Water Resource Development: A Strategic Plan for Wastewater Treatment

Governor's Water Resource Development Commission

March, 2000

Water Resource Development: A Strategic Plan for Wastewater Treatment

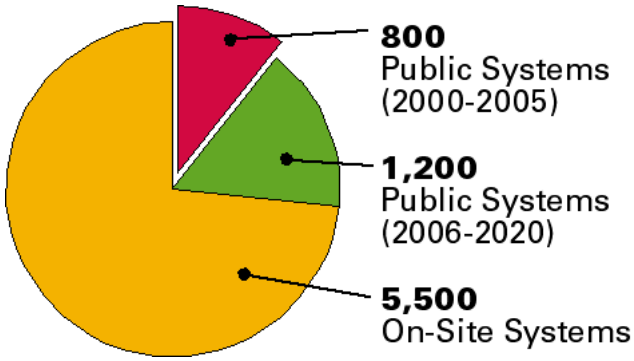
Water Resource Development Commission

CONTENTS

EXECUTIVE SUMMARY

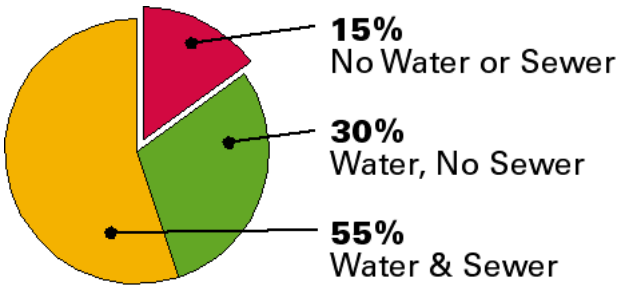
Between 5.5 to 9 billion dollars will be needed to improve and maintain Kentucky's public wastewater treatment infrastructure for the period 2000-2020. This estimate is based on locally identified needs of 2 billion dollars to expand, upgrade, and replace public sewer infrastructure, and an additional 3.5 to 7 billion to bring onsite wastewater systems into compliance.

Residential Wastewater Treatment Needs, 2000-2020
$million

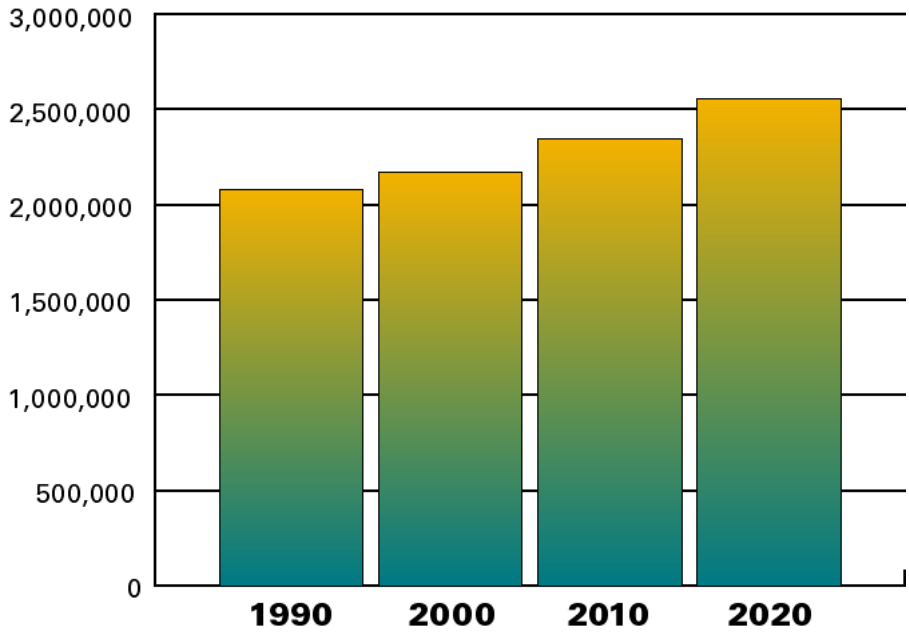


About 860,000 households receive public water and sewer, 460,000 households have public water but no public sewer, and 230,000 households have neither public water or sewer. The fast-growing number of households on public water but not sewer represents that segment for which regional planning and management could provide significant benefits.

Percent on Public Facilities, 1999



Kentuckians on Public Sewer 1990-2020



More and more Kentuckians are connected to public sewage treatment facilities. An additional 385,000 Kentuckians could be connected to public sewer by the year 2020 if all proposed sewer line extensions are built--about 20 percent more than are currently served.

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

The following issues were identified through the efforts state, regional, and local groups.

WASTEWATER TREATMENT ISSUES

Issues and potential solutions for the improvement sewer service in the Commonwealth were identified through interviews with representatives of state and regional agencies. A timely and significant contribution to the identification of these issues was made by the Environmental Quality Commission through their report, "Onsite Sewage in Kentucky: An assessment of issues and policy options to improve onsite sewage management in Kentucky," published in November of 1999.

Percent of Households on Public Sewer Systems in 1999

Commonwealth of Kentucky

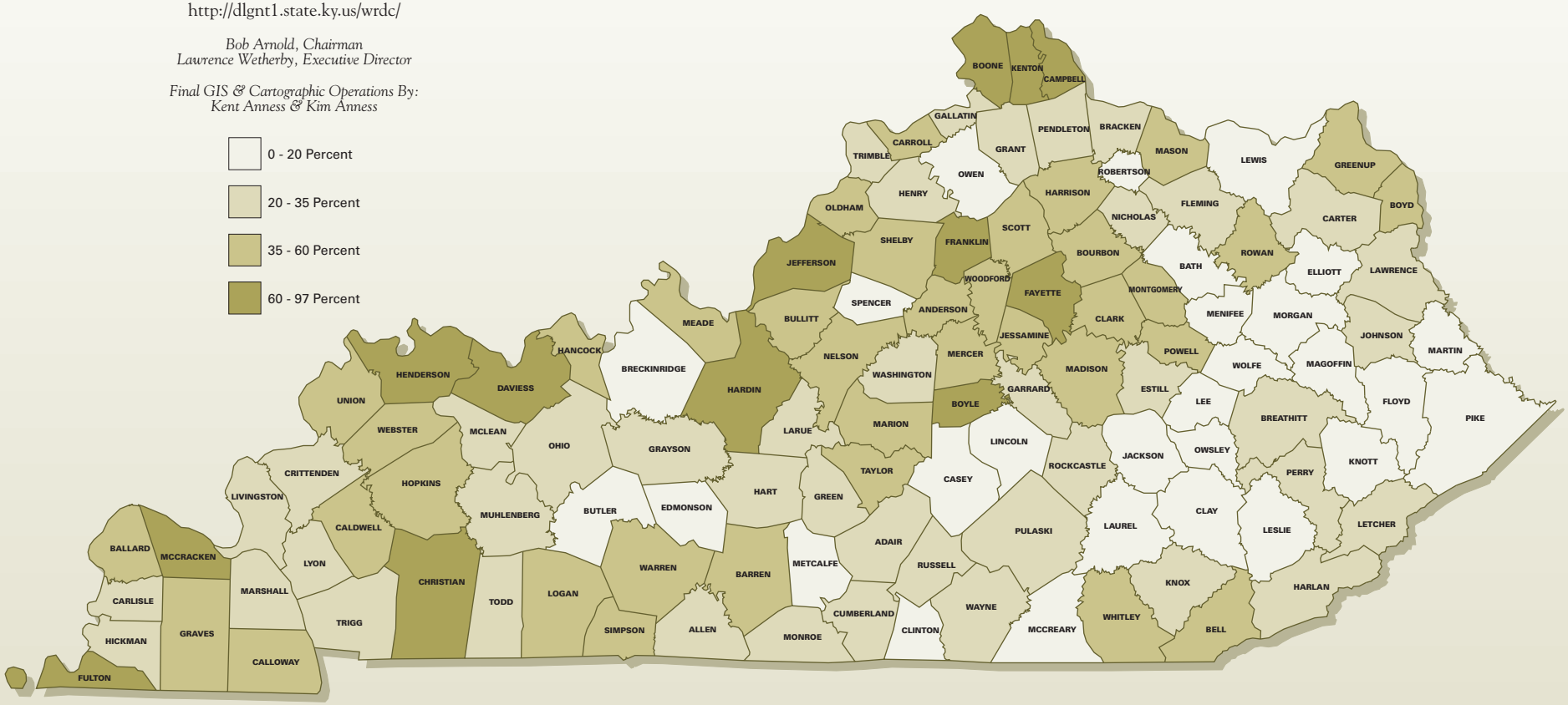
Prepared By:
Water Resource Development Commission

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 Anness

- 0 - 20 Percent
- 20 - 35 Percent
- 35 - 60 Percent
- 60 - 97 Percent



Water Resource Development Commission

1. *The Cabinet for Health Services lacks adequate staff and resources to carry out its program*

Potential solutions

Provide staff and resources to adequately support the CHS Onsite Sewage Program. It is estimated that 4 program evaluators, 1 sanitary engineer, 1 hydrogeologist, and 1 training/public education coordinator would be needed.

2. *Onsite sewage rules are not being consistently implemented and adequately enforced by local health departments*

Potential solutions

- Strengthen onsite sewage enforcement authority of local health departments to provide for notices of violations and penalties.
- Eliminate the "written complaint" provision in the farmstead exemption to allow local health department to respond to public onsite sewage complaints in a more efficient and effective manner.
- Strengthen and enforce monitoring requirements for high maintenance onsite systems.

3. *Greater coordination and cooperation between the CHS and DOW is needed, together with clarification of responsibilities*

Potential solutions

The Natural Resources and Environmental Protection Cabinet and the Cabinet for Health Services should jointly prepare a wastewater treatment action plan to assess and prioritize program needs, promote interagency cooperation, clarify responsibilities, and implement strategies to improve public and onsite wastewater treatment.

4. *The proliferation of residential package plants, problems with operation and maintenance of onsite systems, and lack of expertise about alternative multi-family cluster systems impede the progress of providing acceptable wastewater treatment*

Potential solutions

- Establish county sanitation districts to serve areas outside municipalities. The sanitation district would be responsible for all wastewater treatment in its district.
- Alternatively, require water districts to be responsible for both water and wastewater treatment within their district.
- Alternatively, divide the Commonwealth into Water and Sewer Service Delivery Districts governed by District boards under the authority of the Kentucky Infrastructure Authority.

In any of these proposals, homeowners would have the option of turning the responsibility of operation and maintenance of their system over to the responsible agency for a monthly fee.

- The state or counties develop appropriate mechanisms to compel sewer tie-ons.

- Legislation be enacted to provide for disclosure by a seller to a buyer regarding sewage treatment at the property prior to the transfer/selling of the property.
- Establish a demonstration project to test the feasibility of onsite sewage operation and maintenance management.
- CHS establish an onsite training coordinator and training center.
- NREPC and CHS target a portion of EPA 319 grant funds to develop an Onsite Sewage Education Campaign in Kentucky.

5. *Need to improve county, regional, and state wastewater infrastructure planning in order to better assess needs and promote regional solutions*

Potential solutions

- Counties and cities be provided incentives to develop "Smart Growth" plans to overcome political and geographical boundaries and promote regionalization of wastewater services.
- Cities and counties develop wastewater treatment strategies prior to extending water lines.
- Creation of water and sewer districts as in 4.

6. *Financing needed for both public and onsite systems*

Potential solutions

- Direct the Kentucky Infrastructure Authority to develop, with the assistance of other state and federal agencies, a statewide Onsite Sewage Loan and Hardship Grant Program.
- Evaluate, as a model, the Owensboro/Daviess County RWRA user charge system and how extensions to new areas are funded.

7. *Need to develop a wastewater planning database which would include public and onsite data, soils and geology suitability data, etc.*

Potential solutions

- Expand and maintain the WRDC GIS database of wastewater treatment infrastructure.
- Inventory and map straight pipe and failing systems in each county.
- Create a soils/geology map for each county delineating onsite treatment requirements.

8. *Implementation of innovative systems is often impeded by the need for regulatory agencies to review design and construction specifications on a case by case basis*

Potential solutions

Move from "prescriptive" standards to "performance based" standards to allow for new or innovative onsite sewage technologies. Standards and regulations written specifically for cluster systems would eliminate many problems and take many straight pipes and failing septic systems out of operation.

9. Need to improve the effectiveness of baseline funding requirements for sewer projects.

Potential solutions

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 and cost-effective solutions to problems.

10. Need to establish a centralized review process for funding sewer projects.

Potential solutions

Better arrangements are possible for the centralized review and funding of sewer 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 some of the issues outlined in this report. The WRDC could 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.

11. Need to increase the use of technology in the process of funding sewer projects.

Potential solutions

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.

12. Need provide support for onsite systems such as homeowner septic systems.

Potential solutions

The Cabinet for Health Services is already responsible for the provision of 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. It has been suggested that statutory authority be requested to allow local health departments to charge a fee for these services, and request an appropriation to subsidize the cost.

PUBLIC SEWER INVESTMENT NEEDS

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

PUBLIC SEWER NEEDS: 2000-2020[1]

County	New Customers Served	Other Customers	Estimated Cost ($1,000)	Line Upgrades ($1,000)	Treatment Expansion ($1,000)	New Treatment ($1,000)	Lift Stations and Other ($1,000)	TOTAL NEEDS ($1,000)
Adair	232	Industry	2,500	5,000	-	-	-	**7,500**
Allen	20		-	100	100	-	250	**450**
Anderson	50		3,350	3,300	4,200	-	-	**10,850**
Ballard	191		2,280	-	3,000	-	-	**5,280**
Barren	895		8,850	2,334	-	-	-	**11,184**
Bath	1,101		21,900	-	3,000	-	-	**24,900**
Bell	1,819		40,063	-	4,000	-	-	**44,063**
Boone	-		-	-	-	-	-	**-**
Bourbon	9		250	1,600	2,750	-	370	**4,970**
Boyd	8,685		49,400	-	9,000	5,000	-	**63,400**
Boyle	92	3 subdivisions	4,416	6,925	1,750	-	-	**13,091**
Bracken	-		-	-	-	-	-	**-**
Breathitt	290		2,500	-	-	-	-	**2,500**
Breckinridge	124		1,559	-	1,500	-	-	**3,059**
Bullitt	13	Trailerl. Park	5,078	800	1,350	-	-	**7,228**
Butler	15		180	300	1,000	-	-	**1,480**
Caldwell	335		3,600	-	-	-	-	**3,600**
Calloway	2,121		22,300	-	-	-	-	**22,300**
Campbell	-		-	-	-	-	-	**-**
Carlisle	522		5,500	-	-	4,000	-	**9,500**
Carroll	160	Speedway	12,800	-	-	-	-	**12,800**
Carter	220	Industry	2,800	-	611	-	-	**3,411**
Casey	143		1,997	-	-	-	-	**1,997**
Christian	1,340		15,352	-	-	-	-	**15,352**
Clark	39		3,000	5,500	18,000	-	-	**26,500**
Clay	1,568		37,471	-	4,108	-	-	**41,579**
Clinton	198		4,727	-	4,000	-	-	**8,727**
Crittenden	104		1,070	-	-	-	-	**1,070**
Cumberland	-		-	-	-	-	-	**-**
Daviess	-		-	-	600	-	-	**600**
Edmonson	15		125	-	-	-	-	**125**
Elliott	-		-	-	-	-	-	**-**
Estill	178	Industry	2,355	550	1,810	1,700	600	**7,015**
Fayette	-		-	64,000	30,700	-	32,200	**126,900**
Fleming	105		1,200	-	-	532	-	**1,732**
Floyd	7,706		58,000	-	2,000	2,500	-	**62,500**
Franklin	861		18,100	4,000	2,500	-	-	**24,600**
Fulton	420		4,200	10,000	3,000	-	-	**17,200**
Gallatin	-	Potential	2,000	-	-	-	-	**2,000**

1 As identified by local officials.

County	New Customers Served	Other Customers	Estimated Cost ($1,000)	Line Upgrades ($1,000)	Treatment Expansion ($1,000)	New Treatment ($1,000)	Lift Stations and Other ($1,000)	TOTAL NEEDS ($1,000)
Garrard	125		1,900	400	450	-	-	**2,750**
Grant	534		18,810	-	-	-	-	**18,810**
Graves	2,510		27,100	-	-	-	-	**27,100**
Grayson	179		3,220	-	500	-	-	**3,720**
Green	-	Industry	167	-	-	-	-	**167**
Greenup	2,000		21,530	4,660	3,500	-	-	**29,690**
Hancock	248		117	21	-	-	-	**138**
Hardin	4,014		1,280	3,800	10,000	-	-	**15,080**
Harlan	5,312		44,490	-	4,500	-	-	**48,990**
Harrison	46	Industry	2,060	1,000	6,800	-	1,100	**10,960**
Hart	495		5,442	3,440	-	-	-	**8,882**
Henderson	1,016		13,316	3,106	1,248	-	-	**17,670**
Henry	1,402		11,705	2,111	3,033	-	700	**17,549**
Hickman	175		2,600	3,000	-	2,000	-	**7,600**
Hopkins	-		-	-	-	-	-	**-**
Jackson	231		5,438	-	-	1,400	-	**6,838**
Jefferson	-		Self funded		-	-	-	**-**
Jessamine	719	Potential	11,390	2,400	5,600	-	390	**19,780**
Johnson	1,953		16,100	-	5,000	-	-	**21,100**
Kenton	-		-	-	-	-	-	**-**
Knott	193	Prison	12,000	-	-	-	-	**12,000**
Knox	1,680		17,305	-	8,500	-	-	**25,805**
Larue	-	Ind/com	445	-	300	-	70	
Laurel	1,917		43,792	-	3,500	-	-	**47,292**
Lawrence	120	Industry	2,500	-	500	-	600	**3,600**
Lee	12		500	-	-	-	-	**500**
Leslie	304	Hgh Schl	3,100	2,500	-	-	-	**5,600**
Letcher	2,686		31,520	3,501	-	5,000	2,000	**42,021**
Lewis	235		2,422	-	-	1,000	-	**3,422**
Lincoln	1,591	Potential	15,004	700	2,050	-	-	**17,754**
Livingston	402		5,300	-	-	-	-	**5,300**
Logan	1,502		10,042	2,930	4,500	1,000	740	**19,212**
Lyon	438		5,000	-	2,000	-	-	**7,000**
Madison	1,446		19,922	4,900	7,600	12,900	7,600	**52,922**
Magoffin	1,402		14,300	-	4,000	-	-	**18,300**
Marion	990		2,320	-	-	-	-	**2,320**
Marshall	7,710		68,000	500	5,000	5,000	-	**78,500**
Martin	982		10,400	-	2,000	1,600	-	**14,000**
Mason	477		5,748	-	-	600	-	**6,348**
McCracken	3,214		33,000	-	-	-	500	**33,500**
McCreary	2,678		23,992	-	-	4,620	-	**28,612**
McLean	654		9,337	50	1,600	-	-	**10,987**

County	New Customers Served	Other Customers	Estimated Cost ($1,000)	Line Upgrades ($1,000)	Treatment Expansion ($1,000)	New Treatment ($1,000)	Lift Stations and Other ($1,000)	TOTAL NEEDS ($1,000)
Meade	140		650	-	-	-	-	**650**
Menifee	757		18,600	-	-	-	-	**18,600**
Mercer	954		8,400	1,950	2,600	-	-	**12,950**
Metcalfe	30		335	-	-	-	-	**335**
Monroe	14		806	-	-	-	-	**806**
Montgomery	1,162		14,300	-	2,000	500	-	**16,800**
Morgan	277		8,100	-	-	-	-	**8,100**
Muhlenberg	1,232		15,250	-	-	-	-	**15,250**
Nelson	895	Ind/pot	1,465	200	1,000	18,000	600	**21,265**
Nicholas	174	Ind/pot	2,025	2,200	-	-	-	**4,225**
Ohio	249		1,198	-	-	4,000	-	**5,198**
Oldham	5,500	Potential	42,200	-	-	30,000	-	**72,200**
Owsley	300		9,700	-	2,000	-	-	**11,700**
Owen	-	2-schls	300	-	-	-	-	**300**
Pendleton	133		3,225	-	-	8,000	-	**11,225**
Perry	1,770		12,348	3,000	3,000	6,000	-	**24,348**
Pike	10,374		85,300	-	20,000	4,000	-	**109,300**
Powell	225		3,150	2,450	750	-	-	**6,350**
Pulaski	2,420		21,464	5,048	-	20,000	-	**46,512**
Robertson	163		1,713	-	-	900	-	**2,613**
Rockcastle	806		34,389	-	7,000	-	-	**41,389**
Rowan	1,414	Industry	14,700	-	-	-	-	**14,700**
Russell	450		6,024	-	-	-	-	**6,024**
Scott	2	Potential	550	11,030	3,735	-	115	**15,430**
Shelby	-		-	-	2,000	-	-	**2,000**
Simpson	127		1,500	15,885	-	-	750	**18,135**
Spencer	-		-	-	-	-	-	**-**
Taylor	1,024		8,282	-	-	-	-	**8,282**
Todd	305		3,600	-	-	-	-	**3,600**
Trigg	2,336		25,000	-	-	-	-	**25,000**
Trimble	277		1,225	-	-	4,000	-	**5,225**
Union	46	Industry	581	2,200	250	-	25	**3,056**
Warren	3,890		6,860	50,100	25,000	-	-	**81,960**
Washington	-		-	-	-	-	-	**-**
Wayne	387		1,787	-	-	-	-	**1,787**
Webster	264		1,988	200	1,200	-	770	**4,158**
Whitley	2,730		47,000	-	10,000	-	-	**57,000**
Wolfe	200		1,400	-	1,700	-	-	**3,100**
Woodford	20	Potential	900	2,524	4,400	4,000	-	**11,824**
								-
Est. Totals	**125,000**		**$1,280,000**	**$240,000**	**$270,000**	**$150,000**	**$50,000**	**$2,000,000**

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

- Characterize the existing infrastructure for wastewater treatment in Kentucky.
- Identify issues that need to be addressed in order to build on the strengths and eliminate the weaknesses of Kentucky's wastewater treatment systems.

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

- Characterize the existing systems, both public sewerage and onsite.
- Identify areas where immediate and long-term extension of public sewer service is indicated, together with estimated costs and any improvements to existing systems to accommodate expansion.
- Identify areas where extension of public sewer service is not indicated, and identify issues for the improvement of wastewater treatment systems in those areas.
- Identify issues that need to be addressed to improve wastewater treatment in different regions of the state.
- Identify issues that need to be addressed to improve the regulatory and funding environment for sewer development.

ACKNOWLEDGMENTS

In developing the water and sewer plans, the WRDC made every effort not to constrain, conflict with, or impede any ongoing wastewater treatment 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
- 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 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
- U.S. Department of Agriculture, Rural Development

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 wastewater treatment 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.

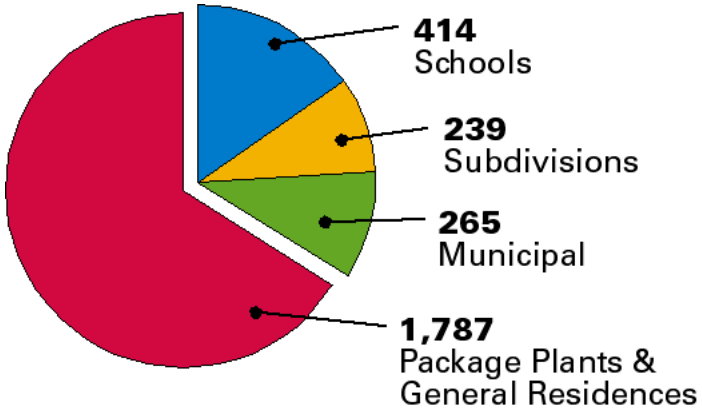
Notwithstanding these deficiencies, a coherent picture of the wastewater treatment systems in Kentucky had to be prepared. To do this, wastewater treatment system information was gathered from a variety of sources: the Division of Water—Facilities Construction Branch, the Cabinet for Health Services, 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 wastewater treatment systems had been developed. We identified wastewater treatment system needs and projected service extensions, both in the near and long term, together with estimated costs. We identified issues related to funding and ways to provide more efficient and cost-effective wastewater treatment. Issues were also identified relating to institutional arrangements that would provide timely solutions to wastewater treatment problems, and would enhance planning and management to ensure adequate wastewater treatment throughout Kentucky.

OVERVIEW OF WASTEWATER TREATMENT SYSTEMS IN KENTUCKY

In 1999 nearly 2.2 million Kentuckians, or about 55 percent of the Commonwealth's residents, were connected to municipal wastewater treatment systems. The remainder relied on private package plants, septic systems, artificial wetlands, other systems, and no treatment system.

Permitted Sewage Treatment Facilities, 1999



MUNICIPAL SYSTEMS

About 265 municipal wastewater treatment systems[1] served Kentuckians in 1999. Municipal sewer systems provide[1]:

- 525 million gallons (MGD) per day of treatment capacity
- 8,330 miles of sewer lines
- An average plant capacity of 1.96 MGD
  - One-half of the plants have treatment capacity of 350,000 GPD or less
  - The largest treatment capacity is 105 MGD

ONSITE WASTEWATER SYTEMS

In 1999 an estimated 690,000 households treated their own sewage with septic tanks or other onsite systems. And about 600,000 households will still rely on a private treatment system in the year 2020. Although over half of all Kentuckians are on public sewer, sewer service is not uniformly provided across the state. In a few, heavily populated counties many people are on municipal sewer, and in many rural counties very few people are served by

Existing Municipal Sewer Service

Commonwealth of Kentucky

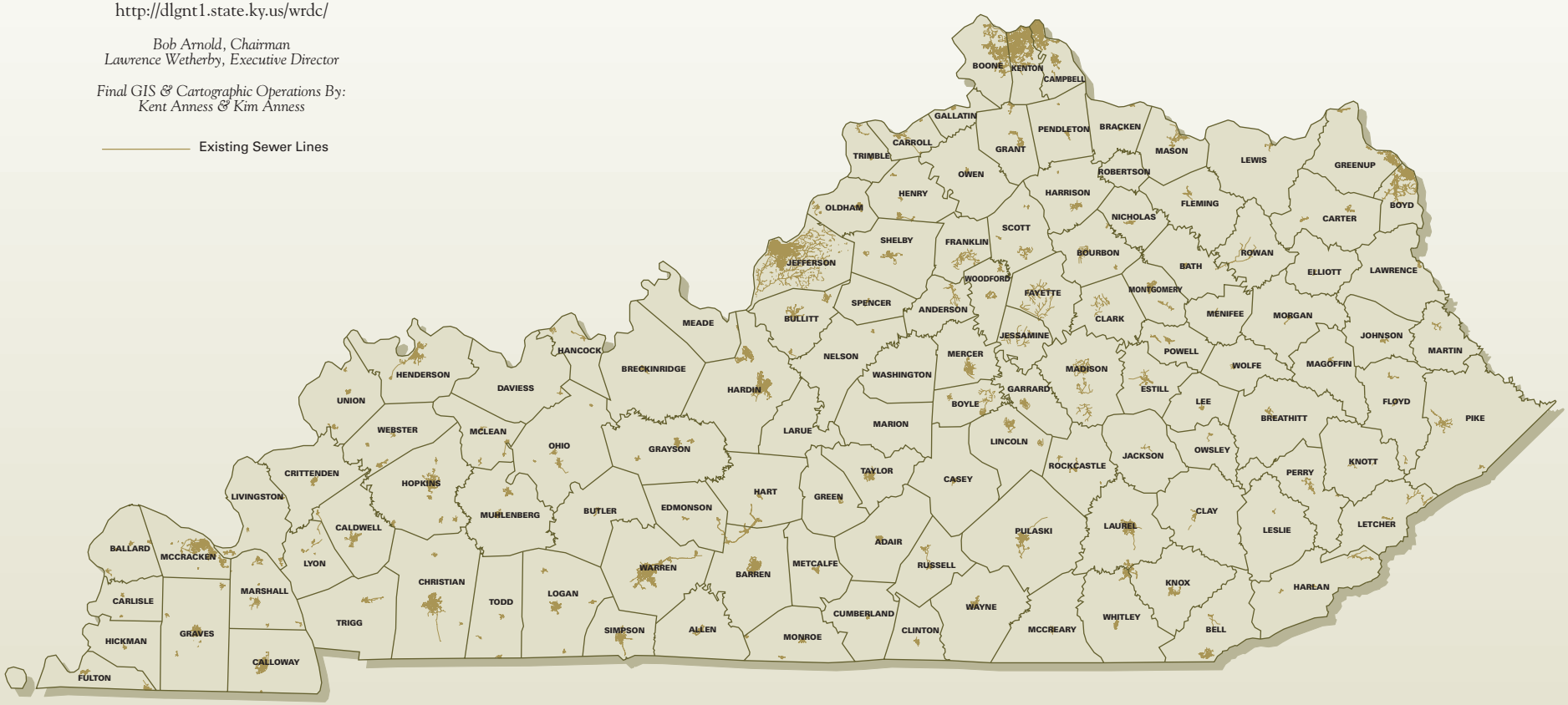
Prepared By:
Water Resource Development Commission

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 Anness

Existing Sewer Lines



Water Resource Development Commission

Percent Public & On-site Sewers, 1999

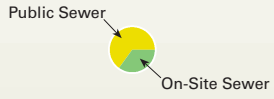
Commonwealth of Kentucky

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 Anness



Water Resource Development Commission

Percent of Households with On-Site Systems in 1999

Commonwealth of Kentucky

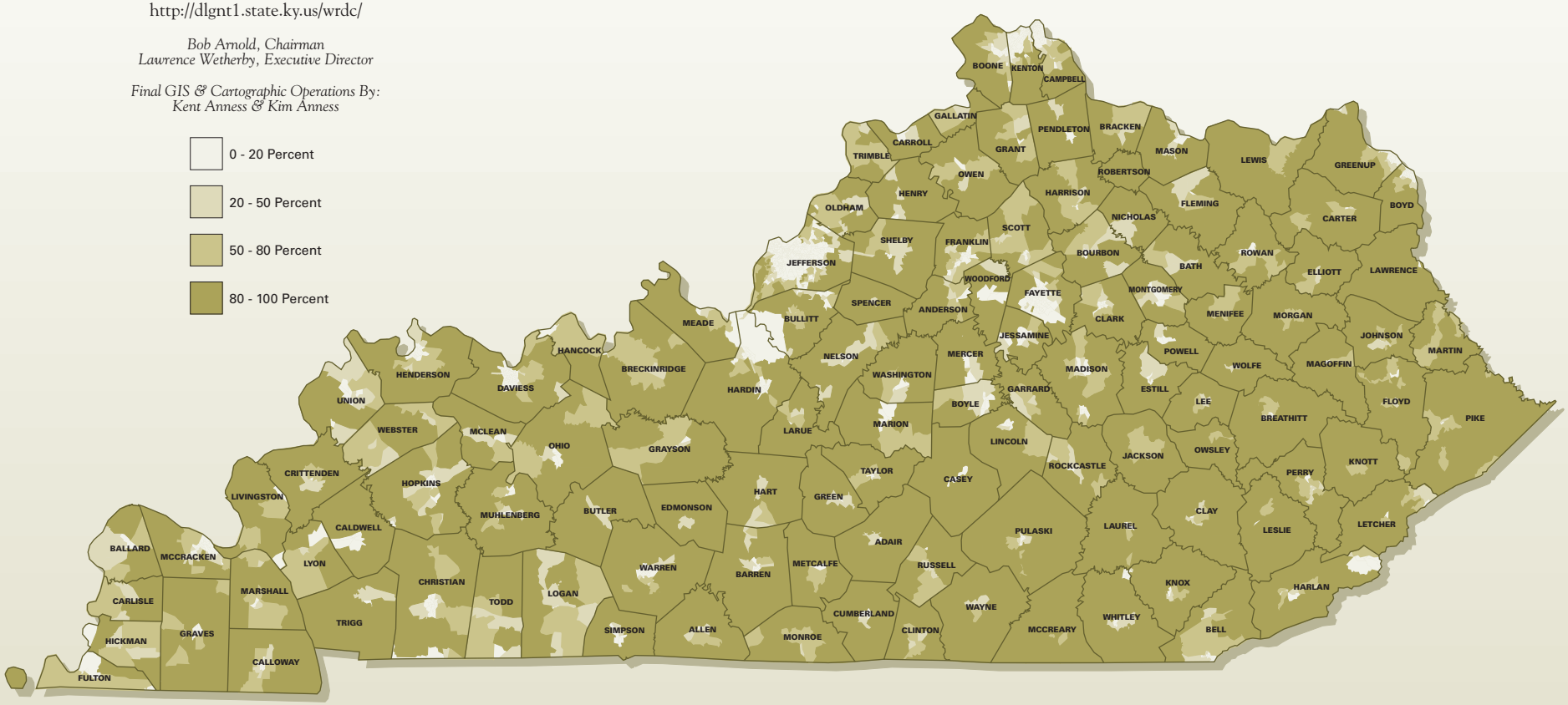
Prepared By:
Water Resource Development Commission

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 Anness

- 0 - 20 Percent
- 20 - 50 Percent
- 50 - 80 Percent
- 80 - 100 Percent



Water Resource Development Commission

municipal sewer systems. 20 counties have more than 55 percent on public sewer, and 100 counties have less than 55 percent. In over half of Kentucky's counties, less than one-third of the households are on municipal sewer.

Onsite systems very often do not work, either because of unsuitable soil conditions or lack of proper operation and maintenance. And it is well known that there are many "straight pipe" systems in Kentucky which direct domestic sewage directly into streams. According to the Environmental Quality Commission2:

> *"While it is not known how many onsite sewage systems are failing or how many illegal straight pipes there are in Kentucky, it is considered a widespread problem across the state. During 1997 more than 5,000 complaints were received by public health officials regarding onsite sewage. The Kentucky Division of Water reports that onsite sewage is the fourth leading source of water pollution in monitored waterways."*

More than 22,000 onsite sewage permits were issued in fiscal year 1998-1999. [1]

An inventory of failing and non-existent systems has been begun through PRIDE program. This inventory needs to be extended to the rest of Kentucky.

Another way to identify priority areas of sewer needs would be to look at the density of housing in non-sewered areas. These high-density areas in 1990 are shown on the following map, based on U.S. census data. By overlaying the sewer lines from the WRDC 1999 database, we can see that public sewer was extended into some of these areas during 1990-1999. Data from the 2000 census should reveal new priority areas.

In 1999 about 2.2 million Kentuckians were connected to public water and sewer, another 1.1 million were connected to public water but not sewer, and another 580,000 had neither public water nor public sewer.

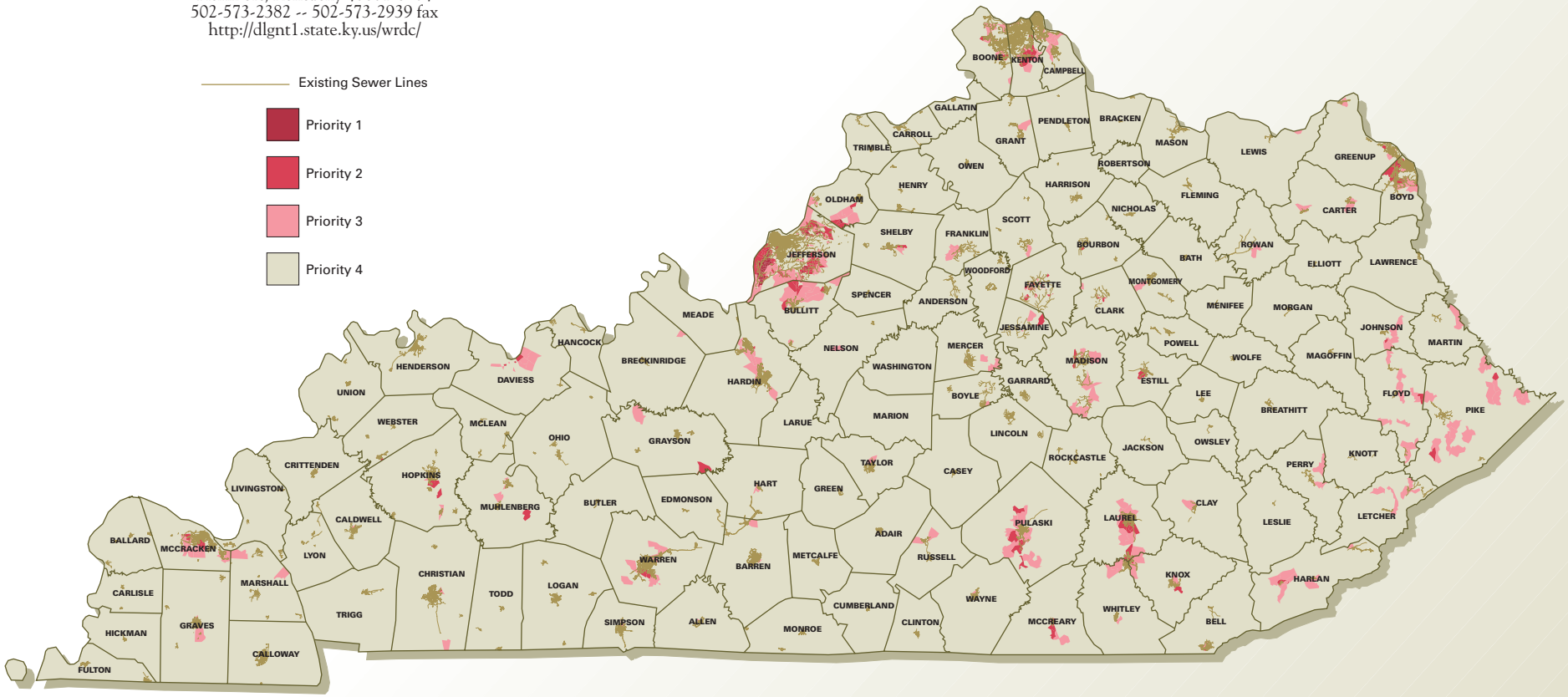
Priority Areas not on Public Sewer
(& Existing Sewer Lines)

(based on density of houses not on sewer, 1990 census, by tract)

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 Anness

Water Resource Development Commission

Existing Sewerlines and Proposed Waterline Extensions through 2020

Commonwealth of Kentucky

Prepared By:
Water Resource Development Commission

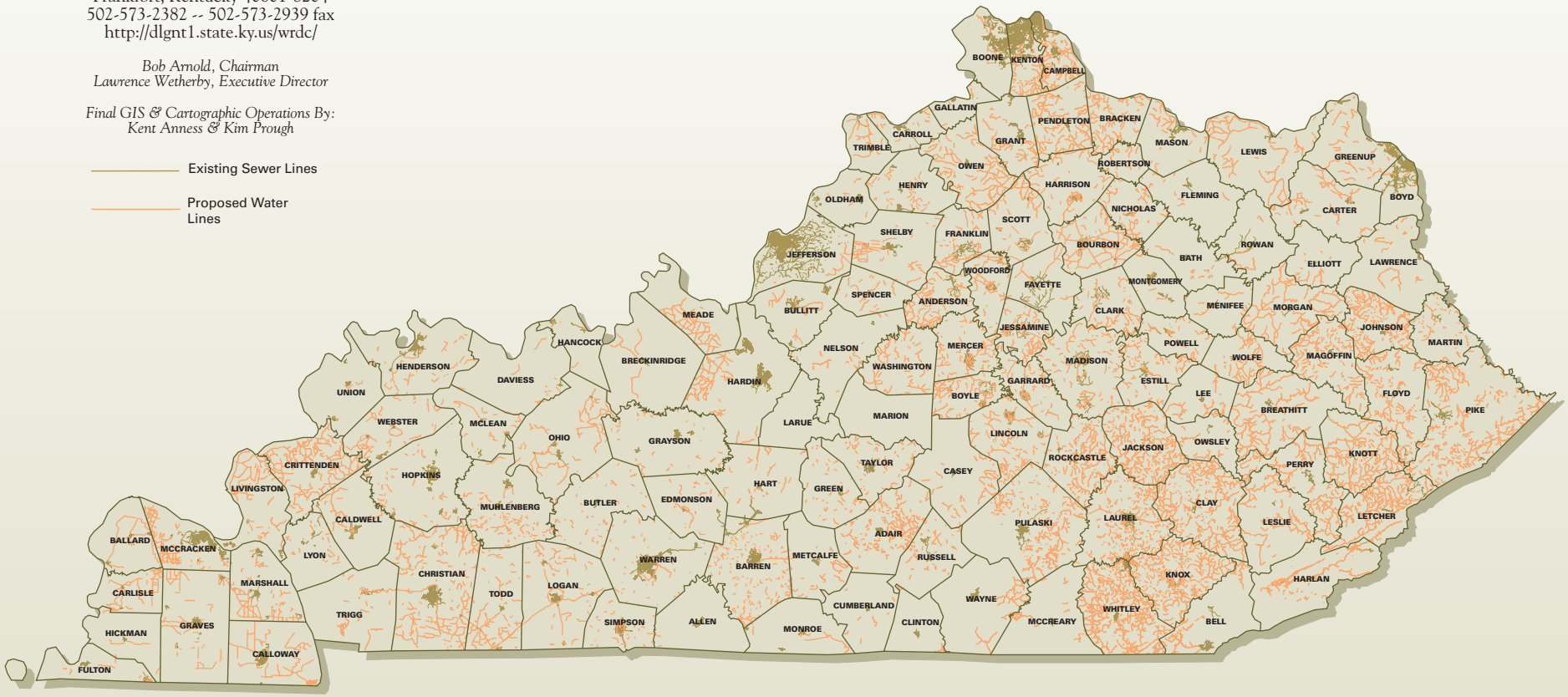
Department for Local Government
1024 Capital Center Drive, Suite 340
Frankfort, Kentucky 40601-8204
502-573-2382 -- 502-573-2939 fax
http://dlgnt1.state.ky.us/wrdc/

Bob Arnold, Chairman
Lawrence Wetherby, Executive Director

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

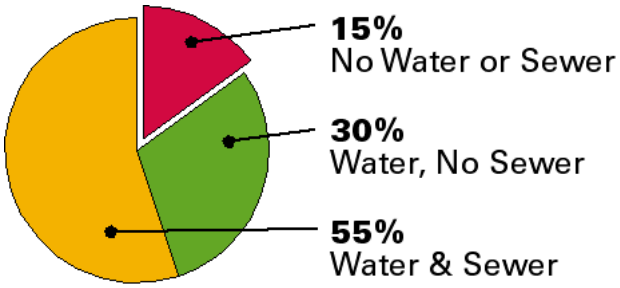
Existing Sewer Lines

Proposed Water Lines



Water Resource Development Commission

Percent on Public Facilities, 1999



Extending public water lines into unsewered areas can be a source of problems. 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. 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.

It is estimated that between $3.5 and $7 billion dollars would be needed to correct existing problems with onsite systems in Kentucky.

PLANNING

One issue that has arisen in the strategic planning for both water and sewer is that of the resulting environmental impact of extending water service into areas where no sewer collections systems exist or are planned. In some Kentucky counties this issue can be addressed through the application of local land use controls such as planning & zoning (P&Z) ordinances and subdivision regulations. Unfortunately, most Kentucky Counties have not implemented P&Z and compiled the associated comprehensive planning document that can effectively guide their community's growth. As for cities, many have P&Z in-place, but their jurisdiction is limited to their corporate boundary for all P&Z ordinances and limited to a 5 mile radius (extraterritorial jurisdiction) from the corporate boundary for

Water & Sewer Service

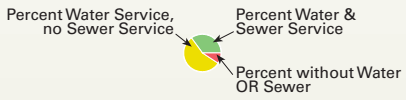
Commonwealth of Kentucky

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 Anness



Water Resource Development Commission

Wastewater Related Problem Areas in Kentucky's PRIDE Region

Commonwealth of Kentucky

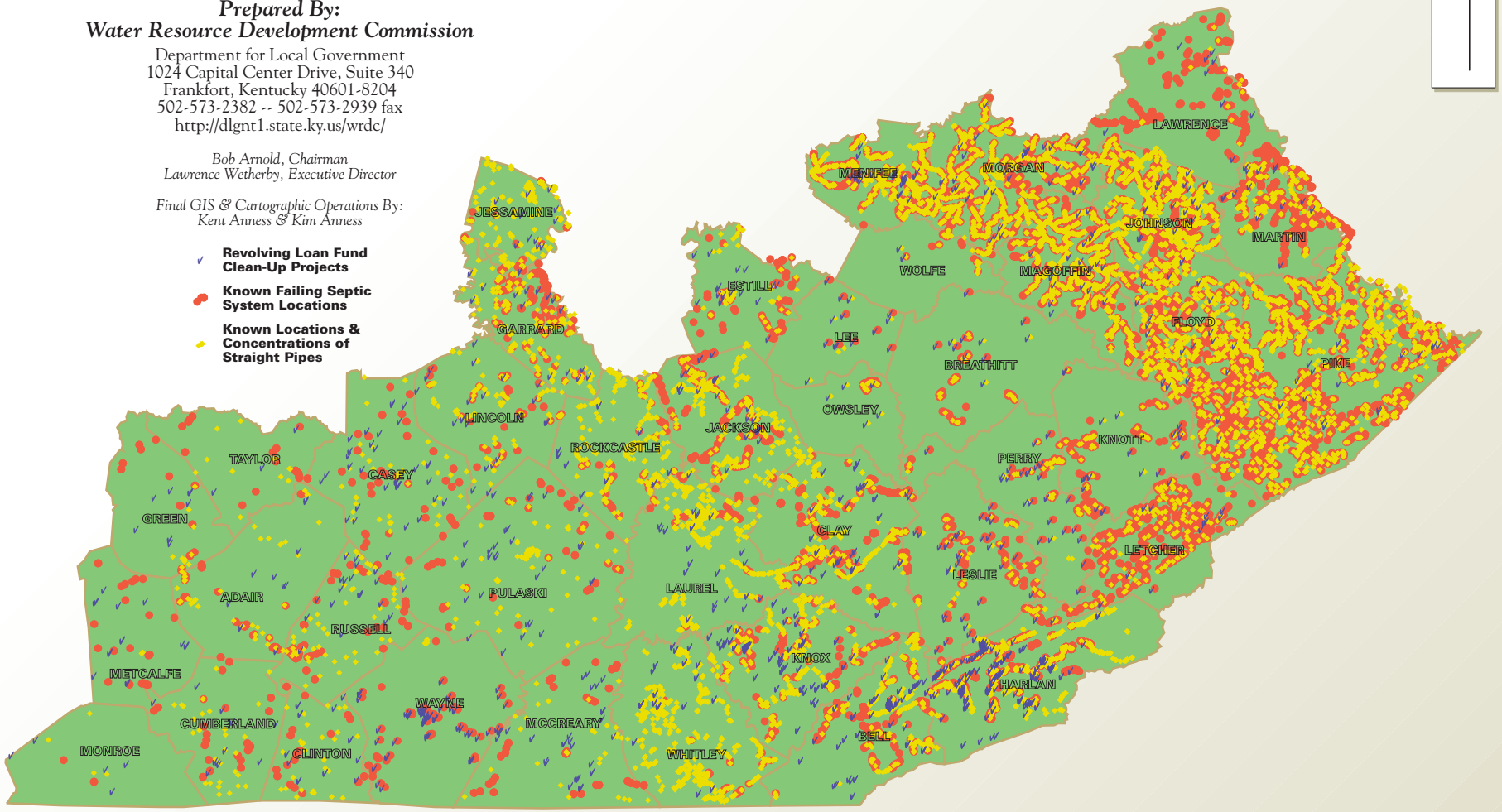
Prepared By:
Water Resource Development Commission

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 Anness

- **Revolving Loan Fund Clean-Up Projects**
- **Known Failing Septic System Locations**
- **Known Locations & Concentrations of Straight Pipes**



Water Resource Development Commission

Counties & Cities with Planning & Zoning in 1999

Commonwealth of Kentucky

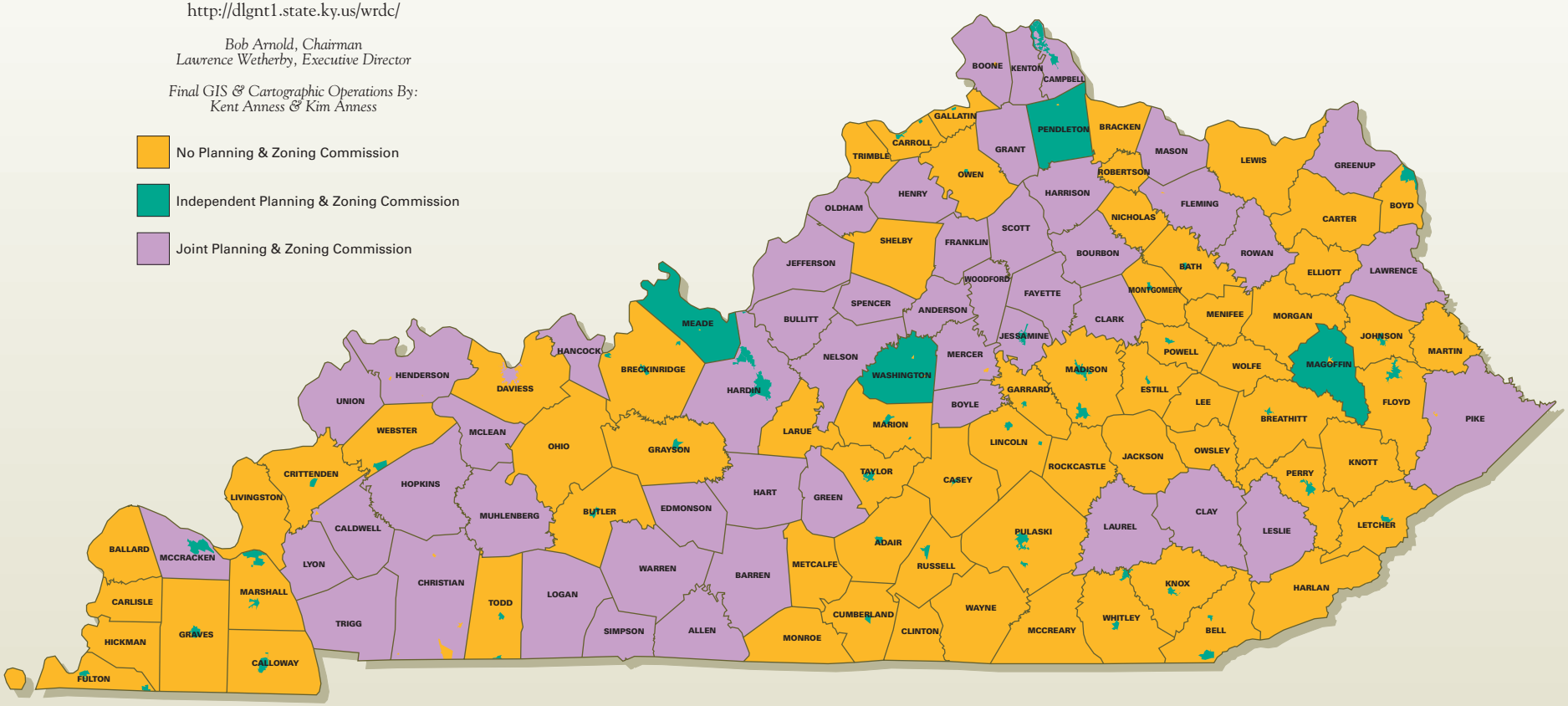
Prepared By:
Water Resource Development Commission

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 Anness

- No Planning & Zoning Commission
- Independent Planning & Zoning Commission
- Joint Planning & Zoning Commission



Water Resource Development Commission

subdivision regulations. This leaves the vast majority of the Commonwealth outside of the influence of local planning activities.

The WRDC recognizes the important role that P&Z can play in its effort to provide all Kentuckians with water service by the year 2020. In counties where these controls are in place, the planning entity should utilize the WRDC's findings and data to more effectively plan for its citizens. In instances where such controls do not exist, it is important that the local legislative bodies work together to structure growth in such a way that the health, safety, and welfare of its citizens and the environment are not compromised.

FUNDING

Until 1960, nearly all water and sewer 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 communities all across Kentucky a new source of low-interest money with which to 'match' Federal grant money.

At present, virtually no sewer system's 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.

FUNDING SOURCES FOR WASTEWATER

Public funds to build wastewater collection and treatment facilities are made available as either grants or loans. Competition for these funds is very keen, and in most funding programs wastewater projects must compete for priority with other public infrastructure needs, notably water projects. Agencies that provide funding for wastewater projects in Kentucky are listed below, with the amount typically obligated for wastewater projects annually. These amounts fluctuate somewhat under the influence of overall program funding, program priorities, and the number and quality of wastewater-project applications.

Agency	Funding
USDA Rural Development	$4,725,000 grant
USDA Rural Development	8,775,000 loan
Community Development Block Grant (CDBG)	5,650,000 grant
Kentucky Infrastructure Authority (KIA)	23,530,000 loan
Appalachian Regional Commission (ARC)	1,151,000 grant
Economic Development Administration (EDA)	3,700,000 grant
Kentucky Association of Counties (KACO) CoLT Program*	2,853,000 loan
Kentucky League of Cities (KLC)*	9,000,000 loan
Kentucky Area Development District (ADD) Small Issuer Loan Program*	1,725,000 loan
Total	$61,109,000

** Figures for KACO, KLC and ADD funds may include some interim financing. These loan pools also finance a wide variety of other types of projects.*

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 wastewater treatment 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 wastewater treatment 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 wastewater treatment 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 sewer 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.

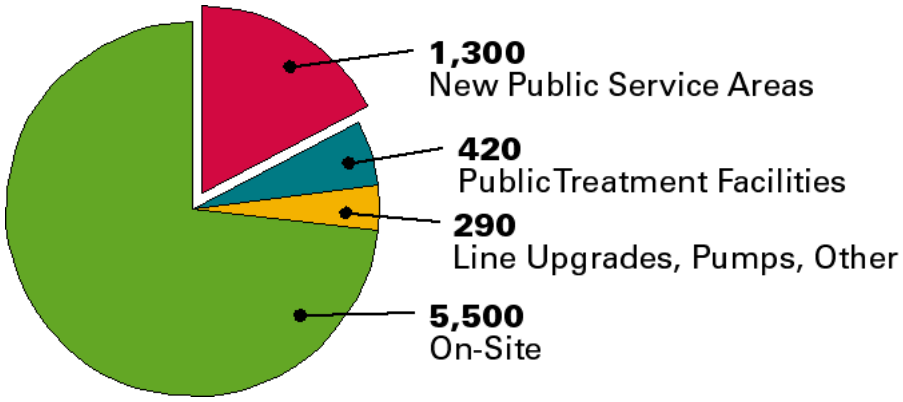
Current funding sources will not meet the infrastructure investment needs of the next 20 years. New sources of funding will be required.

Sewer 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)	Treatment facility operators (Fund A); Governmental agencies (Funds B and C)	Loans	Wastewater Revolving Loan Fund (Fund A) combines federal grants with state bond proceeds specifically for wastewater treatment projects, which must be on DOW priority list. Funds B and C may fund wastewater as well as other types of projects. Fund A and B loan rates based on median household income.
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	Program was re-authorized for 1999 after a hiatus of several years. Funds are allocated by district. Capital projects of all kinds including wastewater facilities are eligible. Normally used for small capital needs not covered by major funding sources.
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 wastewater 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.

INFRASTRUCTURE FUNDING NEEDS

Public and Onsite Sewer Investment Needs, 2000-2020, $million



Area Development Districts, working with local governments and water officials, identified public projects to extend sewer service throughout the state. Projects necessary to support sewer line extensions were also identified, including replacing old lines and providing additional treatment.

Projects were identified for immediate priority (2000-2005) and for long-term priority (2006-2020)[1]. Project costs were estimated at 1999 dollars and are summarized in the following table:

County	New Customers Served	Estimated Cost Line Extensions ($1,000)	Line Upgrades ($1,000)	Treatment Expansion ($1,000)	New Treatment ($1,000)	Lift Stations and Other ($1,000)	TOTAL NEEDS ($1,000)
2000-2005	55,000	480,000	130,000	100,000	70,000	20,000	800,000
2006-2020	70,000	800,000	110,000	170,000	80,000	30,000	1,200,000
TOTAL	**11,939**	**1,300,000**	**240,000**	**270,000**	**150,000**	**50,000**	**2,000,000**

Existing & Proposed Sewer Service

Commonwealth of Kentucky

Prepared By:
Water Resource Development Commission

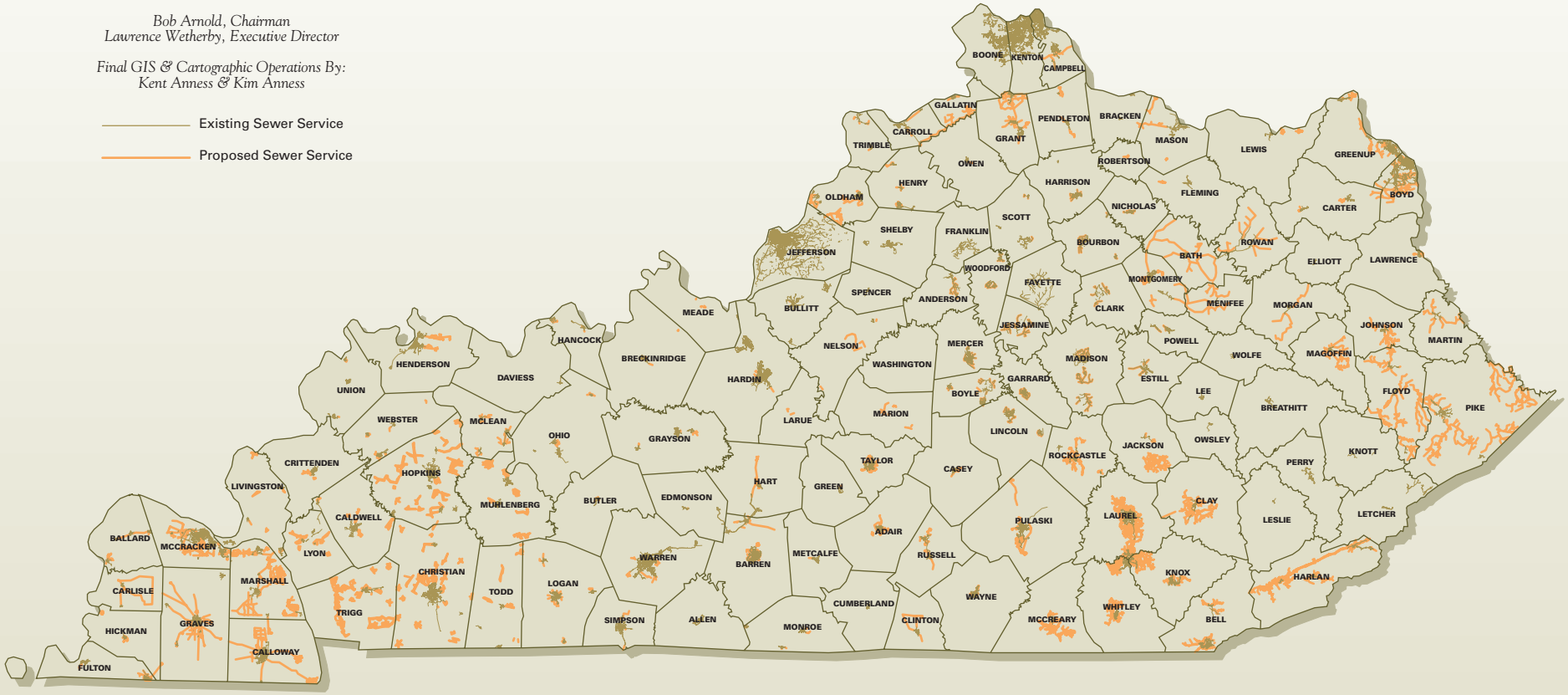
Department for Local Government
1024 Capital Center Drive, Suite 340
Frankfort, Kentucky 40601-8204
502-573-2382 -- 502-573-2939 fax
http://dlgnt1.state.ky.us/wrdc/

Bob Arnold, Chairman
Lawrence Wetherby, Executive Director

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

Existing Sewer Service

Proposed Sewer Service



Water Resource Development Commission

Proposed Expansion Costs through 2020

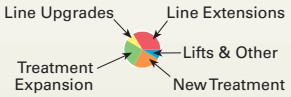
Commonwealth of Kentucky

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 Anness



Water Resource Development Commission

Estimated On-Site Remediation Cost through 2020

Commonwealth of Kentucky

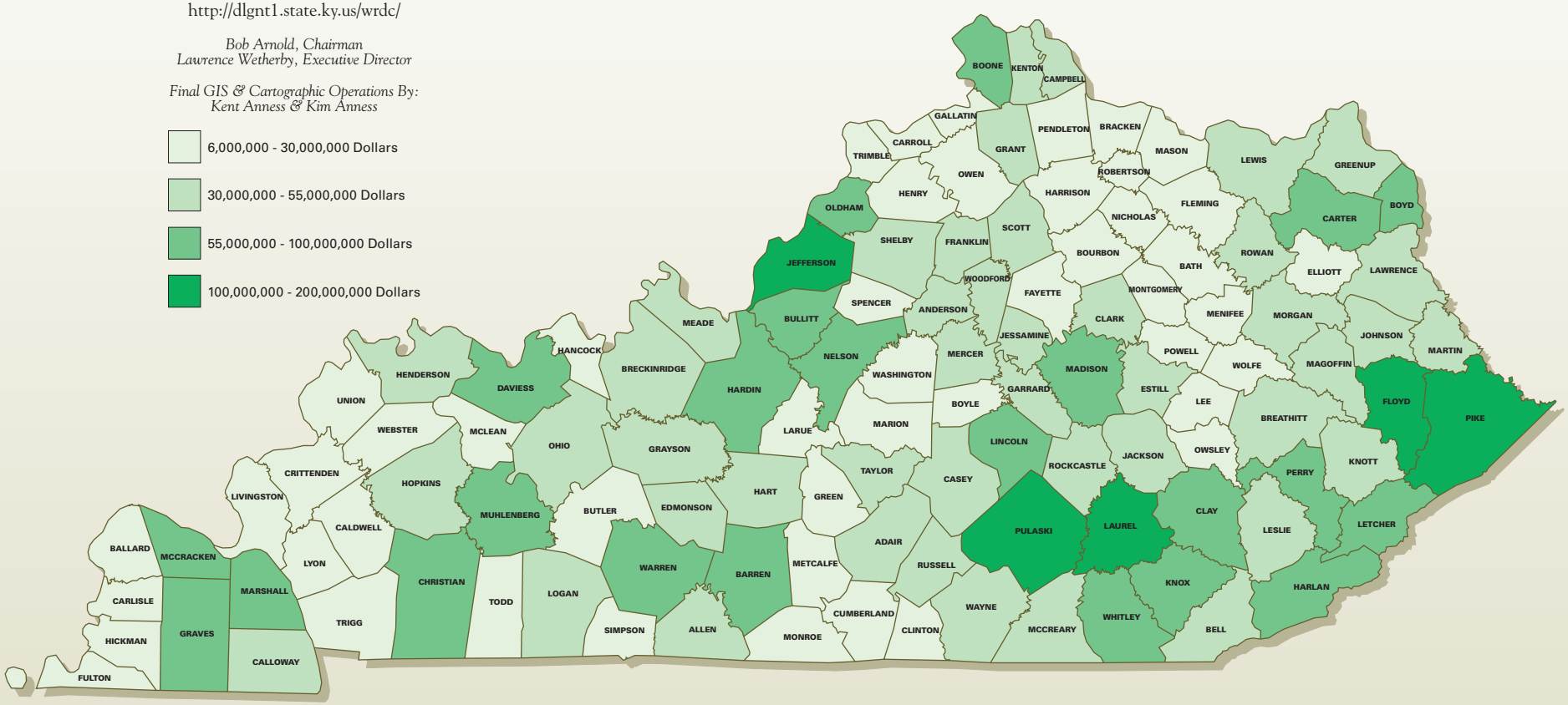
Prepared By:
Water Resource Development Commission

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

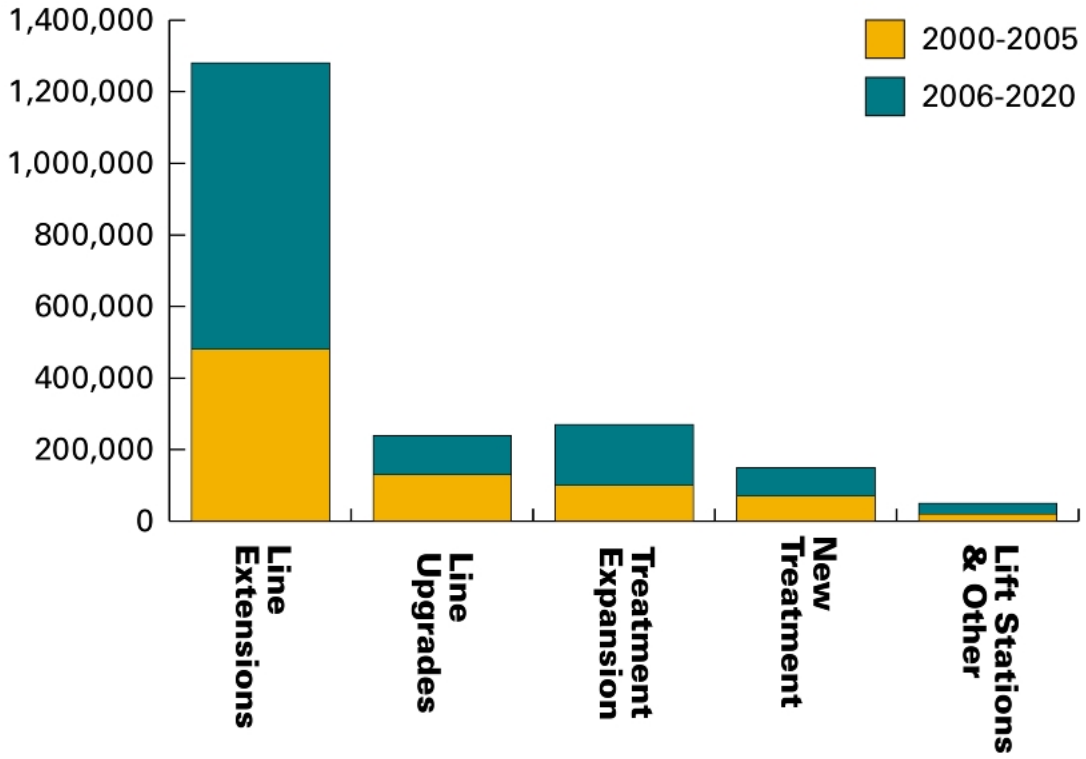
Final GIS & Cartographic Operations By:
Kent Anness & Kim Anness

- 6,000,000 - 30,000,000 Dollars
- 30,000,000 - 55,000,000 Dollars
- 55,000,000 - 100,000,000 Dollars
- 100,000,000 - 200,000,000 Dollars



Water Resource Development Commission

Public Wastewater treatment Projects (2000-2020), in Thousands of Dollars



Planned investments for municipal sewer systems for the period 2000-2020 are:

- 205 systems extending lines to serve new areas, 125,000 households, $1.3 billion
- 28 systems adding new treatment plants, $150 million
- 77 systems expanding treatment capacity, $270 million
- 64 systems, line upgrades, $240 million
- 19 systems, lift stations and other, $50 million

Municipal Sewer Investment Needs through 2020

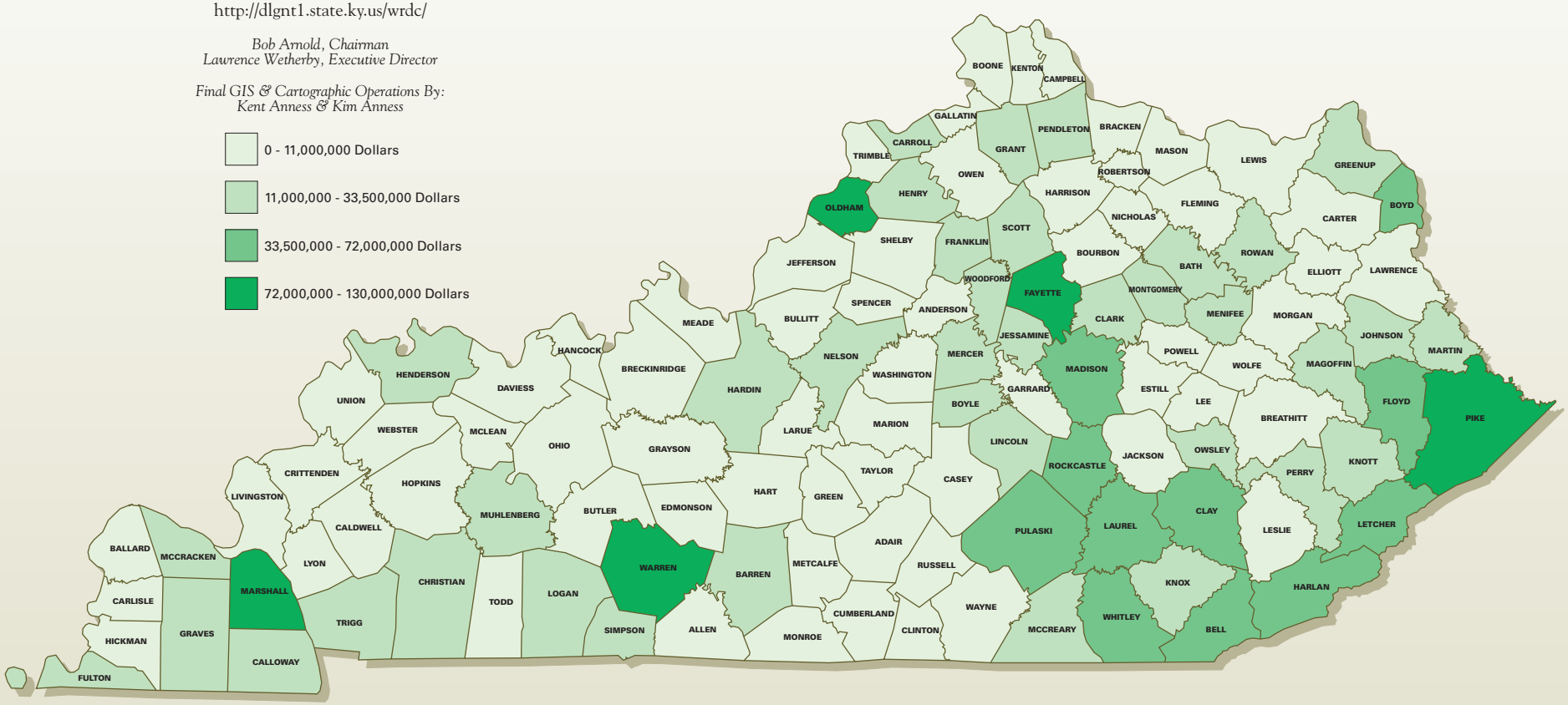
Commonwealth of Kentucky

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/

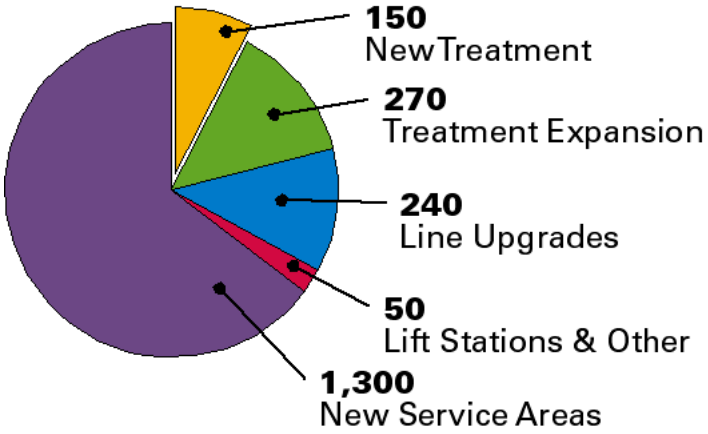
Bob Arnold, Chairman
Lawrence Wetherby, Executive Director

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



Water Resource Development Commission

Municipal Sewer Investment Needs, 2000-2020
$million



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

WASTEWATER TREATMENT ISSUES

Issues and potential solutions for the improvement sewer service in the Commonwealth were identified through interviews with representatives of state and regional agencies. A timely and significant contribution to the identification of these issues, together with recommended solutions, was made by the Environmental Quality Commission through their report, "Onsite Sewage in Kentucky: An assessment of issues and policy options to improve onsite sewage management in Kentucky," published in November of 1999.

1. ***The Cabinet for Health Services lacks adequate staff and resources to carry out its program.***

   Potential solutions

   Provide staff and resources to adequately support the CHS Onsite Sewage Program. It is estimated that 4 program evaluators, 1 sanitary engineer, 1 hydrogeologist, and 1 training/public education coordinator would be needed.

2. ***Onsite sewage rules are not being consistently implemented and adequately enforced by local health departments.***

   Potential solutions

- Strengthen onsite sewage enforcement authority of local health departments to provide for notices of violations and penalties.
- Eliminate the "written complaint" provision in the farmstead exemption to allow local health department to respond to public onsite sewage complaints in a more efficient and effective manner.
- Strengthen and enforce monitoring requirements for high maintenance onsite systems.

3. *Greater coordination and cooperation between the CHS and DOW is needed, together with clarification of responsibilities.*

Potential solutions

The Natural Resources and Environmental Protection Cabinet and the Cabinet for Health Services should jointly prepare a wastewater treatment action plan to assess and prioritize program needs, promote interagency cooperation, clarify responsibilities, and implement strategies to improve public and onsite wastewater treatment.

4. *The proliferation of residential package plants, problems with operation and maintenance of onsite systems, and lack of expertise about alternative multi-family cluster systems impede the progress of providing acceptable wastewater treatment*

Potential solutions

- Establish county sanitation districts to serve areas outside municipalities. The sanitation district would be responsible for all wastewater treatment in its district.
- Alternatively, require water districts to be responsible for both water and wastewater treatment within their district.
- Alternatively, divide the Commonwealth into Water and Sewer Service Delivery Districts governed by District boards under the authority of the Kentucky Infrastructure Authority.

In any of these proposals, homeowners would have the option of turning the responsibility of operation and maintenance of their system over to the responsible agency for a monthly fee.

- The state or counties develop appropriate mechanisms to compel sewer tie-ons.
- Legislation be enacted to provide for disclosure by a seller to a buyer regarding sewage treatment at the property prior to the transfer/selling of the property.
- Establish a demonstration project to test the feasibility of onsite sewage operation and maintenance management.
- CHS establish an onsite training coordinator and training center.
- NREPC and CHS target a portion of EPA 319 grant funds to develop an Onsite Sewage Education Campaign in Kentucky.

5. ***Need to improve county, regional, and state wastewater infrastructure planning in order to better assess needs and promote regional solutions***

Potential solutions

- Counties and cities be provided incentives to develop "Smart Growth" plans to overcome political and geographical boundaries and promote regionalization of wastewater services.
- Cities and counties develop wastewater treatment strategies prior to extending water lines.
- Creation of water and sewer districts as in 4.

6. ***Financing needed for both public and onsite systems***

Potential solutions

- Direct the Kentucky Infrastructure Authority to develop, with the assistance of other state and federal agencies, a statewide Onsite Sewage Loan and Hardship Grant Program.
- Evaluate, as a model, the Owensboro/Daviess County RWRA user charge system and how extensions to new areas are funded.

7. ***Need to develop a wastewater planning database which would include public and onsite data, soils and geology suitability data, etc.***

Potential solutions

- Expand and maintain the WRDC GIS database of wastewater treatment infrastructure.
- Inventory and map straight pipe and failing systems in each county.
- Create a soils/geology map for each county delineating onsite treatment requirements.

8. ***Implementation of innovative systems is often impeded by the need for regulatory agencies to review design and construction specifications on a case by case basis***

Potential solutions

Move from "prescriptive" standards to "performance based" standards to allow for new or innovative onsite sewage technologies. Standards and regulations written specifically for cluster systems would eliminate many problems and take many straight pipes and failing septic systems out of operation.

9. ***Need to improve the effectiveness of baseline funding requirements for sewer projects.***

Potential solutions

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; preliminary engineering reports for all treatment facilities) 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 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. Need to establish a centralized review process for funding sewer projects.

Potential solutions

Better arrangements are possible for the centralized review and funding of sewer 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:
    - 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.
- 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. Need to increase the use of technology in the process of funding sewer projects.

Potential solutions

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 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. Need provide support for onsite systems such as homeowner septic systems.

Potential solutions

The Cabinet for Health Services is already responsible for the provision of 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. It has been suggested that statutory authority be requested to allow local health departments to charge a fee for these services, and request an appropriation to subsidize the cost.

REFERENCES

[1] Kentucky Division of Water, 1999.

[2] Onsite Sewage in Kentucky: An assessment of issues and policy options to improve onsite sewage management in Kentucky, Environmental Quality Commission, November 15, 1999.

[3] Kentucky Department for Health Services.

[4] Data from Area Development Districts, November, 1999.

[5] Section 531 and Other Environmental Initiatives, 5th Congressional District.

[6] Kentucky, On-site sewage disposal systems regulations, 902 KAR10:081, 902 KAR10:085.

[7] Water Resource Development: A Strategic Plan, Water Resource Development Commission, October, 1999.

APPENDIX A

INFRASTRUCTURE FUNDING NEEDS[4]

Public Wastewater Treatment Projects 2000-2005

County	New Customers Served	Estimated Cost ($1,000)	Line Upgrades ($1,000)	Treatment Expansion ($1,000)	New Treatment ($1,000)	Lift Stations and Other ($1,000)	TOTAL NEEDS ($1,000)
Adair	??	1,000					**1,000**
Allen	20		100	100		250	**450**
Anderson	50	2,000	2,300				**4,300**
Ballard	191	2,280					**2,280**
Barren	846	6,730	2,334				**9,064**
Bath	285	5,000					**5,000**
Bell	149	5,960					**5,960**
Boone							**-**
Bourbon	3	40	350	250			**640**
Boyd	4,500	22,800		1,000	5,000		**28,800**
Boyle	35+3 subdivisions	2,966	2,125				**5,091**
Bracken							**-**
Breathitt	290	2,500					**2,500**
Breckinridge	76	1,355		1,500			**2,855**
Bullitt	13	78	800	1,350			**2,228**
Butler	15	180	300				**480**
Caldwell	335	3,600					**3,600**
Calloway	1,011	10,000					**10,000**
Campbell							**-**
Carlisle	403	4,000					**4,000**
Carroll	Speedway	10,000					**10,000**
Carter	220+??	2,800		611			**3,411**
Casey							**-**
Christian	1,340	15,352					**15,352**
Clark			1,625	14,000			**15,625**
Clay	703	8,874		4,108			**12,982**
Clinton	133	3,500		4,000			**7,500**
Crittenden	104	1,070					**1,070**
Cumberland							**-**
Daviess				600			**600**
Edmonson	15	125					**125**
Elliott							**-**
Estill	151+??	2,025	250	110	1,700	600	**4,685**
Fayette			40,000	21,500		13,600	**75,100**
Fleming							**-**
Floyd	3,006	22,400			2,500		**24,900**
Franklin	861	18,100	1,000	2,500			**21,600**
Fulton	270	2,700	10,000	3,000			**15,700**
Gallatin							**-**
Garrard	38	400	120				**520**
Grant	??	1,750					**1,750**
Graves	2,510	27,100					**27,100**
Grayson	109	1,320		500			**1,820**
Green	??	167					**167**

County	New Customers Served	Estimated Cost ($1,000)	Line Upgrades ($1,000)	Treatment Expansion ($1,000)	New Treatment ($1,000)	Lift Stations and Other ($1,000)	TOTAL NEEDS ($1,000)
Greenup	590	5,700	2,700	500			8,900
Hancock	248	117	15				132
Hardin	3,014	780	1,800				2,580
Harlan							-
Harrison	17+??	760	300	5,500			6,560
Hart	495	5,442	3,440				8,882
Henderson			3,106	1,248			4,354
Henry	752	5,305	2,111	1,033			8,449
Hickman	120	2,000	3,000		2,000		7,000
Hopkins							-
Jackson	206	3,181			1,400		4,581
Jefferson		Self Funded					-
Jessamine	368+??	5,690	1,000	800		390	7,880
Johnson	1,641	12,300					12,300
Kenton							-
Knott	193	2,000					2,000
Knox							-
Larue	37+?? + commercial	445				70	515
Laurel							-
Lawrence	120+??	2,500		500		600	3,600
Lee							-
Leslie	104+school	1,100	2,500				3,600
Letcher	874	8,245	3,501			2,000	13,746
Lewis							-
Lincoln	823	7,204	100	450			7,754
Livingston	402	5,300					5,300
Logan	852	3,796	2,130	1,500	1,000	740	9,166
Lyon	438	5,000		2,000			7,000
Madison	900	9,000	1,100	700	900		11,700
Magoffin	320	4,150		4,000			8,150
Marion	676	1,500					1,500
Marshall	773	10,000	500				10,500
Martin	465	3,000			1,600		4,600
Mason	227	2,718					2,718
McCracken	1,741	18,000					18,000
McCreary	1,342	11,877					11,877
McLean	359	2,762	50	1,600			4,412
Meade	140	650					650
Menifee	107	3,000					3,000
Mercer	41	300	1,250	800			2,350
Metcalfe	30	335					335
Monroe	14	806					806
Montgomery	738	9,300		2,000			11,300
Morgan	120	2,000					2,000
Muhlenberg	1,232	15,250					15,250
Nelson	650 potential	735			18,000	600	19,335
Nicholas	74+??	775	400				1,175
Ohio	59	473			4,000		4,473
Oldham	5,500	13,900					13,900
Owsley	140	1,700					1,700
Owen	2-schools	300					300
Pendleton	55	500			5,000		5,500
Perry	655	5,088					5,088
Pike	3,667	26,800		1,000			27,800

County	New Customers Served	Estimated Cost ($1,000)	Line Upgrades ($1,000)	Treatment Expansion ($1,000)	New Treatment ($1,000)	Lift Stations and Other ($1,000)	TOTAL NEEDS ($1,000)
Powell	156	2,300	1,700				**4,000**
Pulaski	619	7,440	5,048		20,000		**32,488**
Robertson	163	1,713			900		**2,613**
Rockcastle							**-**
Rowan	1017+??	7,700					**7,700**
Russell	321	4,490					**4,490**
Scott			2,370	3,735			**6,105**
Shelby							**-**
Simpson	127	1,500	885			750	**3,135**
Spencer							**-**
Taylor	555	4,558					**4,558**
Todd	305	3,600					**3,600**
Trigg	2,336	25,000					**25,000**
Trimble	27	400					**400**
Union	46	571	2,200	250		25	**3,046**
Warren	1,520	3,335	25,100	12,000			**40,435**
Washington							**-**
Wayne	353	1,651					**1,651**
Webster	214	988	200	1,200		770	**3,158**
Whitley							**-**
Wolfe	200	1,400		1,700			**3,100**
Woodford	52+??	600	1,012	200	4,000		**5,812**
							-
Est. Total	**55,000**	**$480,000**	**$130,000**	**$100,000**	**$70,000**	**$20,000**	**$800,000**

Public Wastewater Treatment Projects 2006-2020

County	New Customers Served	Estimated Cost ($1,000)	Line Upgrades ($1,000)	Treatment Expansion ($1,000)	New Treatment ($1,000)	Lift Stations and Other ($1,000)	TOTAL NEEDS ($1,000)
Adair	232	1,500	5,000				**6,500**
Allen							**-**
Anderson		1,350	1,000	4,200			**6,550**
Ballard				3,000			**3,000**
Barren	49	2,120					**2,120**
Bath	816	16,900		3,000			**19,900**
Bell	1,670	34,103		4,000			**38,103**
Boone							**-**
Bourbon	6	210	1,250	2,500		370	**4,330**
Boyd	4,185	26,600		8,000			**34,600**
Boyle	57	1,450	4,800	1,750			**8,000**
Bracken							**-**
Breathitt							**-**
Breckinridge	48	204					**204**
Bullitt	Trailer Parks	5,000					**5,000**
Butler				1,000			**1,000**
Caldwell							
Calloway	1,110	12,300					**12,300**
Campbell							**-**
Carlisle	119	1,500			4,000		**5,500**
Carroll	160	2,800					**2,800**
Carter							**-**
Casey	143	1,997					**1,997**
Christian							**-**
Clark	39	3,000	3,875	4,000			**10,875**
Clay	865	28,597					**28,597**
Clinton	65	1,227					**1,227**
Crittenden							**-**
Cumberland							**-**
Daviess							**-**
Edmonson							**-**
Elliott							**-**
Estill	27	330	300	1,700			**2,330**
Fayette			24,000	9,200		18,600	**51,800**
Fleming	105	1,200			532		**1,732**
Floyd	4,700	35,600		2,000			**37,600**
Franklin			3,000				**3,000**
Fulton	150	1,500					**1,500**
Gallatin	??	2,000					**2,000**
Garrard	87	1,500	280	450			**2,230**
Grant	534	17,060					**17,060**

County	New Customers Served	Estimated Cost ($1,000)	Line Upgrades ($1,000)	Treatment Expansion ($1,000)	New Treatment ($1,000)	Lift Stations and Other ($1,000)	TOTAL NEEDS ($1,000)
Graves							-
Grayson	70	1,900					1,900
Green							-
Greenup	1,410	15,830	1,960	3,000			20,790
Hancock			6				6
Hardin	1,000	500	2,000	10,000			12,500
Harlan	5,312	44,490		4,500			48,990
Harrison	29	1,300	700	1,300		1,100	4,400
Hart							-
Henderson	1,016	13,316					13,316
Henry	650	6,400		2,000		700	9,100
Hickman	55	600					600
Hopkins							-
Jackson	25	2,257					2,257
Jefferson		Self funded					-
Jessamine	351+potential	5,700	1,400	4,800			11,900
Johnson	312	3,800		5,000			8,800
Kenton							-
Knott	Prison	10,000					10,000
Knox	1,680	17,305		8,500			25,805
Larue				300			300
Laurel	1,917	43,792		3,500			47,292
Lawrence							-
Lee	12	500					500
Leslie	200	2,000					2,000
Letcher	1,812	23,275			5,000		28,275
Lewis	235	2,422			1,000		3,422
Lincoln	768+pot	7,800	600	1,600			10,000
Livingston							-
Logan	650	6,246	800	3,000			10,046
Lyon							-
Madison	546	10,922	3,800	6,900	12,000	7,600	41,222
Magoffin	1,082	10,150					10,150
Marion	314	820					820
Marshall	6,937	58,000		5,000	5,000		68,000
Martin	517	7,400		2,000			9,400
Mason	250	3,030			600		3,630
McCracken	1,473	15,000				500	15,500
McCreary	1,336	12,115			4,620		16,735
McLean	295	6,575					6,575
Meade							-
Menifee	650	15,600					15,600
Mercer	913	8,100	700	1,800			10,600

County	New Customers Served	Estimated Cost ($1,000)	Line Upgrades ($1,000)	Treatment Expansion ($1,000)	New Treatment ($1,000)	Lift Stations and Other ($1,000)	TOTAL NEEDS ($1,000)
Metcalfe							-
Monroe							-
Montgomery	424	5,000			500		**5,500**
Morgan	157	6,100					**6,100**
Muhlenberg							-
Nelson	245+industry	730	200	1,000			**1,930**
Nicholas	100+potential	1,250	1,800				**3,050**
Ohio	190	725					**725**
Oldham	??	28,300			30,000		**58,300**
Owsley	160	8,000		2,000			**10,000**
Owen							-
Pendleton	78	2,725			3,000		**5,725**
Perry	1,115	7,260	3,000	3,000	6,000		**19,260**
Pike	6,707	58,500		19,000	4,000		**81,500**
Powell	69	850	750	750			**2,350**
Pulaski	1,801	14,024					**14,024**
Robertson							-
Rockcastle	806	34,389		7,000			**41,389**
Rowan	397	7,000					**7,000**
Russell	129	1,534					**1,534**
Scott	2+potential	550	8,660			115	**9,325**
Shelby				2,000			**2,000**
Simpson			15,000				**15,000**
Spencer							-
Taylor	469	3,724					**3,724**
Todd							-
Trigg							-
Trimble	250	825			4,000		**4,825**
Union	Industry	10					**10**
Warren	2,370	3,525	25,000	13,000			**41,525**
Washington							-
Wayne	34	136					**136**
Webster	50	1,000					**1,000**
Whitley	2,730	47,000		10,000			**57,000**
Wolfe							-
Woodford	20	300	1,512	4,200			**6,012**
							-
Est. Total	**70,000**	**$800,000**	**$110,000**	**$170,000**	**$80,000**	**$30,000**	**$1,200,000**

APPENDIX B

WASTEWATER TREATMENT 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

INNOVATIVE DOMESTIC AND COMMERCIAL WASTEWATER TREATMENT FOR RURAL KENTUCKY

Data from Area Development Districts, November, 1999.