19.7	188	512					512
Martin	36.0	402	1,800					1,800
Mason	36.8	184	1,474					1,474
McCracken	98.9	384	2,571					2,571
McCreary								-
McLean	9.0		500	20	50		2,000	2,570
Meade	28.0	546	1,800					1,800
Menifee	28.0	194	1,400				1,000	2,400
Mercer	50.0	124	2,035	830	500	4,100		7,465
Metcalf	5.4		253					253

County	New Miles of Line	New Customers Served	New Lines in \$1000	Line Rehab in \$1000	Sources in \$1000	Treatment in \$1000	Tanks & Pumps in \$1000	TOTAL NEEDS IN \$1000
Monroe				38	1,000			1,038
Montgomery	7.4	36	330				220	550
Morgan	124.0	1,142	6,200				1,800	8,000
Muhlenberg								-
Nelson	5.0	6	290					290
Nicholas	54.5	134	2,243	500				2,743
Ohio								-
Oldham	5.0	10	136					136
Owsley					2,000	2,000		4,000
Owen	181.4	950	6,400		4,000			10,400
Pendleton	146.0	1,007	5,890		5,000		1,200	12,090
Perry	138.5	2,209	7,400			4,000	300	11,700
Pike	320.0	6,590	16,000	1,000		8,000	4,000	29,000
Powell	23.5	54	1,042	457			250	1,749
Pulaski	118.7	604	4,458					4,458
Robertson								-
Rockcastle	219.0	2,373	11,080				8,660	19,740
Rowan	16.0	51	800					800
Russell	23.3	293	932					932
Scott	13.0	51	810	694			1,500	3,004
Shelby	7.0	317	403					403
Simpson	21.7		365	7,150		550	2,257	10,322
Spencer								-
Taylor	45.5	180	1,820				850	2,670
Todd	47.0		1,404				500	1,904
Trigg								-
Trimble								-
Union								-
Warren	22.2		100	37,881		13,000	6,246	57,227
Washington								-
Wayne	22.4	135	1,163					1,163
Webster				50				50
Whitley	562.0	4,369	28,500			10,000	21,600	60,100
Wolfe	95.0	700	5,000		8,000	5,000	1,500	19,500
Woodford	41.5	193	1,929	1,000		3,800	275	7,004
								-
Total	6,822	59,229	329,569	114,901	76,550	151,752	129,101	801,873

APPENDIX D

1999 DROUGHT SUMMARY