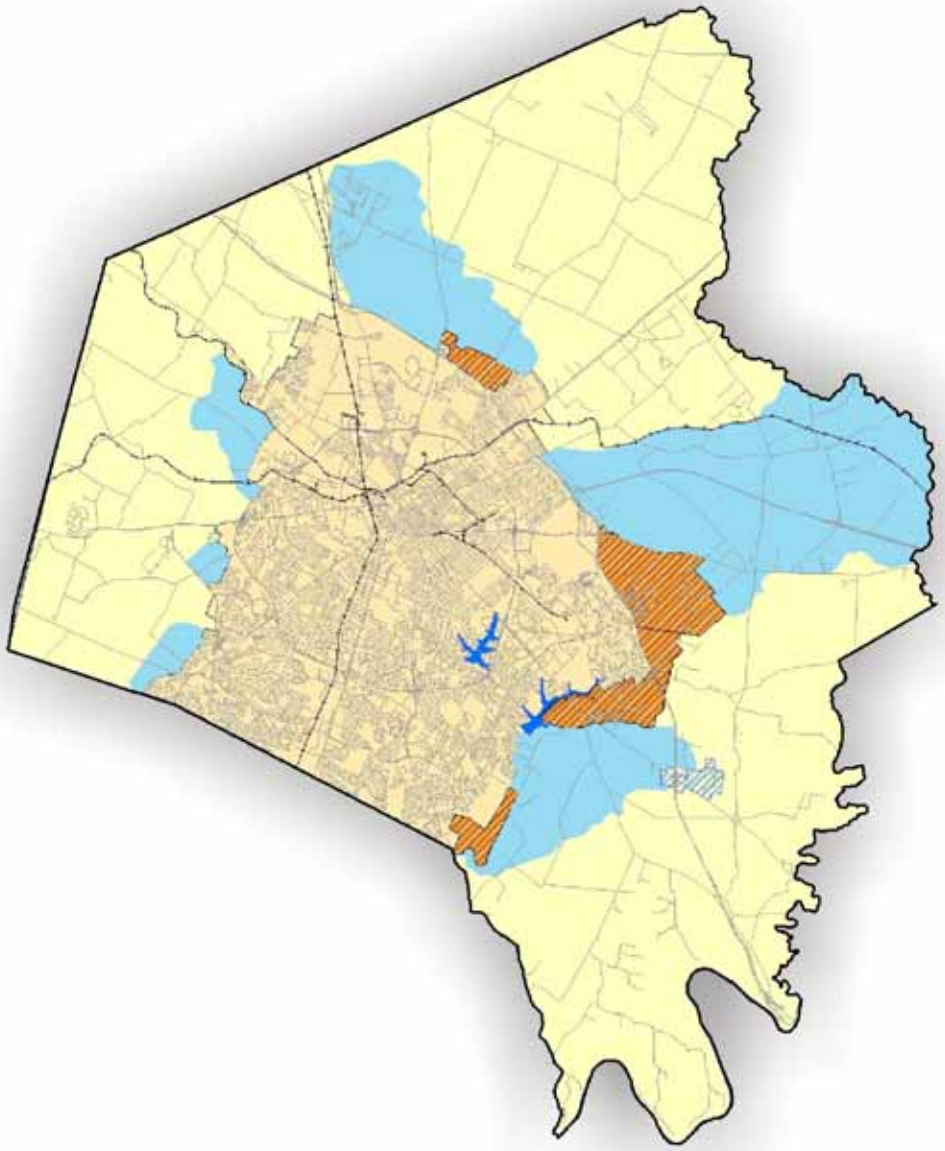
LEXINGTON-FAYETTE
URBAN COUNTY GOVERNMENT
Lexington, Kentucky

Rural Service Area Sanitary Sewer Capability Study



February 2026

GRW, Inc.
801 Corporate Drive ▪ Lexington, KY 40503
(859) 223-3999 ▪ www.grwinc.com

Table Of Contents

Appendices:

Tables:

Exhibits:

Detailed Cost Information:

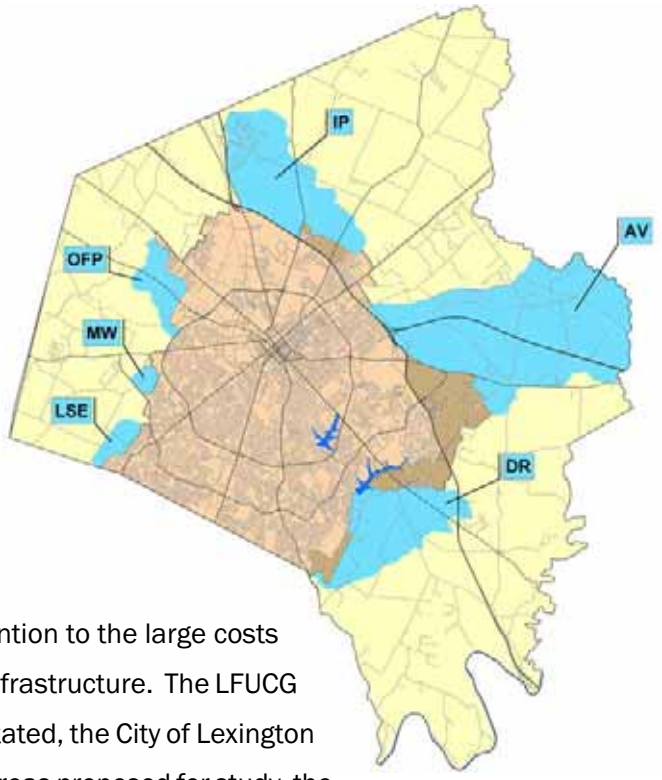
Section 1

Executive Summary

Six regions of the Lexington-Fayette Urban County Government (LFUCG) Rural Service Area (RSA) were previously defined in the 1999 Rural Land Management Plan for review of sanitary sewer capability. This study is a preliminary review of the infrastructure and capital required to provide sanitary sewer service to these regions. The six regions identified for study consist of 31,919 acres of the RSA. The study areas are summarized and shown in Table 1.1 and the map below. A large-scale map of the study areas is also provided in Appendix E.

Table 1.1 Areas for Study
Sanitary Sewer Capability Study
LFUCG Rural Service Area

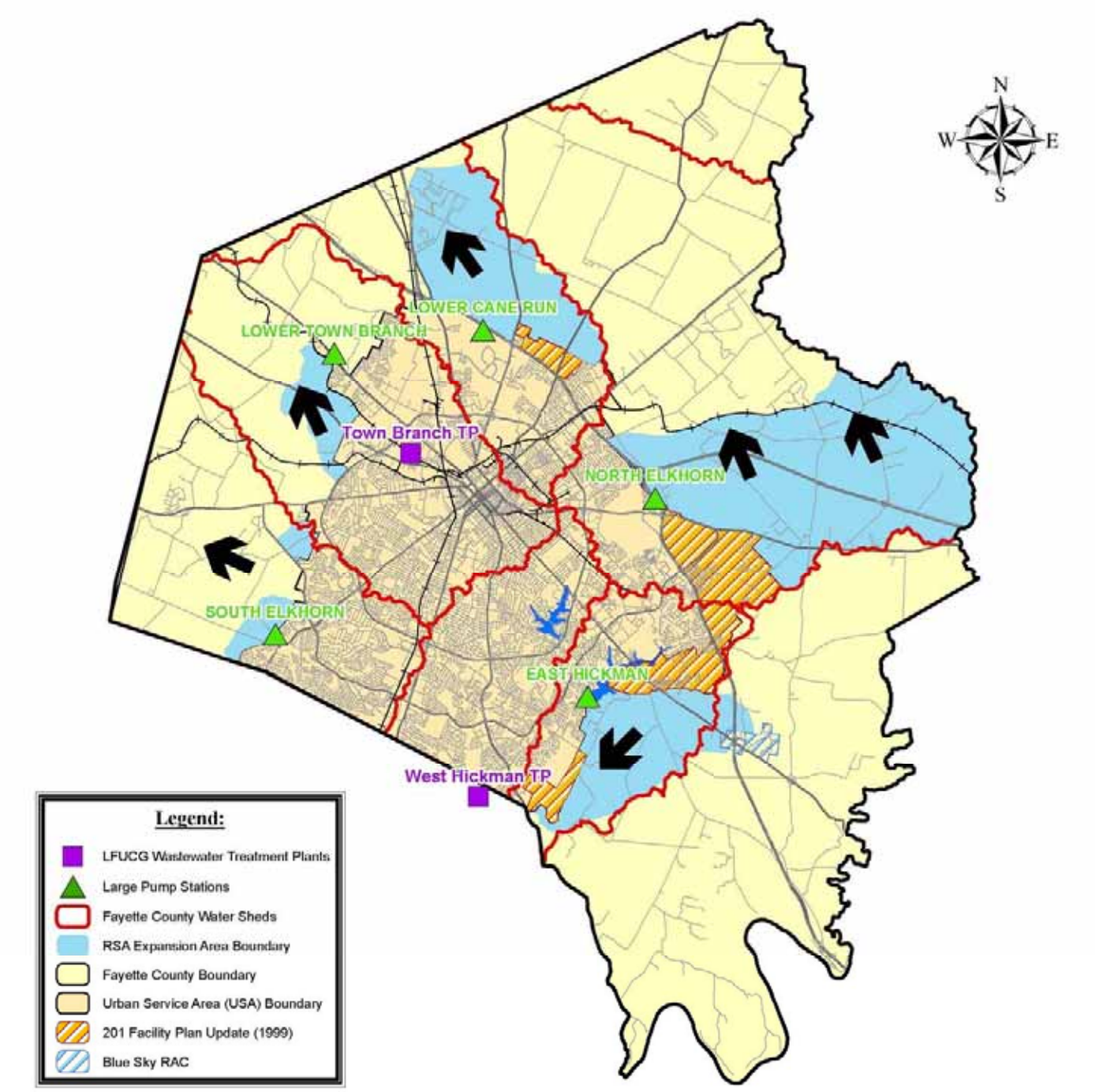
Map Item	LFUCG Rural Service Area	Area (Acres)
LSE	Lower South Elkhorn	774
MW	Man O' War	376
OFP	Old Frankfort Pike	1,683
IP	Ironworks Pike	6,909
AV	Avon/I-64	16,589
DR	Delong Road/Richmond Road	5,588



Background

The most recent wastewater facility plan (1999) brought attention to the large costs associated with expansion of the LFUCG wastewater system infrastructure. The LFUCG Sanitary Sewer System is very unique in topography. Simply stated, the City of Lexington is "built on top of a hill". Exhibit 1.1 portrays the rural service areas proposed for study, the existing wastewater treatment plants, the associated drainage basins, and the natural direction of flow. By inspection, all future potential gravity drainage of wastewater flows away from the current Urban Service Area and existing wastewater treatment facilities. As a result, all future wastewater would be pumped and conveyed upstream for great distances for treatment each time expansion area is developed. Planning for future wastewater systems is more complicated with this occurrence. The short-term required infrastructure, perhaps even for 20-year planning, is often never far enough downstream or large enough for ultimate growth. This report addresses concept design and magnitude of costs for full development of the study areas and provides insight into how future expansion of the LFUCG wastewater system for these areas could occur.

Exhibit 1.1
Direction of Gravity Flow of Potential Wastewater
Lexington-Fayette Urban County Government



Criteria

Several factors affect the results of this study. For this reason, the significant criteria utilized for the development of this summary is reviewed:

- Ultimate development and "build-out" of these areas will occur.
- The unit flow of 1,500 gpd/developable acre is utilized for ultimate flow projections.
- The design criteria of the LFUCG Sanitary Sewer and Pumping Station Manual has been utilized for preliminary sizing of all required infrastructure.
- The LFUCG Wastewater System improvements, as provided for in the 201 Facility Plan, have been constructed or will be constructed by the time described RSA improvements are realized.
- All resultant wastewater flows from development will be returned to one of the two existing LFUCG wastewater treatment plants (WWTP).

A summary of each study area is provided. A review of the key elements for development, required improvements, estimated costs, and further recommendations is provided.

Lower South Elkhorn Rural Service Area

The Lower South Elkhorn Rural Service Area (LSE) is located in southwestern Fayette County. The LSE has a total land area of 774 acres and a total developable land area of 700 acres. In review of the land use information, it is the apparent the region primarily consists of prime agricultural and core equine agricultural land.

The projected average wastewater flow for the LSE is 1.05 MGD. Trunk sewers range in size up to 21" diameter. A Class A pump station is required at the most downstream location of the LSE to provide capacity for the peak wastewater flow of 2,625 gpm. The wastewater will be pumped upstream to the existing South Elkhorn Pump Station via a 14" force main. Pumping upgrades to the South Elkhorn Pump Station and Force Main will be required and flows will ultimately be delivered to the West Hickman Wastewater Treatment Plant, via the upgraded South Elkhorn pump station and force main system.

In 2005, design was initiated for the upgrade of the South Elkhorn Pump Station to near 14,000 gpd capacity and the proposed parallel South Elkhorn Force Main was upgraded to a 36" force main and extended to the West Hickman WWTP. These upgrades, which are greater in magnitude than the 1999 LFUCG 201 Facility Plan recommendations, can accommodate the LFUCG and some potential northern Jessamine County wastewater flows. Currently, an agreement is in place between the LFUCG and Jessamine County to accept up to 2 MGD of wastewater from Jessamine County for treatment at the West Hickman WWTP. The Jessamine County wastewater pumping and conveyance alternatives have not been determined at this time, however, some capacity for northern Jessamine County or additional in-basin LFUCG expansion area will be available upon completion of the 2005 South Elkhorn

Pump Station and Force Main Improvements. Available capacity will be utilized on a first come, first serve basis. Monies from the development of either north Jessamine County or new LFUCG expansion area, such as the LSE, should be provided to the LFUCG for the "shared" costs of the upgraded South Elkhorn pump station and force main improvements.

Table 1.2 provides a summary of estimated total project costs for the wastewater infrastructure required for development of the Lower South Elkhorn RSA. Shared costs for the upgrade improvements of the existing South Elkhorn pump station and force main will be provided by the development of the Lower South Elkhorn RSA.

Table 1.2 Cost Summary
Lower South Elkhorn (LSE) RSA

Item	Total Cost	Total Cost/Acre*
Trunk Sewers	$ 470,934.	$ 673.
Force Main	437,281.	625.
Pump Stations	1,200,000.	1,714.
Shared Costs**	2,673,597.	3,819.
Wastewater Treatment	6,300,000.	9,000.
Total Cost	**$ 11,081,812.**	**$ 15,831.**

* Total Cost is per developable acre.
** For upgrade of South Elkhorn pump station and force main

Existing South Elkhorn Pump Station

The following summary review and recommendations are provided:

Review

- The area is designated as one of the "five focus areas" for rural greenway creation.
- A large portion of the area is designated as a "scenic area".
- All resultant flows from the LSE are downstream of current wastewater infrastructure development. Additional pumping and conveyance will be required.
- Upgrade of the existing South Elkhorn Pump Station and Force Main will be required to convey flow to the West Hickman Wastewater Treatment Plant.
- Continued downstream development of the LSE will present similar problems as the present. No capacity for pumping, conveyance, or treatment of wastewater will exist.
- Existing wastewater planning strategies for the South Elkhorn Sewershed do not address issues beyond the remedy of current sanitary sewer issues within the current LFUCG wastewater planning area.
- With the development of the LSE, opportunity exists to abandon the Palomar Hills Pump Station and convey all flows to the new LSE Pump Station.

Recommendations

- Revisit the issues and costs of an additional wastewater treatment plant
- Evaluate the ability and availability of right-of-way to construct a second force main, along the Fayette County/Jessamine County border, between the South Elkhorn Pump Station and West Hickman WWTP.
- Determine other future alternatives available for pumping, conveyance, and treatment of wastewater flows from the South Elkhorn drainage basin.
- Expand future planning efforts for wastewater infrastructure beyond the traditional 20-year planning period.

Man O' War Rural Service Area

The Man O' War Rural Service Area (MW) is located in southwestern Fayette County. The MW has a total land area of 376 acres and a total developable land area of 341 acres. The land use in this study area is 89% core equine agricultural or prime agricultural.

The projected average wastewater flow for the MW is 511,500 gpd. The projected peak wastewater flow is 1,562 gpm. A Class B pump station is required at the most downstream location of the MW with a capacity of 1,600 gpm. The wastewater will be pumped to the existing South Elkhorn Pump Station. Pumping upgrades to the South Elkhorn Pump Station will be required. Flows will ultimately be delivered to the West Hickman Wastewater Treatment Plant, via the upgraded South Elkhorn pump station and force main system.

In 2005, design was initiated for the upgrade of the South Elkhorn Pump Station to nearly 14,000 gpd capacity and the proposed parallel South Elkhorn Force Main was upgraded to a 36" force main and extended to the West Hickman WWTP. These upgrades, which are greater in magnitude than the 1999 LFUCG 201 Facility Plan recommendations, can accommodate the LFUCG and some potential northern Jessamine County wastewater flows. Currently, an agreement is in place between the LFUCG and Jessamine County to accept up to 2 MGD of wastewater from Jessamine County for treatment at the West Hickman WWTP. The Jessamine County wastewater pumping and conveyance alternatives have not been determined at this time, however, some capacity for northern Jessamine County or additional LFUCG expansion area will be available upon completion of the 2005 South Elkhorn Pump Station and Force Main Improvements. Available capacity will be utilized on a first come, first serve basis. Monies from the development of either north Jessamine County or new LFUCG expansion area, such as the MW, should be provided to the LFUCG for the "shared" costs of the pumping and conveyance infrastructure.

Table 1.3 provides a summary of estimated total project costs for the wastewater infrastructure required for development of the Man O' War RSA. Shared costs for the upgrade improvements of the existing South Elkhorn pump station and force main will be provided by the development of the Man O' War RSA.

Table 1.3 Cost Summary Man O' War (MW) RSA

Item	Total Cost	Total Cost/Acre*
Trunk Sewers	$ 72,232.	$ 212.
Force Main	1,422,814.	4,172.
Pump Stations	600,000.	1,760.
Shared Costs**	1,258,023.	3,689.
Wastewater Treatment	3,069,000.	9000.
Total Cost	**$ 6,422,069.**	**$ 18,833.**

* Total Cost is per developable acre.
** For upgrade of South Elkhorn pump station and force main

Man 'O' War RSA

The following summary review and recommendations are provided:

Review

- The MW is contiguous to current growth in the region.
- Nearly 90% of the property is core equine or prime agricultural land.
- All resultant flows from the MW are downstream of current wastewater infrastructure development. Additional pumping, conveyance, and treatment facilities will be required.
- Upgrade of the existing South Elkhorn Pump Station and Force Main will be required to convey flow to the West Hickman Wastewater Treatment Plant.
- Continued downstream development below the MW will present similar problems as the present. No capacity for pumping, conveyance, or treatment of wastewater will exist.
- Existing wastewater planning strategies for the South Elkhorn Sewershed do not address issues beyond the remedy of current sanitary sewer issues within the current LFUCG wastewater planning area.

Recommendations

- Revisit the issues and costs of an additional wastewater treatment plant.
- Evaluate the ability and availability of right-of-way to construct a second force main, along the Fayette/Jessamine County border, between the South Elkhorn Pump Station and West Hickman WWTP.
- Determine other future alternatives available for pumping, conveyance, and treatment of wastewater flows from the South Elkhorn drainage basin.
- Expand future planning efforts for wastewater infrastructure beyond the traditional 20-year planning period.

Old Frankfort Pike Rural Service Area

The Old Frankfort Pike Rural Service Area (OFP) is located in western Fayette County. The OFP has an identified total area of 1,683 acres and a total developable area of 1,443 acres. Land Use consists of over 99% core equine agricultural. The total projected average daily flow for the OFP is 8.16 MGD. The OFP land area has been divided

into two sub-drainage basins, OFP-1 and OFP-2. Each basin will have independent wastewater infrastructure. The OFP-1 has a total land area of 411 acres and a projected average daily flow of 0.58 MGD. Independent of OFP-1 development, the existing Wolf Run Pump Station, of the Wolf Run Sewershed, would be replaced with the New Wolf Run Pump Station and located near the confluence of Wolf Run Creek and Town Branch Creek, downstream of the Town Branch WWTP. The existing Wolf Run Pump Station requires replacement due to lack of pumping capacity and lack of available space to expand. Relocation is also desired due to the existing pump station being presently located in a commercially developed area. The LFUCG and the OFP-1 development would provide shared monies for the construction of the New Wolf Run pump station, force main, and trunk sewer. The New Wolf Run Pump Station would have a capacity of 12,400 gpm. All wastewater would be conveyed to the Town Branch WWTP.

The OFP-2 has a total land area of 1,272 acres and a projected average daily flow of 1.58 MGD. The peak instantaneous flow is projected to be 3,743 gpm. Trunk sewers ranging up to 30" in diameter, a Class A pump station, and 20" force main would be required. All wastewater would be conveyed to the Town Branch WWTP.

With the development of the OFP, opportunity exists for the LFUCG to decommission several small pump stations along Town Branch Creek by extending gravity sewer service upstream to these locations. Detailed information is provided in Section 5.

Table 1.4 provides a summary of estimated total project costs for the wastewater infrastructure required for development of the Old Frankfort Pike RSA. Equivalent shared costs for the replacement improvements of the New Wolf Run trunk sewer, pump station, and force main would be distributed between the currently served LFUCG Wolf Run Sewershed and the development of the Old Frankfort Pike RSA.

Table 1.4 Cost Summary - Old Frankfort Pike (OFP) RSA

Item	Total Cost	Total Cost/Acre*
Trunk Sewers	$ 8,376,147.	$ 5,805.
Force Main	5,838,063.	4,046.
Pump Stations	6,800,000.	4,712.
Wastewater Treatment	12,987,000.	9,000.
Total Cost	**$ 34,001,210.**	**$23,563.**
Shared Costs**	-(10,394,418)	-(7,203)
Net Cost for OFP	**$ 23,606,792.**	**$16,360.**

* Total Cost is per developable acre.
** LFUCG existing Urban Service Area portion of Wolf Run Improvements

Old Frankfort Pike RSA

The following summary review and recommendations are provided:

Review

- Over 99% of the property is core equine agricultural or prime agricultural land.
- The area is designated as one of the "five focus areas" for rural greenway creation.
- A large portion of the area is designated as a "scenic area".
- All resultant flows from the OFP are downstream of current wastewater infrastructure development. Additional pumping, conveyance, and treatment facilities will be required.
- In the opinion of the LFUCG Division of Sanitary Sewers, replacement of the Wolf Run Pump Station and Force Main would be prior to the development of OFP-1.
- Future downstream development below the OFP will present similar problems as the present; no availability of pumping, conveyance, or treatment capacity is available.
- With the development of the OFP, opportunity exists to decommission several small capacity pump stations along Town Branch Creek.

Recommendations

- Revisit the issues and costs of a wastewater treatment plant in the lower Town Branch drainage basin.
- Investigate the costs and feasibility to pump and convey future wastewater to an adjacent drainage basin WWTP.
- For future development beyond the OFP-2, evaluate the ability and availability of right-of-way to construct another force main between a new downstream pump station below OFP-2 and the Town Branch WWTP.
- Continue evaluation of wastewater discharge limitation concerns on the Town Branch Creek.
- Determine other future alternatives available for pumping, conveyance, and treatment of wastewater flows.
- Expand future planning efforts for wastewater infrastructure beyond traditional 20-year planning period.

Ironworks Pike Rural Service Area

The Ironworks Pike Rural Service Area (IP) is located in northwest Fayette County. The IP has an identified total area of 6,909 acres and a total developable area of 4,776 acres. The large amount of public land associated with these large parcels may be misleading of development potential. Environmentally Sensitive Areas (ESA) have been identified along the Cane Run Creek drainage basin in Fayette County. The Royal Springs Aquifer, which is common with the Cane Run Creek drainage basin is an environmentally sensitive area of great importance and concern. The City of Georgetown receives a portion of their drinking water supply from the Royal Springs Aquifer. In addition, the Spindletop Rural Activity Center exists in the IP.

The projected average wastewater flow is 7.16 MGD or 4,976 gpm. The projected peak wastewater flow is 13,433 gpm. A Class A pump station is required to pump and convey all wastewater to the Town Branch WWTP. Table 1.5 provides a summary of estimated total project costs for the wastewater infrastructure required for development of the Ironworks Pike RSA.

Table 1.5 Cost Summary Ironworks Pike (IP) RSA

Item	Total Cost	Total Cost/Acre*
Trunk Sewers	$ 10,095,599.	$ 2,114.
Force Main	14,883,266.	3,116.
Pump Stations	5,000,000.	1,047.
Shared Costs	0.	0.
Wastewater Treatment	42,984,000.	9,000.
Total Cost	**$ 72,962,865.**	**$ 15,277.**

*Total Cost is per developable acre.

Ironworks Pike RSA

The following summary review and recommendations are provided:

Review

- The land use consists of 43% public land and 37% core equine agricultural land.
- The land is "environmentally sensitive" due to the existence of the Royal Springs Aquifer in this drainage basin.
- Continued downstream development will present similar problems to those that are presently being considered, no pumping, conveyance, or treatment capacity is available.
- Future construction of additional pumping and conveyance facilities to the Town Branch WWTP may be difficult due to the unavailability of right-of-way and cost of construction.

Recommendations

- Revisit the issues and costs of a wastewater treatment plant in the Cane Run drainage basin.
- Investigate the feasibility of pumping and conveyance of wastewater to a new WWTP in an adjacent drainage basin.
- Determine other future alternatives available for pumping, conveyance, and treatment of wastewater flows from the Cane Run drainage basin.

Avon/I-64 Rural Service Area

The Avon/I-64 Rural Service Area (AV) is located in eastern Fayette County. The AV has an identified total area of 16,589 acres and a total developable area of 14,715 acres. This is the largest of the study areas. A wide distribution of land use and parcel size exists in the AV. Over 62% of land parcels are less than 10 acres and over 86% are less than 40 acres. The Avon Rural Activity Center also exists in the AV.

Three separate sub-drainage basins exist in the AV; AV-1, AV-2, and AV-3. The projected total average wastewater flow is 22.07 MGD. Four pump stations are required for the three separate sub-drainage basins of the AV, three Class A and one Class B. One of the Class A pump stations is provided along the route of the force main to provide additional pumping energy to convey the flow to the West Hickman WWTP. Over 23 miles of large diameter force main are required for provision of sanitary sewer to this study area. A summary of costs is provided in Table 1.6

The 1999 LFUCG Wastewater Facilities Plan provides an alternative for construction of a wastewater treatment plant in the North Elkhorn drainage basin, in lieu of the selected improvements of the North Elkhorn Pump Station and Force Main. Given the high cost of pumping and conveyance facilities to the West Hickman Wastewater Treatment Plant for the AV, the future option of a new wastewater treatment plant in the North Elkhorn drainage basin should be considered prior to development of the AV.

With the construction of improvements for AV-1 and AV-2, opportunity exists to provide sanitary sewer service to the Blue Sky Rural Activity Center (RAC) due to the route location of the force main and the proposed Cleveland Road Pump Station. The Blue Sky RAC consists of 465 acres of land, of which 432 acres are developable. Average daily flows would be 648,000 gpd. The inclusion of the Blue Sky RAC into the AV-1/AV-2 project would allow for elimination of two private wastewater treatment facilities, The Blue Sky WWTP (150,000 gpd capacity) and the Boonesboro Manor WWTP (53,000 gpd capacity). All proposed wastewater flows would be conveyed to the West Hickman WWTP. Estimated total project costs for collection, pumping, conveyance, and treatment of wastewater to the West Hickman WWTP is $8,002,858.

Table 1.6 Cost Summary Avon/I-64 (AV) RSA

Item	Total Cost	Total Cost/Acre*
Trunk Sewers	$ 34,738,333.	$ 2,361.
Force Main	65,829,224.	4,474.
Pump Stations	30,100,000.	2,045.
Wastewater Treatment	132,435,000.	9,000.
Total Cost	**$ 263,102,557.**	**$ 17,880.**

*Total Cost is per developable acre.

Avon/I-64 RSA

The following summary review and recommendations are provided:

Review

- Over 70% of the property is core equine agricultural or prime agricultural land. Over 62% of the parcels are tracts of 10 acres or less.
- The North Elkhorn Creek is designated as one of the "five focus areas" for rural greenway creation in the LFUCG Rural Service Area Land Management Plan.
- Several Rural Settlements exist in the AV.
- All resultant flows from the AV are downstream of current wastewater infrastructure development. Additional pumping and conveyance will be required.

- The North Elkhorn Sewershed and Expansion Area 2A are just upstream of AV-1.
- Continued downstream development will present similar problems as the present, no pumping, conveyance, or treatment capacity is available.
- Wastewater planning strategies for an expanded North Elkhorn Sewershed have not been addressed.

Recommendations

- Revisit the issues and costs of a wastewater treatment plant in the North Elkhorn Creek drainage basin.
- Establish preliminary wastewater discharge limits for the North Elkhorn Creek
- Determine other future alternatives available for pumping, conveyance, and treatment of wastewater flows.
- Continue to develop planning strategies for future provision of wastewater infrastructure in the AV.

Delong Road/Richmond Road Rural Service Area

The Delong Road/Richmond Road Rural Service Area (DR) is located in southeastern Fayette County. The DR has a total land area of 5,588 acres and a total developable land area of 5,087 acres. Over 82% of the land use is Core Equine Agricultural and Prime Agricultural. Over 88% of the land parcels are less than 40 acres in size.

The projected average wastewater flow from the DR is 5,299 gpm or 7.63 MGD. The resultant peak wastewater flow is 14,307 gpm. The DR is divided into two subdrainage basins; DR-1 and DR-2. A Class A pump station will be required at the downstream location of the DR-1. A class B pump station will be required in the DR-2 to convey flows to the DR-1 trunk sewer system. All resultant wastewater flows will be pumped and conveyed to the West Hickman WWTP. Table 1.7 provides a summary of estimated total project costs for the wastewater infrastructure required for development of the Delong Road/Richmond Road RSA.

Table 1.7 Cost Summary
Delong Road/Richmond (DR) RSA

Item	Total Cost	Total Cost/Acre*
Trunk Sewers	$ 15,323,989.	$ 3,012.
Force Main	2,131,495.	419.
Pump Stations	6,900,000.	1,357.
Wastewater Treatment	45,783,000.	9,000.
Total Cost	**$ 70,138,484.**	**$ 13,788.**

*Total Cost is per developable acre.

Delong Road/Richmond Road RSA

With development of the DR, opportunity also exists during the development of the DR to decommission several existing pump stations of the East Hickman Sewershed. Details of these pump stations are provided in Section 8.

With the construction of improvements for the DR, opportunity also exists to provide sanitary sewer service to the Blue Sky Rural Activity Center (RAC). The inclusion of the Blue Sky RAC into the DR project would allow for elimination of two private wastewater treatment facilities, The Blue Sky WWTP (150,000 gpd capacity) and the Boonesboro Manor WWTP (53,000 gpd capacity). The decision of inclusion of the Blue Sky RAC into the DR development would be required prior to design and construction of any initial DR phase.

The Blue Sky Rural Activity Center (RAC) has a total land area of 465 acres, of which approximately 432 acres is developable. The projected average wastewater flow from the Blue Sky Rural Activity Center is 648,000 gpd or 450 gpm. Estimated total additional cost for inclusion of the Blue Sky RAC; which includes collection, pumping , conveyance, and treatment; is $7,462,773.

The following summary review and recommendations are provided:

Review

- Over 75% of the property is core equine agricultural or prime agricultural land.
- A large portion of the area is designated as a “scenic area”.
- No capacity exists in the current LFUCG facilities for the DR.
- Expansion Area 1 recommended improvements from the 201 Facility Plan are parallel in nature to the DR improvements. Economy of scale can be achieved with combined consideration of improvements for the DR, East Hickman Sewershed, and current Expansion Areas (1, 2B, and 2C) of the 2001 LFUCG Comprehensive Plan Update.

- The Blue Sky RAC is adjacent to the uppermost reach of the DR. No stand alone alternatives have been presented to convey these flows to LFUCG facilities. No capacity exists in the current LFUCG facilities for the Blue Sky RAC.
- The decision of inclusion of the Blue Sky RAC into the DR development would be required prior to design and construction of the initial DR phase.
- Opportunity exists to decommission several existing pump stations with the development of the DR and/or Expansion Area 1.

Recommendations

- Determine required combined improvements and costs to serve Expansion Areas and the DR. At this time, no improvements have been designed or constructed for the 2001 LFUCG Comprehensive Plan Update Expansion Areas.
- Review feasible phased improvements of the DR. The lower reaches of the DR can be sewered and pumped to the West Hickman WWTP without significant outlay of capital for upstream improvements.

Summary

The study of this vast amount of land in the Rural Service Area is not intended to be a "stepping stone" for development into these regions. The study is intended as a long-range and broad planning document for the evaluation of concept sanitary sewer development. The wastewater system improvements required for service in these identified Rural Service Area regions, are one of many factors that are evaluated in the consideration of Urban Service Area expansion.

Table 1.8 is a summary of estimated total project costs for the complete development of sanitary sewer into these study areas. Table 1.9 provides summary of the projected wastewater flows and the WWTP destination.

Table 1.8
Summary of Estimated Total Project Cost
LFUCG Rural Service Area Sanitary Sewer Capability Study

LFUCG Rural Service Area	Estimated Cost ($)	Developable Acres	Estimated Cost Per Developable Acre
Lower South Elkhorn	$ 11,081,812.	700	$ 15,831.
Man O' War	6,422,069.	341	18,833.
Old Frankfort Pike	23,606,792.	1,443	16,360.
Ironworks Pike	72,962,865.	4,776	15,277.
Avon/I-64	263,102,557.	14,715	17,880.
Delong Road/Richmond Road	70,138,484.	5,087	13,788.
Summary	**$ 447,314,579.**	**27,062.**	**$ 16,529.**

Table 1.9
Summary of Average Daily Flows
LFUCG Rural Service Area Sanitary Sewer Capability Study

LFUCG Rural Service Area	Town Branch WWTP (MGD)	West Hickman WWTP (MGD)
Lower South Elkhorn		1.05
Man O' War		0.51
Old Frankfort Pike	8.16	
Ironworks Pike	7.16	
Avon/I-64		22.07
Delong Road/Richmond Road		7.63
Summary	**15.32**	**31.26**

The amount of monies required for collection, pumping, conveyance, and treatment of wastewater for the study area are vast, however, the amount of land encompassed is also vast. The study area consists of 31,920 acres, which is approximately 58% of the current Urban Service Area. The results of this study provide conceivable options for ultimate development of the LFUCG Sanitary Sewer System utilizing the past practice of returning all flows to one of the two existing wastewater treatment plants. In the future, a shift of paradigm may be in order to provide additional wastewater treatment plants for these outward growing areas. The LFUCG is faced with many of the same decisions concerning additional WWTP's, as they were with the West Hickman WWTP in the 1970's. Further study of these options will provide insight into the least cost and best alternatives for the future of the LFUCG Sanitary Sewer System.

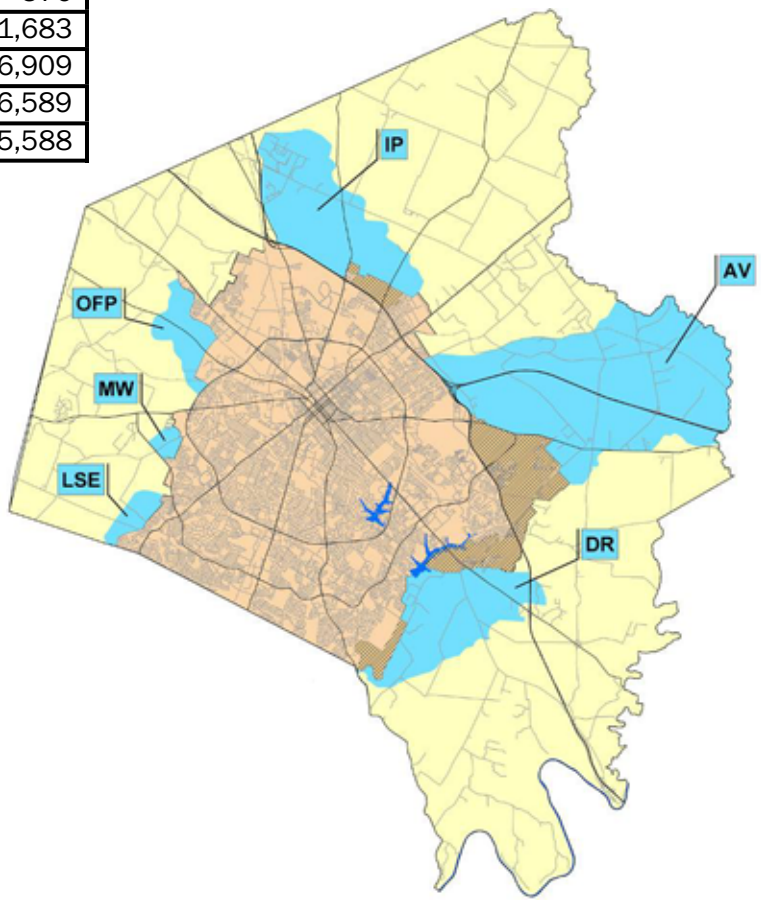
Section 2
Introduction

Six regions of the Lexington-Fayette Urban County Government (LFUCG) Rural Service Area (RSA) were previously defined in the 1999 Rural Land Management Plan for review of sanitary sewer capability. This study is a preliminary review of the infrastructure and capital required to provide sanitary sewer service to these regions. The six regions identified for study consist of 31,919 acres of the RSA.

The study of this vast amount of land in the RSA is not intended as a "stepping-stone" for development into these regions. The study is intended as a long-range and broad planning document for the evaluation of concept sanitary sewer development. This document is only one of many resources that influence the ultimate direction of growth in Fayette County. The study areas are summarized in Table 2.1 and the map below. A large-scale map of the study areas is also provided in Appendix E.

Table 2.1 Areas for Study

Map Item	LFUCG Rural Service Area	Area (Acres)
LSE	Lower South Elkhorn	774
MW	Man O' War	376
OFP	Old Frankfort Pike	1,683
IP	Ironworks Pike	6,909
AV	Avon/I-64	16,589
DR	Delong Road/Richmond Road	5,588



Background

Wastewater systems, like most community infrastructure and development, are envisioned when the demand is forecast, designed when the demand requires, and constructed when the monies are available. The wastewater planning process vision must be consistent and coordinated with the overall urban planning process to provide a unison and logical plan. Historically, the planning of wastewater infrastructure has followed the urban planning process, however, the most recent wastewater facility plan (1999) brought attention to the possible alternatives and large costs associated with expansion of the LFUCG wastewater system infrastructure.

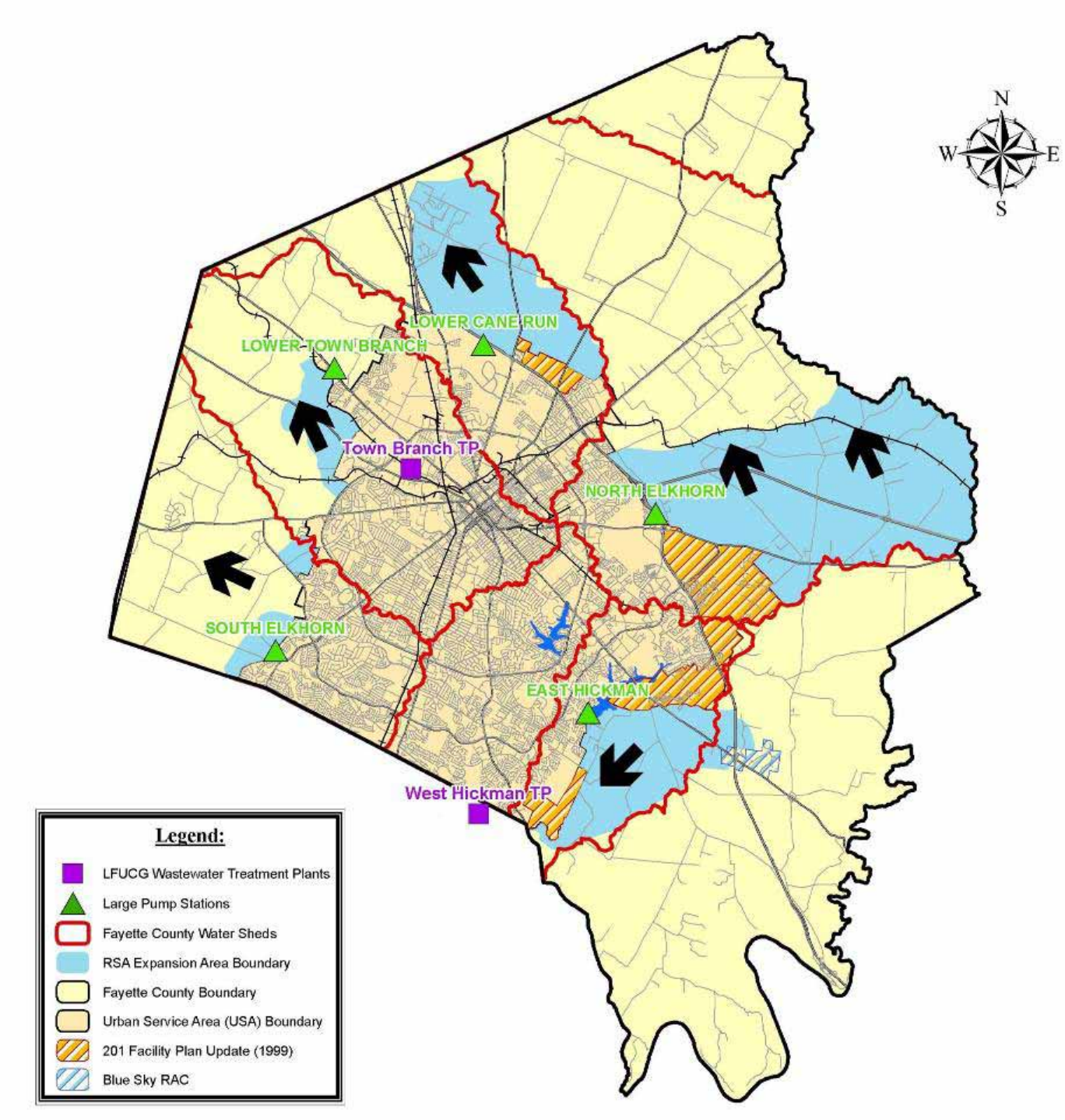
The LFUCG Sanitary Sewer System is very unique in topography. Simply stated, the City of Lexington is "built on top of a hill". Exhibit 2.1 portrays the proposed rural service areas proposed for study, the existing wastewater treatment plants, the associated drainage basins, and the natural direction of flow. By inspection, all future potential gravity drainage of wastewater flows away from the current Urban Service Area and existing wastewater infrastructure. As a result, all future wastewater would be pumped and conveyed upstream for great distances for treatment each time expansion area is developed. Planning for future wastewater systems is more complicated with this occurrence. The short-term required infrastructure, perhaps even for 20-year planning, is often never far enough downstream or large enough for ultimate growth.

The Town Branch Wastewater Treatment Plant (WWTP) site is located on the northwestern portion of the existing Urban Service Area, in what historically was a rural downstream location. Over the last 50 years, Lexington has grown rapidly in the northern, eastern, and southern regions of the community. In 1974, the Urban County Government was formed and soon thereafter, the concept of another wastewater treatment plant, the West Hickman WWTP, was born to alleviate the ever increasing wastewater demand. Now, nearly 30 years later, the growth of Lexington has continued and the solutions for wastewater demand remain difficult. The wastewater from future developed areas will flow away from current facilities and no capacity will exist for pumping, conveyance, or treatment.

A 201 Facility Plan Update for Wastewater Facilities was completed in 1999. The Facility Plan is a 20-year planning document required by the Kentucky Division of Water. The plan reviewed several possible alternatives for meeting current and future needs for the 20-year timeframe. However, for many large and rapidly growing communities, the study period of 20-years is sometimes too short for visionary concepts. This study shall provide insight into the alternatives available for the sewerability of the selected Rural Service Area of the LFUCG.

Exhibit 2.1 Direction of Gravity Flow of Potential Wastewater

Lexington-Fayette Urban County Government



Several LFUCG resources were utilized in the preparation of the study, including:

- The LFUCG Division of Engineering
- The LFUCG Division of Planning, Resources and Personnel
- The LFUCG Division of Sanitary Sewers, Resources and Personnel
- The Geographic Information Systems of the LFUCG Division of Computer Services
- 1986 Implementation Plan for Construction of the Outer Perimeter Sewerage Systems
- 1999 201 Facility Plan Update for Wastewater
- 1999 Rural Service Area Land Management Plan
- 2001 Comprehensive Plan Update
- 2001 Sanitary Sewer and Pumping Station Manual

Significant Criteria

The ultimate criteria and assumptions utilized in the initial stages of this report greatly affect the final product. The following is a review of key elements and assumptions in development of this report.

Purchase of Development Rights Program (PDR)

The PDR program was introduced in the 1999 Rural Land Management Plan as a method to preserve the character unique to the rural areas of Fayette County. The PDR program was adopted in December of 1999. Monies were established for land owners who desired to preserve the rural nature and character of their land for the future. The PDR program has been a very successful program for the LFUCG.

Minimal PDR lands exist in the study areas. Most PDR lands are in the northern region of the County, which have not been included in the study area. For the purposes of this study, all rural lands have been included for development consideration. The conservative approach has been assumed should future change in local regulation of these PDR properties occur.

201 Facility Plan Update

The assumption has been made that all recommended improvements of the 1999 201 Facility Plan Update for the LFUCG wastewater system will be in place and in operation by the time the RSA development occurs. All hypothetical improvements and corresponding estimated costs have been prepared utilizing this approach.

Wastewater Treatment

At the time of this report, the average daily Town Branch WWTP flows since 1999 were approximately 20.4 MGD, approximately 68% of capacity. The average daily West Hickman WWTP flows are 20.9 MGD, approximately 62% of capacity. The remaining available capacity in each WWTP is dedicated to the current LFUCG Urban Service Area

(USA). No capacity exists at the current treatment facilities for the wastewater treatment needs for these study areas. The projected average daily flows generated by these study areas directly correlate to the required treatment capacity. These treatment capacity needs are included in costs of development of wastewater infrastructure for the study areas.

For the purposes of this study, all wastewater will be conveyed to one of the two existing treatment facilities, either Town Branch WWTP or West Hickman WWTP. The 1999 201 Facility Plan Update discussed alternatives of satellite WWTP's in the South Elkhorn and North Elkhorn drainage basins. These options were not selected as the recommended alternative. Historically, the paradigm has been established that all flows from development will be returned to these facilities. The detailed discussion and study of additional wastewater treatment plant sites is not included in the scope of this study.

With future development of the RSA, conveyance of wastewater flows would involve greater distance, more difficult acquisition of right-of-way, and substantially more cost than in previous years. In recent years stream water quality issues have also become a growing concern to the LFUCG and the Kentucky Division of Water. It is generally agreed that the allowable wasteload allocations for the Town Branch Creek and West Hickman Creek streams will not be substantially increased by the Kentucky Division of Water for future increased discharges, due to expansion of the Urban Service Area. The continued transfer of wastewater from one drainage basin to another for treatment will concentrate the waste load and compound the difficulty of meeting stringent allowable discharge limits. In the future, it may be necessary to consider the construction of additional wastewater treatment plants in Fayette County.

Methodology

The general methodology of the 1986 Outer Perimeter Sewerage System Study has been followed. The process to provide preliminary designs and estimated costs for sanitary sewer service is similar in each study area. The following outlines the typical steps in this determination.

1. **Determination of the Total Land Area**

   The boundaries of each study area were identified by the LFUCG. LFUCG GIS mapping was utilized to determine the quantity of total land area.

2. **Identification of Drainage Basins for Future Sewersheds**

   Each area is partitioned into drainage basins and sub-drainage basins. Each of the drainageways within each basin is a potential path for a future gravity sewer, whether a large trunk sewer or small collector sewer. Drainage basins are comprised of numerous sub-drainage basins. The areas of each basin and sub-basin are obtained. Existing LFUCG GIS mapping information provided the delineated boundaries of all drainage basins.

From these features in the mapping database, the area of each was determined utilizing the ArcView 9.0 software platform shapefile features.

3. Determination of Developable Land Area

After the total land area and the drainage basins were defined, a review of the total developable land is performed. Utilizing the GIS mapping, all undevelopable land was removed from consideration. Land area such as roads, railroads, cemeteries, floodplains, public lands, steep slopes, greenways, sinkholes, parks, etc. are removed from the total land area. The remaining area within each drainage and sub-drainage basin was utilized as the basis for wastewater flow determination.

4. Wastewater Unit Flow

1,500 gallons per day per developable acre (gpd/acre) has been utilized to project average daily wastewater flow. This approach was also utilized for the 1986 Outer Perimeter Sewerage Systems Study. In review of the 2001 LFUCG Sanitary Sewer and Pumping Station Manual, these resultant flows were nearly equivalent to 4 residential units per acre. In addition, a review of current field-measured wastewater flows for the existing sanitary sewer service areas was performed and compared to the land area of the current LFUCG Urban Service Area. The calculated wastewater flow per acre was approximately 1,300 gpd/acre and considerable land for fill-in growth still remains. Overall, the 1,500 gpd/acre criteria appears to be a reasonable basis for the projection of average daily wastewater flow for full development.

5. Wastewater Peak Instantaneous Flow

The peak instantaneous flow is the basis of design for all sanitary sewer and pumping station capacities. The peak instantaneous flow is the maximum wastewater flow that can be expected at any point in time. Wastewater flow tends to have a diurnal cycle and peak flow to average flow ratios can be as high as 5 or 6 times that of average. An empirical peaking factor, which is based on the magnitude of average daily flow, is selected and multiplied by the average daily flow to determine the peak instantaneous flow. If available, existing field-measured data should also provide guidance in selection of peaking factors. Appendix B provides a table from the LFUCG Sanitary Sewer and Pumping Station Manual outlining allowable peaking factors. These peaking factors have been utilized for this project.

6. Trunk Sewer Design

All gravity sewer design has been performed in accordance with the LFUCG Sanitary Sewer and Pumping Station Manual. All pipe has been designed for a maximum flow level of 2/3 full. A drainage area- sewage flow- pipe size relationship has been developed for each study area and summarized in a spreadsheet in Appendix A. Under LFUCG guidelines, trunk sewers, 12" and larger, are provided by the LFUCG. All sanitary

sewers under 12" are provided by the land developer. No detail of sewer small than 12" in diameter has been provided.

7. Force Main Design

All force mains have been designed not to substantially exceed a velocity of 6 ft/sec or provide high pumping heads due to excessive friction loss.

8. Pumping Station Design

Pump Station sizing is based on the peak instantaneous flow, which has been identified for each pump station location. All pump station preliminary design is based on the LFUCG Sanitary Sewer and Pumping Station Manual.

9. Unit Costs of Wastewater Facilities

Appendix C contains a summary of all unit costs utilized in the projection of preliminary total costs. These unit costs were developed from historical information of wastewater construction costs. Where historical information was not available, material cost quotes and accepted unit costs for labor, equipment, and installation were forecast. Pump station costs were developed from actual construction data for flows up to 15,000 gpm. Beyond this flow, all costs were estimated on historical magnitudes of cost from EPA reference manuals.

10. Estimates of Probable Cost

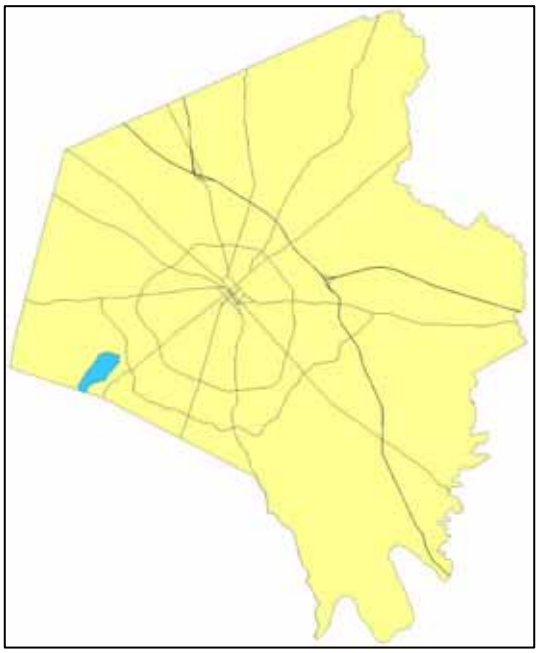
Utilizing the unit costs for wastewater facilities, preliminary quantities of infrastructure have been measured and summarized. Total costs include 15% construction contingencies and 20% non-construction costs. Non-construction costs consist of engineering services, easements, legal services, administrative services, and etc.

Detailed review of each study area is contained in Sections 3 through 8.

Section 3
Lower South Elkhorn Rural Service Area

General

The Lower South Elkhorn Rural Service Area (LSE) is located in southwestern Fayette County. The LSE has a total land area of 774 acres and a total developable land area of 700 acres. A Project Summary is provided in Exhibit 3.1 and detail maps are provided in Exhibits 3.2 and 3.3. The LSE is positioned in the central reach of the Fayette County South Elkhorn Creek drainage basin. The upper region of the South Elkhorn Creek drainage basin is presently served by the current LFUCG South Elkhorn Sewershed and has a service area of 6,604 acres. In addition to the LSE, approximately 12,395 remaining acres of the undeveloped South Elkhorn Creek drainage basin exist in Fayette County and are mostly downstream of the Lower South Elkhorn Rural Service Area (LSE). The Man O' War Rural Service Area (MW) is also located in the undeveloped South Elkhorn Creek drainage basin and consists of 376 acres.



Land Use and Parcel Data

Table 3.1 is a summary of the current land use in the Lower South Elkhorn RSA. Table 3.2 provides the comparison of parcel size distribution within the LSE. Land use data was derived from LFUCG Geographical Information System (GIS) and the LFUCG Rural Service Area Rural Land Management Plan. In review of the land use information, it is apparent the region primarily consists of prime agricultural and core equine agricultural land.

Table 3.1
Land Use Classification - LSE RSA

Land Use Classification	Area (Acres)	% of Total Area
Agricultural Land	16	2.1
Core Equine Agricultural Land	413	53.4
Historic Landmark/Natural Area	19	2.5
Non-Rural Developed Land	4	0.5
Prime Agricultural Land	259	33.4
Rural Developed Land	61	7.8
Other Land	2	0.3
Summary	**774**	**100.0**

Table 3.2
Land Parcel Size Distribution LSE RSA

Land Parcel Size	No. of Parcels	% Total Parcels
> 0 acres and < 5 acres	16	41.0
≥ 5 acres and < 10 acres	5	12.8
≥ 10 acres and < 40 acres	11	28.2
≥ 40 acres and < 100 acres	3	7.7
≥ 100 acres and < 200 acres	1	2.6
≥ 200 acres	3	7.7
Summary	**39**	**100.0**

Rural Settlements

No rural settlements are identified inside the boundaries of the LSE. However, several are in the vicinity and within the South Elkhorn Creek drainage basin. Rural settlements are located downstream and include Little Texas, Little Georgetown, and Ft. Springs.

Rural Activity Centers (RAC)

No RAC's exist in the LSE. The Airport RAC is located downstream of the LSE, within the South Elkhorn Creek drainage basin. The Airport RAC (726.4 acres) is presently sewered and all wastewater is pumped and conveyed to the Town Branch WWTP.

Lower South Elkhorn RSA

Special Natural Protection Areas

No special natural protection areas have been identified in the LSE.

Rural Greenways

South Elkhorn Creek in Fayette County have been identified as one of the "Five Focus Areas" for rural greenway creation in the LFUCG Rural Service Area Land Management Plan. The greenway extends to the Woodford County line and includes floodplain, steep slopes, sinkholes and tree stands along the creek. Potential exists for hiking trails through the creation of conservation/scenic easements.

Scenic Areas

A large portion of the LSE has been identified as "Scenic Area" in the LFUCG Rural Service Area Land Management Plan.

Environmentally Sensitive Areas

Environmentally Sensitive Areas have been identified along the floodplain of the South Elkhorn Creek drainage basin in Fayette County.

Development of Wastewater Facilities

Projected Wastewater Flows

The ultimate projected average wastewater flow, resultant from full development of the LSE, is based on a unit flow of 1,500 gpd/acre of developable land. Peak wastewater flow is derived from utilization of an empirical peak flow factor, as provided in the LFUCG Sanitary Sewer and Pumping Station Manual. The magnitude of the peak flow factor decreases with the increase in average daily wastewater flow. The peak wastewater flow factor is multiplied by the average wastewater flow to obtain the peak instantaneous flow. Appendix B contains a summary of peak flow factors.

The projected average wastewater flow for the LSE is 1.05 MGD or 729 gpm. The peak flow factor for the LSE is 3.6 and the projected peak instantaneous wastewater flow is 2,625 gpm.

Wastewater Infrastructure Summary and Development Review

The LSE is located downstream of current development in the Urban Service Area and all future wastewater will naturally flow away from currently sewered areas. Exhibit 3.1 provides physical, flow, and cost summaries. Exhibits 3.2 and 3.3 provide visual detail of required infrastructure.


Existing South Elkhorn Pump Station

The proposed sanitary sewer system to serve this area will consist of a trunk sewer adjacent to the South Elkhorn Creek ranging in size from 12 to 24 inches. A Class B pump station is required at the most downstream location of the LSE with a capacity of approximately 2,625 gpm. The wastewater will be pumped upstream, via a 14" force main, to the existing South Elkhorn Pump Station. Pumping upgrades to the South Elkhorn Pump Station will be required and flows will ultimately be delivered to the West Hickman Wastewater Treatment Plant, via the upgraded South Elkhorn force main system.

The 1999 LFUCG 201 Facilities Plan Update identifies an upgrade of the existing South Elkhorn Pump Station from a capacity of 7,600 gpm to 12,000 gpm and construction of a 24" force main. No LFUCG expansion area has been added in the South Elkhorn Sewershed, however, a portion of northern Jessamine County is included in the planning area of the Facility Plan.

In 2005, design was initiated for the upgrade of the South Elkhorn Pump Station to near 14,000 gpd capacity and the proposed parallel South Elkhorn Force Main was upgraded to a 36" force main and extended all the way to the West Hickman WWTP. These upgrades, which are greater in magnitude than the 1999 LFUCG 201 Facility Plan recommendations, can accommodate the LFUCG and some potential northern Jessamine County wastewater flows. Currently, an agreement is in place between the LFUCG and Jessamine County to accept up to 2 MGD of wastewater from Jessamine County for treatment at the West Hickman WWTP. The Jessamine County pumping and conveyance alternatives have not been determined at this time, however, some capacity for northern Jessamine County or additional in-basin LFUCG expansion area will be available upon completion of the 2005 South Elkhorn Pump Station and Force Main Improvements. Available capacity will be utilized on a first come, first serve basis. Monies from the development of either north Jessamine County or new LFUCG expansion area, such as the LSE, should be provided to the LFUCG for the "fair share" contributing costs of the pumping and conveyance infrastructure.

With the addition of the 774 acres of the LSE to the South Elkhorn Sewershed, full capacity for wastewater flows derived from the LSE may not exist in the proposed 2005 upgrades of the South Elkhorn Pump Station and Force Main. For the purposes of this study, it has been assumed the pump station will require upgrading for the LSE from the proposed 14,000 gpm to 15,825 gpm. It is also assumed the 36" force main is adequately sized for acceptance of the wastewater flows from the LSE. These assumptions will require re-evaluation at the time of development. Capacity will not be available for continued downstream development of the South Elkhorn Watershed below the LSE. Additional pumping and conveyance infrastructure to the West Hickman WWTP or an additional WWTP, similar to the alternative provided in the 1999 LFUCG 201 Facilities Plan Update, will be required to accommodate flows from further downstream development.

With the development of the LSE, opportunity exists to abandon the existing Palomar Hills Pump Station and convey all wastewater flows by gravity sewer directly to the new LSE Pump Station. Upgrade of the LSE trunk sewer and pump station would be required.

No wastewater treatment capacity exists for the LSE. The projected WWTP capacity is equivalent to the average flow from complete development of the LSE, which is 1.05 MGD. Exhibit 3.1 is a project summary of the Lower South Elkhorn RSA physical, flow, and cost characteristics.

Estimate of Probable Cost for Collection, Pumping, Conveyance, and Treatment

The estimate of probable cost for the Lower South Elkhorn trunk sewer, 2,625 gpm Class B pump station, and 14" force main is $2,108,215. Detailed costs are provided at the rear of this section.

The estimated total project cost of the recommended 2005 South Elkhorn Pump Station and Force Main Improvements is $15,000,000. These improvements will provide benefit to the existing South Elkhorn Sewershed, northern Jessamine County, and the LSE. The proposed expanded area of the South Elkhorn Sewershed, inclusive of the LSE, will have a land area of 7,378 acres. The cost of these improvements will be distributed to the entire sewershed. Individually, the contributing shared cost of the South Elkhorn Pump Station and Force Main improvements for the LSE are $1,573,597.

As discussed previously, an additional upgrade beyond the 2005 designed improvements of the existing South Elkhorn Pump Station is required to accept the additional wastewater from the LSE. Shared monies from the LSE development will be provided for this upgrade. The South Elkhorn Pump Station capacity would be increased by 1,825 gpm for the development of the LSE. The estimated total project cost to expand the South Elkhorn Pump Station and Force Main from a capacity of 14,000 gpm to 15,825 gpm is $1,100,000. Details of the shared costs for the LSE are provided at the end of this section.

The projected WWTP capacity required for complete development of the LSE is 1.05 MGD. At the estimated cost of $6/gallon for expansion of the West Hickman Wastewater Treatment Plant, the projected total construction cost for wastewater treatment is $6,300,000.

Summary, Review, and Recommendations – Lower South Elkhorn RSA

The estimate of total project costs for the collection, pumping, conveyance, and treatment of forecasted wastewater from the LSE is $11,081,812. The unit cost of development is $15,831/acre. These estimated costs include construction, construction contingencies, engineering design and inspection, legal, easements, property acquisition, and other non-construction costs. Table 3.3 provides a summary of project costs. A summary of all detail costs is provided in Exhibit 3.1.

Table 3.3
Cost Summary - LSE RSA

Item	Total Cost	Total Cost/Acre*
Trunk Sewers	$ 470,934.	$ 673.
Force Main	437,281.	625.
Pump Stations	1,200,000.	1,714.
Shared Costs**	2,673,597.	3,819.
Wastewater Treatment	6,300,000.	9,000.
Total Cost	$ 11,081,812.	$ 15,831.

* Total Cost is per developable acre.

** Shared Costs provided by development of the LSE to the LFUCG

Lower South Elkhorn RSA

Future downstream expansion of the South Elkhorn drainage basin below the Lower South Elkhorn RSA may be prohibitive due to the requirement for additional pumping and conveyance capacity to the West Hickman WWTP. The future capacity of the South Elkhorn Pump Station and Force Main may be restricted due to the future diminished ability to construct a second force main along the Jessamine/Fayette County border.

The South Elkhorn Creek drainage basin has a total land area of 19,773 acres in Fayette County, of which 6,604 upstream acres are presently developed and served by the existing South Elkhorn Sewershed. Significant potential exists to construct a future WWTP at a downstream location in the South Elkhorn Creek drainage basin in lieu of additional pumping and conveyance alternatives to the West Hickman WWTP. This alternative was outlined in the 1999 LFUCG 201 Facility Plan Update, however, it was not the selected alternative. Consideration of this alternative may be revisited in the future to re-evaluate least cost scenarios and stream water quality criteria for the South Elkhorn Creek drainage basin.

Review

- The area is designated as one of the "five focus areas" for rural greenway creation.
- A large portion of the area is designated as a "scenic area".
- All resultant flows from the LSE are downstream of current wastewater infrastructure development. Additional pumping and conveyance will be required.
- Upgrade of the existing South Elkhorn Pump Station and Force Main will be required to convey flow to the West Hickman Wastewater Treatment Plant.
- Continued downstream development of the LSE will present similar problems as the present. No capacity for pumping, conveyance, or treatment of wastewater will exist.
- Existing wastewater planning strategies for the South Elkhorn Sewershed do not address issues beyond the remedy of current sanitary sewer issues within the current LFUCG wastewater planning area.
- With the development of the LSE, opportunity exists to abandon the Palomar Hills Pump Station and convey all flows to the new LSE Pump Station.

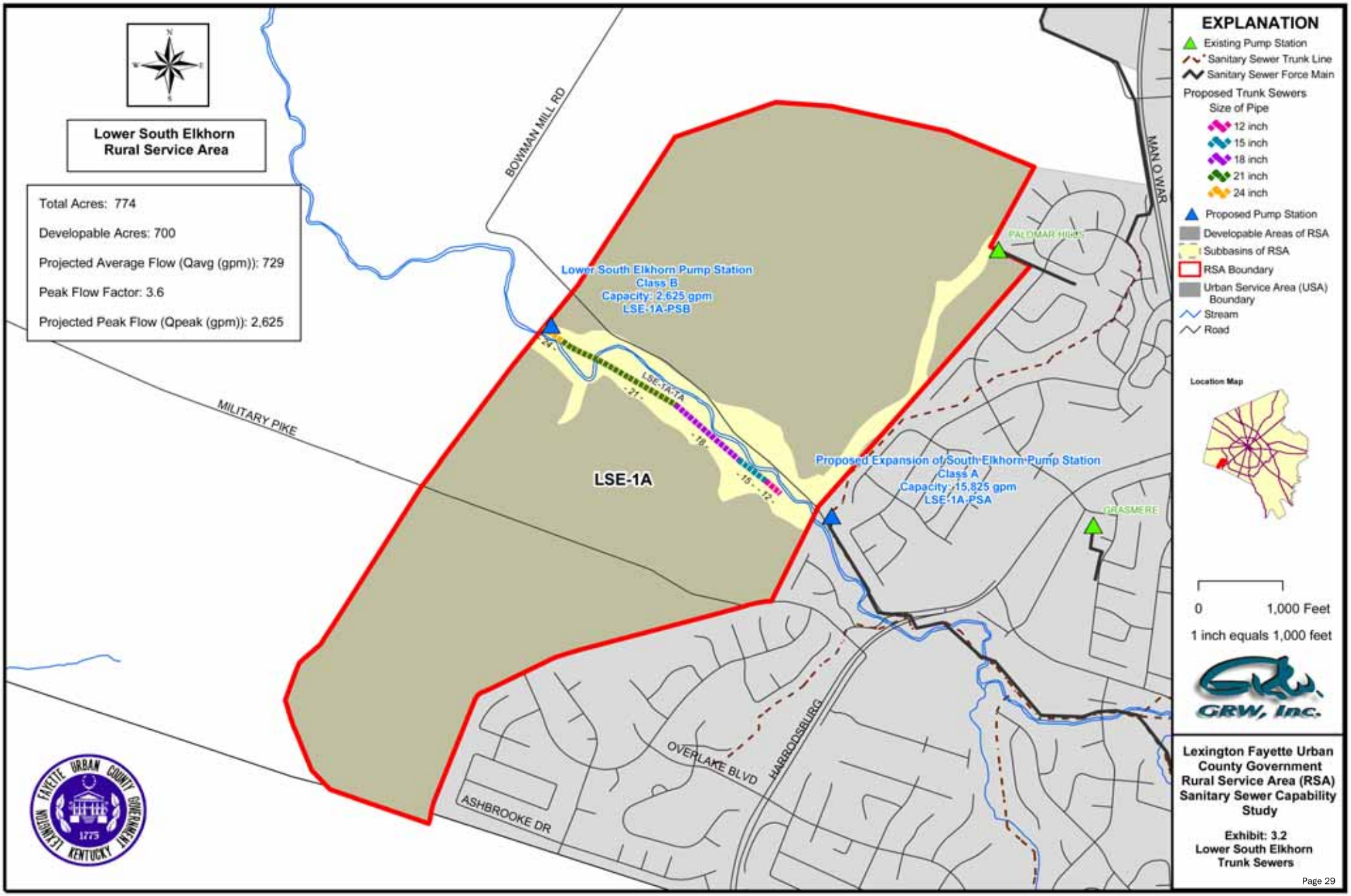
Recommendations

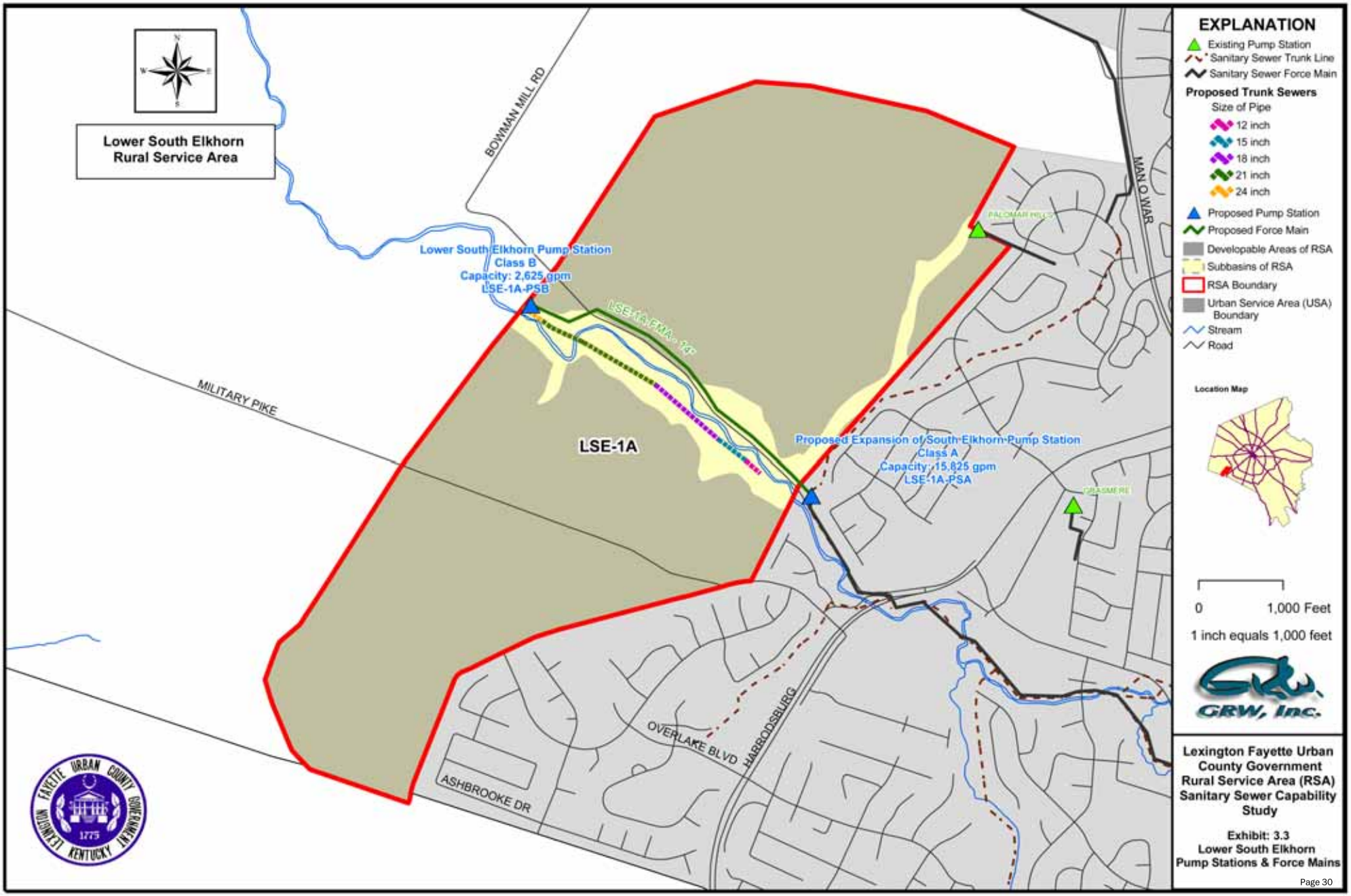
- Revisit the issues and costs of an additional wastewater treatment plant
- Evaluate the ability and availability of right-of-way to construct a second force main, along the Fayette County/Jessamine County border, between the South Elkhorn Pump Station and West Hickman WWTP.
- Determine other future alternatives available for pumping, conveyance, and treatment of wastewater flows from the South Elkhorn drainage basin.
- Expand future planning efforts for wastewater infrastructure beyond the traditional 20-year planning period.

Exhibit 3.1 - Project Summary
Rural Service Area Sanitary Sewer Capability Study
Lower South Elkhorn (LSE) - Refer to Exhibits 3.2 & 3.3

1.	**South Elkhorn Drainage Basin Summary**	
1.a	Total Area South Elkhorn Drainage Basin in Fayette County. (acres)	19,773
1.b	Total Area of South Elkhorn Drainage Basin presently served by LFUCG. (acres)	6,604
1.c	Total Area in proposed service area of LSE. (acres)	774
1.d	Total unserved area remaining in Fayette County. (acres)	12,395
1.e	Total Area of other proposed service in the South Elkhorn Drainage Basin. [5.a,5.b] (acres)	376
2.	**Design Flow Calculation**	
2.a	Total Area in proposed service area for LSE. (acres)	774
2.b	Total Developable area in proposed service area for LSE. (acres)	700
2.c	Projected Average Flow (gpm)	729
2.d	Peak Flow Factor for Lower South Elkhorn Pump Station	3.6
2.e	Projected Peak Flow for Lower South Elkhorn Pump Station. (gpm)	2,625
3.	**Project Cost Summary**	
	Pumping and Conveyance Cost:	
3.a	Trunk Sewers	$470,934
3.b	Force Main	$437,281
3.c	Lower South Elkhorn, Class B Pump Station (2,625 gpm) [5.c,5.d]	$1,200,000
3.d	Subtotal: Pumping and Conveyance	$2,108,215
	Wastewater Treatment Cost:	
	Required Wastewater Treatment Plant Capacity: 1.05 MGD X $ 6 / gallon:	
3.e	Subtotal - Treatment	$6,300,000
3.f	**Subtotal: Estimated Total Project Cost**	**$8,408,215**
3.g	Plus Contributions to:	
	2005 Upgrade of South Elkhorn Pump Station and Force Main.	$1,573,597
	Expansion of South Elkhorn PS and FM from 14,000 gpm capacity to 15,825 gpm.	$1,100,000
3.h	Less Contributions from:	
		$0
3.I	**Net Estimated LSE Project Costs w/adjustments**	**$11,081,812**
4.	**Average Cost Per Total Acre of Development with LFUCG Contribution:[5.e]**	**$15,831**

5.	**Remarks:**
5.a	Man 0' War (376 acres) will require a new (Class B) pump station and deliver flow to the renovated South Elkhorn Pump Station.
5.b	Man O' War drainage area is not within the same subdrainage basin as Lower South Elkhorn, however, it is within the South Elkhorn Drainage Basin.
5.c	The Lower South Elkhorn Pump Station (Class B) will deliver flow to the renovated South Elkhorn Pump Station (Class A).
5.d	Appendix D.1 contains pump station data and costs.
5.e	The cost / acre utilizes total developable area for this determination.


Lower South Elkhorn
Rural Service Area
Total Acres: 774
Developable Acres: 700
Projected Average Flow (Qavg (gpm)): 729
Peak Flow Factor: 3.6
Projected Peak Flow (Qpeak (gpm)): 2,625
BOWMAN MILL RD
MILITARY PIKE
MAN O WAR
PALOMAR HILLS
GRASMERE
OVERLAKE BLVD
HARRODSBURG
ASHBROOKE DR
LSE-1A
Lower South Elkhorn Pump Station
Class B
Capacity: 2,625 gpm
LSE-1A-PSB
LSE-1A-TA
24"
21"
18"
15"
12"
Proposed Expansion of South Elkhorn Pump Station
Class A
Capacity: 15,825 gpm
LSE-1A-PSA
EXPLANATION
Existing Pump Station
Sanitary Sewer Trunk Line
Sanitary Sewer Force Main
Proposed Trunk Sewers
Size of Pipe
12 inch
15 inch
18 inch
21 inch
24 inch
Proposed Pump Station
Developable Areas of RSA
Subbasins of RSA
RSA Boundary
Urban Service Area (USA) Boundary
Stream
Road
Location Map
0
1,000 Feet
1 inch equals 1,000 feet
GRW, Inc.
Lexington Fayette Urban County Government
Rural Service Area (RSA) Sanitary Sewer Capability Study
Exhibit: 3.2
Lower South Elkhorn Trunk Sewers


Lower South Elkhorn
Rural Service Area
BOWMAN MILL RD
MAN O WAR
PALOMAR HILLS
Lower South Elkhorn Pump Station
Class B
Capacity: 2,625 gpm
LSE-1A-PSB
LSE-1A FMA - 12"
MILITARY PIKE
LSE-1A
Proposed Expansion of South Elkhorn Pump Station
Class A
Capacity: 15,825 gpm
LSE-1A-PSA
GRASMERE
OVERLAKE BLVD
HARRODSBURG
ASHBROOKE DR
EXPLANATION
Existing Pump Station
Sanitary Sewer Trunk Line
Sanitary Sewer Force Main
Proposed Trunk Sewers
Size of Pipe
12 inch
15 inch
18 inch
21 inch
24 inch
Proposed Pump Station
Proposed Force Main
Developable Areas of RSA
Subbasins of RSA
RSA Boundary
Urban Service Area (USA) Boundary
Stream
Road
Location Map
0
1,000 Feet
1 inch equals 1,000 feet
GRW, Inc.
Lexington Fayette Urban County Government
Rural Service Area (RSA) Sanitary Sewer Capability Study
Exhibit: 3.3
Lower South Elkhorn
Pump Stations & Force Mains

LEXINGTON-FAYETTE
URBAN COUNTY GOVERNMENT
Lexington, Kentucky

Detailed Cost Information

Cost Summary
Lower South Elkhorn

Trunk Sewers ID:	Cost ($)
LSE-1A-TA	$470,934
Force Main ID:	
LSE-1A-FMA	$437,281
Pump Station ID:	
LSE-1A-PSB	$1,200,000
Total Cost	**$2,108,215**

Shared Costs for System Improvements
Lower South Elkhorn RSA

Construction of 2005 Improvements Improvements for 14,000 GPM South Elkhorn Pump Station and 36" Parallel Force Main	
South Elkhorn Pump Station and 36" Parallel Force Main	
Total Estimated Construction Cost	$15,000,000
Total Acres - Existing South Elkhorn Sewershed	6,604
Total Acres - Lower South Elkhorn Service Area	774
Total Revised Area - South Elkhorn Sewershed	7,378
Shared Cost per Acre	$2,033
Shared Cost to LSE (774 acres)	$1,573,597
Shared Cost to LFUCG (6,604 acres)	$13,426,403

Shared Costs for System Improvements
Lower South Elkhorn RSA

Upgrade of South Elkhorn Pump Station Increase Capacity from 14,000 gpm to 15,825 gpm	
South Elkhorn Pump Station Capacity Upgrade to 15,825 gpm Total Estimated Construction Cost	$1,100,000
Total Acres - Lower South Elkhorn Service Area	774
Contributing Cost Per Acre for LSE	$1,421

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 3.2
Reference ID: LSE-1A-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	243	LF	60	$14,580
2	15" PVC Gravity Sewer (DR 35)	426	LF	70	$29,820
3	18" PVC Gravity Sewer (DR 35)	1,040	LF	75	$78,000
4	21" PVC Gravity Sewer (DR 35)	1,621	LF	85	$137,785
5	24" PVC Gravity Sewer (DR 35)	289	LF	105	$30,345
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	12	EA	2,000	$24,127
MISCELLANEOUS:					
55	Pavement Replacement:	361.90	LF	25	$9,048
56	Aggregate Surface Replacement	72.38	LF	15	$1,086
57	Concrete for Encasement	10.86	CY	150	$1,629
58	Crushed Stone for Special Pipe Bedding	14.48	TN	25	$362
59	Clean-Up/Final Grading/Seeding/Sowing	3,619	LF	4	$14,476

Subtotal	**$341,256**
15% Contingency	$51,188
Total Construction Cost	**$392,445**
20% Non-Construction Costs	$78,489
Total Estimate of Probable Cost	**$470,934**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 3.3
Reference ID: LSE-1A-FMA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
FORCE MAIN:					
29	14" DI Force Main (PC 250 w/ Protecto 401)	4,479	LF	50	$223,950
ROAD BORES / TUNNEL:					
43	24" Steel Casing for 14" Carrier Pipe	150	LF	350	$52,500
MISCELLANEOUS:					
55	Pavement Replacement:	447.90	LF	25	$11,198
56	Aggregate Surface Replacement	89.58	LF	15	$1,344
57	Concrete for Encasement	13.44	CY	150	$2,016
58	Crushed Stone for Special Pipe Bedding	17.92	TN	25	$448
59	Clean-Up/Final Grading/Seeding/Sowing	4,479	LF	4	$17,916
60	Sewage Air Release Valves	3	EA	2,500	$7,500

Subtotal	**$316,871**
15% Contingency	$47,531
Total Construction Cost	**$364,401**
20% Non-Construction Costs	$72,880
Total Estimate of Probable Cost	**$437,281**

Section 4
Man O' War Rural Service Area

General

The Man O' War Rural Service Area (MW) is located in southwestern Fayette County. The MW has a total land area of 376 acres and a total developable land area of 341 acres. A Project Summary is provided in Exhibit 4.1 and detail maps are provided in Exhibits 4.2 and 4.3. The MW is positioned in the upper reach of the Fayette County South Elkhorn Creek drainage basin. An adjacent reach of the South Elkhorn Creek drainage basin is presently served by the LFUCG South Elkhorn Sewershed and has a service area of 6,604 acres. Approximately 12,793 additional acres of the undeveloped South Elkhorn Creek drainage basin exist in Fayette County and are mostly downstream of the Man O' War RSA (MW). The Lower South Elkhorn Rural Service Area (LSE) is also located in the South Elkhorn Creek drainage basin and consists of 774 acres.

Land Use and Parcel Data

Table 4.1 is a summary of the current land use in the MW. Table 4.2 provides the comparison of parcel size distribution within the MW. The land use in this study area is 89% core equine agricultural or prime agricultural.

Table 4.1
Land Use Classification - MW RSA

Land Use Classification	Area (Acres)	% of Total Area
Core Equine Agricultural Land	159	42.3
Non-Rural Developed Land	11	2.9
Prime Agricultural Land	176	46.8
Rural Developed Land	20	5.3
Other Land	10	2.7
Summary	**376**	**100.0**

Table 4.2
Land Parcel Size Distribution – MW RSA

Land Parcel Size	No. of Parcels	% Total Parcels
> 0 acres and < 5 acres	14	66.7
≥ 5 acres and < 10 acres	0	0
≥ 10 acres and < 40 acres	2	9.5
≥ 40 acres and < 100 acres	2	9.5
≥ 100 acres and < 200 acres	3	14.3
≥ 200 acres	0	0
Summary	**21**	**100.0**

Rural Settlements

No rural settlements are identified inside the boundaries of the MW.

Rural Activity Centers (RAC)

No RAC's have been identified inside the boundaries of the MW.

Special Natural Protection Areas

No special natural protection areas have been identified in the MW.

Rural Greenways

No scenic rural greenways have been identified in the boundaries of the MW.

Scenic Areas

A large portion of the MW has been identified as "Scenic Area".

Environmentally Sensitive Areas

Only a small portion of the MW has been identified as an "Environmentally Sensitive Area".

Development of Wastewater Facilities

Projected Wastewater Flows

The ultimate projected average wastewater flow, resultant from full development of the MW, is based on a unit flow of 1,500 gpd/acre of developable land. Peak wastewater flow is derived from utilization of an empirical peak flow factor, based on the relative magnitude of the average wastewater flow. The peak flow factor is multiplied times the average wastewater flow to obtain the peak instantaneous flow. In general, the larger the area and resulting average flow, the smaller the peak flow factor. Appendix B contains a summary of peak flow factors.

The projected average wastewater flow for the MW is 511,500 gpd or 355 gpm. The peak flow factor for the MW is 4.4 and the projected peak wastewater flow is 1,562 gpm.

Wastewater Infrastructure Summary and Development Review

The MW is located downstream of current development in the Urban Service Area and all future wastewater will naturally flow away from currently sewered areas. Exhibit 4.1 provides physical, flow, and cost summaries. Exhibits 4.2 and 4.3 provide visual detail of required infrastructure.

Existing South Elkhorn Pump Station

The proposed sanitary sewer system to serve this area will consist of an 18" trunk sewer. A Class B pump station is required at the most downstream location of the MW with a capacity of 1,600 gpm. The wastewater will be pumped, via a 14" force main to the existing South Elkhorn Pump Station. Flows will ultimately be delivered to the West Hickman Wastewater Treatment Plant, via the upgraded South Elkhorn force main system.

The 1999 LFUCG 201 Facilities Plan Update identifies an upgrade of the existing South Elkhorn Pump Station from a capacity of 7,600 gpm to 12,000 gpm and construction of a 24" force main without addition of expansion area to the current Urban Service Area in the South Elkhorn Sewershed. A portion of northern Jessamine County is included in the planning area of the LFUCG Facility Plan.

In 2005, design was initiated for the upgrade of the South Elkhorn Pump Station to nearly 14,000 gpd capacity and the proposed parallel South Elkhorn Force Main was upgraded to a 36" force main and extended to the West Hickman WWTP. These upgrades, which are greater in magnitude than the 1999 LFUCG 201 Facility Plan recommendations, can accommodate the LFUCG and some potential northern Jessamine County wastewater flows. Currently, an agreement is in place between the LFUCG and Jessamine County to accept up to 2 MGD of wastewater from Jessamine County for treatment at the West Hickman WWTP. The Jessamine County pumping and conveyance alternatives have not been determined at this time, however, some capacity for northern Jessamine County or additional LFUCG expansion area will be available upon completion of the 2005 South Elkhorn Pump Station and Force Main Improvements. Available capacity will be utilized on a first come, first serve basis. Monies from the development of either north Jessamine County or new LFUCG expansion area, such as the MW, should be provided to the LFUCG for the "fair share" contributing costs of the pumping and conveyance infrastructure.

With the addition of the 376 acres of the MW to the South Elkhorn Sewershed, full capacity for wastewater flows derived from the MW may not exist in the proposed 2005 upgrades of the South Elkhorn Pump Station and Force Main. For the purposes of this study, it has been assumed the pump station will require upgrading for the MW from the proposed 14,000 gpm to 14,890 gpm. It is also assumed the 36" force main is adequately sized for acceptance of the wastewater flows from the MW. These assumptions will require reevaluation at the time of development. Capacity will not be available for continued downstream development of the South Elkhorn Watershed below the MW. Additional pumping and conveyance infrastructure to the West Hickman WWTP or an additional WWTP, similar to the alternative provided in the 1999 LFUCG 201 Facilities Plan Update, will be required to accommodate flows from further downstream development.

No wastewater treatment capacity exists for the MW. The projected WWTP capacity required for complete development of the MW is 511,200 gpd. Exhibit 4.1 is a project summary of the Man O' War RSA physical, flow, and cost characteristics.

Estimate of Probable Cost for Collection, Pumping, Conveyance, and Treatment

The estimate of probable cost for the Man O' War trunk sewer, 1,600 gpm Class B pump station, and 14" force main is $2,095,045. Detailed costs are provided at the end of this section.

The estimated total project cost of the recommended 2005 South Elkhorn Pump Station and Force Main Improvements is $15,000,000. These improvements will provide benefit to the existing South Elkhorn Sewershed, northern Jessamine County, and the MW. The proposed expanded area of the South Elkhorn Sewershed in Fayette County, inclusive of the MW, will have a land area of 6,980 acres. The cost of these improvements will be distributed to the entire sewershed. Individually, the "fair share" contributing cost of the South Elkhorn Pump Station and Force Main improvements for the MW are $808,023.

As discussed previously, an additional upgrade of the existing South Elkhorn Pump Station is required to accept the additional wastewater from the MW. Contributed monies from the MW development will be provided for this upgrade. The South Elkhorn Pump Station capacity would be increased by 890 gpm for the development of the MW. The estimated total project cost to expand the South Elkhorn Pump Station from a capacity of 14,000 gpm to 14,890 gpm is $450,000, all of it attributable to the MW. Details of the contributing costs for the MW are provided at the end of this section.

The projected WWTP capacity required for complete development of the MW is 511,200 gpd. At the estimated cost of $6/gallon for expansion of the West Hickman Wastewater Treatment Plant, the projected total construction cost for wastewater treatment is $3,069,000.

Summary, Review and Recommendations – Man O' War Rural Service Area

The estimate of probable costs for the collection, pumping, conveyance, and treatment of forecasted wastewater from the MW is $6,422,068. The unit cost of development is $18,833/acre. These estimated costs include construction, construction contingencies, engineering design and inspection, legal, easements, and other non-construction costs. Table 4.3 provides a summary of project costs. A summary of all detail costs is provided in Exhibit 4.1.

Table 4.3 Cost Summary - MW RSA

Item	Total Cost	Total Cost/Acre*
Trunk Sewers	$ 72,232.	$ 212.
Force Main	1,422,814.	4,172.
Pump Stations	600,000.	1,760.
Shared Costs**	1,258,023.	3,689.
Wastewater Treatment	3,069,000.	9,000.
Total Cost	$ 6,422,069.	$ 18,833.

* Total Cost is per developable acre.
** Shared costs provided by development of the MW to the LFUCG

Man O' War RSA

Future downstream expansion of the South Elkhorn drainage basin below MW may be restricted due to the requirement for additional pumping and conveyance capacity to the West Hickman WWTP. The future availability of right-of-way for a second force main, along the Jessamine/Fayette County border, for another expansion of the South Elkhorn pumping and conveyance system will be an issue.

The South Elkhorn Creek drainage basin has a total area of 19,773 acres in Fayette County, of which 6,604 upstream acres are presently developed. Significant potential exists to construct a future WWTP at a downstream location in the South Elkhorn Creek drainage basin in lieu of additional pumping and conveyance alternatives to the West Hickman WWTP. This alternative was outlined in the 1999 LFUCG 201 Facility Plan Update, however, it was not the selected alternative. Consideration of this alternative may be revisited in the future to reevaluate least cost scenarios and current stream water quality criteria for the South Elkhorn Creek drainage basin.


Man O' War RSA

Review

- The MW is contiguous to current growth in the region.
- Nearly 90% of the property is core equine or prime agricultural land.
- All resultant flows from the MW are downstream of current wastewater infrastructure development. Additional pumping and conveyance will be required.
- In addition to the 2005 proposed improvements for the existing South Elkhorn Pump Station and Force Main, an additional pumping upgrade will be required to convey flow to the West Hickman Wastewater Treatment Plant for the MW.
- Continued downstream development below the MW will present similar problems as the present. No capacity for pumping, conveyance, or treatment of wastewater will exist.
- Existing wastewater planning strategies for the South Elkhorn Sewershed do not address issues beyond the remedy of current sanitary sewer issues within the current LFUCG wastewater planning area.

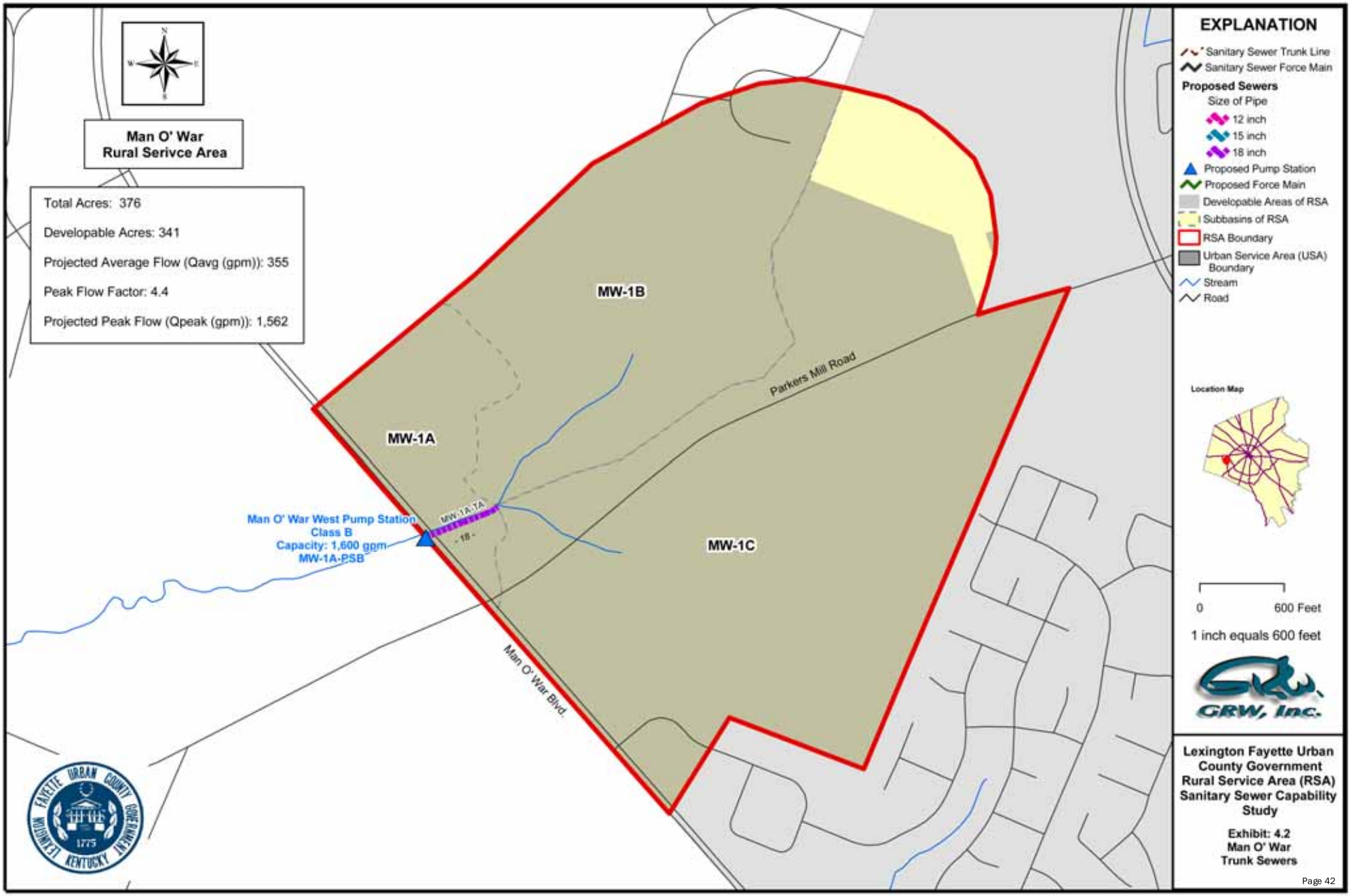
Recommendations

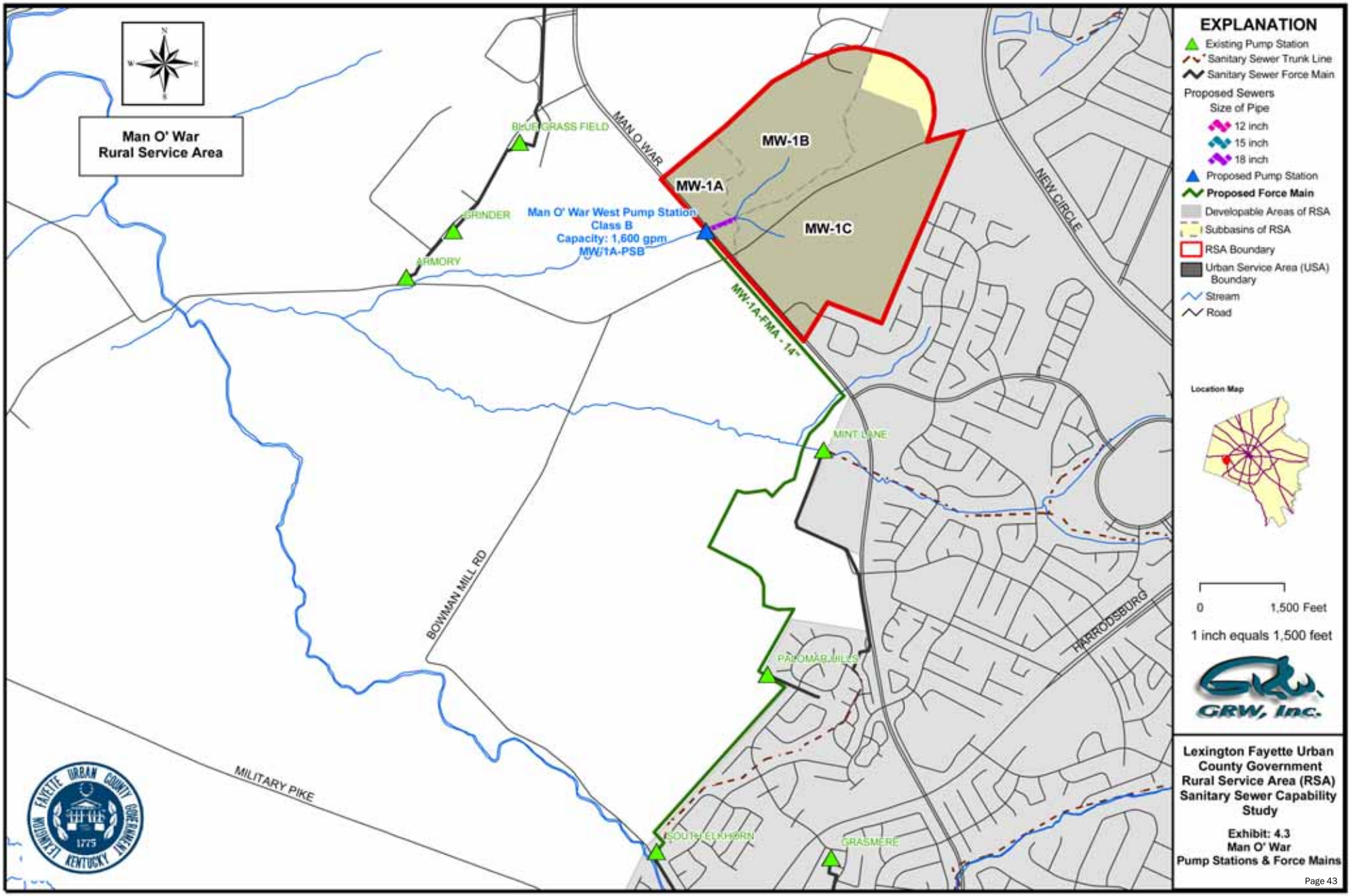
- Revisit the issues and costs of an additional wastewater treatment plant.
- Evaluate the ability and availability of right-of-way to construct a second force main, along the Fayette/Jessamine County border, between the South Elkhorn Pump Station and West Hickman WWTP.
- Determine other future alternatives available for pumping, conveyance, and treatment of wastewater flows from the South Elkhorn drainage basin.
- Expand future planning efforts for wastewater infrastructure beyond the traditional 20-year planning period.

Exhibit 4.1 - Project Summary
Rural Service Area Sanitary Sewer Capability Study
Man O' War (MW) - Refer to Exhibits 4.2 & 4.3

1.	**South Elkhorn Drainage Basin Summary**	
1.a	Total Area South Elkhorn Drainage Basin in Fayette County. (acres)	19,773
1.b	Total Area of South Elkhorn Drainage Basin presently served by LFUCG. (acres)	6,604
1.c	Total Area in proposed service area of MW. (acres)	376
1.d	Total unserved area remaining in Fayette County. (acres)	12,793
1.e	Total Area of other proposed service in the South Elkhorn Drainage Basin. [5.a,5.b] (acres)	774
2.	**Design Flow Calculation**	
2.a	Total Area in proposed service area for MW. (acres)	376
2.b	Total Developable area in proposed service area for MW. (acres)	341
2.c	Projected Average Flow (gpm)	355
2.d	Peak Flow Factor for Man O' War West Pump Station	4.4
2.e	Projected Peak Flow for Man O' War West Pump Station. (gpm)	1,562
3.	**Project Cost Summary**	
	Pumping and Conveyance Cost:	
3.a	Trunk Sewers	$72,232
3.b	Force Main	$1,422,814
3.c	Man O' War West, Class B Pump Station (1,600 gpm) [5.c,5.d]	$600,000
3.d	**Subtotal: Pumping and Conveyance**	$2,095,045
	Wastewater Treatment Cost:	
	Required Wastewater Treatment Plant Capacity: 0.511 MGD X $ 6 / gallon:	
3.e	**Subtotal - Treatment**	$3,069,000
3.f	**Subtotal: Estimated Total Project Cost**	$5,164,045
3.g	Plus Contributions to:	
	2005 Upgrade of South Elkhorn Pump Station and Force Main.	$808,023
	Expansion of South Elkhorn PS and FM from 14,000 gpm capacity to 14,890 gpm.	$450,000
3.h	Less Contributions from:	
		$0
3.I	**Net Estimated MW Project Costs w/adjustments**	**$6,422,068**
4.	**Average Cost Per Total Acre of Development with LFUCG Contribution:[5.e]**	**$18,833**

5.	**Remarks:**
5.a	Lower South Elkhorn will require a New (Class B) Pump Station and will deliver flow to the renovated South Elkhorn Pump Station.
5.b	Lower South Elkhorn is not within the same subdrainage basin as the Man O' War RSA, however, both are located within the South Elkhorn drainage basin.
5.c	The Man O' War West Pump Station (Class B) will deliver flow to the renovated South Elkhorn Pump Station.
5.d	Appendix D.1 contains pump station data and costs.
5.e	The cost / acre utilizes total developable area for this determination.


Man O' War
Rural Serivce Area
Total Acres: 376
Developable Acres: 341
Projected Average Flow (Qavg (gpm)): 355
Peak Flow Factor: 4.4
Projected Peak Flow (Qpeak (gpm)): 1,562
MW-1B
MW-1A
MW-1C
Parkers Mill Road
Man O' War Blvd.
Man O' War West Pump Station
Class B
Capacity: 1,600 gpm
MW-1A-PSB
MW-1A-TA
- 18 -
EXPLANATION
Sanitary Sewer Trunk Line
Sanitary Sewer Force Main
Proposed Sewers
Size of Pipe
12 inch
15 inch
18 inch
Proposed Pump Station
Proposed Force Main
Developable Areas of RSA
Subbasins of RSA
RSA Boundary
Urban Service Area (USA) Boundary
Stream
Road
Location Map
0
600 Feet
1 inch equals 600 feet
GRW, Inc.
Lexington Fayette Urban County Government
Rural Service Area (RSA) Sanitary Sewer Capability Study
Exhibit: 4.2
Man O' War
Trunk Sewers


Man O' War
Rural Service Area
BLUEGRASS FIELD
MAN O WAR
MW-1B
MW-1A
MW-1C
NEW CIRCLE
GRINDER
Man O' War West Pump Station
Class B
Capacity: 1,600 gpm
MW/1A-PSB
ARMORY
MW-1A-FMA - 14"
MINT LANE
BOWMAN MILL RD
HARRODSBURG
PALOMAR HILLS
MILITARY PIKE
SOUTH ELKHORN
GRASMERE
EXPLANATION
Existing Pump Station
Sanitary Sewer Trunk Line
Sanitary Sewer Force Main
Proposed Sewers
Size of Pipe
12 inch
15 inch
18 inch
Proposed Pump Station
Proposed Force Main
Developable Areas of RSA
Subbasins of RSA
RSA Boundary
Urban Service Area (USA) Boundary
Stream
Road
Location Map
0
1,500 Feet
1 inch equals 1,500 feet
GRW, Inc.
Lexington Fayette Urban County Government
Rural Service Area (RSA)
Sanitary Sewer Capability Study
Exhibit: 4.3
Man O' War
Pump Stations & Force Mains

LEXINGTON-FAYETTE
URBAN COUNTY GOVERNMENT
Lexington, Kentucky

Detailed Cost Information

Cost Summary
Man O' War

Trunk Sewers ID:	Cost ($)
MW-1A-TA	$72,232
Force Main ID:	
MW-1A-FMA	$1,422,814
Pump Station ID:	
MW-1A-PSB	$600,000
Total Cost	**$2,095,045**

Shared Costs for System Improvements
Man O' War Rural Service Area

Construction of 2005 Improvements
Improvements for 14,000 GPM South Elkhorn Pump Station and 36" Parallel Force Main

2005 South Elkhorn Pump Station and 36" Parallel Force Main	
Total Estimated Construction Cost	$15,000,000
Total Acres - Existing South Elkhorn Sewershed	6,604
Total Acres - Man O' War Service Area	376
Total Revised Area - South Elkhorn Sewershed	6,980
Shared Cost Per Acre for MW	$2,149
Shared Cost to MW (376 acres)	$808,023
Shared Cost to LFUCG (6,604 acres)	$13,426,403

Shared Costs for System Improvements
Man O' War Rural Service Area

Upgrade of South Elkhorn Pump Station
Increase Capacity from 14,000 gpm to 14,890 gpm

South Elkhorn Pump Station Capacity Upgrade to 14,890 gpm	
Total Estimated Construction Cost	$450,000
Total Acres - Man O' War Service Area	376
Contributing Cost Per Acre for MW	$1,197
Contributing Cost to MW	$450,000

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 4.2
Reference ID: MW-1A-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
3	18" PVC Gravity Sewer (DR 35)	588	LF	75	$44,100
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	2	EA	2,000	$3,920
MISCELLANEOUS:					
55	Pavement Replacement:	58.80	LF	25	$1,470
56	Aggregate Surface Replacement	11.76	LF	15	$176
57	Concrete for Encasement	1.764	CY	150	$265
58	Crushed Stone for Special Pipe Bedding	2.352	TN	25	$59
59	Clean-Up/Final Grading/Seeding/Sowing	588	LF	4	$2,352

Subtotal	**$52,342**
15% Contingency	$7,851
Total Construction Cost	**$60,193**
20% Non-Construction Costs	$12,039
Total Estimate of Probable Cost	**$72,232**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 4.3
Reference ID: MW-1A-FMA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
FORCE MAIN:					
29	14" DI Force Main (PC 250 w/ Protecto 401)	16,670	LF	50	$833,500
ROAD BORES / TUNNEL:					
43	24" Steel Casing for 14" Carrier Pipe	200	LF	350	$70,000
MISCELLANEOUS:					
55	Pavement Replacement:	1,667.00	LF	25	$41,675
56	Aggregate Surface Replacement	333.40	LF	15	$5,001
57	Concrete for Encasement	50.010	CY	150	$7,502
58	Crushed Stone for Special Pipe Bedding	66.680	TN	25	$1,667
59	Clean-Up/Final Grading/Seeding/Sowing	16,670	LF	4	$66,680
60	Sewage Air Release Valves	2	EA	2,500	$5,000

Subtotal	**$1,031,025**
15% Contingency	$154,654
Total Construction Cost	**$1,185,678**
20% Non-Construction Costs	$237,136
Total Estimate of Probable Cost	**$1,422,814**

Section 5
Old Frankfort Pike Rural Service Area

General

The Old Frankfort Pike Rural Service Area (OFP) is located in western Fayette County. The OFP has an identified total area of 1,683 acres and a total developable area of 1,443 acres. A project summary is provided in Exhibits 5.1, 5.2, and 5.3. Detail maps are provided in Exhibits 5.4 and 5.5. The OFP is positioned in the central reach of the Fayette County Town Branch Creek drainage basin. The upper reach of the Town Branch Creek drainage basin is presently served by the LFUCG Town Branch WWTP and the Wolf Run Pump Station, which consists of 14,655 acres. Approximately 11,234 additional acres of the undeveloped Town Branch Creek drainage basin exist in Fayette County that are either downstream or adjacent to the OFP. The OFP area is divided into two sub-drainage basins, OFP-1 and OFP-2. Details and costs of wastewater infrastructure development of each basin will be provided separately.

The OFP-1 has a land area of 411 acres and is located primarily in the Wolf Run Creek drainage basin. Wolf Run Creek is a tributary to Town Branch Creek. A portion of the OFP-1 will flow through currently served areas. In addition, the existing LFUCG Wolf Run Pump Station is located upstream of the identified OFP-1 area. The existing Wolf Run Pump Station will be replaced by the LFUCG in the future. The OFP-2 has a land area of 1,272 acres and is a part of the Town Branch drainage basin. OFP-1 area is upstream of OFP-2.

Land Use and Parcel Data

Table 5.1 through 5.4 are a summary of the current land use and parcel size distribution in OFP-1 and OFP-2, individually. Table 5.5 and 5.6 are a combined summary of the entire proposed rural service area. Overall, land use in the OFP consists of over 99% core equine agricultural and nearly 70% of the land is 200 acre tracts or larger.

Table 5.1 Land Use Classification – OFP-1 RSA

Land Use Classification	Area (Acres)	% of Total Area
Core Equine Agricultural Land	409	99.5
Non-Rural Developed Land	2	0.5
Rural Developed Land	0	0.0
Other Land	0	0.0
Summary	**411**	**100.0**

Table 5.2 Land Use Classification – OFP-2 RSA

Land Use Classification	Area (Acres)	% of Total Area
Core Equine Agricultural Land	1,267	99.6
Non-Rural Developed Land	0	0.0
Rural Developed Land	3	0.2
Other Land	2	0.2
Summary	**1,272**	**100.0**

Table 5.3 Land Parcel Size Distribution – OFP-1 RSA

Land Parcel Size	No. of Parcels	% Total
> 0 acres and < 5 acres	1	6.3
≥ 5 acres and < 10 acres	5	31.2
≥ 10 acres and < 40 acres	5	31.2
≥ 40 acres and < 100 acres	2	12.5
≥ 100 acres and < 200 acres	2	12.5
≥ 200 acres	1	6.3
Summary	**16**	**100**

Table 5.4 Land Parcel Size Distribution – OFP-2 RSA

Land Parcel Size	No. of Parcels	% Total
> 0 acres and < 5 acres	0	0.0
≥ 5 acres and < 10 acres	0	0.0
≥ 10 acres and < 40 acres	3	18.7
≥ 40 acres and < 100 acres	4	25.0
≥ 100 acres and < 200 acres	5	31.3
≥ 200 acres	4	25.0
Summary	**16**	**100**

Table 5.5 Land Use Summary – OFP RSA

Land Use Classification	Area (Acres)	% of Total Area
Core Equine Agricultural Land	1,676	99.6
Non-Rural Developed Land	2	0.1
Rural Developed Land	3	0.2
Other Land	2	0.1
Summary	**1,683**	**100.0**

Table 5.6 Land Parcel Size Summary - OFP RSA

Land Parcel Size	No. of Parcels	% Total
> 0 acres and < 5 acres	1	3.5
≥ 5 acres and < 10 acres	5	17.2
≥ 10 acres and < 40 acres	8	27.7
≥ 40 acres and < 100 acres	5	17.2
≥ 100 acres and < 200 acres	5	17.2
≥ 200 acres	5	17.2
Summary*	**29**	**100.0**

*3 Parcels are overlapping between OFP-1 and OFP-2.

Rural Settlements

No rural settlements are identified inside the boundaries of the OFP.

Rural Activity Centers (RAC)

No RAC's exist in the OFP.

Special Natural Protection Areas

The Mare Haven Farm has been identified as an "A" priority protection area in the LFUCG Rural Service Area Land Management Plan due to the existence of native plants. Two to three acres of Canebrake and 20 to 30 acres of native plants have been identified on the site.

Old Frankfort Pike RSA

Rural Greenways

Old Frankfort Pike and Town Branch have been identified in the LFUCG Rural Service Area Land Management Plan as a Rural Greenway and are identified as one of the "Five Focus Areas" for rural greenway creation. This area has been cited as an outstanding cultural resource with historical buildings, farmsteads, rock fences and numerous horse farms. The Town Branch Creek floodplain region contains steep slopes, some tree stands, and a railroad, which has potential for a bikeway or hiking trail. The potential development of hiking trails or bikeways is desired through the creation of conservation/scenic easements.

Scenic Areas

Old Frankfort Pike and Viley Road in the OFP have been identified in the LFUCG Rural Service Area Land Management Plan as a "Scenic Area".

Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESA) have been identified along the Town Branch Creek floodplain in Fayette County.

Development of Wastewater Facilities

Projected Wastewater Flows

The projected wastewater flows from the OFP are separated into two sub-drainage basins, OFP-1 and OFP-2. The ultimate projected average wastewater flow, resultant from development of the OFP, is based on a unit flow of 1,500 gpd/acre of developable land. Peak wastewater flow is derived from utilization of an empirical peak wastewater flow factor, based on the relative magnitude of the average wastewater flow. The peak flow factor is multiplied times the average wastewater flow to obtain the peak instantaneous flow. In general, the larger the area and resulting average flow, the smaller the peak flow factor. Appendix B contains a summary of peak flow factors.

OFP-1

OFP-1 has a total land area of 411 acres and a total developable area of 386 acres. Independent of OFP-1 development, the existing Wolf Run Pump Station will be replaced with the New Wolf Run Pump Station, which will be relocated to the confluence of Town Branch Creek and Wolf Run Creek. The New Wolf Run Pump Station will provide pumping capacity for OFP-1 and the current Wolf Run Sewershed, which serves approximately 4,000 acres. The projected average wastewater flow for the OFP-1 is 579,000 gpd or 402 gpm and the projected average flow from the existing Wolf Run sewershed is 6 MGD or 4,167 gpm. The combined total projected average daily flow for the OFP-1 and the existing Wolf Run Sewershed is 6.58 MGD. The peak flow factor from Appendix B is 2.7 and the peak wastewater flow capacity for the proposed New Wolf Run Pump Station is 12,337 gpm.

Historically, occasional overflows have occurred during major rain events at the existing Wolf Run Pump Station. The Picadome Pump Station was recently constructed upstream and some relief has occurred with less frequency of overflow at the Wolf Run Pump Station. The existing pumping capacity of the Wolf Run Pump Station is estimated at 4,000 gpm with 1 pump, 5,800 gpm with 2 pumps, and near 8,000 gpm with the large pump in operation. On average flow days, it is estimated one pump runs 24 hours per day, resulting in an estimated average flow of 5.76 MGD (4,000 gpm). The existing Wolf Run Pump station requires replacement and relocation. The facility can not be expanded to meet the existing peak flows from the Wolf Run Sewershed and the current location does not provide available space for construction of a parallel facility. In addition, the

existing Wolf Run Pump Station is located in a commercially developed area and relocation is desired to eliminate nuisance odors and overflows in a populated area. Based on input from the LFUCG Division of Sanitary Sewers, the provision of a New Wolf Run Pump Station prior to the development of OFP-1, is required.

For the purpose of this study and determination of an average wastewater flow for the Wolf Run Sewershed, the capacity of the Picadome Pump Station has not been considered due to the historical occurrences of inflow and infiltration within the sewershed. The Picadome Pump Station currently diverts several hundred acres of drainage directly to the Town Branch WWTP and the frequency and magnitude of occasional overflows at the existing Wolf Run Pump Station have reduced. However, at this time, the entire 4,000 acres of the existing Wolf Run Sewershed is conservatively considered. The resultant average daily flow of 6 MGD will be utilized for the New Wolf Run Sewershed. Utilizing a peaking factor of 2.7, the resultant peak wastewater flow from the New Wolf Run Sewershed is 11,250 gpm, which does not include OFP-1. Further detailed study of the peak flows in the Wolf Run Sewershed may result in reduction of the required capacity of the new Wolf Run Pump Station.

OFP-2

OFP-2 has a total land area of 1,272 acres and a total developable area of 1,057 acres. The projected average wastewater flow is 1.58 MGD or 1,101 gpm. The peak flow factor from Appendix B is 3.4 and the peak wastewater flow capacity for the OFP-2 area is 3,743 gpm.

Wastewater Infrastructure Summary and Development Review

The OFP is mostly located downstream of current development in the Urban Service Area and most future wastewater will naturally flow away from currently sewered areas. A New Wolf Run Pump Station, located at the most downstream location of OFP-1, could pump and convey all wastewater to Town Branch WWTP, separate of OFP-2. OFP-1 and OFP-2 require independent infrastructure and can occur as phased.

Old Frankfort Pike RSA

OFP-1

12" to 15" trunk sewers will be required for development of OFP-1. However, a 54" trunk sewer will be required downstream of the existing Wolf Run Pump Station to route all flows to the relocated pump station at the confluence of Town Branch and Wolf Run Creek. As stated previously, the existing Wolf Run Pump Station requires replacement. The pump station experiences occasional overflows and in the opinion of the LFUCG Division of Sanitary Sewers can not be easily expanded in a cost effective manner. The location of the existing pump station is also central to a commercially developed area and relocation is desired. The New Wolf Run Pump Station (Class A) would pump and convey wastewater to the Town Branch WWTP via a 36" force main. The prorated share of costs for relocation/replacement of the Wolf Run Pump Station, large trunk sewer, and force main for the LFUCG's current sewershed would be provided for in the development costs of OFP-1.

OFP-2

OFP-2 drainage area is 1,272 acres and is located downstream of the confluence of Town Branch Creek and Wolf Run Creek. 12" to 30" trunk mains will be required for development of OFP-2. A Class A pump station will be required at the most downstream location of the OFP-2. A 20" force main will be required to convey flows from the new pump station to the Town Branch Wastewater Treatment Plant, parallel with the existing 20" force main from the existing Lower Town Branch Pump Station and the proposed 36" force main from the New Wolf Run Pump Station.

In review of the OFP-2 study area, the extension of the proposed rural service area downstream another 1,500 LF will allow another sub-drainage basin of the Town Branch Creek, consisting of 796 acres, to have future access to the proposed sanitary sewer system, provided the proposed OFP-2 pump station was also relocated downstream an additional 1,500 feet. The additional land area is not included in the scope of this study, however, consideration of this region in the future may be reviewed.

With the development of the OFP, opportunity exists for the LFUCG to decommission several small pump stations along Town Branch Creek by extending gravity sewer service upstream to these locations. Table 5.7 provides a summary of each pump station which is a candidate for decommissioning in the OFP. Costs of decommissioning have not been included in the study.

Table 5.7 Candidate Pump Stations for Decommissioning

Pump Station Name	Basin
Leestown Industrial	OFP-1
Leestown West	OFP-1
Spicewood	OFP-2
Marshall	OFP-2
Bracktown (Future)	OFP-2

Table 5.8 Required WWTP Capacity for OFP RSA

Sub-Basin	Capacity (MGD)
OFP-1	0.58
OFP-2	1.58
Total	**2.16**

No wastewater treatment capacity exists for the OFP. The projected WWTP capacity required for complete development of the OFP is 1,503 gpm or 2.16 MGD. Table 5.8 provides a summary of required WWTP capacity for the OFP-1 and OFP-2. Exhibit 5.1, 5.2, and 5.3 are project summaries of the OFP physical, flow, and cost characteristics.

Estimate of Probable Cost for Collection, Pumping, Conveyance, and Treatment

The estimate of probable cost for the OFP is provided in separate summaries for the OFP-1 area and the OFP-2 area.

OFP-1

The estimate of total probable cost for the OFP-1 trunk sewer, Class A pump station, and force main to the Town Branch WWTP is $12,557,680. The LFUCG contributed share of costs to the upgrade the Wolf Run Pump Station, force main, and trunk sewer are $10,394,418. These are proportioned costs associated with the replacement of the existing facilities for the current sanitary sewer service area. A summary of these contributing costs is provided with the detailed cost estimates at the end of this section. After these deductive adjustments to the total project cost, the total net estimated cost of pumping and conveyance for OFP-1 is $2,163,262.

OFP-2

The estimate of total probable cost for the OFP-2 trunk sewer, Class A pump station, and force main to the Town Branch WWTP is $8,456,530.

The required WWTP capacity for the projected average flow from complete development of the OFP -1 and OFP -2 is 0.58 MGD and 1.58 MGD, respectively. At the cost of $6/gallon for expansion of the Town Branch WWTP, the projected total construction cost for wastewater treatment is summarized in Table 5.9

Table 5.9 Summary of WWTP Capacity and Cost - OFP RSA

Sub-Basin	Required WWTP Capacity (MGD)	Cost ($)
OFP-1	0.58	$ 3,474,000.
OFP-2	1.58	9,513,000.
Total	**2.16**	**$ 12,987,000.**

These estimated costs include construction, construction contingencies, engineering design and inspection, legal, easements, and other non-construction costs. A summary of all costs is provided in Exhibits 5.1, 5.2, and 5.3.

Summary, Review, and Recommendations – Old Frankfort Pike RSA

The estimate of probable costs for the collection, pumping, conveyance, and treatment of forecast wastewater from the OFP is $23,606,792. The unit cost of development is $16,360/acre. These estimated costs include construction, construction contingencies, engineering design and inspection, legal, easements, and other non-construction costs. Tables 5.10, 5.11, 5.12 provide a summary of project costs. A summary of all detail costs is provided in Exhibit 5.1 through Exhibit 5.3.

Table 5.10 Cost Summary – OFP-1 RSA

Item	Total Cost	Total Cost/Acre*
Trunk Sewers	$ 4,752,690.	$ 12,313.
Force Main	3,004,990.	7,785.
Pump Stations	4,800,000.	12,435.
Wastewater Treatment	3,474,000.	9,000.
Total Cost	**$16,031,680.**	**$ 41,533.**
Shared Cost by LFUCG**	-10,394,418.	-26,929.
Net Cost for OFP-1	**$ 5,637,262.**	**$ 14,604.**

* Total Cost is per developable acre.
** LFUCG existing Urban Service Area portion of Wolf Run Improvements

Table 5.11 Cost Summary – OFP-2 RSA

Item	Total Cost	Total Cost/Acre*
Trunk Sewers	$3,623,457.	$ 3,428.
Force Main	2,833,073.	2,681.
Pump Stations	2,000,000.	1,892.
Wastewater Treatment	9,513,000.	9,000.
Total Cost for OFP-2	$17,969,530.	$ 17,001.

* Total Cost is per developable acre.

Table 5.12 OFP Cost Summary – OFP RSA

Item	Total Cost	Total Cost/Acre*
Trunk Sewers	$ 8,376,147.	$ 5,805.
Force Main	5,838,063.	4,046.
Pump Stations	6,800,000.	4,712.
Wastewater Treatment	12,987,000.	9,000.
Total Cost	$34,001,210.	$ 23,563.
Shared Cost by LFUCG	-10,394,418.	-7,203
Net Cost for OFP	$23,606,792.	$ 16,360.

* Total Cost is per developable acre

Future downstream development below the OFP will be more challenging due to the provision of additional pumping and conveyance capacity to the Town Branch WWTP. The construction of another parallel force main to the OFP improvements will be an issue along the developed corridor of the railroad and OFP. These required improvements will be more costly and more distant from existing or available pumping, conveyance, and treatment facilities.

The Town Branch Creek drainage basin has a total area of 27,572 acres in Fayette County, of which 14,655 upstream acres are presently sewered. Potential exists to construct a future WWTP at a downstream location in the Town Branch Drainage Basin in lieu of additional pumping and conveyance alternatives to the Town Branch WWTP. In addition, pumping and conveyance of these flows to an adjacent drainage basin for treatment at a new WWTP may also be an alternative. These alternatives have not been investigated within the scope of this study.

Review

- Over 99% of the property is core equine agricultural or prime agricultural land.
- The area is designated as one of the “five focus areas” for rural greenway creation.
- A large portion of the area is designated as a “scenic area”.
- All resultant flows from the OFP are downstream of current wastewater infrastructure development. Additional pumping and conveyance will be required.
- In the opinion of the LFUCG Division of Sanitary Sewers, replacement of the Wolf Run Pump Station and Force Main would be prior to the development of OFP-1.
- Future downstream development below the OFP will present similar problems as the present; no pumping, conveyance, or treatment capacity is available.
- With the development of the OFP, opportunity exists to decommission several small capacity pump stations along Town Branch Creek.

Recommendations

- Revisit the issues and costs of a wastewater treatment plant in the lower Town Branch drainage basin.
- Investigate the costs and feasibility to pump and convey future wastewater to an adjacent drainage basin WWTP.
- Evaluate the ability and availability of right-of-way to construct a third force main between a new downstream pump station below OFP-2 and the Town Branch WWTP.
- Continue evaluation of wastewater discharge limitation concerns on the Town Branch Creek.
- Determine other future alternatives available for pumping, conveyance, and treatment of wastewater flows.
- Expand future planning efforts for wastewater infrastructure beyond the traditional 20-year planning period.

Exhibit 5.1 - Project Summary
Rural Service Area Sanitary Sewer Capability Study
Old Frankfort Pike (OFP-1) - Refer to Exhibits 5.4 & 5.5

1.	**Town Branch Drainage Basin Summary**	
1.a	Total Area Town Branch Drainage Basin in Fayette County. (acres)	27,572
1.b	Total Area of Town Branch Drainage Basin presently served by LFUCG. (acres)	14,655
1.c	Total Area in proposed service area of OFP-1. (acres)	411
1.d	Total Area of other proposed service in the Town Branch Drainage Basin. [5.a] (acres)	1,272
1.e	Total unserved area in the Town Branch Drainge Basin remaining in Fayette County. (acres)	11,234
2.	**Design Flow Calculation**	
2.a	Total Area in proposed service area for OFP-1. (acres)	411
2.b	Total Area in Existing Wolf Run. (acres)	4,000
2.c	Total Developable area in proposed service area for OFP-1. (acres)	386
2.d	OFP-1, Projected Average Flow (gpm)	402
2.e	New Wolf Run Projected Average Flow from the Existing USA. (gpm)	4,167
2.f	OFP-1, Peak Flow Factor for the New Wolf Run Pump Station.	2.7
2.g	New Wolf Run Peak Flow Factor.	2.7
2.h	OFP-1, Projected Peak Flow for the New Wolf Run Pump Station. (gpm)	1,087
2.I	New Wolf Run Projected Peak Flow from the Existing USA. (gpm)	11,250
3.	**Project Cost Summary**	
	Pumping and Conveyance Cost:	
3.a	Trunk Sewers	$4,752,690
3.b	Force Main	$3,004,990
3.c	New Wolf Run, Class A Pump Station (12,400 gpm) [5.b,5.c]	$4,800,000
3.d	**Subtotal: Pumping and Conveyance**	$12,557,680
	Wastewater Treatment Cost:	
	Required Wastewater Treatment Plant Capacity: 0.579 MGD X $ 6 / gallon:	
3.e	**Subtotal: Treatment**	$3,474,000
3.f	**Subtotal: Estimated Total Project Cost**	$16,031,680
3.g	Plus Contributions to:	$0
3.h	Less Contributions from:	
	The upgrade of the New Wolf Run Pump Station.	$10,394,418
3.I	**Net Estimated OFP-1 Project Costs w/adjustments**	**$5,637,262**
4.	**Average Cost Per Total Acre of Development with LFUCG Contribution:[5.d]**	**$14,604**

5.	**Remarks:**
5.a	Refers to the area Old Frankfort Pike - 2.
5.b	The New Wolf Run Pump Station (Class A) would receive existing flow from the developed Town Branch watershed, and the proposed flows from the Old Frankfort Pike RSA expansion areas.
5.c	Appendix D.1 contains pump station data and costs.
5.d	The cost / acre utilizes total developable area for this determination.

Exhibit 5.2 - Project Summary
Rural Service Area Sanitary Sewer Capability Study
Old Frankfort Pike (OFP-2) - Refer to Exhibits 5.4 & 5.5

1.	**Town Branch Drainage Basin Summary**	
1.a	Total Area Town Branch Drainage Basin in Fayette County. (acres)	27,572
1.b	Total Area of Town Branch Drainage Basin presently served by LFUCG. (acres)	14,655
1.c	Total Area in proposed service area of OFP-2. (acres)	1,272
1.d	Total Area of other proposed service in the Town Branch Drainage Basin. [5.a] (acres)	411
1.e	Total unserved area in the Town Branch Drainge Basin remaining in Fayette County. (acres)	11,234
2.	**Design Flow Calculation**	
2.a	Total Area in proposed service area for OFP-2. (acres)	1,272
2.b	Total Developable area in proposed service area for OFP-2. (acres)	1,057
2.c	Projected Average Flow (gpm)	1,101
2.d	Peak Flow Factor for the Old Frankfort Pike Pump Station.	3.4
2.e	Projected Peak Flow for the Old Frankfort Pike Pump Station. (gpm)	3,743
3.	**Project Cost Summary**	
	Pumping and Conveyance Cost:	
3.a	Trunk Sewers	$3,623,457
3.b	Force Main	$2,833,073
3.c	Old Frankfort Pike, Class A Pump Station (3,800 gpm) [5.b, 5.c]	$2,000,000
3.d	**Subtotal: Pumping and Conveyance**	$8,456,530
	Wastewater Treatment Cost:	
	Required Wastewater Treatment Plant Capacity: 1.585 MGD X $ 6 / gallon:	
3.e	**Subtotal: Treatment**	$9,513,000
3.f	**Subtotal: Estimated Total Project Cost**	$17,969,530
3.g	Plus Contributions to:	$0
3.h	Less Contributions from:	$0
3.I	**Net Estimated OFP-2 Project Costs w/adjustments**	**$17,969,530**
4.	**Average Cost Per Total Acre of Development with LFUCG Contribution:[5.d]**	**$17,001**

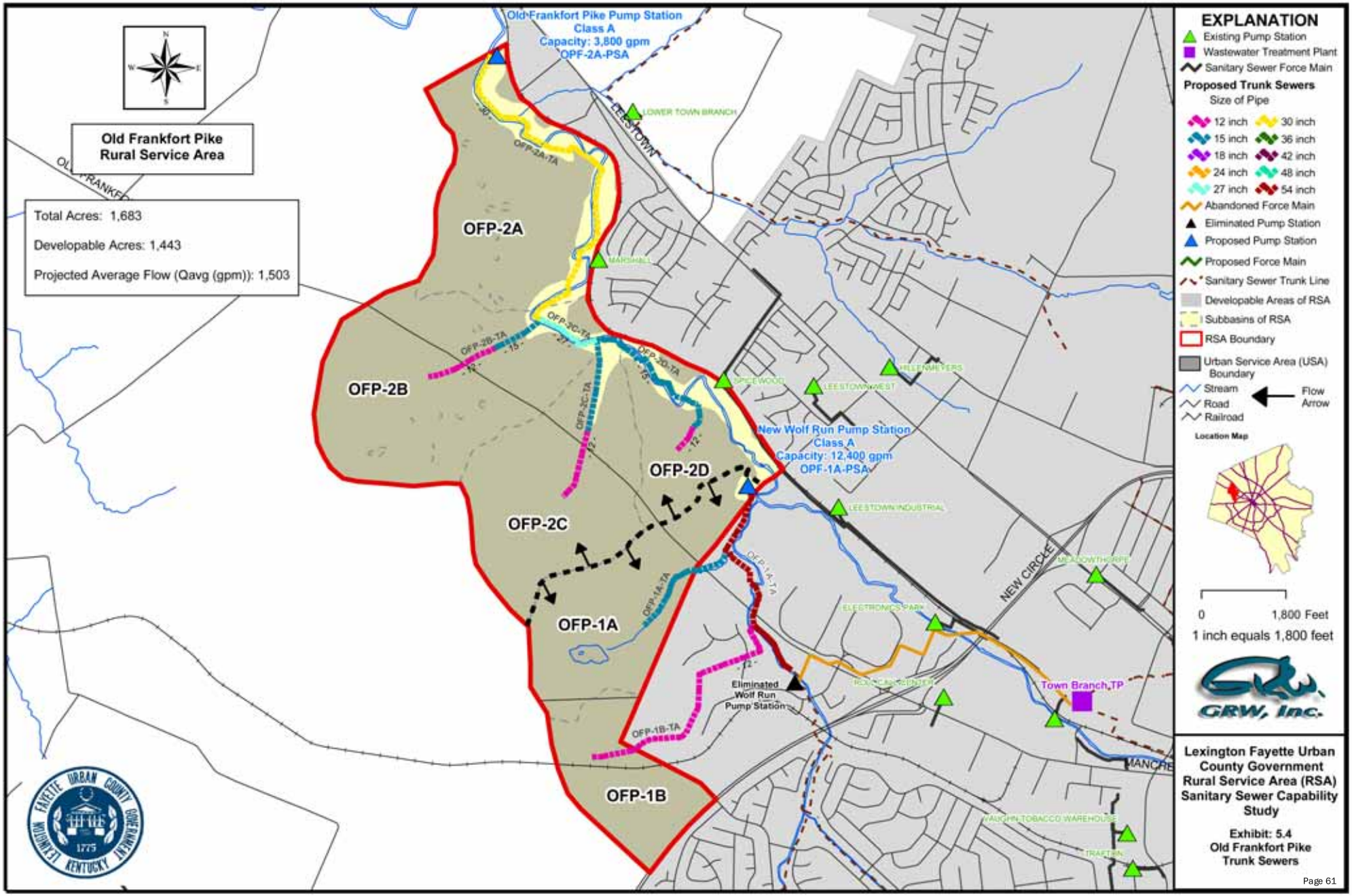
5.	**Remarks:**
5.a	Refers to the area Old Frankfort Pike - 1.
5.b	The Old Frankfort Pike Pump Station (Class A) will receive flow from area OFP-2, and convey it to Town Branch
5.c	Appendix D.1 contains pump station data and costs.
5.d	The cost / acre utilizes total developable area for this determination.

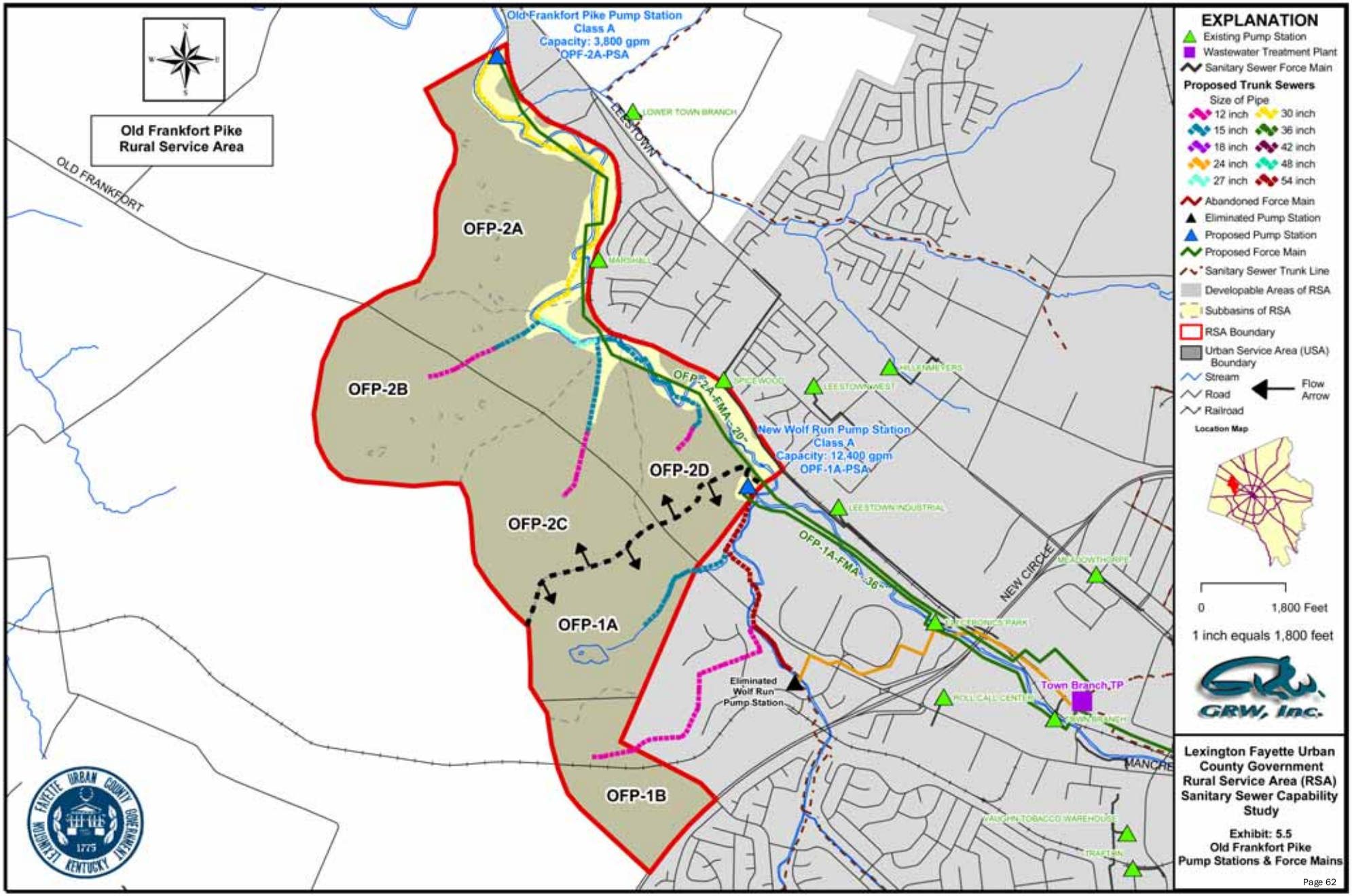
Exhibit 5.3 - Project Summary
Rural Service Area Sanitary Sewer Capability Study
Old Frankfort Pike Summary (OFP) - Refer to Exhibits 5.4 & 5.5

1.	**Town Branch Drainage Basin Summary**	
1.a	Total Area Town Branch Drainage Basin in Fayette County. (acres)	27,572
1.b	Total Area of Town Branch Drainage Basin presently served by LFUCG. (acres)	14,655
1.c	Total Area in proposed service area of OFP-1. (acres)	411
1.d	Total Area in proposed service area of OFP-2. (acres)	1,272
1.e	Total Area of other proposed service in the Town Branch Drainage Basin. (acres)	0
1.f	Total unserved area in the Town Branch Drainge Basin remaining in Fayette County. (acres)	12,506
2.	**Design Flow Calculation**	
2.a	Total Area in proposed service area for OFP-1. (acres)	411
2.b	Total Area in Existing Wolf Run. (acres)	4,000
2.c	Total Area in proposed service area for OFP-2. (acres)	1,272
2.d	Total Developable area in proposed service area for OFP-1. (acres)	386
2.e	Total Developable area in proposed service area for OFP-2. (acres)	1,057
2.f	OFP-1, Projected Average Flow (gpm)	402
2.g	Existing Wolf Run Projected Average Flow (gpm)	4,167
2.h	OFP-2, Projected Average Flow (gpm)	1,101
2.I	OFP-1, Peak Flow Factor for the New Wolf Run Pump Station.	2.7
2.j	Existing Wolf Run Peak Flow Factor.	2.7
2.k	OFP-2, Peak Flow Factor for the Old Frankfort Pike Pump Station.	3.4
2.l	OFP-1, Projected Peak Flow for the New Wolf Run Pump Station. (gpm)	1,087
2.m	Existing Wolf Run Projected Peak Flow. (gpm)	11,250
2.n	OFP-2, Projected Peak Flow for the Old Frankfort Pike Pump Station. (gpm)	3,743
3.	**Project Cost Summary**	
	Pumping and Conveyance Cost:	
3.a	Trunk Sewers for OFP-1	$4,752,690
3.b	Trunk Sewers for OFP-2	$3,623,457
3.c	Force Main for OFP -1	$3,004,990
3.d	Force Main for OFP -2	$2,833,073
3.e	New Wolf Run, Class A Pump Station (12,400 gpm) [5.a, 5.c]	$4,800,000
3.f	Old Frankfort Pike, Class A Pump Station (3,800 gpm) [5.b, 5.c]	$2,000,000
3.g	**Subtotal: Pumping and Conveyance**	$21,014,210
	Wastewater Treatment Cost:	
	Required Wastewater Treatment Plant Capacity: 2.164 MGD X $ 6 / gallon:	
3.h	**Subtotal: Treatment**	$12,987,000
3.I	**Subtotal: Estimated Total Project Cost**	$34,001,210
3.j	Plus Contributions to:	$0
3.k	Less Contributions from: The upgrade of the New Wolf Run Pump Station.	$10,394,418
3.l	**Net Estimated OFP Project Costs w/adjustments**	**$23,606,792**
4.	**Average Cost Per Total Acre of Development with LFUCG Contribution:[5.d]**	**$16,360**

Exhibit 5.3 - Project Summary
Rural Service Area Sanitary Sewer Capability Study
Old Frankfort Pike Summary (OFP) - Refer to Exhibits 5.4 & 5.5

5.	Remarks:
5.a	The New Wolf Run Pump Station (Class A) will receive existing flow from the developed Town Branch watershed, and the proposed flows from the Old Frankfort Pike RSA expansion areas.
5.b	The Old Frankfort Pike Pump Station (Class A) will receive flow from area OFP-2, and convey it to Town Branch Wastewater Treatment Plant, via a 20" DI force main.
5.c	Appendix D.1 contains pump station data and costs.
5.d	The cost / acre utilizes total developable area for this determination.


Old Frankfort Pike Pump Station
Class A
Capacity: 3,800 gpm
OPF-2A-PSA
Old Frankfort Pike
Rural Service Area
Total Acres: 1,683
Developable Acres: 1,443
Projected Average Flow (Qavg (gpm)): 1,503
OFP-2A
OFP-2B
OFP-2C
OFP-2D
OFP-1A
OFP-1B
New Wolf Run Pump Station
Class A
Capacity: 12,400 gpm
OPF-1A-PSA
Eliminated
Wolf Run
Pump Station
Town Branch TP
LEESTOWN
NEW CIRCLE
EXPLANATION
Existing Pump Station
Wastewater Treatment Plant
Sanitary Sewer Force Main
Proposed Trunk Sewers
Size of Pipe
12 inch
15 inch
18 inch
24 inch
27 inch
30 inch
36 inch
42 inch
48 inch
54 inch
Abandoned Force Main
Eliminated Pump Station
Proposed Pump Station
Proposed Force Main
Sanitary Sewer Trunk Line
Developable Areas of RSA
Subbasins of RSA
RSA Boundary
Urban Service Area (USA) Boundary
Stream
Road
Railroad
Flow Arrow
Location Map
0
1,800 Feet
1 inch equals 1,800 feet
GRW, Inc.
Lexington Fayette Urban County Government
Rural Service Area (RSA) Sanitary Sewer Capability Study
Exhibit: 5.4
Old Frankfort Pike
Trunk Sewers


Old Frankfort Pike Pump Station
Class A
Capacity: 3,800 gpm
OPF-2A-PSA
Old Frankfort Pike
Rural Service Area
OLD FRANKFORT
LOWER TOWN BRANCH
LEESTOWN
MARSHALL
OFP-2A
OFP-2B
OFP-2C
OFP-2D
OFP-1A
OFP-1B
OFP-2A-FMA-20"
SPCEWOOD
LEESTOWN WEST
HILLENMEYERS
New Wolf Run Pump Station
Class A
Capacity: 12,400 gpm
OPF-1A-PSA
LEESTOWN INDUSTRIAL
OFP-1A-FMA-36"
NEW CIRCLE
MEADOWTHORPE
GEORGES PARK
Eliminated
Wolf Run
Pump Station
ROLLCALL CENTER
Town Branch TP
TOWN BRANCH
MANCHE
VAUGHN TOBACCO WAREHOUSE
TRAFTON
EXPLANATION
Existing Pump Station
Wastewater Treatment Plant
Sanitary Sewer Force Main
Proposed Trunk Sewers
Size of Pipe
12 inch
30 inch
15 inch
36 inch
18 inch
42 inch
24 inch
48 inch
27 inch
54 inch
Abandoned Force Main
Eliminated Pump Station
Proposed Pump Station
Proposed Force Main
Sanitary Sewer Trunk Line
Developable Areas of RSA
Subbasins of RSA
RSA Boundary
Urban Service Area (USA) Boundary
Stream
Road
Railroad
Flow Arrow
Location Map
0
1,800 Feet
1 inch equals 1,800 feet
GRW, Inc.
Lexington Fayette Urban County Government
Rural Service Area (RSA) Sanitary Sewer Capability Study
Exhibit: 5.5
Old Frankfort Pike
Pump Stations & Force Mains

LEXINGTON-FAYETTE
URBAN COUNTY GOVERNMENT
Lexington, Kentucky

Detailed Cost Information

Cost Summary
Old Frankfort Pike

Trunk Sewers ID:	Cost ($)
Old Frankfort Pike-1:	
OFP-1A-TA	$3,708,502
OFP-1A-TB	$366,911
OFP-1B-TA	$677,277
Subtotal:	$4,752,690
Old Frankfort Pike-2:	
OFP-2A-TA	$2,035,978
OFP-2B-TA	$657,809
OFP-2C-TA	$448,124
OFP-2D-TA	$481,546
Subtotal:	$3,623,457
Total Old Frankfort Pike 1 and 2 Trunk Sewers:	$8,376,147
Force Main ID:	
Old Frankfort Pike -1:	
OFP-1A-FMA	$3,004,990
Old Frankfort Pike-2:	
OFP-2A-FMA	$2,833,073
Total Old Frankfort Pike 1 and 2 Force Mains:	$5,838,062
Pump Station ID:	
OFP-1A-PSA	$4,800,000
OFP-2A-PSA	$2,000,000
Total Cost	$21,014,210

Shared Costs for System Improvements
Old Frankfort Pike RSA
OFP-1 Drainage Basin

Replacement of Wolf Run Pump Station and Force Main
Increase Capacity from 8000 gpm to 12,400 gpm

New Wolf Run Pump Station	$4,800,000
54" Trunk Sewer *	$2,707,207
36" Force Main	$3,004,990
Estimated Total Project Costs:	$10,512,197
Total Acres - OFP-1 Drainage Basin	411
Total Acres - New Wolf Run Drainage Basin (excluding OFP-1)	4,000
Total Acres:	4,411
Contributing Cost Per Acre	$2,383
Contributing Cost to OFP-1 (411 acres)	$979,486
Contributing Cost to Existing Wolf Run (4000 acres)	$9,532,711
Direct Cost to Existing Wolf Run	$861,707
Subtotal:	$10,394,418

* 27% of total costs benefit both LFUCG existing USA and OFP-1.

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 5.4
Reference ID: OFP-1A-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
11	54" DI Gravity Sewer (PC 200) w/Protecto 401	4,996	LF	475	$2,373,100
MANHOLES:					
17	8'0" Dia. Std. Manhole (Upto 6' Deep)	17	EA	7,500	$127,500
ROAD BORES / TUNNEL:					
53	72" Steel Casing for 54" Carrier Pipe	100	LF	1,500	$150,000
MISCELLANEOUS:					
55	Pavement Replacement:	499.60	LF	25	$12,490
56	Aggregate Surface Replacement	99.92	LF	15	$1,499
57	Concrete for Encasement	14.988	CY	150	$2,248
58	Crushed Stone for Special Pipe Bedding	19.984	TN	25	$500
59	Clean-Up/Final Grading/Seeding/Sowing	4,996	LF	4	$19,984

Subtotal	**$2,687,321**
15% Contingency	$403,098
Total Construction Cost	**$3,090,419**
20% Non-Construction Costs	$618,084
Total Estimate of Probable Cost	**$3,708,502**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 5.4
Reference ID: OFP-1A-TB

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
2	15" PVC Gravity Sewer (DR 35)	2,748	LF	70	$192,360
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	9	EA	2,000	$18,320
ROAD BORES / TUNNEL:					
43	24" Steel Casing for 14" - 15" Carrier Pipe	100	LF	350	$35,000
MISCELLANEOUS:					
55	Pavement Replacement:	274.80	LF	25	$6,870
56	Aggregate Surface Replacement	54.96	LF	15	$824
57	Concrete for Encasement	8.244	CY	150	$1,237
58	Crushed Stone for Special Pipe Bedding	10.992	TN	25	$275
59	Clean-Up/Final Grading/Seeding/Sowing	2,748	LF	4	$10,992

Subtotal	**$265,878**
15% Contingency	$39,882
Total Construction Cost	**$305,759**
20% Non-Construction Costs	$61,152
Total Estimate of Probable Cost	**$366,911**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 5.4
Reference ID: OFP-1B-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	5,766	LF	60	$345,960
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	19	EA	2,000	$38,440
ROAD BORES / TUNNEL:					
42	18" Steel Casing for 12" Carrier Pipe	200	LF	320	$64,000
MISCELLANEOUS:					
55	Pavement Replacement:	576.60	LF	25	$14,415
56	Aggregate Surface Replacement	115.32	LF	15	$1,730
57	Concrete for Encasement	17.298	CY	150	$2,595
58	Crushed Stone for Special Pipe Bedding	23.064	TN	25	$577
59	Clean-Up/Final Grading/Seeding/Sowing	5,766	LF	4	$23,064

Subtotal	**$490,780**
15% Contingency	$73,617
Total Construction Cost	**$564,397**
20% Non-Construction Costs	$112,879
Total Estimate of Probable Cost	**$677,277**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 5.5
Reference ID: OFP-1A-FMA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
FORCE MAIN:					
35	36" DI Force Main (PC 200 w/ Protecto 401)	10,336	LF	182	$1,881,152
ROAD BORES / TUNNEL:					
50	50" Steel Casing for 36" Carrier Pipe	200	LF	925	$185,000
MISCELLANEOUS:					
55	Pavement Replacement:	1,033.60	LF	25	$25,840
56	Aggregate Surface Replacement	2,067.20	LF	15	$31,008
57	Concrete for Encasement	31.008	CY	150	$4,651
58	Crushed Stone for Special Pipe Bedding	41.344	TN	25	$1,034
59	Clean-Up/Final Grading/Seeding/Sowing	10,336	LF	4	$41,344
60	Sewage Air Release Valves	3	EA	2,500	$7,500

Subtotal	**$2,177,529**
15% Contingency	$326,629
Total Construction Cost	**$2,504,158**
20% Non-Construction Costs	$500,832
Total Estimate of Probable Cost	**$3,004,990**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 5.4
Reference ID: OFP-2A-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
7	30" DI Gravity Sewer (PC 200) w/Protecto 401	8,729	LF	155	$1,352,995
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	29	EA	2,000	$58,193
MISCELLANEOUS:					
55	Pavement Replacement:	872.90	LF	25	$21,823
56	Aggregate Surface Replacement	174.58	LF	15	$2,619
57	Concrete for Encasement	26.187	CY	150	$3,928
58	Crushed Stone for Special Pipe Bedding	34.916	TN	25	$873
59	Clean-Up/Final Grading/Seeding/Sowing	8,729	LF	4	$34,916

Subtotal	**$1,475,346**
15% Contingency	$221,302
Total Construction Cost	**$1,696,648**
20% Non-Construction Costs	$339,330
Total Estimate of Probable Cost	**$2,035,978**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 5.4
Reference ID: OFP-2B-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	1,644	LF	60	$98,640
2	15" PVC Gravity Sewer (DR 35)	1,208	LF	70	$84,560
6	27" PVC Gravity Sewer (DR 35)	1,538	LF	130	$199,940
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	15	EA	2,000	$29,267
ROAD BORES / TUNNEL:					
42	18" Steel Casing for 12" Carrier Pipe	100	LF	320	$32,000
MISCELLANEOUS:					
55	Pavement Replacement:	439.00	LF	25	$10,975
56	Aggregate Surface Replacement	87.80	LF	15	$1,317
57	Concrete for Encasement	13.170	CY	150	$1,976
58	Crushed Stone for Special Pipe Bedding	17.560	TN	25	$439
59	Clean-Up/Final Grading/Seeding/Sowing	4,390	LF	4	$17,560

Subtotal	**$476,673**
15% Contingency	$71,501
Total Construction Cost	**$548,174**
20% Non-Construction Costs	$109,635
Total Estimate of Probable Cost	**$657,809**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 5.4
Reference ID: OFP-2C-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	1,595	LF	60	$95,700
2	15" PVC Gravity Sewer (DR 35)	2,079	LF	70	$145,530
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	12	EA	2,000	$24,493
ROAD BORES / TUNNEL:					
42	18" Steel Casing for 12" Carrier Pipe	100	LF	320	$32,000
MISCELLANEOUS:					
55	Pavement Replacement:	367.40	LF	25	$9,185
56	Aggregate Surface Replacement	73.48	LF	15	$1,102
57	Concrete for Encasement	11.022	CY	150	$1,653
58	Crushed Stone for Special Pipe Bedding	14.696	TN	25	$367
59	Clean-Up/Final Grading/Seeding/Sowing	3,674	LF	4	$14,696

Subtotal	**$324,727**
15% Contingency	$48,709
Total Construction Cost	**$373,436**
20% Non-Construction Costs	$74,687
Total Estimate of Probable Cost	**$448,124**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 5.4
Reference ID: OFP-2D-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	636	LF	60	$38,160
2	15" PVC Gravity Sewer (DR 35)	3,593	LF	70	$251,510
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	14	EA	2,000	$28,193
MISCELLANEOUS:					
55	Pavement Replacement:	422.90	LF	25	$10,573
56	Aggregate Surface Replacement	84.58	LF	15	$1,269
57	Concrete for Encasement	12.687	CY	150	$1,903
58	Crushed Stone for Special Pipe Bedding	16.916	TN	25	$423
59	Clean-Up/Final Grading/Seeding/Sowing	4,229	LF	4	$16,916

Subtotal	**$348,946**
15% Contingency	$52,342
Total Construction Cost	**$401,288**
20% Non-Construction Costs	$80,258
Total Estimate of Probable Cost	**$481,546**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 5.5
Reference ID: OFP-2A-FMA

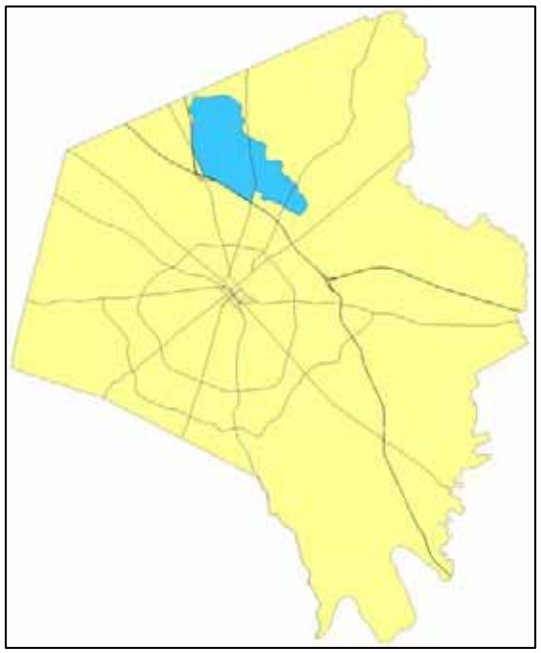
Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
FORCE MAIN:					
32	20" DI Force Main (PC 250 w/ Protecto 401)	22,592	LF	75	$1,694,400
ROAD BORES / TUNNEL:					
46	36" Steel Casing for 20" Carrier Pipe	300	LF	475	$142,500
MISCELLANEOUS:					
55	Pavement Replacement:	2,259.20	LF	25	$56,480
56	Aggregate Surface Replacement	451.84	LF	15	$6,778
57	Concrete for Encasement	67.776	CY	150	$10,166
58	Crushed Stone for Special Pipe Bedding	90.368	TN	25	$2,259
59	Clean-Up/Final Grading/Seeding/Sowing	22,592	LF	4	$90,368
60	Sewage Air Release Valves	20	EA	2,500	$50,000

Subtotal	**$2,052,951**
15% Contingency	$307,943
Total Construction Cost	**$2,360,894**
20% Non-Construction Costs	$472,179
Total Estimate of Probable Cost	**$2,833,073**

Section 6
Ironworks Pike Rural Service Area

General

The Ironworks Pike Rural Service Area (IP) is located in northern Fayette County. The IP has an identified total area of 6,909 acres and a total developable area of 4,776 acres. A Project Summary is provided in Exhibit 6.1 and detail maps are provided in Exhibits 6.2 and 6.3. The identified area is positioned in the central reach of the Cane Run drainage basin within Fayette County. An upper reach of the Cane Run drainage basin consists of 7,424 acres and is presently served by the LFUCG Cane Run Sewershed. Approximately 3,868 additional acres within the undeveloped Cane Run Creek drainage basin exist in Fayette County and are either downstream or adjacent to the IP.



Land Use and Parcel Data

Table 6.1 is a summary of the current land use in the IP. Table 6.2 provides the comparison of parcel size distribution within the IP. Coldstream Farm (University of Kentucky), Spindletop Farm (University of Kentucky), and the Kentucky Horse Park represent a large portion of the public lands within the boundaries of the IP.

Table 6.1 Land Use Classification - IP RSA

Land Use Classification	Area (Acres)	% of Total Area
Core Equine Agricultural Land	2,536	36.7
Non-Rural Developed Land	249	3.6
Prime Agricultural Land	1,133	16.4
Public Land	2,964	42.9
Rural Developed Land	20	0.3
Other Land	7	0.1
Summary	**6,909**	**100.0**

Table 6.2 Land Parcel Size Distribution – IP RSA

Land Parcel Size	No. of Parcels	% Total Parcels
> 0 acres and < 5 acres	95	55.1
≥ 5 acres and < 10 acres	6	3.5
≥ 10 acres and < 40 acres	27	15.7
≥ 40 acres and < 100 acres	18	10.5
≥ 100 acres and < 200 acres	19	11.1
≥ 200 acres	7	4.1
Summary	**172**	**100.0**

Rural Settlements

No rural settlements exist in the boundaries of the IP. Maddoxtown is located just north of the boundary in the vicinity of Ironworks Pike and Russell Cave Pike.

Rural Activity Centers (RAC)

Spindletop RAC (188 acres) exists in the boundaries of the IP and is included as developable land. The Kentucky Horse Park (Kentucky State Park) is also just downstream of the boundaries of the IP and has existing sanitary sewer

facilities which return wastewater to the LFUCG sanitary sewer system. No consideration of additional collection, pumping, conveyance, or treatment is provided for the Kentucky Horse Park or Spindletop RAC beyond what was provided for in the agreement between the State of Kentucky and the LFUCG.


Spindletop Farm

In addition, Spindletop Farm is adjacent to the Spindletop RAC. All existing wastewater from Spindletop Farm (University of Kentucky) is pumped and conveyed to the Lower Cane Run Pump Station, via the Spindletop Pump Station. Spindletop Farm area is not included as developable area of the IP.

Special Natural Protection Areas

Two "B" Priority Sites, Special Natural Protection Areas have been identified within the boundaries of the IP by the LFUCG Rural Service Area Land Management Plan. The two sites are Ironworks Pike, south of the Kentucky Horse Park (50 acres) and Cane Run on Coldstream Farm, just north of the interstate. An "A" Priority Site has been identified downstream in the Kentucky Horse Park. Several stands of blue ash and oak savannah – woodland trees exist and should be protected.

Rural Greenways

Cane Run Creek has been identified as a possible greenway in the LFUCG Rural Service Area Land Management Plan, however, it has not been designated as one of the "Five Focus Areas".

Scenic Areas

A small portion of the IP has been identified as "Scenic Area" in the LFUCG Rural Service Area Land Management Plan. A significant amount of this land is owned by the Commonwealth of Kentucky and the University of Kentucky.

Environmentally Sensitive Areas

Environmentally Sensitive Areas have been identified in the LFUCG Rural Service Area Land Management Plan along the Cane Run Creek drainage basin in Fayette County. The Royal Springs Aquifer, which coincides with the Cane Run Creek drainage basin is an environmentally sensitive area of great importance and concern. Georgetown derives a portion of its drinking water from the Royal Spring. Since 80% of the aquifer for that spring is located in Fayette County, rainwater that infiltrates the ground in Fayette County becomes a source of drinking water in Scott County. This is the largest spring-fed public water supply in the state, providing water to over 7,000 customers.

Development of Wastewater Facilities

Projected Wastewater Flows

The ultimate projected average wastewater flow, resultant from full development of the IP, is based on a unit flow of 1,500 gpd/acre of developable land. Peak wastewater flow is derived from utilization of an empirical peak wastewater flow factor, based on the relative magnitude of the average wastewater flow. The peak flow factor is multiplied by the average wastewater flow to obtain peak instantaneous flow. In general, the larger the area and resulting average flow, the smaller the peak flow factor. Appendix B contains a summary of peak wastewater flow factors.

A total of 4,776 acres of developable land exist in the IP. The resultant projected average wastewater flow is 7.16 MGD or 4,976 gpm. The peak flow factor for the IP is 2.7 and the projected peak wastewater flow is 13,435 gpm. The Kentucky Horse Park and Spindletop Farm have not been included as developable area. The Spindletop RAC also has been included as developable area.

Wastewater Infrastructure Summary and Development Review

The IP is located downstream of current development in the Urban Service Area and all future wastewater will naturally flow away from currently sewered areas. Presently, the Kentucky Horse Park and a portion of the Spindletop RAC have existing pumping and conveyance facilities to the LFUCG Lower Cane Run Pump Station. The LFUCG owns the pumping and conveyance facilities; however, contractual agreements between the Commonwealth of Kentucky and LFUCG are in place to limit and prohibit new development from utilizing these facilities.

The proposed sanitary sewer system that would serve this area would consist of trunk sewers ranging in size from 12 to 42 inches. A Class A pump station would be required at the most downstream location of the IP with a capacity of approximately 13,500 gpm. The wastewater will be pumped and conveyed upstream, via a 36" force main to the Town Branch WWTP.

Opportunity exists to decommission the existing Spindletop Pump Station with the development of the IP. Detail of the required infrastructure and cost to remove this pump station has not been provided within the scope of this study.

No treatment capacity exists for the IP. The projected WWTP capacity required for complete development of the IP is 7.16 MGD. Exhibit 6.1 is a project summary of the IP physical, flow, and cost characteristics.

Estimate of Probable Cost for Collection, Pumping, Conveyance, and Treatment

The estimate of probable cost for the IP trunk sewer, Class A pump station, and force main is $29,978,864. Exhibit 6.1 provides a cost summary. Additional cost detail is provided for the specific trunk sewers and force mains at the end of the section.

The required WWTP capacity is equivalent to the projected average flow from complete development of the IP is 7.16 MGD. At the cost of $6/gallon for expansion of the Town Branch WWTP, the projected total construction cost for wastewater treatment is $42,984,000.

Summary, Review, and Recommendations – Ironworks Pike Rural Service Area

The estimate of probable costs for the collection, pumping, conveyance, and treatment of forecast wastewater from the IP is $72,962,865. The unit cost of development is $15,277/acre. These estimated costs include construction, construction contingencies, engineering design and inspection, legal, easements, and other non-construction costs. Table 6.3 provides a summary of project costs. A summary of all detail costs is provided in Exhibit 6.1.

Table 6.3 Cost Summary – IP RSA

Item	Total Cost	Total Cost/Acre*
Trunk Sewers	$ 10,095,599.	$ 2,114.
Force Main	14,883,266.	3,116.
Pump Stations	5,000,000.	1,068.
Contributing Costs	0.	0.
Wastewater Treatment	42,984,000.	9,000.
Total Cost	**$ 72,962,865.**	**$ 15,277.**

* Total Cost is per developable acre.

Iron Works Pike

Further development of the Cane Run drainage basin outside of the IP will be challenging due to the provision of additional pumping and conveyance facilities to the Town Branch WWTP. Additional development of areas such as, Kentucky Horse Park, Spindletop Farm, and other undeveloped areas, will require pumping and conveyance facilities that are parallel to those of the IP.

The Cane Run Creek drainage basin has a total area of 18,201 acres in Fayette County, of which 7,424 upstream acres are presently developed. Potential exists to construct a future WWTP at a downstream location in the Cane Run Creek drainage basin in lieu of additional pumping and conveyance alternatives that direct sewage to the Town Branch WWTP. This alternative has not been reviewed under the scope of this study. Several conditions exist which may be detrimental to the development of a WWTP in this drainage basin, such as the Royal Springs aquifer, the location of the Kentucky Horse Park, resultant infrastructure costs associated with construction through the State Park property, etc.

Review

- The land use consists of 43% public land and 37% core equine agricultural land.
- The land is "environmentally sensitive" due to the existence of the Royal Springs Aquifer in this drainage basin.
- Continued downstream development will present similar problems to those that are presently being considered, no pumping, conveyance, or treatment capacity is available.
- Future construction of additional pumping and conveyance facilities to the Town Branch WWTP may be difficult due to the unavailability of right-of-way and cost of construction.

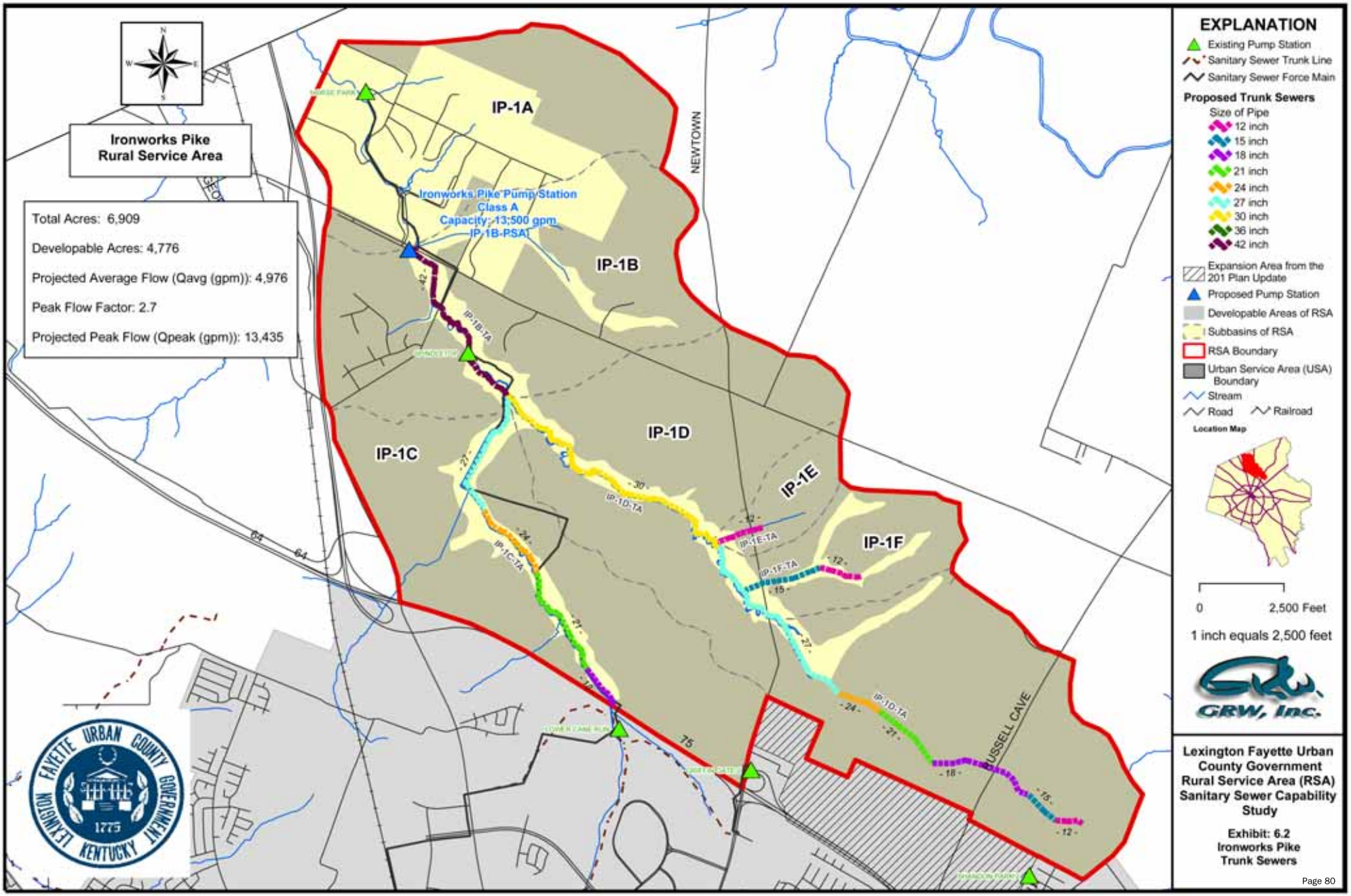
Recommendations

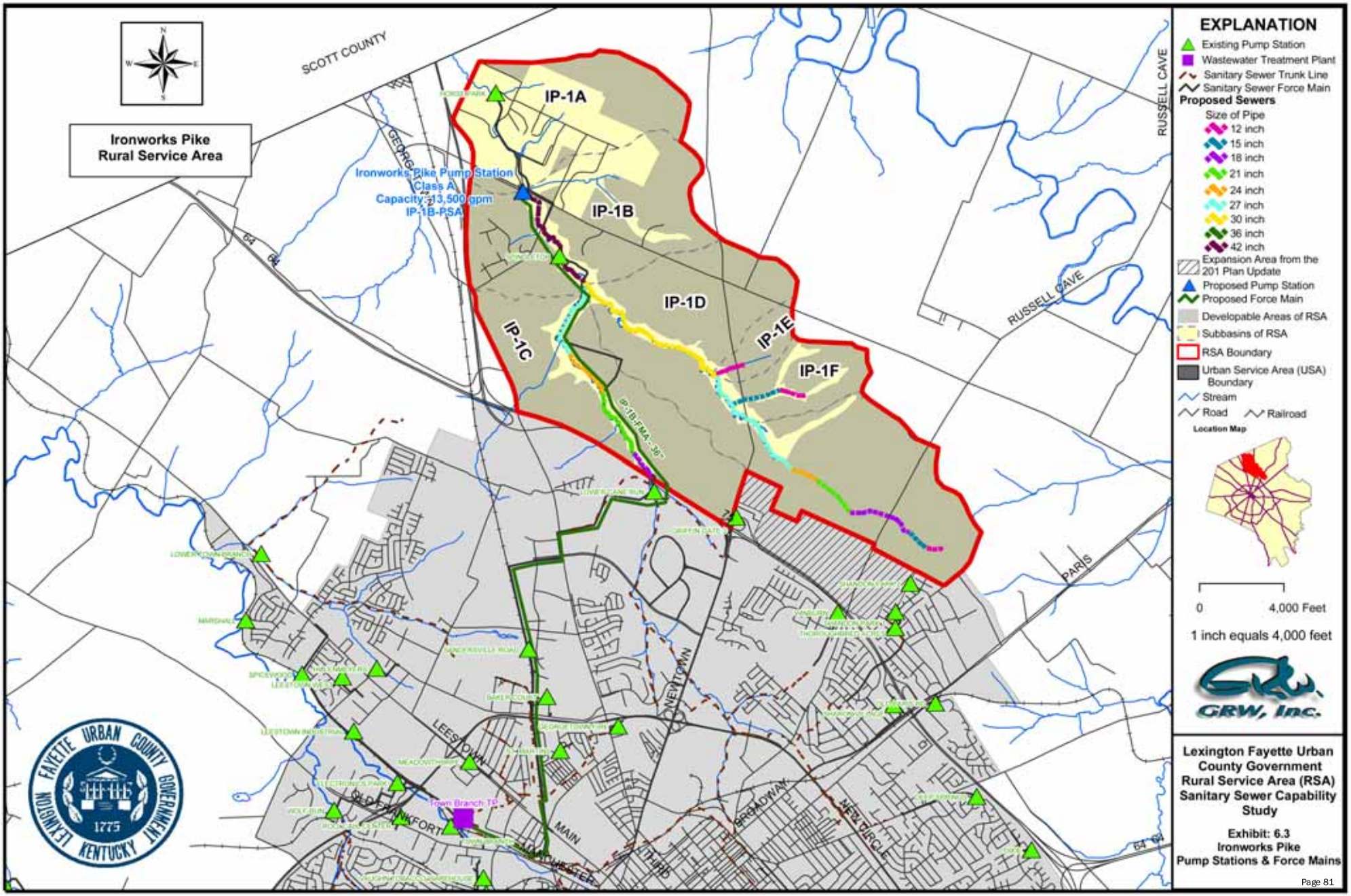
- Revisit the issues and costs of a wastewater treatment plant in the Cane Run drainage basin.
- Investigate the feasibility of pumping and conveyance of wastewater to a new WWTP in an adjacent drainage basin.
- Determine other future alternatives available for pumping, conveyance, and treatment of wastewater flows from the Cane Run drainage basin.
- Expand future planning efforts for wastewater infrastructure beyond the traditional 20-year planning period.

Exhibit 6.1 - Project Summary
Rural Service Area Sanitary Sewer Capability Study
Ironworks Pike (IP) - Refer to Exhibits 6.2 & 6.3

1.	**Cane Run Drainage Basin Summary**	
1.a	Total Area Cane Run Drainage Basin in Fayette County. (acres)	18,201
1.b	Total Area of Cane Run Drainage Basin presently served by LFUCG. (acres)	7,424
1.c	Total Area in proposed service area of IP. (acres)	6,909
1.d	Total Area of other proposed service in the Cane Run Drainage Basin. (acres)	0
1.e	Total unserved area of the Cane Run Drainage Basin remaining in Fayette County. (acres)	3,868
2.	**Design Flow Calculation**	
2.a	Total Area in proposed service area for IP. (acres)	6,909
2.b	Total Developable area in proposed service area for IP. (acres)	4,776
2.c	Projected Average Flow (gpm)	4,976
2.d	Peak Flow Factor for the Ironworks Pike Pump Station.	2.7
2.e	Projected Peak Flow for the Ironworks Pike Pump Station. (gpm)	13,435
3.	**Project Cost Summary**	
	Pumping and Conveyance Cost:	
3.a	Trunk Sewers	$10,095,599
3.b	Force Main	$14,883,266
3.c	Ironworks Pike, Class A Pump Station (13,500 gpm) [5.a,5.b]	$5,000,000
3.d	**Subtotal: Pumping and Conveyance**	$29,978,865
	Wastewater Treatment Cost:	
	Required Wastewater Treatment Plant Capacity: 7.165 MGD X $ 6 / gallon:	
3.e	**Subtotal: Treatment**	$42,984,000
3.f	**Subtotal: Estimated Total Project Cost**	$72,962,865
3.g	Plus Contributions to:	$0
3.h	Less Contributions from:	$0
3.I	**Net Estimated IP Project Costs w/adjustments**	**$72,962,865**
4.	**Average Cost Per Total Acre of Development with LFUCG Contribution:[5.c]**	**$15,277**

5.	**Remarks:**
5.a	Ironworks Pike Pump Station (Class A) will receive flow from the IP area, and convey to the Town Branch Wastewater Treatment Plant, via a 36" DI force main.
5.b	Appendix D.1 contains pump station data and costs.
5.c	The cost / acre utilizes total developable area for this determination.


Ironworks Pike
Rural Service Area
Total Acres: 6,909
Developable Acres: 4,776
Projected Average Flow (Qavg (gpm)): 4,976
Peak Flow Factor: 2.7
Projected Peak Flow (Qpeak (gpm)): 13,435
IP-1A
IP-1B
IP-1C
IP-1D
IP-1E
IP-1F
Ironworks Pike Pump Station
Class A
Capacity: 13,500 gpm
IP-1B-PSA
NEWTOWN
RUSSELL CAVE
EXPLANATION
Existing Pump Station
Sanitary Sewer Trunk Line
Sanitary Sewer Force Main
Proposed Trunk Sewers
Size of Pipe
12 inch
15 inch
18 inch
21 inch
24 inch
27 inch
30 inch
36 inch
42 inch
Expansion Area from the 201 Plan Update
Proposed Pump Station
Developable Areas of RSA
Subbasins of RSA
RSA Boundary
Urban Service Area (USA) Boundary
Stream
Road
Railroad
Location Map
0
2,500 Feet
1 inch equals 2,500 feet
GRW, Inc.
Lexington Fayette Urban County Government
Rural Service Area (RSA) Sanitary Sewer Capability Study
Exhibit: 6.2
Ironworks Pike
Trunk Sewers


Ironworks Pike
Rural Service Area
SCOTT COUNTY
IP-1A
IP-1B
IP-1C
IP-1D
IP-1E
IP-1F
Ironworks Pike Pump Station
Class A
Capacity: 13,500 gpm
IP-1B-PSA
IP-1B-FMA - 30"
RUSSELL CAVE
PARIS
LEESTOWN
NEWTOWN
MAIN
BROADWAY
THIRD
NEW CIRCLE
OLD FRANKFORT
Town Branch TP
EXPLANATION
Existing Pump Station
Wastewater Treatment Plant
Sanitary Sewer Trunk Line
Sanitary Sewer Force Main
Proposed Sewers
Size of Pipe
12 inch
15 inch
18 inch
21 inch
24 inch
27 inch
30 inch
36 inch
42 inch
Expansion Area from the 201 Plan Update
Proposed Pump Station
Proposed Force Main
Developable Areas of RSA
Subbasins of RSA
RSA Boundary
Urban Service Area (USA) Boundary
Stream
Road
Railroad
Location Map
0
4,000 Feet
1 inch equals 4,000 feet
GRW, Inc.
Lexington Fayette Urban County Government
Rural Service Area (RSA)
Sanitary Sewer Capability Study
Exhibit: 6.3
Ironworks Pike
Pump Stations & Force Mains

LEXINGTON-FAYETTE
URBAN COUNTY GOVERNMENT
Lexington, Kentucky

Detailed Cost Information

Cost Summary
Ironworks Pike

Trunk Sewers ID:	Cost ($)
IP-1B-TA	$2,731,856
IP-1C-TA	$1,954,494
IP-1D-TA	$4,726,134
IP-1E-TA	$210,142
IP-1F-TA	$472,972
Subtotal:	$10,095,599
Force Main ID:	
IP-1B-FMA	$14,883,266
Pump Station ID:	
IP-1B-PSA	$5,000,000
Total Cost	**$29,978,865**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 6.2
Reference ID: IP-1B-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
9	42" DI Gravity Sewer (PC 200) w/Protecto 401	6,323	LF	280	$1,770,440
MANHOLES:					
14	5'0" Dia. Std. Manhole (Upto 6' Deep)	21	EA	2,500	$52,692
ROAD BORES / TUNNEL:					
51	60" Steel Casing for 42" Carrier Pipe	100	LF	1,100	$110,000
MISCELLANEOUS:					
55	Pavement Replacement:	632.30	LF	25	$15,808
56	Aggregate Surface Replacement	126.46	LF	15	$1,897
57	Concrete for Encasement	18.969	CY	150	$2,845
58	Crushed Stone for Special Pipe Bedding	25.292	TN	25	$632
59	Clean-Up/Final Grading/Seeding/Sowing	6,323	LF	4	$25,292

Subtotal	**$1,979,606**
15% Contingency	$296,941
Total Construction Cost	**$2,276,547**
20% Non-Construction Costs	$455,309
Total Estimate of Probable Cost	**$2,731,856**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 6.2
Reference ID: IP-1C-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
3	18" PVC Gravity Sewer (DR 35)	1,473	LF	75	$110,475
4	21" PVC Gravity Sewer (DR 35)	3,584	LF	85	$304,640
5	24" PVC Gravity Sewer (DR 35)	2,669	LF	105	$280,245
6	27" PVC Gravity Sewer (DR 35)	4,254	LF	130	$553,020
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	40	EA	2,000	$79,867
MISCELLANEOUS:					
55	Pavement Replacement:	1,198.00	LF	25	$29,950
56	Aggregate Surface Replacement	239.60	LF	15	$3,594
57	Concrete for Encasement	35.940	CY	150	$5,391
58	Crushed Stone for Special Pipe Bedding	47.920	TN	25	$1,198
59	Clean-Up/Final Grading/Seeding/Sowing	11,980	LF	4	$47,920

Subtotal	**$1,416,300**
15% Contingency	$212,445
Total Construction Cost	**$1,628,745**
20% Non-Construction Costs	$325,749
Total Estimate of Probable Cost	**$1,954,494**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 6.2
Reference ID: IP-1D-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	870	LF	60	$52,200
2	15" PVC Gravity Sewer (DR 35)	1,164	LF	70	$81,480
3	18" PVC Gravity Sewer (DR 35)	3,364	LF	75	$252,300
4	21" PVC Gravity Sewer (DR 35)	2,321	LF	85	$197,285
5	24" PVC Gravity Sewer (DR 35)	1,404	LF	105	$147,420
6	27" PVC Gravity Sewer (DR 35)	6,516	LF	130	$847,080
7	30" DI Gravity Sewer (PC 200) w/Protecto 401	9,261	LF	155	$1,435,455
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	83	EA	2,000	$166,000
ROAD BORES / TUNNEL:					
48	40" Steel Casing for 27" Carrier Pipe	100	LF	625	$62,500
MISCELLANEOUS:					
55	Pavement Replacement:	2,490.00	LF	25	$62,250
56	Aggregate Surface Replacement	498.00	LF	15	$7,470
57	Concrete for Encasement	74.700	CY	150	$11,205
58	Crushed Stone for Special Pipe Bedding	99.600	TN	25	$2,490
59	Clean-Up/Final Grading/Seeding/Sowing	24,900	LF	4	$99,600

Subtotal	**$3,424,735**
15% Contingency	$513,710
Total Construction Cost	**$3,938,445**
20% Non-Construction Costs	$787,689
Total Estimate of Probable Cost	**$4,726,134**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 6.2
Reference ID: IP-1E-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	1,625	LF	60	$97,500
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	5	EA	2,000	$10,833
ROAD BORES / TUNNEL:					
42	18" Steel Casing for 12" Carrier Pipe	100	LF	320	$32,000
MISCELLANEOUS:					
55	Pavement Replacement:	162.50	LF	25	$4,063
56	Aggregate Surface Replacement	32.50	LF	15	$488
57	Concrete for Encasement	4.875	CY	150	$731
58	Crushed Stone for Special Pipe Bedding	6.500	TN	25	$163
59	Clean-Up/Final Grading/Seeding/Sowing	1,625	LF	4	$6,500

Subtotal	**$152,277**
15% Contingency	$22,842
Total Construction Cost	**$175,119**
20% Non-Construction Costs	$35,024
Total Estimate of Probable Cost	**$210,142**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 6.2
Reference ID: IP-1F-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	1,321	LF	60	$79,260
2	15" PVC Gravity Sewer (DR 35)	2,499	LF	70	$174,930
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	13	EA	2,000	$25,467
ROAD BORES / TUNNEL:					
43	24" Steel Casing for 14" - 15" Carrier Pipe	100	LF	350	$35,000
MISCELLANEOUS:					
55	Pavement Replacement:	382.00	LF	25	$9,550
56	Aggregate Surface Replacement	76.40	LF	15	$1,146
57	Concrete for Encasement	11.460	CY	150	$1,719
58	Crushed Stone for Special Pipe Bedding	15.280	TN	25	$382
59	Clean-Up/Final Grading/Seeding/Sowing	3,820	LF	4	$15,280

Subtotal	**$342,734**
15% Contingency	$51,410
Total Construction Cost	**$394,144**
20% Non-Construction Costs	$78,829
Total Estimate of Probable Cost	**$472,972**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 6.3
Reference ID: IP-1B-FMA

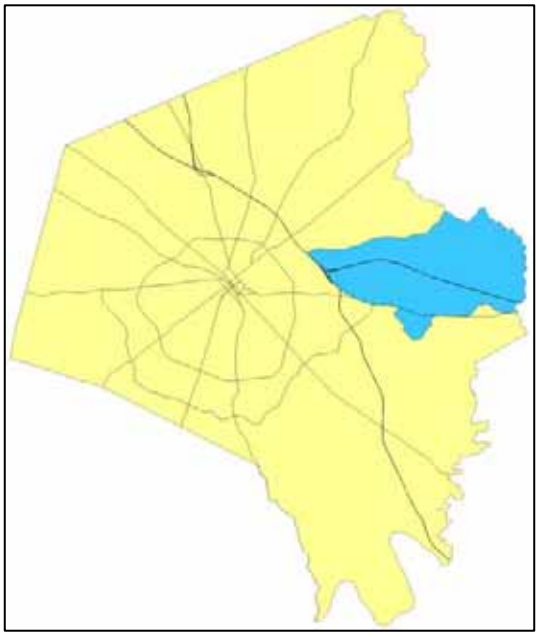
Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
FORCE MAIN:					
35	36" DI Force Main (PC 200 w/ Protecto 401)	48,838	LF	182	$8,888,516
ROAD BORES / TUNNEL:					
50	50" Steel Casing for 36" Carrier Pipe	1,600	LF	925	$1,480,000
MISCELLANEOUS:					
55	Pavement Replacement:	4,883.80	LF	25	$122,095
56	Aggregate Surface Replacement	976.76	LF	15	$14,651
57	Concrete for Encasement	146.514	CY	150	$21,977
58	Crushed Stone for Special Pipe Bedding	195.352	TN	25	$4,884
59	Clean-Up/Final Grading/Seeding/Sowing	48,838	LF	4	$195,352
60	Sewage Air Release Valves	23	EA	2,500	$57,500

Subtotal	**$10,784,975**
15% Contingency	$1,617,746
Total Construction Cost	**$12,402,722**
20% Non-Construction Costs	$2,480,544
Total Estimate of Probable Cost	**$14,883,266**

Section 7
Avon/I-64 Rural Service Area

General

The Avon/I-64 Rural Service Area (AV) is located in eastern Fayette County. The AV has an identified total area of 16,589 acres and a total developable area of 14,715 acres. A project summary is provided in Exhibits 7.1 through 7.5. Detailed maps are provided in Exhibits 7.6 and 7.7. The AV is located in the central reach of the Fayette County North Elkhorn Creek drainage basin. Approximately 7,462 acres of the upper reach of the North Elkhorn Creek drainage basin is presently served by the LFUCG North Elkhorn Sewershed. Approximately 24,040 additional acres of the undeveloped North Elkhorn Creek drainage basin exist in Fayette County.



The AV area has been divided into three sub-drainage basins; AV-1, AV-2, and AV-3. AV-1 is the main fork of the North Elkhorn Creek and nearest the current Urban Service Area. The area upstream of AV-1 is served by the LFUCG North Elkhorn Sewershed. In addition, Expansion Area 2A (1999 201 Facility Plan Update) could conceivably flow to AV-1. However, within the scope of this study it has been assumed all flows from Expansion Area 2A will be returned to the existing North Elkhorn Sewershed. AV-2 is a small drainage basin adjacent to AV-1. AV-3 is located in the easternmost area of Fayette County and near the rural settlement of Avon. For the purpose of this study, it has been assumed that ultimate flows from the AV would be pumped and conveyed to the West Hickman WWTP.

Land Use and Parcel Data

Table 7.1 through Table 7.8 summarize the current land use and land parcel size distribution within the AV. A wide distribution of land use and parcel size exists in the AV.

Table 7.1 Land Use Classification - AV RSA

Land Use Classification	Area (Acres)	% of Total Area
Agricultural Land	581	3.5
Core Equine Agricultural Land	4,297	25.9
Non-Rural Developed Land	697	4.2
Prime Agricultural Land	8,626	52.0
Public Land	1,956	11.8
Rural Developed Land	432	2.6
Summary	**16,589**	**100.0**

Table 7.2 Land Parcel Size Distribution– AV RSA

Land Parcel Size	No. of Parcels	% Total Parcels
> 0 acres and < 5 acres	358	50.9
≥ 5 acres and < 10 acres	79	11.3
≥ 10 acres and < 40 acres	168	23.9
≥ 40 acres and < 100 acres	44	6.3
≥ 100 acres and < 200 acres	28	4.0
≥ 200 acres	25	3.6
Summary	**702**	**100.0**

Table 7.3 Land Use AV-1

Land Use Classification	Area (Acres)	% of Total Area
Agricultural Land	289	4.5
Core Equine Agricultural Land	2,561	40.0
Non-Rural Developed Land	412	6.4
Prime Agricultural Land	2,392	37.3
Public Land	450	7.0
Rural Developed Land	305	4.8
Summary	**6,409**	**100.0**

Table 7.4 Land Parcel Size Distribution AV-1

Land Parcel Size	No. of Parcels	% Total Area
> 0 acres and < 5 acres	209	63.0
≥ 5 acres and < 10 acres	23	6.9
≥ 10 acres and < 40 acres	59	17.8
≥ 40 acres and < 100 acres	19	5.7
≥ 100 acres and < 200 acres	13	3.9
≥ 200 acres	9	2.7
Summary	**332**	**100.0**

Table 7.5 Land Use AV-2

Land Use Classification	Area (Acres)	% of Total Area
Agricultural Land	0	0
Core Equine Agricultural Land	477	67.2
Non-Rural Developed Land	3	0.4
Prime Agricultural Land	128	18.1
Public Land	72	10.1
Rural Developed Land	30	4.2
Summary	**710**	**100.0**

Table 7.6 Land Parcel Size Distribution AV-2

Land Parcel Size	No. of Parcels	% Total Area
> 0 acres and < 5 acres	1	3.3
≥ 5 acres and < 10 acres	10	33.3
≥ 10 acres and < 40 acres	10	33.3
≥ 40 acres and < 100 acres	6	20.0
≥ 100 acres and < 200 acres	2	6.7
≥ 200 acres	1	3.4
Summary	**30**	**100.0**

Table 7.7 Land Use AV-3

Land Use Classification	Area (Acres)	% of Total Area
Agricultural Land	490	5.2
Core Equine Agricultural Land	1,102	11.6
Non-Rural Developed Land	312	3.3
Prime Agricultural Land	5,863	61.9
Public Land	1,592	16.8
Rural Developed Land	111	1.2
Summary	**9,470**	**100.0**

Table 7.8 Land Parcel Size Distribution AV-3

Land Parcel Size	No. of Parcels	% Total Area
> 0 acres and < 5 acres	148	43.5
≥ 5 acres and < 10 acres	46	13.5
≥ 10 acres and < 40 acres	99	29.1
≥ 40 acres and < 100 acres	19	5.6
≥ 100 acres and < 200 acres	13	3.8
≥ 200 acres	15	4.5
Summary	**340**	**100.0**

Rural Settlements

Several rural settlements exist in the Avon/I-64 RSA, which include Avon, Willow Lane, and Uttingertown/Columbus. In addition, several rural settlements exist between the Avon/I-64 RSA and the Richmond Road/Delong Road RSA, which include Pricetown, Nihizertown, Centerville, and Athens.

Rural Activity Centers (RAC)

The Avon RAC (294 acres) exists near the Avon rural settlement.

Special Natural Protection Areas

Two "B" Priority Special Natural Protection Areas have been identified in the Avon/I-64 RSA, which are Bryan Station Road, north of Briar Hill Road (300 acres) and Winchester Road, east of I-75 (60 acres).

Rural Greenways

North Elkhorn Creek in Fayette County has been identified as one of the "Five Focus Areas" for rural greenway creation in the LFUCG Rural Service Area Land Management Plan. The greenway extends to the Scott County line and includes floodplain, tree stands, environmentally sensitive areas, or geologic hazard areas. Potential development of hiking trails is desired through the creation of conservation/scenic easements.

Avon/I-64 RSA

Scenic Areas

A portion of the Avon/I-64 RSA has been identified as "Scenic Area" in the LFUCG Rural Service Area Land Management Plan.

Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESA) have been identified along the floodplain of the North Elkhorn Creek drainage basin in Fayette County in the LFUCG Rural Service Area Land Management Plan.

Development of Wastewater Facilities

Projected Wastewater Flows

The projected wastewater flow from the Avon/I-64 RSA will be the aggregate of the three component drainage basins, AV-1, AV-2, and AV-3. The ultimate projected average wastewater flow, resultant from full development of the AV, is based on a unit flow of 1,500 gpd/acre of developable land. Peak wastewater flow is derived from utilization of an empirical peak wastewater flow factor, based on the relative magnitude of the average wastewater flow. The peak wastewater flow factor is multiplied times the average wastewater flow to obtain the peak instantaneous flow. In general, the larger the area and resulting average flow, the smaller the peak flow factor. Appendix B contains a summary of peak wastewater flow factors.

AV-1

AV-1 has a total land area of 6,409 acres and a developable land area of 5,575 acres. The projected average wastewater flow from AV-1 is 5,807 gpm. The peak flow factor from Appendix B is 2.6 and the resultant peak wastewater flow from AV-1 is 15,098 gpm.

AV-2

AV-2 has a total land area of 710 acres and a developable land area of 599 acres. The projected average wastewater flow from AV-2 is 624 gpm. The peak flow factor from Appendix B is 3.8 and the resultant peak wastewater flow is 2,371 gpm.

AV-3

AV-3 has a total land area of 9,470 acres and a developable land area of 8,541 acres. The projected average wastewater flow from AV-3 is 8,897 gpm. The peak flow factor from Appendix B is 2.5 and the resultant peak wastewater flow is 22,243 gpm.

In summary, a total of 16,589 acres exist in the Avon/I-64 RSA, of which 14,715 acres are developable. The projected total average wastewater flow is 22.07 MGD.

Wastewater Infrastructure Summary and Development Review

The Avon/I-64 RSA is located downstream of current development in the Urban Service Area and all future wastewater will naturally flow away from currently sewered areas. The following is a summary of facilities required for each sub-drainage basin.

AV-1

12" to 42" trunk sewers will be required for development of AV-1. A new 16,725 gpm Class A Pump Station, which is located near Bryan Station Road, will be required. This pump station is sized to accept flows from AV-1 and AV-2. A 36" force main is required to convey the wastewater to the West Hickman WWTP. An intermediate 17,500 gpm Class A pump station will be required on Cleveland Road near Athens, Kentucky. This intermediate pump station is sized to accept sub-drainage areas AV-1 and AV-2. It will be expandable in the future for sub-drainage basin AV-3.

AV-2

12" to 18" trunk sewers will be required for development of AV-2. AV-2 is a small drainage basin between two larger AV drainage basins and a separate pump station will be required for this development. A 2,400 gpm Class B pump station is required near Briar Hill Road. A 14" force main will be required to convey the wastewater to the AV-1 pump station, which in turn conveys wastewater to the West Hickman WWTP via a 36" force main. An intermediate 17,500 gpm Class A pump station will be required near Athens, Kentucky. This pump station is sized to accept sub-drainage areas AV-1 and AV-2. It will be expandable in the future for sub-drainage basin AV-3.

AV-3

12" to 48" trunk sewers will be required for development of AV-3. A 23,000 gpm, Class A pump station will be required. A 42" force main will be required to convey flows to the West Hickman WWTP. The proposed pump station near Athens will be expanded to a capacity of 40,500 gpm.

The development of the infrastructure can be phased for each area. For the purposes of this study, it has been assumed AV-1 will initially develop, due to its close proximity to the Urban Service Area. AV-2 and AV-3 would follow at a later time.

The 1999 LFUCG Facilities Plan Update provided recommended improvements in the current North Elkhorn Sewershed. These improvements include a new North Elkhorn Pump Station (19 MGD Capacity) and a 30"/36" force main, which routes between the pump station, located near I-75 and Winchester Road, to the Town Branch Wastewater Treatment Plant. In addition to demands of the current sewershed, the facilities will also serve Expansion Area 2A, as described in the most recent LFUCG Comprehensive Planning Study. These improvements are presently designed, however, not constructed.

The LFUCG Division of Sanitary Sewer's staff considered the routing of all proposed wastewater flows from the AV to the Town Branch WWTP, similar to the North Elkhorn Pump Station and Force Main alternative. After considerable discussion with the LFUCG Division of Sanitary Sewers, it was determined all proposed flows for the AV shall be routed to the West Hickman WWTP due to the lesser impact on the discharge limits of a large drainage area addition. In addition, flows from other RSA areas, provided within this report, are already proposed for delivery to the Town Branch WWTP, such as Old Frankfort Pike and Ironworks Pike.

No treatment capacity exists for the Avon/I-64 RSA. The projected WWTP capacity required for complete development of the Avon/I-64 is 22.07 MGD. Exhibits 7.1 through Exhibit 7.4 are project summaries of the Avon/I-64 RSA physical, flow, and cost characteristics.

The 1999 LFUCG Wastewater Facilities Plan provides an alternative for construction of a wastewater treatment plant in the North Elkhorn drainage basin, in lieu of the selected improvements of the North Elkhorn Pump Station and Force Main. Given the high cost of pumping and conveyance facilities to the West Hickman Wastewater Treatment Plant for the AV, the future option of a new wastewater treatment plant in the North Elkhorn drainage basin should be considered prior to development of the AV.

Estimate of Probable Cost for Collection, Pumping, Conveyance, and Treatment

The estimate of probable cost for the Avon/I-64 RSA infrastructure is $ 263,102,557. Additional cost detail is provided for the specific trunk sewers, force mains, and pump stations summarized for each area in Exhibits 7.1 through 7.4.

AV-1

The estimate of total probable cost for the AV-1 trunk sewer, two Class A pump stations, and force main is $54,840,354. The costs of the initial intermediate Cleveland Road pump station near Athens and the force mains will be shared between the development of each sub-drainage basins, AV-1 and AV-2. These costs are initially provided for in the AV-1 improvements. AV-2 will reimburse $3,911,137. in shared costs to the AV-1 for required improvements to convey the wastewater to the West Hickman WWTP.

The required WWTP capacity is equivalent to the projected average flow from complete development of the AV-1, which is 8.36 MGD. At the cost of $6/gallon for expansion of the West Hickman WWTP, the projected total construction cost for wastewater treatment is $50,175,000.

The total estimated cost for development of AV-1, which includes collection, pumping, conveyance, and treatment is $105,015,354. The total adjusted cost for the AV-1 is $101,104,217. which includes the shared contribution from the AV-2 for the infrastructure. The adjusted unit cost per acre is $18,135. Exhibit 7.1 provides a summary of these costs. Detail costs for development are provided at the end of this section.

AV-2

The estimate of total probable cost for the AV-2 trunk sewer, Class B pump station, and force main is $3,859,021. An additional $3,911,137. is provided as shared costs for the development of the 36" force main, Bryan Station pump station, and Cleveland Road pump station for AV-1. For the purposes of this study, an assumption has been made that AV-1 will develop prior to AV-2.

The required WWTP capacity is equivalent to the projected average flow from complete development of the AV-2, which is 899,000 gpd. At the cost of $6/gallon for expansion of the West Hickman WWTP, the projected total construction cost for wastewater treatment is $5,391,000.

The total estimated cost for development of AV-2, which includes collection, pumping, conveyance, and treatment is $9,250,021. The added shared costs for the development of AV-1 are $3,911,137. The total adjusted costs for the AV-2 are $13,161,158. The unit cost per acre is $21,972. Exhibit 7.2 provides a summary of these costs. Detail costs for development are provided at the end of this section.

AV-3

The estimate of total probable cost for the AV-3 trunk sewer, two Class A pump stations, and 42" force main is $71,968,183. The costs of the pump station upgrade near Athens and the parallel 42" force mains are associated with AV-3 development only.

The required WWTP capacity is equivalent to the projected average flow from complete development of the AV-3, which is 12.81 MGD. At the cost of $6/gallon for expansion of the West Hickman WWTP, the projected total construction cost for wastewater treatment is $76,869,000.

Avon/I-64 RSA

The total estimated cost for development of AV-3, which includes collection, pumping, conveyance, and treatment is $148,837,183. The unit cost per acre is $17,426. Exhibit 7.3 provides a summary of these costs. Detail costs for development are provided at the end of this section.

The estimated cost of pumping and conveyance to the treatment facility for the complete development of the AV is $130,667,557. As an alternative for consideration, the provision of a WWTP in the North Elkhorn drainage basin would alleviate the need for a significant portion of these pumping and conveyance monies. The reduction of pumping and conveyance monies would effectively reduce the total cost of the infrastructure required for the AV. The total estimated costs for AV wastewater treatment facilities are $132,435,000. Total estimated costs for development of all wastewater facilities for the AV are $263,102,557. Exhibit 7.4 provides summary of these costs.

Blue Sky Rural Activity Center – Alternative

With the construction of improvements for AV-1/AV-2, opportunity exists to provide sanitary sewer service to the Blue Sky Rural Activity Center (RAC) due to the route location of the force main and the Cleveland Road Pump Station. The inclusion of the Blue Sky RAC into the AV-1/AV-2 project would allow for elimination of two private wastewater treatment facilities, The Blue Sky WWTP (150,000 gpd capacity) and the Boonesboro Manor WWTP (53,000 gpd capacity). All proposed wastewater flows would be conveyed to the West Hickman WWTP.

The Blue Sky Rural Activity Center (RAC) has a total land area of 465 acres, of which approximately 432 acres is developable. The projected average wastewater flow from the Blue Sky Rural Activity Center is 648,000 gpd or 450 gpm.

Two pump stations and associated force mains will be required to service this area. 366 developable acres exist on the east side I-75. An average daily resultant wastewater flow would be 549,000 gpd. The peak flow factor from Appendix B is 4.4 and the resultant peak wastewater flow is 1,678 gpm. A 1,700 gpm pump station and 12” force main are required. The force main would be routed to the new Cleveland Road Class A Pump Station, which would require expansion by approximately 400 gpm.

A smaller pump station would be required on the west side of the I-75. Approximately 66 developable acres exist on the west side of I-75. An average daily resultant wastewater flow is 99,000 gpd. The peak flow factor from Appendix B is 5.0 and the resultant peak wastewater flow is 344 gpm. A 350 gpm pump station and 6" force main would be required to service this area. The force main would directly connect to the new 36" AV force main.

The estimate of total probable cost for the Blue Sky RAC for construction of pump stations and force mains to convey the flows to the LFUCG sanitary sewer system is $2,536,675. Costs to upgrade and utilize the Cleveland Road pump station and force main to accommodate Blue Sky RAC are $1,570,651. The required WWTP capacity is equivalent to the projected average flow from the Blue Sky RAC, which is 648,000 gpd. At the cost of $6/gallon for expansion of the West Hickman WWTP, the projected total cost for wastewater treatment is $3,888,000. The total estimated cost for inclusion of the Blue Sky RAC, which includes pumping, conveyance, and treatment is $7,995,326. A summary of these costs is provided in Exhibit 7.5.

Summary – Avon/I-64 RSA

In summary, the full development of the Avon/I-64 RSA would result in an average wastewater flow generation of 22.07 MGD. The Avon/I-64 RSA encompasses a large amount of land. The alternatives have been presented in a phased format in order of AV-1, AV-2, and then AV-3. The optional inclusion of the Blue Sky RAC area can be provided at any time. Total projected costs for the required improvements for the AV are $263,102,557 and the unit cost of development is 17,880/acre. Summary costs for the AV are provided in Tables 7.9 to 7.12.

Avon/I-64 RSA

Table 7.9 Cost Summary – AV RSA

Item	Total Cost	Total Cost/Acre*
Trunk Sewers	34,738,333.	$ 2,361.
Force Mains	65,829,224.	4,474.
Pump Stations	30,100,000.	2,045.
Wastewater Treatment	132,435,000.	9,000.
Total Cost	**$263,102,557.**	**$ 17,880.**

* Total Cost is per developable acre

Table 7.10 Cost Summary – AV-1 RSA

Item	Total Cost	Total Cost/Acre*
Trunk Sewers	$14,527,568.	$ 2,606.
Force Mains	28,112,785.	5,043.
Pump Stations	12,200,000.	2,188.
Wastewater Treatment	50,175,000.	9,000.
Total Cost	**$105,015,354.**	**$ 18,837.**
Shared Costs from AV-2	-3,911,137.	-702.
Net Cost for AV-1	**$101,104,217.**	**$ 18,135.**

* Total Cost is per developable acre

Table 7.11 Cost Summary – AV-2 RSA

Item	Total Cost	Total Cost/Acre*
Trunk Sewers	$ 710,894.	$ 1,187.
Force Mains	2,048,127.	3,419.
Pump Stations	1,100,000.	1,836.
Total Cost	**$ 9,250,021.**	**$ 15,442.**
Shared Costs to AV-1	3,911,137.	6,530.
Net Cost for AV-2	**$13,161,158.**	**$ 21,972.**

* Total Cost is per developable acre

Table 7.12 Cost Summary –AV-3 RSA

Item	Total Cost	Total Cost/Acre*
Trunk Sewers	19,499,871.	$ 2,283.
Force Mains	35,668,312.	4,176.
Pump Stations	16,800,000.	1,967.
Wastewater Treatment	76,869,000.	9,000.
Total Cost	**$148,837,183.**	**$ 17,426.**

* Total Cost is per developable acre

The North Elkhorn Creek drainage basin has a total area of 48,091 acres in Fayette County, of which 7,462 upstream acres are presently within the North Elkhorn Sewershed. Potential exists to construct a future WWTP at a downstream location in the North Elkhorn Creek drainage basin in lieu of additional pumping and conveyance alternatives to the West Hickman WWTP. A similar alternative was outlined in the 1999 LFUCG 201 Facility Plan Update, however, it was not the selected alternative. Consideration of this alternative may be revisited in the future to re-evaluate least cost scenarios.

Review

- Over 70% of the property is core equine agricultural or prime agricultural land. Over 62% of the parcels are tracts of 10 acres or less.
- The North Elkhorn Creek is designated as one of the "five focus areas" for rural greenway creation in the LFUCG Rural Service Area Land Management Plan.
- Several Rural Settlements exist in the AV.
- All resultant flows from the AV are downstream of current wastewater infrastructure development. Additional pumping and conveyance will be required.
- The North Elkhorn Sewershed and Expansion 2A are just upstream of AV-1.
- Continued downstream development will present similar problems as the present, no pumping, conveyance, or treatment capacity is available.
- Wastewater planning strategies for an expanded North Elkhorn Sewershed have not been addressed.

Recommendations

- Revisit the issues and costs of a wastewater treatment plant in the North Elkhorn Creek drainage basin.
- Establish preliminary wastewater discharge limits for the North Elkhorn Creek
- Determine other future alternatives available for pumping, conveyance, and treatment of wastewater flows.
- Continue to develop planning strategies for future provision of wastewater infrastructure in the AV.
- Continue to evaluate available and future capacity of the two existing LFUCG wastewater treatment facilities.
- Expand future planning efforts for wastewater infrastructure beyond the traditional 20-year planning period.

.

Exhibit 7.1 - Project Summary
Rural Service Area Sanitary Sewer Capability Study
Avon / I-64 Area (AV-1) - Refer to Exhibits 7.7 & 7.8

1.	**North Elkhorn Drainage Basin Summary**	
1.a	Total Area North Elkhorn Drainage Basin in Fayette County. (acres)	48,091
1.b	Total Area of North Elkhorn Drainage Basin presently served by LFUCG. (acres)	7,462
1.c	Total Area in proposed service area of AV-1. (acres)	6,409
1.d	Total Area of other proposed service in the North Elkhorn Drainage Basin. [5.a,5.b] (acres)	10,180
1.e	Total area remaining in North Elkhorn Drainage Basin in Fayette County. (acres)	24,040
2.	**Design Flow Calculation**	
2.a	Total Area in proposed service area for AV-1. (acres)	6,409
2.b	Total Developable area in proposed service area for AV-1. (acres)	5,575
2.c	AV-1 Projected Average Flow (gpm)	5,807
2.d	Total Area in proposed service area for AV-2. (acres)	710
2.e	Total Developable area in proposed service area for AV-2. (acres)	599
2.f	AV-2 Projected Average Flow (gpm)	624
2.g	Total Projected Average Flow (gpm) - AV-1 and AV-2	6,431
2.h	Peak Flow Factor for Bryan Station Road Pump Station	2.6
2.i	Projected Peak Flow from AV-1 (gpm)	15,098
2.j	Projected Peak Flow from AV-2 (gpm)	1,622
2.k	Projected Peak Flow for Bryan Station Road Pump Station. (gpm)	16,721
3.	**Project Cost Summary**	
	Pumping and Conveyance Cost:	
3.a	Trunk Sewers	$14,527,568
3.b	Force Main	$28,112,785
3.c	Bryan Station Road, Class A Pump Station (16,725 gpm) [5.c,5.e]	$6,000,000
	Cleveland Road, Class A Pump Station (17,500 gpm) [5.d,5.e]	$6,200,000
3.d	**Subtotal - Pumping and Conveyance**	$54,840,354
	Wastewater Treatment Cost:	
	Required Wastewater Treatment Plant Capacity: 8.363 MGD X $ 6 / gallon	
3.e	**Subtotal - Treatment**	$50,175,000
3.f	**Subtotal - Estimated Total Project Cost**	$105,015,354
3.g	Plus Shared Costs to:	$0
3.h	Less Shared Costs from:	
	Bryan Station Road Pump Station, Cleveland Road Pump Station and 36" Force Main for AV-2	$3,911,137
3.I	**Net Estimated AV-1 Project Costs w/adjustments**	**$101,104,217**
4.	**Average Cost Per Total Acre of Development with LFUCG Contribution:** [5.f]	**$18,135**

5.	**Remarks:**
5.a	Refers to the acreage of I-64 / Avon Area - 2.
5.b	Refers to the acreage of I-64 / Avon Area - 3.
5.c	The Bryan Station Road Pump Station (Class A) will receive flow from AV-1, and convey it to the West Hickman Wastewater Treatment Plant, via a 36" DI force main.
5.f	The cost / acre utilizes total developable area for this determination.

Exhibit 7.2 - Project Summary
Rural Service Area Sanitary Sewer Capability Study
Avon / I-64 Area (AV-2) - Refer to Exhibits 7.7 & 7.8

1.	**North Elkhorn Drainage Basin Summary**	
1.a	Total Area North Elkhorn Drainage Basin in Fayette County. (acres)	48,091
1.b	Total Area of North Elkhorn Drainage Basin presently served by LFUCG. (acres)	7,462
1.c	Total Area in proposed service area of AV-2. (acres)	710
1.d	Total Area of other proposed service in the North Elkhorn Drainage Basin. [5.a,5.b] (acres)	15,879
1.e	Total area remaining in North Elkhorn Drainage Basin in Fayette County. (acres)	24,040
2.	**Design Flow Calculation**	
2.a	Total Area in proposed service area for AV-2. (acres)	710
2.b	Total Developable area in proposed service area for AV-2. (acres)	599
2.c	Projected Average Flow (gpm)	624
2.d	Peak Flow Factor for Briar Hill Road Pump Station	3.8
2.e	Projected Peak Flow for Briar Hill Road Pump Station. (gpm)	2,371
3.	**Project Cost Summary**	
	Pumping and Conveyance Cost:	
3.a	Trunk Sewers	$710,894
3.b	Force Main	$2,048,127
3.c	Briar Hill Road, Class B Pump Station (2,400 gpm) [5.c,5.d]	$1,100,000
3.d	**Subtotal - Pumping and Conveyance**	$3,859,021
	Wastewater Treatment Cost:	
	Required Wastewater Treatment Plant Capacity: 0.899 MGD X $ 6 / gallon:	
3.e	**Subtotal - Treatment**	$5,391,000
3.f	**Subtotal - Estimated Total Project Cost**	$9,250,021
3.g	Plus Shared Costs to: 36" Force Main, Bryan Station Pump Station, and Cleveland Road Pump Station	$3,911,137
3.h	Less Shared Costs from:	$0
3.I	**Net Estimated AV-2 Project Costs w/adjustments**	**$13,161,158**
4.	**Average Cost Per Total Acre of Development with LFUCG Contribution:[5.e]**	**$21,972**

5.	**Remarks:**
5.a	Refers to the acreage of I-64 / Avon Area - 1.
5.b	Refers to the acreage of I-64 / Avon Area - 3.
5.c	The Briar Hill Road Pump Station (Class B) will receive flow from AV-2, and convey it to the West Hickman Wastewater Treatment Plant through a 14" DI force main, into a 36" DI force main.
5.d	Appendix D.1 contains pump station data and costs.
5.e	The cost / acre utilizes total developable area for this determination.

Exhibit 7.3 - Project Summary
Rural Service Area Sanitary Sewer Capability Study
Avon / I-64 Area (AV-3) - Refer to Exhibits 7.7 & 7.8

1.	**North Elkhorn Drainage Basin Summary**	
1.a	Total Area North Elkhorn Drainage Basin in Fayette County. (acres)	48,091
1.b	Total Area of North Elkhorn Drainage Basin presently served by LFUCG. (acres)	7,462
1.c	Total Area in proposed service area of AV-3. (acres)	9,470
1.d	Total Area of other proposed service in the North Elkhorn Drainage Basin. [5.a,5.b] (acres)	7,119
1.e	Total area remaining in North Elkhorn Drainage Basin in Fayette County. (acres)	24,040
2.	**Design Flow Calculation**	
2.a	Total Area in proposed service area for AV-3. (acres)	9,470
2.b	Total Developable area in proposed service area for AV-3. (acres)	8,541
2.c	Projected Average Flow (gpm)	8,897
2.d	Peak Flow Factor for Avon Pump Station	2.5
2.e	Projected Peak Flow for Avon Pump Station. (gpm)	22,243
3.	**Project Cost Summary**	
	Pumping and Conveyance Cost:	
3.a	Trunk Sewers	$19,499,871
3.b	Force Main	$35,668,312
3.c	Avon, Class A Pump Station (23,000 gpm) [5.c,5.d]	$8,400,000
	Cleveland Road Pump Station (23,000 gpm)	$8,400,000
3.d	**Subtotal - Pumping and Conveyance**	$71,968,183
	Wastewater Treatment Cost:	
	Required Wastewater Treatment Plant Capacity: 12.812 MGD X $ 6 / gallon:	
3.e	**Subtotal - Treatment**	$76,869,000
3.f	**Subtotal - Estimated Total Project Cost**	$148,837,183
3.g	Plus Contributions to:	$0
3.h	Less Contributions from:	$0
3.I	**Net Estimated AV-3 Project Costs w/adjustments**	**$148,837,183**
4.	**Average Cost Per Total Acre of Development with LFUCG Contribution:[5.e]**	**$17,426**

5.	**Remarks:**
5.a	Refers to the acreage of I-64 / Avon Area - 1.
5.b	Refers to the acreage of I-64 / Avon Area - 2.
5.c	The Avon Pump Station (Class A) will immediately receive flows from AV-3, and convey it to West Hickman Wastewater Treatment Plant, via a 42" DI force main.
5.d	Appendix D.1 contains pump station data and costs.
5.e	The cost / acre utilizes total developable area for this determination.

Exhibit 7.4 - Project Summary
Rural Service Area Sanitary Sewer Capability Study
Avon / I-64 Area Summary (AV) - Refer to Exhibits 7.7 & 7.8

1.	**North Elkhorn Drainage Basin Summary**	
1.a	Total Area North Elkhorn Drainage Basin in Fayette County. (acres)	48,091
1.b	Total Area of North Elkhorn Drainage Basin presently served by LFUCG. (acres)	7,462
1.c	Total Area in proposed service area of AV-1. (acres)	6,409
1.d	Total Area in proposed service area of AV-2. (acres)	710
1.e	Total Area in proposed service area of AV-3. (acres)	9,470
1.f	Total Area of other proposed service in the North Elkhorn Drainage Basin. (acres)	0
1.g	Total unserved area remaining in Fayette County. (acres)	24,040
2.	**Design Flow Calculation**	
2.a	Total Area in proposed service area for AV-1. (acres)	6,409
2.b	Total Area in proposed service area for AV-2. (acres)	710
2.c	Total Area in proposed service area for AV-3. (acres)	9,470
2.d	Total Developable area in proposed service area for AV-1. (acres)	5,575
2.e	Total Developable area in proposed service area for AV-2. (acres)	599
2.f	Total Developable area in proposed service area for AV-3. (acres)	8,541
2.g	Projected Average Flow for AV-1 (gpm)	5,807
2.h	Projected Average Flow for AV-2 (gpm)	624
2.I	Projected Average Flow for AV-3 (gpm)	8,897
2.j	Peak Flow Factor for AV-1	2.6
2.k	Peak Flow Factor for AV-2	3.8
2.l	Peak Flow Factor for AV-3	2.5
2.m	Projected Peak Flow for AV-1 (gpm)	15,098
2.n	Projected Peak Flow for AV-2 (gpm)	2,371
2.o	Projected Peak Flow for AV-3 (gpm)	22,243
3.	**Project Cost Summary**	
	Pumping and Conveyance Cost:	
3.a	Trunk Sewers for AV-1	$14,527,568
	Trunk Sewers for AV-2	$710,894
	Trunk Sewers for AV-3	$19,499,871
3.b	Force Main for AV-1	$28,112,785
	Force Main for AV-2	$2,048,127
	Force Main for AV-3	$35,668,312
3.c	Bryan Station Road, Class A Pump Station (16,725 gpm) [5.a,5.e]	$6,000,000
	Briar Hill Road, Class B Pump Station (2,400 gpm) [5.b,5.e]	$1,100,000
	Avon, Class A Pump Station (23,000 gpm) [5.c,5.e]	$8,400,000
	Cleveland Road, Class A Pump Station (17,500 gpm) [5.d,5.e]	$6,200,000
	Expanded Cleveland Road, Class A Pump Station (23,000 gpm) [5.d,5.e]	$8,400,000
3.d	**Subtotal - Pumping and Conveyance**	$130,667,557
	Wastewater Treatment Cost:	
	Required Wastewater Treatment Plant Capacity: 22.073 MGD X $ 6 / gallon:	
3.e	**Subtotal - Treatment**	$132,435,000
3.f	**Subtotal - Estimated Total Project Cost**	$263,102,557
3.g		

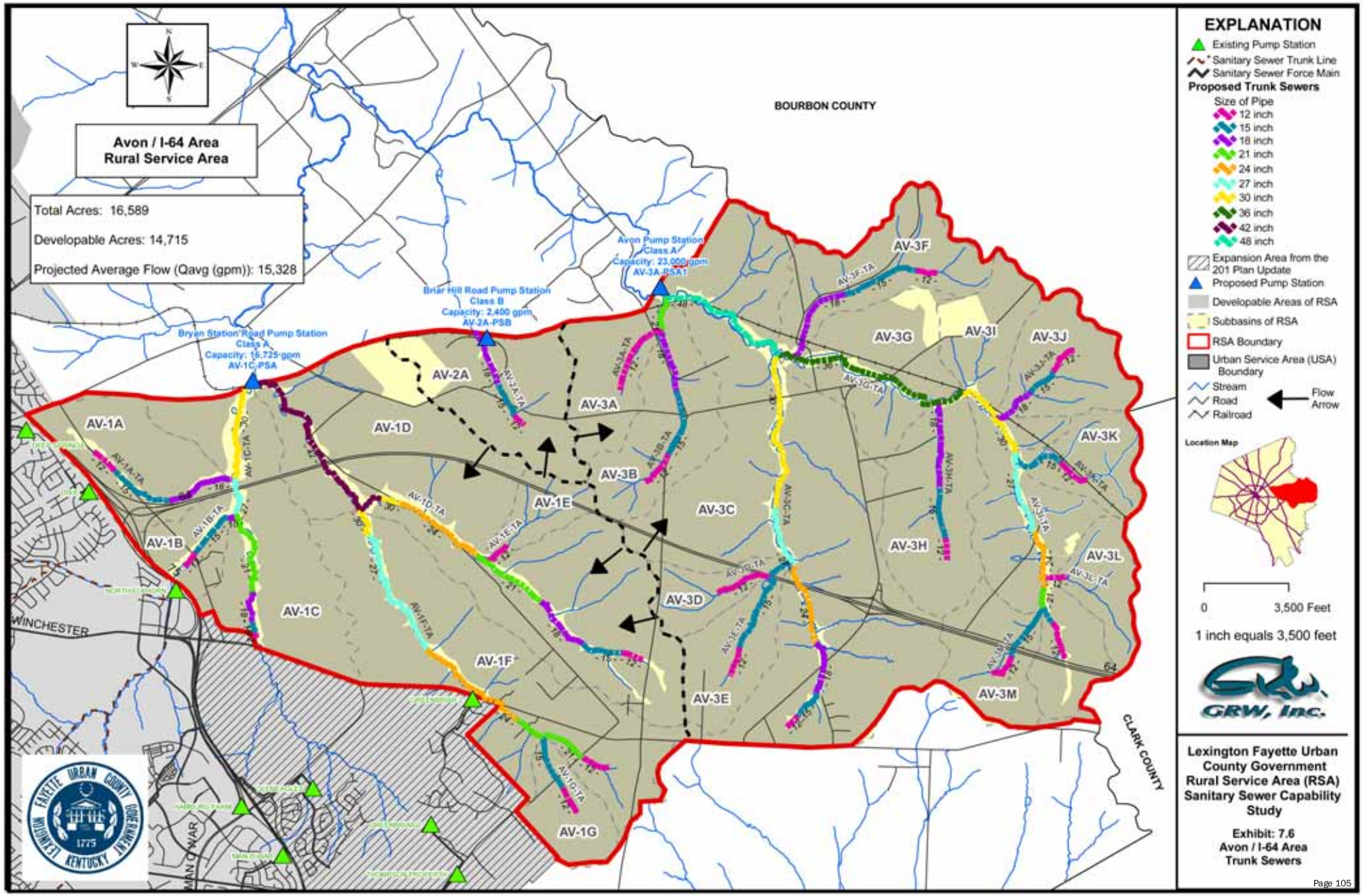
Exhibit 7.4 - Project Summary
Rural Service Area Sanitary Sewer Capability Study
Avon / I-64 Area Summary (AV) - Refer to Exhibits 7.7 & 7.8

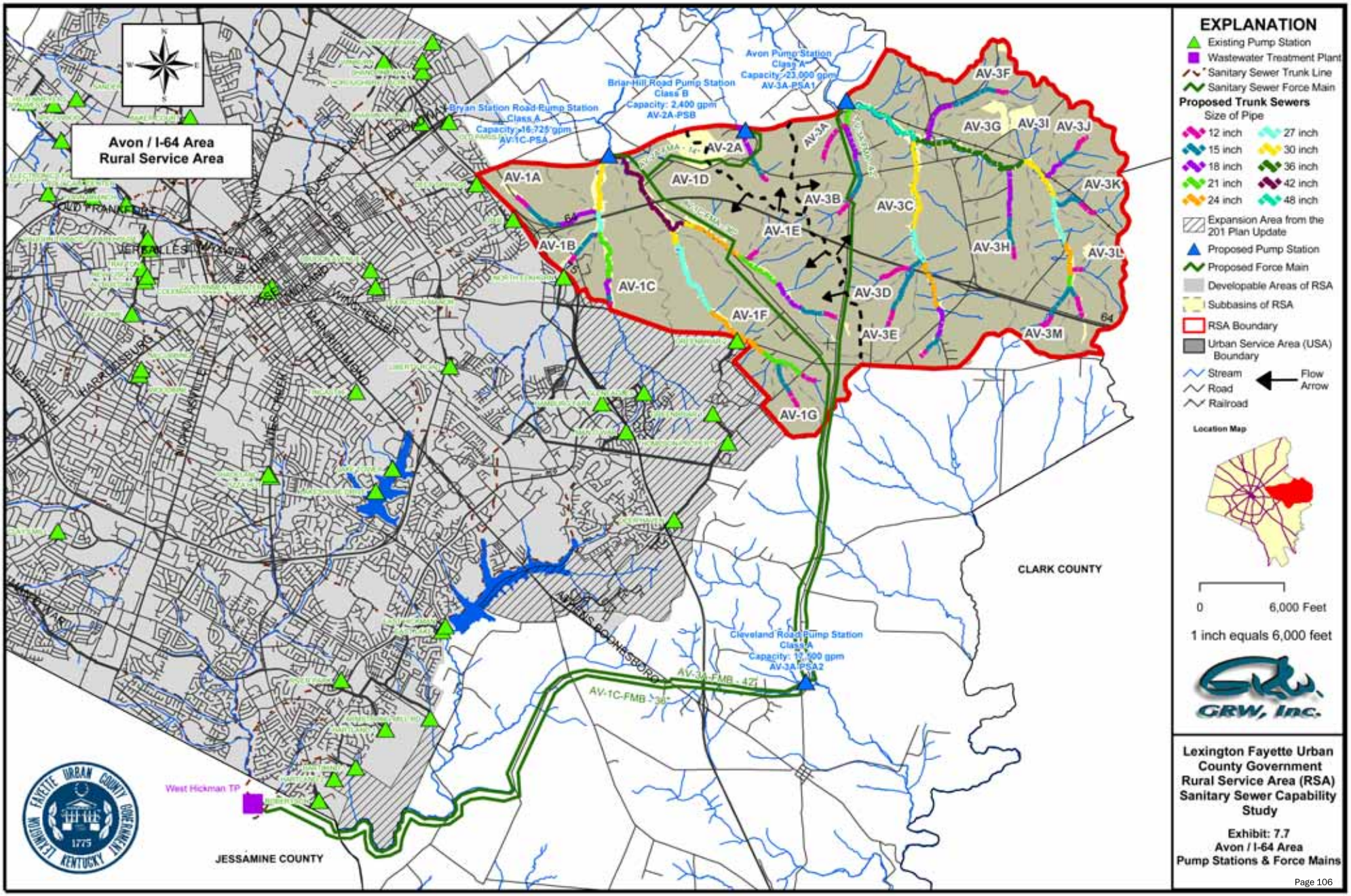
3.h		
3.I	**Net Estimated AV Summary Project Costs w/adjustments**	**$263,102,557**
4.	**Average Cost Per Total Acre of Development with LFUCG Contribution:[5.f]**	**$17,880**

5.	**Remarks:**
5.a	The Bryan Station Road Pump Station (Class A) will receive flow from AV-1, and convey it to the West Hickman Wastewater Treatment Plant, via a 36" DI force main.
5.b	The Briar Hill Road Pump Station (Class B) will receive flow from AV-2, and convey it to the West Hickman Wastewater Treatment Plant through a 14" DI force main, into a 36" DI force main.
5.c	The Avon Pump Station (Class A) will immediately receive flows from AV-3, and convey it to West Hickman Wastewater Treatment Plant, via a 42" DI force main.
5.d	The Cleveland Road Pump Station (Class A) will receive flows from AV-1, AV-2 and AV-3 and convey it to West Hickman Wastewater Treatment Plant, via two DI force mains, 36" and 42".
5.e	Appendix D.1 contains pump station data and costs.
5.f	The cost / acre utilizes total developable area for this determination.

Exhibit 7.5 - Project Summary
Rural Service Area Sanitary Sewer Capability Study
Avon / I-64 Area Summary of Blue Sky RAC (AV)

1.	**North Elkhorn Drainage Basin Summary**	
1.a	Total Area North Elkhorn Drainage Basin in Fayette County. (acres)	48,091
1.b	Total Area of North Elkhorn Drainage Basin presently served by LFUCG. (acres)	7,462
1.f	Total Area in Blue Sky RAC. (acres)	465
2.	**Design Flow Calculation**	
2.d	Total Area in Blue Sky RAC. (acres)	465
2.h	Total Developable area in Blue Sky RAC. (acres)	432
	Blue Sky RAC - East of I/75	366
	Blue Sky RAC - West of I/75	66
2.l	Projected Average Flow Blue Sky RAC (gpm)	450
	Blue Sky RAC - East of I/75	381
	Blue Sky RAC - West of I/75	69
2.p	Peak Flow Factor for Blue Sky RAC	
	Blue Sky RAC - East of I/75	4.4
	Blue Sky RAC - West of I/75	5.0
2.t	Projected Peak Flow for Blue Sky RAC Pump Station (gpm)	
	Blue Sky RAC - East of I/75	1,676
	Blue Sky RAC - West of I/75	345
3.	**Project Cost Summary**	
	Pumping and Conveyance Cost:	
3.a	Trunk Sewers and Force Main for Blue Sky RAC	$936,675
3.b	Pump Stations [5a]	
	Blue Sky RAC - East of I/75 (1700 gpm)	$900,000
	Blue Sky RAC - West of I/75 (350 gpm)	$700,000
	Subtotal - Pumping and Conveyance	**$2,536,675**
3.c	Wastewater Treatment Cost:	
3.d	Required Wastewater Treatment Plant Capacity: 0.648 MGD X $ 6 / gallon:	
3.e	**Subtotal - Treatment**	**$3,888,000**
3.f	**Subtotal - Estimated Total Project Cost**	**$6,424,675**
	Plus Contributions to:	
	Cleveland Road Pump Station and Force Main (AV-1, AV-2 Only)	$1,570,651
	Total Project Cost of Blue Sky RAC Improvements	**$7,995,326**
4.	**Average Cost Per Total Acre of Development with LFUCG Contribution:[5.b]**	**$18,508**
5.	**Remarks:**	
5.a	Appendix D.1 contains pump station data and costs.	
5.b	The cost / acre utilizes total developable area for this determination.	
5.c		


Avon / I-64 Area
Rural Service Area
Total Acres: 16,589
Developable Acres: 14,715
Projected Average Flow (Qavg (gpm)): 15,328
BOURBON COUNTY
CLARK COUNTY
WINCHESTER
Avon Pump Station
Class A
Capacity: 23,000 gpm
AV-3A-PSA1
Briar Hill Road Pump Station
Class B
Capacity: 2,400 gpm
AV-2A-PSB
Bryan Station Road Pump Station
Class A
Capacity: 15,725 gpm
AV-1C-PSA
AV-1A
AV-1B
AV-1C
AV-1D
AV-1E
AV-1F
AV-1G
AV-2A
AV-3A
AV-3B
AV-3C
AV-3D
AV-3E
AV-3F
AV-3G
AV-3H
AV-3I
AV-3J
AV-3K
AV-3L
AV-3M
64
EXPLANATION
Existing Pump Station
Sanitary Sewer Trunk Line
Sanitary Sewer Force Main
Proposed Trunk Sewers
Size of Pipe
12 inch
15 inch
18 inch
21 inch
24 inch
27 inch
30 inch
36 inch
42 inch
48 inch
Expansion Area from the 201 Plan Update
Proposed Pump Station
Developable Areas of RSA
Subbasins of RSA
RSA Boundary
Urban Service Area (USA) Boundary
Stream
Road
Railroad
Flow Arrow
Location Map
0
3,500 Feet
1 inch equals 3,500 feet
GRW, Inc.
Lexington Fayette Urban County Government
Rural Service Area (RSA) Sanitary Sewer Capability Study
Exhibit: 7.6
Avon / I-64 Area
Trunk Sewers


Avon / I-64 Area
Rural Service Area
Avon Pump Station
Class A
Capacity: 23,000 gpm
AV-3A-PSA1
Briar Hill Road Pump Station
Class B
Capacity: 2,400 gpm
AV-2A-PSB
Bryan Station Road Pump Station
Class A
Capacity: 16,725 gpm
AV-1C-PSA
AV-1A
AV-1B
AV-1C
AV-1D
AV-1E
AV-1F
AV-1G
AV-2A
AV-3A
AV-3B
AV-3C
AV-3D
AV-3E
AV-3F
AV-3G
AV-3H
AV-3I
AV-3J
AV-3K
AV-3L
AV-3M
Cleveland Road Pump Station
Class A
Capacity: 12,500 gpm
AV-3A-PSA2
AV-3A-FMB - 42"
AV-1C-FMB - 36"
West Hickman TP
CLARK COUNTY
JESSAMINE COUNTY
EXPLANATION
Existing Pump Station
Wastewater Treatment Plant
Sanitary Sewer Trunk Line
Sanitary Sewer Force Main
Proposed Trunk Sewers
Size of Pipe
12 inch
15 inch
18 inch
21 inch
24 inch
27 inch
30 inch
36 inch
42 inch
48 inch
Expansion Area from the 201 Plan Update
Proposed Pump Station
Proposed Force Main
Developable Areas of RSA
Subbasins of RSA
RSA Boundary
Urban Service Area (USA) Boundary
Stream
Road
Railroad
Flow Arrow
Location Map
0
6,000 Feet
1 inch equals 6,000 feet
GRW, Inc.
Lexington Fayette Urban County Government
Rural Service Area (RSA)
Sanitary Sewer Capability Study
Exhibit: 7.7
Avon / I-64 Area
Pump Stations & Force Mains

LEXINGTON-FAYETTE
URBAN COUNTY GOVERNMENT
Lexington, Kentucky

Detailed Cost Information

Cost Summary
Avon / I-64 Area

Trunk Sewers ID:		Cost ($)
Avon-1:		
AV-1A-TA		$929,832
AV-1B-TA		$412,253
AV-1C-TA		$2,565,439
AV-1D-TA		$6,670,543
AV-1E-TA		$124,308
AV-1F-TA		$3,354,601
AV-1G-TA		$470,593
	Subtotal:	$14,527,569
Avon-2:		
AV-2A-TA		$710,894
	Subtotal:	$710,894
Avon-3:		
AV-3A-TA		$573,199
AV-3B-TA		$948,258
AV-3C-TA		$7,538,206
AV-3D-TA		$451,732
AV-3E-TA		$620,002
AV-3F-TA		$1,048,175
AV-3G-TA		$3,192,090
AV-3H-TA		$887,100
AV-3I-TA		$2,559,505
AV-3J-TA		$579,324
AV-3K-TA		$433,534
AV-3L-TA		$111,029
AV 3M-TA		$557,718
	Subtotal:	$19,499,871
	Total Avon 1, 2 and 3 Trunk Sewers:	$34,738,334

Cost Summary
Avon / I-64 Area

Force Main ID:	Cost ($)
Avon-1:	
AV-1C-FMA	$13,458,588
AV-1C-FMB	$14,654,197
Avon-2:	
AV-2A-FMA	$2,048,127
Avon-3:	
AV-3A-FMA	$16,064,530
AV-3A-FMB	$19,603,781
Total Avon 1, 2 and 3 Force Mains:	$65,829,225
Pump Station ID:	
Avon-1:	
AV-1C-PSA1	$6,000,000
AV-1C-PSA2	$6,200,000
Avon-2:	
AV-2A-PSB	$1,100,000
Avon-3:	
AV-3A-PSA1	$8,400,000
AV-3A-PSA2	$8,400,000
Total Avon 1,2 and 3 Pump Stations:	$30,100,000
Total Cost	$130,667,559

Shared Costs for System Improvements
Avon / I-64 RSA
AV-1 and AV-2 Drainage Basins

Shared Costs for Construction of 36" Force Main, Bryan Station Road P.S. (16,725 gpm),and Cleveland Road P.S. (17,500 gpm)

Bryan Station Road Pump Station (16,725 gpm)	$6,000,000
36" Force Main for AV-1 and AV-2 (AV-1C-FMA, AV-1C-FMB)	$28,112,785
Cleveland Road Pump Station (17,500 gpm)	$6,200,000
Total Estimated Shared Construction Cost:	$40,312,785
Total Area - AV-1 and AV-2	6,174
Total Area - AV -1 RSA (acres)	5,575
Total Area - AV -2 RSA (acres)	599
Shared Cost Per Acre	$6,529
AV-1 RSA (5,575 Acres) Shared Cost	$36,401,649
AV-2 RSA (599 Acres) Shared Cost	$3,911,137

Shared Costs for System Improvements
Avon / I-64 RSA
Blue Sky RAC Inclusion

Shared Costs for Construction of 36" Force Main and Cleveland Road Pump Station

36" Force Main for AV-1 and AV-2 (AV-1C-FMB)	$14,654,197
Cleveland Road Pump Station (17,500 gpm)	$6,200,000
Total Estimated Shared Construction Cost:	$20,854,197
Total Area - AV-1 and AV-2	6,174
Blue Sky RAC	465
Total Area - AV -2 RSA (acres)	6,639
Shared Cost Per Acre	$3,378
Blue Sky RAC	$1,570,651
AV-1, AV-2	$22,424,849

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 7.7
Reference ID: AV-1A-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	1,233	LF	60	$73,980
2	15" PVC Gravity Sewer (DR 35)	2,826	LF	70	$197,820
3	18" PVC Gravity Sewer (DR 35)	3,287	LF	75	$246,525
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	24	EA	2,000	$48,973
ROAD BORES / TUNNEL:					
43	24" Steel Casing for 14" - 15" Carrier Pipe	150	LF	350	$52,500
MISCELLANEOUS:					
55	Pavement Replacement:	734.60	LF	25	$18,365
56	Aggregate Surface Replacement	146.92	LF	15	$2,204
57	Concrete for Encasement	22.038	CY	150	$3,306
58	Crushed Stone for Special Pipe Bedding	29.384	TN	25	$735
59	Clean-Up/Final Grading/Seeding/Sowing	7,346	LF	4	$29,384

Subtotal	**$673,791**
15% Contingency	$101,069
Total Construction Cost	**$774,860**
20% Non-Construction Costs	$154,972
Total Estimate of Probable Cost	**$929,832**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 7.7
Reference ID: AV-1B-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	665	LF	60	$39,900
2	15" PVC Gravity Sewer (DR 35)	2,163	LF	70	$151,410
3	18" PVC Gravity Sewer (DR 35)	402	LF	75	$30,150
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	11	EA	2,000	$21,533
ROAD BORES / TUNNEL:					
42	18" Steel Casing for 12" Carrier Pipe	100	LF	320	$32,000
MISCELLANEOUS:					
55	Pavement Replacement:	323.00	LF	25	$8,075
56	Aggregate Surface Replacement	64.60	LF	15	$969
57	Concrete for Encasement	9.690	CY	150	$1,454
58	Crushed Stone for Special Pipe Bedding	12.920	TN	25	$323
59	Clean-Up/Final Grading/Seeding/Sowing	3,230	LF	4	$12,920

Subtotal	**$298,734**
15% Contingency	$44,810
Total Construction Cost	**$343,544**
20% Non-Construction Costs	$68,709
Total Estimate of Probable Cost	**$412,253**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 7.7
Reference ID: AV-1C-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	260	LF	60	$15,600
2	15" PVC Gravity Sewer (DR 35)	505	LF	70	$35,350
3	18" PVC Gravity Sewer (DR 35)	1,502	LF	75	$112,650
4	21" PVC Gravity Sewer (DR 35)	4,205	LF	85	$357,425
6	27" PVC Gravity Sewer (DR 35)	1,763	LF	130	$229,190
7	30" DI Gravity Sewer (PC 200) w/Protecto 401	4,768	LF	155	$739,040
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	43	EA	2,000	$86,687
ROAD BORES / TUNNEL:					
48	40" Steel Casing for 27" Carrier Pipe	300	LF	625	$187,500
MISCELLANEOUS:					
55	Pavement Replacement:	1,300.30	LF	25	$32,508
56	Aggregate Surface Replacement	260.06	LF	15	$3,901
57	Concrete for Encasement	39.009	CY	150	$5,851
58	Crushed Stone for Special Pipe Bedding	52.012	TN	25	$1,300
59	Clean-Up/Final Grading/Seeding/Sowing	13,003	LF	4	$52,012

Subtotal	**$1,859,014**
15% Contingency	$278,852
Total Construction Cost	**$2,137,866**
20% Non-Construction Costs	$427,573
Total Estimate of Probable Cost	**$2,565,439**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 7.7
Reference ID: AV-1D-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	987	LF	60	$59,220
2	15" PVC Gravity Sewer (DR 35)	1,843	LF	70	$129,010
3	18" PVC Gravity Sewer (DR 35)	2,869	LF	75	$215,175
4	21" PVC Gravity Sewer (DR 35)	3,495	LF	85	$297,075
5	24" PVC Gravity Sewer (DR 35)	4,169	LF	105	$437,745
7	30" DI Gravity Sewer (PC 200) w/Protecto 401	871	LF	155	$135,005
9	42" DI Gravity Sewer (PC 200) w/Protecto 401	9,859	LF	280	$2,760,520
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	47	EA	2,000	$94,893
14	5'0" Dia. Std. Manhole (Upto 6' Deep)	20	EA	2,500	$50,000
15	6'0" Dia. Std. Manhole (Upto 6' Deep)	13	EA	3,500	$45,500
ROAD BORES / TUNNEL:					
46	36" Steel Casing for 24" Carrier Pipe	100	LF	475	$47,500
51	60" Steel Casing for 42" Carrier Pipe	350	LF	1,100	$385,000
MISCELLANEOUS:					
55	Pavement Replacement:	2,409.30	LF	25	$60,233
56	Aggregate Surface Replacement	481.86	LF	15	$7,228
57	Concrete for Encasement	72.279	CY	150	$10,842
58	Crushed Stone for Special Pipe Bedding	96.372	TN	25	$2,409
59	Clean-Up/Final Grading/Seeding/Sowing	24,093	LF	4	$96,372

Subtotal	**$4,833,727**
15% Contingency	$725,059
Total Construction Cost	**$5,558,786**
20% Non-Construction Costs	$1,111,757
Total Estimate of Probable Cost	**$6,670,543**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 7.7
Reference ID: AV-1E-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	1,217	LF	60	$73,020
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	4	EA	2,000	$8,113
MISCELLANEOUS:					
55	Pavement Replacement:	121.70	LF	25	$3,043
56	Aggregate Surface Replacement	24.34	LF	15	$365
57	Concrete for Encasement	3.651	CY	150	$548
58	Crushed Stone for Special Pipe Bedding	4.868	TN	25	$122
59	Clean-Up/Final Grading/Seeding/Sowing	1,217	LF	4	$4,868

Subtotal	**$90,078**
15% Contingency	$13,512
Total Construction Cost	**$103,590**
20% Non-Construction Costs	$20,718
Total Estimate of Probable Cost	**$124,308**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 7.7
Reference ID: AV-1F-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	1,270	LF	60	$76,200
4	21" PVC Gravity Sewer (DR 35)	3,414	LF	85	$290,190
5	24" PVC Gravity Sewer (DR 35)	5,397	LF	105	$566,685
6	27" PVC Gravity Sewer (DR 35)	6,417	LF	130	$834,210
7	30" DI Gravity Sewer (PC 200) w/Protecto 401	1,385	LF	155	$214,675
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	60	EA	2,000	$119,220
ROAD BORES / TUNNEL:					
42	18" Steel Casing for 12" Carrier Pipe	100	LF	320	$32,000
46	36" Steel Casing for 20" - 21" Carrier Pipe	350	LF	475	$166,250
MISCELLANEOUS:					
55	Pavement Replacement:	1,788.30	LF	25	$44,708
56	Aggregate Surface Replacement	357.66	LF	15	$5,365
57	Concrete for Encasement	53.649	CY	150	$8,047
58	Crushed Stone for Special Pipe Bedding	71.532	TN	25	$1,788
59	Clean-Up/Final Grading/Seeding/Sowing	17,883	LF	4	$71,532

Subtotal	**$2,430,870**
15% Contingency	$364,631
Total Construction Cost	**$2,795,501**
20% Non-Construction Costs	$559,100
Total Estimate of Probable Cost	**$3,354,601**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 7.7
Reference ID: AV-1G-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	1,275	LF	60	$76,500
2	15" PVC Gravity Sewer (DR 35)	2,519	LF	70	$176,330
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	13	EA	2,000	$25,293
ROAD BORES / TUNNEL:					
43	24" Steel Casing for 14" - 15" Carrier Pipe	100	LF	350	$35,000
MISCELLANEOUS:					
55	Pavement Replacement:	379.40	LF	25	$9,485
56	Aggregate Surface Replacement	75.88	LF	15	$1,138
57	Concrete for Encasement	11.382	CY	150	$1,707
58	Crushed Stone for Special Pipe Bedding	15.176	TN	25	$379
59	Clean-Up/Final Grading/Seeding/Sowing	3,794	LF	4	$15,176

Subtotal	**$341,009**
15% Contingency	$51,151
Total Construction Cost	**$392,161**
20% Non-Construction Costs	$78,432
Total Estimate of Probable Cost	**$470,593**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 7.8
Reference ID: AV-1C-FMA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
FORCE MAIN:					
35	36" DI Force Main (PC 200 w/ Protecto 401)	46,000	LF	182	$8,372,000
ROAD BORES / TUNNEL:					
50	50" Steel Casing for 36" Carrier Pipe	1,100	LF	925	$1,017,500
MISCELLANEOUS:					
55	Pavement Replacement:	4,600.00	LF	25	$115,000
56	Aggregate Surface Replacement	920.00	LF	15	$13,800
57	Concrete for Encasement	138.000	CY	150	$20,700
58	Crushed Stone for Special Pipe Bedding	184.000	TN	25	$4,600
59	Clean-Up/Final Grading/Seeding/Sowing	46,000	LF	4	$184,000
60	Sewage Air Release Valves	10	EA	2,500	$25,000

Subtotal	**$9,752,600**
15% Contingency	$1,462,890
Total Construction Cost	**$11,215,490**
20% Non-Construction Costs	$2,243,098
Total Estimate of Probable Cost	**$13,458,588**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 7.8
Reference ID: AV-1C-FMB

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
FORCE MAIN:					
35	36" DI Force Main (PC 200 w/ Protecto 401)	51,579	LF	182	$9,387,378
ROAD BORES / TUNNEL:					
50	50" Steel Casing for 36" Carrier Pipe	900	LF	925	$832,500
MISCELLANEOUS:					
55	Pavement Replacement:	5,157.90	LF	25	$128,948
56	Aggregate Surface Replacement	1,031.58	LF	15	$15,474
57	Concrete for Encasement	154.737	CY	150	$23,211
58	Crushed Stone for Special Pipe Bedding	206.316	TN	25	$5,158
59	Clean-Up/Final Grading/Seeding/Sowing	51,579	LF	4	$206,316
60	Sewage Air Release Valves	8	EA	2,500	$20,000

Subtotal	**$10,618,984**
15% Contingency	$1,592,848
Total Construction Cost	**$12,211,831**
20% Non-Construction Costs	$2,442,366
Total Estimate of Probable Cost	**$14,654,197**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 7.7
Reference ID: AV-2A-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	616	LF	60	$36,960
2	15" PVC Gravity Sewer (DR 35)	1,542	LF	70	$107,940
3	18" PVC Gravity Sewer (DR 35)	2,550	LF	75	$191,250
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	16	EA	2,000	$31,387
ROAD BORES / TUNNEL:					
43	24" Steel Casing for 14" - 15" Carrier Pipe	200	LF	350	$70,000
45	30" Steel Casing for 18" Carrier Pipe	100	LF	430	$43,000
MISCELLANEOUS:					
55	Pavement Replacement:	470.80	LF	25	$11,770
56	Aggregate Surface Replacement	94.16	LF	15	$1,412
57	Concrete for Encasement	14.124	CY	150	$2,119
58	Crushed Stone for Special Pipe Bedding	18.832	TN	25	$471
59	Clean-Up/Final Grading/Seeding/Sowing	4,708	LF	4	$18,832

Subtotal	**$515,140**
15% Contingency	$77,271
Total Construction Cost	**$592,412**
20% Non-Construction Costs	$118,482
Total Estimate of Probable Cost	**$710,894**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 7.8
Reference ID: AV-2A-FMA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
FORCE MAIN:					
33	24" DI Force Main (PC 200 w/ Protecto 401)	11,492	LF	102	$1,172,184
ROAD BORES / TUNNEL:					
47	38" Steel Casing for 24" Carrier Pipe	400	LF	550	$220,000
MISCELLANEOUS:					
55	Pavement Replacement:	1,149.20	LF	25	$28,730
56	Aggregate Surface Replacement	229.84	LF	15	$3,448
57	Concrete for Encasement	34.476	CY	150	$5,171
58	Crushed Stone for Special Pipe Bedding	45.968	TN	25	$1,149
59	Clean-Up/Final Grading/Seeding/Sowing	11,492	LF	4	$45,968
60	Sewage Air Release Valves	3	EA	2,500	$7,500

Subtotal	**$1,484,150**
15% Contingency	$222,623
Total Construction Cost	**$1,706,773**
20% Non-Construction Costs	$341,355
Total Estimate of Probable Cost	**$2,048,127**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 7.7
Reference ID: AV-3A-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	3,478	LF	60	$208,680
4	21" PVC Gravity Sewer (DR 35)	1,595	LF	85	$135,575
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	17	EA	2,000	$33,820
MISCELLANEOUS:					
55	Pavement Replacement:	507.30	LF	25	$12,683
56	Aggregate Surface Replacement	101.46	LF	15	$1,522
57	Concrete for Encasement	15.219	CY	150	$2,283
58	Crushed Stone for Special Pipe Bedding	20.292	TN	25	$507
59	Clean-Up/Final Grading/Seeding/Sowing	5,073	LF	4	$20,292

Subtotal	**$415,362**
15% Contingency	$62,304
Total Construction Cost	**$477,666**
20% Non-Construction Costs	$95,533
Total Estimate of Probable Cost	**$573,199**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 7.7
Reference ID: AV-3B-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	1,615	LF	60	$96,900
2	15" PVC Gravity Sewer (DR 35)	2,988	LF	70	$209,160
3	18" PVC Gravity Sewer (DR 35)	2,680	LF	75	$201,000
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	24	EA	2,000	$48,553
ROAD BORES / TUNNEL:					
43	24" Steel Casing for 14" - 15" Carrier Pipe	100	LF	350	$35,000
45	30" Steel Casing for 18" Carrier Pipe	100	LF	430	$43,000
MISCELLANEOUS:					
55	Pavement Replacement:	728.30	LF	25	$18,208
56	Aggregate Surface Replacement	145.66	LF	15	$2,185
57	Concrete for Encasement	21.849	CY	150	$3,277
58	Crushed Stone for Special Pipe Bedding	29.132	TN	25	$728
59	Clean-Up/Final Grading/Seeding/Sowing	7,283	LF	4	$29,132

Subtotal	**$687,143**
15% Contingency	$103,072
Total Construction Cost	**$790,215**
20% Non-Construction Costs	$158,043
Total Estimate of Probable Cost	**$948,258**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 7.7
Reference ID: AV-3C-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	679	LF	60	$40,740
2	15" PVC Gravity Sewer (DR 35)	1,367	LF	70	$95,690
3	18" PVC Gravity Sewer (DR 35)	2,408	LF	75	$180,600
5	24" PVC Gravity Sewer (DR 35)	3,686	LF	105	$387,030
6	27" PVC Gravity Sewer (DR 35)	2,864	LF	130	$372,320
7	30" DI Gravity Sewer (PC 200) w/Protecto 401	7,176	LF	155	$1,112,280
10	48" DI Gravity Sewer (PC 200) w/Protecto 401	7,046	LF	380	$2,677,480
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	61	EA	2,000	$121,200
14	5'0" Dia. Std. Manhole (Upto 6' Deep)	23	EA	2,500	$58,717
ROAD BORES / TUNNEL:					
43	24" Steel Casing for 14" - 15" Carrier Pipe	100	LF	350	$35,000
45	30" Steel Casing for 18" Carrier Pipe	200	LF	430	$86,000
47	38" Steel Casing for 24" Carrier Pipe	200	LF	550	$110,000
MISCELLANEOUS:					
55	Pavement Replacement:	2,522.60	LF	25	$63,065
56	Aggregate Surface Replacement	504.52	LF	15	$7,568
57	Concrete for Encasement	75.678	CY	150	$11,352
58	Crushed Stone for Special Pipe Bedding	100.904	TN	25	$2,523
59	Clean-Up/Final Grading/Seeding/Sowing	25,226	LF	4	$100,904

Subtotal	**$5,462,468**
15% Contingency	$819,370
Total Construction Cost	**$6,281,838**
20% Non-Construction Costs	$1,256,368
Total Estimate of Probable Cost	**$7,538,206**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 7.7
Reference ID: AV-3D-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	2,577	LF	60	$154,620
2	15" PVC Gravity Sewer (DR 35)	1,245	LF	70	$87,150
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	13	EA	2,000	$25,480
ROAD BORES / TUNNEL:					
42	18" Steel Casing for 12" Carrier Pipe	100	LF	320	$32,000
MISCELLANEOUS:					
55	Pavement Replacement:	382.20	LF	25	$9,555
56	Aggregate Surface Replacement	76.44	LF	15	$1,147
57	Concrete for Encasement	11.466	CY	150	$1,720
58	Crushed Stone for Special Pipe Bedding	15.288	TN	25	$382
59	Clean-Up/Final Grading/Seeding/Sowing	3,822	LF	4	$15,288

Subtotal	**$327,342**
15% Contingency	$49,101
Total Construction Cost	**$376,443**
20% Non-Construction Costs	$75,289
Total Estimate of Probable Cost	**$451,732**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 7.7
Reference ID: AV-3E-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	1,320	LF	60	$79,200
2	15" PVC Gravity Sewer (DR 35)	3,768	LF	70	$263,760
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	17	EA	2,000	$33,920
ROAD BORES / TUNNEL:					
43	24" Steel Casing for 14" -15" Carrier Pipe	100	LF	350	$35,000
MISCELLANEOUS:					
55	Pavement Replacement:	508.80	LF	25	$12,720
56	Aggregate Surface Replacement	101.76	LF	15	$1,526
57	Concrete for Encasement	15.264	CY	150	$2,290
58	Crushed Stone for Special Pipe Bedding	20.352	TN	25	$509
59	Clean-Up/Final Grading/Seeding/Sowing	5,088	LF	4	$20,352

Subtotal	**$449,277**
15% Contingency	$67,392
Total Construction Cost	**$516,668**
20% Non-Construction Costs	$103,334
Total Estimate of Probable Cost	**$620,002**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 7.7
Reference ID: AV-3F-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	991	LF	60	$59,460
2	15" PVC Gravity Sewer (DR 35)	3,408	LF	70	$238,560
3	18" PVC Gravity Sewer (DR 35)	4,009	LF	75	$300,675
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	28	EA	2,000	$56,053
ROAD BORES / TUNNEL:					
45	30" Steel Casing for 18" Carrier Pipe	100	LF	430	$43,000
MISCELLANEOUS:					
55	Pavement Replacement:	840.80	LF	25	$21,020
56	Aggregate Surface Replacement	168.16	LF	15	$2,522
57	Concrete for Encasement	25.224	CY	150	$3,784
58	Crushed Stone for Special Pipe Bedding	33.632	TN	25	$841
59	Clean-Up/Final Grading/Seeding/Sowing	8,408	LF	4	$33,632

Subtotal	**$759,547**
15% Contingency	$113,932
Total Construction Cost	**$873,479**
20% Non-Construction Costs	$174,696
Total Estimate of Probable Cost	**$1,048,175**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 7.7
Reference ID: AV-3G-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
8	36" DI Gravity Sewer (PC 200) w/Protecto 401	9,422	LF	220	$2,072,840
MANHOLES:					
14	5'0" Dia. Std. Manhole (Upto 6' Deep)	31	EA	2,500	$78,517
ROAD BORES / TUNNEL:					
50	50" Steel Casing for 36" Carrier Pipe	100	LF	925	$92,500
MISCELLANEOUS:					
55	Pavement Replacement:	942.20	LF	25	$23,555
56	Aggregate Surface Replacement	188.44	LF	15	$2,827
57	Concrete for Encasement	28.266	CY	150	$4,240
58	Crushed Stone for Special Pipe Bedding	37.688	TN	25	$942
59	Clean-Up/Final Grading/Seeding/Sowing	9,422	LF	4	$37,688

Subtotal	**$2,313,108**
15% Contingency	$346,966
Total Construction Cost	**$2,660,075**
20% Non-Construction Costs	$532,015
Total Estimate of Probable Cost	**$3,192,090**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 7.7
Reference ID: AV-3H-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	969	LF	60	$58,140
2	15" PVC Gravity Sewer (DR 35)	2,214	LF	70	$154,980
3	18" PVC Gravity Sewer (DR 35)	3,843	LF	75	$288,225
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	23	EA	2,000	$46,840
ROAD BORES / TUNNEL:					
45	30" Steel Casing for 18" Carrier Pipe	100	LF	430	$43,000
MISCELLANEOUS:					
55	Pavement Replacement:	702.60	LF	25	$17,565
56	Aggregate Surface Replacement	140.52	LF	15	$2,108
57	Concrete for Encasement	21.078	CY	150	$3,162
58	Crushed Stone for Special Pipe Bedding	28.104	TN	25	$703
59	Clean-Up/Final Grading/Seeding/Sowing	7,026	LF	4	$28,104

Subtotal	**$642,826**
15% Contingency	$96,424
Total Construction Cost	**$739,250**
20% Non-Construction Costs	$147,850
Total Estimate of Probable Cost	**$887,100**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 7.7
Reference ID: AV-3I-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	1,725	LF	60	$103,500
2	15" PVC Gravity Sewer (DR 35)	777	LF	70	$54,390
4	21" PVC Gravity Sewer (DR 35)	893	LF	85	$75,905
5	24" PVC Gravity Sewer (DR 35)	2,783	LF	105	$292,215
6	27" PVC Gravity Sewer (DR 35)	3,617	LF	130	$470,210
7	30" DI Gravity Sewer (PC 200) w/Protecto 401	3,986	LF	155	$617,830
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	46	EA	2,000	$91,873
ROAD BORES / TUNNEL:					
46	36" Steel Casing for 20" - 21" Carrier Pipe	100	LF	475	$47,500
MISCELLANEOUS:					
55	Pavement Replacement:	1,378.10	LF	25	$34,453
56	Aggregate Surface Replacement	275.62	LF	15	$4,134
57	Concrete for Encasement	41.343	CY	150	$6,201
58	Crushed Stone for Special Pipe Bedding	55.124	TN	25	$1,378
59	Clean-Up/Final Grading/Seeding/Sowing	13,781	LF	4	$55,124

Subtotal	**$1,854,714**
15% Contingency	$278,207
Total Construction Cost	**$2,132,921**
20% Non-Construction Costs	$426,584
Total Estimate of Probable Cost	**$2,559,505**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 7.7
Reference ID: AV-3J-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	1,460	LF	60	$87,600
2	15" PVC Gravity Sewer (DR 35)	1,371	LF	70	$95,970
3	18" PVC Gravity Sewer (DR 35)	2,208	LF	75	$165,600
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	17	EA	2,000	$33,593
MISCELLANEOUS:					
55	Pavement Replacement:	503.90	LF	25	$12,598
56	Aggregate Surface Replacement	100.78	LF	15	$1,512
57	Concrete for Encasement	15.117	CY	150	$2,268
58	Crushed Stone for Special Pipe Bedding	20.156	TN	25	$504
59	Clean-Up/Final Grading/Seeding/Sowing	5,039	LF	4	$20,156

Subtotal	**$419,800**
15% Contingency	$62,970
Total Construction Cost	**$482,770**
20% Non-Construction Costs	$96,554
Total Estimate of Probable Cost	**$579,324**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 7.7
Reference ID: AV-3K-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	1,519	LF	60	$91,140
2	15" PVC Gravity Sewer (DR 35)	2,401	LF	70	$168,070
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	13	EA	2,000	$26,133
MISCELLANEOUS:					
55	Pavement Replacement:	392.00	LF	25	$9,800
56	Aggregate Surface Replacement	78.40	LF	15	$1,176
57	Concrete for Encasement	11.760	CY	150	$1,764
58	Crushed Stone for Special Pipe Bedding	15.680	TN	25	$392
59	Clean-Up/Final Grading/Seeding/Sowing	3,920	LF	4	$15,680

Subtotal	**$314,155**
15% Contingency	$47,123
Total Construction Cost	**$361,279**
20% Non-Construction Costs	$72,256
Total Estimate of Probable Cost	**$433,534**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 7.7
Reference ID: AV-3L-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	1,087	LF	60	$65,220
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	4	EA	2,000	$7,247
MISCELLANEOUS:					
55	Pavement Replacement:	108.70	LF	25	$2,718
56	Aggregate Surface Replacement	21.74	LF	15	$326
57	Concrete for Encasement	3.261	CY	150	$489
58	Crushed Stone for Special Pipe Bedding	4.348	TN	25	$109
59	Clean-Up/Final Grading/Seeding/Sowing	1,087	LF	4	$4,348

Subtotal	**$80,456**
15% Contingency	$12,068
Total Construction Cost	**$92,525**
20% Non-Construction Costs	$18,505
Total Estimate of Probable Cost	**$111,029**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 7.7
Reference ID: AV-3M-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	1,545	LF	60	$92,700
2	15" PVC Gravity Sewer (DR 35)	2,616	LF	70	$183,120
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	14	EA	2,000	$27,740
ROAD BORES / TUNNEL:					
43	24" Steel Casing for 14" - 15" Carrier Pipe	200	LF	350	$70,000
MISCELLANEOUS:					
55	Pavement Replacement:	416.10	LF	25	$10,403
56	Aggregate Surface Replacement	83.22	LF	15	$1,248
57	Concrete for Encasement	12.483	CY	150	$1,872
58	Crushed Stone for Special Pipe Bedding	16.644	TN	25	$416
59	Clean-Up/Final Grading/Seeding/Sowing	4,161	LF	4	$16,644

Subtotal	**$404,143**
15% Contingency	$60,622
Total Construction Cost	**$464,765**
20% Non-Construction Costs	$92,953
Total Estimate of Probable Cost	**$557,718**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 7.8
Reference ID: AV-3A-FMA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
FORCE MAIN:					
36	42" DI Force Main (PC 200 w/ Protecto 401)	43,517	LF	242	$10,531,114
ROAD BORES / TUNNEL:					
51	60" Steel Casing for 42" Carrier Pipe	700	LF	1,100	$770,000
MISCELLANEOUS:					
55	Pavement Replacement:	4,351.70	LF	25	$108,793
56	Aggregate Surface Replacement	870.34	LF	15	$13,055
57	Concrete for Encasement	130.551	CY	150	$19,583
58	Crushed Stone for Special Pipe Bedding	174.068	TN	25	$4,352
59	Clean-Up/Final Grading/Seeding/Sowing	43,517	LF	4	$174,068
60	Sewage Air Release Valves	8	EA	2,500	$20,000

Subtotal	**$11,640,964**
15% Contingency	$1,746,145
Total Construction Cost	**$13,387,109**
20% Non-Construction Costs	$2,677,422
Total Estimate of Probable Cost	**$16,064,530**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 7.8
Reference ID: AV-3A-FMB

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
FORCE MAIN:					
36	42" DI Force Main (PC 200 w/ Protecto 401)	52,479	LF	242	$12,699,918
ROAD BORES / TUNNEL:					
51	60" Steel Casing for 42" Carrier Pipe	1,000	LF	1,100	$1,100,000
MISCELLANEOUS:					
55	Pavement Replacement:	5,247.90	LF	25	$131,198
56	Aggregate Surface Replacement	1,049.58	LF	15	$15,744
57	Concrete for Encasement	157.437	CY	150	$23,616
58	Crushed Stone for Special Pipe Bedding	209.916	TN	25	$5,248
59	Clean-Up/Final Grading/Seeding/Sowing	52,479	LF	4	$209,916
60	Sewage Air Release Valves	8	EA	2,500	$20,000

Subtotal	**$14,205,639**
15% Contingency	$2,130,846
Total Construction Cost	**$16,336,484**
20% Non-Construction Costs	$3,267,297
Total Estimate of Probable Cost	**$19,603,781**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: **Avon/I-64**
Reference ID: **Blue Sky RAC**

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	600	LF	60	$36,000
2	15" PVC Gravity Sewer (DR 35)	700	LF	70	$49,000
3	18" PVC Gravity Sewer (DR 35)	1,300	LF	75	$97,500
4	21" PVC Gravity Sewer (DR 35)	1,000	LF	85	$85,000
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	12	EA	2,000	$24,000
FORCE MAIN:					
26	8" DI Force Main (PC 350 w/ Protecto 401)	500	LF	30	$15,000
28	12" DI Force Main (PC 350 w/ Protecto 401)	2,900	LF	42	$121,800
ROAD BORES / TUNNEL:					
42	18" Steel Casing for 12" Carrier Pipe	300	LF	320	$96,000
45	30" Steel Casing for 18" Carrier Pipe	100	LF	430	$43,000
47	38" Steel Casing for 24" Carrier Pipe	100	LF	550	$55,000
MISCELLANEOUS:					
55	Pavement Replacement:	700	LF	25	$17,500
56	Aggregate Surface Replacement	140	LF	15	$2,100
57	Concrete for Encasement	21.000	CY	150	$3,150
58	Crushed Stone for Special Pipe Bedding	28.000	TN	25	$700
59	Clean-Up/Final Grading/Seeding/Sowing	7,000	LF	4	$28,000
60	Sewage Air Release Valves	2	EA	2,500	$5,000

Subtotal	**$678,750**
15% Contingency	$101,813
Total Construction Cost	**$780,563**
20% Non-Construction Costs	$156,113
Total Estimate of Probable Cost	**$936,675**

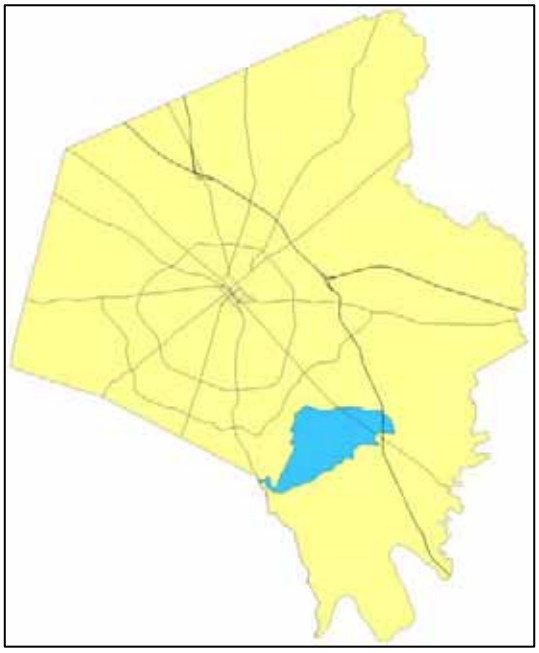
PUMP STATIONS:					
61	Blue Sky RAC PS - Class B, 1700 gpm	1	EA	900,000	$900,000
62	Boonesboro-Manor PS - Class C, 350 gpm	1	EA	700,000	$700,000

Subtotal:	**$1,600,000**

Section 8
Delong Road/Richmond Road Rural Service Area

General

The Delong Road/Richmond Road Rural Service Area (DR) is located in southeastern Fayette County. The DR has a total land area of 5,588 acres and a total developable land area of 5,087 acres. Project summaries are provided in Exhibits 8.1 through 8.3. Detailed maps are provided in Exhibits 8.4 and 8.5. The Delong Road/Richmond Road RSA has been divided into two sub-drainage basins, DR-1 and DR-2. The DR-1 is positioned in the East Hickman Creek drainage basin of Fayette County and originates near the southernmost border of Fayette County and extends north and northeast to the uppermost reach of the drainage basin. The DR-2 is located in the Baughman Run Creek drainage basin in Fayette County, which flows southeast, directly to the Kentucky River. In addition, the Blue Sky Rural Activity Center (RAC) will be presented as an optional area for inclusion of sanitary sewer service and estimates of cost are provided.



DR-1

DR-1 has an area of 4,970 acres and is a part of the East Hickman Creek drainage basin. DR-1 extends to the uppermost reach of the East Hickman Creek drainage basin. Approximately 354 additional acres of the East Hickman drainage basin in Fayette County would remain unsewered and are downstream of or adjacent to DR-1. Refer to Exhibits 8.4 and 8.5

DR-2

DR-2 has an area of 618 acres and is located in the uppermost reach of the Baughman Run drainage basin, which flows east to the Kentucky River. The wastewater generated from DR-2 would be pumped and conveyed to DR-1.

The development of DR would have no effect on the capacity of the existing LFUCG East Hickman Sewershed or Expansion Area 1 (2001 LFUCG Comprehensive Plan Update). Ultimate flows from this area would be pumped and conveyed separately and directly to West Hickman WWTP. Expansion Area 2B and 2C (2001 LFUCG Comprehensive Plan Update) are located in the upper reaches of the East Hickman drainage basin. Refer to Exhibits 8.4 and 8.5.

Land Use and Parcel Data

Table 8.1 is a summary of the current land use in the Delong Road/Richmond Road RSA. Table 8.2 provides comparison of relative size of land parcel distribution within the DR. Over 82% of the land use is Core Equine Agricultural and Prime Agricultural. Over 88% of the land parcels are less than 40 acres in size. Similar details of each sub-drainage basin, DR-1 and DR-2, are summarized in Exhibit 8.6.

Table 8.1 Land Use Classification– DR RSA

Land Use Classification	Area (Acres)	% of Total Area
Agricultural Land	285	5.1
Core Equine Agricultural Land	3,085	55.2
Non-Rural Developed Land	179	3.2
Prime Agricultural Land	1,503	26.9
Public Land	22	0.4
Rural Developed Land	492	8.8
Other Land	22	0.4
Summary	**5,588**	**100.0**

Delong Road/Richmond Road RSA

Table 8.2 Land Parcel Size Distribution – DR RSA

Land Parcel Size	No. of Parcels	% Total Parcels
> 0 acres and < 5 acres	174	49.3
≥ 5 acres and < 10 acres	45	12.7
≥ 10 acres and < 40 acres	92	26.1
≥ 40 acres and < 100 acres	21	6.0
≥ 100 acres and < 200 acres	9	2.5
≥ 200 acres	12	3.4
Summary	**353**	**100.0**

Rural Settlements

No rural settlements exist inside the boundaries of the Delong Road/Richmond Road RSA. However, Coletown is southeast of lower East Hickman Creek, just outside the boundaries of the Delong Road/Richmond Road RSA.

Rural Activity Centers (RAC)

Blue Sky RAC (465 acres) is located near the extreme upper portion of the Delong Road/Richmond Road RSA, near DR-2. The drainage from this region naturally flows away from the East Hickman Creek drainage basin and toward Baughman Run Creek of the Kentucky River basin. Two privately-owned WWTP's also exist in this area, Blue Sky WWTP and Boonesboro Manor WWTP.

Special Natural Protection Areas

Two "B" Priority Special Natural Protection Areas have been identified in the Delong Road/Richmond Road RSA, which are East Hickman Creek, west of Delong Road (250 acres) and Athens-Walnut Hill Road near I-75. These were identified in the LFUCG Rural Service Area Land Management Plan.

Rural Greenways

East Hickman Creek is listed as an additional area for rural greenways; however, it is not identified as one of the "Five Focus Areas" for rural greenway creation in the LFUCG Rural Service Area Land Management Plan.

Scenic Areas

Most of the Delong Road/Richmond Road RSA has been identified as "Scenic Area" in the LFUCG Rural Service Area Land Management Plan.

Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESA) have been identified along the East Hickman Creek floodplain in Fayette County in the LFUCG Rural Service Area Land Management Plan.

Wastewater Facilities

Projected Wastewater Flows

The projected wastewater flows from the Delong Road/Richmond Road RSA are cumulative of the two included drainage basins, DR-1 and DR-2. In addition, options of including the flows from the existing Blue Sky Rural Activity Center will also be provided. The ultimate projected average wastewater flow, resultant from full development of the DR, is based on a unit flow of 1,500 gpd/acre of developable land. Peak wastewater flow is derived from utilization of an empirical peak flow factor, based on the relative magnitude of the average wastewater flow. The peak flow factor is multiplied by the average wastewater flow to obtain the peak instantaneous flow. In general, the larger the area and resulting average flow, the smaller the peak flow factor. Appendix B contains a summary of peak wastewater flow factors.

DR-1

The DR-1 has a total land area of 4,970 acres and a total developable land area of 4,494 acres. As mentioned previously, DR-1 will receive all flows from DR-2, therefore, wastewater flow projections will reflect the area of the entire DR. The projected average wastewater flow from DR-1 and DR-2 is 5,299 gpm or 7.63 MGD. The peak flow factor from Appendix B is 2.7 and the resultant peak wastewater flow is 14,307 gpm.

DR-2

DR-2 has a total land area of 618 acres and a developable land area of 593 acres. The projected average wastewater flow from DR-2 is 618 gpm or 0.89 MGD. The peak flow factor from Appendix B is 3.8 and the resultant peak wastewater flow is 2,348 gpm.

Table 8.3 provides a summary of wastewater flows for the Delong Road/Richmond Road RSA. Options are provided for inclusion of wastewater flows from the Blue Sky RAC at the end of this section. Another alternative for the Blue Sky RAC was also previously discussed in Section 7.

Table 8.3 Average and Peak Wastewater Flows – DR RSA

Area	Average Daily Flow (gpd)	Peak Flow (gpm)
DR-1*	7,630,500	14,307
DR-2	889,500	2,348

* Includes flows from DR-2

Delong Road/Richmond Road RSA

Wastewater Infrastructure Summary and Development Review

The Delong Road/Richmond Road RSA is located to the east of the current LFUCG Expansion Area 1. All proposed wastewater infrastructure would be parallel to the proposed improvements of the 1999 201 Facility Plan Update for Expansion Area 1, which have not been constructed at this time. For the purposes of this study, it has been assumed Expansion Area 1 improvements have been constructed. Should the Delong Road/Richmond Road RSA be included in a future expansion area prior to the construction of Expansion Area 1 improvements, scale economy can be achieved by providing larger facilities to serve the entire area.

DR-1

12" to 42" trunk sewers would be required for development of DR-1. A 14,500 gpm Class A pump station and 30" force main are required to pump and convey all wastewater flows to the West Hickman Wastewater Treatment Plant. DR-1 receives all flows from DR-2. With inclusion of the Blue Sky RAC wastewater flows, the trunk sewers would be extended and pump station capacities would be increased. Blue Sky RAC is discussed later in this section.

DR-2

A short length of 12" trunk sewer would be required. A 2,400 gpm Class B pump station and 14" force main would be required to convey the flows to DR-1. With inclusion of the Blue Sky RAC wastewater flows, the pump station capacity and force main size would increase. Blue Sky RAC is discussed later in this section.

No treatment capacity exists for the Delong Road/Richmond Road RSA. The projected WWTP capacity required for complete development of the Delong Road/Richmond Road RSA is 7.63 MGD.

Opportunity also exists during the development of the DR to decommission several existing pump stations of the East Hickman Sewershed. These pump stations include:

- East Hickman
- East Lake
- Armstrong Mill

Opportunity also exists to decommission the following additional pump stations with the simultaneous development of Expansion Area 1 (2001 LFUCG Comprehensive Plan Update) and the DR:

- Hartland No. 1
- Hartland No. 2
- Hartland No. 3
- Robertson

Details of the upsizing of DR-1 sanitary sewer infrastructure that would be necessitated by decommissioning of these pump stations have not been provided within the scope of work of this study.

Estimate of Probable Cost of Collection, Pumping, Conveyance, and Treatment

The estimate of probable costs for the Delong Road/Richmond RSA are provided in the project summaries, Exhibits 8.1 through 8.3. Additional additive costs are provided at the end of the section for the inclusion of Blue Sky RAC.

DR-1

The estimate of total probable cost for the DR1 trunk sewer, 14,500 gpm Class A pump station, and 30" force main is $22,388,739. All facilities have been sized to accept wastewater flows from DR-2. Details of these costs are provided in the end of this section.

The required WWTP capacity is equivalent to the projected average flow from complete development of the DR-1 (without flows from DR-2), is 6.74 MGD. At the cost of $6/gallon for expansion of the West Hickman WWTP, the projected total construction cost for wastewater treatment is $40,446,000.

The total estimated cost for development of DR-1, which includes collection, pumping, conveyance, and treatment is $62,834,739. The Blue Sky RAC upgrade costs have not been included in these costs. The average cost per acre, after contribution of shared costs from the DR-2, is $11,839. per acre.

DR-2

The estimate of total probable cost for the DR-2 trunk sewer, Class B pump station and 14"force main is $1,966,745. Details of these costs are provided in the end of this section.

The required WWTP capacity is equivalent to the projected average flow from complete development of the DR-2, which is 0.89 MGD. At the cost of $6/gallon for expansion of the West Hickman WWTP, the projected total construction cost for wastewater treatment is $5,337,000.

For the purposes of this study, it has been assumed DR-1 would develop prior to DR-2. Therefore, the facilities of DR-1 have been initially sized to accept flows from DR-2. Shared costs for common infrastructure exist between the two drainage basins, DR-1 and DR-2. DR-2 would reimburse DR-1 $2,609,892. for this common infrastructure.

The total estimated cost for development of DR-2, which includes pumping, conveyance, and treatment is $7,303,745. The adjusted cost, which includes shared costs of development is $9,913,637. The Blue Sky RAC upgrade costs have not been included in these costs. The adjusted cost per acre, after contribution of shared costs to the DR-1, is $16,718. per acre.

Blue Sky Rural Activity Center – Alternative

With the construction of improvements for the DR, opportunity exists to provide sanitary sewer service to the Blue Sky Rural Activity Center (RAC). The inclusion of the Blue Sky RAC into the DR project would allow for elimination of two private wastewater treatment facilities, The Blue Sky WWTP (150,000 gpd capacity) and the Boonesboro Manor WWTP (53,000 gpd capacity). The decision of inclusion of the Blue Sky RAC into the DR development would be required prior to design and construction of the initial DR phase.

Blue Sky RAC

The Blue Sky Rural Activity Center (RAC) has a total land area of 465 acres, of which approximately 432 acres is developable. The projected average wastewater flow from the Blue Sky Rural Activity Center is 648,000 gpd or 450 gpm.

Approximately 66 developable acres exist on the west side of I-75 and 366 developable acres exist on the east side of I-75. An average daily resultant wastewater flow would be 99,000 gpd for the west side of interstate I-75 and 549,000 gpd for the east side of I-75, respectively. One additional pump station, upgrade of the proposed DR pump stations, trunk sewer, and force main will be required to service this area.

A 12" trunk sewer will be required to serve the east side of I-75. A 1,700 gpm pump station and 12" force main are required to convey flows to the proposed DR-2 Boonesboro Manor Pump Station, which is located on the west side of the interstate. The DR-2 facilities would be expanded to accommodate flows from the Blue Sky RAC.

Some DR-1 facilities would also be expanded. The DR-1 would require an initial 21" trunk sewer in lieu of the proposed 18". The proposed Tates Creek Road Pump Station capacity would also be expanded from 14,500 gpm to 15,700 gpm for the Blue Sky RAC.

The estimate of total probable additional cost for inclusion of the Blue Sky RAC for pumping and conveyance is $3,574,773. Detailed costs to accommodate the Blue Sky RAC are included at the end of this section.

The additional required WWTP capacity to accommodate the flows from the Blue Sky RAC is equivalent to the projected average flow from the Blue Sky RAC, which is 648,000 gpd. At the cost of $6/gallon for expansion of the West Hickman WWTP, the projected total cost for wastewater treatment is $3,888,000. The total additional estimated cost for inclusion of the Blue Sky RAC, which includes pumping, conveyance, and treatment is $7,462,773. A summary of these costs is provided in detailed costs, at the end of this section.

Summary, Review, and Recommendations – Delong Road/Richmond Road RSA

In summary, the full development of the Delong Road/Richmond Road RSA will result in an average wastewater flow generation of 7.63 MGD and a peak flow of 14,307 gpm. The total projected costs for the required improvements are $70,138,484. and the unit cost of development is $13,788/acre. Optional costs for inclusion of the Blue Sky RAC are $7,462,773. Tables 8.4 summarizes the estimated probable costs of the wastewater improvements for the Delong Road/Richmond Road RSA.

Table 8.4 Cost Summary - DR RSA

Item	Total Cost	Total Cost/Acre*
Trunk Sewers	$15,323,989.	$ 3,012.
Force Main	2,131,495.	419.
Pump Stations	6,900,000.	1,357.
Wastewater Treatment	45,783,000.	9,000.
Total Cost	**$70,138,484.**	**$ 13,788.**

* Total Cost is per developable acre

Delong Road/Richmond Road RSA

The East Hickman Creek drainage basin has a total area of 12,792 acres in Fayette County, of which 7,462 upstream acres are presently developed. All wastewater flows will be conveyed to the West Hickman WWTP. Downstream construction of a WWTP has not been considered due to the close proximity of the West Hickman WWTP.

Review

- Over 75% of the property is core equine agricultural or prime agricultural land.
- A large portion of the area is designated as a "scenic area".
- No capacity exists in the current LFUCG facilities for the DR.
- Expansion Area 1 recommended improvements from the 201 Facility Plan are parallel in nature to the DR improvements. Economy of scale can be achieved with combined consideration of the DR and the Expansion Areas of the 2001 LFUCG Comprehensive Plan Update.
- The Blue Sky RAC is adjacent to the uppermost reach of the DR. No stand alone alternatives have been presented to convey these flows to LFUCG facilities. No capacity exists in the current LFUCG facilities for the Blue Sky RAC.
- The decision of inclusion of the Blue Sky RAC into the DR development would be required prior to design and construction of the initial DR phase.
- Opportunity exists to decommission several existing pump stations with the development of the DR and/or Expansion Area 1.

Recommendations

- Determine required combined improvements and costs to serve Expansion Areas and the DR. At this time, no improvements have been designed or constructed for the 2001 LFUCG Comprehensive Plan Update Expansion Areas.
- Review feasible phased improvements of the DR. The lower reaches of the DR can be sewered and pumped to the West Hickman WWTP without significant outlay of capital for upstream improvements.
- Expand future planning efforts for wastewater infrastructure beyond the traditional 20-year planning period.

Exhibit 8.1 - Project Summary
Rural Service Area Sanitary Sewer Capability Study
Delong Road / Richmond Road Summary (DR-1[5a]) - Refer to Exhibits 8.4 & 8.5

1.	**East Hickman & Baughman Fork Drainage Basin Summary**	
1.a	Total Area East Hickman Drainage Basin in Fayette County. (acres)	12,792
1.b	Total Area Baughman Fork Drainage Basin in Fayette County. (acres)	6,011
1.c	Total Area of East Hickman Drainage Basin presently served by LFUCG. (acres)	7,462
1.d	Total Area of Baughman Fork Drainage Basin presently served by LFUCG. (acres)	0
1.e	Total Area in proposed service area of DR-1. (acres)	4,970
1.f	Total Area in proposed service area of DR-2. (acres)	618
1.g	Total Area of other proposed service in the East Hickman Drainage Basin. (acres)	0
1.h	Total Area of other proposed service in the Baughman Fork Drainage Basin. (acres)	0
1.i	Total unserved area of East Hickman drainage basin remaining in Fayette County. (acres)	354
2.	**Design Flow Calculation**	
2.a	Total Area in proposed service area for DR-1. (acres)	4,970
2.b	Total Area in proposed service area for DR-2. (acres)	618
2.c	Total Developable area in proposed service area for DR-1. (acres)	4,494
2.d	Total Developable area in proposed service area for DR-2. (acres)	593
2.e	Projected Average Flow from DR-1. (gpm)	4,681
2.f	Projected Average Flow from DR-2. (gpm)	618
2.g	Peak Flow Factor for Tates Creek Road Pump Station	2.7
2.h	Peak Flow Factor for Boonesboro-Manor Pump Station	3.8
2.i	Projected Peak Flow for Tates Creek Road Pump Station which includes DR-2. (gpm)	14,307
2.j	Projected Peak Flow for Boonesboro-Manor Pump Station. (gpm)	2,348
3.	**Project Cost Summary**	
	Pumping and Conveyance Cost[5a]:	
3.a	Trunk Sewers for DR-1	$15,224,706
3.b	Force Main for DR-1	$1,864,033
3.c	Tates Creek Road, Class A Pump Station (14,500 gpm) [5.a,5.b]	$5,300,000
3.d	**Subtotal: Pumping and Conveyance**	$22,388,739
	Wastewater Treatment Cost: Required Wastewater Treatment Plant Capacity: 6.741 MGD X $ 6 / gallon:	
3.e	**Subtotal: Treatment**	$40,446,000
3.f	**Subtotal: Estimated Total Project Cost**	$62,834,739
3.g	Plus Contributions to:	$0
3.h	Less Contributions from: DR-2 for DR-1 Pumping and Conveyance Improvements	$2,609,892
3.i	**Net Estimated DR Project Costs w/adjustments**	**$60,224,847**
4.	**Average Cost Per Total Acre of Development with LFUCG Contribution:[5.c]**	**$11,839**

Exhibit 8.1 - Project Summary
Rural Service Area Sanitary Sewer Capability Study
Delong Road / Richmond Road Summary (DR-1[5a]) - Refer to Exhibits 8.4 & 8.5

5.	Remarks:
5.a	The DR-1 pumping and conveyance facilities have been designed to accept flows from the DR-2 sub-drainage basin.
5.b	Appendix D.1 contains pump station data and costs.
5.c	The cost / acre utilizes total developable area for this determination.

Exhibit 8.2 - Project Summary
Rural Service Area Sanitary Sewer Capability Study
Delong Road / Richmond Road Summary (DR-2[5a]) - Refer to Exhibits 8.4 & 8.5

1.	**East Hickman & Baughman Fork Drainage Basin Summary**	
1.a		
1.b	Total Area Baughman Fork Drainage Basin in Fayette County. (acres)	6,011
1.c	Total Area of East Hickman Drainage Basin presently served by LFUCG. (acres)	7,462
1.d	Total Area of Baughman Fork Drainage Basin presently served by LFUCG. (acres)	0
1.e	Total Area in proposed service area of DR-1. (acres)	4,970
1.f	Total Area in proposed service area of DR-2. (acres)	618
1.g	Total Area of other proposed service in the East Hickman Drainage Basin. (acres)	0
1.h	Total Area of other proposed service in the Baughman Fork Drainage Basin. (acres)	0
1.i	Total unserved area of East Hickman drainage basin remaining in Fayette County. (acres)	354
2.	**Design Flow Calculation**	
2.a	Total Area in proposed service area for DR-2. (acres)	618
2.b	Total Developable area in proposed service area for DR-2. (acres)	593
2.c	Projected Average Flow from DR-2. (gpm)	618
2.d	Peak Flow Factor for Boonesboro-Manor Pump Station	3.8
2.e	Projected Peak Flow for DR-2, Boonesboro-Manor Pump Station. (gpm)	2,348
3.	**Project Cost Summary**	
	Pumping and Conveyance Cost:	
3.a	Trunk Sewers for DR-2	$99,283
3.b	Force Main for DR-2	$267,462
3.c	Boonesboro-Manor, Class B Pump Station (2,400 gpm) [5.b,5.c]	$1,600,000
3.d	**Subtotal - Pumping and Conveyance**	$1,966,745
	Wastewater Treatment Cost:	
	Required Wastewater Treatment Plant Capacity: 0.890 MGD X $ 6 / gallon:	
3.e	**Subtotal - Treatment**	$5,337,000
3.f	**Subtotal - Estimated Total Project Cost**	$7,303,745
3.g	Plus Contributions to: DR-1 Pumping and Conveyance Improvements	$2,609,892
3.h	Less Contributions from:	$0
3.i	**Net Estimated DR Project Costs w/adjustments**	**$9,913,637**
4.	**Average Cost Per Total Acre of Development with LFUCG Contribution:[5.d]**	**$16,718**

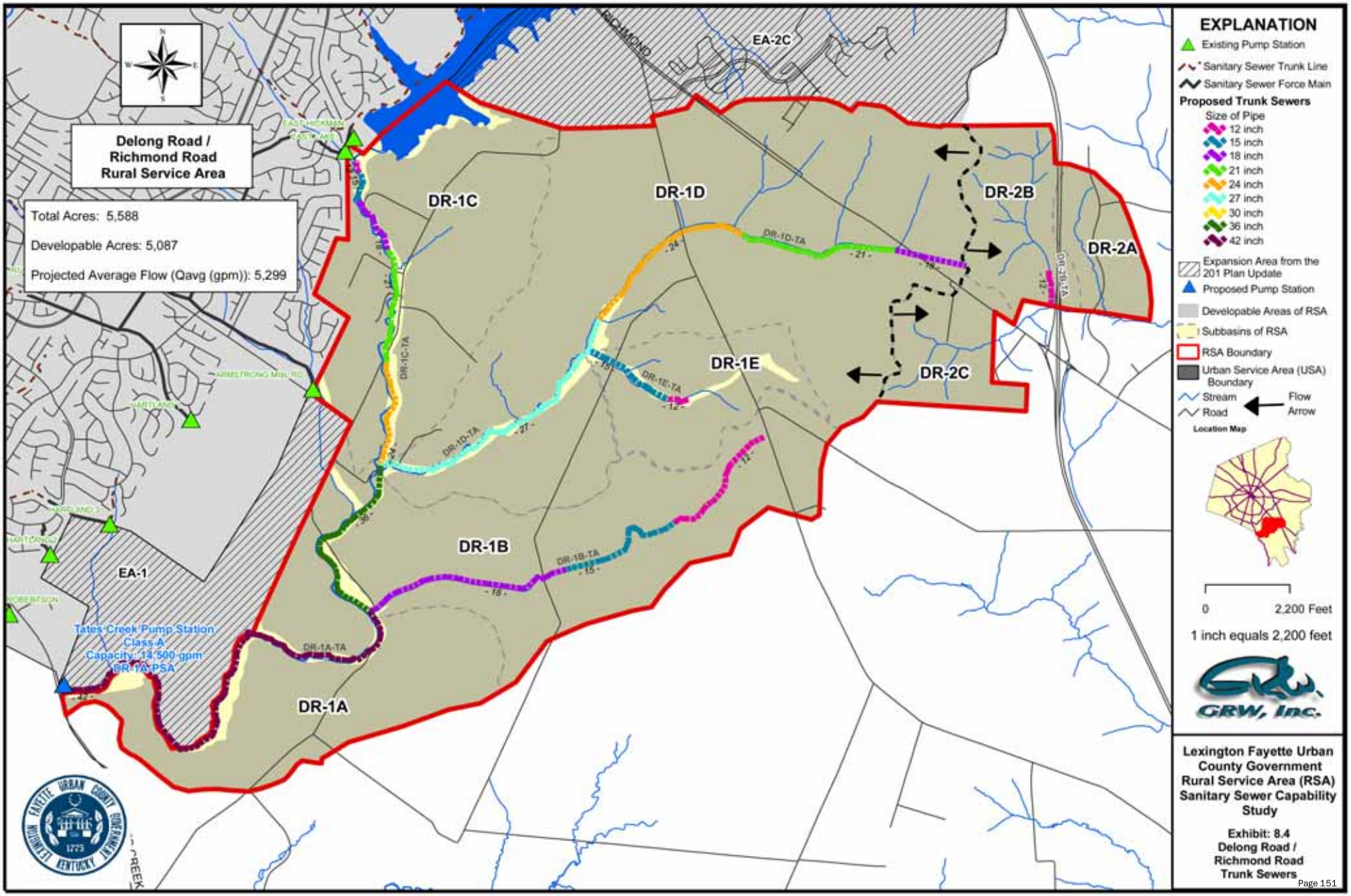
5.	**Remarks:**
5.a	The DR-1 pumping and conveyance facilities have been designed to accept flows from the DR-2 sub-drainage basin.
5.b	The Boonesboro-Manor Pump Station (Class B) will receive flow from DR-2, and convey it back into the trunk lines within DR-1.
5.c	Appendix D.1 contains pump station data and costs.
5.d	The cost / acre utilizes total developable area for this determination.

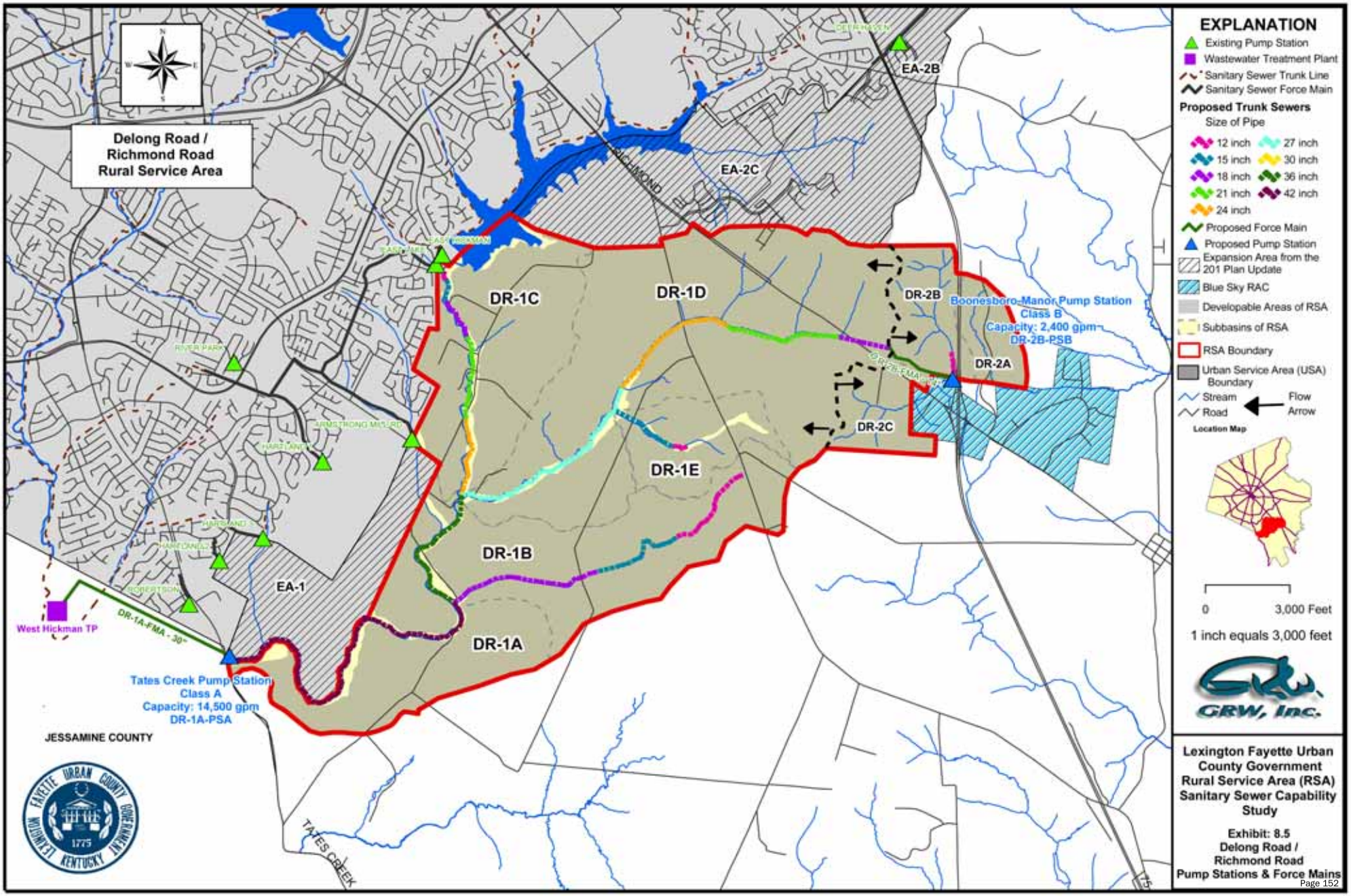
Exhibit 8.3 - Project Summary
Rural Service Area Sanitary Sewer Capability Study
Delong Road / Richmond Road Summary (DR[5a]) - Refer to Exhibits 8.4 & 8.5

1.	**East Hickman & Baughman Fork Drainage Basin Summary**	
1.a	Total Area East Hickman Drainage Basin in Fayette County. (acres)	12,792
1.b	Total Area Baughman Fork Drainage Basin in Fayette County. (acres)	6,011
1.c	Total Area of East Hickman Drainage Basin presently served by LFUCG. (acres)	7,462
1.d	Total Area of Baughman Fork Drainage Basin presently served by LFUCG. (acres)	0
1.e	Total Area in proposed service area of DR-1. (acres)	4,970
1.f	Total Area in proposed service area of DR-2. (acres)	618
1.g	Total Area of other proposed service in the East Hickman Drainage Basin. (acres)	0
1.h	Total Area of other proposed service in the Baughman Fork Drainage Basin. (acres)	0
1.I	Total unserved area of East Hickman drainage basin remaining in Fayette County. (acres)	354
2.	**Design Flow Calculation**	
2.a	Total Area in proposed service area for DR-1. (acres)	4,970
2.b	Total Area in proposed service area for DR-2. (acres)	618
2.c	Total Developable area in proposed service area for DR-1. (acres)	4,494
2.d	Total Developable area in proposed service area for DR-2. (acres)	593
2.e	Projected Average Flow from DR-1. (gpm)	4,681
2.f	Projected Average Flow from DR-2. (gpm)	618
2.g	Peak Flow Factor for Tates Creek Road Pump Station	2.7
2.h	Peak Flow Factor for Boonesboro-Manor Pump Station	3.8
2.I	Projected Peak Flow for Tates Creek Road Pump Station which includes DR-2. (gpm)	12,639
2.j	Projected Peak Flow for Boonesboro-Manor Pump Station. (gpm)	2,348
3.	**Project Cost Summary**	
	Pumping and Conveyance Cost:	
3.a	Trunk Sewers for DR-1	$15,224,706
	Trunk Sewers for DR-2	$99,283
3.b	Force Main for DR-1	$1,864,033
	Force Main for DR-2	$267,462
3.c	Tates Creek Road, Class A Pump Station (14,500 gpm) [5.a,5.c]	$5,300,000
	Boonesboro-Manor, Class B Pump Station (2,400 gpm) [5.b,5.c]	$1,600,000
3.d	**Subtotal: Pumping and Conveyance**	$24,355,484
	Wastewater Treatment Cost:	
	Required Wastewater Treatment Plant Capacity: 7.631 MGD X $ 6 / gallon:	
3.e	**Subtotal: Treatment**	$45,783,000
3.f	**Subtotal: Estimated Total Project Cost**	$70,138,484
3.g	Plus Contributions to:	$0
3.h	Less Contributions from:	$0
3.I	**Net Estimated DR Project Costs w/adjustments**	**$70,138,484**
4.	**Average Cost Per Total Acre of Development with LFUCG Contribution:[5.d]**	**$13,788**

Exhibit 8.3 - Project Summary
Rural Service Area Sanitary Sewer Capability Study
Delong Road / Richmond Road Summary (DR^{5a}) - Refer to Exhibits 8.4 & 8.5

5.	Remarks:
5.a	The DR-1 pumping and conveyance facilities have been designed to accept flows from the DR-2
5.b	The Boonesboro-Manor Pump Station (Class B) will receive flow from DR-2, and convey it back into the trunk lines within DR-1.
5.c	Appendix D.1 contains pump station data and costs.
5.d	The cost / acre utilizes total developable area for this determination.


Delong Road / Richmond Road Rural Service Area
Total Acres: 5,588
Developable Acres: 5,087
Projected Average Flow (Qavg (gpm)): 5,299
DR-1A
DR-1B
DR-1C
DR-1D
DR-1E
DR-2A
DR-2B
DR-2C
EA-1
EA-2C
Tates Creek Pump Station
Class A
Capacity: 14,500 gpm
DR-1A PSA
EXPLANATION
Existing Pump Station
Sanitary Sewer Trunk Line
Sanitary Sewer Force Main
Proposed Trunk Sewers
Size of Pipe
12 inch
15 inch
18 inch
21 inch
24 inch
27 inch
30 inch
36 inch
42 inch
Expansion Area from the 201 Plan Update
Proposed Pump Station
Developable Areas of RSA
Subbasins of RSA
RSA Boundary
Urban Service Area (USA) Boundary
Stream
Road
Flow Arrow
Location Map
0
2,200 Feet
1 inch equals 2,200 feet
GRW, Inc.
Lexington Fayette Urban County Government
Rural Service Area (RSA) Sanitary Sewer Capability Study
Exhibit: 8.4
Delong Road / Richmond Road Trunk Sewers


Delong Road /
Richmond Road
Rural Service Area
EA-2B
EA-2C
DR-1C
DR-1D
DR-2B
Boonesboro Manor Pump Station
Class B
Capacity: 2,400 gpm
DR-2B-PSB
DR-2A
DR-2C
DR-1E
DR-1B
DR-1A
EA-1
West Hickman TP
DR-1A-FMA - 30"
Tates Creek Pump Station
Class A
Capacity: 14,500 gpm
DR-1A-PSA
JESSAMINE COUNTY
TATES CREEK
EXPLANATION
Existing Pump Station
Wastewater Treatment Plant
Sanitary Sewer Trunk Line
Sanitary Sewer Force Main
Proposed Trunk Sewers
Size of Pipe
12 inch
15 inch
18 inch
21 inch
24 inch
27 inch
30 inch
36 inch
42 inch
Proposed Force Main
Proposed Pump Station
Expansion Area from the 201 Plan Update
Blue Sky RAC
Developable Areas of RSA
Subbasins of RSA
RSA Boundary
Urban Service Area (USA) Boundary
Stream
Road
Flow Arrow
Location Map
0
3,000 Feet
1 inch equals 3,000 feet
GRW, Inc.
Lexington Fayette Urban County Government
Rural Service Area (RSA)
Sanitary Sewer Capability Study
Exhibit: 8.5
Delong Road /
Richmond Road
Pump Stations & Force Mains

LEXINGTON-FAYETTE
URBAN COUNTY GOVERNMENT
Lexington, Kentucky

Detailed Cost Information

Cost Summary
Delong Road / Richmond Road

Trunk Sewer ID:	Cost ($)
DR - 1:	
DR-1A-TA	$8,226,230
DR-1B-TA	$1,587,981
DR-1C-TA	$1,528,228
DR-1D-TA	$3,473,371
DR-1E-TA	$408,895
Subtotal:	$15,224,706
DR - 2:	
DR-2B-TA	$99,283
Subtotal:	$99,283
Total Delong Road / Richmond Road 1 and 2 Trunk Sewers:	$15,323,989
Force Main ID:	
DR - 1:	
DR-1A-FMA	$1,864,033
DR - 2:	
DR-2B-FMA	$267,462
Total Delong Road / Richmond Road 1 and 2 Force Mains:	$2,131,494
Pump Station ID:	
DR - 1:	
DR-1A-PSA	$5,300,000
DR - 2:	
DR-2B-PSB	$1,600,000
Total Delong Road/ Richmond Road Pump Stations	$6,900,000
Total Delong Road/Richmond Road Imp.	**$24,355,484**
Alternative Costs:	
Blue Sky RAC Sewer System	$3,574,773

Shared Costs for System Improvements
Delong Rd./Richmond Rd.
DR-1 and DR-2 Drainage Basins

Shared Costs for Construction of Trunk Sewer, 14,500 gpm Tates Creek Rd. Pump Station, and 30" Force Main

30" Force Main for DR-1 and DR-2 (DR-1A-FMA)	$1,864,033
Tates Creek Road Pump Station (14,500 gpm)	$5,300,000
Trunk Sewers	$15,224,706
Total Estimated Shared Construction Cost:	$22,388,739
Total Area - DR-1 and DR-2	5,087
Total Area - AV -1 RSA (acres)	4,494
Total Area - AV -2 RSA (acres)	593
Shared Cost Per Acre	$4,401
AV-1 RSA (4,494 Acres) Shared Cost	$19,778,847
AV-2 RSA (593 Acres) Shared Cost	$2,609,892

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 8.4
Reference ID: DR-1A-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
8	36" DI Gravity Sewer (PC 200) w/Protecto 401	5,468	LF	220	$1,202,960
9	42" DI Gravity Sewer (PC 200) w/Protecto 401	14,522	LF	280	$4,066,160
MANHOLES:					
14	5'0" Dia. Std. Manhole (Upto 6' Deep)	18	EA	2,500	$45,567
15	6'0" Dia. Std. Manhole (Upto 6' Deep)	48	EA	3,500	$169,423
ROAD BORES / TUNNEL:					
51	60" Steel Casing for 42" Carrier Pipe	300	LF	1,100	$330,000
MISCELLANEOUS:					
55	Pavement Replacement:	1,999.00	LF	25	$49,975
56	Aggregate Surface Replacement	399.80	LF	15	$5,997
57	Concrete for Encasement	59.970	CY	150	$8,996
58	Crushed Stone for Special Pipe Bedding	79.960	TN	25	$1,999
59	Clean-Up/Final Grading/Seeding/Sowing	19,990	LF	4	$79,960

Subtotal	**$5,961,037**
15% Contingency	$894,155
Total Construction Cost	**$6,855,192**
20% Non-Construction Costs	$1,371,038
Total Estimate of Probable Cost	**$8,226,230**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 8.4
Reference ID: DR-1B-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	3,669	LF	60	$220,140
2	15" PVC Gravity Sewer (DR 35)	3,701	LF	70	$259,070
3	18" PVC Gravity Sewer (DR 35)	5,900	LF	75	$442,500
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	44	EA	2,000	$88,467
ROAD BORES / TUNNEL:					
45	30" Steel Casing for 18" Carrier Pipe	100	LF	430	$43,000
MISCELLANEOUS:					
55	Pavement Replacement:	1,327.00	LF	25	$33,175
56	Aggregate Surface Replacement	265.40	LF	15	$3,981
57	Concrete for Encasement	39.810	CY	150	$5,972
58	Crushed Stone for Special Pipe Bedding	53.080	TN	25	$1,327
59	Clean-Up/Final Grading/Seeding/Sowing	13,270	LF	4	$53,080

Subtotal	**$1,150,711**
15% Contingency	$172,607
Total Construction Cost	**$1,323,318**
20% Non-Construction Costs	$264,664
Total Estimate of Probable Cost	**$1,587,981**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 8.4
Reference ID: DR-1C-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	351	LF	60	$21,060
2	15" PVC Gravity Sewer (DR 35)	835	LF	70	$58,450
3	18" PVC Gravity Sewer (DR 35)	1,632	LF	75	$122,400
4	21" PVC Gravity Sewer (DR 35)	3,239	LF	85	$275,315
5	24" PVC Gravity Sewer (DR 35)	3,023	LF	105	$317,415
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	30	EA	2,000	$60,533
ROAD BORES / TUNNEL:					
45	30" Steel Casing for 18" Carrier Pipe	100	LF	430	$43,000
46	36" Steel Casing for 20" - 21" Carrier Pipe	300	LF	475	$142,500
MISCELLANEOUS:					
55	Pavement Replacement:	908.00	LF	25	$22,700
56	Aggregate Surface Replacement	181.60	LF	15	$2,724
57	Concrete for Encasement	27.240	CY	150	$4,086
58	Crushed Stone for Special Pipe Bedding	36.320	TN	25	$908
59	Clean-Up/Final Grading/Seeding/Sowing	9,080	LF	4	$36,320

Subtotal	**$1,107,411**
15% Contingency	$166,112
Total Construction Cost	**$1,273,523**
20% Non-Construction Costs	$254,705
Total Estimate of Probable Cost	**$1,528,228**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 8.4
Reference ID: DR-1D-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
3	18" PVC Gravity Sewer (DR 35)	1,985	LF	75	$148,875
4	21" PVC Gravity Sewer (DR 35)	4,378	LF	85	$372,130
5	24" PVC Gravity Sewer (DR 35)	5,099	LF	105	$535,395
6	27" PVC Gravity Sewer (DR 35)	8,210	LF	130	$1,067,300
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	66	EA	2,000	$131,147
ROAD BORES / TUNNEL:					
47	38" Steel Casing for 24" Carrier Pipe	100	LF	550	$55,000
48	40" Steel Casing for 27" Carrier Pipe	100	LF	625	$62,500
MISCELLANEOUS:					
55	Pavement Replacement:	1,967.20	LF	25	$49,180
56	Aggregate Surface Replacement	393.44	LF	15	$5,902
57	Concrete for Encasement	59.016	CY	150	$8,852
58	Crushed Stone for Special Pipe Bedding	78.688	TN	25	$1,967
59	Clean-Up/Final Grading/Seeding/Sowing	19,672	LF	4	$78,688

Subtotal	**$2,516,936**
15% Contingency	$377,540
Total Construction Cost	**$2,894,476**
20% Non-Construction Costs	$578,895
Total Estimate of Probable Cost	**$3,473,371**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 8.4
Reference ID: DR-1E-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	604	LF	60	$36,240
2	15" PVC Gravity Sewer (DR 35)	2,578	LF	70	$180,460
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	11	EA	2,000	$21,213
ROAD BORES / TUNNEL:					
43	24" Steel Casing for 14" - 15" Carrier Pipe	100	LF	350	$35,000
MISCELLANEOUS:					
55	Pavement Replacement:	318.20	LF	25	$7,955
56	Aggregate Surface Replacement	63.64	LF	15	$955
57	Concrete for Encasement	9.546	CY	150	$1,432
58	Crushed Stone for Special Pipe Bedding	12.728	TN	25	$318
59	Clean-Up/Final Grading/Seeding/Sowing	3,182	LF	4	$12,728

Subtotal	**$296,301**
15% Contingency	$44,445
Total Construction Cost	**$340,746**
20% Non-Construction Costs	$68,149
Total Estimate of Probable Cost	**$408,895**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 8.5
Reference ID: DR-1A-FMA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
FORCE MAIN:					
34	30" DI Force Main (PC 200 w/ Protecto 401)	7,658	LF	139	$1,064,462
ROAD BORES / TUNNEL:					
49	46" Steel Casing for 30" Carrier Pipe	300	LF	750	$225,000
MISCELLANEOUS:					
55	Pavement Replacement:	765.80	LF	25	$19,145
56	Aggregate Surface Replacement	153.16	LF	15	$2,297
57	Concrete for Encasement	22.974	CY	150	$3,446
58	Crushed Stone for Special Pipe Bedding	30.632	TN	25	$766
59	Clean-Up/Final Grading/Seeding/Sowing	7,658	LF	4	$30,632
60	Sewage Air Release Valves	2	EA	2,500	$5,000

Subtotal	**$1,350,748**
15% Contingency	$202,612
Total Construction Cost	**$1,553,361**
20% Non-Construction Costs	$310,672
Total Estimate of Probable Cost	**$1,864,033**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 8.4
Reference ID: DR-2B-TA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)	972	LF	60	$58,320
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)	3	EA	2,000	$6,480
MISCELLANEOUS:					
55	Pavement Replacement:	97.20	LF	25	$2,430
56	Aggregate Surface Replacement	19.44	LF	15	$292
57	Concrete for Encasement	2.916	CY	150	$437
58	Crushed Stone for Special Pipe Bedding	3.888	TN	25	$97
59	Clean-Up/Final Grading/Seeding/Sowing	972	LF	4	$3,888

Subtotal	**$71,944**
15% Contingency	$10,792
Total Construction Cost	**$82,736**
20% Non-Construction Costs	$16,547
Total Estimate of Probable Cost	**$99,283**

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: 8.5
Reference ID: DR-2B-FMA

Item No.	Description	Number of Units	Units of Measure	Unit Cost	Total Cost
FORCE MAIN:					
29	14" DI Force Main (PC 250 w/ Protecto 401)	2,682	LF	50	$134,100
ROAD BORES / TUNNEL:					
43	24" Steel Casing for 14" Carrier Pipe	100	LF	350	$35,000
MISCELLANEOUS:					
55	Pavement Replacement:	268.20	LF	25	$6,705
56	Aggregate Surface Replacement	53.64	LF	15	$805
57	Concrete for Encasement	8.046	CY	150	$1,207
58	Crushed Stone for Special Pipe Bedding	10.728	TN	25	$268
59	Clean-Up/Final Grading/Seeding/Sowing	2,682	LF	4	$10,728
60	Sewage Air Release Valves	2	EA	2,500	$5,000

Subtotal	**$193,813**
15% Contingency	$29,072
Total Construction Cost	**$222,885**
20% Non-Construction Costs	$44,577
Total Estimate of Probable Cost	**$267,462**

LEXINGTON-FAYETTE
URBAN COUNTY GOVERNMENT
Lexington, Kentucky

Appendix A

APPENDIX A
DESIGN FLOW CALCULATIONS FOR TRUNK SEWERS
Rural Service Area Sanitary Sewer Capability Study
Lexington Urban Fayette County Government

RSA Expansion Area	Total Area (Acre)	Total Developable Area (Acre)	Sub-Watershed Area	Total Sub-Shed Area (Acre)	Developable Area (Acre)	Undevelopable Area (Acre)	Total Drainage Area (Acre)	Flow per Area @ 1500 gpd/acre	Q (gpm)	Peaking Factor	Q_{PEAK} (gpm)	Slope (ft / ft)	Pipe Diameter (in)	Nominal Pipe Diameter (in)
1. Lower South Elkhorn	773.989	700.030	SE-1A-TA	773.989	700.030	73.959	700.030	1050045.00	729.20	3.6	2625.11	0.0020948	21.145	24
			SE-1A-TA		623.000		623.000	934500.00	648.96	3.8	2466.04	0.0020294	20.778	21
			SE-1A-TA		332.000		332.000	498000.00	345.83	4.4	1521.67	0.0018603	17.623	18
			SE-1A-TA		158.400		158.400	237600.00	165.00	4.7	775.50	0.0015245	14.207	15
			SE-1A-TA		103.680		103.680	155520.00	108.00	4.7	507.60	0.0022000	11.314	12
			SE-1A-TA		73.000		73.000	109500.00	76.04	4.7	357.40	0.0025563	9.644	10
2. Man O' War	376.040	354.800	MW-1A-TA	376.040	340.608	21.240	340.608	510912.00	354.80	4.4	1561.12	0.005195	14.676	18
			MW-1B		103.133		103.133	154699.20	107.43	4.7	504.92	0.020662	7.419	8
			MW-1C		204.125		204.125	306187.20	212.63	4.6	978.10	0.028369	8.958	10
3. Old Frankfort Pike	1682.026	1469.690	OFP-1A-TA	410.770	236.554	25.263	236.5536	354830.40	246.41	4.6	1133.49	0.011274	11.256	12
			OFP-1A-TA		157.440		157.44	236160.00	164.00	4.7	770.80	0.011274	9.741	10
			OFP-1B-TA		148.954		148.9536	223430.40	155.16	4.7	729.25	0.03169	7.860	10
			Wolf Run		3789.000		3789	5683500.00	3946.88	2.8	11051.25	0.00037	50.175	54
			Wolf Run		1051.248		1051.248	1576872.00	1095.05	3.4	3723.17	0.00037	33.366	36
			OFP-2A-TA	1271.26	1056.413	212.336	1056.4128	1584619.20	1100.43	3.4	3741.46	0.0012	26.810	30
			OFP-2A-TA		955.200		955.2	1432800.00	995.00	3.6	3582.00	0.0015	25.294	27
			OFP-2B-TA		382.205		382.2048	573307.20	398.13	4.4	1751.77	0.015309	12.513	15
			OFP-2B-TA		312.960		312.96	469440.00	326.00	4.4	1434.40	0.015309	11.610	12
			OFP-2B-TA		195.840		195.84	293760.00	204.00	4.7	958.80	0.015309	9.982	10
			OFP-2C-TA		294.307		294.3072	441460.80	306.57	4.4	1348.91	0.0098608	12.321	15
			OFP-2C-TA		250.000		250	375000.00	260.42	4.6	1197.92	0.0098608	11.784	12
			OFP-2C-TA		146.880		146.88	220320.00	153.00	4.7	719.10	0.0098608	9.732	10
			OFP-2D-TA		114.576		114.576	171864.00	119.35	4.7	560.95	0.0015	12.620	15
			OFP-2D-TA		91.200		91.2	136800.00	95.00	4.7	446.50	0.0015	11.585	12
			OFP-2D-TA		56.000		56	84000.00	58.33	5.0	291.67	0.0015	9.876	10
			Large Trunk		1056.413		1056.413	1584619.50	1100.43	3.4	3741.46	0.0012	26.810	30
			Large Trunk		712.000		712	1068000.00	741.67	3.6	2670.00	0.00067	26.351	27
			Large Trunk		500.083		500.0832	750124.80	520.92	4.0	2083.68	0.0008	23.226	24
			Large Trunk		385.507		385.5072	578260.80	401.57	4.4	1766.91	0.01020987	13.544	15
			Large Trunk		148.954		148.9536	223430.40	155.16	4.7	729.25	0.02285714	8.356	10
4. Ironworks Pike Area	6908.772	5389.998	IP-1A	1130.6	399.072	1518.774	399.072	598608.00	415.70	4.4	1829.08	0.001	21.212	24
			IP-1B-TA	1438.08	4775.318		4775.3184	7162977.60	4974.29	2.7	13430.58	0.00164435	40.811	42
			IP-1B-TA		3189.120		3189.12	4783680.00	3322.00	2.8	9301.60	0.00164435	35.559	36
			IP-1C-TA	1270.86	1066.819	204.041	1066.8192	1600228.80	1111.27	3.4	3778.32	0.00175131	25.067	27
			IP-1C-TA		747.840		747.84	1121760.00	779.00	3.6	2804.40	0.00175131	22.416	24
			IP-1C-TA		528.000		528	792000.00	550.00	4.0	2200.00	0.00175131	20.466	21
			IP-1C-TA		309.120		309.12	463680.00	322.00	4.4	1416.80	0.00175131	17.352	18
			IP-1C-TA		172.800		172.8	259200.00	180.00	4.7	846.00	0.00175131	14.301	15
			IP-1C-TA		98.880		98.88	148320.00	103.00	4.7	484.10	0.00175131	11.600	12
			IP-1C-TA		57.600		57.6	86400.00	60.00	5.0	300.00	0.00175131	9.695	10
			IP-1D-TA	3069.232	2682.038	387.194	2682.0384	4023057.60	2793.79	2.8	7822.61	0.0031	29.588	30
			IP-1D-TA		1626.000		1626	2439000.00	1693.75	3.2	5420.00	0.00275805	26.356	27
			IP-1D-TA		1008.960		1008.96	1513440.00	1051.00	3.4	3573.40	0.00275805	22.544	24
			IP-1D-TA		736.320		736.32	1104480.00	767.00	3.6	2761.20	0.00275805	20.467	21
			IP-1D-TA		480.000		480	720000.00	500.00	4.0	2000.00	0.00275805	18.135	21
			IP-1D-TA		227.520		227.52	341280.00	237.00	4.6	1090.20	0.00275805	14.444	18
			IP-1D-TA		123.840		123.84	185760.00	129.00	4.7	606.30	0.00275805	11.592	12
			IP-1D-TA		72.960		72.96	109440.00	76.00	4.7	357.20	0.00275805	9.505	10
			IP-1E-TA		155.184		155.184	232776.00	161.65	4.7	759.76	0.00735502	10.496	12
			IP-1E-TA		126.720		126.72	190080.00	132.00	4.7	620.40	0.00735502	9.728	10
			IP-1F-TA		293.280		293.28	439920.00	305.50	4.4	1344.20	0.00597015	13.518	15
			IP-1F-TA		153.600		153.6	230400.00	160.00	4.7	752.00	0.00773481	10.357	12
			IP-1F-TA		130.560		130.56	195840.00	136.00	4.7	639.20	0.00773481	9.745	10
			IP-1G		105.888		105.888	158832.00	110.30	4.7	518.41	0.01267427	8.212	10
5. Avon / I-64 Area	16603.100	15340.669	64/AV-Large	1874.29	1585.517	1262.431	1585.5168	2378275.20	1651.58	3.2	5285.06	0.00177746	28.350	30
			64/AV-Large		839.981		839.9808	1259971.20	874.98	3.6	3149.93	0.00177746	23.349	24
			64/AV-Large		566.381		566.3808	849571.20	589.98	3.8	2241.92	0.00177746	20.554	21
			64/AV-Large		311.040		311.04	466560.00	324.00	4.4	1425.60	0.00177746	17.344	18
			64/AV-Large		170.880		170.88	256320.00	178.00	4.7	836.60	0.00177746	14.202	15
			64/AV-Large		99.840		99.84	149760.00	104.00	4.7	488.80	0.00177746	11.610	12
			64/AV-Large		58.560		58.56	87840.00	61.00	5.0	305.00	0.00177746	9.728	10
			AV-1A-TA		518.400		518.4	777600.00	540.00	4.0	2160.00	0.00682128	15.751	18
			AV-1A-TA		373.000		373	559500.00	388.54	4.4	1709.58	0.00682128	14.429	15
			AV-1A-TA		208.000		208	312000.00	216.67	4.6	996.67	0.00682128	11.786	12
			AV-1A-TA		121.920		121.92	182880.00	127.00	4.7	596.90	0.00682128	9.724	10
			AV-1B-TA		210.240		210.24	315360.00	219.00	4.6	1007.40	0.00238039	14.415	15
			AV-1B-TA		201.600		201.6	302400.00	210.00	4.6	966.00	0.00238039	14.190	15
			AV-1B-TA		115.200		115.2	172800.00	120.00	4.7	564.00	0.00238039	11.597	12
			AV-1B-TA		72.000		72	108000.00	75.00	4.7	352.50	0.00238039	9.723	10
			AV-1C-TA		857.280		857.28	1285920.00	893.00	3.6	3214.80	0.00177746	23.528	27
			AV-1C-TA		809.280		809.28	1213920.00	843.00	3.6	3034.80	0.00177746	23.025	24
			AV-1C-TA		559.680		559.68	839520.00	583.00	3.8	2215.40	0.00177746	20.462	21
			AV-1C-TA		311.040		311.04	466560.00	324.00	4.4	1425.60	0.00177746	17.344	18

RSA Expansion Area	Total Area (Acre)	Total Developable Area (Acre)	Sub-Watershed Area	Total Sub-Shed Area (Acre)	Developable Area (Acre)	Undevelopable Area (Acre)	Total Drainage Area (Acre)	Flow per Area @ 1500 gpd/acre	Q (gpm)	Peaking Factor	Q_{PEAK} (gpm)	Slope (ft / ft)	Pipe Diameter (in)	Nominal Pipe Diameter (in)
5. Avon / I-64 Area			AV-1C-TA		170.880		170.88	256320.00	178.00	4.7	836.60	0.00177746	14.202	15
			AV-1C-TA		99.840		99.84	149760.00	104.00	4.7	488.80	0.00177746	11.610	12
			AV-1C-TA		58.560		58.56	87840.00	61.00	5.0	305.00	0.00177746	9.728	10
			AV-1F-TA	1891.73	1739.184	152.546	1739.184	2608776.00	1811.65	3.2	5797.28	0.00324254	26.222	27
			AV-1F-TA		1692.480		1692.48	2538720.00	1763.00	3.2	5641.60	0.00324254	25.956	27
			AV-1F-TA		1157.760		1157.76	1736640.00	1206.00	3.4	4100.40	0.00324254	23.028	24
			AV-1F-TA		798.720		798.72	1198080.00	832.00	3.6	2995.20	0.00324254	20.470	21
			AV-1F-TA		264.000		264	396000.00	275.00	4.6	1265.00	0.01436782	11.208	12
			AV-1F-TA		181.440		181.44	272160.00	189.00	4.7	888.30	0.01436782	9.816	10
			64/AV-2(a)		48.000		48	72000.00	50.00	5.0	250.00	0.01598082	5.981	10
			AV-1G-TA		285.120		285.12	427680.00	297.00	4.4	1306.80	0.00774293	12.740	15
			AV-1G-TA		212.160		212.16	318240.00	221.00	4.6	1016.60	0.00774293	11.595	12
			AV-1G-TA		130.560		130.56	195840.00	136.00	4.7	639.20	0.00774293	9.743	10
			AV-1D-TA	2644.87	3989.002		3989.0016	5983502.40	4155.21	2.8	11634.59	0.0014314	39.691	42
			AV-1D-TA		1611.840		1611.84	2417760.00	1679.00	3.2	5372.80	0.0014314	29.707	30
			AV-1D-TA		1527.360		1527.36	2291040.00	1591.00	3.2	5091.20	0.00563768	22.515	24
			AV-1D-TA		1115.520		1115.52	1673280.00	1162.00	3.4	3950.80	0.00563768	20.472	21
			AV-1D-TA		678.720		678.72	1018080.00	707.00	3.6	2545.20	0.00563768	17.360	18
			AV-1D-TA		339.000		339	508500.00	353.13	4.4	1553.75	0.00563768	14.427	15
			AV-1D-TA		177.600		177.6	266400.00	185.00	4.7	869.50	0.00563768	11.605	12
			AV-1D-TA		111.360		111.36	167040.00	116.00	4.7	545.20	0.00563768	9.741	10
			64/AV-3(a)		160.320		160.32	240480.00	167.00	4.7	784.90	0.0152264	9.270	10
			AV-1E-TA		194.880		194.88	292320.00	203.00	4.7	954.10	0.0147492	10.033	12
			AV-1E-TA		180.480		180.48	270720.00	188.00	4.7	883.60	0.0147492	9.749	10
			64/AV-3(c)		143.040		143.04	214560.00	149.00	4.7	700.30	0.0124275	9.226	10
			64/AV-3(d)		203.520		203.52	305280.00	212.00	4.6	975.20	0.0194877	9.601	10
			AV-2A-TA	710.18	598.618	111.562	598.6176	897926.40	623.56	3.8	2369.53	0.00605694	16.675	18
			AV-2A-TA		351.000		351	526500.00	365.63	4.4	1608.75	0.00603865	14.430	15
			AV-2A-TA		191.000		191	286500.00	198.96	4.7	935.10	0.00603865	11.773	12
			AV-2A-TA		139.200		139.2	208800.00	145.00	4.7	681.50	0.00883861	9.735	10
			AV-3B-TA	986.7	945.926	40.774	945.9264	1418889.60	985.34	3.6	3547.22	0.00765404	18.566	21
			AV-3B-TA		538.886		538.8864	808329.60	561.34	3.8	2133.09	0.00765404	15.342	18
			AV-3B-TA		416.640		416.64	624960.00	434.00	4.0	1736.00	0.00765404	14.202	15
			AV-3B-TA		211.200		211.2	316800.00	220.00	4.6	1012.00	0.00765404	11.600	12
			AV-3B-TA		129.600		129.6	194400.00	135.00	4.7	634.50	0.00765404	9.737	10
			AV-3A-TA		271.680		271.68	407520.00	283.00	4.4	1245.20	0.01182732	11.556	12
			AV-3A-TA		161.280		161.28	241920.00	168.00	4.7	789.60	0.01182732	9.741	10
			AV-3C-TA	3719.37	3370.867	348.503	3370.8672	5056300.80	3511.32	2.8	9831.70	0.00208921	34.712	36
			AV-3C-TA		2860.147		2860.1472	4290220.80	2979.32	2.8	8342.10	0.00393082	28.991	30
			AV-3C-TA		2111.040		2111.04	3166560.00	2199.00	3.0	6597.00	0.00443319	25.956	27
			AV-3C-TA		1015.680		1015.68	1523520.00	1058.00	3.4	3597.20	0.00443319	20.676	21
			AV-3C-TA		570.240		570.24	855360.00	594.00	3.8	2257.20	0.00443319	17.361	18
			AV-3C-TA		288.000		288	432000.00	300.00	4.4	1320.00	0.00443319	14.197	15
			AV-3C-TA		157.440		157.44	236160.00	164.00	4.7	770.80	0.00443319	11.603	12
			AV-3C-TA		98.880		98.88	148320.00	103.00	4.7	484.10	0.00443319	9.746	10
			Large		8541.120		8541.12	12811680.00	8897.00	2.5	22242.50	0.00199561	47.553	48
			AV-3D-TA		595.200		595.2	892800.00	620.00	3.8	2356.00	0.01427552	14.169	15
			AV-3D-TA		218.880		218.88	328320.00	228.00	4.6	1048.80	0.01135718	10.918	12
			AV-3D-TA		158.400		158.4	237600.00	165.00	4.7	775.50	0.01135718	9.749	10
			AV-3E-TA		376.320		376.32	564480.00	392.00	4.4	1724.80	0.009375	13.639	15
			AV-3E-TA		234.240		234.24	351360.00	244.00	4.6	1122.40	0.009375	11.609	12
			AV-3E-TA		143.040		143.04	214560.00	149.00	4.7	700.30	0.009375	9.727	10
			AV-3G-TA	1955.26	4415.000		4415	6622500.00	4598.96	2.7	12417.19	0.00380373	33.862	36
			AV-3G-TA		2467.200		2467.2	3700800.00	2570.00	3.0	7710.00	0.00380373	28.321	30
			AV-3G-TA		1720.320		1720.32	2580480.00	1792.00	3.2	5734.40	0.00380373	25.345	27
			AV-3F-TA		606.720		606.72	910080.00	632.00	3.8	2401.60	0.00748192	16.109	18
			AV-3F-TA		411.840		411.84	617760.00	429.00	4.0	1716.00	0.00748192	14.201	15
			AV-3F-TA		217.920		217.92	326880.00	227.00	4.6	1044.20	0.00748192	11.787	12
			AV-3F-TA		127.680		127.68	191520.00	133.00	4.7	625.10	0.00748192	9.724	10
			AV-3H-TA		636.480		636.48	954720.00	663.00	3.8	2519.40	0.00661266	16.785	18
			AV-3H-TA		367.000		367	550500.00	382.29	4.4	1682.08	0.00661266	14.425	15
			AV-3H-TA		196.800		196.8	295200.00	205.00	4.7	963.50	0.00661266	11.705	12
			AV-3H-TA		120.000		120	180000.00	125.00	4.7	587.50	0.00661266	9.723	10
			AV-3I-TA	2820.7	2482.906	337.794	2482.9056	3724358.40	2586.36	3.0	7759.08	0.00303605	29.614	30
			AV-3I-TA		1618.560		1618.56	2427840.00	1686.00	3.2	5395.20	0.00303605	25.841	27
			AV-3I-TA		1072.320		1072.32	1608480.00	1117.00	3.4	3797.80	0.00303605	22.654	24
			AV-3I-TA		670.080		670.08	1005120.00	698.00	3.6	2512.80	0.00303605	19.403	21
			AV-3J-TA		447.360		447.36	671040.00	466.00	4.0	1864.00	0.0068899	14.876	18
			AV-3J-TA		354.240		354.24	531360.00	369.00	4.4	1623.60	0.0068899	14.126	15
			AV-3J-TA		151.680		151.68	227520.00	158.00	4.7	742.60	0.0068899	10.534	12
			AV-3J-TA		122.880		122.88	184320.00	128.00	4.7	601.60	0.0068899	9.735	10
			AV-3K-TA		292.800		292.8	439200.00	305.00	4.4	1342.00	0.0104297	12.168	15
			AV-3K-TA		202.560		202.56	303840.00	211.00	4.6	970.60	0.0104297	10.776	12
			AV-3K-TA		151.680		151.68	227520.00	158.00	4.7	742.60	0.0104297	9.747	10
			64/AV-8(b1)		201.600		201.6	302400.00	210.00	4.6	966.00	0.01089621	10.669	12
			64/AV-8(b1)		158.400		158.4	237600.00	165.00	4.7	775.50	0.01089621	9.825	10
			AV-3L-TA		278.500		278.5	417750.00	290.10	4.4	1276.46	0.0111982	11.784	12
			AV-3L-TA		163.000		163	244500.00	169.79	4.7	798.02	0.0111982	9.881	10
			AV-3M-TA		398.400		398.4	597600.00	415.00	4.4	1826.00	0.0101688	13.723	15
			AV-3M-TA		243.840		243.84	365760.00	254.00	4.6	1168.40	0.0101688	11.607	12
			AV-3M-TA		149.760		149.76	224640.00	156.00	4.7	733.20	0.0101688	9.746	10
			AV-3I-TA		269.760		269.76	404640.00	281.00	4.4	1236.40	0.00988468	11.919	15

RSA Expansion Area	Total Area (Acre)	Total Developable Area (Acre)	Sub-Watershed Area	Total Sub-Shed Area (Acre)	Developable Area (Acre)	Undevelopable Area (Acre)	Total Drainage Area (Acre)	Flow per Area @ 1500 gpd/acre	Q (gpm)	Peaking Factor	Q_{PEAK} (gpm)	Slope (ft / ft)	Pipe Diameter (in)	Nominal Pipe Diameter (in)
5. Avon / I-64 Area			AV-3I-TA		240.000		240	360000.00	250.00	4.6	1150.00	0.00988468	11.600	12
			AV-3I-TA		146.880		146.88	220320.00	153.00	4.7	719.10	0.00988468	9.727	10
6. Delong Road / Richmond Road Area	5588.220	5269.842	DR-1A-TA	1730.04	1568.640	318.378	1568.64	2352960.00	1634.00	3.2	5228.80	0.00156174	28.930	30
			DR-1A-TA		1228.800		1228.8	1843200.00	1280.00	3.4	4352.00	0.00192926	25.956	27
			DR-1A-TA		536.000		536	804000.00	558.33	3.8	2121.67	0.0008	23.384	24
			DR-1B-TA		864.000		864	1296000.00	900.00	3.6	3240.00	0.0094088	17.265	18
			DR-1B-TA		462.720		462.72	694080.00	482.00	4.0	1928.00	0.0094088	14.211	15
			DR-1B-TA		244.000		244	366000.00	254.17	4.6	1169.17	0.0094088	11.780	12
			DR-1B-TA		96.000		150	225000.00	156.25	4.7	734.38	0.0094088	9.895	10
			Large Trunk		4493.760		4493.76	6740640.00	4681.00	2.7	12638.70	0.00177089	39.341	42
			Large Trunk		3310.080		3310.08	4965120.00	3448.00	2.8	9654.40	0.00177089	35.562	36
			DR-1C-TA	894.56	746.880		746.88	1120320.00	778.00	3.6	2800.80	0.0018616	22.150	24
			DR-1C-TA		604.800		604.8	907200.00	630.00	3.8	2394.00	0.0018616	20.884	24
			DR-1C-TA		318.720		318.72	478080.00	332.00	4.4	1460.80	0.0018616	17.353	18
			DR-1C-TA		178.560		178.56	267840.00	186.00	4.7	874.20	0.0018616	14.313	15
			DR-1C-TA		96.000		96	144000.00	100.00	4.7	470.00	0.0018616	11.342	12
			DR-1C-TA		59.520		59.52	89280.00	62.00	5.0	310.00	0.0018616	9.703	10
			DR-1D-TA	2345.41	2177.904		2177.904	3266856.00	2268.65	3.0	6805.95	0.0045584	26.125	27
			DR-1D-TA		1459.200		1459.2	2188800.00	1520.00	3.2	4864.00	0.0045584	23.032	24
			DR-1D-TA		1003.200		1003.2	1504800.00	1045.00	3.4	3553.00	0.0045584	20.473	21
			DR-1D-TA		577.920		577.92	866880.00	602.00	3.8	2287.60	0.0045584	17.357	18
			DR-1E-TA		289.920		289.92	434880.00	302.00	4.4	1328.80	0.0110742	11.988	15
			DR-1E-TA		192.000		265	397500.00	276.04	4.6	1269.79	0.0110742	11.785	12
			DR-1E-TA		155.520		155.52	233280.00	162.00	4.7	761.40	0.0110742	9.728	10
			DR-2C		200.640		200.64	300960.00	209.00	4.6	961.40	0.01707412	9.790	10
			DR-2B-TA		241.000		241	361500.00	251.04	4.6	1154.79	0.01707412	10.486	12
			DR-2B-TA		206.000		206	309000.00	214.58	4.6	987.08	0.01707412	9.887	10
			DR-2A-TA		150.720		150.72	226080.00	157.00	4.7	737.90	0.01707412	8.865	10

Constants:

Usage	=	100	gpcd
Population	=	15	people/acre
n	=	0.013	Manning's EQ.
d/D	=	0.67	
A/D^2	=	0.5594	
R/D	=	0.2917	

LEXINGTON-FAYETTE
URBAN COUNTY GOVERNMENT
Lexington, Kentucky

Appendix B

Appendix B

Table 4-2
Peaking Factors

Average Daily Flow Rate (GPD)	Average Daily Flow Rate (GPM)	Tributary Population	Ratio of Peak Instantaneous Flow Rate to Average Daily Flow Rate
<100,000	<69	<1,000	5.0
100,000-300,000	69-208	1,001-3,000	4.7
300,000-400,000	208-278	3,001-4,000	4.6
400,000-600,000	278-417	4,001-6,000	4.4
600,000-800,000	417-556	6,001-8,000	4.0
800,000-1,000,000	556-694	8,001-10,000	3.8
1,000,000-1,500,000	694-1,042	10,001-15,000	3.6
1,500,000-2,000,000	1,042-1,389	15,001-20,000	3.4
2,000,000-3,000,000	1,389-2,083	20,001-30,000	3.2
3,000,000-4,000,000	2,083-2,778	30,001-40,000	3.0
4,000,000-6,000,000	2,778-4,167	40,001-60,000	2.8
6,000,000-8,000,000	4,167-5,556	60,001-80,000	2.7
8,000,000-10,000,000	5,556-6,944	80,001-100,000	2.6
>10,000,000	>6,944	>100,000	2.5

LEXINGTON-FAYETTE
URBAN COUNTY GOVERNMENT
Lexington, Kentucky

Appendix C

Estimate of Probable Cost

Rural Service Area
Sanitary Sewer Capability Study
Lexington-Fayette Urban County Government

Exhibit: **Appendix C**
Reference ID: **Unit Cost**

Item No.	Description		Units of Measure	Unit Cost	
TRUNK SEWERS:					
1	12" PVC Gravity Sewer (DR 35)		LF	60	
2	15" PVC Gravity Sewer (DR 35)		LF	70	
3	18" PVC Gravity Sewer (DR 35)		LF	75	
4	21" PVC Gravity Sewer (DR 35)		LF	85	
5	24" PVC Gravity Sewer (DR 35)		LF	105	
6	27" PVC Gravity Sewer (DR 35)		LF	130	
7	30" DI Gravity Sewer (PC 200) w/Protecto 401		LF	155	
8	36" DI Gravity Sewer (PC 200) w/Protecto 401		LF	220	
9	42" DI Gravity Sewer (PC 200) w/Protecto 401		LF	280	
10	48" DI Gravity Sewer (PC 200) w/Protecto 401		LF	380	
11	54" DI Gravity Sewer (PC 200) w/Protecto 401		LF	475	
12	60" DI Gravity Sewer (PC 200) w/Protecto 401		LF	565	
MANHOLES:					
13	4'0" Dia. Std. Manhole (Upto 6' Deep)		EA	2,000	
14	5'0" Dia. Std. Manhole (Upto 6' Deep)		EA	2,500	
15	6'0" Dia. Std. Manhole (Upto 6' Deep)		EA	3,500	
16	7'0" Dia. Std. Manhole (Upto 6' Deep)		EA	5,000	
17	8'0" Dia. Std. Manhole (Upto 6' Deep)		EA	7,500	
18	4'0" Dia. Manhole Barrel Extension		VLF	125	
19	5'0" Dia. Manhole Barrel Extension		VLF	180	
20	6'0" Dia. Manhole Barrel Extension		VLF	300	
21	7'0" Dia. Manhole Barrel Extension		VLF	450	
22	8'0" Dia. Manhole Barrel Extension		VLF	650	
23	Waterproof Manhole Covers		EA	250	
24	New Manhole - Set On Existing Sewer		EA	5,000	
FORCE MAIN:					
25	6" DI Force Main (PC 350 w/ Protecto 401)		LF	25	
26	8" DI Force Main (PC 350 w/ Protecto 401)		LF	30	
27	10" DI Force Main (PC 350 w/ Protecto 401)		LF	35	
28	12" DI Force Main (PC 350 w/ Protecto 401)		LF	42	
29	14" DI Force Main (PC 250 w/ Protecto 401)		LF	50	
30	16" DI Force Main (PC 250 w/ Protecto 401)		LF	59	
31	18" DI Force Main (PC 250 w/ Protecto 401)		LF	66	
32	20" DI Force Main (PC 250 w/ Protecto 401)		LF	75	
33	24" DI Force Main (PC 200 w/ Protecto 401)		LF	102	
34	30" DI Force Main (PC 200 w/ Protecto 401)		LF	139	
35	36" DI Force Main (PC 200 w/ Protecto 401)		LF	182	

36	42" DI Force Main (PC 200 w/ Protecto 401)		LF	242	
37	48" DI Force Main (PC 200 w/ Protecto 401)		LF	310	
38	54" DI Force Main (PC 200 w/ Protecto 401)		LF	380	
39	60" DI Force Main (PC 200 w/ Protecto 401)		LF	450	
ROAD BORES / TUNNEL:					
40	14" Steel Casing for 8" Carrier Pipe		LF	230	
41	16" Steel Casing for 10" Carrier Pipe		LF	260	
42	18" Steel Casing for 12" Carrier Pipe		LF	320	
43	24" Steel Casing for 14" - 15" Carrier Pipe		LF	350	
44	28" Steel Casing for 16" Carrier Pipe		LF	390	
45	30" Steel Casing for 18" Carrier Pipe		LF	430	
46	36" Steel Casing for 20" - 21" Carrier Pipe		LF	475	
47	38" Steel Casing for 24" Carrier Pipe		LF	550	
48	40" Steel Casing for 27" Carrier Pipe		LF	625	
49	46" Steel Casing for 30" Carrier Pipe		LF	750	
50	50" Steel Casing for 36" Carrier Pipe		LF	925	
51	60" Steel Casing for 42" Carrier Pipe		LF	1,100	
52	66" Steel Casing for 48" Carrier Pipe		LF	1,300	
53	72" Steel Casing for 54" Carrier Pipe		LF	1,500	
54	78" Steel Casing for 60" Carrier Pipe		LF	1,800	
MISCELLANEOUS:					
55	Pavement Replacement:		LF	25	
56	Aggregate Surface Replacement		LF	15	
57	Concrete for Encasement		CY	150	
58	Crushed Stone for Special Pipe Bedding		TN	25	
59	Clean-Up/Final Grading/Seeding/Sowing		LF	4	
60	Sewage Air Release Valves		EA	2,500	
PUMP STATIONS:					
61	Pump Station		EA		

Subtotal	**$0**
15% Contingency	$0
Total Construction Cost	**$0**
20% Non-Construction Costs	$0
Total Estimate of Probable Cost	**$0**

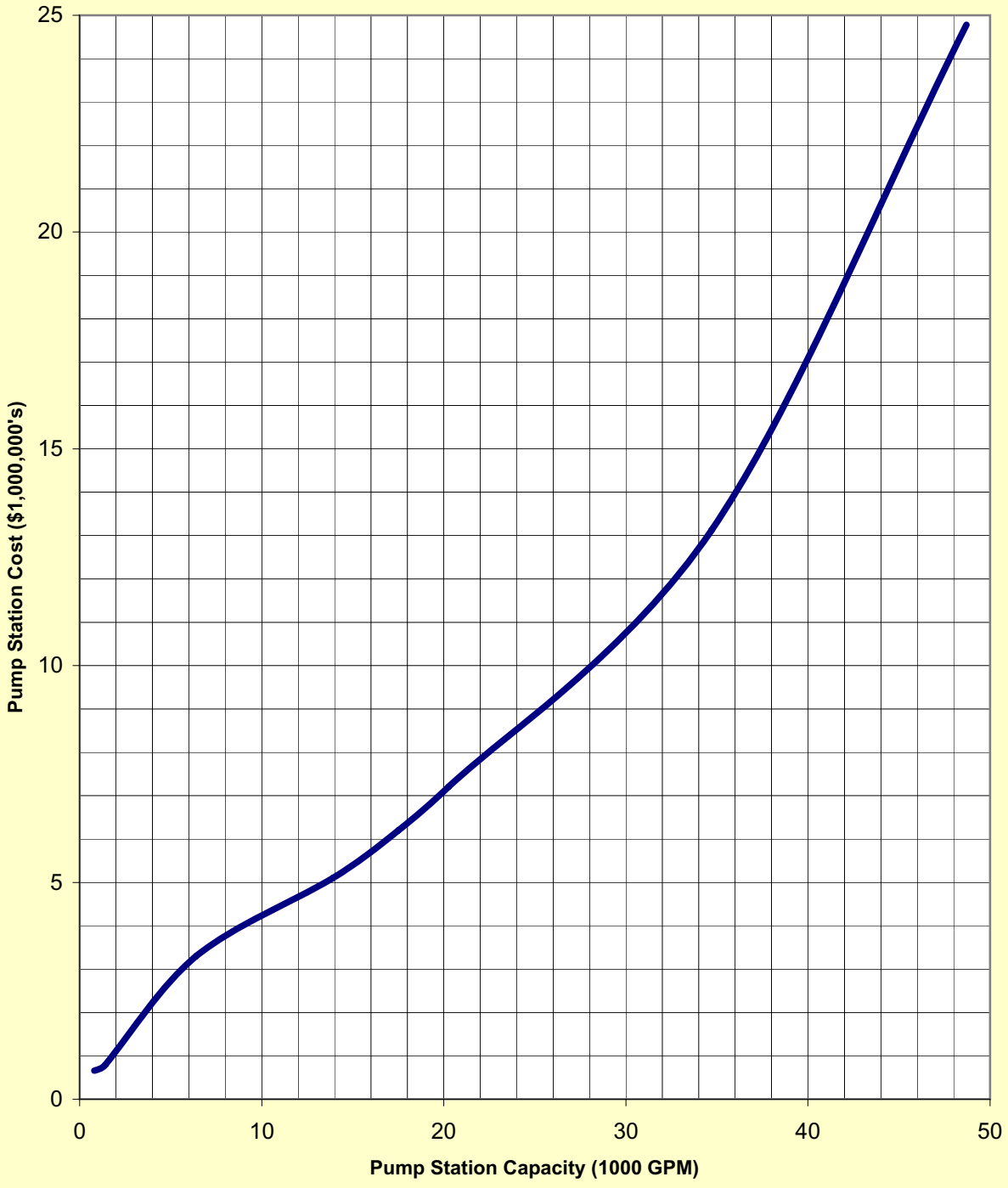
LEXINGTON-FAYETTE
URBAN COUNTY GOVERNMENT
Lexington, Kentucky

Appendix D

Appendix D.1
Pump Station Data & Costs

Pump Station Name	Class	Capacity (gpm)	Location	Reference ID	Cost: ($)
1. Lower South Elkhorn	B	2,625	LSE	LSE-1A-PSB	$1,200,000
2. Expansion of South Elkhorn	A	15,825	LSE	LSE-1A-PSA	$1,100,000
3. Man O' War West	B	1,600	MW	MW-1A-PSB	$600,000
4. New Wolf Run	A	12,400	OFP	OFP-1A-PSA	$4,800,000
5. Old Frankfort Pike	A	3,800	OFP	OFP-2A-PSA	$2,000,000
6. Ironworks Pike	A	13,500	IP	IP-1B-PSA	$5,000,000
7. Bryan Station Road	A	16,725	AV	AV-1C-PSA	$6,000,000
8. Briar Hill Road	B	2,400	AV	AV-2A-PSB	$1,100,000
9. Avon	A	23,000	AV	AV-3A-PSA1	$8,400,000
10. Cleveland Road	A	17,500	AV-1	AV-3A-PSA2	$6,200,000
11. Cleveland Road	A	23,000	AV-3	AV-3A-PSA3	$8,400,000
12. Tates Creek Road	A	14,500	DR	DR-1A-PSA	$5,300,000
13. Boonesboro-Manor	B	2,400	DR	DR-2B-PSB	$1,600,000

Appendix D.2
Estimate of Probable Cost
Pump Stations
LFUCG RSA Sanitary Sewer Capacity



LEXINGTON-FAYETTE
URBAN COUNTY GOVERNMENT
Lexington, Kentucky

Appendix E