MSD

Louisville and Jefferson County
Metropolitan Sewer District

Updated Sanitary Sewer Overflow Plan

February 10, 2006

MSD

Louisville and Jefferson County
Metropolitan Sewer District

SECTION 1

SECTION 1: INTRODUCTION

1.1 REPORT PURPOSE

The Sanitary Sewer Overflow Program (SSOP) is MSD's centralized program for managing the investigation, prioritization, and rehabilitation of the Separate Sanitary Sewer (SSS) system in order to reduce sanitary sewer overflows and basement backups. This program represents MSD's proactive approach toward eliminating excess inflow and infiltration from the SSS in order to achieve these goals and provide capacity and treatment. As dictated in the Consent Decree (CD), MSD must define the SSOP activities in three reports.

1.1.1 Update SSOP

This document satisfies the requirement of Paragraph 24(a)(1) of the CD which stipulates that MSD will submit an Updated SSOP to the Kentucky Environmental and Public Protection Cabinet Department for Environmental Protection's Division of Water (DOW) and to the United States Environmental Protection Agency (EPA), no later than six months (February 12, 2006) after formal entry into the CD and shall include detailed improvements to be accomplished through December 31, 2008.

This Update SSOP consists of eight sections. The first section is the introduction to this report, which covers the purpose of the document and the background and history of MSD's program. The introduction is followed by six sections that are each dedicated to the regional sewersheds; section eight is dedicated to the sub-regional package treatment plants. Each of the following sections include details of the system characteristics, flow monitoring, Sanitary Sewer Evaluation Study (SSES) activities, hydraulic modeling, collection system rehabilitation, abatement alternatives, tables, maps and fact sheets for known discharge locations.

1.1.2 Interim Sanitary Sewer Discharge Plan (SSDP)

Paragraph 24(a)(2) of the CD stipulates that by September 30, 2007, MSD will submit an Interim SSDP identifying remedial measures for the specific unauthorized discharges (specified in Paragraph 24(a)(2)) in the SSS. As written in the CD, the Interim SSDP shall include schedules for design and construction to be completed by December 31, 2011 for the Beechwood Village area and Southeastern Diversion Structure and by December 31, 2013 for the Hikes Point area and the Highgate Springs Pump Station.

1.1.3 Final SSDP

Paragraph 24(a)(3) of the CD further stipulates that by December 31, 2008, MSD will submit a Final SSDP to the DOW/EPA for review and joint approval. The Final SSDP will identify remedial measures for the unauthorized discharges from the SSS at locations not identified in the Interim SSDP. The Final SSDP will contain the long term projects, including schedules, milestones, and deadlines that will not extend past December 31, 2024.

1.2 GROWTH: SEPARATE SANITARY SEWER SYSTEM

1.2.1 Historical Background

MSD's first sewers were installed before 1850, routing wastewater directly to the Ohio River. By the end of the 19th Century, the system had expanded to almost 100 miles of clay, brick, and timber-lined sewers that moved the waste of 209,000 residents directly to the Ohio River. The Metropolitan Sewer District (MSD) was formed in 1946, and as the combined system continued to expand within the City, the first wastewater treatment plant (Morris Forman) went into operation in 1958. Currently, more than 10% of MSD's sewers are over 100 years old.

As the County expanded, septic systems and package treatment plants began to appear to keep pace with development. Over the years MSD has acquired and eliminated more than 300 small package plants and eliminated more than 40,000 septic systems in Jefferson County.

1.2.2 SSO Program History (Prior to 1997)

Since the early 1960s, MSD has conducted periodic sewer evaluation and rehabilitation studies in order to assess collection system condition and improve capacity to prevent basement backups. These early projects were reactive in nature, developed purely in response to active problems.

MSD, recognizing that Combined Sewer Overflows (CSOs) and Sanitary Sewer Overflows (SSOs) were related, consolidated the SSO Program which began officially with the hiring of the MSD I/I Coordinator in 1993 to develop a comprehensive program to address SSOs. Initial goals of the Program were to continue the on-going SSES work, to integrate the efforts of MSD's Maintenance Department with the Engineering Department, to research and potentially implement a comprehensive Private Property Program; to evaluate new technologies; to evaluate programs in other municipalities; actively participate in the National EPA effort to develop SSO Guidance and to improve MSD's SSO reporting.

This program outlined a 15-year program of study, investigation, and rehabilitation designed to minimize SSOs and their impact on the environment. The new SSO Team produced the first Sanitary Sewer Overflow Plan (SSOP) in 1997. This report not only reviewed important project activities that took place during the year, but outlined MSD's vision and 15-year plan for SSO reduction activities. SSOPs were submitted in 1997 and 1998 and were consolidated with the Combined Sewer Overflow Plan (CSOP) and Municipal Separate Storm Sewer System (MS4) under the WATERS (Watershed Approach to Environmentally Responsible Stewardship) Report beginning in 1999.

1.2.3 SSO Program History (1998 to Present)

Between 1998 and the present, the SSO program focus has shifted. Initially, the program was primarily investigation-based, focused on characterizing the system and quantifying/prioritizing the problems. From 2000 to 2002, the program shifted toward large-scale rehabilitation and evaluation, averaging over $8 Million annually in sanitary sewer rehabilitation projects in order to repair those areas deemed critical during the characterization phase. To determine the effectiveness of these rehabilitation construction projects, MSD used flow monitoring to compare pre-rehab and post-rehab data. The results of these post-construction evaluations have shown that large-scale collection system rehabilitation is not the most cost-effective method to reduce SSOs and improve water quality. Therefore, beginning in 2003, the SSO, CSO, and MS4 programs were integrated in order to re-evaluate water quality from a watershed-based approach. Trends in SSO reduction/elimination has been moving away from indiscriminate, wide-scale sewer and manhole rehabilitation and toward more targeted, cost-effective approaches to increase conveyance capacity. While traditional sewer rehabilitation techniques are still used to renew deteriorating infrastructure, MSD no longer uses these techniques for the sole purpose of reducing wet weather impact on the collection system.

1.3 MSD ORGANIZATION AND STRUCTURE

MSD is governed by an 8-member citizen board that approves budgets, rates, policies, and initiatives. They are appointed by the Metro Mayor and serve 3-year overlapping terms. The MSD Board meets bi-weekly in a public forum at MSD. Daily operations are managed by the Executive Director. MSD is organized into divisions consisting of: Infrastructure & Flood Protection (I&FP), Legal, Human Resources, Finance, Physical Assets, Regulatory Management Services (RMS), Engineering, Operations and Information Technology.

1.3.1 Programmatic Reorganization (From 1988 to 1997)

The regulatory initiatives that established the CSO, SSO and MS4 programs occurred independently and at different times. As such, the programs established obligations and regulatory requirements that did not necessarily reflect the efforts of the other programs. This structure did not lend itself to integrated solutions related to the permits and programs.

As a result, significant organizational changes occurred during this timeframe, including the following actions:

- Creation of an Information Technology Division and implementation of process mapping;
- Establishment of Watershed Area Teams and reorganization of the Engineering Division;
- Integration of the regulatory programs managed within the Stormwater Department, including the CSO, SSO, MS4 and Stream Monitoring programs;
- Formation of the Industrial Compliance and Monitoring Division; and
- Integration of Operations and Maintenance resources and functions.

1.3.2 Programmatic Reorganization (From 1997 to Present)

Prior to 1999, MSD developed a separate report for the CSO, SSO and MS4 programs on an annual basis. As the focus on watershed management became more prevalent, MSD assessed ways to provide a coordinated overview of the three regulatory programs on a watershed basis. MSD entered into discussions with DOW to develop a new reporting format that would incorporate the then existing programmatic reporting with the similar information on a watershed basis. This combined reporting called WATERS (Watershed Approach To Environmentally Responsive Stewardship) allowed the regulatory agency to view activities both from a programmatic and a watershed approach.

As this new combined report was generated each year, it became clear that the next step was to integrate the programs within the MSD organizational structure to achieve the goal of true watershed management. In late 2000, the CSO and SSO programs were merged. The next year, the MS4 and Stream Monitoring programs were added to the merged CSO and SSO programs.

The integration of these programs required a strategic and targeted planning effort. In 2001, MSD embarked on the development of a Strategic Water Quality-Based Management Plan. The first step was to form a Wet Weather and Water Quality (WWWQ) Team to coordinate internal and external wet weather program management functions with their internal and external partners. Recent efforts have increased the scope of functions performed within the WWWQ Team to include management of the Pretreatment Compliance Program, which was previously in a separate MSD division. With this latest addition to the program, the department became the Regulatory Management Services (RMS) Division, and reports to a Director-Level Administrator.

The last Waters Report submittal was made in December 2004 and the latest MS4 report was submitted in December 2005 with the SSOP Update and interim Long Term Control Plan to be submitted by February 12, 2006.

1.3.3 Watershed Area Teams

Under the Engineering Division, the three Watershed Area Teams are responsible for the planning and execution of neighborhood maintenance, major capital projects, and coordination of operations and customer service needs in their respective service areas. Figure 1 depicts the three area team boundaries in Jefferson County. These Area Teams include:

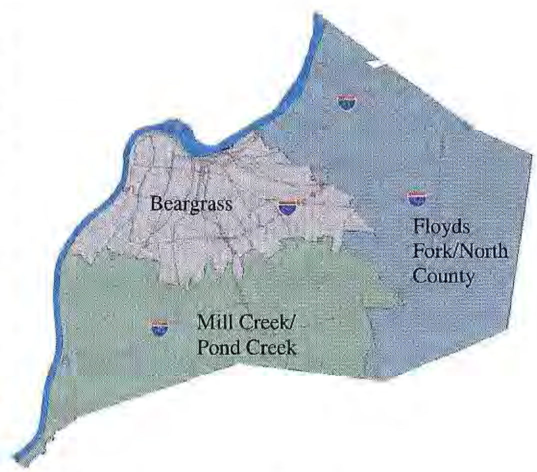


Figure 1 – Current Area Team Boundaries

- ***Beargrass Creek***—the most densely populated area, Beargrass Creek covers about 61 square miles in the northwestern corner of the county bordered by the Ohio River. Major facilities in this area include Morris Forman Wastewater Treatment Plant (MSD's main wastewater treatment plant) and the Beargrass Creek Pumping Station. The entire combined sewer system and some of the SSS are contained within the Beargrass Creek watershed.
- ***Floyds Fork/North County***—covers about 122 square miles in the eastern portion of Jefferson County. This area contains the Floyds Fork, Hite Creek, and Jeffersontown wastewater treatment plants.
- ***Mill Creek/Pond Creek***—situated on the southern county boundary along the Ohio River, Mill Creek/Pond Creek contains 154 square miles of area, the West County Wastewater Treatment Plant, and Cedar Creek Wastewater Treatment Plant.

1.3.4 Regulatory Management Services (RMS) Division

The RMS Division fulfills requirements specified by Paragraph 22 of the Consent Decree. This Division is headed by a Director-Level Administrator that reports directly to MSD's Executive Director and Board as required by the Consent Decree. RMS is responsible for CSO and SSO programs and projects countywide and works closely with the other MSD entities including the Area Teams, Operations, and I&FP to implement wet weather projects, policy, and programs.

1.4 TREATMENT SYSTEMS AND CHARACTERISTICS

See Figure 2 for a map that outlines the general service areas.

MSD currently has over 3,100 miles of separate and combined sewers (approximately 600 combined, 2,500 separate), serving over 220,000 customer accounts throughout the 385 square miles of Jefferson County. The following table shows current MSD collection and treatment system statistics.

Population Served	693,000
Number of Customer Accounts	220,000
Number of Treatment Plants	6 Major, 19 small package plants
Total Wastewater Design Treatment Capacity	172.4 MGD
Total Volume of Wastewater Treated	145.4 MGD
Miles of Gravity Sewers	2,957
Number of Manholes	65,000 +
Number of Inverted Siphons	18
Number of Pump Stations	275
Miles of Force Main	162
Number of Employees	602
Total Annual Operating Budget	$78.6M

MSD operates six major wastewater treatment plants as identified below:

- ***Morris Forman, 120 MGD – KPDES Permit No. KY0022411,*** constructed in 1958, serves the entire combined sewered area and a large portion of the separate sewered area in eastern Jefferson County. MFWTP serves roughly 139,000 customer accounts and is the only WTP with combined sewers.
- ***West County, 30 MGD – KPDES Permit No. KY0078956,*** built in 1986 and recently expanded to its present capacity, the West County WTP serves about 51,000 customer accounts in southern and southwestern Jefferson County.
- ***Cedar Creek, 7.5 MGD – KPDES Permit No. KY0089540,*** completed in 1995 and rated at 2.2 MGD, the plant was expanded to its current capacity in 2001 and serves approximately 5,700 customer accounts.
- ***Floyds Fork, 3.25 MGD – KPDES Permit No. KY0102784,*** began operation in 2001 and is MSD's newest treatment plant. Floyds Fork WTP serves approximately 2,300 customer accounts.
- ***Jeffersontown, 4.0 MGD – KPDES Permit No. KY0025194,*** was acquired from the City of Jeffersontown in 1990. The Jeffersontown plant was recently expanded to 4.0 MGD. It serves approximately 7,000 customer accounts and treats an average daily flow of 3.7 MGD.
- ***Hite Creek, 4.4 MGD – KPDES Permit No. KY0022420,*** Originally built in 1970 and rated at 2.2 MGD, the Hite Creek WTP was expanded in 2005 to its present capacity and serves approximately 6,200 customer accounts.

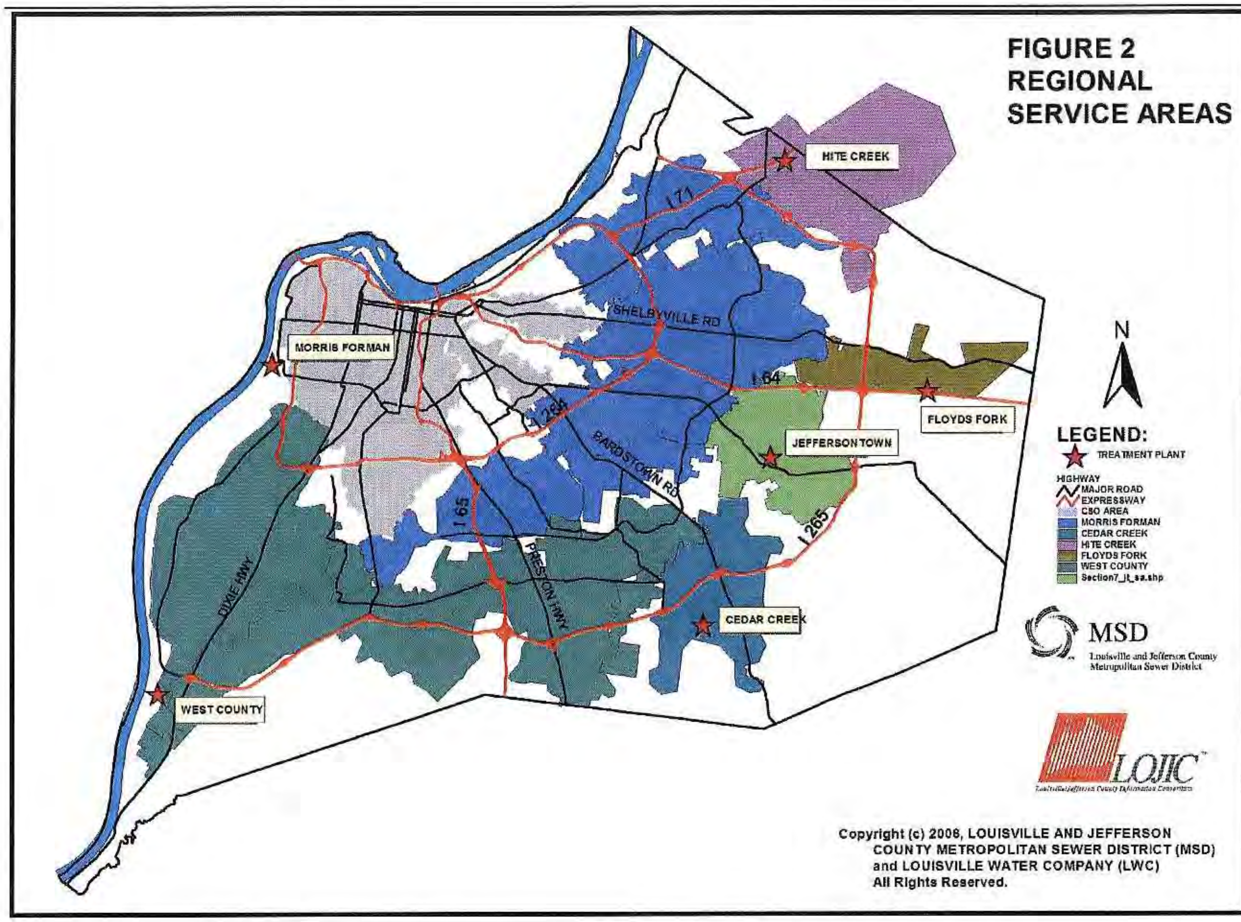


Figure 2 –Service Area Outline

1.5 PHILOSOPHY AND APPROACH TO ADDRESSING OVERFLOWS

MSD's efforts to address system wet weather Inflow and Infiltration (I/I) and the resultant SSO problems were centralized following the extensive flooding in March 1997. Prior to this date, MSD conducted I/I studies and rehabilitation based on response to acute problem areas and eliminated SSOs through system capacity expansions. As MSD gained more system condition data using the program elements, the program shifted toward system rehabilitation. Use of the program elements is demonstrated in the chapters which outline what has been done in specific sewersheds.

Program Elements:

- Flow monitoring
- SSES and other sewer investigation/study project
- Computer modeling
- Rehabilitation
- Post-Rehabilitation flow monitoring

1.5.1 Flow Monitoring

During the flow monitoring phase, entire sewersheds were broken down into sub basins. Rain gauges and flow monitors were installed in each basin, and were monitored for a specified period of time or until sufficient rainfall and flow response had been obtained. The flow monitoring data was then analyzed for typical parameters, such as peaking factor, average dry flows, and wet weather flow characteristics in order to determine the nature of the problem for each sub basin. This flow data served as the basis for prioritizing the sewershed for further study and rehabilitation.

1.5.2 Sanitary Sewer Evaluation Studies (SSES)

The SSES is an important tool for diagnosing the condition of the sewer system. SSES project areas are determined by flow monitoring results and findings from hydraulic modeling. The SSES is then used to prioritize areas for rehabilitation, construction and maintenance activities. The SSES process used is detailed below.

- **Smoke testing** is a low-cost method of locating major collection system defects. This is an effective means to identify both direct and indirect storm sewer cross-connections. With the increasing realization that private property defects can contribute significantly to wet weather capacity problems, it is important to identify private side defects. Smoke testing is the best tool for locating and documenting such defects without accessing private property.
- **Manhole inspections** are used to determine the condition of manholes, to verify parameters and to lamp sewer lines. Line Lamping is a process where a strong light is shined down a pipe to illuminate the pipe interior which is then observed from the manhole for obvious defects such as root intrusions, active leaks, or other observable defects. Line lamping performed during the manhole inspection is important in determining which lines to TVI.
- **TVI Review** includes cleaning of sewer lines when necessary to allow inspection. The purpose of the TVI review is to locate and quantify pipe defects that allow inflow and infiltration to occur. Typical defects include cracked and broken lines, dropped and/or leaking joints, root intrusions, and general pipe conditions such as grease buildup and sags.
- **Dye Water Testing** is used to confirm potential cross-connections and other inflow leaks. This item is used to verify cross-connections and typically is used only in contingency when smoke testing does not positively identify potential cross-connections.
- **Night Flow Isolation** is used to identify areas that have significant infiltration by quantifying base flows that occur when sanitary flows are at a minimum and therefore the chief component of the flow is clear water. Results are used to narrow down areas that may benefit from TVI.
- **Wet Weather Investigation** has been added, where field crews seek out overflows during wet weather, perform dye water tests as needed, and install surcharge level indicators (SLI's) at select locations. Such locations include downstream of pump stations and in areas where manhole inspections identified significant surcharging.
- **FELL 41 Inspection** relies on a specially-constructed electrode called a "sonde" that generates an electrical field and a second electrode that is put in the ground surface. The sonde is pulled through a surcharged, non-conductive sewer pipe and the magnitude of

the current flow from the sonde to the surface electrode is monitored. Defects in the pipe that allow the flow of fluids into or out of the pipe will provide an electrical pathway, causing a spike in electric current. Although this system is not a replacement for closed-circuit television inspection, initial findings indicate that the FELL 41 system can locate and quantify potential leaks that would not be identified otherwise. This technology targets lines identified through lamping as having high defective potential and areas that are near surface waters, ponding areas, or otherwise likely to experience high groundwater levels. The current cost to inspect a given line is similar to that of TVI, though the inflow/infiltration measurement capability is far superior to TVI (though without a visual component).

- **Sonar** is used when sewers are completely submerged with water and a sonar image of the pipe with its condition/defects is generated. The image identifies debris in the pipe as well as defects and holes. This is generally used in about 24-inch lines or greater as the equipment will not fit in smaller sewers.
- **TISCIT** is used when the sewer diameter is about 24-inch or greater and the line is partially submerged. This technique includes a CCTV floating on top of sonar. The image is CCTV on top and sonar in the submerged section of pipe. Using TISCIT and sonar prevent the need to perform bypass pumping which isn't cost effective on larger diameter pipe.

1.5.3 Computer Modeling

The hydraulic flow model is built for selected basins in tandem with the flow monitoring. The hydraulic model is populated with infrastructure data from MSD's IMS sewer asset database. Field inspection and survey are then typically required to verify data that does not make "hydraulic sense." The model is then calibrated using the flow monitoring data. The hydraulic model is used for "hydraulic verification" of the existing asset database, identification of significant hydraulic bottlenecks (capacity determination), and testing rehabilitation scenarios, modeling wet-weather system response, and identifying the impact of future development scenarios.

1.5.4 Rehabilitation

A rehabilitation plan is then developed for each SSES project area, depending upon the size of the area and severity of I/I problems discovered during the investigation phase. Inflow problems are addressed first (in order to lower the critical peak wet-weather flow rates), followed by infiltration problems. Rehabilitation planning is optimized by evaluating rehabilitation scenarios through hydraulic modeling in selected project areas.

1.5.5 Post-Rehabilitation Flow Monitoring

Flow Monitoring is conducted after each phase of rehabilitation to assess the effectiveness of each rehabilitation construction effort. Flow monitors are placed in the same manholes that were used in the preliminary basin-wide flow monitoring program. Additionally, control basins are used (basins that are not rehabilitated) in order to adjust the post-rehabilitation flow data for any seasonal or antecedent condition differences between the pre- and post- flow monitoring periods to get a more realistic representation of the rehabilitation results.

1.6 OTHER SSO RELATED REPORT REQUIREMENTS

1.6.1 Capacity, Management, Operation and Maintenance (CMOM) Program Self-Assessment

MSD has used CMOM principles since the early 1960's to operate and maintain the sewers in Jefferson County. Now MSD employs an aggressive approach to investigate, evaluate and develop solutions to the wet weather and water quality issues facing Jefferson County. The sources of water quality impairment are not limited to sanitary sewer overflows; investigation and evaluation must also include the impacts of combined sewer overflows and storm water runoff. MSD's approach is that of watershed management, in which all sources of impairment are evaluated simultaneously to determine real solutions to real problems and to attain the ultimate goal – stream water quality compliance and enhancement.

These principles will be outlined in the CMOM Program Self-Assessment which will satisfy the requirement of Paragraph 23(c) of the CD which stipulates that MSD will submit the Self-Assessment to the Kentucky Division of Water/EPA no later than six months (February 12, 2006) after formal entry into the CD. The Update includes detailed improvements and schedules.

1.6.2 Sewer Overflow Response Protocol (SORP)

MSD has made a tremendous investment in technology to aid planning and management activities throughout the organization. There are many tools available to track overflows and develop methods to abate overflows in the community. An interactive Geographical Information System (GIS) allows managers to view overflow locations, identify landuse, service area, and watersheds and correlate overflow data to many other community assets and features maintained in their Hansen Asset Management System (Hansen) and the Louisville and Jefferson County Information Consortium (LOJIC) GIS database. MSD maintains an active database in the Hansen system on SSOs reported to KDOW. This database is analyzed to help develop patterns and to predict system SSO response in order to streamline investigation and mitigation efforts.

SSOs that are identified by operations, maintenance and field reconnaissance activities are reported to DOW and entered into Hansen following procedures identified in MSD's SORP, which is a companion to this document.

This process will be outlined in the SORP which will satisfy the requirement of Paragraph 23(d) of the CD which stipulates that MSD will submit the SORP to the DOW/EPA no later than six months (February 12, 2006) after formal entry into the CD.

MSD

Louisville and Jefferson County
Metropolitan Sewer District

SECTION 2

SECTION 2: MORRIS FORMAN WASTEWATER TREATMENT PLANT

2.1 MORRIS FORMAN WASTEWATER TREATMENT PLANT HISTORY

The Morris Forman Wastewater Treatment Plant (MFWTP) is the oldest and largest treatment plant in the MSD service area. Originally built in 1958 as a primary plant that removed only heavy, solid wastes, it was rededicated as a secondary treatment facility that treated organic matter and bacteria in 1975. With a treatment design capacity of 120 million gallons per day, the plant serves the city of Louisville, much of suburban Jefferson County, and continues to be the biosolids processing facility for the entire service area.

The Morris Forman service area is the largest sewershed in the MSD collection system, serving approximately 500,000 people. The collection system contains approximately 2500 miles of pipe, consisting mostly of vitrified clay pipe (VCP), reinforced concrete pipe (RCP), and PVC pipe. There are 99 pump/lift stations in the service area. Pipe sizes range from 8 inches in diameter to 18 foot x 27 foot egg-shaped with construction dates ranging from before 1850 to the present. Figure 1 depicts the combined sewer system and the separate sewer system of the Morris Forman service area.

2.2 SSO PROJECT HISTORY

The wet weather project history diagram (Figure 2) illustrates the SSO-specific projects conducted in the Morris Forman sewershed since the inception of the consolidated SSO program in 1998. The following sections in this document describe each of the SSO-specific projects in detail and are organized by the five program elements which are described in more detail in Section One:

- Flow monitoring
- SSES and other sewer investigation/study project
- Computer modeling
- Rehabilitation
- Post-Rehabilitation flow monitoring

Capital projects that removed SSOs (such as pump station and small treatment plant eliminations) are not included in the SSO-specific project history diagram but are included in the project write-up sections under "Other Projects." Due to the complexity of the Morris Forman sewershed, this chapter has been divided into key locations as shown in Figure 3.

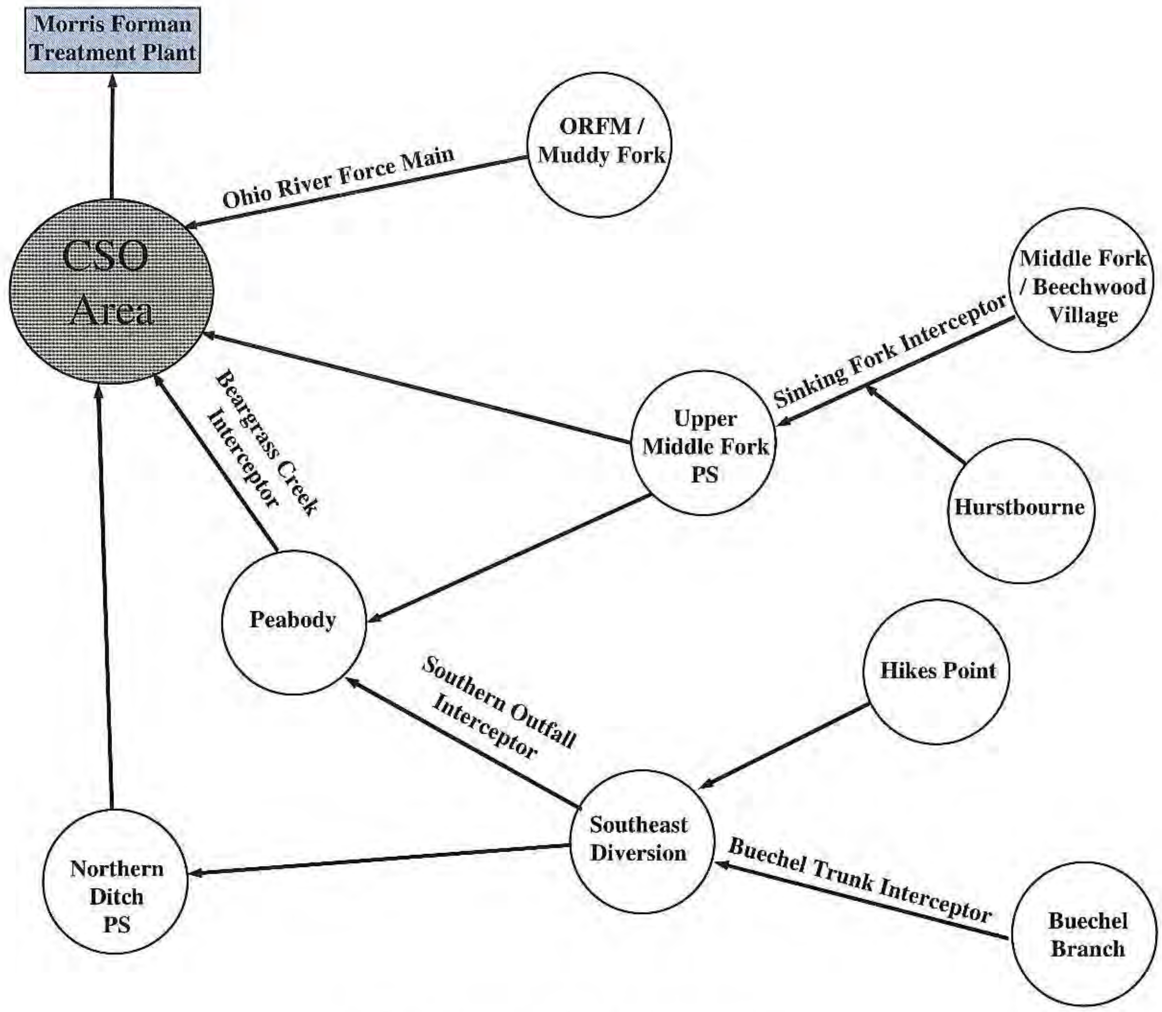


Figure 3 – Morris Forman Key Locations Diagram

2.2.1 Middle Fork Beargrass Creek (Middle Fork)

2.2.1.1 Middle Fork Background

The Middle Fork service area covers approximately 22.3 square miles and is centrally located at the intersection of Lyndon Lane and Shelbyville Road. The sewer system contains a total of 1.6 million linear feet (304 miles) of gravity sewer pipe ranging in size from 8-inch to 51-inch diameter. The majority, 81%, are 8-inch collection sewers. Of the entire sewershed, 31% of the system was installed prior to 1970 and 54% of the system consists of clay pipe (VCP). The majority of the land use in the service area is residential, with some smaller areas of commercial and parks.

Documented overflows in the Middle Fork service area include the Beechwood Village area, the Middle Fork Interceptor (MFI) at Breckenridge Lane, the Woodland Hills Pump Station, Falgate Court, Hurstbourne Lane Pump Station, Old Cannons Lane, and the Carson/Ribble location in Hikes Point. Figure 4 is a service area diagram showing the hydraulic connectivity of overflow locations, Figure 5 shows a map of the Middle Fork of Beargrass Creek service area with

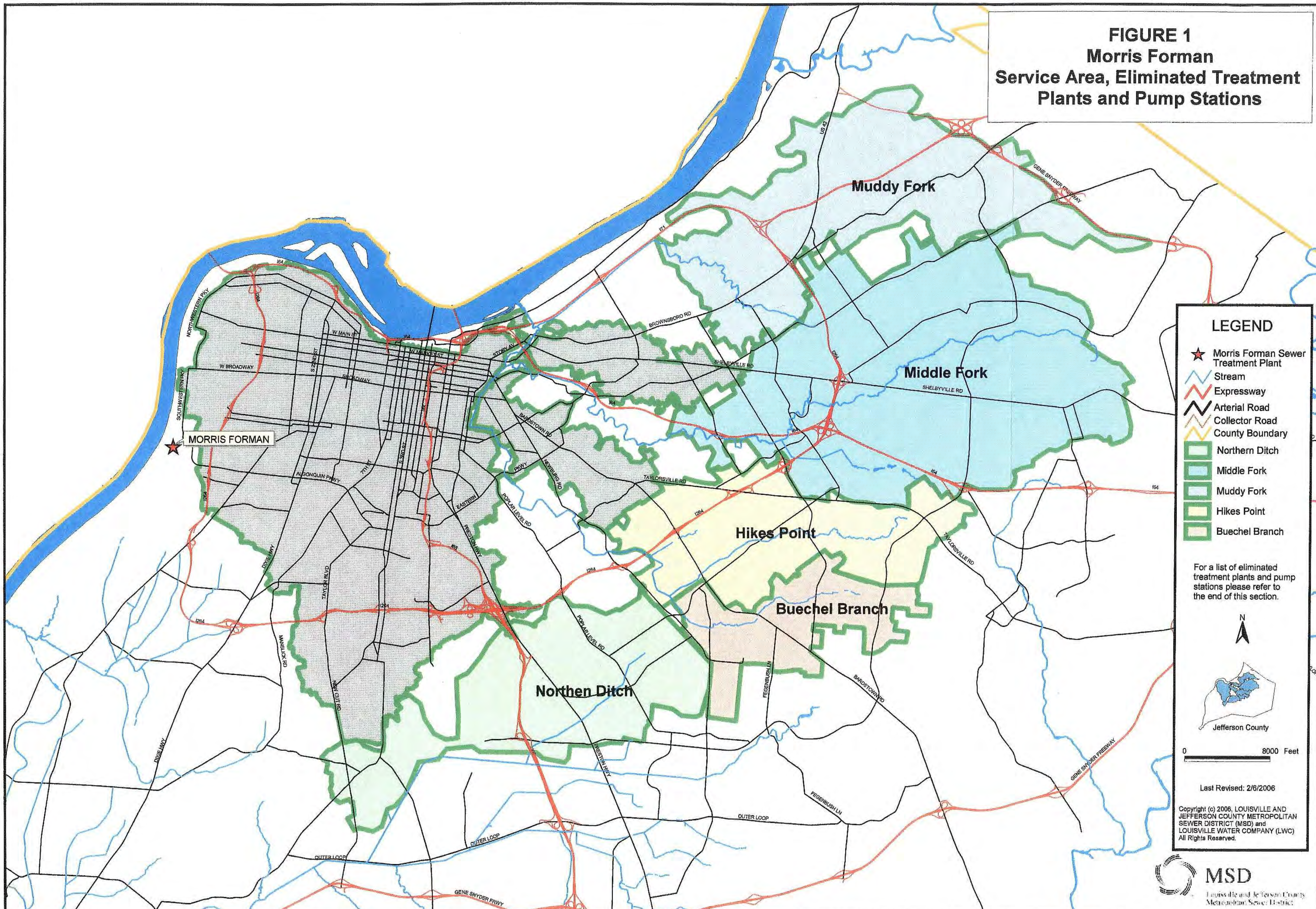
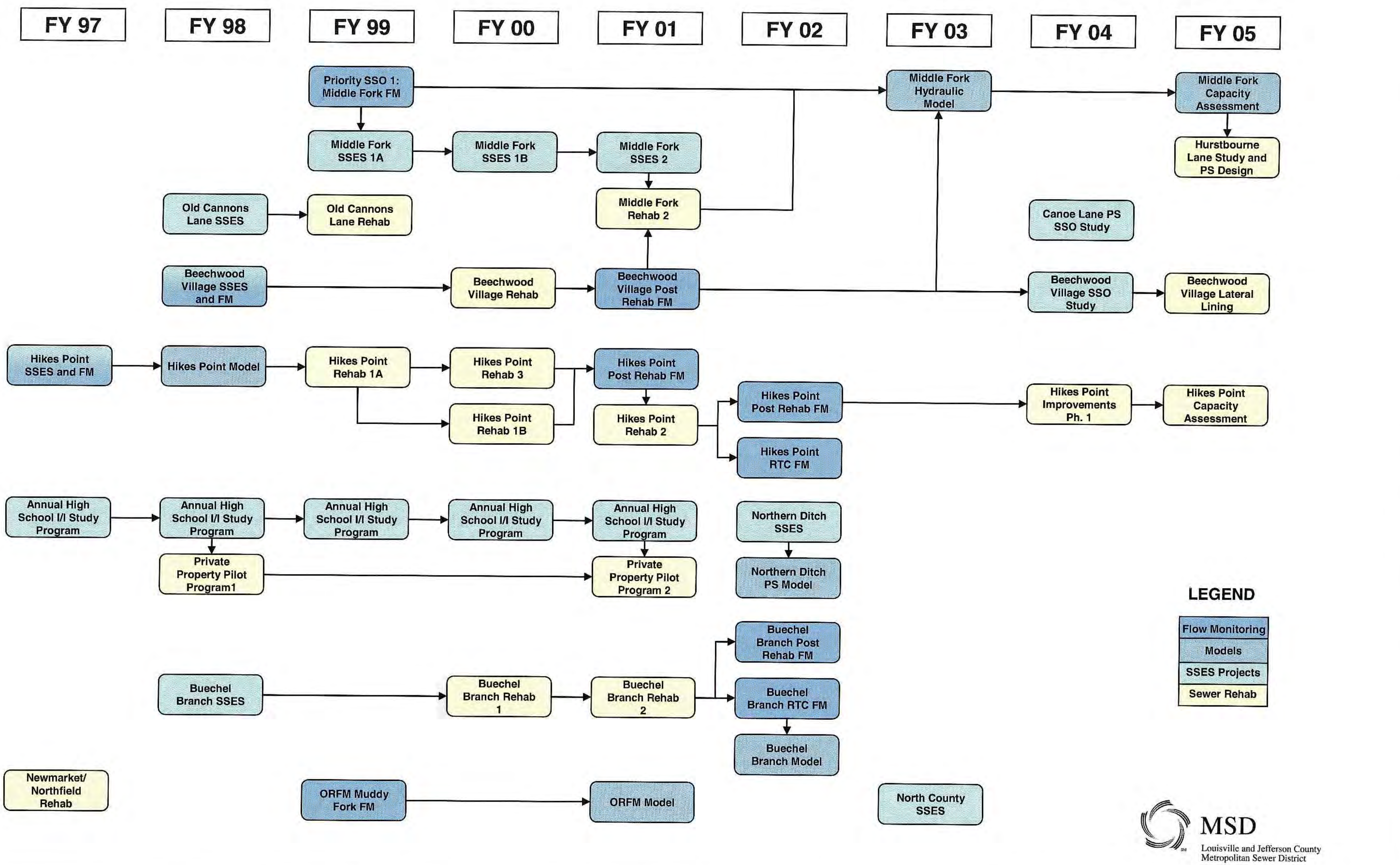


FIGURE 1
Morris Forman
Service Area, Eliminated Treatment
Plants and Pump Stations
Muddy Fork
Middle Fork
Hikes Point
Buechel Branch
Northen Ditch
MORRIS FORMAN
LEGEND
Morris Forman Sewer Treatment Plant
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Northern Ditch
Middle Fork
Muddy Fork
Hikes Point
Buechel Branch
For a list of eliminated treatment plants and pump stations please refer to the end of this section.
N
Jefferson County
0
8000 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD
Louisville and Jefferson County Metropolitan Sewer District
W BROADWAY
BROWNSBORO RD
SHELBYVILLE RD
TAYLORSVILLE RD
BARDSTOWN RD
POPLAR LEVEL RD
PRESTON HWY
OUTER LOOP
GENE SNYDER FRWY
GENE SNYDER FREEWAY
FEGENBUSH LN
DIXIE HWY
TAYLOR BLVD
NEW CUT RD
MANSLICK RD
ALGONQUIN PKWY
SOUTHWESTERN PKY
NORTHWESTERN PKY

Morris Forman Sewershed Wet Weather Projects

FIGURE 2
Morris Forman Project History



eliminated treatment plants and pumping stations. See figures 6 – 9 for the program elements described in section 2.2 on the following pages.

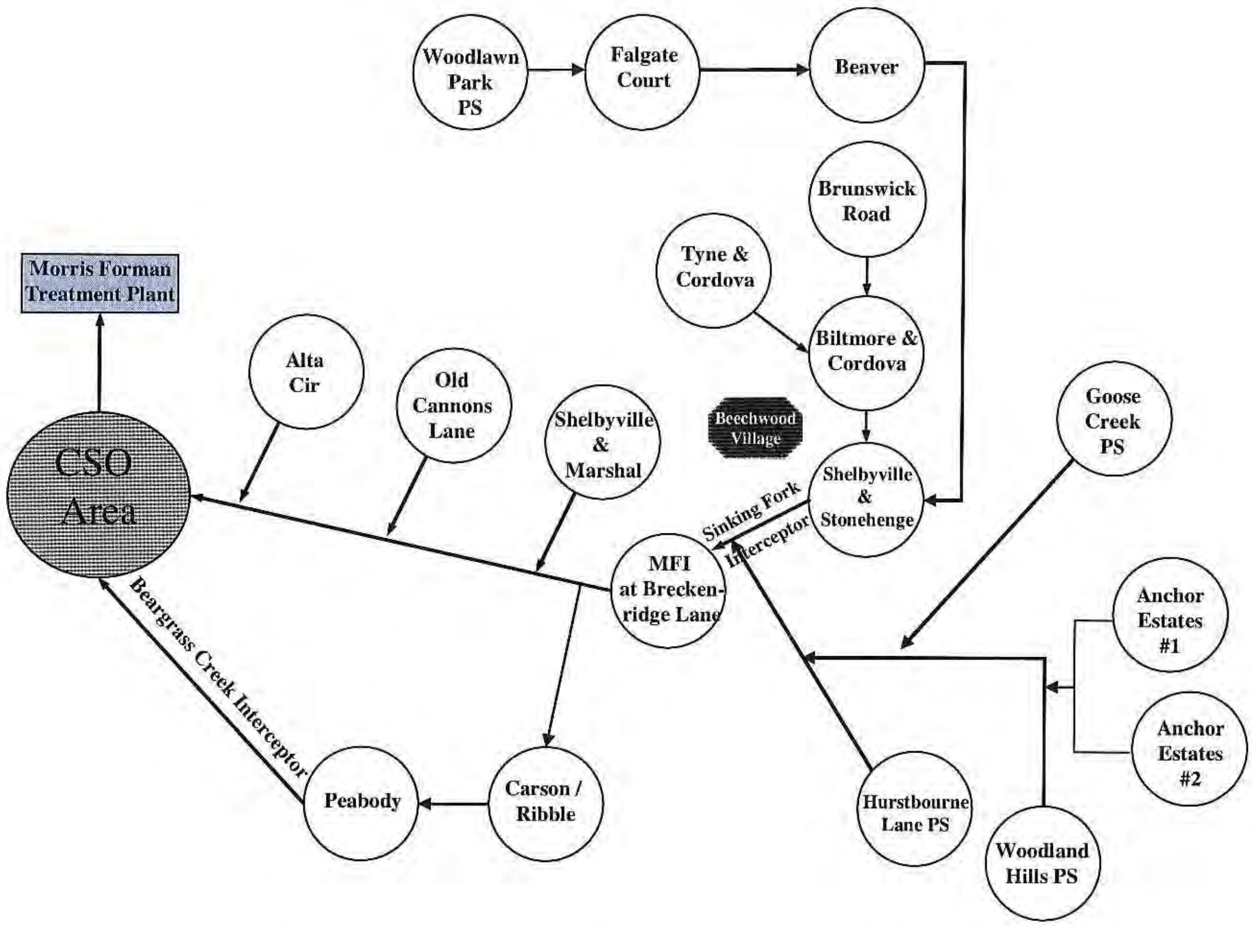


Figure 4 – Middle Fork – Hydraulic Connectivity Diagram of Unauthorized Discharges

2.2.1.2 Middle Fork Flow Monitoring

Figure 6 represents the areas that were flow monitored in Middle Fork.

Priority SSO Flow Monitoring Part 1: Middle Fork Beargrass Creek

This study was developed to characterize and prioritize the 60 subbasins for further study and rehabilitation through the analysis of wet and dry weather flow data, customer sewer backup requests, and MSD SSO reporting. Monitors were maintained and data collected for a period of 45 days beginning February 19, 1999, and ending April 4, 1999.

Two significant rain events were monitored: March 8-9 (1.4"), and March 20 (1.3"). Each of the sites in the Middle Fork basin experienced some amount of Inflow and Infiltration (I/I) during these rain events. Hydrograph analysis showed that some areas experienced more inflow than infiltration and some experienced more infiltration than inflow. Many sites experienced immediate increases in flow rate after rain events, indicating inflow sources in the system. There were also significant periods of surcharging throughout the system.

The primary weighting factors for this analysis included basement back-up frequencies, SSO frequencies, and flow monitoring I/I analysis. This analysis was used to delineate SSES project areas for FY99 through FY03 (July 1, 1998, through June 30, 2003), tailoring rehabilitation efforts to the particular problems in each subbasin for more cost-effective solutions. This project was completed in February 1999 and cost approximately $313,000.

Middle Fork Flow Monitoring

The purpose of this project was to collect average dry weather flows and wet weather responses to be used for the Middle Fork hydraulic model calibration. For a period of 70 days (December 9, 2003, through February 16, 2004) 23 flow monitors and one rain gauge were installed and maintained. There were two significant rain events observed: January 2, 2004, (1.6") and January 5, 2004 (1.2"). The cost for this project was approximately $140,000 and it was completed in May 2004.

2.2.1.3 Middle Fork Sanitary Sewer Evaluation Studies (SSES)

Figure 7 represents the SSES study areas in the Middle Fork service area.

Middle Fork SSES Ph. 1A

The objective of this study was to determine where the sanitary sewer system in the Middle Fork 1A study area is subject to excessive I/I in order to prioritize and phase rehabilitation. The study included the following components to identify active and potential sources of I/I:

- Gathering and reviewing existing pertinent data (LOJIC, IMS, & flow data) to evaluate the quantity of I/I entering the sewer system;
- Conducting physical inspections of manholes to identify corrosion and structural defects that may be contributing excessive I/I (600 manholes);
- Conducting smoke testing to identify structural defects that may contribute to I/I (126,350 linear feet sewer);
- Conducting TV inspections (31,100 linear feet sewer), dyed-water flooding, and flow isolations in a limited amount of the system to identify structural defects that may contribute I/I to the system and blockages that may be inhibiting efficient hydraulic flow;
- Compiling and analyzing data generated during the SSES to quantify the amount of excessive I/I entering the system and prioritize subbasins for rehabilitation.

The Middle Fork 1A basins were selected for evaluation based on the flow monitoring results of the Priority SSO Flow Monitoring Project Part 1. The sanitary sewers in the study area were found to be in relatively good shape. Minor defects were found and were repaired under the Old Cannons Lane Rehabilitation project but no major defects were discovered. Since no major public defects were found to account for this inflow problem, the inflow is likely to be from private side defects. However, no downspout or area drain connections were identified by smoke testing. This project was completed in July 1998 and cost approximately $299,000.

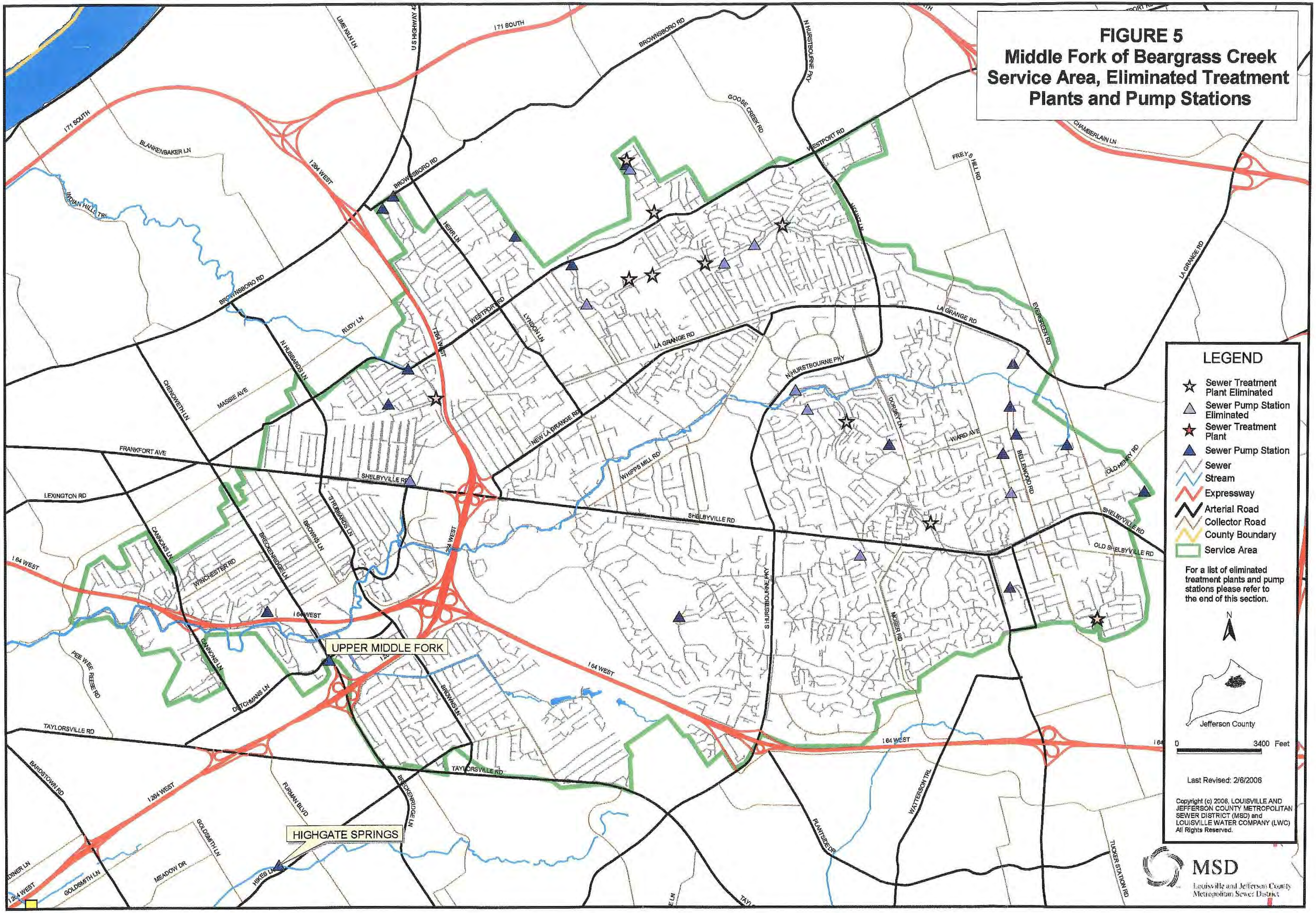


FIGURE 5
Middle Fork of Beargrass Creek Service Area, Eliminated Treatment Plants and Pump Stations
LEGEND
Sewer Treatment Plant Eliminated
Sewer Pump Station Eliminated
Sewer Treatment Plant
Sewer Pump Station
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Service Area
For a list of eliminated treatment plants and pump stations please refer to the end of this section.
N
Jefferson County
0
3400 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD
Louisville and Jefferson County Metropolitan Sewer District
UPPER MIDDLE FORK
HIGHGATE SPRINGS
I 71 SOUTH
BROWNSBORO RD
BLANKENBAKER LN
I 264 WEST
N HURSTBOURNE PKY
GOOSE CREEK RD
WESTPORT RD
CHAMBERLAIN LN
FREYS HILL RD
LA GRANGE RD
NEW LA GRANGE RD
LYNDON LN
HERR LN
RUDY LN
N HUBBARDS LN
MASSIE AVE
CHENOWETH LN
FRANKFORT AVE
LEXINGTON RD
SHELBYVILLE RD
S HUBBARDS LN
BROWNS LN
BRECKENRIDGE LN
WINCHESTER RD
CANNONS LN
I 64 WEST
PEE WEE REESE RD
DUTCHMANS LN
TAYLORSVILLE RD
BARDSTOWN RD
FURMAN BLVD
GOLDSMITH LN
MEADOW DR
HIKES LN
WHIPPS MILL RD
S HURSTBOURNE PKY
DORSEY LN
WARD AVE
BELLEWOOD RD
EVERGREEN RD
OLD HENRY RD
OLD SHELBYVILLE RD
MOSER RD
WATTERSON TRL
PLANTSIDE DR
TUCKER STATION RD
LIME KILN LN
INDIAN HILLS TRL

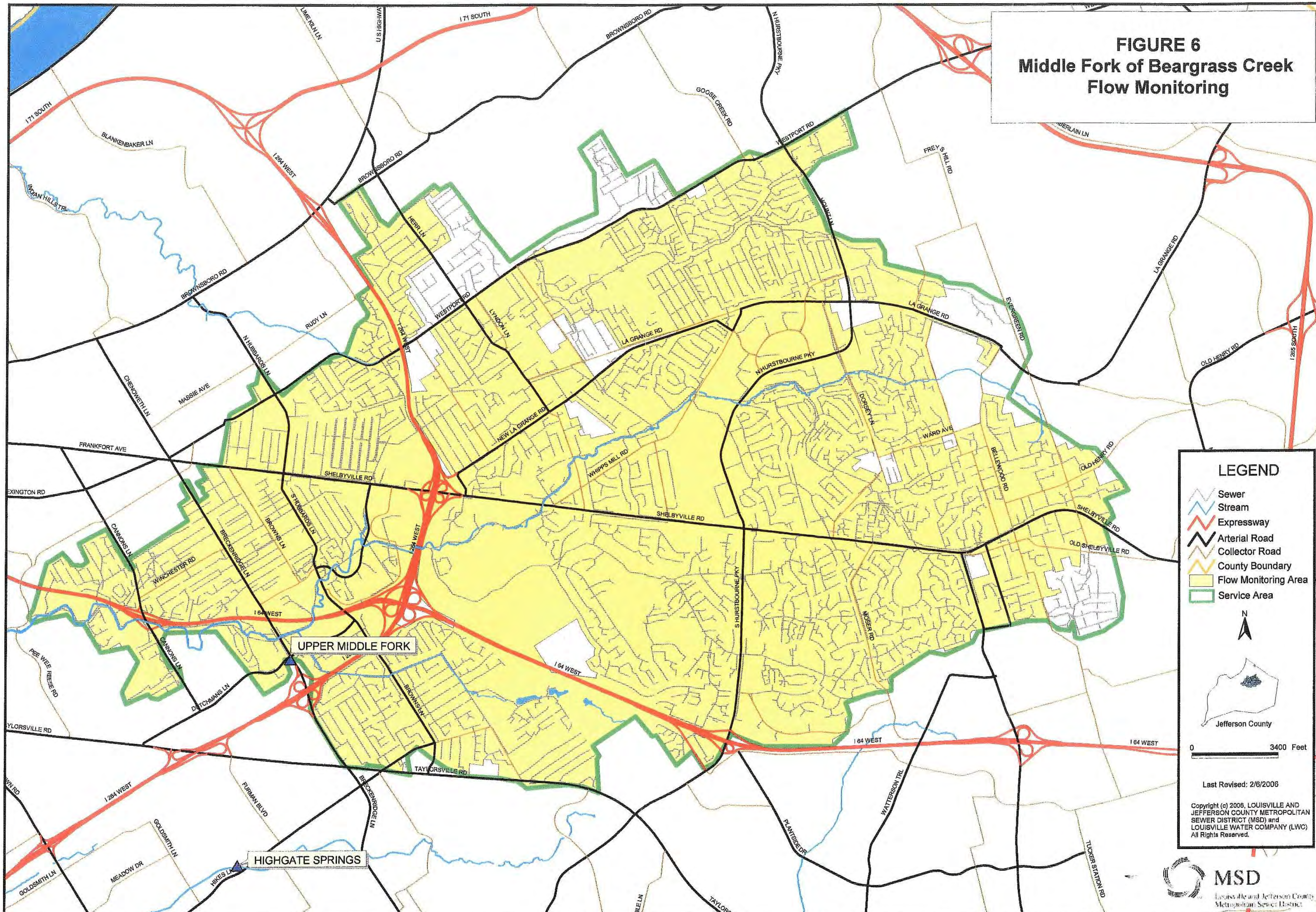


FIGURE 6
Middle Fork of Beargrass Creek Flow Monitoring

Middle Fork SSES Ph. 1B

The objective of this study was to determine where the sanitary sewer system in the Middle Fork 1B study area was subject to excessive I/I in order to prioritize and phase rehabilitation. The study included the following components to identify active and potential sources of I/I:

- Gathering and reviewing existing pertinent data (LOJIC, IMS, & flow data) to evaluate the quantity of I/I entering the sewer system;
- Conducting physical inspections of manholes to identify corrosion and structural defects that may be contributing excessive I/I (1,004 manholes);
- Conducting smoke testing to identify structural defects that may contribute to I/I (253,600 linear feet sewer);
- Conducting TV inspections (42,000 linear feet sewer), dyed-water flooding, and flow isolations in a limited amount of the system to identify structural defects that may contribute I/I to the system and blockages that may be inhibiting efficient hydraulic flow;
- Compiling and analyzing data generated during the SSES to quantify the amount of excessive I/I entering the system and prioritize subbasins for rehabilitation.

The Middle Fork 1B basins were selected for evaluation based on the flow monitoring results of the Priority SSO Flow Monitoring Project Part 1. The sanitary sewers in the study area were found to be in relatively good shape. Minor structural defects were found and were repaired under the Middle Fork Rehabilitation Phase 2 project but no major defects were discovered. In general, the system was correctly sized for the amount of upstream customers as evaluated at flow monitoring locations. Since no major public defects were found to account for this inflow problem, the inflow is likely to be from private side defects. This Project was completed in June 2000 and cost approximately $434,000.

Middle Fork SSES Ph. 2

The objective of this study was to determine where the sanitary sewer system in the Middle Fork study area is subject to excessive I/I in order to prioritize and phase rehabilitation. The study included the following components to identify active and potential sources of I/I:

- Gathering and reviewing existing pertinent data (LOJIC, IMS, & flow data) to evaluate the quantity of I/I entering the sewer system;
- Conducting physical inspections of manholes to identify corrosion and structural defects that may be contributing excessive I/I (954 manholes);
- Conducting smoke testing to identify structural defects that may contribute to I/I (214,814 linear feet sewer);
- Conducting TV inspections (38,294 linear feet sewer);
- Conducting dyed-water testing in a limited amount of the system to identify structural defects that may contribute I/I to the system and blockages that may be inhibiting efficient hydraulic flow;
- Compiling and analyzing data generated during the SSES to quantify the amount of excessive I/I entering the system and prioritize subbasins for rehabilitation.

Based on data collected and analyzed through the SSES, the Middle Fork Ph. 2 sewer system was considered to be in relatively good condition compared to other systems of similar age. Of the 1,094 manholes slated for inspection, only 954 were investigated. Inspections were not performed on manholes that were buried or unable to be located. The primary problems encountered were leaking riser rings and offset manhole frames. Defects were spread throughout the study area and not concentrated in one or two basins. The majority of the defects identified through smoke testing were area drains, cleanouts, or property service connections. Television inspection (TVI) identified 67 sewer lines that required rehabilitation. The main problems identified during TVI were root intrusion at the joints, causing separation and leaks. The project was completed in April 2002 and cost approximately $465,000. The significant manhole defects identified in this SSES were repaired under the Middle Fork Rehabilitation Phase 2 project.

2.2.1.4 Middle Fork Computer Modeling

In FY03 (July 1, 2002 – June 30, 2003), the Middle Fork model was built and calibrated to FY99 (July 1, 1998 – June 30, 1999) flow monitoring and rain gauge data. This calibration was used to analyze the system for deficient sewers and overflows for various rainfall depths. Since the original flow monitoring data was old, new flow monitoring was performed from December 2003 through February 2004 and the model calibration was checked. If model predicted flows were within 10% of the new flow monitoring data, the calibration was considered acceptable. If the model results were over 10% of the new flow monitoring data, the associated areas were recalibrated to the new flow data.

Most of the basins were recalibrated to two monitored storm events: January 2, 2004, and January 5, 2004, with 1.61 inches and 1.2 inches, respectively. Volumes and peak flows for both storms were analyzed so that model outputs were within 10% of observed data. In some instances basin calibration was not adjusted due to inadequate flow monitoring data during the rain events.

Both FY99 (July 1, 1998 – June 30, 1999) and FY04 (July 1, 2003 – June 30, 2004) calibrated models show similar results in that the majority of the wet weather problems occur in the Beechwood Village/Sinking Fork and Lower Middle Fork sub-watersheds. These two areas contain the majority of overflows, overflow volume, and capacity deficient sewers. In addition, 69% of these sewers were constructed prior to 1980. The total cost for this effort was approximately $321,000 and the project was completed in August 2004.

This model is currently being used to analyze potential improvements in Beechwood Village and other areas of the Middle Fork System. Figure 8 presents a map of the modeled area in the Middle Fork of Beargrass Creek.

2.2.1.5 Middle Fork Rehabilitation

<u>Middle Fork Phase 2</u>

This project provided for the rehabilitation of defects identified in the Middle Fork SSES Phase 2 and Phase 1B. This rehabilitation effort consisted of 1,872 linear feet of cured-in-place sewer main rehabilitation, 47 cured-in-place lateral rehabilitations, and 382 manhole chimney seal installations. The project was completed in February 2002 and cost approximately $435,000. Figure 9 displays the rehabilitation work conducted under the Middle Fork Rehabilitation project.

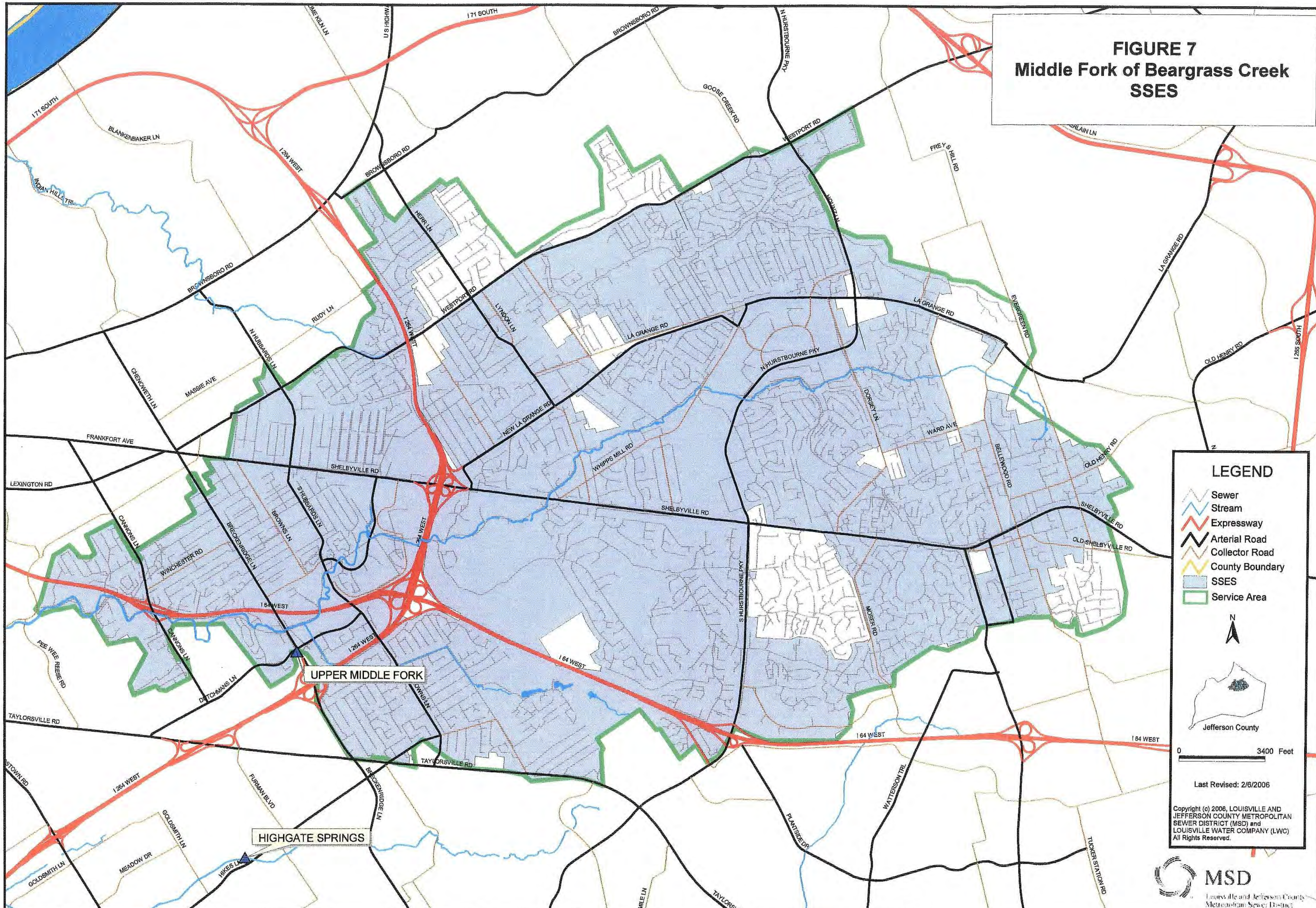


FIGURE 7
Middle Fork of Beargrass Creek
SSES
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
SSES
Service Area
N
Jefferson County
0
3400 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD
UPPER MIDDLE FORK
HIGHGATE SPRINGS
I 71 SOUTH
BROWNSBORO RD
N HURSTBOURNE PKY
GOOSE CREEK RD
WESTPORT RD
FREYS HILL RD
BLANKENBAKER LN
I 264 WEST
INDIAN HILLS TRL
HERR LN
LYNDON LN
LA GRANGE RD
N HUBBARDS LN
RUDY LN
CHENOWETH LN
MASSIE AVE
NEW LA GRANGE RD
EVERGREEN RD
OLD HENRY RD
I 265 SOUTH
DORSEY LN
WARD AVE
WHIPPS MILL RD
FRANKFORT AVE
SHELBYVILLE RD
LEXINGTON RD
BELLEWOOD RD
S HUBBARDS LN
BROWNS LN
OLD SHELBYVILLE RD
CANNONS LN
BRECKENRIDGE LN
WINCHESTER RD
I 64 WEST
S HURSTBOURNE PKY
MOSER RD
PEE WEE REESE RD
DUTCHMANS LN
TAYLORSVILLE RD
FURMAN BLVD
WATTERSON TRL
PLANTSIDE DR
GOLDSMITH LN
MEADOW DR
HIKES LN
TUCKER STATION RD

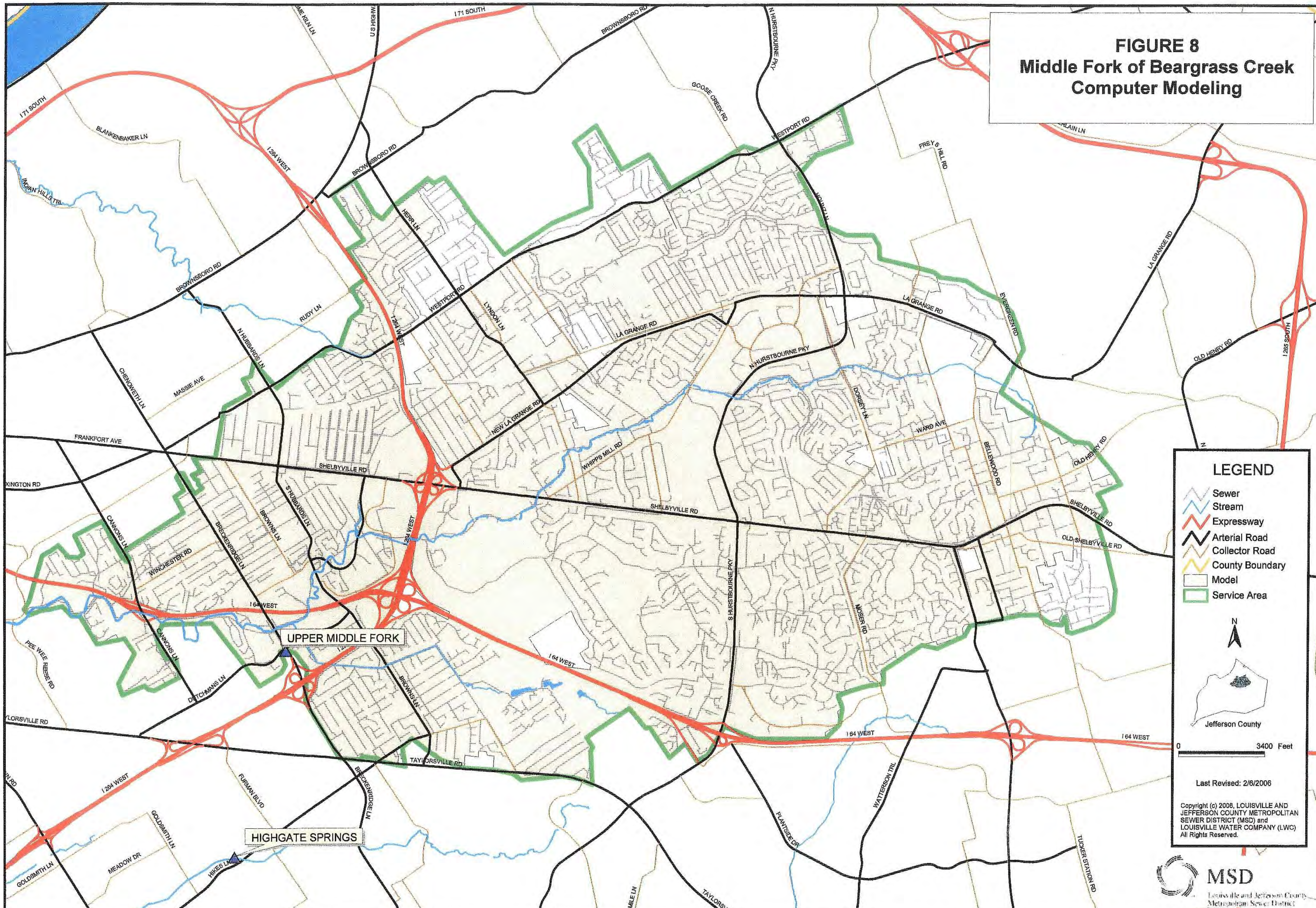


FIGURE 8
Middle Fork of Beargrass Creek
Computer Modeling
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Model
Service Area
N
Jefferson County
0
3400 Feet
Last Revised: 2/6/2006
UPPER MIDDLE FORK
HIGHGATE SPRINGS
MSD
Louisville and Jefferson County Metropolitan Sewer District

2.2.1.6 Middle Fork Post-Rehabilitation Flow Monitoring

Due to the intricate nature of the Middle Fork sewershed, much of the post rehabilitation flow monitoring has been performed under other areas such as Beechwood Village and Hikes Point.

2.2.1.7 Other Capital Projects in Middle Fork

Private Property Disconnection Pilot Project

The purpose of this project was to investigate options for MSD to address removal of private property clean water sources that contributed to excessive flow in the sanitary sewer system. These sources included sump pumps, downspouts, area drains, foundation drains, and cracked/leaking service connections.

In summary, the project was used to:

- Conduct a literature search and site visits to municipalities similar to Louisville to learn of the different approaches used to inspect property, reduce private I/I sources, fund programs, and enforce non-compliance;
- Explore different methods of inspection, disconnection, and/or rehabilitation of private I/I sources;
- Determine methods to accomplish inspection, disconnection, and/or rehabilitation of private I/I sources, possibly including ordinances to provide MSD enforcement authority or plumbing code revisions to construction requirements;
- Provide cost estimates for each type of disconnection and extrapolate costs for a county-wide program;
- Provide recommendations to the MSD Board for implementing a private property disconnection project.

Based on research as described above, the following methodology was used to implement this program. First, elected officials are contacted and informed of this program and a public meeting is held to educate the public in target areas about the program and its intent. Then a letter is sent to homeowners providing program details and requesting an appointment for inspection of their property. Once an appointment is scheduled, a two person team will inspect the property and report the inspection results to the homeowner and MSD. If improper connections are identified, the affected homeowner also receives a list of approved plumbers. The homeowner arranges for at least three plumbers to provide estimates of the cost for disconnection. These estimates are then provided to MSD for selection of the plumber who will perform the disconnection. Finally, the homeowner contacts the selected plumber to arrange the disconnection. Once work is complete, MSD re-inspects the property, and then reimburses the homeowner.

Neighborhoods in the pilot project included: Woodland Hills, Beechwood Village, a small area of Old Cannons Lane, a small area in Jeffersontown and a small area in Hikes Point. About 36% of the residents in the five areas allowed inspections. Of that number, 15% were found to have improper connections. Table 1 shows the program response.

Table 1 – Private Property Disconnection Pilot Project

Area	Inspected	Improper Connections	Estimates to Correct	Implemented Corrections
Woodland Hills	39%(214)	17	6	3
Beechwood Village	41%(273)	52	23	6
Jeffersontown	20%(34)	10	2	0
Old Cannons Ln	44%(150)	7	2	1
Hikes Point	<1% (60)	2	0	0

The typical inflow source problems were combination sump pumps used to discharge both washing machine water and groundwater into the sanitary sewer. Plumbers corrected this by installing above-ground "sump mate" pumps which are used to discharge washing machine water into the sanitary, with the existing sump pump being re-routed outside onto a splash block.

Middle Fork Capacity Assessment

Under this project, the Middle Fork Hydraulic Model built in FY03 (July 1, 2002 – June 30, 2003) and calibrated in FY04 (July 1, 2003 – June 30, 2004) was used to begin evaluating various options for eliminating both modeled and known overflows occurring during a 10 year, 24 hour event. Options being evaluated include transport, storage, and high rate treatment. This project is ongoing and is expected to cost approximately $76,000.

Old Cannons Lane SSES & SSO Abatement Project

This project was created to identify the cause of the recurring SSO at 1112 Old Cannons Lane (ID# 27821). This project consisted of an assessment of the hydraulics of the collection system to identify possible bottlenecks, manhole inspections, smoke testing, and TVI. Recommendations included sewer main and service lateral lining, cleanout installation, manhole rehabilitation, and private property inflow source disconnection. The significant defects identified in this SSES were repaired under the Old Cannons Lane Rehabilitation project.

Old Cannons Lane Rehabilitation

This project provided for the rehabilitation of defects identified in the Old Cannons Lane SSO Abatement study. This rehabilitation effort consisted of 2,153 linear feet of cured-in-place sewer main rehabilitation, 20 cured-in-place lateral rehabilitations, and 12 manhole chimney seals. Figure 11 displays the rehabilitation work conducted under the Old Cannons Lane Rehabilitation project. This project was completed in the fall of 1999 and cost approximately $213,000.

Hurstbourne Lane PS Study and Design

Under this project, the Middle Fork XP-SWMM Hydraulic Model was used to evaluate options for abating overflows at the Hurstbourne Lane Pump Station without producing additional downstream overflows. The model showed that adding two new 6-inch force mains to carry flow from the pump station to the Middle Fork Interceptor directly would alleviate inadequate pump

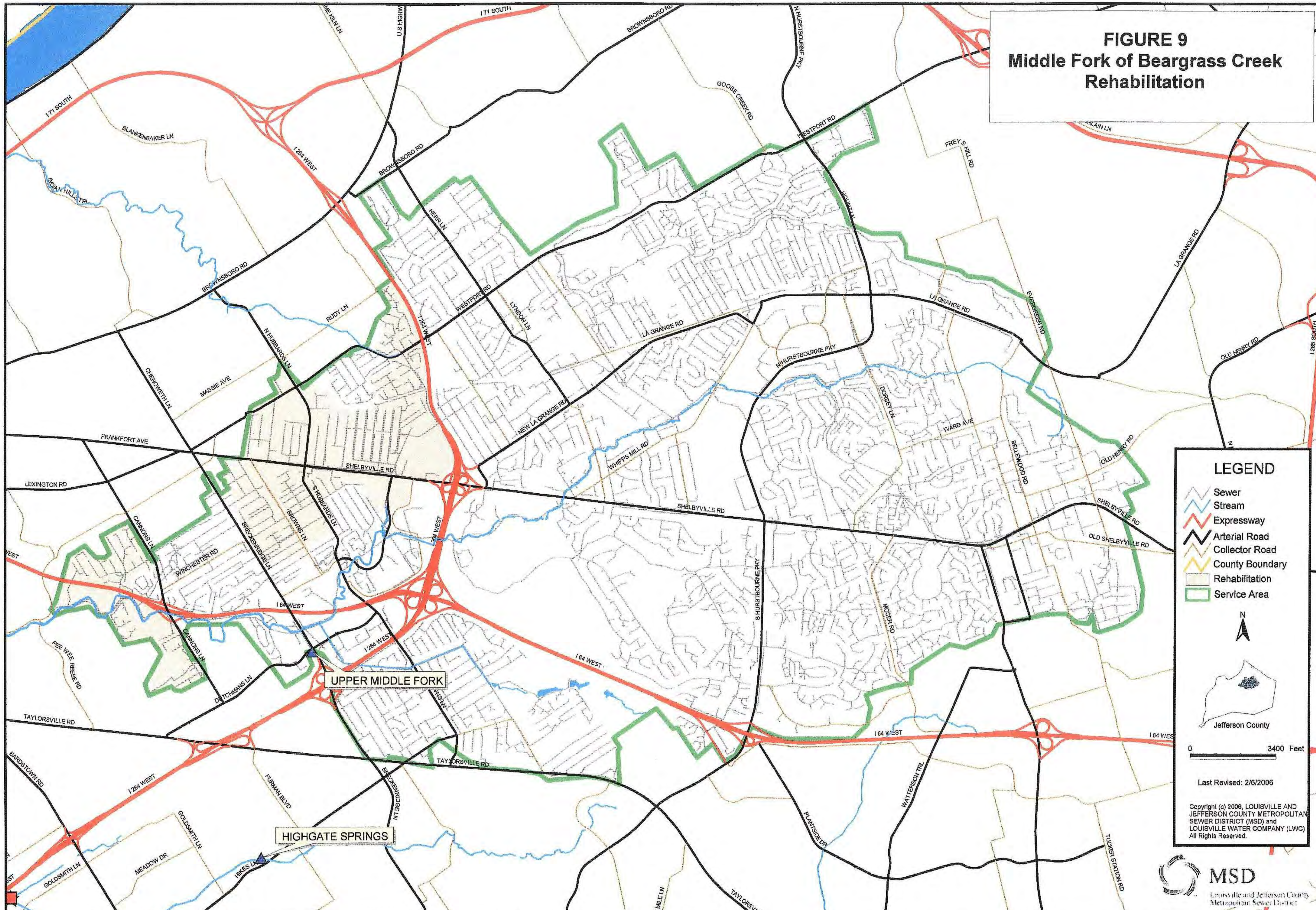


FIGURE 9
Middle Fork of Beargrass Creek Rehabilitation

station capacity without causing new overflows. This project was complete in August 2004 and cost approximately $83,000.

Hurstbourne Lane Pump Station Overflow Elimination Project

This project included building a parallel force main system from the existing Hurstbourne Lane Pump Station to the Middle Fork Interceptor. The smaller of the two force mains would carry dry weather flow; in the event the wet well level is high, a three-way valve will be turned and excess flow from wet weather will be sent through the larger force main, directly to the Middle Fork Interceptor. As a result, Hurstbourne Lane Pump Station no longer overflows during normal wet weather events. This project was substantially complete in June 2005 and cost approximately $333,000.

Tucker Station Interceptor Sanitary Sewer Project

This project involved the construction of approximately 7000 linear feet of 8 and 15-inch gravity sewer to eliminate two facilities (Running Creek WTP and the old Pope Lick Pump Station) and reroute the flows to the new Floyds Fork WTP. This project was also responsible for eliminating the overflow at the Woodland Hills Pump Station. The project began at an existing interceptor and followed along the west branch of Pope Lick Run to the Woodland Hills Pump Station. During some wet weather events, Woodland Hills Pump Station currently pumps excess flows to the Middle Fork service area. This project serves the west portion of the Pope Lick Run Basin, a rapidly growing area which needed expanding conveyance and treatment capacity in order to develop. This project cost approximately $2,435,000.

2.2.1.8 Future / Ongoing Projects in Middle Fork

Old Cannons Lane Sanitary Relief Sewer (MSD Budget ID # B06004)

This project involves the construction of 1,160 linear feet of 15-inch sewer in Old Cannons Lane that will divert approximately 80% of the flow from an upstream manhole above the surcharged 8-inch line and connecting directly to a 39-inch interceptor sewer to the south, and on the south side of Beargrass Creek. This project is anticipated to abate a frequently occurring sanitary sewer overflow at two manhole locations. This project is currently in under construction with a scheduled completion date of June 30, 2006, and the approximate cost for the project is $260,000.

Interceptor Condition Assessment Phase 1 (Middle Fork) (MSD Budget ID # H04272)

This project involves the inspection of 36,000 linear feet of the Middle Fork Interceptor from the intersection with Payne Street which is in the combined sewer area to east of the intersection with the I-264 Watterson Expressway to document its condition and locate defects, blockages, or other conditions contributing to inadequate operating conditions. MSD anticipates approximately $282,000 in inspection and $105,000 in rehabilitation work to the Middle Fork Interceptor as an immediate result of the findings in this report. Completion of the rehabilitation work is due by December 31, 2008.

Middle Fork System Improvements Phase 1 (MSD Budget ID # H04276)

Provide repairs and rehabilitation for the Middle Fork system. Perform improvements and repairs based on the results of the ICA and other MSD knowledge of the system. This project is estimated to cost $500,000 and shall be completed by December 31, 2008.

2.2.2 Beechwood Village

2.2.2.1 Beechwood Village Background

Beechwood Village is located along the Sinking Fork Interceptor, which is a part of the Middle Fork service area described in the previous section. The Beechwood Village sanitary sewer system has experienced excessive I/I since the construction of the neighborhood's sanitary sewers in the early 1960s. Available data suggests that the sanitary system was constructed to substandard conditions, adding to the infiltration problems typically associated with clay tile pipe. The neighborhood is also located in an area with unusually high groundwater and poor drainage. MSD acquired the system in the mid-1960s and has since been working with the neighborhood to alleviate the chronic basement backups. Figure 10 shows where Beechwood Village is located in relation to the Middle Fork service area. See Figures 11 - 14 for the program elements described in section 2.2 on the following pages.

2.2.2.2 Beechwood Village Flow Monitoring

Flow monitoring sites were selected in Beechwood Village and Falgate Court as part of the Beechwood Village SSES. MSD installed four monitors in Beechwood Village and one monitor at Falgate Court. In addition, one monitoring site was used from a concurrent flow monitoring project, Priority SSO Flow Monitoring Phase 1: Middle Fork of Beargrass Creek. The subbasin size for the flow monitors ranged from 3,000 to 14,000 linear feet. The monitors were maintained and data collected for a period of 157 days beginning March 6, 1998, and ending August 9, 1998.

Six significant rain events were monitored: March 8 (1.52"), March 20 (1.47"), April 16 (1.68") April 29 – April 30 (1.59"), May 23 (1.06"), and July 7 (1.40"). Each of the sites in the study area experienced some amount of I/I during these rain events. Hydrograph analysis showed that some areas experienced more infiltration than inflow and vice versa. Many sites experienced sewer flow that remained elevated for an extended period of time after a rain ended, indicating infiltration sources in the system. There were also significant periods of surcharging throughout the system.

Dry weather flow analysis indicated that Beechwood Village and Falgate Court have one of the highest per capita dry weather flows in the entire area upstream of the Beargrass Creek Interceptor. A possible cause of the excessive flow in Beechwood Village could be parallel 8-inch gravity collector sewers that service the majority of the area, which provides twice the surface area for infiltration to enter the sewers than in areas served by single collectors. The elevated dry weather flow rate may also be related to illicit private side connections. Figure 11 represents the area that was flow monitored in Beechwood Village.

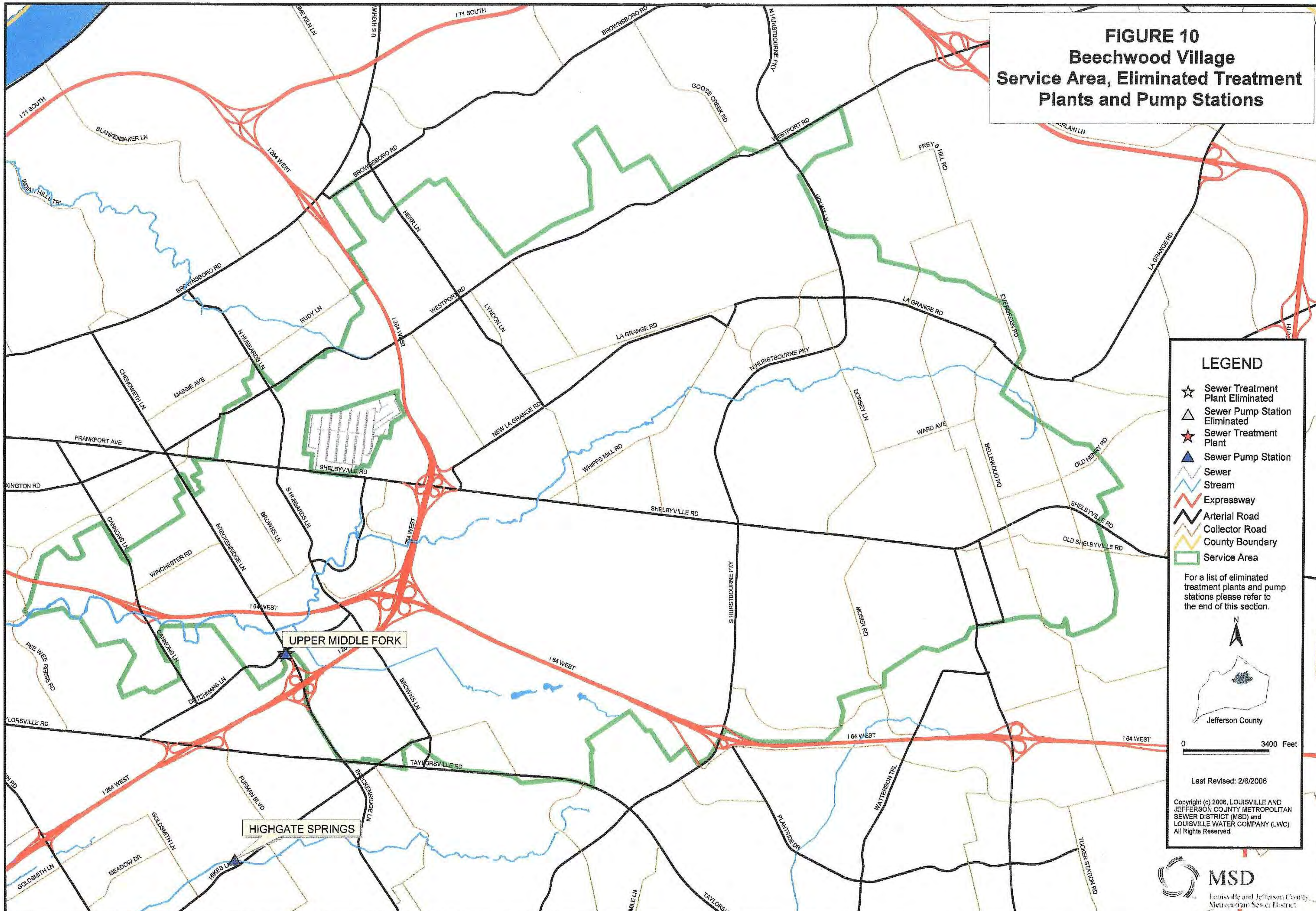


FIGURE 10
Beechwood Village
Service Area, Eliminated Treatment Plants and Pump Stations

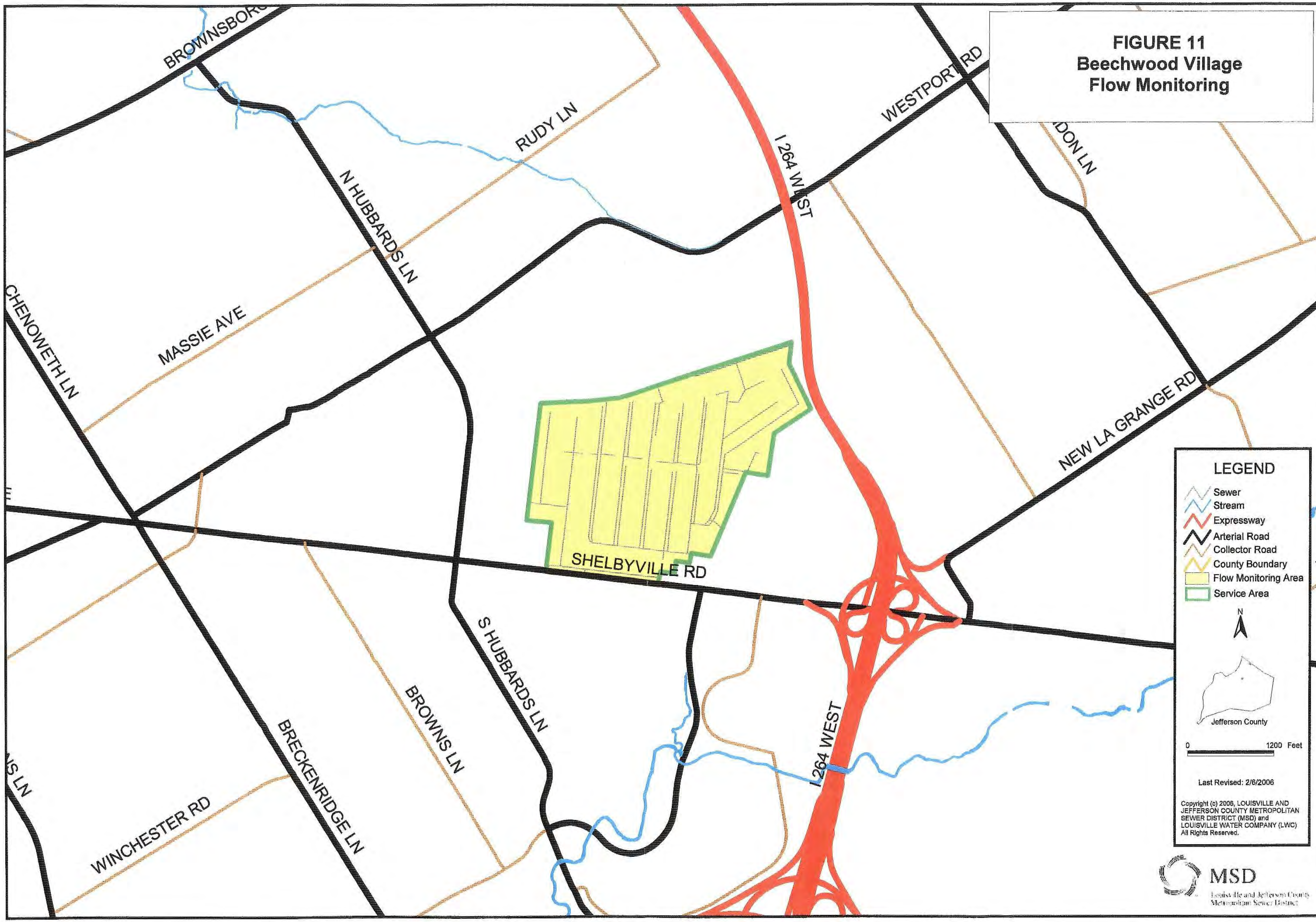


FIGURE 11
Beechwood Village
Flow Monitoring
BROWNSBORO
RUDY LN
WESTPORT RD
I 264 WEST
N HUBBARDS LN
CHENOWETH LN
MASSIE AVE
NEW LA GRANGE RD
SHELBYVILLE RD
S HUBBARDS LN
BROWNS LN
BRECKENRIDGE LN
WINCHESTER RD
I 264 WEST
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Flow Monitoring Area
Service Area
N
Jefferson County
0
1200 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD

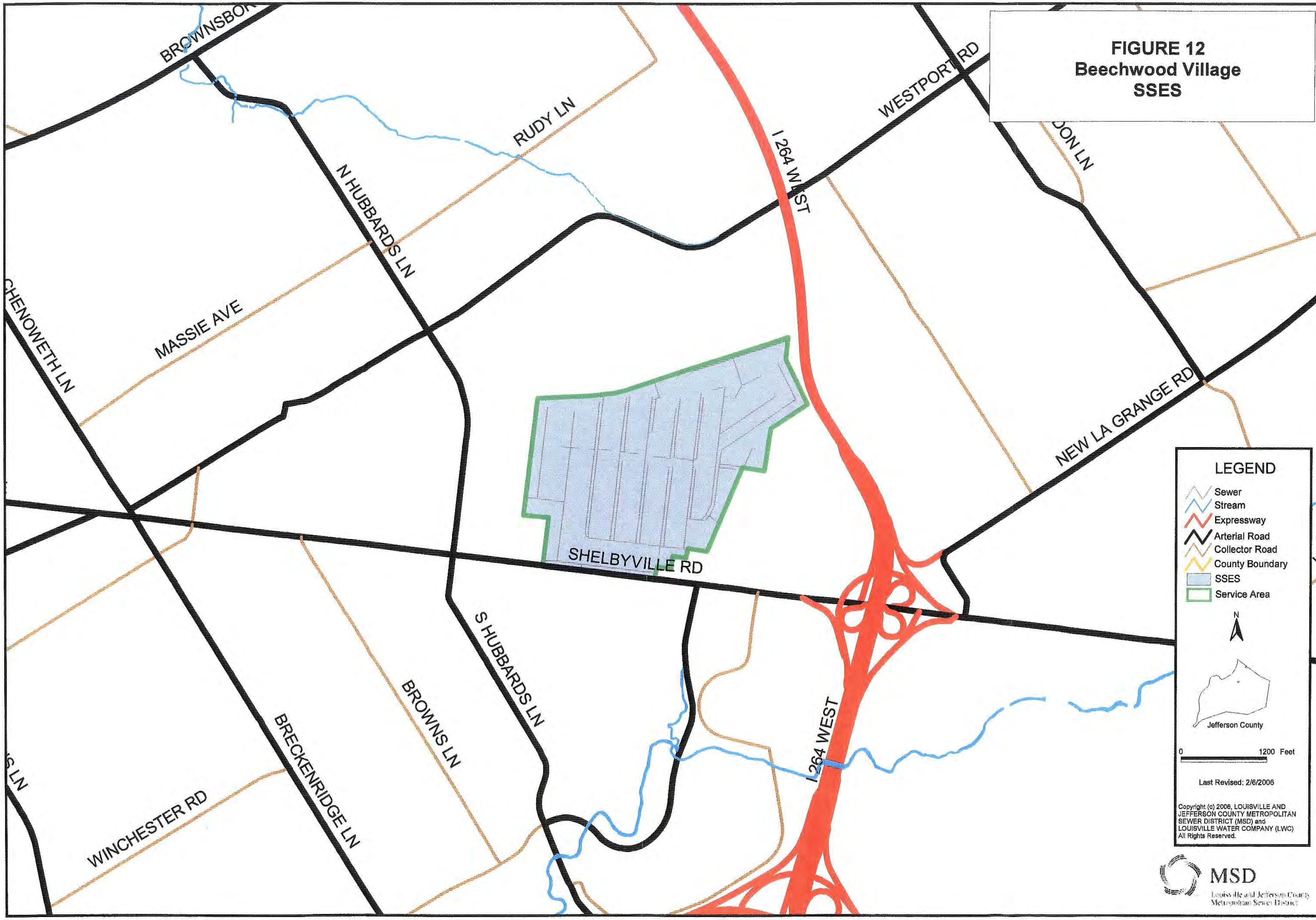


FIGURE 12
Beechwood Village
SSES
BROWNSBOR
WESTPORT RD
RUDY LN
I 264 WEST
N HUBBARDS LN
CHENOWETH LN
MASSIE AVE
NEW LA GRANGE RD
SHELBYVILLE RD
S HUBBARDS LN
BROWNS LN
BRECKENRIDGE LN
WINCHESTER RD
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
SSES
Service Area
N
Jefferson County
0
1200 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD
Louisville and Jefferson County Metropolitan Sewer District

2.2.2.3 Beechwood Village Sanitary Sewer Evaluation Study (SSES)

Figure 12 represents the SSES study areas in the Beechwood Village service area.

Beechwood Village SSES

The objective of this study was to develop a plan of improvements to rehabilitate the sewer collection system. This work was focused toward setting up projects to rehabilitate the defects found during the SSES with an emphasis on rehabilitation improvements, O&M concerns, estimated I/I reduction, and estimated costs. The study included the following components to identify active and potential sources of I/I:

- Gathering and reviewing existing pertinent data (LOJIC, IMS) to evaluate the quantity of I/I entering the sewer system;
- Conducting physical inspections of manholes to identify corrosion and structural defects that may be contributing excessive I/I (147 manholes);
- Conducting smoke testing and dyed-water testing to identify structural defects that may contribute to I/I (34,000 linear feet);
- Conducting a review of MSD TV inspection logs in a limited amount of the system to identify structural defects that may contribute I/I to the system and blockages that may be inhibiting efficient hydraulic flow (34,000 linear feet);
- Compiling and analyzing data generated during the SSES to quantify the amount of excessive I/I entering the sewer system;

The manhole inspections revealed that approximately 50% of the manholes inspected had defects. The majority of the manhole defects were in the chimney, bench and invert portions of the manhole. Smoke testing at Beechwood Village identified a number of inflow sources. Most of these sources were relatively minor, located on private property, and not contributing a significant amount of inflow to the sanitary sewer system. TVI identified a significant quantity of defects, and overall, the Beechwood Village sewer system was in extremely poor condition. Roots were a chronic problem in both the main lines and in service laterals. Structural defects, such as cracks and missing pipe, contributed to the excessive infiltration and I/I. This project, including flow monitoring, was completed in July 1999 and cost approximately $117,000. The significant manhole and pipe defects in the single sewer line area were repaired under the Beechwood Village Rehabilitation Project and Middle Fork Phase 2 Project.

Beechwood Village SSO Study

Under this project, the XP SWMM Middle Fork Hydraulic model and a HEC RAS model of the Sinking Fork branch of the Middle Fork of Beargrass Creek were used to evaluate whether sump pump and roof leaders could be re-routed to an improved storm water collection system and discharged to the Sinking Fork. The models determined that downstream culverts were not adequately sized to handle the additional flow. In addition, a preliminary groundwater study determined that pumping down groundwater in the area would not alleviate the need for sump pumps. This study also determined that many of the basements required sump pumps because the basements punctured a layer of soil that acted as a cap to an aquifer that recharges during wet weather and becomes pressurized. This project cost approximately $73,000 and was completed in July 2004.

2.2.2.4 Beechwood Village Computer Modeling

Beechwood Village is a part of the Middle Fork model which is described in section 2.2.1.4. Figure 13 represents the hydraulic model study area in the Beechwood Village service area.

2.2.2.5 Beechwood Village Rehabilitation

Figure 14 displays the rehabilitation work conducted under the Beechwood Village Rehabilitation projects.

Beechwood Village I/I Remediation

This project provided for the rehabilitation of defects identified in the Beechwood Village SSES. This rehabilitation effort consisted of lining 10,991 linear feet of sewer main with cured-in-place pipe (CIPP), lining the public portion of 29 property service connections with CIPP, and sealing 24 manholes with butyl rubber chimney seals. This project was completed in November 2001 and cost approximately $608,000.

Beechwood Village Lateral Lining

This project was executed by the MSD Infrastructure and Flood Protection Division and consisted of lining laterals in the Beechwood Village area upstream for the emergency pumped overflow at Marshal Drive and Shelbyville Road (MH 21101). This project represents a continuation of the original Beechwood Village Rehabilitation Phase 1 project from FY00 (July 1, 1999 – June 30, 2000). Under this project, laterals that had not been lined were lined to the residence and those laterals that were lined to the property line in FY00 (July 1, 1999 – June 30, 2000) were lined to the residence as well. Upon completion of this project all main lines, laterals, and manhole chimneys have been rehabilitated. No post-rehabilitation flow monitoring has been conducted since completion of this project. This project was completed in 2005 and cost approximately $532,000.

Middle Fork Phase 2

Beechwood Village is a part of the Middle Fork Phase 2 project which is described in Section 2.2.1.5.

2.2.2.6 Beechwood Village Post-Rehabilitation Flow Monitoring

Beechwood Village Chimney Seal and Cured In Place Pipe Installation: Post-Rehab Flow Monitoring

This study was conducted to assess the effectiveness of butyl rubber manhole chimney seals and cured in place pipe lining, installed as a part of the Beechwood Village Rehabilitation project discussed in section 2.2.1.5, in keeping rainwater I/I out of the collection system. The project cost was $18,000. After the rehabilitation was completed, flow monitors were installed in the identical locations used in the prior flow monitoring projects. A monitor was also installed in an

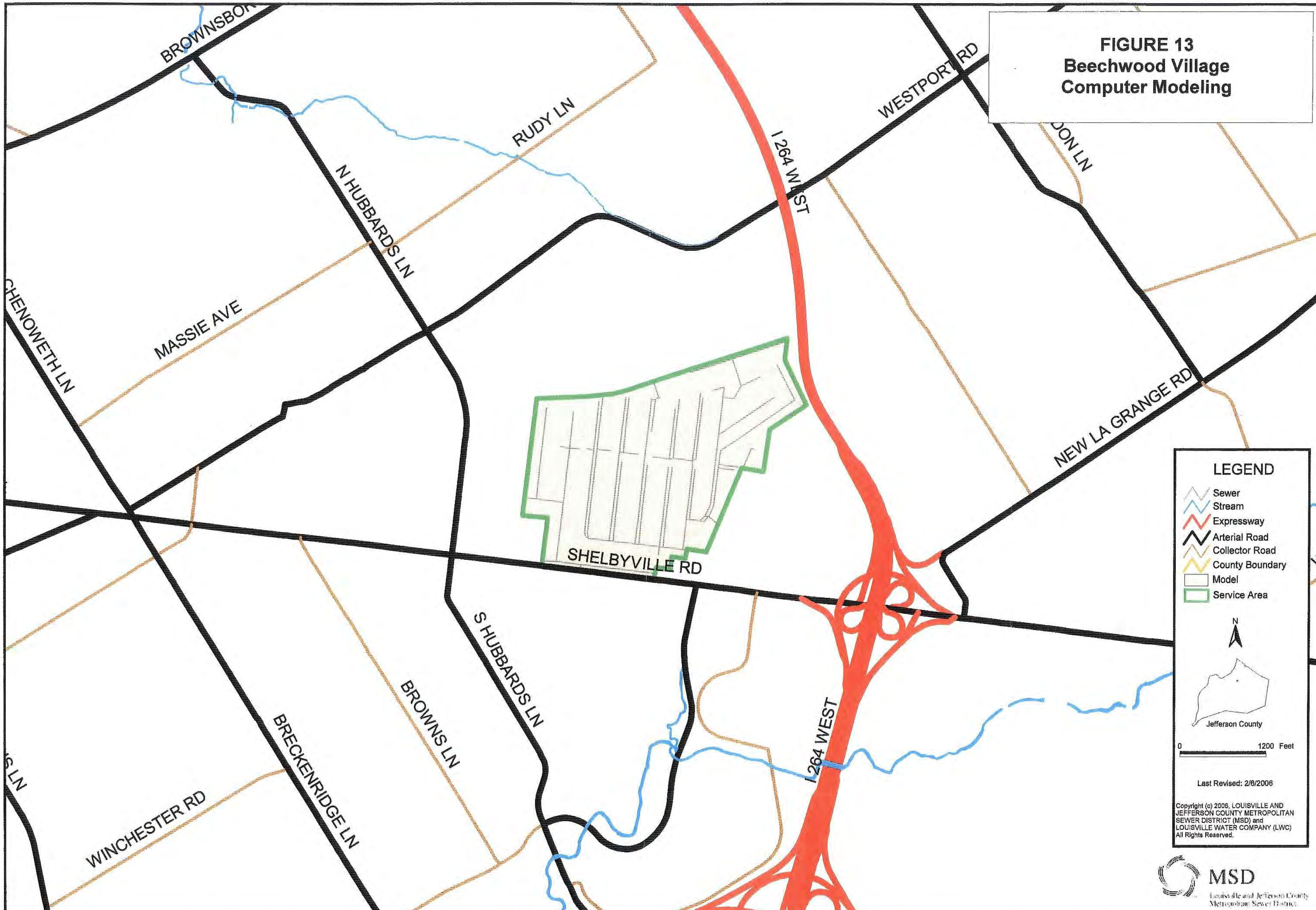
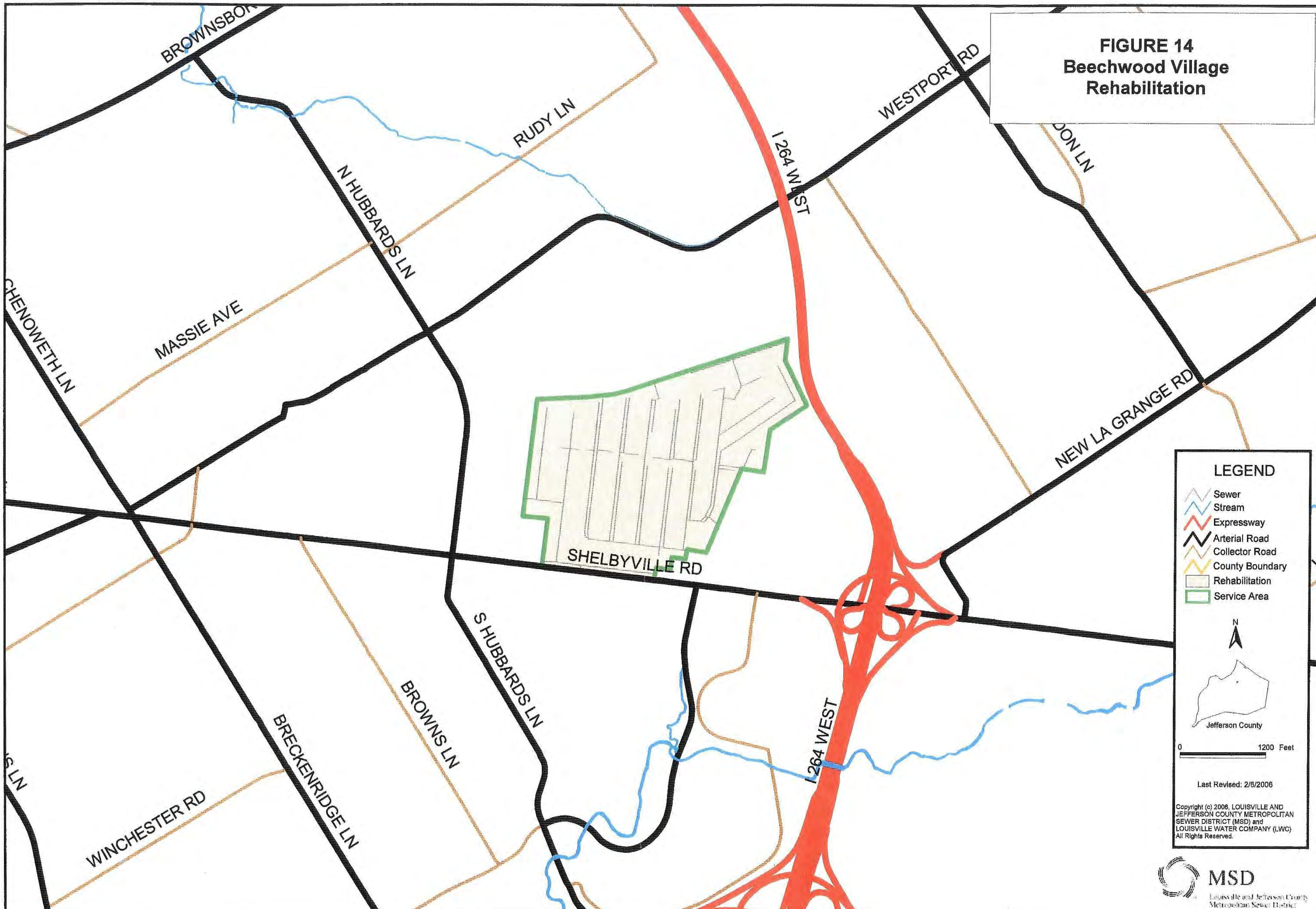


FIGURE 13
Beechwood Village
Computer Modeling

FIGURE 14
Beechwood Village Rehabilitation



un-rehabilitated subbasin to serve as a control basin. Post-rehab flow monitoring took place from February 12, 2001, through April 16, 2001. Two notable rain events were monitored: February 15 (0.75") and February 25 (0.72").

Observations from the study included the following:

- ***Peak wet weather flows were reduced.*** Peaking factors increased less than the control basin, indicating the chimney seals had a positive effect on reducing peak wet weather flow rates;
- ***Wet weather total excess flows were reduced.*** Reductions were shown in both rehabilitated subbasins expressed as a percentage of control basin excess flow; and,
- ***The general health of the system improved.*** Velocity has increased in most segments with only one rehabilitated segment displaying a systemic flaw.

This project was completed in June 2001 and cost approximately $22,000.

2.2.2.7 Other Capital Projects in Beechwood Village

Private Property Disconnection Pilot Project

Beechwood Village was part of the private property disconnection project discussed in section 2.2.1.7

2.2.2.8 Future / Ongoing Projects in Beechwood Village

Beechwood Village SSO Abatement Phase 2 (MSD Budget ID # H06301)

Continue the efforts in the Beechwood Village area to abate the discharges from the pumping operations associated with protecting the connected homes and building from system backups. Previous efforts have included rehabilitation of some sewers in the area, installation of backflow prevention devices, related drainage improvements that may convey the water discharged from properly installed sump pumps, manhole rehabilitation, and a pilot project to line property service laterals from the public portion of the connection to the house. Phase 2 will continue the efforts to reduce the frequency and volume of the pumped discharge for the area. This project is to be completed by December 31, 2008, and is estimated to cost $800,000.

Interceptor Condition Assessment Phase 1 (Sinking Fork) (MSD Budget ID # H04272)

This project involves the inspection of 8,400 linear feet of the Sinking Fork Interceptor from the Middle Fork Interceptor to the east side of the intersection with the I-264 Watterson Expressway to document their condition and locate defects, blockages, or other conditions contributing to inadequate operating conditions. MSD anticipates approximately $67,000 in inspection and $25,000 in rehabilitation work to the Sinking Fork Interceptor as an immediate result of the findings in this report. Completion of the rehabilitation work is due by December 31, 2008.

2.2.3 Ohio River Force Main (ORFM) / Muddy Fork

2.2.3.1 Ohio River Force Main / Muddy Fork Background

The ORFM / Muddy Fork service area consists primarily of single family residential housing and vacant or undeveloped land along with a small amount of apartments and commercial development. The collector sewers in the ORFM / Muddy Fork area were built mostly since the 1970s and are comprised of vitrified clay pipe and some polyvinyl PVC. The Ohio River Force Main in the study area was also constructed in the mid 1990s and is mostly comprised of PVC. The service area is generally bounded on the northwest by the Ohio River, and northeast by I-265 South and the south by Westport Road. Figure 15 is a service area diagram showing the hydraulic connectivity of overflow locations. Figure 16 shows a map of the ORFM / Muddy Fork of Beargrass Creek service area with eliminated treatment plants and pumping stations. See Figures 17 – 20 for the program elements described in section 2.2.

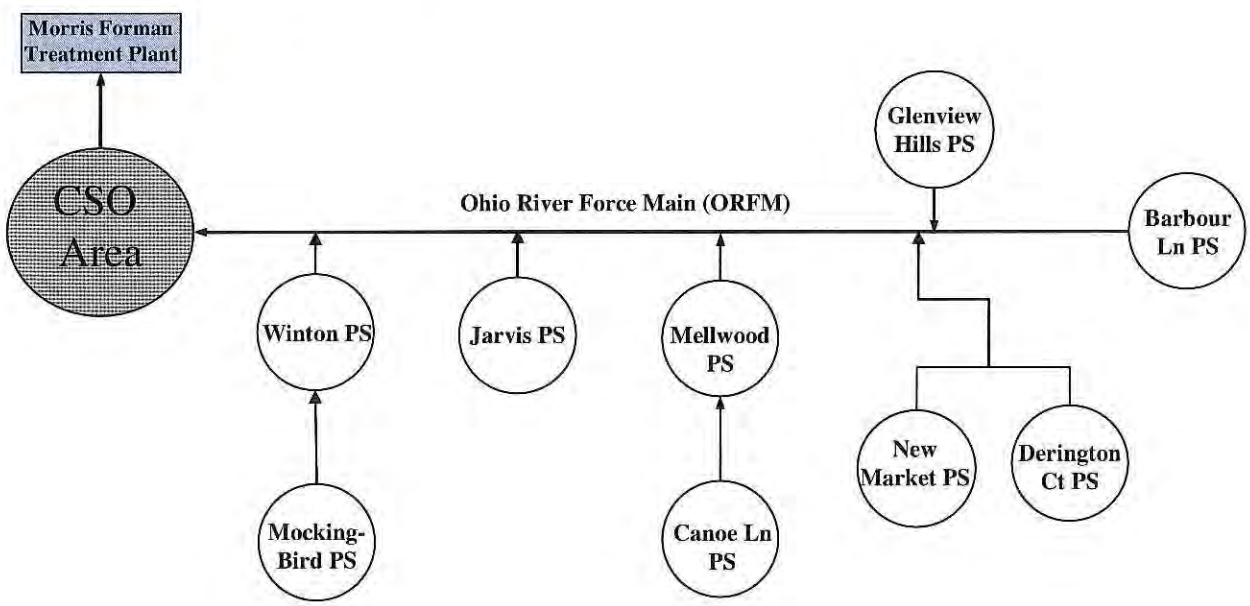


Figure 15 – ORFM / Muddy Fork– Hydraulic Connectivity Diagram of Unauthorized Discharges

2.2.3.2 Ohio River Force Main / Muddy Fork Flow Monitoring

<u>ORFM Muddy Fork Flow Monitoring</u>

This study was conducted to characterize and prioritize the 44 subbasins for further study and rehabilitation through the analysis of wet and dry-weather flow data, customer sewer backup requests, and MSD SSO reporting. Monitors were maintained and data collected for a period of 56 days beginning January 15, 1999, and ending March 12, 1999. The monitoring period was extended for seven meters that recorded flow into and through the Ohio River Force Mains.

Two significant rain events were monitored: January 21-23 (2.6"), and January 31 - February 1 (1.3"). Each of the sites in the ORFM / Muddy Fork basin experienced some amount of

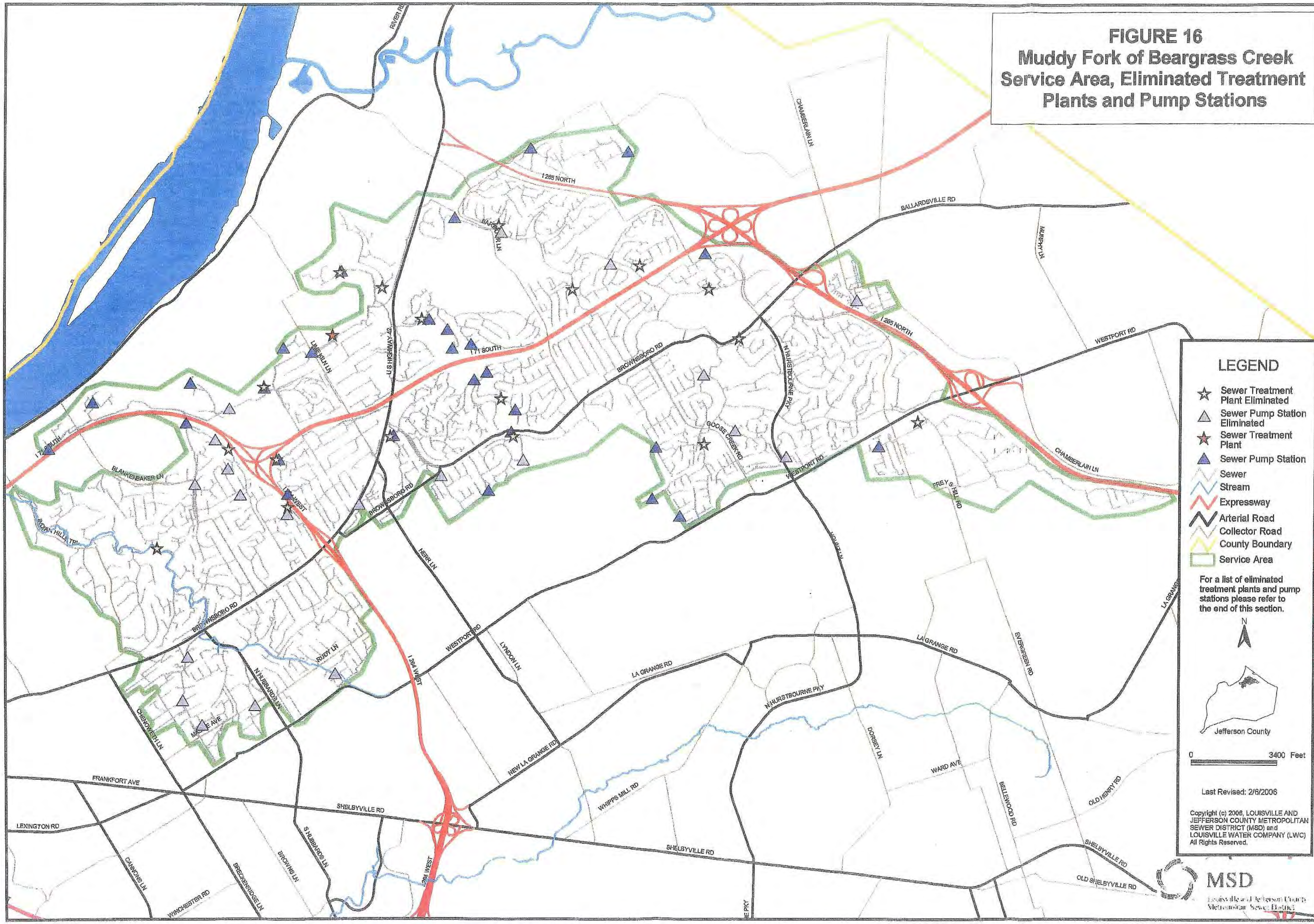


FIGURE 16
Muddy Fork of Beargrass Creek Service Area, Eliminated Treatment Plants and Pump Stations

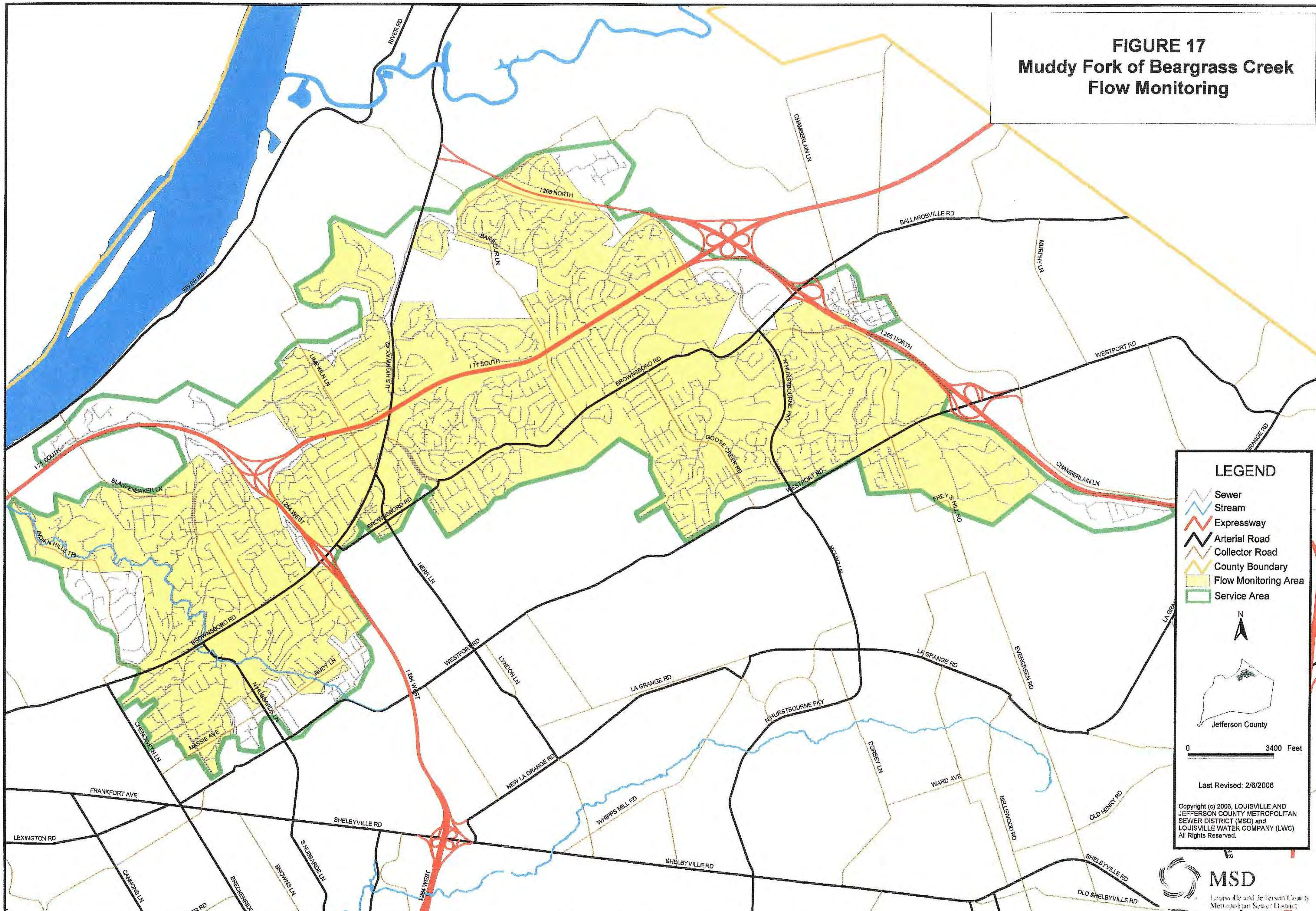


FIGURE 17
Muddy Fork of Beargrass Creek
Flow Monitoring
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Flow Monitoring Area
Service Area
N
Jefferson County
0
3400 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD
RIVER RD
I 265 NORTH
BALLARDSVILLE RD
CHAMBERLAIN LN
MURPHY LN
BARBOUR LN
I 71 SOUTH
LIME KILN LN
U.S. HIGHWAY 42
BROWNSBORO RD
N HURSTBOURNE PKY
GOOSE CREEK RD
WESTPORT RD
FREYS HILL RD
BLANKENBAKER LN
I 264 WEST
INDIAN HILLS TR
RUDY LN
N HUBBARDS LN
MASSIE AVE
CHENOWETH LN
HERR LN
LYNDON LN
LA GRANGE RD
EVERGREEN RD
DORSEY LN
NEW LA GRANGE RD
WHIPPS MILL RD
WARD AVE
BELLEWOOD RD
OLD HENRY RD
FRANKFORT AVE
SHELBYVILLE RD
LEXINGTON RD
S HUBBARDS LN
BROWNS LN
CANNONS LN
BRECKENRIDGE
OLD SHELBYVILLE RD

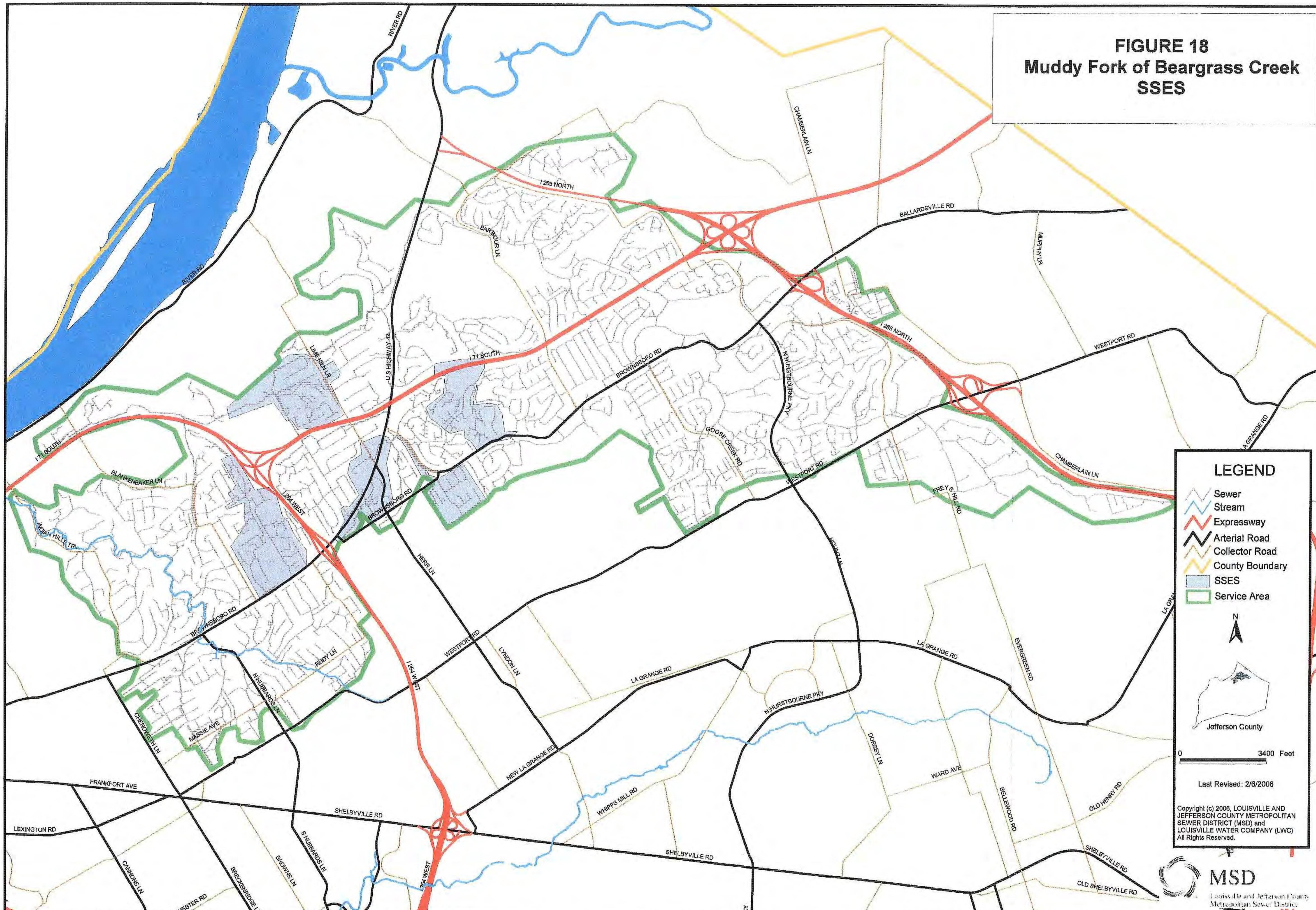


FIGURE 18
Muddy Fork of Beargrass Creek
SSES

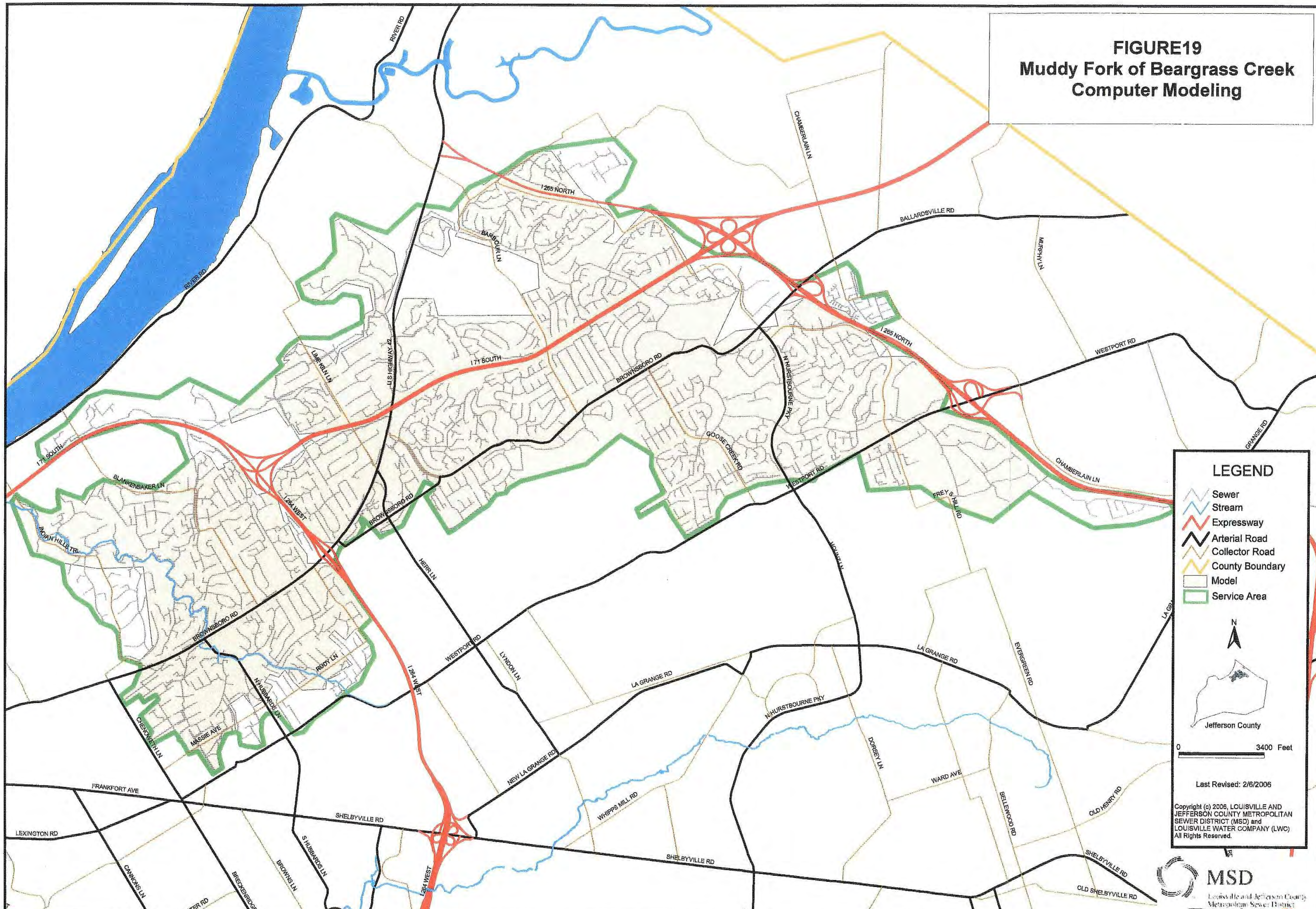


FIGURE19
Muddy Fork of Beargrass Creek Computer Modeling

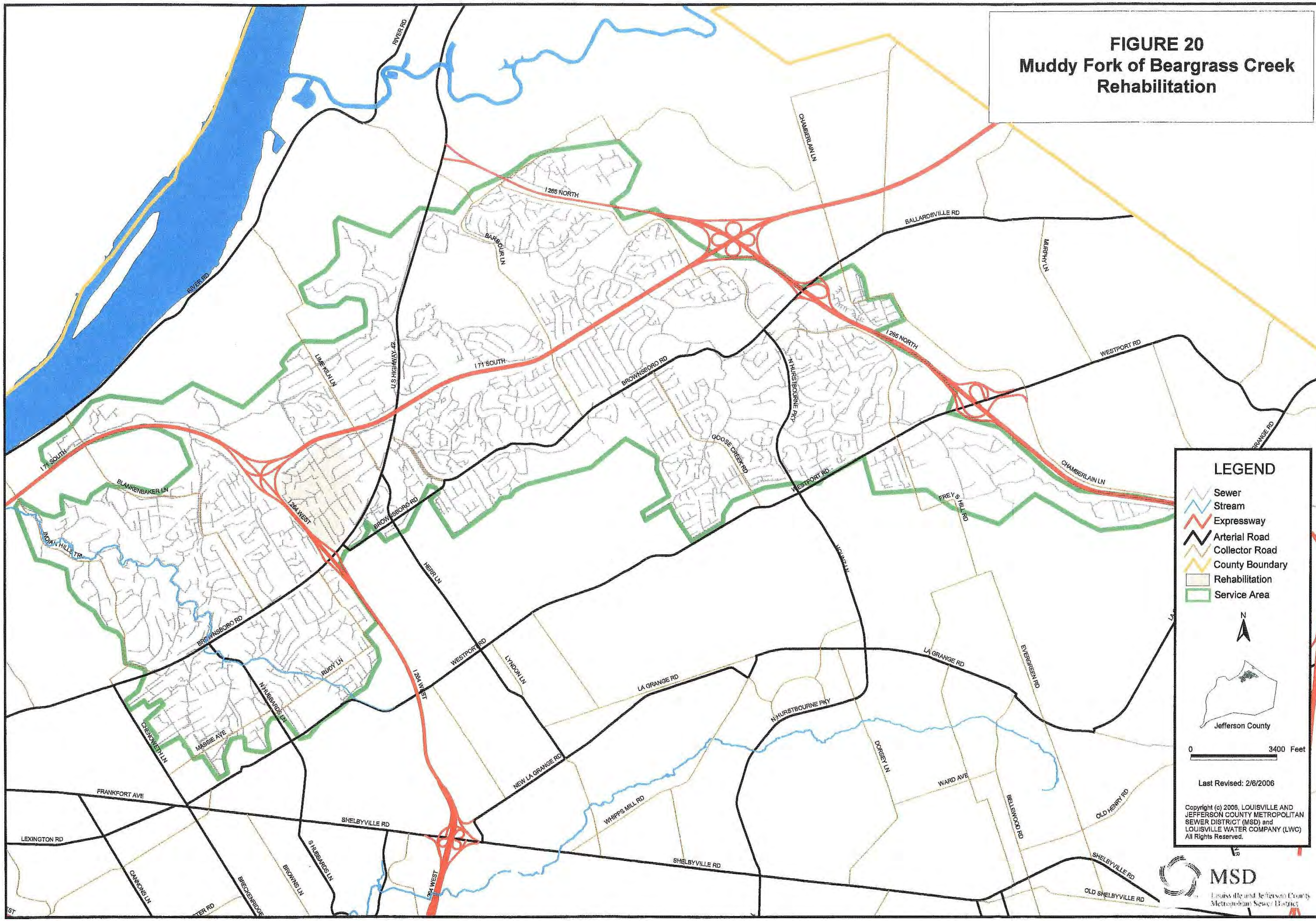


FIGURE 20
Muddy Fork of Beargrass Creek
Rehabilitation
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Rehabilitation
Service Area
N
Jefferson County
0
3400 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD
RIVER RD
I 265 NORTH
BALLARDSVILLE RD
CHAMBERLAIN LN
MURPHY LN
BARBOUR LN
I 71 SOUTH
LIME KILN LN
U.S HIGHWAY 42
BROWNSBORO RD
N HURSTBOURNE PKY
WESTPORT RD
GOOSE CREEK RD
FREYS HILL RD
BLANKENBAKER LN
INDIAN HILLS TR
I 264 WEST
HERR LN
LYNDON LN
RUDY LN
N HUBBARDS LN
CHENOWETH LN
MASSIE AVE
LA GRANGE RD
EVERGREEN RD
DORSEY LN
WARD AVE
NEW LA GRANGE RD
WHIPPS MILL RD
BELLEWOOD RD
OLD HENRY RD
FRANKFORT AVE
LEXINGTON RD
SHELBYVILLE RD
OLD SHELBYVILLE RD
CANNONS LN
BRECKENRIDGE
BROWNS LN
S HUBBARDS LN

inflow/infiltration (I/I) during these rain events. Hydrograph analysis showed that some areas experience more inflow than infiltration and vice versa. Many sites experienced immediate increases in flow rate after rain events, indicating inflow sources in the system. There were also significant periods of surcharging throughout the system.

The primary weighting factors for this analysis included basement back-up frequencies, SSO frequencies, and I/I analysis of flow monitoring. This analysis was used to delineate SSES project areas for FY01 (July 1, 2000 – June 30, 2001) through FY04 (July 1, 2003 – June 30, 2004). The flow monitoring data will be used further with field data collected as part of these SSES projects in order to tailor rehabilitation efforts to the particular problems in each subbasin for more cost-effective solutions. This project was completed in December 1999 and cost approximately $303,000. Figure 17 represents the area that was flow monitored in ORFM / Muddy Fork.

2.2.3.3 Ohio River Force Main / Muddy Fork Sanitary Sewer Evaluation Study (SSES)

<u>North County SSES</u>

A portion of the ORFM / Muddy Fork system with elevated peaking factors was investigated under the North County SSES project which is discussed in section 4.2.2. Figure 18 represents the SSES study areas in the ORFM / Muddy Fork service area.

2.2.3.4 Ohio River Force Main / Muddy Fork Computer Modeling

<u>Ohio River Force Main (ORFM)</u>

The ORFM is a twin barrel force main consisting of 92,000 linear feet of pipe ranging from 16 to 24 inch diameter. Approximately 57,000 linear feet is 24 inch diameter. There are 8 connected pump stations in the model. The ORFM Hydraulic Model was built and calibrated in FY01 (July 1, 2000 – June 30, 2001) using FY99 (July 1, 1998 – June 30, 1999) flow monitoring data to evaluate numerous operational scenarios in an effort to determine how the system would function at different combinations of pumps in operation and at maximum flow conditions. The most important scenario includes the existing and planned ORFM pump stations operating at the peak ultimate flow. The Harrods Creek Service Area was added to this scenario, and then the Goshen Service Area was added to ascertain if the ORFM could serve the entire area. This project cost approximately $92,000. Figure 19 represents the hydraulic model study area in the ORFM / Muddy Fork service area.

2.2.3.5 Ohio River Force Main / Muddy Fork Rehabilitation

Figure 20 displays the rehabilitation work conducted under the ORFM / Muddy Fork Rehabilitation projects.

<u>Newmarket / Northfield</u>

This project included rehabilitation consisting of 1,000 linear feet of cured-in-place sewer main rehabilitation, 22 manhole chimney seal installations, and 21 full manhole rehabilitations using the spraywall application. Since no formal SSES was conducted in this area, the needed repairs were determined from internal TVI performed by MSD to investigate overflow occurrences at a manhole upstream of the New Market Pump Station. This project was completed in 1997 and cost approximately $226,000.

Chimney Seal Reinstallation

This project was designed to reinstall chimney seals that were disconnected or removed during paving operations by paving contractors for the Jefferson County Public Works and various small cities throughout the county. Once paving was completed, these seals were not reinstalled or replaced. Reinstallation efforts occurred in Jeffersontown, Northfield/New Market, and the Pope Lick areas. This project was completed in 2004 and cost approximately $83,000.

2.2.3.6 Other Capital Projects in Ohio River Force Main / Muddy Fork

Muddy Fork Pump Station Rehabilitation

This project consisted of flood proofing rehabilitation to the existing Muddy Fork Pump Station. The project installed a floor drain system and sump pump piping. The project furnished and installed replacement electrical, mechanical and instrumentation equipment and other rehabilitation work to complete the flood proofing of the pump station. A change order installed air relief valves on the discharge piping, did work on the potable water system and replaced rotors on the two 88 HP pumps that are in the pump station.

Jarvis Ln. Pump Station Upgrades

This project consisted of upsizing the pumps and force main at Jarvis Ln. Pump Station. This project was completed in June 2005 and cost approximately $60,000.

Canoe Pump Station Improvements Project

This project investigated the Canoe Lane Pump Station and collection system to find options for eliminating the overflow at the pump station. The study included flow monitoring to establish actual peaking factors and to determine whether downstream collection system had sufficient capacity to accept additional flows. It was determined that pump replacement would eliminate the overflow for historic discharge events, but eliminating the pump station by gravity would be the best solution for ultimate overflow abatement. In addition, an endangered species assessment was conducted which identified potential habitat for the Indiana Bat, and a preliminary design of a pump station and force main modification was performed. The conclusions from the endangered species assessment could impact the construction timeline, but the final determination is that the project is feasible. Gravity elimination of the Canoe Lane Pump Station will be considered as the final SSDP is prepared. The approximate total cost of these project components was $75,000 and the project is scheduled for completion by June 30, 2006.

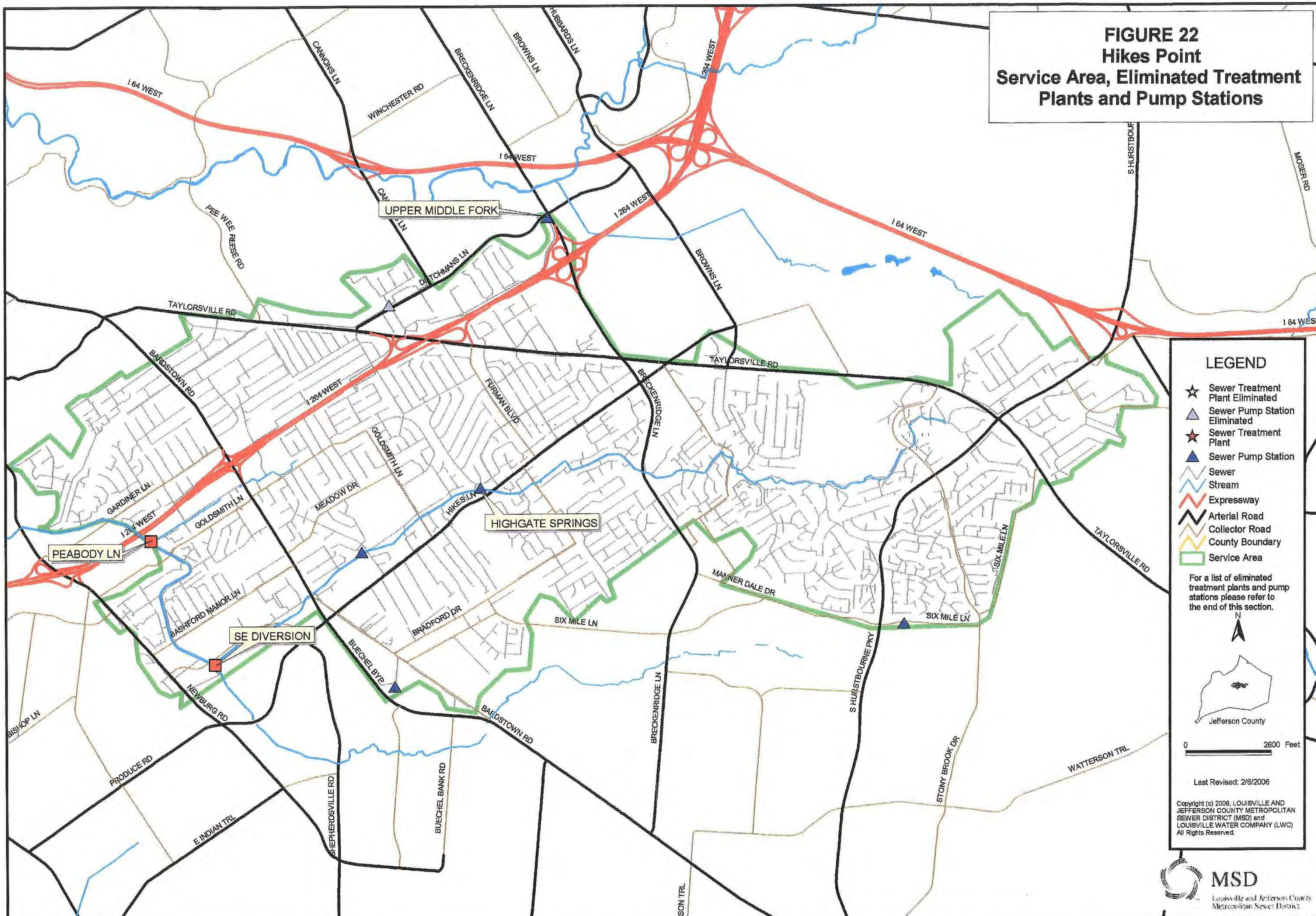


FIGURE 22
Hikes Point
Service Area, Eliminated Treatment Plants and Pump Stations

2.2.3.7 Future / Ongoing Projects in Ohio River Force Main / Muddy Fork

Murray Hills Pump Station Upgrade (MSD Budget ID # F06297)

The Acushnet Road and Denbeige Court Pump Stations were a part of the Murray Hills Treatment Plant sewershed until the plant was decommissioned in 1993. Acushnet Road Pump Station was built in 1969 and has had problems with unauthorized discharges. Denbeige Court Pump Station was built in 1970. Existing pumps and motors at both of these pump stations are worn and outdated. This project includes pump station upgrades to the Acushnet Road Pump Station and the Denbeige Court Pump Station. The expected cost for this project is $150,000 and shall be completed by September 30, 2008.

2.2.4 Hikes Point / Highgate Springs Pump Station

2.2.4.1 Hikes Point / Highgate Springs Background

The Hikes Point/Highgate Springs Pump Station area covers approximately 8.6 square miles and is centrally located at the intersection of Hikes Lane and Goldsmith Lane. The sewer system contains a total of 750,000 linear feet (142 miles) of gravity sewer pipe ranging in size from 8-inch to 48-inch diameter. The majority (82%) are 8-inch collection sewers. Of the entire sewershed, 55% of the system was installed prior to 1970 and 68% of the system consists of vitrified clay pipe (VCP). The majority of the land use in the service area is residential, with some smaller areas of commercial and parks.

In 1961, Hikes Point experienced heavy rains that caused 263 basement backups in the Highgate Springs area. As a result, MSD requested an intensive study of the area to propose remedial actions to reduce basement backups. According to the study, the three principle causes of the flooding were due to excessive infiltration of groundwater into the sewers, the surcharged condition of the Beargrass Interceptor Extension, and surface flooding.

The option recommended was to construct six temporary underground pumping stations throughout the Hikes Point area to discharge excess flows from the sanitary sewers into storm drains that drain to the South Fork of Beargrass Creek. MSD constructed Highgate Springs Pump Station in 1963 which was one of the six recommended pumping stations. It was designed to relieve the Beargrass Interceptor and prevent surcharging in the Highgate Springs sewer system.

During dry weather, a weir prevents flow from the 36-inch Highgate Springs Interceptor from entering the stations wet well. The flow is passed through the pump station by gravity and through a 30-inch tide gate into the Beargrass Interceptor. During wet weather, the tide gate closes and flow from the Highgate Springs Interceptor spills into the wet well of the Highgate Springs Pump Station. For small storm events, one pump discharges directly into the Beargrass Interceptor. For increasingly larger events, the remaining three pumps will turn on sequentially until 3 pumps are discharging to the creek and preventing basement backups to approximately 300 homes.

The remaining five locations where temporary pumping stations were recommended are the locations called out in the Consent Decree as a part of the Hikes Point area. Figure 21 is a service area diagram showing the hydraulic connectivity of overflow locations and the flow monitoring basins in which they occur. Figure 22 shows a map of the Hikes Point service area with eliminated treatment plants and pumping stations. See Figures 23 - 26 for the program elements described in section 2.2.

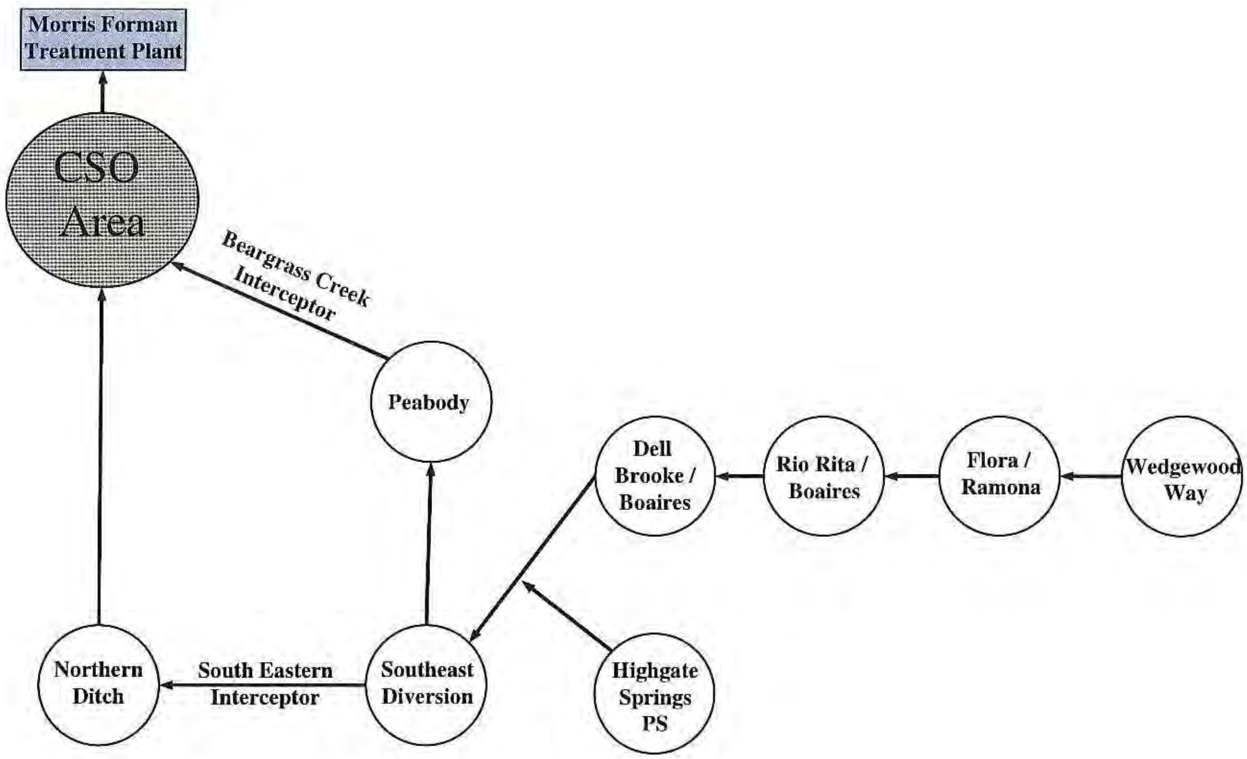


Figure 21 – Hikes Point – Hydraulic Connectivity Diagram of Unauthorized Discharges

2.2.4.2 Hikes Point / Highgate Springs Flow Monitoring

<u>Hikes Point Real-Time Control Flow Monitoring</u>

This project was developed to assess the condition of the Hikes Point sewer system, to quantify the impacts of I/I, and to assess the impact of previous rehabilitation. The results of the wet and dry weather flow data analysis were used to update the MSD hydraulic model for use with the Real Time Control (RTC) project. This project included five flow monitors and one rain gauge in the Hikes Point sewer system. For additional information on RTC, see the Interim Long Term Control Plan dated February 2006.

Monitors were maintained and data collected for a period of 120 days beginning January 17, 2002, and ending May 16, 2002. The flow monitoring data gathered during the monitoring period was analyzed and used to characterize the flow for each subbasin in the project area. This analysis included peaking factor analysis, hydrograph analysis, wet-weather flow analysis, and dry-weather flow analysis.

Twelve significant rain events (>0.75") were monitored; however, only the most intense event was used: January 23 –24 (approximately 2.65" of rain over 48 hours). The flow meters in each of the Hikes Point subbasins showed that the average dry weather flow was less than 50% of the pipe capacity. Wet weather analysis showed peaking factors ranging from 2.46-8.93. It

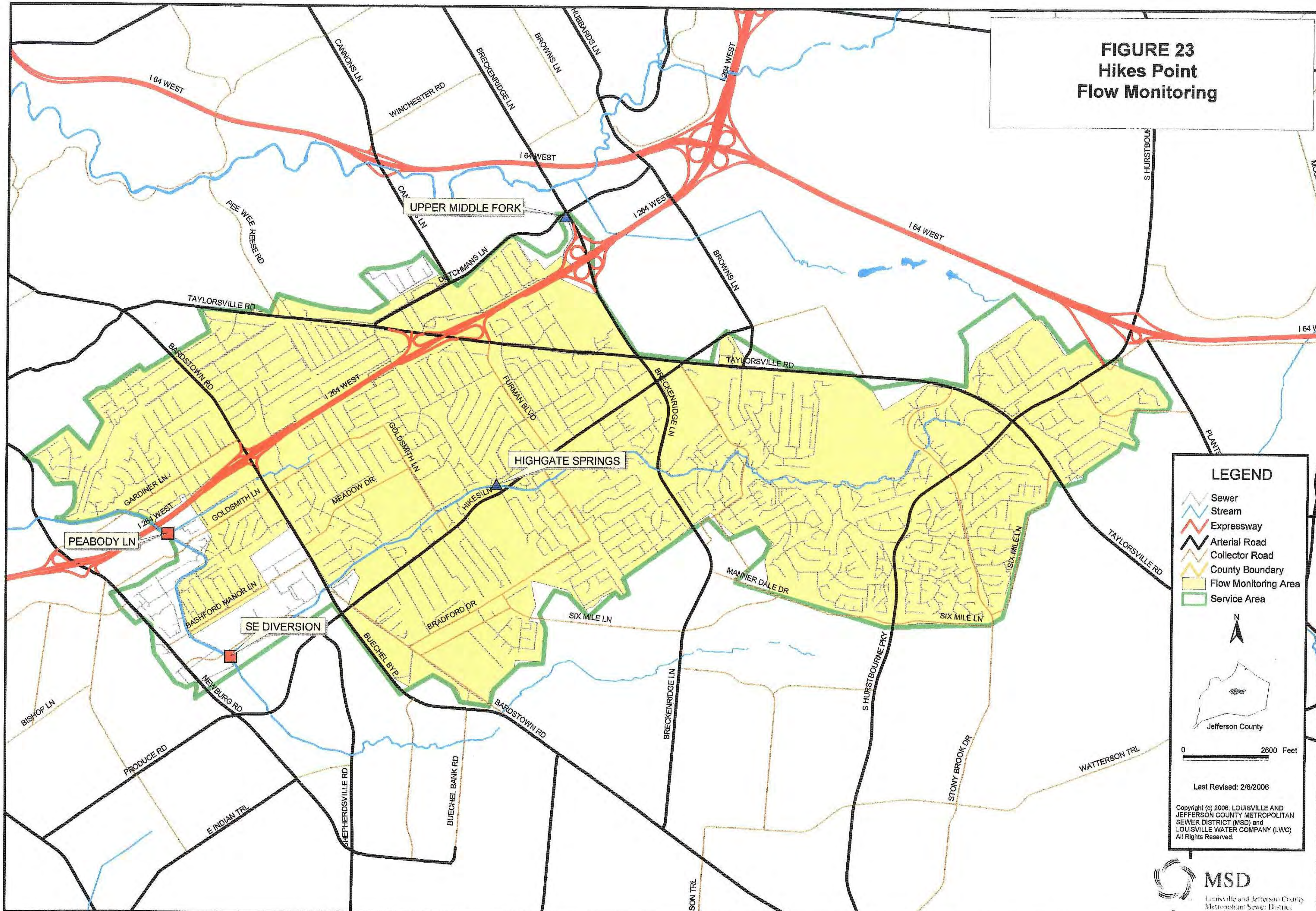


FIGURE 23
Hikes Point
Flow Monitoring
UPPER MIDDLE FORK
HIGHGATE SPRINGS
PEABODY LN
SE DIVERSION
I 64 WEST
I 264 WEST
CANNONS LN
WINCHESTER RD
BRECKENRIDGE LN
BROWNS LN
HUBBARDS LN
PEE WEE REESE RD
DUTCHMANS LN
TAYLORSVILLE RD
BARDSTOWN RD
FURMAN BLVD
GOLDSMITH LN
MEADOW DR
GARDINER LN
HIKES LN
BASHFORD MANOR LN
BRADFORD DR
BUECHEL BYP
NEWBURG RD
SIX MILE LN
MANNER DALE DR
S HURSTBOURNE PKY
STONY BROOK DR
WATTERSON TRL
BUECHEL BANK RD
SHEPHERDSVILLE RD
E INDIAN TRL
PRODUCE RD
BISHOP LN
MOSER RD
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Flow Monitoring Area
Service Area
N
Jefferson County
0
2600 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD
Louisville and Jefferson County Metropolitan Sewer District

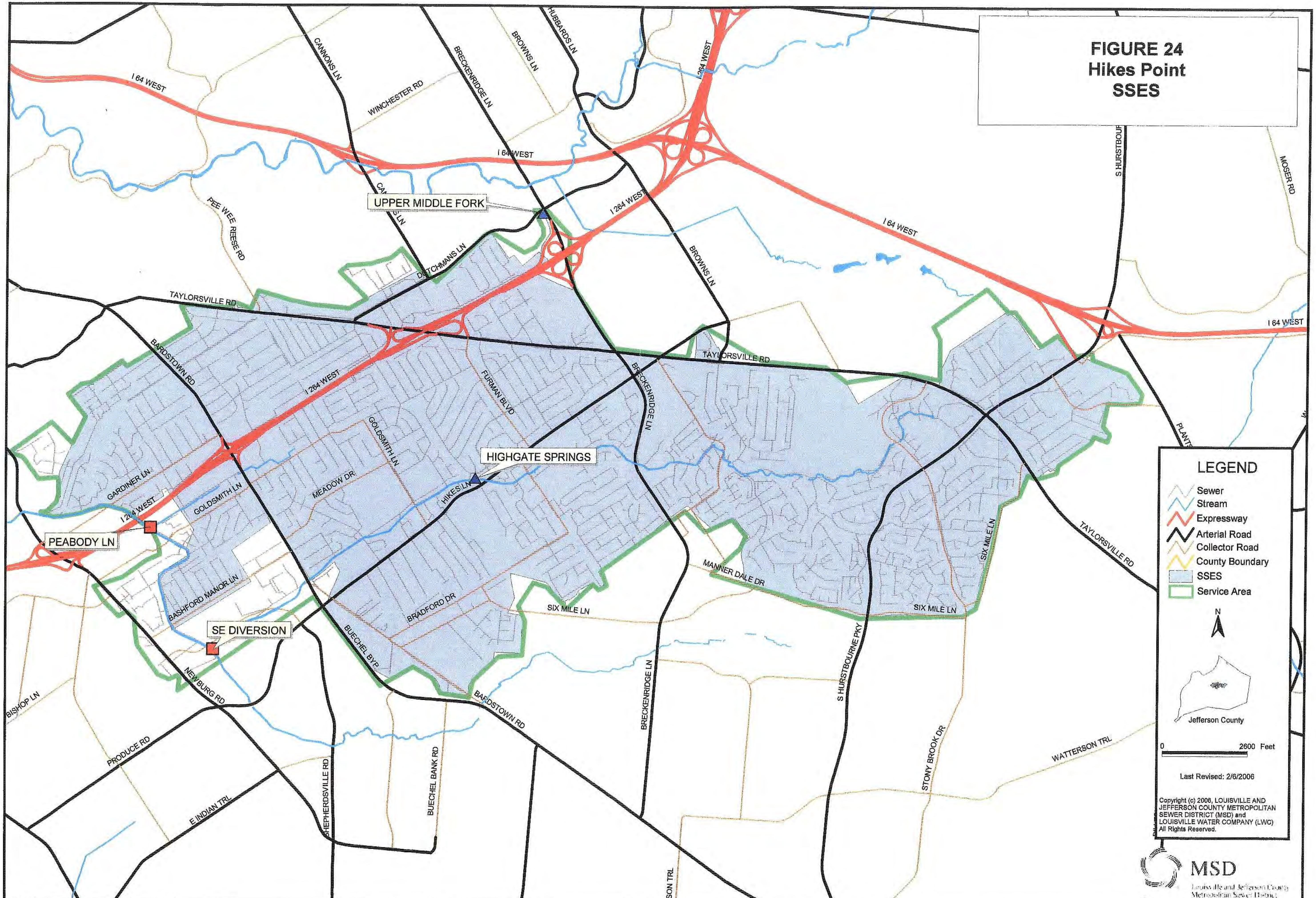


FIGURE 24
Hikes Point
SSES
I 64 WEST
I 264 WEST
CANNONS LN
WINCHESTER RD
BRECKENRIDGE LN
BROWNS LN
HUBBARDS LN
S HURSTBOURNE PKY
MOSER RD
UPPER MIDDLE FORK
PEE WEE REESE RD
DUTCHMANS LN
TAYLORSVILLE RD
BARDSTOWN RD
FURMAN BLVD
GOLDSMITH LN
HIGHGATE SPRINGS
MEADOW DR
GARDINER LN
HIKES LN
PEABODY LN
BASHFORD MANOR LN
SE DIVERSION
BRADFORD DR
SIX MILE LN
MANNER DALE DR
BUECHEL BYP
NEW BURG RD
BISHOP LN
PRODUCE RD
E INDIAN TRL
SHEPHERDSVILLE RD
BUECHEL BANK RD
STONY BROOK DR
WATTERSON TRL
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
SSES
Service Area
N
Jefferson County
0
2600 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD
Louisville and Jefferson County Metropolitan Sewer District

also showed that only one of the overflows in the Hikes Point RTC Flow Monitoring Report area occurred at a pump station, suggesting that overflows occurred as a result of undersized pipes rather than undersized facilities, such as pump stations. This project was completed in November 2002 and cost approximately $120,000. Figure 23 represents the area that was flow monitored in Hikes Point.

2.2.4.3 Hikes Point / Highgate Springs Sanitary Sewer Evaluation Study (SSES)

Hikes Point SSES

The Hikes Point SSES Project was initiated after the March 1, 1997, flood to address basement flooding in the Highgate Springs area. The project cost was approximately $1,100,000 and included initial flow monitoring in the Hike Point system. The objective of this study conducted in 1997 was to find sources of excessive groundwater infiltration, storm water inflow, and rainfall-derived infiltration to the system in order to prepare a long term plan of improvements for capital funding. The study included the following components to identify active and potential sources of I/I:

- Installation of 25 strategically placed flow meters to monitor sanitary sewage flows and 4 rain gauges to measure rain events for an average of 45 days;
- Gathering and reviewing existing pertinent data (LOJIC, IMS, & flow data) to evaluate the quantity of I/I entering the sewer system;
- Conducting physical inspections of manholes to identify corrosion and structural defects that may be contributing excessive I/I (2,143 manholes);
- Conducting smoke testing to identify structural defects that may contribute to I/I (500,000 linear feet sewer);
- Conducting TV inspections, dyed-water flooding, and flow isolations in a limited amount of the system to identify structural defects that may contribute I/I to the system and blockages that may be inhibiting efficient hydraulics; and,
- Home inspection of sump pumps by high school students employed by MSD;
- Compiling and analyzing data generated during the SSES to quantify the amount of excessive I/I entering the system and prioritize subbasins for rehabilitation.

Hikes Point exhibited the characteristics typical of a 40-year old sewer system. I/I had approximately doubled since 1964 and was in high levels throughout the study area. The worst basins were adjacent to the combined area, although some newer sections near Hurstbourne Parkway also exhibited high rates.

Inflow was the most serious problem in this area. The major inflow contributors were manhole leaks from shifted manhole frames and chimneys and private side defects, such as Property Service Connection (PSC) leaks. There were also sections of the sewer that were undersized. The critical undersized lines were the major interceptors downstream of Highgate Springs Pump Station and a 15-inch spur that serves the area where four of the five pumped SSOs occur. These interceptors were maximized during wet weather. This project was completed in December 1998. The significant defects identified in this SSES were repaired under the Hikes Point Rehabilitation Phases 1A, 1B, 2, and 3 projects. Figure 24 represents the SSES study area in the Hikes Point service area.

2.2.4.4 Hikes Point / Highgate Springs Computer Modeling

Hikes Point

The Hikes Point hydraulic model was developed as part of the 1997 Sanitary Sewer Evaluation Study. This model was then used to test various scenarios for inline storage in the area affected by wet weather emergency pumped overflows and results were used to establish design parameters for the Hikes Point phase 1B project. In 2002, the model was updated and recalibrated to FY02 (July 1, 2001 – June 30, 2002) flow monitoring data for use with the Real Time Control (RTC) system currently being developed by MSD and was extended to include the Southeast Diversion Structure. The Hikes Point model was also used to perform green line analyses for several overflow sites in FY03 (July 1, 2002 – June 30, 2003) with the goal of determining whether emergency pumps were required and if so, at what depth of flow they should be activated. Finally, this model was used as the basis for the Hikes Point System Improvement Phase 1 project in FY04 (July 1, 2003 – June 30 2004) and the Hikes Point Capacity Assessment Project in FY05. These projects are discussed in section 2.2.4.7.

In FY04, XP-SWMM was used to estimate the total overflow volume that occurs during a 2-year and 10-year, 24-hour SCS Type II storm event. The overflows occur throughout the Hikes Point system. The model was also used to determine available hydraulic capacity in the system for each of the storm events. Figure 25 represents the hydraulic model study area in the Hikes Point service area.

2.2.4.5 Hikes Point / Highgate Springs Rehabilitation

Figure 26 displays the rehabilitation work conducted under the Hikes Point Rehabilitation projects.

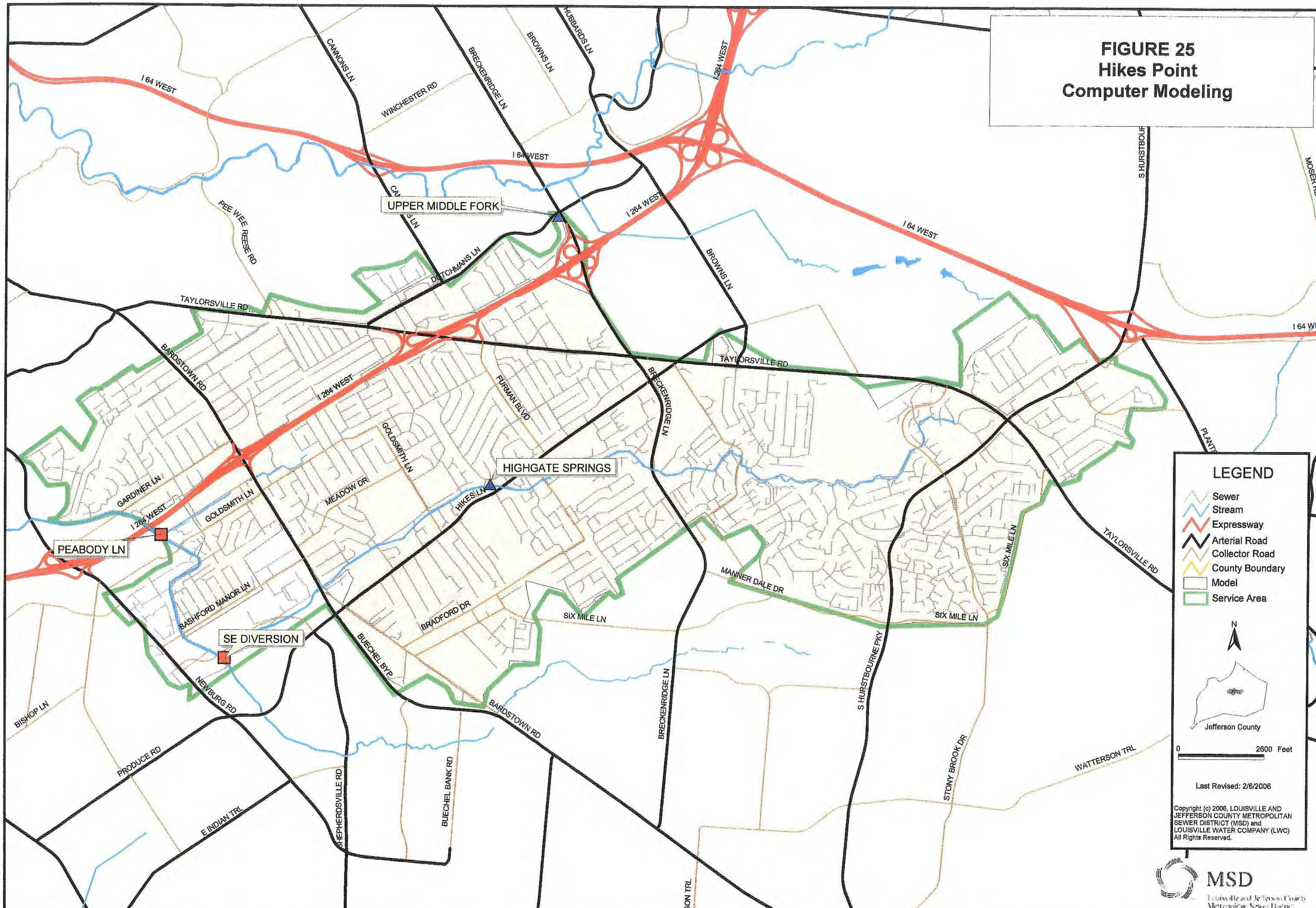
Hikes Point Phase 1A

This project provided for the rehabilitation of defects identified in the Hikes Point SSES. This rehabilitation effort involved lining 7,611 linear feet of sewer mains with cured-in-place pipe (CIPP) and sealing 309 manholes with butyl rubber chimney seals. This effort was the first of four comprehensive rehabilitation projects designed to lower the extensive basement flooding and wet weather problems in the Hikes Point area. This first phase of rehabilitation targeted direct inflow sources identified through the Hikes Point SSES in order to lower the peak flows during wet weather, as well as address system capacity problems. Later phases of rehabilitation addressed steady state infiltration in order to reduce base flow levels. Post-rehabilitation flow monitoring was included in all phases of rehabilitation to assess the impacts of the work on reducing wet weather impacts to the system. This project was completed in the fall of 1999 and cost approximately $670,000.

Hikes Point Phase 1B

This project provided additional in-line storage to reduce the need for MSD to set pumps to alleviate property damage and flooding during rain events. The project cost approximately $656,000 and the effort consisted of upsizing 1,885 linear feet of 15- and 16-inch clay sewer

FIGURE 25
Hikes Point
Computer Modeling



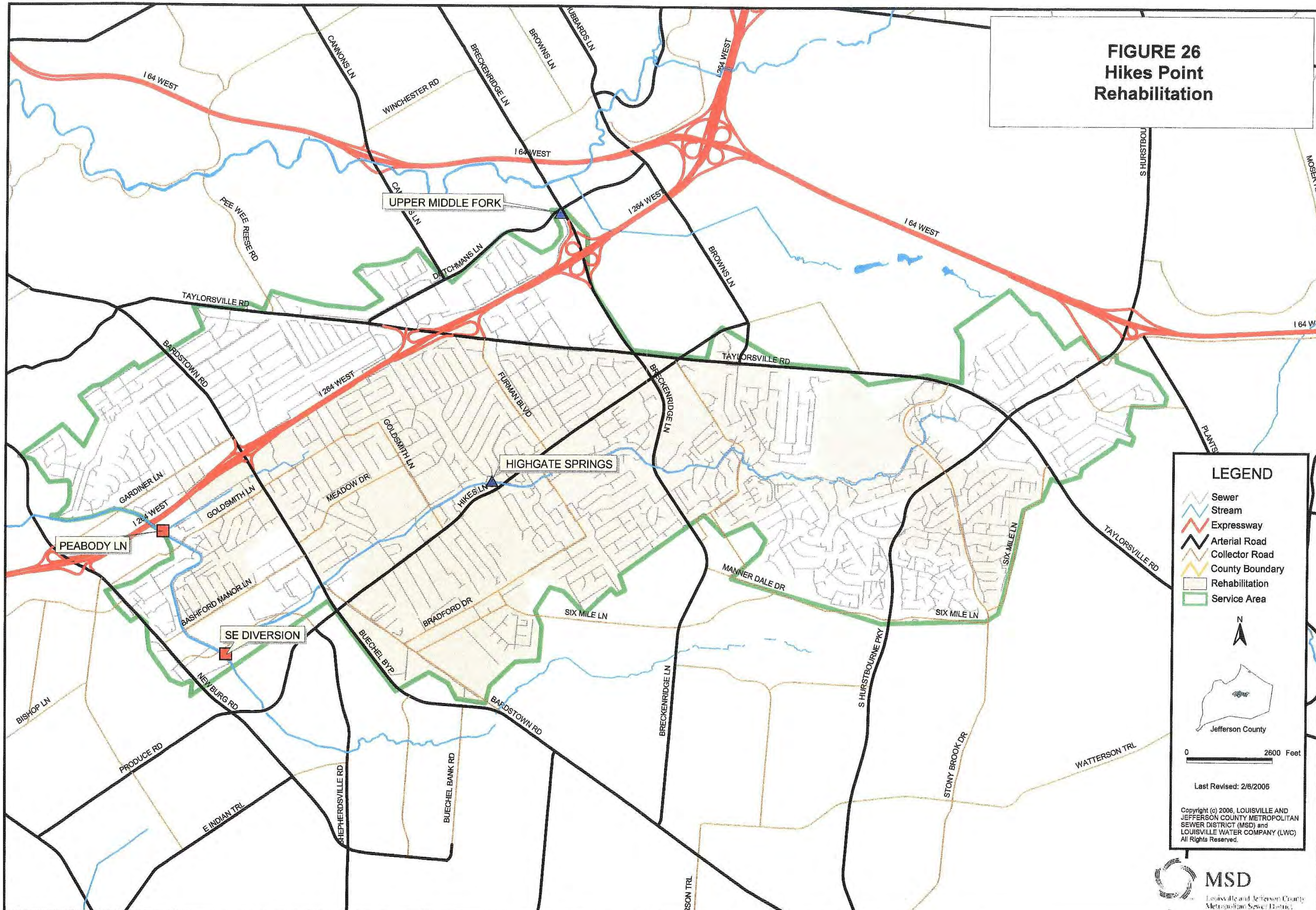


FIGURE 26
Hikes Point Rehabilitation

main to 21-inch PVC sewer main along Boaires Lane and Rio Rita Avenue. This project was completed in the fall of 2000.

Hikes Point Phase 2

This project provided for the rehabilitation of defects identified in the Hikes Point SSES. This project was a trenchless rehabilitation project that rehabilitated 701 manhole chimneys and castings using an internal butyl rubber seal or a brush-on coating. This project was completed in June 2001 and cost approximately $469,000.

Hikes Point Phase 3

This project provided for the rehabilitation of defects identified in the Hikes Point SSES and from additional TVI performed on a previous rehabilitation project. The goal of the rehabilitation design was to address all significant sewer line defects upstream of the Highgate Springs Pump Station. This rehabilitation effort consisted of rehabilitating 8,062 linear feet of cured-in-place sewer main rehabilitation and 95 cured-in-place lateral rehabilitations. This project was completed in October 2001 and cost approximately $1,008,000.

2.2.4.6 Hikes Point / Highgate Springs Post-Rehabilitation Flow Monitoring

Hikes Point Chimney Seal and Cured In Place Pipe Installation: Post-Rehab Flow Monitoring

This study was conducted to assess the effectiveness of butyl rubber manhole chimney seals and cured-in-place pipe lining, installed as a part of the Hikes Point Phases 1A Rehabilitation project discussed above, in keeping rainwater inflow and infiltration out of the sanitary sewer collection system. After the rehabilitation was completed, flow monitors were installed in the identical locations used in the prior flow monitoring projects. A monitor was also installed in an un-rehabilitated subbasin to serve as a control basin. Post-rehab flow monitoring took place from February 12, 2001, through April 16, 2001. Two notable rain events were monitored: February 15 (0.78") and February 25 (0.76").

Observations from the study included the following:

- ***Peak wet weather flows were reduced.*** Peaking factors increased less than the control basin, indicating the chimney seals had a positive effect on reducing peak wet weather flow rates.
- ***Wet weather total excess flows were reduced.*** Reductions were shown in both subbasins expressed as a percentage of control basin excess flow.
- ***The general health of the system improved.*** Velocity increased in one segment with the other showing a downstream bottleneck, possibly justifying further investigation.

This project was completed in June 2001 and cost approximately $22,000.

Hikes Point Chimney Seal and Cured In Place Pipe Installation: Post-Rehabilitation Flow Monitoring

This study was conducted to assess the effectiveness of butyl rubber manhole chimney seals and cured in place pipe lining, installed as a part of the Hikes Point Phases 2 and 3 Rehabilitation projects discussed above, in keeping rainwater inflow and infiltration out of the sanitary sewer collection system. After the rehabilitation was completed, flow monitors were installed in the identical locations used in the prior flow monitoring projects. A monitor was also installed in an un-rehabilitated subbasin to serve as a control basin. Post-rehabilitation flow monitoring took place from January 3, 2002, through March 3, 2002. Two significant rain events were monitored: January 24 (2.65") and January 30 (1.48").

Observations from the study included the following:

- ***Peak wet weather flows were reduced.*** Peaking factors increased less than the control basin, indicating the chimney seals and cured in place lining had a positive effect on reducing peak wet weather flow rates.
- ***Wet weather total excess flows were reduced.*** Reductions were shown in the subbasin expressed as a percentage of control basin excess flow.
- ***The general health of the system improved.*** Velocity and depth increased and post rehab data collected closely followed the theoretical sewer capacity calculated using Manning's Equation.

This project was completed in June 2002 and cost approximately $18,000.

2.2.4.7 Other Capital Projects in Hikes Point / Highgate Springs

Private Property Disconnection Pilot Project

A portion of the Hikes Point area was included in the Private Property Disconnection Pilot Project which is discussed in section 2.2.1.7.

Hikes Point System Improvements Phase 1

This project used the Hikes Point XP SWMM Hydraulic Model (developed in FY98 (July 1, 1997 – June 30, 1998) and recalibrated in FY02 (July 1, 2001 – June 30, 2002)) to develop a solution to eliminate overflows, both model-predicted and known, in Hikes Point for protection up to the 10-year, 24-hour event. Opinions of cost were developed for viable solutions and reported to MSD. This project was completed in September 2004 and cost approximately $77,000.

Hikes Point Capacity Assessment

This project built on the Hikes Point System Improvements Phase 1 project and used the Hikes Point XP SWMM Hydraulic Model developed in FY98 (July 1, 1997 – June 30, 1998). The model was recalibrated in FY02 (July 1, 2001 – June 30, 2002) to refine solutions developed in the system improvements project and evaluate options for redirecting flows external to the Hikes Point system through the area. In addition, cost estimates were refined and ground truthing was

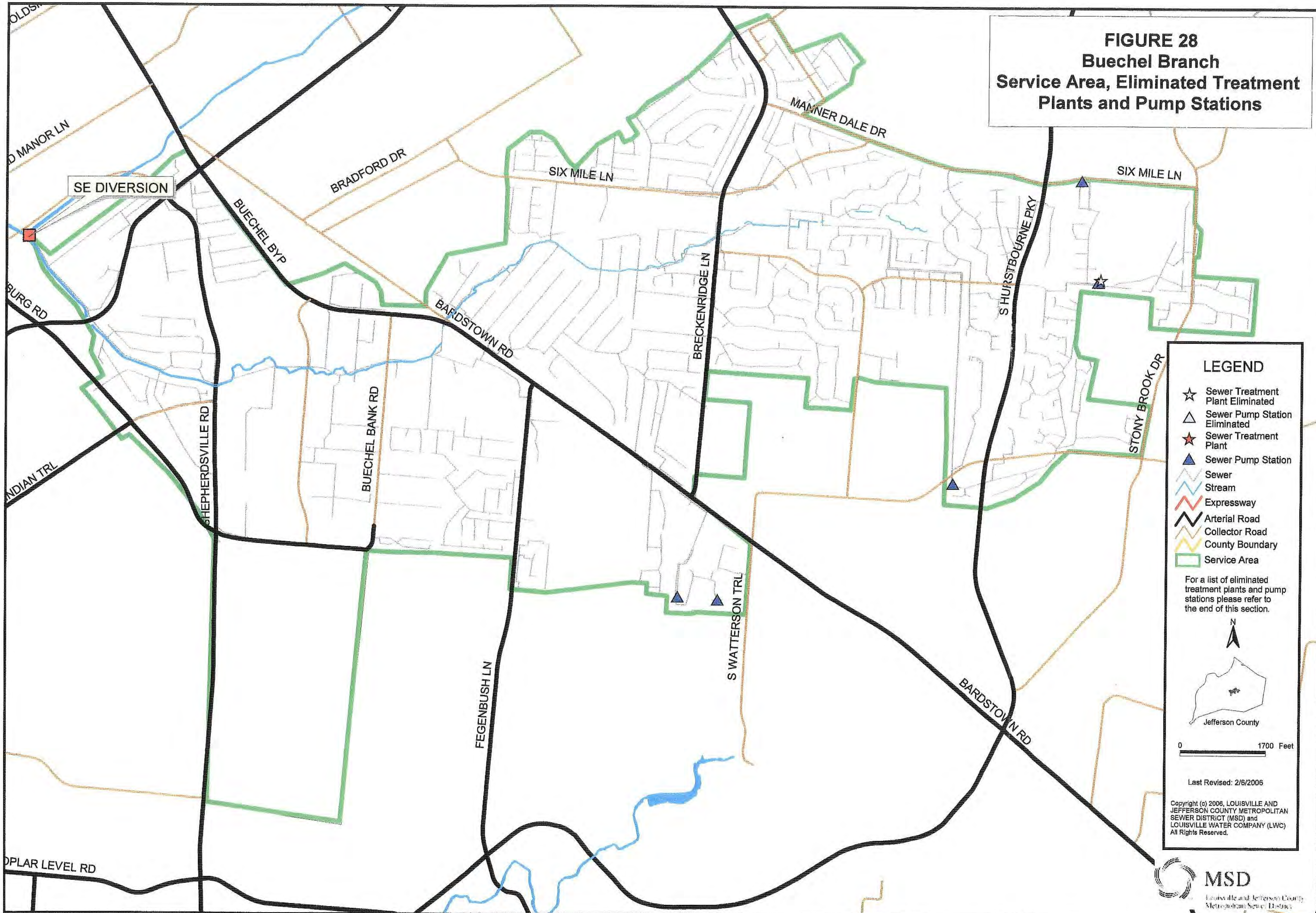


FIGURE 28
Buechel Branch
Service Area, Eliminated Treatment
Plants and Pump Stations
SE DIVERSION
MANOR LN
BRADFORD DR
BUECHEL BYP
SIX MILE LN
MANNER DALE DR
SIX MILE LN
BRECKENRIDGE LN
S HURSTBOURNE PKY
BARDSTOWN RD
STONY BROOK DR
SHEPHERDSVILLE RD
BUECHEL BANK RD
DIAN TRL
S WATTERSON TRL
FEGENBUSH LN
BARDSTOWN RD
PLAR LEVEL RD
LEGEND
Sewer Treatment Plant Eliminated
Sewer Pump Station Eliminated
Sewer Treatment Plant
Sewer Pump Station
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Service Area
For a list of eliminated treatment plants and pump stations please refer to the end of this section.
N
Jefferson County
0
1700 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD

performed to help identify the most viable abatement options. This project was completed in November 2005 and cost approximately $40,000.

2.2.4.8 Future / Ongoing Projects in Hikes Point / Highgate Springs

Interceptor Condition Assessment Phase 1 (Hikes Point) (MSD Budget ID # H04272)

This project involves the inspection of 47,000 linear feet of the Beargrass Interceptor and the Beargrass Relief Interceptor from the Nightingale Pump Station through the Southeast Diversion to the east side of the U.S. Army Corps of Engineers Breckenridge basin site to document their condition and locate defects, blockages, or other conditions contributing to inadequate operating conditions. MSD anticipates approximately $320,000 in inspection and $140,000 in rehabilitation work to the Beargrass Interceptor and the Beargrass Relief Interceptor as an immediate result of the findings in this report. Completion of the rehabilitation work is due by December 31, 2008.

Interceptor Condition Assessment Phase 1 (Goldsmith) (MSD Budget ID # H04272)

This project involves the inspection of 24,000 linear feet of the Goldsmith Interceptor to document their condition and locate defects, blockages, or other conditions contributing to inadequate operating conditions. MSD anticipates approximately $164,000 in inspection and $70,000 in rehabilitation work to the Goldsmith Interceptor as an immediate result of the findings in this report. Completion of the rehabilitation work is due by December 31, 2008.

2.2.5 Buechel Branch

2.2.5.1 Buechel Branch Background

The majority of the Buechel Branch sanitary sewers were built during the mid-1960s and early 1970s, primarily of vitrified clay pipe. The system was not originally designed to limit I/I, which combined with the system's age, has provided for significant leaks. The Buechel Branch service area is located in central Jefferson County and is part of the South Fork of Beargrass Creek watershed. In the late 1970s, the Southeastern Interceptor was constructed as a result of a system constriction on the Beargrass Interceptor (BGI). The Southeastern Interceptor extended from the Southeast Diversion structure to the Northern Ditch Interceptor. In the early 1990s, an evaluation of relief capacities of the Southeastern Interceptor was conducted using the USEPA Stormwater Management Model (SWMM). It was then determined that a sluice gate opening of 6 inches at the diversion structure would provide some relief to the Hikes Point and Buechel Branch areas upstream of the diversion structure and maintain control on the total flow diverted to the Southeastern Interceptor during wet weather to assure no detrimental effects on the downstream facilities. Shortly after the opening of the sluice gate, MSD found that the 6-inch opening caused surcharging and overflows upstream of the Southeast Diversion Structure. For additional information about how the diversion is operated, refer to the RTC section in the Interim Long Term Control Plan dated February 2006. Figure 27 is a service area diagram showing the hydraulic connectivity of overflow locations. Figure 28 shows a map of the Buechel Branch service area with eliminated treatment plants and pumping stations. See Figures 29 – 32 for the program elements described in section 2.2.

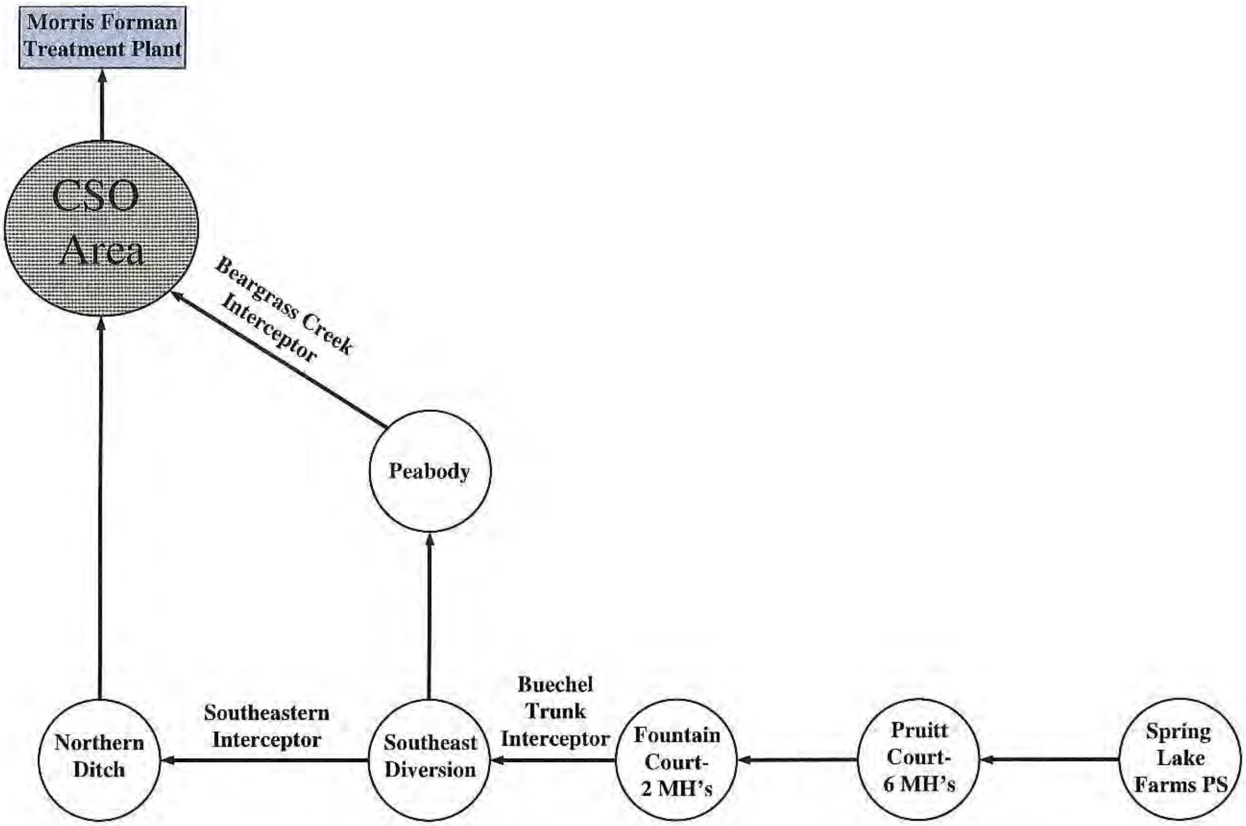


Figure 27 – Buechel Branch – Hydraulic Connectivity Diagram of Unauthorized Discharges

2.2.5.2 Buechel Branch Flow Monitoring

Buechel Branch Real-Time Control Flow Monitoring

This study was developed to assess the condition of the Buechel Branch and Northern Ditch sewer system and to quantify the impacts of I/I. The results of the wet and dry weather flow data analysis were used to update the MSD hydraulic model for use with the Real Time Control project. This project included twelve flow monitors and three rain gauges in the Buechel Branch and Northern Ditch systems.

Monitors were maintained and data collected for a period of 120 days. Monitors were installed in two waves, the first beginning January 1, 2002, and ending May 7, 2002 and the other beginning January 17, 2002, and ending May 16, 2002. The flow monitoring data gathered during the monitoring period was analyzed and used to characterize the flow for each subbasin in the project area. This analysis included peaking factor analysis, hydrograph analysis, wet-weather flow analysis, and dry-weather flow analysis.

Twelve significant rain events (>0.75") were monitored; however, only the most intense event was used: January 23 –24 (approximately 2.65" of rain over 48 hours). The flow meters in each of the subbasins show that the average dry weather flow was at or below 50% of the pipe capacity. Wet weather analysis showed peaking factors ranging from 1.31 to 11.54. It also showed that half of the overflows are at pump stations suggesting that overflows occurred as a

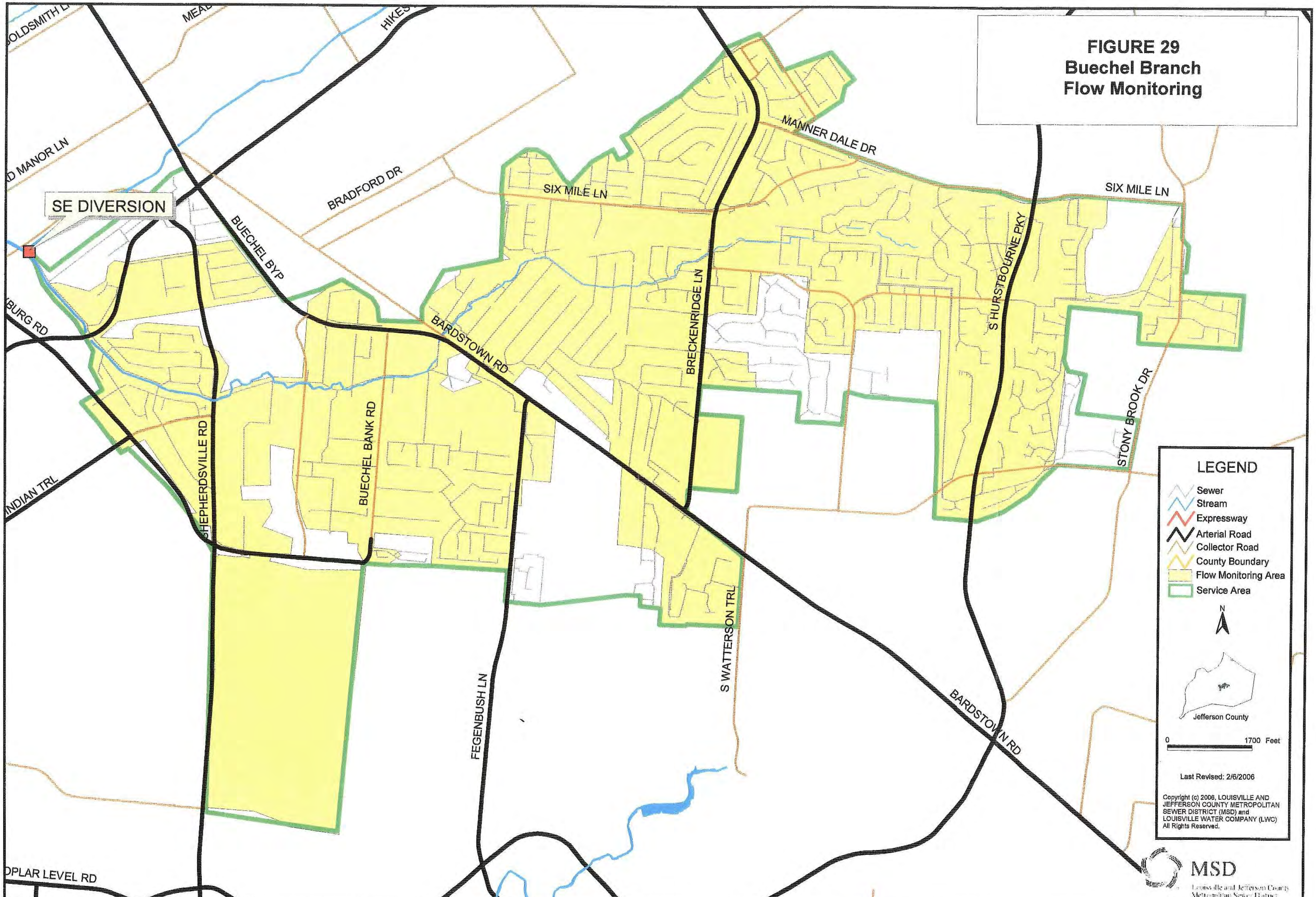


FIGURE 29
Buechel Branch
Flow Monitoring
SE DIVERSION
MANNER DALE DR
SIX MILE LN
SIX MILE LN
BRADFORD DR
BUECHEL BYP
BARDSTOWN RD
BRECKENRIDGE LN
S HURSTBOURNE PKY
STONY BROOK DR
SHEPHERDSVILLE RD
BUECHEL BANK RD
INDIAN TRL
FEGENBUSH LN
S WATTERSON TRL
BARDSTOWN RD
OPLAR LEVEL RD
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Flow Monitoring Area
Service Area
N
Jefferson County
0
1700 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD

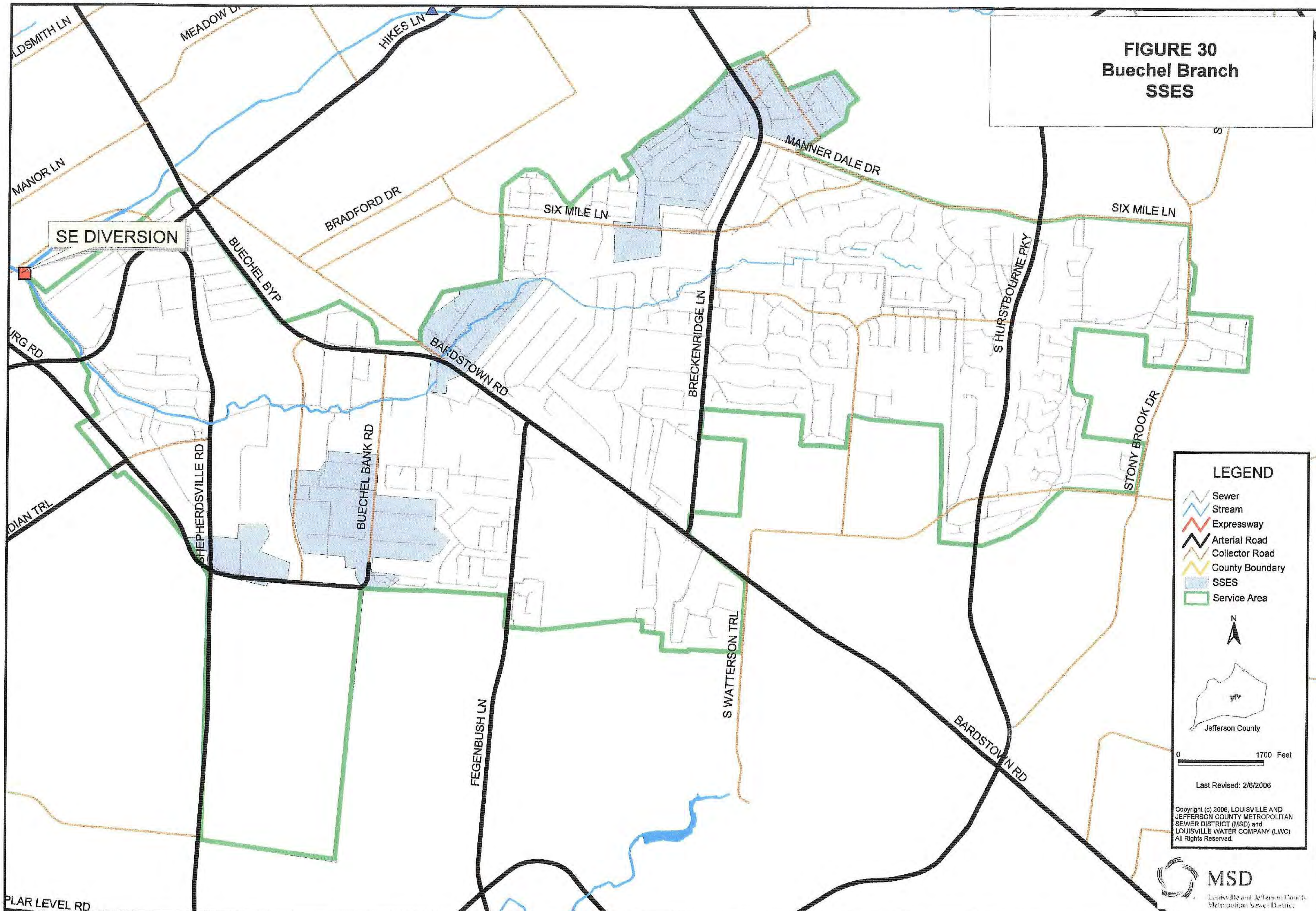


FIGURE 30
Buechel Branch
SSES
SE DIVERSION
HIKES LN
MANOR LN
BRADFORD DR
BUECHEL BYP
BARDSTOWN RD
SIX MILE LN
MANNER DALE DR
BRECKENRIDGE LN
S HURSTBOURNE PKY
STONY BROOK DR
SHEPHERDSVILLE RD
BUECHEL BANK RD
FEGENBUSH LN
S WATTERSON TRL
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
SSES
Service Area
N
Jefferson County
0
1700 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD
Louisville and Jefferson County Metropolitan Sewer District

result of both undersized pipes and undersized facilities, such as pump stations. This project was completed in November 2002 and cost approximately $120,000. Figure 29 represents the area that was flow monitored in Buechel Branch.

2.2.5.3 Buechel Branch Sanitary Sewer Evaluation Study (SSES)

Buechel Branch SSES Ph. 1

The objective of this study was to develop a plan of improvements to rehabilitate the sewer collection system. This work was focused toward setting up projects to rehabilitate the defects found during the SSES with an emphasis on rehabilitation improvements, O&M concerns, estimated I/I reduction, and estimated costs. The study included the following components to identify active and potential sources of I/I:

- Gathering and reviewing existing pertinent data (LOJIC, IMS, & flow data) to evaluate the quantity of I/I entering the sewer system;
- Conducting physical inspections of manholes to identify corrosion and structural defects that may be contributing excessive I/I (157 manholes);
- Conducting smoke testing to identify structural defects that may contribute to I/I (37,500 linear feet sewer);
- Conducting TV inspections (44,500 linear feet sewer), dyed-water flooding, and flow isolations in a limited amount of the system to identify structural defects that may contribute I/I to the system and blockages that may be inhibiting efficient hydraulic flow; and,
- Compiling and analyzing data generated during the SSES to quantify the amount of excessive I/I entering the system and prioritize subbasins for rehabilitation.

The manhole inspections revealed that approximately 14% of the manholes inspected had defects. The majority of these defects were a result of deterioration in the manholes, especially in the chimney area. Smoke testing of the Buechel Branch Phase I subbasins identified a number of inflow sources. Most of these sources were relatively minor, located on private property, and not contributing a significant amount of inflow to the sanitary sewer system. Overall, the Buechel Branch sewer system was in fair condition. Roots were a chronic problem in both the main lines and in service laterals. Structural defects, such as cracks, contributed to the excessive I/I in the sewer system. The significant defects identified in this SSES were repaired under the Buechel Branch Rehabilitation Phase 1 and Phase 2 projects and two system modifications were made based on the results: flow from the General Electric plant were redirected to an interceptor with more available capacity and a sheet piling that bisected an interceptor was removed. This project was completed in March 2000 and cost approximately $50,000. Figure 30 represents the SSES study area in the Buechel Branch service area.

2.2.5.4 Buechel Branch Computer Modeling

Buechel Branch

The Buechel Branch RTC Model covers approximately 4.4 square miles and is centrally located at the intersection of Breckenridge Lane and Nachand Lane. The sewer system contains 312,000 linear feet (59 miles) of gravity sewer pipe ranging in size from 8-inch to 30-inch diameter. 78% are 8-inch collection sewers. Of the entire sewershed, 59% of the system was installed prior to 1980 and 50% of the system consists of clay pipe (VCP). The majority of the land use in the service area is residential, with some smaller areas of multi-residential and parks.

There are three known overflow areas located in the Buechel Branch system. Two of them, Fountain Court/Fountain lane and Pruitt Court, are included within the model. A third, Spring Lake Farms, is not included in the model because MSD was and continues to evaluate options to eliminate the overflow with a capital improvement project directing this area away from the Buechel Branch system. This SSO is located at a pump station relatively high in the sewer drainage area.

The Buechel Branch RTC Model was built and calibrated in FY02 (July 1, 2001 – June 30, 2002) using FY02 (July 1, 2001 – June 30, 2002) flow monitoring data collected during the Real-Time Control project. In FY03 (July 1, 2002 – June 30, 2003), minor updates were made to this model which included adding a small amount of new development. This project was completed in January 2003 and cost approximately 64,000. Figure 31 represents the hydraulic model study area in the Buechel Branch service area.

2.2.5.5 Buechel Branch Rehabilitation

Figure 32 displays the rehabilitation work conducted under the Buechel Branch Rehabilitation projects.

Buechel Branch Phase 1

This project provided for the rehabilitation of defects identified in the Buechel Branch SSES. This rehabilitation effort consisted of 2,782 linear feet of cured-in-place sewer main rehabilitation and 26 cured-in-place lateral rehabilitations. This project was completed in November 2001 and cost approximately $273,000.

Buechel Branch Phase 2

This project provided for the rehabilitation of defects identified in the Buechel Branch SSES. This project was a trenchless rehabilitation project that rehabilitated 409 manhole chimneys and castings using an internal butyl rubber seal or a brush on coating. The project also included the application of a root control agent to 52,888 linear feet of sewer in areas identified by MSD maintenance as having chronic root intrusions. Figure 32 displays the rehabilitation work conducted under the Buechel Branch Ph. 2 Rehabilitation project. This project was completed in September 2001 and cost approximately $423,000.

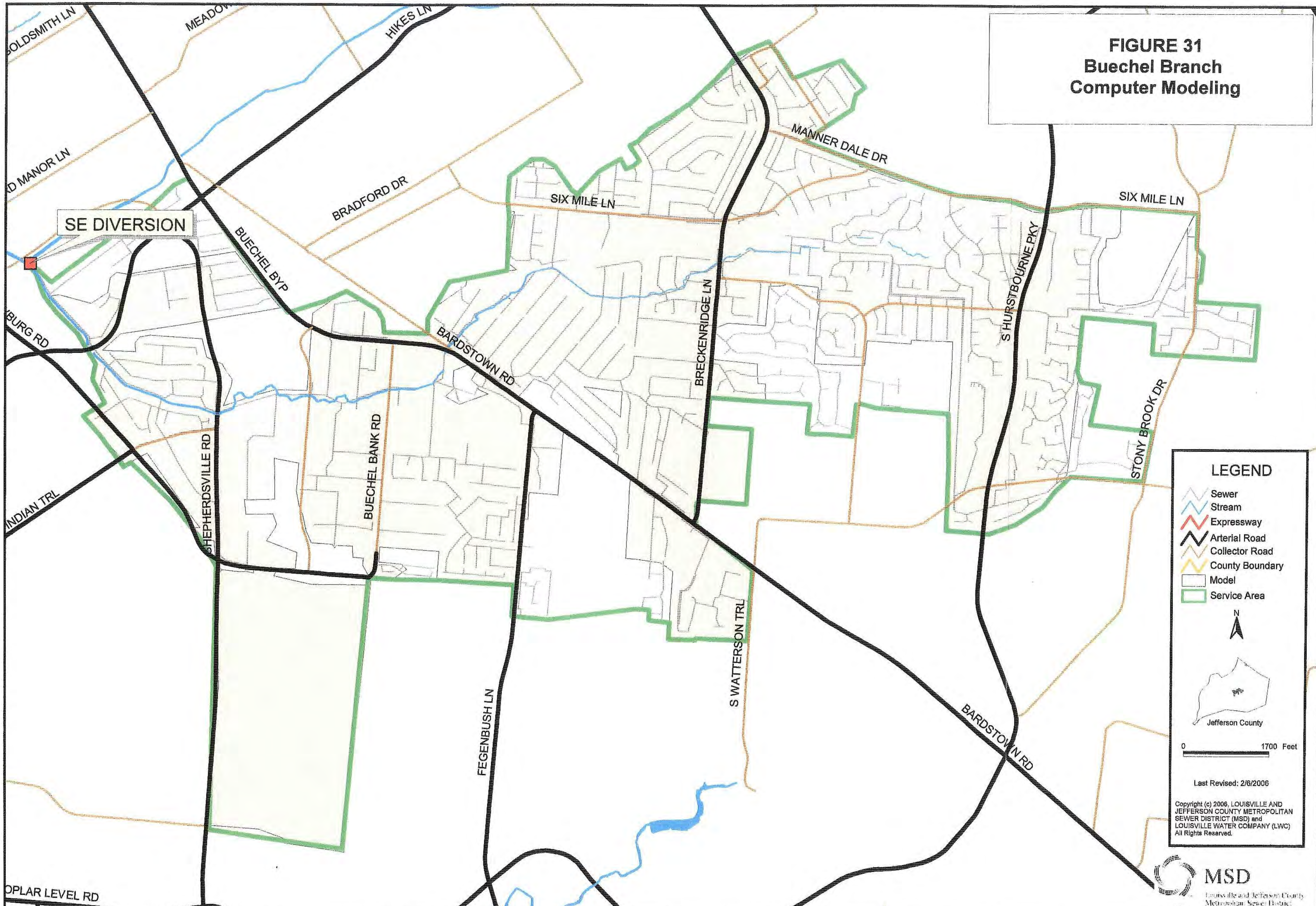


FIGURE 31
Buechel Branch
Computer Modeling

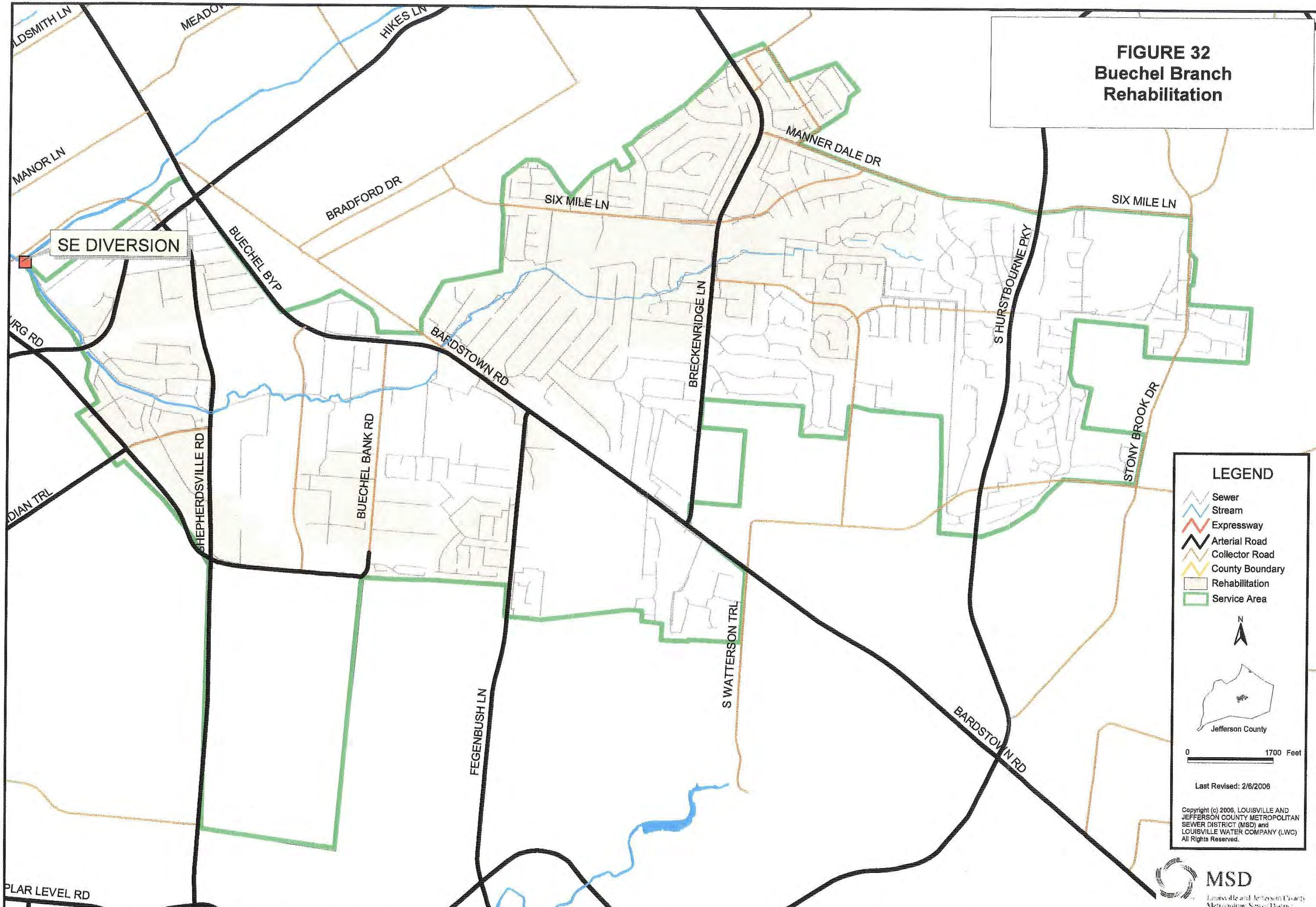


FIGURE 32
Buechel Branch
Rehabilitation
SE DIVERSION
MANOR LN
HIKES LN
BRADFORD DR
BUECHEL BYP
SIX MILE LN
MANNER DALE DR
SIX MILE LN
BARDSTOWN RD
BRECKENRIDGE LN
S HURSTBOURNE PKY
STONY BROOK DR
SHEPHERDSVILLE RD
BUECHEL BANK RD
FEGENBUSH LN
S WATTERSON TRL
BARDSTOWN RD
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Rehabilitation
Service Area
N
Jefferson County
0
1700 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD

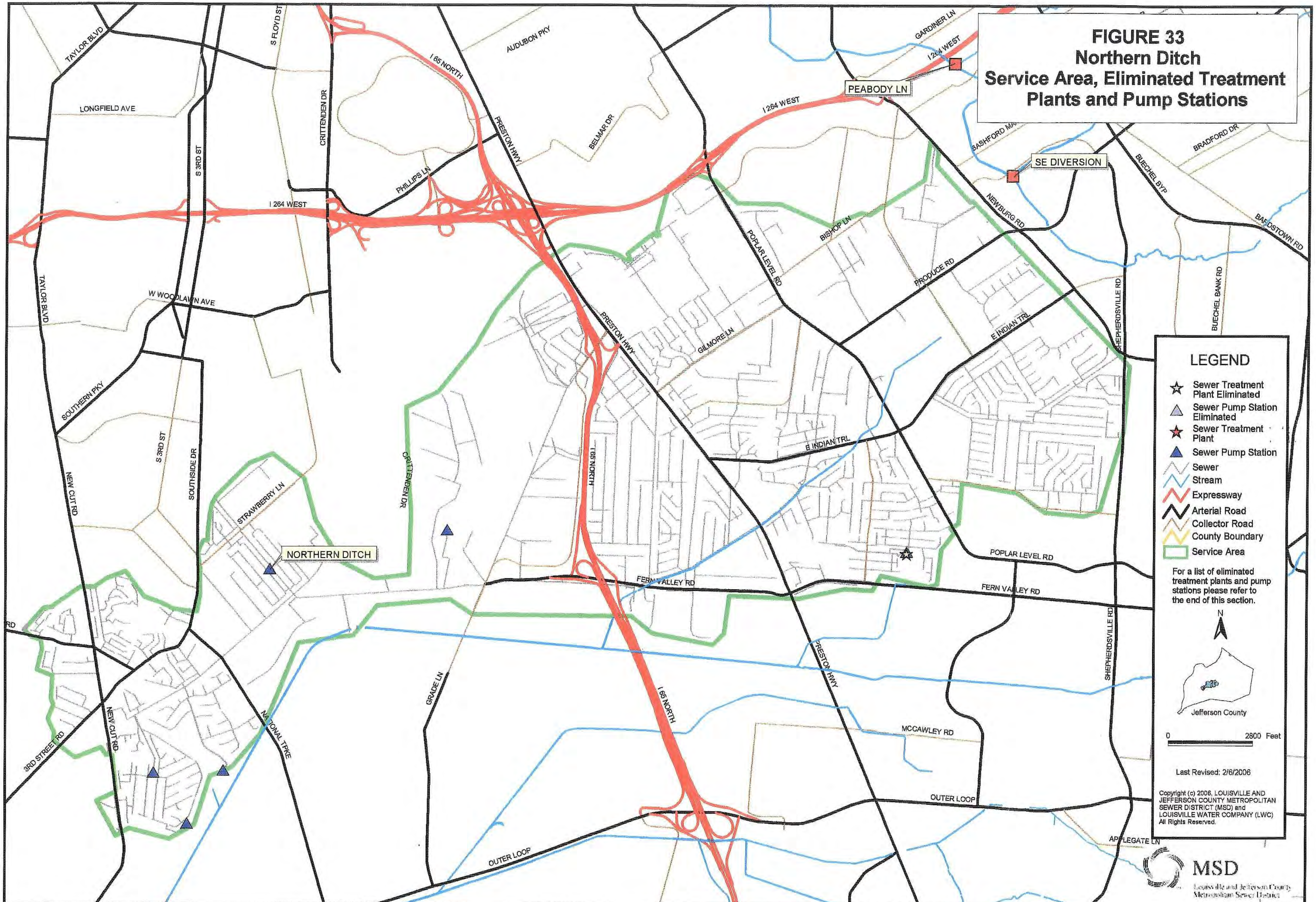


FIGURE 33
Northern Ditch
Service Area, Eliminated Treatment
Plants and Pump Stations
PEABODY LN
SE DIVERSION
NORTHERN DITCH
TAYLOR BLVD
LONGFIELD AVE
S FLOYD ST
AUDUBON PKY
I 65 NORTH
CRITTENDEN DR
S 3RD ST
PRESTON HWY
BELMAR DR
PHILLIPS LN
I 264 WEST
GARDINER LN
BASHFORD MANOR
BRADFORD DR
BUECHEL BYP
NEWBURG RD
BARDSTOWN RD
BISHOP LN
POPLAR LEVEL RD
PRODUCE RD
GILMORE LN
E INDIAN TRL
SHEPHERDSVILLE RD
BUECHEL BANK RD
W WOODLAWN AVE
SOUTHERN PKY
SOUTHSIDE DR
NEW CUT RD
STRAWBERRY LN
FERN VALLEY RD
GRADE LN
NATIONAL TPKE
3RD STREET RD
MCCAWLEY RD
OUTER LOOP
APPLEGATE LN
LEGEND
Sewer Treatment Plant Eliminated
Sewer Pump Station Eliminated
Sewer Treatment Plant
Sewer Pump Station
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Service Area
For a list of eliminated treatment plants and pump stations please refer to the end of this section.
N
Jefferson County
0
2800 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD
Louisville and Jefferson County Metropolitan Sewer District

2.2.5.6 Buechel Branch Post-Rehabilitation Flow Monitoring

Buechel Branch Chemical Root Control: Post Rehabilitation Flow Monitoring

This study was conducted to assess the effect of chemical root control on wet weather flows. After the rehabilitation was completed, flow monitors were installed in the identical locations used in the prior flow monitoring projects. A monitor was also installed in an un-rehabilitated subbasin to serve as a control basin. Post-rehab flow monitoring took place from January 3, 2002, through March 3, 2002. Two significant rain events were monitored: January 24 (2.65") and January 30 (1.48"). Observations from the study included the following:

- ***Peak wet weather flows were reduced.*** Peaking factors increased less than the control basin, indicating the root control had a positive effect on reducing peak wet weather flow rates.
- ***Wet weather total excess flows were reduced.*** Reductions were shown in the subbasin expressed as a percentage of control basin excess flow; and,
- ***The general health of the system improved.*** Velocity and depth seemed to have improved (although post rehab flow monitoring data was collected one manhole downstream from pre rehab data) and data collected closely followed the theoretical sewer capacity calculated using Manning's Equation.

This project was completed in June 2002 and cost approximately $18,000.

2.2.5.7 Future / Ongoing Projects in Buechel Branch

Interceptor Condition Assessment Phase 1 (Buechel Branch) (MSD Budget ID # H04272)

This project involves the inspection of 19,200 linear feet of the Buechel Branch of the Beargrass Interceptor to document their condition and locate defects, blockages, or other conditions contributing to inadequate operating conditions. MSD anticipates approximately $123,000 in inspection and $55,000 in rehabilitation work to the Buechel Branch of the Beargrass Interceptor as an immediate result of the findings in this report. Completion of the rehabilitation work is due by December 31, 2008.

2.2.6 Northern Ditch

2.2.6.1 Northern Ditch Background

The Northern Ditch area covers approximately 12.25 square miles and is centrally located at the intersection of I-65 and Preston Highway. The sewer system contains a total of 684,000 linear feet (130 miles) of gravity sewer pipe ranging in size from 8-inch to 72-inch diameter. 67% are 8-inch collection sewers. Of the entire sewershed, 65% of the system was installed prior to 1970 and 64% of the system consists of clay pipe (VCP). The majority of the land use in the service area is residential and industrial.

In the late 1970s, the Southeast Interceptor was constructed as a result of a system constriction on the Beargrass Interceptor (BGI). The Southeast Interceptor extended from the Southeast Diversion structure to the Northern Ditch Interceptor. Shortly after the Southeast Interceptor was placed into service, wet weather flooding occurred in the vicinity of the Northern Ditch Pump Station (NDPS). An investigation into this flooding determined that the NDPS was not discharging to its original design capacity. In the mid-1980s, the NDPS was upgraded to meet original design capacity. In the early 1990s, an evaluation of relief capacities of the Southeastern Interceptor was conducted using the USEPA Stormwater Management Model (SWMM). It was then determined that a sluice gate opening of 6 inches at the diversion structure would provide some relief and maintain control on the total flow diverted to the Southeastern Interceptor during wet weather to assure no detrimental effects on the downstream facilities. Shortly after the opening of the sluice gate, MSD found that the 6-inch opening caused surcharging and overflows upstream of the Southeast Diversion Structure. Today, the sluice gate at the Southeast Diversion is normally closed during wet weather.

Only one known overflow is located in the Northern Ditch area – just upstream of the Northern Ditch Pump Station. Additionally, an interceptor "blow-off" structure has been included as a potential overflow location, although no discharges have been observed during wet weather flows and the hydraulic model does not predict an overflow at this location. Basement flooding is the primary concern in this area. Figure 33 shows a map of the Northern Ditch service area with eliminated treatment plants and pumping stations. See Figures 34 – 36 for the program elements described in section 2.2.

2.2.6.2 Northern Ditch Flow Monitoring

Northern Ditch is a part of the Buechel Branch Real-Time Control Flow Monitoring, which is described in section 2.2.5.2. Figure 34 represents the area that was flow monitored in Northern Ditch.

2.2.6.3 Northern Ditch Sanitary Sewer Evaluation Study (SSES)

<u>Northern Ditch SSES</u>

The objective of this study was to develop a plan of improvements to rehabilitate the sewer collection system. This work was focused toward setting up projects to rehabilitate the defects identified during the SSES with an emphasis on rehabilitation improvements, O&M concerns, estimated I/I reduction, and estimated costs. The study included the following components to identify active and potential sources of I/I:

- Conducting physical inspections of a limited number of manholes to identify corrosion and structural defects that may be contributing excessive I/I (459 manholes);
- Conducting inspections of a limited number of manholes during wet weather to identify problems and environmental conditions that would contribute to I/I (149 manholes);
- Conducting TV inspections (52,791 linear feet of sewer) on a limited amount of the system to identify structural defects that may contribute I/I to the system and to identify blockages that may be inhibiting efficient hydraulic flow;
- Conducting Fell-41 inspections (4,889 linear feet of sewer) on a limited amount of the system to identify defects not visible on TVI inspection that may contribute I/I to the system;
- Compiling and analyzing data generated during the SSES to quantify the amount of excessive I/I entering the system and prioritize subbasins for rehabilitation;

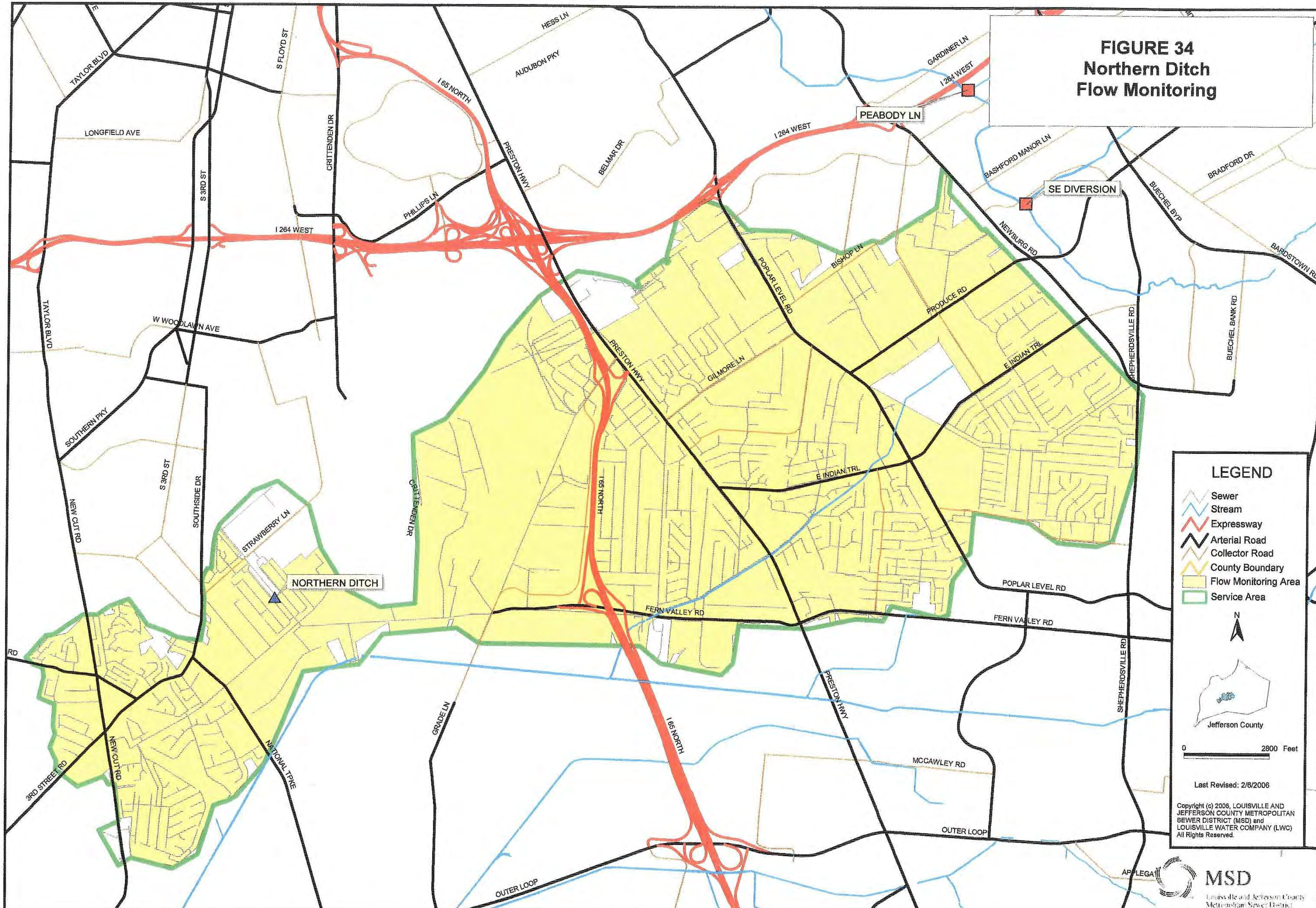


FIGURE 34
Northern Ditch
Flow Monitoring
NORTHERN DITCH
PEABODY LN
SE DIVERSION
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Flow Monitoring Area
Service Area
N
Jefferson County
0
2800 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD
Louisville and Jefferson County Metropolitan Sewer District
TAYLOR BLVD
LONGFIELD AVE
S FLOYD ST
CRITTENDEN DR
I 65 NORTH
HESS LN
AUDUBON PKY
PRESTON HWY
BELMAR DR
GARDINER LN
I 264 WEST
BASHFORD MANOR LN
BRADFORD DR
BUECHEL BYP
S 3RD ST
PHILLIPS LN
NEWBURG RD
BARDSTOWN RD
BISHOP LN
POPLAR LEVEL RD
PRODUCE RD
W WOODLAWN AVE
GILMORE LN
E INDIAN TRL
SHEPHERDSVILLE RD
BUECHEL BANK RD
SOUTHERN PKY
SOUTHSIDE DR
NEW CUT RD
STRAWBERRY LN
FERN VALLEY RD
3RD STREET RD
NATIONAL TPKE
GRADE LN
MCCAWLEY RD
OUTER LOOP
APPLEGATE

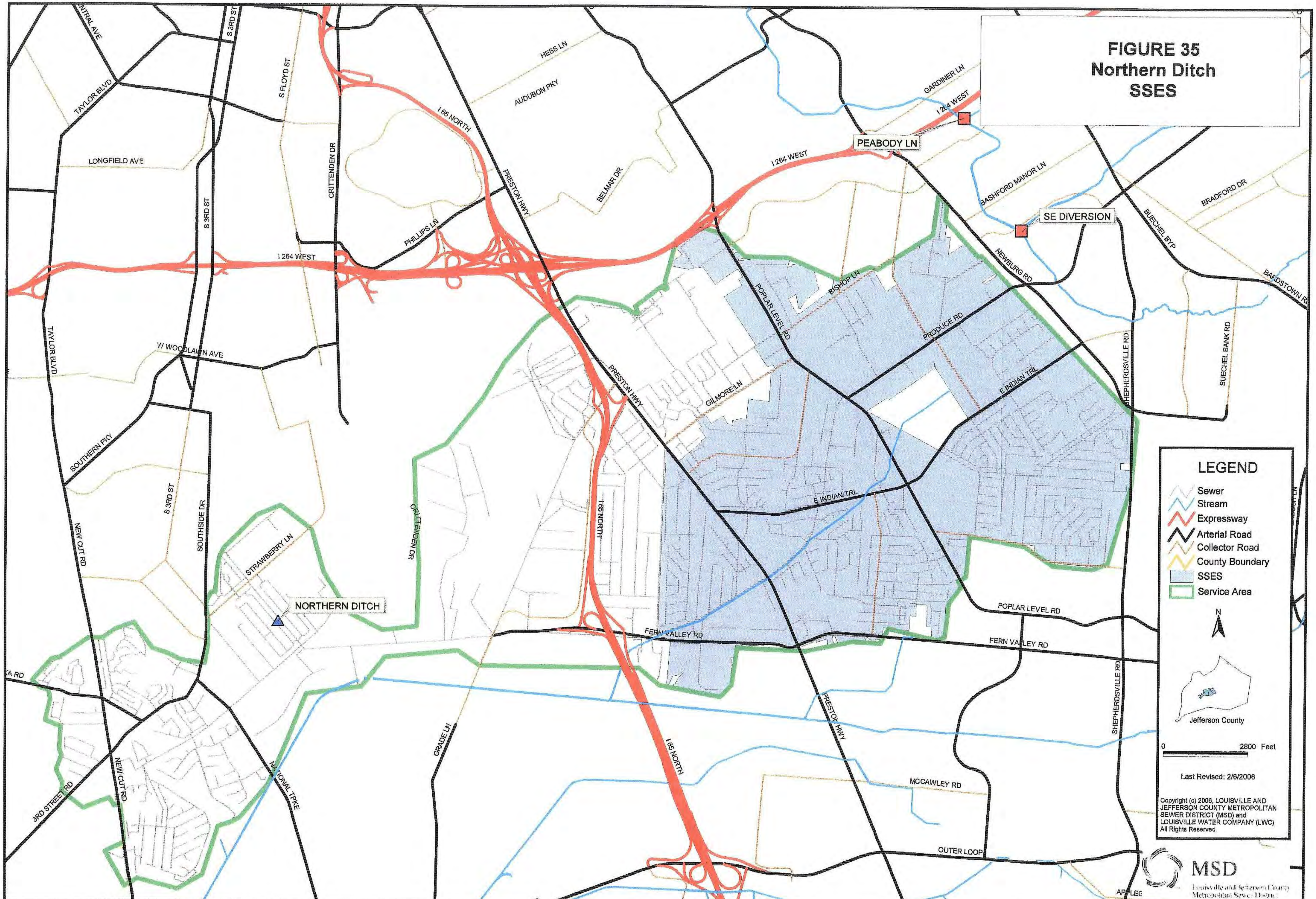


FIGURE 35
Northern Ditch SSES

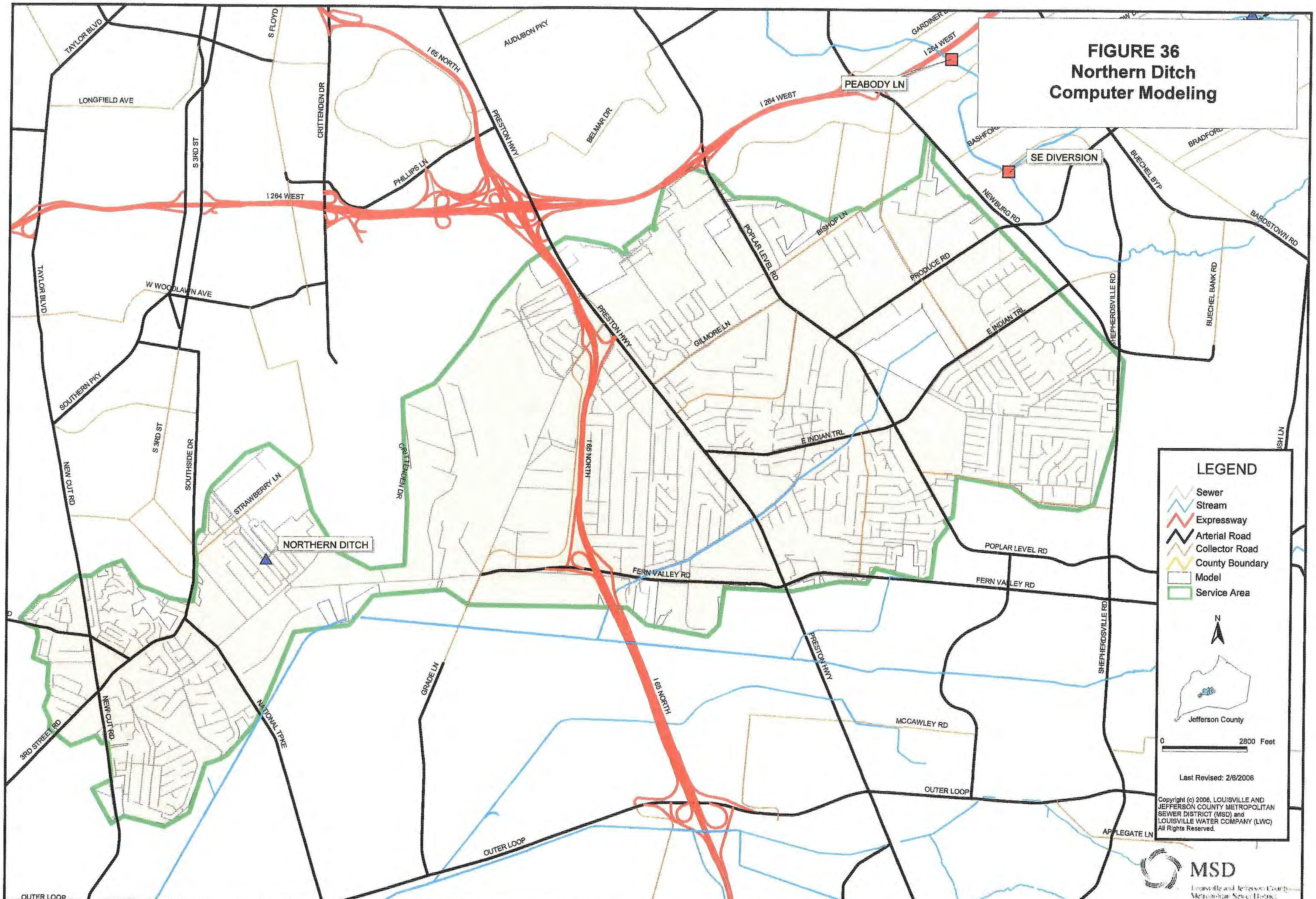


FIGURE 36
Northern Ditch
Computer Modeling
PEABODY LN
SE DIVERSION
NORTHERN DITCH
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Model
Service Area
N
Jefferson County
0
2800 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD
Louisville and Jefferson County Metropolitan Sewer District
TAYLOR BLVD
LONGFIELD AVE
S FLOYD
CRITTENDEN DR
I 65 NORTH
AUDUBON PKY
PRESTON HWY
BELMAR DR
I 264 WEST
GARDINER LN
PHILLIPS LN
S 3RD ST
W WOODLAWN AVE
SOUTHERN PKY
NEW CUT RD
SOUTHSIDE DR
STRAWBERRY LN
POPLAR LEVEL RD
BISHOP LN
GILMORE LN
PRODUCE RD
E INDIAN TRL
NEWBURG RD
BUECHEL BYP
BARDSTOWN RD
SHEPHERDSVILLE RD
BUECHEL BANK RD
FERN VALLEY RD
GRADE LN
NATIONAL TPKE
3RD STREET RD
MCCAWLEY RD
OUTER LOOP
APPLEGATE LN

- Performing a basic capacity analysis to determine if the collection system is sized properly.

The manhole inspections revealed that approximately 10% of the manholes inspected had significant defects. The majority of these defects were a result of deterioration in the manholes' cone, wall, and bench. Concrete deterioration and misalignments typified the defects. The Pond Creek sewer system was in poor condition based on the TV inspection. Root intrusions were a chronic problem in both the main lines and in service laterals, affecting large sections of pipe. Additionally there were excessive grease buildups noticed in several places in the system. Structural defects, such as cracks, contributed to the excessive I/I in the sewer system. Finally, one utility line was found intersecting a sewer line. It was not evident which utility owned or maintained the line. This project was completed in September 2002 and cost approximately $272,000. Figure 35 represents the SSES study area in the Northern Ditch service area.

2.2.6.4 Northern Ditch Computer Modeling

<u>Northern Ditch</u>

The Northern Ditch model area sewershed covers approximately 4.4 square miles and is centrally located at the intersection of Preston Highway and Indian Trail. The sewer system contains a total of 682,000 linear feet (129 miles) of gravity sewer pipe ranging in size from 8-inch to 72-inch diameter. 67% are 8-inch collection sewers. Of the entire sewershed, 63% of the system was installed prior to 1970 and 62% of the system consists of clay pipe (VCP). The majority of the land use in the service area is residential and industrial, with some smaller areas of multi-residential and parks.

This model was built and calibrated in FY02 (July 1, 2001 – June 30, 2002) using FY02 (July 1, 2001 – June 30, 2002) flow monitoring data as part of the Real-Time Control project. The project was completed in January 2003 and cost approximately $64,000. Figure 36 represents the hydraulic model study area in the Northern Ditch service area.

2.2.6.5 Future / Ongoing Projects in Northern Ditch

<u>Interceptor Condition Assessment Phase 1 (Northern Ditch) (MSD Budget ID # H04272)</u>

This project involves the inspection of 36,000 linear feet of the Northern Ditch Interceptor to document their condition and locate any defects, blockages, or other conditions contributing to inadequate operating conditions. MSD anticipates approximately $240,000 in inspection and $105,000 in rehabilitation work to the Northern Ditch Interceptor as an immediate result of the findings in this report. Completion of the rehabilitation work is due by December 31, 2008.

<u>Northern Ditch Pump Replacement Project (MSD Budget ID # C00158)</u>

The Northern Ditch Pump Station (NDPS) consists of four submersible pumps each rated at 14,000 gallon per minute (GPM). In recent years, maintenance and operation costs have increased at the pump station due to the age and poor condition of the original equipment. It has also become difficult to obtain parts for the pumps and the control equipment. Many of the original equipment manufacturers are no longer in business. Additionally, with the Real Time

Control Project scheduled to become operational in the summer of 2006, NDPS will receive additional flows from the Southeastern Diversion during some wet weather events. This project will replace the existing pumps, flap valves, pump columns, crane hoist and flow recording equipment. This project is also being reported as part of the interim CSO Long Term Control Plan. This project is currently under construction and is estimated to cost $1,300,000 with a completion date of November 30, 2006.

Sonne Pump Station Pump Replacement Project (MSD Budget ID # F02325)

The existing pumps and motors at the Sonne Pump Station are worn and outdated. This project will replace the existing centrifugal pumps and motors at this pump station to achieve the original design capacity to abate the known overflow at this site. It will be investigated to see if larger pumps or impellors can be upsized. This will be based on the pump station configuration and whether the receiving system can accommodate additional flow. This effort may also require related pump station upgrades. This project is expected to cost $49,000 and is due to be completed March 30, 2007.

2.3 ELIMINATIONS

Over the years, many wastewater treatment plants and pump stations have been closed and eliminated through MSD's sanitary sewer expansion program. Their sizes range from large plants to small "package" plants and pumping stations designed to serve individual residences and businesses. The following list includes treatment plants and then pump stations eliminated from the Morris Forman sewer system. Most of these facilities were privately owned before acquisition by MSD. Although records do not exist, it is suspected that each was probably an SSO. In addition to treatment plants and pump stations, the expansion program has also eliminated thousands of individual septic tank systems.

TREATMENT PLANTS ID	NAME	ADDRESS		CAPACITY (GPD)
MSD0227	Green Springs	4422	Deepwood Dr	117,000
32188-TP	Spring Creek	4313	Creek Bend Ct	30,000
MSD0253	Glenview Woods	3726	Hillsdale Rd	5,000
MSD0239	Springdale	4308	Twillingate Ln	60,000
MSD0222	Barbour Manor	7909	Barbour Manor Dr	107,000
MSD0245	Falls Creek	6702	Falls Creek Rd	44,000
MSD0252	Netherton	9309	Springbrooke Cir	40,000
MSD0261	Glenview Hills	3450	Woodside Rd	61,700
MSD0241	Spring Valley	3107	Haddon Rd	108,000
MSD0217	Frey's West	3331	Freys Hill Rd	120,000
MSD0210	Old Brownsboro Place	7302	Brownsboro Rd	100,000
MSD0246	Thornhill	6605	Seminary Woods Pl	133,000
MSD0280	Murray Hills	3100	Goose Creek Rd	246,885
MSD0274	Winding Falls	2507	Phoenix Hill Dr	125,000
MSD0204	New Market	6001	Rodes Ct	80,000
MSD0287	Plantation Hills #2	8400	Saurel Dr	30,000
MSD0288	Ramada Inn East	5919	Ashwood Bluff Dr	52,000
MSD0286	Plantation Subd #1	8511	Westport Rd	60,000

MSD0218	Rolling Hills	9326 Tiverton Way	585,000
MSD0240	Dove Creek	8916 Harmony Place Ct	60,000
46874-TP	Kentucky Childrens Home	8310 Westport Rd	45,000
44636-TP	Westport Middle School	8100 Westport Rd	40,000
67952-TP	Green Meadow	6829 Green Meadow Cir	
MSD0283	Foxboro	10200 Foxboro Dr	102,000
01272-TP	Douglas Hills	200 Edgewood Way	525,000
MSD0220	Spring Lake Farms	8806 Tranquil Valley Ln	160,000
MSD0201	Shady Villa	6101 Oaknoll Dr	250,000
MSD0244	Woodstone	3908 Woodstone Ridge Way	50,000
MSD0402	Woodland Hills	12200 Ridge Crest Dr	
MSD0205	Muddy Fork	1910 Charbdin Pl	360,000

PUMP STATIONS

ID	NAME	ADDRESS
MSD0145-PS	Brownsboro Woods	4400 Holly Tree Dr
MSD0172-LS	Cranborne Court	3507 Rems Ct
MSD0171-PS	Albans Place	3113 Albans Pl
44005-PS	Winding Falls	2600 Phoenix Hill Dr
MSD0094-PS	Tuckaho	2403 Tuckaho Rd
MSD0071-PS	Blankenbaker	434 Blankenbaker Ln
MSD0093-PS	Hempstead	5500 Hempstead Rd
MSD1011-PS	Saberdee	8409 Saberdee Dr
79776-PS	Temporary Ashwood Bluff	5924 Ashwood Bluff Dr
MSD0141-PS	Westgate	4324 N Foeburn Ln
MSD0009-LS	Leland	4017 Leland Rd
68125-PS	Upper Middle Fork	1001 Forest Bridge Rd
MSD0008-PS	Gilman	4022 Gilman Ave
MSD1006-PS	Clearcreek	10003 Clearcreek Way
71537-PS	Sinking Fork	4603 Shelbyville Rd
MSD0059-PS	Griffytown #2	401 Old Harrods Creek Rd
01303-PS	Blue Ridge Manor Sect 1	116 Blue Fields Rd
72104-LS	Bowman Field	3516 Dutchmans Ln
33914-PS	Louisville Zoo	1505 Sylvan Way
07207-PS	Arlington Village	3639 Elderwood Way
MSD0005-PS	Greenleaves	725 Greenridge Ln
MSD0030-LS	St.Matthews #1	423 Sunnyview Rd
MSD0084-PS	Hayward	6822 Brownsboro Rd
MSD0085-PS	Henley Court	2400 Henley Ct
MSD0092-PS	Barbour Manor	4220 Machupe Dr
MSD0096-PS	Henry Clay	9214 Tiverton Way
MSD0097-PS	Westmoorland	2012 Balfour Dr
MSD0128-PS	Ormsby Lane	1603 Ormsby Ln
MSD0129-PS	Wolf Creek	4319 Barbour Ln
MSD0176-PS	Baptist Homes East	3001 N Hurstbourne Pky
MSD0033-PS	St. Matthews #3	4150 Massie Ave
MSD0003-LS	Melody Lane	1603 Melody Ln
MSD0117-LS	Holiday Manor	2207 Holiday Manor Ctr
MSD0089-PS	Letterle	1685 Story Ave
MSD0118-PS	Riverwood	606 Blankenbaker Ln
MSD0179-PS	Arden	3110 Arden Rd

Fact Sheets

The following pages are fact sheets of known unauthorized discharge locations. For status and discharge type definitions, refer to the SORP.

WET WELL FOR WOODLAND HILLS PUMP STATION.

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility 0038-W

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2004	6	615,000 Gallons
2003	8	571,000 Gallons
2002	11	871,000 Gallons
2001	5	664,000 Gallons

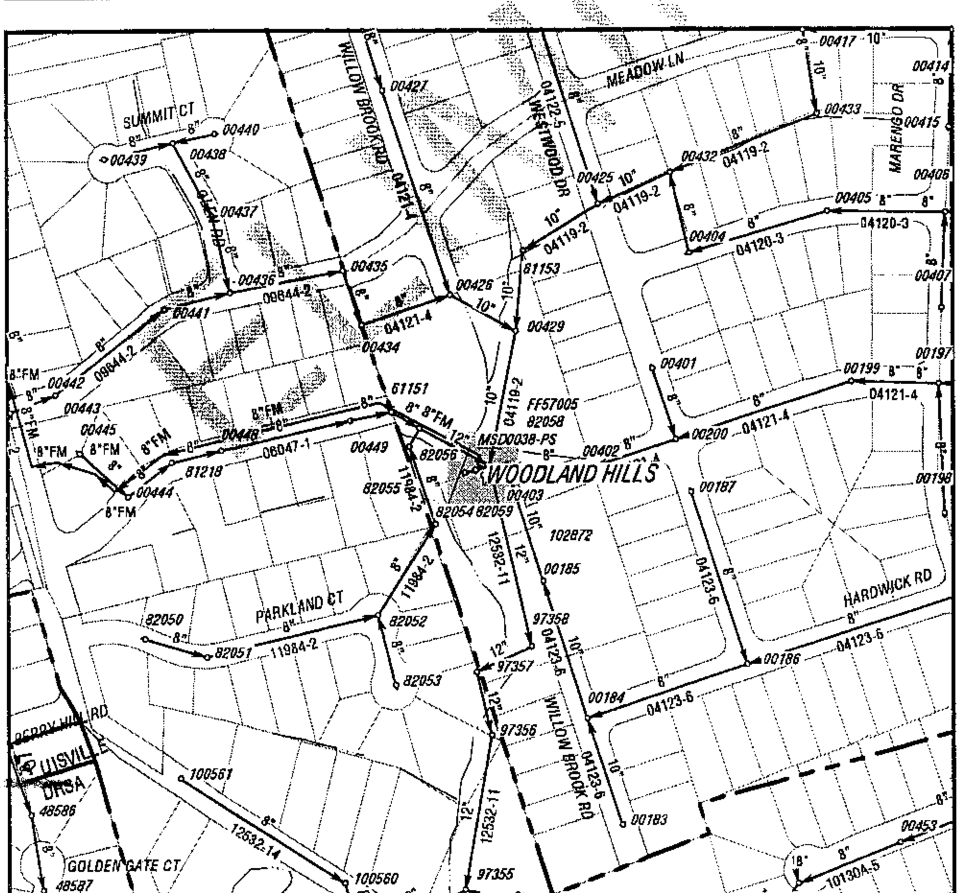
Background & History:

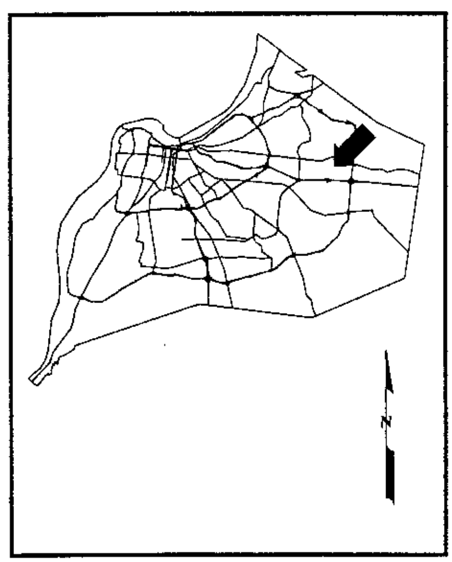
Pipe Size:
Inflow: 12"
Outflow: 12"
Outflow: 12"

Upstream Collection System Length: 23,400 L.F.
Watershed: FLOYDS FORK
Discharge Type: CONSTRUCTED
Discharged To: STREAM
Receiving Stream: POPE LICK
Status: ELIMINATED

Downstream Landuse:

VACANT AND UNDEVELOPED	0.7 ac.
SINGLE FAMILY RESIDENTIAL	20 ac.
PUBLIC AND SEMI-PUBLIC	0.4 ac.
MULTI-FAMILY RESIDENTIAL	0.5 ac.
PARKS, CEMETERIES, ETC.	1.5 ac.





Metro: MAL24
Atlas Map: BA240

Scale 1" = 400 '

WET WELL MANHOLE - OVERFLOW LOCATION FOR DEVONDALE PS - DEVONDALE DR / END OF ST

MSD
Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility 21628-W

Customer Service 587-0603 | Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	3	68,000 Gallons
2004	3	53,000 Gallons
2003	4	13,500 Gallons

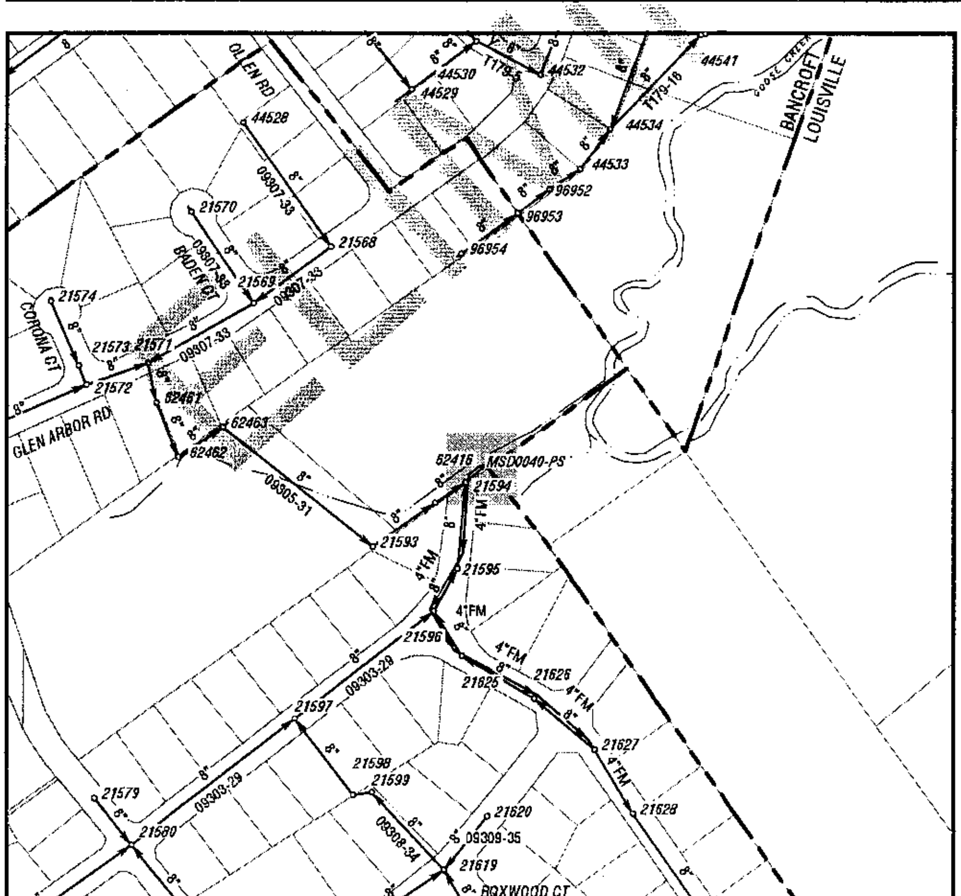
Background & History:

Pipe Size:
Inflow: 8"
Outflow: 8"

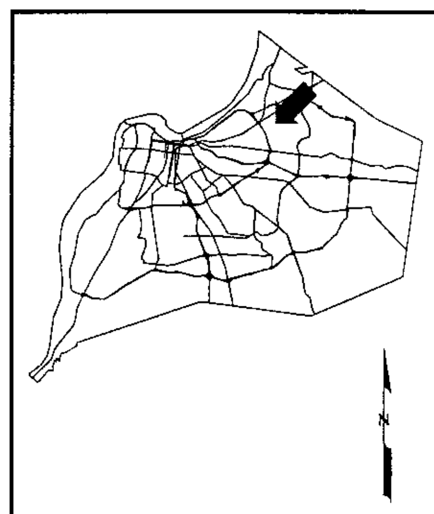
Upstream Collection System Length: 11,700 L.F.
Watershed: GOOSE CREEK
Discharge Type: PUMPED
Discharged To: DITCH
Receiving Stream: GOOSE CREEK
Status: ELIMINATED

[illegible]:

VACANT AND UNDEVELOPED	1.1 ac.
SINGLE FAMILY RESIDENTIAL	18.4 ac.
PUBLIC AND SEMI-PUBLIC	1.5 ac.
GENERAL COMM. AND OFFICE	1.1 ac.
MULTI-FAMILY RESIDENTIAL	1.7 ac.



Scale 1" = 400 '



Metro: MAK22
Atlas Map: AS232

WET WELL MANHOLE - OVERFLOW LOCATION FOR HURSTBOURNE PS

MSD

Louisville-Jefferson County Metropolitan Sewer District

MSD Facility 48516-W

Customer Service 587-0603

Report as of December 2005

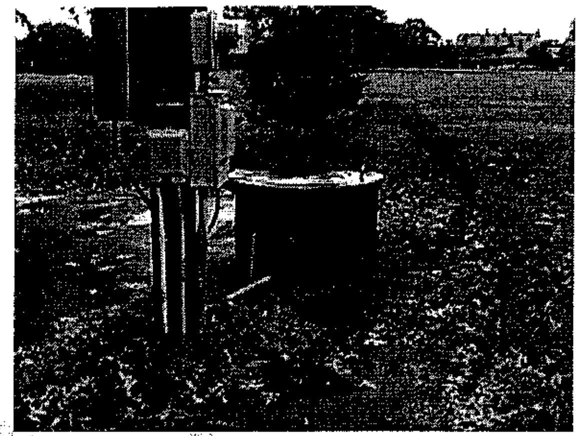
Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	6	86,500 Gallons
2004	5	98,000 Gallons
2003	5	79,000 Gallons
2002	8	82,500 Gallons
2001	4	22,000 Gallons

Background & History: This pump station was built circa 1972. Wetwell is pumped by MSD Operations to reduce risk of basement flooding of nearby homes.

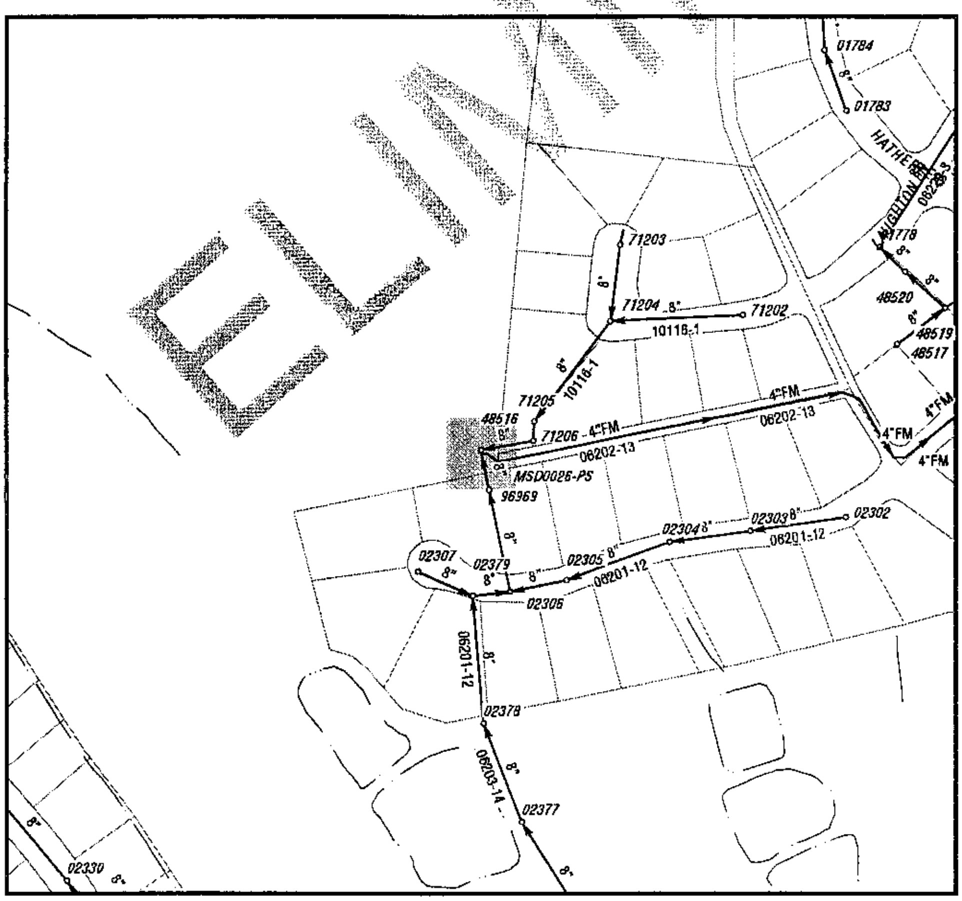
Pipe Size:
Inflow: 8"
Inflow: 8"
Outflow: 4"

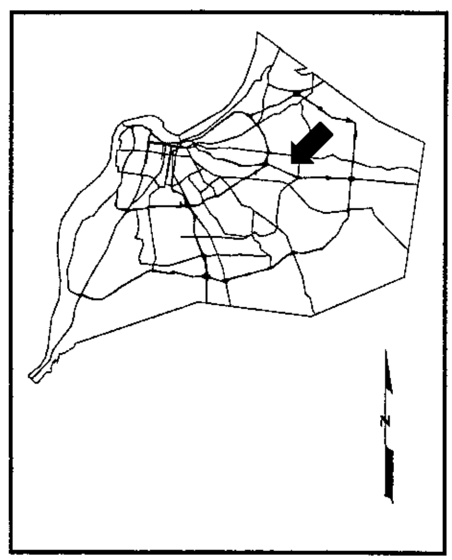
Upstream Collection System Length: 8,350 L.F.
Watershed: MIDDLE FORK BEARGRASS CREEK
Discharge Type: PUMPED
Discharged To: GROUND
Receiving Stream: MIDDLE FORK BEARGRASS CREEK
Status: ELIMINATED



Downstream Landuse:

PARKS, CEMETERIES, ETC.	11.1 ac.
SINGLE FAMILY RESIDENTIAL	13.4 ac.





Metro: MAL22

Atlas Map: BA234

Scale 1" = 400 '

OVERFLOW LOCATION FOR ANCHOR ESTATES PS #1 - BELLEWOOD RD/WILLOW LN.

MSD

Louisville-Jefferson County Metropolitan Sewer District

MSD Facility 00746

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	8	140,000 Gallons
2004	14	206,000 Gallons
2003	6	52,500 Gallons
2002	7	31,800 Gallons
2001	1	4,000 Gallons

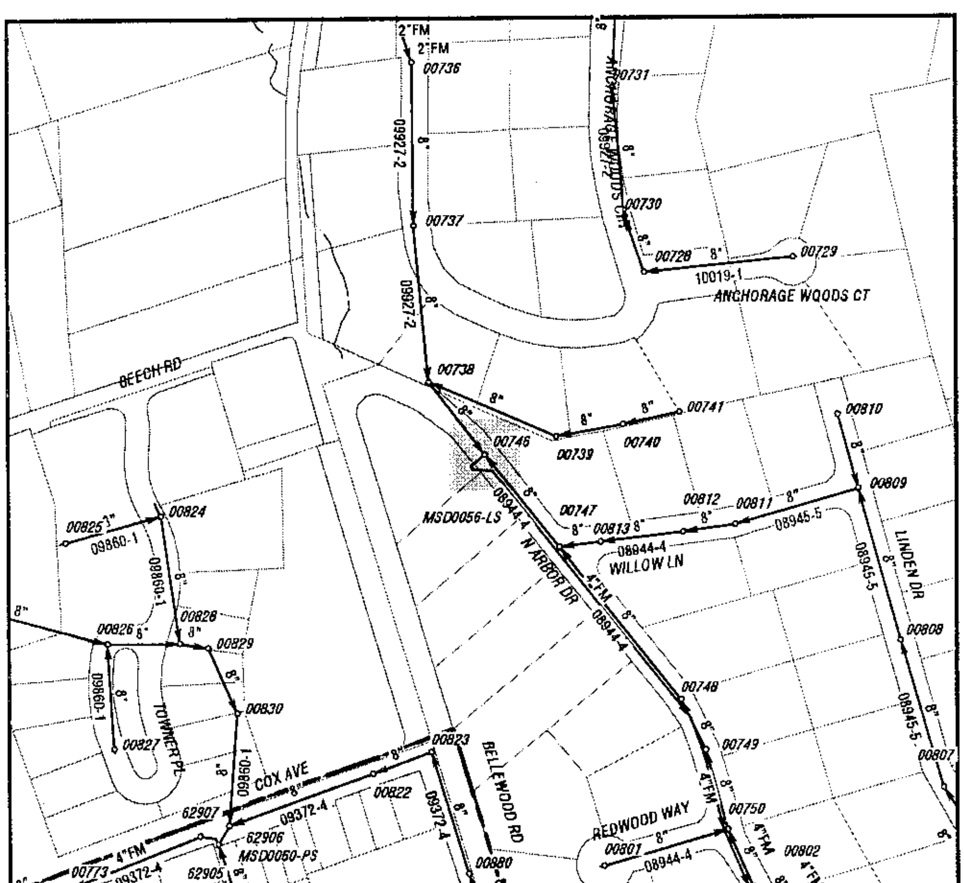
Background & History: This pump station was built by MSD in 1977.

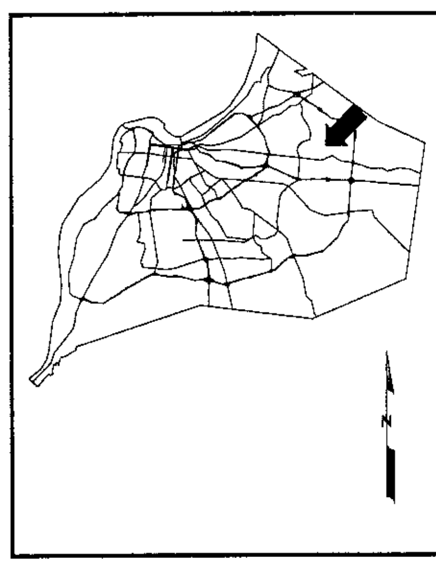
Pipe Size:
Inflow: 8"
Inflow: 8"
Outflow: 8"

Upstream Collection System Length: 7,670 L.F.
Watershed: MIDDLE FORK BEARGRASS CREEK
Discharge Type: PUMPED
Discharged To: DITCH
Receiving Stream: MIDDLE FORK BEARGRASS CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	18.6 ac.
PARKS, CEMETERIES, ETC.	1.5 ac.
PUBLIC AND SEMI-PUBLIC	1.4 ac.
GENERAL COMM. AND OFFICE	2.1 ac.
VACANT AND UNDEVELOPED	0.2 ac.





Metro: MAL23
Atlas Map: AW238

Scale 1" = 400 '

MSD

Louisville-Jefferson County Metropolitan Sewer District

MIDDLE FORK AT BRECKENRIDGE - 100 FEET WEST OF OFFICE DEPOT

MSD Facility 08935-SM

Customer Service 587-0603

Report as of December 2005

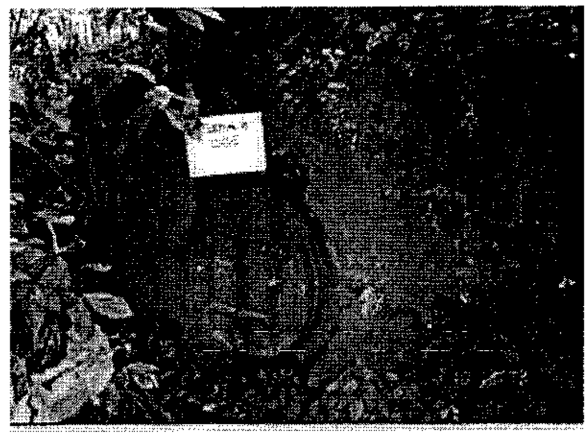
Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	4	13,200,000 Gallons
2004	9	7,380,000 Gallons
2003	3	1,960,000 Gallons
2002	4	2,300,000 Gallons
2001	2	4,000,000 Gallons

Background & History: This manhole was constructed with a high-level overflow structure. The overflow pipe is equipped with a flap gate on the end.

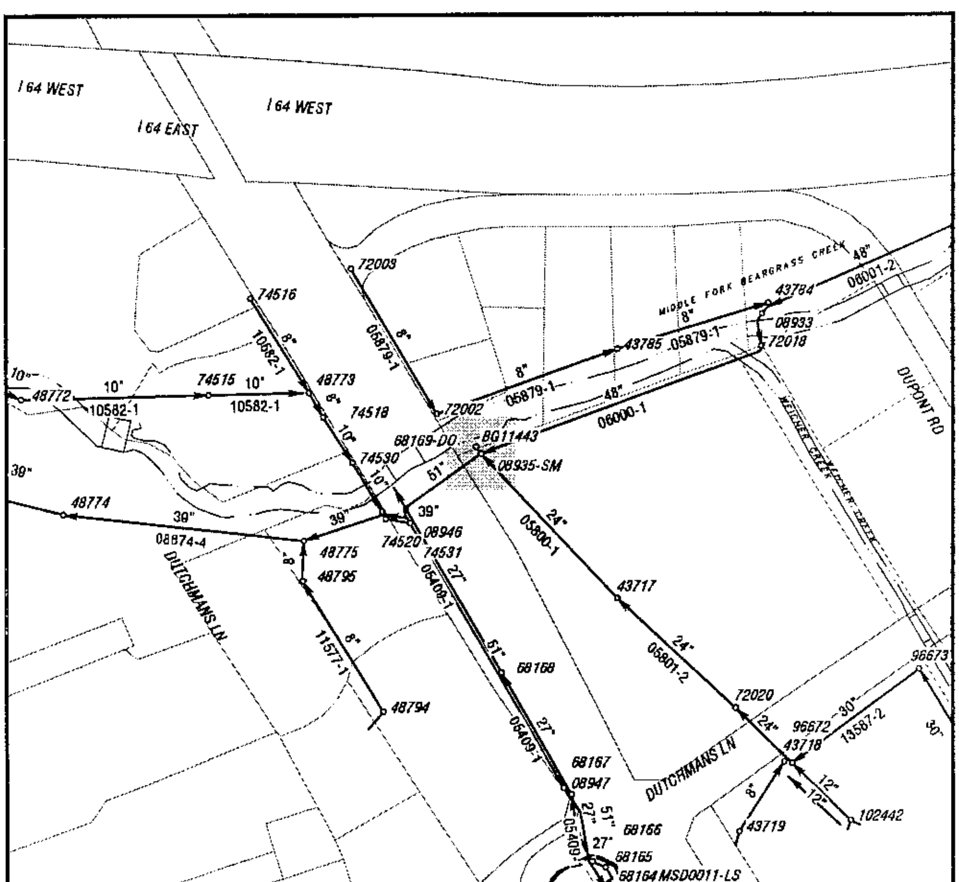
Pipe Size:
Inflow: 48"
Inflow: 24"
Outflow: 24"
Outflow: 51"

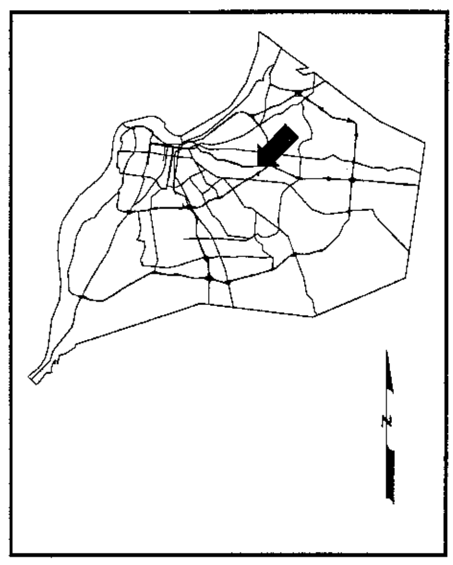
Upstream Collection System Length: 1,470,000 L.F.
Watershed: MIDDLE FORK BEARGRASS CREEK
Discharge Type: CONSTRUCTED
Discharged To: STREAM
Receiving Stream: MIDDLE FORK BEARGRASS CREEK
Status: DOCUMENTED



Downstream Landuse:

VACANT AND UNDEVELOPED	14.6 ac.
PARKS, CEMETERIES, ETC.	6.7 ac.
SINGLE FAMILY RESIDENTIAL	5.6 ac.
GENERAL COMM. AND OFFICE	19.7 ac.
MULTI-FAMILY RESIDENTIAL	0.5 ac.





Metro: MAL21
Atlas Map: BA230

Scale 1" = 400 '

4432 CORDOVA RD AND TYNE AVE (BEECHWOOD VILLAGE) - IFP PUMPED LOCATION.

MSD Facility 21061

MSD
Louisville-Jefferson County Metropolitan Sewer District

Customer Service 587-0603

Report as of December 2005

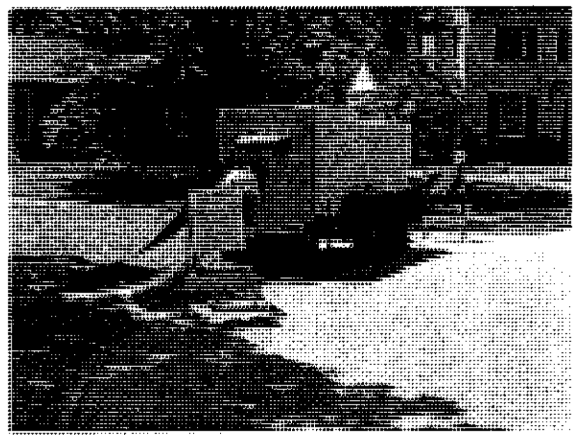
Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	2	2,420,000 Gallons
2004	4	6,890,000 Gallons
2003	4	4,330,000 Gallons
2002	4	5,490,000 Gallons
2001	2	878,000 Gallons

Background & History: Pumped by MSD Maintenance to reduce the risk of basement flooding in nearby homes.

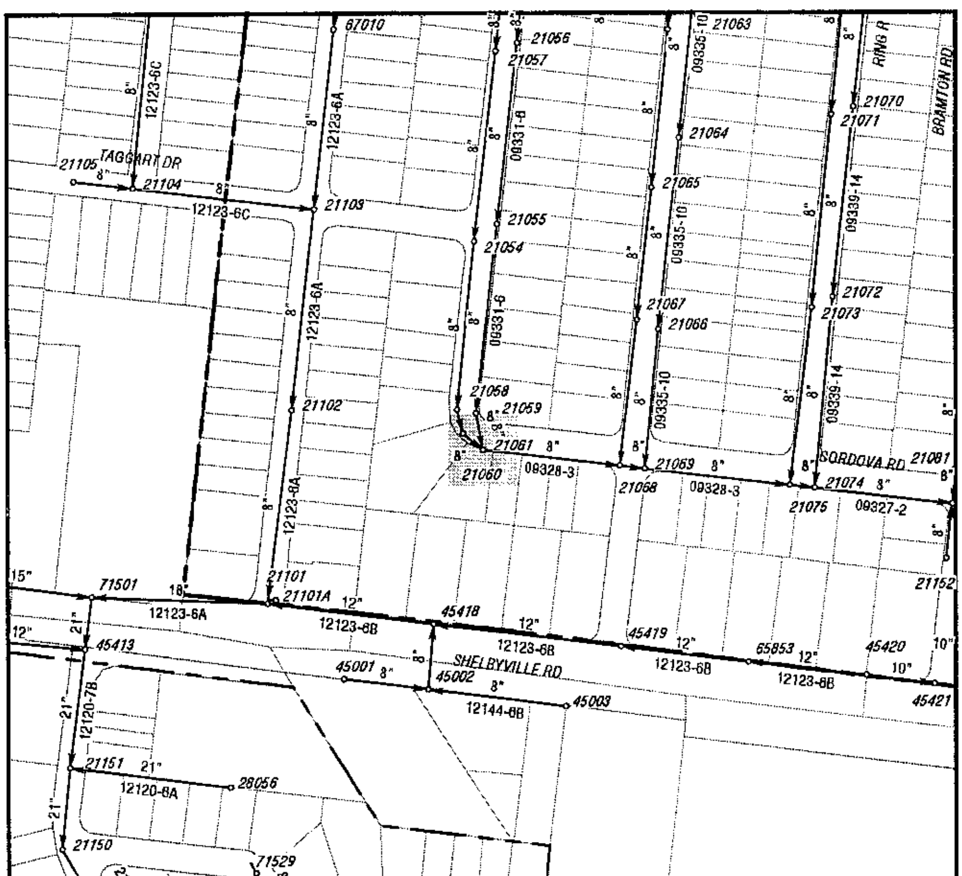
Pipe Size:
Inflow: 8"
Inflow: 8"
Outflow: 8"

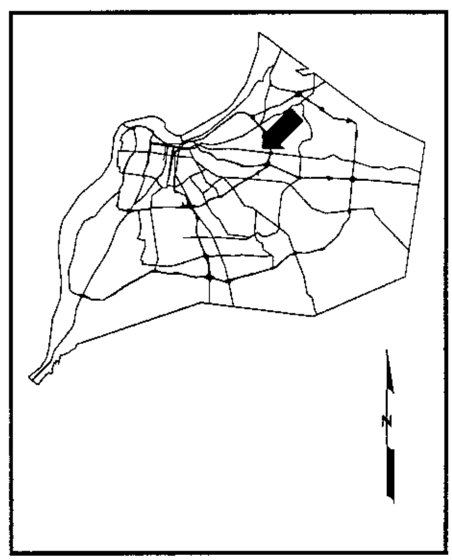
Upstream Collection System Length: 4,160 L.F.
Watershed: MIDDLE FORK BEARGRASS CREEK
Discharge Type: PUMPED
Discharged To: CATCH BASIN
Receiving Stream: UPPER SINKING FORK
Status: DOCUMENTED



Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	5.5 ac.
PUBLIC AND SEMI-PUBLIC	0.5 ac.
MULTI-FAMILY RESIDENTIAL	3.2 ac.
GENERAL COMM. AND OFFICE	12.7 ac.
VACANT AND UNDEVELOPED	0.9 ac.





Metro: MAL21
Atlas Map: AW230

Scale 1" = 400'

207 BRUNSWICK RD (BEECHWOOD VILLAGE) - IFP PUMPED LOCATION.

MSD

Louisville-Jefferson County Metropolitan Sewer District

MSD Facility 21089

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	2	10,600,000 Gallons
2004	5	3,800,000 Gallons
2003	2	2,230,000 Gallons
2002	4	5,100,000 Gallons
2001	2	2,800,000 Gallons

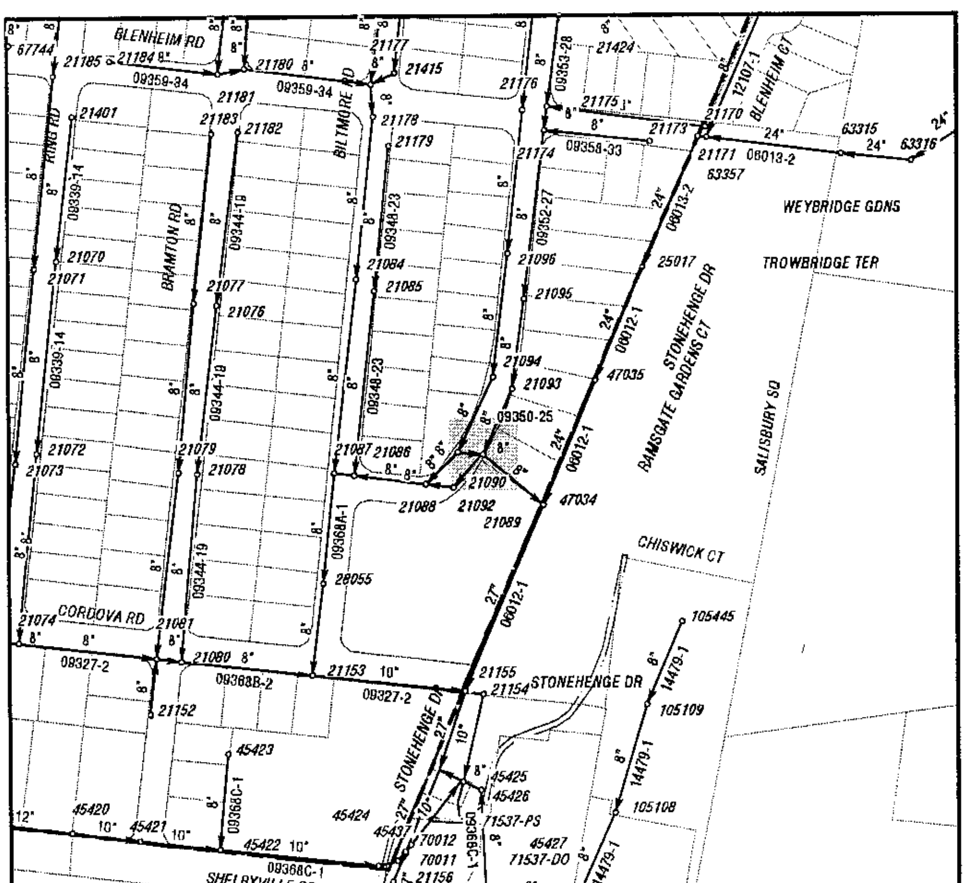
Background & History: Pumped by MSD Maintenance to reduce the risk of basement flooding in nearby homes.

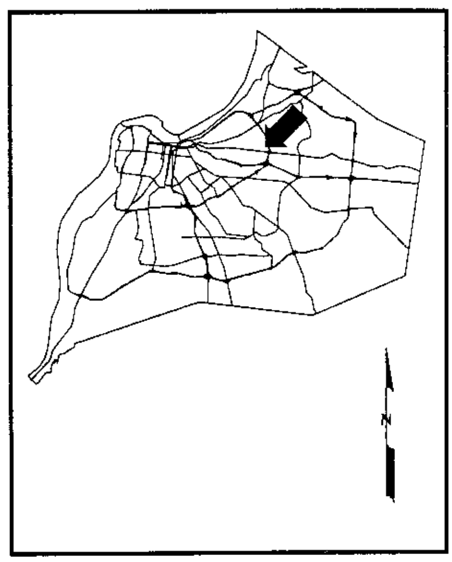
Pipe Size:
Inflow: 8"
Inflow: 8"
Outflow: 8"

Upstream Collection System Length: 8,700 L.F.
Watershed: MIDDLE FORK BEARGRASS CREEK
Discharge Type: PUMPED
Discharged To: CATCH BASIN
Receiving Stream: UPPER SINKING FORK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	0.7 ac.
MULTI-FAMILY RESIDENTIAL	9.1 ac.
PUBLIC AND SEMI-PUBLIC	1.1 ac.
GENERAL COMM. AND OFFICE	12.2 ac.
VACANT AND UNDEVELOPED	0.9 ac.





Metro: MAL21

Atlas Map: AW230

Scale 1" = 400'

SHELBYVILLE RD AND MARSHALL DR
IFP PUMPED LOCATION.

MSD
Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility 21101

Customer Service 587-0603 | **Report as of December 2005**

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	2	3,710,000 Gallons
2004	7	4,770,000 Gallons
2003	5	8,300,000 Gallons
2002	3	5,950,000 Gallons
2001	3	4,150,000 Gallons

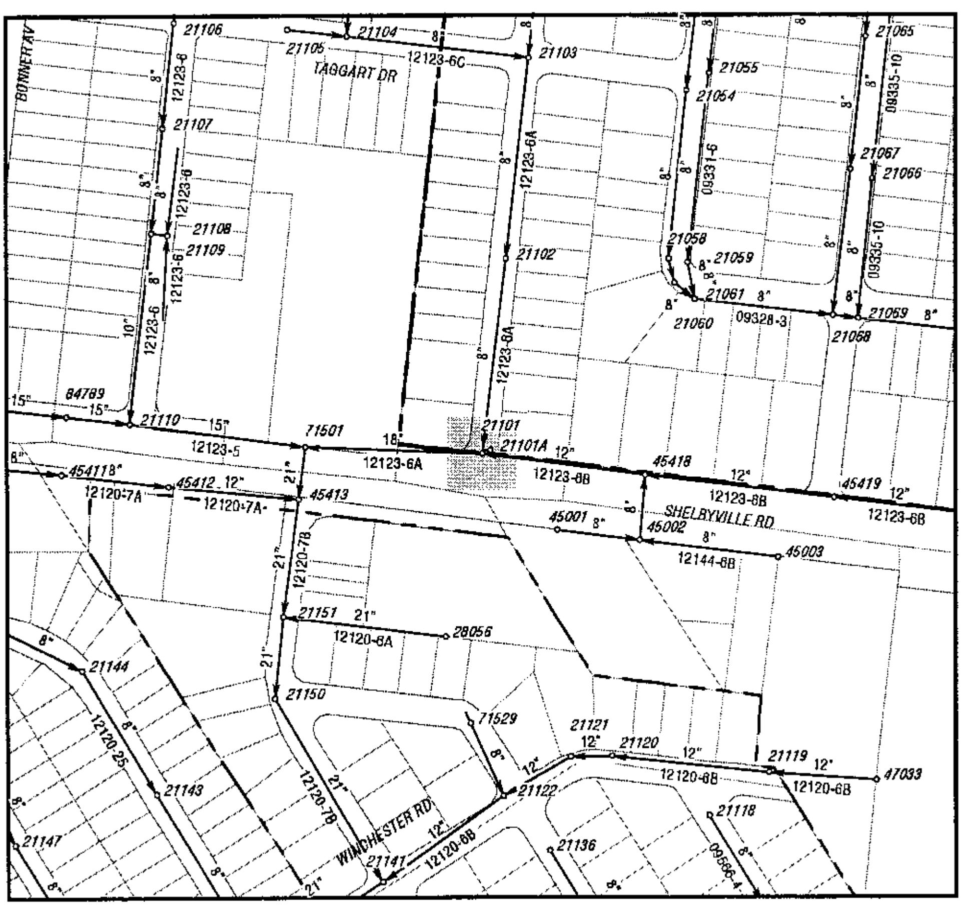
Background & History: Pumped by MSD Maintenance to reduce the risk of basement flooding in nearby homes.

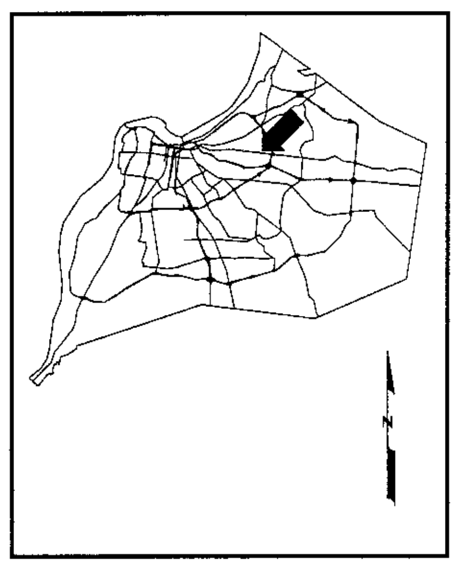
Pipe Size:
Inflow: 8"
Inflow: 12"
Outflow: 18"

Upstream Collection System Length: 5,980 L.F.
Watershed: MIDDLE FORK BEARGRASS CREEK
Discharge Type: PUMPED
Discharged To: DITCH
Receiving Stream: UPPER SINKING FORK
Status: DOCUMENTED

Downstream Landuse:

GENERAL COMM. AND OFFICE	2.9 ac.
MULTI-FAMILY RESIDENTIAL	1 ac.
SINGLE FAMILY RESIDENTIAL	13.3 ac.
PUBLIC AND SEMI-PUBLIC	7.1 ac.





Metro: MAL21
Atlas Map: AW230

Scale 1" = 400 '

BILTMORE RD AND CORDOVA RD - IFP PUMPED LOCATION.

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility 21153

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	2	1,980,000 Gallons
2004	11	13,400,000 Gallons
2003	3	4,310,000 Gallons
2002	3	4,770,000 Gallons
2001	3	5,830,000 Gallons

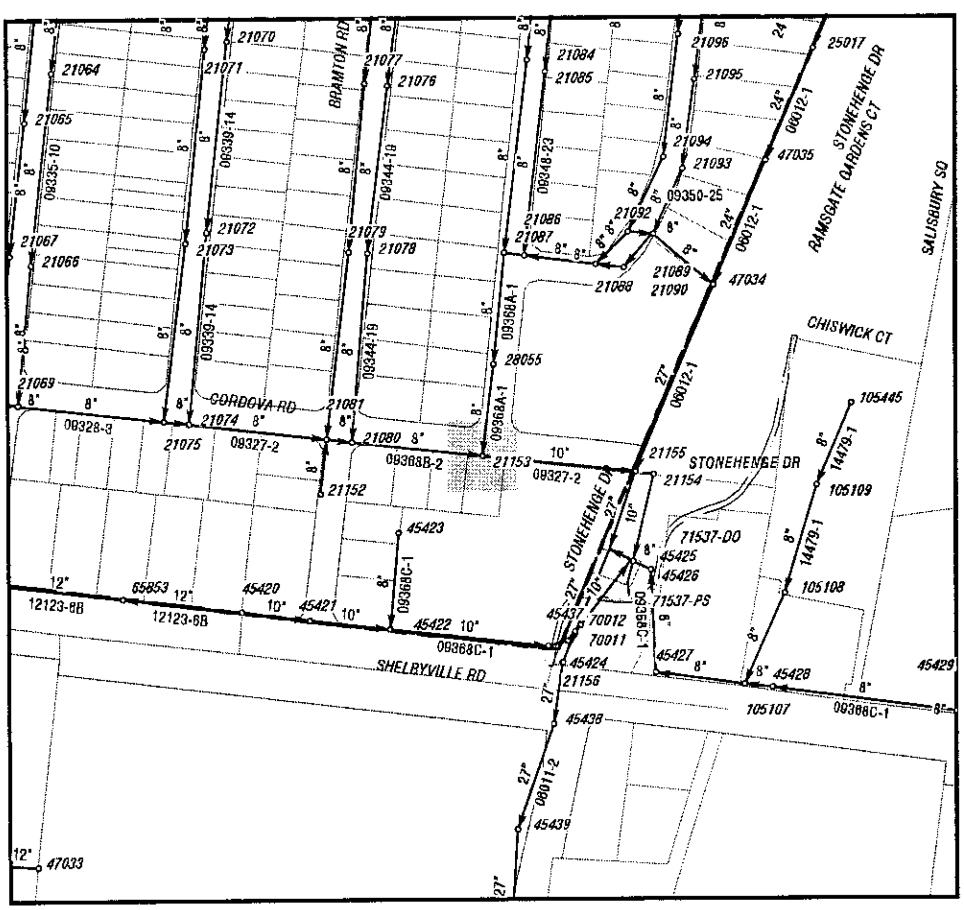
Background & History: This manhole is located on a 27" interceptor which joins with the Upper Middle Fork Interceptor.

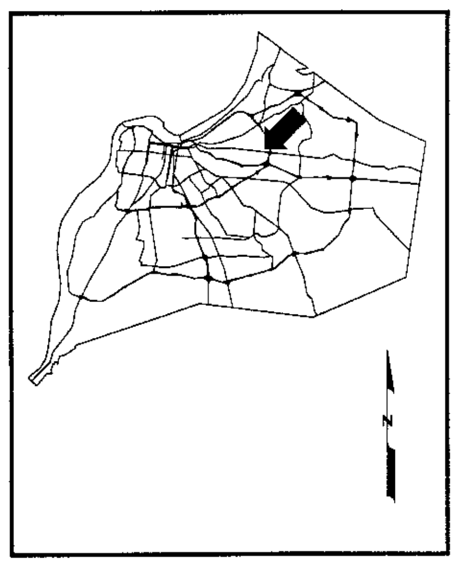
Pipe Size:
Inflow: 8"
Inflow: 8"
Outflow: 10"

Upstream Collection System Length: 22,500 L.F.
Watershed: MIDDLE FORK BEARGRASS CREEK
Discharge Type: PUMPED
Discharged To: CATCH BASIN
Receiving Stream: UPPER SINKING FORK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	0.1 ac.
PUBLIC AND SEMI-PUBLIC	0.5 ac.
MULTI-FAMILY RESIDENTIAL	9.5 ac.
GENERAL COMM. AND OFFICE	12.7 ac.
VACANT AND UNDEVELOPED	0.9 ac.





Metro: MAL21
Atlas Map: AW230

Scale 1" = 400 '

SHELBYVILLE RD AND STONEHENGE RD (BEECHWOOD VILLAGE) IFP PUMPED LOCATION.

MSD Facility 21156

MSD
Louisville-Jefferson County Metropolitan Sewer District

Customer Service 587-0603

Report as of December 2005

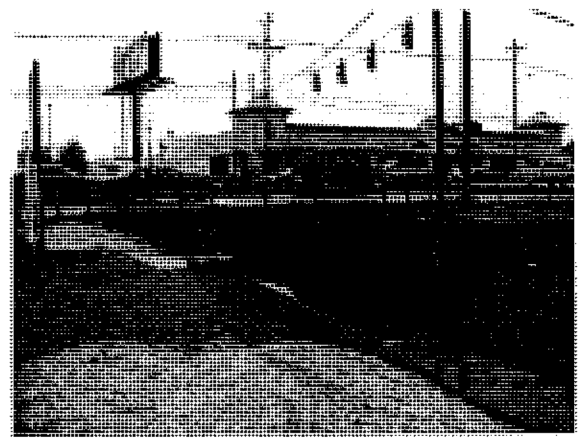
Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	2	3,140,000 Gallons
2004	8	10,900,000 Gallons
2003	3	4,270,000 Gallons
2002	3	6,770,000 Gallons
2001	3	5,460,000 Gallons

Background & History: Pumped by MSD Maintenance to reduce the risk of basement flooding in nearby homes.

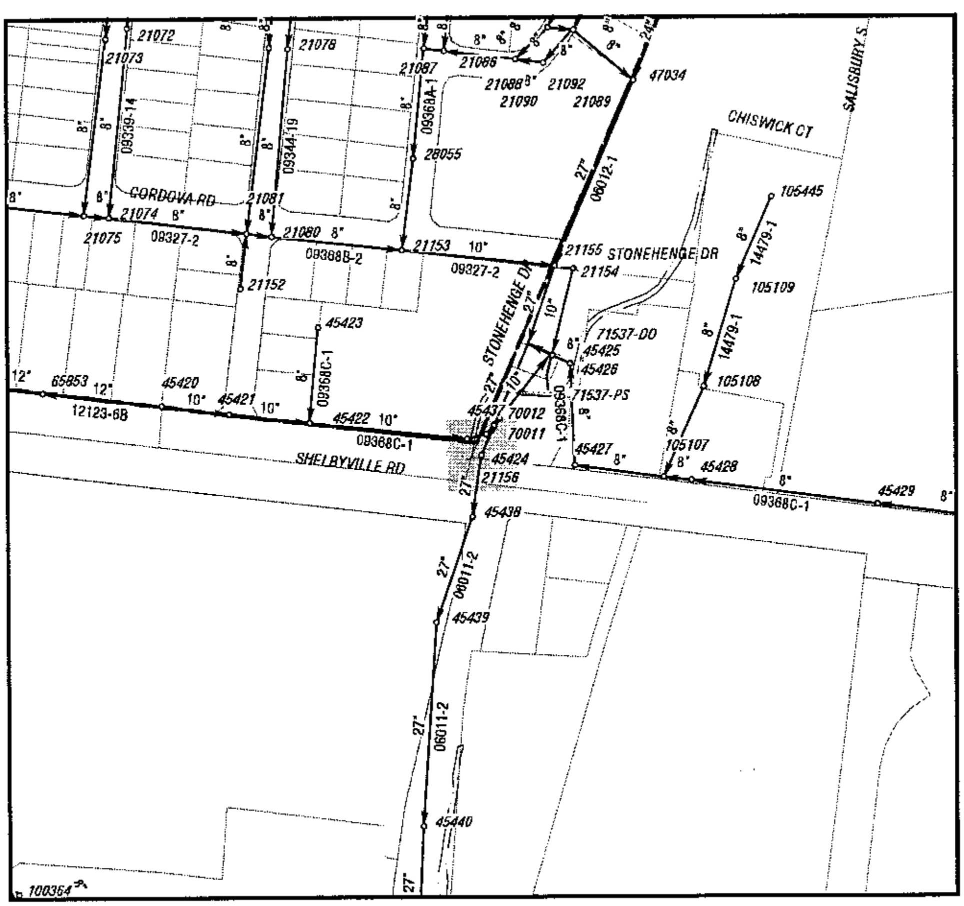
Pipe Size:
Inflow: 27"
Outflow: 27"

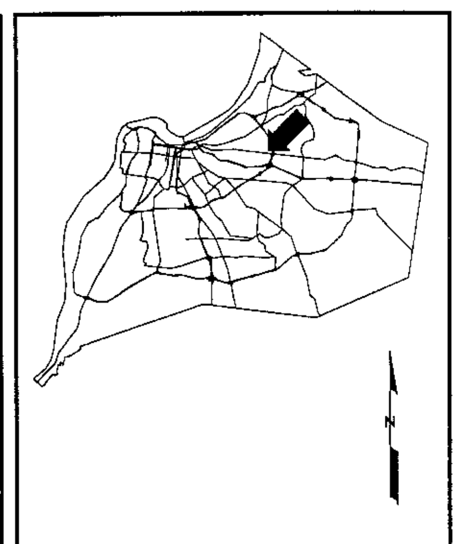
Upstream Collection System Length: 255,000 L.F.
Watershed: MIDDLE FORK BEARGRASS CREEK
Discharge Type: PUMPED
Discharged To: CATCH BASIN
Receiving Stream: UPPER SINKING FORK
Status: DOCUMENTED



Downstream Landuse:

GENERAL COMM. AND OFFICE	11 ac.
MULTI-FAMILY RESIDENTIAL	11.2 ac.
VACANT AND UNDEVELOPED	0.5 ac.
PARKS, CEMETERIES, ETC.	1.7 ac.





Metro: MAL21

Atlas Map: AW230

Scale 1" = 400 '

905 FALGATE CT WINDHURST RD / END OF ST IFP PUMPED LOCATION.

MSD

Louisville-Jefferson County Metropolitan Sewer District

MSD Facility 21506

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2004	2	1,460,000 Gallons
2003	2	530,000 Gallons
2002	3	4,400,000 Gallons
2001	1	830,000 Gallons

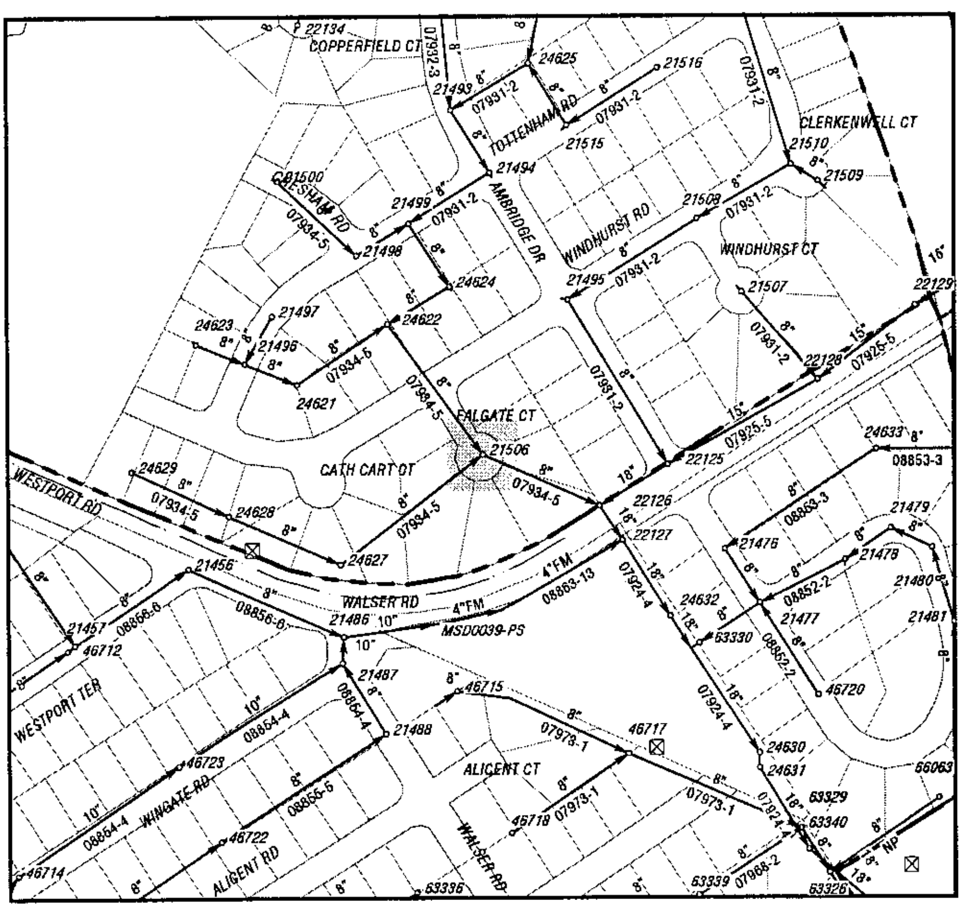
Background & History: Pumped by MSD Maintenance to reduce the risk of basement flooding in nearby homes.

Pipe Size:
Inflow: 8"
Inflow: 8"
Outflow: 8"

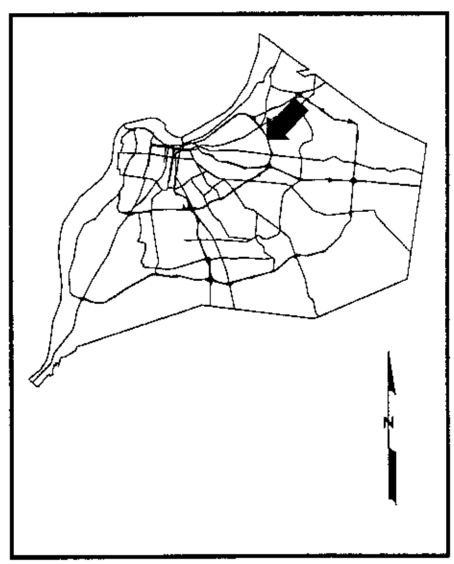
Upstream Collection System Length: 8,210 L.F.
Watershed: MUDDY FORK BEARGRASS CREEK
Discharge Type: PUMPED
Discharged To: CATCH BASIN
Receiving Stream: MUDDY FORK BEARGRASS CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	8.2 ac.
PUBLIC AND SEMI-PUBLIC	1.8 ac.
VACANT AND UNDEVELOPED	6.9 ac.
PARKS, CEMETERIES, ETC.	5.9 ac.
MULTI-FAMILY RESIDENTIAL	1.4 ac.



Scale 1" = 400 '



Metro: MAK21

Atlas Map: AU230

4641 BEAVER RD

MSD
Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility 25012

Customer Service 587-0603 | **Report as of December 2005**

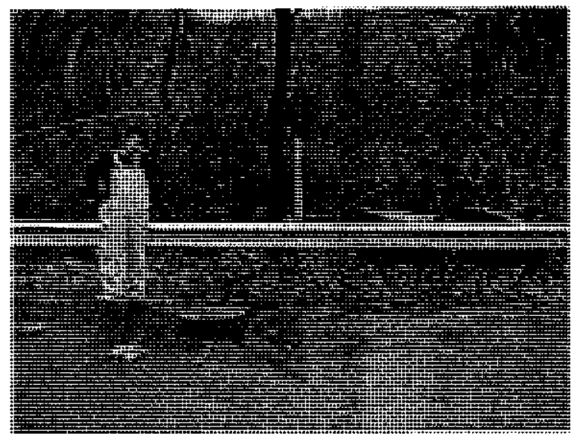
Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	1	9,640,000 Gallons
2004	1	350,000 Gallons

Background & History: This manhole was identified as an overflow during FY02 and will be monitored in the future.

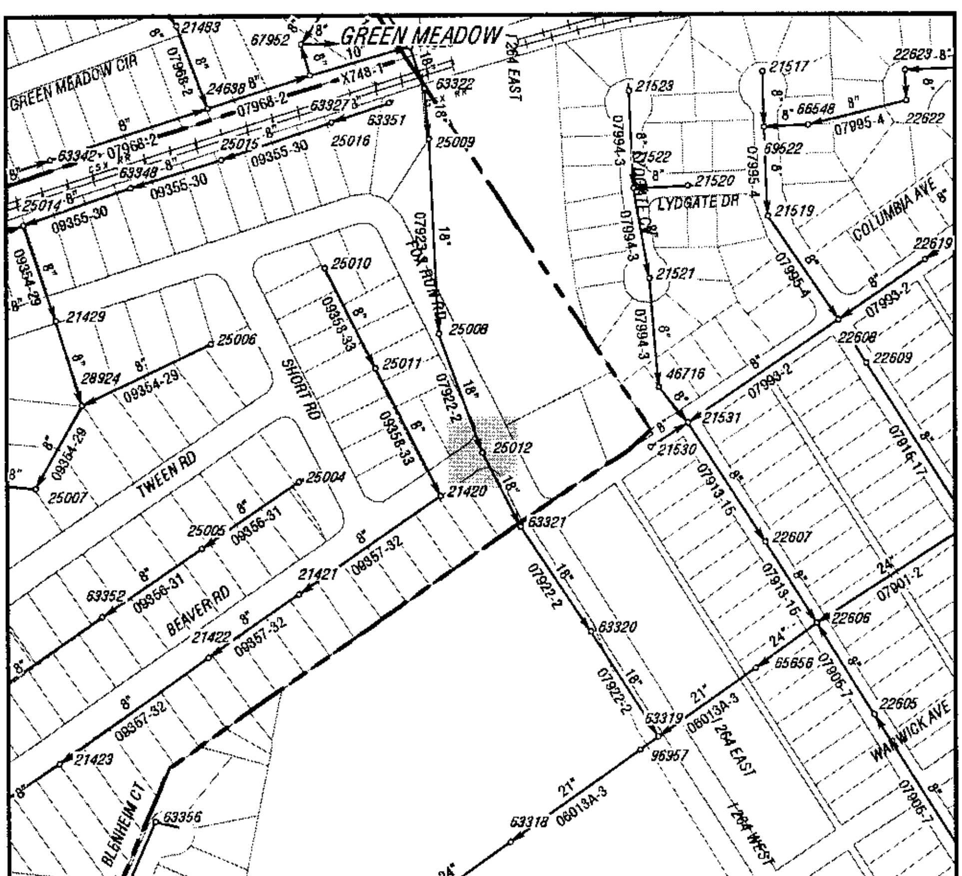
Pipe Size:
Inflow: 18"
Outflow: 18"

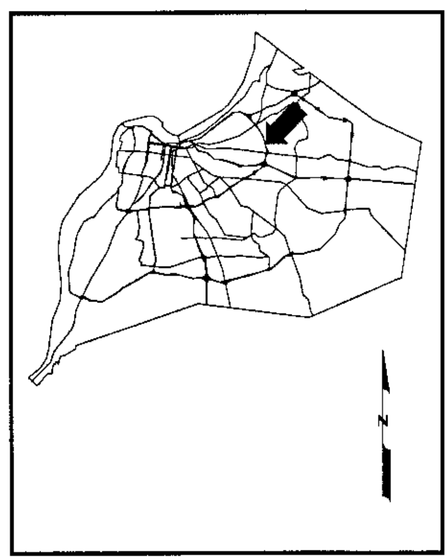
Upstream Collection System Length: 107,000 L.F.
Watershed: MIDDLE FORK BEARGRASS CREEK
Discharge Type: CAPACITY
Discharged To: DITCH
Receiving Stream: UPPER SINKING FORK
Status: DOCUMENTED



Downstream Landuse:

VACANT AND UNDEVELOPED	2.5 ac.
SINGLE FAMILY RESIDENTIAL	2.8 ac.
PARKS, CEMETERIES, ETC.	5.9 ac.
MULTI-FAMILY RESIDENTIAL	3.3 ac.
PUBLIC AND SEMI-PUBLIC	1 ac.
GENERAL COMM. AND OFFICE	8.2 ac.





Metro: MAL22
Atlas Map: AW232

Scale 1" = 400 '

MH IN SERVICE ROAD 50' NW OF BRIDGE #6 IN CHEROKEE PARK

MSD

Louisville-Jefferson County Metropolitan Sewer District

MSD Facility 27005

Customer Service 587-0603

Report as of December 2005

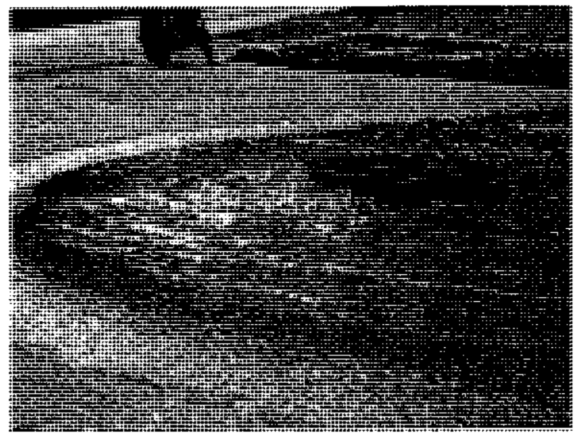
Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	5	47,800,000 Gallons
2004	13	14,500,000 Gallons
2003	1	1,900,000 Gallons

Background & History: This site was reported as an overflow in Hansen during FY04. It is new to the list and will be montitored in the future.

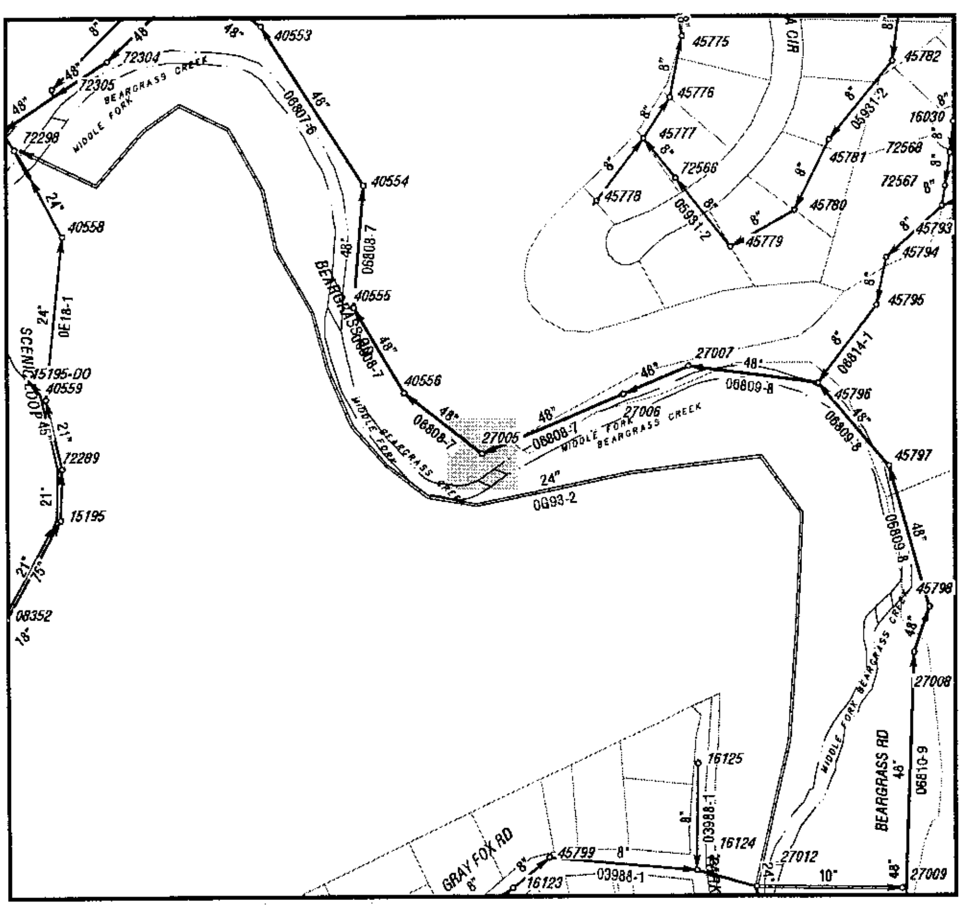
Pipe Size:
Inflow: 48"
Outflow: 48"

Upstream Collection System Length: 1,730,000 L.F.
Watershed: MIDDLE FORK BEARGRASS CREEK
Discharge Type: CAPACITY
Discharged To: GROUND
Receiving Stream: MIDDLE FORK BEARGRASS CREEK
Status: DOCUMENTED

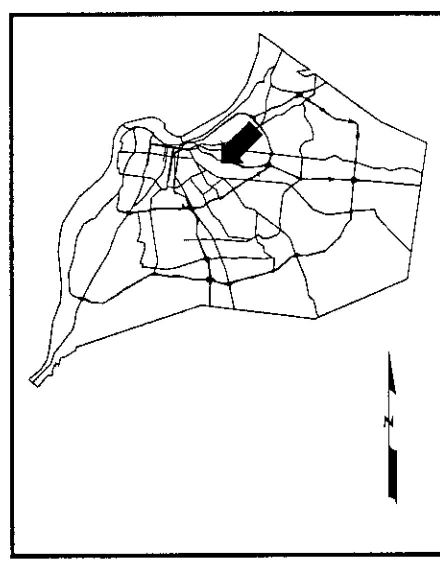


Downstream Landuse:

PARKS, CEMETERIES, ETC.	24.4 ac.
VACANT AND UNDEVELOPED	0 ac.



Scale 1" = 400 '



Metro: MAL20

Atlas Map: BA224

WWWQ RECON SITE - MANHOLE 10' SOUTH OF STORMWATER DITCH IN FRONT YARD

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility 27821

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	4	217,000 Gallons
2004	14	3,450,000 Gallons
2003	8	516,000 Gallons
2002	4	775,000 Gallons

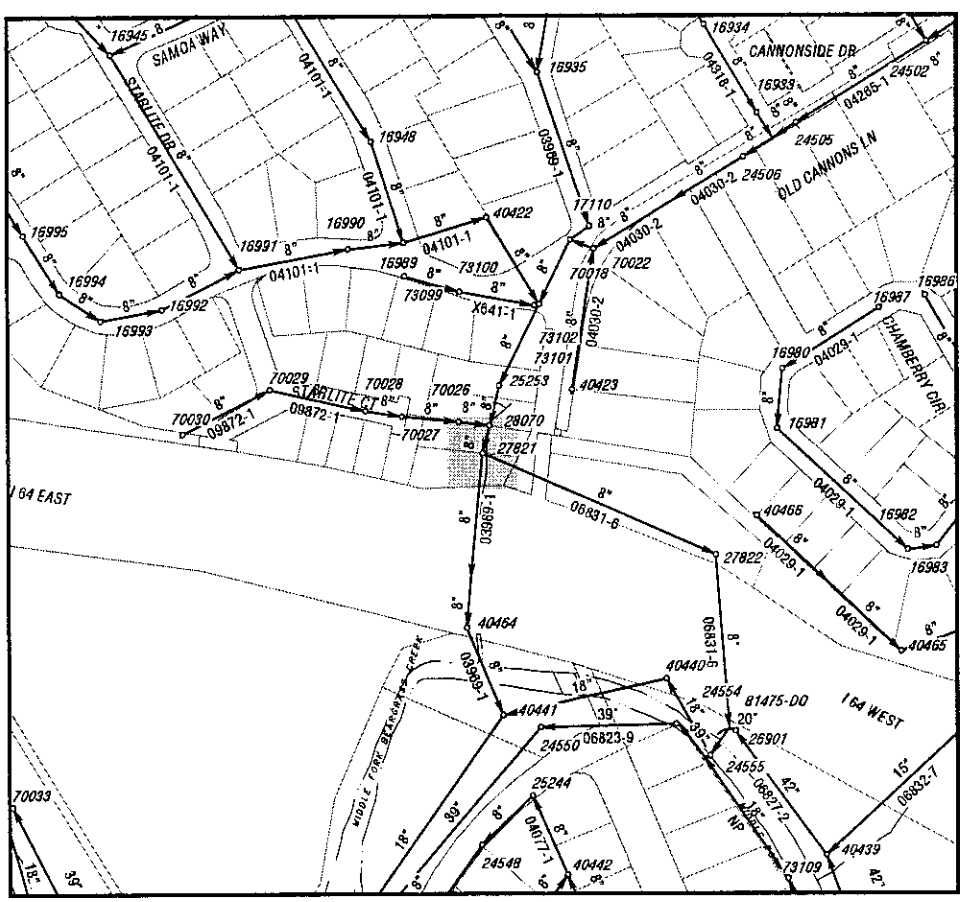
Background & History: Work has been completed at this site to remove the manhole from the driveway at 1112 Old Cannons Lane to prevent overflows into the home; however, the new manhole intalled across the creek still overflows.

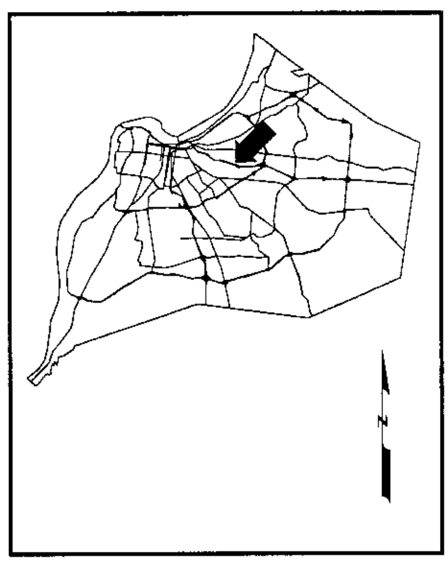
Pipe Size:
Inflow: 8"
Outflow: 8"

Upstream Collection System Length: 12,900 L.F.
Watershed: MIDDLE FORK BEARGRASS CREEK
Discharge Type: CAPACITY
Discharged To: GROUND
Receiving Stream: MIDDLE FORK BEARGRASS CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	4.5 ac.
VACANT AND UNDEVELOPED	3.3 ac.
PARKS, CEMETERIES, ETC.	15.8 ac.





Metro: MAL21

Atlas Map: AY228

Scale 1" = 400 '

WWWQ RECON SITE - MH 180' NW OF INT OF ALTA VISTA RD & BEARGRASS RD

MSD Facility 45835

MSD

Louisville-Jefferson County Metropolitan Sewer District

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	4	4,040,000 Gallons
2004	4	596,000 Gallons
2003	1	650,000 Gallons

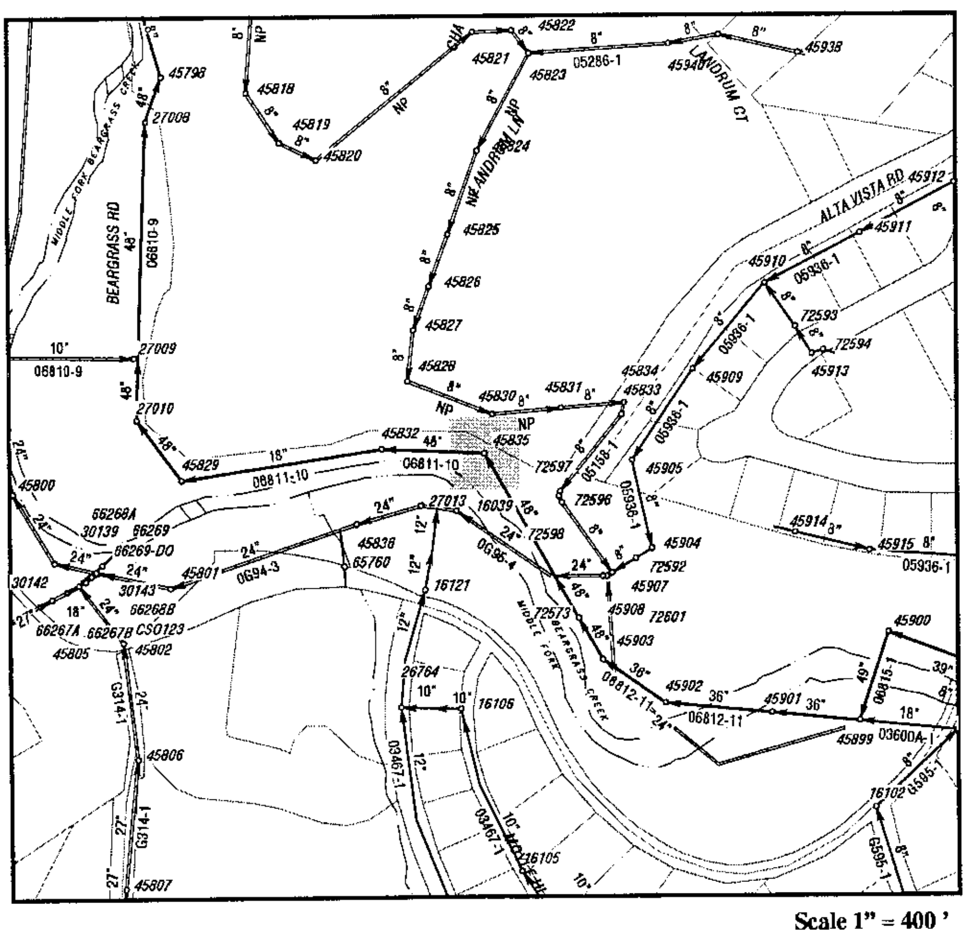
Background & History: This site was reported as an overflow in Hansen during FY04.

Pipe Size:
Inflow: 48"
Outflow: 48"

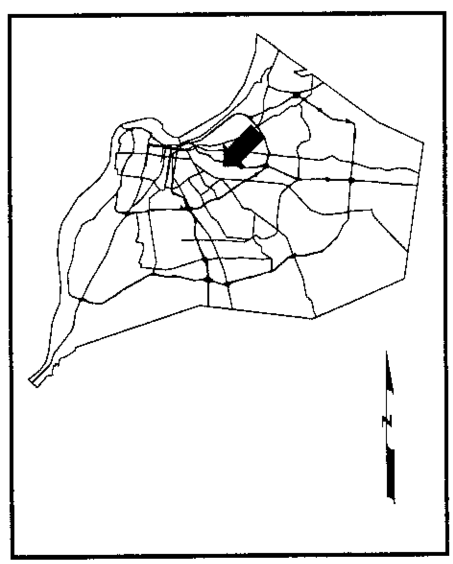
Upstream Collection System Length: 1,710,000 L.F.
Watershed: MIDDLE FORK BEARGRASS CREEK
Discharge Type: CAPACITY
Discharged To: GROUND
Receiving Stream: MIDDLE FORK BEARGRASS CREEK
Status: DOCUMENTED

Downstream Landuse:

PARKS, CEMETERIES, ETC.	17 ac.
SINGLE FAMILY RESIDENTIAL	0.5 ac.
PUBLIC AND SEMI-PUBLIC	6.2 ac.



Scale 1" = 400 '



Metro: MAL20
Atlas Map: BA226

7800 WESTPORT RD (WET WELL FOR GOOSE CREEK PS)

MSD

Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility 46891

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2003	1	15,000 Gallons

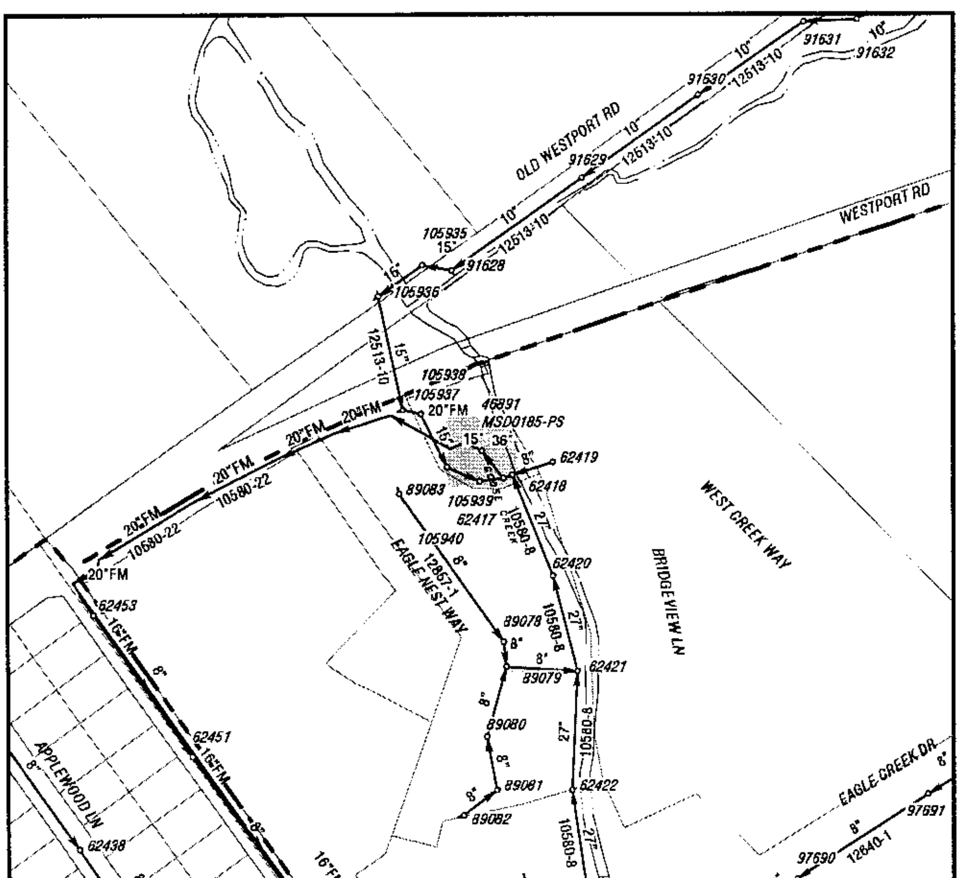
Background & History:

Pipe Size:
Inflow: 36"
Outflow: 36"

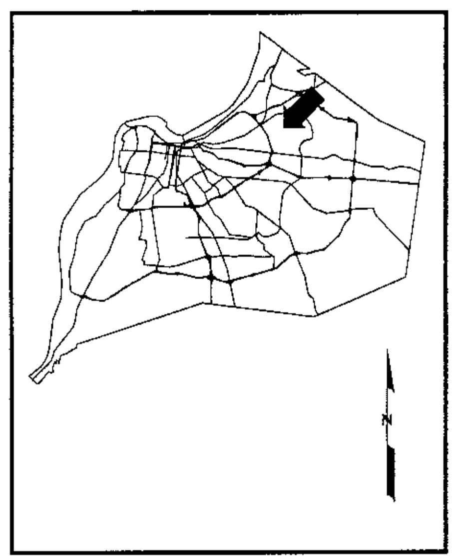
Upstream Collection System Length: 238,000 L.F.
Watershed: GOOSE CREEK
Discharge Type: PUMPED
Discharged To: DITCH
Receiving Stream: GOOSE CREEK
Status: DOCUMENTED

Downstream Landuse:

VACANT AND UNDEVELOPED	3.9 ac.
MULTI-FAMILY RESIDENTIAL	3.4 ac.
SINGLE FAMILY RESIDENTIAL	11.8 ac.



Scale 1" = 400 '



Metro: MAK22

Atlas Map: AS234

1418 TREVILIAN WAY

MSD

Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility 51594

Customer Service 587-0603 | **Report as of December 2005**

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	2	55 Gallons

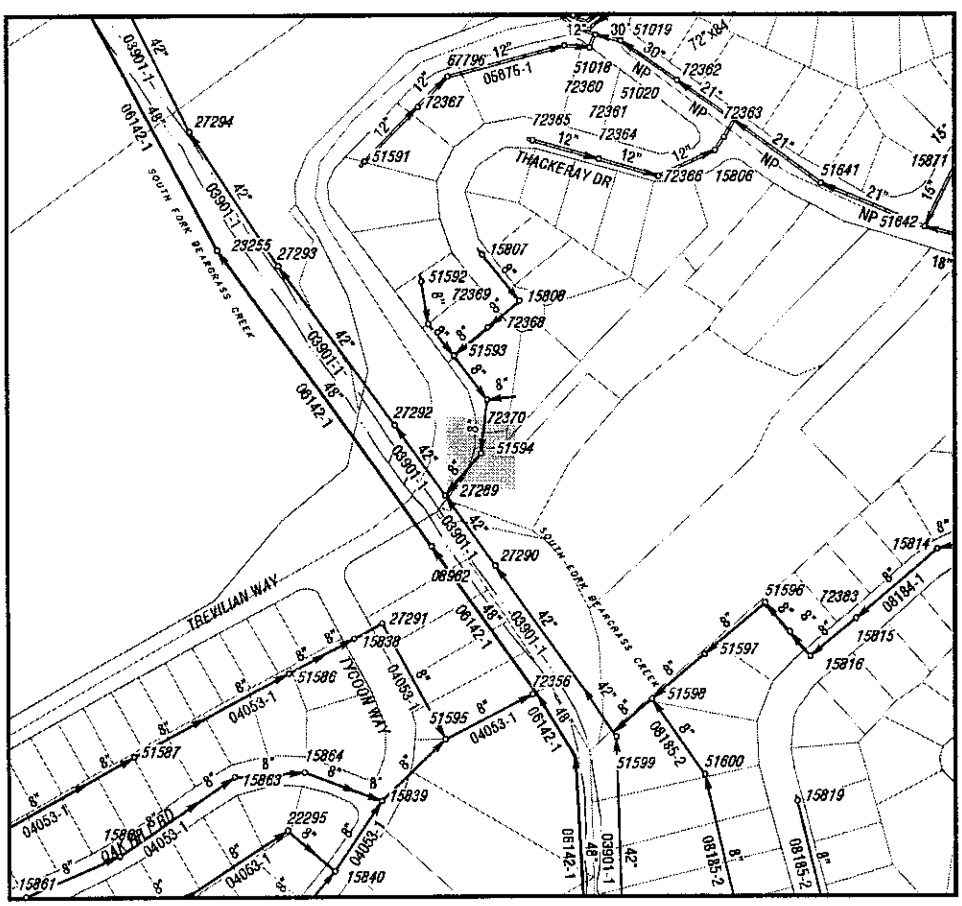
Background & History:

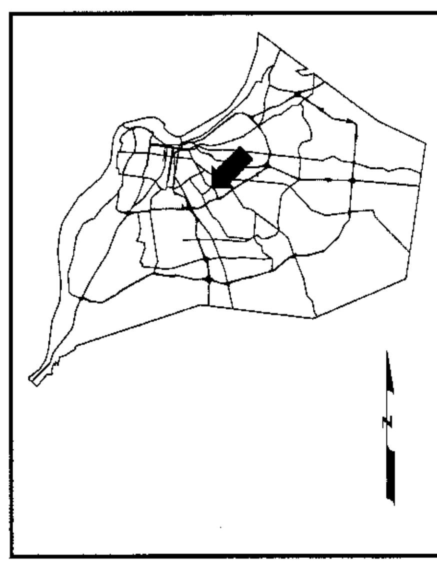
Pipe Size:
Inflow: 8"
Outflow: 8"

Upstream Collection System Length: 798 L.F.
Watershed: SOUTH FORK BEARGRASS CREEK
Discharge Type: CAPACITY
Discharged To:
Receiving Stream:
Status: DOCUMENTED

Downstream Landuse:

VACANT AND UNDEVELOPED	17.1 ac.
PUBLIC AND SEMI-PUBLIC	8.8 ac.
PARKS, CEMETERIES, ETC.	10.1 ac.
SINGLE FAMILY RESIDENTIAL	5.7 ac.





Metro: MAM20
Atlas Map: BE224

Scale 1" = 400 '

WOODLAWN PARK

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility MSD0039-PS

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	3	18,000 Gallons
2004	1	10,000 Gallons

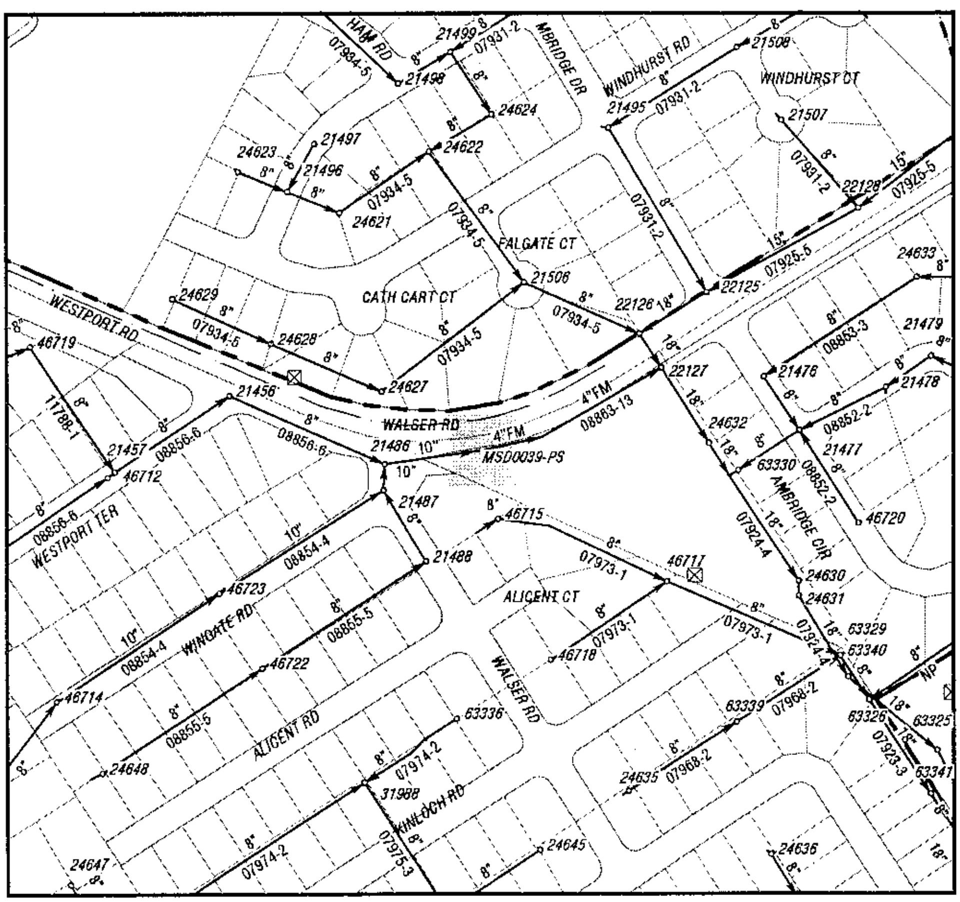
Background & History:

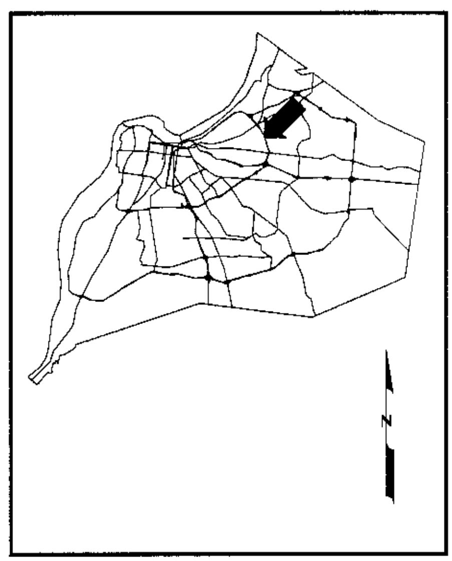
Pipe Size:
Inflow: 6"
Outflow: 4"

Upstream Collection System Length: 15,200 L.F.
Watershed: MUDDY FORK BEARGRASS CREEK
Discharge Type: CAPACITY
Discharged To: DITCH
Receiving Stream: MUDDY FORK BEARGRASS CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	7.4 ac.
PUBLIC AND SEMI-PUBLIC	2.9 ac.
VACANT AND UNDEVELOPED	6.9 ac.
PARKS, CEMETERIES, ETC.	5.9 ac.
MULTI-FAMILY RESIDENTIAL	1.4 ac.





Scale 1" = 400 '

Metro: MAK21

Atlas Map: AU230

DEVONDALE PS

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility MSD0040-PS

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2003	2	9,500 Gallons
2002	7	41,500 Gallons
2001	1	400 Gallons

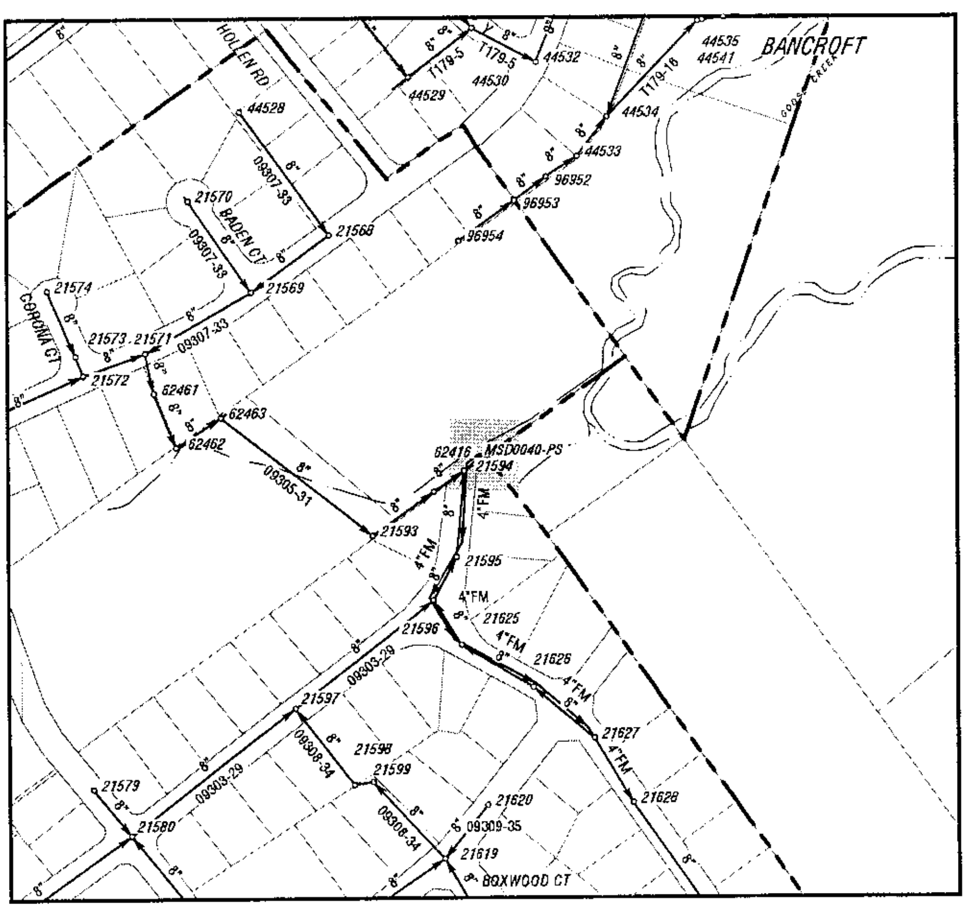
Background & History:

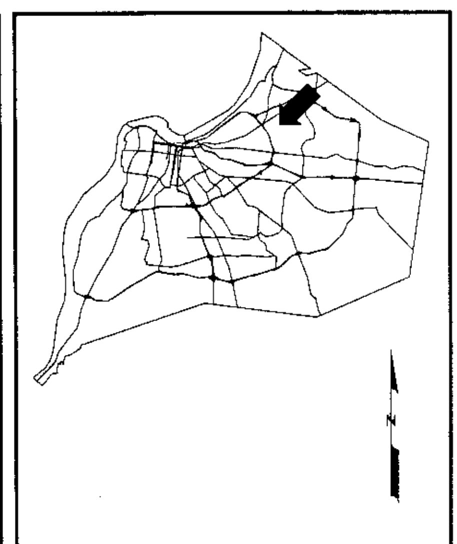
Pipe Size:
Inflow: 8"
Outflow: 4"

Upstream Collection System Length: 11,700 L.F.
Watershed: GOOSE CREEK
Discharge Type: CAPACITY
Discharged To: DITCH
Receiving Stream: GOOSE CREEK
Status: DOCUMENTED

Downstream Landuse:

VACANT AND UNDEVELOPED	1.1 ac.
SINGLE FAMILY RESIDENTIAL	18.4 ac.
PUBLIC AND SEMI-PUBLIC	1.5 ac.
GENERAL COMM. AND OFFICE	1.1 ac.
MULTI-FAMILY RESIDENTIAL	1.7 ac.





Metro: MAK22
Atlas Map: AS232

Scale 1" = 400 '

ANCHOR ESTATES #1

MSD

Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility MSD0056-LS

Customer Service 587-0603 | **Report as of December 2005**

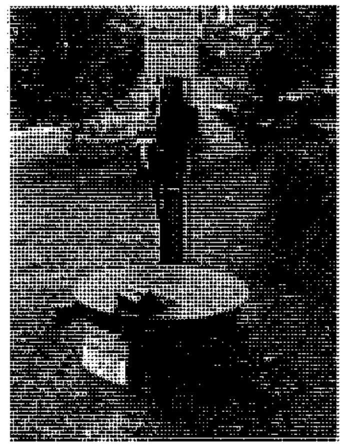
Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	1	100 Gallons

Background & History:

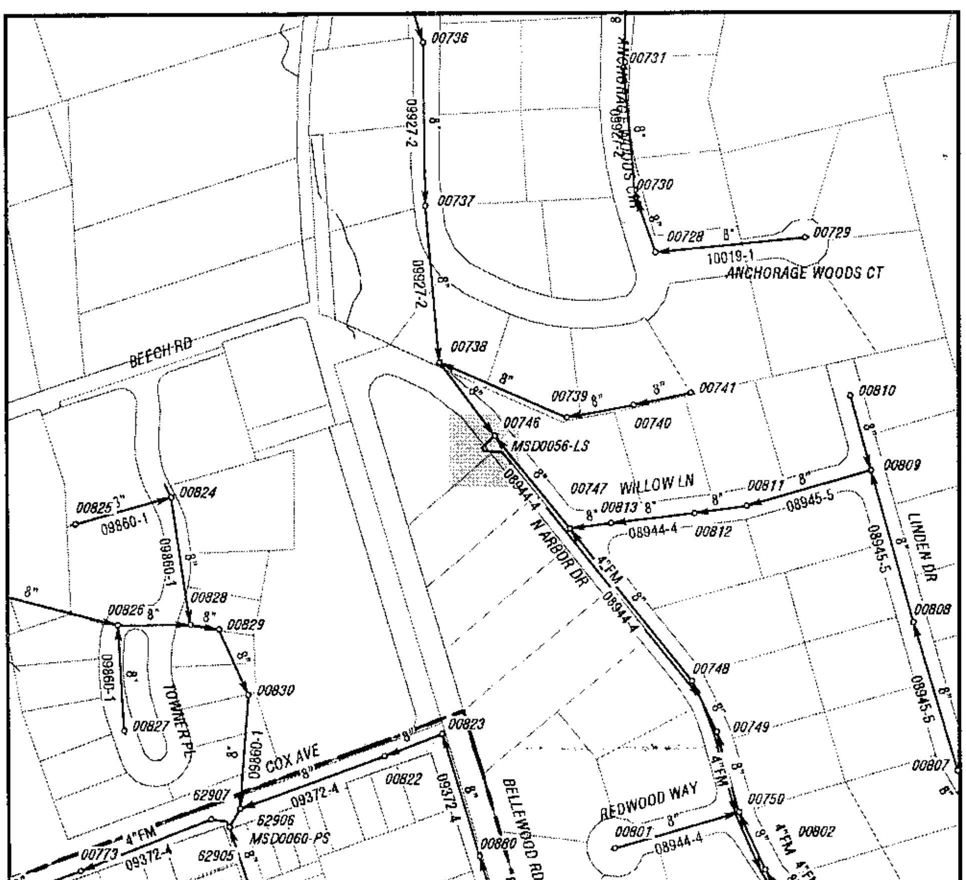
Pipe Size:
Inflow: 8"
Outflow: 4"

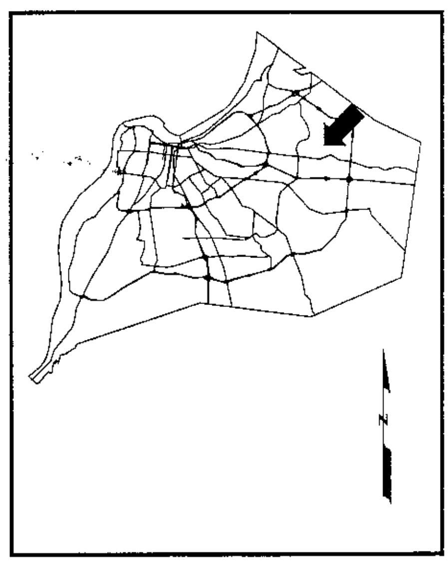
Upstream Collection System Length: 7,720 L.F.
Watershed: MIDDLE FORK BEARGRASS CREEK
Discharge Type: CAPACITY
Discharged To: GROUND
Receiving Stream: MIDDLE FORK BEARGRASS CREEK
Status: N



Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	18.5 ac.
PARKS, CEMETERIES, ETC.	1.5 ac.
PUBLIC AND SEMI-PUBLIC	1.4 ac.
GENERAL COMM. AND OFFICE	2.1 ac.
VACANT AND UNDEVELOPED	0.2 ac.





Metro: MAL23
Atlas Map: AW238

Scale 1" = 400 '

ANCHOR ESTATES #2

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility MSD0057-LS

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	8	148,000 Gallons
2004	16	172,000 Gallons
2003	9	48,000 Gallons
2002	9	156,000 Gallons
2001	6	13,500 Gallons

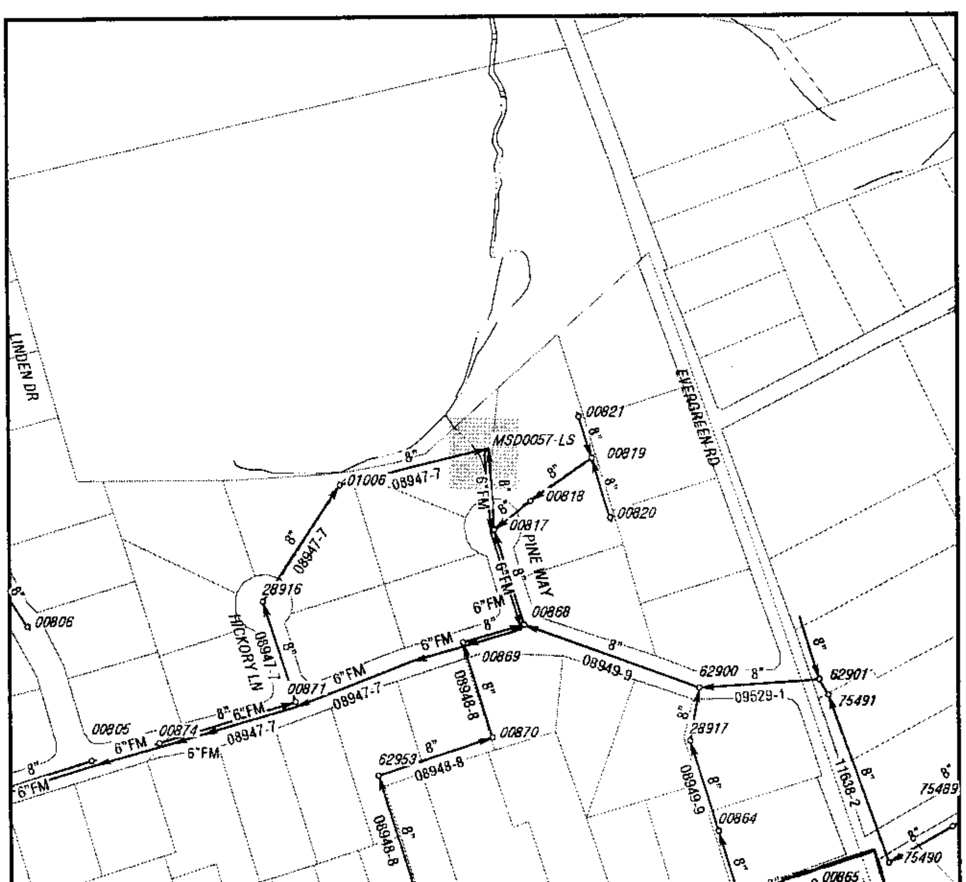
Background & History:

Pipe Size:
Inflow: 8"
Outflow: 6"

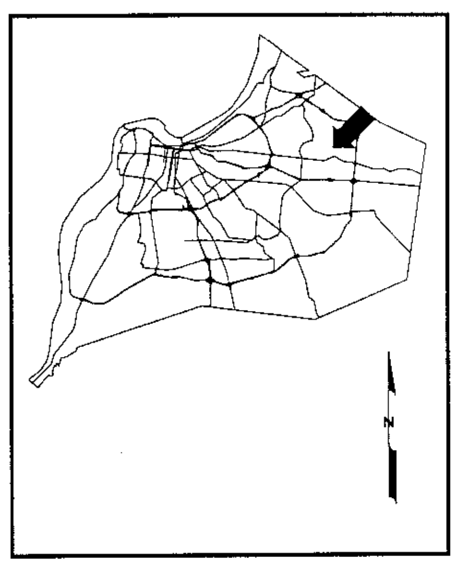
Upstream Collection System Length: 7,570 L.F.
Watershed: MIDDLE FORK BEARGRASS CREEK
Discharge Type: CAPACITY
Discharged To: STREAM
Receiving Stream: MIDDLE FORK BEARGRASS CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	20.3 ac.
PARKS, CEMETERIES, ETC.	1.5 ac.
PUBLIC AND SEMI-PUBLIC	1.4 ac.
GENERAL COMM. AND OFFICE	0.8 ac.
VACANT AND UNDEVELOPED	0.2 ac.



Scale 1" = 400 '



Metro: MAL24
Atlas Map: AW240

ST. MATTHEWS VILLAGE

MSD Facility MSD0070-PS

MSD
Louisville-Jefferson County
Metropolitan Sewer District

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2004	1	12,000 Gallons

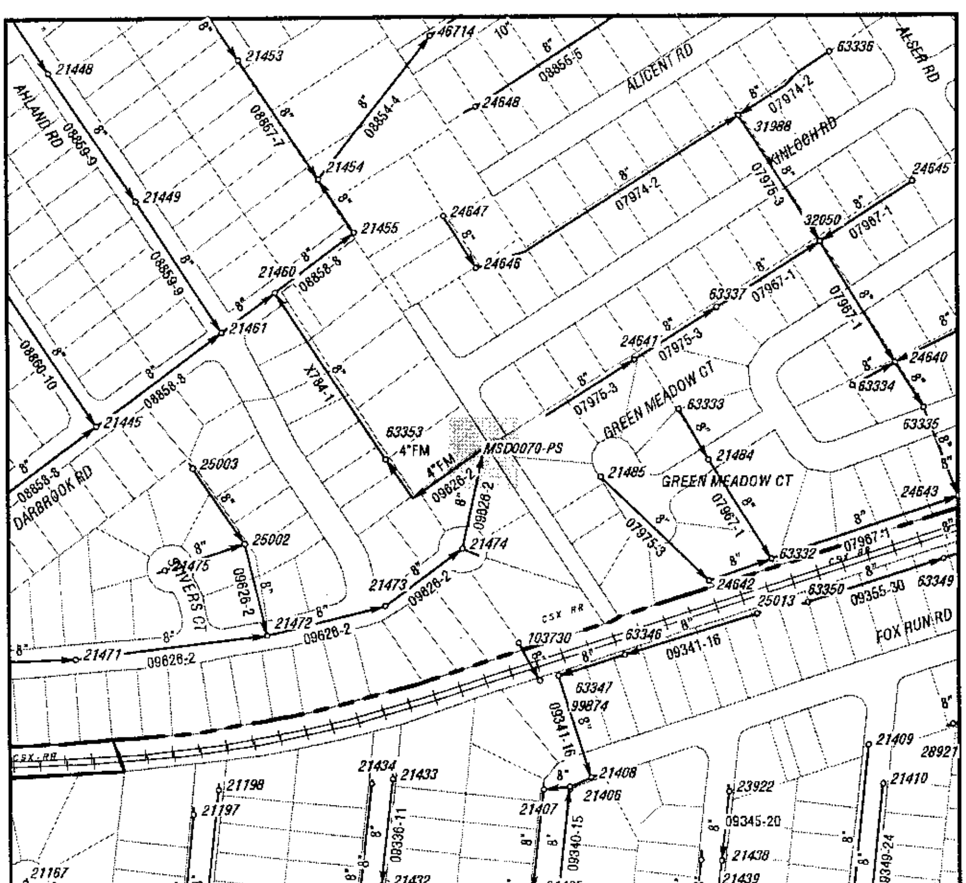
Background & History:

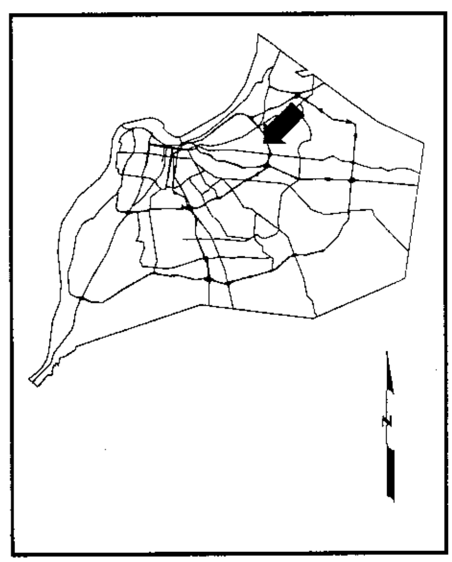
Pipe Size:
Inflow: 8"
Outflow: 4"

Upstream Collection System Length: 2,070 L.F.
Watershed: MIDDLE FORK BEARGRASS CREEK
Discharge Type: CAPACITY
Discharged To: DITCH
Receiving Stream: MIDDLE FORK BEARGRASS CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	16.4 ac.
PUBLIC AND SEMI-PUBLIC	2.9 ac.
VACANT AND UNDEVELOPED	4.5 ac.





Metro: MAL21
Atlas Map: AW230

Scale 1" = 400 '

MSD
Louisville-Jefferson County
Metropolitan Sewer District

DERINGTON CT.

MSD Facility MSD0095-PS

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2003	1	3,000 Gallons

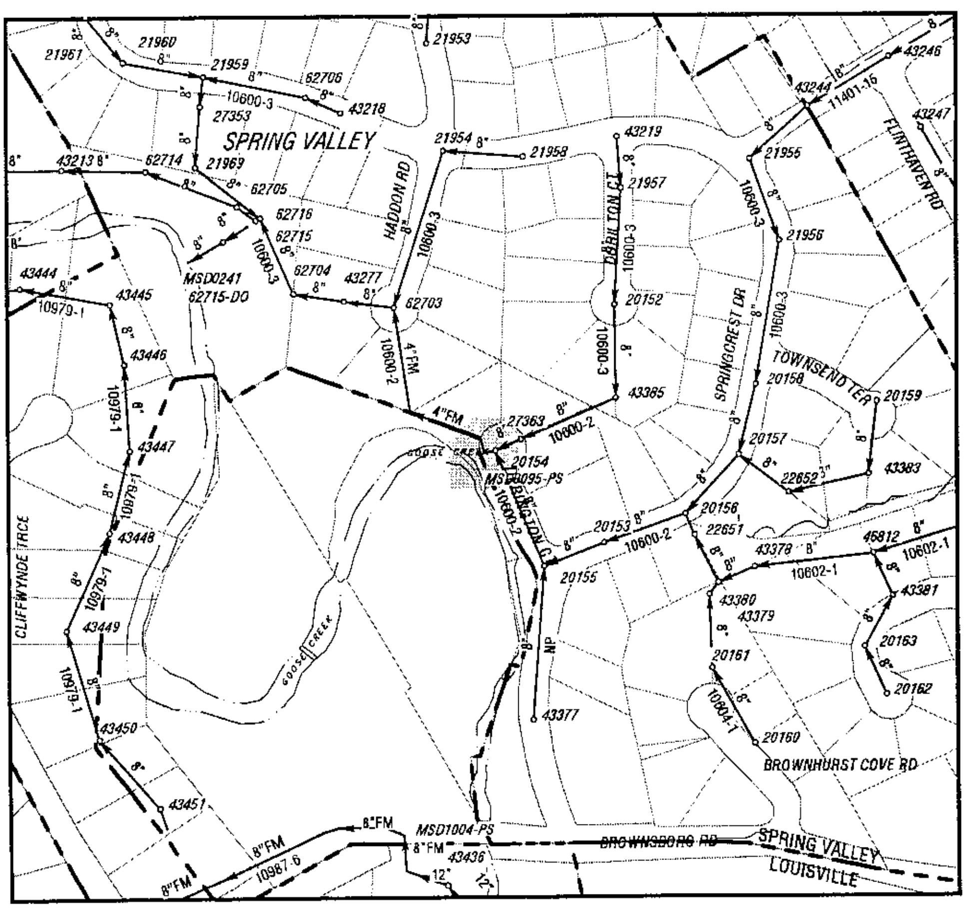
Background & History:

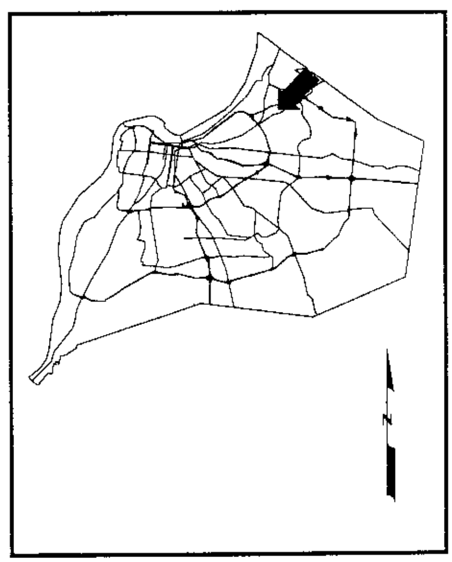
Pipe Size:
Inflow: 8"
Outflow: 4"

Upstream Collection System Length: 13,400 L.F.
Watershed: GOOSE CREEK
Discharge Type: PUMPED
Discharged To: STREAM
Receiving Stream: GOOSE CREEK
Status: DOCUMENTED

Downstream Landuse:

VACANT AND UNDEVELOPED	10.7 ac.
SINGLE FAMILY RESIDENTIAL	12.6 ac.





Metro: MAK22
Atlas Map: A0232

Scale 1" = 400 '

ACUSHNET ROAD PS

MSD
Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility MSD0175-PS

Customer Service 587-0603 **Report as of December 2005**

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	2	18,800 Gallons
2003	5	21,400 Gallons
2002	4	21,000 Gallons
2001	2	3,020 Gallons

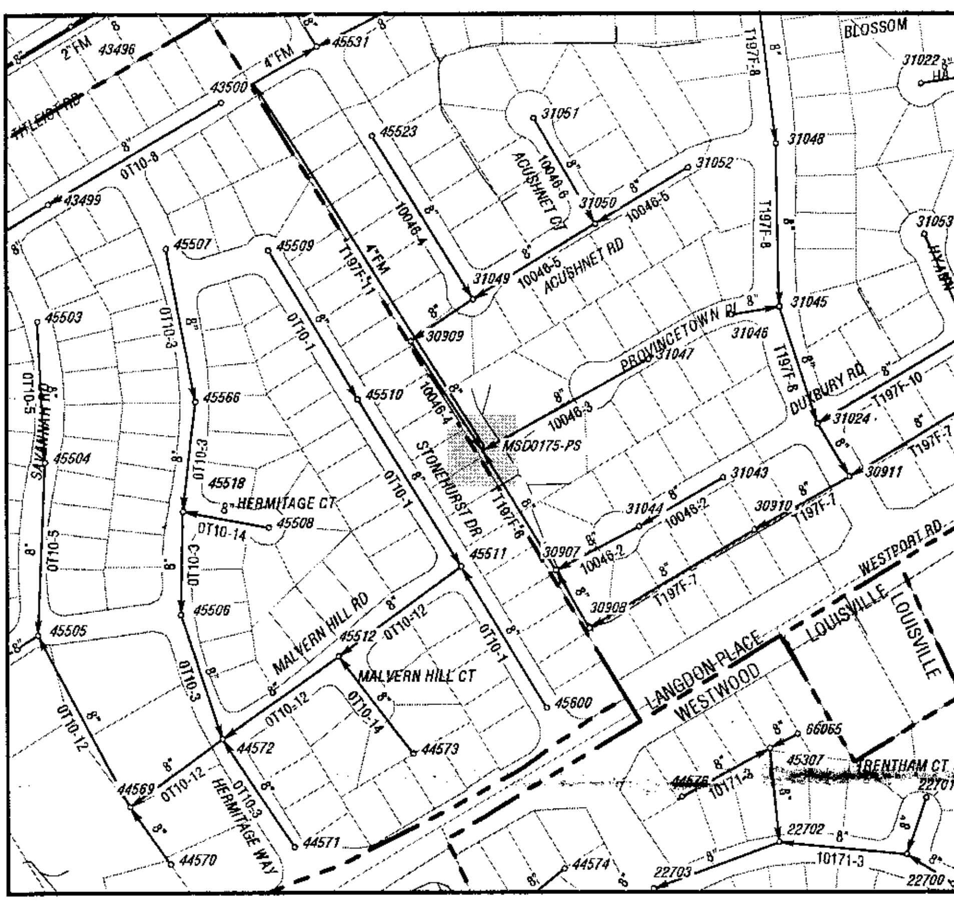
Background & History: This site is currently being monitored.

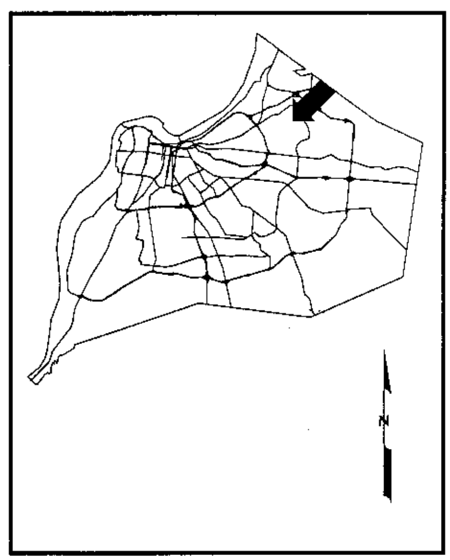
Pipe Size:
Inflow: 8"
Inflow: 8"
Inflow: 8"
Outflow: 4"

Upstream Collection System Length: 6,480 L.F.
Watershed: GOOSE CREEK
Discharge Type: CAPACITY
Discharged To: DITCH
Receiving Stream: GOOSE CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	18.8 ac.
VACANT AND UNDEVELOPED	4.9 ac.
PARKS, CEMETERIES, ETC.	0.1 ac.





Metro: MAK22
Atlas Map: AQ234

Scale 1" = 400 '

JARVIS LANE

MSD Facility MSD0006-PS

Customer Service 587-0603

Report as of December 2005

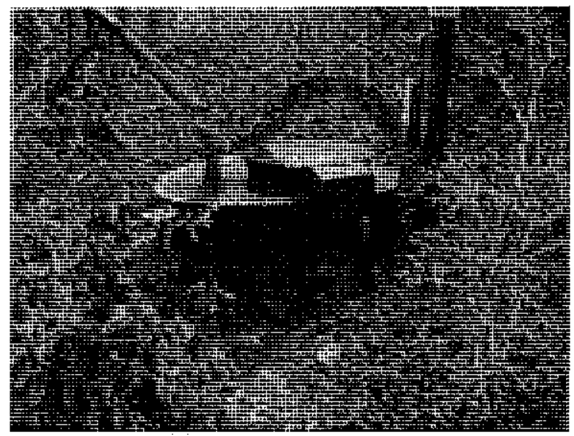
Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2002	3	148,000 Gallons

Background & History: This site was reported as an overflow during FY03. It will be monitored in the future.

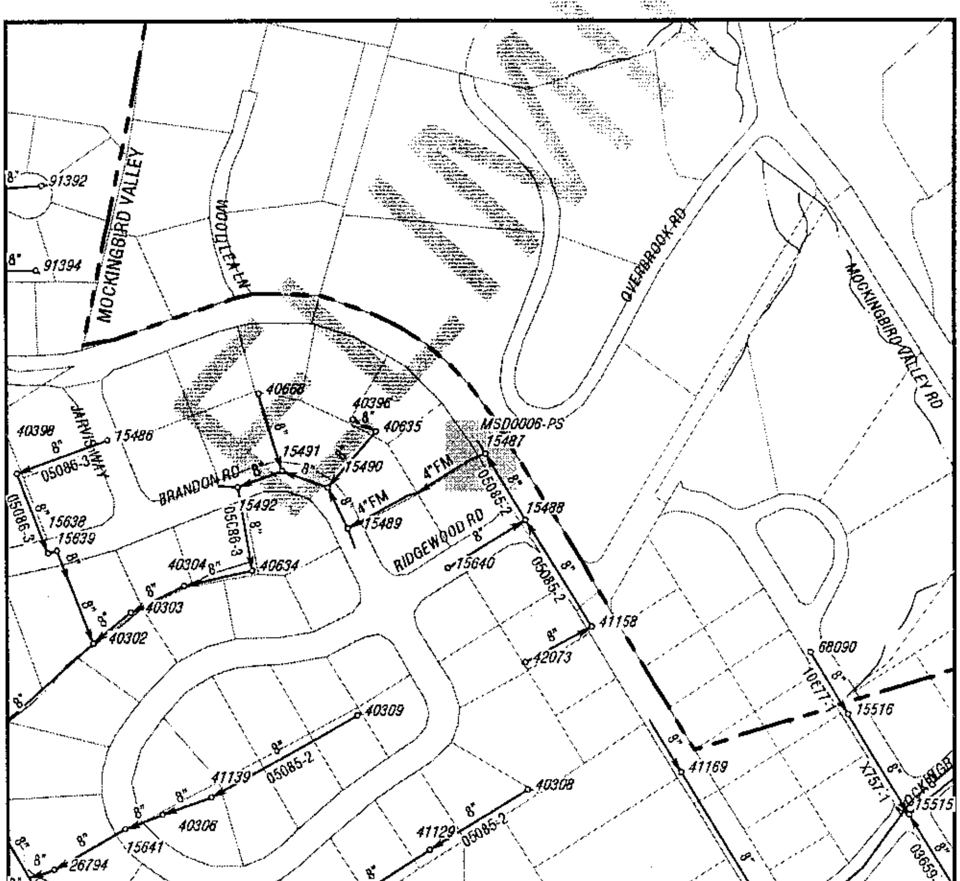
Pipe Size:
Inflow: 8"
Outflow: 1.25"

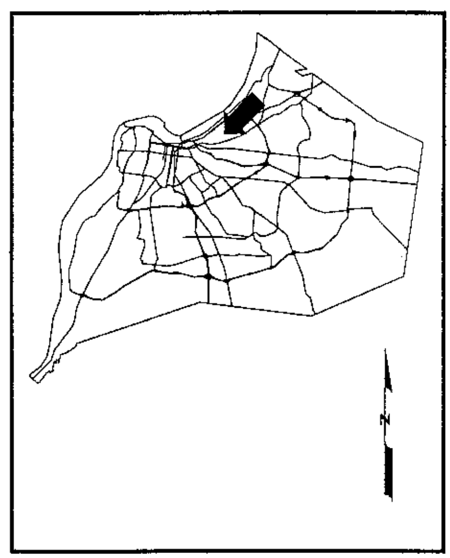
Upstream Collection System Length: 825 L.F.
Watershed: MUDDY FORK BEARGRASS CREEK
Discharge Type: PUMPED
Discharged To: GROUND
Receiving Stream: MUDDY FORK BEARGRASS CREEK
Status: ELIMINATED



Downstream Landuse:

VACANT AND UNDEVELOPED	7.3 ac.
SINGLE FAMILY RESIDENTIAL	13.1 ac.
MULTI-FAMILY RESIDENTIAL	2.9 ac.





Metro: MAK20
Atlas Map: AU226

Scale 1" = 400 '

MOCKINGBIRD VALLEY

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility MSD0007-PS

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

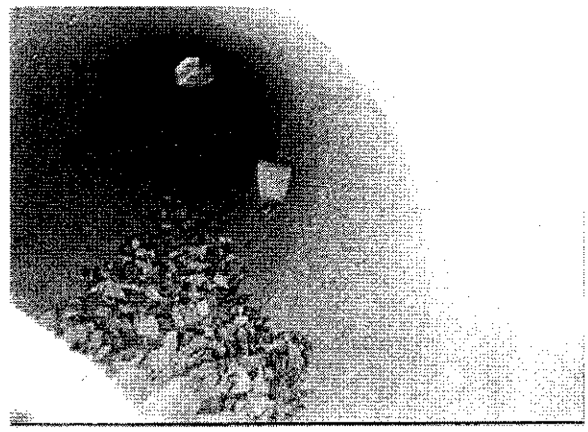
Yr	Num Overflows	Estimated Volume
2005	1	50,000 Gallons
2002	4	10,500 Gallons

Background & History:

Pipe Size:

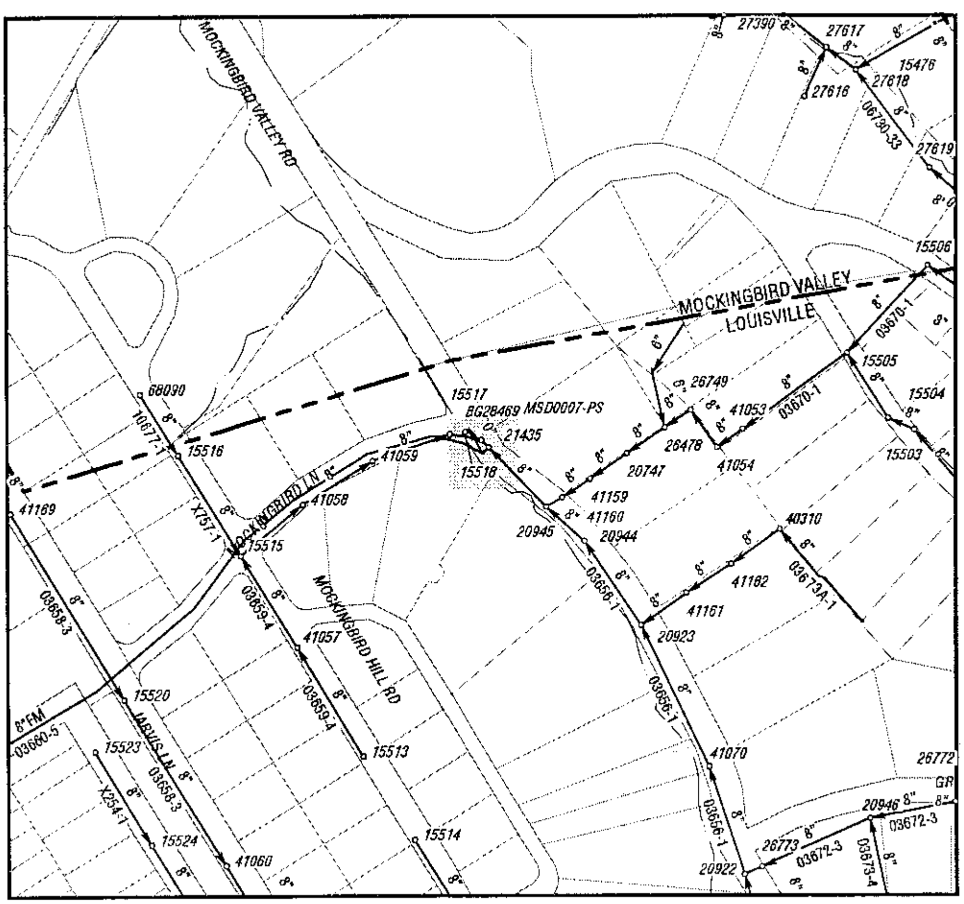
Inflow: 12"
Outflow: 0"
Outflow: 8"

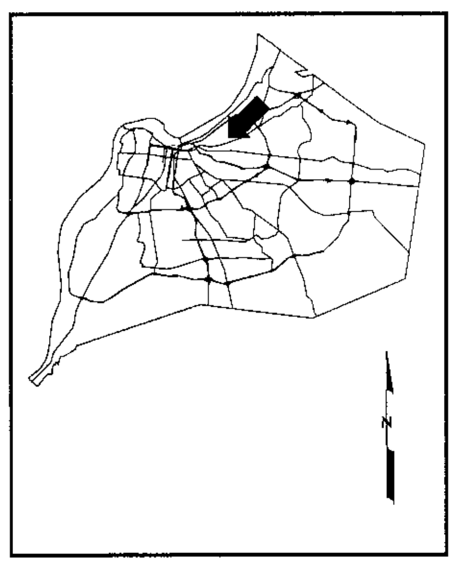
Upstream Collection System Length: 34,700 L.F.
Watershed: MUDDY FORK BEARGRASS CREEK
Discharge Type: CONSTRUCTED
Discharged To: DITCH
Receiving Stream: MUDDY FORK BEARGRASS CREEK
Status: DOCUMENTED



Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	17.8 ac.
VACANT AND UNDEVELOPED	0.2 ac.
PARKS, CEMETERIES, ETC.	1.2 ac.
MULTI-FAMILY RESIDENTIAL	1.4 ac.
GENERAL COMM. AND OFFICE	2.4 ac.
PUBLIC AND SEMI-PUBLIC	0.1 ac.





Metro: MAK20

Atlas Map: AU226

Scale 1" = 400 '

WINTON

MSD Facility MSD0010-PS

MSD
Louisville-Jefferson County Metropolitan Sewer District

Customer Service 587-0603 | **Report as of December 2005**

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2003	1	7,000 Gallons

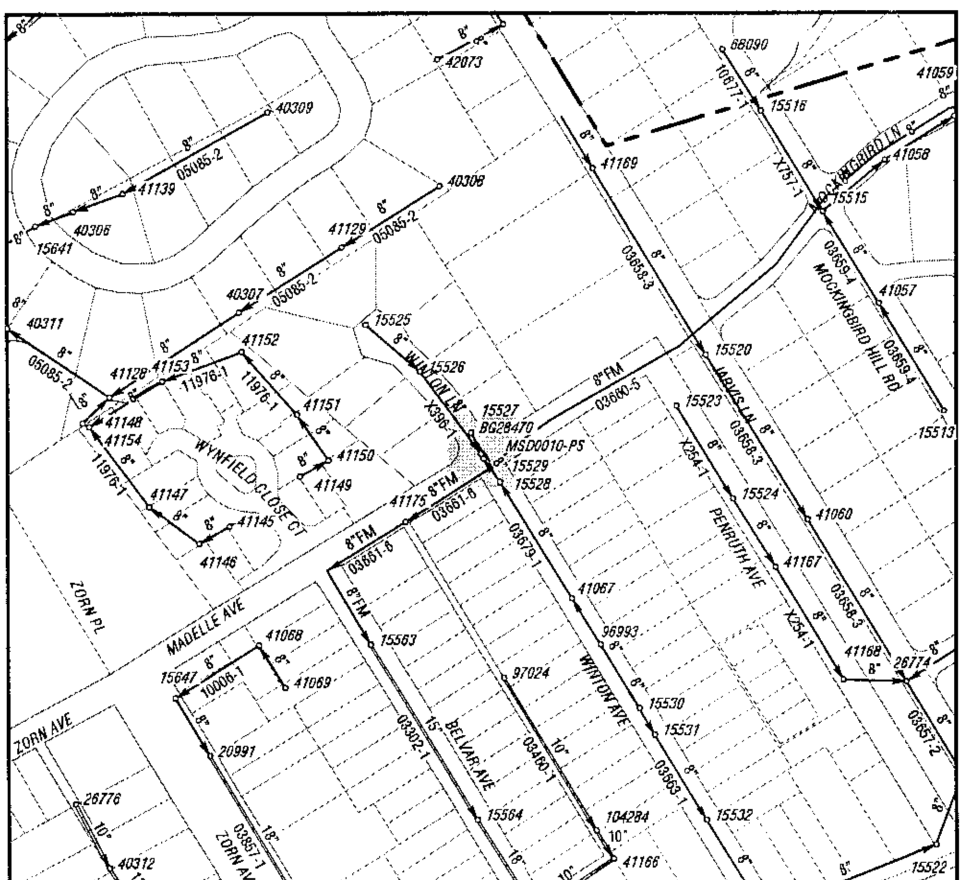
Background & History: This site was recently added to the investigation list. This site will be monitored in the future.

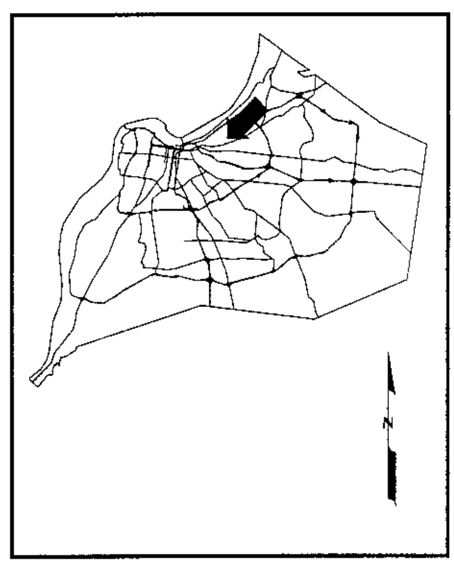
Pipe Size:
Inflow: 12"
Outflow: 3"
Outflow: 0"

Upstream Collection System Length: 1,000 L.F.
Watershed: MUDDY FORK BEARGRASS CREEK
Discharge Type: CONSTRUCTED
Discharged To: CATCH BASIN
Receiving Stream: MUDDY FORK BEARGRASS CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	14 ac.
PARKS, CEMETERIES, ETC.	1.2 ac.
MULTI-FAMILY RESIDENTIAL	4.4 ac.
GENERAL COMM. AND OFFICE	3.2 ac.
PUBLIC AND SEMI-PUBLIC	1.8 ac.





Metro: MAK20

Atlas Map: AU226

Scale 1" = 400 '

MELLWOOD AVENUE

MSD

Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility MSD0023-PS

Customer Service 587-0603 | **Report as of December 2005**

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	1	200 Gallons
2004	12	6,310,000 Gallons

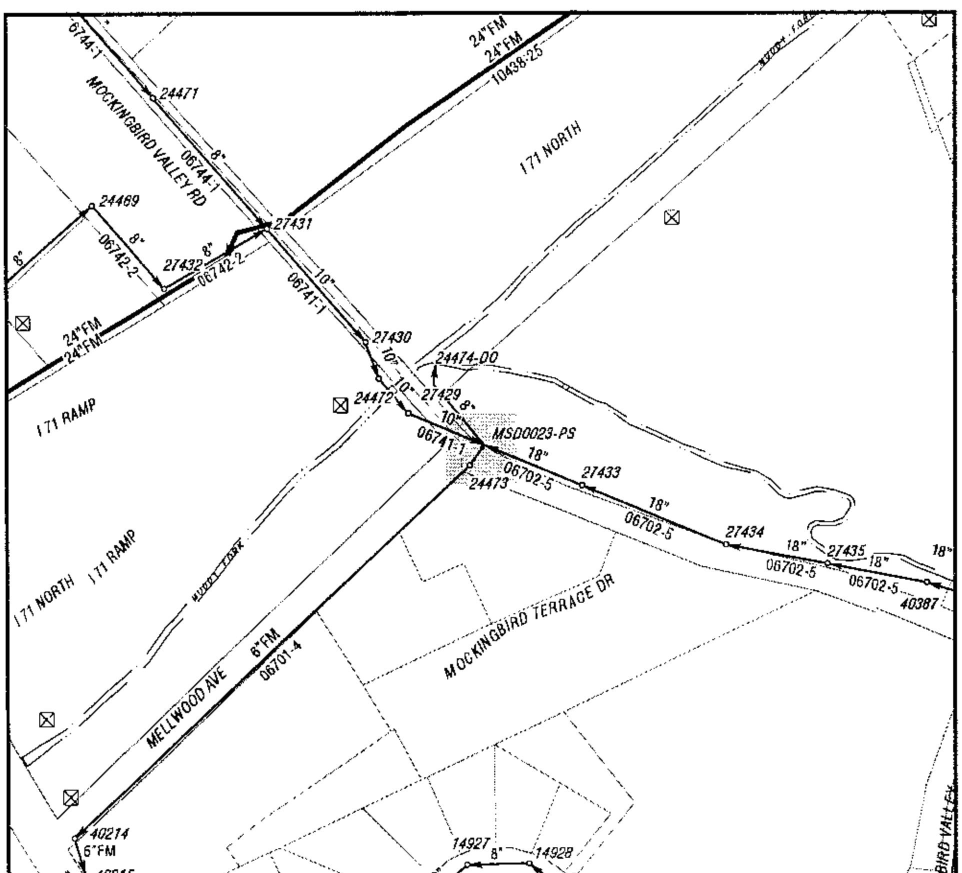
Background & History: This site was first reported as a sanitary overflow during FY99.

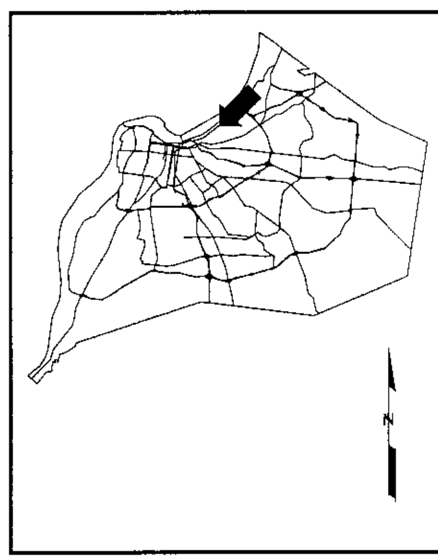
Pipe Size:
Inflow: 5"
Inflow: 5"
Outflow: 6"

Upstream Collection System Length: 49,700 L.F.
Watershed: MUDDY FORK BEARGRASS CREEK
Discharge Type: CONSTRUCTED
Discharged To: STREAM
Receiving Stream: MUDDY FORK BEARGRASS CREEK
Status: DOCUMENTED

Downstream Landuse:

VACANT AND UNDEVELOPED	13.4 ac.
MULTI-FAMILY RESIDENTIAL	5.9 ac.
GENERAL COMM. AND OFFICE	2.4 ac.
PUBLIC AND SEMI-PUBLIC	0 ac.
SINGLE FAMILY RESIDENTIAL	2.4 ac.





Metro: MAK20

Atlas Map: AS224

Scale 1" = 400 '

CANOE LANE

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility MSD0024-PS

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	1	35,000 Gallons
2003	1	8,000 Gallons
2002	5	15,500 Gallons

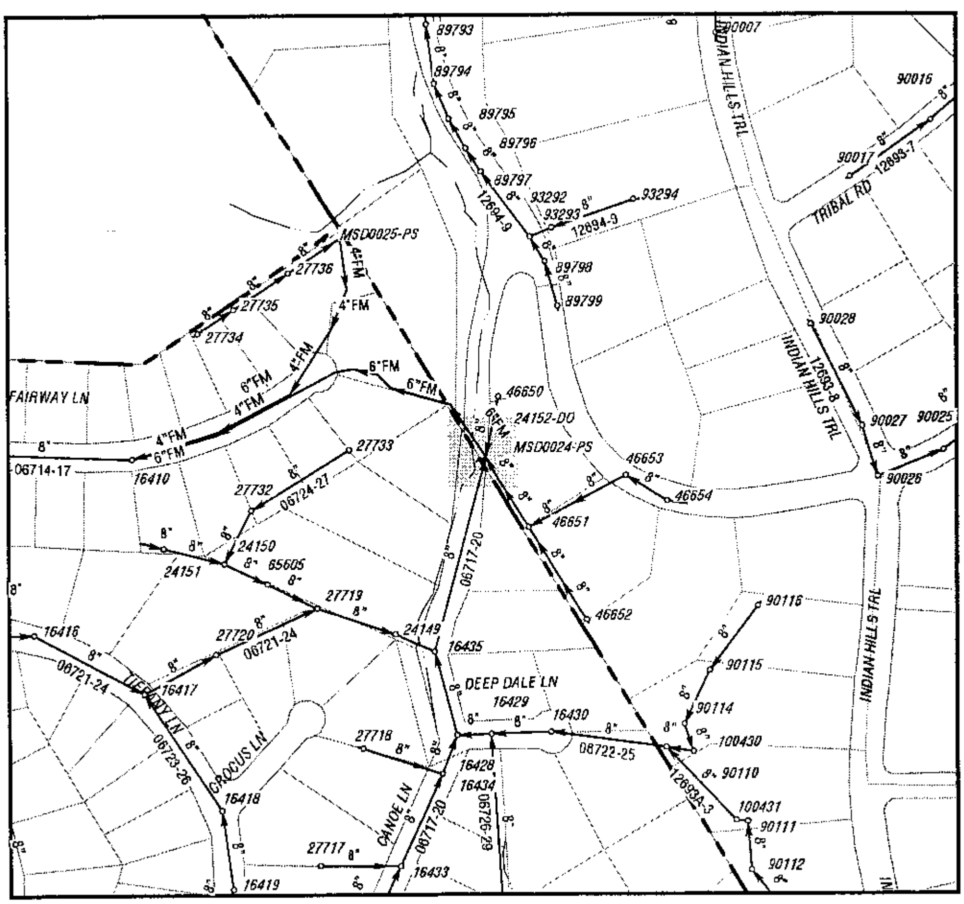
Background & History: This site was identified during an investigation of constructed overflow pipes.

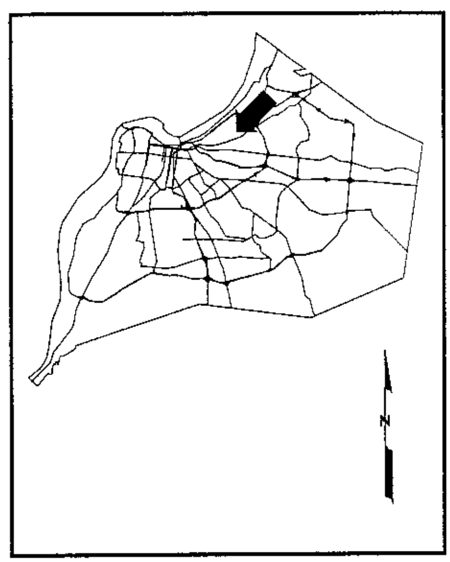
Pipe Size:
Inflow: 6"
Outflow: 6"

Upstream Collection System Length: 16,900 L.F.
Watershed: MUDDY FORK BEARGRASS CREEK
Discharge Type: CAPACITY
Discharged To: DITCH
Receiving Stream: MUDDY FORK BEARGRASS CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	19 ac.
PARKS, CEMETERIES, ETC.	5.5 ac.





Metro: MAK21
Atlas Map: AS228

Scale 1" = 400 '

WIND RIDGE

MSD
Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility MSD0124-PS

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2004	1	10,000 Gallons

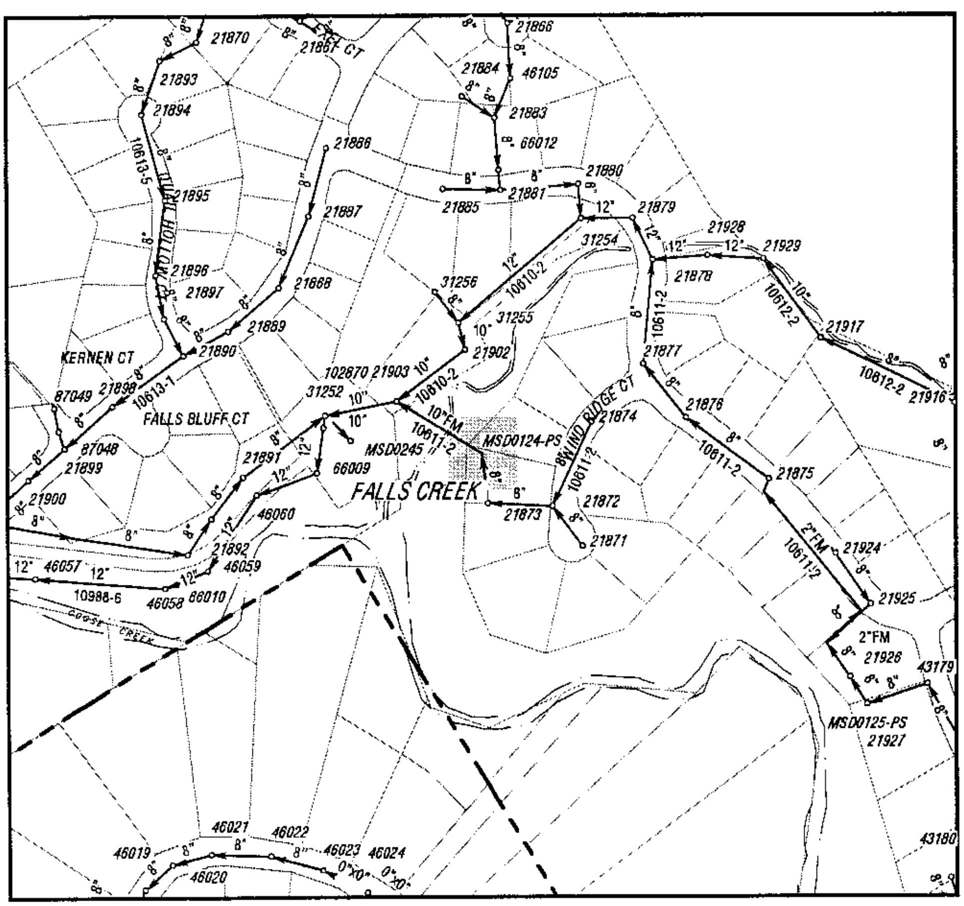
Background & History:

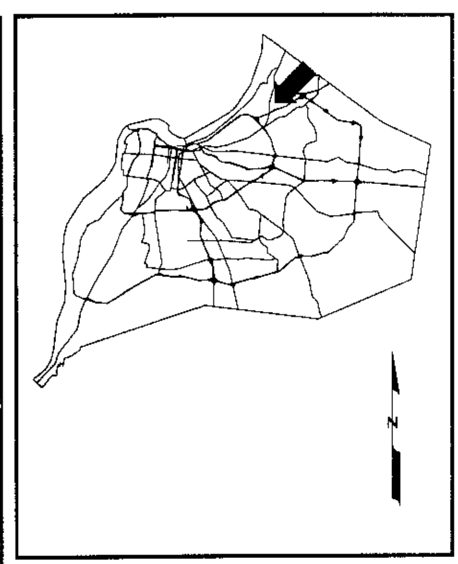
Pipe Size:
Inflow: 8"
Outflow: 10"

Upstream Collection System Length: 569 L.F.
Watershed: GOOSE CREEK
Discharge Type: CAPACITY
Discharged To: STREAM
Receiving Stream: LITTLE GOOSE CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	18.9 ac.
VACANT AND UNDEVELOPED	5.7 ac.





Metro: MAK22
Atlas Map: A0232

Scale 1" = 400 '

TRAIL RIDGE

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility MSD0125-PS

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2004	1	10,000 Gallons

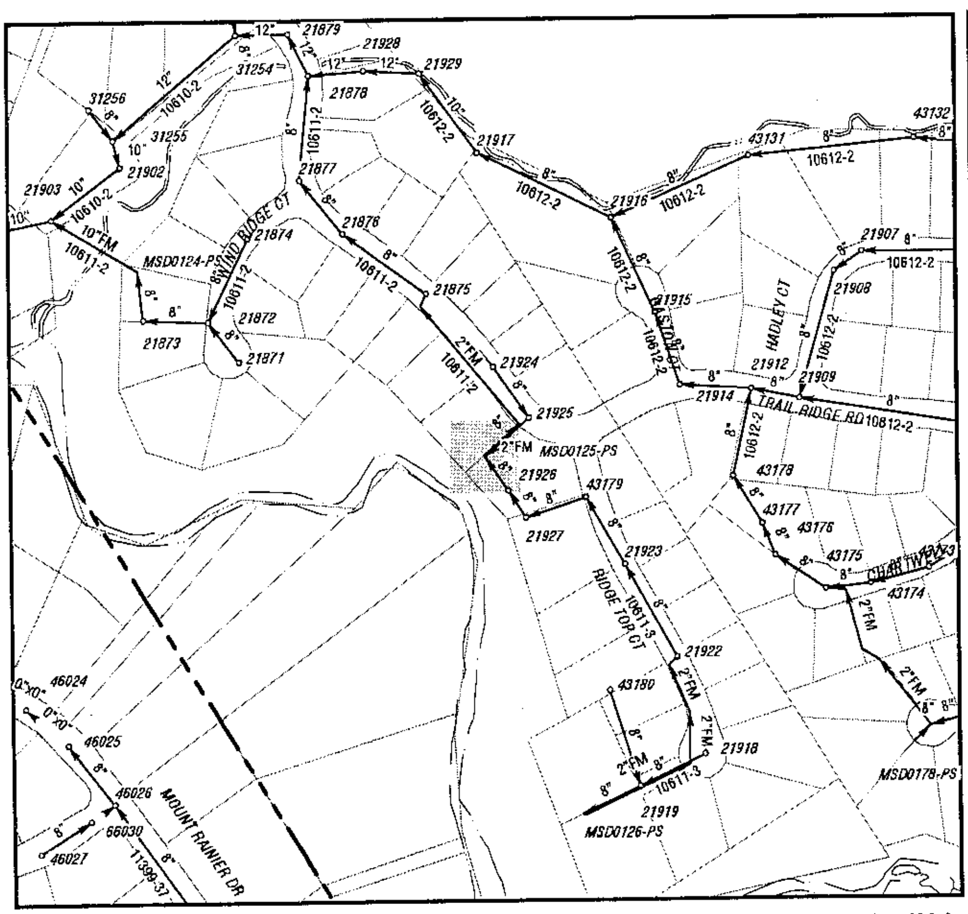
Background & History:

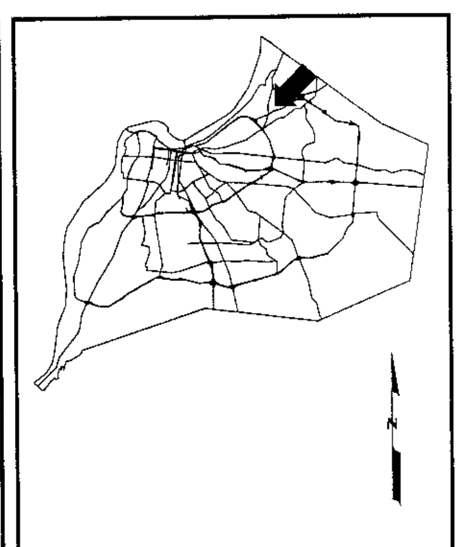
Pipe Size:
Inflow: 8"
Inflow: 8"
Outflow: 2"

Upstream Collection System Length: 1,990 L.F.
Watershed: GOOSE CREEK
Discharge Type: CAPACITY
Discharged To: STREAM
Receiving Stream: LITTLE GOOSE CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	18.7 ac.
VACANT AND UNDEVELOPED	5.7 ac.





Metro: MAK22
Atlas Map: A0232

Scale 1" = 400 '

GLENVIEW HILLS PS

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility MSD0183-PS

Customer Service 587-0603 | **Report as of December 2005**

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	8	413,000 Gallons
2004	4	1,150,000 Gallons
2003	4	64,000 Gallons
2002	4	24,000 Gallons

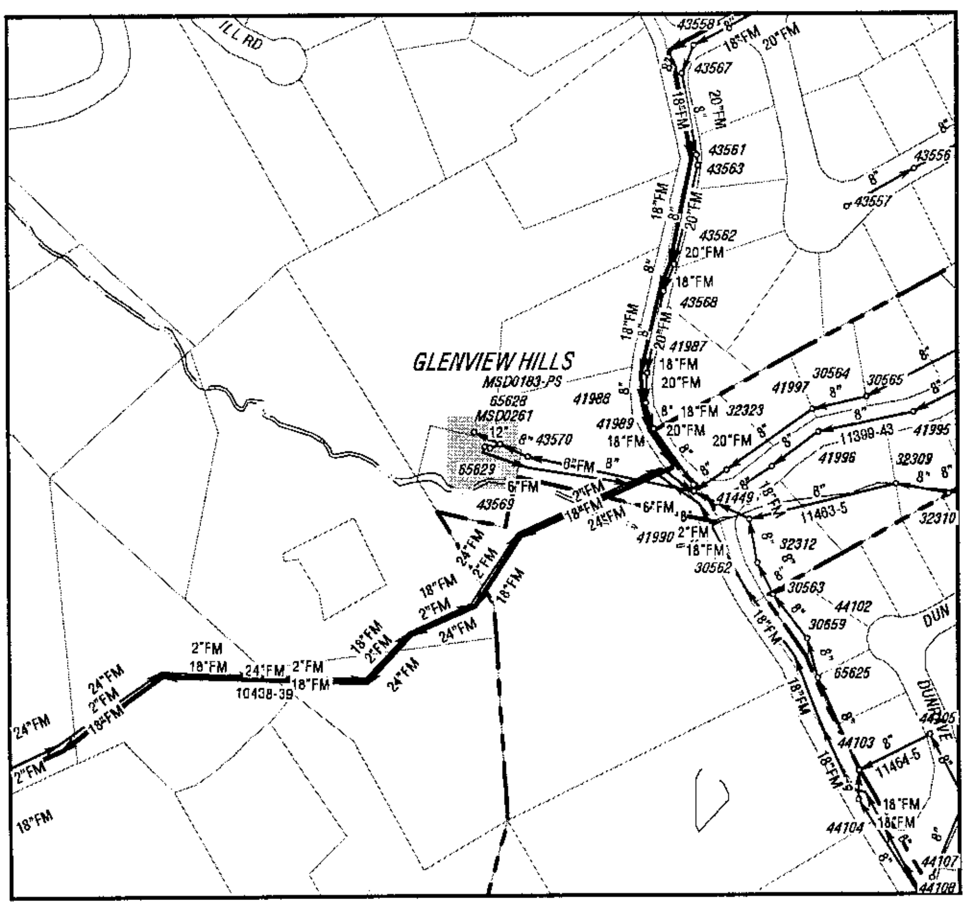
Background & History: This site is currently being monitored.

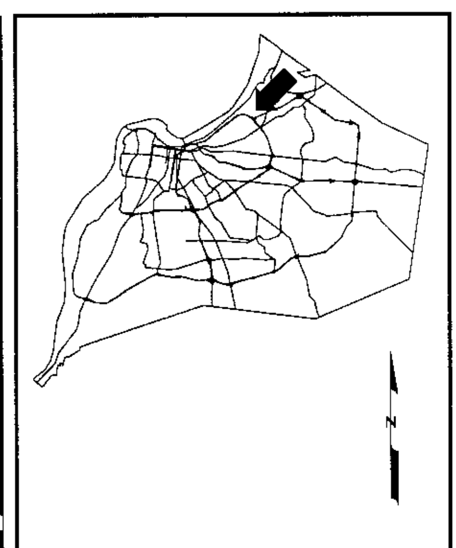
Pipe Size:
Inflow: 8"
Outflow: 6"

Upstream Collection System Length: 31,000 L.F.
Watershed: CITY/OHIO RIVER
Discharge Type: CAPACITY
Discharged To: DITCH
Receiving Stream: OHIO RIVER
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	14.9 ac.
VACANT AND UNDEVELOPED	8.4 ac.





Metro: MAK21
Atlas Map: AO230

Scale 1" = 400 '

BARBOUR LANE PS

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility MSD0192-PS

Customer Service 587-0603

Report as of December 2005

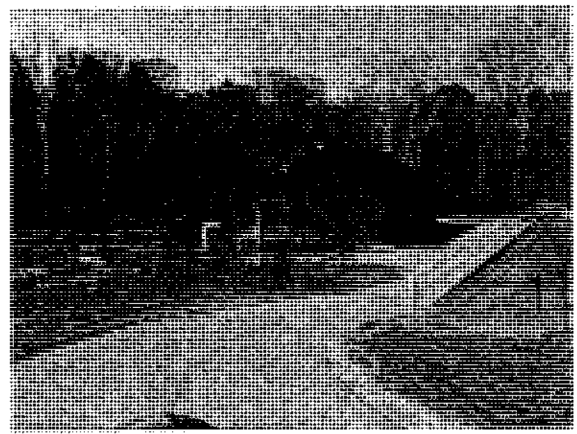
Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	3	135,000 Gallons
2003	1	50,000 Gallons
2002	6	650,000 Gallons
2001	1	150,000 Gallons

Background & History: First reported on February 18, 2000 during 4 inch rain event.

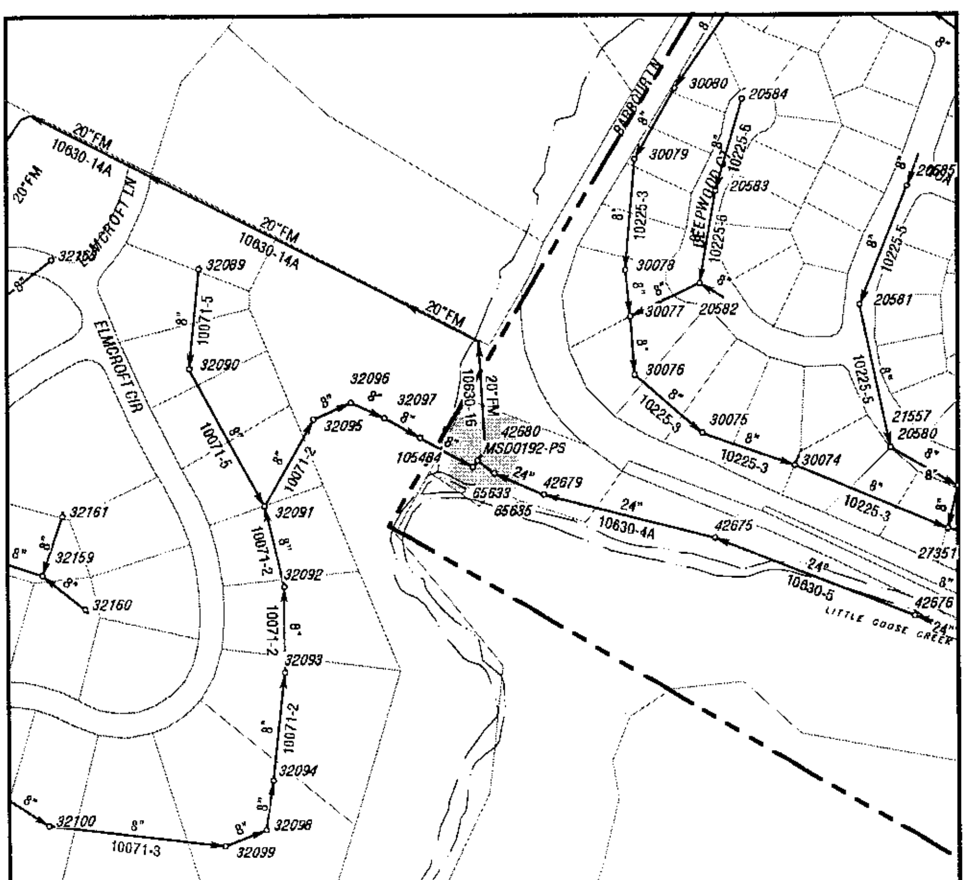
Pipe Size:
Inflow: 24"
Outflow: 20"

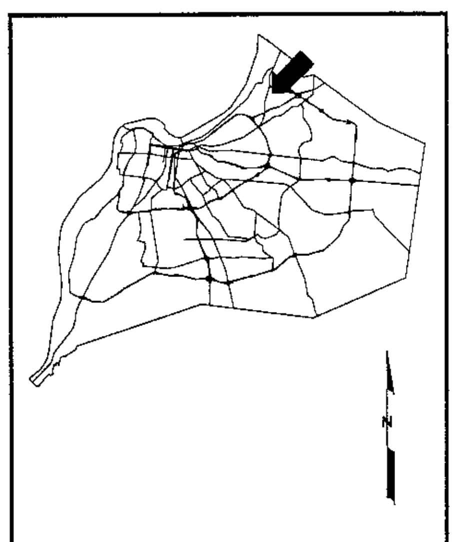
Upstream Collection System Length: 402,000 L.F.
Watershed: GOOSE CREEK
Discharge Type: CAPACITY
Discharged To: STREAM
Receiving Stream: LITTLE GOOSE CREEK
Status: DOCUMENTED



Downstream Landuse:

VACANT AND UNDEVELOPED	13.2 ac.
SINGLE FAMILY RESIDENTIAL	9.3 ac.





Metro: MAJ22
Atlas Map: AM232

Scale 1" = 400 '

MSD

Louisville-Jefferson County Metropolitan Sewer District

NEW MARKET

MSD Facility MSD0193-PS

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	1	14,000 Gallons
2004	1	23,000 Gallons

Background & History:

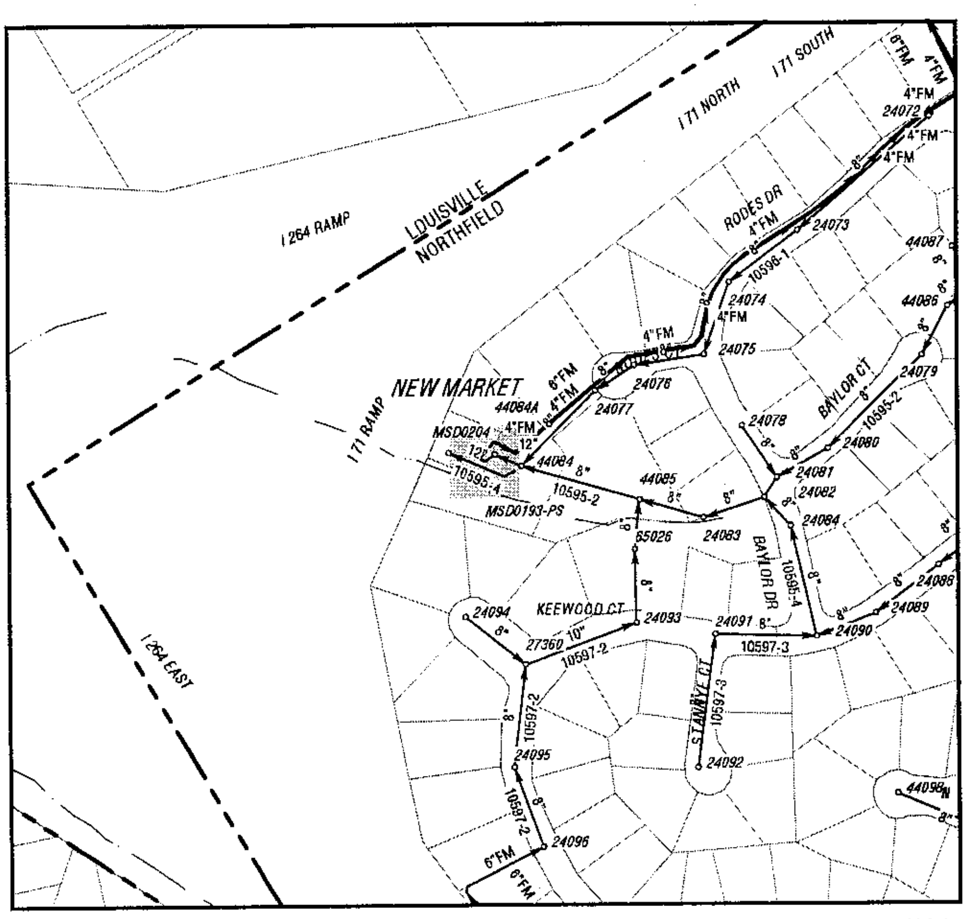
Pipe Size:

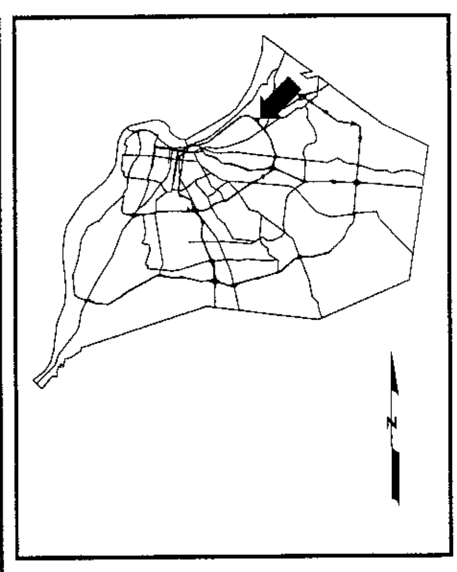
Inflow: 8"
Outflow: 6"
Outflow: 4"

Upstream Collection System Length: 27,300 L.F.
Watershed: CITY/OHIO RIVER
Discharge Type: CAPACITY
Discharged To: STREAM
Receiving Stream: HARRODS CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	22.1 ac.
VACANT AND UNDEVELOPED	2.4 ac.





Metro: MAK21

Atlas Map: AQ230

Scale 1" = 400 '

CARSON WAY AND RIBBLE RD (HIKES POINT) IFP PUMPED LOCATION.

MSD
Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility 17571

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	5	2,480,000 Gallons
2004	9	11,500,000 Gallons
2003	2	3,180,000 Gallons
2002	3	5,230,000 Gallons
2001	3	2,420,000 Gallons

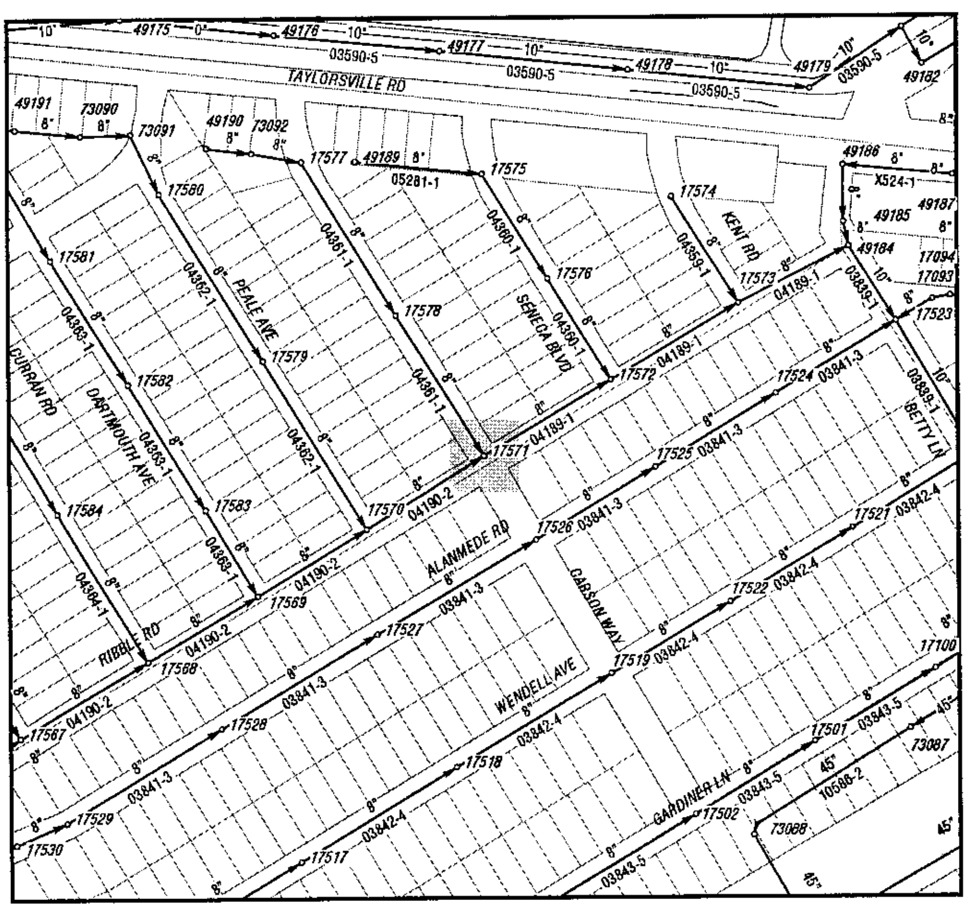
Background & History: Pumped by MSD Maintenance to reduce the risk of basement flooding in nearby homes.

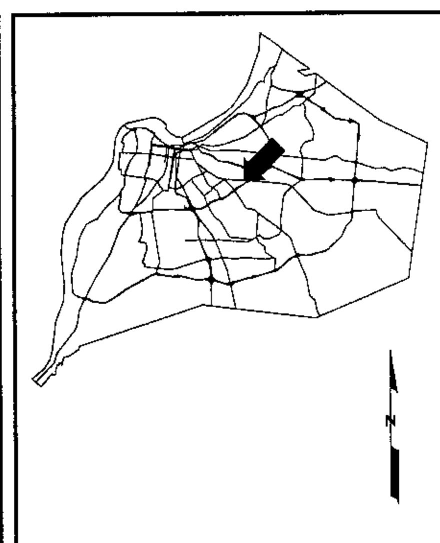
Pipe Size:
Inflow: 8"
Inflow: 8"
Outflow: 8"

Upstream Collection System Length: 9,210 L.F.
Watershed: SOUTH FORK BEARGRASS CREEK
Discharge Type: PUMPED
Discharged To: CATCH BASIN
Receiving Stream: SOUTH FORK BEARGRASS CREEK
Status: DOCUMENTED

Downstream Landuse:

MULTI-FAMILY RESIDENTIAL	0 ac.
VACANT AND UNDEVELOPED	0.8 ac.
SINGLE FAMILY RESIDENTIAL	22.5 ac.





Metro: MAL21

Atlas Map: BC228

Scale 1" = 400 '

2201 GERALD CT - #2

MSD

Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility 18298

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	1	152,000 Gallons
2004	1	17,000 Gallons

Background & History: This manhole was reported as an overflow during FY03. It is new to the list during FY03 and will be monitored in the future.

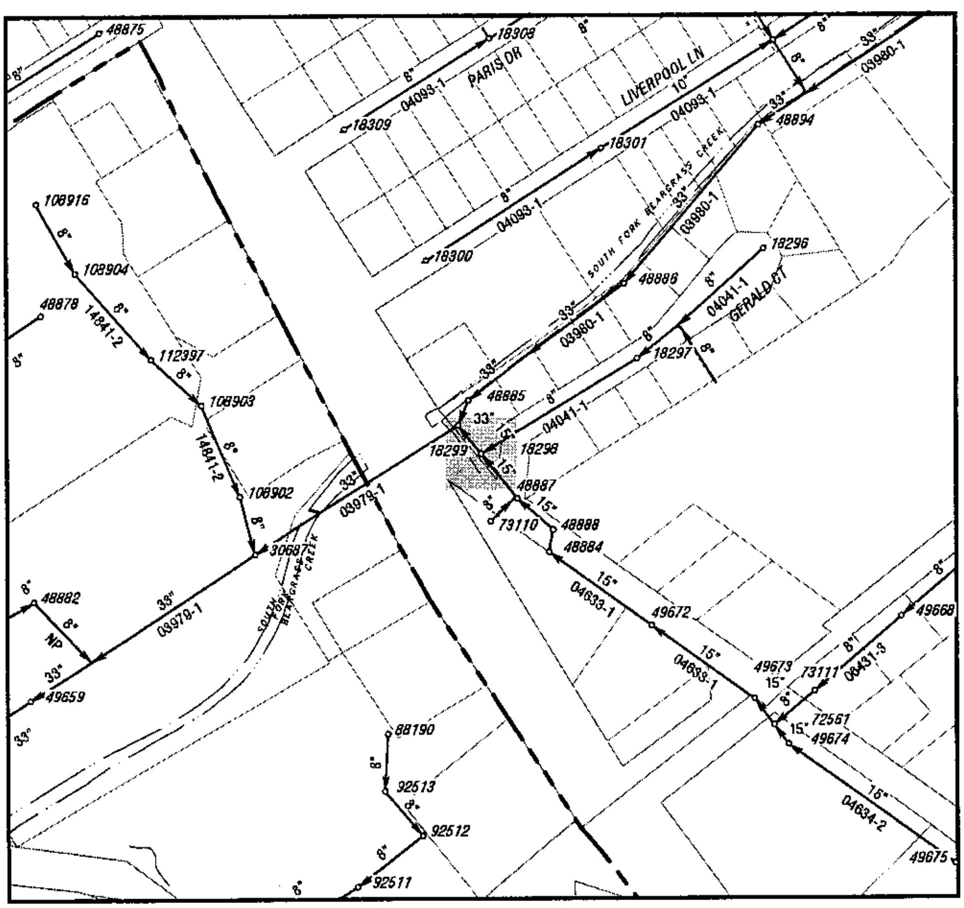
Pipe Size:

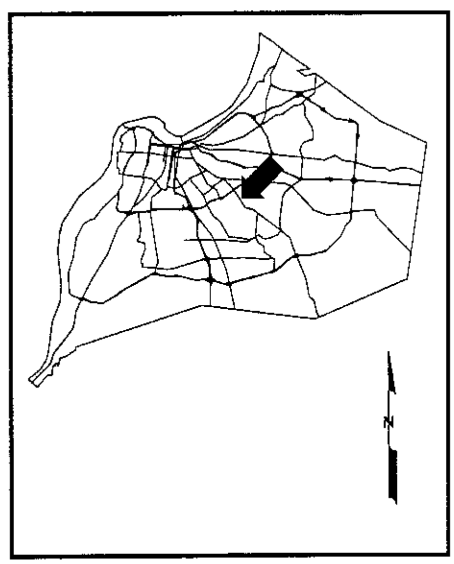
Inflow: 8"
Inflow: 15"
Outflow: 15"

Upstream Collection System Length: 32,900 L.F.
Watershed: SOUTH FORK BEARGRASS CREEK
Discharge Type: CAPACITY
Discharged To: STREAM
Receiving Stream: SOUTH FORK BEARGRASS CREEK
Status: DOCUMENTED

Downstream Landuse:

PUBLIC AND SEMI-PUBLIC	0.1 ac.
MULTI-FAMILY RESIDENTIAL	5.9 ac.
GENERAL COMM. AND OFFICE	8.5 ac.
VACANT AND UNDEVELOPED	16.6 ac.
SINGLE FAMILY RESIDENTIAL	0.2 ac.
INDUSTRIAL	5.4 ac.





Metro: MAM21

Atlas Map: BG228

Scale 1" = 400 '

DELL BROOKE AVE AND BOARIES LN (HIKES POINT) - IFP PUMPED LOCATION.

MSD

Louisville-Jefferson County Metropolitan Sewer District

MSD Facility 18471

Customer Service 587-0603

Report as of December 2005

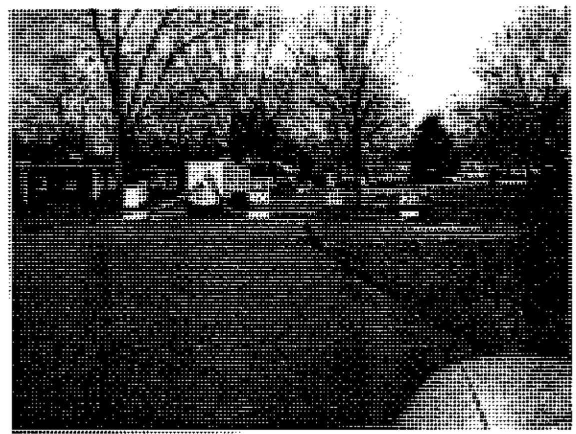
Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	2	2,780,000 Gallons
2004	6	5,000,000 Gallons
2003	3	5,240,000 Gallons
2002	3	5,810,000 Gallons
2001	3	3,430,000 Gallons

Background & History: Pumped by MSD Maintenance to reduce the risk of basement flooding in nearby homes.

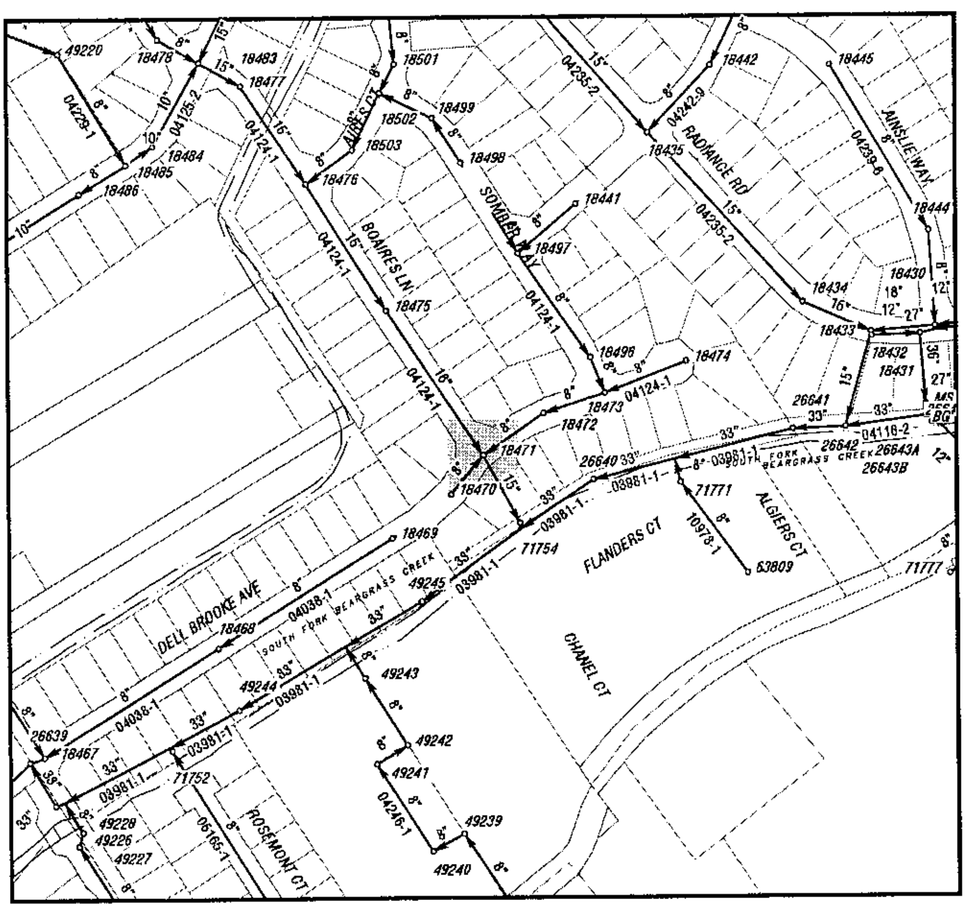
Pipe Size:
Inflow: 8"
Inflow: 16"
Inflow: 8"
Outflow: 15"

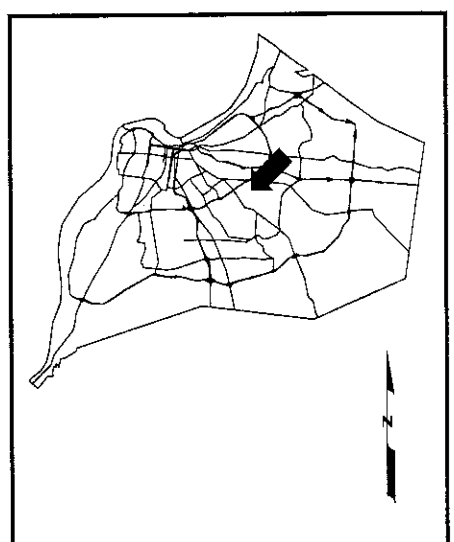
Upstream Collection System Length: 26,500 L.F.
Watershed: SOUTH FORK BEARGRASS CREEK
Discharge Type: PUMPED
Discharged To: CATCH BASIN
Receiving Stream: SOUTH FORK BEARGRASS CREEK
Status: DOCUMENTED



Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	6.6 ac.
MULTI-FAMILY RESIDENTIAL	12.5 ac.
PUBLIC AND SEMI-PUBLIC	5.5 ac.
GENERAL COMM. AND OFFICE	0 ac.





Metro: MAM21

Atlas Map: BE228

Scale 1" = 400 '

MSD

Louisville-Jefferson County
Metropolitan Sewer District

3012 BOARIES AVE AND RIO RITA AVE (HIKES POINT) - IFP PUMPED LOCATION.

MSD Facility 18483

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	2	1,970,000 Gallons
2004	5	4,690,000 Gallons
2003	1	990,000 Gallons
2002	3	4,540,000 Gallons
2001	3	3,270,000 Gallons

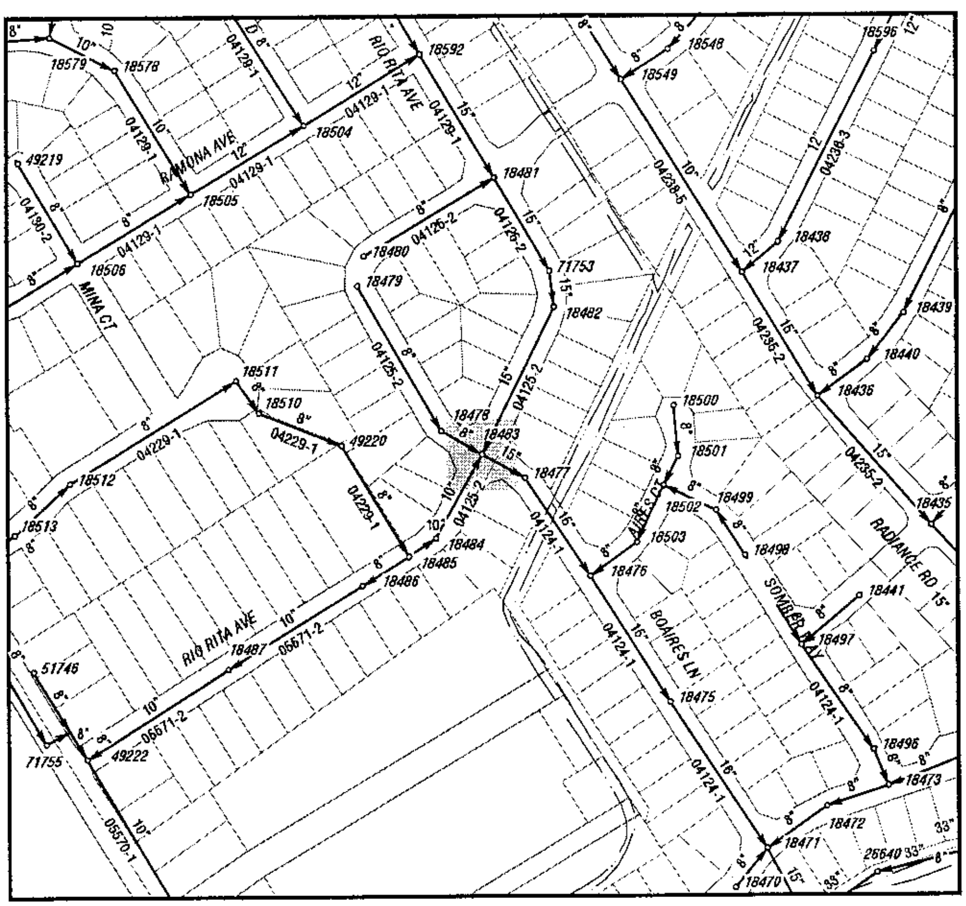
Background & History: Pumped by MSD Maintenance to reduce the risk of basement flooding in nearby homes.

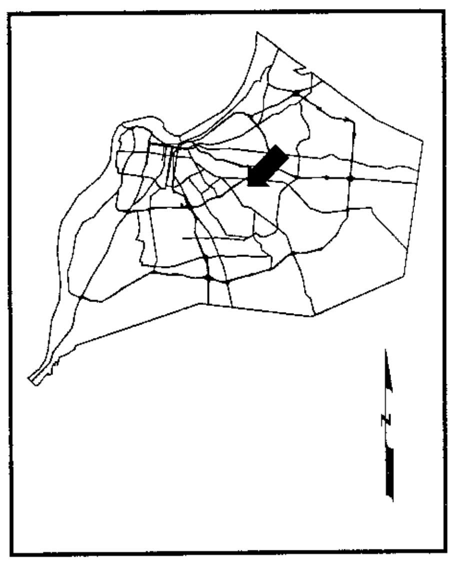
Pipe Size:
Inflow: 15"
Inflow: 8"
Inflow: 10"
Outflow: 15"

Upstream Collection System Length: 23,600 L.F.
Watershed: SOUTH FORK BEARGRASS CREEK
Discharge Type: PUMPED
Discharged To: CATCH BASIN
Receiving Stream: SOUTH FORK BEARGRASS CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	11.3 ac.
MULTI-FAMILY RESIDENTIAL	7.2 ac.
PUBLIC AND SEMI-PUBLIC	4.7 ac.





Metro: MAM21

Atlas Map: BE228

Scale 1" = 400 '

3540 RAMONA AVE AND FLORA AVE - IFP PUMPED LOCATION.

MSD

Louisville-Jefferson County Metropolitan Sewer District

MSD Facility 18505

Customer Service 587-0603

Report as of December 2005

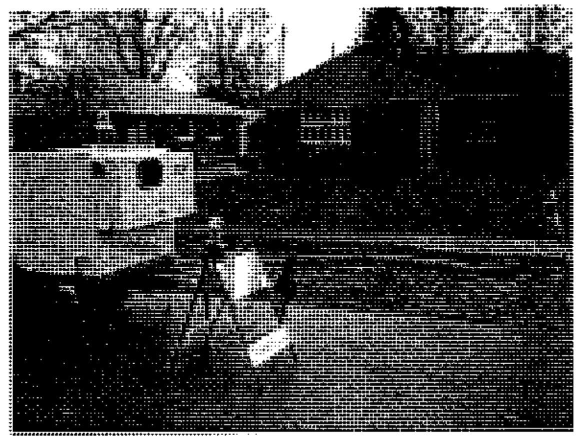
Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	2	2,080,000 Gallons
2004	4	7,900,000 Gallons
2003	1	340,000 Gallons
2002	3	4,190,000 Gallons
2001	3	3,970,000 Gallons

Background & History: Pumped by MSD Maintenance to reduce the risk of basement flooding in nearby homes.

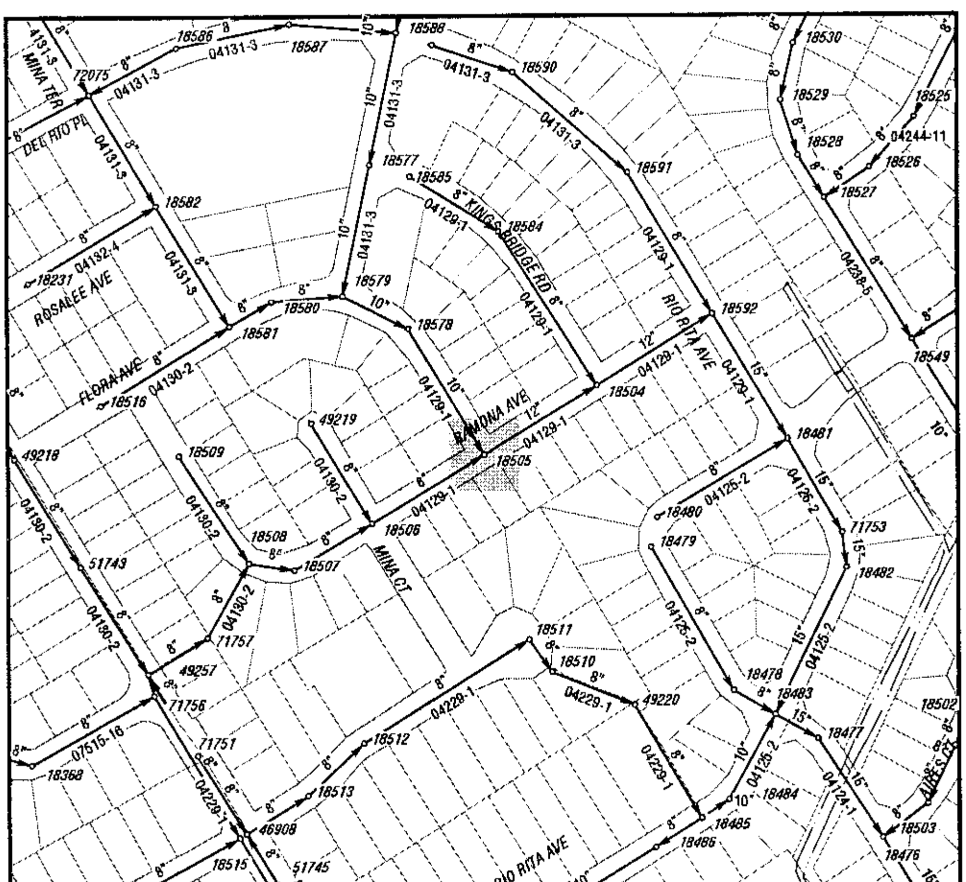
Pipe Size:
Inflow: 10"
Inflow: 8"
Outflow: 12"

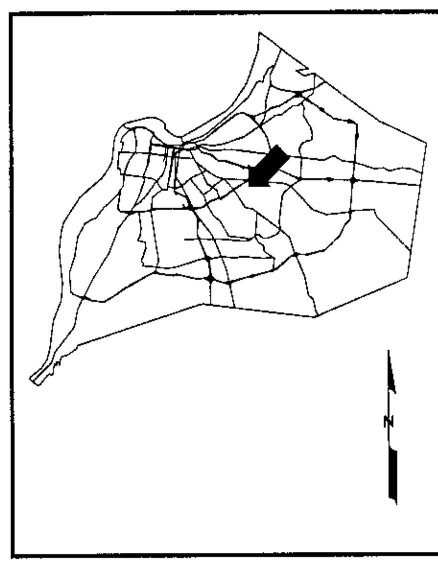
Upstream Collection System Length: 19,600 L.F.
Watershed: SOUTH FORK BEARGRASS CREEK
Discharge Type: PUMPED
Discharged To: CATCH BASIN
Receiving Stream: SOUTH FORK BEARGRASS CREEK
Status: DOCUMENTED



Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	16 ac.
MULTI-FAMILY RESIDENTIAL	4.3 ac.
PUBLIC AND SEMI-PUBLIC	2.1 ac.





Metro: MAM21
Atlas Map: BE228

Scale 1" = 400 '

3101 WEDGEWOOD WAY (HIKES POINT) - IFP PUMPED LOCATION

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility 18595

Customer Service 587-0603

Report as of December 2005

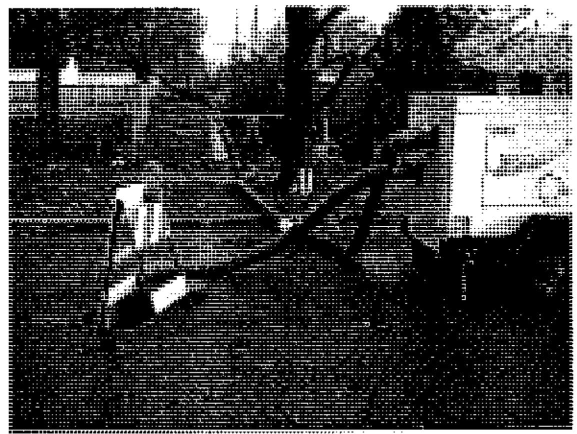
Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	2	1,970,000 Gallons
2004	3	4,520,000 Gallons
2003	3	2,540,000 Gallons
2002	3	5,630,000 Gallons
2001	2	1,860,000 Gallons

Background & History: Pumped by MSD Maintenance to reduce the risk of basement flooding in nearby homes.

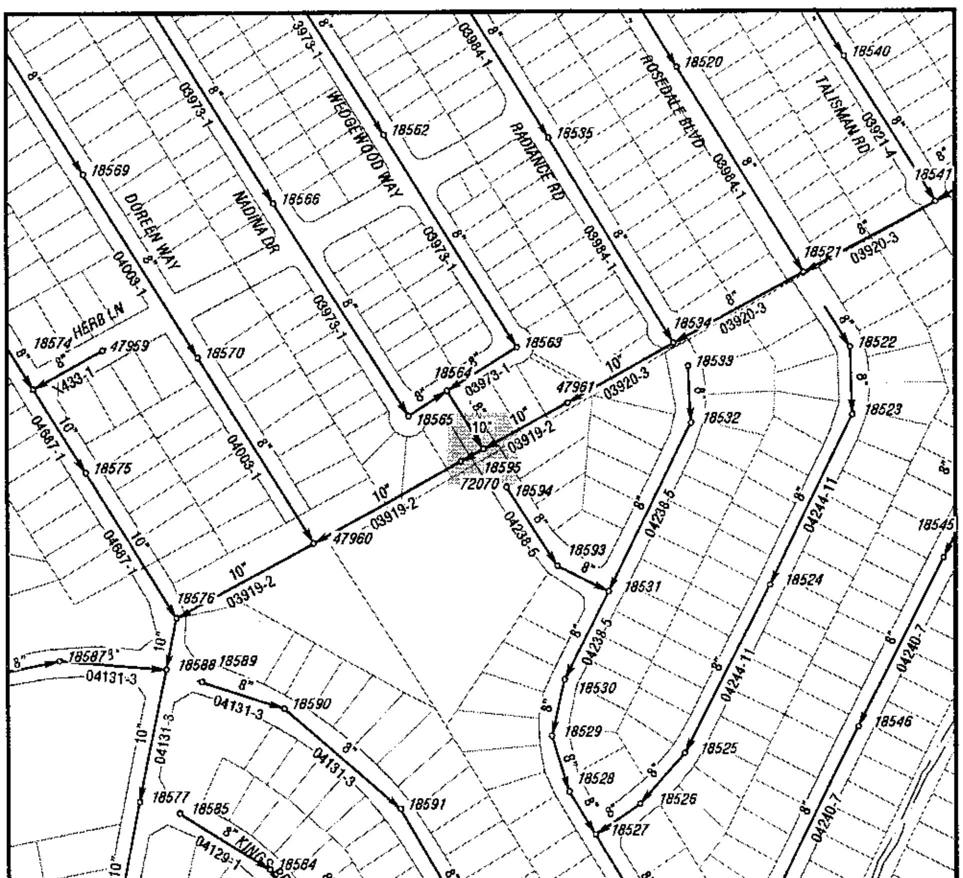
Pipe Size:
Inflow: 10"
Inflow: 8"
Outflow: 10"

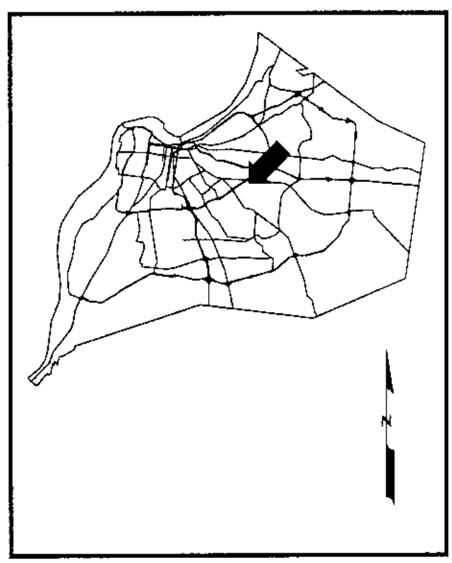
Upstream Collection System Length: 10,200 L.F.
Watershed: SOUTH FORK BEARGRASS CREEK
Discharge Type: PUMPED
Discharged To: DITCH
Receiving Stream: WEDGEWOOD DITCH
Status: DOCUMENTED



Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	16.9 ac.
PARKS, CEMETERIES, ETC.	1.8 ac.
GENERAL COMM. AND OFFICE	2.1 ac.
MULTI-FAMILY RESIDENTIAL	3.6 ac.





Metro: MAM21

Atlas Map: BE228

Scale 1" = 400 '

3614 KELLY WAY

MSD

Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility 18596

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2004	1	549,000 Gallons

Background & History:

Pipe Size:

Inflow: 12"
Outflow: 12"

Upstream Collection System Length: 33,200 L.F.

Watershed: SOUTH FORK BEARGRASS CREEK

Discharge Type: CAPACITY

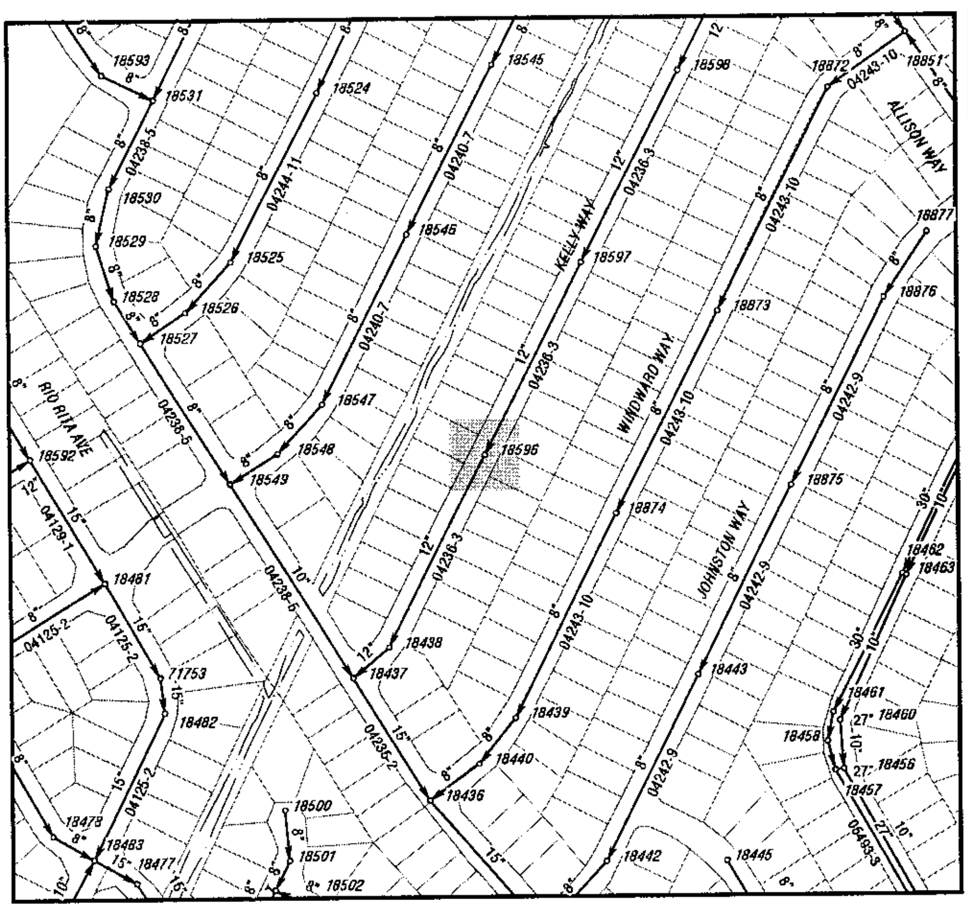
Discharged To:

Receiving Stream:

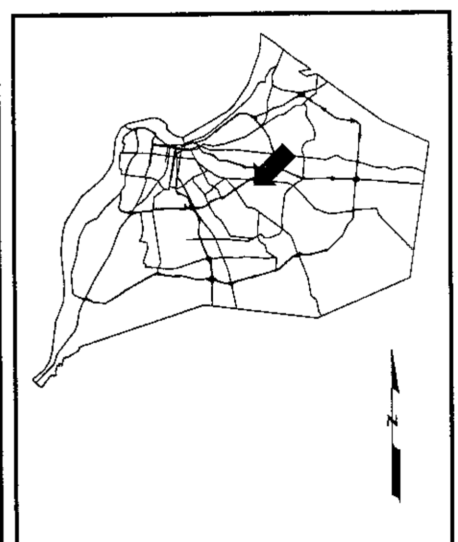
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	15.1 ac.
MULTI-FAMILY RESIDENTIAL	6.7 ac.
PUBLIC AND SEMI-PUBLIC	2.1 ac.



Scale 1" = 400 '



Metro: MAM21

Atlas Map: BE228

MSD
Louisville-Jefferson County
Metropolitan Sewer District

3302 TROUT CREEK DR (WWWQ RECON SITE - AT CREEK)

MSD Facility 23211

Customer Service 587-0603 **Report as of December 2005**

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	1	7,590,000 Gallons
2004	6	7,460,000 Gallons

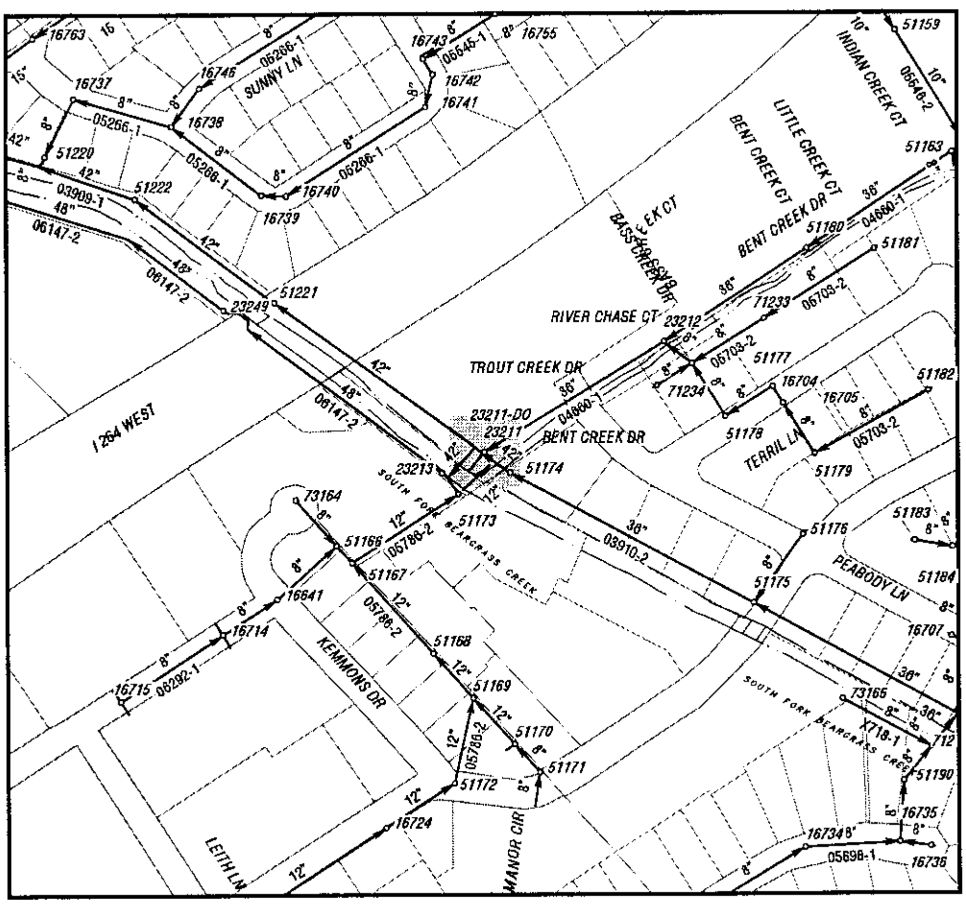
Background & History: Manual sluice gate opened by MSD Maintenance to reduce the risk of basement flooding in nearby homes.

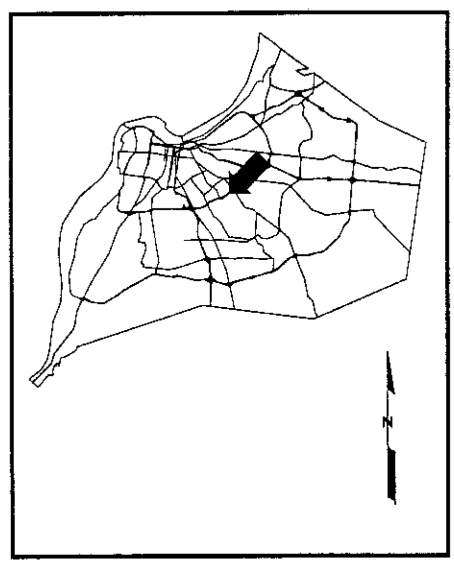
Pipe Size:
Inflow: 36"
Outflow: 36"
Outflow: 36"

Upstream Collection System Length: 1,610,000 L.F.
Watershed: SOUTH FORK BEARGRASS CREEK
Discharge Type: CONSTRUCTED
Discharged To: STREAM
Receiving Stream: SOUTH FORK BEARGRASS CREEK
Status: DOCUMENTED

Downstream Landuse:

MULTI-FAMILY RESIDENTIAL	4 ac.
SINGLE FAMILY RESIDENTIAL	24.5 ac.
VACANT AND UNDEVELOPED	6.8 ac.
PUBLIC AND SEMI-PUBLIC	0.7 ac.





Metro: MAM20
Atlas Map: BG226

Scale 1" = 400 '

MSD

Louisville-Jefferson County
Metropolitan Sewer District

3852 FINCASTLE RD

MSD Facility 44397

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	3	486,000 Gallons
2004	3	232,000 Gallons

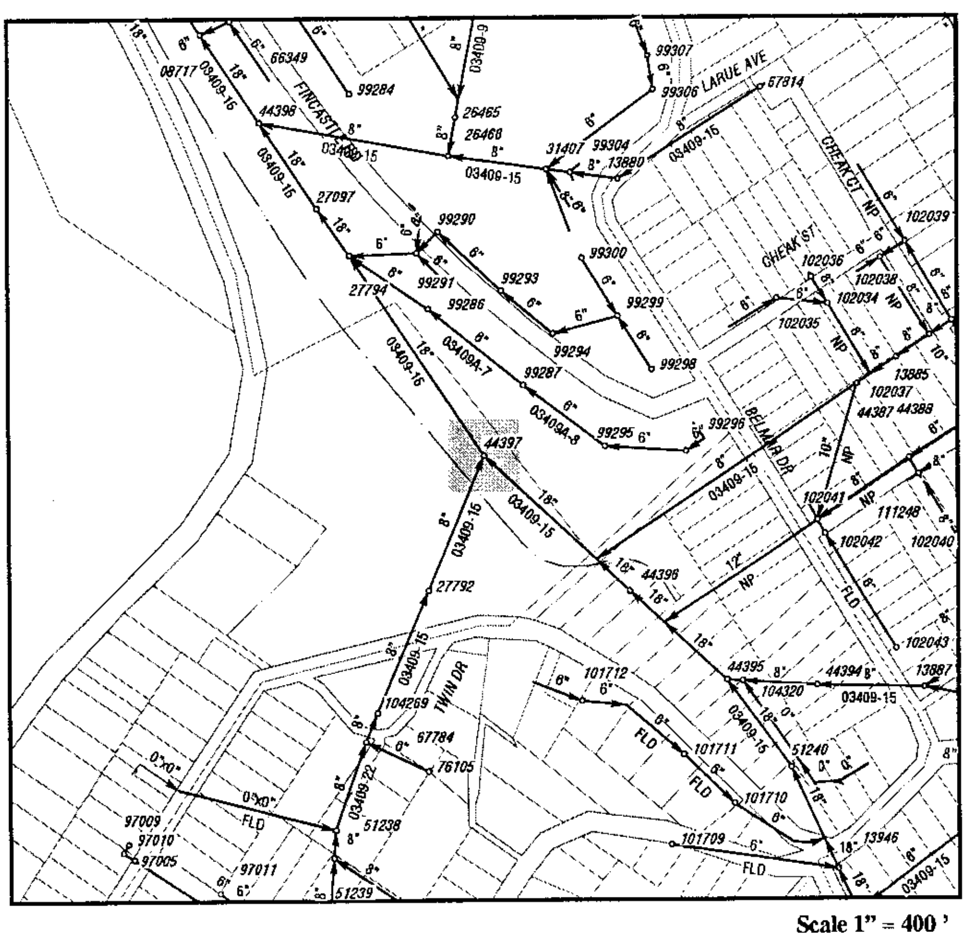
Background & History: This location was identified under a 1995 study as being a rainfall induced overflow. No overflows have been reported in the period 1994-97. This location will be monitored in the future.

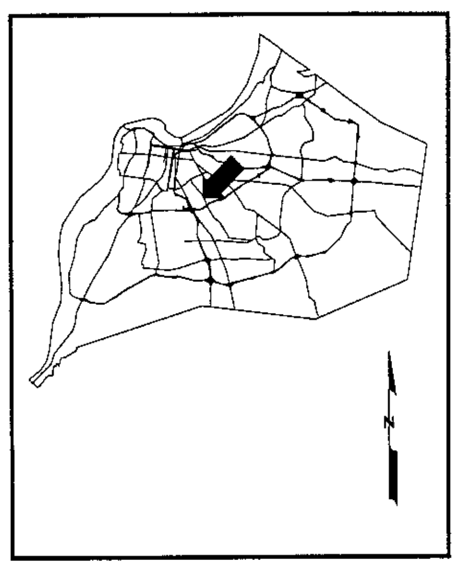
Pipe Size:
Inflow: 18"
Inflow: 8"
Outflow: 18"

Upstream Collection System Length: 46,900 L.F.
Watershed: SOUTH FORK BEARGRASS CREEK
Discharge Type: CAPACITY
Discharged To: GROUND
Receiving Stream: SOUTH FORK BEARGRASS CREEK
Status: DOCUMENTED

Downstream Landuse:

VACANT AND UNDEVELOPED	20.8 ac.
SINGLE FAMILY RESIDENTIAL	8.8 ac.
PUBLIC AND SEMI-PUBLIC	1.7 ac.
GENERAL COMM. AND OFFICE	0.3 ac.
INDUSTRIAL	0.3 ac.
MULTI-FAMILY RESIDENTIAL	10.7 ac.





Metro: MAM19

Atlas Map: BG222

Scale 1" = 400 '

SOUTHEAST DIVERSION STRUCTURE

MSD
Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility 72571-X

Customer Service 587-0603

Report as of December 2005

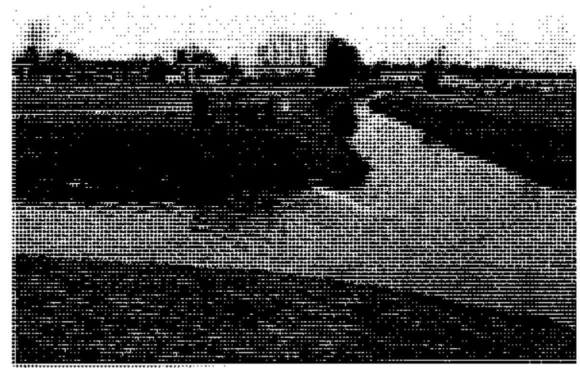
Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	5	28,800,000 Gallons
2004	10	190,000,000 Gallons
2003	4	34,900,000 Gallons
2002	5	10,000,000 Gallons
2001	2	20,000,000 Gallons

Background & History: A small portion of this flow is diverted by a sluice gate through a 60" interceptor to the Northern Ditch PS. The larger portion of this flow eventually enters the combined system through the 30" BGI. The BGI is equipped with an overflow structure.

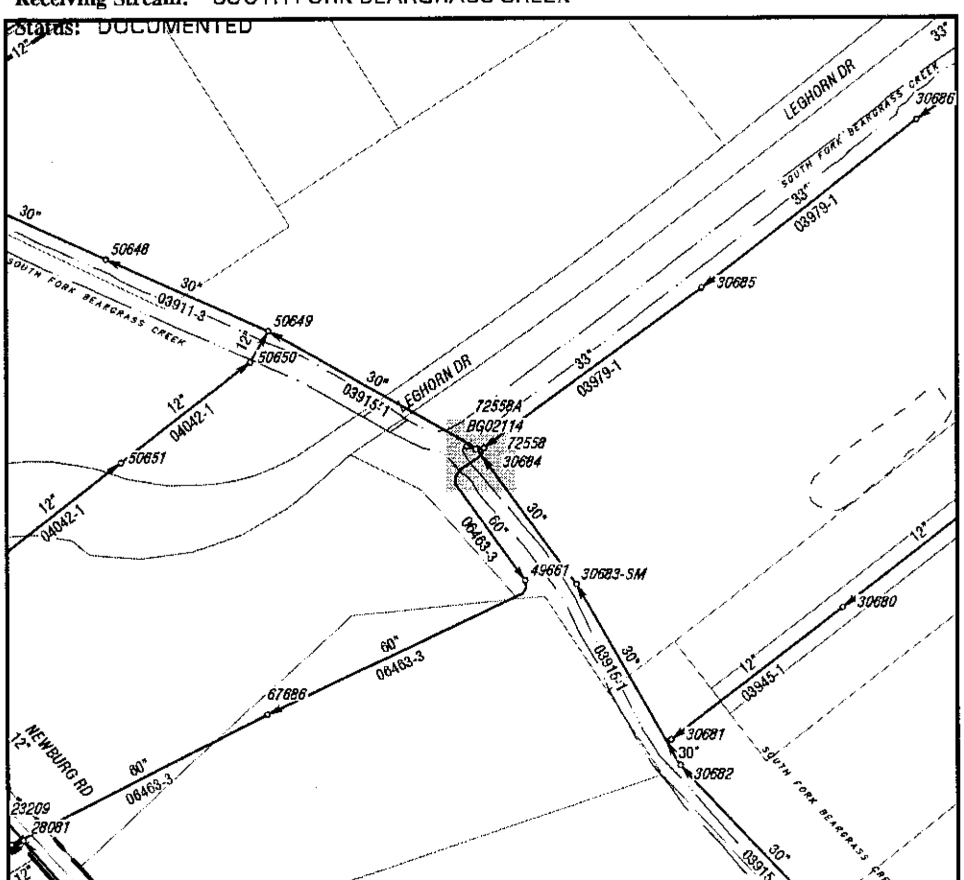
Pipe Size:
Inflow: 33"
Inflow: 30"
Outflow: 30"
Outflow: 60"

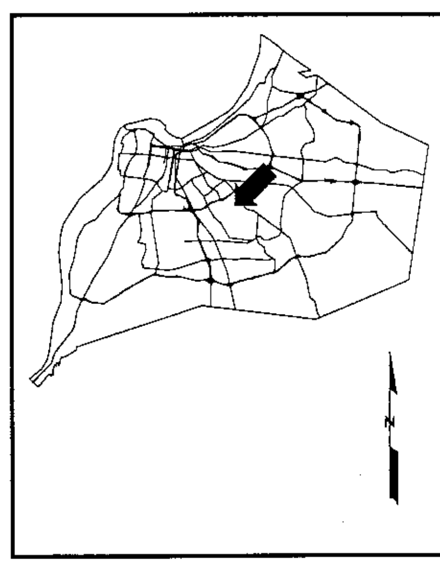
Upstream Collection System Length: 880,000 L.F.
Watershed: SOUTH FORK BEARGRASS CREEK
Discharge Type: CONSTRUCTED
Discharged To: STREAM
Receiving Stream: SOUTH FORK BEARGRASS CREEK
Status: DOCUMENTED



Downstream Landuse:

MULTI-FAMILY RESIDENTIAL	12.5 ac.
SINGLE FAMILY RESIDENTIAL	10.8 ac.
VACANT AND UNDEVELOPED	11.9 ac.
INDUSTRIAL	17.3 ac.
GENERAL COMM. AND OFFICE	0.1 ac.





Metro: MAM20
Atlas Map: BG226

Scale 1" = 400 '

MSD

Louisville-Jefferson County Metropolitan Sewer District

4103 LEE AVE - IN LOT AT NORTHERN SIDE P/L. NOTE: THIS MH FOUND BY MSD TV FIELD CREW DURING ROUTINE FIELD INVESTIGATION.
MSD Facility 104223

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	1	40 Gallons

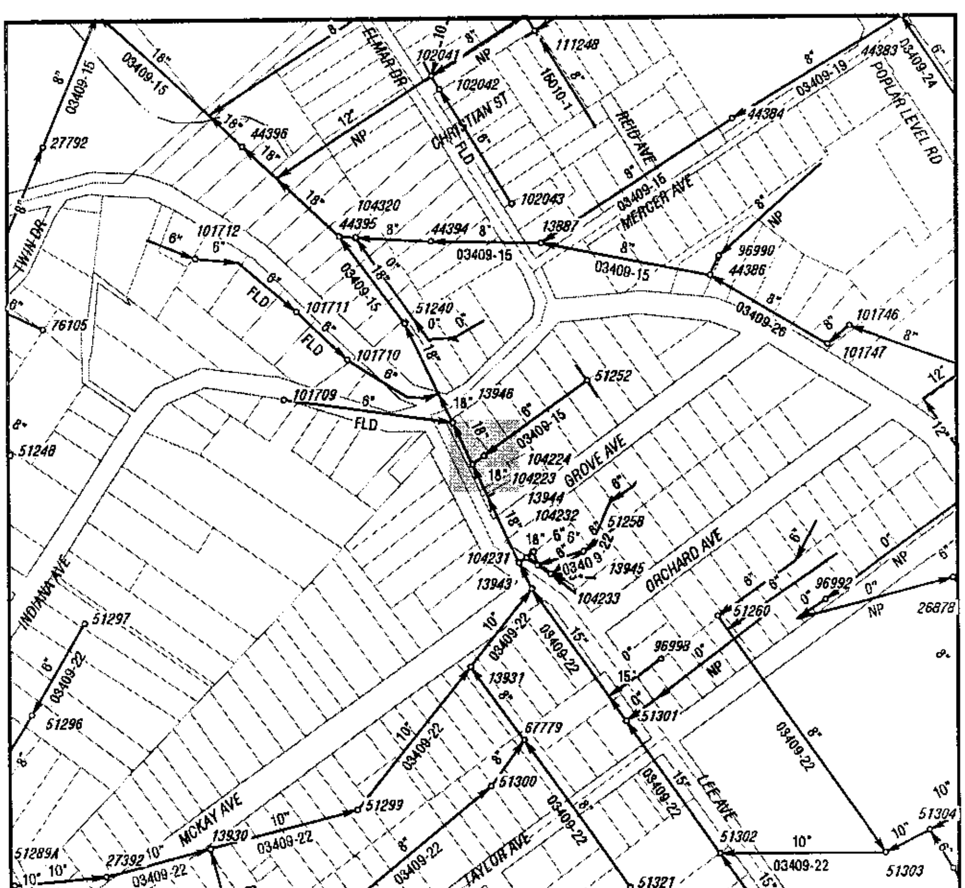
Background & History:

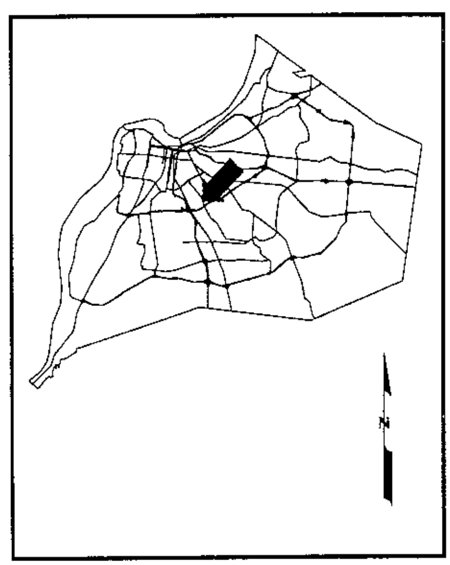
Pipe Size:
Inflow: 6"
Outflow: 6"

Upstream Collection System Length: 348 L.F.
Watershed: SOUTH FORK BEARGRASS CREEK
Discharge Type: CAPACITY
Discharged To:
Receiving Stream:
Status: DOCUMENTED

Downstream Landuse:

VACANT AND UNDEVELOPED	21 ac.
SINGLE FAMILY RESIDENTIAL	12.6 ac.
PUBLIC AND SEMI-PUBLIC	1.7 ac.
GENERAL COMM. AND OFFICE	0.3 ac.
INDUSTRIAL	0.3 ac.
MULTI-FAMILY RESIDENTIAL	11.4 ac.





Metro: MAM19

Atlas Map: BG222

Scale 1" = 400 '

HIGHGATE SPRINGS

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility MSD0012-PS

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	4	44,000,000 Gallons
2004	9	13,600,000 Gallons
2003	4	30,600,000 Gallons
2002	6	17,900,000 Gallons
2001	3	29,200,000 Gallons

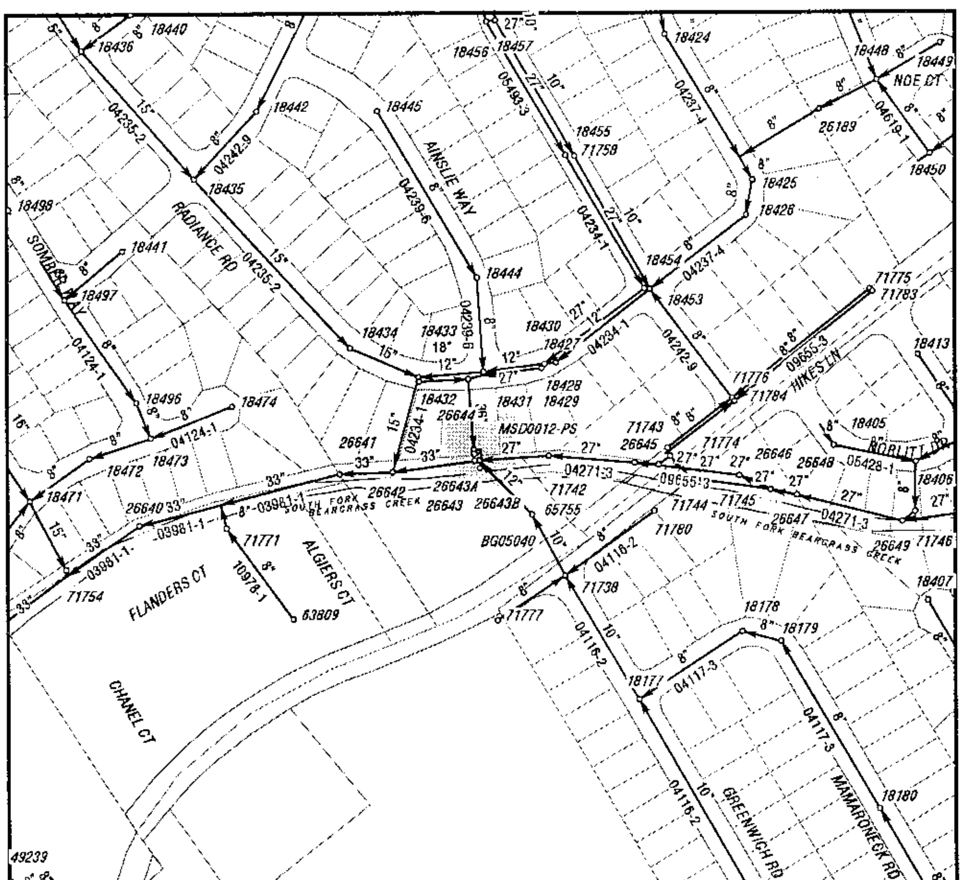
Background & History: This pump station was constructed in 1963 as part of a relief sewer system and was designed to pump flow to the creek during high flow conditions to reduce the risk of basement flooding in nearby homes.

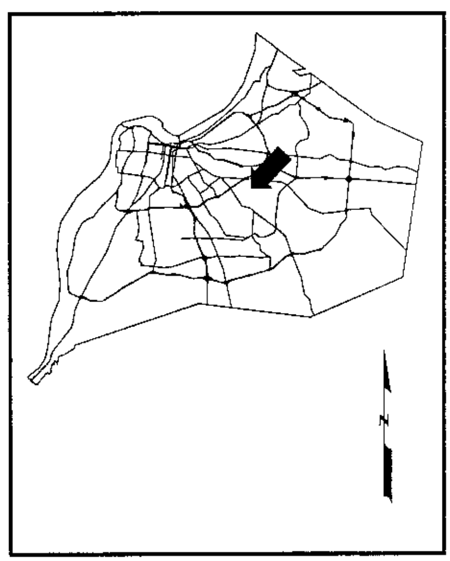
Pipe Size:
Inflow: 30"
Outflow: 36"
Outflow: 6"

Upstream Collection System Length: 88,500 L.F.
Watershed: SOUTH FORK BEARGRASS CREEK
Discharge Type: CONSTRUCTED
Discharged To: STREAM
Receiving Stream: SOUTH FORK BEARGRASS CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	7.7 ac.
MULTI-FAMILY RESIDENTIAL	11.9 ac.
PUBLIC AND SEMI-PUBLIC	4.7 ac.





Metro: MAM21
Atlas Map: BE230

Scale 1" = 400 '

4315 PRUITT CT - #5

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility 08426

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2003	1	54,000 Gallons

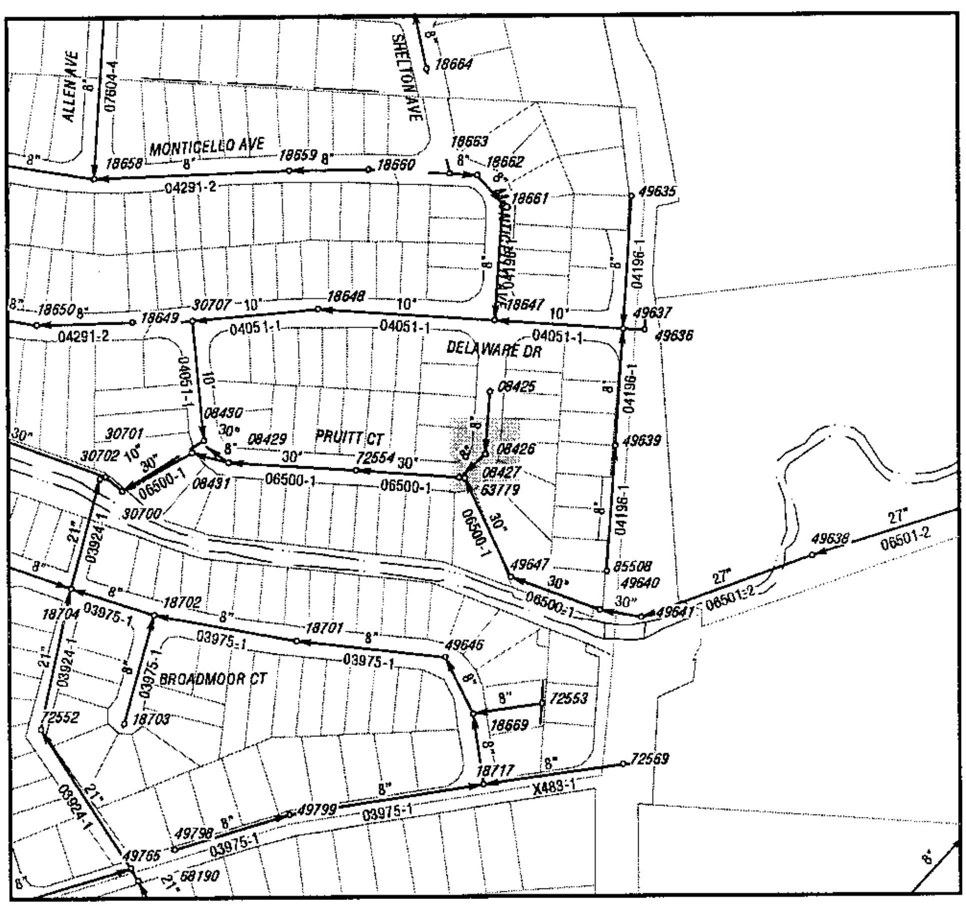
Background & History: This site was reported as an overflow in Hansen during FY04. It is new to the list and will be montitored in the future.

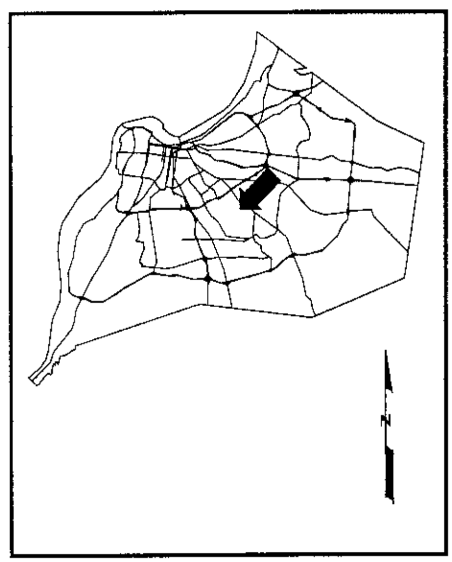
Pipe Size:
Inflow: 8"
Outflow: 8"

Upstream Collection System Length: 135 L.F.
Watershed: SOUTH FORK BEARGRASS CREEK
Discharge Type: CAPACITY
Discharged To: GROUND
Receiving Stream: SOUTH FORK BEARGRASS CREEK
Status: DOCUMENTED

Downstream Landuse:

VACANT AND UNDEVELOPED	9.4 ac.
INDUSTRIAL	9.9 ac.
SINGLE FAMILY RESIDENTIAL	11.1 ac.
MULTI-FAMILY RESIDENTIAL	2.2 ac.





Metro: MAM21
Atlas Map: BI228

Scale 1" = 400 '

4313 PRUITT CT

MSD

Louisville-Jefferson County Metropolitan Sewer District

MSD Facility 08427

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2004	1	23,100 Gallons
2003	1	55,000 Gallons
2002	5	1,840,000 Gallons

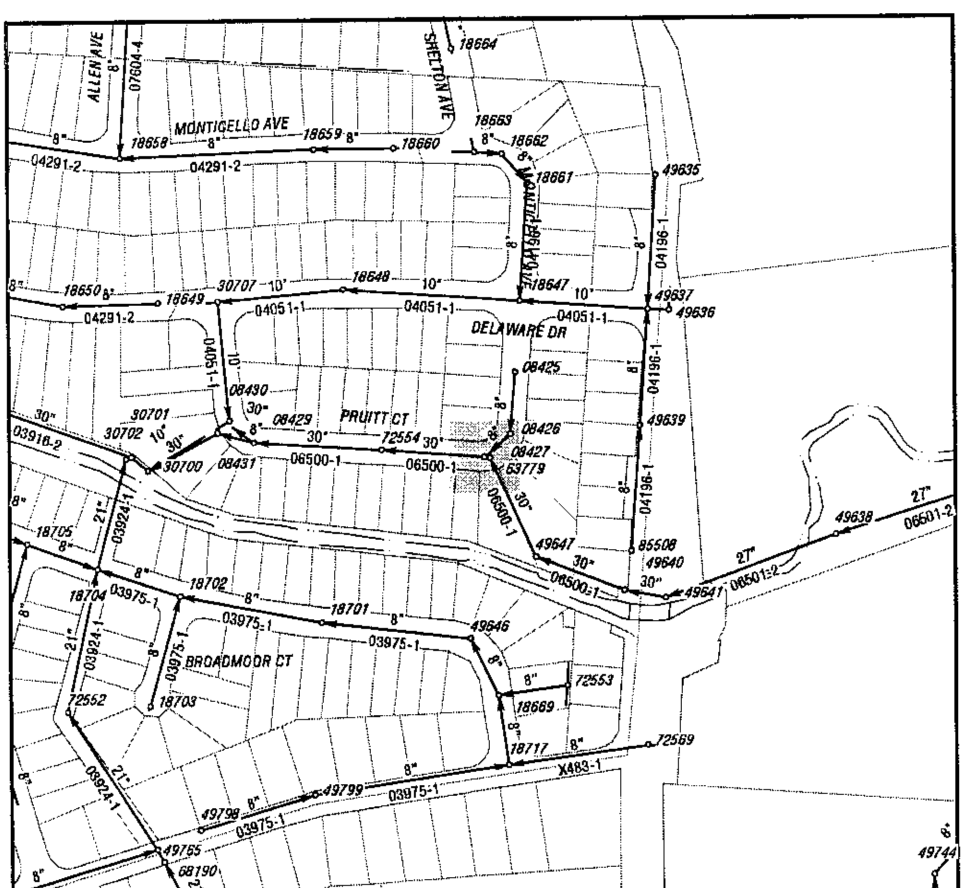
Background & History:

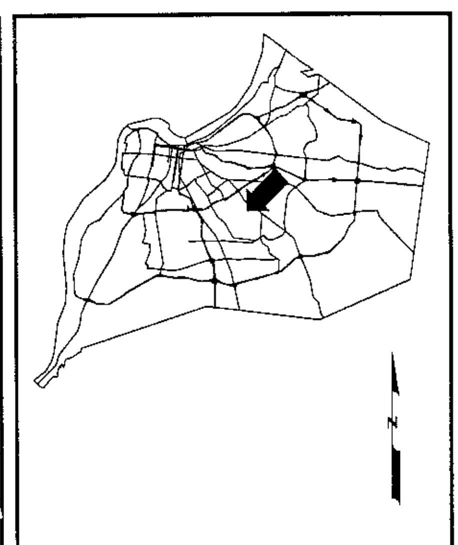
Pipe Size:
Inflow: 30"
Outflow: 30"

Upstream Collection System Length: 311,000 L.F.
Watershed: SOUTH FORK BEARGRASS CREEK
Discharge Type: CAPACITY
Discharged To: GROUND
Receiving Stream: SOUTH FORK BEARGRASS CREEK
Status: DOCUMENTED

Downstream Landuse:

VACANT AND UNDEVELOPED	9.4 ac.
INDUSTRIAL	9.9 ac.
SINGLE FAMILY RESIDENTIAL	10.8 ac.
MULTI-FAMILY RESIDENTIAL	2.2 ac.





Metro: MAM21

Atlas Map: BI228

Scale 1" = 400 '

4341 PRUITT CT - #1

MSD

Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility 08430

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	1	5,350,000 Gallons
2004	3	94,100 Gallons
2003	1	54,000 Gallons

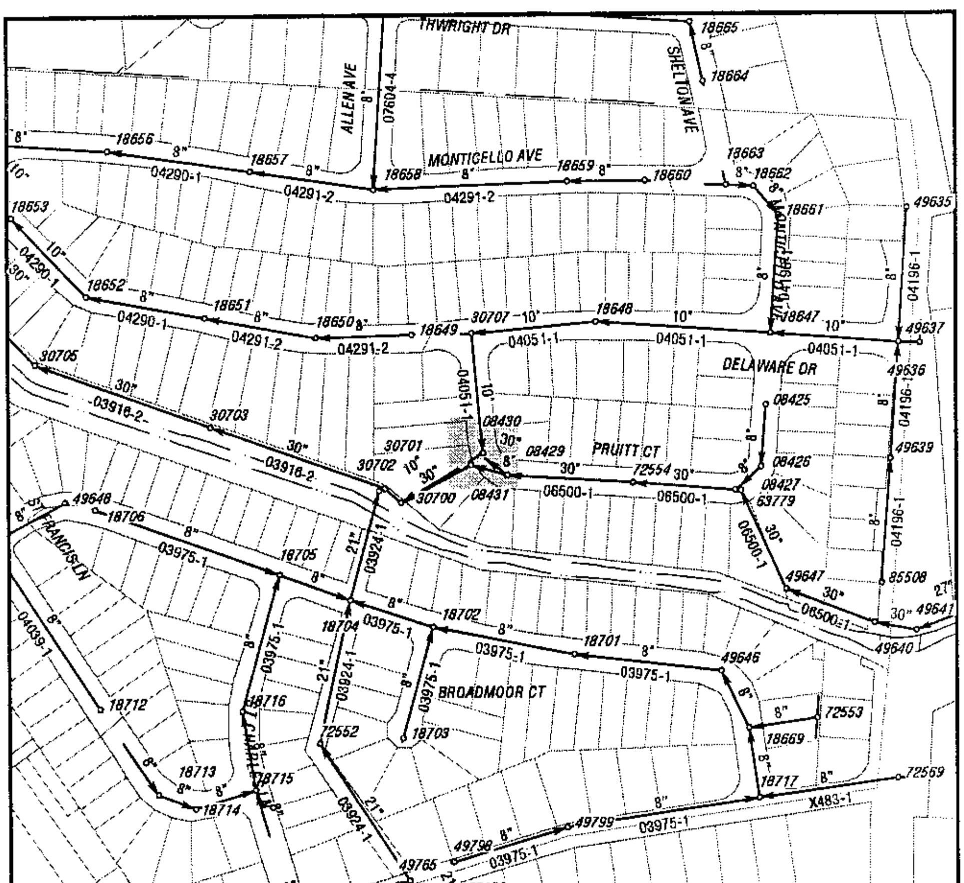
Background & History: This overflow was suspected to be a result of a significant blockage downstream of Pruitt Ct in the 30" interceptor. The blockage has been removed; however, the manhole still overflows.

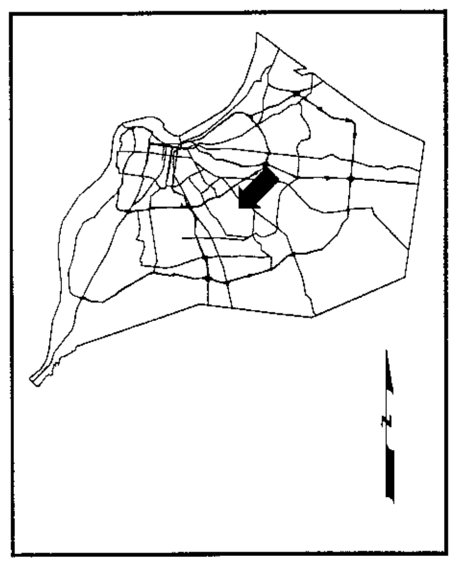
Pipe Size:
Inflow: 10"
Outflow: 10"

Upstream Collection System Length: 2,490 L.F.
Watershed: SOUTH FORK BEARGRASS CREEK
Discharge Type: CAPACITY
Discharged To: GROUND
Receiving Stream: SOUTH FORK BEARGRASS CREEK
Status: DOCUMENTED

Downstream Landuse:

MULTI-FAMILY RESIDENTIAL	3.3 ac.
VACANT AND UNDEVELOPED	13 ac.
INDUSTRIAL	10.1 ac.
SINGLE FAMILY RESIDENTIAL	8.4 ac.





Metro: MAM21
Atlas Map: BI228

Scale 1" = 400 '

4339 PRUITT CT - #4

MSD
Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility 08431

Customer Service 587-0603 | **Report as of December 2005**

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2004	2	71,000 Gallons
2003	1	54,000 Gallons

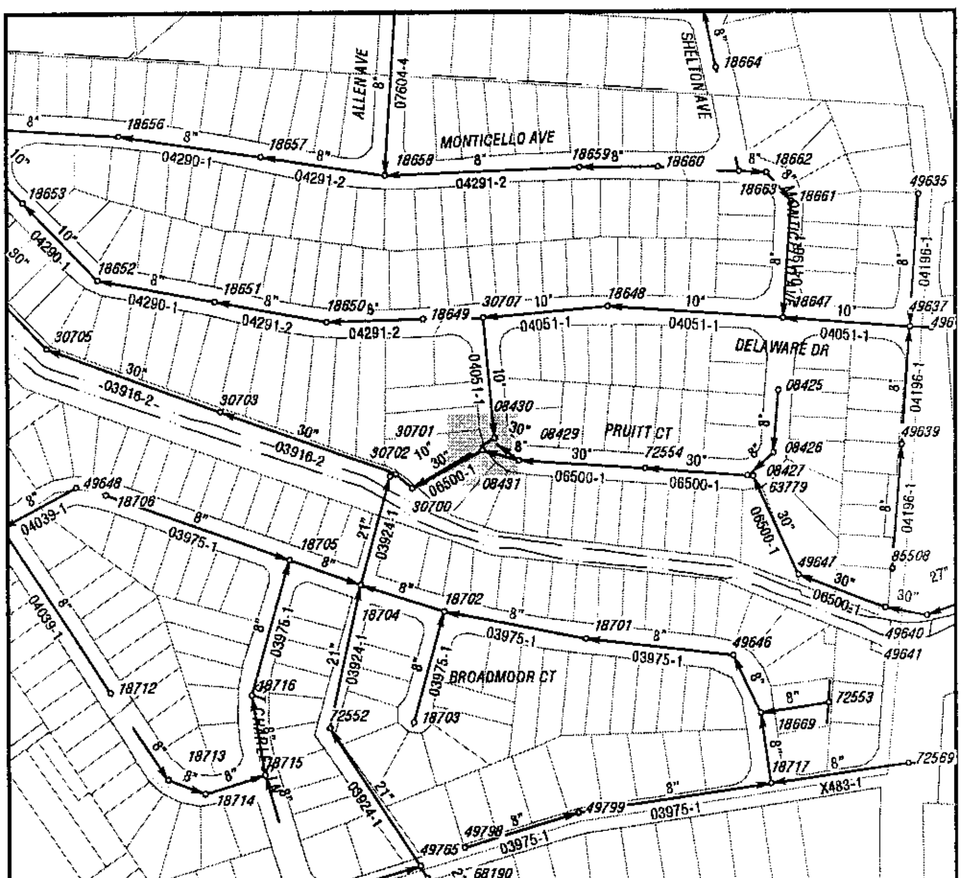
Background & History: This site was reported as an overflow in Hansen during FY04. It is new to the list and will be montitored in the future.

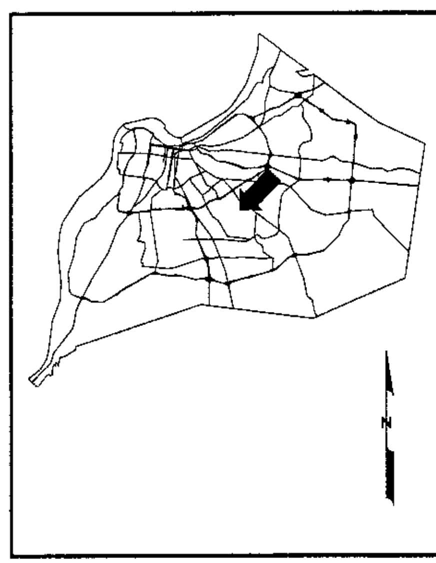
Pipe Size:
Inflow: 30"
Inflow: 10"
Outflow: 30"

Upstream Collection System Length: 314,000 L.F.
Watershed: SOUTH FORK BEARGRASS CREEK
Discharge Type: CAPACITY
Discharged To: GROUND
Receiving Stream: SOUTH FORK BEARGRASS CREEK
Status: DOCUMENTED

Downstream Landuse:

MULTI-FAMILY RESIDENTIAL	3.3 ac.
VACANT AND UNDEVELOPED	13 ac.
INDUSTRIAL	10.1 ac.
SINGLE FAMILY RESIDENTIAL	8.2 ac.





Metro: MAM21
Atlas Map: BI228

Scale 1" = 400 '

3420 FOUNTAIN DR

MSD

Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility 30680

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	2	161,000 Gallons
2004	2	71,300 Gallons

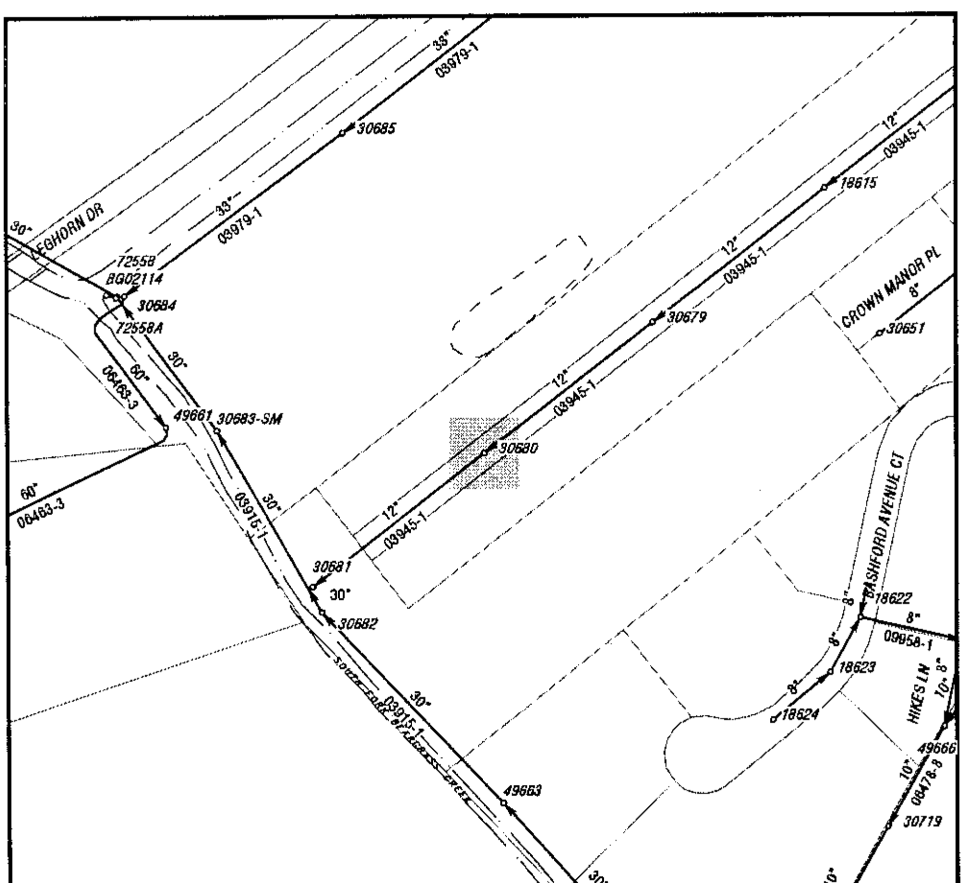
Background & History: This site is currently being monitored.

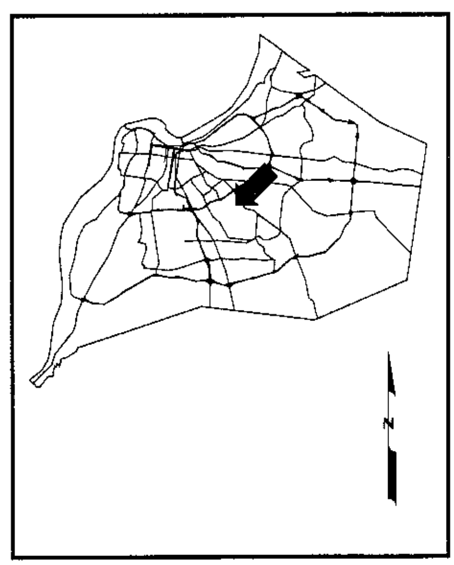
Pipe Size:
Inflow: 12"
Outflow: 12"

Upstream Collection System Length: 8,950 L.F.
Watershed: SOUTH FORK BEARGRASS CREEK
Discharge Type: CAPACITY
Discharged To: GROUND
Receiving Stream: SOUTH FORK BEARGRASS CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	10.3 ac.
MULTI-FAMILY RESIDENTIAL	10.5 ac.
VACANT AND UNDEVELOPED	13.6 ac.
INDUSTRIAL	15.5 ac.





Metro: MAM20

Atlas Map: BI226

Scale 1" = 400 '

3401 FOUNTAIN DRIVE AT CREEK

MSD
Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility 30681

Customer Service 587-0603

Report as of December 2005

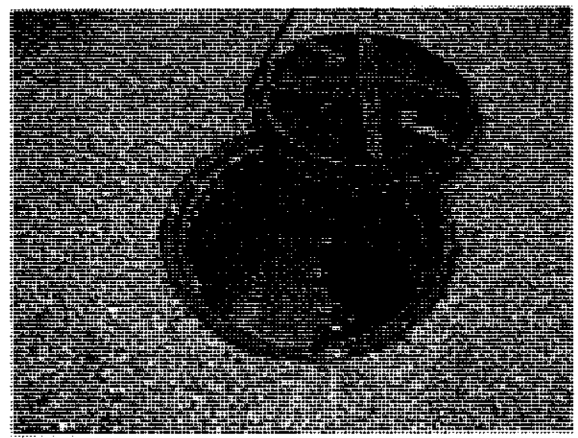
Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2004	1	23,100 Gallons

Background & History: This site is currently being monitored.

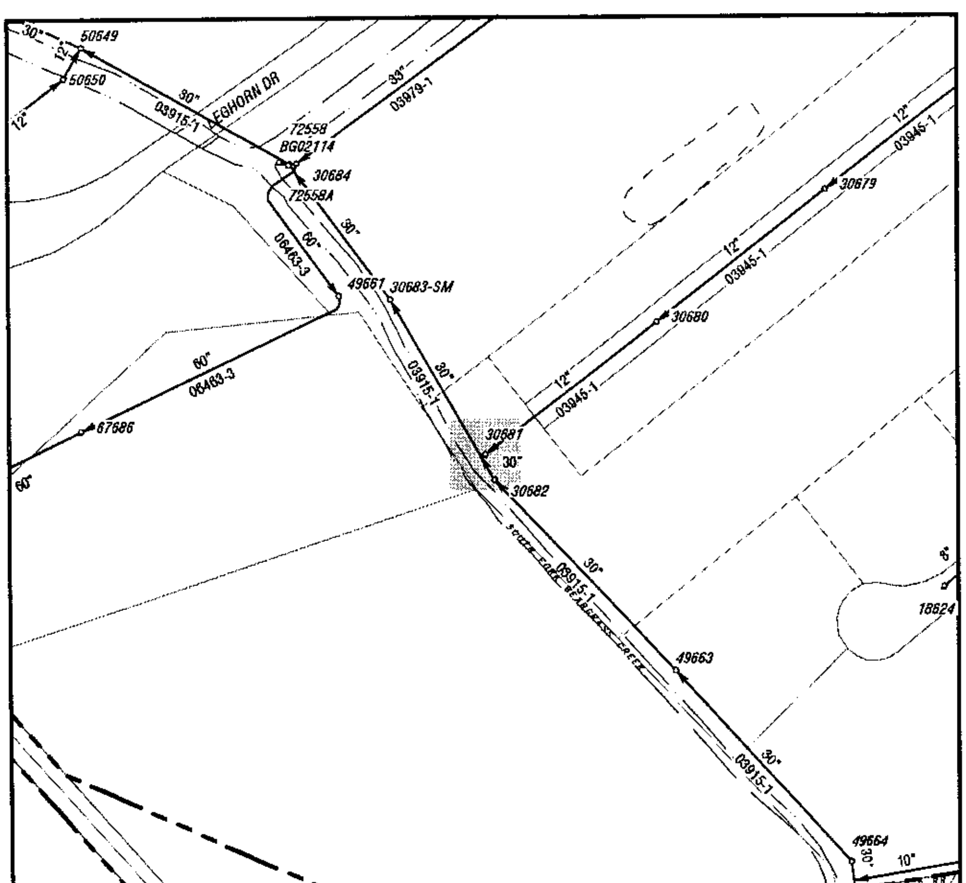
Pipe Size:
Inflow: 12"
Outflow: 12"

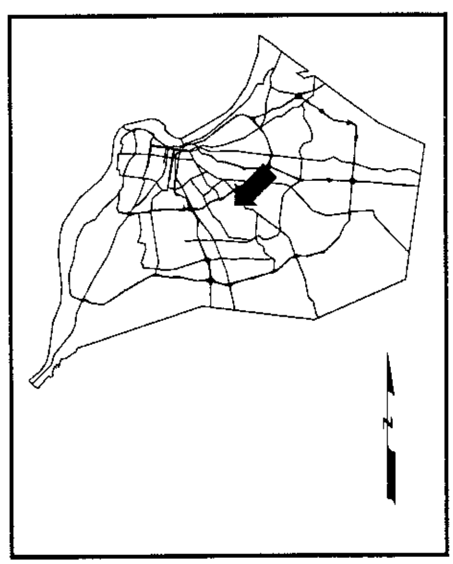
Upstream Collection System Length: 9,410 L.F.
Watershed: SOUTH FORK BEARGRASS CREEK
Discharge Type: CAPACITY
Discharged To: GROUND
Receiving Stream: SOUTH FORK BEARGRASS CREEK
Status: DOCUMENTED



Downstream Landuse:

MULTI-FAMILY RESIDENTIAL	10.3 ac.
SINGLE FAMILY RESIDENTIAL	10.8 ac.
VACANT AND UNDEVELOPED	13.5 ac.
INDUSTRIAL	15.9 ac.





Metro: MAM20
Atlas Map: BI226

Scale 1" = 400 '

4315 PRUITT CT - #2

MSD

Louisville-Jefferson County Metropolitan Sewer District

MSD Facility 49647

Customer Service 587-0603

Report as of December 2005

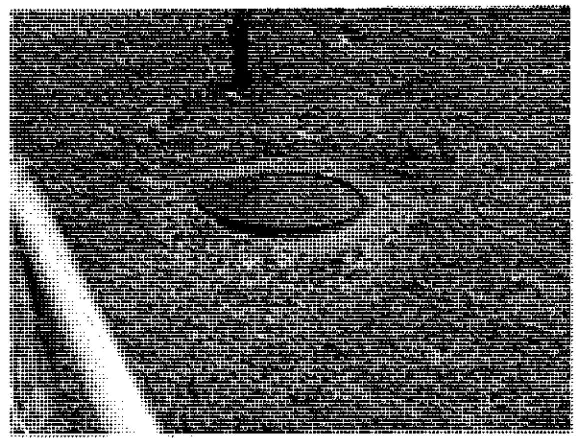
Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	1	5,350,000 Gallons
2004	3	278,000 Gallons
2003	1	400,000 Gallons
2001	2	2,000,000 Gallons

Background & History: This site was reported as an overflow during FY03. It will be monitored in the future.

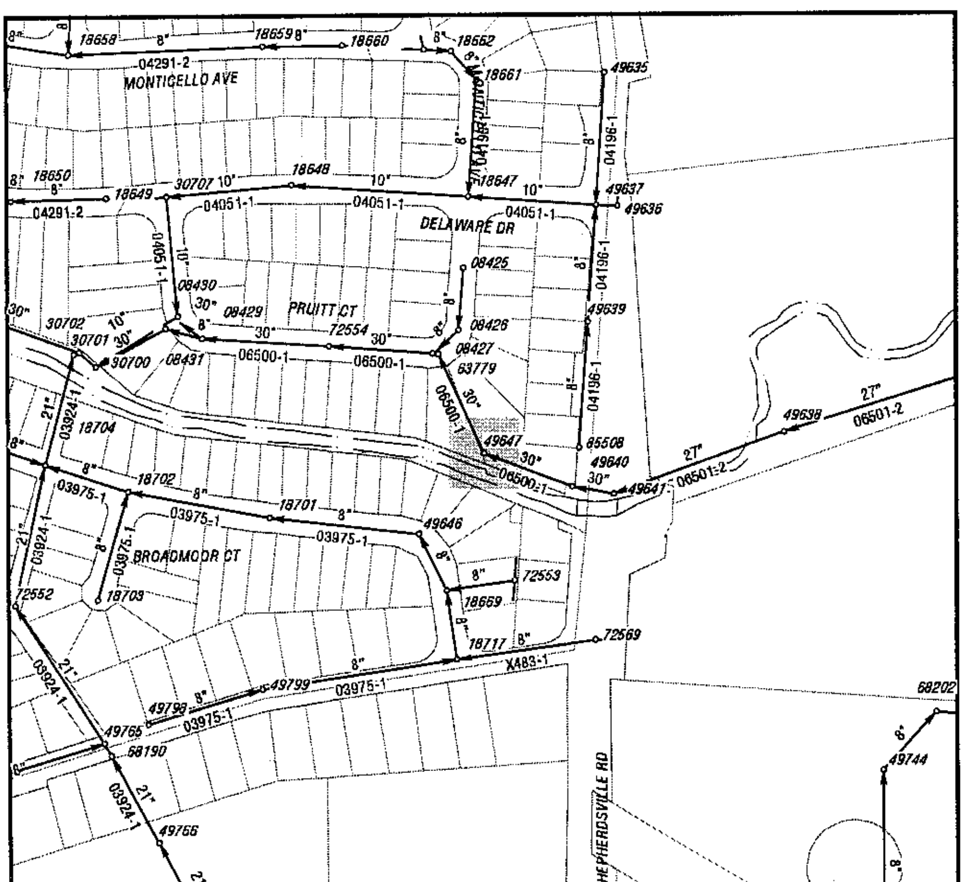
Pipe Size:
Inflow: 30"
Outflow: 30"

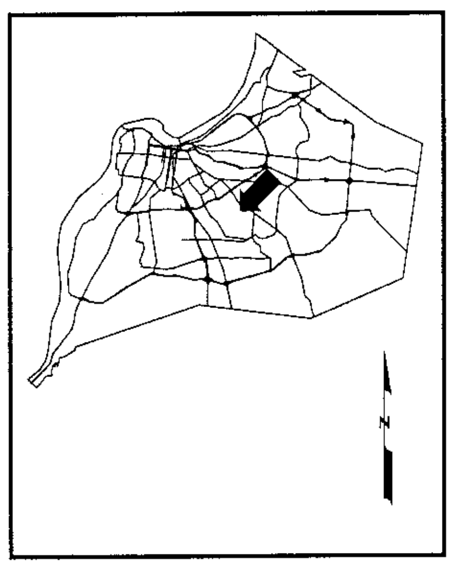
Upstream Collection System Length: 311,000 L.F.
Watershed: SOUTH FORK BEARGRASS CREEK
Discharge Type: CAPACITY
Discharged To: GROUND
Receiving Stream: SOUTH FORK BEARGRASS CREEK
Status: DOCUMENTED



Downstream Landuse:

VACANT AND UNDEVELOPED	7.3 ac.
INDUSTRIAL	9.9 ac.
SINGLE FAMILY RESIDENTIAL	11.9 ac.
MULTI-FAMILY RESIDENTIAL	2.2 ac.





Metro: MAM21

Atlas Map: BI228

Scale 1" = 400 '

4315 PRUITT CT - #3 MANHOLE 3 FEET FROM CURB

MSD

Louisville-Jefferson County Metropolitan Sewer District

MSD Facility 63779

Customer Service 587-0603

Report as of December 2005

Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	1	14,500,000 Gallons
2004	3	8,810,000 Gallons
2003	2	280,000 Gallons

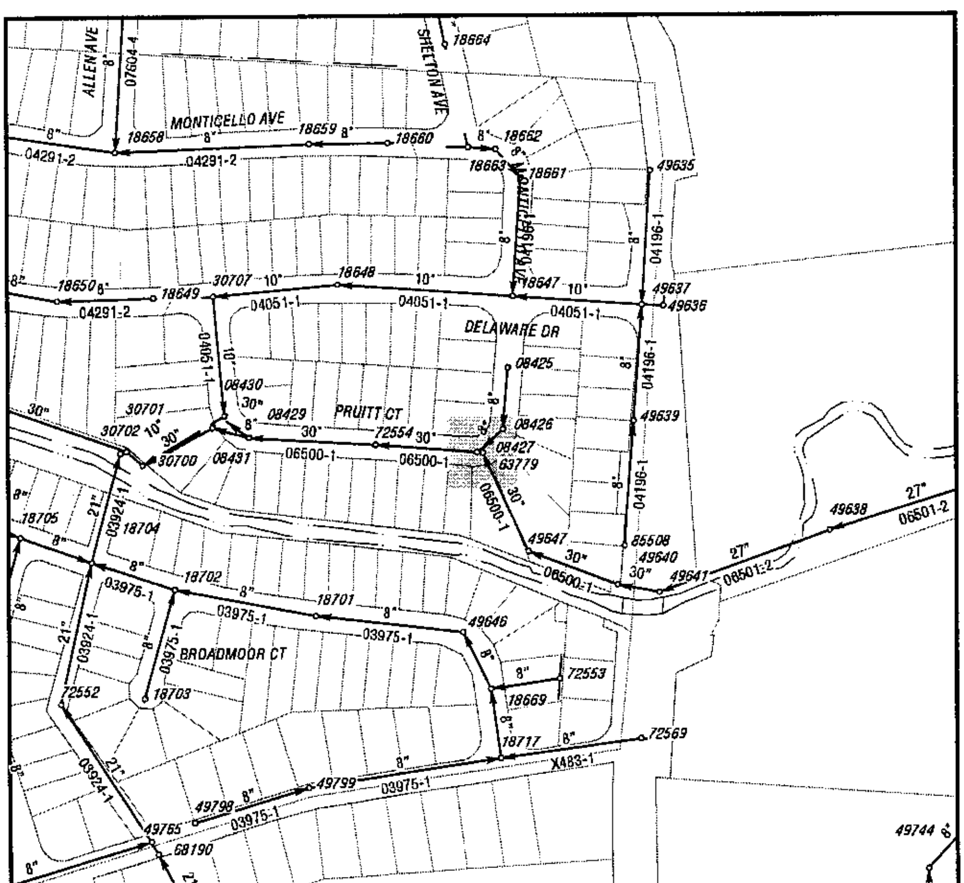
Background & History: This site was reported as an overflow during FY03. It will be monitored in the future.

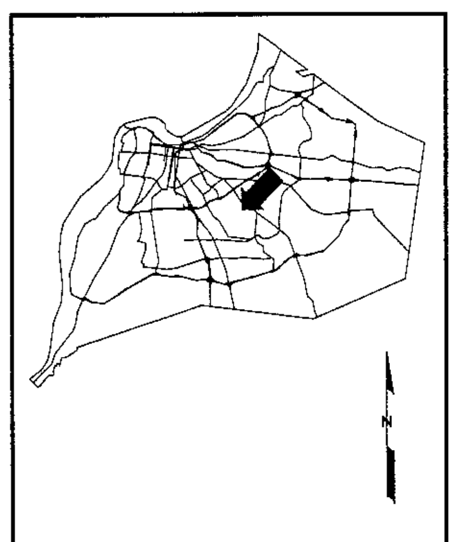
Pipe Size:
Inflow: 30"
Inflow: 8"
Outflow: 30"

Upstream Collection System Length: 311,000 L.F.
Watershed: SOUTH FORK BEARGRASS CREEK
Discharge Type: CAPACITY
Discharged To: GROUND
Receiving Stream: SOUTH FORK BEARGRASS CREEK
Status: DOCUMENTED

Downstream Landuse:

VACANT AND UNDEVELOPED	9.4 ac.
INDUSTRIAL	9.9 ac.
SINGLE FAMILY RESIDENTIAL	10.8 ac.
MULTI-FAMILY RESIDENTIAL	2.2 ac.





Metro: MAM21

Atlas Map: BI228

Scale 1" = 400 '

8805 TRANQUIL VALLEY LN (40 FEET EAST OF SPRING LAKE FARMS PS)

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility 73345

Customer Service 587-0603

Report as of December 2005

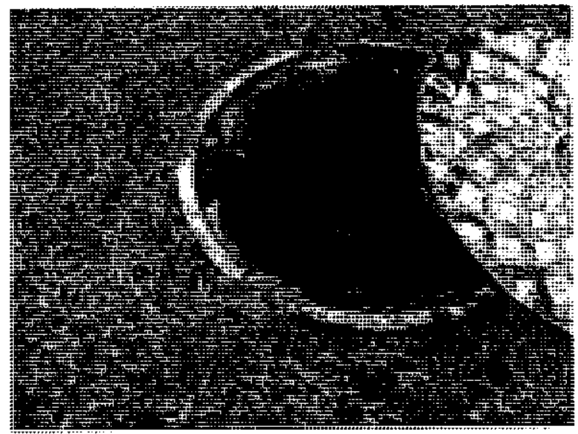
Service Area:

Yr	Num Overflows	Estimated Volume
2004	3	170,000 Gallons
2003	3	178,000 Gallons
2002	4	235,000 Gallons
2001	2	370,000 Gallons

Background & History: This pump station was built in 1989 when the Spring Lake Farms treatment plant was eliminated. MSD acquired the system in 1986.

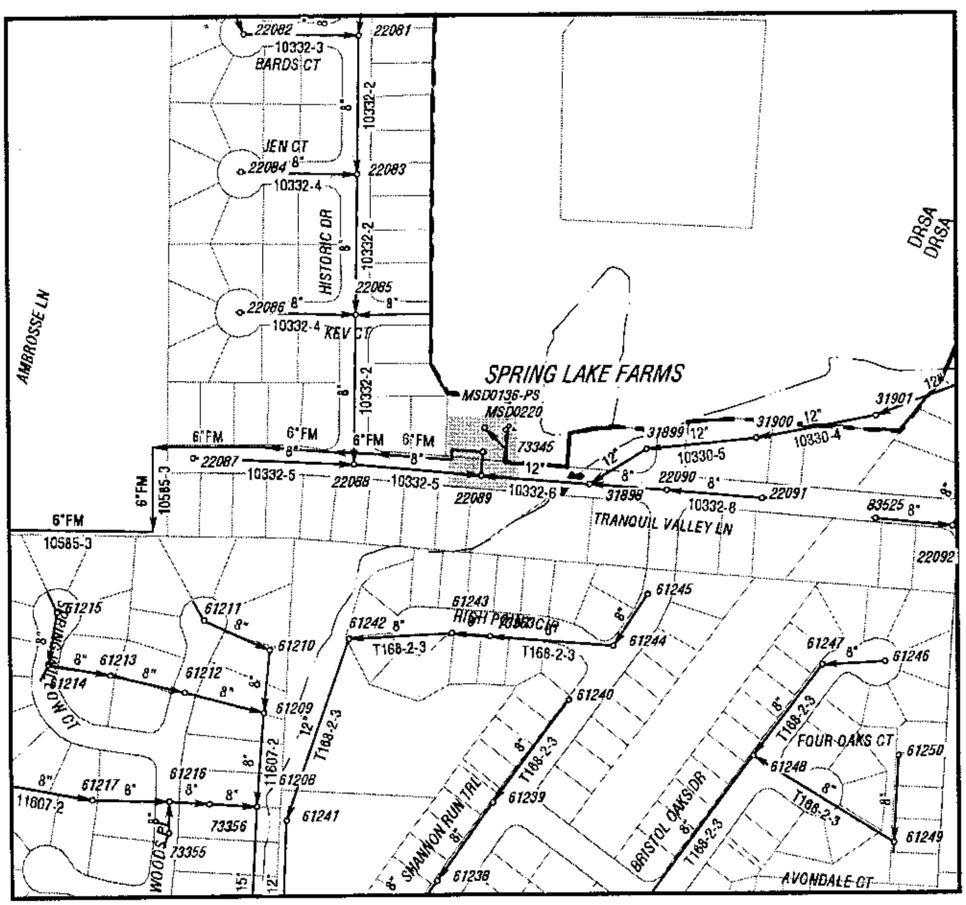
Pipe Size:
Inflow: 15"
Outflow: 15"

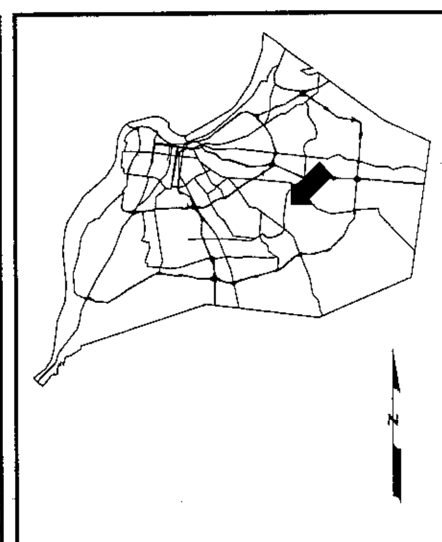
Upstream Collection System Length: 19,100 L.F.
Watershed: POND CREEK
Discharge Type: CAPACITY
Discharged To: GROUND
Receiving Stream: FERN CREEK
Status: DOCUMENTED



Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	17.7 ac.
GENERAL COMM. AND OFFICE	5 ac.
MULTI-FAMILY RESIDENTIAL	1.6 ac.





Metro: MAM22

Atlas Map: BI234

Scale 1" = 400 '

HAZELWOOD

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility MSD0002-PS

Customer Service 587-0603

Report as of December 2005

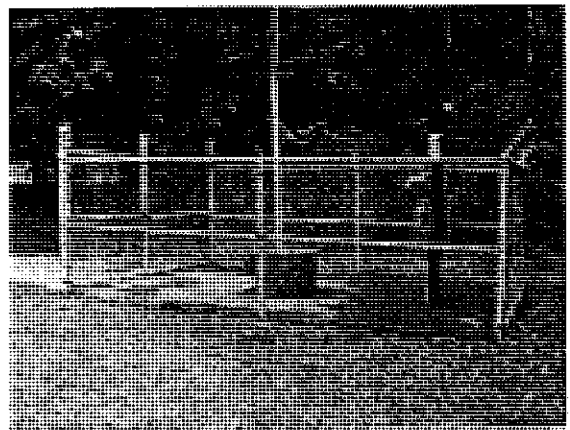
Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2004	2	51,000 Gallons
2002	3	378,000 Gallons

Background & History:

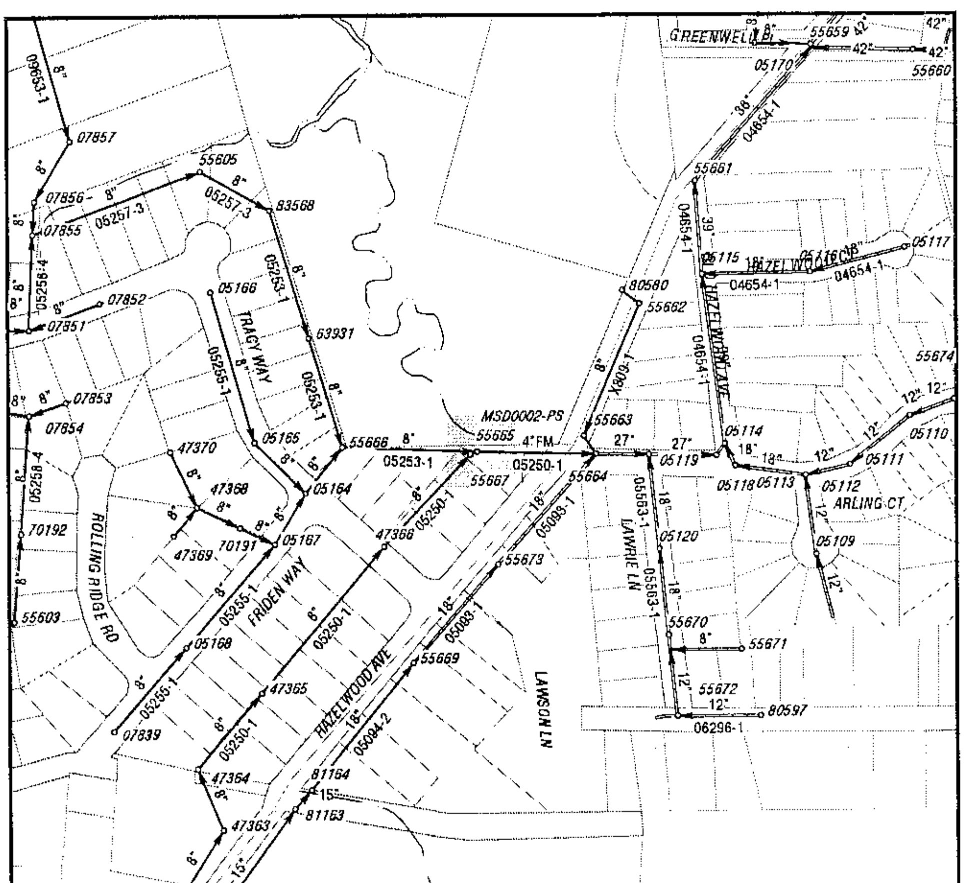
Pipe Size:
Inflow: 8"
Outflow: 4"

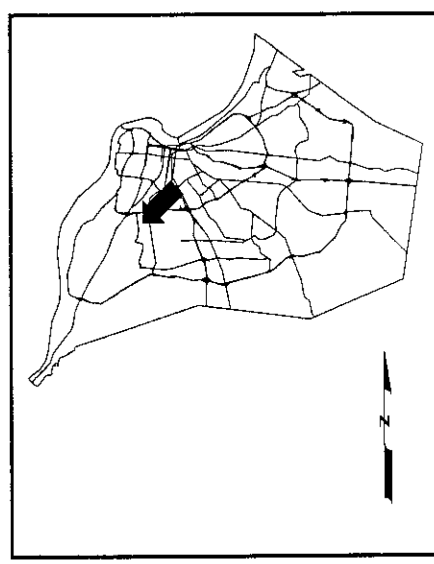
Upstream Collection System Length: 11,400 L.F.
Watershed: MILL CREEK
Discharge Type: CAPACITY
Discharged To: DITCH
Receiving Stream: MILL CREEK
Status: DOCUMENTED



Downstream Landuse:

MULTI-FAMILY RESIDENTIAL	5.5 ac.
SINGLE FAMILY RESIDENTIAL	10.5 ac.
GENERAL COMM. AND OFFICE	0.6 ac.
PARKS, CEMETERIES, ETC.	0.8 ac.
PUBLIC AND SEMI-PUBLIC	4.8 ac.
VACANT AND UNDEVELOPED	0.6 ac.





Metro: MAM17

Atlas Map: BK214

Scale 1" = 400 '

SONNE AVE PS

MSD
Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility MSD0042-PS

Customer Service 587-0603 **Report as of December 2005**

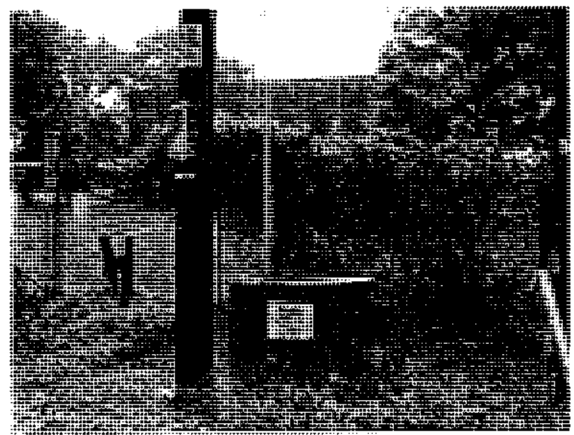
Service Area: MORRIS FORMAN

Yr	Num Overflows	Estimated Volume
2005	2	260,000 Gallons
2004	4	363,000 Gallons
2003	4	252,000 Gallons
2002	5	1,020,000 Gallons
2001	2	153,000 Gallons

Background & History: First reported on 28-Jun-99. By-pass a result of 4.72 inch rainfall.

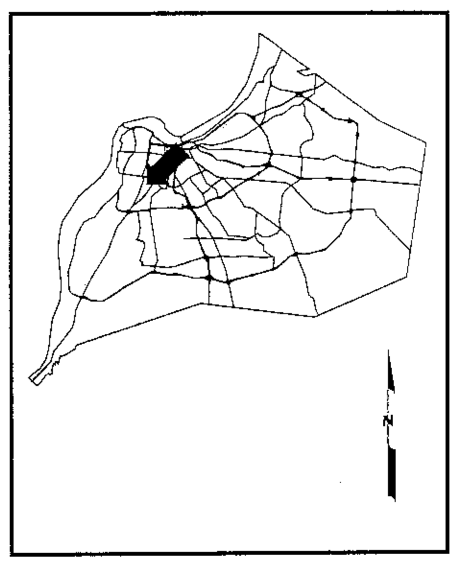
Pipe Size:
Inflow: 8"
Outflow: 4"

Upstream Collection System Length: 13,000 L.F.
Watershed: CITY/OHIO RIVER
Discharge Type: PUMPED
Discharged To: GROUND
Receiving Stream: PADDY RUN
Status: DOCUMENTED



Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	16.3 ac.
INDUSTRIAL	1.3 ac.
GENERAL COMM. AND OFFICE	1.1 ac.
VACANT AND UNDEVELOPED	0.9 ac.
PUBLIC AND SEMI-PUBLIC	2.9 ac.



Metro: MAM18
Atlas Map: BE216

Scale 1" = 400 '

MSD

Louisville and Jefferson County
Metropolitan Sewer District

SECTION 3

SECTION 3: CEDAR CREEK WASTEWATER TREATMENT PLANT

3.1 CEDAR CREEK WASTEWATER TREATMENT PLANT HISTORY

The Cedar Creek Wastewater Treatment Plant was constructed in 1995 to provide service to one of the fastest growing areas of Jefferson County and to eliminate nine small treatment plants and numerous septic systems. The plant was expanded in 2002 to its present design capacity of 7.5 million gallons per day. The average day flow to the plant is 3.4 million gallons per day as of December 2005.

The Cedar Creek service area covers approximately 7 square miles and serves approximately 5,700 customer accounts. The land use consists primarily of single family residential with a small amount of multi-family and industrial land. The Cedar Creek collection system was constructed between 1960 and the present. However, the majority of the collection system was constructed after 1990. The collection system consists of approximately 650,000 linear feet (106 miles) of 8- to 36-inch diameter pipe and is primarily constructed of 8" Polyvinyl (PVC) pipe (52%). The service area includes 36 pump/lift stations. See Figure 1 for a map of the Cedar Creek service area, eliminated treatment plants and pump stations.

3.2 SSO PROJECT HISTORY

The wet weather project history diagram (Figure 2) illustrates the SSO-specific projects conducted in the Cedar Creek sewershed since the inception of the consolidated SSO program in 1998. The following sections in this document describe each of the SSO-specific projects in detail and are organized by the five major project types:

- Flow monitoring
- SSES and other sewer investigation/study project
- Computer modeling
- Rehabilitation
- Post-Rehabilitation flow monitoring

Capital projects that removed SSOs (such as pump station and small treatment plant eliminations) are not included in the SSO-specific project history diagram but are included in the project write-up sections under "Other Projects." Figure 7 is a service area diagram showing the hydraulic connectivity of overflow locations. See Figures 3 – 6 for the program elements described in this section.

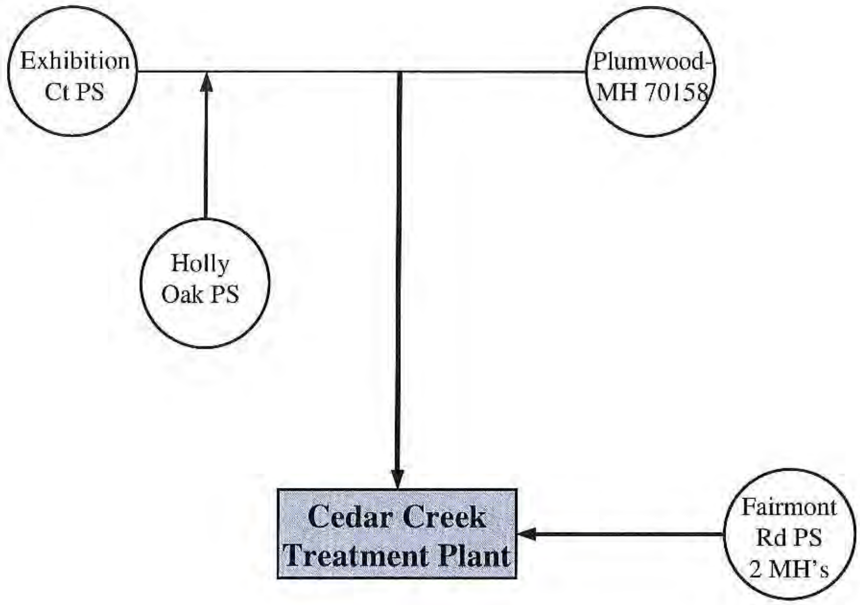


Figure 7 – Cedar Creek – Hydraulic Connectivity Diagram of Unauthorized Discharges

3.2.1 Cedar Creek Flow Monitoring

Flow monitoring was conducted for a period of 45 days beginning March 16, 1999, and ending May 6, 1999 and results were included as part of the Cedar Creek SSES. The sewershed was broken down into six discrete basins with 25,000 - 50,000 linear feet of sanitary sewer each. Flow monitors were installed in each basin and the data was analyzed for the typical parameters, such as peaking factor, average dry weather flows, and wet weather flow characteristics. Four significant rain events were monitored: March 23 (0.73"); April 5 (0.78"); April 26 (0.89"); and April 28 (2.71"). The hydrographs were analyzed to determine the nature of the problem for each basin. The following figure shows a flow monitoring schematic of the sewer systems in the Cedar Creek study area. The numbered circles in Figure 8 represent the basins monitored by each of the flow meters.

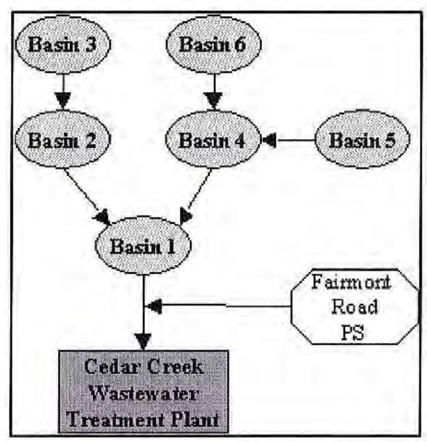


Figure 8 – Cedar Creek Flow Monitoring Schematic

The key locations with the potential for high inflow were indicated by high peaking factors. Each monitored basin showed peaking factors in excess of the generally accepted range of 3 to 4, however, basins 3, 5, and 6 all showed peaking factors greater than 10. The majority of the pipe in these three basins is vitrified clay pipe (VCP).

Areas with potential for high groundwater infiltration rates were indicated by a prolonged period of elevated flow after a rain event. Only Basins 2 and 3 showed this tendency. Inflow appeared to be the primary wet weather problem and infiltration does not appear prevalent from analysis of the wet-weather hydrographs. Systematic surcharging was observed during the April 28, 1999 rain event; however, the majority of the 2.71" of rain fell during a one-hour period, making this storm a 15 to 20-year one-hour event. Peak flow rates of 13 MGD were measured on April

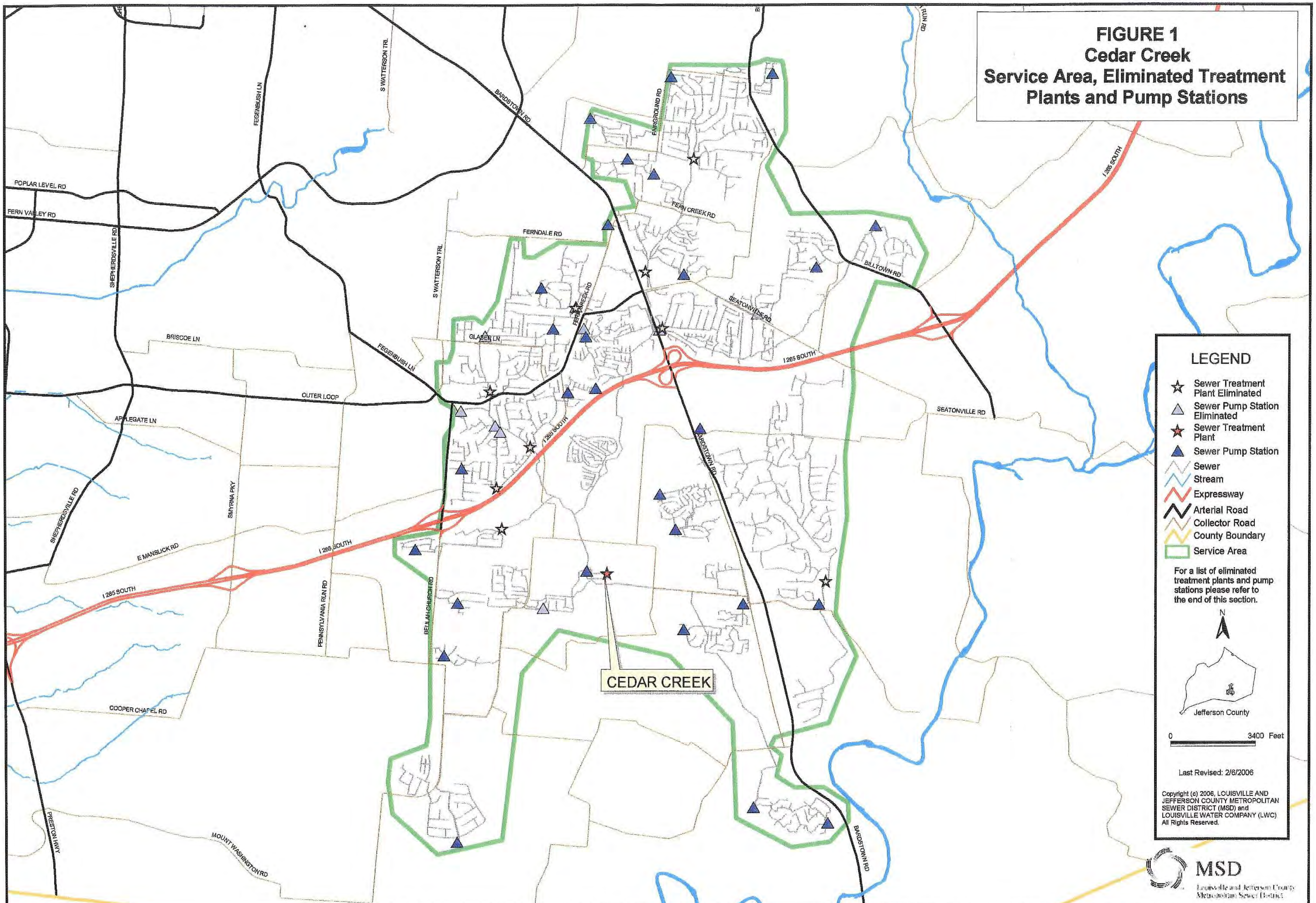
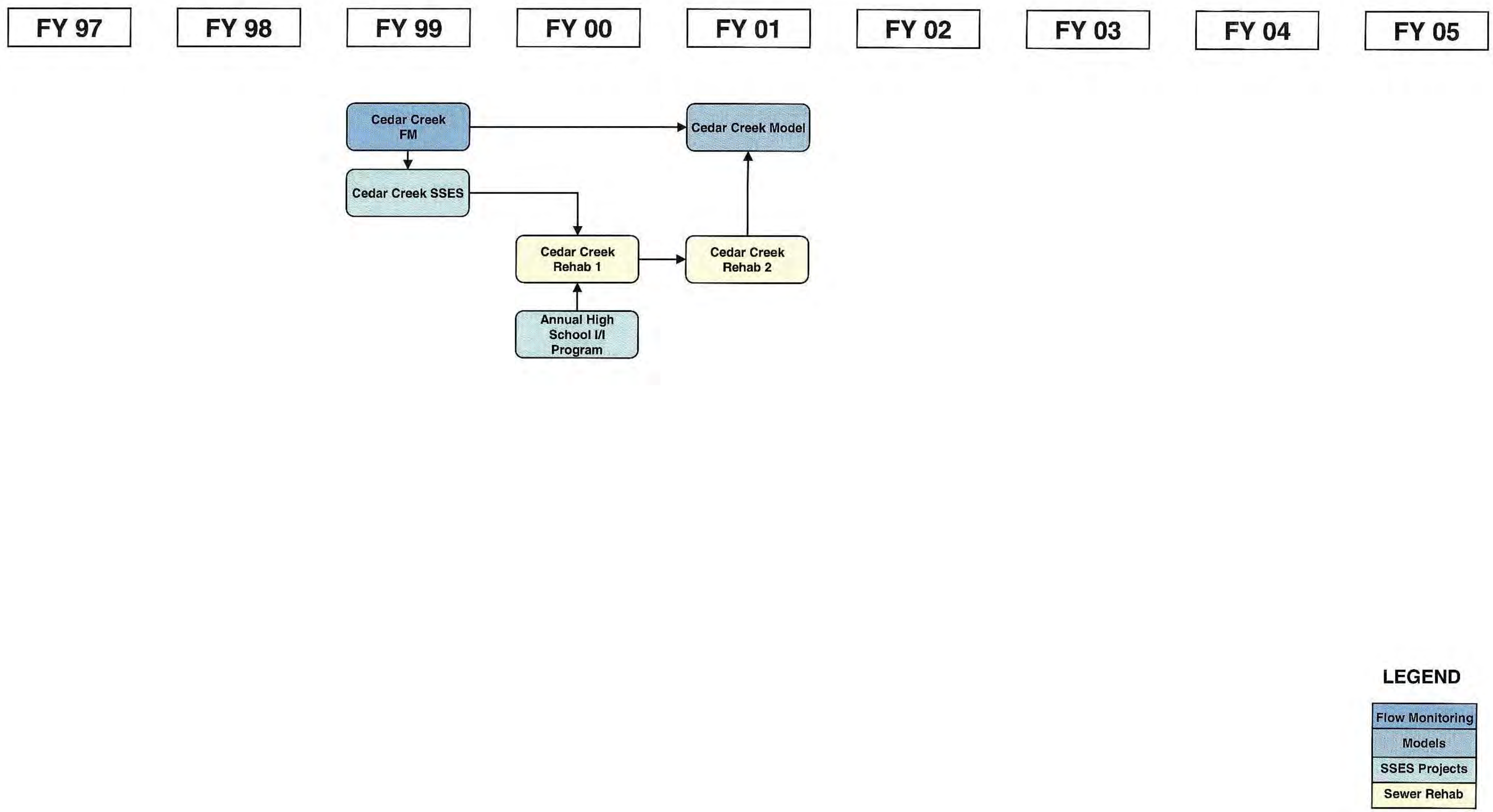


FIGURE 1
Cedar Creek
Service Area, Eliminated Treatment Plants and Pump Stations

FIGURE 2
Cedar Creek Project History

Cedar Creek Sewershed Wet Weather Projects



MSD
Louisville and Jefferson County Metropolitan Sewer District

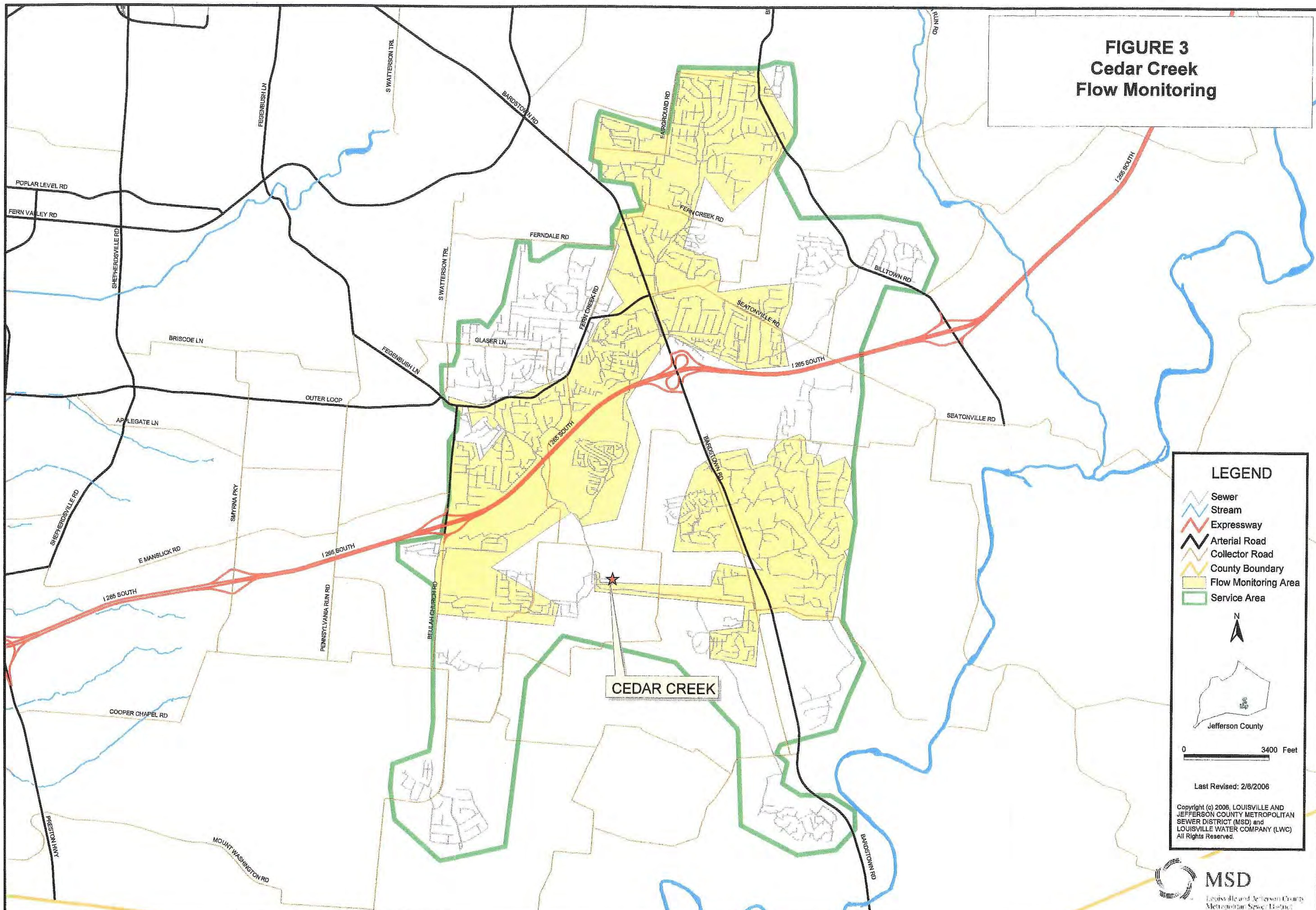


FIGURE 3
Cedar Creek
Flow Monitoring
POPLAR LEVEL RD
FERN VALLEY RD
SHEPHERDSVILLE RD
FEGENBUSH LN
S WATTERSON TRL
BARDSTOWN RD
FERNDALE RD
FAIRGROUND RD
FERN CREEK RD
BILLTOWN RD
SEATONVILLE RD
GLASER LN
BRISCOE LN
OUTER LOOP
APPLEGATE LN
I 265 SOUTH
SMYRNA PKY
E MANSLICK RD
PENNSYLVANIA RUN RD
BEULAH CHURCH RD
COOPER CHAPEL RD
PRESTON HWY
MOUNT WASHINGTON RD
CEDAR CREEK
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Flow Monitoring Area
Service Area
N
Jefferson County
0
3400 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD

29, 1999. It was also noted that due to the additional flows from the Fairmont Road Pump Station (not monitored) the treatment plant was most likely receiving flows in excess of 14 MGD. Figure 3 represents the area that was flow monitored in Cedar Creek.

Flow Monitoring of the entire sewershed was also conducted in FY03 (July 1, 2002 – June 30, 2003) in support of hydraulic modeling. This effort is discussed in Section 3.4, Hydraulic Modeling.

3.2.2 Cedar Creek Sanitary Sewer Evaluation Study (SSES)

The objective of this study was to develop a plan of improvements to rehabilitate the sewer collection system. This work was focused toward setting up projects to rehabilitate the defects found during the SSES with an emphasis on rehabilitation improvements, O&M concerns, estimated I/I reduction, and estimated costs. The study included the following components to identify active and potential sources of I/I:

- 633 manholes were inspected. 597 via formal (standard) inspection and 36 via informal inspection with digital photos. This represents 37% of the 1723 total manholes in the collection system;
- 284,000 linear feet of sewer main was smoke tested to identify defects causing inflow. This represents 77% of the collection system;
- 134,000 linear feet of sewer main were television inspected, representing 36% of the collection system;
- Approximately 20 hours of wet weather inspections, or "rain chasing" was conducted. This activity involves sending crews out to inspect key areas of the collection system during periods of heavy rainfall. Crews worked in a methodical pattern to open manholes and check for systematic leakage, surcharging, etc.

Manhole inspections and TVI indicated that the public side sewer was in fair condition system-wide, although there were some concentrated pockets of significant defects, especially in basin 6. Smoke Testing identified many defects on private property, primarily defective cleanouts. Smoke testing also identified one grate leak, one drainage pipe and a storm sewer cross connection. The project was completed in May 2000. The significant defects identified in this SSES were repaired under the Cedar Creek Rehabilitation Phase 1 and Phase 2 projects. Figure 4 represents the Cedar Creek SSES study area. This project cost approximately $246,000 and was completed in November 2001. Figure 4 represents the Cedar Creek SSES study area.

3.2.3 Cedar Creek Computer Modeling

The Cedar Creek model was originally built and calibrated in FY01 (July 1, 2000 – June 30, 2001) using the FY99 (July 1, 1998 – June 30, 1999) flow monitoring data. The project cost approximately $73,000 and was completed in October 2001. This model consisted of 8" and greater diameter sanitary sewer tributary to the Cedar Creek Wastewater Treatment Plant. The model was updated in FY03 (July 1, 2002 – June 30, 2003) to include areas of new development and re-calibrated using flow monitoring data collected in FY03 (July 1, 2002 – June 30, 2003). The FY03 (July 1, 2002 – June 30, 2003) monitoring included two additional basins as a result of significant development in the area. Due to poor-quality flow monitoring data in Basin 1 and no flow monitoring data in Basin 8, assumptions based on previous flow monitoring data and system-wide calibration averages were used to re-calibrate these basins.

The following objectives were addressed under the FY03 (July 1, 2002 – June 30, 2003) model:

- New system infrastructure was added to the model based on the LOJIC database. Pump stations and force mains were revised as necessary;
- Capture results from system rehabilitation;
- Re-calibrated the model based upon new flow monitoring data performed from December 23, 2002 – February 5, 2003. The model was re-calibrated for wet weather flow and dry weather flow. Potential SSO locations from recent storm events were identified;
- Analyzed various scenarios, including the existing conditions, 1-year, 2-year, 5-year, and 10-year storm events. A map was made showing the potential locations of SSOs. The results of the analysis were summarized in a memo and potential solutions to SSOs were investigated;
- Future conditions scenarios were analyzed in conjunction with the J-Town Interceptor Condition Assessment project (refer to section 7.3.3.). Areas that were proposed to be diverted to the Cedar Creek area in the Jeffersontown Action Plan were added to the model and the effects analyzed.

Figure 5 represents the Cedar Creek Computer Modeling study area.

3.2.4 Cedar Creek Rehabilitation

Figure 6 displays the rehabilitation work conducted under the Cedar Creek Rehabilitation projects.

<u>Cedar Creek Rehabilitation Phase 1</u>

This project provided for the rehabilitation of defects identified in the Cedar Creek SSES. This rehabilitation effort consisted of lining 2,859 linear feet of sewer main with cured-in-place pipe (CIPP), lining the public portion of 12 property service connections with CIPP, and sealing 432 manhole chimneys with butyl rubber chimney seals. This project cost approximately $495,000 and was completed in October 2001.

<u>Cedar Creek Rehabilitation Phase 2</u>

This project provided for the rehabilitation of defects identified in the Cedar Creek SSES. This rehabilitation effort consisted of lining 2,115 linear feet of sewer main with cured-in-place pipe, lining the public portion of 21 property service connections with CIPP, and installing 21 property service cleanouts. 1,487 chimney seals were also installed under this project and completed chimney rehabilitation in the Cedar Creek service area to prevent inflow. This project cost approximately $1,015,000 and was completed in June 2002.

<u>McNeely Lake Rehabilitation Ph. 1A</u>

As a result of various change orders during the McNeely Lake Rehabilitation Phase 1A Project, additional funds were available for rehabilitation in the Cedar Creek watershed under the this project. A review of collector systems in the McNeely Lake area identified the Birchwood sewer system as having significant I/I. The Birchwood system had recently been acquired from a private owner after which flows were diverted to the Cedar Creek WTP. In addition, inspection

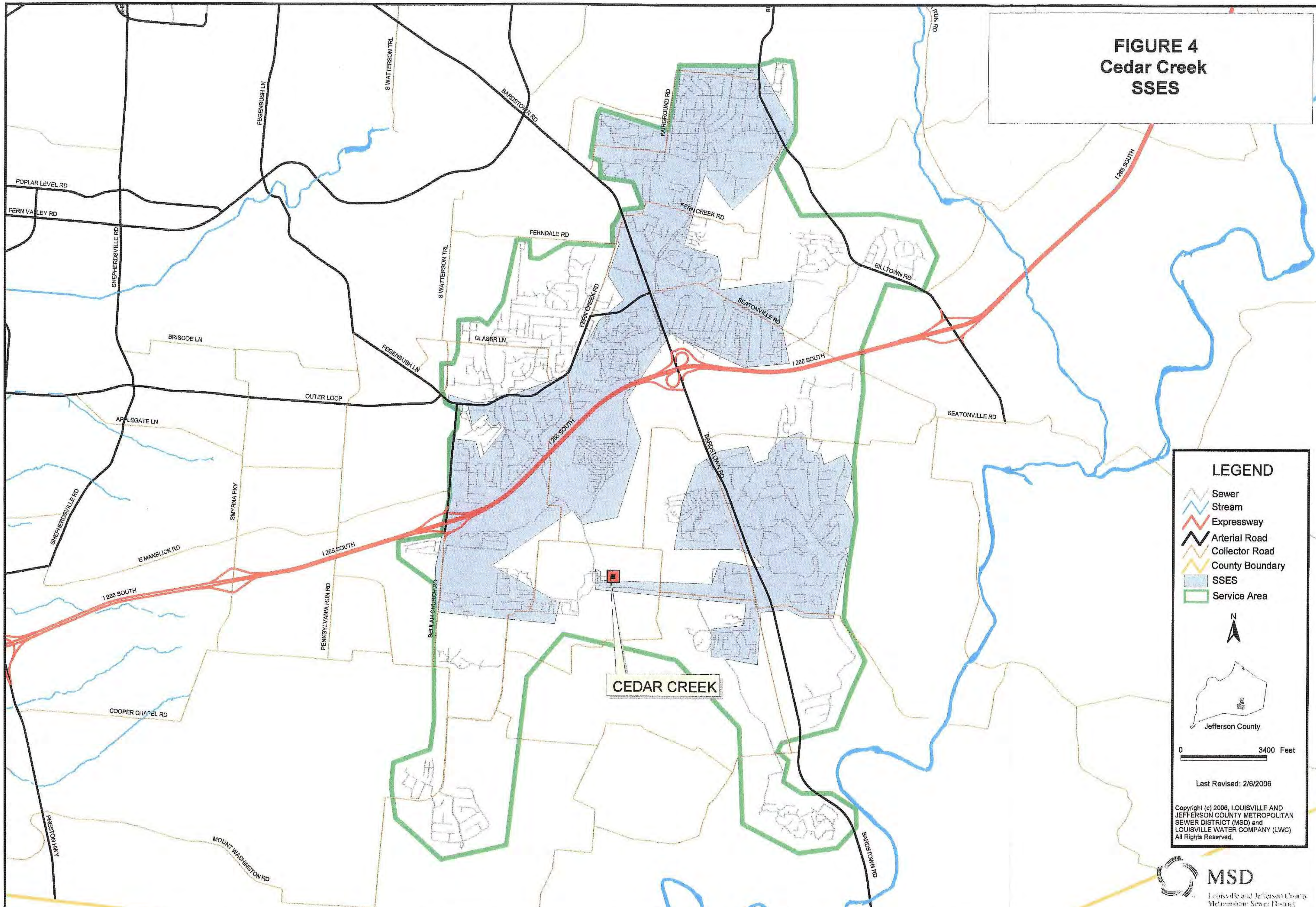


FIGURE 4
Cedar Creek
SSES
BARDSTOWN RD
S WATTERSON TRL
FEGENBUSH LN
POPLAR LEVEL RD
FERN VALLEY RD
SHEPHERDSVILLE RD
FAIRGROUND RD
FERN CREEK RD
FERNDALE RD
BILLTOWN RD
SEATONVILLE RD
GLASER LN
BRISCOE LN
OUTER LOOP
I 265 SOUTH
APPLEGATE LN
SMYRNA PKY
E MANSLICK RD
BEULAH CHURCH RD
PENNSYLVANIA RUN RD
COOPER CHAPEL RD
PRESTON HWY
MOUNT WASHINGTON RD
CEDAR CREEK
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
SSES
Service Area
N
Jefferson County
0
3400 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD
Louisville and Jefferson County Metropolitan Sewer District

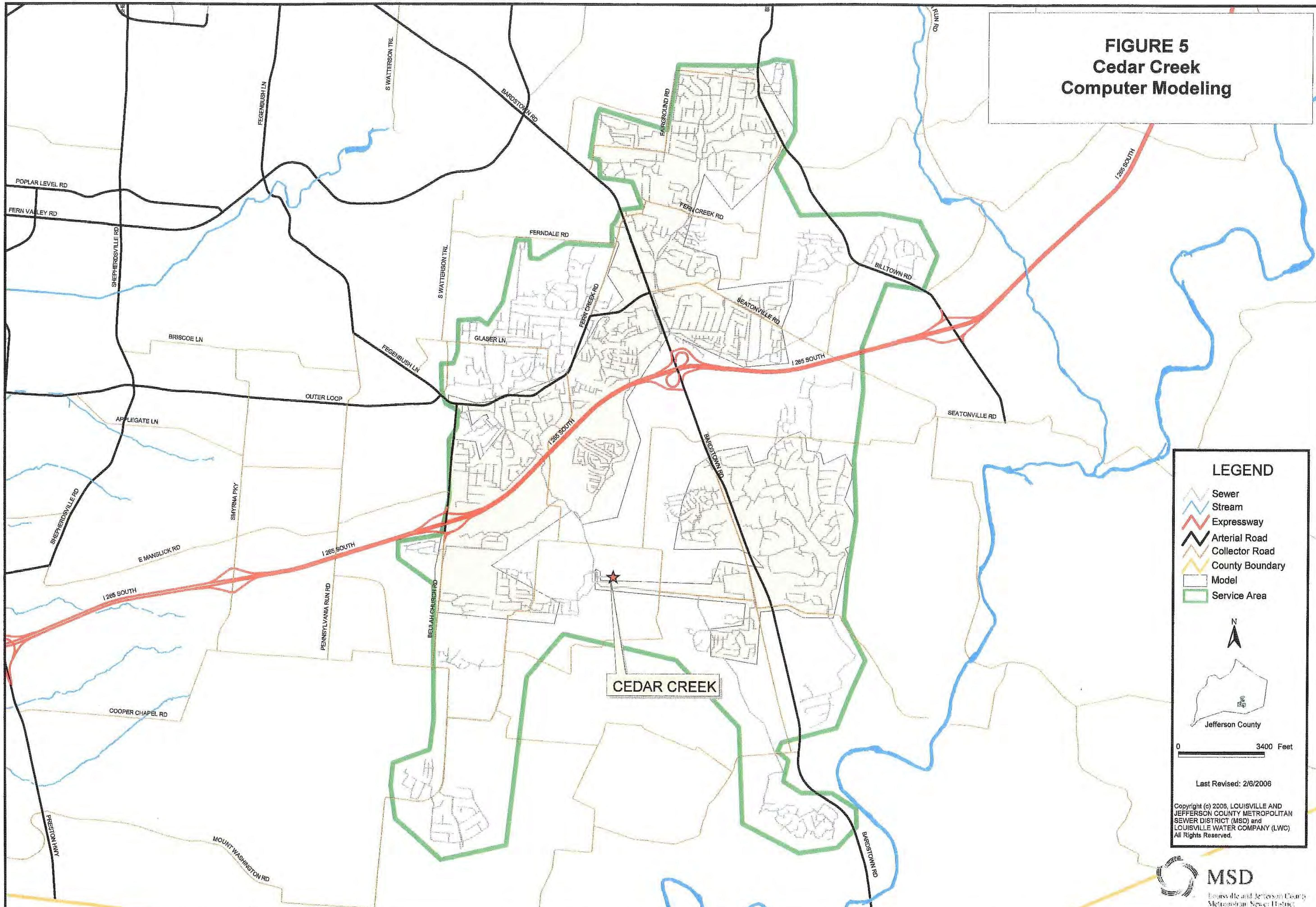


FIGURE 5
Cedar Creek
Computer Modeling
CEDAR CREEK
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Model
Service Area
N
Jefferson County
0
3400 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD
POPLAR LEVEL RD
FERN VALLEY RD
SHEPHERDSVILLE RD
FEGENBUSH LN
S WATTERSON TRL
BARDSTOWN RD
FAIRGROUND RD
FERN CREEK RD
FERNDALE RD
FERN CREEK RD
BILLTOWN RD
SEATONVILLE RD
GLASER LN
BRISCOE LN
OUTER LOOP
APPLEGATE LN
I 265 SOUTH
SMYRNA PKY
E MANSLICK RD
PENNSYLVANIA RUN RD
BEULAH CHURCH RD
COOPER CHAPEL RD
PRESTON HWY
MOUNT WASHINGTON RD

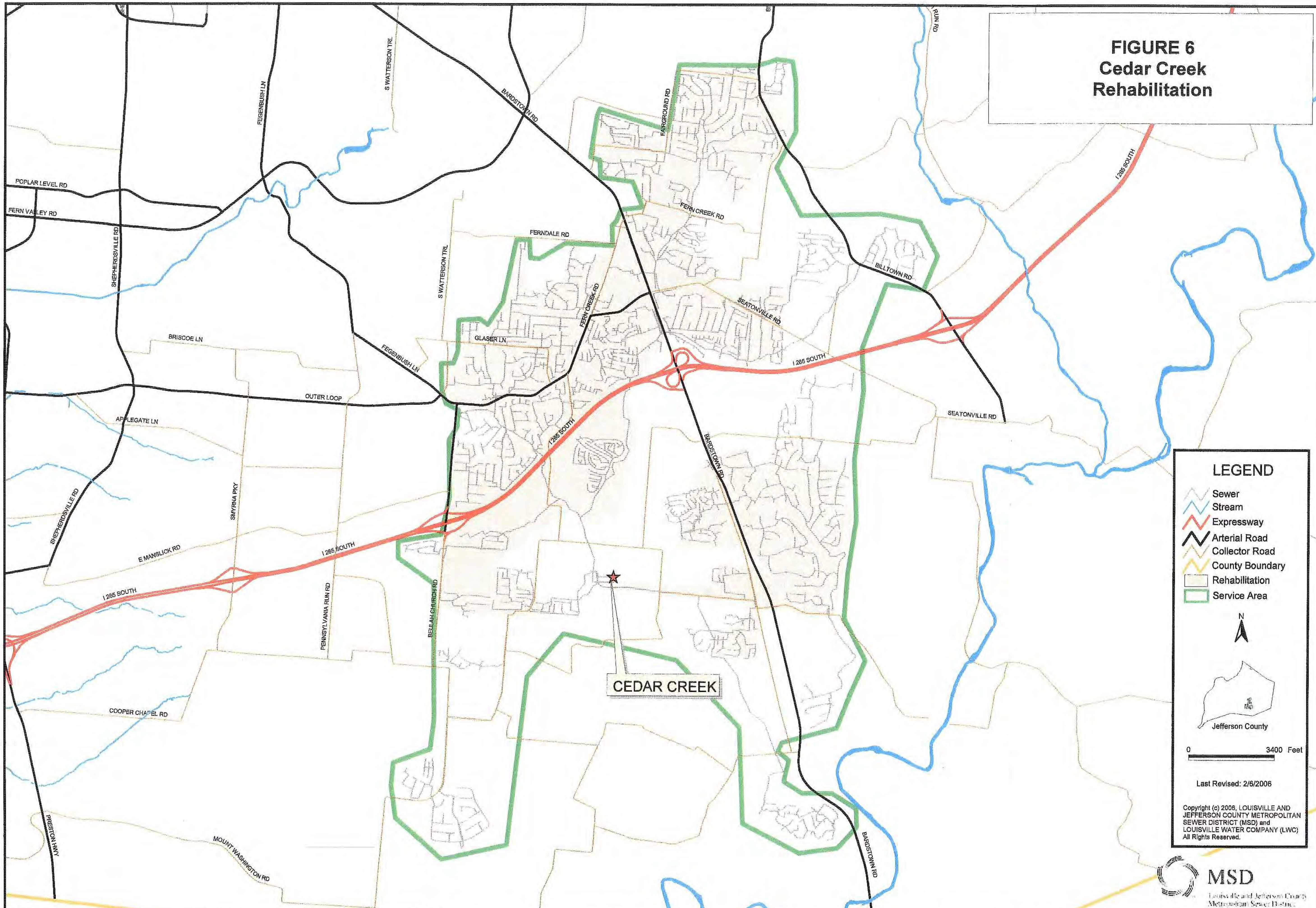


FIGURE 6
Cedar Creek
Rehabilitation
POPLAR LEVEL RD
FERN VALLEY RD
SHEPHERDSVILLE RD
FEGENBUSH LN
S WATTERSON TRL
BARDSTOWN RD
FAIRGROUND RD
FERN CREEK RD
FERNDALE RD
BILLTOWN RD
SEATONVILLE RD
GLASER LN
BRISCOE LN
OUTER LOOP
APPLEGATE LN
I 265 SOUTH
SMYRNA PKY
E MANSLICK RD
PENNSYLVANIA RUN RD
BEULAH CHURCH RD
COOPER CHAPEL RD
PRESTON HWY
MOUNT WASHINGTON RD
CEDAR CREEK
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Rehabilitation
Service Area
N
Jefferson County
0
3400 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD

of approximately 25% of the Birchwood system manholes identified chimney defects in the majority of these manholes. The manholes were divided into two tiers, tier 1 manholes were a top priority and Tier 2 manholes were the second priority and scheduled for rehabilitation if funds were available. There were 94 manholes in the tier 1 group and 58 manholes in the tier 2 group. The tier 1 and tier 2 manholes were rehabilitated using Cretex Chimney Seals and Flex Seal Utility Sealant. This project was completed in December 2000 and cost approximately $1,068,000.

3.2.5 Other Capital Projects in Cedar Creek

Cedar Creek Interceptor #11 Sanitary Sewer Project

This project involved the construction of approximately 6,150 linear feet of 8- to 15-inch gravity sewer and provided sanitary sewer service to the Pond Creek service area. The project provided for the elimination of the Cedar Creek Subdivision and Stonebluff Wastewater Treatment Plants, as well as the Tangelo Court and the Switchbark Pump Stations, both known overflows. The project also enabled collector projects to be initiated to provide collector sewers to unsewered areas. This project cost approximately $1,904,000.

Cedar Creek Subregional WTP Expansion Project

This project involved the expansion of the existing Cedar Creek Wastewater Treatment Plant from the existing 2.5 MGD average daily flow capacity to the capacity required to meet changing KPDES permit limits and measured and anticipated peak flows. The plant has since been expanded to 7.5 MGD in accordance with the Cedar Creek Area Action Plan Update (CCAPU). This project cost approximately $15,376,000.

Little Cedar Creek Interceptor Sanitary Sewer Project

This project involved the construction of 12,000 linear feet of trunk sewer ranging in size from 8- to 21- inch in diameter to eliminate four wastewater treatment plants (Farmgate, Gainsborough, Zelma Fields, and Beulah Land) and three pumping stations. This project was responsible for eliminating the known overflows at the Farmgate Wastewater Treatment Plant and the McKenna Way Pump Station. This project cost approximately $2,700,000.

3.2.6 Future / Ongoing Projects in Cedar Creek

Fern Hill Subdivision Interceptor #8 Sanitary Sewer Project (MSD Budget ID # C94086)

This project involves the construction of approximately 8,200 linear feet of 8- to 15- inch gravity sewer and will provide sanitary sewer service to the area through the provision of the required interceptor. This project will eliminate the Fern Hill Wastewater Treatment Plant and the existing Holly Oaks and Exhibition Ct. Pump Stations, all known overflows. The project will also enable collector projects to be initiated to provide sewer service to unsewered areas. The expected cost for this project is $837,000 with a completion date of March 30, 2009.

3.3 ELIMINATIONS

Over the years, several wastewater treatment plants and pump stations have been closed and eliminated through MSD's sanitary sewer expansion program. Their sizes range from large plants to small "package" plants and pumping stations designed to serve individual residences and businesses. The following list includes treatment plants and then pump stations eliminated from the Cedar Creek sewer system. Most of these facilities were privately owned before acquisition by MSD. Although records do not exist, it is suspected that each was probably an SSO. In addition to treatment plants and pump stations, the expansion program has also eliminated thousands of individual septic tank systems.

TREATMENT PLANTS

ID	NAME	ADDRESS	CAPACITY (GPD)
MSD0264	Idlewood	5600 Hofelich Ct	594,000
MSD0225	Fern Creek	6505 Bardstown Rd	20,000
MSD0295	Birchwood	6717 Santom Ln	250,000
MSD0223	Cedar Lake Park	6924 Holly Lake Dr	200,000
MSD0224	Farmgate	7502 Farmhouse Ln	
MSD0226	Gainsboro	7814 Watering Pl	90,000
MSD0231	Zelma Fields	8310 Silver Bell Ave	100,000
MSD0212	Beulah Land	8426 Damascus Cir	150,000
MSD0254	Glenmary	10616 Stonebreaker Rd	160,000

PUMP STATIONS

ID	NAME	ADDRESS
MSD0295A-PS	Birchwood	6717 Santom Ln
MSD0108-LS	Seatonville Road	10203 Seatonville Rd
81280-LS	St. Alban's	8920 Beulah Church Rd
MSD1079-PS	Mckenna Way	8300 Mckenna Way
MSD0181-PS	Beulah Church	7813 Beulah Church Rd
79634-PS	Rose Bowl South	7813 Beulah Church Rd
MSD0182-PS	Happiness Way	8410 Happiness Way
MSD0107-LS	Mary Sue Drive	8300 Randomwood Ct
MSD0121-LS	Cedar Springs	6943 Bardstown Rd
MSD1039-PS	Adams Run #2	8907 Cedar Creek Rd

<u>Fact Sheets</u>

The following pages are fact sheets of known unauthorized discharge locations. For status and discharge type definitions, refer to the SORP.

9517 PLUMWOOD COLL. SYS #3

MSD

Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility 70158

Customer Service 587-0603

Report as of December 2005

Service Area: CEDAR CREEK

Yr	Num Overflows	Estimated Volume
2005	1	803,000 Gallons
2004	2	332,000 Gallons
2002	1	72,000 Gallons

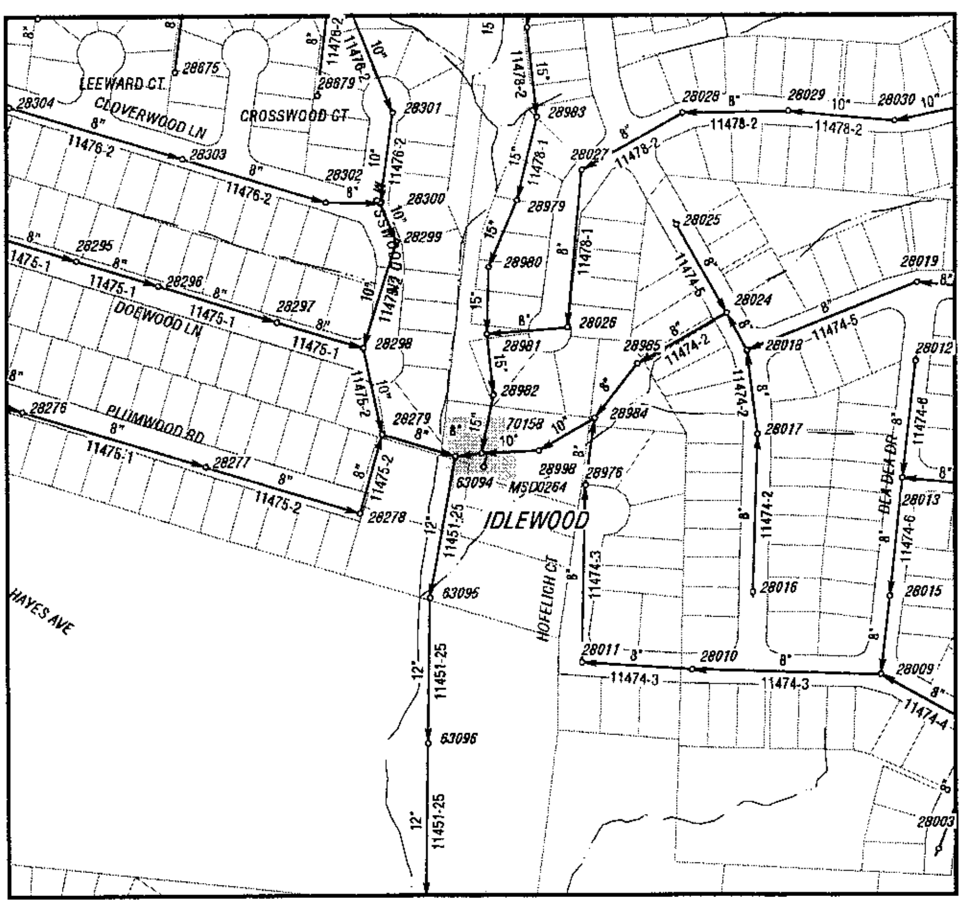
Background & History: This site was identified by computer model and verified in the field. Resident has verified overflow existance.

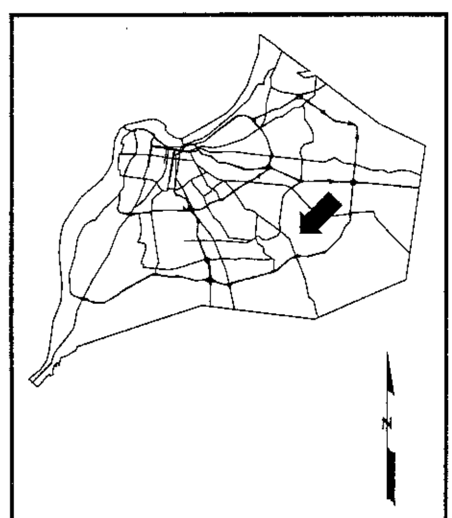
Pipe Size:
Inflow: 10"
Inflow: 15"
Outflow: 8"

Upstream Collection System Length: 51,100 L.F.
Watershed: CEDAR CREEK
Discharge Type: CAPACITY
Discharged To: GROUND
Receiving Stream: CEDAR CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	12.7 ac.
VACANT AND UNDEVELOPED	8.6 ac.
GENERAL COMM. AND OFFICE	1.6 ac.
MULTI-FAMILY RESIDENTIAL	1.5 ac.





Metro: MAN23

Atlas Map: BM236

Scale 1" = 400 '

MSD

Louisville-Jefferson County Metropolitan Sewer District

10801 FAIRMOUNT RD (30 FT EAST OF FAIRMOUNT RD PS)

MSD Facility 81316

Customer Service 587-0603

Report as of December 2005

Service Area: CEDAR CREEK

Yr	Num Overflows	Estimated Volume
2004	1	500 Gallons

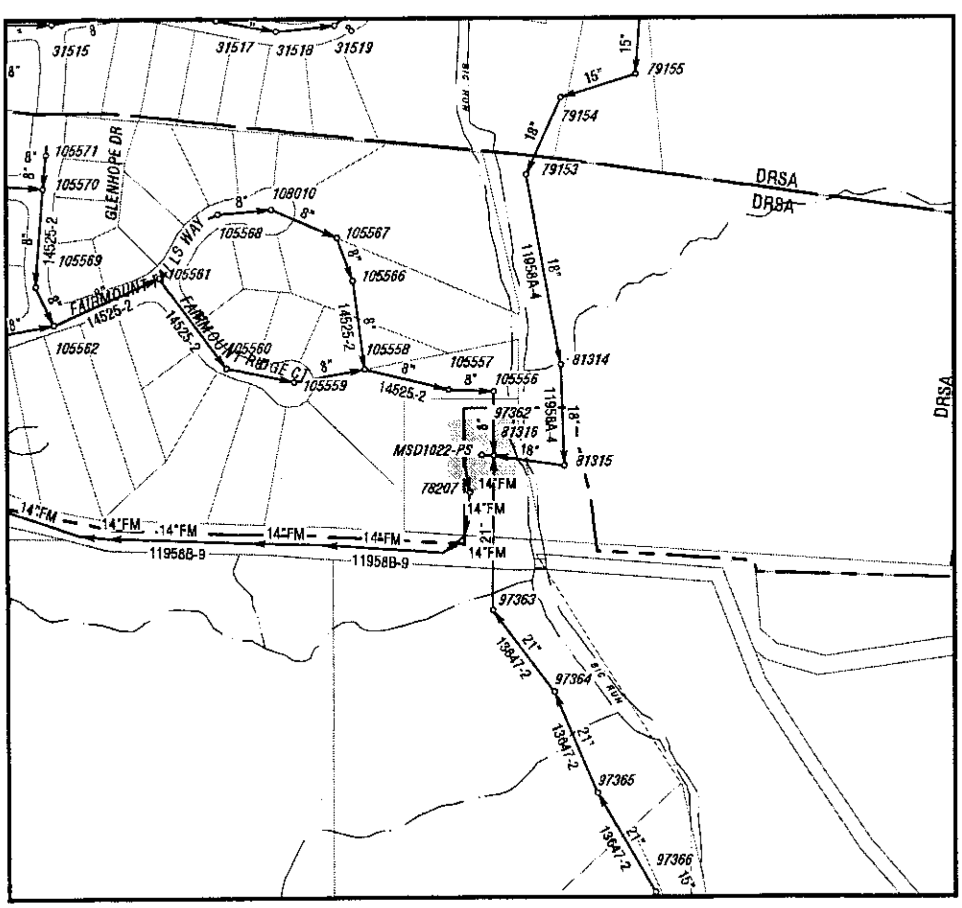
Background & History: This site was reported as an overflow in Hansen during FY04. It will be montitored in the future.

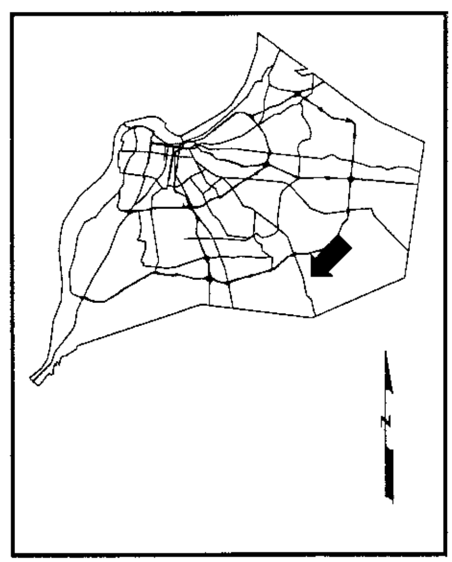
Pipe Size:
Inflow: 27"
Outflow: 27"

Upstream Collection System Length: 112,000 L.F.
Watershed: FLOYDS FORK
Discharge Type: CAPACITY
Discharged To: GROUND
Receiving Stream: BIG RUN
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	5.7 ac.
VACANT AND UNDEVELOPED	11.4 ac.
GENERAL COMM. AND OFFICE	0.1 ac.





Metro: MA023
Atlas Map: BW236

Scale 1" = 400 '

10801 FAIRMOUNT RD (2 MANHOLES UPSTREAM OF FAIRMOUNT RD PS)

MSD

Louisville-Jefferson County Metropolitan Sewer District

MSD Facility 97362

Customer Service 587-0603

Report as of December 2005

Service Area: CEDAR CREEK

Yr	Num Overflows	Estimated Volume
2004	2	101,000 Gallons

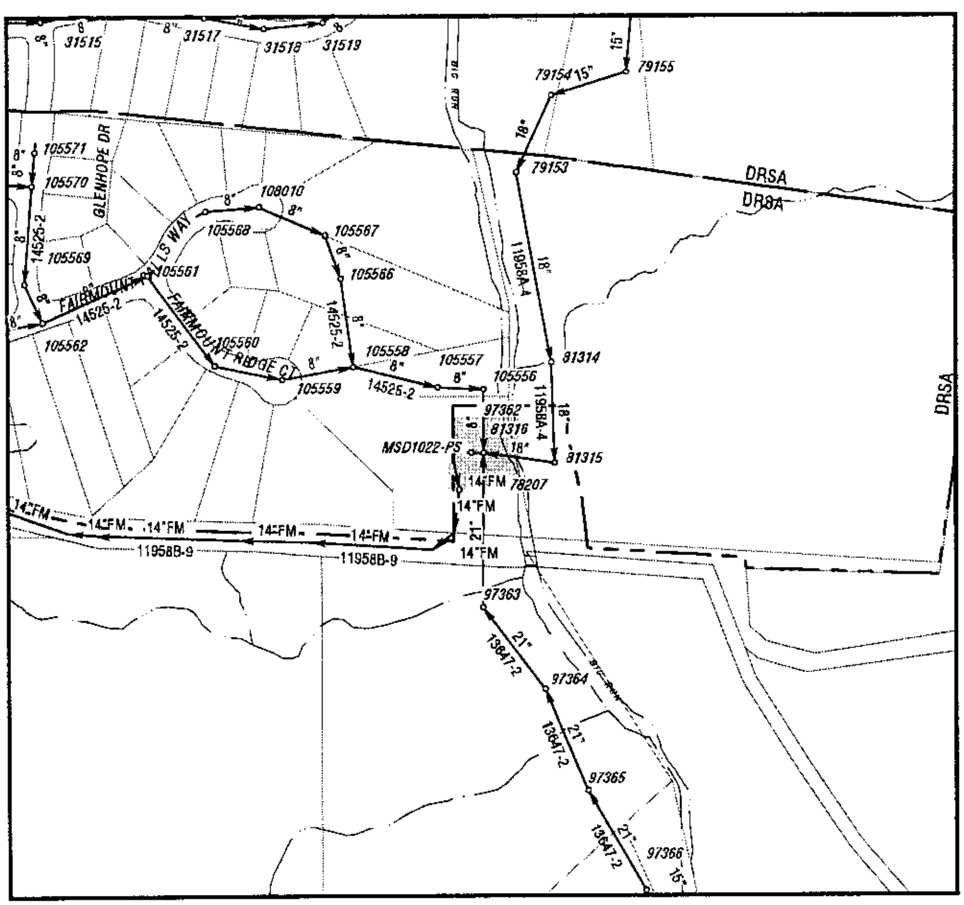
Background & History: This site was reported as an overflow in Hansen during FY04. It will be montitored in the future.

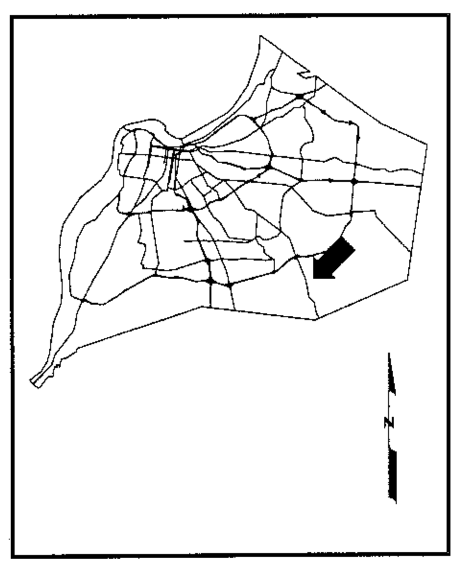
Pipe Size:
- Inflow: 18"
- Inflow: 8"
- Inflow: 21"
- Outflow: 27"

Upstream Collection System Length: 112,000 L.F.
Watershed: FLOYDS FORK
Discharge Type: CAPACITY
Discharged To: GROUND
Receiving Stream: BIG RUN
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	5.7 ac.
VACANT AND UNDEVELOPED	11.5 ac.
GENERAL COMM. AND OFFICE	0.1 ac.





Metro: MA023

Atlas Map: BW236

Scale 1" = 400 '

HOLLY OAKS PS

MSD
Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility MSD0161-LS

Customer Service 587-0603

Report as of December 2005

Service Area: CEDAR CREEK

Yr	Num Overflows	Estimated Volume
2005	2	4,200 Gallons
2004	8	229,000 Gallons
2003	5	129,000 Gallons
2002	5	178,000 Gallons
2001	4	252,000 Gallons

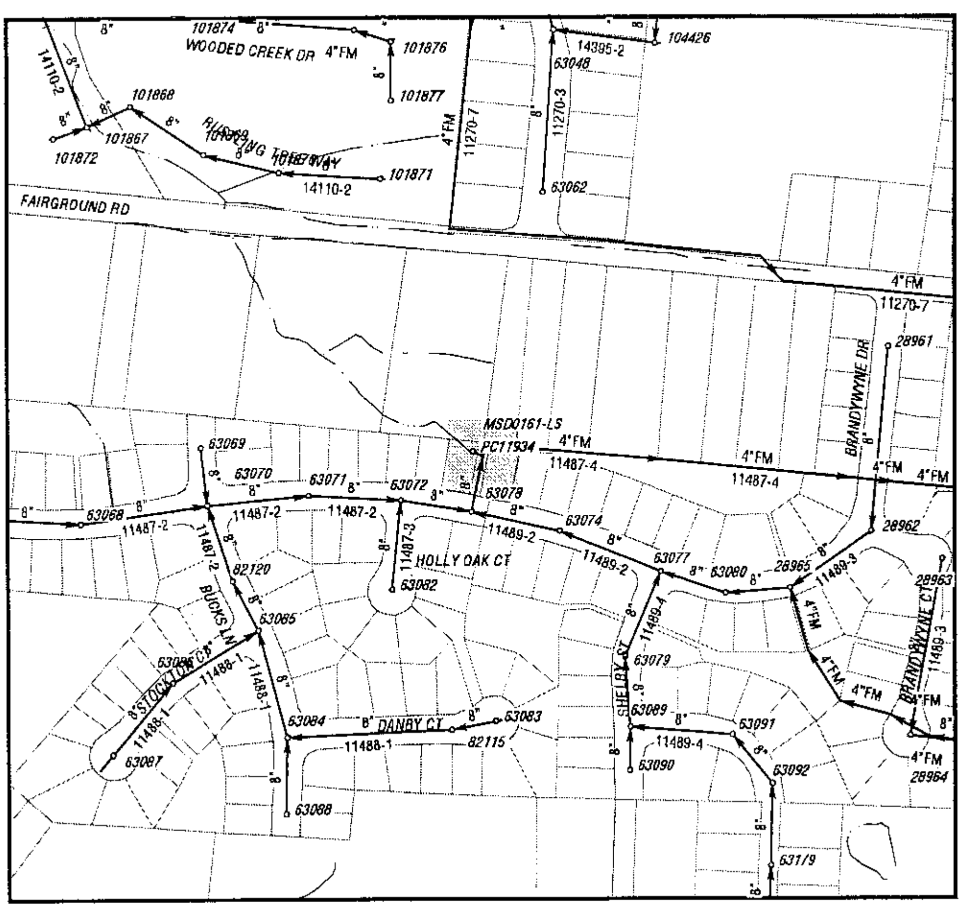
Background & History: This location was identified as having rainfall induced overflows in a 1995 study. No overflows as a result of heavy rain were reported during the period 1994-97.

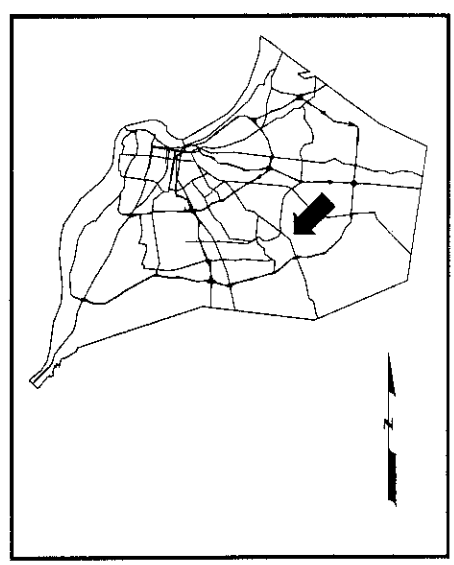
Pipe Size:
Inflow: 8"
Outflow: 4"
Outflow: 8"

Upstream Collection System Length: 8,000 L.F.
Watershed: POND CREEK
Discharge Type: PUMPED
Discharged To: DITCH
Receiving Stream: FERN CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	22.9 ac.
VACANT AND UNDEVELOPED	1.8 ac.





Metro: MAN22
Atlas Map: BM234

Scale 1" = 400 '

EXHIBITION CT

MSD
Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility MSD1052-PS

Customer Service 587-0603

Report as of December 2005

Service Area: CEDAR CREEK

Yr	Num Overflows	Estimated Volume
2004	1	15,000 Gallons

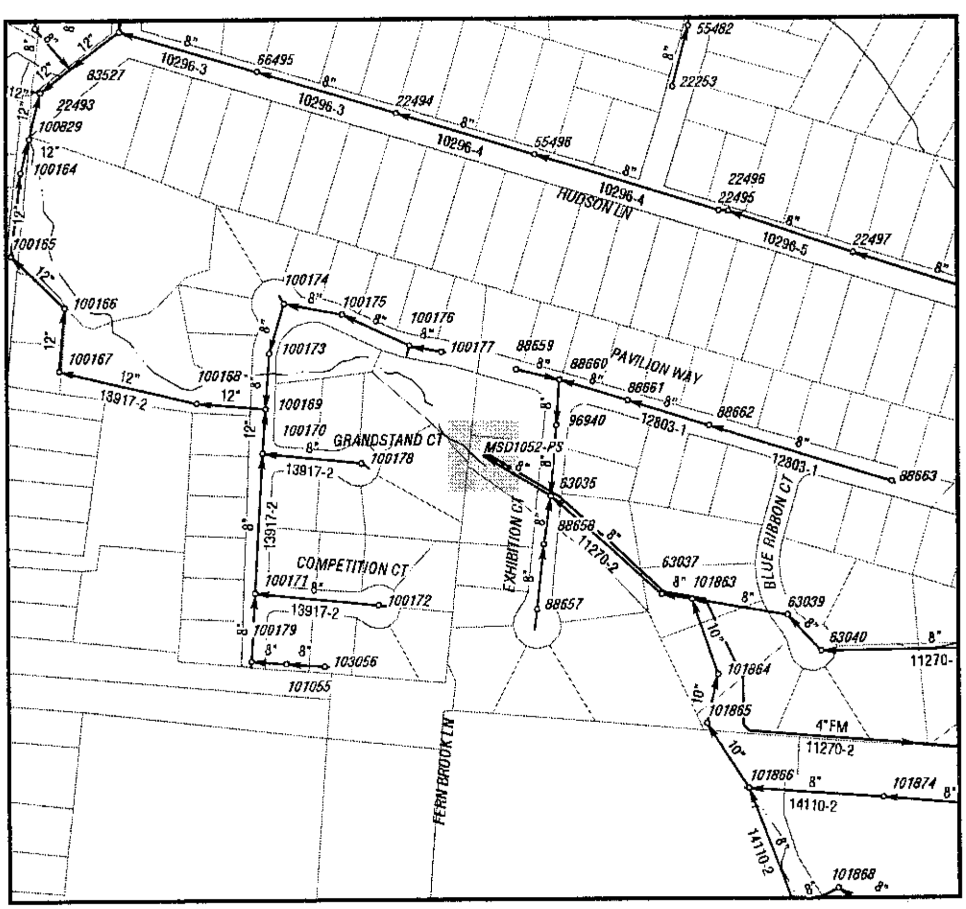
Background & History:

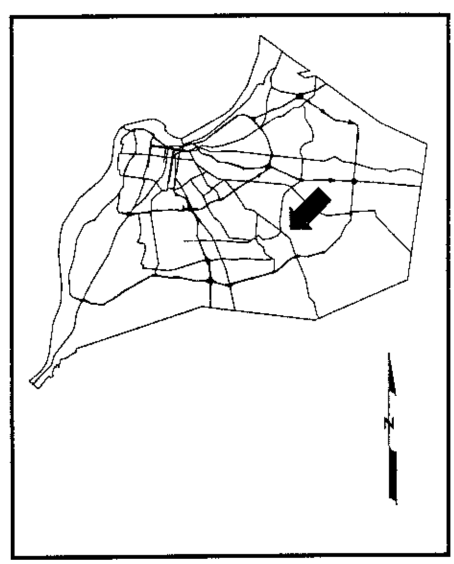
Pipe Size:
Inflow: 8"
Outflow: 4"

Upstream Collection System Length: 7,900 L.F.
Watershed: POND CREEK
Discharge Type: CAPACITY
Discharged To: DITCH
Receiving Stream: POND CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	22.4 ac.
MULTI-FAMILY RESIDENTIAL	1.6 ac.





Metro: MAN22
Atlas Map: BM234

Scale 1" = 400 '

MSD

Louisville and Jefferson County
Metropolitan Sewer District

SECTION 4

SECTION 4: HITE CREEK WASTEWATER TREATMENT PLANT

4.1 HITE CREEK WASTEWATER TREATMENT PLANT HISTORY

The Hite Creek Wastewater Treatment Plant came on line in late 1970 to provide service to the newly constructed Ford truck assembly plant and the surrounding suburbs in eastern Jefferson County. Various upgrades have occurred at the plant to increase the rated capacity. The facility now has a treatment design capacity of 6.0 million gallons per day and the average daily flow to the plant is 3.9 million gallons per day. The Ford truck assembly plant contributes nearly one million gallons per day to the facility.

The Hite Creek service area covers approximately 10 square miles and serves approximately 6,200 customers. The land use consists primarily of single family residential areas with a small amount of multi-family areas, commercial lots, and the Ford truck plant. The Hite Creek collection system contains approximately 597,000 linear feet (113 miles) of 8- to 30-inch diameter pipe, primarily 8" vitrified clay pipe (VCP) and PVC pipe constructed since 1970 (85%). However, approximately half of the system has been constructed since 2000. The service area includes 24 pump/lift stations. See Figure 1 for a map of the Hite Creek service area.

4.2 SSO PROJECT HISTORY

The wet weather project history diagram (Figure 2) illustrates the SSO-specific projects conducted in the Hite Creek sewershed since the inception of the consolidated SSO program in 1998. The following sections in this document describe each of the SSO-specific projects in detail and are organized by the five major project types:

- Flow monitoring
- SSES and other sewer investigation/study project
- Computer modeling
- Rehabilitation
- Post-Rehabilitation flow monitoring

Capital projects that removed SSOs (such as pump station and small treatment plant eliminations) are not included in the SSO-specific project history diagram but are included in the project write-up sections under "Other Projects." Figure 6 is a service area diagram showing the hydraulic connectivity of overflow locations. See Figures 3 – 5 for the program elements described in this section.

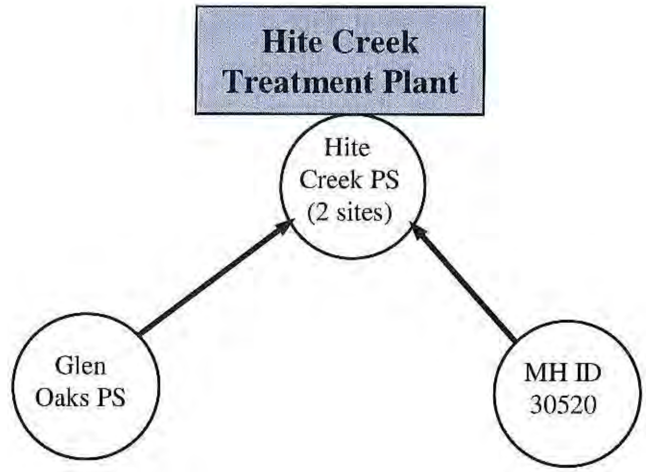


Figure 6 – Hite Creek – Hydraulic Connectivity Diagram of Unauthorized Discharges

4.2.1 Hite Creek Flow Monitoring

This study was conducted to determine the total flows going to the Hite Creek WTP on wet and dry weather days, estimate the flow contribution from the Ford Truck Plant, and to prioritize the basins for further investigation. Six flow monitors were installed for 70 days beginning May 2, 2000, and ending July 11, 2000. One monitor was also installed to determine the flows from the Crestwood system located in neighboring Oldham County. The area north of I-71 was not monitored because no suitable flow monitor location was identified. After analysis of the flow data began in mid-July, it became apparent that Meter 5 (just upstream of the WTP) had performed erratically and the data could not be corrected. Since an accurate reading of the total flows going to the plant was crucial, a new meter was installed beginning August 14, 2000, and ending October 23, 2000. The May-July data was used to prioritize and compare the sub-basins, while the August-October data was used for estimates of total flows to the WTP.

During the August-October flow monitoring period, three significant rain events were monitored: August 18 (0.76"), September 20-21 (1.30"), and September 24-25 (2.55"). It was determined from this flow monitoring project that the average flow for the monitoring period was 3.4 MGD and the Ford truck plant contributed approximately 1 MGD of flow based on a decrease in flow rates associated with the Ford truck plant shut down from June 10 through June 17. The 3.4 MGD average flow rate was about 77% of the plants rated capacity at the time and other efforts have reduced daily flows to the plant. In addition, peaking factors were relatively low (ranging from 1.9 to 4.4) but base flow was elevated and may be artificially lowering the peaking factor. The elevated base flow rate can be attributed to industrial flows and/or groundwater infiltration. Finally, the peak wet weather flow was 8.6 MGD and occurred in response to a 1.4 inch 24 hour rain event. The service area peaking factor was 3.3 for this event.

The flow data indicated that inflow reduction would help reduce peak flows, however; the heavy base flows would be difficult to reduce. There were several creek crossings/runs that have the potential for steady state infiltration into the system. In addition, it was recommended that a hydraulic model be prepared to determine future impacts of lateral extension and to identify areas with limited available capacity. Figure 3 represents the area that was flow monitored in Hite Creek.

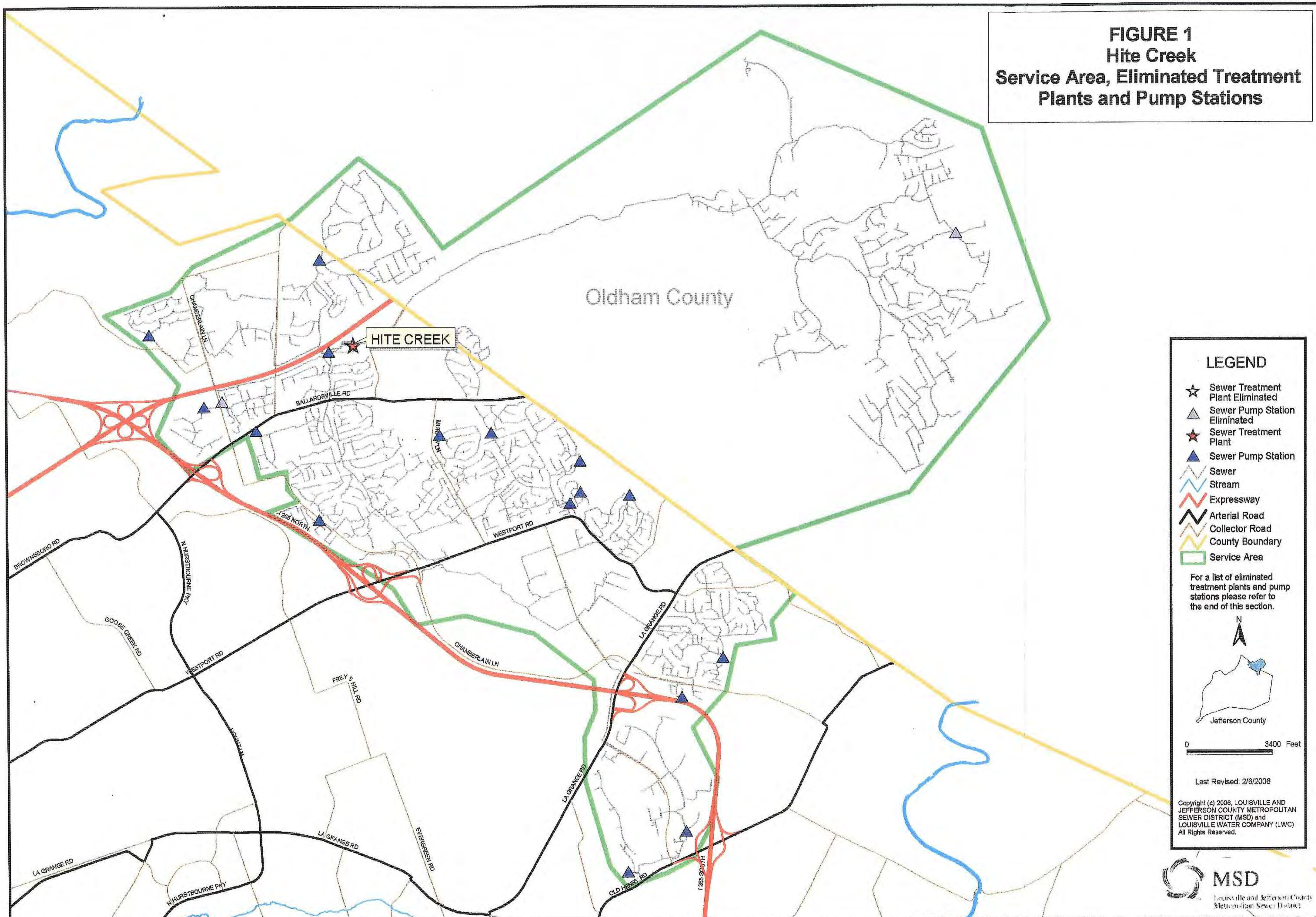
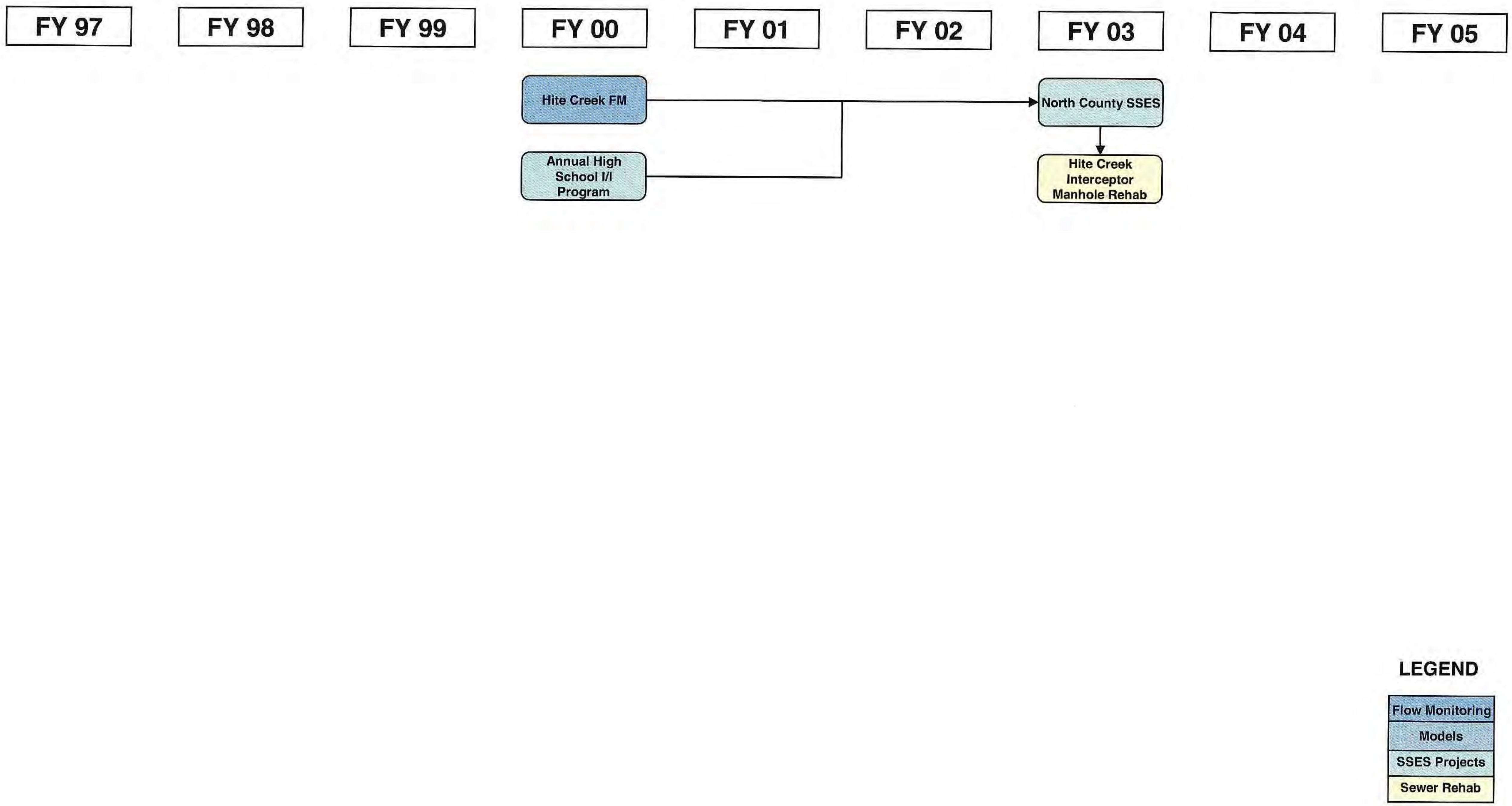


FIGURE 1
Hite Creek
Service Area, Eliminated Treatment Plants and Pump Stations

FIGURE 2
Hite Creek Project History

Hite Creek Sewershed Wet Weather Projects



MSD
Louisville and Jefferson County Metropolitan Sewer District

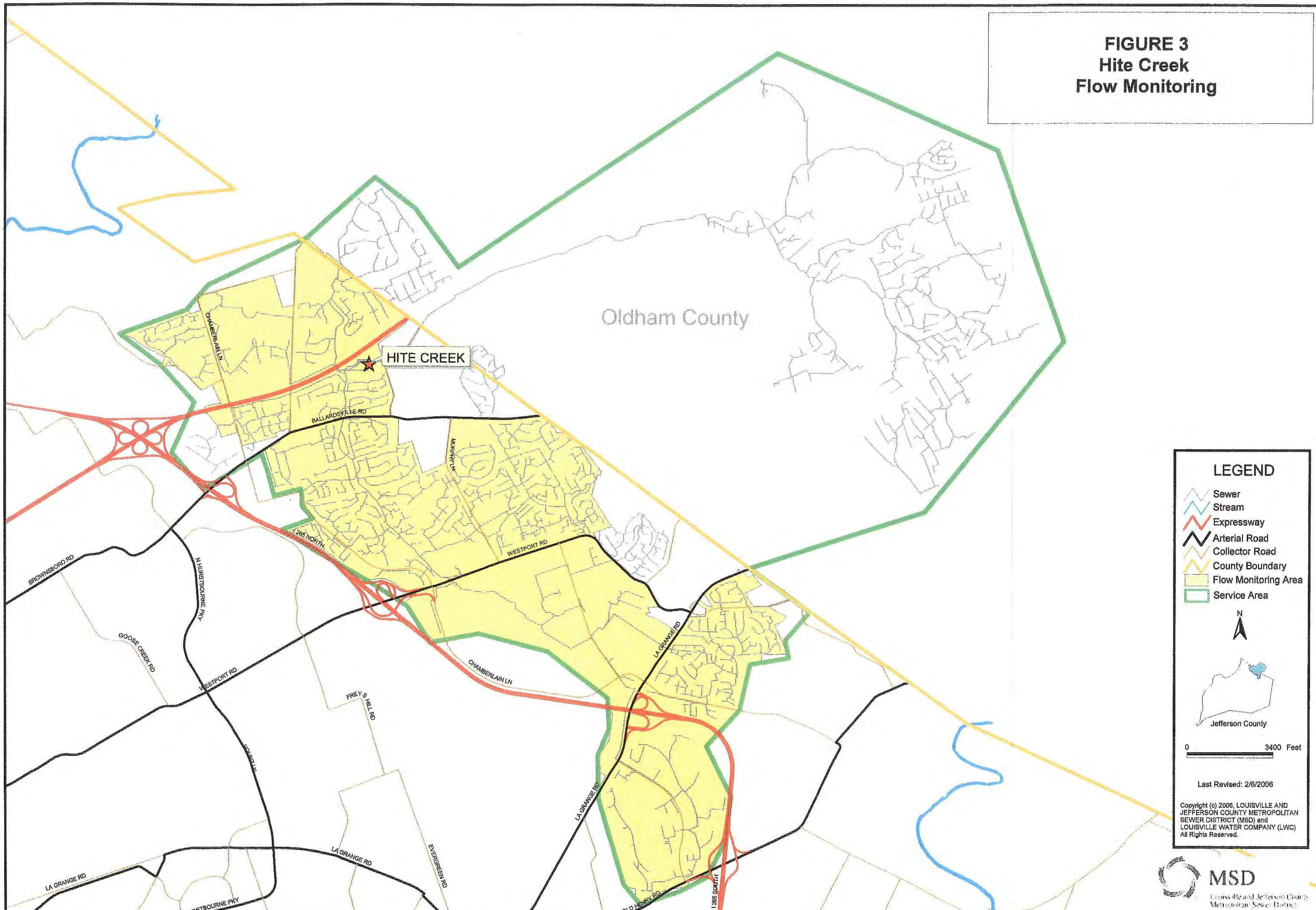


FIGURE 3
Hite Creek
Flow Monitoring

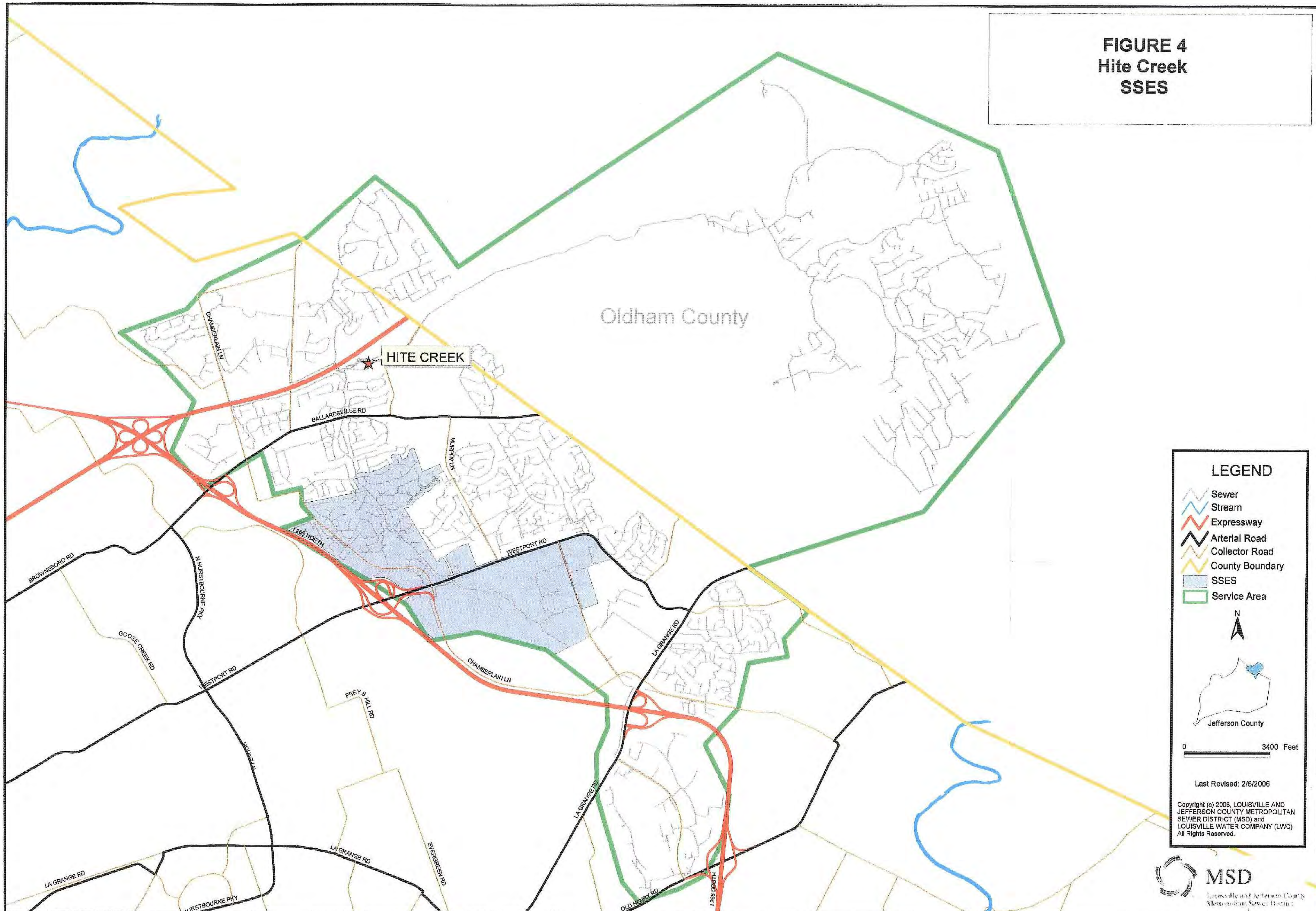


FIGURE 4
Hite Creek
SSES
Oldham County
HITE CREEK
CHAMBERLAIN LN
BALLARDSVILLE RD
MURPHY LN
1 265 NORTH
WESTPORT RD
BROWNSBORO RD
N HURSTBOURNE PKY
GOOSE CREEK RD
CHAMBERLAIN LN
LA GRANGE RD
FREYS HILL RD
LA GRANGE RD
EVERGREEN RD
HURSTBOURNE PKY
OLD HENRY RD
1 265 SOUTH
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
SSES
Service Area
N
Jefferson County
0
3400 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD

4.2.2 Hite Creek Sanitary Sewer Evaluation Study (SSES)

North County SSES

This investigation was focused on the Muddy Fork system which is part of the Morris Forman service area; however, one previously flow monitored basin in the Hite Creek collection system was studied as a part of this project. The basin included the Ford Motor Company Plant and the main interceptor leading to the Hite Creek WTP. The objective of this study was to locate and qualify sources of extraneous groundwater and stormwater entering the existing sanitary sewer system. The Hite Creek portion of this study included the following components to identify active and potential sources of I/I:

- Gathering and reviewing existing pertinent data (LOJIC, IMS, & flow data) to evaluate the quantity of I/I entering the sewer system;
- Conducting physical inspections of manholes to identify corrosion and structural defects that may be contributing excessive I/I (360 manholes);
- Conducting smoke testing to identify structural defects that may contribute to I/I (72,100 linear feet sewer);
- Conducting TV inspections (8,000 linear feet sewer), dyed-water flooding, and flow isolations in a limited amount of the system to identify structural defects that may contribute I/I to the system and blockages that may be inhibiting efficient hydraulic flow;

Inspections revealed that infiltration was likely to be the major contributing factor to excess wet weather flows, primarily due to leaky manholes and sewer joints. Manhole inspections and TVI indicated that the public side sewer was generally in good structural condition system-wide. However, many manholes along the Main Interceptor were located near Hite Creek and in low areas subject to flooding and as a result Inflow was significant in this area. Smoke Testing identified only a few private side defects, primarily defective cleanouts and one connected downspout. The significant manhole defects identified in this SSES were repaired under the Hite Creek Interceptor Manhole Rehabilitation project. This project cost approximately $291,000 and was completed in September 2003. Figure 4 represents the North County SSES study area.

4.2.3 Hite Creek Rehabilitation

Hite Creek Interceptor Manhole Rehabilitation

This project completed nearly $160,000 of rehabilitation for defects identified in the North County SSES project and was focused on eliminating inflow sources along Hite Creek and in areas subject to flood water inundation. This rehabilitation effort included the complete rehabilitation of 21 manholes using the Spraywall system, the installation of 31 manhole chimney seals, and the installation of 33 bolt-down water-tight castings. Figure 5 displays the rehabilitation work conducted under the Hite Creek Interceptor Manhole Rehabilitation project. This project cost approximately $202,000 and was completed in 2004.

4.2.4 Other Capital Projects in Hite Creek

Hite Creek Wastewater Treatment Plant Expansion Project

This project was necessitated by the continuing expansion of sewer service in the area to absorb on site systems and the continuing development in the area. A combination of modification to the existing facilities and the construction of new plant elements have increased the Plants capacity to 4.4 million gallons per day. This project was substantially completed and operational in 2005. The project cost was approximately $15,300,000 with a completion date of September 30, 2006.

4.3 ELIMINATIONS

Over the years, many wastewater treatment plants and pump stations have been closed and eliminated through MSD's sanitary sewer expansion program. Their sizes range from large plants to small "package" plants and pumping stations designed to serve individual residences and businesses. However, no treatment plants have been eliminated and few pump stations in the Hite Creek area because the regional treatment plant was constructed prior to significant development in this area of the county.

PUMP STATIONS

ID	NAME	ADDRESS
MSD1097-PS	Camden Acres	5924 Camden Acres Dr
MSD1107-PS	Cobblestone Subd	5108 Telford Ln

Fact Sheets

The following pages are fact sheets of known unauthorized discharge locations. For status and discharge type definitions, refer to the SORP.

MSD

Louisville-Jefferson County
Metropolitan Sewer District

MANHOLE ALONG CREEK WEST OF ELKINGTON LANE

MSD Facility 30520

Customer Service 587-0603

Report as of December 2005

Service Area: HITE CREEK

Yr	Num Overflows	Estimated Volume
2005	1	600,000 Gallons
2004	3	380,000 Gallons

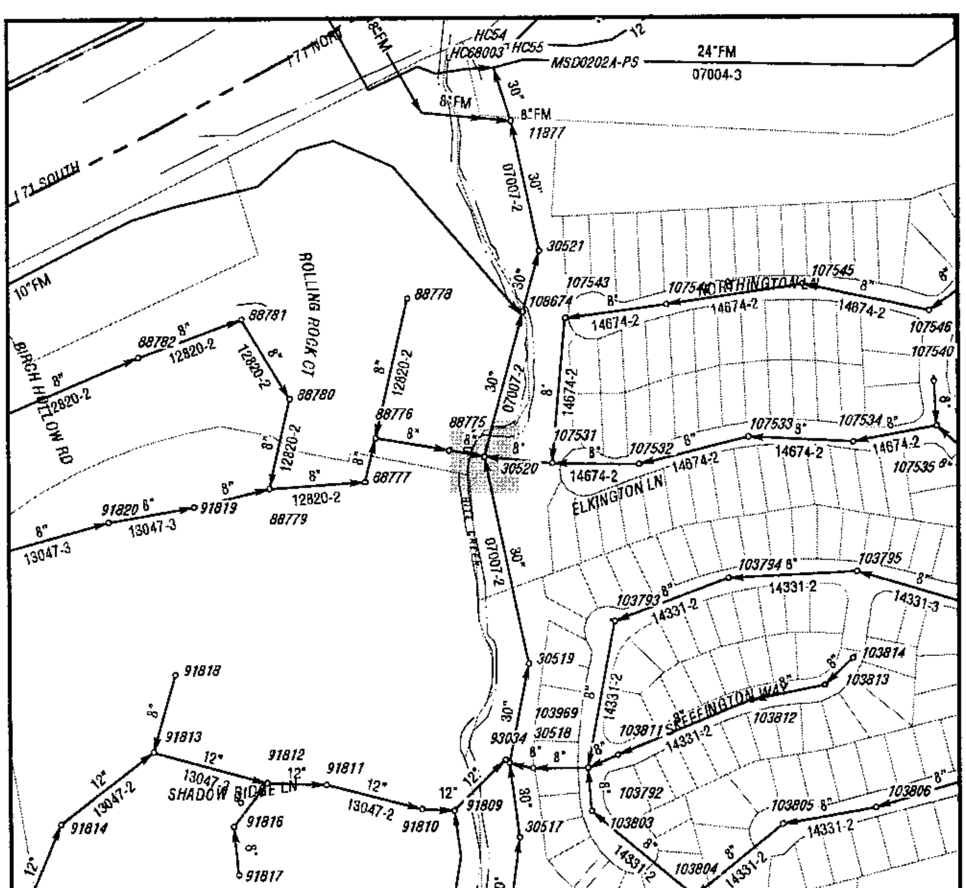
Background & History: This site is currently being monitored.

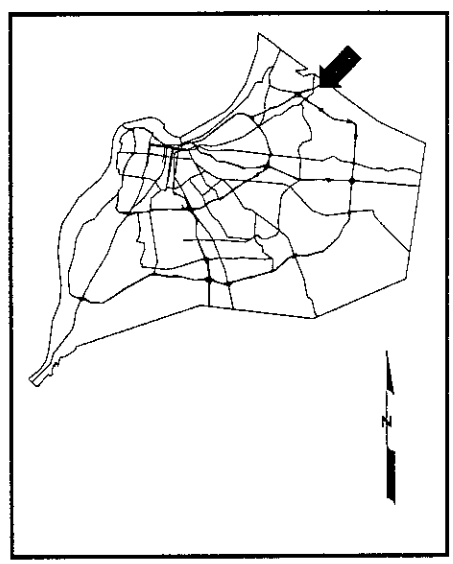
Pipe Size:
Inflow: 8"
Inflow: 30"
Inflow: 8"
Outflow: 30"

Upstream Collection System Length: 395,000 L.F.
Watershed: HARRODS CREEK
Discharge Type: CAPACITY
Discharged To: STREAM
Receiving Stream: HITE CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	2.1 ac.
VACANT AND UNDEVELDPED	10.7 ac.
MULTI-FAMILY RESIDENTIAL	1.1 ac.





Metro: MAJ23

Atlas Map: AK238

Scale 1" = 400 '

MSD
Louisville-Jefferson County
Metropolitan Sewer District

OVERFLOW LOCATION FOR HCWTP - AT REAR OF LOT

MSD Facility 11877

Customer Service 587-0603

Report as of December 2005

Service Area: HITE CREEK

Yr	Num Overflows	Estimated Volume
2004	1	10,000 Gallons
2003	8	323,000 Gallons
2002	9	763,000 Gallons
2001	3	330,000 Gallons

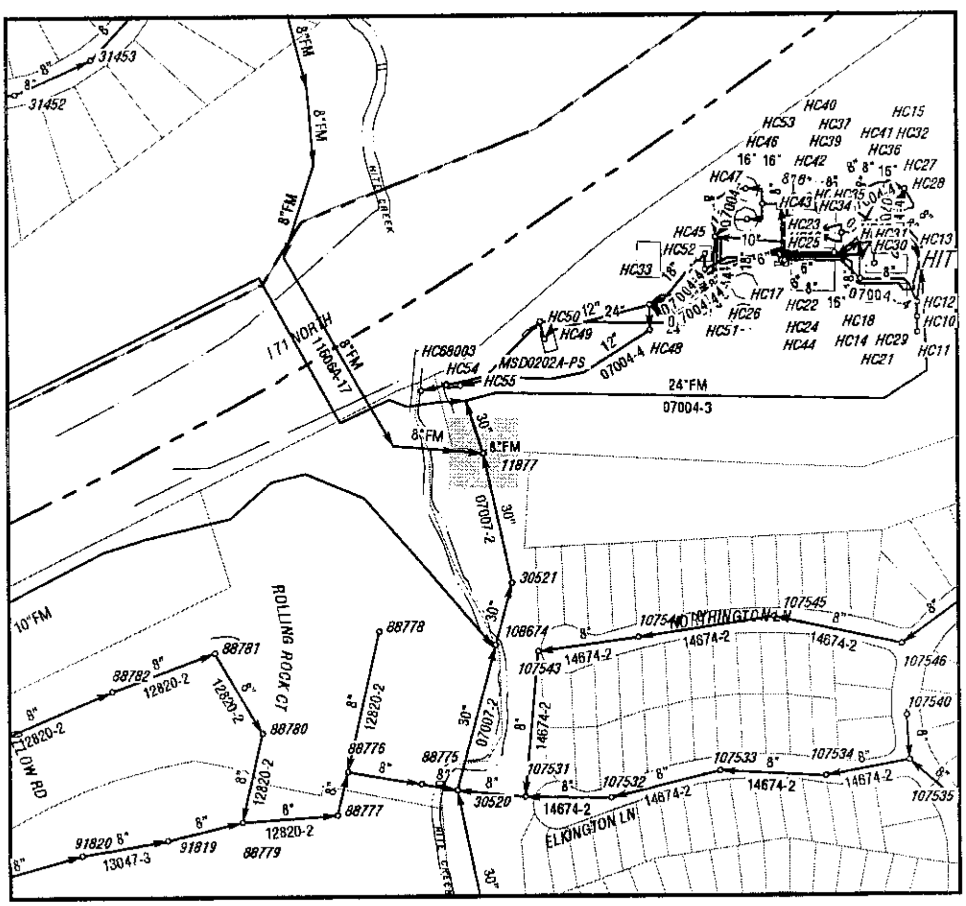
Background & History:

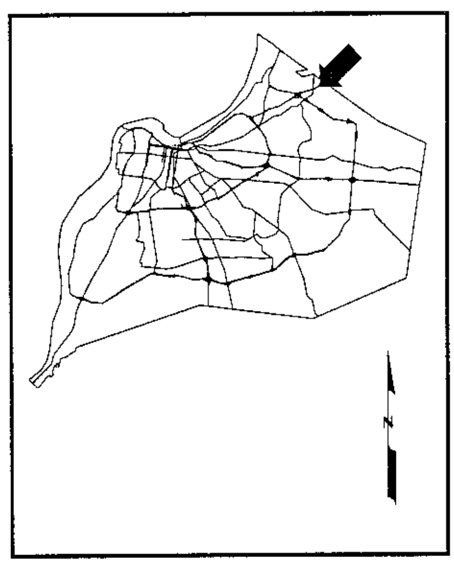
Pipe Size:
Inflow: 8"
Inflow: 30"
Outflow: 30"

Upstream Collection System Length: 475,000 L.F.
Watershed: HARRODS CREEK
Discharge Type: CAPACITY
Discharged To: STREAM
Receiving Stream: HITE CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	2.1 ac.
VACANT AND UNDEVELOPED	8.4 ac.
MULTI-FAMILY RESIDENTIAL	0.1 ac.





Metro: MAJ23
Atlas Map: AK238

Scale 1" = 400 '

GLEN OAKS

MSD
Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility MSD0191-PS

Customer Service 587-0603

Report as of December 2005

Service Area: HITE CREEK

Yr	Num Overflows	Estimated Volume
2003	1	2,000 Gallons
2002	2	23,500 Gallons

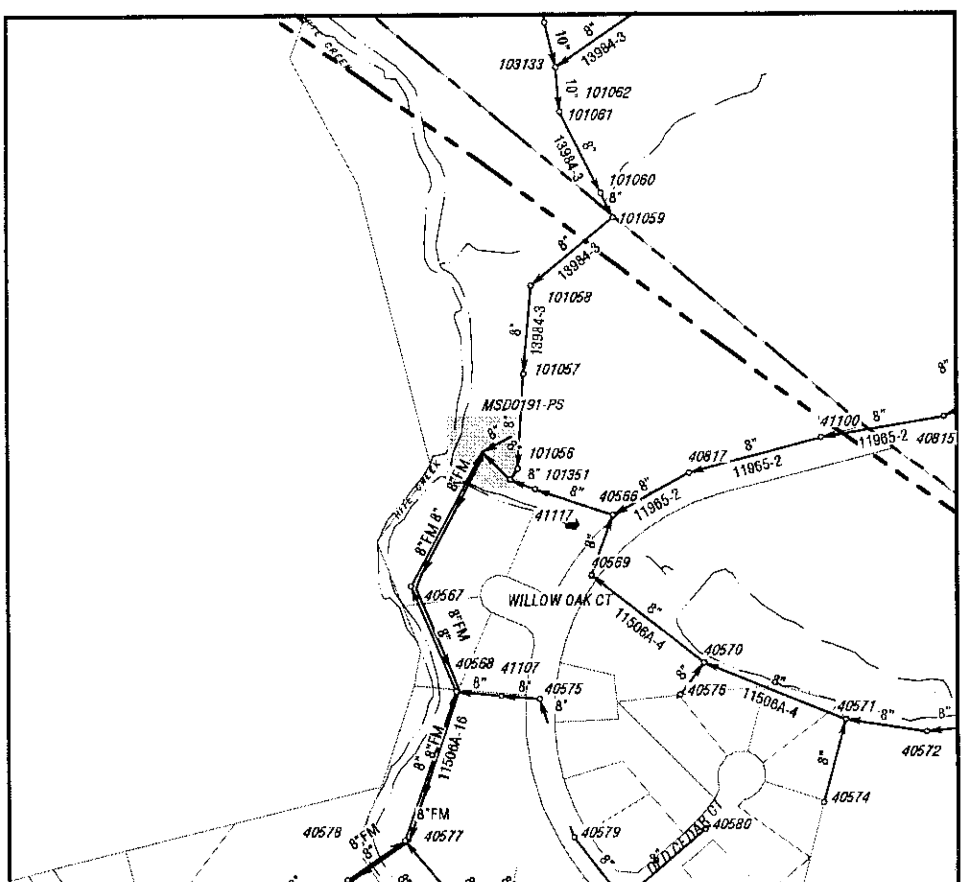
Background & History: This manhole was reported as an overflow during FY02. It will be monitored in the future.

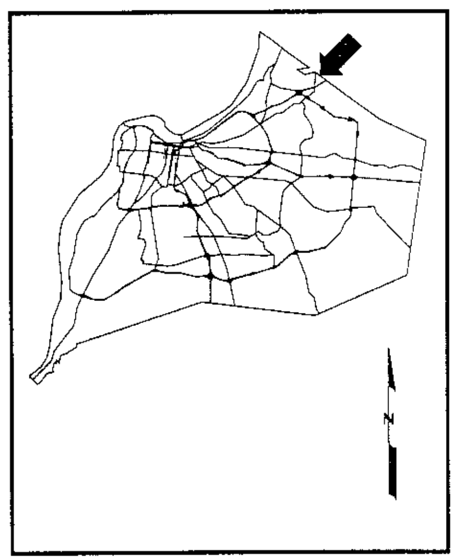
Pipe Size:
Inflow: 8"
Inflow: 8"
Inflow: 8"
Outflow: 8"

Upstream Collection System Length: 50,500 L.F.
Watershed: HARRODS CREEK
Discharge Type: CAPACITY
Discharged To: STREAM
Receiving Stream: HITE CREEK
Status: DOCUMENTED

Downstream Landuse:

VACANT AND UNDEVELOPED	11.1 ac.
SINGLE FAMILY RESIDENTIAL	9.7 ac.
MULTI-FAMILY RESIDENTIAL	0.7 ac.





Metro: MAJ23

Atlas Map: AI238

Scale 1" = 400 '

MSD

Louisville and Jefferson County
Metropolitan Sewer District

SECTION 5

SECTION 5: FLOYDS FORK WASTEWATER TREATMENT PLANT

5.1 FLOYDS FORK WASTEWATER TREATMENT PLANT HISTORY

Construction of the Floyds Fork Wastewater Treatment Plant was completed in 2001 to provide service to one of the fastest growing areas of Jefferson County while also eliminating several small treatment plants and off loading some areas that were previously directed to the Jeffersontown WTP. The plant's design capacity is 3.25 million gallons per day and the average daily flow to the plant is 1.2 million gallons per day.

The Floyds Fork service area covers approximately 6 square miles and serves approximately 2,200 customers. The land use consists primarily of single family residential housing with a small amount of apartments and commercial development. The Floyds Fork collection system contains approximately 274,000 linear feet (52 miles) of 8- to 54-inch diameter pipe, primarily 8" vitrified clay pipe (VCP) and PVC pipe constructed since the 1950s (66%). However, approximately 56% of the system has been constructed since 2000. The service area includes 11 pump/lift stations. See Figure 1 for a map of the Floyds Fork service area.

5.2 SSO PROJECT HISTORY

The wet weather project history diagram (Figure 2) illustrates the SSO-specific projects conducted in the Floyds Fork sewershed since the inception of the consolidated SSO program. Most of these projects were conducted when these areas were actually part of the Morris Forman WTP sewershed before the Tucker Station Interceptor re-routed them to the Floyds Fork WTP in 2001. The following sections in this document describe each of the SSO-specific projects in detail and are organized by the five major project types:

- Flow monitoring
- SSES and other sewer investigation/study project
- Computer modeling
- Rehabilitation
- Post-Rehabilitation flow monitoring

Capital projects that removed SSOs (such as pump station and small treatment plant eliminations) are not included in the SSO-specific project history diagram but are included in the project write-up sections under "Capital Projects." See Figures 3 – 6 for the program elements described in this section.

5.2.1 Floyds Fork Flow Monitoring

Pope Lick Flow Monitoring

Six flow meters and one rain gauge were installed in the Pope Lick service area from January 31, 1998, to March 22, 1998. The purpose of the study was to establish the dry and wet weather flows so that a proposed Pope Lick Pump Station could be properly sized. Two significant rain events were monitored: March 9 (1.05") and March 20 (1.72"). The hydrographs were analyzed to determine the nature of the problem for each basin. The following figure shows a flow monitoring schematic of the sewer systems in the Floyds Fork study area. The numbered circles in Figure 7 represent the basins monitored by each of the flow meters.

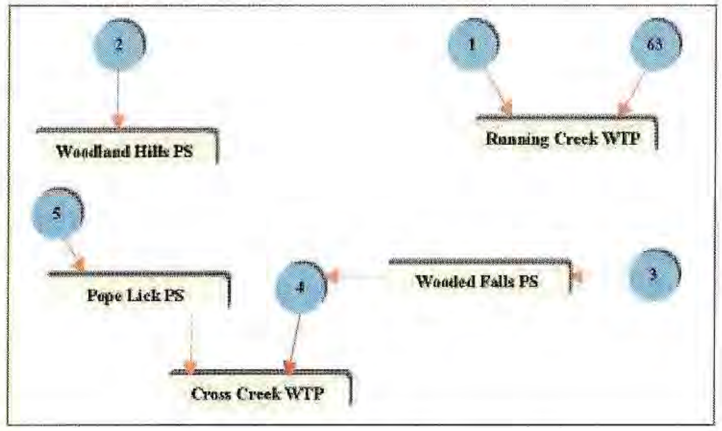


Figure 7 – Pope Lick Flow Monitoring Schematic

Results from the monitoring indicated each of the sites in the Pope Lick basin experienced some amount of I/I during rain events. The hydrographs showed that some areas experienced more inflow than infiltration and vice versa. Many sites experienced immediate increases in flow rate after rain events, indicating inflow sources in the system. There were also a significant amount of surcharges throughout the system.

A wet weather peaking factor of 3 - 4 is generally considered acceptable and it was determined through this study that five of the monitored basins had peaking factors greater than 4. The only area with an acceptable peaking factor was Running Creek South (basin 63). The largest peak flow rate occurred in Woodland Hills but the quantity of I/I per foot of sewer main was greatest in the Running Creek North area, followed by Pope Lick and then Woodland Hills. The major pipe defects identified in these areas were rehabilitated under the Pope Lick I/I Remediation projects. In addition, it was determined that the average flow rate for the entire project area during the monitoring period was 0.74 MGD and that the peak wet weather flow rate was 3.75 MGD. This project was part of the Pope Lick SSES project and was completed in December 1999. Figure 3 represents the area that was flow monitored in Pope Lick.

5.2.2 Floyds Fork Sanitary Sewer Evaluation Study (SSES)

<u>Pope Lick SSES</u>

The objective of this study was to develop a plan of improvements to rehabilitate the sewer collection system. This project included flow monitoring and cost approximately $388,000. This work was focused toward setting up projects to rehabilitate the defects found during the SSES with an emphasis on rehabilitation improvements, O&M concerns, estimated I/I reduction, and estimated costs. The study included the following components to identify active and potential sources of I/I:

- Gathering and reviewing pertinent data in the Louisville and Jefferson County Information Consortium database and MSD's Information Management System database (LOJIC, IMS) to evaluate the quantity of I/I entering the sewer system;
- Conducting a flow monitoring program to monitor rain events and measure wastewater flows at key points in the sewer system (six flow monitors and one rain gauge for 51 days);
- Conducting physical inspections of manholes to identify corrosion and structural defects that may be contributing excessive I/I (total of 354 manholes inspected);
- Conducting smoke testing to identify structural defects that may contribute to I/I (75,700 linear feet sewer);

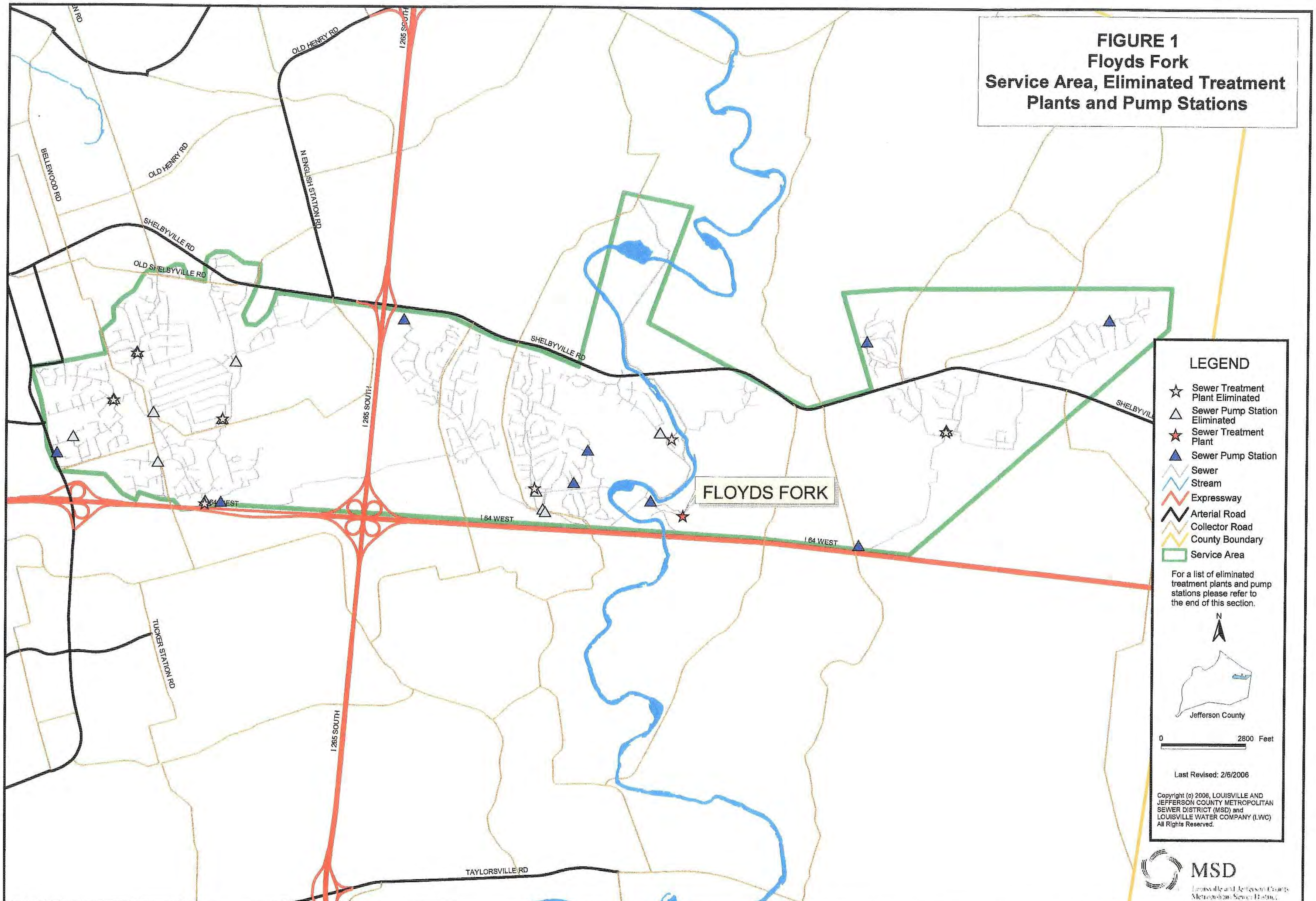
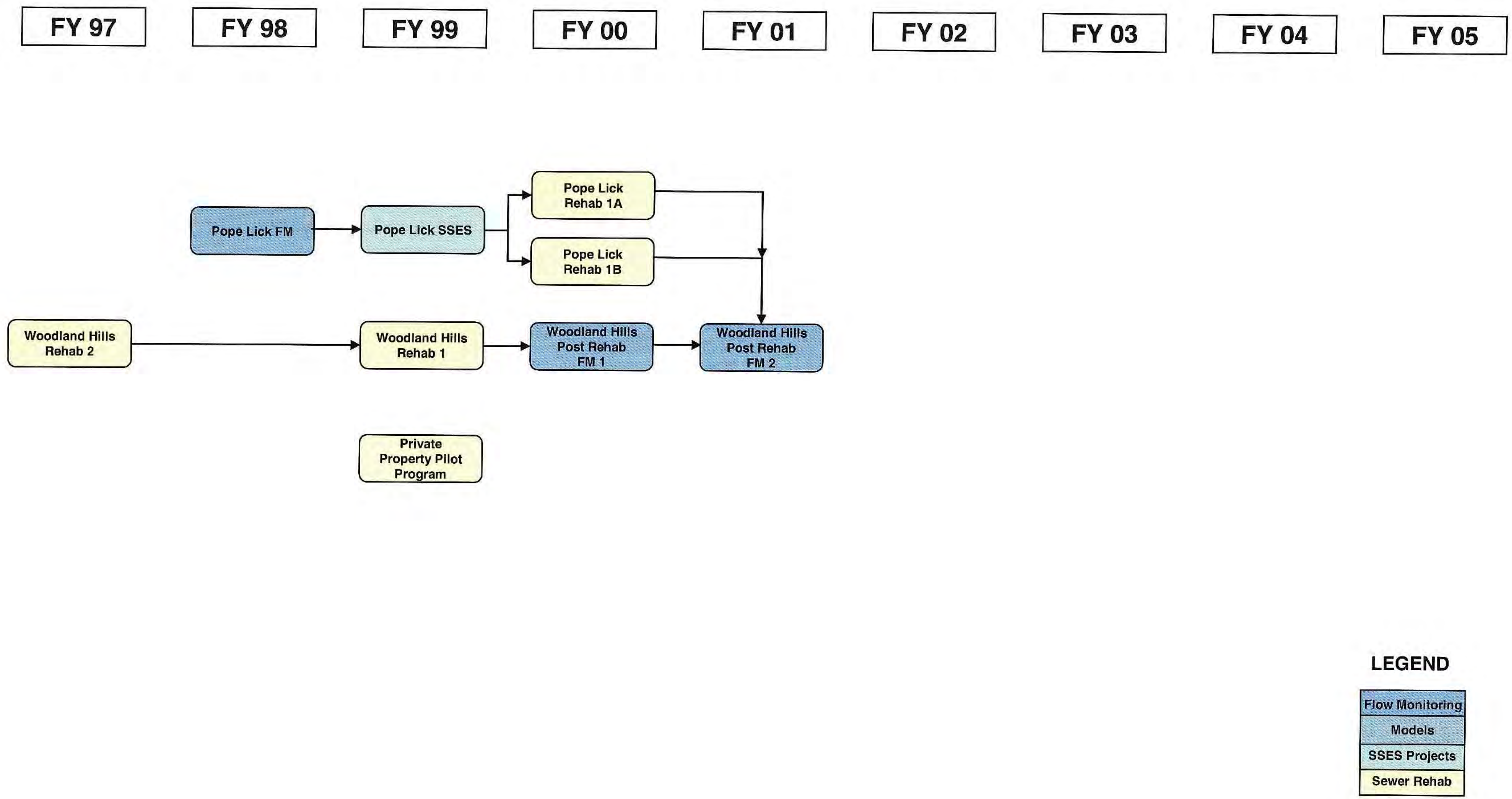


FIGURE 1
Floyds Fork
Service Area, Eliminated Treatment Plants and Pump Stations

FIGURE 2
Floyds Fork Project History

Floyds Fork Sewershed Wet Weather Projects



MSD
Louisville and Jefferson County Metropolitan Sewer District

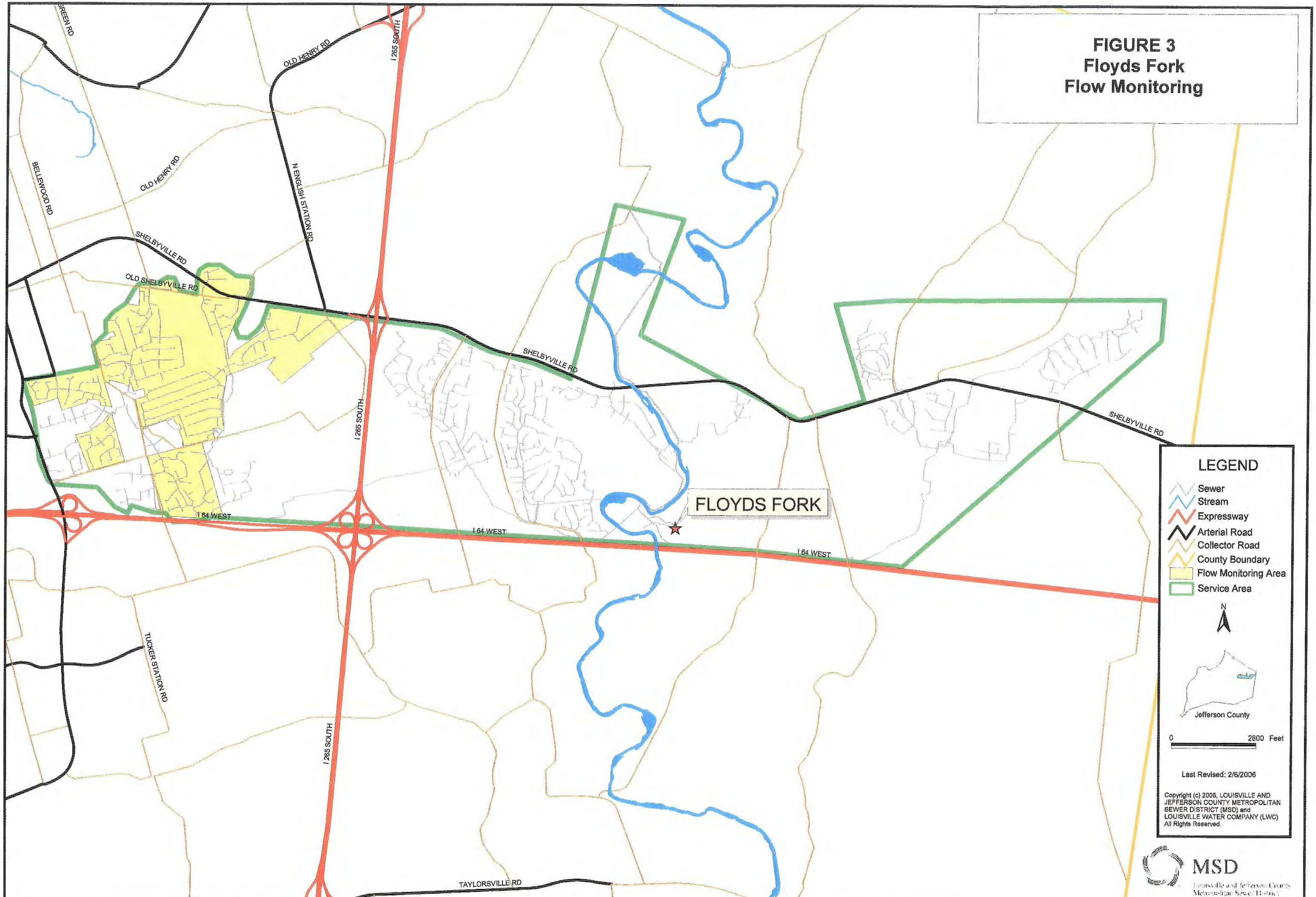


FIGURE 3
Floyds Fork
Flow Monitoring
FLOYDS FORK
OLD HENRY RD
I 265 SOUTH
BELLEWOOD RD
N ENGLISH STATION RD
SHELBYVILLE RD
OLD SHELBYVILLE RD
I 64 WEST
TUCKER STATION RD
TAYLORSVILLE RD
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Flow Monitoring Area
Service Area
N
Jefferson County
0
2800 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD

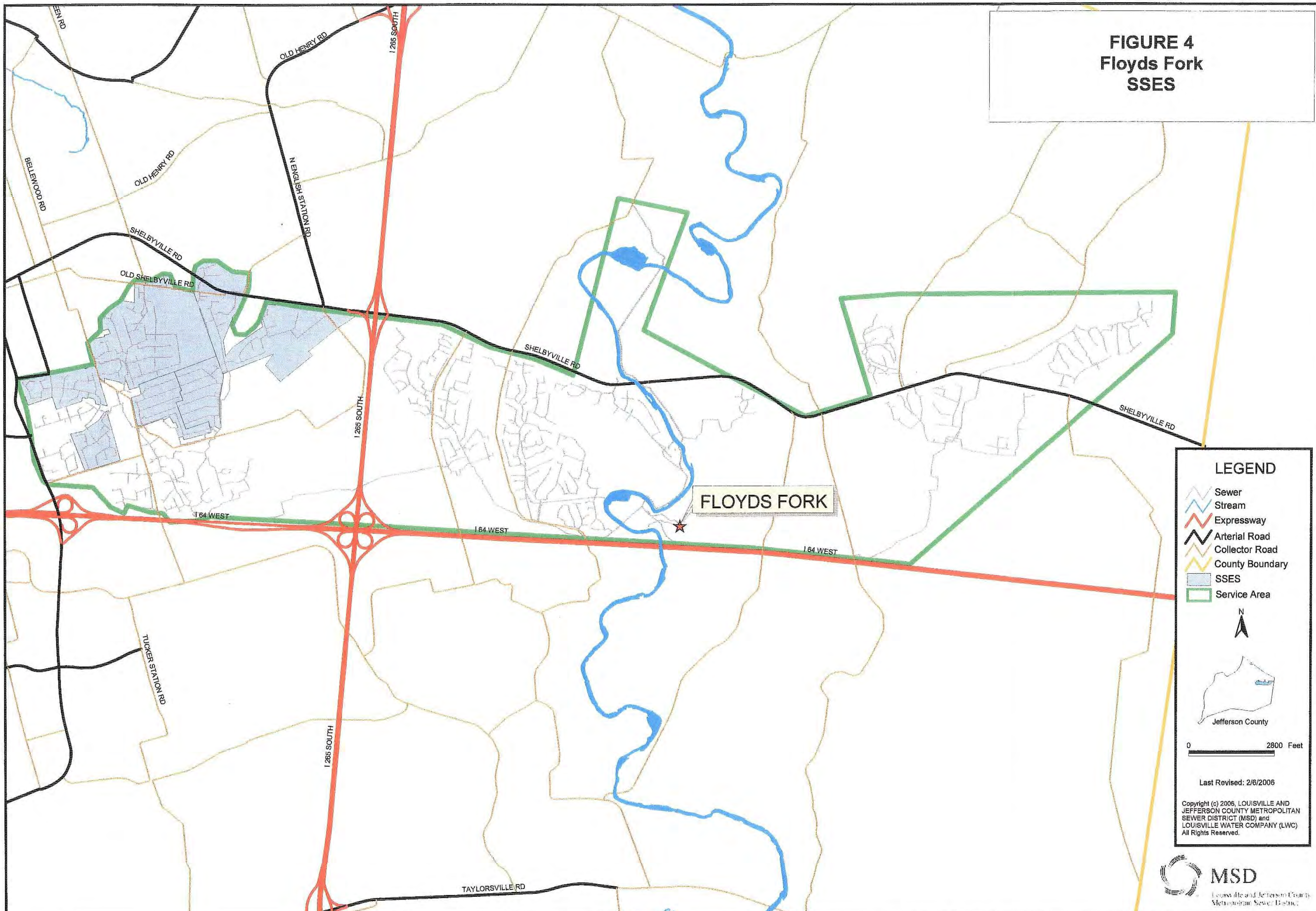


FIGURE 4
Floyds Fork
SSES
OLD HENRY RD
I 265 SOUTH
BELLEWOOD RD
OLD HENRY RD
N ENGLISH STATION RD
SHELBYVILLE RD
OLD SHELBYVILLE RD
SHELBYVILLE RD
SHELBYVILLE RD
I 265 SOUTH
FLOYDS FORK
I 64 WEST
I 64 WEST
I 64 WEST
TUCKER STATION RD
I 265 SOUTH
TAYLORSVILLE RD
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
SSES
Service Area
N
Jefferson County
0
2800 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD
Louisville and Jefferson County Metropolitan Sewer District

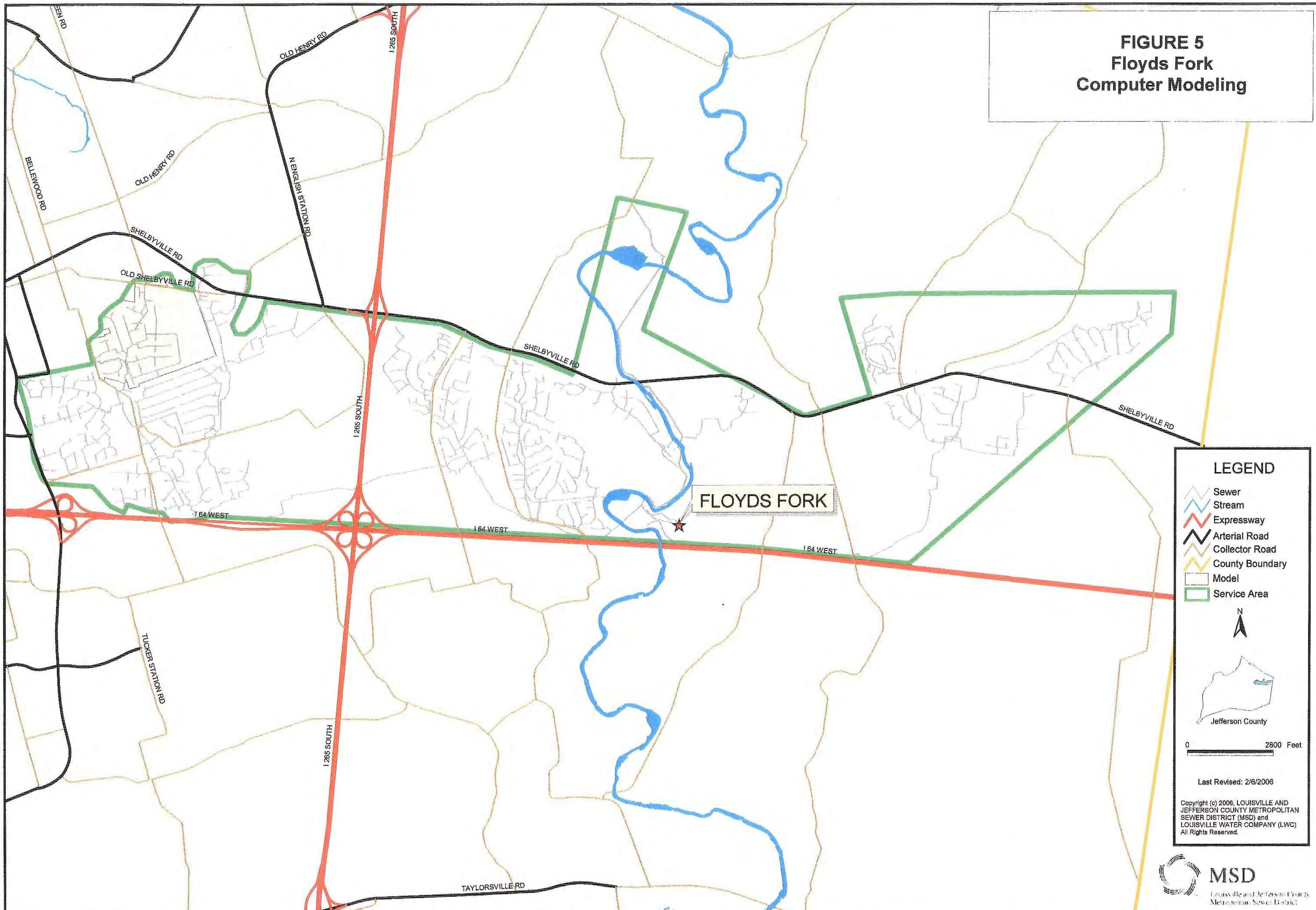


FIGURE 5
Floyds Fork
Computer Modeling
FLOYDS FORK
OLD HENRY RD
I 265 SOUTH
BELLEWOOD RD
N ENGLISH STATION RD
SHELBYVILLE RD
OLD SHELBYVILLE RD
I 64 WEST
TUCKER STATION RD
TAYLORSVILLE RD
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Model
Service Area
N
Jefferson County
0
2800 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD
Louisville and Jefferson County Metropolitan Sewer District

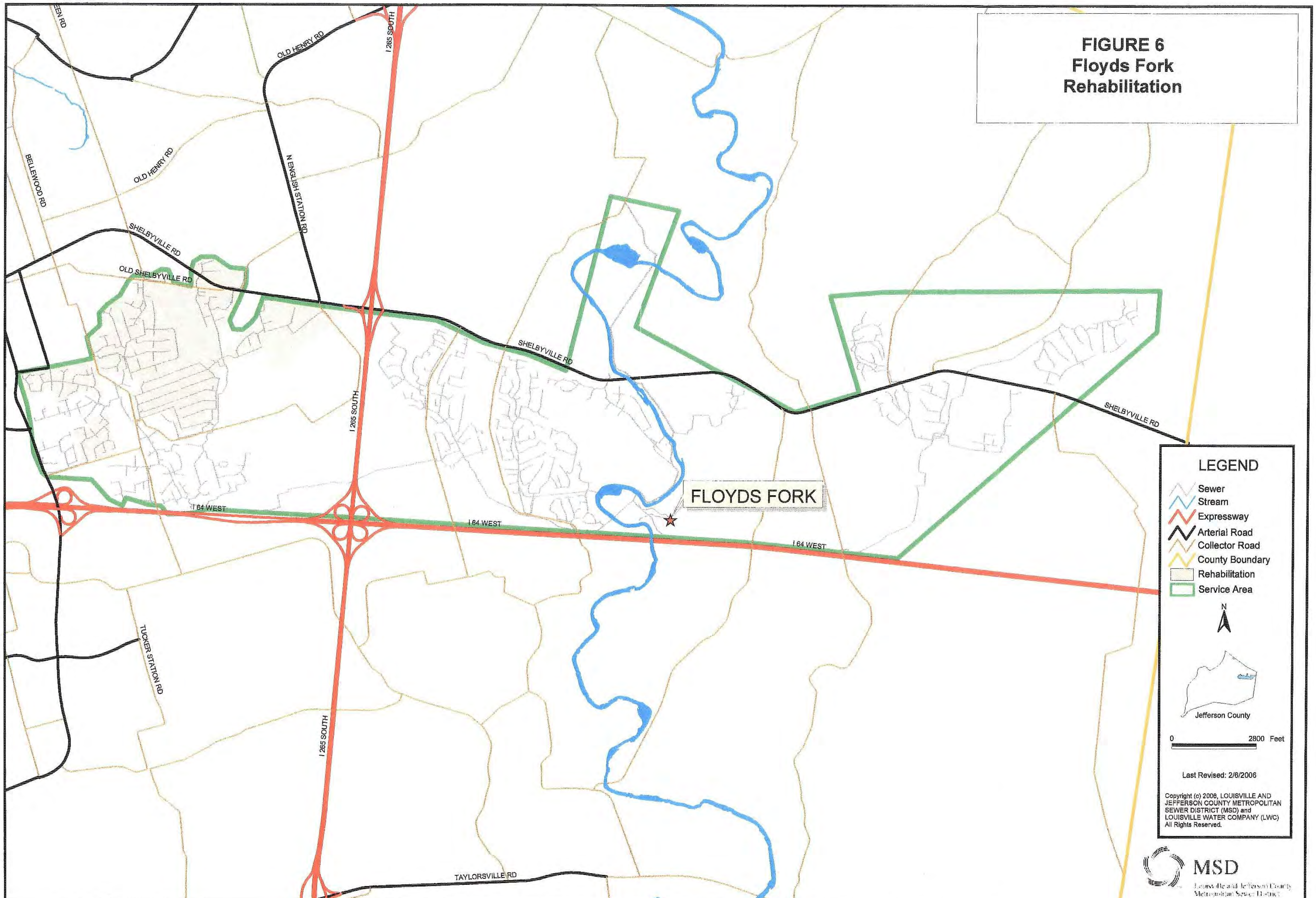


FIGURE 6
Floyds Fork
Rehabilitation
OLD HENRY RD
I 265 SOUTH
BELLEWOOD RD
N ENGLISH STATION RD
SHELBYVILLE RD
OLD SHELBYVILLE RD
FLOYDS FORK
I 64 WEST
TUCKER STATION RD
TAYLORSVILLE RD
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Rehabilitation
Service Area
N
Jefferson County
0
2800 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD

- Conducting TV inspections (33,800 linear feet sewer), dyed-water flooding, and flow isolations in a limited amount of the system to identify structural defects that may contribute I/I to the system and blockages that may be inhibiting efficient hydraulic flow;
- Compiling and analyzing data generated during the SSES to quantify the amount of excessive I/I entering the system and prioritize sub-basins for rehabilitation.

Field inspection results confirmed that Woodland Hills had significant main line defects, although manhole condition appeared to be sound. Night flow isolation revealed some extremely high infiltration rates in Woodland Hills, including areas that had previously been lined by CIPP. This pointed to a private source problem—either defective laterals, connected sump pumps, or other unidentified defects. Coupled with the recurring SSO problems at the Woodland Hills Pump Station, these findings indicated that Woodland Hills should be targeted for removal of both inflow and infiltration sources both public and private side, in order to lower flow volumes conveyed to the overloaded Woodland Hills Pumping Station. The significant defects identified in the Woodland Hills area were repaired under the Pope Lick Rehabilitation Phase 1B project.

Field inspection results also indicated extensive manhole and mainline defects in the Cross Creek subdivision. Many of these critical main line defects occurred in the deepest sections of the system along a stormwater drainage swale. Running Creek and Pope Lick displayed significant I/I during flow monitoring, but field inspection did not reveal structural problems as extensive as those found in Woodland Hills and Cross Creek. The project was completed in December 1999. The significant defects identified in the Cross Creek and Running Creek service areas were repaired under the Pope Lick Rehabilitation Phase 1A project. Figure 4 represents the Pope Lick SSES study area.

5.2.3 Floyds Fork Computer Modeling

A hydraulic model has not been developed for the Floyds Fork service area. However, a model of the Woodland Hills area was constructed under the Middle Fork Hydraulic Modeling Project and stands ready for inclusion in a future Floyd's Fork Hydraulic Model. Figure 5 represents the Woodland Hills area studied in the Middle Fork Hydraulic Modeling Project.

5.2.4 Floyds Fork Rehabilitation

Figure 6 displays the rehabilitation work conducted under the Floyds Fork Rehabilitation projects.

Woodland Hills Phase 2

This project provided for the rehabilitation of defects identified during flow monitoring and TVI activities performed by MSD. This rehabilitation effort involved lining 5,667 LF of sewer mains with cured-in-place pipe (CIPP), lining the public portion of 51 property service connections with CIPP and cementitous rehabilitation of 23 manholes. Part of the CIPP installation process required TVI and cleaning prior to installation. It was confirmed during TVI that the property service laterals contributed enormously to the excessive flow in the system. A change order was initiated to rehabilitate the service laterals within the public right-of-way (ROW) using a no dig, Cured-in-Place methodology where the liner is inserted through a cleanout. Construction was completed in late December 1997. This project was completed in the fall of 1997 and cost approximately $474,000.

Woodland Hills Phase 1

This project provided for the rehabilitation of defects identified during flow monitoring and TVI activities performed by MSD. This rehabilitation effort involved lining 3,381 LF of sewer mains with cured-in-place pipe (CIPP), lining the public portion of 81 property service connections with CIPP, and sealing 18 manholes with butyl rubber chimney seals. This project was completed in the fall of 1999 and cost approximately $485,000.

Pope Lick I/I Remediation Phase 1A

This project included rehabilitation to target primarily inflow sources identified during the Pope Lick SSES in order to reduce peak flow rates. This rehabilitation effort consisted of 5,805 LF of cured-in-place sewer main rehabilitation, 99 cured-in-place lateral rehabilitations, 253 manhole chimney seals, and 5 full manhole rehabilitations using cementitious grout to patch and wipe manhole interiors. This project was completed in August 2000 and cost approximately $941,000.

Pope Lick I/I Remediation Phase 1B

This project provided for the rehabilitation of defects identified in the Pope Lick SSES and completed the public side rehabilitation of the Woodland Hills system. This rehabilitation effort consisted of 4,973 LF of cured-in-place sewer main rehabilitation, 114 cured-in-place lateral rehabilitations, 90 manhole chimney seals, and 5 full manhole rehabilitations using cementitious grout to patch and wipe manhole interiors. This project was completed in December 2000 and cost approximately $839,000.

Chimney Seal Reinstallation

A portion of the Floyds Fork service area was included in the Chimney Seal Reinstallation Project discussed in section 2.2.3.5 of this report.

5.2.5 Floyds Fork Post-Rehabilitation Flow Monitoring

Woodland Hills Chimney Seal and Cured In Place Pipe Installation: Post-Rehab Flow Monitoring

This study was conducted to assess the effectiveness of comprehensive public-side pipeline and manhole rehabilitation in keeping rainwater inflow and infiltration out of the sanitary sewer collection system. This rehabilitation was conducted to eliminate the recurring sanitary sewer overflows at the Woodland Hills Pump Station and basement backups in the Woodland Hills neighborhood. After the rehabilitation was completed, flow monitors were installed in the identical locations used in the prior flow monitoring projects. A monitor was also installed in an un-rehabilitated sub-basin to serve as a control basin. Post-rehab flow monitoring took place from January 5, 2000, through March 31, 2000 to capture results from the Woodland Hills phase 1 and 2 rehabilitation projects and February 12, 2001, through April 16, 2001 to capture results from the Pope Lick 1A and 1B rehabilitation projects. Four notable rain events were monitored during the two monitoring periods: February 18, 2000 (3.84"), March 16, 2000 (1.62"), February

15, 2001 (0.67") and February 25, 2001 (0.84"). Observations from the 2001 study included the following:

- ***Peak wet weather flows were not reduced.*** Woodland Hills was the only basin monitored in 2001 where peaking factors increased with respect to the control basin.
- ***Wet weather total excess flows were not reduced.*** Woodland Hills was the only basin not to show a reduction expressed as a percentage of control basin excess flow.
- ***The general health of the system improved.*** Velocity increased relative to depth, reflecting an increase in the system's efficiency. The depth-velocity scatter chart indicated a surcharge state was occurring at less than maximum pipe velocity.

This project was completed in June 2001 and cost approximately $15,000.

5.2.6 Other Capital Projects in Floyds Fork

Floyds Fork Interceptor Section 1A

This project involved the construction of sewer interceptors along Floyds Fork from the Floyds Fork Wastewater Treatment Plant to Shelbyville Road. The design of the project included the construction of approximately 600 LF of 54-inch diameter gravity sewer in order to provide the initial facility that would be able to provide sanitary sewer service to the portion north in the Floyds Fork watershed. This first section was constructed with the Pope Lick Force Main and Gravity Sewer Project discussed in a following section. The portion that has been constructed included the crossing of Floyds Fork which has enabled construction of additional projects upstream which have eliminated various small treatment plants and provided sewer service to unsewered areas of the Floyds Fork Watershed. This project cost approximately $933,000.

Floyds Fork Subregional WTP Project

This project involved the construction of a subregional wastewater treatment plant (WTP) with an average daily design capacity of 3.25 MGD. This WTP provided sanitary sewer service to the portion of Floyds Fork planning area north of I-64. It utilizes the extended aeration process for wastewater treatment. The design of the plant included a raw wastewater pump station and force main, mechanically cleaned bar screens, grit removal chambers, oxidation ditch, secondary clarifiers, filtration units, ultraviolet disinfection units, waste sludge pump station, biosolids holding tank included in the outer ring of the oxidation ditch, and an administrative/laboratory building. This project will allow for the current elimination of 6 small treatment plants and will allow for the eventual elimination of five more small treatment plants. This project cost approximately $24,433,000.

Old Henry Road Force Main North Project

Under this project, 11,100 linear feet of 20-inch diameter force main has been constructed to carry flows from the Old Henry Pump Station on Long Creek Way and is a continuation of the Old Henry Road Force Main South Project. The Force Main North project begins at Floyds Fork, north of Aiken Rd and proceeds southward, crossing Floyd's Fork to a point near the intersection of N. Beckley Station Road near the CSX Railroad crossing. This project cost approximately $3,155,000.

Old Henry Road Force Main South Project

This project consists of 6225 linear feet of 20-inch and 24-inch diameter force mains that begin at N. Beckley Station Road near the CSX Railroad crossing and continues south to the end point of the Floyds Fork Interceptor Section 1 A. This project also provided rehabilitation to the existing English Station pump station, allowing for the elimination of the English Station WTP, with the flow diverted to the Floyds Fork WTP via the Old Henry Road Force Main South Project. This project cost approximately $3,808,000.

Pope Lick Sanitary Sewer Pump Station Project

This project involved the construction of a pump station on North Pope Lick Rd, across Pope Lick from the former Kirkham Trace WTP. The Pump Station was designed to deliver flow from the Pope Lick area north of I-64 to the Floyds Fork WTP. Three existing treatment plants (Running Creek, Cross Creek, and Tucker Station) were eliminated with the construction of interceptor sewers to this new Pope Lick Pump Station. This project had to be completed before the construction of the Pope Lick Interceptor and the Tucker Station Interceptor in order to provide an outlet for the flow. A portion of the Floyds Fork Interceptor Section 1 project was bid and constructed under the same construction contract as this project. This project cost approximately $2,465,000.

Pope Lick Force Main and Interceptor Project Phases 1 and 2

The result of these two projects provided the 18 inch diameter force main from the Pope Lick Pump Station east to English Station Road. At that point, flow can be gravity fed to the Floyds Fork WTP with a 30 inch diameter gravity interceptor that follows a tributary stream of Floyds Fork, and then parallels Interstate 64, crossing Floyds Fork to the Plant's Influent Pump Station. In addition, these projects installed an 8 inch diameter gravity sewer line to allow for the elimination of the Copperfield WTP.

Pope Lick Interceptor Project

This project involved the construction of interceptor sewers from the Pope Lick Pump Station, north across N. Pope Lick Rd and then along Creek Valley Rd towards Shelbyville Road. The design of the project included the construction of 5800 LF of 24 to 27 inch gravity sewer to eliminate MSD's Cross Creek Wastewater Treatment Plant (WTP), Kirkham Trace WTP, and the Wooded Falls Pump Station. There is additional interceptor line included in the design which will divert some flow from a privately owned WTP. The additional interceptor will not be constructed until acquisition negotiations are complete with the owner of the private WTP. This project cost approximately $1,812,000.

Tucker Station Interceptor Sanitary Sewer Project

This project involved the construction of approximately 7000 LF of 8 and 15-inch gravity sewer to eliminate two facilities (Running Creek WTP and the old Pope Lick Pump Station) and reroute the flows to the new Floyds Fork WTP. This project was also responsible for eliminating the overflow at the Woodland Hills Pump Station. The project began at an existing interceptor and followed along the west branch of Pope Lick Run to the Woodland Hills Pump Station. During some wet weather events, Woodland Hills Pump Station currently pumps excess flows to the Middle Fork service area. This project serves the west portion of the Pope Lick Run Basin, a rapidly growing area which needed expanding conveyance and treatment capacity in order to develop. This project cost approximately $2,435,000.

Long Run Pump Station

This project provided a Pump Station at Eastwood-Fisherville Rd at I-64 that provides service to the eastern portion of the Floyds Fork WTP service area. The station contains three 155 HP submersible pumps. The station allowed for the elimination of the upstream Ashmoor Woods WTP and undeveloped land.

Long Run Force Main and Interceptor Sanitary Sewer Project

This project involved the construction of a 6200 LF of 48 inch and 42 – inch diameter interceptor and 6000 LF of 20 inch and 24 inch diameter force mains The interceptor followed Long Run north from the Long Run Pump Station to a point adjacent to the Ashmoor Woods subdivision. The force mains transport the wastewater from the Long Run Pump Station on Eastwood-Fisherville Rd, parallel to I-64 to the Floyds Fork WTP. The project also eliminated MSD's Ashmoor Woods Wastewater Treatment Plant. This project cost approximately $3,821,000.

Private Property Disconnection Pilot Project

The Woodland Hills area was included in the Private Property Source Disconnection Project which is discussed in section 2.2.1.7 of this report.

5.2.7 Future / Ongoing Projects in Floyds Fork

Old Henry Road Pump Station, Force Main, and Interceptor Project (MSD Budget ID # E03601)

Under this project, a submersible pump station on Long Creek Way near Champion Lake Dr has been constructed. This pump station, in conjunction with Old Henry Force Main North and South Projects, provide sanitary sewer service to the Old Henry Road area. This project will also allow for the elimination of the Eastpointe Pump Station and Cypress Springs Pump Station with future construction project. This project cost approximately $3,268,000 and will be completed by June 30, 2006.

5.3 ELIMINATIONS

Over the years, many wastewater treatment plants and pump stations have been closed and eliminated through MSD's sanitary sewer expansion program. Their sizes range from large plants to small "package" plants and pumping stations designed to serve individual residences and businesses. The following list includes treatment plants and then pump stations eliminated from the Floyds Fork sewer system. Most of these facilities were privately owned before acquisition by MSD. Although records do not exist, it is suspected that each was probably an SSO.

TREATMENT PLANTS ID	NAME	ADDRESS	CAPACITY (GPD)
MSD0211	Cross Creek	12524 Farmbrook Dr	
MSD0279	Ashmoor Woods	401 Ash Run Rd	33,000
MSD0268	Copperfield	715 Brendon Hills Pl	161,000
MSD0297	Kirkham	1118 Kirkham Trace	60,000
MSD0270	English Station	15030 Bircham Rd	33,000
MSD0402	Woodland Hills	12200 Ridge Crest Dr	
MSD0269	Running Creek	12021 Running Creek Rd	110,000

PUMP STATION ID	NAME	ADDRESS
MSD0090-PS	Wooded Falls	12622 Ledges Dr
MSD0211A-LS	Cross Creek	12524 Farmbrook Dr
MSD0279A-PS	Ashmoor Woods	401 Ash Run Rd
MSD0270A-PS	English Station-Old	15030 Bircham Rd
MSD1034-LS	Belmont Park	12100 Triple Crown Ct
MSD0268A-PS	Copperfield	715 Brendon Hills Pl
MSD0297A-PS	Kirkham Trace	1118 Kirkham Trace
MSD1023-PS	Beckley Station	912 Locust Pointe Pl
MSD1083-PS	South Beckley Station	1000 S Beckley Station Rd
MSD0269A-PS	Running Creek	12021 Running Creek Rd
MSD0091-LS	Pope Lick	805 N Pope Lick Rd
MSD1045-PS	Swan Pointe	1010 Tucker Station Rd

Fact Sheets

The following pages are fact sheets of known unauthorized discharge locations. For status and discharge type definitions, refer to the SORP.

MSD
Louisville-Jefferson County
Metropolitan Sewer District

FORMERLY RUNNING CREEK WTP

MSD Facility 68596

Customer Service 587-0603

Report as of December 2005

Service Area: FLOYDS FORK

Yr	Num Overflows	Estimated Volume
2003	1	5,000 Gallons

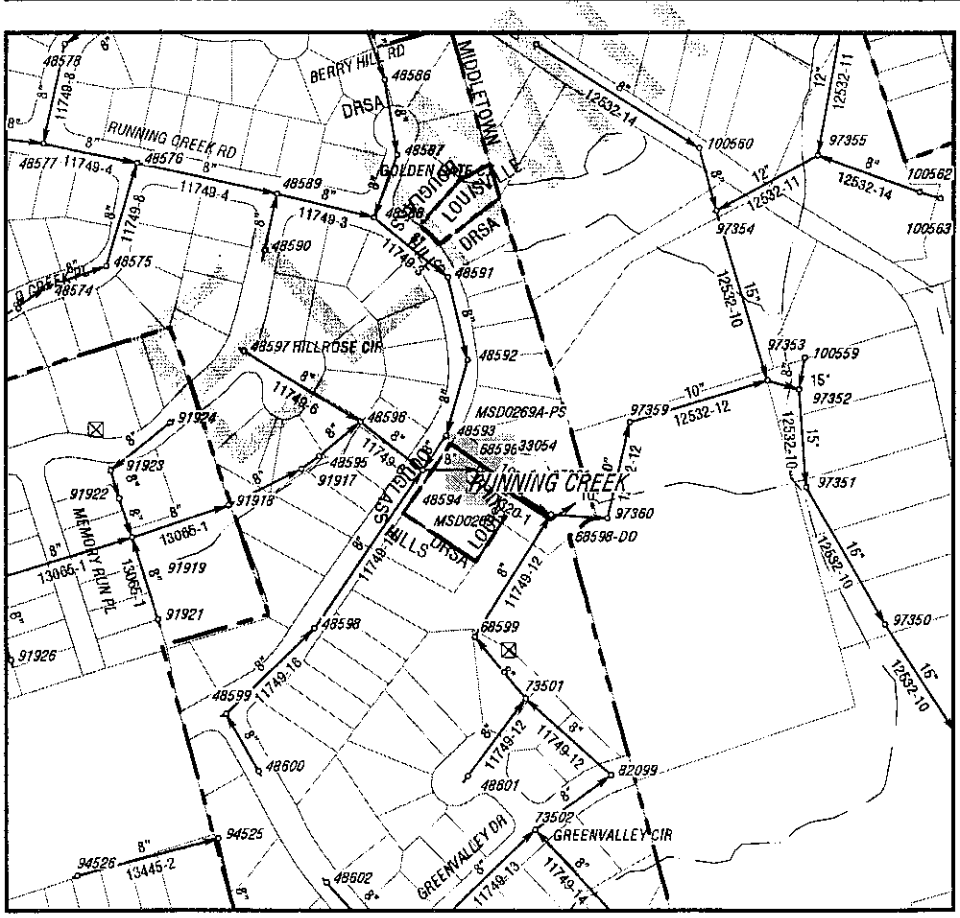
Background & History: This site was reported as an overflow during FY03. It will be monitored in the future.

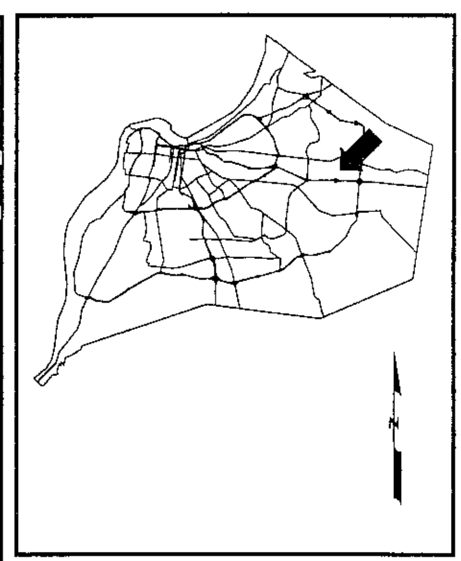
Pipe Size:
Inflow: 8"
Outflow: 10"

Upstream Collection System Length: 14,300 L.F.
Watershed: FLOYDS FORK
Discharge Type: CAPACITY
Discharged To: STREAM
Receiving Stream: POPE LICK
Status: ELIMINATED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	19.5 ac.
VACANT AND UNDEVELOPED	4.9 ac.





Metro: MAL24
Atlas Map: BA240

Scale 1" = 400 '

OLDE COPPER CT PS

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility MSD0165-PS

Customer Service 587-0603 | **Report as of December 2005**

Service Area: FLOYDS FORK

Yr	Num Overflows	Estimated Volume
2004	3	7,500 Gallons
2003	10	23,500 Gallons
2002	5	20,200 Gallons
2001	1	200 Gallons

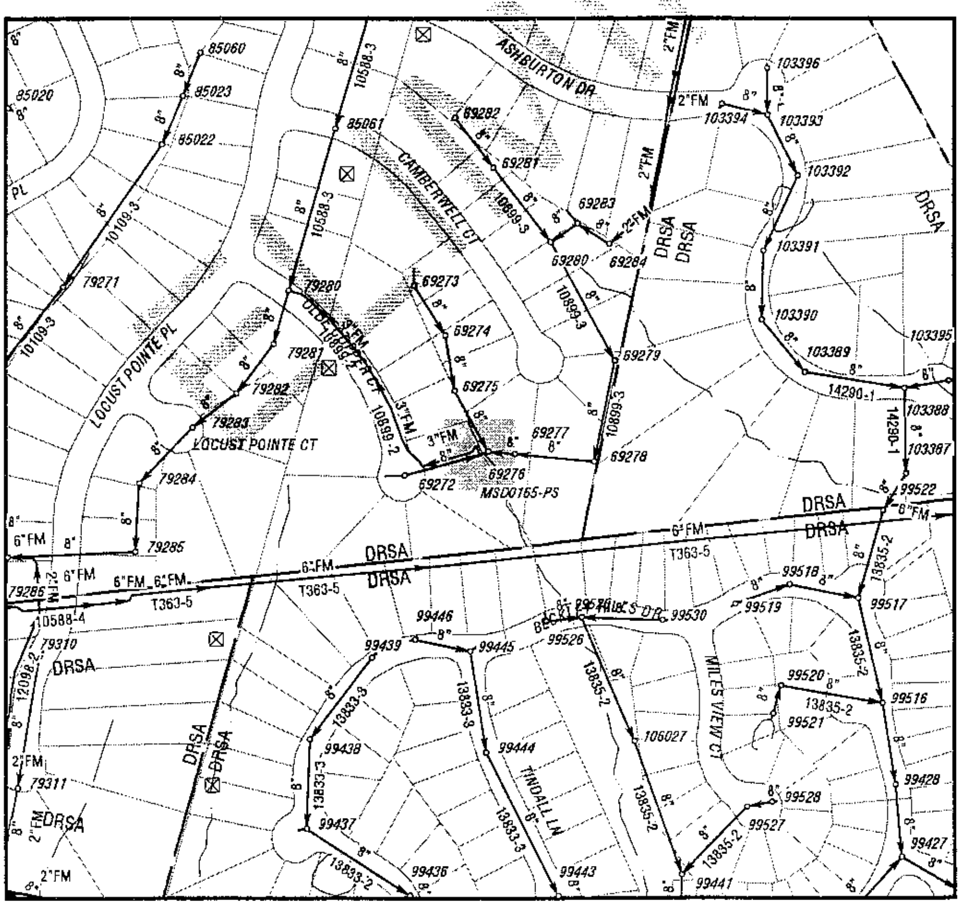
Background & History: Olde Copper PS was added to the investigation list during the 1998 reporting period. There has been no previously documented SSO at this location. Roof drains, which were contributing inflow to the system, have been eliminated.

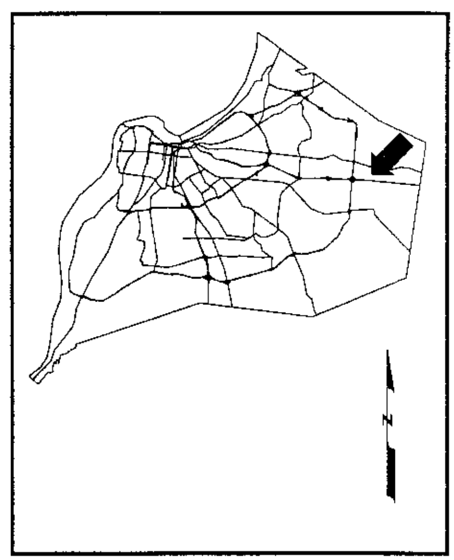
Pipe Size:
Inflow: 8"
Inflow: 8"
Outflow: 2.5"

Upstream Collection System Length: 5,310 L.F.
Watershed: FLOYDS FORK
Discharge Type: CAPACITY
Discharged To: DITCH
Receiving Stream: FLOYDS FORK
Status: ELIMINATED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	20.8 ac.
VACANT AND UNDEVELOPED	1.3 ac.





Metro: MAL25
Atlas Map: BC244

Scale 1" = 400 '

MSD
Louisville-Jefferson County
Metropolitan Sewer District

DONNINGTON COURT

MSD Facility MSD1050-PS

Customer Service 587-0603

Report as of December 2005

Service Area: FLOYDS FORK

Yr	Num Overflows	Estimated Volume
2004	2	1,030 Gallons

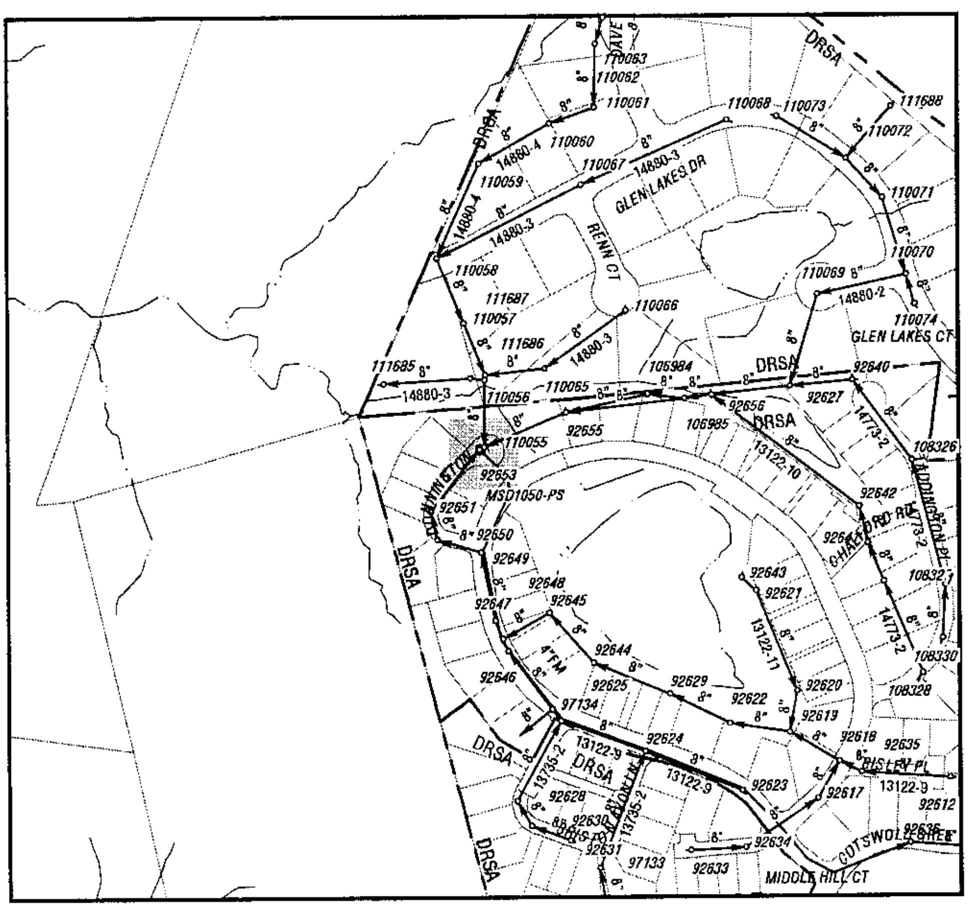
Background & History:

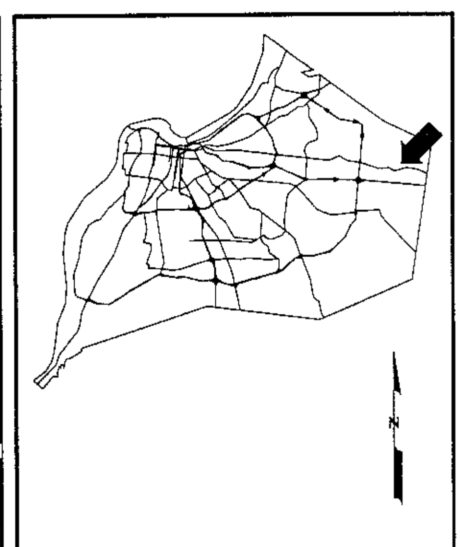
Pipe Size:
Inflow: 8″
Inflow: 8″
Outflow: 4″

Upstream Collection System Length: 9,770 L.F.
Watershed: FLOYDS FORK
Discharge Type: CAPACITY
Discharged To: DITCH
Receiving Stream: BRUSH RUN
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	18 ac.
VACANT AND UNDEVELOPED	5.1 ac.
GENERAL COMM. AND OFFICE	1 ac.





Metro: MAL26
Atlas Map: BA248

Scale 1" = 400 '

MSD

Louisville and Jefferson County
Metropolitan Sewer District

SECTION 6

SECTION 6: WEST COUNTY WASTEWATER TREATMENT PLANT

6.1 WEST COUNTY WASTEWATER TREATMENT PLANT HISTORY

The West County Wastewater Treatment Plant was originally proposed in the 1960's as part of the county wide sewer plan but construction was delayed due to lack of funding. In the 1970's, this plan was updated and included provisions to take over small treatment plants and collection systems as trunk sewers reached them. Litigation by home builders related to the water quality impact of septic tanks delayed construction of the plant for several more years until the EPA issued an environmental impact statement. Once the impact statement was issued indicating that septic tanks worked well in the southwest county and sewers were unnecessary for residential areas, MSD entered negotiations with the EPA that ultimately resulted in a decrease to 1/3 of the treatment plant's planned capacity. With these negotiations complete, construction of the WTP began in 1984 and the plant came on line in 1986 with a design capacity of 15 million gallons per day. The West County Plant eliminated over 45 small treatment plants and numerous pump stations and septic systems in the Pond/Mill Creek area where water quality was significantly impaired by permit violations and failing septic systems. As the service area and population has grown, capacity has been added. The current design capacity of the plant is 30 million gallons per day and the average flow rate is 21.8 million gallons per day.

The West County service area serves approximately 51,000 customer accounts, primarily single family residential area and vacant or undeveloped land. The West County collection system contains approximately 4,000,000 linear feet of pipe, consisting primarily of 8" vitrified clay pipe (VCP) and PVC pipe constructed from the 1950s to the present. The service area includes 60 pump/lift stations. See Figure 1 for a map of the West County service area.

6.2 SSO PROJECT HISTORY

The wet weather project history diagram (Figure 2) on the following page illustrates the SSO-specific projects conducted in the West County sewershed since the inception of the consolidated SSO program in 1998. The following sections in this document describe each of the SSO-specific projects in detail and are organized by the four major project types:

- Flow monitoring
- SSES and other sewer investigation/study project
- Computer modeling
- Rehabilitation
- Post-Rehabilitation flow monitoring

Capital projects that removed SSOs (such as pump station and small treatment plant eliminations) are not included in the SSO-specific project history diagram but are included in the project write-up sections under "Other Capital Projects." Figure 3 is a service area diagram showing the hydraulic connectivity of overflow locations.

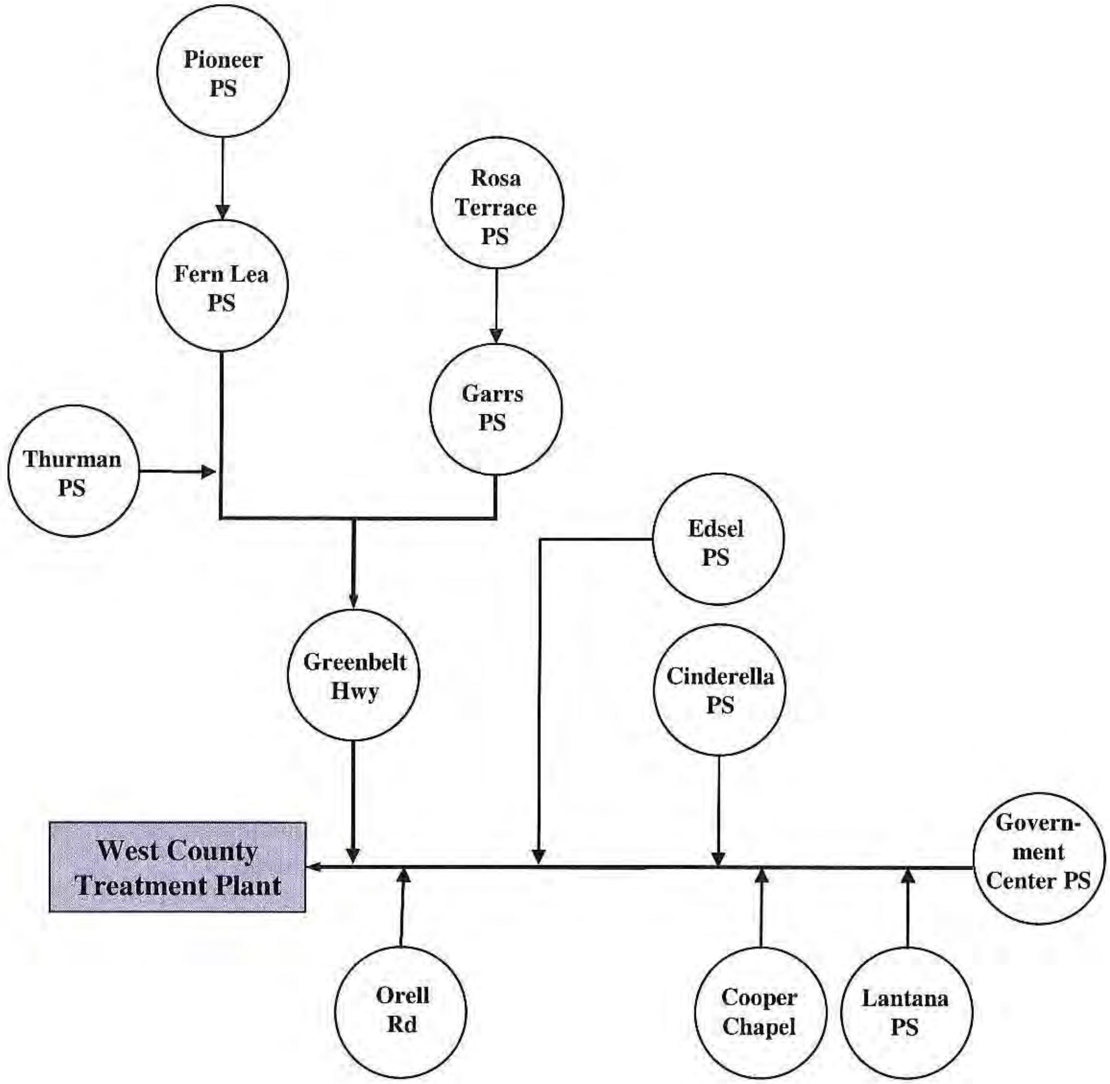


Figure 3 – West County – Hydraulic Connectivity Diagram of Unauthorized Discharges

6.2.1 Pond Creek

6.2.1.1 Pond Creek Background

The Pond Creek area covers approximately 36 square miles and is centrally located at the intersection of Preston Highway and I-265. The sewer system contains a total of 2,220,000 linear feet (420 miles) of gravity sewer pipe ranging in size from 8-inch to 10-foot diameter of which 78% are 8-inch collection sewers. Approximately 67% of the system consists of clay pipe (VCP) and polyvinyl chloride pipe (PVC) and 57% of the system was installed after 1980. The majority of the land use in the service area is residential and undeveloped/vacant land. Figure 4 shows a map of the Pond Creek service area with eliminated treatment plants and pumping stations. See Figures 5 - 8 for the program elements described in this section.

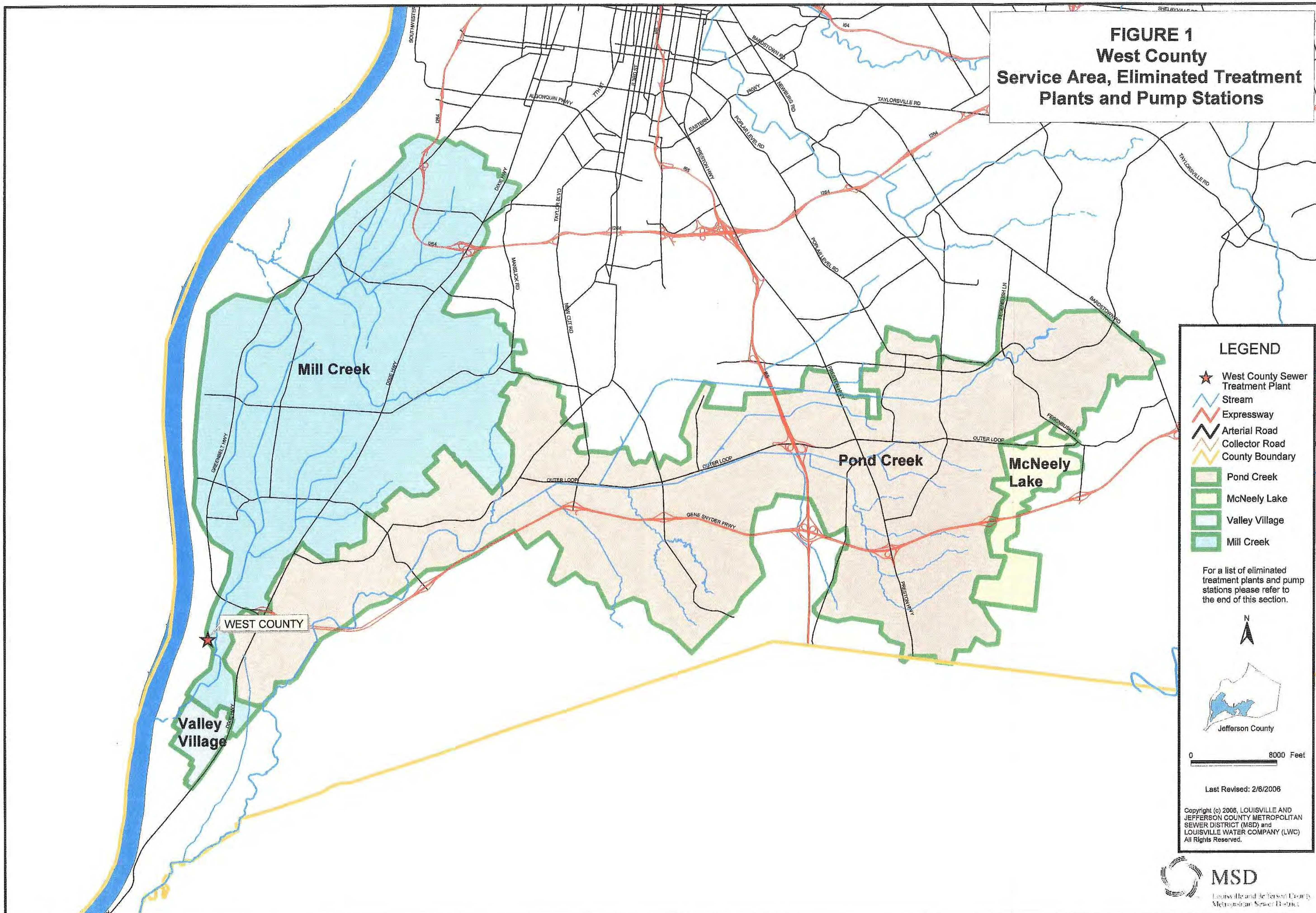
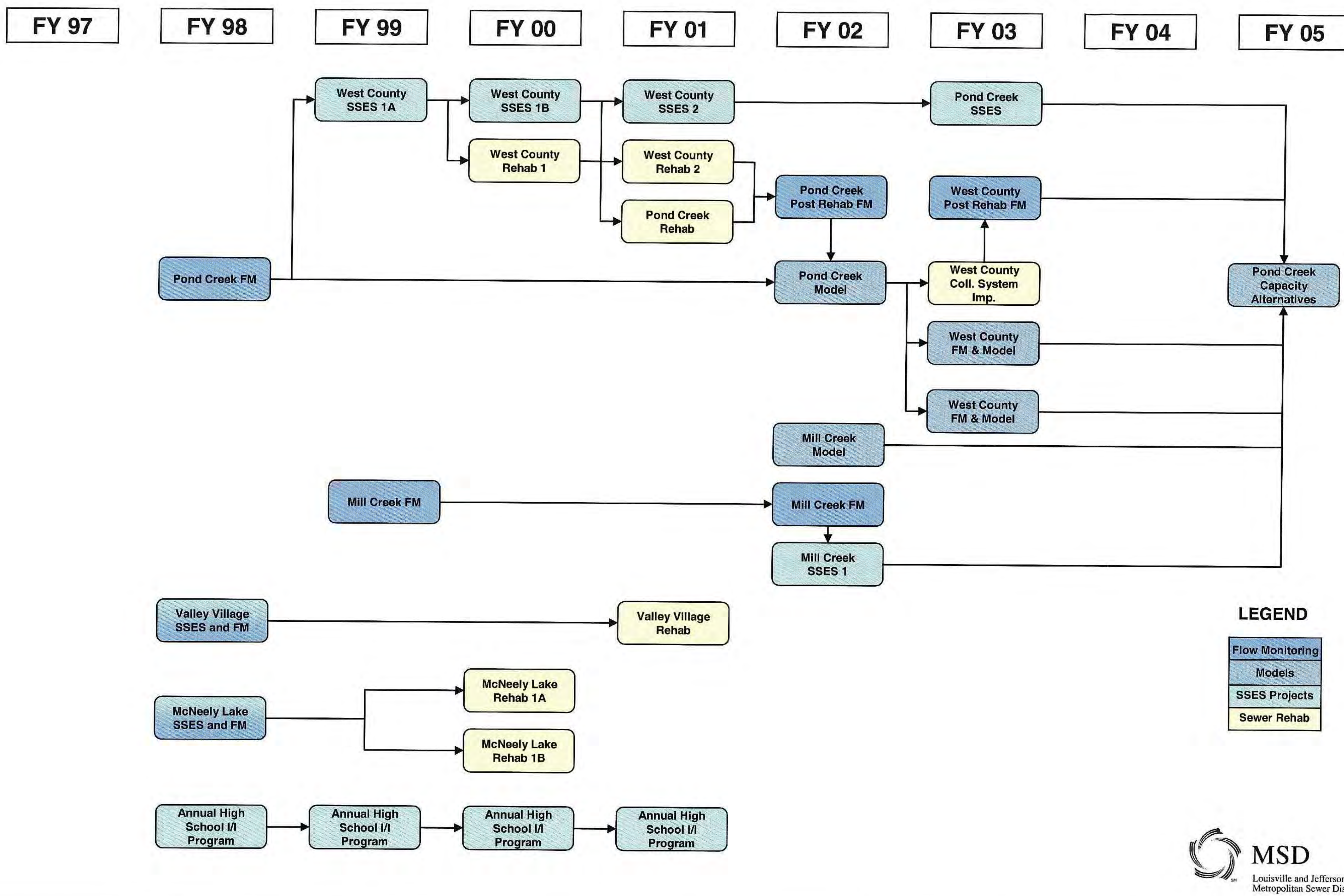


FIGURE 1
West County
Service Area, Eliminated Treatment
Plants and Pump Stations
LEGEND
West County Sewer Treatment Plant
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Pond Creek
McNeely Lake
Valley Village
Mill Creek
For a list of eliminated treatment plants and pump stations please refer to the end of this section.
N
Jefferson County
0
8000 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD
Mill Creek
Pond Creek
McNeely Lake
Valley Village
WEST COUNTY
OUTER LOOP
GENE SNYDER FRWY
TAYLORSVILLE RD
BARDSTOWN RD
POPLAR LEVEL RD
PRESTON HWY
DIXIE HWY
GREENBELT HWY
FEGENBUSH LN
NEWBURG RD
ALGONQUIN PKWY
TAYLOR BLVD
MANSLICK RD
NEW CUT RD

West County Sewershed Wet Weather Projects

FIGURE 2
West County Project History



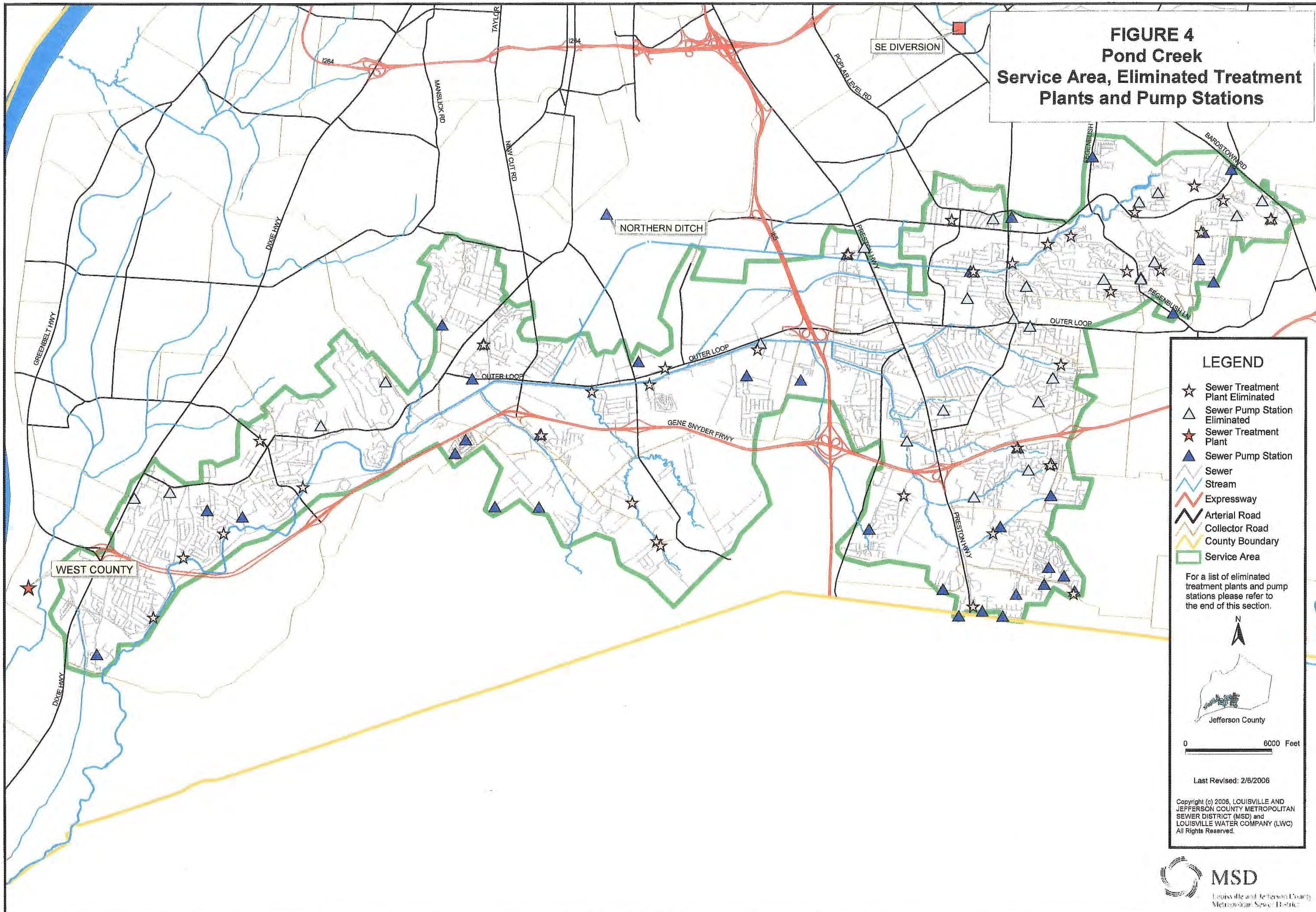


FIGURE 4
Pond Creek
Service Area, Eliminated Treatment Plants and Pump Stations
SE DIVERSION
NORTHERN DITCH
WEST COUNTY
I264
TAYLOR
MANSLICK RD
NEW CUT RD
DIXIE HWY
GREENBELT HWY
POPLAR LEVEL RD
PRESTON HWY
BARDSTOWN RD
FEGENBUSH
FEGENBUSH LN
OUTER LOOP
GENE SNYDER FRWY
I65
LEGEND
Sewer Treatment Plant Eliminated
Sewer Pump Station Eliminated
Sewer Treatment Plant
Sewer Pump Station
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Service Area
For a list of eliminated treatment plants and pump stations please refer to the end of this section.
N
Jefferson County
0
6000 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD
Louisville and Jefferson County Metropolitan Sewer District

6.2.1.2 Pond Creek Flow Monitoring

Priority SSO Flow Monitoring Part 2: Pond Creek

This study was developed to characterize and help prioritize the 48 sub-basins in Pond Creek for further study and rehabilitation through the analysis of wet and dry-weather flow data, customer sewer backup complaints, and MSD SSO reporting. Monitors were maintained and data collected for a period of 45 days beginning April 13, 1998, and ending May 27, 1998. The following figure shows a flow monitoring schematic of the sewer systems in the Pond Creek study area. The numbered circles in Figure 9 represent the basins monitored by each of the flow meters.

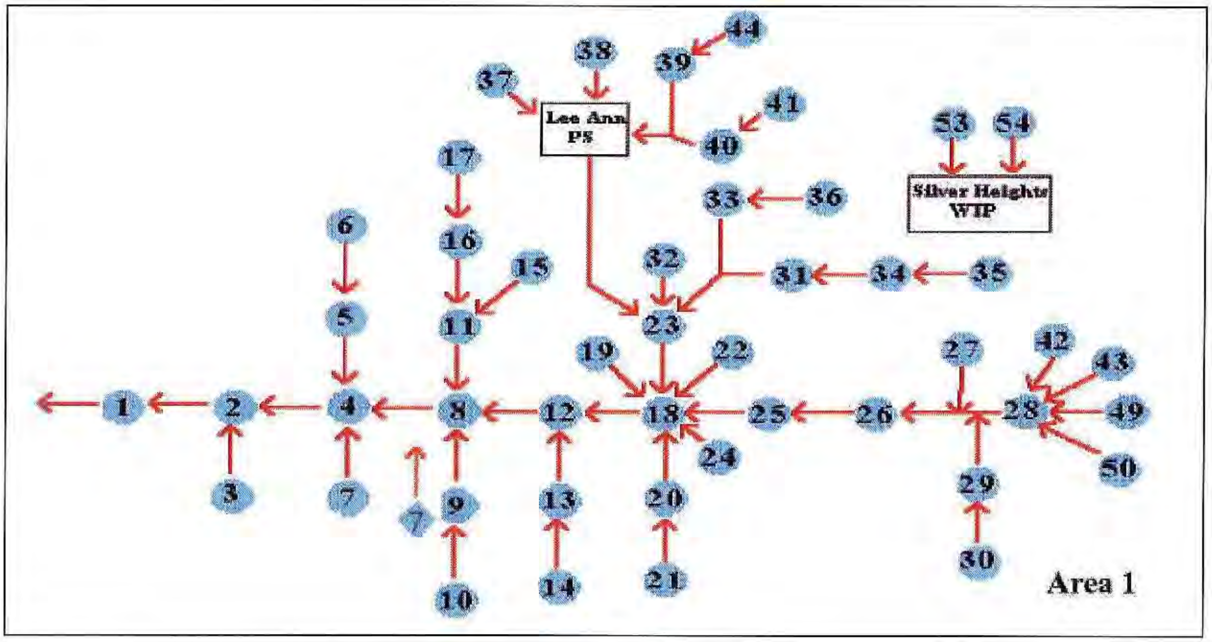


Figure 9 – Pond Creek Flow Monitoring Schematic

Three significant rain events were monitored: April 16 (1.96"), April 29-30 (1.66"), and May 23 (0.82"). All of the sites in the Pond Creek basin experienced some amount of inflow/infiltration (I/I) during these rain events. Hydrograph analysis shows that some areas experience more inflow than infiltration and vice versa. Many sites experienced immediate increases in flow rate after rain events, indicating inflow sources in the system. There were also significant periods of surcharging throughout the system.

System-wide flow monitoring was also conducted in the Middle Fork of Beargrass Creek area and the Hikes Point Area. Based on peaking factors, Pond Creek had a worse I/I problem than the Middle Fork of Beargrass Creek study Area. Over half of the subbasins in Pond Creek had a peaking factor greater than 4. However, less than a third of the subbasins in the Middle Fork area had a peaking factor greater than 4. The high peaking factors in the Pond Creek area were similar to the peaking factors in the Hikes Point Area.

The primary weighting factors used to prioritize basins included basement back-up frequencies, SSO frequencies, and flow monitoring inflow/infiltration analysis. This analysis was used to delineate SSES project areas for FY99 (July 1, 1998 – June 30 1999) through FY03 (July 1, 2002 – June 30, 2003). The flow monitoring data was used with field data collected as part of these SSES projects in order to tailor rehabilitation efforts to the particular problems in each sub-basin for more cost-effective solutions. Figure 5 represents the area that was flow monitored in Pond Creek. This project was completed in February 1999 and cost approximately $313,000.

West County Flow Monitoring

In FY03 (July 1, 2002 – June 30, 2003), thirteen flow monitors and two rain gauges were installed and maintained for a period of 45 days starting December 23, 2002, and ending February 5, 2003. The purpose of this project was to collect average dry weather flows and wet weather responses to be used for the recalibration of the West County WTP Spline Model to reflect post rehabilitation flow rates. This project cost approximately $51,000 and was completed in March 2003.

6.2.1.3 Pond Creek Sanitary Sewer Evaluation Studies (SSES)

Figure 6 represents the SSES study areas in the Pond Creek system.

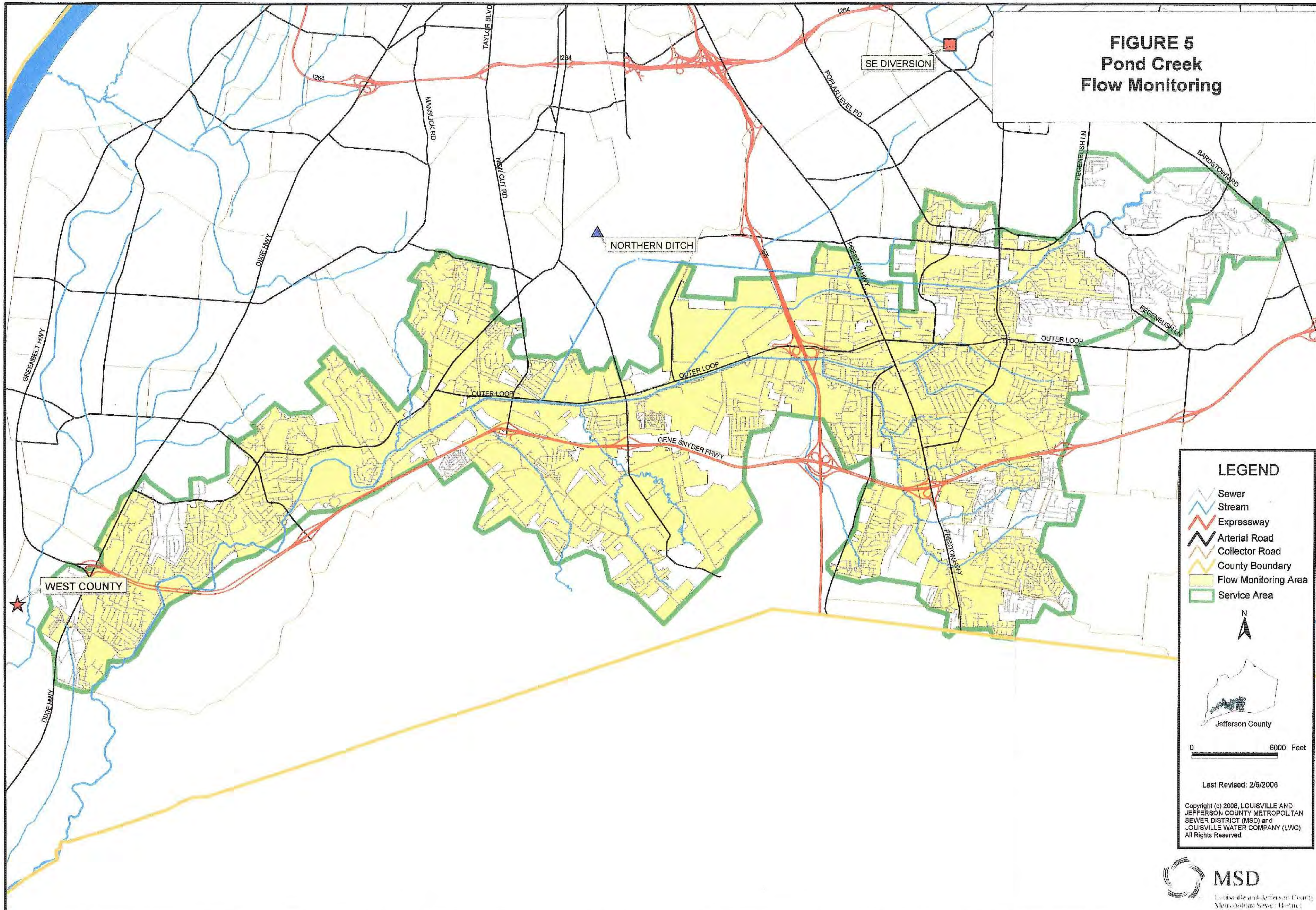
Pond Creek SSES

The objective of this study was to identify sources of excessive inflow and infiltration (I/I) as well as structural defects in the sanitary system in order to plan rehabilitation construction to target excessive inflow and infiltration and reduce the frequency and volume of overflows. The study included the following components to identify active and potential sources of I/I:

- Physical inspections of manholes to identify corrosion and structural defects that may be contributing excessive I/I (1,200 manholes);
- Smoke testing to identify structural defects that may contribute to I/I (193,000 linear feet sewer);
- TV inspections (16,650 linear feet sewer) to identify sources of I/I and verify structural defects;
- Fell-41 inspections (23,500 linear feet of sewer) to identify non-visible sources of infiltration;
- Conducting flow isolations to quantify and locate constant infiltration;
- Conducting dyed-water testing as needed in a limited amount of the system to identify structural defects that may contribute I/I to the system and blockages that may be inhibiting efficient hydraulic flow;
- Compiling and analyzing the data generated during the SSES to quantify the defects that allow excessive I/I to enter the system, determine corrective actions to address defects, and prioritize sub-basins for rehabilitation.

The system was in relatively sound structural condition compared to other systems of similar age. Constant infiltration was the dominant problem however it may have been masking a rain derived inflow problem. Few major defects were found. The majority of public side inflow was attributed to manholes (leaking riser rings and offset frames). The majority of public side infiltration was attributed to cracked pipes and leaking joints due to root intrusions. Private side contribution sources were rare as only defective cleanouts were identified. However, as the

FIGURE 5
Pond Creek
Flow Monitoring



MSD
Louisville and Jefferson County Metropolitan Sewer District

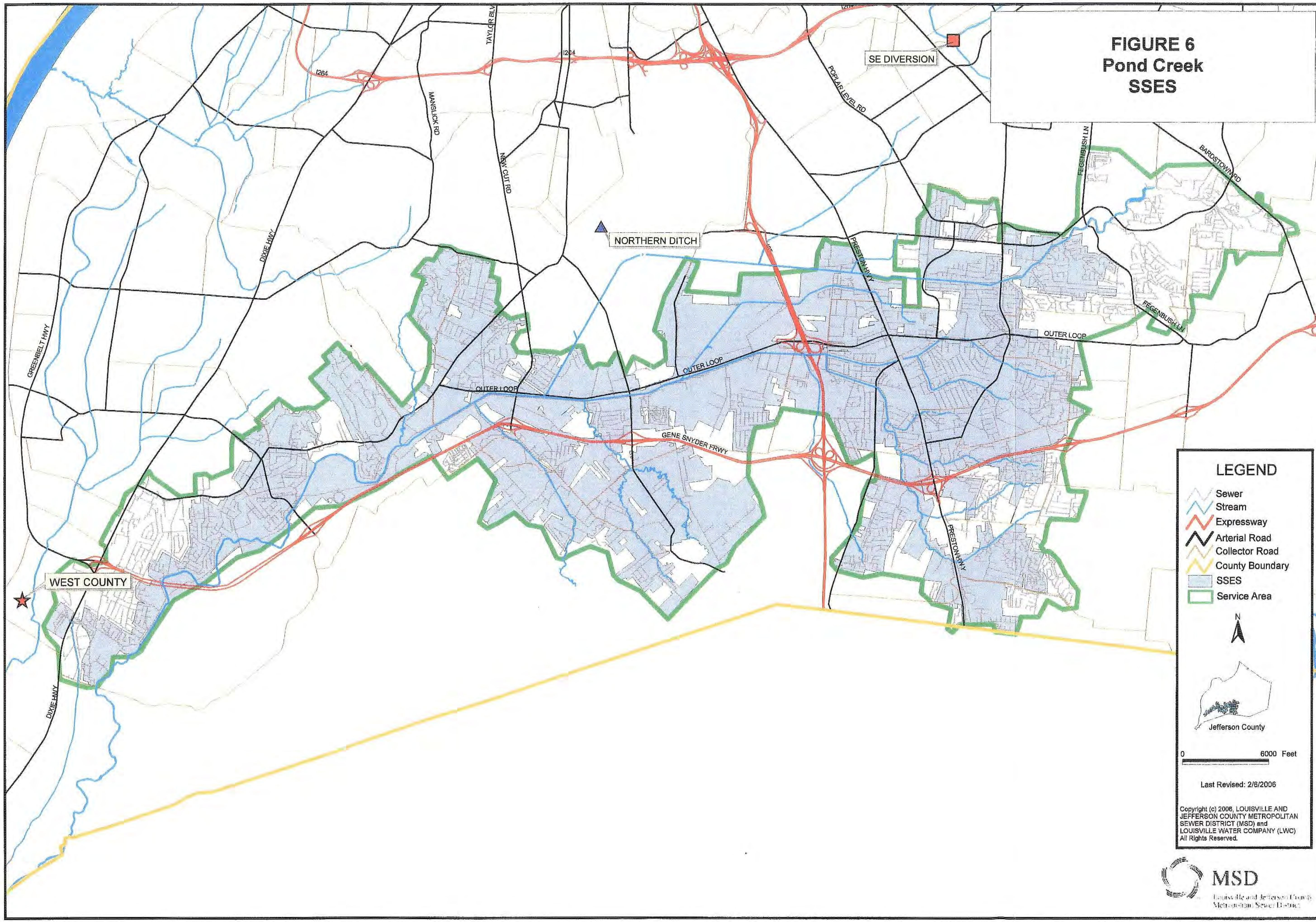


FIGURE 6
Pond Creek
SSES
SE DIVERSION
NORTHERN DITCH
WEST COUNTY
I264
TAYLOR BLV
MANSLICK RD
NEW CUT RD
DIXIE HWY
GREENBELT HWY
POPLAR LEVEL RD
PRESTON HWY
FEGENBUSH LN
BARDSTOWN RD
OUTER LOOP
GENE SNYDER FRWY
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
SSES
Service Area
N
Jefferson County
0
6000 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD
Louisville and Jefferson County Metropolitan Sewer District

area was suspected to suffer from a high water table, there may be sump pumps that contributed to the high base flows even during dry weather conditions. In addition, areas where residents have been relocated due to expansion of the Louisville International Airport remain connected and these areas will only contribute I/I to the collection system. Locations of maintenance related issues such as root intrusions and grease build-up were provided to the MSD maintenance department for action. The project was completed in October 2004 and cost approximately $306,000.

West County Phase 1A SSES

The objective of this study was to find sources of excessive inflow and infiltration (I/I) to the Pond Creek sanitary sewer system in order to identify rehabilitation construction for West County Rehabilitation Phase I. The study included the following components to identify active and potential sources of I/I:

- Gathering and reviewing existing pertinent data (LOJIC, IMS, & flow data) to evaluate the quantity of I/I entering the sewer system;
- Conducting physical inspections of manholes to identify corrosion and structural defects that may be contributing excessive I/I (932 manholes);
- Conducting smoke testing to identify structural defects that may contribute to I/I (242,500 linear feet sewer);
- Conducting TV inspections (48,400 linear feet sewer), dyed-water flooding, and flow isolations in a limited amount of the system to identify structural defects that may contribute I/I to the system and blockages that may be inhibiting efficient hydraulic flow;
- Compiling and analyzing data generated during the SSES to quantify the amount of excessive I/I entering the system and prioritize sub-basins for rehabilitation.

The sanitary sewers in most basins of the study area were in fair condition. Several defects were found which should be repaired but no catastrophic defects were discovered. Public defects were found that may account for the inflow, but there may be some contribution by private sources such as sump pumps. Smoke testing identified no downspout or area drain connections. This project was completed in March 2000 and cost approximately $567,000. The defects identified in this study were repaired under the West County Phase 1 and Pond Creek Rehabilitation projects.

West County Phase 1B SSES

The objective of this study was to find sources of excessive inflow and infiltration (I/I) in the West County sanitary sewer system in order to identify rehabilitation construction for capital funding and to help reduce the frequency of SSOs. The study included the following components to identify active and potential sources of I/I:

- Gathering and reviewing existing pertinent data (LOJIC, IMS, and flow data) to evaluate the quantity of I/I entering the sewer system;
- Conducting physical inspections of manholes to identify corrosion and structural defects that may be contributing excessive I/I (952 manholes);
- Conducting smoke testing to identify defects that may contribute to I/I (200,000 linear feet of sewer);

- Conducting TV inspections (50,000 linear feet), dyed-water flooding, and night flow isolations in a limited amount of the system to identify structural defects that may contribute I/I to the system and to identify blockages that may be inhibiting efficient hydraulic flow;
- Compiling and analyzing data generated during the SSES to quantify the amount of excessive I/I entering the system and prioritize sub-basins for rehabilitation;
- Performing a basic capacity analysis to determine if the collection system is sized properly.

The West County 1B basins were selected for evaluation based on the flow monitoring results, of the Priority SSO Flow Monitoring Project Part 2. The sanitary sewers in the study area were in relatively good shape. Minor structural defects were found which should be repaired but no major defects were discovered. In general, the system was correctly sized for the amount of upstream customers as evaluated at flow monitoring locations. This project was completed in September 2000 and cost approximately $936,000. The major defects identified in this study were repaired under the West County Phase 2 and Pond Creek Rehabilitation projects.

West County Phase 2 SSES

The objective of this study was to determine where the sanitary sewer system in the West County study area is subject to excessive I/I in order to prioritize and phase rehabilitation. The study included the following components to identify active and potential sources of I/I:

- Gathering and reviewing existing pertinent data (LOJIC, IMS, & flow data) to evaluate the quantity of I/I entering the sewer system;
- Conducting physical inspections of manholes to identify corrosion and structural defects that may be contributing excessive I/I (978 manholes);
- Conducting smoke testing to identify structural defects that may contribute to I/I (234,600 linear feet sewer);
- Conducting TV inspections (60,000 linear feet sewer) and flow isolations in a limited amount of the system to identify structural defects that may contribute I/I to the system and blockages that may be inhibiting efficient hydraulic flow;
- Compiling and analyzing data generated during the SSES to quantify the amount of excessive I/I entering the system and prioritize sub-basins for rehabilitation.

A significant number of structural defects were identified and prioritized for repair. In general, the system was correctly sized for the amount of upstream customers as evaluated at flow monitoring locations. About two thirds of the basins had adequate dry weather flow capacity. This project was completed in January 2002 and cost approximately $491,000.

6.2.1.4 Pond Creek Computer Modeling

Figure 7 represents the hydraulic model study areas in the Pond Creek system.

Pond Creek

This model was calibrated during FY02 (July 1, 2001 – June 30, 2002) using FY98 (July 1, 1997 – June 30, 1998) flow monitoring data. The model consists of 10" and greater diameter sanitary sewer tributary to the Pond Creek and Mill Creek interceptors but does not include the Valley

FIGURE 7
Pond Creek
Computer Modeling

Village Interceptor (these models were joined and the Valley Village interceptor was added under the WCWTP Spline model built under the West County Conveyance System Improvements Project). This project cost approximately $62,000 and was completed in January 2003.

This model was updated and re-calibrated using flow monitoring data collected in FY03 (July 1, 2003 – June 30, 2003). Poor-quality flow monitoring data limited the calibration of basins 09, 13, and McNeely Lake (Fishpool Interceptor). Assumptions based on previous flow monitoring data, pump run records, and downstream flow monitoring data were used to calibrate these basins.

Pond Creek Capacity Alternatives

The Pond Creek and Mill Creek conveyance systems experienced very high wet weather flows in 2002, leading to emergency repairs to identifiable system deficiencies. These repairs were completed in early 2003 and have significantly reduced wet weather peaks. In 2003 a conceptual design report studied the "post improvements" condition and concluded that a combination of in-line storage in the existing interceptors plus a wet weather storage basin, located in the northeast corner of the WCWTP site, could eliminate overflows for various frequency storm events. A conceptual plan and preliminary design report were prepared for this basin. This project involved modeling of the WCWTP system to evaluate the costs and effectiveness of in-line and in-basin storage against high-rate treatment systems. An array of hydraulic models was constructed to determine the configuration of in line controls that would provide maximum overflow reduction. This project is ongoing.

West County WTP Spline

This model was built by joining the Mill Creek model with a spline model of the Pond Creek system. This model was originally calibrated during FY02 (July 1, 2001 – June 30, 2002) using FY98 (July 1, 1997 – June 30, 1998) flow monitoring data in the Pond Creek system and FY02 (July 1, 2001 – June 30, 2002) data in the Mill Creek system. This model was re-calibrated post rehabilitation flow monitoring data collected in FY03 (July 1, 2002 – June 30, 2003) to reflect system changes due to interceptor repairs under the West County Conveyance System Improvements Project. This model was used for analysis of the proposed Pond Creek Interceptor Storage Basin and to identify system corrections to eliminate the direct entry of flood waters from Mill Creek to the system. The repairs completed under the West County WTP Conveyance System Improvements project discussed in section 6.2.1.5 resulted form this study. This model is also being used to evaluate inline storage options under the Pond Creek Capacity Alternatives project initiated in late FY05 (July 1, 2004 – June 30, 2005). This project cost approximately $10,000 and was completed in January 2003. The original development of the West County Spline Model cost approximately $64,000 and was completed in 2003

6.2.1.5 Pond Creek Rehabilitation

Figure 8 displays the rehabilitation work conducted under the Pond Creek Rehabilitation projects.

Pond Creek Rehabilitation

This project provided for the rehabilitation of defects identified in the West County SSES Phases 1A and 1B. The rehabilitation effort consisted of 7,036 linear feet of cured-in-place sewer main rehabilitation and 130 cured-in-place lateral rehabilitations. The project addressed the remaining priority main line defects identified in the West County SSES phase 1A and 1B. This project was completed in November 2001 and cost approximately $637,000

West County Rehabilitation Phase 1

This project provided for the rehabilitation of defects identified in the West County SSES Ph. 1A. The rehabilitation effort consisted of 1,147 linear feet of cured-in-place sewer main rehabilitation, 8 cured-in-place lateral rehabilitations, and 357 manhole chimney seals. The project addressed significant manhole defects and the highest priority main line defects identified in the West County SSES Phase 1A. This project was completed in October 2001 and cost approximately $362,000.

West County I/I Remediation Phase 2

This project provided for the rehabilitation of defects identified in the West County SSES Phases 1A and 1B. The rehabilitation effort consisted of 2,574 linear feet of cured-in-place sewer main rehabilitation and 204 manhole chimney seals. The project addressed significant manhole defects and the highest priority main line defects identified in the West County SSES phase 1B. This project was completed June 2001 and cost approximately $461,000.

West County WTP Conveyance System Improvements

This project completed nearly $180,000 of rehabilitation and system modifications to prevent the direct entry of flood waters from Mill Creek to the conveyance system. The rehabilitation and modification effort consisted of the installation of 50 chimney seals and water-tight castings; raising the rim elevation of 24 manholes; constructing five flood water inflow abatement dikes; installing 8 check valves in drain lines between sludge main manholes and the interceptors; reconstructing five manholes; and installing five remote sensors to monitor interceptor and creek water surface elevations at manholes along the Mill Creek and Valley Village Interceptors. This project was completed in May 2003.

6.2.1.6 Pond Creek Post-Rehabilitation Flow Monitoring

Pond Creek Chimney Seal and Cured In Place Pipe Installation: Post-Rehabilitation Flow Monitoring

This study was conducted to assess the effectiveness of butyl rubber manhole chimney seals and cured in place pipe lining installed in FY01 (July 1, 2000 – June 30, 2001) to keep rainwater inflow and infiltration out of the sanitary sewer collection system. Post-rehabilitation flow monitoring took place from January 3, 2002, through March 14, 2002. Two significant rain events were monitored: January 24 (3.13") and January 30 (1.73"). Observations from this analysis included the following:

FIGURE 8
Pond Creek Rehabilitation

- ***Peak wet weather flows were reduced.*** Peaking factors increased less than the control basin, indicating the chimney seals had a positive effect on reducing peak wet weather flow rates.
- ***Wet weather total excess flows were reduced.*** Reductions were shown in the Pond Creek sub-basin expressed as a percentage of control basin excess flow.
- ***The general health of the system has improved.*** Velocity has increased in the rehabilitated basin indicating a reasonably healthy system.

Assuming that the evaluated basin would have contributed excess wet weather flows at the same percentage rate with respect to the control basin as they did before rehabilitation, the chimney seal project prevented roughly 2.53 MG of excess flow during the post-rehab monitoring period across all basins. The project was completed in 2003 and cost approximately $24,000.

6.2.1.7 Other Capital Projects in Pond Creek

Billie Lane Pump Station Elimination Project

This project involved the construction of approximately 680 linear feet of 8-inch gravity sewer to eliminate the Billie Lane Pump Station, a known overflow. This project cost approximately $145,000.

Caven Avenue Pump Station Upgrade Project

This project involved upgrading the existing Caven Avenue Pump Station to allow sanitary flow to the proposed Parkside Apartments at Blue Lick Road and Hillview Drive. This project was responsible for eliminating the known overflow at Caven Avenue Pump Station. This project cost approximately $87,000.

Oaklawn Sanitary Sewer Interceptor Project

This project involved the construction of 2,700 linear feet of 24-inch sanitary sewer from an existing 15-inch sanitary sewer at 7204 Preston Highway to the existing 27-inch interceptor paralleling Wet Woods Creek at Bea Way. The project eliminated the overflow located at a manhole at 7204 Preston Highway and also eliminated the siphon under Wet Woods Creek. This project cost approximately $1,165,000.

Luhr School Interceptor #12

This project involved the construction of approximately 4,700 linear feet of 8-inch gravity sewer and provided sanitary sewer service to the Luhr Elementary School through the provision of the required interceptor. This project eliminated the existing Luhr School Wastewater Treatment Plant. The project also enabled collector projects to be initiated to provide collector sewers to unsewered areas.

Grafton Hall Interceptor & Collector (GH-1 & 1C) Sanitary Sewer Assessment Project

This project provided service to Grafton Hall, Milwaukee Way, Benson Way, Golden Dr., Constance Dr., Torrington Rd., Marcitis Rd., Beatrice Way, Emma Jean Way., Green Tree Ln., Deering Rd., West Ave., Scrim Ave., East Ave., and Valley Station Road. It consisted of approximately 5,000 linear feet of 18-inch pipe, 1,975 linear feet of 15-inch pipe, 1,546 linear feet of 12-inch pipe, 3,921 linear feet of 10-inch pipe, 28,177 linear feet of 8-inch pipe and necessary appurtenances. This system now discharges into the existing Pond Creek Interceptor. This project enabled a large number of residential property owners to receive sanitary sewer service. The area used to rely on on-site disposal systems to treat its wastewater. This project was responsible for eliminating the Deering Rd. Pump Station, a known overflow. This project cost approximately $4,055,000.

6.2.1.8 Future / Ongoing Projects in Pond Creek

Running Fox Sewer Replacement (MSD Budget ID # C06308)

The existing sanitary sewer has a sag in the line. This location has a history of grease buildup and has been responsible for basement backups. This project involves the reconstruction of the sewer to remove the sag in the line. This project is due for completion by August 30, 2006, and is estimated to cost $150,000.

Zabel Way Pump Station Elimination (MSD Budget ID # C06295)

The existing Zabel Way Pump Station was built in 1971 and has a history of unauthorized discharges during wet weather events. This project shall eliminate the Zabel Way Pump Station by gravity. The estimated cost for this project is $150,000 with a completion date of September 30, 2008.

Watterson Woods WTP Elimination (MSD Budget ID # C06291)

This project was originally a part of the Fern Creek/Nottingham Interceptor #6. The Watterson Woods WTP is privately owned, but MSD operated. Due to easement and treatment plant acquisition issues which were delaying the completion of Interceptor #6, the elimination of the Watterson Woods Treatment Plant was made into a separate project. This project is scheduled for completion March 30, 2007, and is estimated to cost approximately $320,000.

Fern Creek/Nottingham Interceptor #6 (MSD Budget ID # C94082)

This project is in progress and includes the construction of approximately 15,125 LF of 8- to 24-inch gravity sewer and provided sanitary sewer service to the area. This project eliminated the Nottingham Hills (a known overflow), Fern Hill, and Wildwood Country Club Wastewater Treatment Plants. In addition, the project has eliminated the Nottinghamshire Pump Station, a known overflow and will eliminate the Watterson Trail Pump Station. The project also enabled collector projects to be initiated to provide sewer service to unsewered areas. This project to date has cost $5,900,000 to be completed by June 30, 2006.

Broadfern PS Upgrade (MSD Budget ID # F02327)

The existing pumps and motors at the Broadfern Pump Station are worn and outdated. This project will replace the existing pumps and motors at this pump station to achieve the original design capacity to abate the known overflow at this site. It will be investigated to see if larger pumps or impellors can be upsized. This will be based on the pump station configuration and whether the receiving system can accommodate additional flow. This effort may also require related pump station upgrades. This project is expected to cost $80,000 with a completion date of December 31, 2007.

6.2.2 McNeely Lake

6.2.2.1 McNeely Lake Background

The McNeely Lake sewer shed covers approximately 1.5 square miles and is centrally located at I-265 and Smyrna Parkway in Southern Jefferson County. The sewer system contains approximately 168,300 linear feet (32 miles) of gravity sewer pipe ranging in diameter from 8-inch to 24-inch. Approximately 81% of the system is 8–inch diameter collectors. Of the entire system, 50% of the sewers are constructed of VCP, 28% of PVC, and the pipe material for 13% is unidentified. Construction has been evenly distributed from the 1960's through the present. The McNeely Lake area was acquired in stages during the late 1980s and 1990s and is comprised of six small treatment plant areas: The Pines; Pleasant Valley; Apple Valley; Maple Grove; Old Maple Grove; and McNeely Lake. Each of the associated small treatment plants were eliminated in 1999 and directed to the West County WTP with the exception of the McNeely Lake WTP which is still in service. Figure 10 shows a map of the McNeely Lake service area with eliminated treatment plants and pumping stations. See Figures 11 - 14 for the program elements described in this section.

6.2.2.2 McNeely Lake Flow Monitoring

Figure 11 represents the McNeely Lake Flow Monitoring Basins.

Priority SSO Flow Monitoring Part 2: Pond Creek

The McNeely Lake area was monitored as part of the Priority SSO Flow Monitoring Part 2 project which is discussed in section 6.2.1.2 of this document.

West County Flow Monitoring

The McNeely Lake area was monitored as part of the West County Flow Monitoring project which is discussed in section 6.2.1.2 of this document.

6.2.2.3 McNeely Lake Sanitary Sewer Evaluation Study (SSES)

The objective of this study was to determine where the sanitary sewer system in the McNeely Lake study area is subject to excessive I/I in order to prioritize and phase rehabilitation. The study included the following components to identify active and potential sources of I/I:

- Gathering and reviewing existing pertinent data (LOJIC, IMS) to evaluate the quantity of I/I entering the sewer system;
- Conducting a flow-monitoring program to monitor rain events and measure wastewater flows at key points in the sewer system (9 meters for 45 days);
- Conducting physical inspections of manholes to identify corrosion and structural defects that may be contributing excessive I/I (688 manholes);
- Conducting smoke testing to identify structural defects that may contribute to I/I (165,000 linear feet);
- Conducting TV inspections, dyed-water flooding, and flow isolations in a limited amount of the system to identify structural defects that may contribute I/I to the system and blockages that may be inhibiting efficient hydraulic flow (41,000 linear feet of TVI);
- Compiling and analyzing data generated during the SSES to quantify the amount of excessive I/I entering the system and prioritize basins for rehabilitation.

Based on the flow-monitoring results, Sites 6 and 7 (The Pines), Site 8 (Pleasant Valley), and Sites 9 and 10 (Apple Valley) contributed over two-thirds of the I/I measured in the McNeely Lake service area. The Pines sub-basin (Sites 6 and 7) and Pleasant Valley (Site 8) also appeared to have the worst steady-state infiltration problem. Field inspection results confirmed that the Pines and Pleasant Valley also had significant main line defects, although manhole condition appeared to be sound. Flow-monitoring also showed an unusually large baseflow in the Pines (Site 7).

Field inspection results indicated extensive manhole defects in the Apple Valley and Maple Grove subdivisions. Manhole inspection results indicated a significant H_2S deterioration problem for the manholes in the Apple Valley system, which could explain the large wet weather contribution. Maple Grove displayed a significant number of manhole defects, but field inspection did not reveal mainline structural problems as extensive as those found in the Pines and Pleasant Valley. Old Maple Grove and McNeely Lake had limited manhole and main line defects identified during the SSES and did not appear to be major I/I contributors (on a relative scale) to the system. This project was completed in December 1999 and cost approximately $494,000.

The significant manhole chimney and pipe defects identified in this study were repaired under the McNeely Lake Phases 1A and 1B Rehabilitation projects. Figure 12 represents the McNeely Lake SSES study area.

6.2.2.4 McNeely Lake Computer Modeling

Figure 13 represents the hydraulic model study areas in the McNeely Lake system.

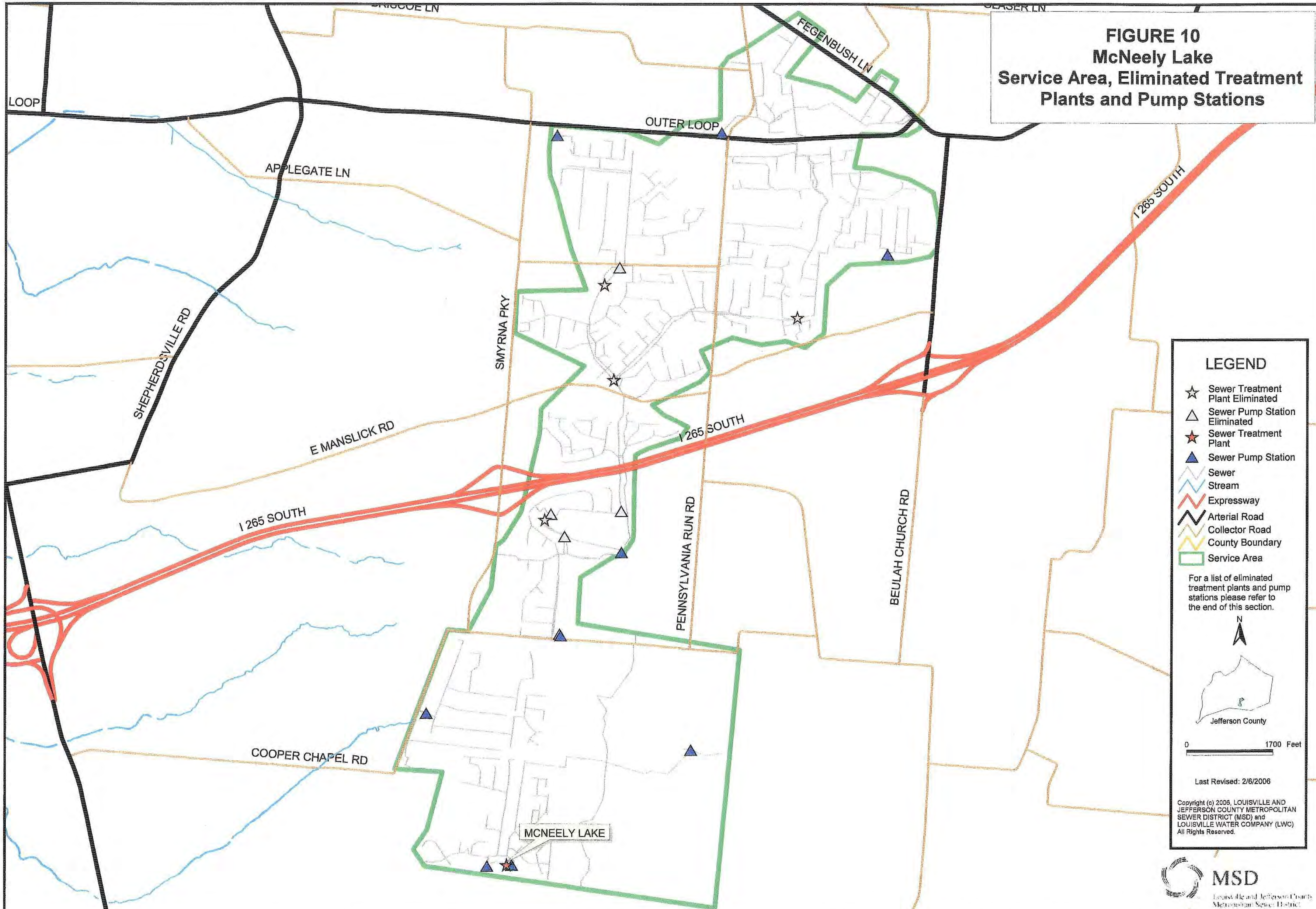


FIGURE 10
McNeely Lake
Service Area, Eliminated Treatment Plants and Pump Stations
LOOP
OUTER LOOP
FEGENBUSH LN
APPLEGATE LN
SHEPHERDSVILLE RD
SMYRNA PKY
E MANSLICK RD
I 265 SOUTH
I 265 SOUTH
I 265 SOUTH
PENNSYLVANIA RUN RD
BEULAH CHURCH RD
COOPER CHAPEL RD
MCNEELY LAKE
LEGEND
Sewer Treatment Plant Eliminated
Sewer Pump Station Eliminated
Sewer Treatment Plant
Sewer Pump Station
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Service Area
For a list of eliminated treatment plants and pump stations please refer to the end of this section.
N
Jefferson County
0
1700 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD

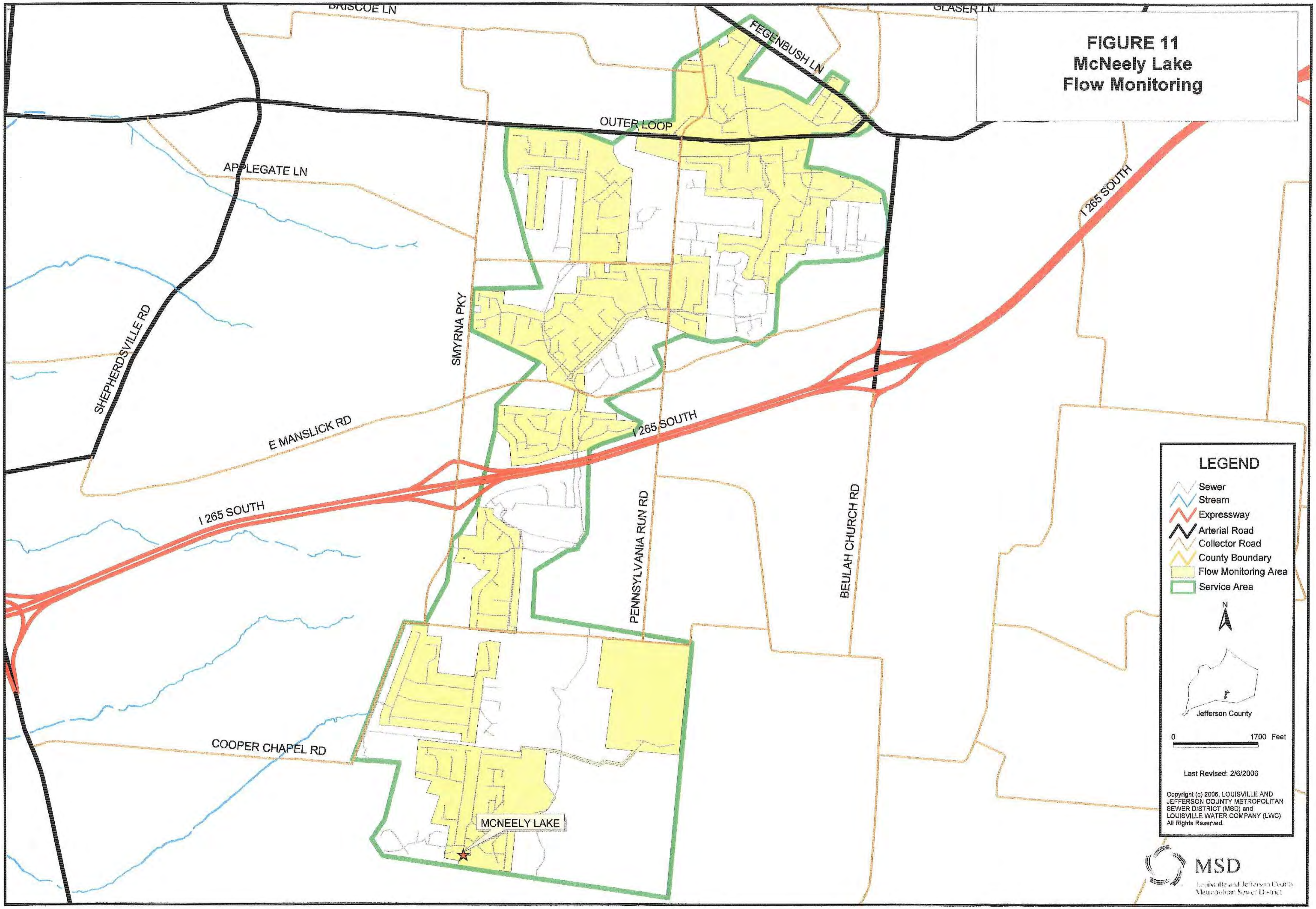


FIGURE 11
McNeely Lake
Flow Monitoring
BRISCOE LN
GLASER LN
FEGENBUSH LN
OUTER LOOP
APPLEGATE LN
SHEPHERDSVILLE RD
SMYRNA PKY
E MANSLICK RD
I 265 SOUTH
I 265 SOUTH
I 265 SOUTH
PENNSYLVANIA RUN RD
BEULAH CHURCH RD
COOPER CHAPEL RD
MCNEELY LAKE
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Flow Monitoring Area
Service Area
N
Jefferson County
0
1700 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD

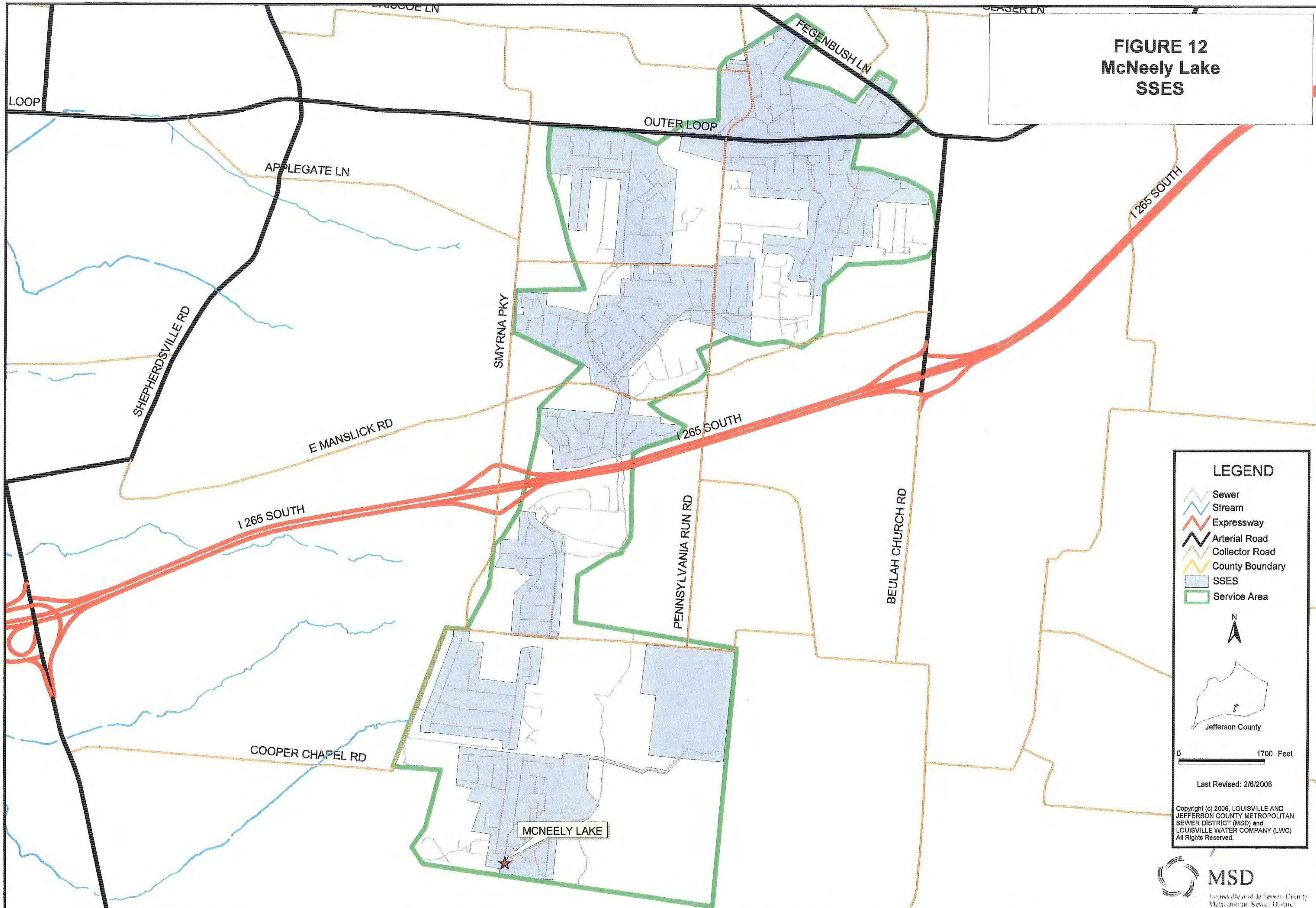


FIGURE 12
McNeely Lake
SSES
LOOP
OUTER LOOP
FEGENBUSH LN
APPLEGATE LN
SHEPHERDSVILLE RD
SMYRNA PKY
E MANSLICK RD
I 265 SOUTH
I 265 SOUTH
I 265 SOUTH
PENNSYLVANIA RUN RD
BEULAH CHURCH RD
COOPER CHAPEL RD
MCNEELY LAKE
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
SSES
Service Area
N
Jefferson County
0
1700 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD

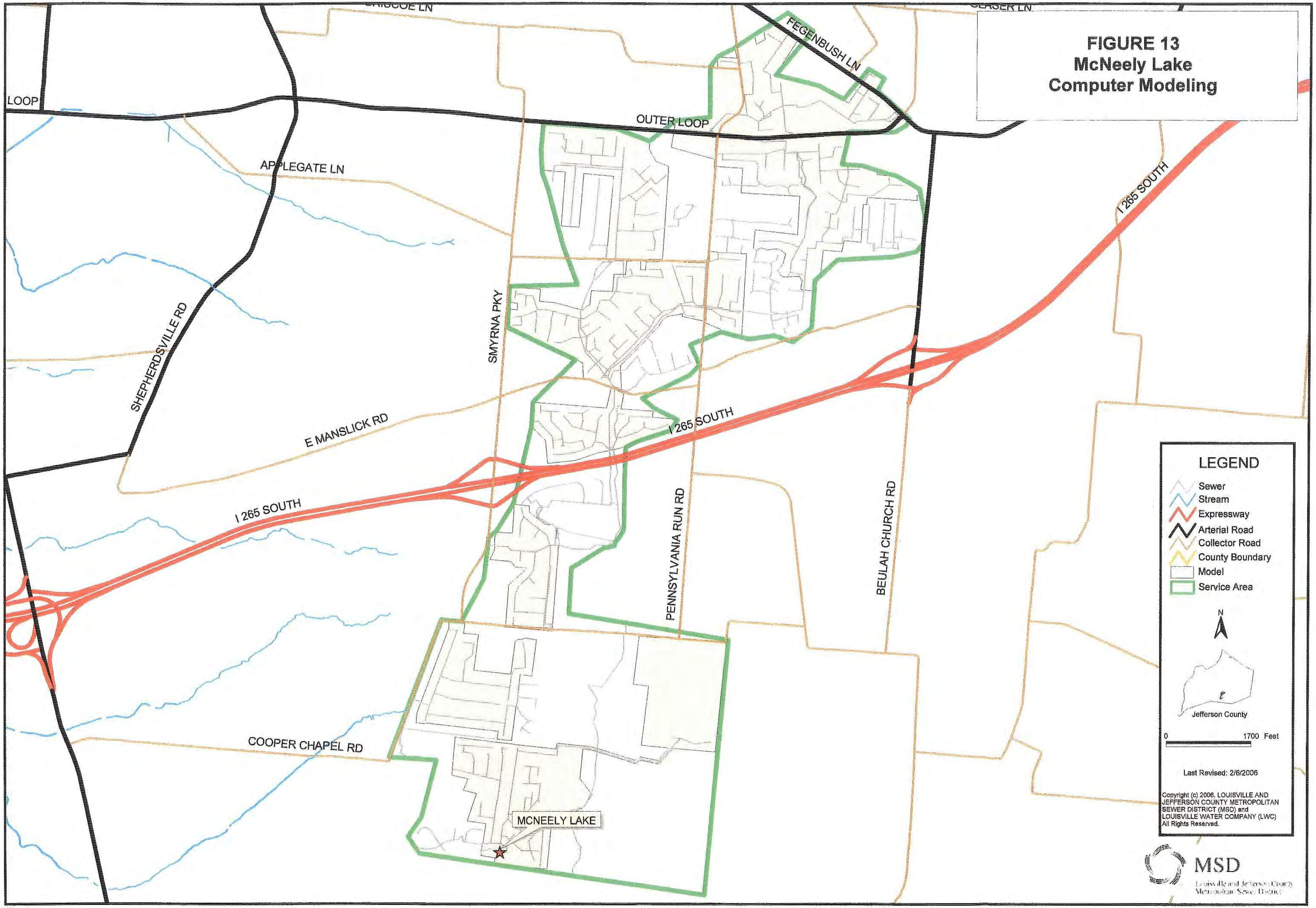


FIGURE 13
McNeely Lake
Computer Modeling
FEGENBUSH LN
OUTER LOOP
LOOP
APPLEGATE LN
SHEPHERDSVILLE RD
SMYRNA PKY
E MANSLICK RD
I 265 SOUTH
I 265 SOUTH
I 265 SOUTH
PENNSYLVANIA RUN RD
BEULAH CHURCH RD
COOPER CHAPEL RD
MCNEELY LAKE
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Model
Service Area
N
Jefferson County
0
1700 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD

Pond Creek

The McNeely Lake area was modeled as part of the Pond Creek Hydraulic Model project which is discussed in section 6.2.1.4 of this document.

Pennsylvania Run

The Pennsylvania Run study area covers approximately 5 square miles and is centrally located at the intersection of Smyrna Parkway and I-265. The sewer system contains a total of 400,000 feet (76 miles) of gravity sewer pipe ranging in size from 8-inch to 36-inch diameter. 78% are 8-inch collection sewers. Of the entire study area, 56% of the system was installed after 1980 and 73% of the system consists of clay pipe (VCP) and polyvinyl chloride pipe (PVC) (21% is unknown pipe material). The majority of the land use in the service area is residential and undeveloped/vacant land.

The purpose of this project was to determine the apparent best hydraulic solution to address the impact of planned and future developments in the Pennsylvania Run watershed to the existing collection system. A subset of this development would be the planned Washington Green PS which serves this area. The existing Pond Creek Collection system model was built in FY02 and then recalibrated to new flow monitoring data collected in FY03 (July 1, 2002 – June 30, 2003). Some of the flow monitoring data in the McNeely Lake basin (which included the Admiral PS and a portion of the Fishpool Interceptor) was judged to be poor, making calibration in the area less certain. To improve on the calibration, previous flow monitoring data, pump run records, and downstream flow monitoring data were reviewed. This project cost approximately $7,000 and was completed in September 2004.

6.2.2.5 McNeely Lake Rehabilitation

Figure 14 displays the rehabilitation work conducted under the McNeely Lake Rehabilitation projects.

McNeely Lake I/I Rehabilitation Phase 1A

This project provided for the rehabilitation of defects identified in the McNeely Lake SSES. The rehabilitation effort consisted of 2,709 linear feet of cured-in-place sewer main rehabilitation, 56 cured-in-place lateral rehabilitations, and 644 manhole chimney seals. This effort addressed a portion of the defects identified in the McNeely Lake SSES conducted in FY99. A change order to this project incorporated rehabilitation of more than 100 manholes in the Cedar Creek Service Area as well (see section 3.2.4). This project was completed in December 2000 and cost approximately $1,068,000.

McNeely Lake I/I Rehabilitation Phase 1B

This project provided for the rehabilitation of defects identified in the McNeely Lake SSES. The rehabilitation effort consisted of 4,624 linear feet of cured-in-place sewer main rehabilitation and 27 cured-in-place lateral rehabilitations. This effort addressed the remaining significant defects identified in the McNeely Lake SSES conducted in FY99 (July 1, 1997 – June 30, 1998) except

H2S related defects. This project was completed in November 2001 and cost approximately $299,000.

6.2.2.6 Other Capital Projects in McNeely Lake

McNeely Lake Pump Station and Force Main

This project involved the construction of approximately 1,150 linear feet of 20-inch diameter force main and a new 2.8 MGD raw wastewater pumping station. The new raw wastewater pumping station replaced the existing Pennsylvania Run Pump Station and directed the flow to the Pond Creek system. Four small treatment plants were also taken out of service with the construction of this project. These treatment plants included: Apple Valley, Pleasant Valley, The Pines, and Maple Grove #5, all known overflows. Apple Valley, The Pines, and Maple Grove #5 could not accept additional flow due to limited capacity. Elimination of these plants allowed MSD to provide sanitary sewer service to new development in the area and improve the water quality of the area. This project cost approximately $3,242,000.

Fishpool Interceptor (FP-8,9,10)

This project involved the construction of approximately 12,680 linear feet of 20- to 24- inch diameter interceptor sewer. The project connected the effluent line from the new McNeely Lake (Admiral Way) Pump Station to the existing Fishpool Interceptor, taking flows to the Pond Creek system. This project eliminated the Old Maple Grove WTP, a known overflow. This project cost approximately $2,956,000.

6.2.3 Mill Creek

6.2.3.1 Mill Creek Background

The Mill Creek study area covers approximately 33 square miles and is centrally located at the intersection of Dixie Highway and Greenwood Road. The sewer system contains a total of 1,880,000 linear feet (356 miles) of gravity sewer pipe ranging in size from 8-inch to 78-inch diameter of which 77% are 8-inch collection sewers. Approximately 40% of the collection system is constructed of vitrified clay pipe (VCP), however, no material is identified for 34% of the collection system. Of the entire study area, 67% of the system was installed in the 1990's and 2000's. The majority of the land use in the service area is residential and undeveloped/vacant land. Figure 15 shows a map of the Mill Creek service area with eliminated treatment plants and pumping stations. See Figures 16 - 19 for the program elements described in this section.

6.2.3.2 Mill Creek Flow Monitoring

Figure 16 represents the areas that were flow monitored in Mill Creek.

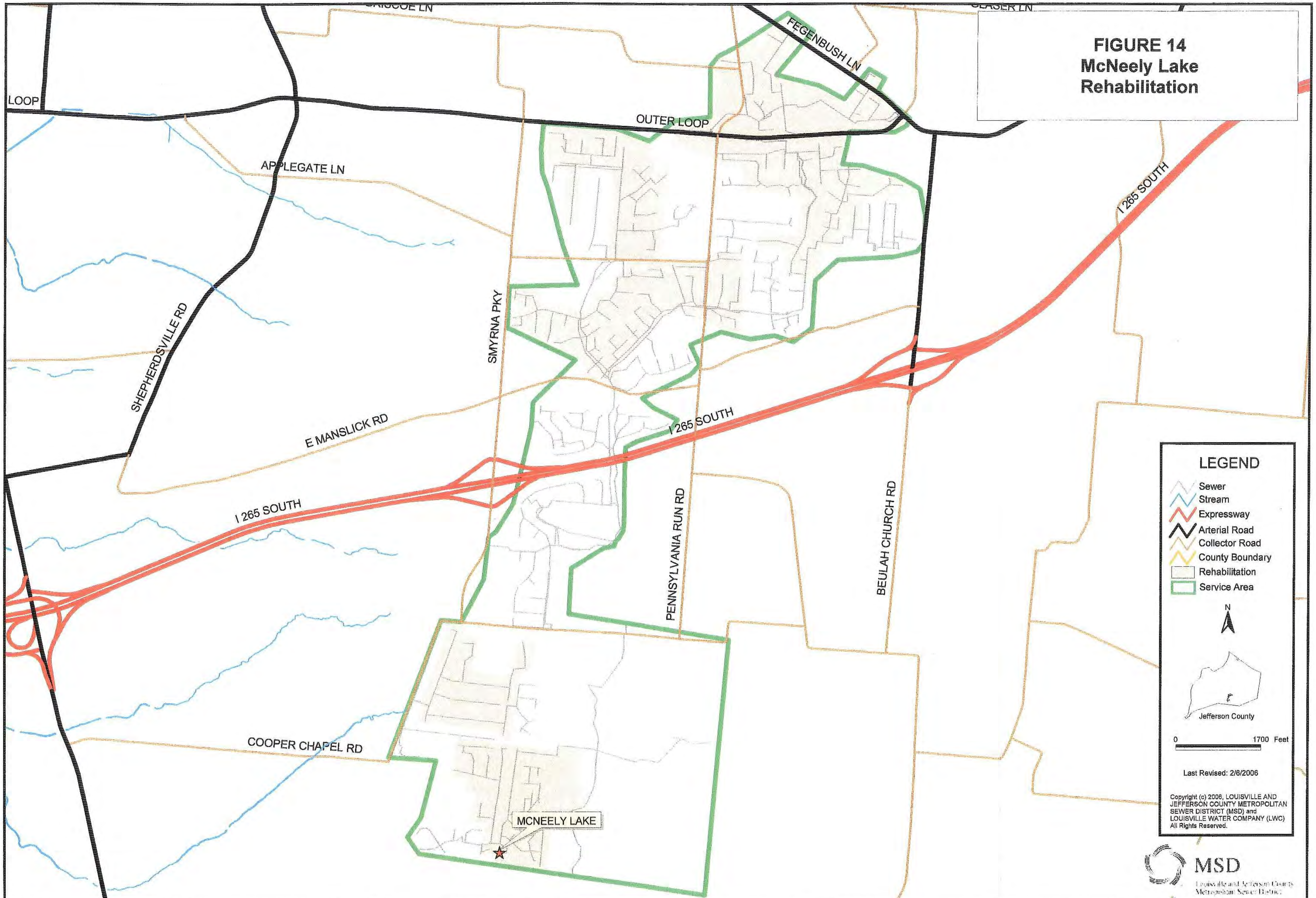
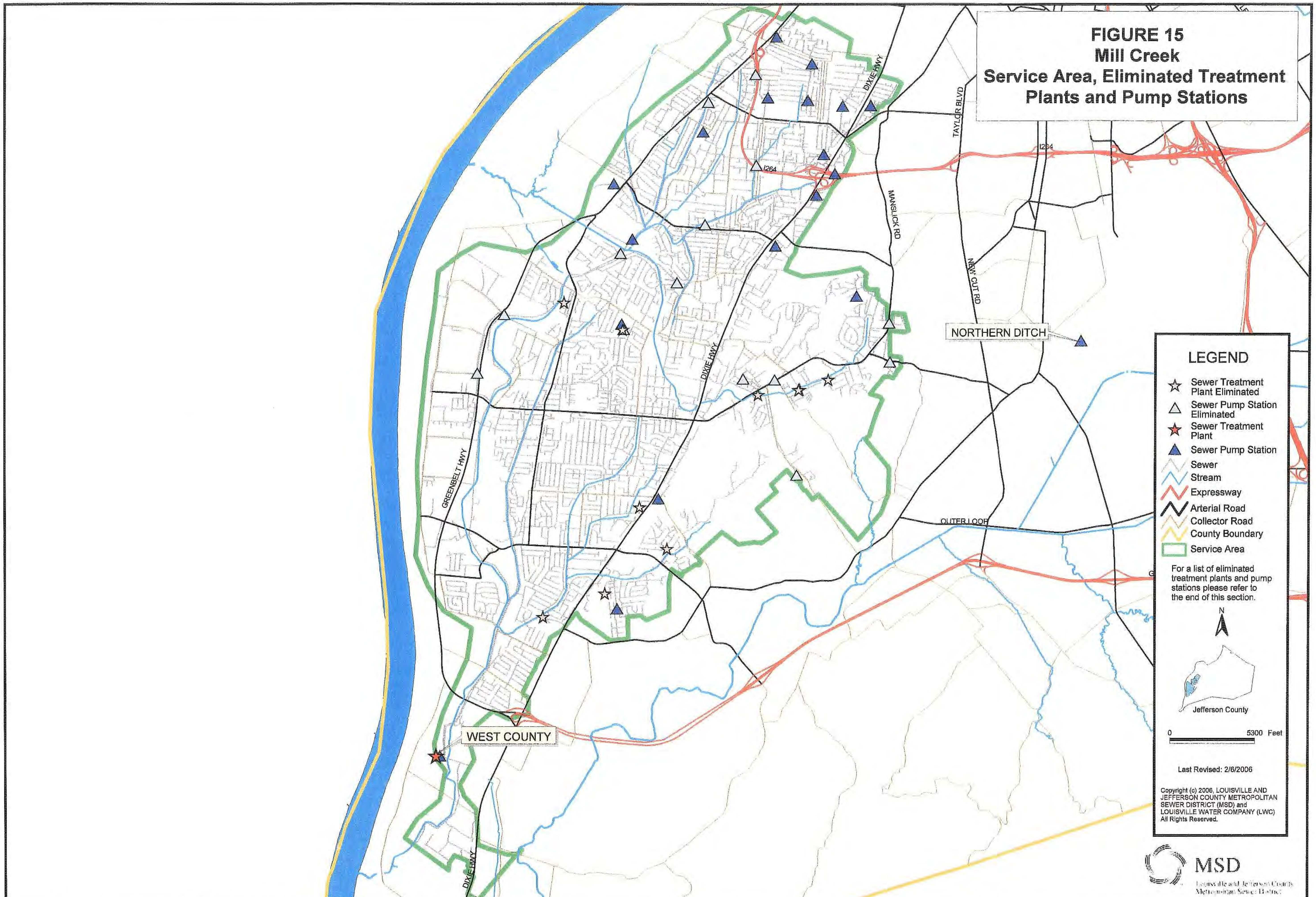


FIGURE 14
McNeely Lake
Rehabilitation
LOOP
OUTER LOOP
FEGENBUSH LN
APPLEGATE LN
SHEPHERDSVILLE RD
SMYRNA PKY
E MANSLICK RD
I 265 SOUTH
I 265 SOUTH
I 265 SOUTH
PENNSYLVANIA RUN RD
BEULAH CHURCH RD
COOPER CHAPEL RD
MCNEELY LAKE
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Rehabilitation
Service Area
N
Jefferson County
0
1700 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD

FIGURE 15
Mill Creek
Service Area, Eliminated Treatment Plants and Pump Stations



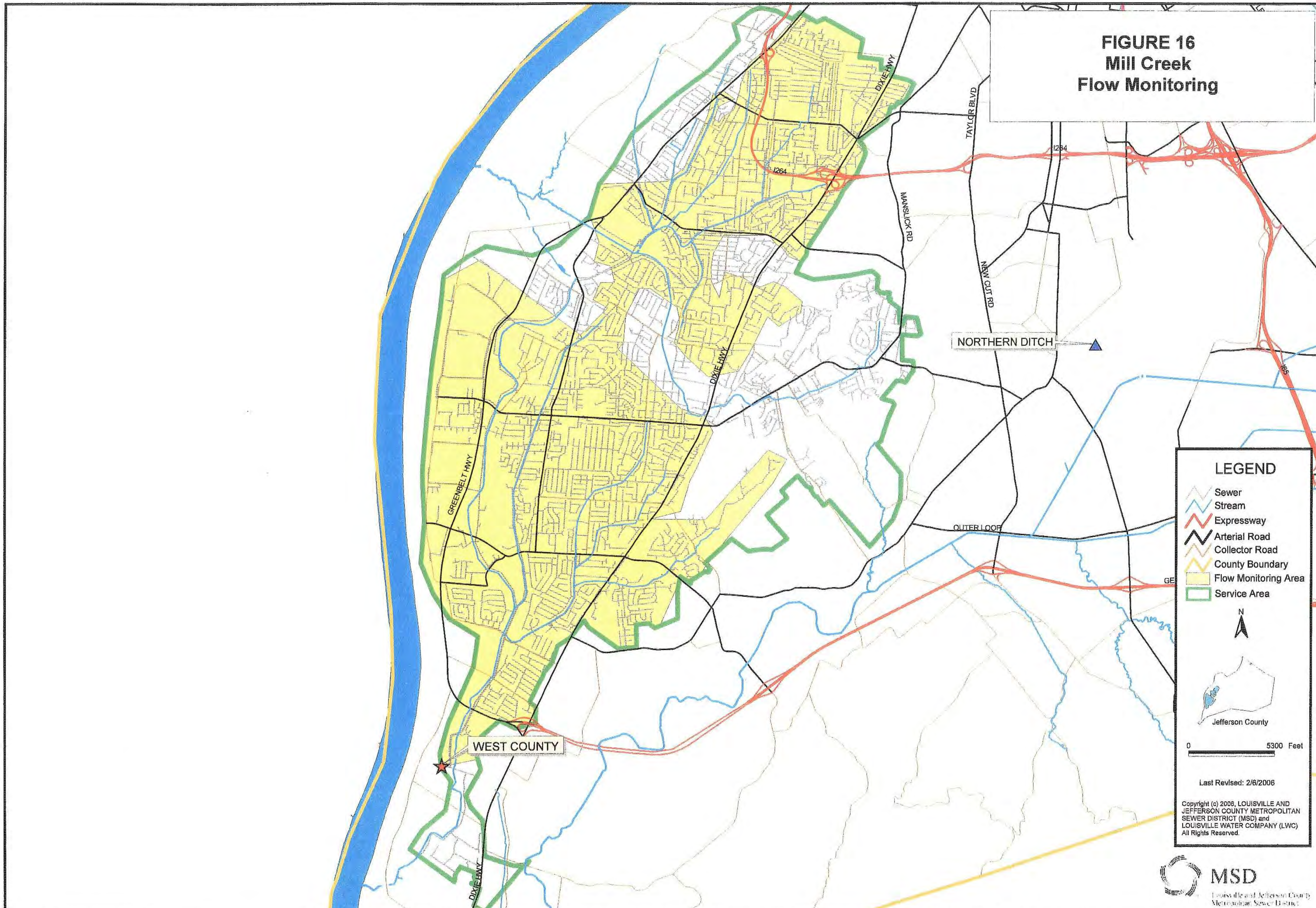


FIGURE 16
Mill Creek
Flow Monitoring
NORTHERN DITCH
WEST COUNTY
DIXIE HWY
GREENBELT HWY
TAYLOR BLVD
MANSLICK RD
NEW CUT RD
I264
OUTER LOOP
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Flow Monitoring Area
Service Area
N
Jefferson County
0
5300 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD
Louisville and Jefferson County Metropolitan Sewer District

Mill Creek Flow Monitoring

Four flow monitors were placed by MSD in the study area. Three of these monitors were located in the Mill Creek Sewershed and one was placed to monitor the Pond Creek Sewershed. Flow monitoring was conducted for 105 days beginning October 6, 1998, and ending January 18, 1999. Four significant rain events were monitored: October 7 (1.49"), December 21 (1.29"), January 2 (1.11"), and January 8 (1.89").

The flow monitoring study noted that basement flooding did not correlate with peaking factors and was likely due to several factors and not just interceptor flow. Results also showed that peaking factors in the Mill Creek sewershed were low, especially in comparison with the neighboring Pond Creek sewershed. Data for the Pond Creek Flow Monitor used in this study was suspect; however, the reported flows may have been a result of either low ground water during the study period or a downstream flow impediment possibly related to WTP activities. The other flow monitor data was acceptable and could be used for the Mill Creek area without adjustment. The project was completed in April 1999.

Mill Creek Flow Monitoring

This study, which cost $50,000, was developed to assess the condition of the Mill Creek sewer system and to quantify the impacts of infiltration and inflow. Flow data was collected for a period of 60 days beginning December 16, 2001, and ending March 18, 2002. The flow data was used to characterize the flow for each sub-basin in the project area. This analysis included analyzing peaking factors, hydrographs, wet-weather flows, and dry-weather flows. The flow monitoring schematic in Figure 19 shows how sewage is transported through the system to the West County Wastewater Treatment Plant.

Several flow data periods were used to represent a typical dry weather period (average daily flow) in Mill Creek. The discrete dry weather flow for each sub-basin was categorized as sanitary flow and infiltration. Infiltration was estimated as 80% of the daily minimum flow and represents steady-state infiltration into the Mill Creek sewer system.

Two significant rain events were monitored: January 30, 2002 – February 1, 2002 (2.2"), and March 16, 2002 (0.93"). The Operations team at the West County Wastewater Treatment Plant reported finding large catfish on the screens at the plant on more than one occasion. This suggested that there is a large inflow source somewhere within the system upstream of the WCWTP, which includes both the Mill Creek and Pond Creek areas. The flow monitor on the 78" interceptor recorded zero flow three times during the storm events that occurred between January 24 and February 1. During each event the flow monitor read excessive pressure heads before recording zero flows and pressures. This indicated that the pipe surcharged and flow eventually began flowing in the reverse direction. Due to this surcharging and reverse flow it was impossible to calculate the actual peak wet weather flow for this site. This project was completed in June 2002 and cost approximately $61,000.

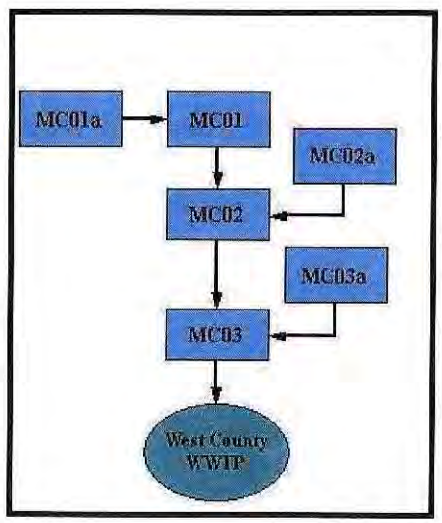


Figure 19 – Mill Creek Flow Monitoring Schematic

6.2.3.3 Mill Creek Sanitary Sewer Evaluation Study (SSES)

The objective of this study, which cost $231,000, was to develop a plan of improvements to rehabilitate the sewer collection system. This work was focused toward setting up projects to rehabilitate the defects identified during the SSES with an emphasis on rehabilitation improvements, O&M concerns, estimated I/I reduction, and estimated costs. The study included the following components to identify active and potential sources of I/I:

- Gathering and reviewing existing pertinent data (LOJIC, IMS, & flow data) to evaluate the quantity of I/I entering the sewer system;
- Physical inspections of manholes to identify corrosion and structural defects that may be contributing excessive I/I (682 manholes);
- Smoke testing to identify structural defects that may contribute to I/I (150,000 linear feet sewer);
- TV inspections (30,000 linear feet of sewer) to identify sources of I/I and verify structural defects;
- Conducting 20 flow isolations to quantify and locate constant infiltration;
- Conducting 20 dyed-water tests as needed in a limited amount of the system to identify structural defects that may contribute I/I to the system and blockages that may be inhibiting efficient hydraulic flow;
- Compiling and analyzing the data generated during the SSES to quantify the defects that allow excessive I/I to enter the system, determine corrective actions to address defects, and prioritize sub-basins for rehabilitation.

Dry weather flow monitoring and flow isolations indicated low infiltration. Manhole inspections and TVI indicated that the public side sewer is in poor condition, suffering from cracks and misalignments in both pipes and manholes. TVI showed that 15% of the system is suffering from a serious root problem and smoke testing identified many defects in manholes with only a few private side defects. No rehabilitation has been performed as a result of this study but locations of maintenance related issues such as root intrusions and grease build-up were provided to the MSD maintenance department for action. The project was completed in October 2002 and cost approximately $284,000. Figure 17 represents the Mill Creek SSES study area.

6.2.3.4 Mill Creek Computer Modeling

Figure 18 represents the hydraulic model study areas in the McNeely Lake system.

<u>West County WTP Spline</u>

This model was built by joining the Mill Creek model with a spline model of the Pond Creek system. This project is discussed in section 6.2.1.4 of this document.

<u>Mill Creek</u>

This model was calibrated during FY02 (July 1, 2001 – June 30, 2002) using FY02 (July 1, 2001 – June 30, 2002) flow monitoring data. It consisted of approximately 230,000 linear feet of sanitary sewer greater than or equal to 10" diameter. This model was built to simulate dry

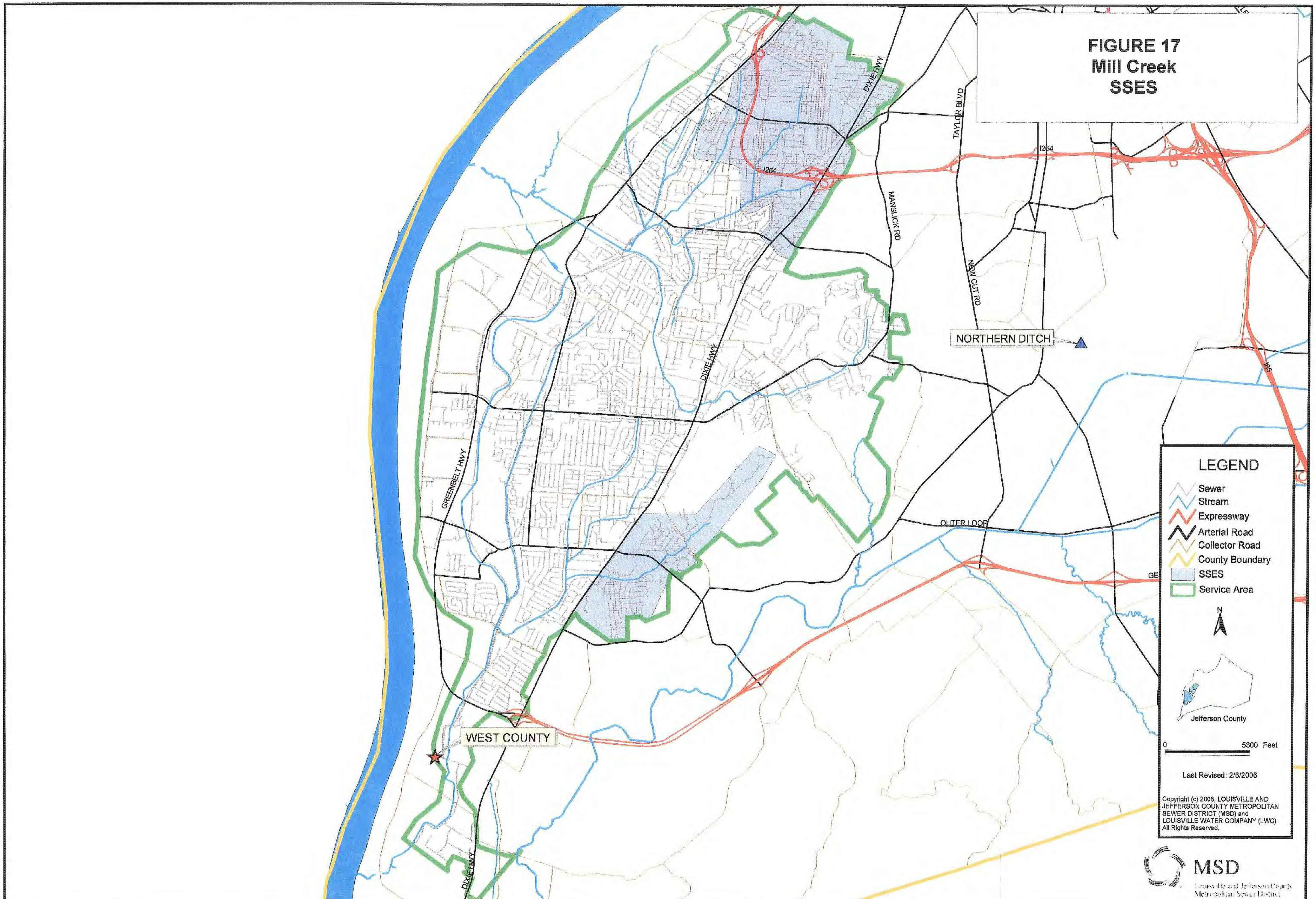


FIGURE 17
Mill Creek
SSES
DIXIE HWY
TAYLOR BLVD
I264
MANSLICK RD
NEW CUT RD
NORTHERN DITCH
I65
GREENBELT HWY
OUTER LOOP
WEST COUNTY
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
SSES
Service Area
N
Jefferson County
0
5300 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD
Louisville and Jefferson County Metropolitan Sewer District

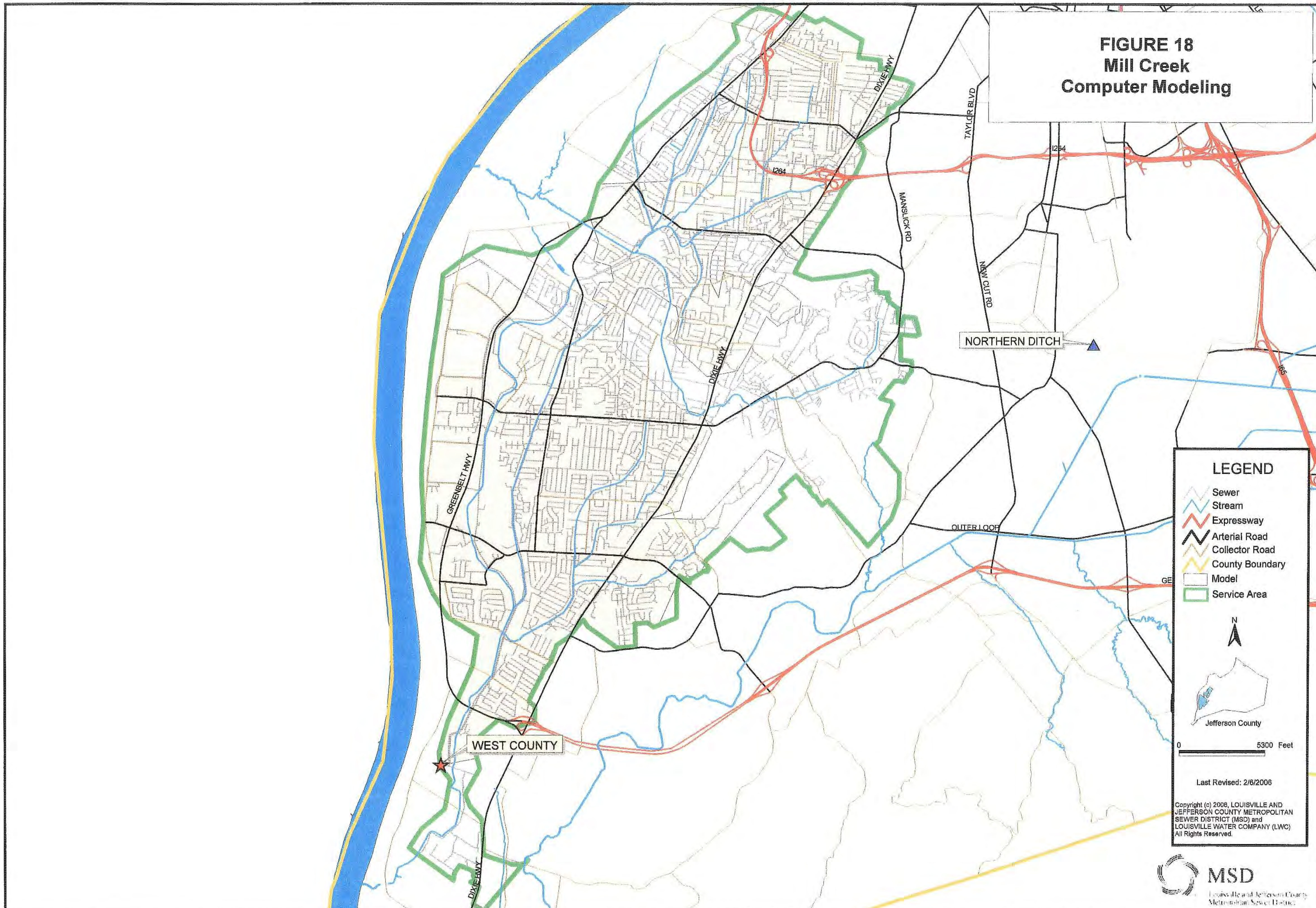


FIGURE 18
Mill Creek
Computer Modeling
DIXIE HWY
TAYLOR BLVD
I264
MANSLICK RD
NEW CUT RD
NORTHERN DITCH
GREENBELT HWY
OUTER LOOP
WEST COUNTY
I65
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Model
Service Area
N
Jefferson County
0
5300 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD
Louisville and Jefferson County Metropolitan Sewer District

weather and wet weather flow in the sanitary sewer system. The model was developed under the Pond creek modeling project. The approximate total cost of the project was $64,000.

6.2.3.5 Future / Ongoing Project in Mill Creek

Rosa Terrace Pump Station Pump Replacement Project (MSD Budget ID # F02322)

The existing pumps and motors at the Rosa Terrace Pump Station are exhausted and outdated and inadequate for current capacity needs. This project will replace the existing centrifugal pumps and motors at this pump station and create additional needed capacity to abate the known overflow at this site. This effort may also require some suction and/or discharge piping modifications. This project is expected to cost $36,000 and will be completed by June 30, 2007.

Thurman Drive Pump Station Elimination (MSD Budget ID # B06299)

The Thurman Drive Pump Station is located in the Shively service area. This pump station was put into commission in 1962 and has had recent unauthorized discharge events. As a result, MSD shall eliminate the Thurman Drive Pump Station by gravity to an interceptor on the other side of I-65. This project will also take approximately 30 customers off septic tanks. The estimated cost for this project is $150,000 with a completion date of September 30, 2008.

6.2.4 Valley Village

6.2.4.1 Valley Village Background

The Valley Village sewershed covers approximately 1.5 square miles and is centrally located at Dixie Highway and Watson Lane in Southwest Jefferson County. The sewer system contains approximately 86,300 (16 miles) of gravity sewer pipe ranging in diameter from 8-inch to 27-inch pipe. Approximately 75% of the system is 8 –inch diameter collectors. Of the entire system, 60% of the sewers are constructed of VCP, 23% of PVC, and the pipe material for 14% is unidentified. Approximately 52% Of the system has been constructed during the 2000s, 31% in the 1950s, and the remainder in the 1980s and 1990s. The Valley Village system was acquired in 1986 and the original small treatment plant was taken off line in 1989 with the construction of an interceptor to the West County WTP. Figure 20 shows a map of the Valley Village service area with eliminated treatment plants and pumping stations. See Figures 21 - 24 for the program elements described in this section.

6.2.4.2 Valley Village Flow Monitoring

Flow monitoring was conducted for a period of 68 days beginning March 3, 1998, and ending May 11, 1998. The Valley Village study area was broken down into six discrete basins. Flow monitors were installed in each basin and the data was analyzed for the typical parameters, such as peaking factor, average dry weather flows, and wet weather flow characteristics. Three significant rain events were monitored: March 9 (1.05”), March 20 (1.62”), and April 16 (1.85”). The hydrographs were analyzed to determine the nature of the problem for each basin. The numbered circles in Figure 25 represent the basins monitored by each of the flow meters. This project cost is included in the total cost for the Valley Village SSES discussed in section 6.2.4.3.

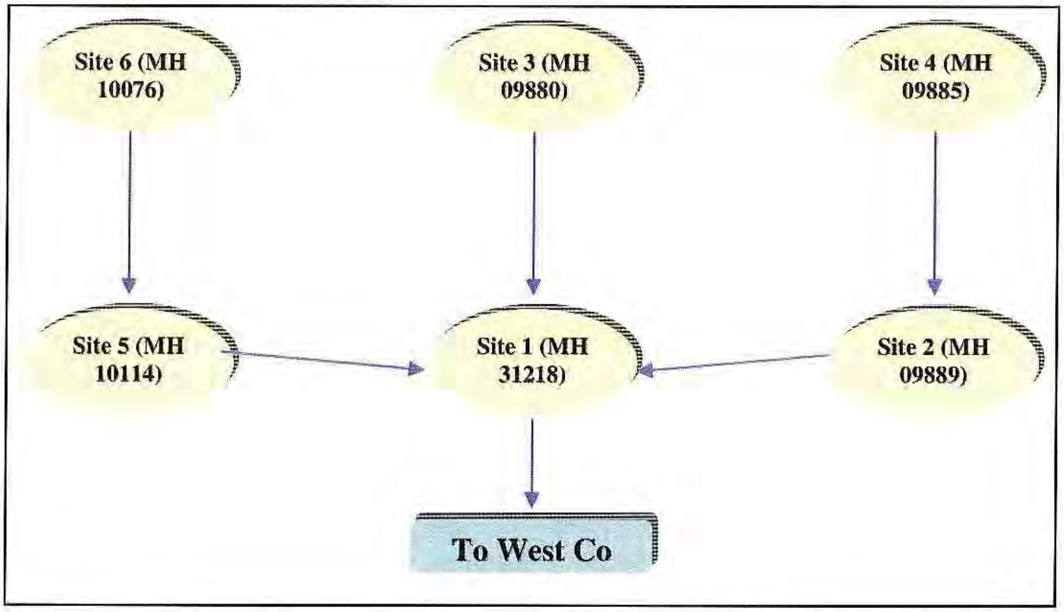


Figure 25 – Valley Village Flow Monitoring Schematic

Flow monitoring results showed each site had high peaking factors - ranging from 14 to 32 - except for basin 2. In basin 2, dry weather flow was not considered reliable and it is likely that this basin had high peaking factors as well. In three cases, flow caused the sewers to surcharge.

There were significant wet weather impacts on the system; the dry weather flow was significantly below what one would expect for basins this size. In fact the total dry weather flow for all basins – 0.21 MGD – was less than half of MSD Design Standards. Peaking factors were also estimated using the average flow estimated by MSD standards. These factors ranged from 4.1-13, more in line with values observed in other portions of the county.

Inflow was the primary problem. The high frequency of zero flow readings for all basins indicated that debris and sediment were also a problem. TVI confirmed significant amounts of debris and roots. Significant amounts of sediment probably entered the pipe during wet weather. As the flow subsides, sediment was trapped by roots and formed a series of "check dams." This project was completed in February 1999. Figure 21 represents the area that was flow monitored in Valley Village. This project cost approximately $174,000.

6.2.4.3 Valley Village Sanitary Sewer Evaluation Study (SSES)

The objective of this study was to determine where the sanitary sewer system in the Valley Village study area is subject to excessive I/I in order to prioritize rehabilitation. The study included the following components to identify active and potential sources of I/I:

- Gathering and reviewing existing pertinent data (LOJIC, IMS) to evaluate the quantity of I/I entering the sewer system;

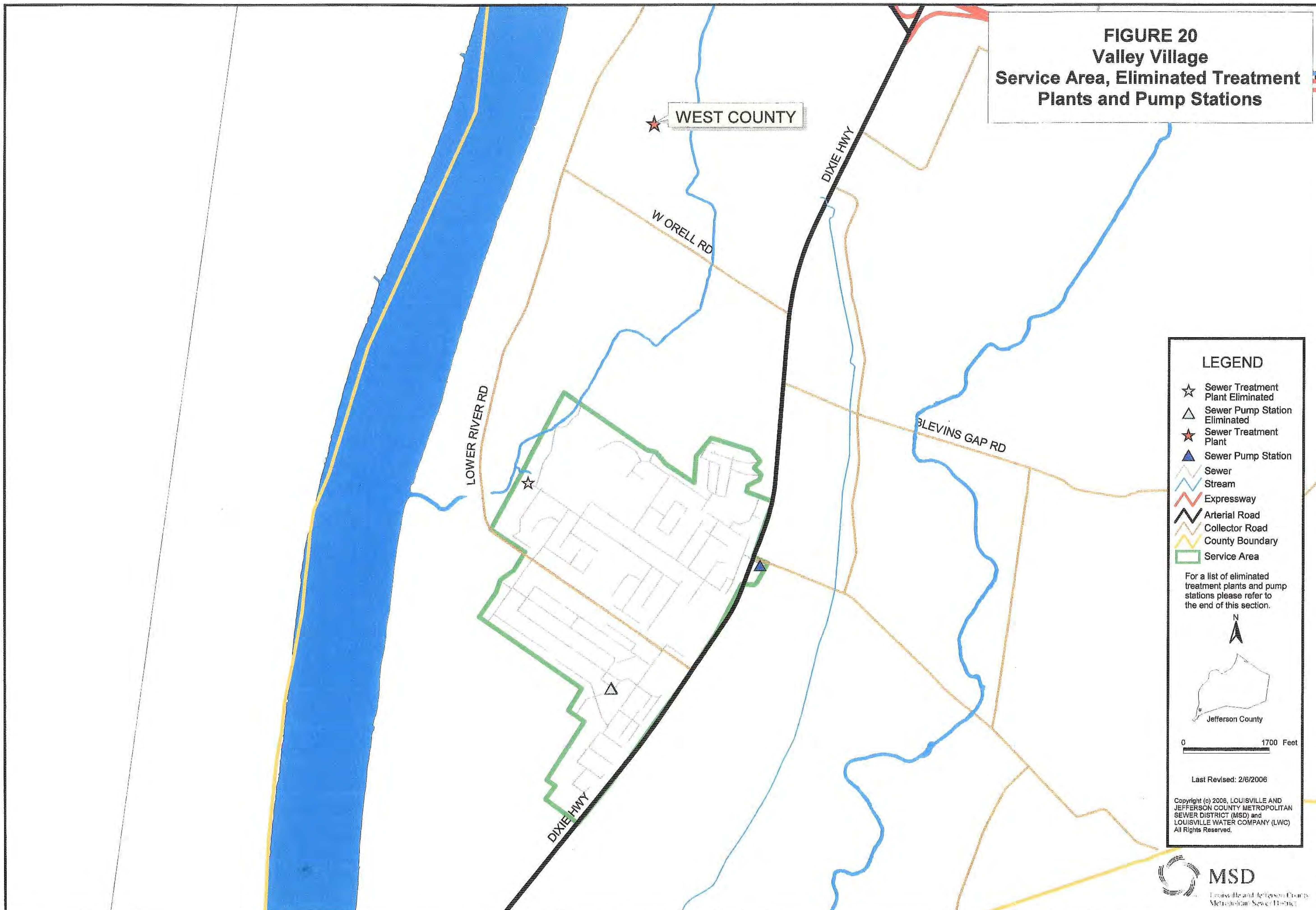


FIGURE 20
Valley Village
Service Area, Eliminated Treatment
Plants and Pump Stations
WEST COUNTY
DIXIE HWY
W ORELL RD
LOWER RIVER RD
BLEVINS GAP RD
DIXIE HWY
LEGEND
Sewer Treatment Plant Eliminated
Sewer Pump Station Eliminated
Sewer Treatment Plant
Sewer Pump Station
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Service Area
For a list of eliminated treatment plants and pump stations please refer to the end of this section.
N
Jefferson County
0
1700 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD

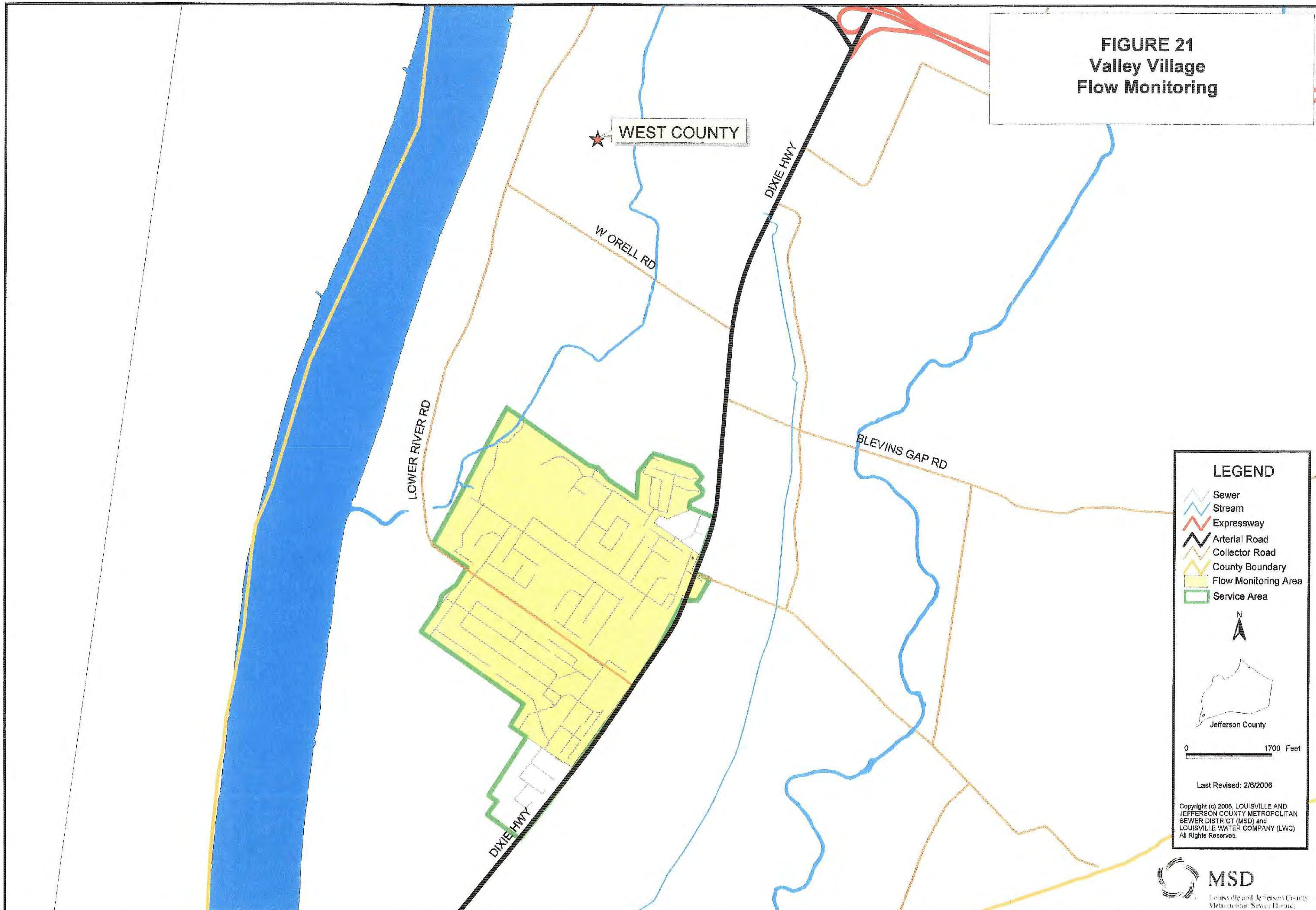


FIGURE 21
Valley Village
Flow Monitoring
WEST COUNTY
DIXIE HWY
W ORELL RD
LOWER RIVER RD
BLEVINS GAP RD
DIXIE HWY
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Flow Monitoring Area
Service Area
N
Jefferson County
0
1700 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD

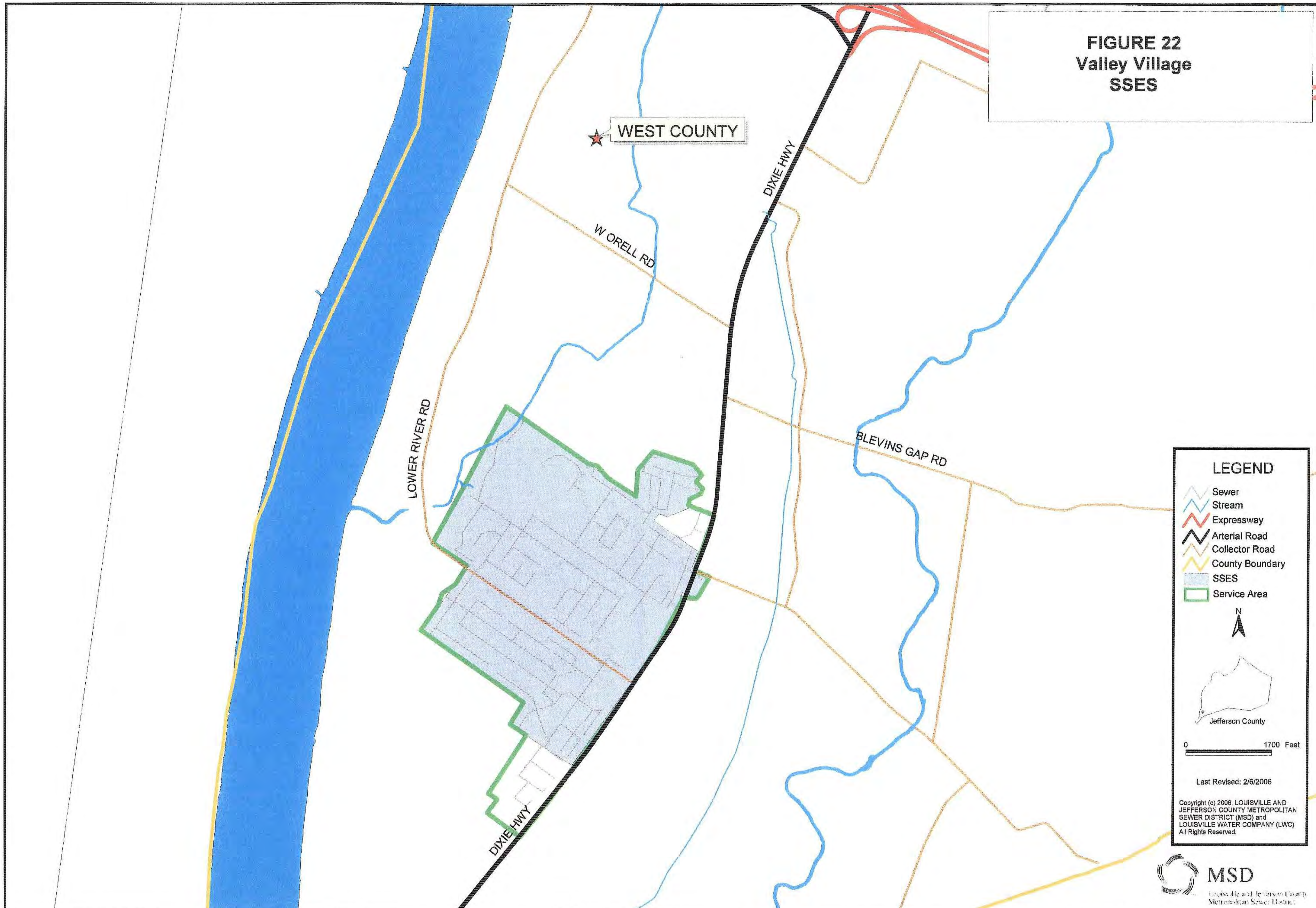


FIGURE 22
Valley Village
SSES
WEST COUNTY
DIXIE HWY
W ORELL RD
LOWER RIVER RD
BLEVINS GAP RD
DIXIE HWY
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
SSES
Service Area
N
Jefferson County
0
1700 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD

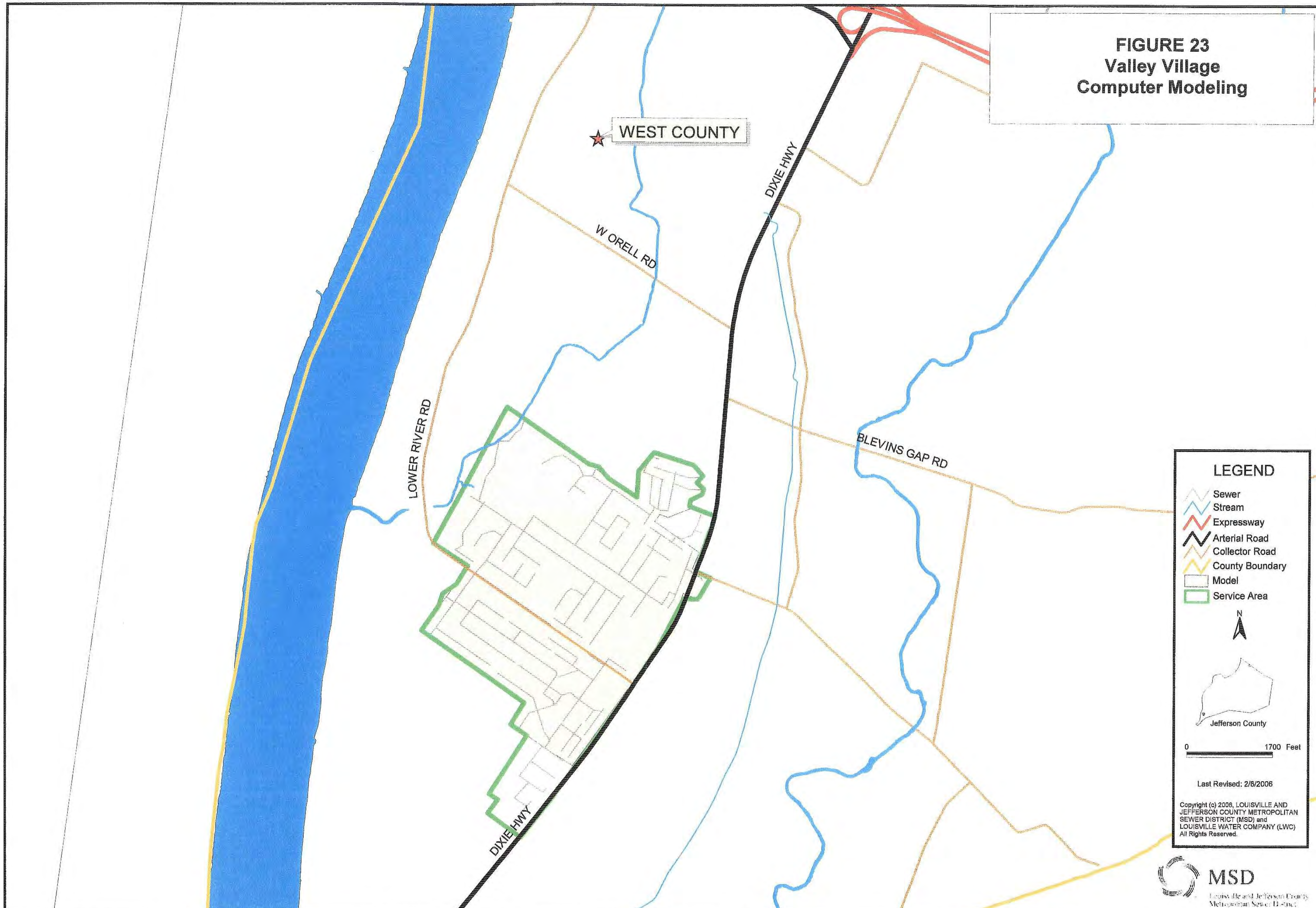


FIGURE 23
Valley Village
Computer Modeling
WEST COUNTY
DIXIE HWY
W ORELL RD
LOWER RIVER RD
BLEVINS GAP RD
DIXIE HWY
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Model
Service Area
N
Jefferson County
0
1700 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD

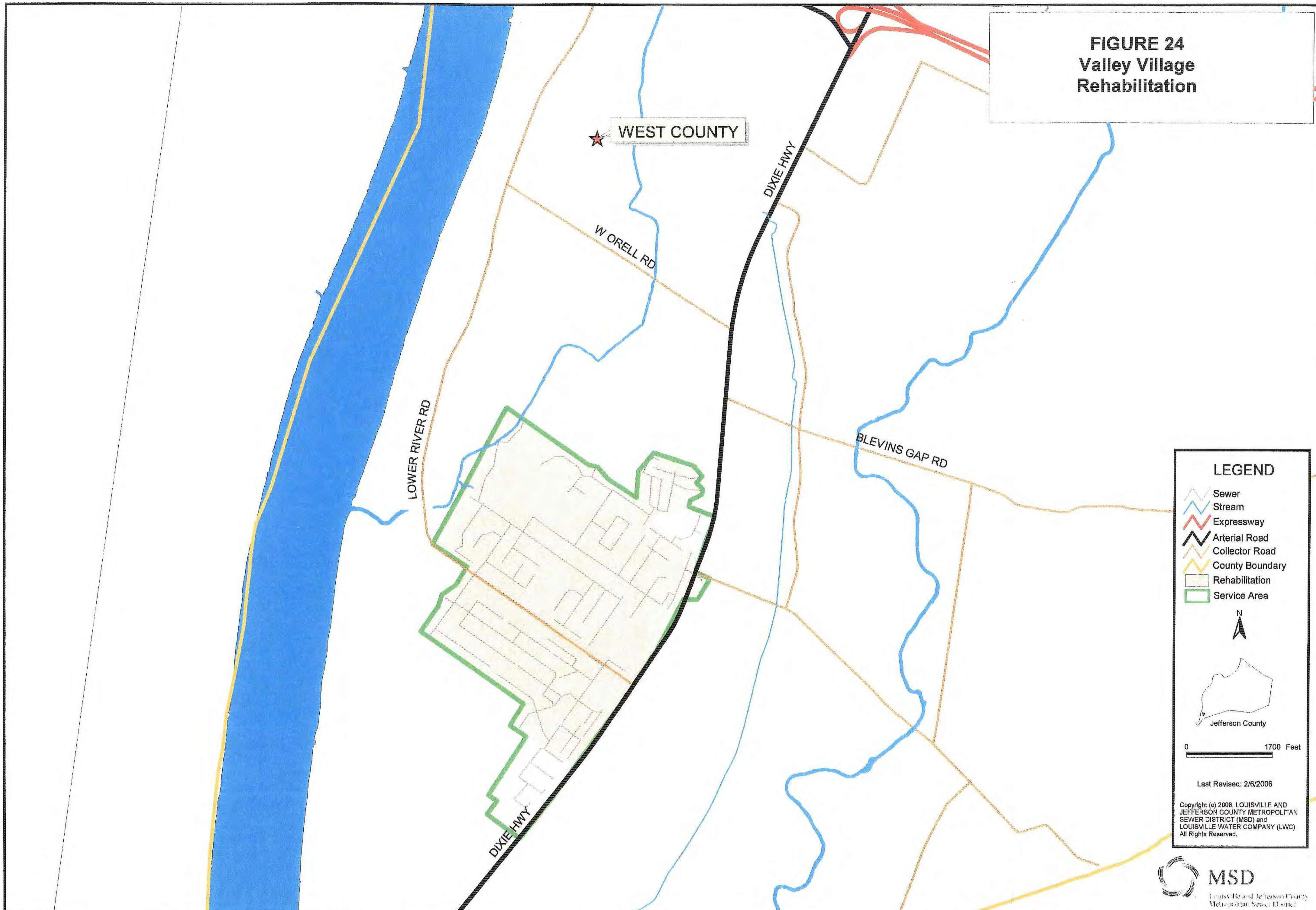


FIGURE 24
Valley Village
Rehabilitation

- Conducting a flow monitoring program to monitor rain events and measure wastewater flows at key points in the sewer system (6 meters for 68 days);
- Conducting physical inspections of manholes to identify corrosion and structural defects that may be contributing excessive I/I (184 manholes);
- Conducting smoke testing and dyed-water testing to identify structural defects that may contribute to I/I (54,000 linear feet);
- Conducting a review of MSD TV inspection logs in a limited amount of the system to identify structural defects that may contribute I/I to the system and blockages that may be inhibiting efficient hydraulic flow (35,000 linear feet);
- Compiling and analyzing data generated during the SSES to quantify the amount of excessive I/I entering the sewer system;
- Preparing a plan to remediate the sources found during the investigation phases described above.

The field investigations indicated that Valley Village exhibited the characteristics typical of a 50-year old sewer system: leaking joints, leaking laterals and several cross connections with storm drainage. Peaking factors from some internal sub-basins ranged from 5 to 32, although dry weather flow was significantly below corresponding MSD design average flows. The pipe itself was in good condition and, based on complaint files, there were no capacity problems. There were no basements in the study area and no known sanitary sewer overflows (SSOs).

The chief problems with the system were not related to excessive I/I, although there was a sizable contribution from the area. Rather the problems were related to the system's location – in an alluvial floodplain – that presented the most immediate concern. The open joints between pipe sections allowed fine silts to enter the sewer, causing sedimentation in the sewer and subsidence of the earth above the sewer. The subsidence resulted in cracked and tilted sidewalks and roads, sinkholes and numerous related complaints. This project, which included flow monitoring, was completed in February 1999 and cost approximately 193,000. The significant defects identified in this study were repaired under the Valley Village Rehabilitation project. Figure 22 represents the Valley Village SSES study area.

6.2.4.4 Valley Village Computer Modeling

West County WTP Spline

The Valley Village area was incorporated into the West County Spline Model which is discussed in section 6.2.1.4 of this document. Figure 23 represents the hydraulic model study area in the Valley Village system that is included in the West County WTP Spline.

6.2.4.5 Valley Village Rehabilitation

Figure 24 displays the rehabilitation work conducted under the Valley Village Rehabilitation projects.

West County/Valley Village I/I Remediation

This project provided for the rehabilitation of defects identified in the Valley Village SSES. The rehabilitation effort consisted of 3,236 linear feet of cured-in-place sewer main rehabilitation, about 12 point repairs of major line defects, and 46,423 linear feet of root control. This project addressed the priority mainline defects and maintenance issues identified in the Valley Village SSES conducted in FY99 (July 1, 1998 – June 30, 1999). This project was completed in March 2001 and cost approximately $332,000.

West County WTP Conveyance System Improvements

The interceptor from Valley Village to the West County WTP was part of the West County WTP Conveyance System Improvements project discussed in section 6.2.1.5 of this document.

6.3 ELIMINATIONS

Over the years, many wastewater treatment plants and pump stations have been closed and eliminated through MSD's sanitary sewer expansion program. Their sizes range from large plants to small "package" plants and pumping stations designed to serve individual residences and businesses. The following list includes treatment plants and then pump stations eliminated from the West County sewer system. In addition to treatment plants and pump stations, the expansion program has also eliminated thousands of individual septic tank systems. Most of these facilities were privately owned before acquisition by MSD. Although records do not exist, it is suspected that each was probably an SSO.

TREATMENT PLANTS ID	NAME	ADDRESS	CAPACITY (GPD)
MSD0273	Pine Tree	6206 Jeffrey Dr	40,000
81621-TP	Spanish Cove	5741 S Watterson Trl	
MSD0250	Kellwood	5336 Hames Trce	270,000
MSD0262	Stonebluff	7108 Ridge Creek Rd	100,000
MSD0235	Fernbrook	6024 Shean Ct	30,000
54638-TP	Poplar Level Scd	5119 Braidwood Dr	
MSD0259	Waterfern	7804 Edsel Ln	140,000
MSD0219	Shallow Creek	6297 Mandeville Rd	100,000
MSD0201A	Poplar Park	6002 Fern Valley Rd	
MSD0299	Forest Hills	7603 Pimlico Dr	300,000
MSD0203	Industrial	1160 Industrial Blvd	40,000
MSD0265	West Springfield	3011 Fordhaven Rd	200,000
MSD0256	Fordhaven	3105 Fordhaven Rd	150,000
MSD0275	Whispering Hills	6913 Shepherdsville Rd	595,000
MSD0267	Havalock	7201 Gaymont Dr	90,000
MSD0232	Cedar Creek	7500 Cedar Hollow Dr	210,000
MSD0276	Sungold	5010 Lea Ann Way	180,000
MSD0284	Glencoe	6908 Norlynn Dr	100,000
MSD0213	Candlelight	8129 Afterglow Dr	340,000
MSD0127A	Okolona	8108 Paul Rd	2,600,000

33772-TP	Eden Apartments	502 Minette Cir	
MSD0236	Friendly Hills	6109 Richiewayne Dr	130,000
78852-TP	Outer Loop Facility	1213 Outer Loop	3,000
MSD0230	Pleasant Valley	6806 Applegate Ln	225,000
MSD0281	Apple Valley	8204 Cortland Dr	200,000
36703-TP	Westminister Park South	9729 Buckingham Dr	
MSD0400	Glengarry	300 Glengarry Dr	175,000
MSD0257	Pines (The)	8515 Roseborough Rd	200,000
40611-TP	Timothy Hills	9103 Wanlou Dr	100,000
MSD0216	Tree Line Estates	423 Echappe Ln	70,000
MSD0238	Humana Southwest	9820 3rd Street Rd	
MSD0229	Maple Grove #5	9111 Lantana Dr	206,000
MSD0260	Cinderella	9200 Cinderella Ln	157,000
09849-TP	Valley HS	10200 Dixie Hwy	56,000
MSD0248	Old Maple Grove	6100 Galvin Ct	185,000
MSD0214	Prairie Village	3704 Iron Horse Way	100,000
MSD0249	Treasure Island West	9801 Normie Ln	340,000
MSD0215	Tin Dor	805 Tin Dor Way	81,200
MSD0401	Tarrytowne	4404 Case Way	135,000
MSD0233	Charleswood	10214 Charleswood Rd	160,000
MSD0243	Holly Villa 2	10501 Charlene Dr	31,000
MSD0243A	Holly Villa 1	10507 Allen Dr	54,400
MSD0272	Glen Hill Manor	4119 Glen Hill Manor Dr	80,000
MSD0266	Larkgrove	7315 Regiment Rd	120,000
MSD0237	Treasure Island East	11224 Crandon Rd	108,800
30918-TP	Leemont Acres	5401 Cedarwood Dr	80,000
MSD0221	Valley Village	7514 Wimstock Ave	500,000
104336-TP	Shacklette Elementary	5310 Mercury Dr	
83675-TP	Villa Ana	9615 Anita Blvd	169,000
108555-TP	Luhr Elementary	6901 Fernhaven Rd	15,000
MSD0234	Fern Hill	5206 Stony Brook Dr	200,000

PUMP STATIONS

ID	**NAME**	**ADDRESS**
MSD0144-PS	Crums Ln	4403 Cane Run Rd
82212-PS	Shively – Conn. to MFWTP	2317 Rockford Ln
MSD0058-PS	Murray Heights	5505 Landcross Dr
MSD0177-PS	Hunters Point	4701 Hunters Point Cir
63026-LS	Lorenz Shopping Center	5623 Bardstown Rd
MSD0032-PS	Riverport #2	7101 Greenbelt Hwy
MSD0156-PS	Bluffington	7312 Bluffington Rd
63063-LS	Tradewinds Shopping Ctr	5628 Bardstown Rd
MSD0157-LS	Ridge Creek	7114 Quail Ridge Rd
MSD0138-PS	Big Ben	5555 Big Ben Dr
MSD0235A-PS	Fernbrook	6024 Shean Ct
MSD0031-PS	Riverport #1	7101 Distribution Dr
MSD0066-PS	Preston Highway	6804 Preston Hwy
MSD0153-LS	Baymeadow Drive	3808 Baymeadow Dr
MSD0162-PS	St. Andrews Church	7830 St Andrews Church Rd
MSD0109-PS	Switchbark	6800 Switch Bark Ct
MSD0276A-PS	Sungold	5007 Lea Ann Way
MSD0110-PS	Tangelo Court	6915 Fegenbush Ln

MSD1120-PS	Tangelo Court #2	6915	Fegenbush Ln
MSD0168-LS	Green Manor	6602	Green Manor Dr
MSD0170-PS	Billie Lane	7111	Billie Ln
57877-LS	Outer Loop (Marathon)	5800	Outer Loop
MSD0127A-PS	Okolona	8108	Paul Rd
57738-LS	Candlelight Sect 3A	8129	Afterglow Dr
MSD0230A-PS	Pleasant Valley	6806	Applegate Ln
60308-PS	Arnoldtown Rd Interceptor	8703	Mountain Brook Dr
MSD0139-PS	Bridgegate	3302	Gatecreek Rd
MSD0100-LS	John Paul	7011	John Paul Ln
MSD0229A-PS	Maple Grove #5	6802	John Paul Ln
MSD0102-LS	Lantana #2	9125	Lantana Dr
MSD0001-LS	Penn Run	8800	Admiral Dr
MSD0248A-LS	Old Maple Grove	6100	Galvin Ct
MSD0155-LS	Stillridge Place	9417	Tallridge Ct
MSD0101A-LS	Lantana #1	9317	Lantana Dr
MSD0077-PS	Chapel Hill	9718	Chapel Hill Rd
MSD0131-PS	Ashby Ln	10411	Dixie Hwy
MSD0167-LS	Fern Valley Circle	6201	Fern Valley Cir
104336A-LS	Shacklette Elementary	5310	Mercury Dr
MSD0076-PS	South Park	4202	South Park Rd
MSD0078-PS	Old Shepherdsville Road	7612	Shepherdsville Rd
MSD0079-PS	Ronwood	4909	Ronwood Dr
MSD0105-PS	Smyrna Place	6200	Smyrna Pl
MSD0104-PS	Roth Road	8600	Roth Rd
MSD0190-LS	Settle Boulevard	4700	Settle Blvd
MSD0098-PS	Petwood	13908	Petwood Blvd
MSD1014-LS	Deering Rd	10315	Deering Rd
MSD0003-LS	Melody Lane	1603	Melody Ln
MSD0061-PS	Cardinal Hill	7000	Venetian Way
MSD0132-PS	Windsor Lakes	8100	Windsor Lakes Ct
MSD0045-PS	Riedley Ct	4104	Riedley Rd
MSD0051-PS	Savage Drive	4228	Savage Dr

Fact Sheets

The following pages are fact sheets of known unauthorized discharge locations. For status and discharge type definitions, refer to the SORP.

MSD
Louisville-Jefferson County Metropolitan Sewer District

VAGABOND LN AND SIESTA WAY IFP PUMPED LOCATION.

MSD Facility 17428

Customer Service 587-0603 **Report as of December 2005**

Service Area: WEST COUNTY

Yr	Num Overflows	Estimated Volume
2002	3	7,200,000 Gallons

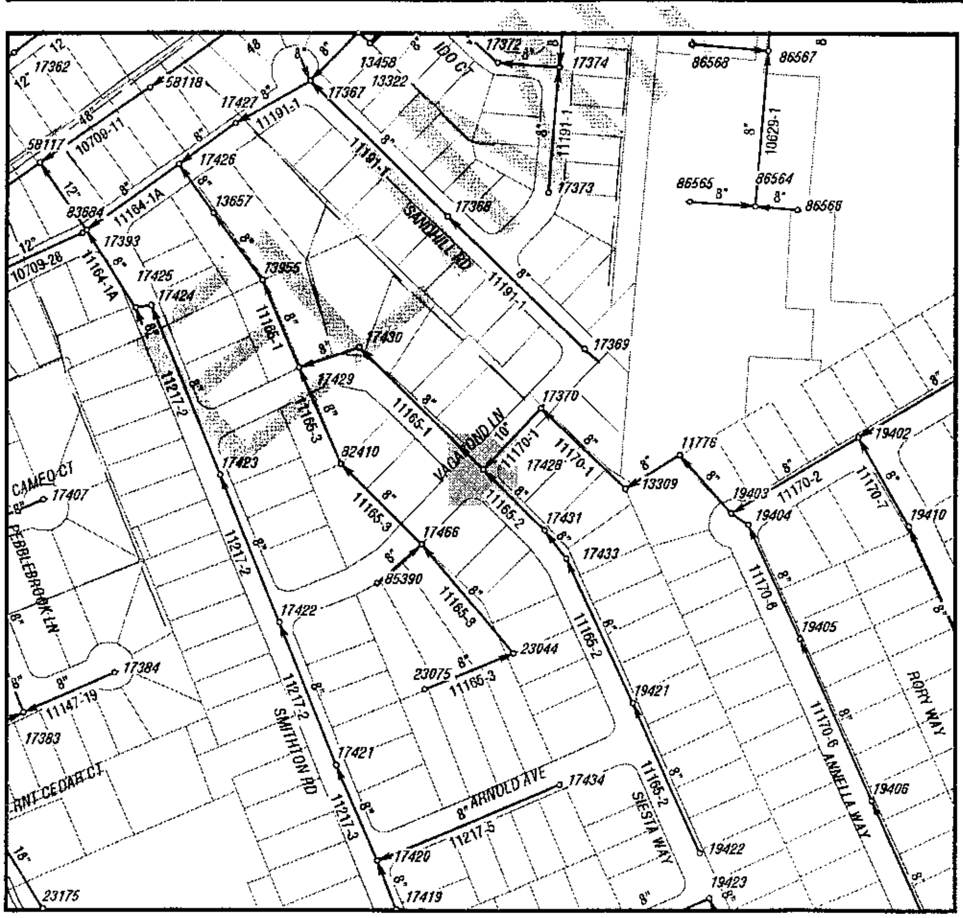
Background & History: Pumped by MSD Maintenance to reduce the risk of basement flooding in nearby homes. SD2a Interceptor eliminated the need for pumping.

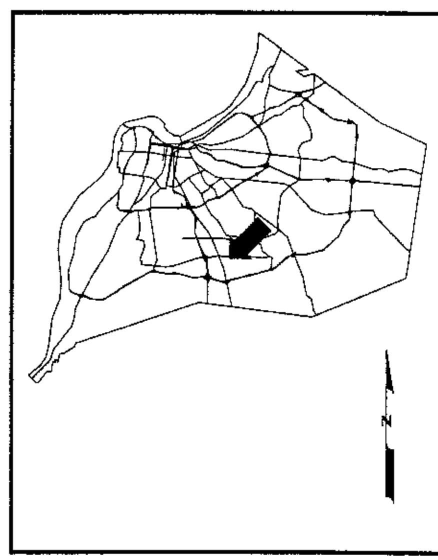
Pipe Size:
Inflow: 10"
Inflow: 8"
Outflow: 8"

Upstream Collection System Length: 7,380 L.F.
Watershed: POND CREEK
Discharge Type: PUMPED
Discharged To: CATCH BASIN
Receiving Stream: SOUTHERN DITCH
Status: ELIMINATED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	30.2 ac.
VACANT AND UNDEVELOPED	19.5 ac.
INDUSTRIAL	12.5 ac.
PUBLIC AND SEMI-PUBLIC	2.1 ac.
GENERAL COMM. AND OFFICE	4.6 ac.
MULTI-FAMILY RESIDENTIAL	0.9 ac.
PARKS, CEMETERIES, ETC.	37.5 ac.





Metro: MAN20
Atlas Map: BS226

Scale 1" = 400 '

7204 PRESTON HWY

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility 82371

Customer Service 587-0603 **Report as of December 2005**

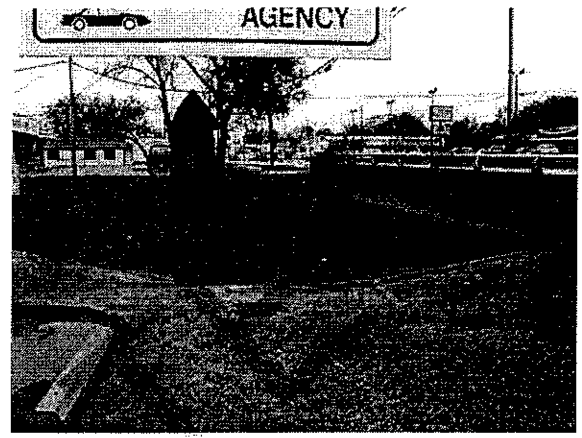
Service Area:

Yr	Num Overflows	Estimated Volume
2002	3	4,410,000 Gallons
2001	3	4,300,000 Gallons

Background & History: Pumped by MSD Maintenance to reduce the risk of basement flooding in nearby homes.

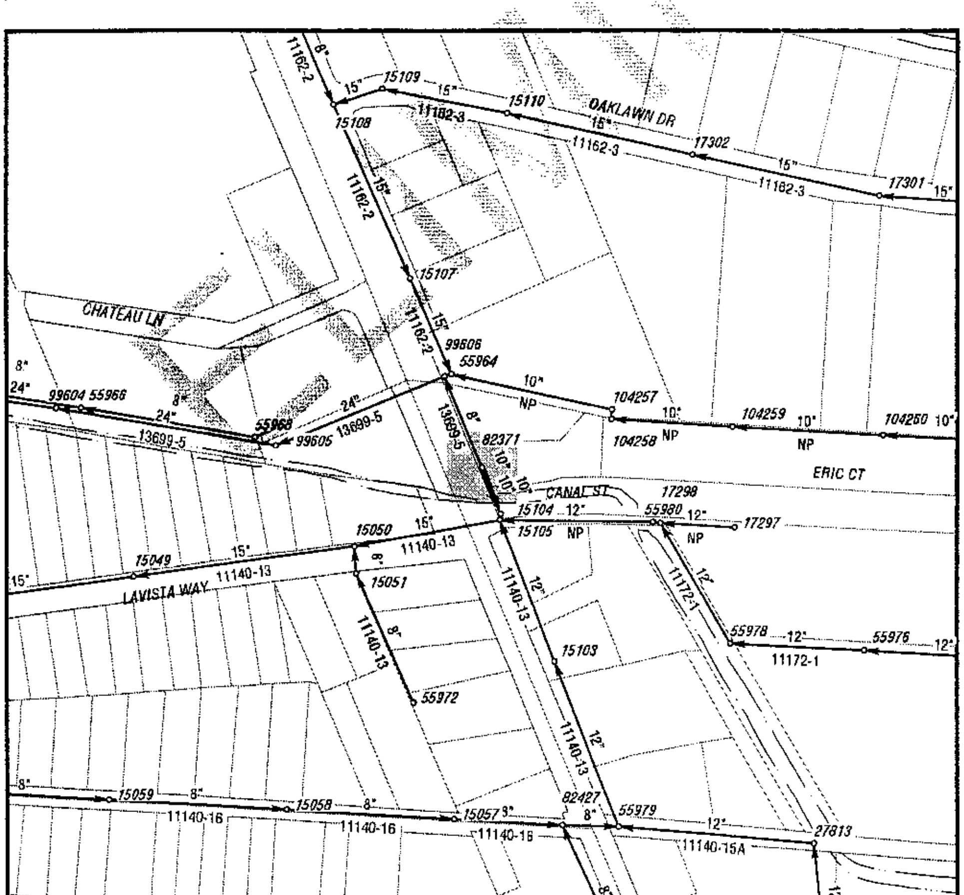
Pipe Size:
Outflow: 8"

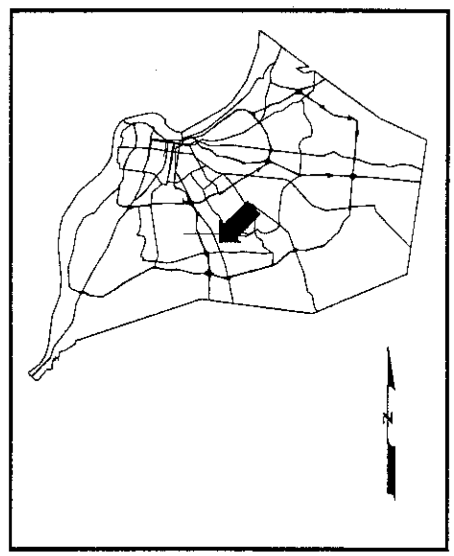
Upstream Collection System Length: 0 L.F.
Watershed: POND CREEK
Discharge Type: PUMPED
Discharged To: STREAM
Receiving Stream: POND CREEK
Status: ELIMINATED



Downstream Landuse:

VACANT AND UNDEVELOPED	30.7 ac.
MULTI-FAMILY RESIDENTIAL	3.2 ac.
SINGLE FAMILY RESIDENTIAL	19.6 ac.
GENERAL COMM. AND OFFICE	1.8 ac.
PUBLIC AND SEMI-PUBLIC	0.9 ac.
PARKS, CEMETERIES, ETC.	37.8 ac.
INDUSTRIAL	12.5 ac.





Metro: MAN20
Atlas Map: BQ224

Scale 1" = 400 '

COOPER CHAPEL

MSD
Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility MSD0130-PS

Customer Service 587-0603 | **Report as of** December 2005

Service Area: WEST COUNTY

Yr	Num Overflows	Estimated Volume
2005	1	2,000 Gallons
2002	1	25,000 Gallons

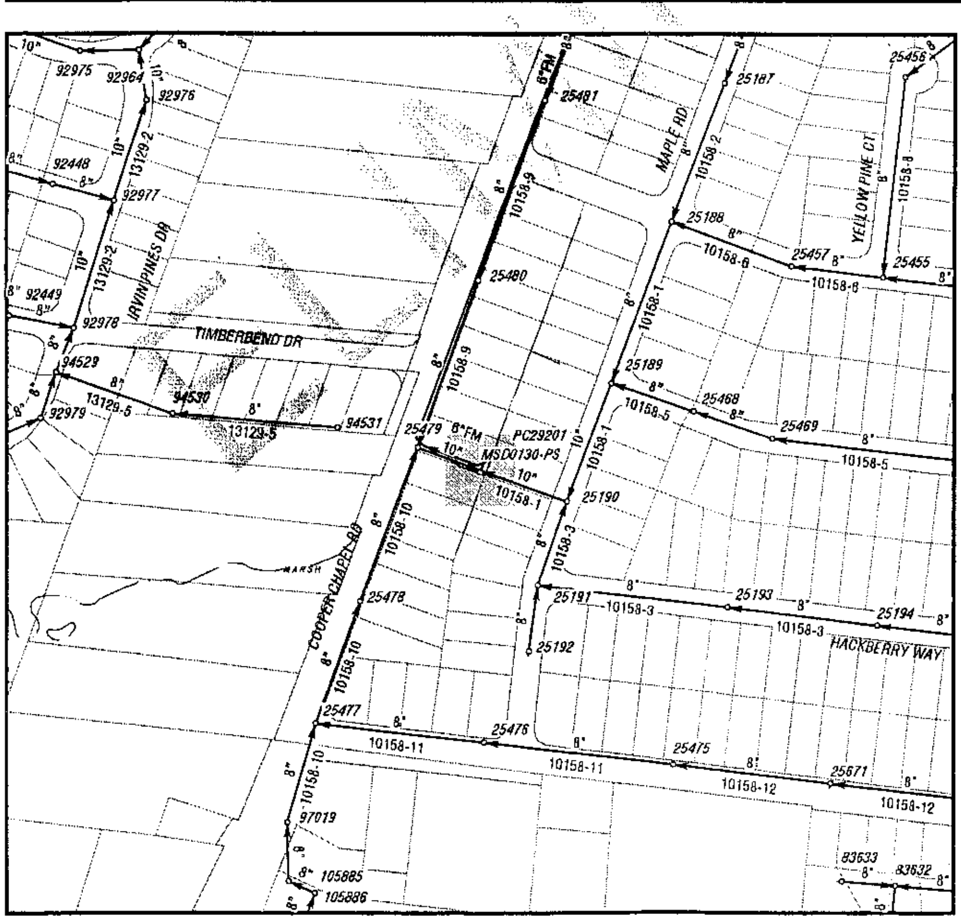
Background & History:

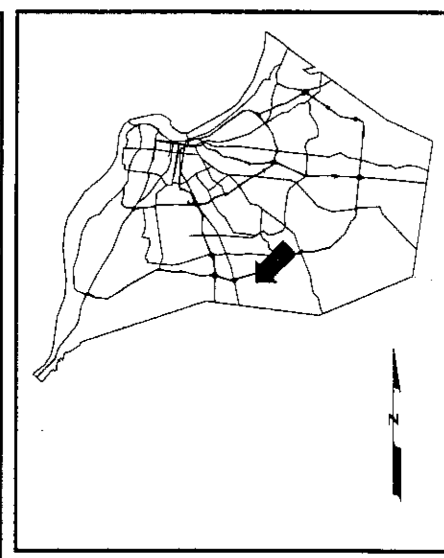
Pipe Size:
Inflow: 10"
Inflow: 10"
Outflow: 6"
Outflow: 8"

Upstream Collection System Length: 17,200 L.F.
Watershed: POND CREEK
Discharge Type: CONSTRUCTED
Discharged To: DITCH
Receiving Stream: FISHPOOL CREEK
Status: ELIMINATED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	36.1 ac.
VACANT AND UNDEVELOPED	20.8 ac.
INDUSTRIAL	12.5 ac.
PARKS, CEMETERIES, ETC.	37.5 ac.
PUBLIC AND SEMI-PUBLIC	0.4 ac.





Metro: MA021
Atlas Map: BY228

Scale 1" = 400 '

1096 SPRINGVIEW DRIVE

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility 17724

Customer Service 587-0603 | **Report as of December 2005**

Service Area: WEST COUNTY

Yr	Num Overflows	Estimated Volume
2005	1	60 Gallons
2003	1	15 Gallons

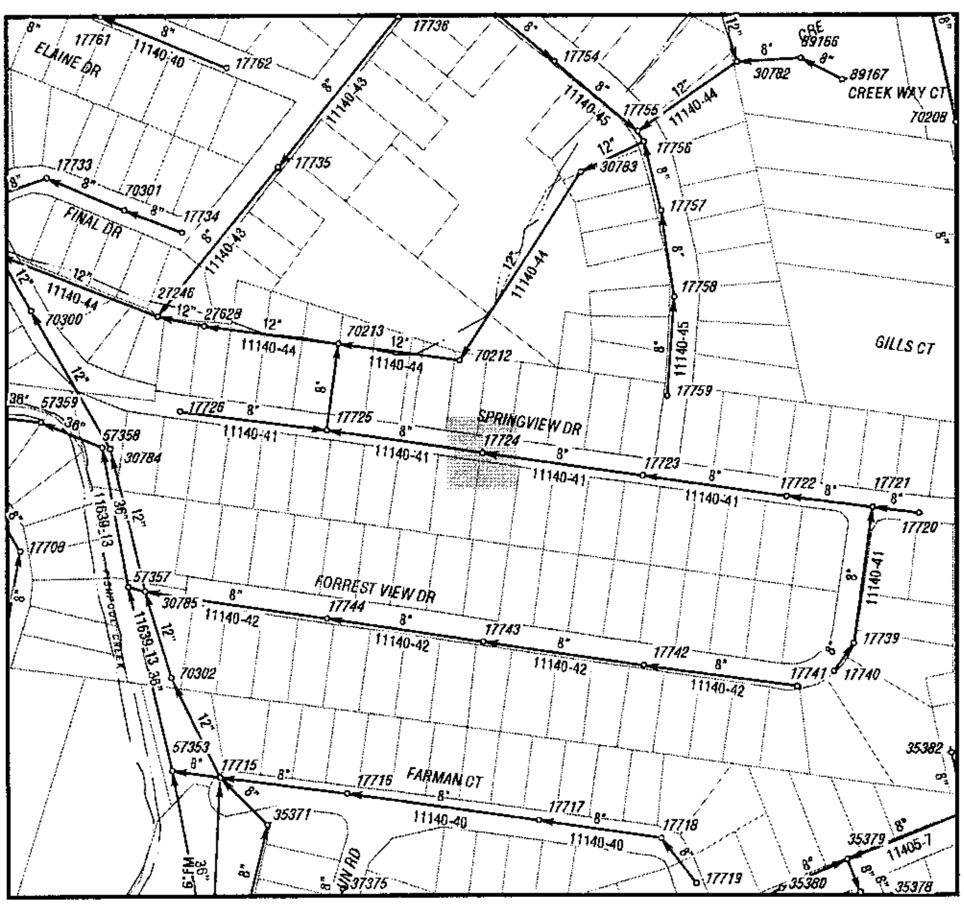
Background & History:

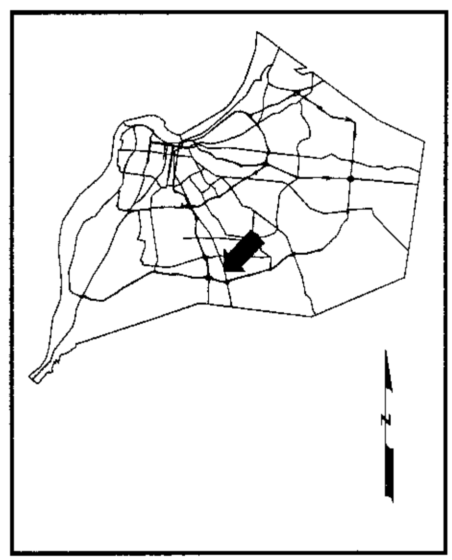
Pipe Size:
Inflow: 8"
Outflow: 8"

Upstream Collection System Length: 1,280 L.F.
Watershed: POND CREEK
Discharge Type: CAPACITY
Discharged To:
Receiving Stream:
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	32.8 ac.
VACANT AND UNDEVELOPED	23.9 ac.
INDUSTRIAL	12.5 ac.
PUBLIC AND SEMI-PUBLIC	0.8 ac.
PARKS, CEMETERIES, ETC.	37.5 ac.





Metro: MA020
Atlas Map: BU226

Scale 1" = 400 '

* BARDSTOWN RD / PAULA MARIE PL

MSD
Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility 22232

Customer Service 587-0603

Report as of December 2005

Service Area: WEST COUNTY

Yr	Num Overflows	Estimated Volume
2004	1	50 Gallons

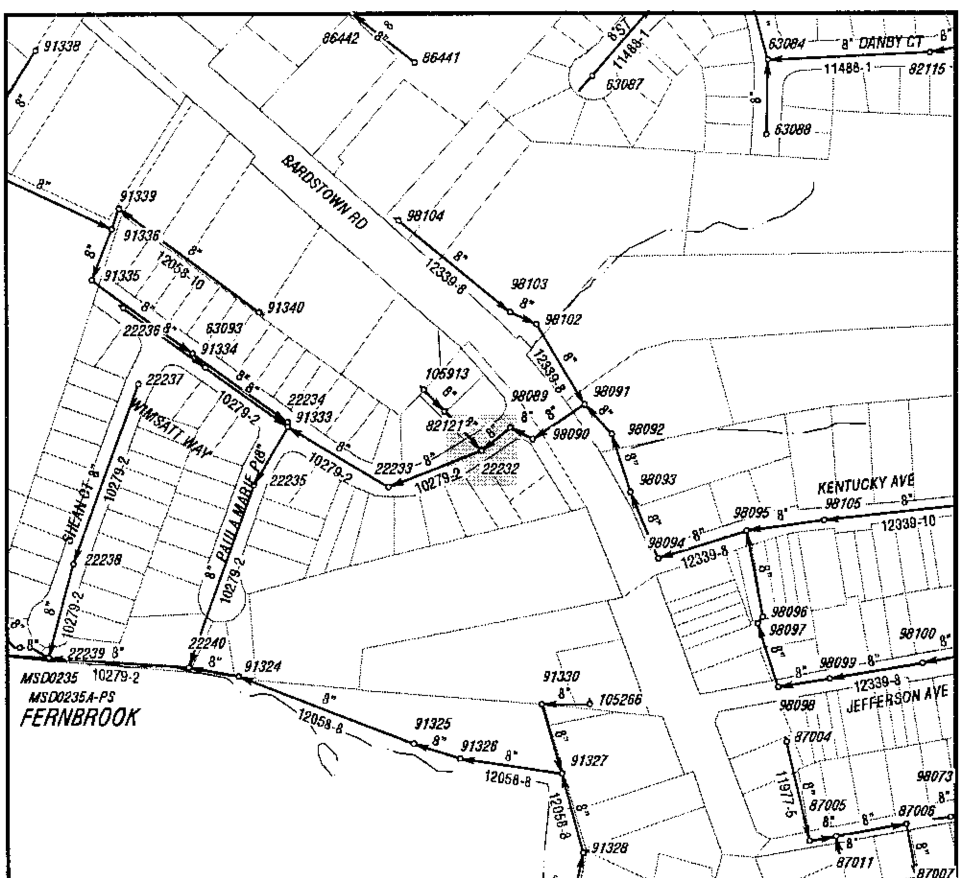
Background & History:

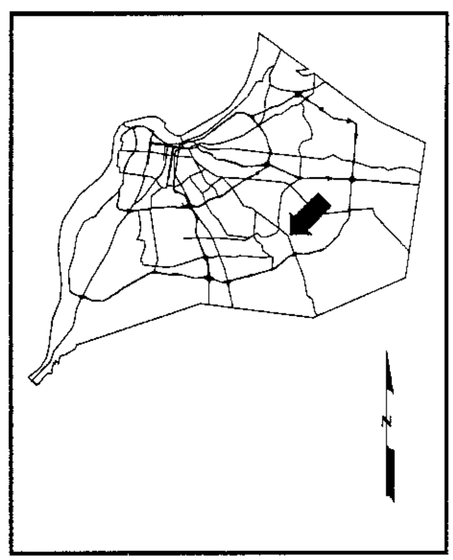
Pipe Size:
Inflow: 8"
Inflow: 8"
Outflow: 8"

Upstream Collection System Length: 3,010 L.F.
Watershed: POND CREEK
Discharge Type: CAPACITY
Discharged To:
Receiving Stream:
Status: DOCUMENTED

Downstream Landuse:

MULTI-FAMILY RESIDENTIAL	3.9 ac.
SINGLE FAMILY RESIDENTIAL	27 ac.
VACANT AND UNDEVELOPED	19.3 ac.
GENERAL COMM. AND OFFICE	0.1 ac.
PARKS, CEMETERIES, ETC.	39.9 ac.
PUBLIC AND SEMI-PUBLIC	4.5 ac.
INDUSTRIAL	12.5 ac.





Metro: MAN22

Atlas Map: BO234

Scale 1" = 400 '

GREENBELT HWY

MSD Facility 22370

MSD
Louisville-Jefferson County Metropolitan Sewer District

Customer Service 587-0603

Report as of December 2005

Service Area: WEST COUNTY

Yr	Num Overflows	Estimated Volume
2002	1	24,600,000 Gallons

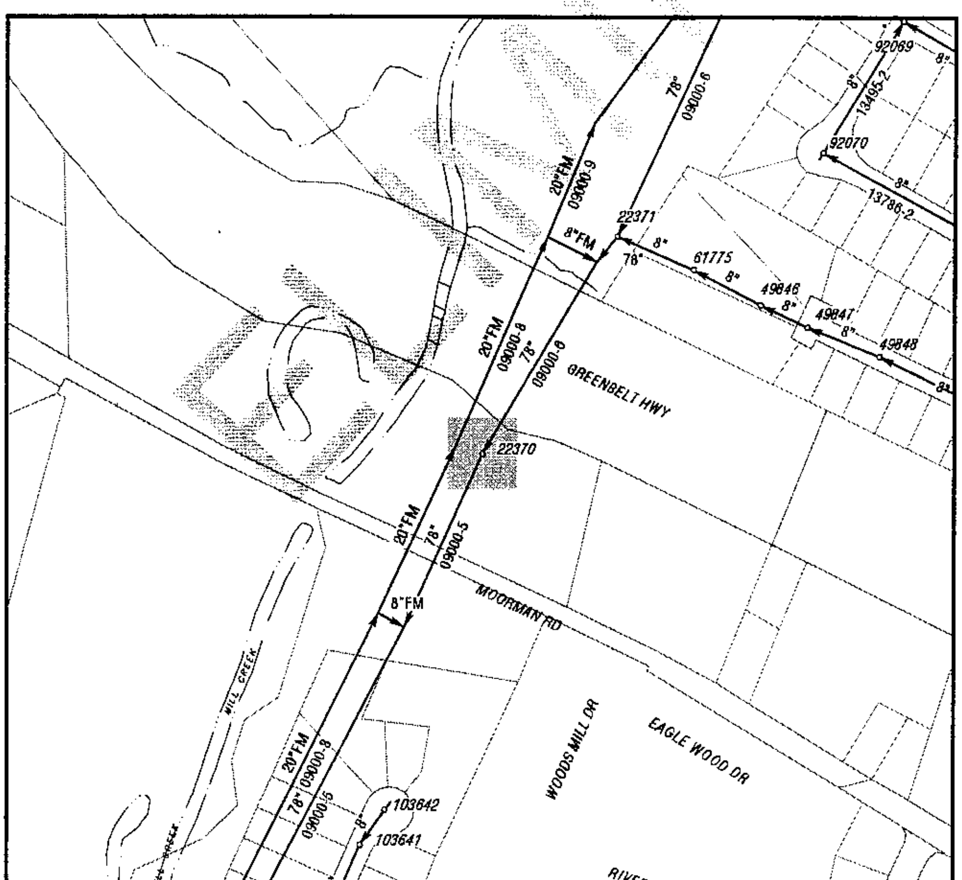
Background & History: Identified by XP-SWIMM Model and field confirmed.

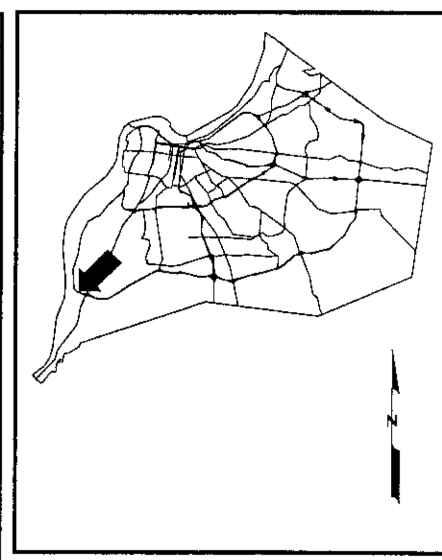
Pipe Size:
Inflow: 78"
Outflow: 78"

Upstream Collection System Length: 4,180,000 L.F.
Watershed: MILL CREEK
Discharge Type: CAPACITY
Discharged To: GROUND
Receiving Stream: MILL CREEK
Status: ELIMINATED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	17.9 ac.
VACANT AND UNDEVELOPED	14.7 ac.
INDUSTRIAL	15.3 ac.
PARKS, CEMETERIES, ETC.	37.5 ac.
PUBLIC AND SEMI-PUBLIC	0.4 ac.





Metro: MA015
Atlas Map: BY206

Scale 1" = 400'

6112 COOPER CHAPEL RD (UPSTREAM OF COOPER CHAPEL PS)

MSD

Louisville-Jefferson County Metropolitan Sewer District

MSD Facility 25480

Customer Service 587-0603

Report as of December 2005

Service Area: WEST COUNTY

Yr	Num Overflows	Estimated Volume
2005	1	1,000 Gallons
2004	1	12,000 Gallons

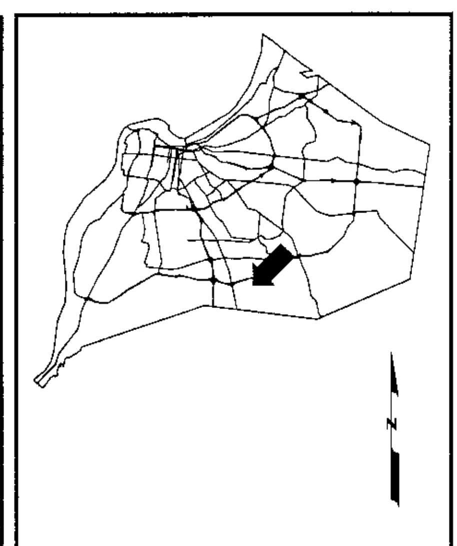
Background & History: This site is currently being monitored.

Pipe Size:
Inflow: 8"
Outflow: 8"

Upstream Collection System Length: 1,200 L.F.
Watershed: POND CREEK
Discharge Type: CAPACITY
Discharged To: GROUND
Receiving Stream: FISHPOOL CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	36.1 ac.
VACANT AND UNDEVELOPED	18.6 ac.
INDUSTRIAL	12.5 ac.
PARKS, CEMETERIES, ETC.	37.5 ac.
PUBLIC AND SEMI-PUBLIC	0.4 ac.



Metro: MA021
Atlas Map: BW228

Scale 1" = 400 '

12700 ABBEY RD. #1

MSD

Louisville-Jefferson County Metropolitan Sewer District

MSD Facility 32688

Customer Service 587-0603

Report as of December 2005

Service Area: WEST COUNTY

Yr	Num Overflows	Estimated Volume
2002	5	14,900,000 Gallons
2001	1	900,000 Gallons

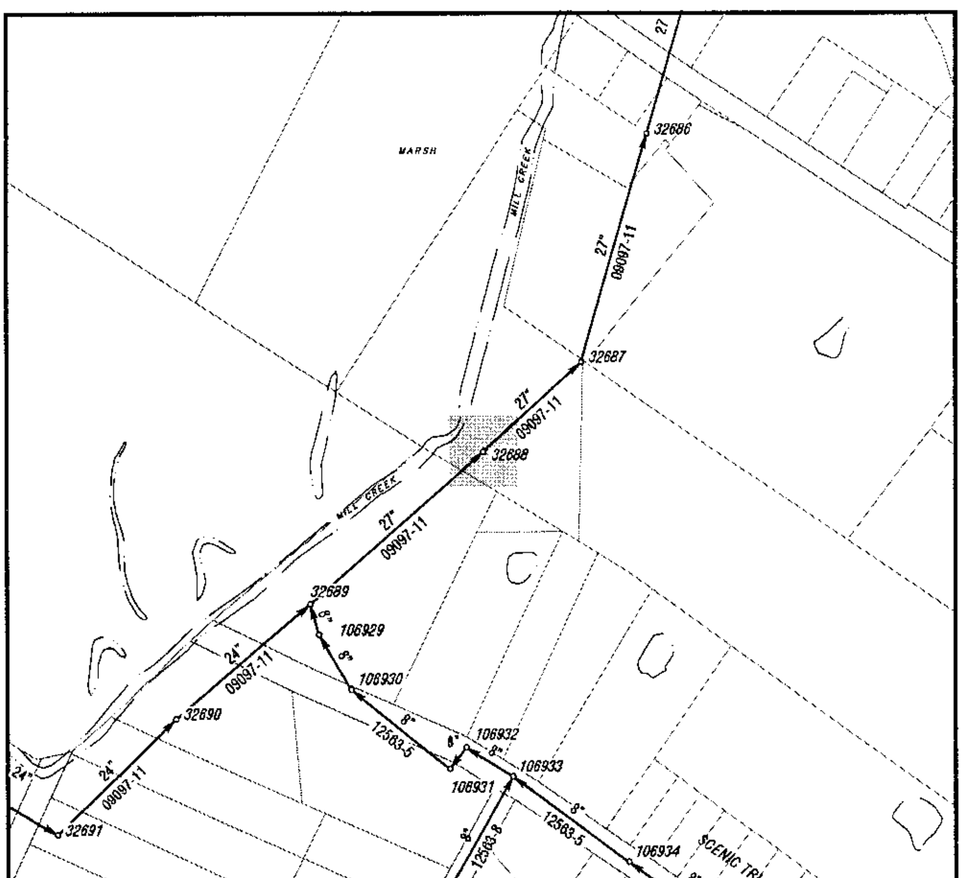
Background & History: This manhole was reported by a resident as an overflow during FY02. This site is currently being monitored.

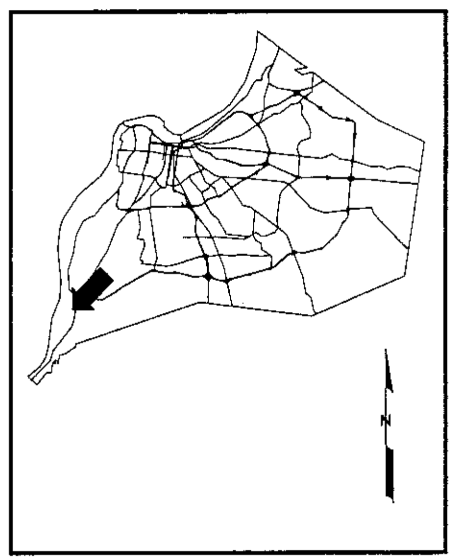
Pipe Size:
Inflow: 27"
Outflow: 27"

Upstream Collection System Length: 83,200 L.F.
Watershed: MILL CREEK
Discharge Type: CAPACITY
Discharged To: GROUND
Receiving Stream: MILL CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	17.9 ac.
VACANT AND UNDEVELOPED	19.4 ac.
INDUSTRIAL	14.6 ac.
PARKS, CEMETERIES, ETC.	53.5 ac.
PUBLIC AND SEMI-PUBLIC	0.4 ac.
MULTI-FAMILY RESIDENTIAL	0 ac.





Metro: MAP15

Atlas Map: CC206

Scale 1" = 400 '

7804 EDSEL LANE (3 MANHOLES UPSTREAM OF EDSEL LN PS)

MSD Facility 94009

MSD
Louisville-Jefferson County Metropolitan Sewer District

Customer Service 587-0603

Report as of December 2005

Service Area: WEST COUNTY

Yr	Num Overflows	Estimated Volume
2004	1	500,000 Gallons
2001	1	500 Gallons

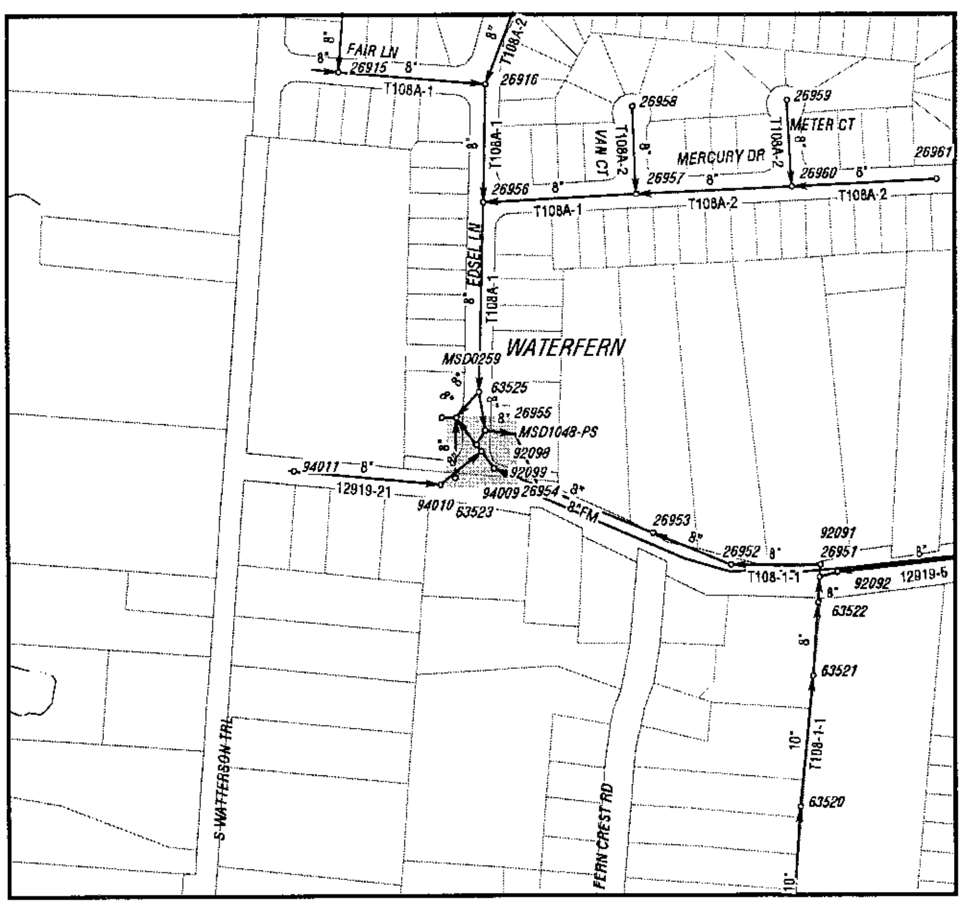
Background & History:

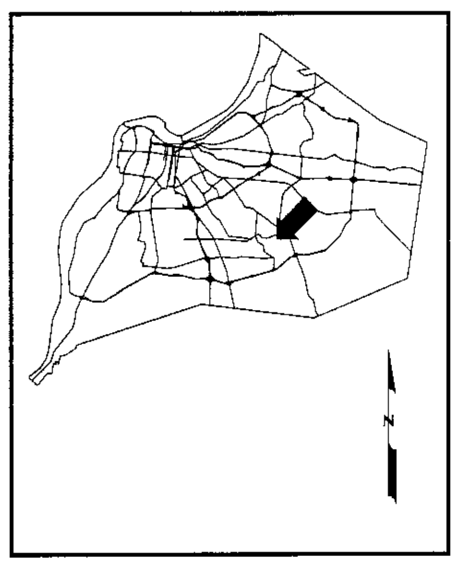
Pipe Size:
Inflow: 8"
Inflow: 8"
Outflow: 8"

Upstream Collection System Length: 17,500 L.F.
Watershed: POND CREEK
Discharge Type: CAPACITY
Discharged To: DITCH
Receiving Stream: POND CREEK
Status: DOCUMENTED

Downstream Landuse:

MULTI-FAMILY RESIDENTIAL	4 ac.
SINGLE FAMILY RESIDENTIAL	36.8 ac.
VACANT AND UNDEVELOPED	14.7 ac.
INDUSTRIAL	12.5 ac.
PARKS, CEMETERIES, ETC.	37.5 ac.
PUBLIC AND SEMI-PUBLIC	0.4 ac.





Metro: MAN22
Atlas Map: BO232

Scale 1" = 400'

MSD

Louisville-Jefferson County
Metropolitan Sewer District

LANTANA DRIVE #1 PS

MSD Facility MSD0101-PS

Customer Service 587-0603

Report as of December 2005

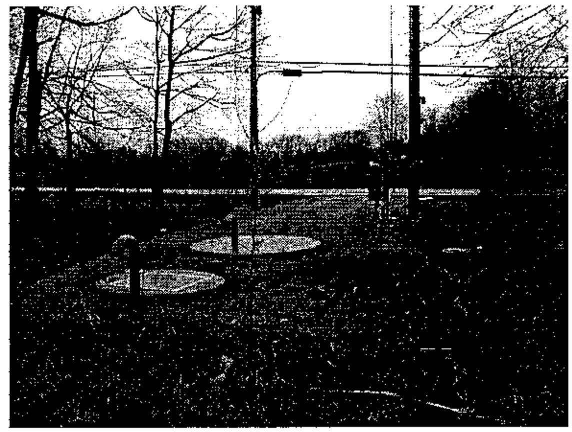
Service Area: WEST COUNTY

Yr	Num Overflows	Estimated Volume
2005	1	1,000 Gallons
2004	2	93,000 Gallons
2003	2	112,000 Gallons
2002	4	95,000 Gallons

Background & History: This PS had a constructed overflow. It was upgraded; however it still overflows.

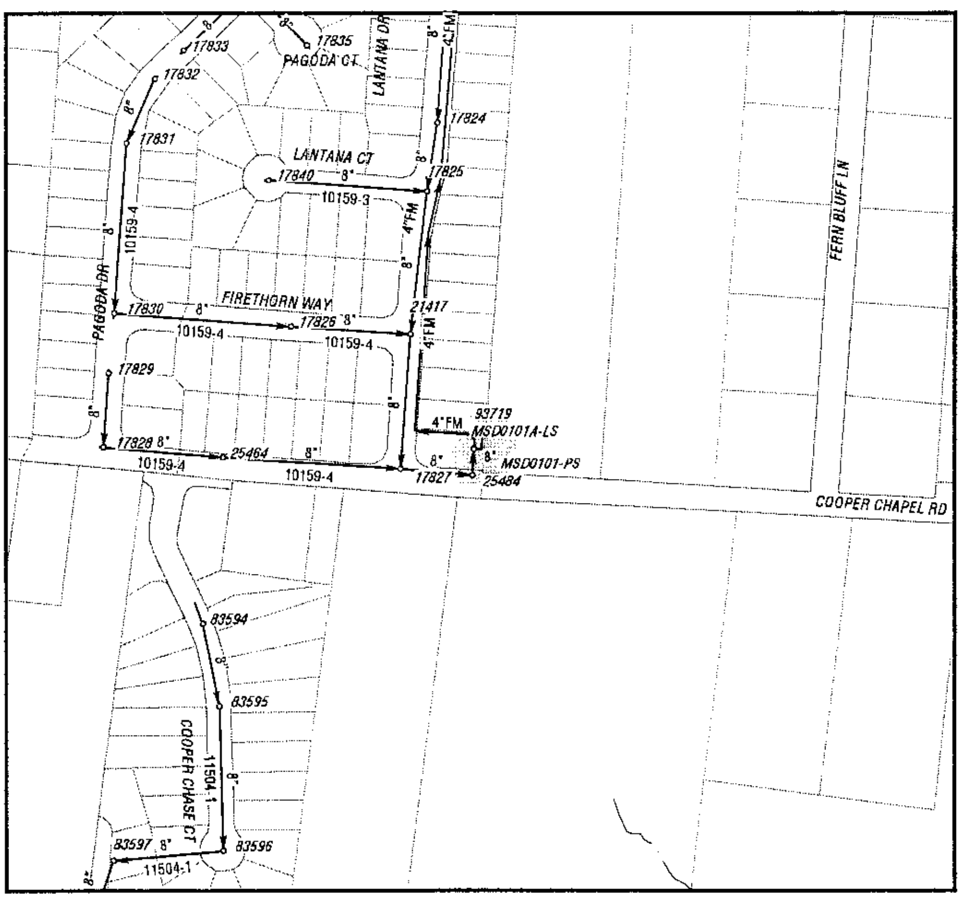
Pipe Size:
Inflow: 8"
Outflow: 4"

Upstream Collection System Length: 3,610 L.F.
Watershed: PENNSYLVANIA RUN
Discharge Type: CAPACITY
Discharged To: DITCH
Receiving Stream: PENNSYLVANIA RUN
Status: DOCUMENTED

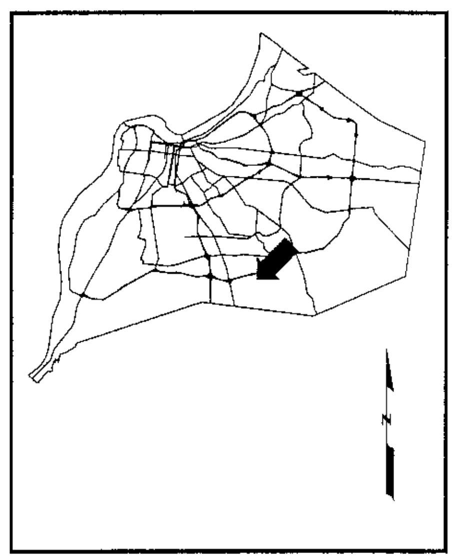


Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	28.1 ac.
VACANT AND UNDEVELOPED	20.6 ac.
INDUSTRIAL	12.5 ac.
PARKS, CEMETERIES, ETC.	37.6 ac.
PUBLIC AND SEMI-PUBLIC	0.4 ac.



Scale 1" = 400 '



Metro: MA021

Atlas Map: BW230

GOVERNMENT CENTER PS

MSD

Louisville-Jefferson County Metropolitan Sewer District

MSD Facility MSD0180-PS

Customer Service 587-0603

Report as of December 2005

Service Area: WEST COUNTY

Yr	Num Overflows	Estimated Volume
2005	4	8,780 Gallons
2004	5	114,000 Gallons
2003	1	300,000 Gallons
2002	2	65,000 Gallons

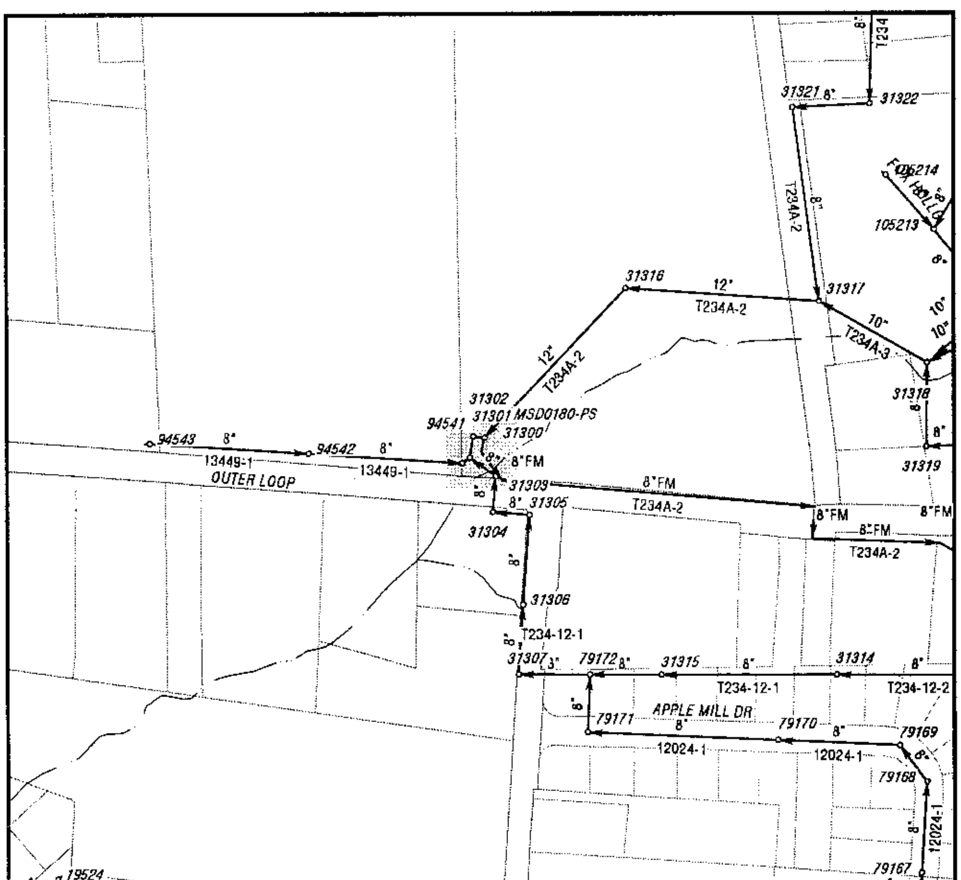
Background & History: First reported on June 28, 1999 during 4.72 inch rain event.

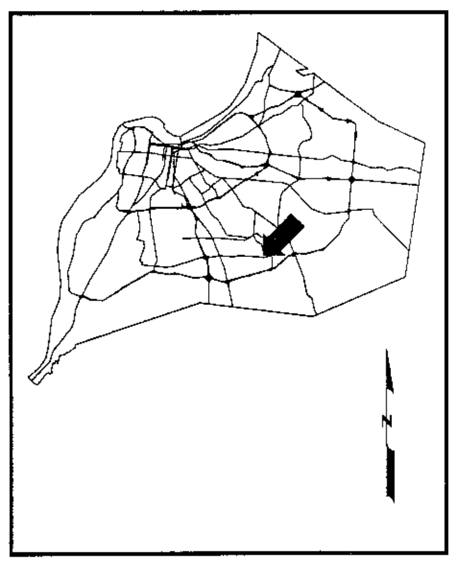
Pipe Size:
Inflow: 12"
Outflow: 8"

Upstream Collection System Length: 24,800 L.F.
Watershed: PENNSYLVANIA RUN
Discharge Type: CAPACITY
Discharged To: DITCH
Receiving Stream: PENNSYLVANIA RUN
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	33.6 ac.
VACANT AND UNDEVELOPED	17.9 ac.
PUBLIC AND SEMI-PUBLIC	3.2 ac.
INDUSTRIAL	12.5 ac.
MULTI-FAMILY RESIDENTIAL	2 ac.
PARKS, CEMETERIES, ETC.	37.5 ac.





Metro: MAN21

Atlas Map: BS230

Scale 1" = 400 '

CINDERELLA PS

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility MSD1013-PS

Customer Service 587-0603

Report as of December 2005

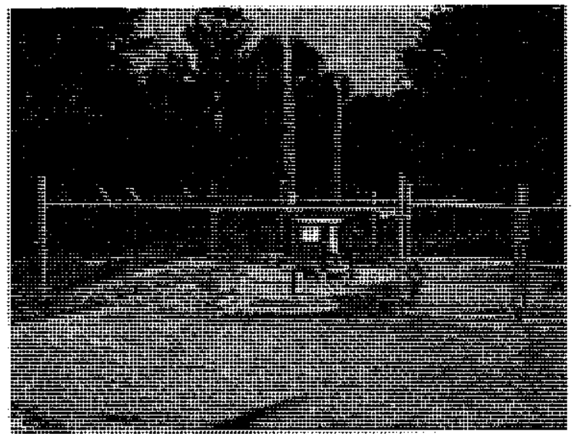
Service Area: WEST COUNTY

Yr	Num Overflows	Estimated Volume
2005	2	1,500 Gallons
2004	3	134,000 Gallons
2003	1	100,000 Gallons
2002	3	80,000 Gallons
2001	2	150,000 Gallons

Background & History: This pump station was acquired in 1990 as part of the Cinderella treatment system. The treatment plant was eliminated in January 1990.

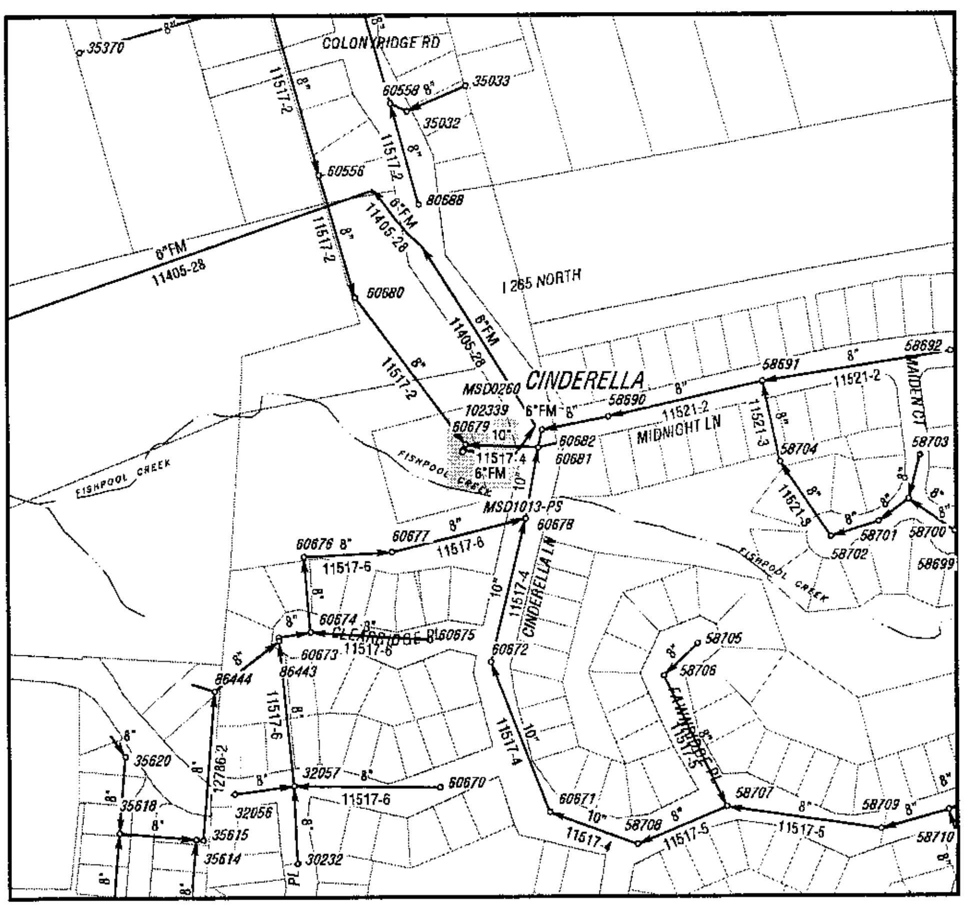
Pipe Size:
Inflow: 12"
Outflow: 6"

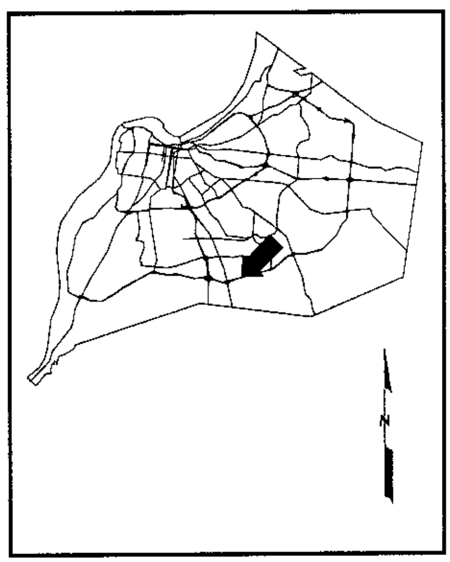
Upstream Collection System Length: 15,500 L.F.
Watershed: POND CREEK
Discharge Type: CAPACITY
Discharged To: DITCH
Receiving Stream: FISHPOOL CREEK
Status: DOCUMENTED



Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	22.2 ac.
VACANT AND UNDEVELOPED	30.3 ac.
INDUSTRIAL	12.5 ac.
PARKS, CEMETERIES, ETC.	37.5 ac.
MULTI-FAMILY RESIDENTIAL	0.4 ac.
PUBLIC AND SEMI-PUBLIC	4.6 ac.





Metro: MAO21
Atlas Map: BW228

Scale 1" = 400 '

MELODY LANE

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility MSD0003-LS

Customer Service 587-0603

Report as of December 2005

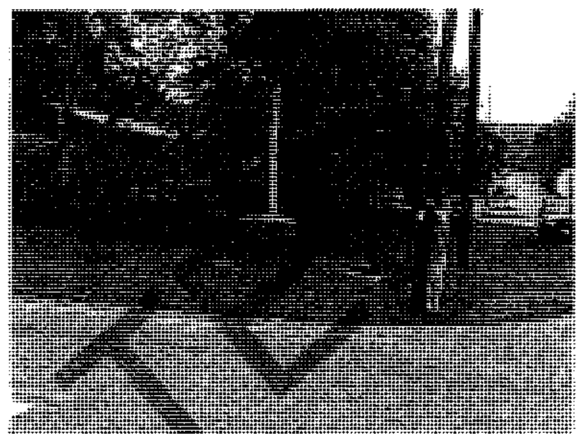
Service Area:

Yr	Num Overflows	Estimated Volume
2002	1	61,700 Gallons

Background & History:

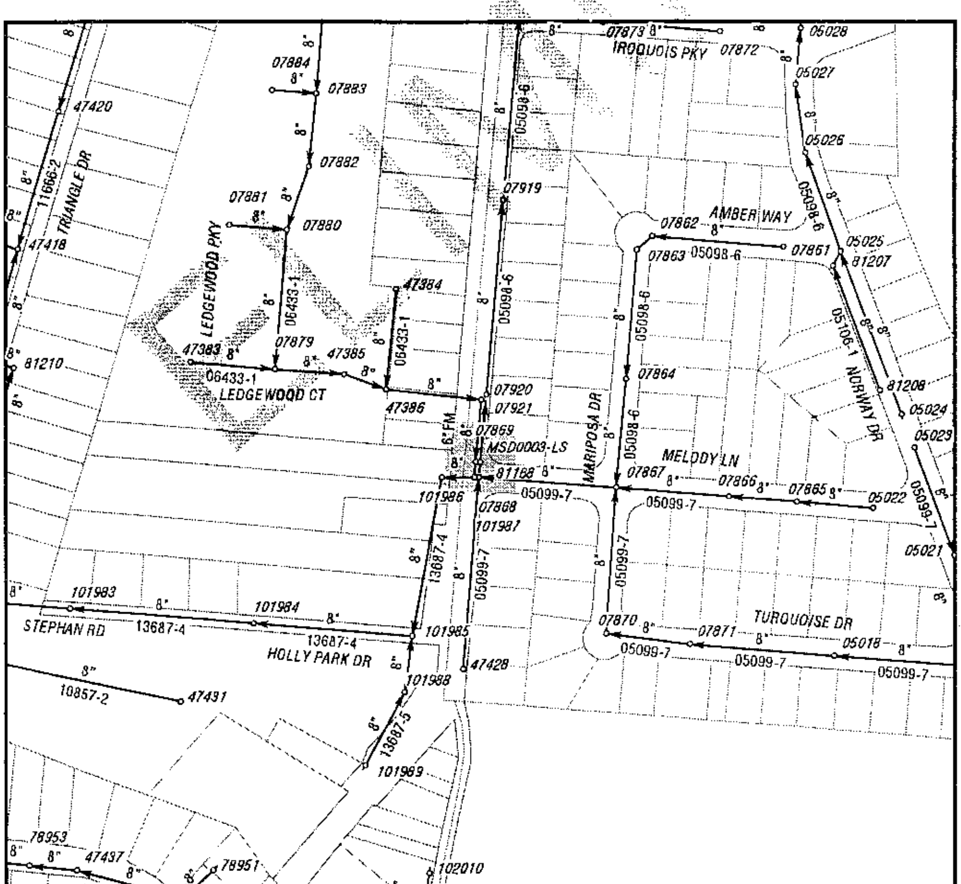
Pipe Size:
Inflow: 8"
Outflow: 6"

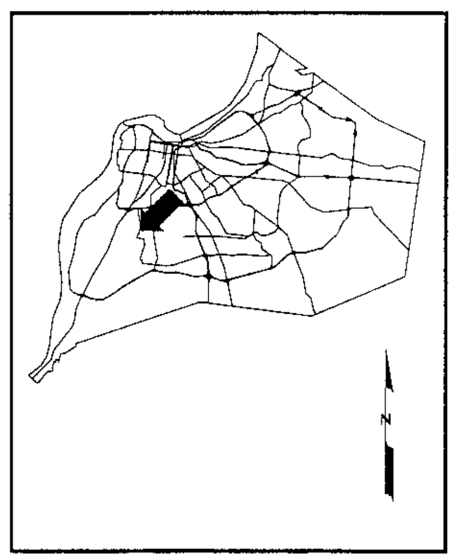
Upstream Collection System Length: 36 L.F.
Watershed: MILL CREEK
Discharge Type: PUMPED
Discharged To: DITCH
Receiving Stream: MILL CREEK
Status: ELIMINATED



Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	1.2 ac.
MULTI-FAMILY RESIDENTIAL	0 ac.





Metro: MAN17
Atlas Map: BM214

Scale 1" = 400 '

JACKS LN

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility MSD0044-PS

Customer Service 587-0603 | **Report as of December 2005**

Service Area: WEST COUNTY

Yr	Num Overflows	Estimated Volume
2001	1	13,500 Gallons

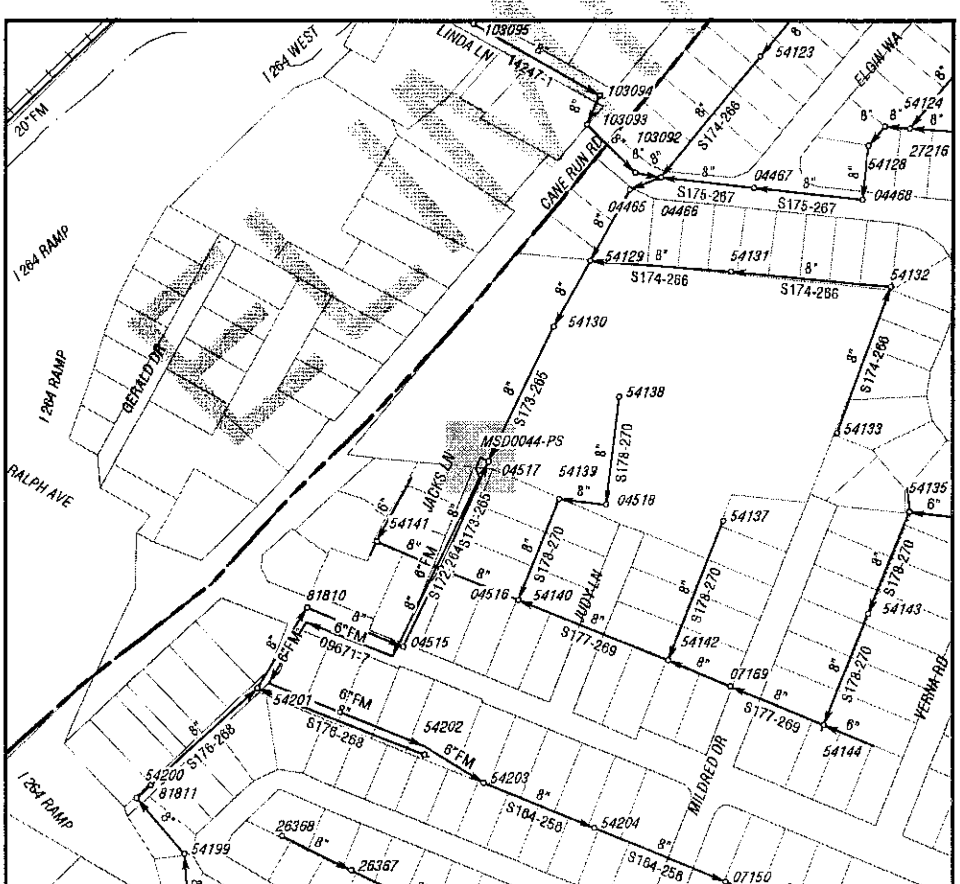
Background & History:

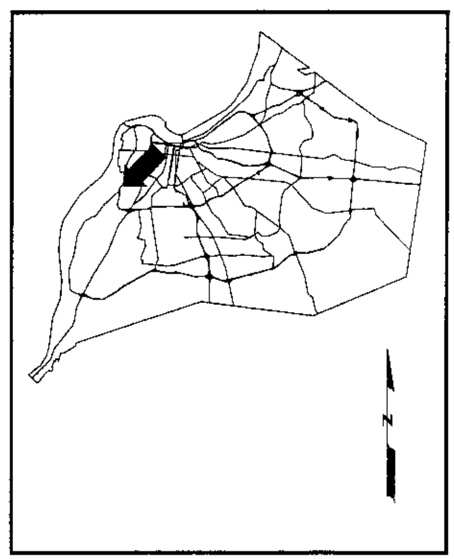
Pipe Size:
Inflow: 6"
Outflow: 6"

Upstream Collection System Length: 10,000 L.F.
Watershed: MILL CREEK
Discharge Type: PUMPED
Discharged To: GROUND
Receiving Stream:
Status: ELIMINATED

Downstream Landuse:

PUBLIC AND SEMI-PUBLIC	2 ac.
SINGLE FAMILY RESIDENTIAL	22.3 ac.
GENERAL COMM. AND OFFICE	0.9 ac.
MULTI-FAMILY RESIDENTIAL	0.4 ac.
VACANT AND UNDEVELOPED	8 ac.
INDUSTRIAL	7.7 ac.
PARKS, CEMETERIES, ETC.	33.7 ac.





Metro: MAM17
Atlas Map: BE212

Scale 1" = 400 '

EA 110' NW

MSD

Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility 04599

Customer Service 587-0603

Report as of December 2005

Service Area:

Yr	Num Overflows	Estimated Volume
2003	2	201,000 Gallons
2001	1	36,000 Gallons

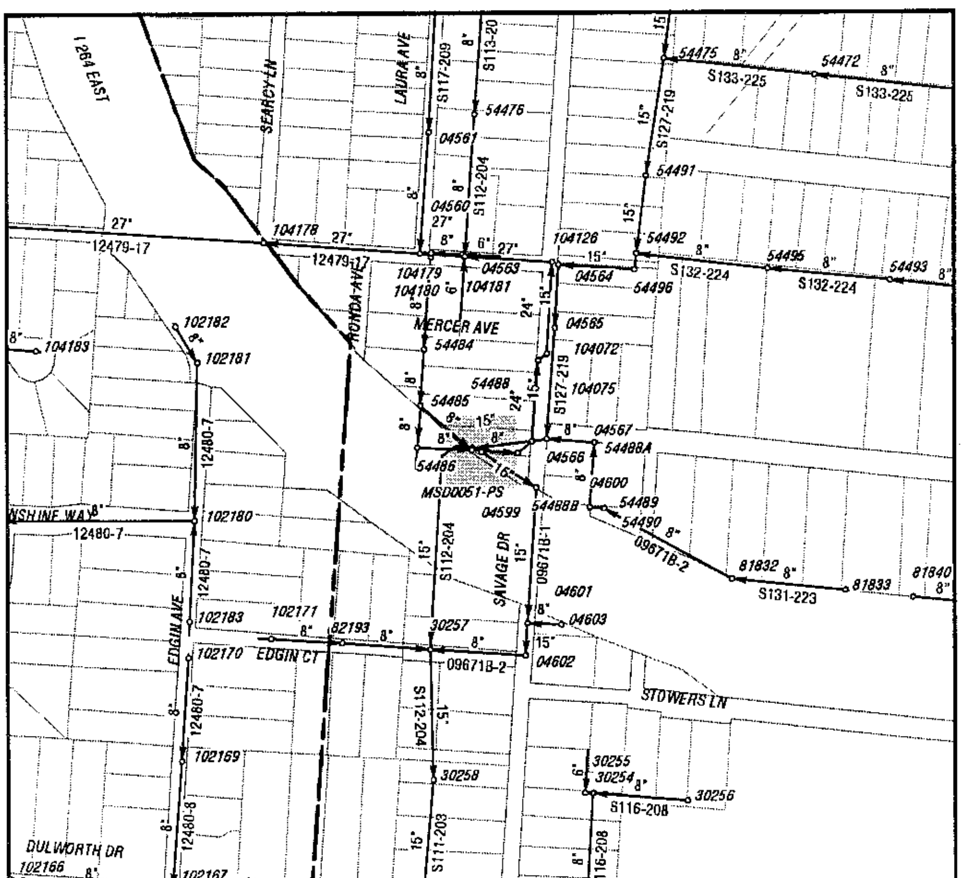
Background & History:

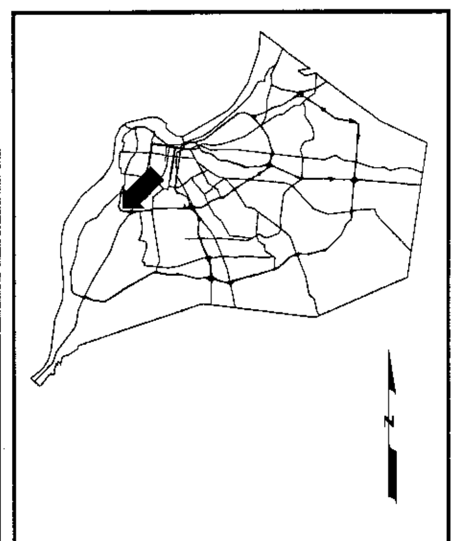
Pipe Size:
Inflow: 8"
Outflow: 15"

Upstream Collection System Length: 30 L.F.
Watershed: MILL CREEK
Discharge Type: CAPACITY
Discharged To:
Receiving Stream:
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	1.3 ac.
VACANT AND UNDEVELOPED	1.2 ac.





Metro: MAM17

Atlas Map: BI212

Scale 1" = 400 '

PIONEER RD PS

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility 81814-W

Customer Service 587-0603

Report as of December 2005

Service Area: WEST COUNTY

Yr	Num Overflows	Estimated Volume
2004	1	54,000 Gallons
2003	1	45,000 Gallons
2002	1	180,000 Gallons

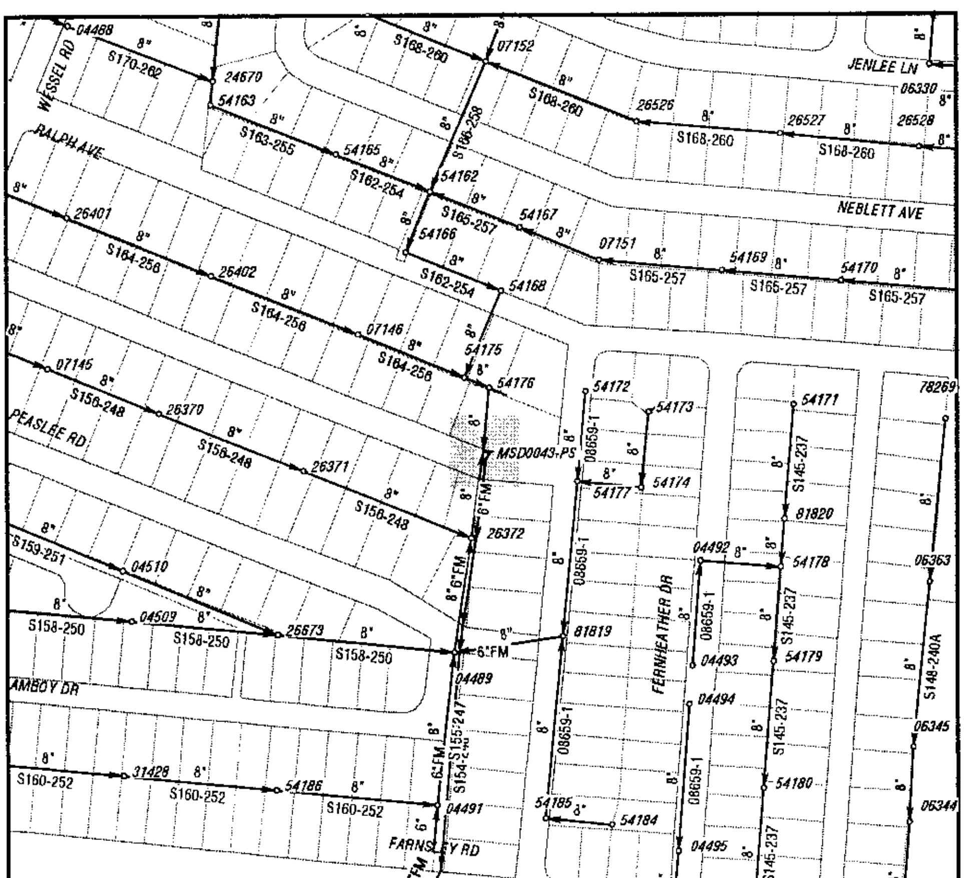
Background & History: This SSO was reported for the first time in 1999. Overflow was caused by a 4.72 inch rain event on June 28, 1999.

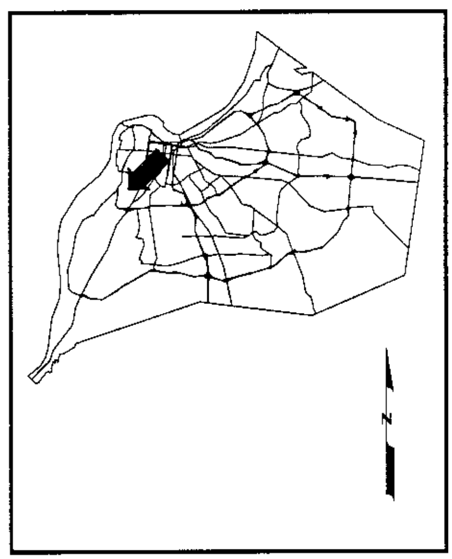
Pipe Size:
Inflow: 8"
Inflow: 8"
Outflow: 8"

Upstream Collection System Length: 40,500 L.F.
Watershed: MILL CREEK
Discharge Type: PUMPED
Discharged To: DITCH
Receiving Stream: MILL CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	18.7 ac.
PARKS, CEMETERIES, ETC.	38.5 ac.
MULTI-FAMILY RESIDENTIAL	0.3 ac.
PUBLIC AND SEMI-PUBLIC	1.5 ac.
VACANT AND UNDEVELOPED	8 ac.
INDUSTRIAL	7.7 ac.





Metro: MAM17

Atlas Map: BE212

Scale 1" = 400 '

MSD

Louisville-Jefferson County Metropolitan Sewer District

THURMAN

MSD Facility MSD0046-PS

Customer Service 587-0603

Report as of December 2005

Service Area: WEST COUNTY

Yr	Num Overflows	Estimated Volume
2004	1	126,000 Gallons

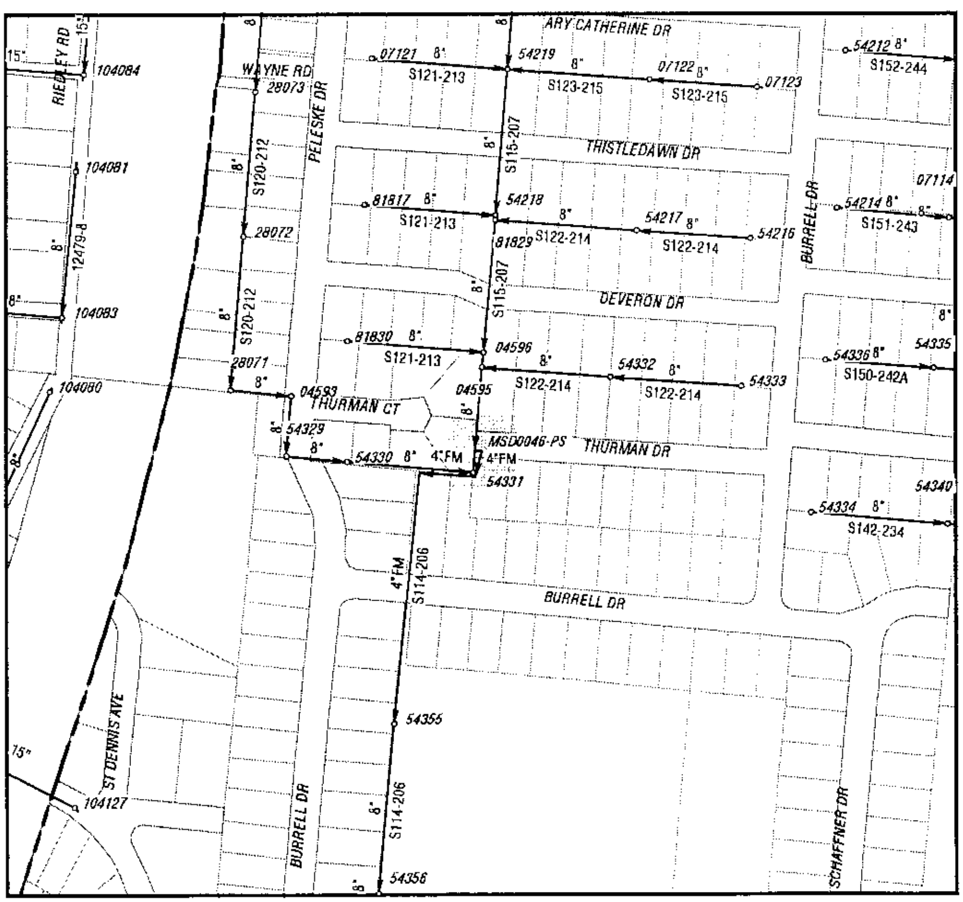
Background & History: This site is new to the investigation list and will be monitored in the future.

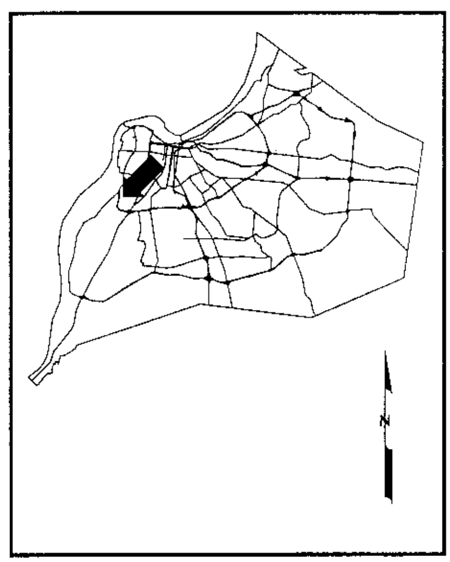
Pipe Size:
Inflow: 8"
Outflow: 4"

Upstream Collection System Length: 6,260 L.F.
Watershed: MILL CREEK
Discharge Type: PUMPED
Discharged To: GROUND
Receiving Stream: MILL CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	20.1 ac.
PUBLIC AND SEMI-PUBLIC	2.5 ac.
MULTI-FAMILY RESIDENTIAL	0.6 ac.
GENERAL COMM. AND OFFICE	1.3 ac.
VACANT AND UNDEVELOPED	9.5 ac.
INDUSTRIAL	7.7 ac.
PARKS, CEMETERIES, ETC.	33.7 ac.





Metro: MAM17

Atlas Map: BG212

Scale 1" = 400 '

FERN LEA PS

MSD
Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility MSD0047-PS

Customer Service 587-0603

Report as of December 2005

Service Area: WEST COUNTY

Yr	Num Overflows	Estimated Volume
2005	2	341,000 Gallons
2004	6	503,000 Gallons
2003	5	356,000 Gallons
2002	7	965,000 Gallons
2001	3	149,000 Gallons

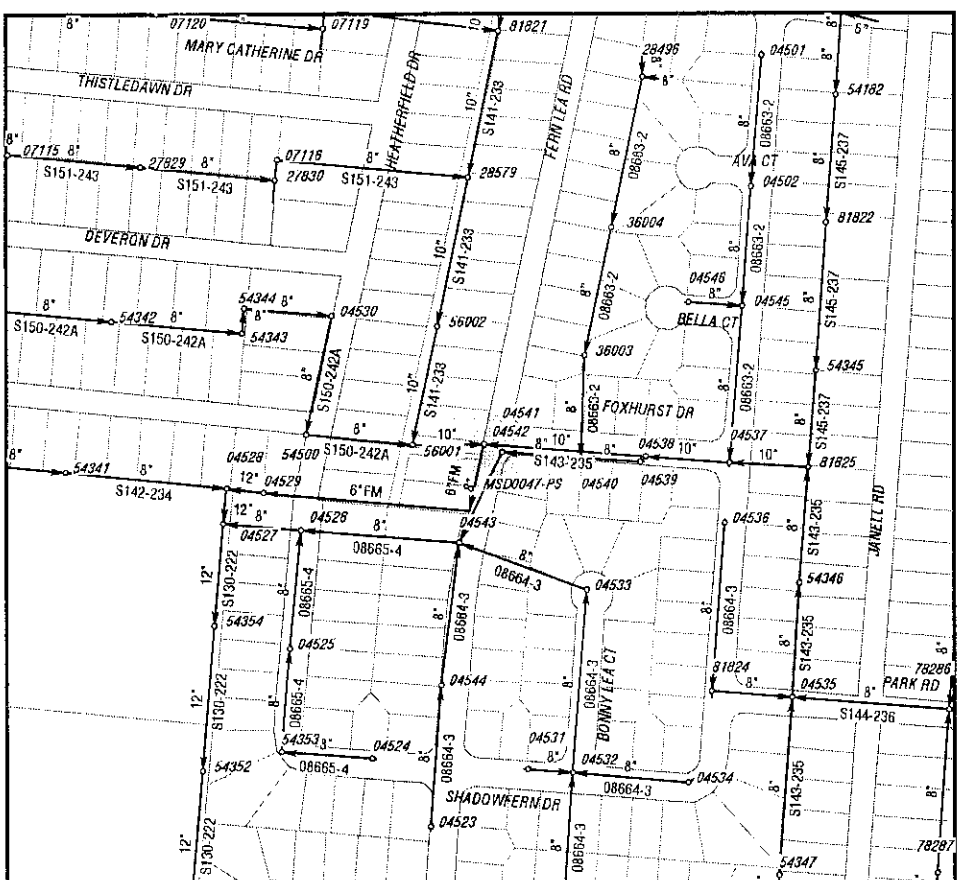
Background & History: First recorded on June 28, 1999 as a result of a large rainfall event.

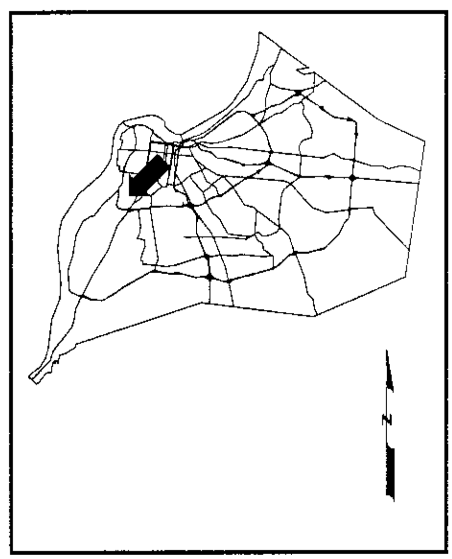
Pipe Size:
Inflow: 10"
Outflow: 6"

Upstream Collection System Length: 64,000 L.F.
Watershed: MILL CREEK
Discharge Type: PUMPED
Discharged To: CATCH BASIN
Receiving Stream: MILL CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	17.4 ac.
PARKS, CEMETERIES, ETC.	38.5 ac.
MULTI-FAMILY RESIDENTIAL	0.3 ac.
PUBLIC AND SEMI-PUBLIC	1.5 ac.
VACANT AND UNDEVELOPED	9 ac.
INDUSTRIAL	7.7 ac.





Metro: MAM17
Atlas Map: BG212

Scale 1" = 400 '

ROSA TERRACE

MSD
Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility MSD0049-PS

Customer Service 587-0603

Report as of December 2005

Service Area: WEST COUNTY

Yr	Num Overflows	Estimated Volume
2004	1	90,000 Gallons

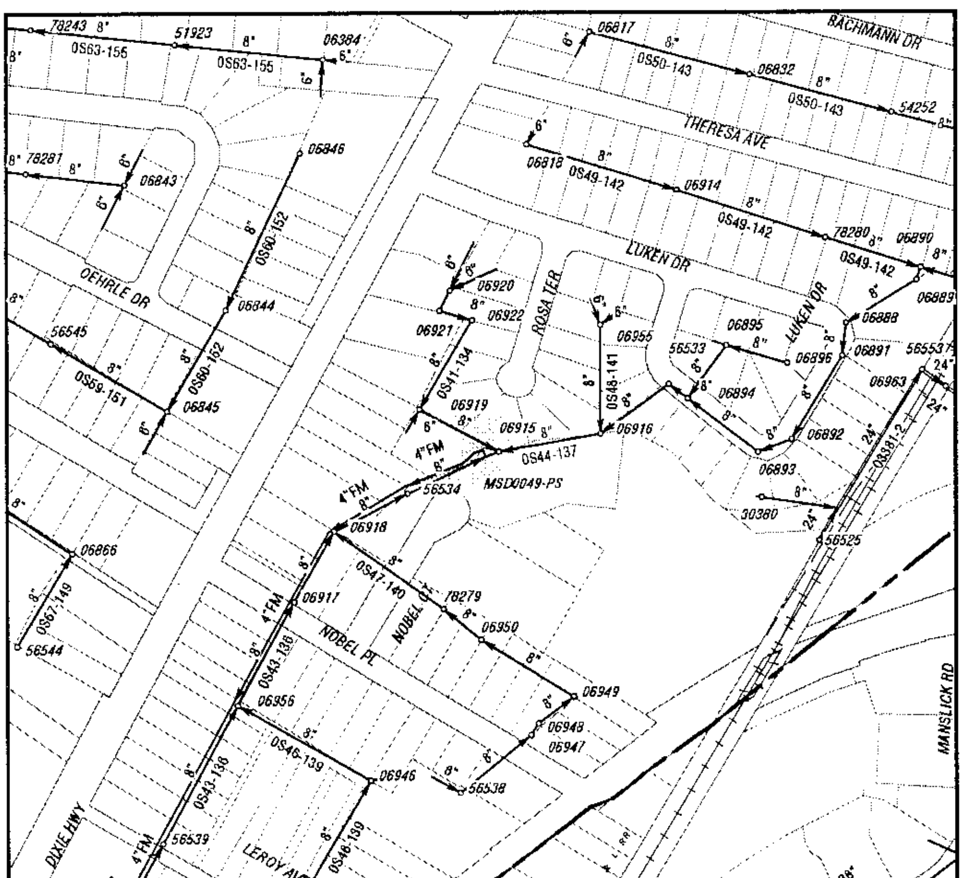
Background & History:

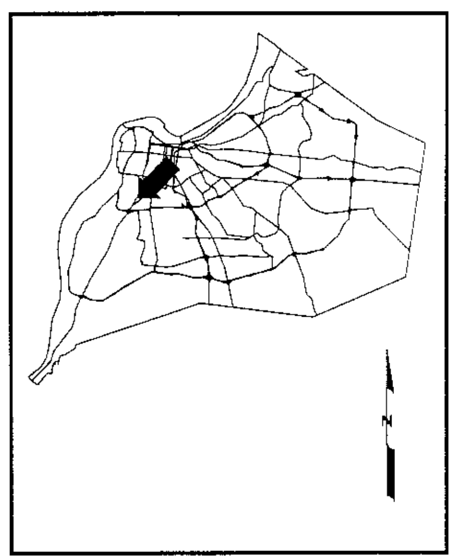
Pipe Size:
Inflow: 8"
Outflow: 4"

Upstream Collection System Length: 12,100 L.F.
Watershed: MILL CREEK
Discharge Type: PUMPED
Discharged To: GROUND
Receiving Stream:
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	10.3 ac.
INDUSTRIAL	8.5 ac.
GENERAL COMM. AND OFFICE	12.6 ac.
MULTI-FAMILY RESIDENTIAL	1.4 ac.
VACANT AND UNDEVELOPED	8 ac.
PARKS, CEMETERIES, ETC.	33.7 ac.
PUBLIC AND SEMI-PUBLIC	0.4 ac.





Metro: MAM17

Atlas Map: BG214

Scale 1" = 400 '

GARRS LN

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility MSD0050-PS

Customer Service 587-0603 **Report as of December 2005**

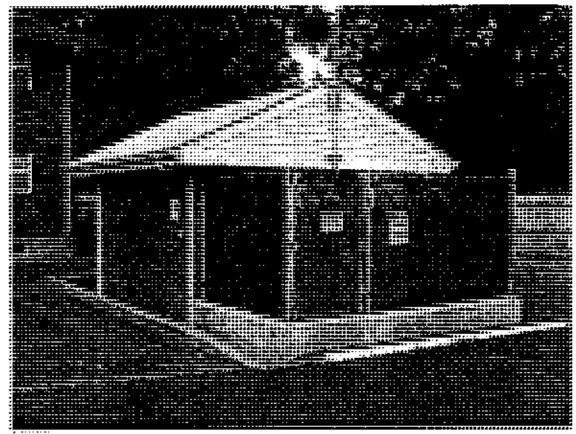
Service Area: WEST COUNTY

Yr	Num Overflows	Estimated Volume
2004	1	72,000 Gallons

Background & History: By-Pass first reported on June 28, 1999 as a result of large rain event.

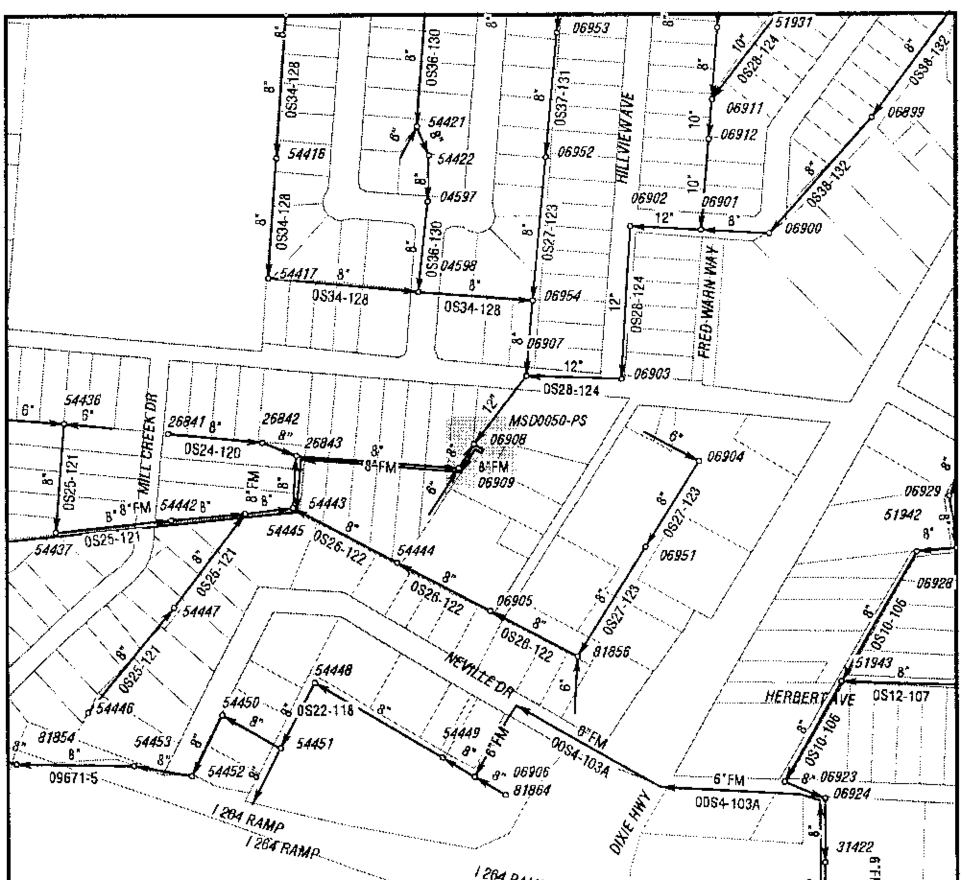
Pipe Size:
Inflow: 8"
Outflow: 8"

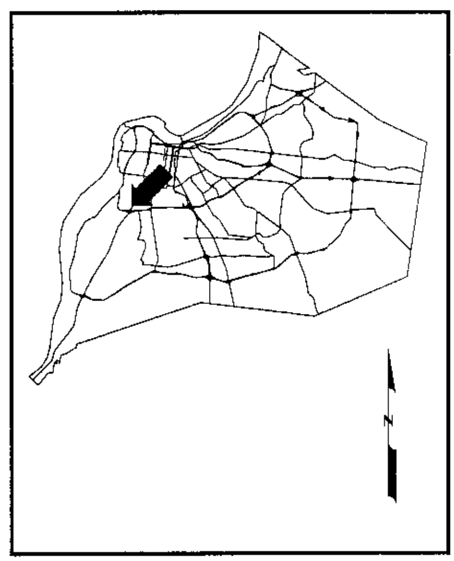
Upstream Collection System Length: 54,800 L.F.
Watershed: MILL CREEK
Discharge Type: PUMPED
Discharged To: DITCH
Receiving Stream: MILL CREEK
Status: DOCUMENTED



Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	13.9 ac.
MULTI-FAMILY RESIDENTIAL	1.7 ac.
VACANT AND UNDEVELOPED	11.5 ac.
PARKS, CEMETERIES, ETC.	39.3 ac.
INDUSTRIAL	7.7 ac.
PUBLIC AND SEMI-PUBLIC	0.4 ac.





Metro: MAM17
Atlas Map: BI214

Scale 1" = 400 '

MSD

Louisville and Jefferson County
Metropolitan Sewer District

SECTION 7

SECTION 7: JEFFERSONTOWN WASTEWATER TREATMENT PLANT

7.1 JEFFERSONTOWN WASTEWATER TREATMENT PLANT HISTORY

The Jeffersontown Wastewater Treatment Plant was constructed in 1956 and acquired by MSD in 1990. In 1998, the system was placed under an Agreed Order by the Kentucky Division of Water (Case No. 97201). The Agreed Order required various rehabilitation projects and treatment plant upgrades because the average annual hydraulic load was at 90% of its permitted capacity and the system experienced wet weather overflows at the siphon just upstream of the plants headworks during wet weather. All rehabilitation projects and plant upgrades identified in this document were mandated by the Agreed Order and completed in a timely manner, and, in December 2004, MSD notified the Kentucky Division of Water (KDOW) that all components identified in the Agreed Order were completed with additional repairs not specifically called out in the Agreed Order to be completed by June 30, 2005. The Jeffersontown WTP was expanded several times prior to acquisition by MSD. After acquisition, additional improvements were made by MSD to the plant from 1997 to 2000 that added phosphorous removal, UV disinfection, and a new RAS pump station. These modifications were required by Section 6.e. and 6.h. of the Agreed Order. Its current design capacity of 4 million gallons per day and the average daily flow is 3.7 million gallons per day.

The Jeffersontown service area covers approximately 8.3 square miles and serves approximately 7,000 customer accounts. The land use consists primarily of single family residential and industrial with a small amount of vacant or undeveloped land. The Jeffersontown collection system contains approximately 635,000 linear feet (120 miles) of 8- to 36-inch diameter pipe, primarily 8" vitrified clay pipe (VCP) and PVC pipe constructed from 1950 to the present. Approximately 58% of the system was constructed after 1990. The service area includes 26 pump/lift stations. See Figure 1 for a map of the Jeffersontown service area.

7.2 SSO PROJECT HISTORY

The wet weather project history diagram (Figure 2) on the following page illustrates the SSO-specific projects conducted in the Jeffersontown sewershed since the inception of the consolidated SSO program in 1998. The following sections in this document describe each of the SSO-specific projects in detail and are organized by the five major project types:

- Flow monitoring
- SSES and other sewer investigation/study project
- Computer modeling
- Rehabilitation
- Post-Rehabilitation flow monitoring

Capital projects that removed SSOs (such as pump station and small treatment plant eliminations) are not included in the SSO-specific project history diagram but are included in the project write-up sections under "Other Capital Projects." Figure 7 is a service area diagram showing the hydraulic connectivity of overflow locations. See Figures 3 – 6 for the program elements described in this section.

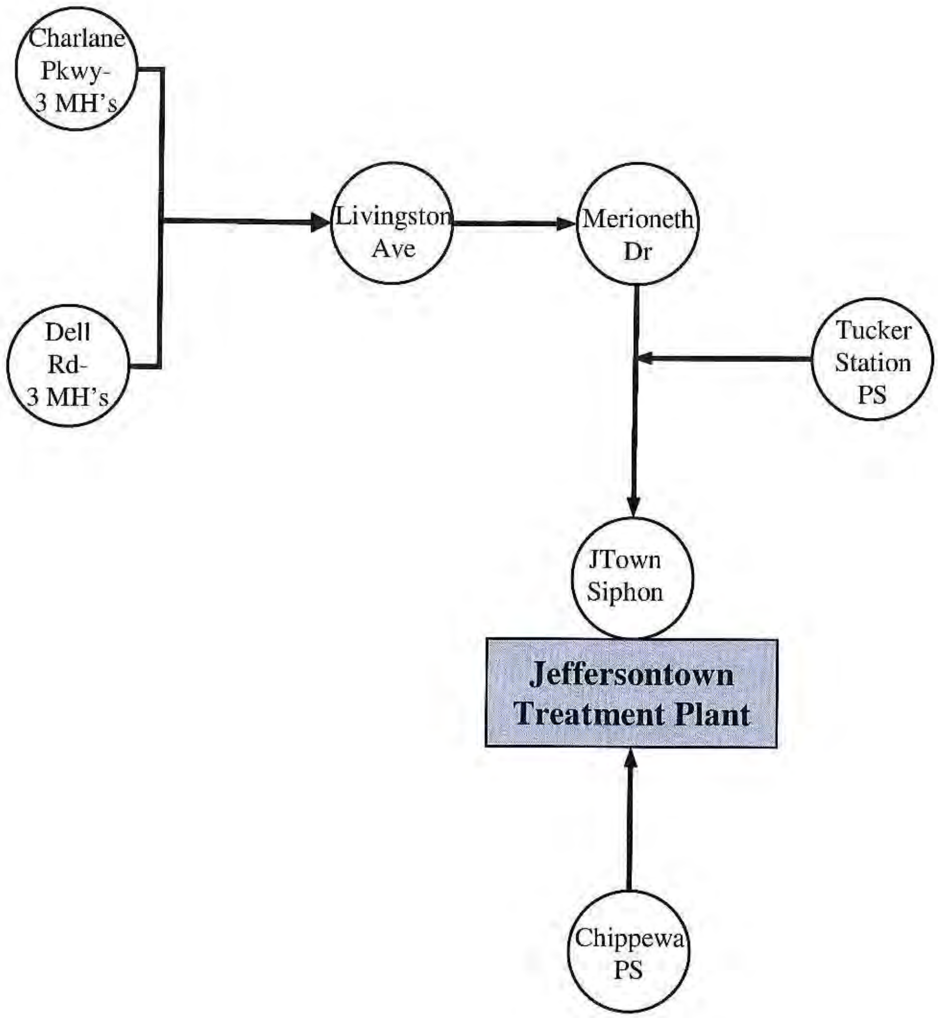


Figure 7 – Jeffersontown – Hydraulic Connectivity Diagram of Unauthorized Discharges

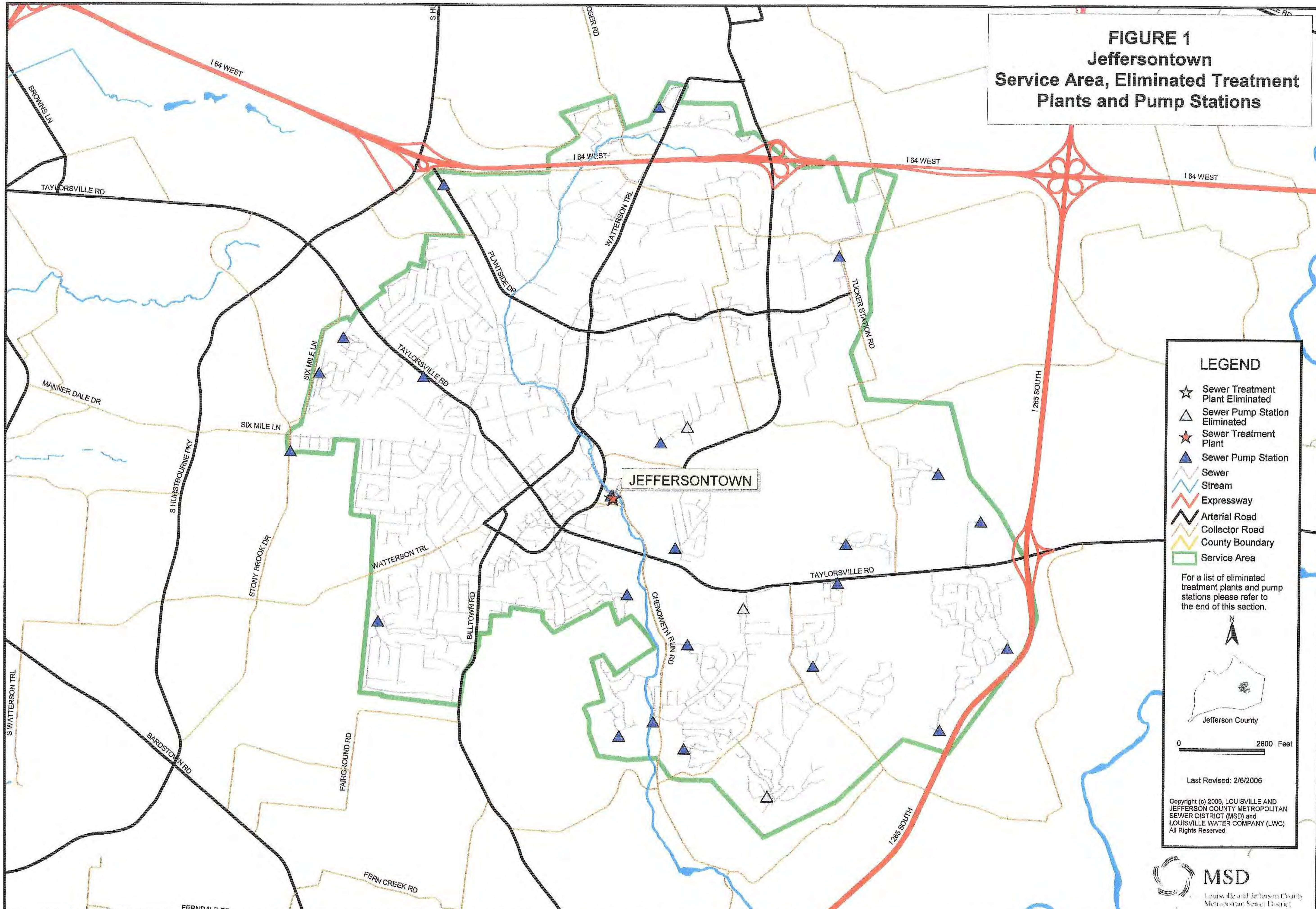
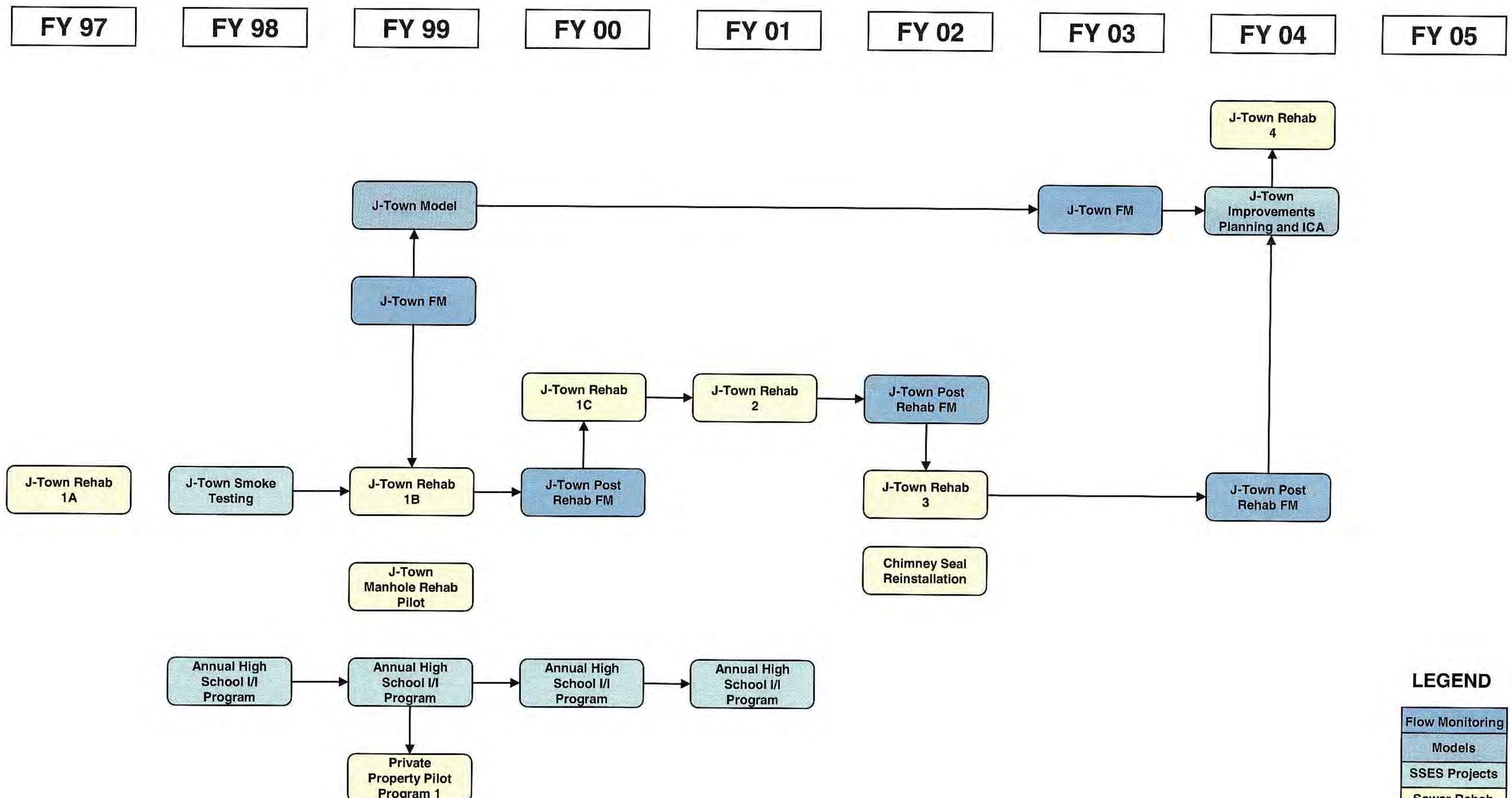


FIGURE 1
Jeffersontown
Service Area, Eliminated Treatment Plants and Pump Stations

Jeffersontown Sewershed Wet Weather Projects

FIGURE 2
Jeffersontown Project History



MSD
Louisville and Jefferson County Metropolitan Sewer District

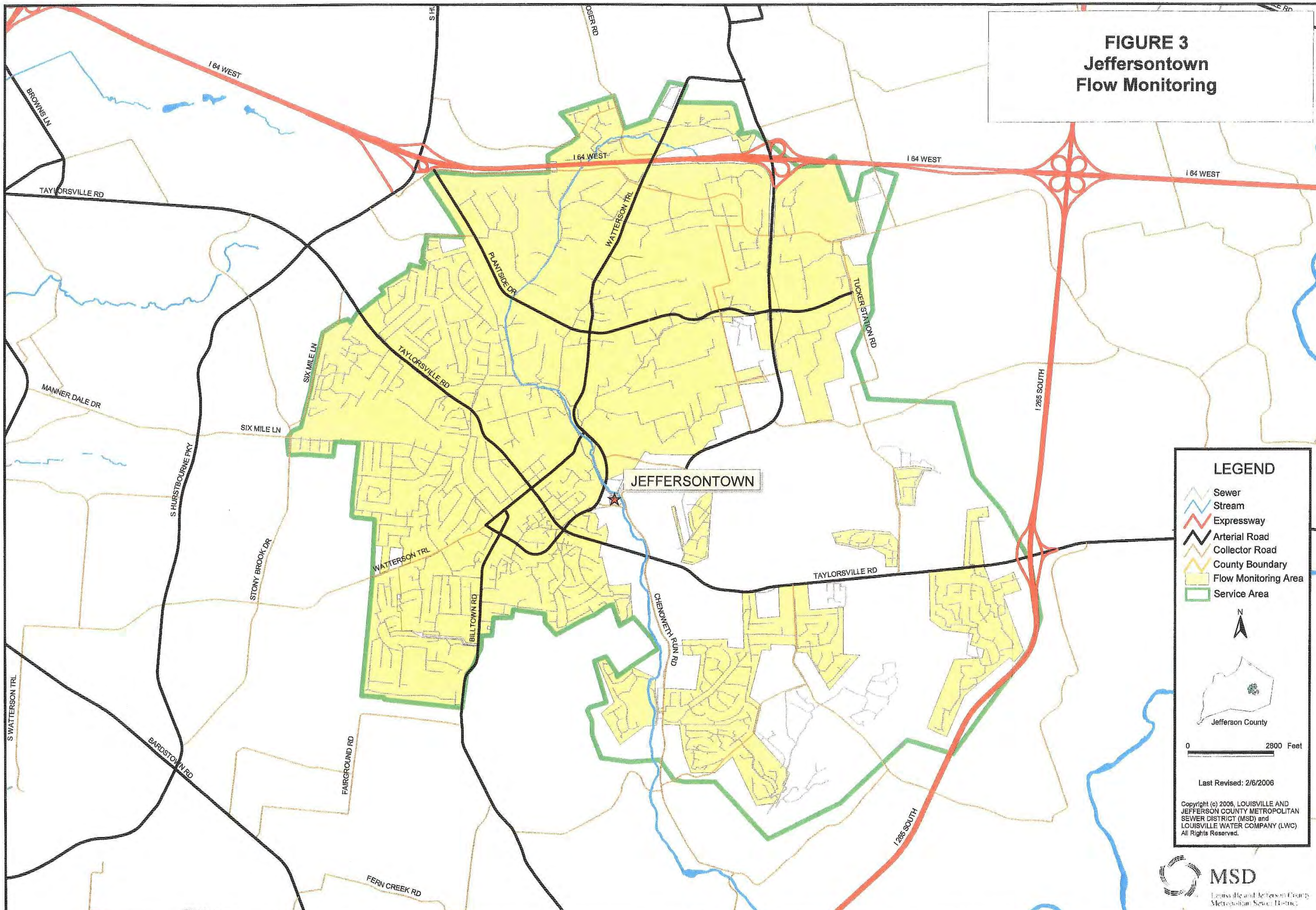


FIGURE 3
Jeffersontown
Flow Monitoring
I 64 WEST
BROWNS LN
TAYLORSVILLE RD
PLANTSIDE DR
WATTERSON TRL
TUCKER STATION RD
I 265 SOUTH
SIX MILE LN
MANNER DALE DR
S HURSTBOURNE PKY
JEFFERSONTOWN
STONY BROOK DR
BILLTOWN RD
CHENOWETH RUN RD
S WATTERSON TRL
BARDSTOWN RD
FAIRGROUND RD
FERN CREEK RD
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Flow Monitoring Area
Service Area
N
Jefferson County
0
2800 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD

7.2.1 Jeffersontown Flow Monitoring

Figure 3 represents the area that was flow monitored in Jeffersontown.

<u>Jeffersontown Flow Monitoring</u>

Twenty-four (24) flow monitors were installed in the Jeffersontown collection system from September 1, 1998, through October 10, 1998. Schedule constraints at the time required the flow monitoring to be conducted in the fall during a very dry period. As a result, there was substantially less base infiltration than expected. Daily flow records for the Jeffersontown Treatment Plant were obtained for the monitoring period and the spring of 1999. The plant records indicate there was 26% more flow during the spring than during the fall. The following figure shows a flow monitoring schematic of the sewer systems in the Jeffersontown study area. The numbered circles in Figure 8 represent the basins monitored by each of the flow meters.

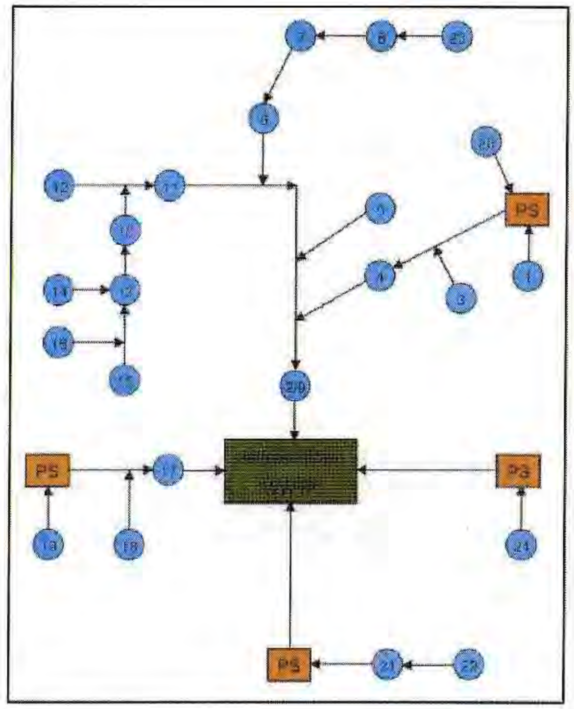


Figure 8 – Jeffersontown Flow Monitoring Schematic

Two significant rain events were monitored: October 3 (1.24"), and October 7 (1.72"). All of the sites in Jeffersontown experienced some amount of inflow/infiltration (I/I) during these rain events. Many sites experienced immediate increases in flow rate after rain events, indicating significant inflow sources. Flow monitoring results revealed that peaking factors ranged from 1.86 to 10.25 for the sub-basins. Approximately one-third of the sub-basins in the Jeffersontown area had a peaking factor greater than 4. The sub-basins with the highest peaking factors were scattered through Jeffersontown and include portions of the original residential area, the southern industrial park area, and two relatively new areas (Chenoweth Run and Stone Lakes Farm). Basement flooding occurred mainly in the residential areas west and north of Chenoweth Run Creek and was not necessarily related to sub-basins with high peaking factors. The basins were prioritized according to peaking factor, number of basement backups, and other wet weather impacts to form a rehabilitation strategy for the Jeffersontown sanitary sewer system. This project cost approximately $161,000 and was completed in June 1999.

<u>Jeffersontown Flow Monitoring</u>

In FY03 (July 1, 2002 – June 30, 2003), ten flow monitors and two rain gauges were installed and maintained for a period of 45 days beginning December 23, 2002, and ending February 5, 2003. The purpose of this project was to collect average dry weather flows and wet weather responses to be used for the FY03 (July 1, 2002 – June 30, 2002) Jeffersontown hydraulic model calibration. This project cost approximately $63,000 and was completed in March 2003.

7.2.2 Jeffersontown Sanitary Sewer Evaluation Study (SSES)

No formal SSES project has been performed in the Jeffersontown sewershed. However, 86,000 linear feet of pipe was smoke tested in the Jeffersontown area as part of the High School Inflow Source Identification Program in 2000 but no significant defects were identified. This smoke testing was performed predominantly in the Industrial Park to fulfill requirements set forth in section 6.b. of the Jeffersontown Agreed Order. This effort was completed in July 1998.

MSD's Infrastructure and Flood Protection Division has performed extensive TVI of the Jeffersontown collector sewers and the data has been used to program CIPP rehabilitation. This effort included TVI of the main interceptor area associated with the "25 defects noted in the 1985 H. K. Bell report." As reported to KDOW in December 1998, the interceptor was in sound condition.

<u>Jeffersontown Interceptor Condition Assessment</u>

Under this project, TVI of the Jeffersontown interceptor system was performed. The inspection included approximately 56,000 linear feet of sanitary sewers with diameters of 12 inches and larger. The results were reviewed and significant hydraulic restrictions and defects such as collapsing lines and active leaks were identified and repaired as part of the Jeffersontown Phase 4 project. Design also occurred under this project as well as a review of the Hansen IMS system to assess the programs capabilities for prioritization of repairs. In addition, a capacity assessment was performed and preliminary recommendations for the elimination of overflows were made. This project cost approximately $682,000 and was completed in July 2005. The project fulfilled requirements established in section 6.d. of the Jeffersontown Agreed Order as modified in 1998. Figure 4 represents the SSES study areas in the Jeffersontown service area.

7.2.3 Jeffersontown Computer Modeling

The Jeffersontown XP-SWMM model was originally built and calibrated in FY99 (July1, 1998 – June 30, 1999) using the FY98 (July 1, 1997 – June 30, 1998) flow monitoring data. This model consisted of 8" and greater diameter sanitary sewer tributary to the Jeffersontown Wastewater Treatment Plant. Model runs were performed to evaluate the system response to various design storms. The modeled scenarios ranged from 3-month to 100-year return frequencies and durations of 1 hour to 24 hours. All 24-hour events with a return frequency of 3 months or greater caused SSOs within the model. In FY01 (July 1, 2000 – June 30, 2001), this model was also used to evaluate scenarios for inclusion in Jeffersontown Facilities Plan. The Jeffersontown Facilities Plan was submitted to the KDOW on August 31, 2002 to fulfill requirements established in section 6.g. of the Jeffersontown Agreed Order. The modeling project cost approximately $113,000 and was completed in May 2000. Figure 5 represents the Jeffersontown Computer Modeling study area.

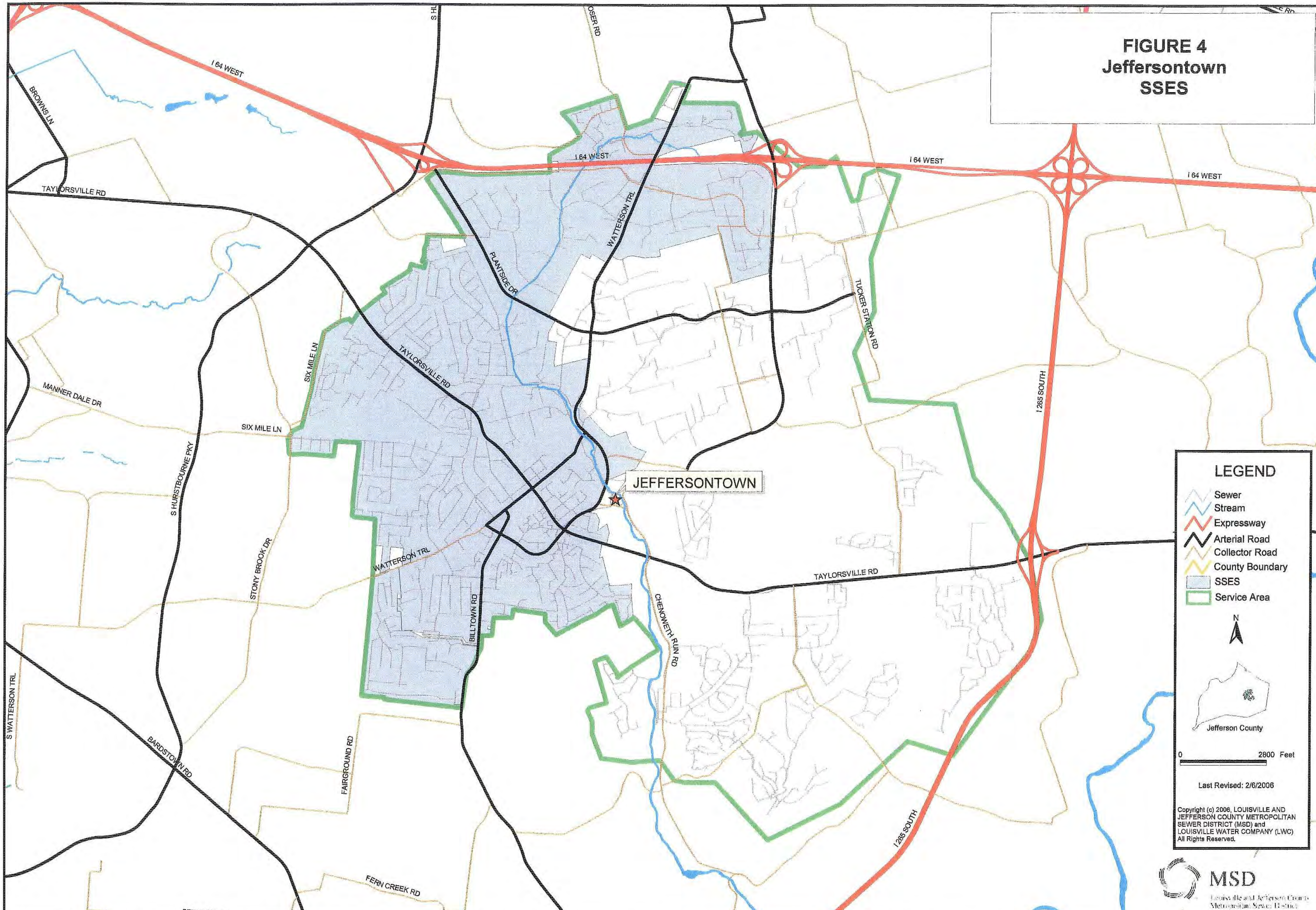


FIGURE 4
Jeffersontown
SSES
I 64 WEST
I 64 WEST
I 64 WEST
I 64 WEST
BROWNS LN
TAYLORSVILLE RD
PLANTSIDE DR
WATTERSON TRL
TUCKER STATION RD
I 265 SOUTH
MANNER DALE DR
SIX MILE LN
SIX MILE LN
TAYLORSVILLE RD
S HURSTBOURNE PKY
JEFFERSONTOWN
STONY BROOK DR
WATTERSON TRL
BILLTOWN RD
TAYLORSVILLE RD
CHENOWETH RUN RD
S WATTERSON TRL
BARDSTOWN RD
FAIRGROUND RD
FERN CREEK RD
FERNDALE RD
I 265 SOUTH
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
SSES
Service Area
N
Jefferson County
0
2800 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD

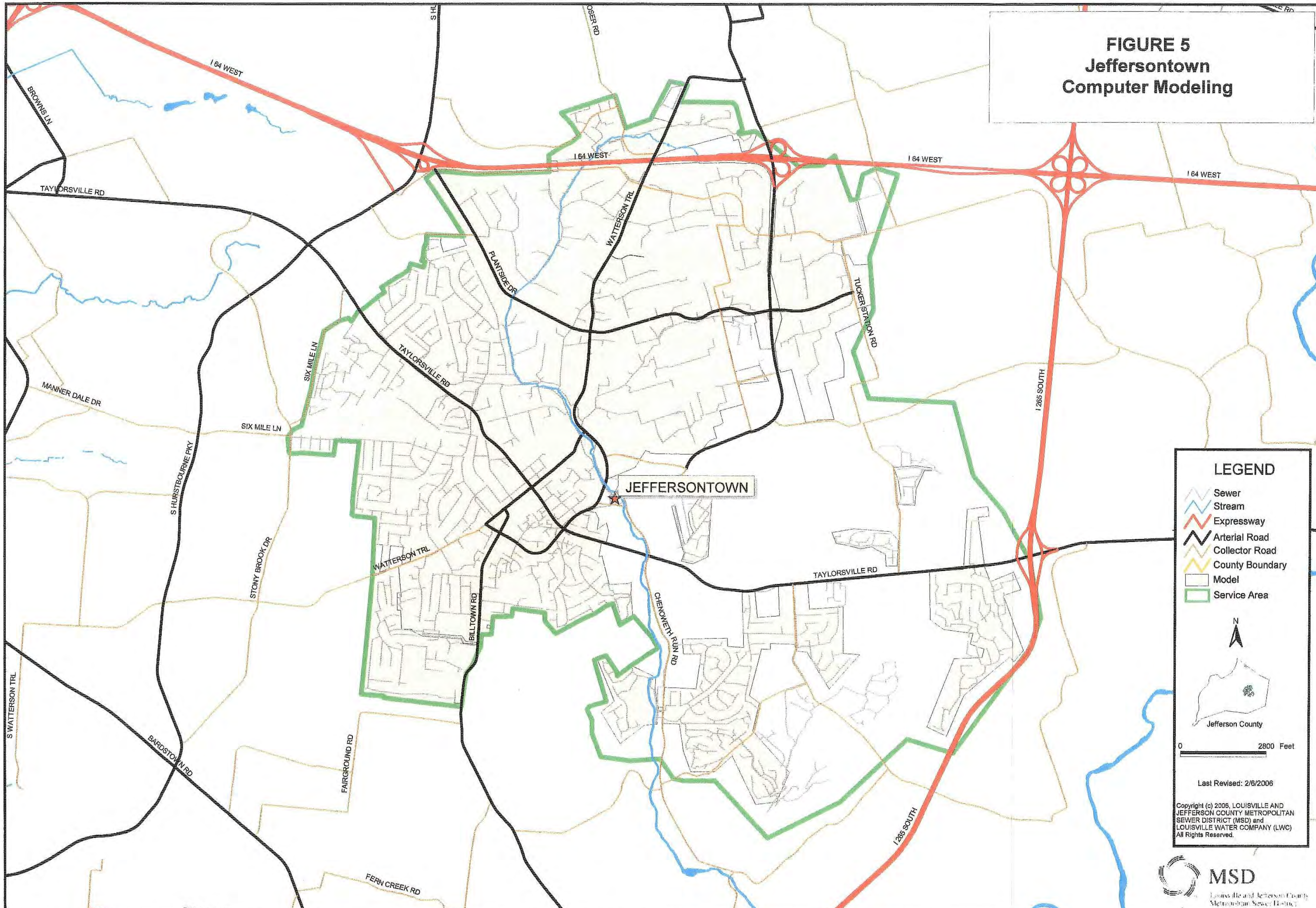


FIGURE 5
Jeffersontown
Computer Modeling
I 64 WEST
BROWNS LN
TAYLORSVILLE RD
PLANTSIDE DR
WATTERSON TRL
TUCKER STATION RD
I 265 SOUTH
SIX MILE LN
MANNER DALE DR
S HURSTBOURNE PKY
JEFFERSONTOWN
STONY BROOK DR
BILLTOWN RD
CHENOWETH RUN RD
S WATTERSON TRL
BARDSTOWN RD
FAIRGROUND RD
FERN CREEK RD
FERNDALE RD
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Model
Service Area
N
Jefferson County
0
2800 Feet
Last Revised: 2/6/2006
Copyright (c) 2005, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD

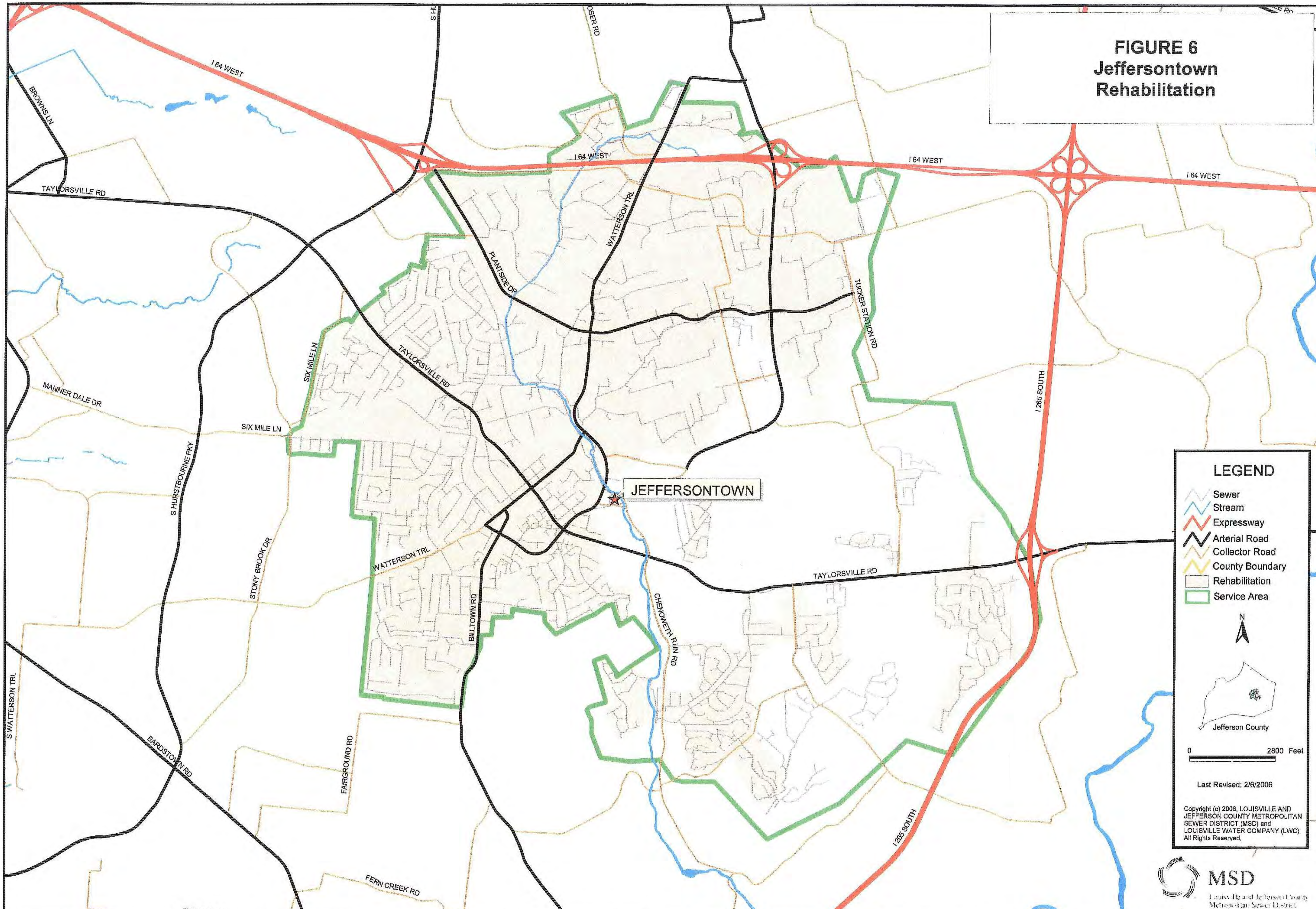


FIGURE 6
Jeffersontown
Rehabilitation
I 64 WEST
BROWNS LN
TAYLORSVILLE RD
PLANTSIDE DR
WATTERSON TRL
TUCKER STATION RD
SIX MILE LN
MANNER DALE DR
S HURSTBOURNE PKY
STONY BROOK DR
I 265 SOUTH
JEFFERSONTOWN
BILLTOWN RD
CHENOWETH RUN RD
S WATTERSON TRL
BARDSTOWN RD
FAIRGROUND RD
FERN CREEK RD
LEGEND
Sewer
Stream
Expressway
Arterial Road
Collector Road
County Boundary
Rehabilitation
Service Area
N
Jefferson County
0
2800 Feet
Last Revised: 2/6/2006
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.
MSD

7.2.4 Jeffersontown Rehabilitation

Figure 6 displays the rehabilitation work conducted under the Jeffersontown Rehabilitation projects.

Jeffersontown I/I Remediation Phase 1A

This project was a pilot project for use of Cured-In-Place Pipe and the Spraywall method of manhole rehabilitation. It completed nearly $133,000 of rehabilitation for defects in small area that produced very high flows and was tributary to a section of interceptor with limited capacity. The rehabilitation effort consisted of 3,685 linear feet of CIPP rehabilitation and 11 full manhole rehabilitations were performed using the Spraywall system. This project was mandated by the Jeffersontown Agreed Order and results were submitted to the KDOW in December 1998 in fulfillment of section 6.b. requirements. The project cost was approximately $188,000.

Jeffersontown I/I Remediation Phase 1B

This project targeted basins with high peaking factors identified by the FY99 Jeffersontown flow monitoring project. The rehabilitation effort consisted of 408 manhole chimney seal installations. This project was completed in June 1999 and fulfilled requirements of section 6.i. of the Jeffersontown Agreed Order. The project cost was approximately $280,000

Jeffersontown I/I Remediation Phase 1C

This project targeted areas with significant peaking factors as identified in the FY99 (July 1, 1998 – June 30, 1999) Jeffersontown Flow Monitoring Project. The rehabilitation effort consisted of 755 manhole chimney seal installations. This project was completed in October 2001 and fulfilled requirements of section 6.i. of the Jeffersontown Agreed Order. The project Cost approximately $546,000.

Jeffersontown I/I Remediation Phase 2

This project targeted areas with significant peaking factors as identified in the FY99 Jeffersontown Flow Monitoring Project and significant pipe defects identified through MSD TVI efforts. The project consisted of 2,540 linear feet of cured-in-place sewer main rehabilitation, 67 cured-in-place lateral rehabilitations, and 920 manhole chimney seal installations. This project was completed in May 2002 and fulfilled requirements of section 6.i. of the Jeffersontown Agreed Order. The project cast approximately $805,000.

Jeffersontown I/I Remediation Phase 3

This project provided for the rehabilitation of defects identified through MSD TVI, the installation of chimney seals in remaining unrehabilitated basins, brick constructed manholes and manholes deteriorated by H2S at force main discharge points. The rehabilitation effort consisted of 3,247 linear feet of cured-in-place sewer main rehabilitation, 38 cured-in-place lateral rehabilitations, 320 manhole chimney seals, and 120 full manhole rehabilitations using the Spraywall application and Polytriplex cured-in-place application. Figure 9 displays the rehabilitation work conducted under the Jeffersontown Ph. 3 Rehabilitation project. This project was completed in

September 2003 and fulfilled requirements of section 6.i. of the Jeffersontown Agreed Order. The project cost approximately $1,240,000.

In addition to the effort discussed above, interceptor repairs were made in response to significant defects identified during the Interceptor Condition Assessment discussed in section 7.2.6 of this report. Repairs were made in the Grassland area to relieve a hydraulic constriction on the interceptor and disconnect abandoned sections of old sewer pipe, along Chenoweth Run to repair several substantial leaks related to utility and developer work by other entities, and replaced a sewer line along Watterson Trail that was nearly collapsed. During the manhole location phase of the Interceptor Condition Assessment, numerous manholes not previously located during previous rehabilitation projects were located and rehabilitated. These work items were funded from the Jeffersontown Phase 4 budget under the Jeffersontown Phase 3 project fulfilling the requirements of section 6.a and 6.d of the Jeffersontown Agreed Order.

<u>Jeffersontown Manhole Rehabilitation Pilot</u>

This small project was used as a pilot project to field test a variety of full manhole rehabilitation systems including Cured-In-Place, Epoxy coatings, and cementitious products. Under this project, 15 manholes in a contiguous area that were severely corroded due to H_2S were rehabilitated and the rehabilitation systems were periodically evaluated to determine which methodologies were most effective. This project was completed in October 1999 at a cost of approximately $45,000. This project was not mandated by the Jeffersontown Agreed Order.

<u>Chimney Seal Reinstallation</u>

The Jeffersontown Service Area was included in the Chimney Seal Reinstallation project which is discussed in section 2.2.3.5 of this document. This project was not mandated by the Jeffersontown Agreed Order but was executed to maintain system improvements in accordance with CMOM principles.

7.2.5 Jeffersontown Post-Rehabilitation Flow Monitoring

<u>Jeffersontown Chimney Seal Installation: Post-Rehabilitation Flow Monitoring</u>

This study was conducted to assess the effectiveness of butyl rubber manhole chimney seals installed as part of the Jeffersontown phase 1B rehabilitation project. After the rehabilitation was completed, flow monitors were installed in the identical locations used in the prior flow monitoring project. A monitor was also installed in an un-rehabilitated sub-basin to serve as control, i.e., to show baseline differences in flow data between the pre and post-rehabilitation flow monitoring data due to seasonal variations in groundwater, antecedent soil conditions, and other factors that could skew the results. Post-rehabilitation flow monitoring took place from January 5, 2000, through March 31, 2000. Three significant rain events were monitored during this period: February 13-14 (1.89"), February 18 (3.84"), and March 16 (1.62"). Observations from this analysis included the following:

- ***Peak wet weather flows were reduced.*** Peaking factors in each of the four sub-basins increased less than the control basin, indicating the chimney seals had a positive effect on reducing peak wet weather flow rates;
- ***Wet weather total excess flows were reduced.*** Reductions were shown in the four rehabilitated sub-basins expressed as a percentage of control basin excess flow.

Based on these results, butyl rubber manhole chimney seals appear effective at eliminating inflow and to some extent, infiltration from the sanitary sewer system. Therefore, a rehabilitation strategy focusing on the installation of chimney seals throughout the Jeffersontown service area was established. This project was completed in June 2000 and cost approximately $18,000.

Jeffersontown Chimney Seal Installation: Post-Rehabilitation Flow Monitoring

This study was conducted to assess the effectiveness of butyl rubber manhole chimney seals installed in the recently developed Stone Lakes Farm area as part of the Jeffersontown Phase 2 project. After the rehabilitation was completed, flow monitors were installed in the identical locations used in the prior flow monitoring project. A monitor was also installed in an un-rehabilitated sub-basin to serve as control, i.e., to show baseline differences in flow data between the pre and post-rehabilitation flow monitoring data due to seasonal variations in groundwater, antecedent soil conditions, and other factors that could skew the results. Post-rehabilitation flow monitoring took place from January 3, 2002, through March 14, 2002. Two significant rain events were monitored during this period: January 24 (2.62") and January 30 (1.48"). Observations from this analysis included the following:

- ***Peak wet weather flows were not reduced.*** Peaking factors increased more in the rehabilitated basin than the control basin. There was an unknown variable causing increased wet weather flows in this basin. However, it can be concluded that I/I is not due to leaky chimney seals.
- ***Wet weather total excess flows were not reduced.*** Total excess flows increased by a surprising percentage. Hydrograph analysis indicated an inflow problem, which may be related to private property or possibly one of the 15 manholes not located for rehabilitation, one of which is near a small lake;
- ***No conclusions can be made.*** The only abnormal conditions indicated by the depth/velocity plots were variable downstream conditions at the pump station.

This project was completed in June 2002 and cost approximately $15,000.

Jeffersontown I/I Rehabilitation Phase 3: Post-Rehabilitation Flow Monitoring

This report was prepared to assess the effectiveness of butyl rubber manhole chimney seals and Spraywall manhole rehabilitation performed as part of the Jeffersontown Phase 3 project. This rehabilitation was conducted in an attempt to reduce sanitary sewer overflows and basement backups in the Jeffersontown area. This project was the first time that a significant number of full manhole rehabilitations using Spraywall had been performed in a single sewershed (Basin 10, the original downtown area). After the rehabilitation was completed, flow monitors were installed in the identical locations used in the prior flow monitoring projects. In each project a monitor was also installed in an unchanged sub-basin to serve as control, i.e., to show baseline differences in flow data between the pre and post-rehabilitation flow monitoring data due to seasonal variations in groundwater, antecedent soil conditions, and other factors that could skew the results. Under the Jeffersontown Phase 3 project, the original control basin, Basin 15, was rehabilitated. Therefore Basin 14, rehabilitated in 1999 and flow monitored in 2000, was used as a control basin for Basin 15.

Post-rehabilitation flow monitoring took place from December 8, 2003, through January 26, 2004. The 2003 monitoring period experienced significantly more consistent rainfall than in previous periods which experienced either drought or drought combined with intense rains. Two significant rain events were monitored during this period: December 23 (0.83") and January 4 (0.9") Observations from this analysis included the following:

- ***Infiltration was very low.*** Recovery times during wet seasons for both basin 10 and 15 were both comparable to recovery times during drought conditions in 2000, indicating the system provided little access for infiltration. Improvements in basin 10 were likely to account for some of this improvement;
- ***Depth/Velocity analysis showed the system was running smoother and faster after rehabilitation.*** The rehabilitated areas were showing improved performance likely due to downstream improvements or reduced flows due to other rehabilitations;
- ***The system was limited by downstream conditions.*** Depth/Velocity plots generally indicated a smooth flowing system that could not reach capacity due to downstream capacity restrictions.

This project was completed in May 2004 and cost approximately $22,000.

7.2.6 Other Capital Projects in Jeffersontown

Private Property Pilot Program

A portion of the Jeffersontown Service Area was included in the Private Property Disconnection project which is discussed in section 2.2.1.7 of this document. This project fulfilled requirements established in section 6.f. of the Jeffersontown Agreed Order.

Jeffersontown Interceptor Condition Assessment

A simple hydraulic isolation analysis was performed in FY03 (July 1, 2002 – June 30, 2003) using the FY03 (July 1, 2002 – June 30, 2003) flow monitoring data. This analysis created several artificial free outfalls within the system to evaluate the performance of the sub-basins independent of the primary interceptors. A basin by basin evaluation was performed, calculating the design flow for each sub-basin as specified by the MSD Design Manual and the theoretical Manning's flow of the sewers using LOJIC data. The analysis showed that Basins 11, 15, 17, and 21 were inadequate for wet weather flow with an expected deficit of 2.2 MGD.

The model was also revised to reflect the impact of the Jeffersontown Facilities Plan as it currently stands, which recommends the elimination of the flows from the northeastern and southeastern areas of the sewershed. This neither reduced the flows to the plant to an acceptable level nor eliminated overflows in the upper portion of the system.

The Facilities Plan model was then updated to include anticipated flows from undeveloped areas in the industrial parks. MSD standards for usage based on acreage were used to estimate the approximate flows which were applied to likely tie-in points. This became the baseline model used to evaluate all scenarios.

Finally, the model was used to evaluate various options including transport, storage and treatment to improve the system and eliminate unauthorized discharges. A report detailing this information and providing recommendations for capacity improvements and overflow elimination was developed. The total cost for the project was approximately $682,000 and it was completed in September 2005.

Jeffersontown WTP Improvement Project

This project involved the upgrade of MSD's Jeffersontown Wastewater Treatment Plant by providing the following replacement equipment and process modifications: 1) Eliminating the digestion process and converting digesters to holding tanks; 2) Providing wet weather treatment capability of up to 20 MGD; 3) Adding new influent screening equipment; 4) Adding an ultraviolet disinfection system and final effluent pump station; 5) Eliminating sludge dewatering at the plant; 6) Adding a new generator; 7) Providing miscellaneous pump additions; and 8) Providing a phosphorus removal system. This project was completed in 2000 but all necessary components were in operation in December 1999 in accordance with requirements established in section 6.e. and 6.h. of the Jeffersontown Agreed Order.

7.3 ELIMINATIONS

Over the years, many wastewater treatment plants and pump stations have been closed and eliminated through MSD's sanitary sewer expansion program. Their sizes range from large plants to small "package" plants and pumping stations designed to serve individual residences and businesses. However, since the Jeffersontown system is served by a single regional WTP, there have been no eliminated treatment plants in the Jeffersontown Service Area and only two pump stations have been eliminated.

PUMP STATIONS

ID	**NAME**	**ADDRESS**
MSD0146-PS	Element	3001 Element Ln
MSD1094-PS	Pine Valley	12401 Valley Park Ct

Fact Sheets

The following pages are fact sheets of known unauthorized discharge locations. For status and discharge type definitions, refer to the SORP.

MSD

Louisville-Jefferson County
Metropolitan Sewer District

3506 CHARLANE PKY

MSD Facility 28250

Customer Service 587-0603 **Report as of December 2005**

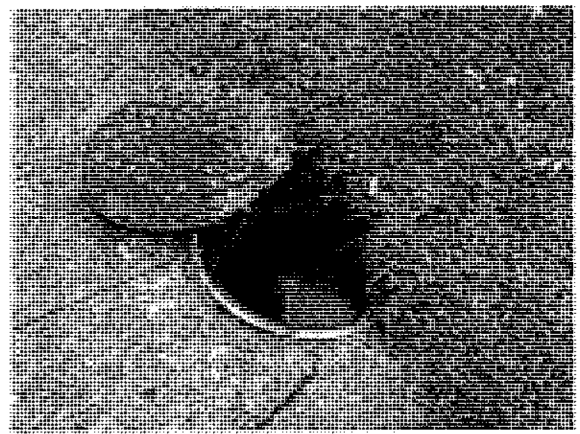
Service Area: JEFFERSONTOWN

Yr	Num Overflows	Estimated Volume
2005	2	179,000 Gallons

Background & History: This site was identified by computer model and verified in the field. Resident has verified overflow existance.

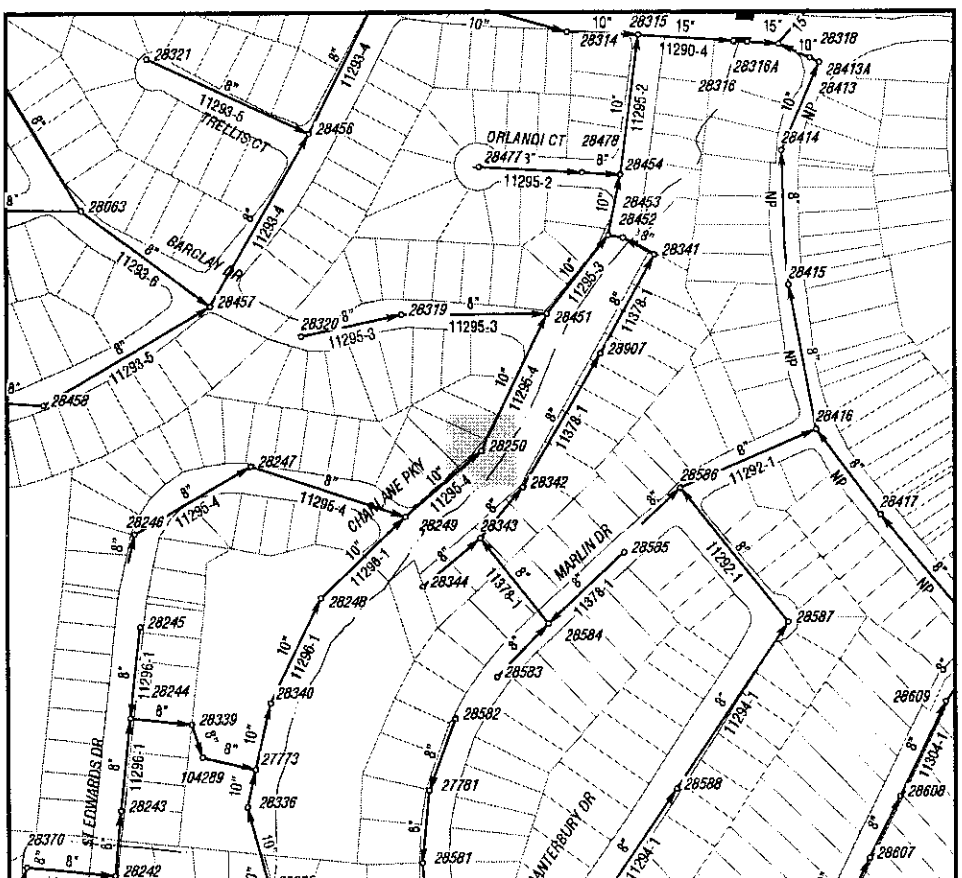
Pipe Size:
Inflow: 10"
Outflow: 10"

Upstream Collection System Length: 35,100 L.F.
Watershed: FLOYDS FORK
Discharge Type: CAPACITY
Discharged To: DITCH
Receiving Stream: CHENOWETH RUN
Status: DOCUMENTED

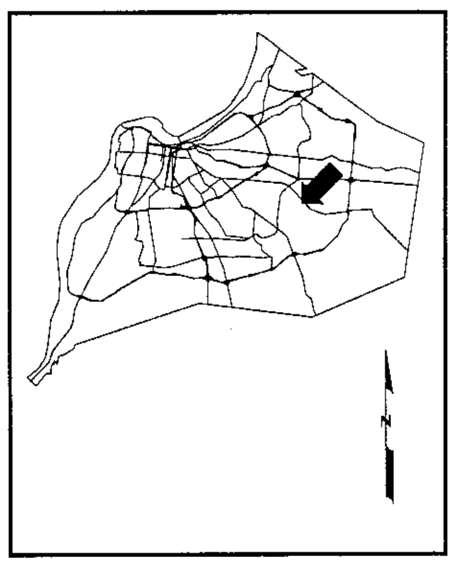


Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	19.6 ac.
INDUSTRIAL	1.2 ac.
GENERAL COMM. AND OFFICE	2.9 ac.
MULTI-FAMILY RESIDENTIAL	0.9 ac.



Scale 1" = 400 '



Metro: MAM23

Atlas Map: BI236

MSD

Louisville-Jefferson County
Metropolitan Sewer District

9707 WILLOWWOOD WAY

MSD Facility 28336

Customer Service 587-0603

Report as of December 2005

Service Area: JEFFERSONTOWN

Yr	Num Overflows	Estimated Volume
2005	1	13,800 Gallons

Background & History:

Pipe Size:
Inflow: 10"
Outflow: 10"

Upstream Collection System Length: 25,900 L.F.

Watershed: FLOYDS FORK

Discharge Type: CAPACITY

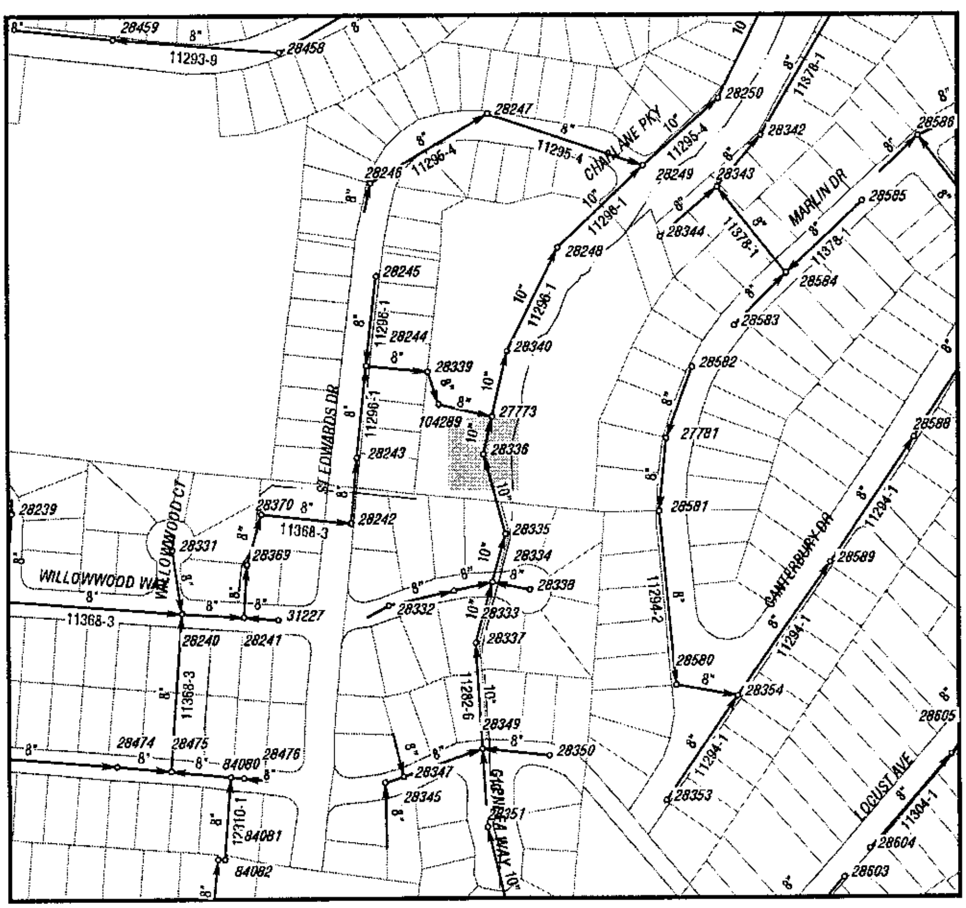
Discharged To:

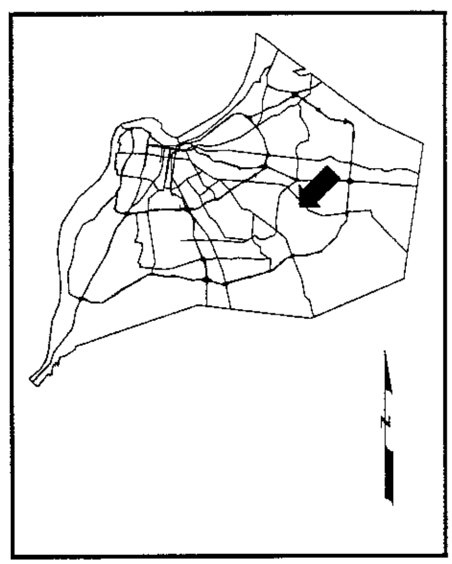
Receiving Stream:

Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	16.4 ac.
INDUSTRIAL	1.1 ac.
GENERAL COMM. AND OFFICE	2.9 ac.
MULTI-FAMILY RESIDENTIAL	0.9 ac.
VACANT AND UNDEVELOPED	2.9 ac.





Metro: MAM23

Atlas Map: BI236

Scale 1" = 400 '

MSD
Louisville-Jefferson County
Metropolitan Sewer District

3620 CHARLANE PKY

MSD Facility 28340

Customer Service 587-0603 | **Report as of December 2005**

Service Area: JEFFERSONTOWN

Yr	Num Overflows	Estimated Volume
2005	2	179,000 Gallons

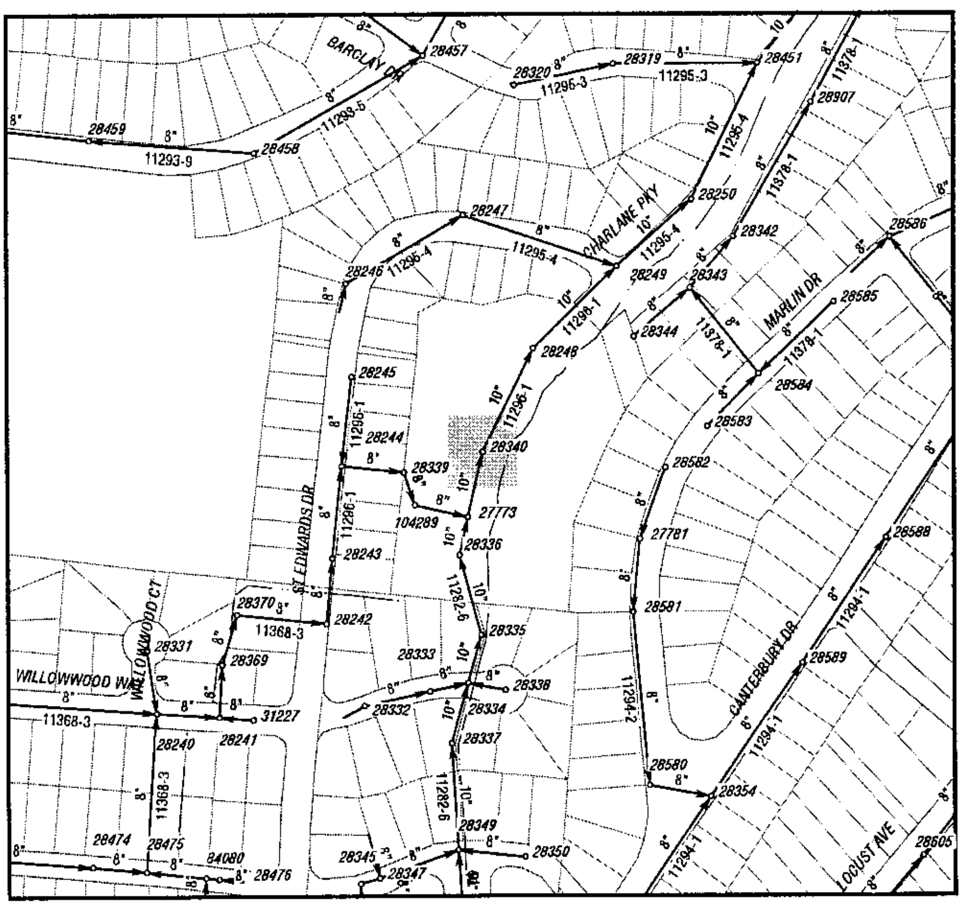
Background & History:

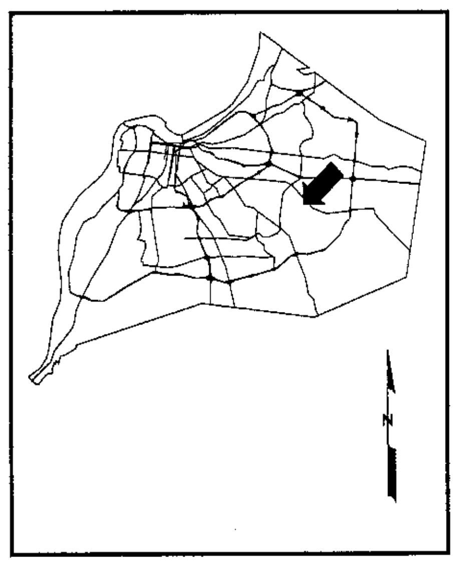
Pipe Size:
Inflow: 10"
Outflow: 10"

Upstream Collection System Length: 33,700 L.F.
Watershed: FLOYDS FORK
Discharge Type: CAPACITY
Discharged To:
Receiving Stream:
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	18.2 ac.
INDUSTRIAL	1.1 ac.
GENERAL COMM. AND OFFICE	2.9 ac.
MULTI-FAMILY RESIDENTIAL	0.9 ac.
VACANT AND UNDEVELOPED	1.9 ac.





Metro: MAM23
Atlas Map: BI236

Scale 1" = 400 '

10020 MERIONETH DR (GRASSLAND #4)

MSD

Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility 28391

Customer Service 587-0603 | **Report as of December 2005**

Service Area: JEFFERSONTOWN

Yr	Num Overflows	Estimated Volume
2005	1	418,000 Gallons
2004	2	743,000 Gallons

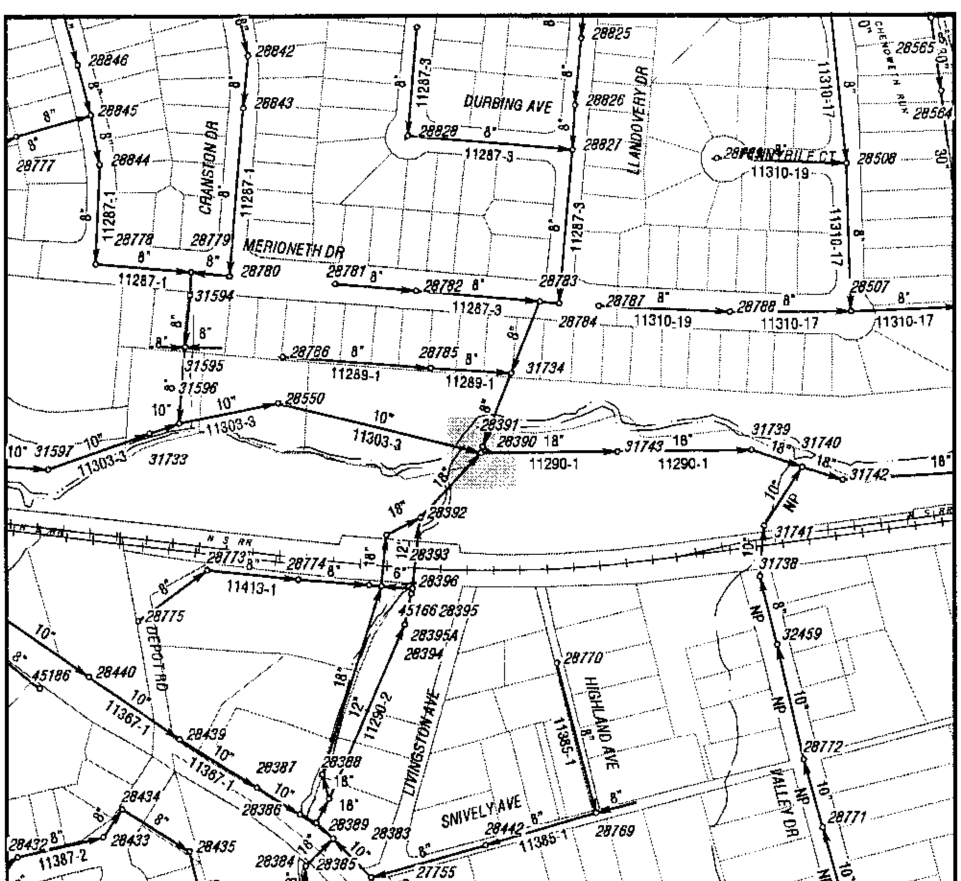
Background & History: This site was reported as an overflow during FY03. It is new to the list during FY03 and will be monitored in the future.

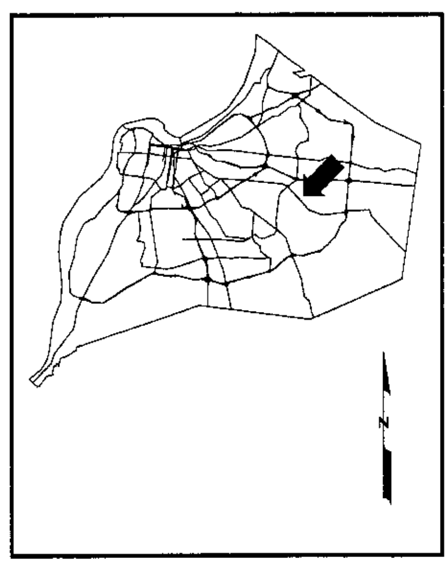
Pipe Size:
Inflow: 10"
Inflow: 18"
Outflow: 18"

Upstream Collection System Length: 151,000 L.F.
Watershed: FLOYDS FORK
Discharge Type: CAPACITY
Discharged To: STREAM
Receiving Stream: CHENOWETH RUN
Status: DOCUMENTED

Downstream Landuse:

PARKS, CEMETERIES, ETC.	6.4 ac.
INDUSTRIAL	8.5 ac.
SINGLE FAMILY RESIDENTIAL	6.7 ac.
VACANT AND UNDEVELOPED	1.5 ac.
GENERAL COMM. AND OFFICE	0.3 ac.





Metro: MAM23
Atlas Map: BG236

Scale 1" = 400 '

Louisville-Jefferson County Metropolitan Sewer District

MARLIN DR/GALENE DR

MSD Facility 28413

Customer Service 587-0603 | **Report as of December 2005**

Service Area: JEFFERSONTOWN

Yr	Num Overflows	Estimated Volume
2002	1	25,000 Gallons

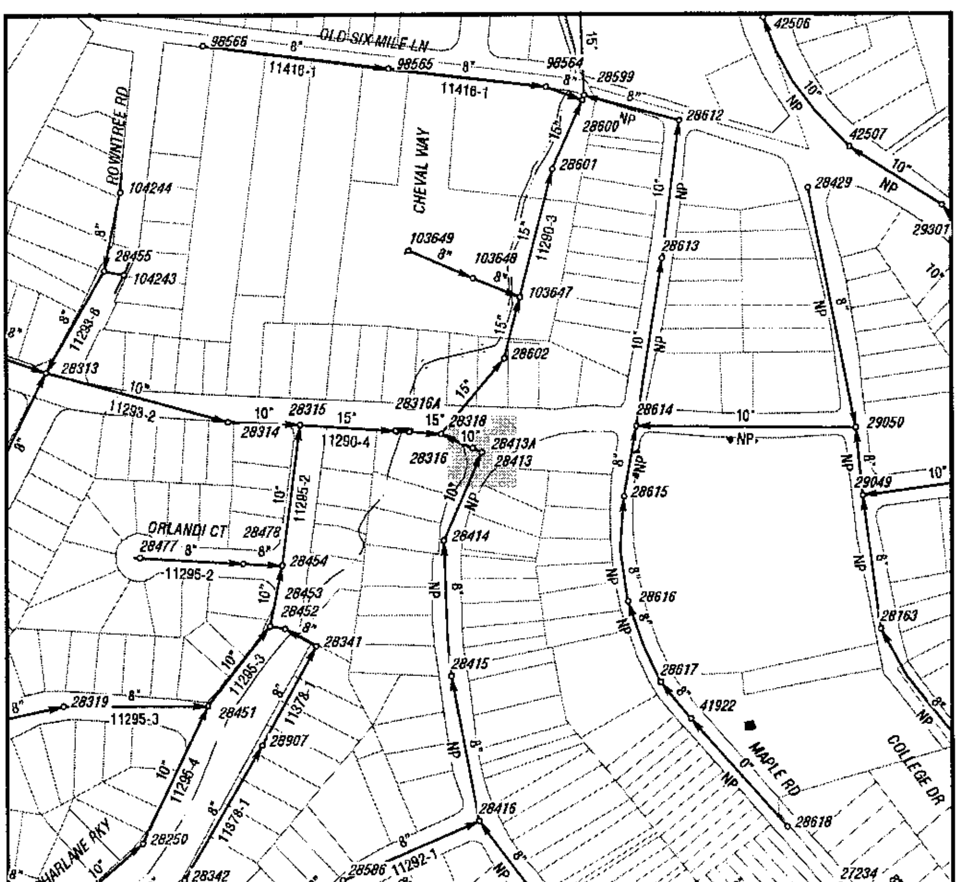
Background & History:

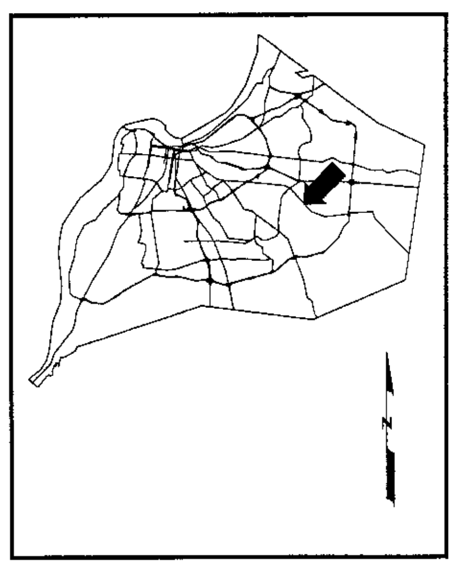
Pipe Size:
Inflow: 10"
Outflow: 10"

Upstream Collection System Length: 11,600 L.F.
Watershed: FLOYDS FORK
Discharge Type: CAPACITY
Discharged To:
Receiving Stream:
Status: DOCUMENTED

Downstream Landuse:

PARKS, CEMETERIES, ETC.	2.4 ac.
INDUSTRIAL	3.4 ac.
SINGLE FAMILY RESIDENTIAL	14.4 ac.
GENERAL COMM. AND OFFICE	2.9 ac.
MULTI-FAMILY RESIDENTIAL	0.9 ac.





Metro: MAM23

Atlas Map: BG236

Scale 1" = 400 '

MARLIN DR/GALENE DR

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility 28414

Customer Service 587-0603 | **Report as of December 2005**

Service Area: JEFFERSONTOWN

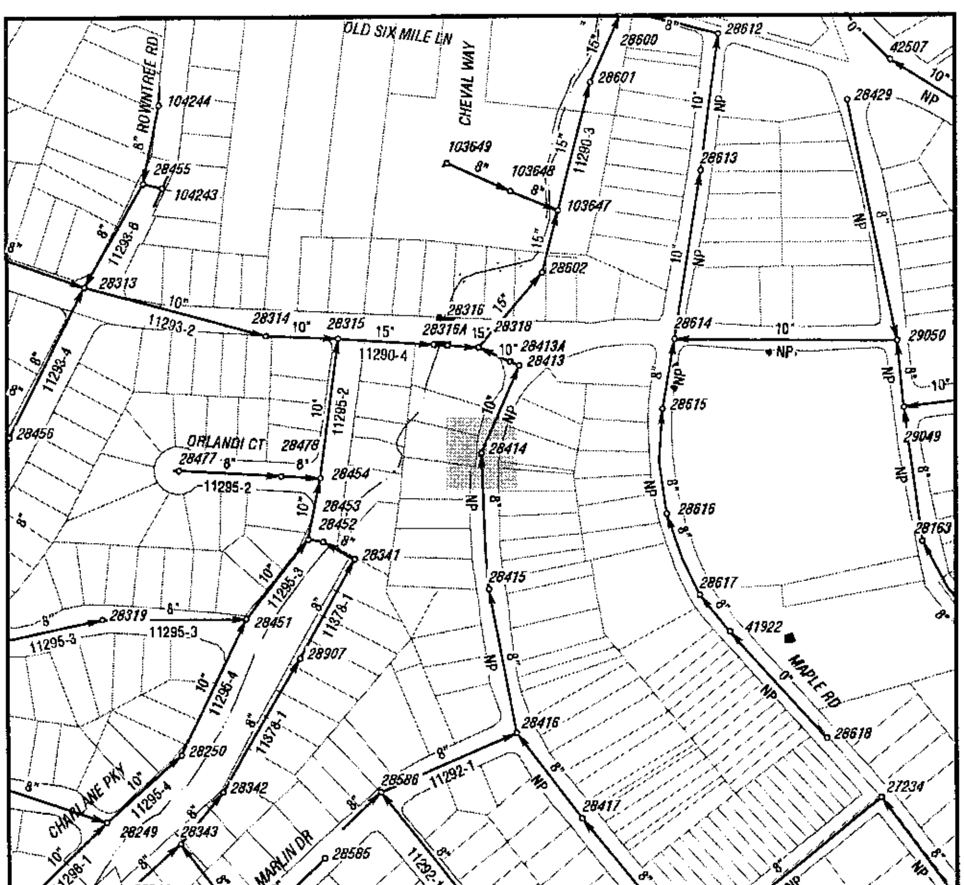
Yr	Num Overflows	Estimated Volume
2005	1	166,000 Gallons

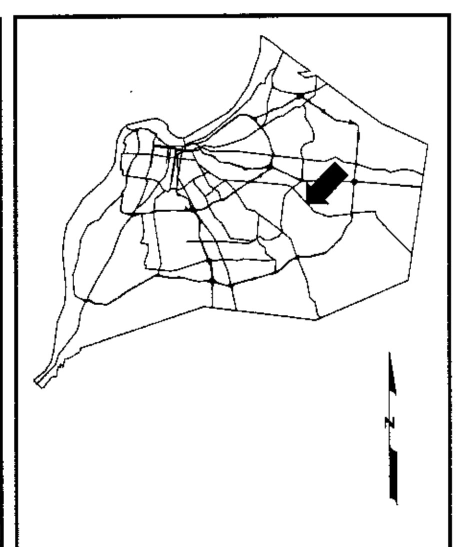
Background & History:
Pipe Size:
Inflow: 8"
Outflow: 10"

Upstream Collection System Length: 11,400 L.F.
Watershed: FLOYDS FORK
Discharge Type: CAPACITY
Discharged To:
Receiving Stream:
Status: DOCUMENTED

Downstream Landuse:

PARKS, CEMETERIES, ETC.	2.4 ac.
INDUSTRIAL	3.4 ac.
SINGLE FAMILY RESIDENTIAL	15.3 ac.
GENERAL COMM. AND OFFICE	2.9 ac.
MULTI-FAMILY RESIDENTIAL	0.9 ac.





Metro: MAM23
Atlas Map: BG236

Scale 1" = 400 '

3406 DELL RD

MSD

Louisville-Jefferson County Metropolitan Sewer District

MSD Facility 28415

Customer Service 587-0603

Report as of December 2005

Service Area: JEFFERSONTOWN

Yr	Num Overflows	Estimated Volume
2005	1	166,000 Gallons
2002	1	132,000 Gallons

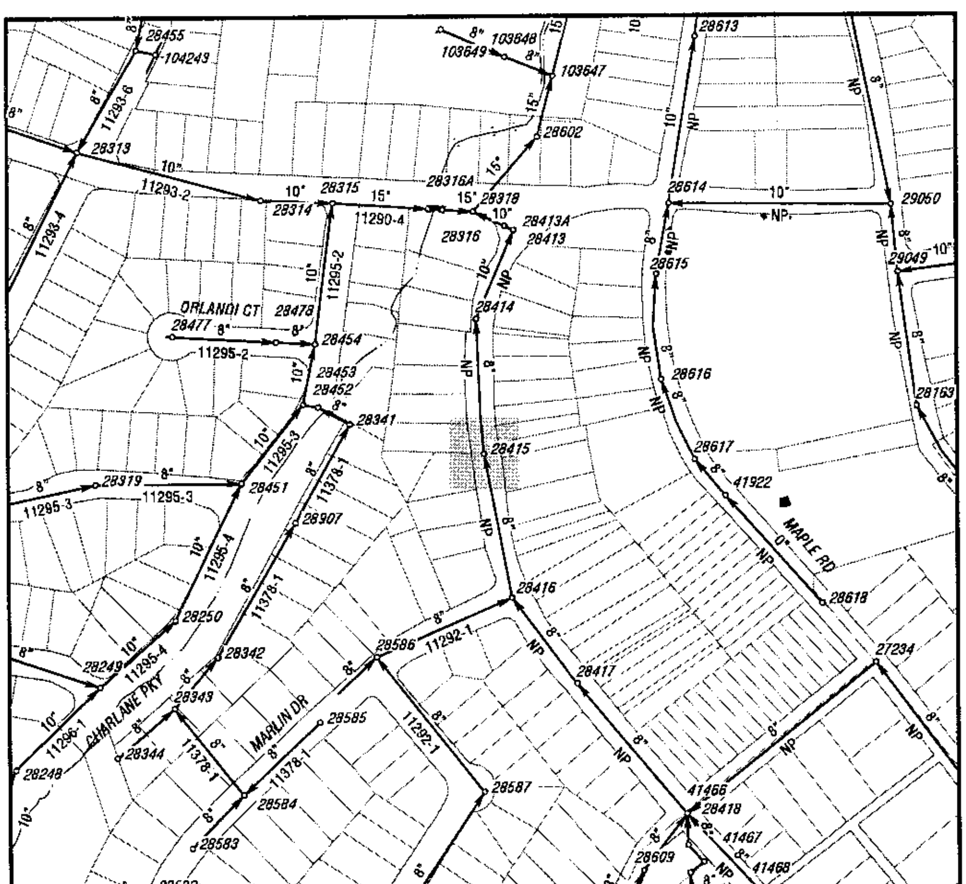
Background & History: This site was reported by a resident as an overflow during FY02. It is new to the list during FY02 and will be monitored in the future.

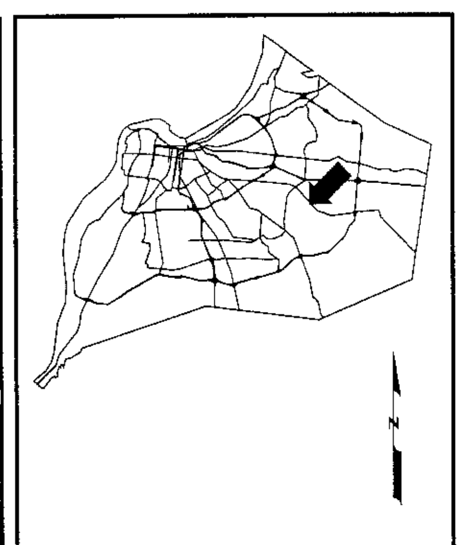
Pipe Size:
Inflow: 8"
Outflow: 8"

Upstream Collection System Length: 11,100 L.F.
Watershed: FLOYDS FORK
Discharge Type: CAPACITY
Discharged To: GROUND
Receiving Stream: CHENOWETH RUN
Status: DOCUMENTED

Downstream Landuse:

PARKS, CEMETERIES, ETC.	0.7 ac.
INDUSTRIAL	3.4 ac.
SINGLE FAMILY RESIDENTIAL	16.6 ac.
GENERAL COMM. AND OFFICE	2.9 ac.
MULTI-FAMILY RESIDENTIAL	0.9 ac.





Metro: MAM23

Atlas Map: BG236

Scale 1" = 400 '

11804 CHIPPEWA RIDGE LN (JUST UPSTREAM OF CHIPPEWA PS)

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility 92061

Customer Service 587-0603

Report as of December 2005

Service Area: JEFFERSONTOWN

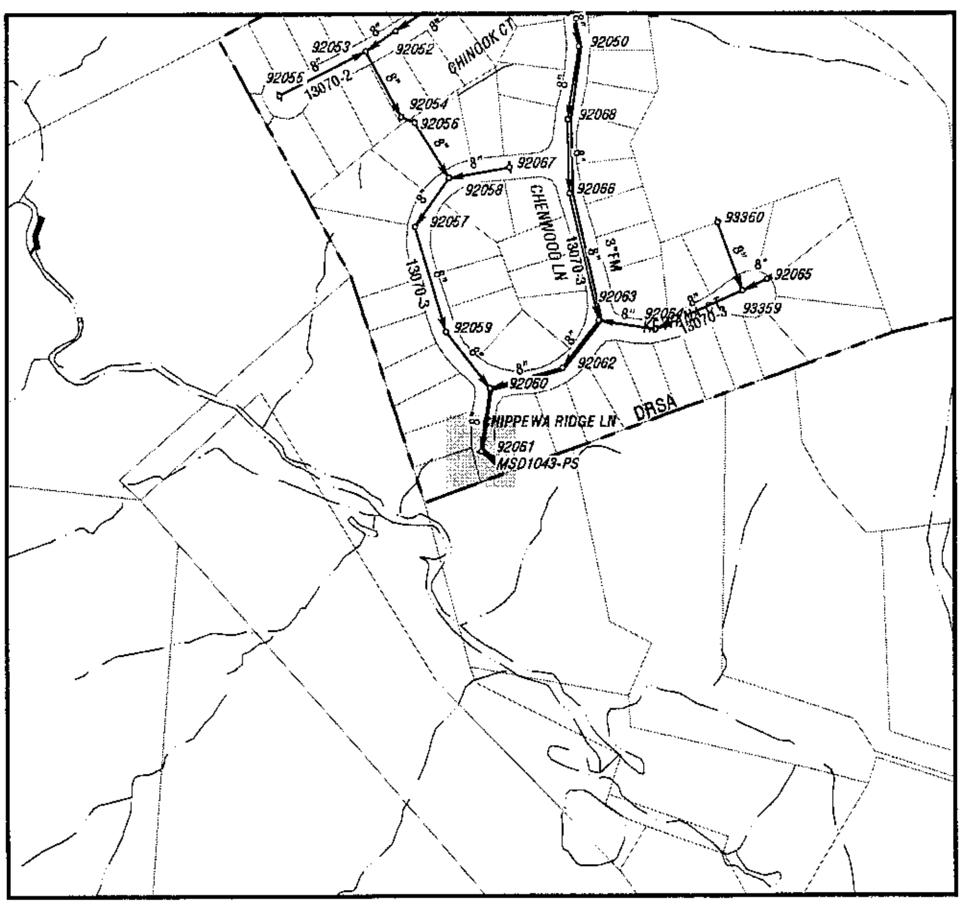
Yr	Num Overflows	Estimated Volume
2005	1	300 Gallons
2001	1	500 Gallons

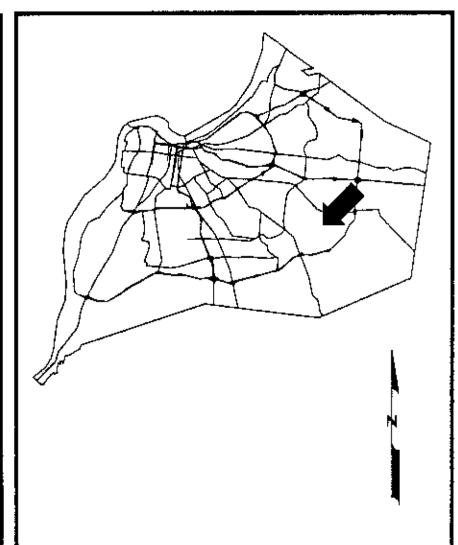
Background & History:

Pipe Size:
Inflow: 8"
Inflow: 8"
Outflow: 8"

Upstream Collection System Length: 3,400 L.F.
Watershed: FLOYDS FORK
Discharge Type: CAPACITY
Discharged To:
Receiving Stream:
Status: DOCUMENTED

Downstream Landuse:
SINGLE FAMILY RESIDENTIAL 22 ac.





Metro: MAN23

Atlas Map: BM238

Scale 1" = 400 '

J-TOWN WTP SIPHON

MSD
Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility IS028-SI

Customer Service 587-0603

Report as of December 2005

Service Area: JEFFERSONTOWN

Yr	Num Overflows	Estimated Volume
2004	1	430,000 Gallons
2002	1	25,000 Gallons

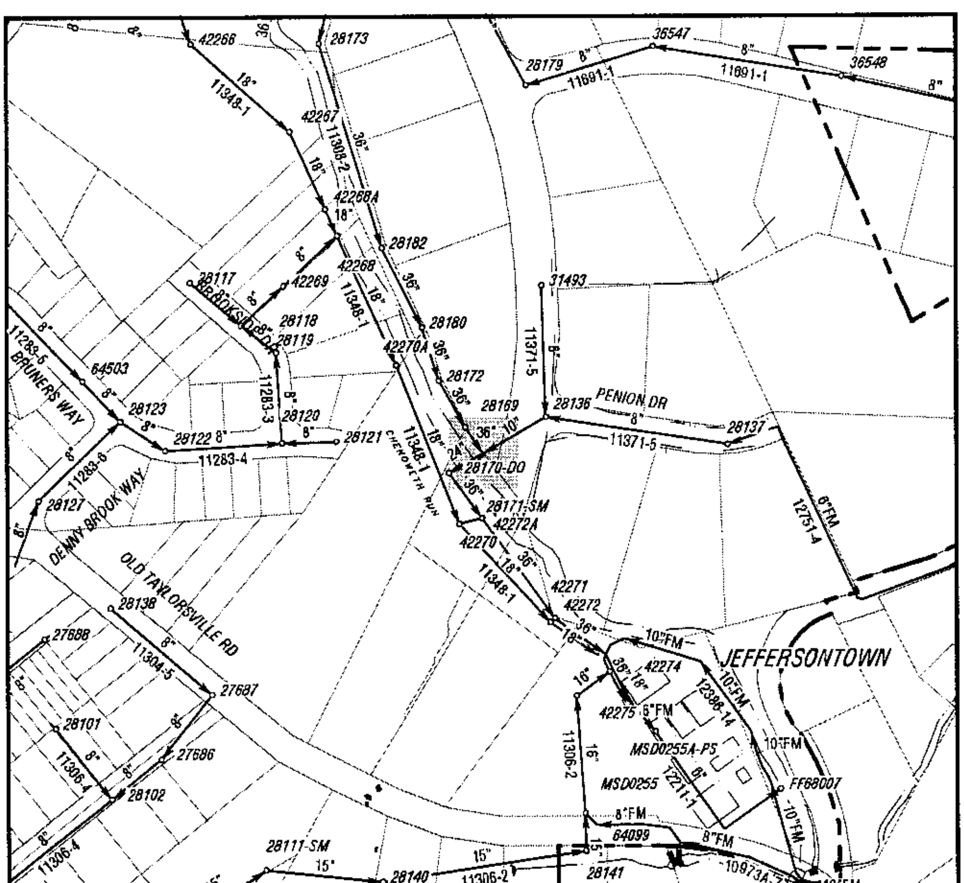
Background & History: Upstream end of the Jtown siphon overflows during wet weather.

Pipe Size:
Inflow: 36"
Inflow: 10"
Outflow: 24"

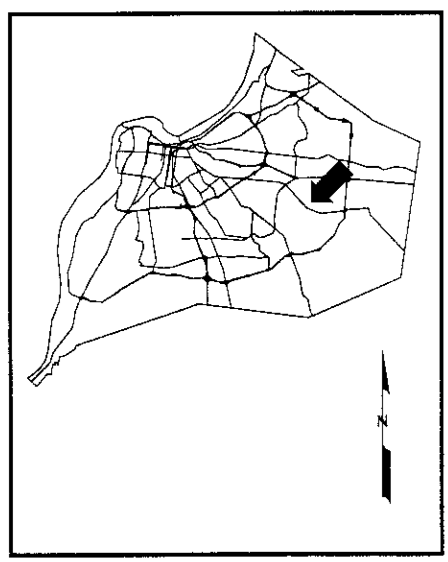
Upstream Collection System Length: 365,000 L.F.
Watershed: FLOYDS FORK
Discharge Type: CONSTRUCTED
Discharged To: STREAM
Receiving Stream: CHENOWETH RUN
Status: DOCUMENTED

Downstream Landuse:

INDUSTRIAL	2.7 ac.
SINGLE FAMILY RESIDENTIAL	0.3 ac.
PUBLIC AND SEMI-PUBLIC	2.8 ac.



Scale 1" = 400 '



Metro: MAM23

Atlas Map: BI238

TUCKER STATION

MSD
Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility MSD0194-PS

Customer Service 587-0603 | **Report as of December 2005**

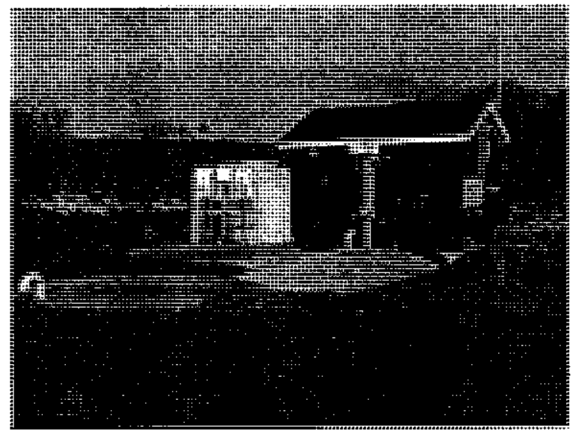
Service Area: JEFFERSONTOWN

Yr	Num Overflows	Estimated Volume
2004	1	120,000 Gallons

Background & History:

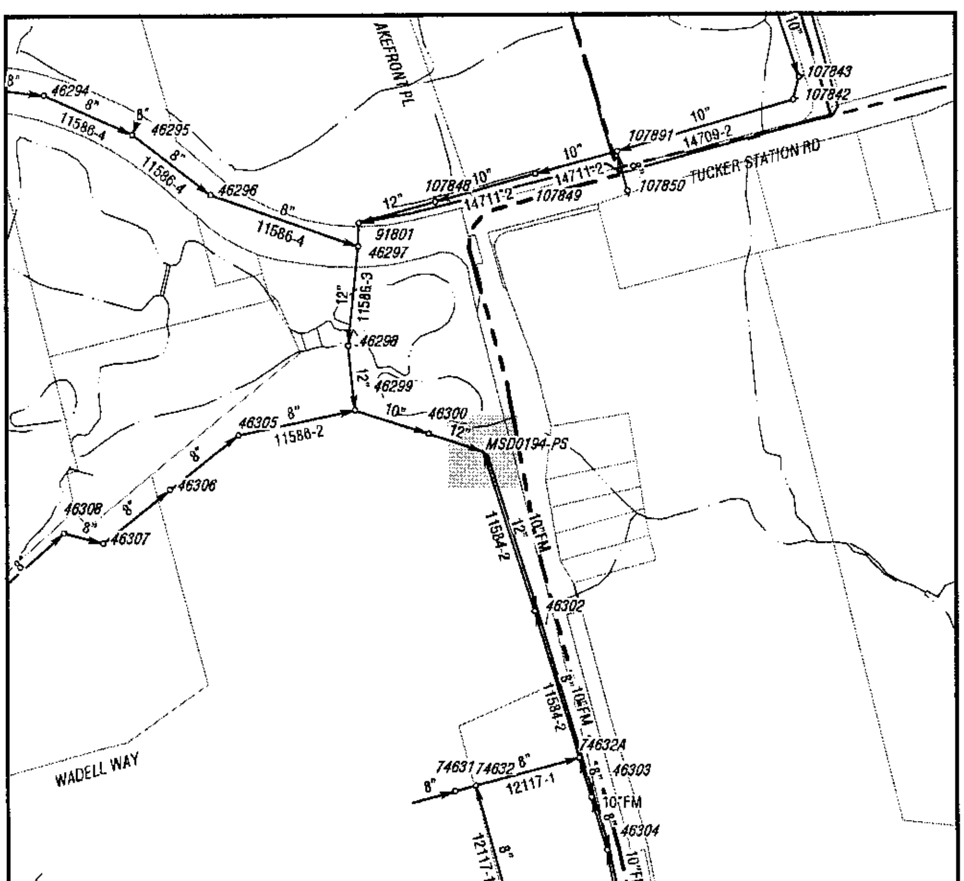
Pipe Size:
Inflow: 12"
Inflow: 12"
Outflow: 10"

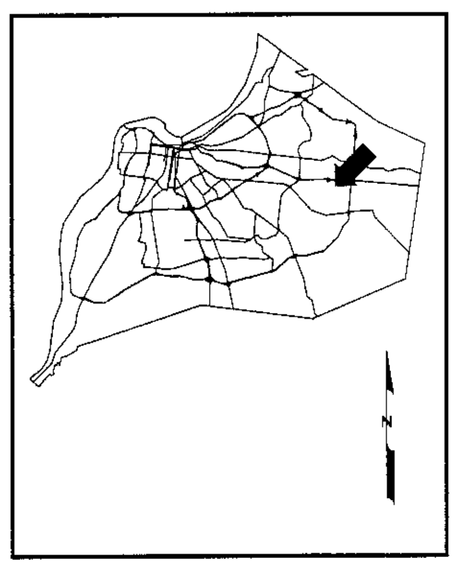
Upstream Collection System Length: 24,000 L.F.
Watershed: FLOYDS FORK
Discharge Type: CAPACITY
Discbarged To: STREAM
Receiving Stream: POPE LICK
Status: DOCUMENTED



Downstream Landuse:

INDUSTRIAL	18.9 ac.
SINGLE FAMILY RESIDENTIAL	1.3 ac.
VACANT AND UNDEVELOPED	1.2 ac.
GENERAL COMM. AND OFFICE	2.8 ac.





Metro: MAM24
Atlas Map: BE240

Scale 1" = 400 '

2901 LIVINGSTON AVE (GRASSLAND #3)

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility 28392

Customer Service 587-0603

Report as of December 2005

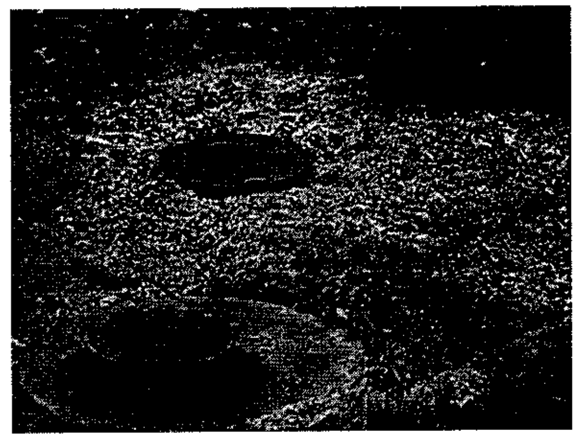
Service Area: JEFFERSONTOWN

Yr	Num Overflows	Estimated Volume
2001	1	2,000,000 Gallons

Background & History: This site was reported as an overflow during FY03. It is new to the list during FY03 and will be monitored in the future.

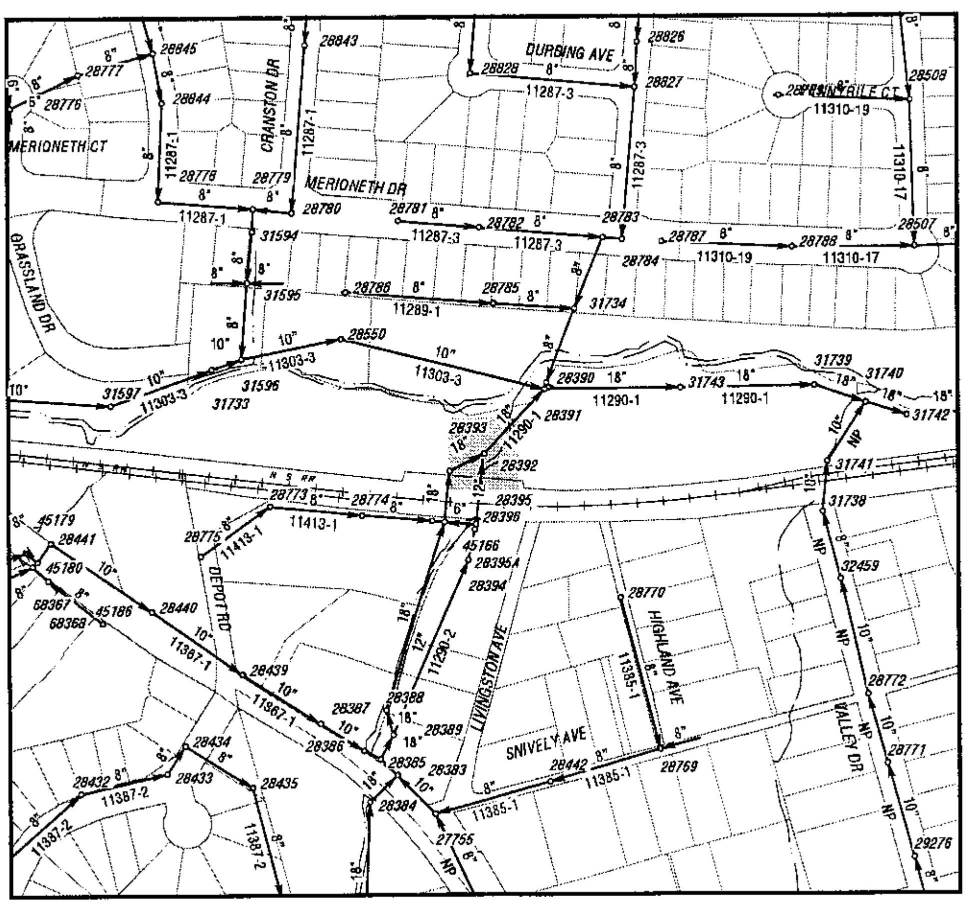
Pipe Size:
Inflow: 18"
Outflow: 18"

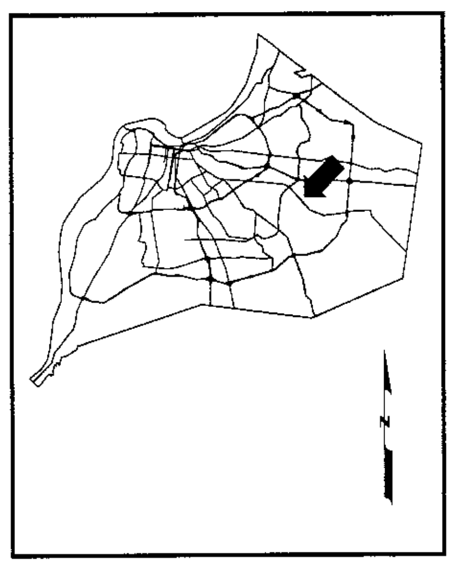
Upstream Collection System Length: 103,000 L.F.
Watershed: FLOYDS FORK
Discharge Type: CAPACITY
Discharged To: STREAM
Receiving Stream: CHENOWETH RUN
Status: S



Downstream Landuse:

PARKS, CEMETERIES, ETC.	6.4 ac.
INDUSTRIAL	8.5 ac.
SINGLE FAMILY RESIDENTIAL	7.6 ac.
VACANT AND UNDEVELOPED	1.5 ac.
GENERAL COMM. AND OFFICE	0.3 ac.





Metro: MAM23
Atlas Map: BG236

Scale 1" = 400 '

MSD

Louisville and Jefferson County
Metropolitan Sewer District

SECTION 8

SECTION 8: OTHER COLLECTION SYSTEMS

8.1 OTHER COLLECTION SYSTEMS HISTORY

As a result of the 1937 flood, suburban expansion was occurring faster than MSD could provide regional sewer service in the new areas. These new homes used septic tanks to dispose of their sewage. In some areas of Jefferson County, septic tanks were not a good solution for these suburban areas. In many cases, the topography of the neighborhood was very flat and the bedrock was very close to the surface. In wet weather, groundwater would rise above the level of the septic tank systems, and raw sewage would stand in the yards and drainage ditches. As a result, the Board of Health agreed to allow individual septic tanks where the land could accommodate them, and to require small, "package" sewage treatment plants where septic tanks wouldn't work well. These "package" sewage treatment plants were typically operated by the developer. By mid-1972, there were about 350 small treatment plants in Jefferson County.

Small plant takeovers became controversial for a time, until pressure from state and federal regulators made it clear that their owners would have to make large investments to meet new water pollution regulations. Several court decisions also affirmed that MSD had the power to take over small plant systems when MSD lines reached them. Even though it had been the policy for three decades to consider small plants as temporary measures to treat wastewater until MSD service was available, many small plant operators wanted large payments for their systems. MSD would negotiate payments with the owners of the small plants, taking over their debts along with their systems, and paying for equipment that could still be used. The customers of the small plants, in turn, would pay a surcharge on their new MSD bills until MSD's acquisition costs had been paid. In most instances, even with the surcharges, customers' bills were reduced as soon as MSD took over.

This section is arranged by small service areas. When applicable to specific small service areas, SSO-specific projects are discussed in detail and are organized by the five major project types:

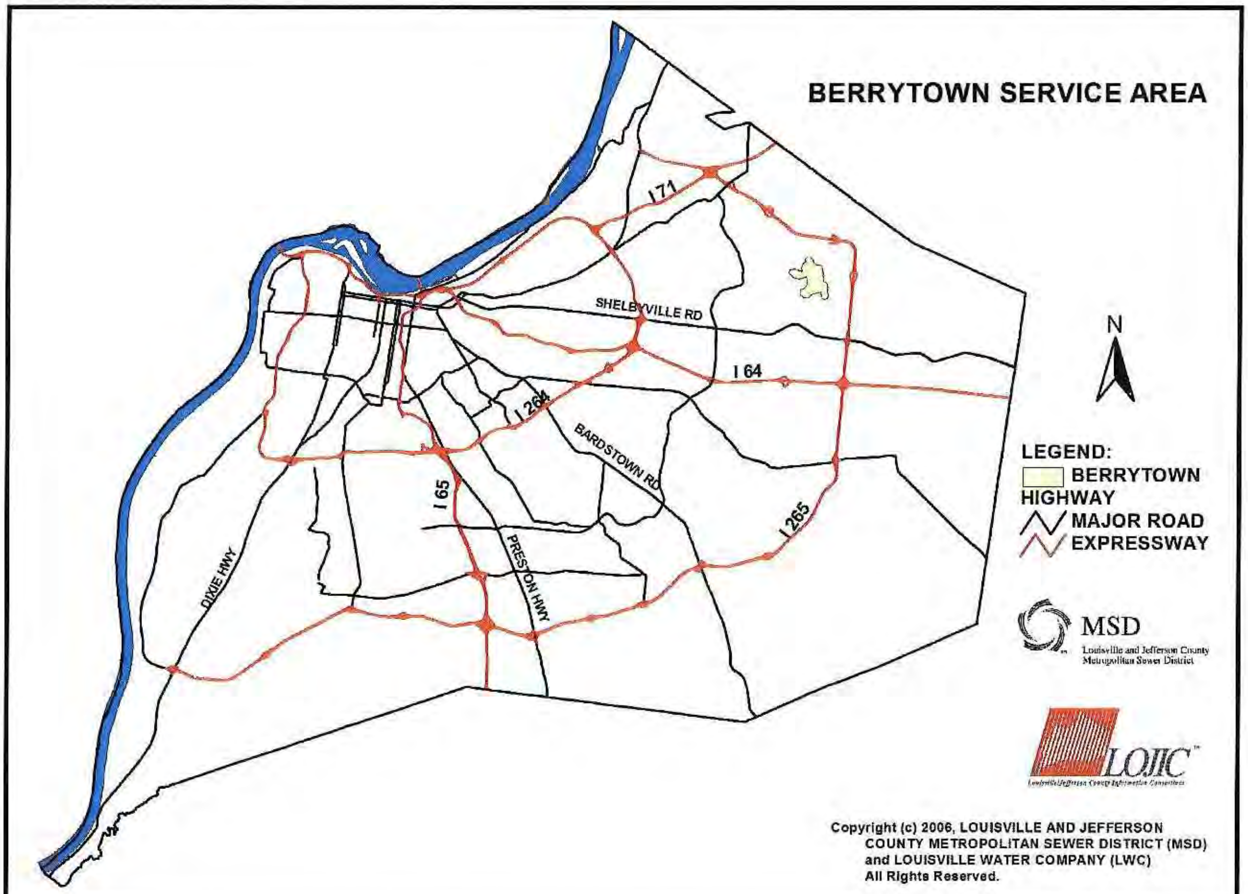
- Flow monitoring
- SSES and other sewer investigation/study project
- Computer modeling
- Rehabilitation
- Post-Rehabilitation flow monitoring

Capital projects that removed SSOs (such as pump station and small treatment plant eliminations) are not included in the SSO-specific project history diagram but are included in the project write-up sections under "Other Capital Projects."

8.2 BERRYTOWN WTP (MSD0209)

8.2.1 Berrytown Background

The Berrytown Service Area is a historic area Bounded by Lagrange Road, English Station Road, and Ridge Road in eastern Jefferson County. The Berrytown Wastewater Treatment Plant was constructed in 1975. The plant's design capacity is 0.075 million gallons per day and it receives an average daily flow of 0.096 million gallons per day. The WTP serves approximately 300 customer accounts, primarily single family residential with a small amount of vacant or undeveloped land. The Berrytown collection system contains approximately 35,000 linear feet of pipe, consisting primarily of 8" vitrified clay pipe (VCP) constructed from the 1970's to the present. There are 5 pump/lift stations in the service area. Figures 1 and 2 show the Berrytown service area.



Figures 1 and 2 – Berrytown Service Area and Landuse

There are two overflow locations associated with this service area. Figure 3 is a service area diagram showing the hydraulic connectivity of overflow locations.

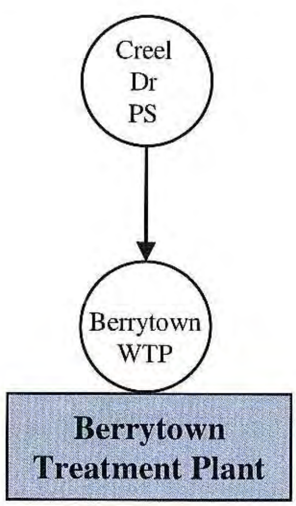


Figure 3 – Berrytown – Hydraulic Connectivity Diagram of Unauthorized Discharges

8.2.2 Other Capital Projects in Berrytown

Berrytown WTP Rehabilitation, Phase 2

The Berrytown Wastewater Treatment Plant consists of two 75,000 gallon treatment tanks. Tank 2 was refurbished in 2001 and was brought back on-line after the work was completed. At that time Tank 1 was taken off-line and inspected. The inspection revealed severe corrosion of the steel walls and vertical stiffeners. In many places, where the water line contacts the air, the tank had corroded so severely that there were holes all the way through the walls. During wet weather, it was found that flow into the Berrytown WWTP exceeded the capacity of a single treatment tank. It was determined that Tank 1 needed to be refurbished to provide redundant treatment capacity during periods of high flow levels experienced in wet weather events.

This project provided for the work required to refurbish treatment Tank 1 including the repair of corroded wall panels and vertical stiffeners, re-bracing the primary treatment tank end walls, removal of the wall separating the primary tank from the digester for added storage capacity, rerouting the waste activated sludge (WAS) lines, and painting the inside and outside of the tank.

Berrytown Pump Station Project

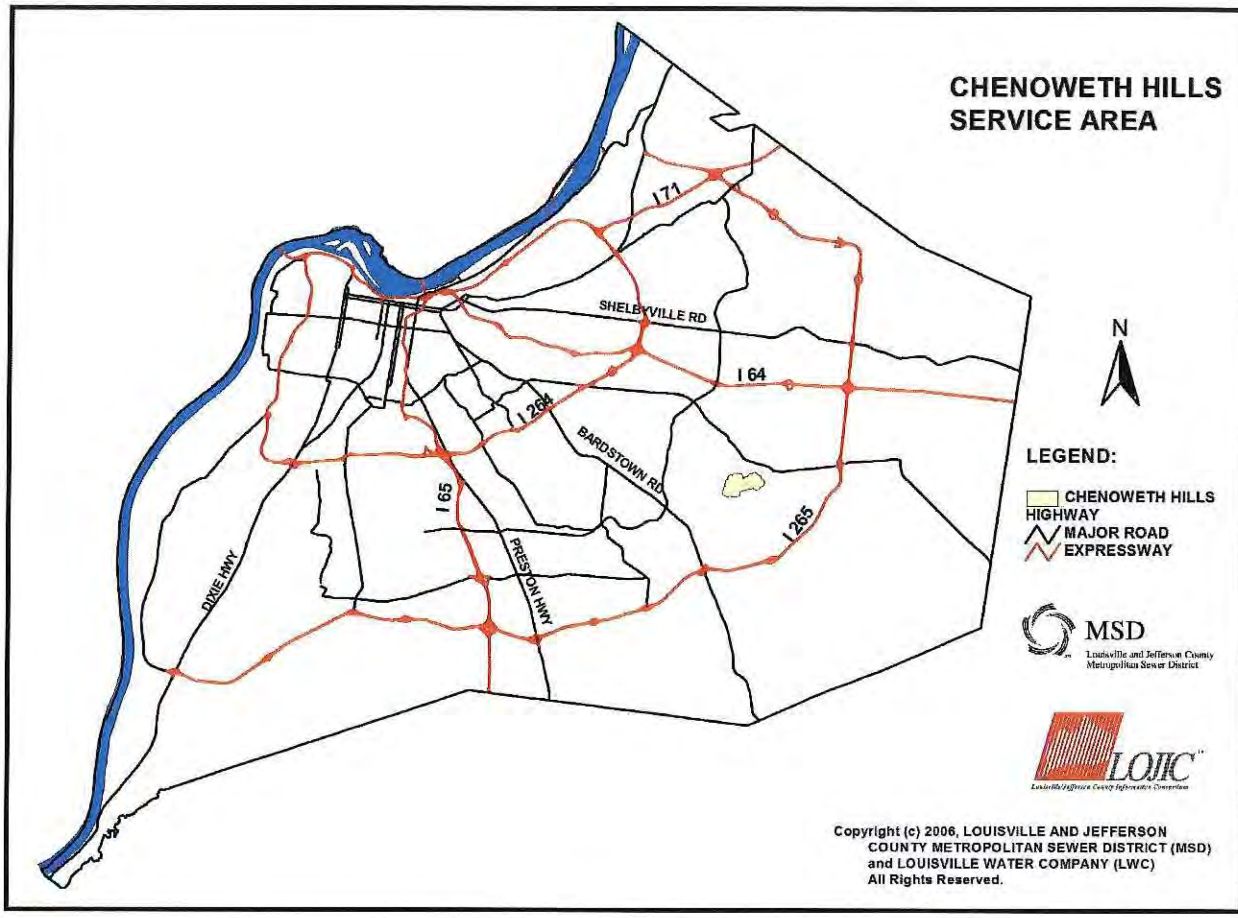
The influent flow into the Berrytown Wastewater Treatment Plant is pumped into the tanks by a duplex pump station. This pump station had become a maintenance burden because of age and condition as pump failures and clogging occurred frequently. The existing hydromatic pumps and suction piping needed to be removed and replaced with new and more efficient submersible pumps to improve reliability at the pump station.

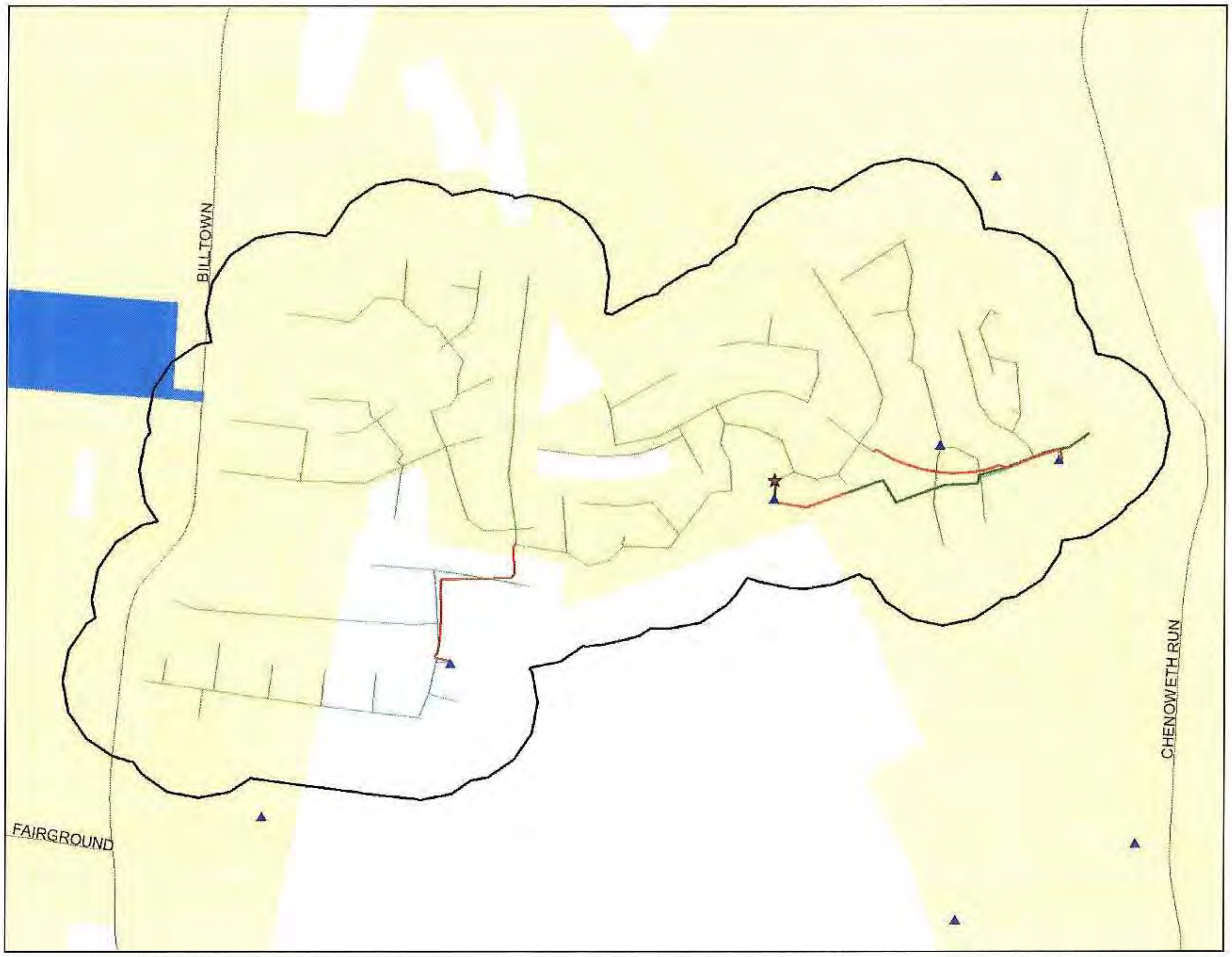
This project involved the removal of two hydromatic pumps, suction piping and valves, modifications to the wet well, and installation of two new submersible pumps, guide rails, discharge piping, valves, control panel, and appurtenances.

8.3 CHENOWETH HILLS WTP (MSD0263)

8.3.1 Chenoweth Hills Background

The Chenoweth Hills Service Area is centrally located at St. Rene and Gaudet Roads in eastern Jefferson County. The Chenoweth Hills Wastewater Treatment Plant was constructed in 1972 and acquired by MSD in 1990. The plant's design capacity is 0.200 million gallons per day and it receives an average daily flow of 0.229 million gallons per day. The WTP serves approximately 800 customer accounts, primarily single family residential with a small amount of vacant or undeveloped land. The Chenoweth Hills collection system contains approximately 36,000 linear feet of pipe, consisting primarily of 8" vitrified clay pipe (VCP) constructed from the 1970's to the present. There are 2 pump/lift stations in the service area. There is one overflow associated with this service area located at the plant. Figures 4 and 5 show the Chenoweth Hills service area.


CHENOWETH HILLS
SERVICE AREA
I 71
SHELBYVILLE RD
I 64
I 264
BARDSTOWN RD
I 65
PRESTON HWY
DIXIE HWY
I 265
N
LEGEND:
CHENOWETH HILLS
HIGHWAY
MAJOR ROAD
EXPRESSWAY
MSD
LOJIC
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC)
All Rights Reserved.



Figures 4 and 5 – Chenoweth Hills Service Area and Landuse

8.3.2 Chenoweth Hills Rehabilitation

Jeffersontown I/I Remediation Phase 2

The Chenoweth Hills Service area was rehabilitated under the Jeffersontown I/I Remediation Phase 2 project discussed in section 7.2.4 of this document.

8.3.3 Other Capital Projects in Chenoweth Hills

St. Anthony Interceptor Clearing and Grubbing

This project involved improvements at the Chenoweth Hills WTP. Improvements included a new sludge holding tank, the installation of new and the modification of existing process piping, filling the existing sludge holding tank with concrete and water-tight sealing connections, providing concrete wall encasements around the existing chlorine contact tanks complete with platform and ladders, and constructing a new concrete foundation under one of the chlorine contact tanks.

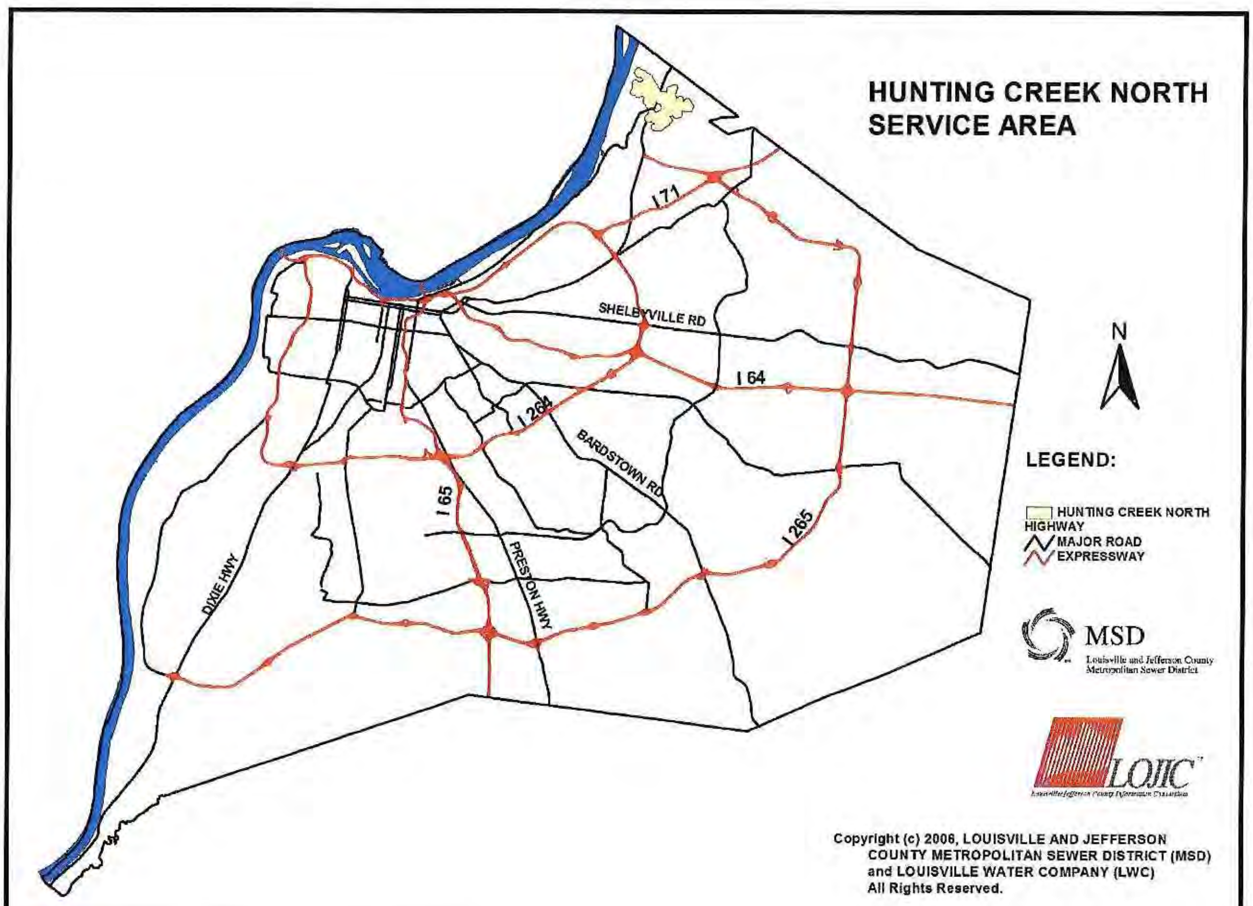
8.4 PROSPECT

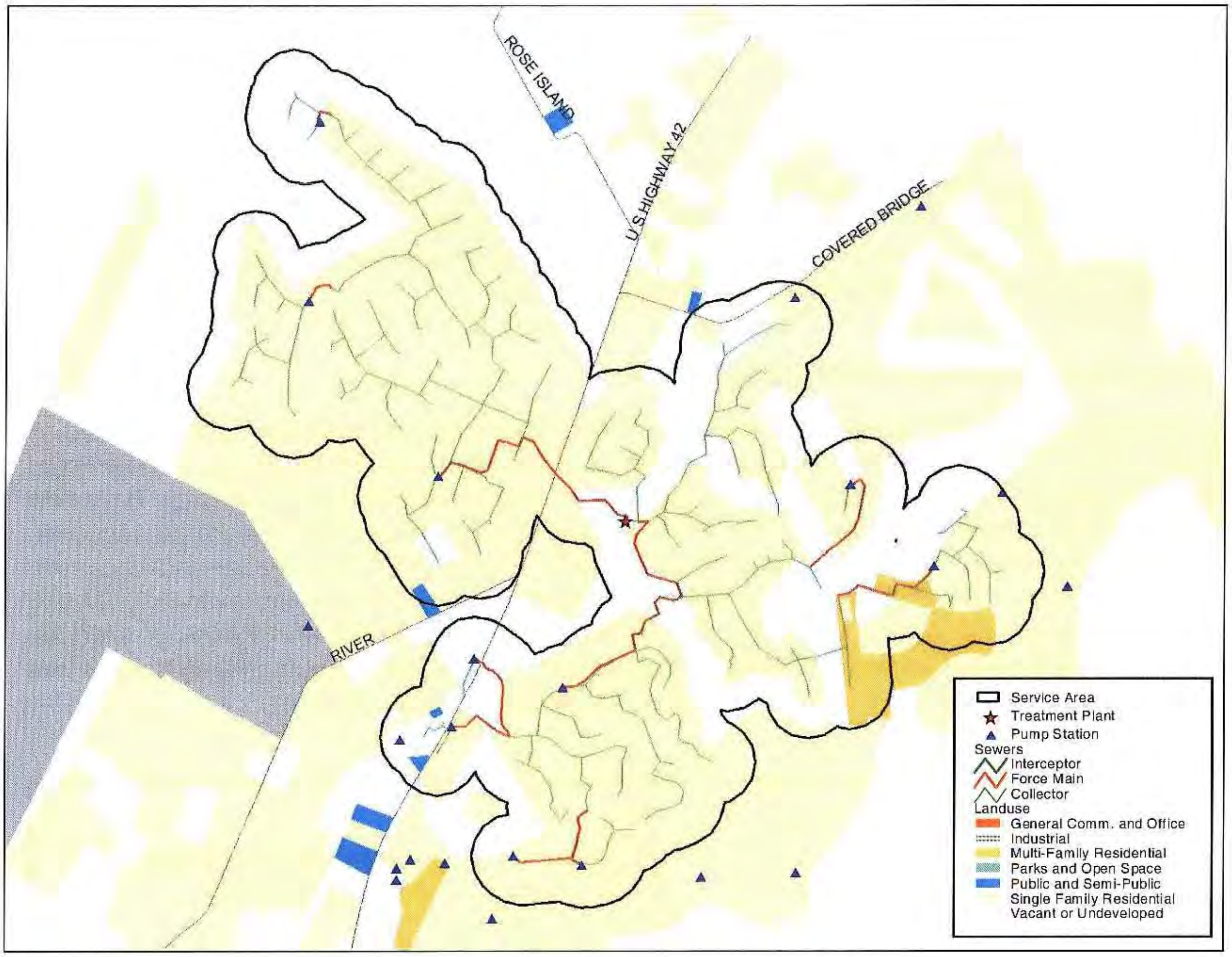
8.4.1 Prospect Background

The Prospect area contains five small treatment plants. The characteristics for each of these plants are identified below. Generally, the projects executed under the consolidated SSO Program in the Prospect Area addressed each of the five service areas and any exception is identified in the project descriptions under each subsection.

8.4.2 Hunting Creek North WTP (MSD0291)

The Hunting Creek North Wastewater Treatment Plant was constructed in 1964 and acquired by MSD in 1999. The service area is centrally located at US Highway 42 and Happy Hollow Road The plant's design capacity is 0.358 million gallons per day and it receives an average daily flow of 0.196 million gallons per day. The WTP serves approximately 950 customer accounts, primarily single family residential with a small amount of multi-family residential and vacant or undeveloped land. The Hunting Creek North collection system contains approximately 87,000 linear feet of pipe, consisting primarily of 8" vitrified clay pipe (VCP) and Polyvinyl Chloride (PVC) pipe constructed from the 1960's to the present. There are 10 pump/lift stations in the service area. Figures 6 and 7 show the Hunting Creek North service area.





Figures 6 and 7 – Hunting Creek North Service Area and Landuse

There are two overflow locations associated with this service area. Figure 8 is a service area diagram showing the hydraulic connectivity of overflow locations.

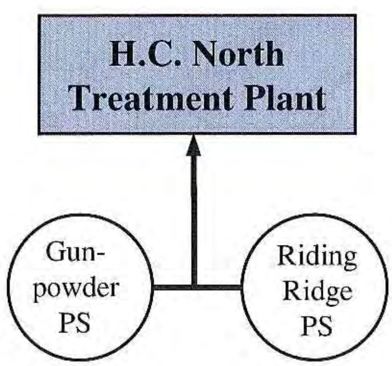
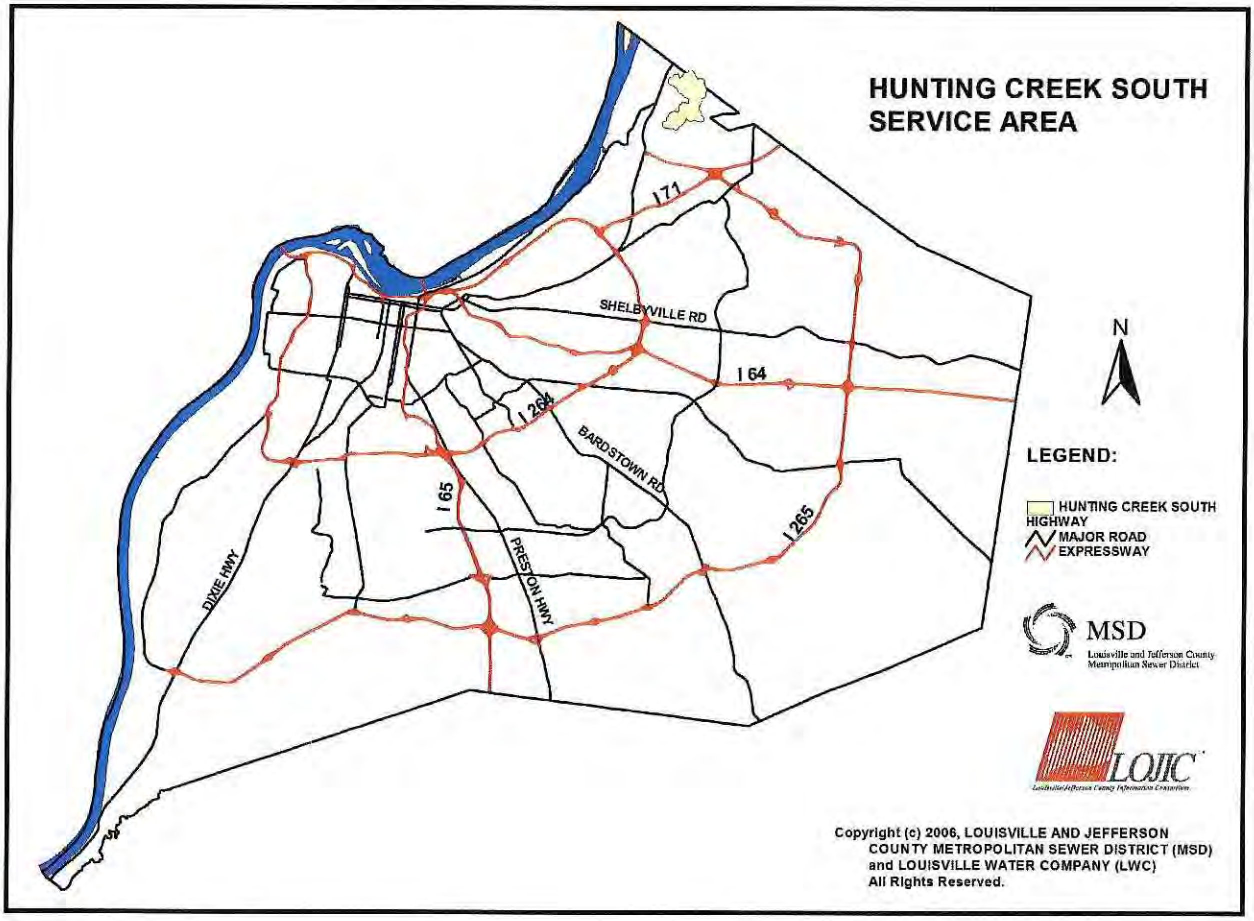
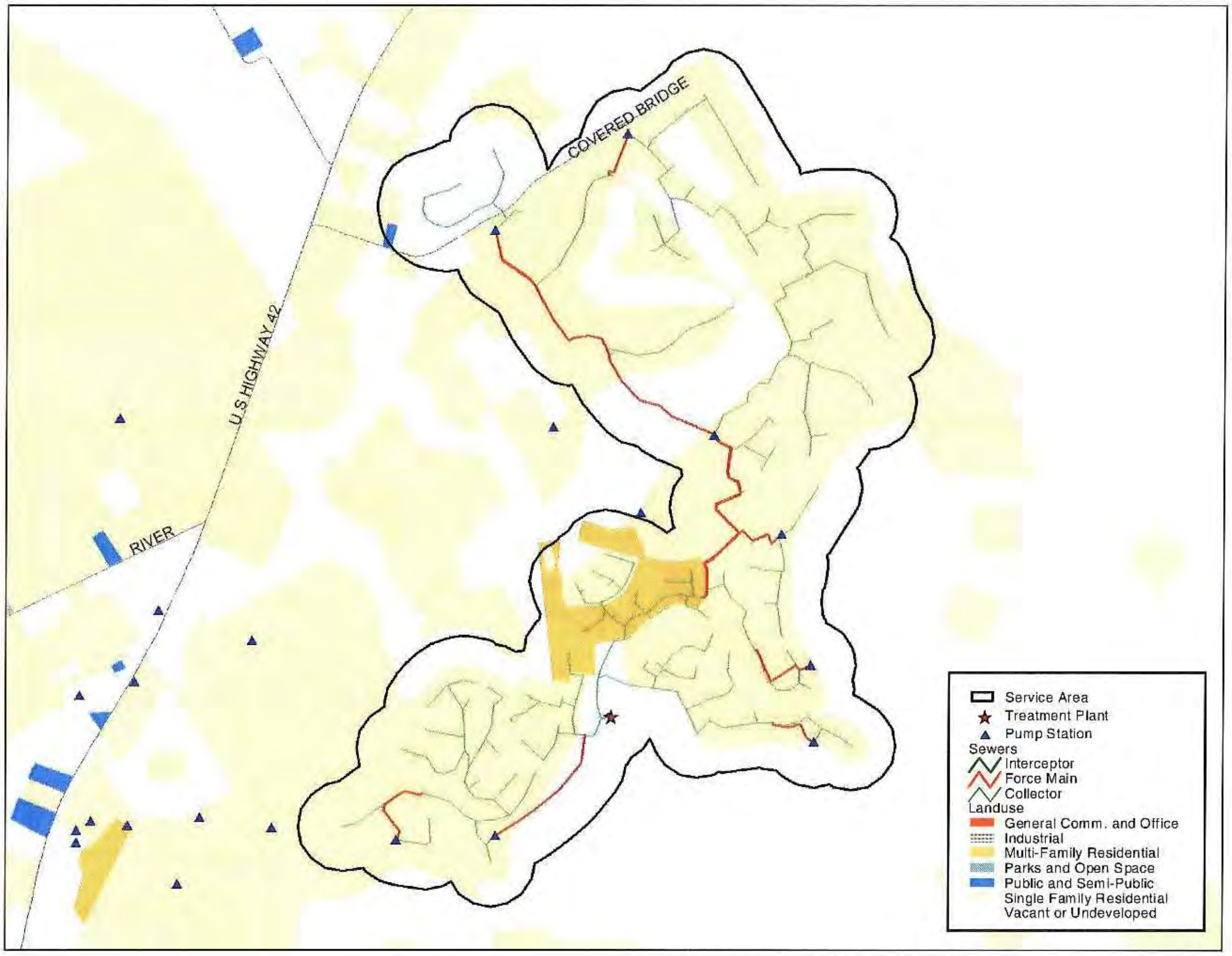


Figure 8 – Hunting Creek North – Hydraulic Connectivity Diagram of Unauthorized Discharges

8.4.3 Hunting Creek South WTP (MSD0292)

The Hunting Creek South Wastewater Treatment Plant was constructed in 1968 and acquired by MSD in 1999. The service area is centrally located at Hunting Creek and Westover Drives in Northern Jefferson County. The plant's design capacity is 0.251 million gallons per day and it receives an average daily flow of 0.185 million gallons per day. The WTP serves approximately 650 customer accounts, primarily single family residential with a small amount of vacant or undeveloped land. The Hunting Creek South collection system contains approximately 73,000 linear feet of pipe, consisting primarily of 8" vitrified clay pipe (VCP) and Polyvinyl Chloride (PVC) pipe constructed from the 1960's to the present. The service area contains 8 pump/lift stations. Figures 9 and 10 show the Hunting Creek South service area.





Figures 9 and 10 – Hunting Creek South Service Area

There are four overflow locations associated with this service area. Figure 11 is a service area diagram showing the hydraulic connectivity of overflow locations.

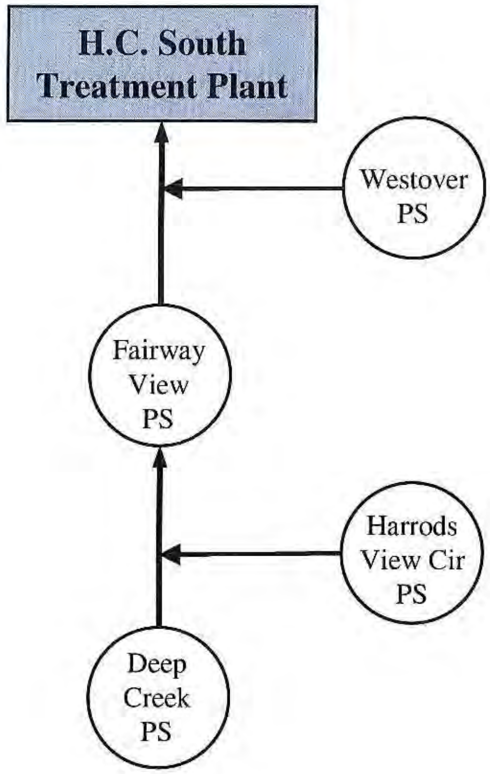
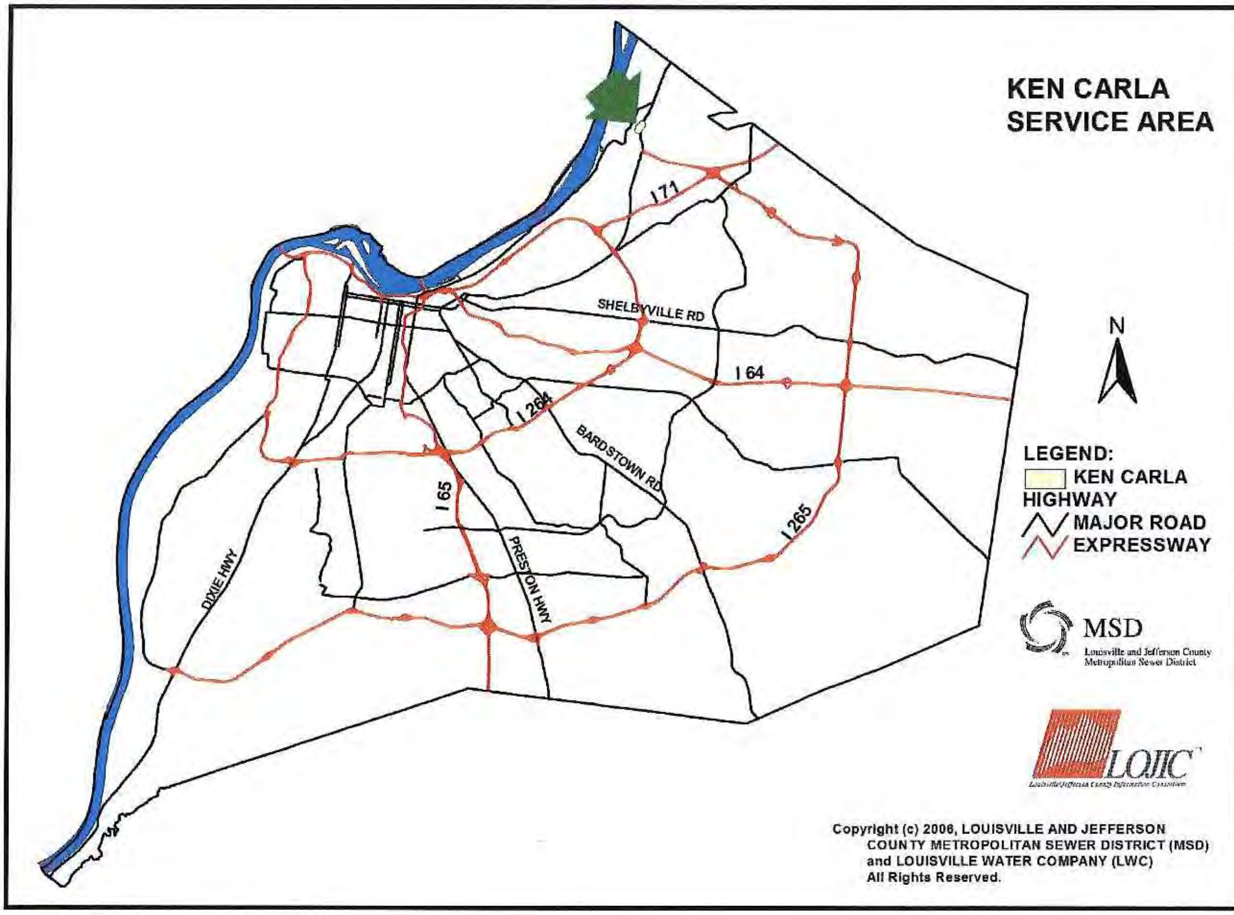
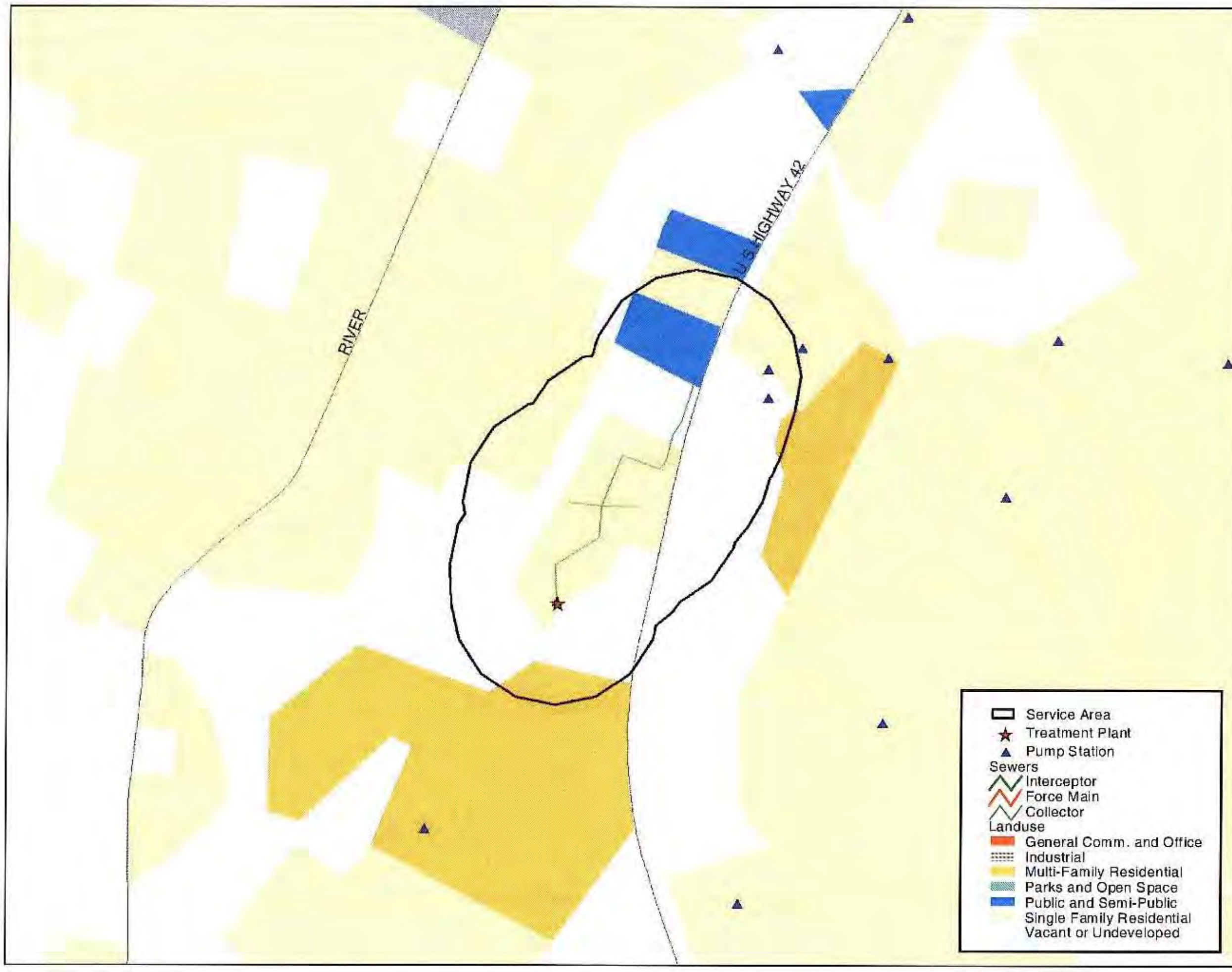


Figure 11 – Hunting Creek South – Hydraulic Connectivity Diagram of Unauthorized Discharges

8.4.4 Ken Carla WTP (MSD0208)

The Ken Carla Wastewater Treatment Plant was constructed in 1968 and acquired by MSD in 1997. The service area is centrally located at Ken Carla Drive and Lynnhall Court in Northern Jefferson County. The plant's design capacity is 0.010 million gallons per day and it receives an average daily flow of 0.004 million gallons per day. The WTP serves approximately 25 customer accounts, primarily single family residential with a small amount of vacant or undeveloped land. The Ken Carla collection system contains approximately 1,800 linear feet of 8" vitrified clay pipe (VCP) constructed during the 1960's and 70's. There is one pump station in the service area and there is one overflow located at the plant. Figures 12 and 13 show the Ken Carla service area.

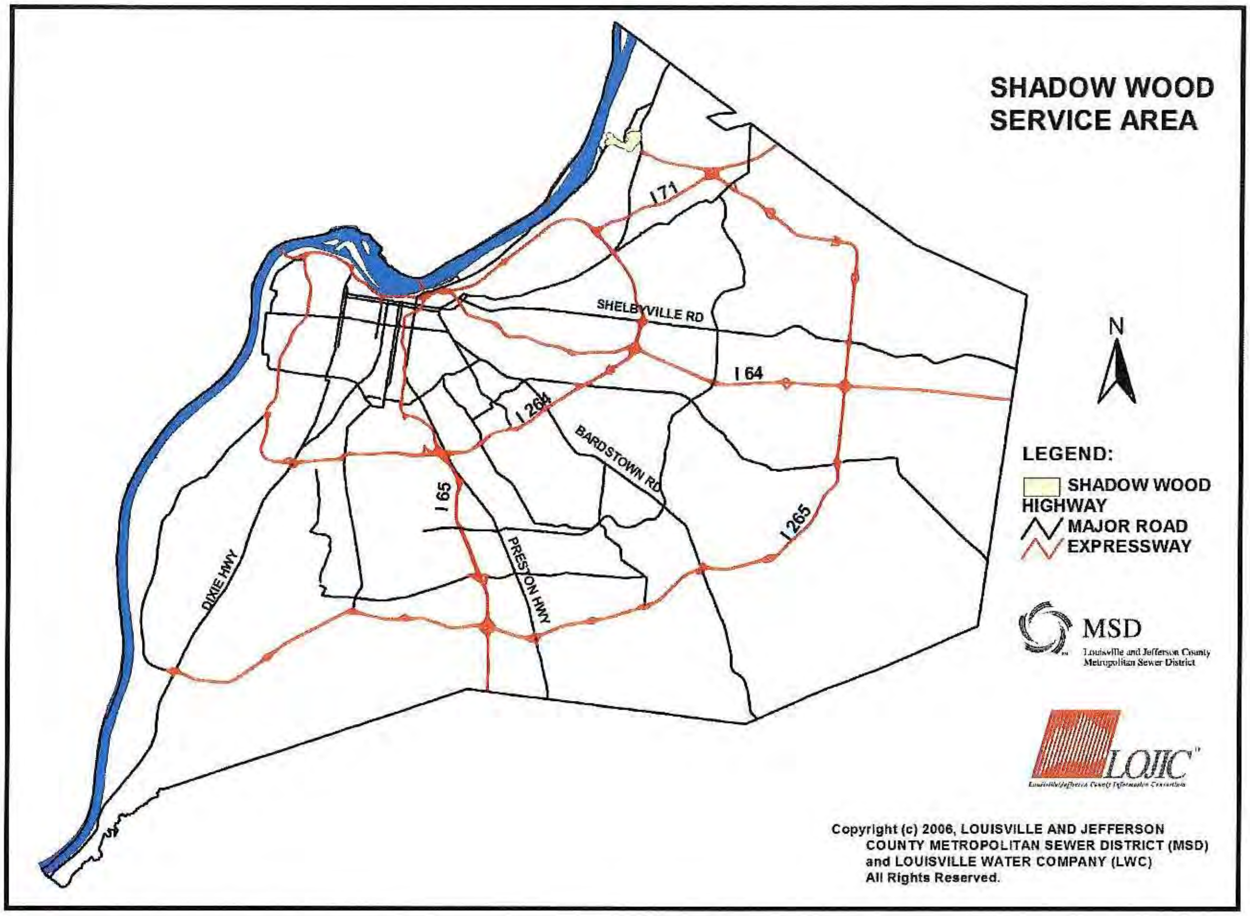

KEN CARLA
SERVICE AREA
I 71
SHELBYVILLE RD
I 64
I 264
BARDSTOWN RD
I 65
PRESTON HWY
DIXIE HWY
I 265
N
LEGEND:
KEN CARLA
HIGHWAY
MAJOR ROAD
EXPRESSWAY
MSD
Louisville and Jefferson County
Metropolitan Sewer District
LOJIC
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC)
All Rights Reserved.



Figures 12 and 13 – Ken Carla Service Area and Landuse

8.4.5 Shadow Wood WTP (MSD0404)

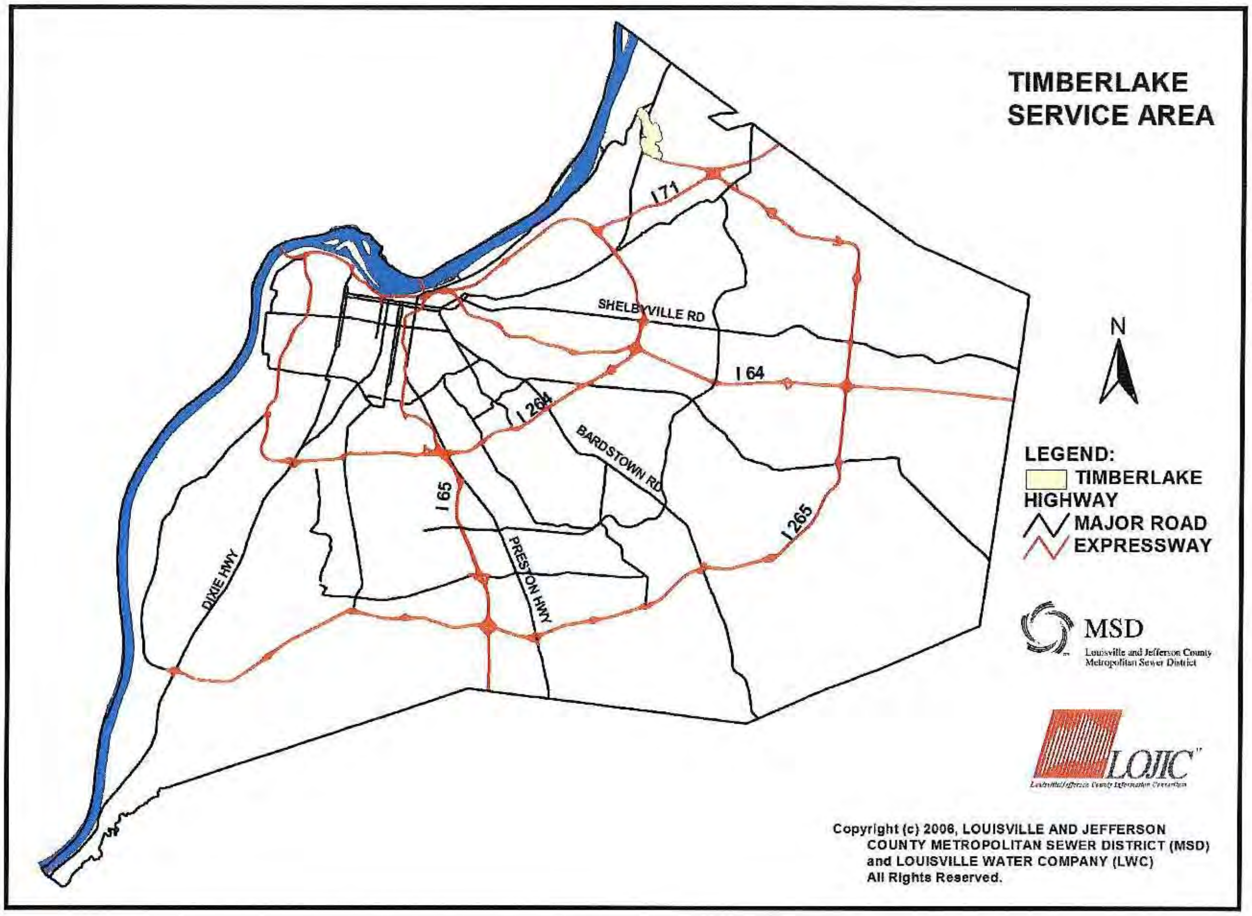
The Shadow Wood Wastewater Treatment Plant was constructed in 1979. MSD does not own this treatment plant, but was contracted to operate the plant in 2005. The service area is centrally located at River Road and Shadow Wood Lane in Northern Jefferson County. The plant's design capacity is 0.085 million gallons per day and it receives an average daily flow of 0.049 million gallons per day. The WTP serves approximately 300 customer accounts, consisting of single family and multi-family residential land. The Shadow Wood collection system contains approximately 13,500 linear feet of pipe, consisting primarily of 4" and 8" polyvinyl chloride pipe (PVC) constructed during the 1970's and 1990's. There are two pump/lift station and no overflows in the service area. Figures 14 and 15 show the Shadow Wood service area.

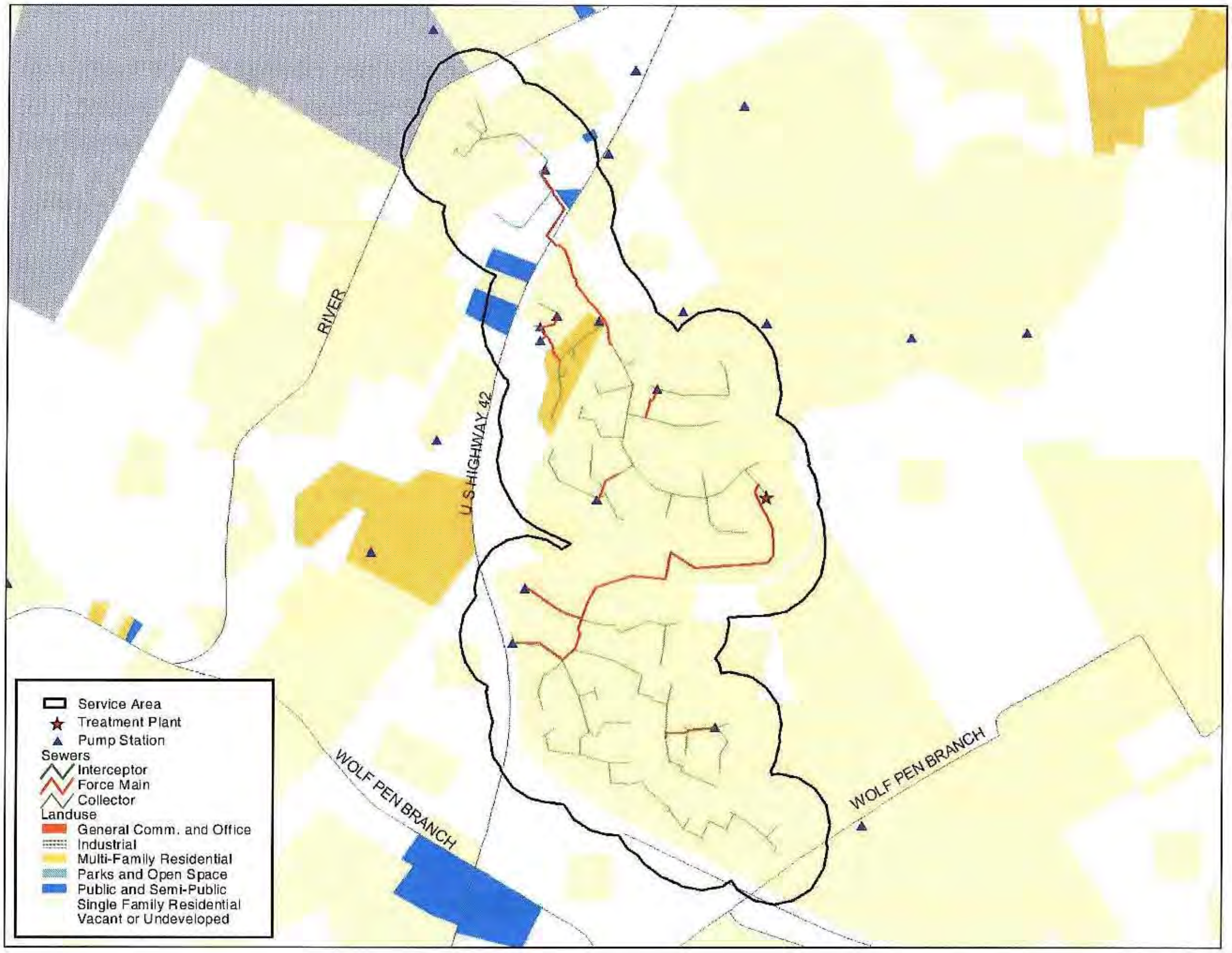

SHADOW WOOD
SERVICE AREA
I 71
SHELBYVILLE RD
I 64
I 264
BARDSTOWN RD
I 65
PRESTON HWY
DIXIE HWY
I 265
N
LEGEND:
SHADOW WOOD
HIGHWAY
MAJOR ROAD
EXPRESSWAY
MSD
Louisville and Jefferson County
Metropolitan Sewer District
LOJIC
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC)
All Rights Reserved.

Figures 14 and 15 – Shadow Wood Service Area and Landuse

8.4.6 Timberlake WTP (MSD0293)

The Timberlake Wastewater Treatment Plant was constructed in 1973 and acquired by MSD in 1999. The service area is centrally located at US Highway 42 and Timber Ridge Drive in Northern Jefferson County. The plant's design capacity is 0.150 million gallons per day and it receives an average daily flow of 0.070 million gallons per day. The WTP serves approximately 550 customer accounts, primarily single family residential with a small amount of multi-family residential land. The Timberlake collection system contains approximately 36,000 linear feet of pipe, consisting primarily of 8" Polyvinyl Chloride pipe (PVC) constructed from the 1970's to the present. There are eight pump/lift stations and no overflows in the service area. Figures 16 and 17 show the Timberlake service area.


TIMBERLAKE
SERVICE AREA
I 71
SHELBYVILLE RD
I 64
I 264
BARDSTOWN RD
I 65
PRESTON HWY
I 265
DIXIE HWY
N
LEGEND:
TIMBERLAKE
HIGHWAY
MAJOR ROAD
EXPRESSWAY
MSD
Louisville and Jefferson County Metropolitan Sewer District
LOJIC
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC)
All Rights Reserved.



Figures 16 and 17 – Timberlake Service Area and Landuse

8.4.7 Prospect Flow Monitoring

Prospect Flow Monitoring

This project, which cost $82,000, was developed to assess the condition of the Prospect sewer system and to quantify the impacts of infiltration and inflow in each of the service areas except for the small service area associated with the Ken Carla WTP. The results of the wet and dry weather flow data analysis were used to help prioritize the 10 basins for further study and rehabilitation. This project was conducted in FY00 and involved the siting, installation, data collection, and data analysis of flow monitors in 10 separate basins for a period of 60 days from December 22, 1999, through February 19, 2000.

Flow data from the period December 26, 1999 – January 1, 2000 was used to represent a typical dry weather period (average daily flow) in Prospect. The discrete dry weather flow for each sub-basin was categorized as sanitary flow and infiltration. Infiltration was estimated as 80% of the daily minimum flow and represented steady-state infiltration into the Prospect sewer system. The following figure shows a flow monitoring schematic of the sewer systems in the

Prospect study area. The numbered circles in Figure 18 represent the basins monitored by each of the flow meters.

Two significant rain events were monitored: January 2 – 3 (4.4"), and February 18 (3.84"). A peaking factor analysis was performed to show the reaction of the system to the rain events. In addition to analyzing the peaking factors, the amount of inflow and infiltration (I/I) was calculated for each sub-basin.

There was moderate infiltration throughout the project area, but Basins 2 and 7 stood out with rates exceeding 1000 gallons per inch-diameter mile. Using traditional peaking factor analysis, the system showed moderate to heavy inflow. Several sewer basins exceeded a peaking factor of 5 (the design standard) and Basins 1, 3 and 8 exceeded a peaking factor of ten. Using normalized I/I data, Basins 1, 2, 3, 5 and 6 displayed the highest inflow contributions. Thus, Basins 1 and 3 consistently had the worst inflow. Capacity analyses suggested that some interceptors in Basin 2 were undersized for large rain events. Based on a weighted analysis, Basins 2, 3, and 6 merited the most attention for I/I reduction. The Project was completed in June 2000.

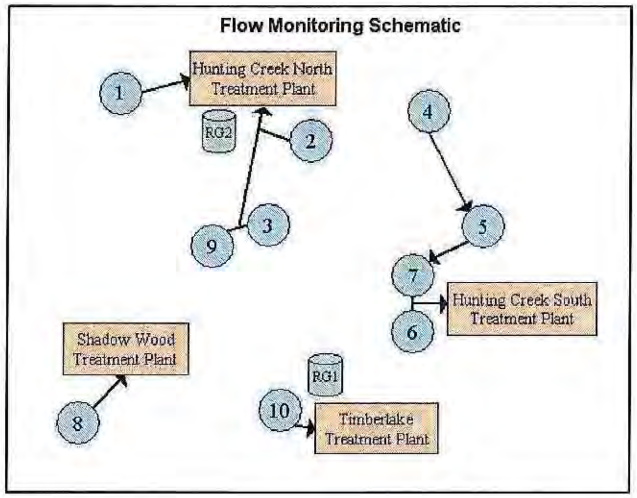


Figure 18 – Prospect Flow Monitoring Schematic

8.4.8 Prospect Sanitary Sewer Evaluation Studies (SSES)

<u>Prospect SSES</u>

The Prospect SSES project area included the service areas for four of the five small WTPs in the Prospect area. The Shadow Wood service area was not investigated because it was a privately owned and operated system at the time. In March 2005, MSD entered an agreement to operate the plant but it remains privately owned.

The objective of this SSES was to determine where the sanitary sewer system in the Prospect study area is subject to excessive I/I in order to prioritize and phase rehabilitation. The study included the following components to identify active and potential sources of I/I:

- Gathering and reviewing existing pertinent data (LOJIC, IMS, & flow data) to evaluate the quantity of I/I entering the sewer system;
- Conducting physical inspections of manholes to identify corrosion and structural defects that may be contributing excessive I/I (802 manholes);
- Conducting smoke testing to identify structural defects that may contribute to I/I (154,572 linear feet sewer);
- Conducting TV inspections (87,014 linear feet sewer);
- Conducting dyed-water flooding, and wet weather inspections in a limited amount of the system to identify structural defects that may contribute I/I to the system and blockages that may be inhibiting efficient hydraulic flow;

- Compiling and analyzing data generated during the SSES to quantify the amount of excessive I/I entering the system and prioritize basins for rehabilitation.

The field investigations indicated that the system is in relatively sound structural condition compared to other systems of similar age. Inflow was the dominant problem, although infiltration was still significant. Of the 802 manholes slated for inspection, only 585 could be investigated. Inspections were not performed on manholes that were buried or unable to be located.

The primary problems encountered were leaking riser rings and offset manhole frames. Defects were spread throughout the study area and not concentrated in one or two basins. Only 16 leaks were identified through smoke testing, which is indicative of a tight sewer system. The majority of the defects identified through smoke testing were possible sump pump connections, property service connections, or mainline leaks. Due to insufficient flow, dye testing could not confirm the connectivity of two storm water catch basins identified as potentially connected during smoke testing. Television inspections identified 87 sewer lines that require rehabilitation. The main problem identified during TVI was root intrusion at the joints, causing separation and leaks. 45 manholes were wet-weather inspected in Basin 4 of the Prospect study area. Of the 45 manholes inspected, 16 manholes showed inflow. This project cost $143,000 and was completed in October 2001.

<u>Gunpowder, Riding Ridge, and Covered Cove Way Pump Station SSO Abatement</u>

This project consisted of constructing and calibrating a Prospect computer model based on the Prospect flow monitoring performed in FY00 (July 1, 1999 – June 30, 2000), collecting existing SSES data for the areas upstream of each pump station, and performing field investigation/surveying as necessary to confirm model results and obtain Infrastructure data not provided in LOJIC. The computer model and SSES data were used to develop a comprehensive solution to abate the overflows at these pump stations. During the course of collecting data, it was determined that the pumps at Riding Ridge PS had recently been upgraded and were sufficient to eliminate the overflows at this PS. In addition, it was determined that the Covered Cove Way PS overflows were due to power failures and/or pump failures and the problem could be addressed through telemetry. Therefore, this project focused on developing an overflow abatement solution for the Gunpowder PS only.

Since the overflow volumes at the Gunpowder PS were relatively small, a combination of short term action designed to offload flow to the PS and to improve the ability of the station to transmit wastewater to treatment were made. In addition, long term solutions were recommended for implementation if the short term solutions proved insufficient to abate the overflow. Short-term recommendations included cleaning force mains, inspecting and repairing pumps, and redirecting flow from the Prospect Pointe Pump Station to the Bass Shirley Assessment project. A long term recommendation included sump pump disconnection, backflow prevention, and lining laterals in the collection system upstream of the Gunpowder Pump Station. Another long term recommendation included upgrading the Gunpowder Pump Station, force mains, and collection lines leading to the Hunting Creek North Wastewater Treatment Plant and providing a storage basin at the treatment plant to store excess wet weather flow for treatment. This project cost $63,000 and was completed in August 2004.

8.4.9 Prospect Computer Modeling

The Prospect model area includes the Hunting Creek North, Hunting Creek South, and Timberlake WTPs. The Ken Carla service area is small and the Shadow Wood WTP was privately owned and operated, therefore, these service areas were not modeled. The modeled areas cover approximately 2.9 square miles and are centrally located at the intersection of U.S. Hwy 42 and Fox Harbor Road. The sewer systems contains a total of 165,000 linear feet (31 miles) of gravity sewer pipe ranging in size from 8-inch to 15-inch diameter of which 96% are 8-inch collection sewers. Approximately 80% of the collection system is constructed of vitrified clay pipe (VCP) and polyvinyl chloride (PVC) pipe, however, no material is identified for 19% of the collection system. Of the entire modeled area, 74% of the system was installed in the 1960's, 1970's, and 1980's. The majority of the land use is residential and undeveloped/vacant land.

The Prospect model was calibrated during FY03 (July 1, 2002 – June 30, 2003) using FY00 (July 1, 1999 – June 30, 2000) flow monitoring data. This model consisted of 8" and greater diameter sanitary sewer and was built to simulate dry weather and wet weather flow in the sanitary sewer system. The dry weather period used for model calibration was from December 30, 1999 to December 31, 1999 and the wet weather period used was from January 2, 2000 to January 3, 2000 (approximately a 5-year storm event). This model was used in conjunction with existing SSES data and wet weather inspections to develop a comprehensive solution for elimination of the overflows at Gunpowder pump stations. This project was completed in August 2004 as a subset of the Gunpowder, Riding Ridge, and Covered Cove Way Pump Station SSO Abatement discussed in the previous section.

8.4.10 Other Capital Projects in Prospect

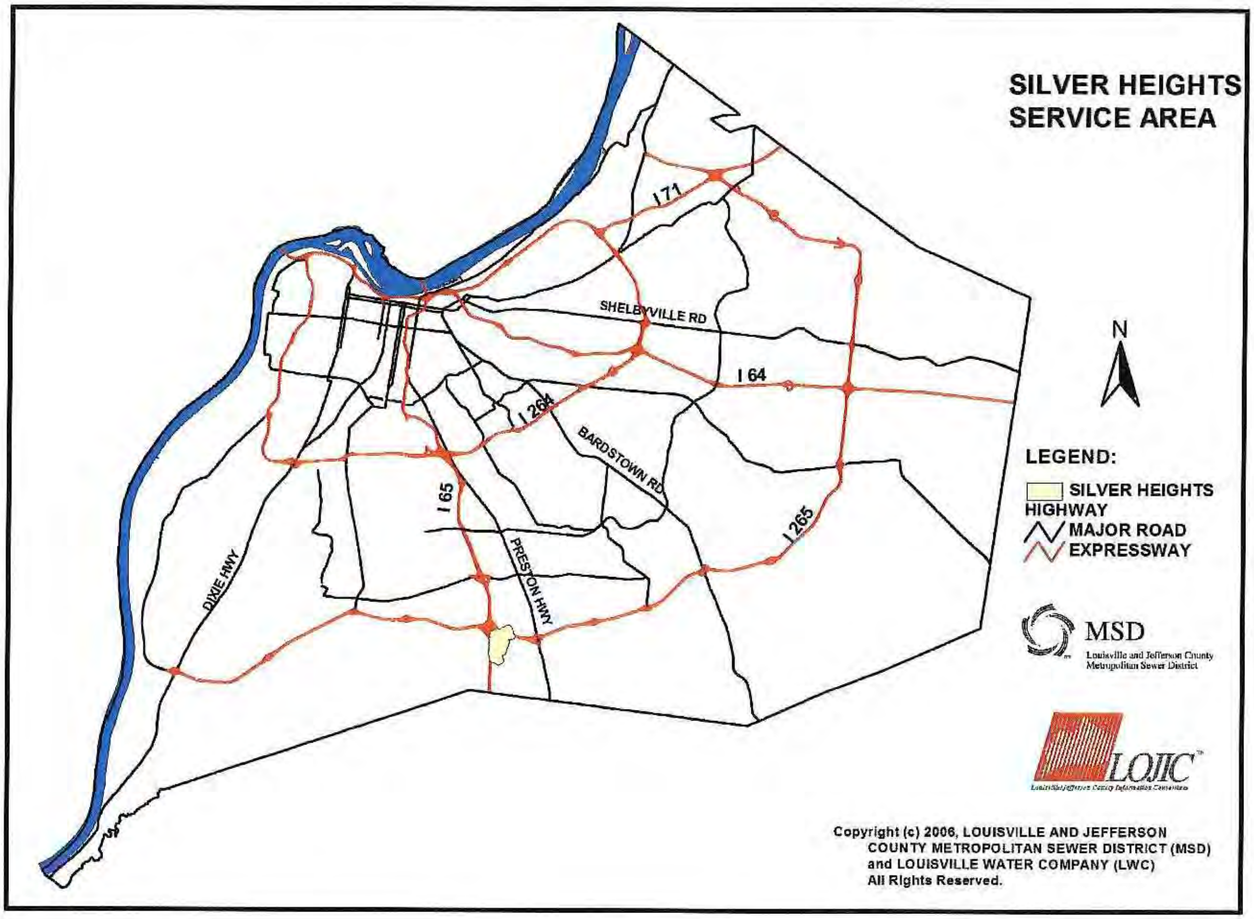
Gunpowder Pump Station (MSD Budget ID # H04012)

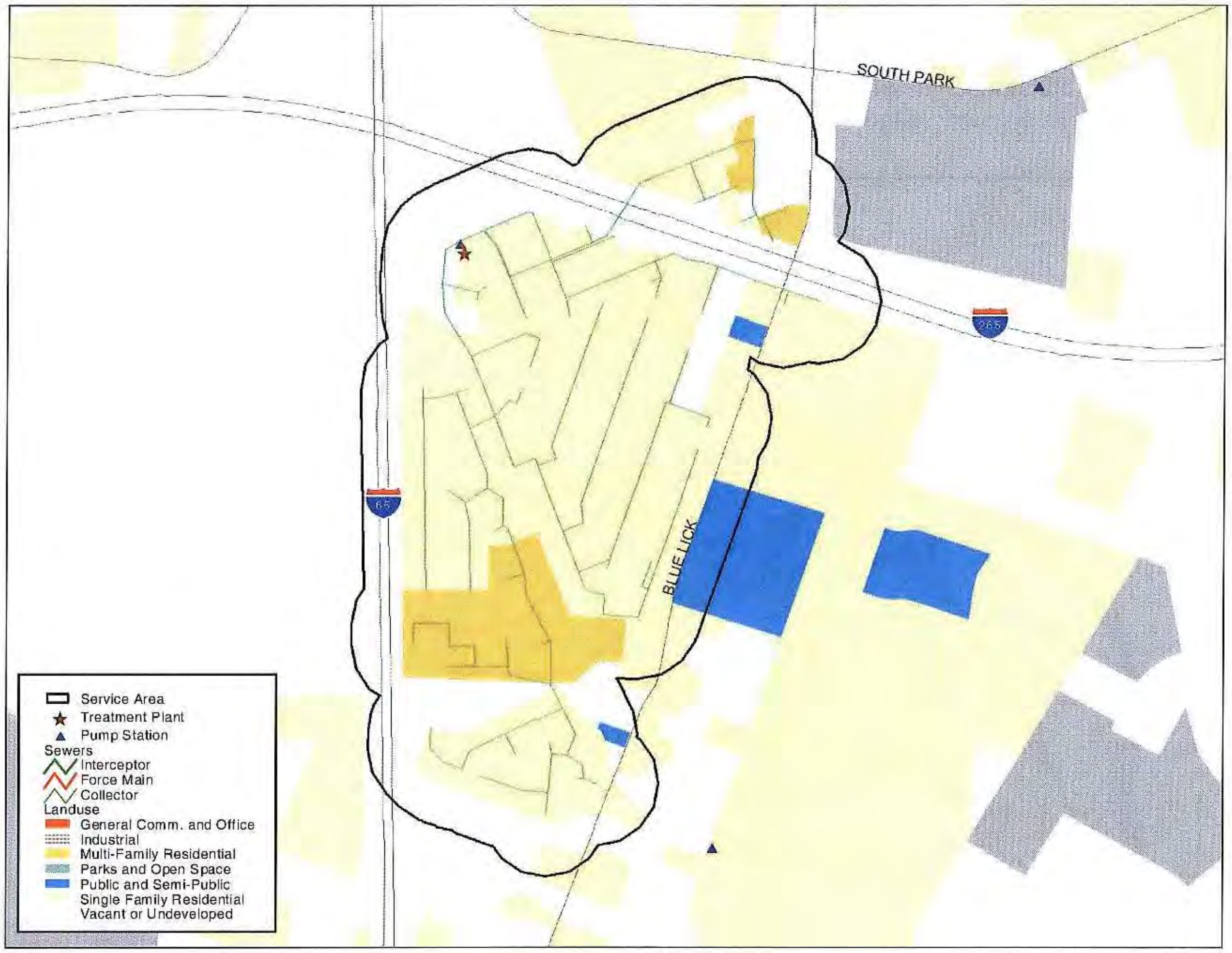
The Gunpowder Pump Station is fed by four small pump stations and conveys the flow to the Hunting Creek North Wastewater Treatment Plant (HCNWTP). Evaluations of the Gunpowder and the tributary pump stations indicate that the tributary pump stations are capable of conveying more flow than Gunpowder PS can convey. Recommendations have been made to construct additional wet weather storage adjacent to the Prospect Pointe Pump Station and install communications between the Gunpowder and Prospect Pointe Pump Stations. This communication will allow Prospect Pointe to continue normal operations until Gunpowder begins to experience high wet well conditions at which point the Prospect Pointe PS will stop pumping and begin storing flows until it receives communications allowing it to resume pumping. This project will be completed by June 30, 2006, in accordance with the Consent Decree.

8.5 SILVER HEIGHTS WTP (MSD0258)

8.5.1 Silver Heights Background

The Silver Heights Wastewater Treatment Plant was constructed in 1963 and acquired by MSD in 1990. The plant's design capacity is 0.500 million gallons per day and it receives an average daily flow of 0.286 million gallons per day. The WTP serves approximately 950 customer accounts, primarily single family residential with a small amount of multi-family residential land. The Silver Heights collection system contains approximately 36,000 linear feet of pipe, consisting primarily of 8" vitrified clay pipe (VCP) constructed during the 1960's and 1970's. There is one lift station in the service area. See Figures 23 and 24 for the program elements described in this section. Figures 19 and 20 show the Silver Heights service area.





Figures 19 and 20 – Silver Heights Service Area and Landuse

There is one overflow location associated with this service area. Figure 21 is a service area diagram showing the hydraulic connectivity of overflow locations.

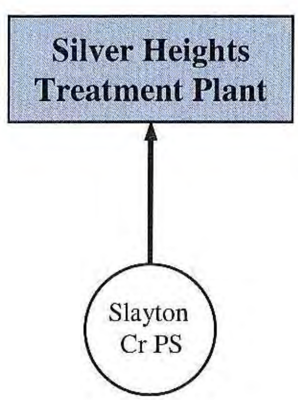


Figure 21 – Silver Heights – Hydraulic Connectivity Diagram of Unauthorized Discharges

8.5.2 Silver Heights Flow Monitoring

Priority SSO Flow Monitoring Part 2: Pond Creek

The Silver Heights Service Area was flow monitored as part of the Priority SSO Flow Monitoring Part 2 project which is discussed in section 6.2.1.2. Refer to Figure 11 in section 6 for a map of the Silver Heights Flow Monitoring Basins.

8.5.3 Silver Heights Sanitary Sewer Evaluation Study (SSES)

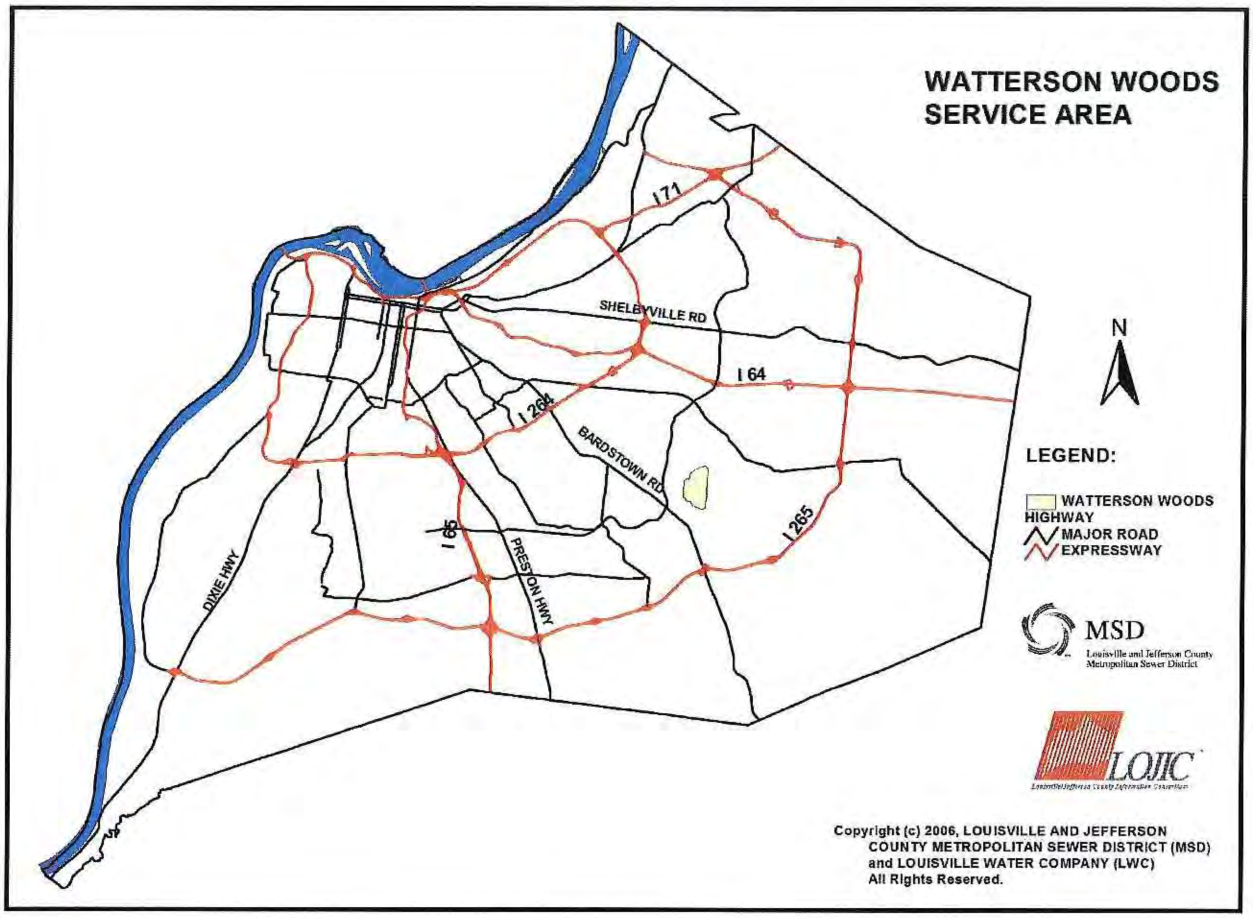
West County Phase 1A SSES

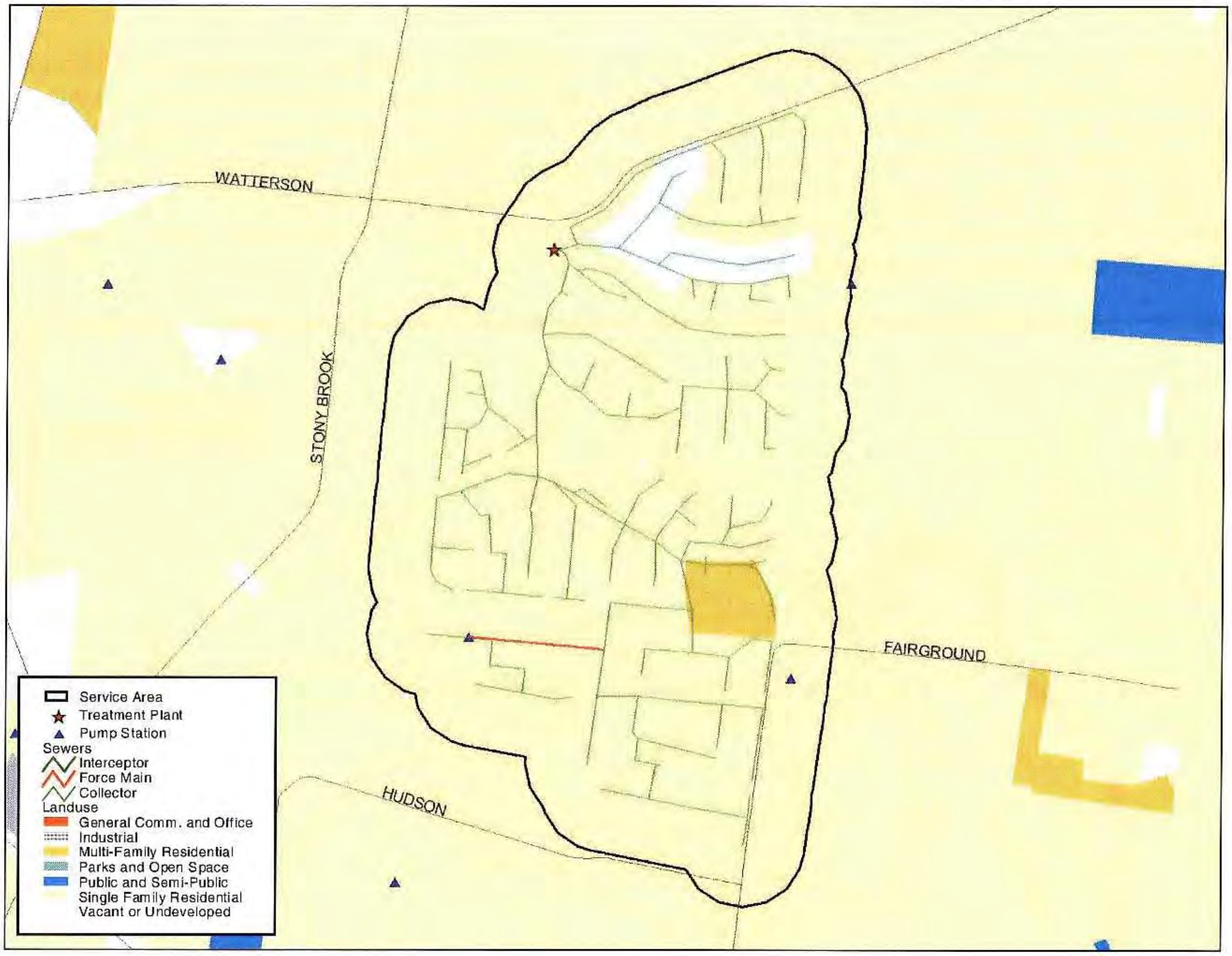
The Silver Heights Service area was investigated as part of the West County Phase 1A SSES project which is discussed in section 6.2.1.3. There were no priority 1 defects identified during the Silver Heights portion of the SSES but 22 of the 170 manholes in the service area had priority 2 defects. Refer to Figure 6 in section 6 for a map of the West County Phase 1A SSES study area.

8.6 WATTERSON WOODS WTP (MSD0298)

8.6.1 Watterson Woods Background

The Watterson Woods Wastewater Treatment Plant was constructed in 1970. MSD does not own this treatment plant, but entered an agreement to operate the plant in 2000. The plant's design capacity is 0.343 million gallons per day and it receives an average daily flow of 0.325 million gallons per day. The WTP serves approximately 1,100 customer accounts, primarily single family residential with a small amount of multi-family residential land. The Watterson Woods collection system contains approximately 50,000 linear feet of pipe, consisting primarily of 8" vitrified clay pipe (VCP) constructed from the 1970's to the present. This WTP was planned for elimination under the unexecuted Fern Hill Interceptor #8 capital improvement project. However; the elimination portion of the project was combined with the Fern Creek/Nottingham Interceptor #6 project to accelerate the elimination of the WTP, which is expected to occur in 2006 pending easement acquisitions. Figures 22 and 23 show the Watterson Woods service area.


WATTERSON WOODS
SERVICE AREA
I 71
SHELBYVILLE RD
I 64
I 264
BARDSTOWN RD
I 65
PRESTON HWY
I 265
DIXIE HWY
N
LEGEND:
WATTERSON WOODS
HIGHWAY
MAJOR ROAD
EXPRESSWAY
MSD
Louisville and Jefferson County
Metropolitan Sewer District
LOJIC
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC)
All Rights Reserved.



Figures 22 and 23 – Watterson Woods Service Area and Landuse

There are two overflow locations associated with this service area. Figure 24 is a service area diagram showing the hydraulic connectivity of overflow locations.

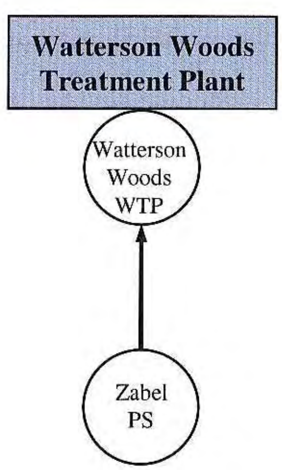
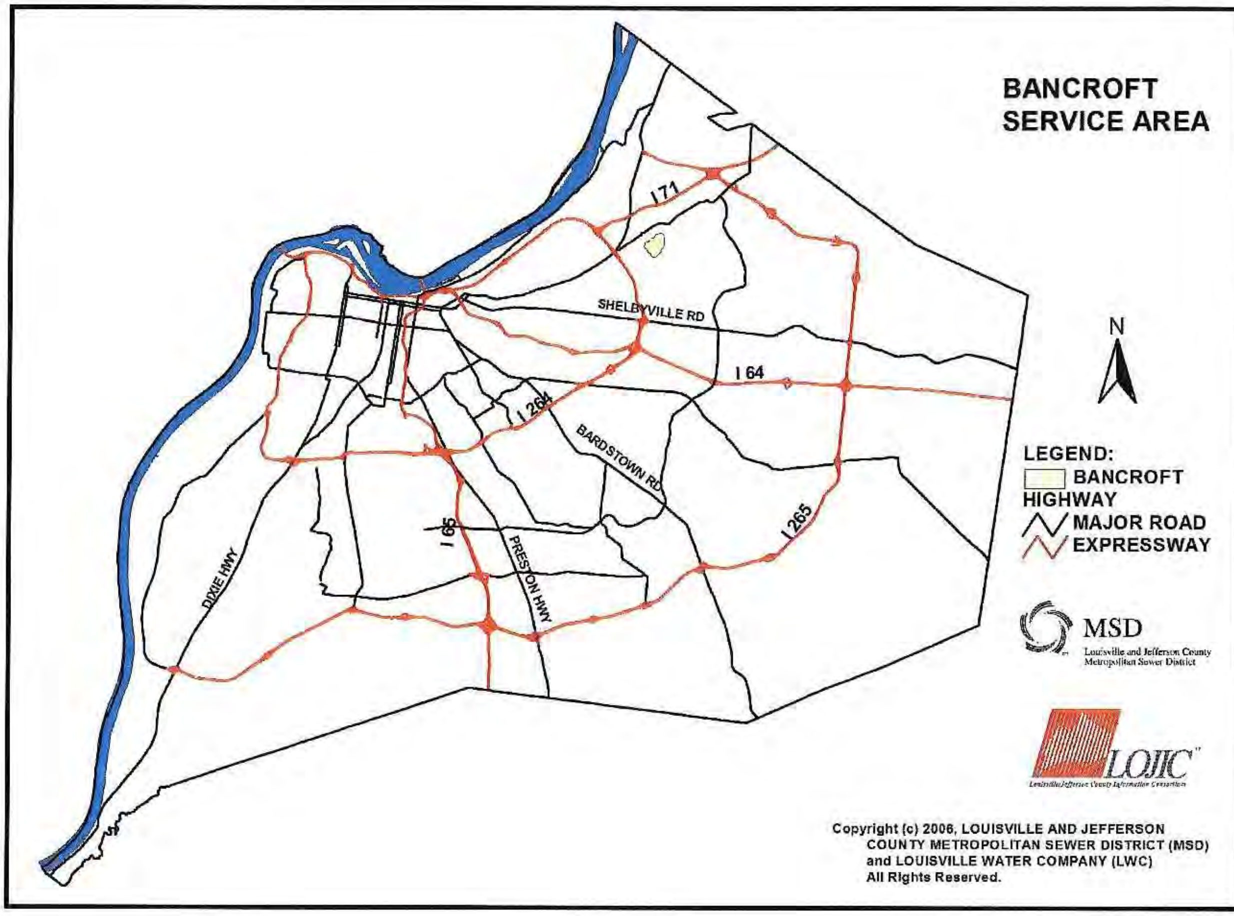
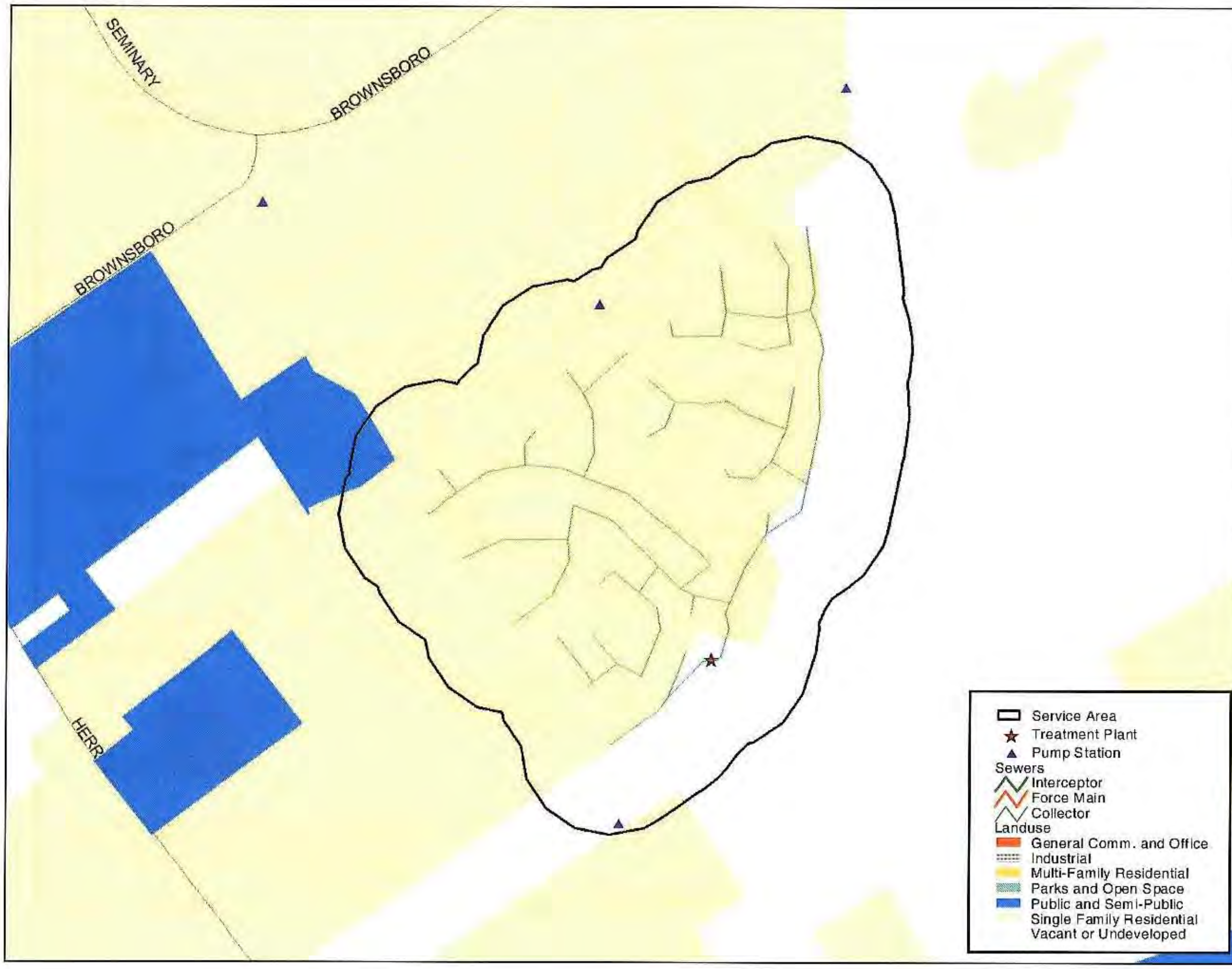


Figure 24 – Watterson Woods – Hydraulic Connectivity Diagram of Unauthorized Discharges

8.7 BANCROFT WTP (MSD0290)

The Bancroft Wastewater Treatment Plant was constructed in 1966 and acquired by MSD in 1998. The plant's design capacity is 0.080 million gallons per day and it receives an average daily flow of 0.032 million gallons per day. The Bancroft WTP service area serves approximately 200 customer accounts, all single family residential. The Bancroft collection system contains approximately 16,000 linear feet of pipe, consisting primarily of 8" vitrified clay pipe (VCP) constructed during the 1960's. There are no overflows in this service area. Figures 25 and 26 show the Bancroft service area.

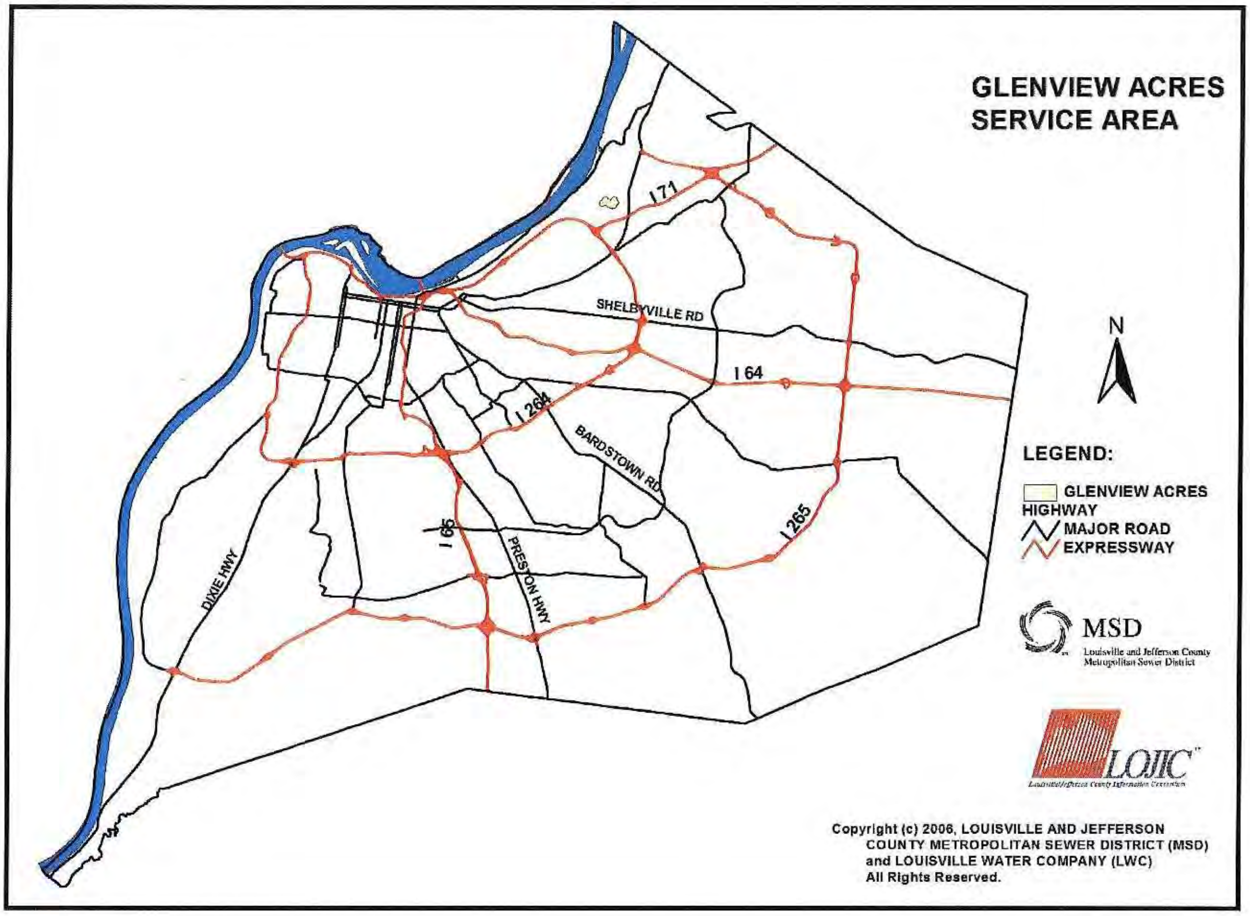




Figures 25 and 26 – Bancroft Service Area and Landuse

8.8 GLENVIEW ACRES WTP (MSD0206)

The Glenview Acres Wastewater Treatment Plant was constructed in 1968. The plant's design capacity is 0.012 million gallons per day and it receives an average daily flow of 0.008 million gallons per day. The WTP serves approximately 40 customer accounts, all single family residential land. The Glenview Acres collection system contains approximately 4,700 linear feet of pipe, consisting primarily of 8" gravity lines and 1.5" force mains constructed during the 1960's and 1980's. There is one pump station and no overflows in this service area. Figures 27 and 28 show the Glenview Acres service area.


GLENVIEW ACRES
SERVICE AREA
I 71
SHELBYVILLE RD
I 64
I 264
BARDSTOWN RD
I 65
PRESTON HWY
DIXIE HWY
I 265
N
LEGEND:
GLENVIEW ACRES
HIGHWAY
MAJOR ROAD
EXPRESSWAY
MSD
Louisville and Jefferson County
Metropolitan Sewer District
LOJIC
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC)
All Rights Reserved.

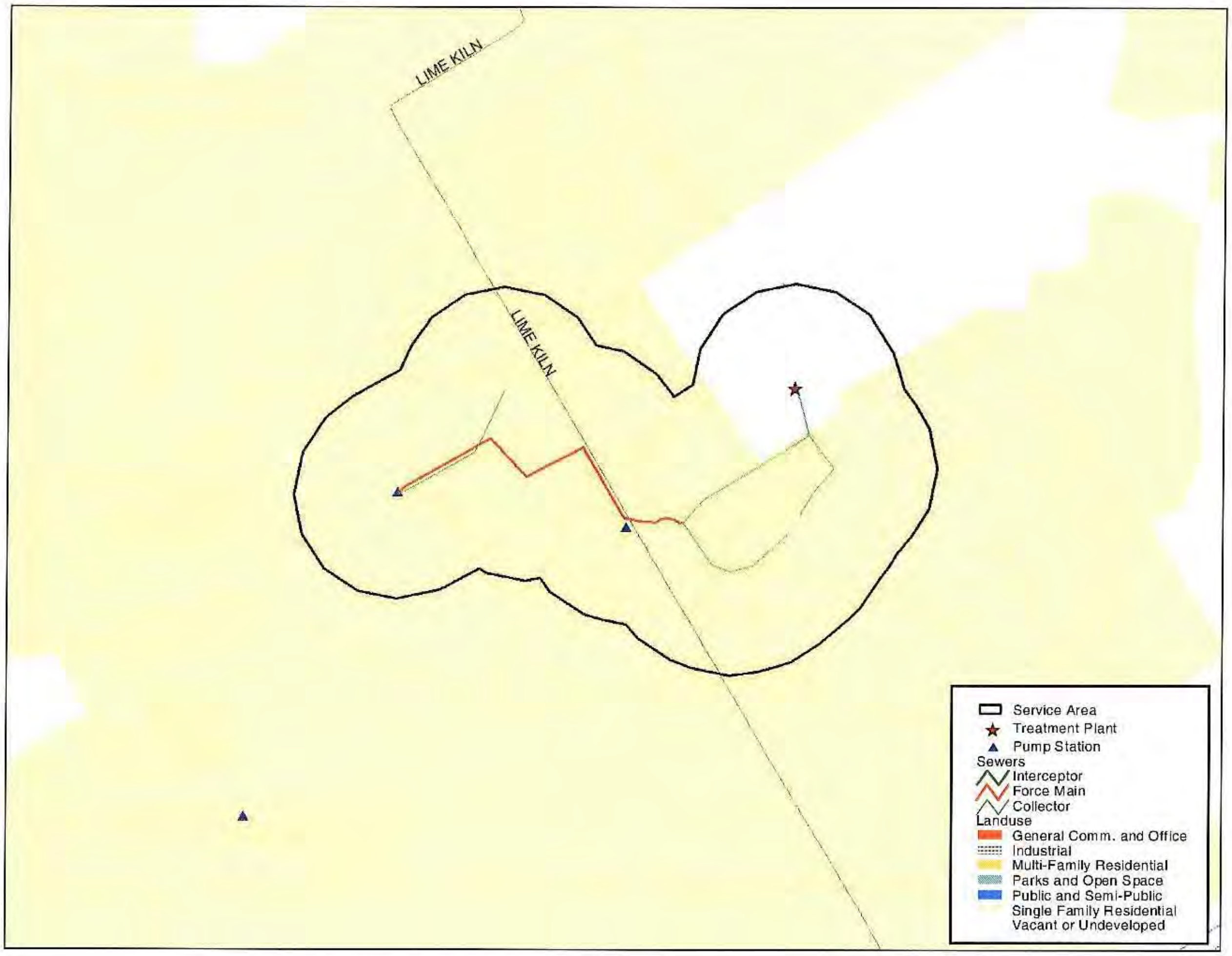
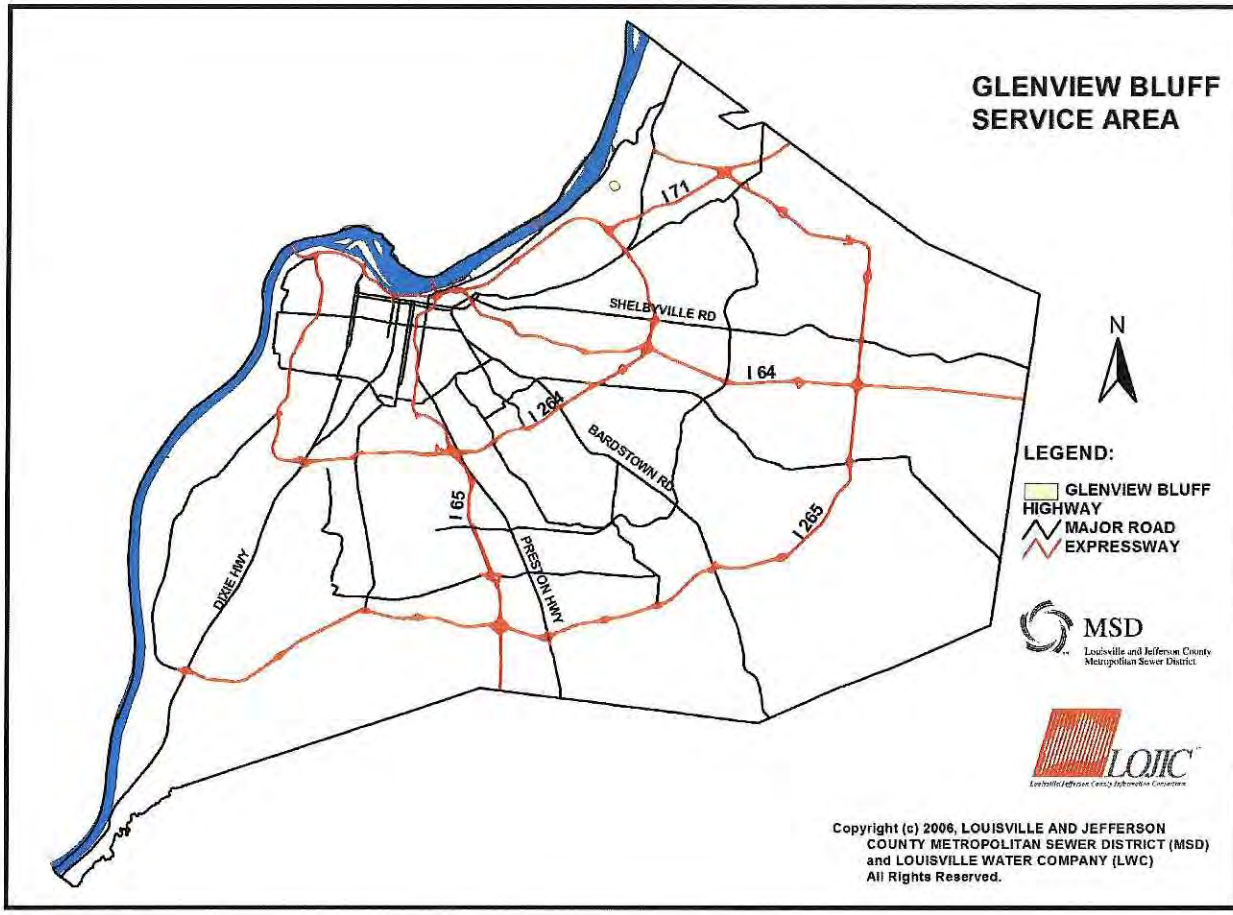


Figure 27 and 28 – Glenview Acres Service Area and Landuse

8.9 GLENVIEW BLUFF WTP (MSD0207)

The Glenview Bluff Wastewater Treatment Plant was constructed in 1976. The plant's design capacity is 0.010 million gallons per day and it receives an average daily flow of 0.003 million gallons per day. The WTP serves approximately 20 customer accounts, primarily single family residential with a small amount of vacant or undeveloped land. The Glenview Bluff collection system contains approximately 1,600 linear feet of pipe, all consisting of 8" vitrified clay pipe (VCP) and Polyvinyl Chloride (PVC) pipe constructed during the 1970's and 2000's. There are no pump/lift station or overflows in the service area. Figures 29 and 30 show the Glenview Bluff service area.


GLENVIEW BLUFF
SERVICE AREA
I 71
SHELBYVILLE RD
I 64
I 264
BARDSTOWN RD
I 65
PRESTON HWY
DIXIE HWY
I 265
N
LEGEND:
GLENVIEW BLUFF
HIGHWAY
MAJOR ROAD
EXPRESSWAY
MSD
Louisville and Jefferson County
Metropolitan Sewer District
LOJIC
Copyright (c) 2006, LOUISVILLE AND JEFFERSON
COUNTY METROPOLITAN SEWER DISTRICT (MSD)
and LOUISVILLE WATER COMPANY (LWC)
All Rights Reserved.

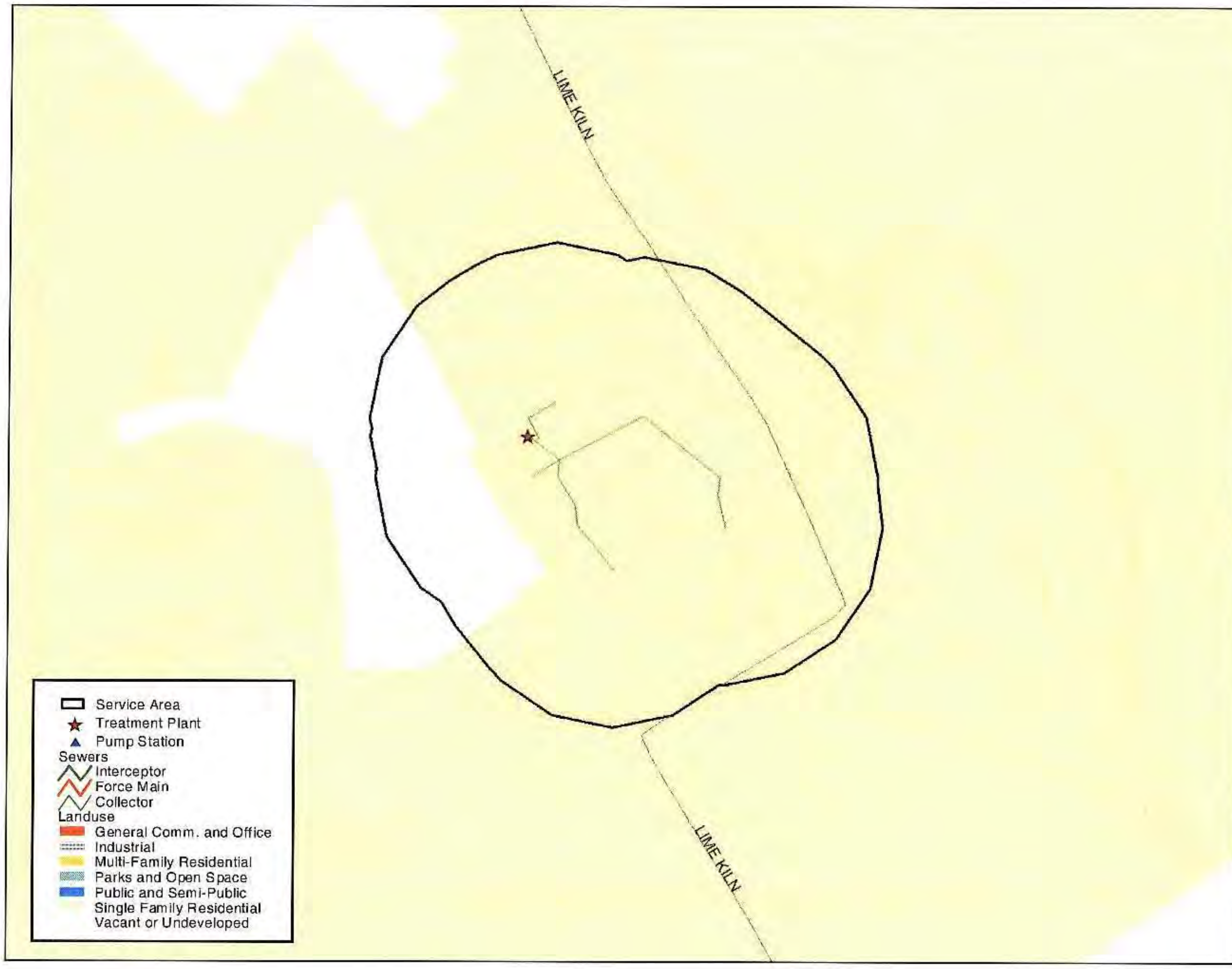
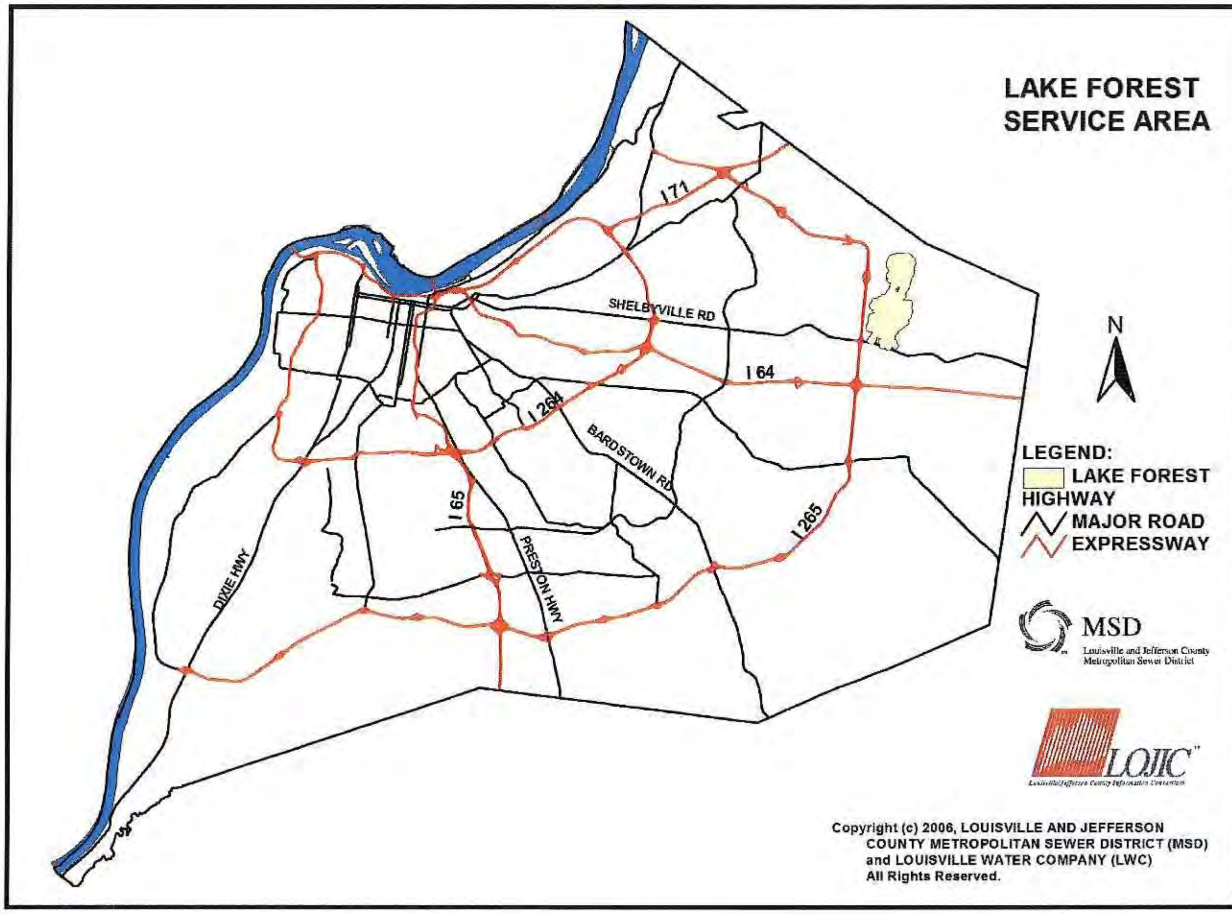
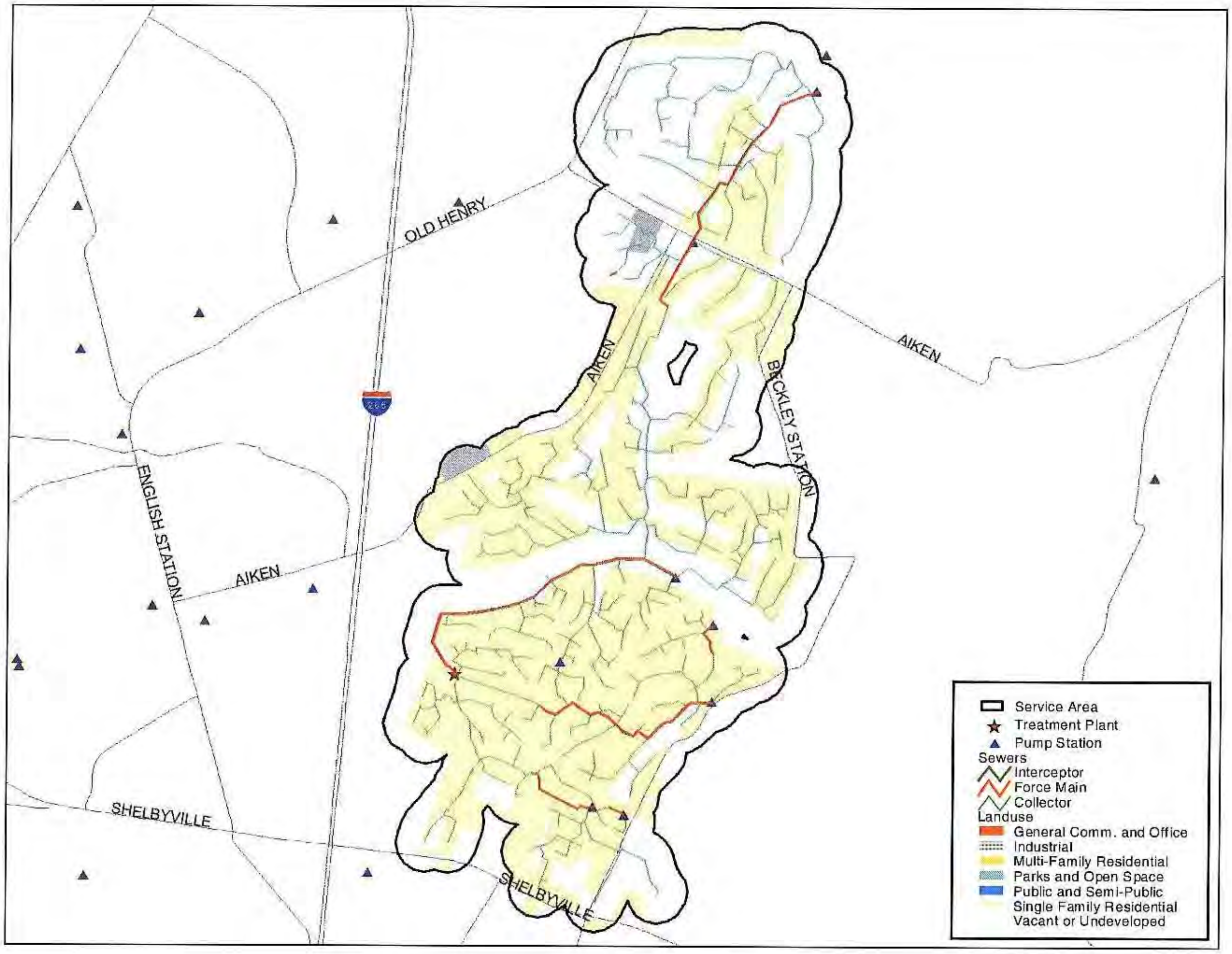


Figure 29 and 30 – Glenview Bluff Service Area and Landuse

8.10 LAKE FOREST WTP (MSD0403)

The Lake Forest Wastewater Treatment Plant was constructed in 1988 and acquired by MSD in 2005. The plant's design capacity is 0.470 million gallons per day and it receives an average daily flow of 0.401 million gallons per day. The WTP serves approximately 2,200 customer accounts, primarily single family residential with a small amount of industrial land. The Lake Forest collection system contains approximately 185,000 linear feet of pipe, consisting primarily of 8" vitrified clay pipe (VCP) constructed from the 1970's to the present. There are six pump/lift stations in the service area. Figures 31 and 32 show the Lake Forest service area.


LAKE FOREST
SERVICE AREA
I 71
SHELBYVILLE RD
I 64
I 264
BARDSTOWN RD
I 65
PRESTON HWY
DIXIE HWY
I 265
N
LEGEND:
LAKE FOREST
HIGHWAY
MAJOR ROAD
EXPRESSWAY
MSD
LOJIC
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC)
All Rights Reserved.



Figures 31 and 32 – Lake Forest Service Area and Landuse

There are two overflow locations associated with this service area. Figure 33 is a service area diagram showing the hydraulic connectivity of overflow locations.

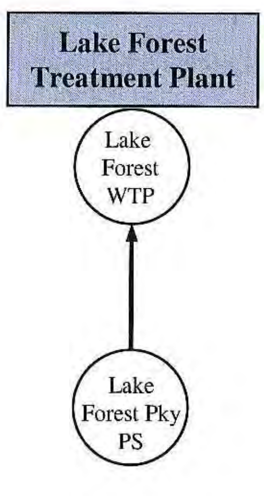


Figure 33 – Lake Forest – Hydraulic Connectivity Diagram of Unauthorized Discharges

8.11 KENTUCKY CORRECTIONS INSTITUTE FOR WOMEN (KCI) WTP (MSD0296)

The KCI Wastewater Treatment Plant was constructed in1990. MSD does not own this treatment plant, but was contracted to operate the plant in 1999. The plant's design capacity is 0.125 million gallons per day and it receives an average daily flow of 0.034 million gallons per day. The WTP serves one customer account, the Kentucky Corrections Institute for Women. There are no pump/lift stations and no overflows in the service area. Figure 34 shows the KCIWTP service area.

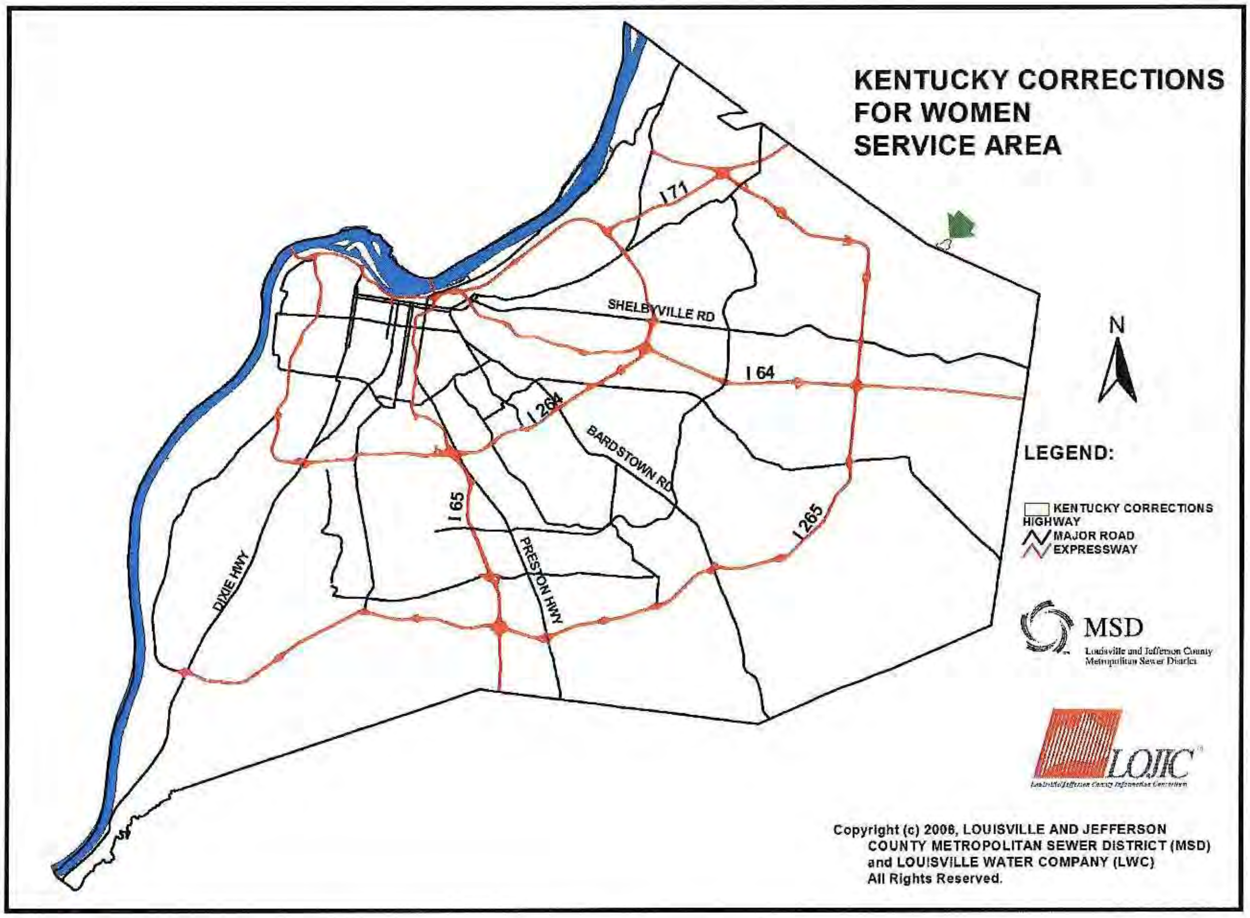
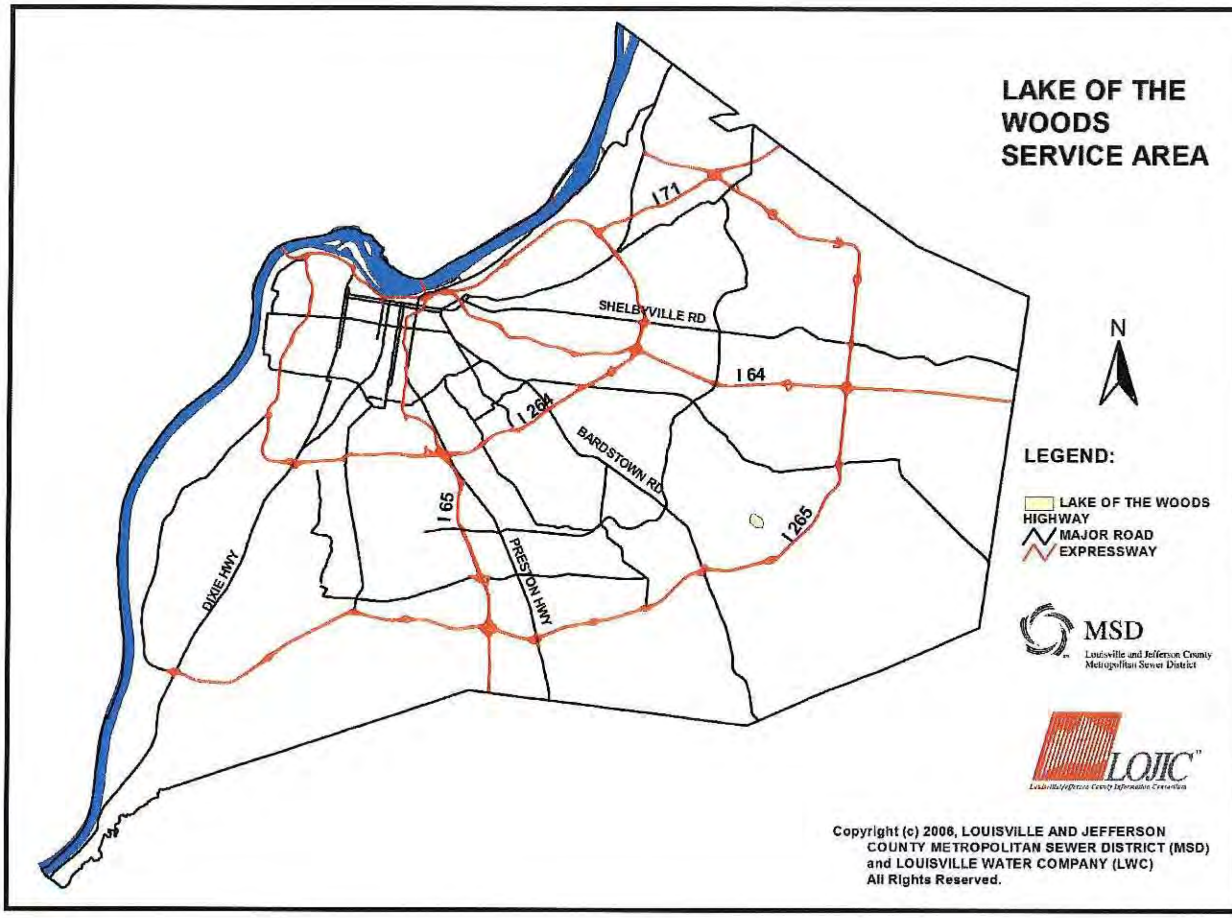
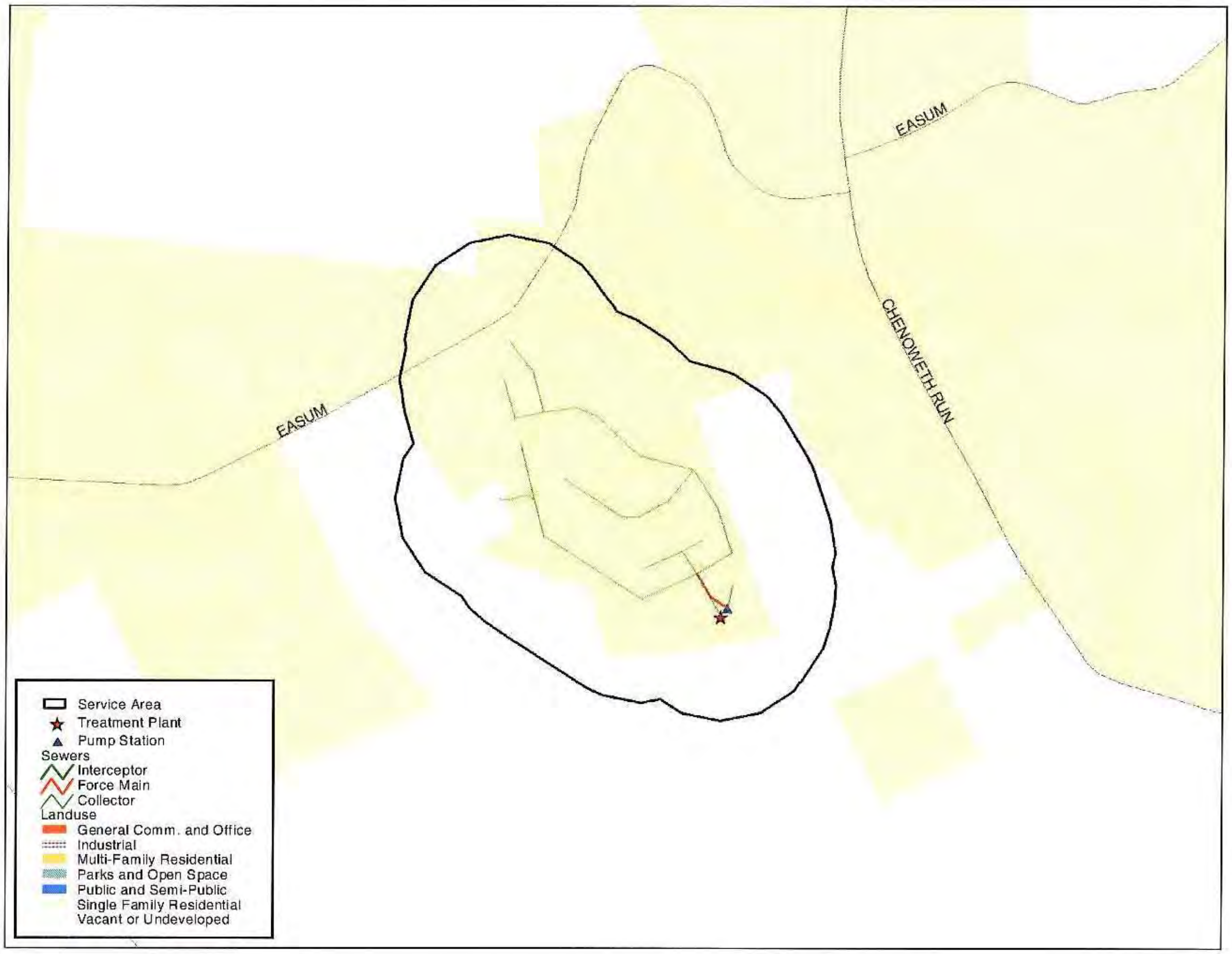


Figure 34 – Lake Forest Service Area

8.12 LAKE OF THE WOODS WTP (MSD0251)

The Lake of the Woods Wastewater Treatment Plant was constructed in 1976 and Acquired by MSD in 1989. The plant's design capacity is 0.044 million gallons per day and it receives an average daily flow of 0.019 million gallons per day. The WTP serves approximately 120 customer accounts, primarily single family residential with a small amount of vacant or undeveloped land. The Lake of the Woods collection system contains approximately 5,500 linear feet of pipe, consisting primarily of 8" vitrified clay pipe (VCP) constructed during the 1970's and 1990's. There is one lift station and no overflows in the service area. Figures 35 and 36 show the Lake of the Woods service area.

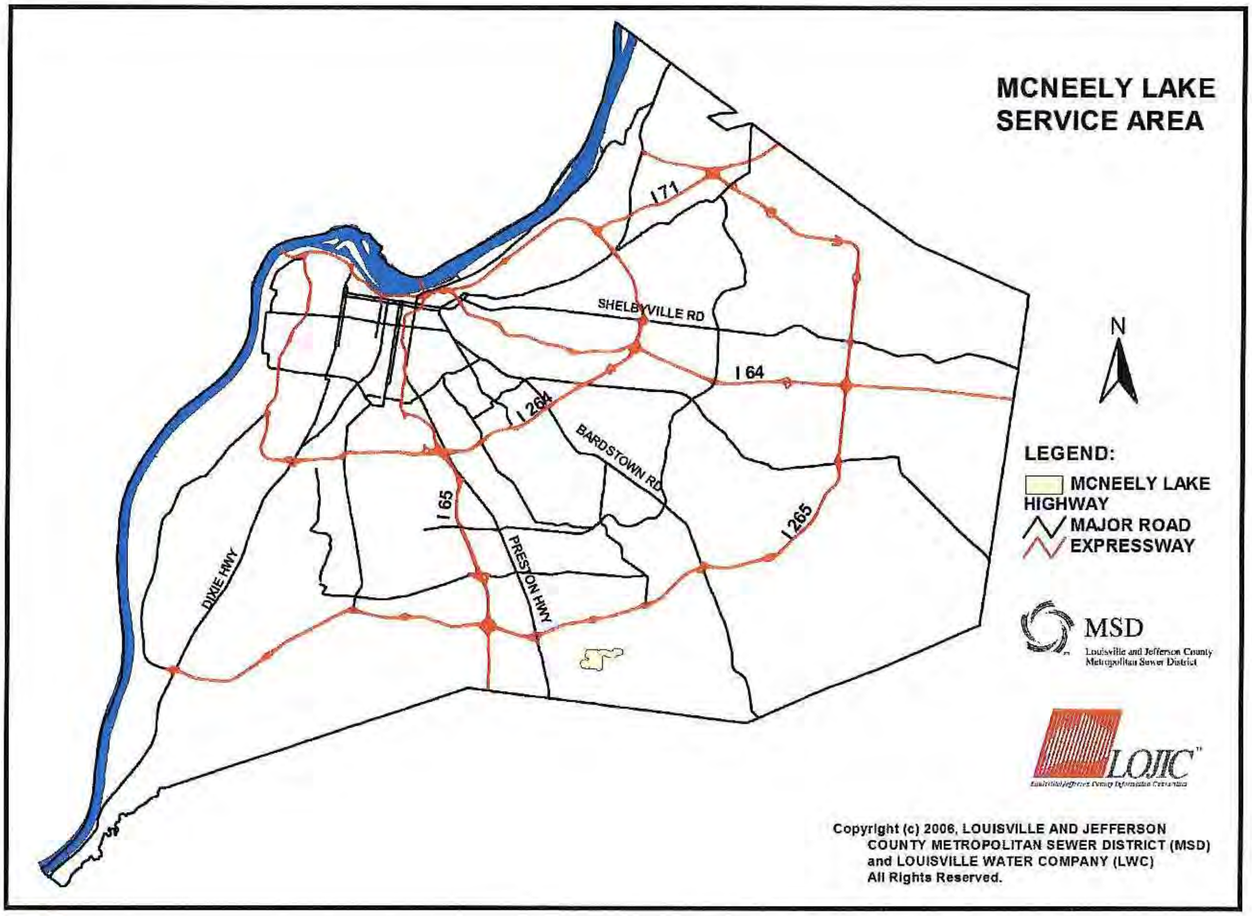

LAKE OF THE WOODS SERVICE AREA
SHELBYVILLE RD
I 64
I 71
I 264
BARDSTOWN RD
I 65
PRESTON HWY
DIXIE HWY
I 265
N
LEGEND:
LAKE OF THE WOODS
HIGHWAY
MAJOR ROAD
EXPRESSWAY
MSD
Louisville and Jefferson County Metropolitan Sewer District
LOJIC

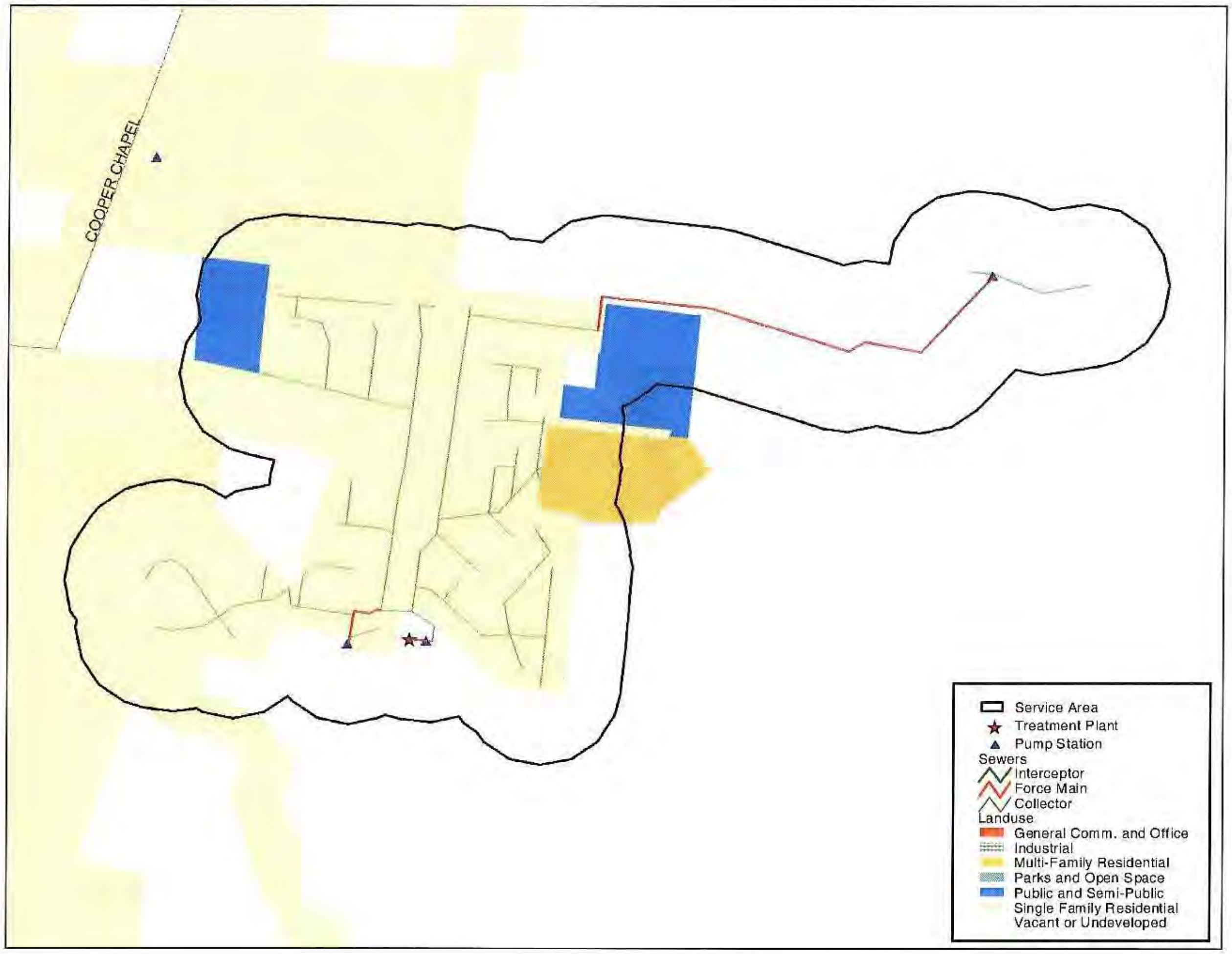


Figures 35 and 36 – Lake of the Woods Service Area and Landuse

8.13 MCNEELY LAKE WTP (MSD0228)

The McNeely Lake Wastewater Treatment Plant was constructed in 1964 and acquired by MSD in 1986. The plant's design capacity is 0.205 million gallons per day and it receives an average daily flow of 0.077 million gallons per day. The WTP serves approximately 670 customer accounts, primarily single family residential with a small amount of vacant or undeveloped land. The McNeely Lake collection system contains approximately 23,000 linear feet of pipe, consisting primarily of 8" vitrified clay pipe (VCP) constructed from the 1960's to the present. There are three pump stations and no overflows in the service area. Figures 37 and 38 show the McNeely Lake service area.





Figures 37 and 38 – McNeely Lake Service Area and Landuse

8.13.1 McNeely Lake Flow Monitoring

<u>Priority SSO Flow Monitoring Part 2: Pond Creek</u>

The McNeely Lake area was monitored as part of the Priority SSO Flow Monitoring Part 2 project which is discussed in section 6.2.1.2. Refer to Figure 11 in section 6 for a map of the McNeely Lake Flow Monitoring Basins

8.13.2 McNeely Lake Sanitary Sewer Evaluation Study (SSES)

The objective of this study was to determine where the sanitary sewer system in the McNeely Lake study area is subject to excessive I/I in order to prioritize and phase rehabilitation. The study included the following components to identify active and potential sources of I/I:

- Gathering and reviewing existing pertinent data (LOJIC, IMS) to evaluate the quantity of I/I entering the sewer system;
- Conducting a flow-monitoring program to monitor rain events and measure wastewater flows at key points in the sewer system (9 meters for 45 days);

- Conducting physical inspections of manholes to identify corrosion and structural defects that may be contributing excessive I/I (688 manholes);
- Conducting smoke testing to identify structural defects that may contribute to I/I (165,000 linear feet);
- Conducting TV inspections, dyed-water flooding, and flow isolations in a limited amount of the system to identify structural defects that may contribute I/I to the system and blockages that may be inhibiting efficient hydraulic flow (41,000 linear feet of TVI);
- Compiling and analyzing data generated during the SSES to quantify the amount of excessive I/I entering the system and prioritize basins for rehabilitation.

Based on the flow-monitoring results, Sites 6 and 7 (The Pines), Site 8 (Pleasant Valley), and Sites 9 and 10 (Apple Valley) contributed over two-thirds of the I/I measured in the McNeely Lake service area. The Pines sub-basin (Sites 6 and 7) and Pleasant Valley (Site 8) also appeared to have the worst steady-state infiltration problem. Field inspection results confirmed that the Pines and Pleasant Valley also had significant main line defects, although manhole condition appeared to be sound. Flow-monitoring also showed an unusually large baseflow in the Pines (Site 7).

Field inspection results indicated extensive manhole defects in the Apple Valley and Maple Grove subdivisions. Manhole inspection results indicated a significant H_2S deterioration problem for the manholes in the Apple Valley system, which could explain the large wet weather contribution. Maple Grove displayed a significant number of manhole defects, but field inspection did not reveal mainline structural problems as extensive as those found in the Pines and Pleasant Valley. Old Maple Grove and McNeely Lake had limited manhole and main line defects identified during the SSES and did not appear to be major I/I contributors (on a relative scale) to the system. This project was completed in December 1999 and cost approximately $494,000.

The significant manhole chimney and pipe defects identified in this study were repaired under the McNeely Lake Phases 1A and 1B Rehabilitation projects. Refer to Figure 12 in section 6 for a map of the McNeely Lake SSES study area.

8.13.3 McNeely Lake Computer Modeling

<u>Pond Creek</u>

The McNeely Lake area was modeled as part of the Pond Creek Hydraulic Model project which is discussed in section 6.2.1.4. Refer to Figure 13 in section 6 for a map of the hydraulic model study areas in the McNeely Lake system.

8.13.4 McNeely Lake Rehabilitation

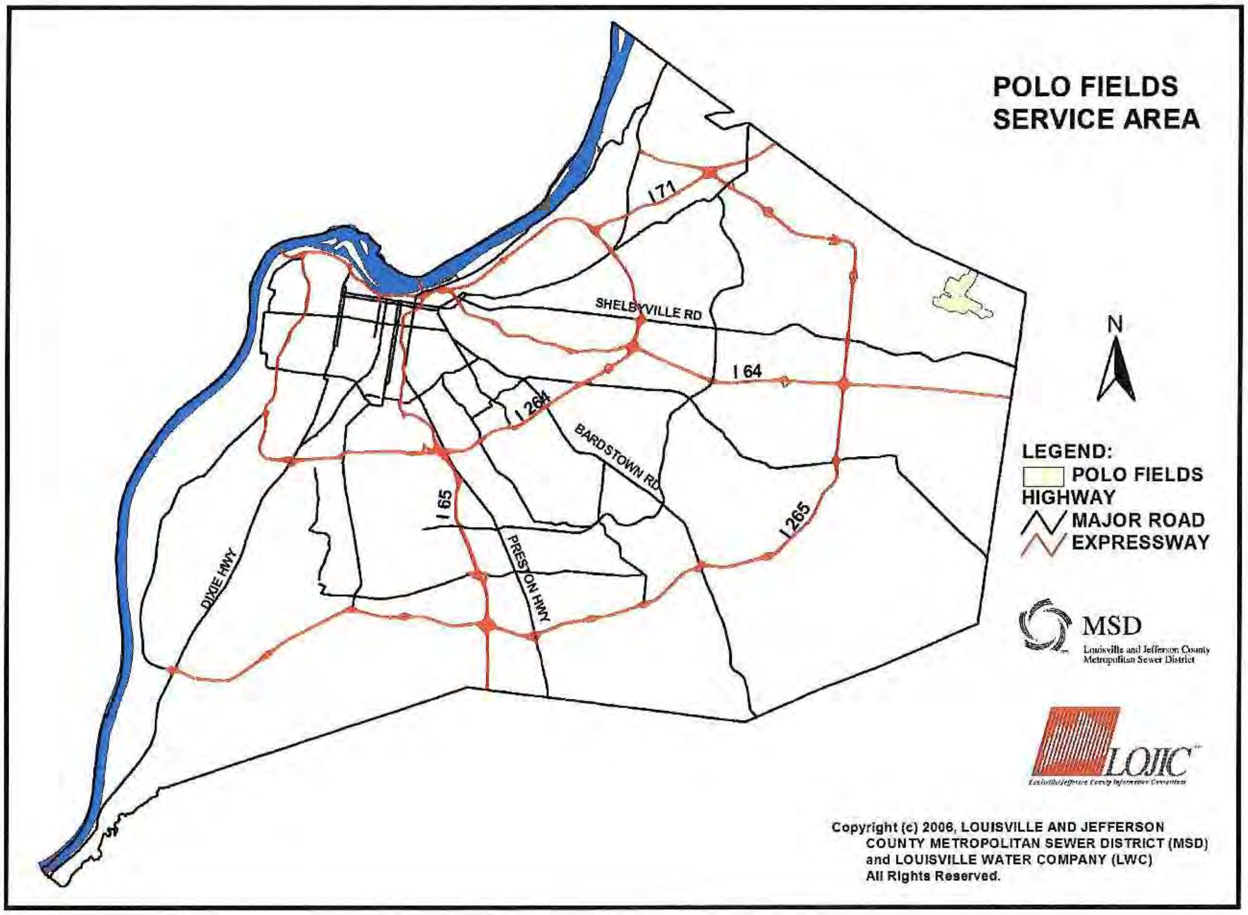
<u>McNeely Lake I/I Rehabilitation Phase 1A</u>

This project provided for the rehabilitation of defects identified in the McNeely Lake SSES. The rehabilitation effort consisted of 2,709 linear feet of cured-in-place sewer main rehabilitation, 56 cured-in-place lateral rehabilitations, and 644 manhole chimney seals. This effort addressed a portion of the defects identified in the McNeely Lake SSES conducted in FY99. A change order to this project incorporated rehabilitation of more than 100 manholes in the Cedar Creek Service

Area as well (see section 3.2.4). This project was completed in December 2000 and cost approximately $1,068,000. Refer to Figure 14 in section 6 for a map of the rehabilitation work conducted under the McNeely Lake Rehabilitation Phase 1A project.

8.14 POLO FIELDS WTP (MSD0285)

The Polo Fields Wastewater Treatment Plant was constructed in 1993. The plant's design capacity is 0.125 million gallons per day and it receives an average daily flow of 0.082 million gallons per day. The WTP serves approximately 900 customer accounts, primarily single family residential land. The Polo Fields collection system contains approximately 60,000 linear feet of pipe, consisting primarily of 8" polyvinyl chloride pipe (PVC) constructed during the 1990's and 2000's. This area has been placed under a moratorium on new connections. There are three pump stations in the service area and the plant has an associated overflow. Figures 39 and 40 show the Polo Fields service area.



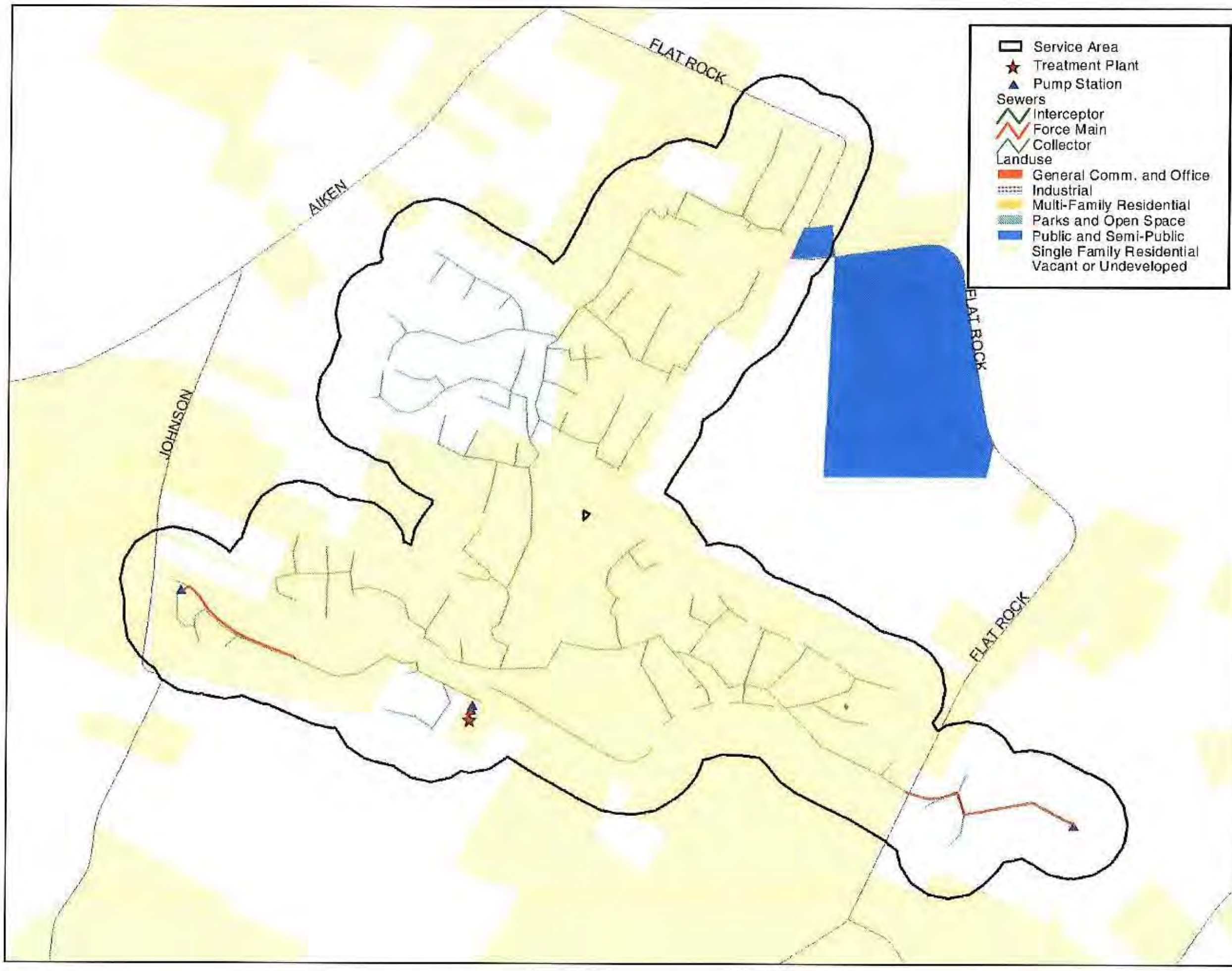
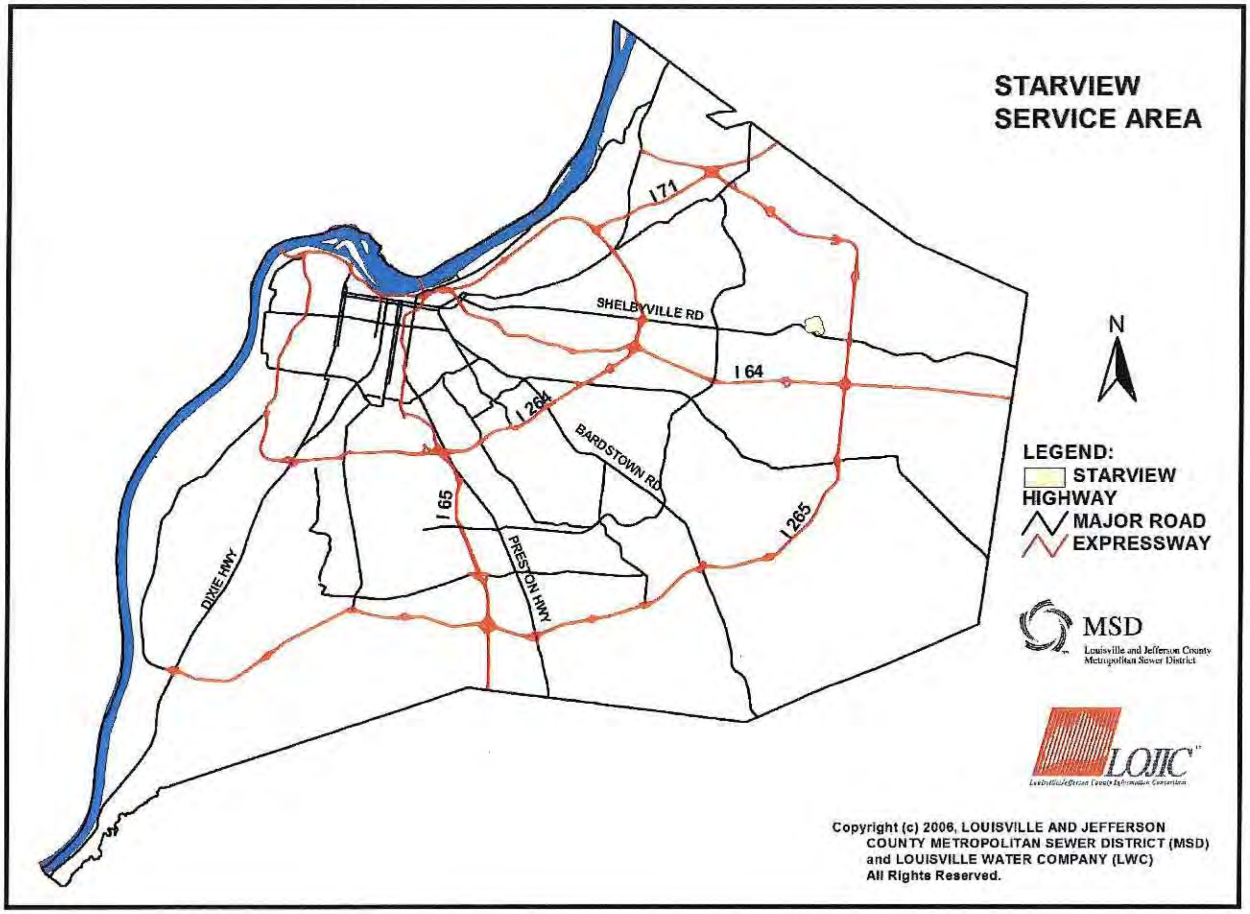
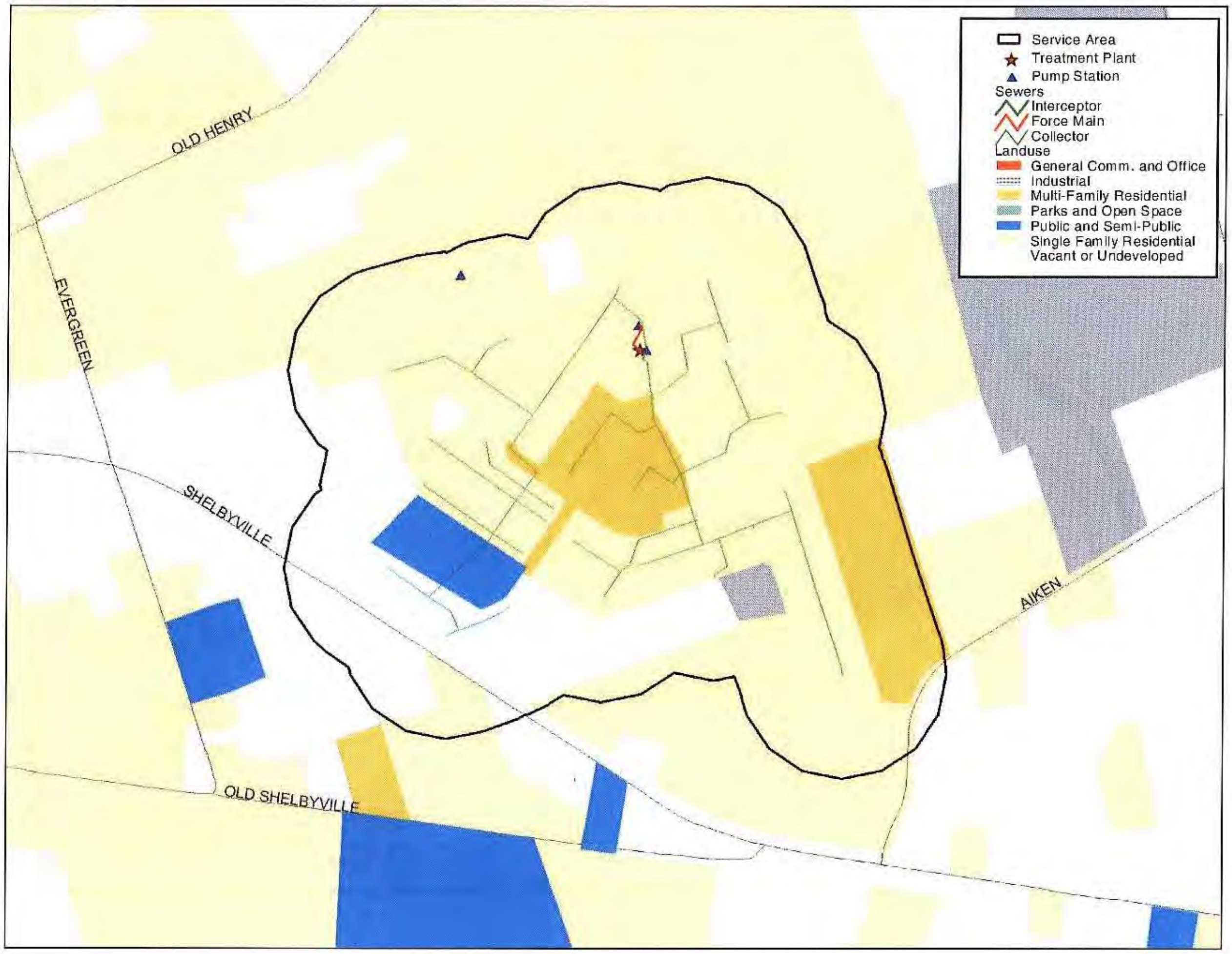


Figure 39 and 40 – Polo Fields Service Area and Landuse

8.15 STARVIEW WTP (MSD0247)

The Starview Wastewater Treatment Plant was constructed in 1971 and acquired by MSD in 1988. The plant's design capacity is 0.100 million gallons per day and it receives an average daily flow of 0.080 million gallons per day. The WTP serves approximately 400 customer accounts, primarily single family residential, multi-family residential, and a small amount of public land. The Starview collection system contains approximately 12,600 linear feet of pipe, consisting primarily of 8" vitrified clay pipe (VCP) constructed during the 1970's, 1990's and 2000's. There is one pump station in the service area and the plant has an associated overflow. Figures 41 and 42 show the Starview service area.

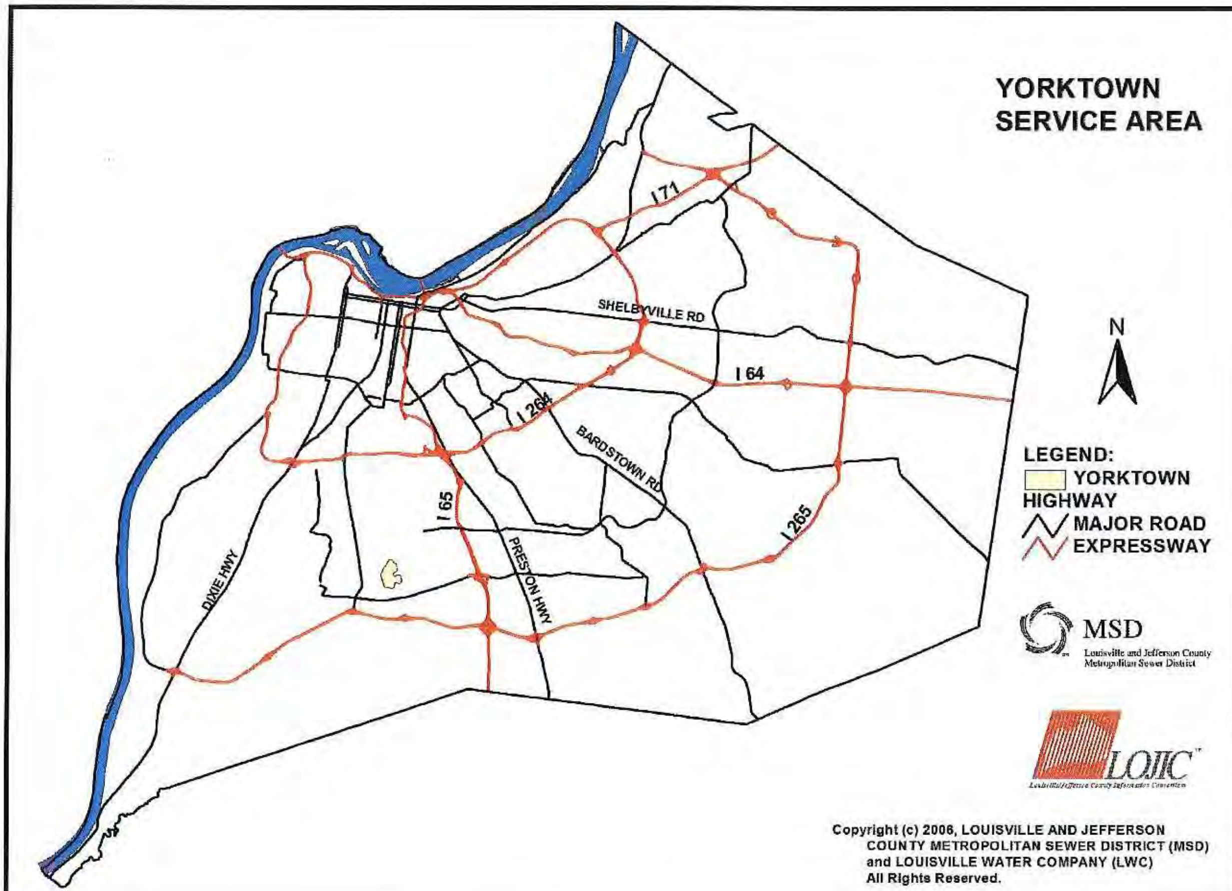

STARVIEW
SERVICE AREA
I 71
SHELBYVILLE RD
I 64
I 264
BARDSTOWN RD
I 65
PRESTON HWY
DIXIE HWY
I 265
N
LEGEND:
STARVIEW
HIGHWAY
MAJOR ROAD
EXPRESSWAY
MSD
LOJIC
Copyright (c) 2006, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) and LOUISVILLE WATER COMPANY (LWC) All Rights Reserved.



Figures 41 and 42 – Starview Service Area and Landuse

8.16 YORKTOWN WTP (MSD0271)

The Yorktown Wastewater Treatment Plant was constructed in 1968 and acquired by MSD in 1991. The plant's design capacity is 0.150 million gallons per day and it receives an average daily flow of 0.150 million gallons per day. The WTP serves approximately 300 customer accounts, primarily single family residential land. The Yorktown collection system contains approximately 14,000 linear feet of pipe, consisting primarily of 8" vitrified clay pipe (VCP) constructed during the 1960's and 1990's. There is one pump station and no overflows in the service area. Figures 43 and 44 show the Yorktown service area.


YORKTOWN
SERVICE AREA
I 71
SHELBYVILLE RD
I 64
I 264
BARDSTOWN RD
I 65
PRESTON HWY
DIXIE HWY
I 265
N
LEGEND:
YORKTOWN
HIGHWAY
MAJOR ROAD
EXPRESSWAY
MSD
LOJIC

Figures 43 and 44 – Yorktown Service Area and Landuse

MSD

Louisville-Jefferson County
Metropolitan Sewer District

9412 SLAYTON CR (UPSTREAM OF SILVER HEIGHTS PS)

MSD Facility 61683

Customer Service 587-0603

Report as of December 2005

Service Area: SILVER HEIGHTS

Yr	Num Overflows	Estimated Volume
2001	1	6,000 Gallons

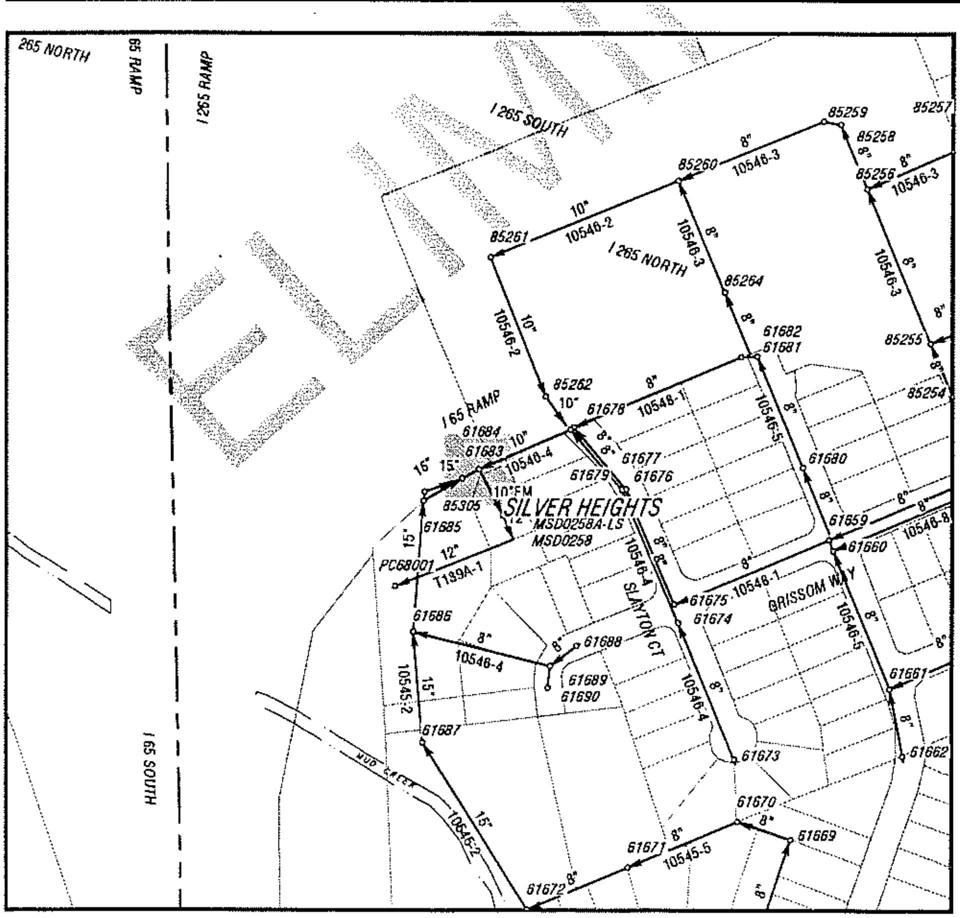
Background & History: This package plant was built in 1963 and acquired in 1990.

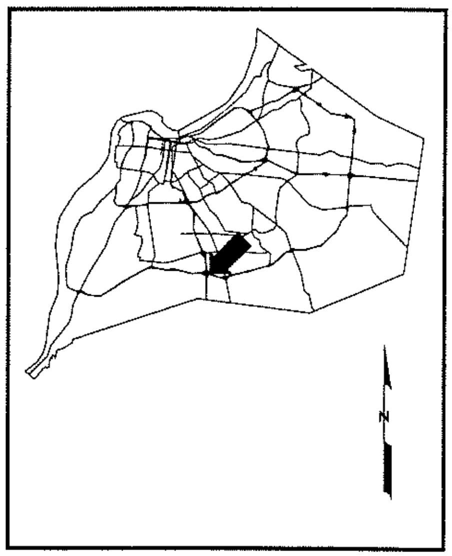
Pipe Size:
Inflow: 10"
Inflow: 15"
Outflow: 15"

Upstream Collection System Length: 36,300 L.F.
Watershed: POND CREEK
Discharge Type: CAPACITY
Discharged To: DITCH
Receiving Stream: MUD CREEK
Status: ELIMINATED

Downstream Landuse:

VACANT AND UNDEVELOPED	1.4 ac.
SINGLE FAMILY RESIDENTIAL	1.1 ac.





Metro: MAO20

Atlas Map: BW224

Scale 1" = 400 '

FERN HILL WTP

MSD

Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility MSD0234

Customer Service 587-0603 **Report as of** December 2005

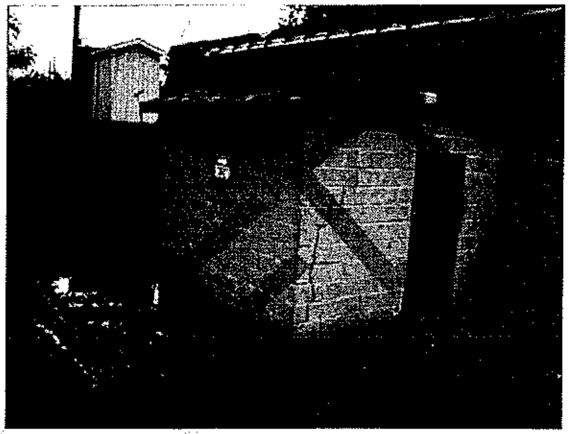
Service Area: FERN HILL WTP

Yr	Num Overflows	Estimated Volume
2004	3	208,000 Gallons
2003	1	20,000 Gallons
2002	5	189,000 Gallons
2001	3	302,000 Gallons

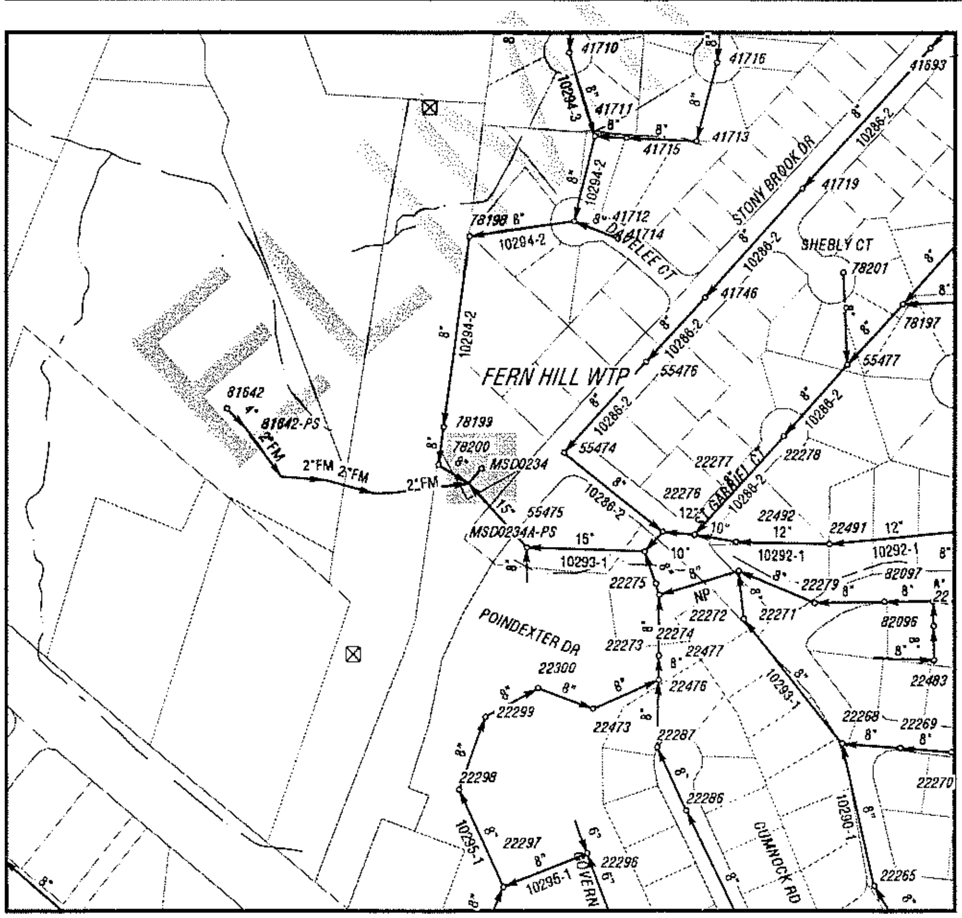
Background & History: This package plant was built in 1972, acquired in 1986. This location has been eliminated.

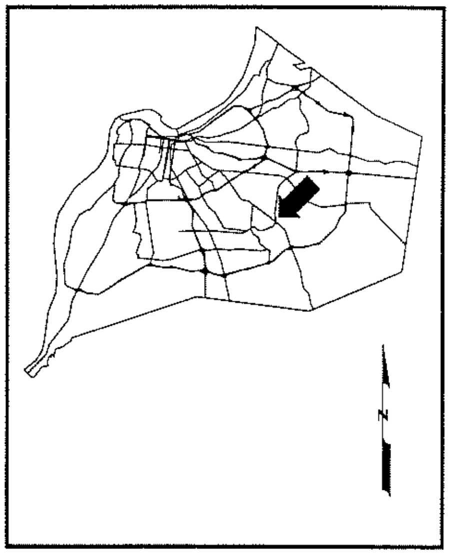
Pipe Size:
inflow: 6"

Upstream Collection System Length: 33,600 L.F.
Watershed: POND CREEK
Discharge Type: CAPACITY
Discharged To: DITCH
Receiving Stream: FERN CREEK
Status: ELIMINATED



Downstream Landuse:





Metro: MAN22
Atlas Map: BM234

Scale 1" = 400 '

MSD

Louisville-Jefferson County Metropolitan Sewer District

ENGLISH STATION

MSD Facility MSD0270

Customer Service 587-0603

Report as of December 2005

Service Area:

Yr	Num Overflows	Estimated Volume
2001	2	3,000 Gallons

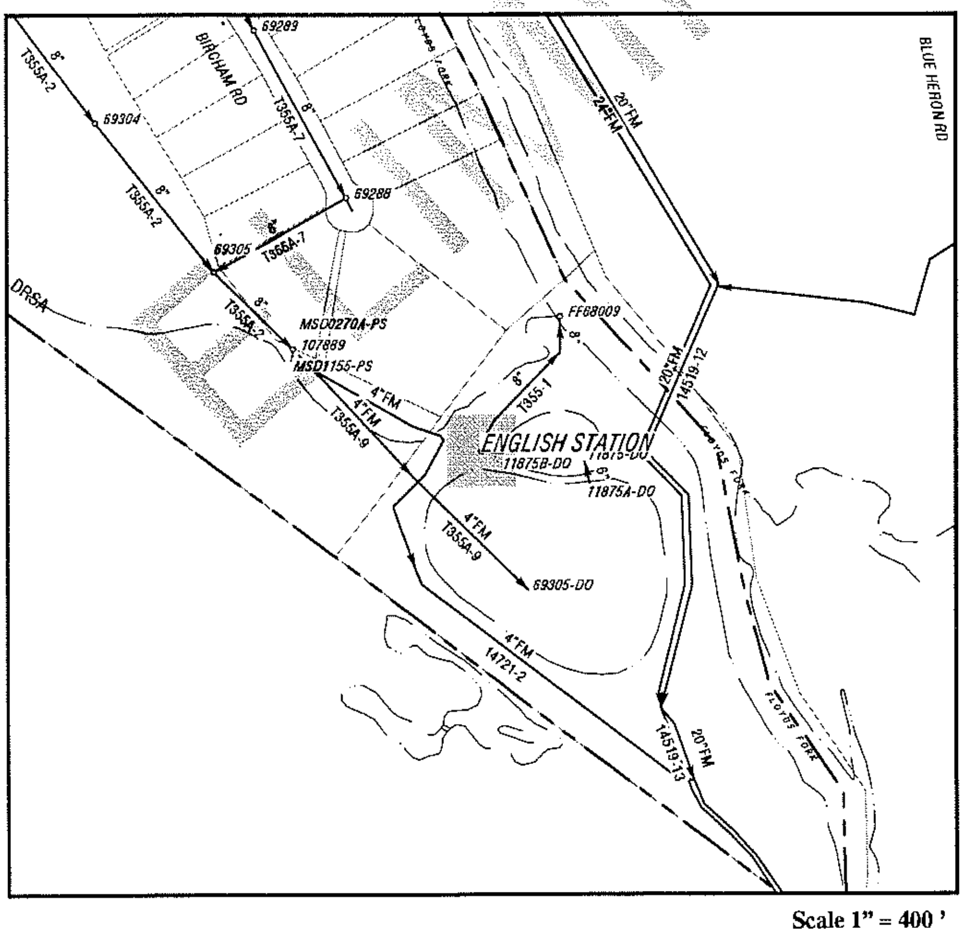
Background & History:

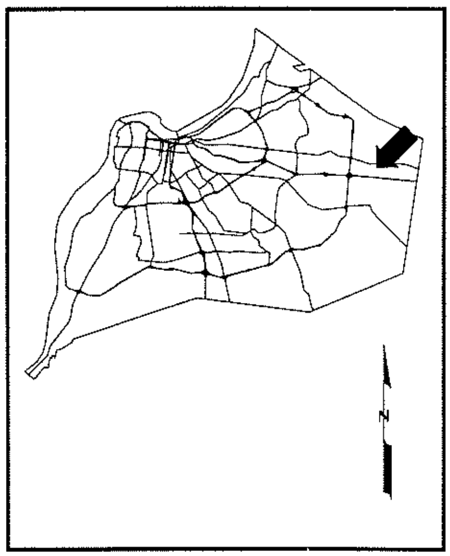
Pipe Size:
Inflow: 6"
Outflow: 8"

Upstream Collection System Length: 44 L.F.
Watershed: FLOYDS FORK
Discharge Type: PUMPED
Discharged To: GROUND
Receiving Stream: FLOYDS FORK
Status: ELIMINATED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	2.1 ac.
VACANT AND UNDEVELOPED	0 ac.





Metro: MAL25

Atlas Map: BA246

Scale 1" = 400 '

MSD
Louisville-Jefferson County
Metropolitan Sewer District

SOUTH BECKLEY STATION

MSD Facility MSD1083-PS

Customer Service 587-0603

Report as of December 2005

Service Area:

Yr	Num Overflows	Estimated Volume
2001	1	1,500 Gallons

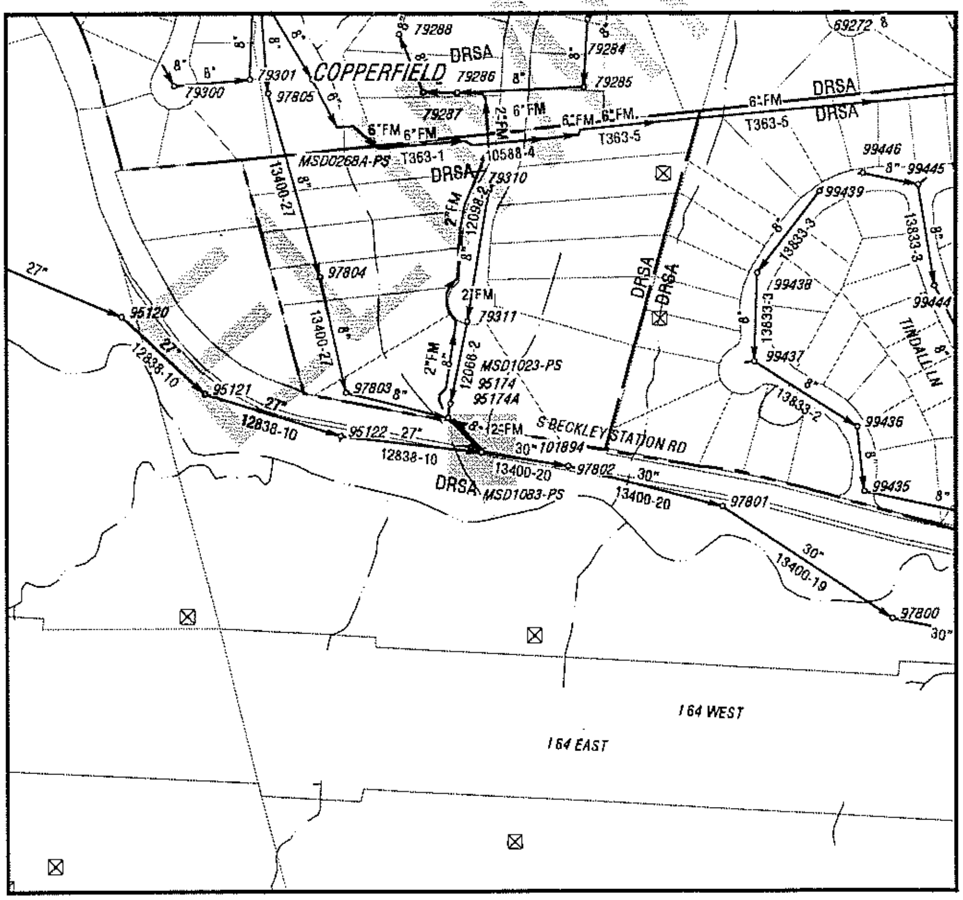
Background & History:

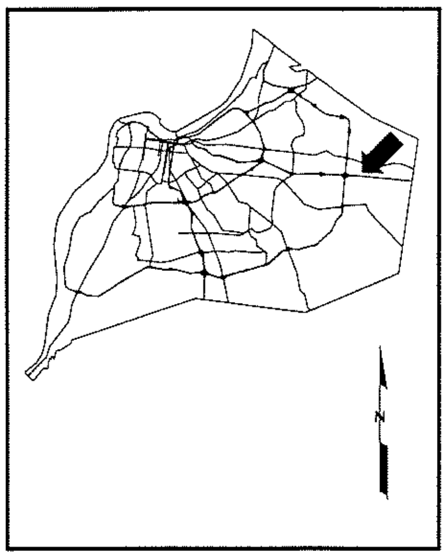
Pipe Size:
Outflow: 1.5"

Upstream Collection System Length: 0 L.F.
Watershed: FLOYDS FORK
Discharge Type: CAPACITY
Discharged To: GROUND
Receiving Stream: FLOYDS FORK
Status: ELIMINATED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	1 ac.
VACANT AND UNDEVELOPED	0 ac.





Metro: MAL25
Atlas Map: BC244

Scale 1" = 400 '

LAKE FOREST PW / END OF ST

MSD

Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility 84571

Customer Service 587-0603 | **Report as of December 2005**

Service Area: LAKE FOREST

Yr	Num Overflows	Estimated Volume
2002	2	170,000 Gallons

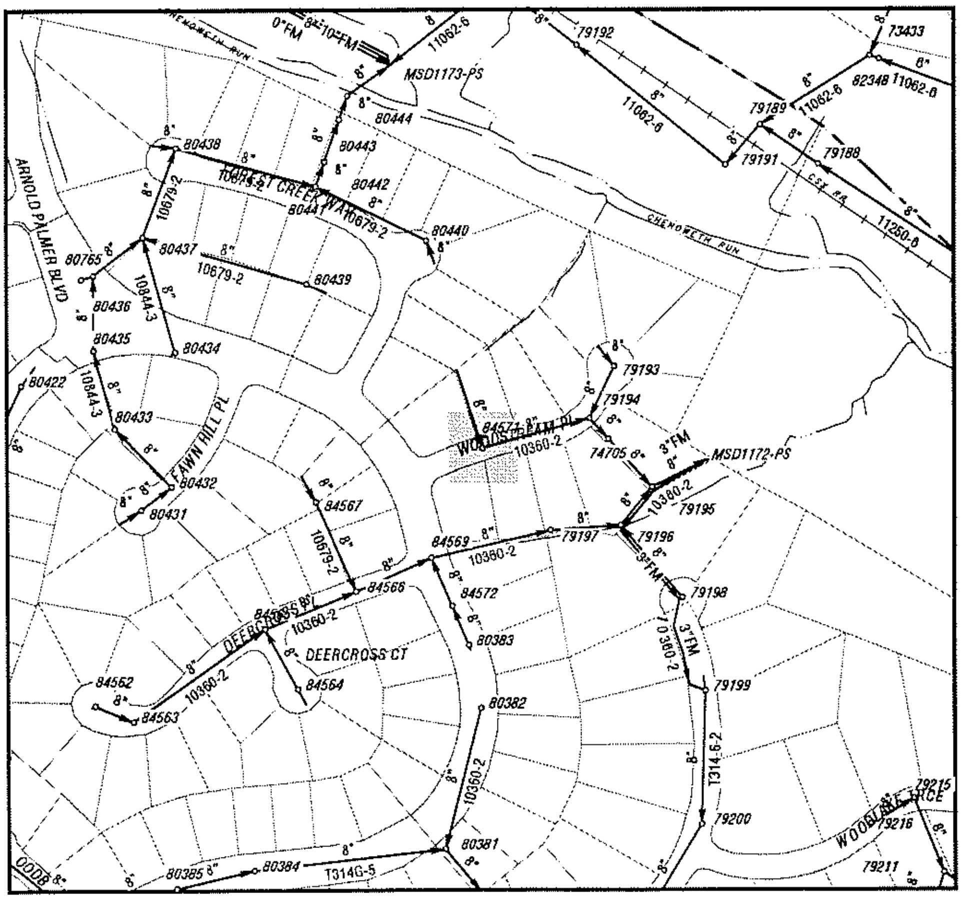
Background & History:

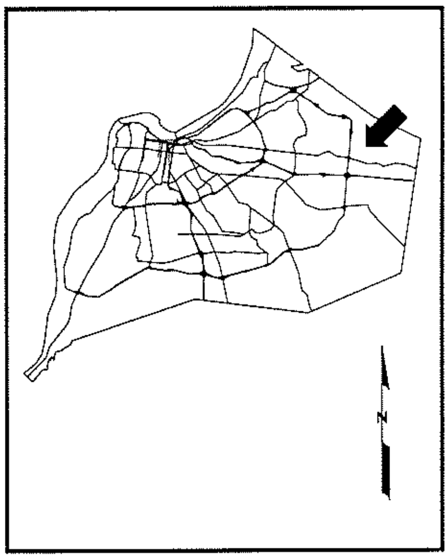
Pipe Size:
Inflow: 8"
Outflow: 8"

Upstream Collection System Length: 168 L.F.
Watershed: FLOYDS FORK
Discharge Type: CAPACITY
Discharged To:
Receiving Stream:
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	20.1 ac.
VACANT AND UNDEVELOPED	2.7 ac.
PARKS, CEMETERIES, ETC.	0.2 ac.





Metro: MAL25
Atlas Map: AW244

Scale 1" = 400 '

WET WELL MANHOLE - OVERFLOW LOCATION FOR NOTTINGHAMSHIRE PS - EA 180' NE

MSD Facility 41544-W

MSD
Louisville-Jefferson County Metropolitan Sewer District

Customer Service 587-0603

Report as of December 2005

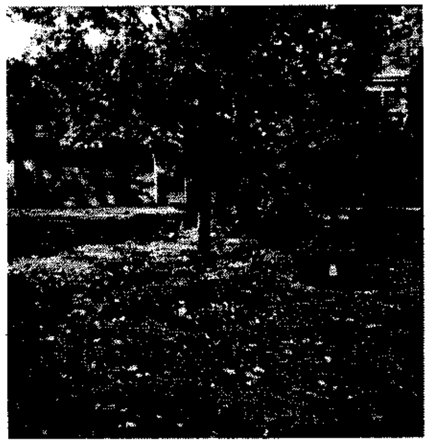
Service Area: NOTTINGHAM HILLS

Yr	Num Overflows	Estimated Volume
2005	1	3,000 Gallons
2004	11	321,000 Gallons
2003	6	678,000 Gallons
2002	6	682,000 Gallons
2001	3	803,000 Gallons

Background & History: This pump station was acquired in 1987 as part of the Nottingham Hills treatment system.

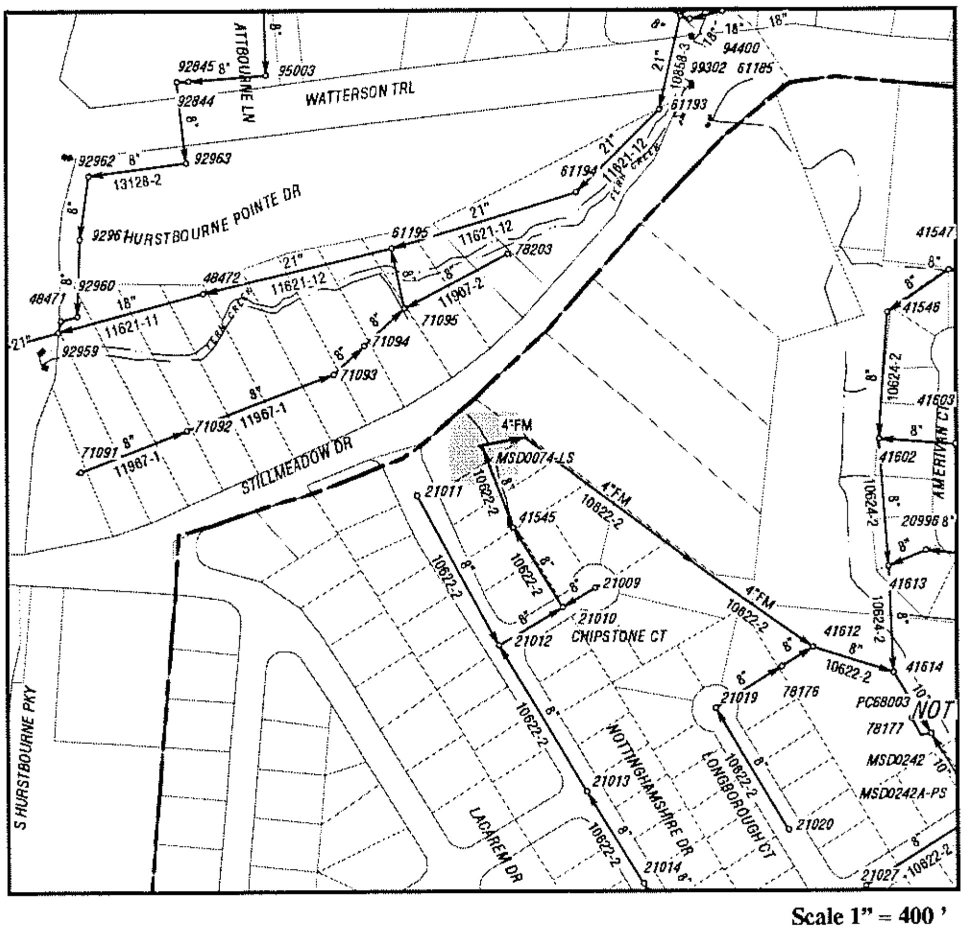
Pipe Size:
Inflow: 8"
Outflow: 8"

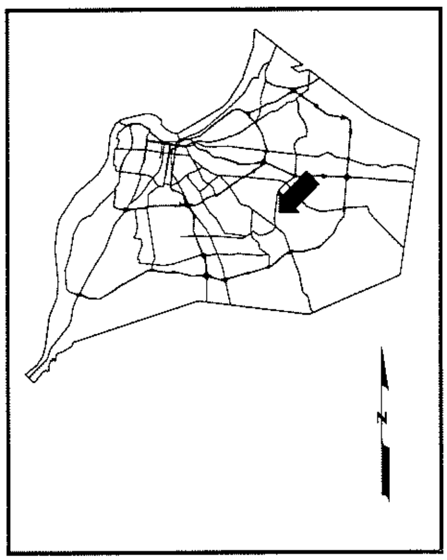
Upstream Collection System Length: 5,250 L.F.
Watershed: POND CREEK
Discharge Type: PUMPED
Discharged To: DITCH
Receiving Stream: FERN CREEK
Status: DOCUMENTED



Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	4 ac.
VACANT AND UNDEVELOPED	2.1 ac.





Metro: MAM22

Atlas Map: BK234

Scale 1" = 400 '

KEN CARLA

MSD
Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility MSD0208

Customer Service 587-0603

Report as of December 2005

Service Area: KEN CARLA

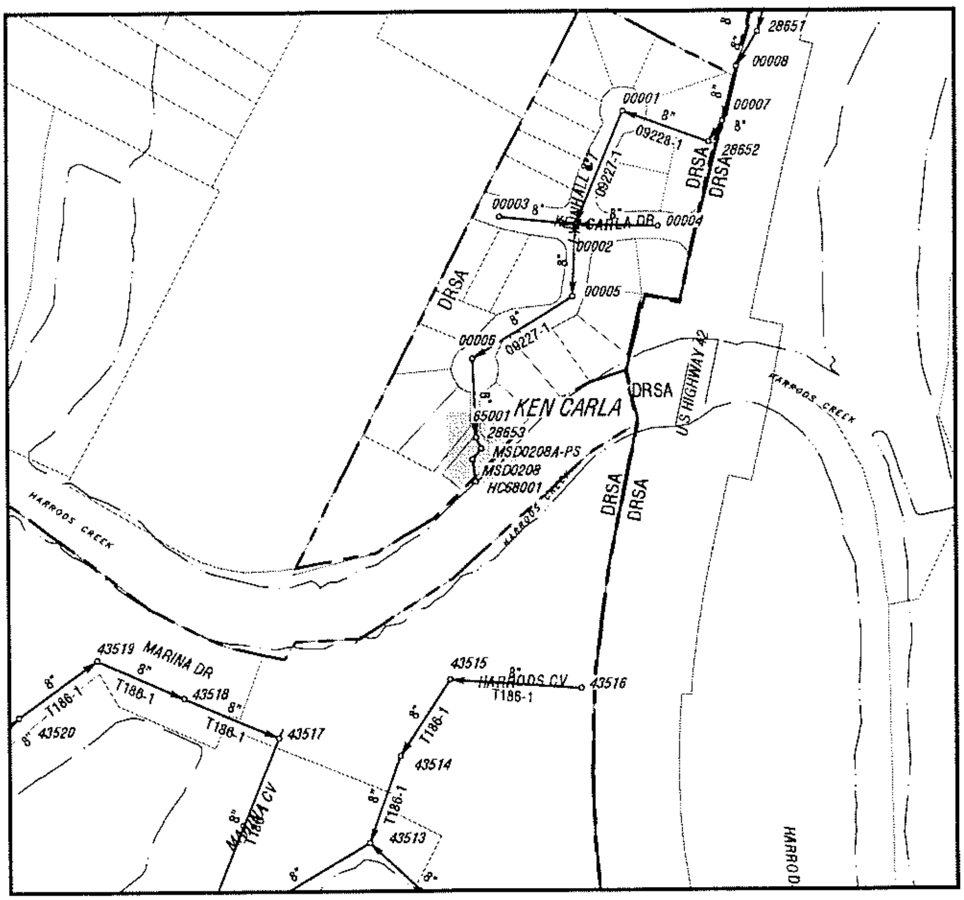
Yr	Num Overflows	Estimated Volume
2004	1	1,500 Gallons

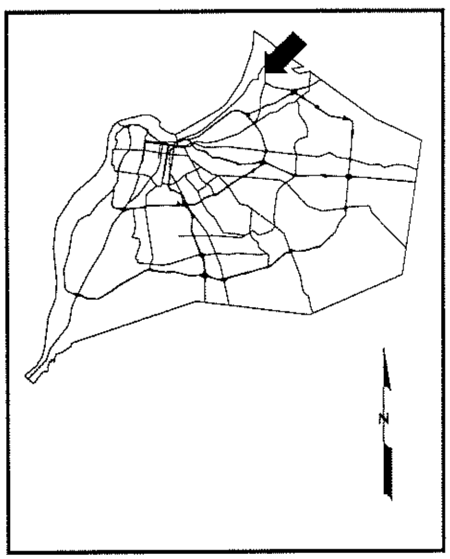
Background & History:
Pipe Size:
Inflow: 4"
Outflow: 8"

Upstream Collection System Length: 1,830 L.F.
Watershed: HARRODS CREEK
Discharge Type: CONSTRUCTED
Discharged To: STREAM
Receiving Stream: HARRODS CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	0.5 ac.
VACANT AND UNDEVELOPED	0.5 ac.





Metro: MAJ22

Atlas Map: AI232

Scale 1" = 400 '

MSD

Louisville-Jefferson County
Metropolitan Sewer District

KEN CARLA

MSD Facility MSD0208A-PS

Customer Service 587-0603

Report as of December 2005

Service Area: KEN CARLA

Yr	Num Overflows	Estimated Volume
2004	1	10,000 Gallons

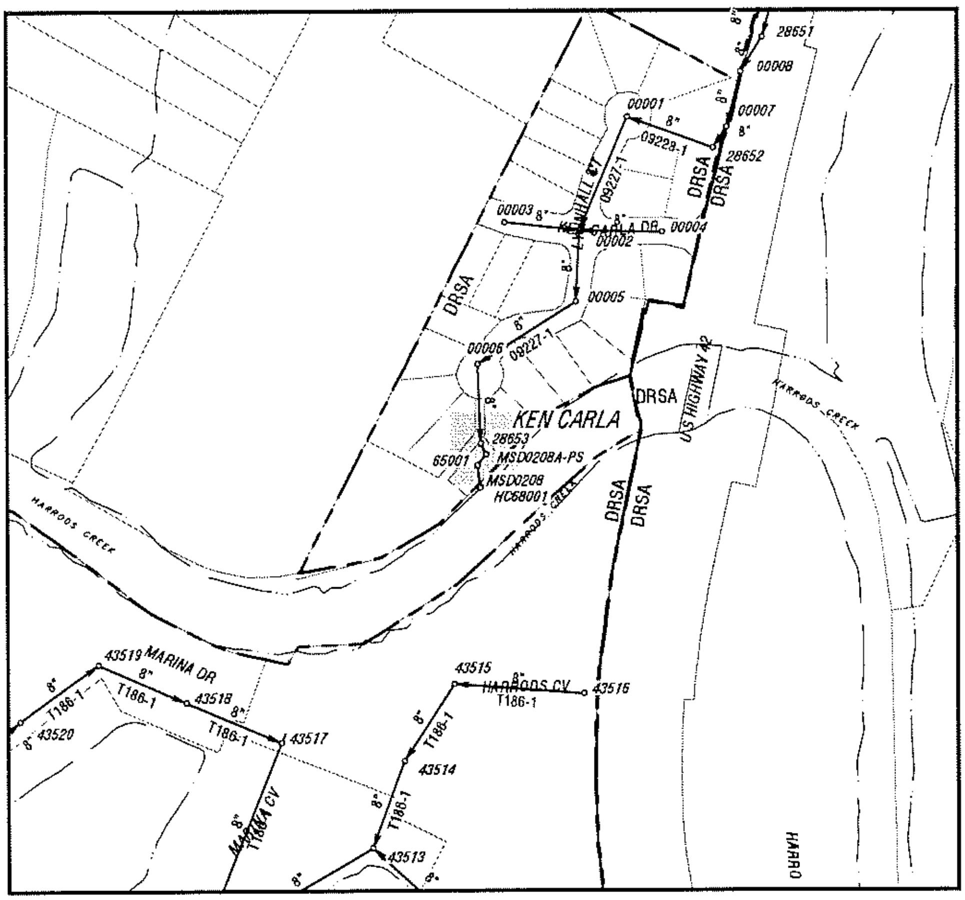
Background & History:

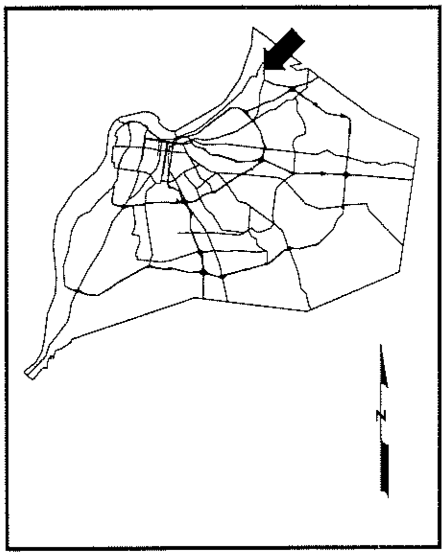
Pipe Size:
Inflow: 8"
Outflow: 4"

Upstream Collection System Length: 1,820 L.F.
Watershed: HARRODS CREEK
Discharge Type: CONSTRUCTED
Discharged To: STREAM
Receiving Stream: HARRODS CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	0.6 ac.
VACANT AND UNDEVELOPED	0.5 ac.





Metro: MAJ22

Atlas Map: AI232

Scale 1" = 400 '

BERRYTOWN WTP

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility MSD0209

Customer Service 587-0603

Report as of December 2005

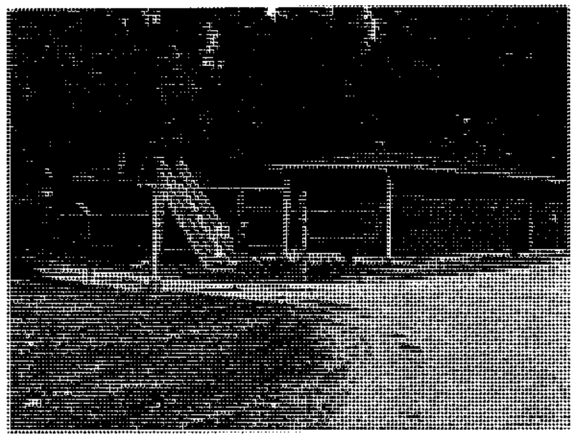
Service Area: BERRYTOWN WTP

Yr	Num Overflows	Estimated Volume
2004	1	100,000 Gallons
2003	5	43,500 Gallons
2002	7	50,500 Gallons
2001	1	2,000 Gallons

Background & History: After upgrades are finished to the second plant at the site, there will be enough tank capacity to add a third influent pump and not run the risk of flooding the tanks till they spill over.

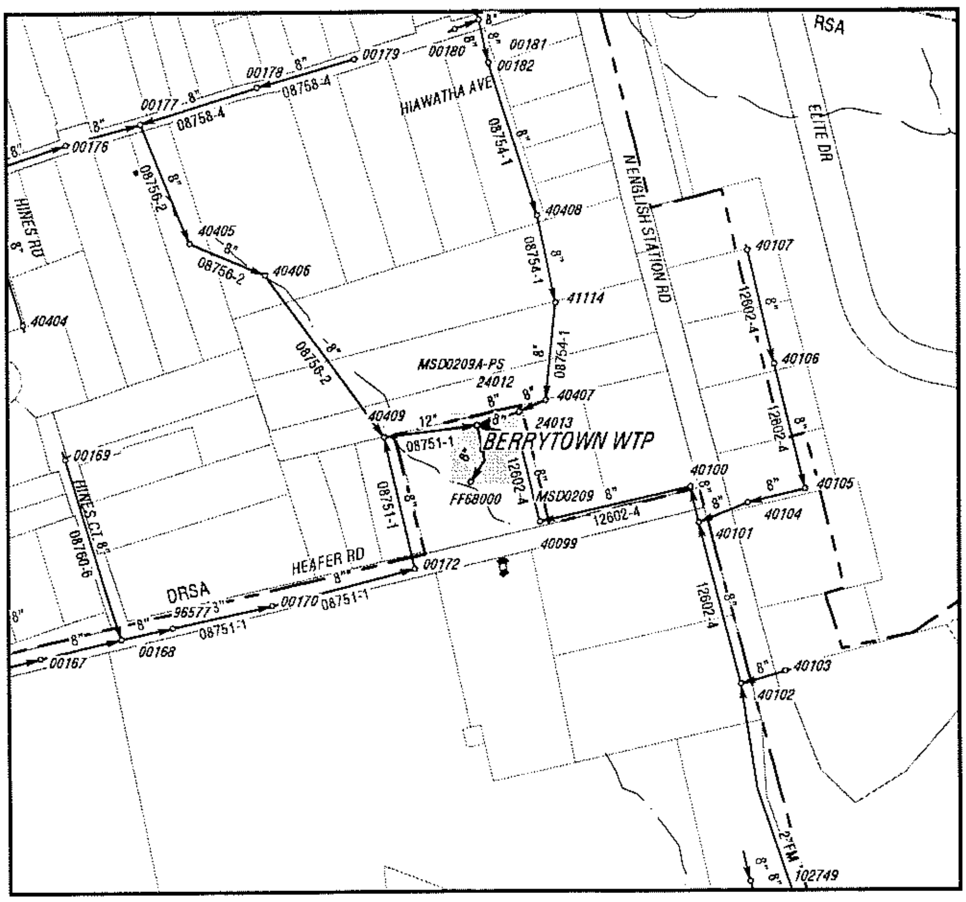
Pipe Size:
Inflow: 6"
Outflow: 6"

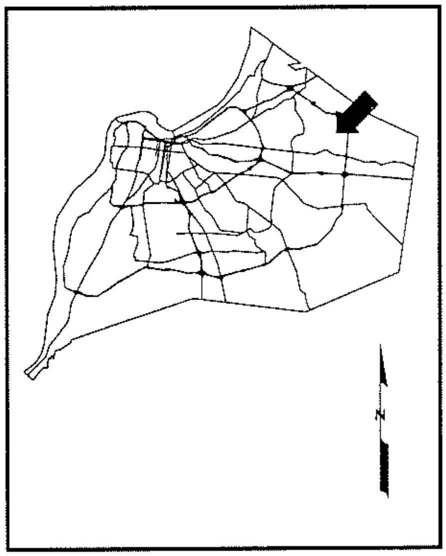
Upstream Collection System Length: 35,000 L.F.
Watershed: FLOYDS FORK
Discharge Type: CAPACITY
Discharged To: STREAM
Receiving Stream: FLOYDS FORK
Status: DOCUMENTED



Downstream Landuse:

VACANT AND UNDEVELOPED	0 ac.
SINGLE FAMILY RESIDENTIAL	1 ac.





Metro: MAK24

Atlas Map: AU242

Scale 1" = 400 '

BERRYTOWN

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility MSD0209A-PS

Customer Service 587-0603

Report as of December 2005

Service Area: BERRYTOWN WTP

Yr	Num Overflows	Estimated Volume
2001	1	600 Gallons

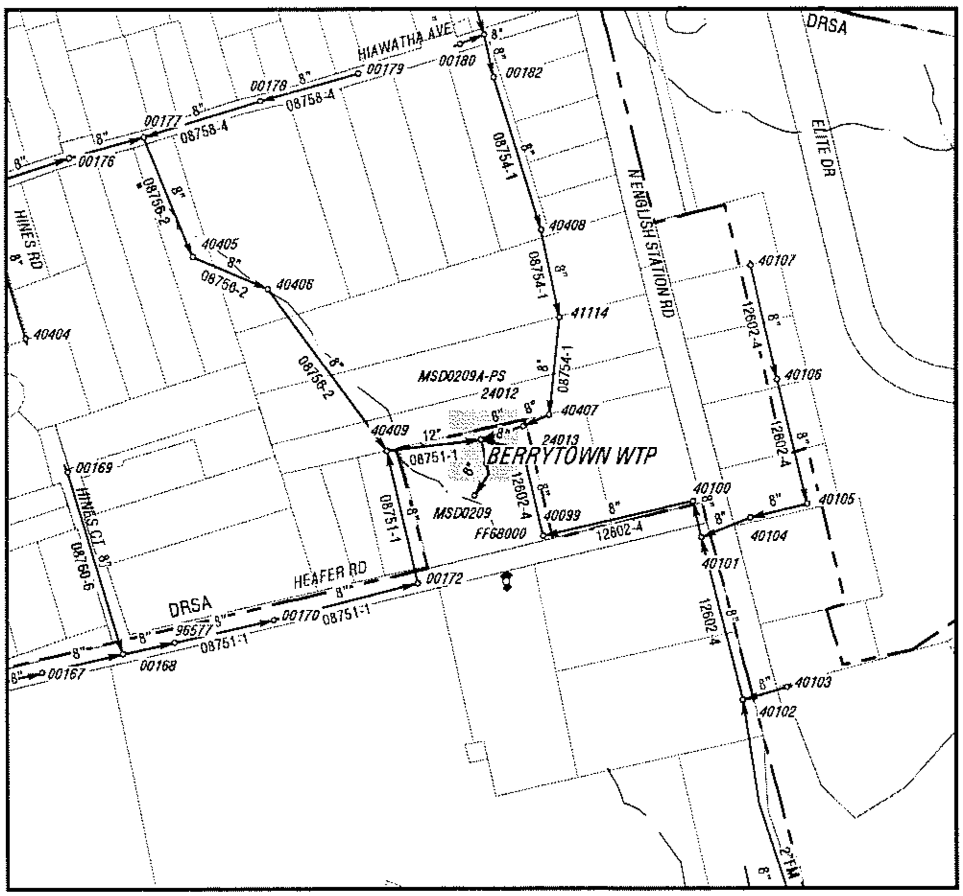
Background & History:

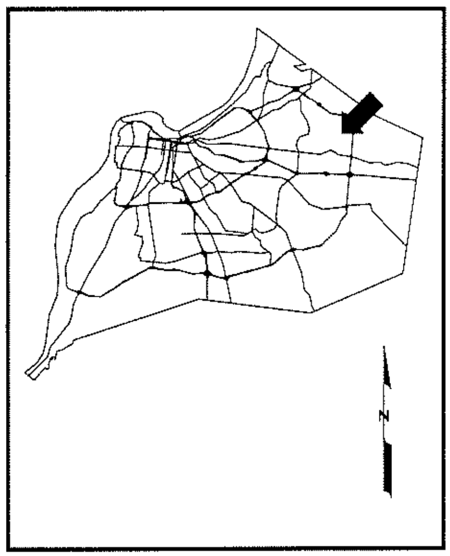
Pipe Size:
Inflow: 12"
Outflow: 6"

Upstream Collection System Length: 35,000 L.F.
Watershed: FLOYDS FORK
Discharge Type: PUMPED
Discharged To: GROUND
Receiving Stream: FLOYDS FORK
Status: DOCUMENTED

Downstream Landuse:

VACANT AND UNDEVELOPED	0.2 ac.
SINGLE FAMILY RESIDENTIAL	1 ac.





Metro: MAK24
Atlas Map: AU242

Scale 1" = 400'

STARVIEW

MSD

Louisville-Jefferson County Metropolitan Sewer District

MSD Facility MSD0247

Customer Service 587-0603

Report as of December 2005

Service Area: STARVIEW

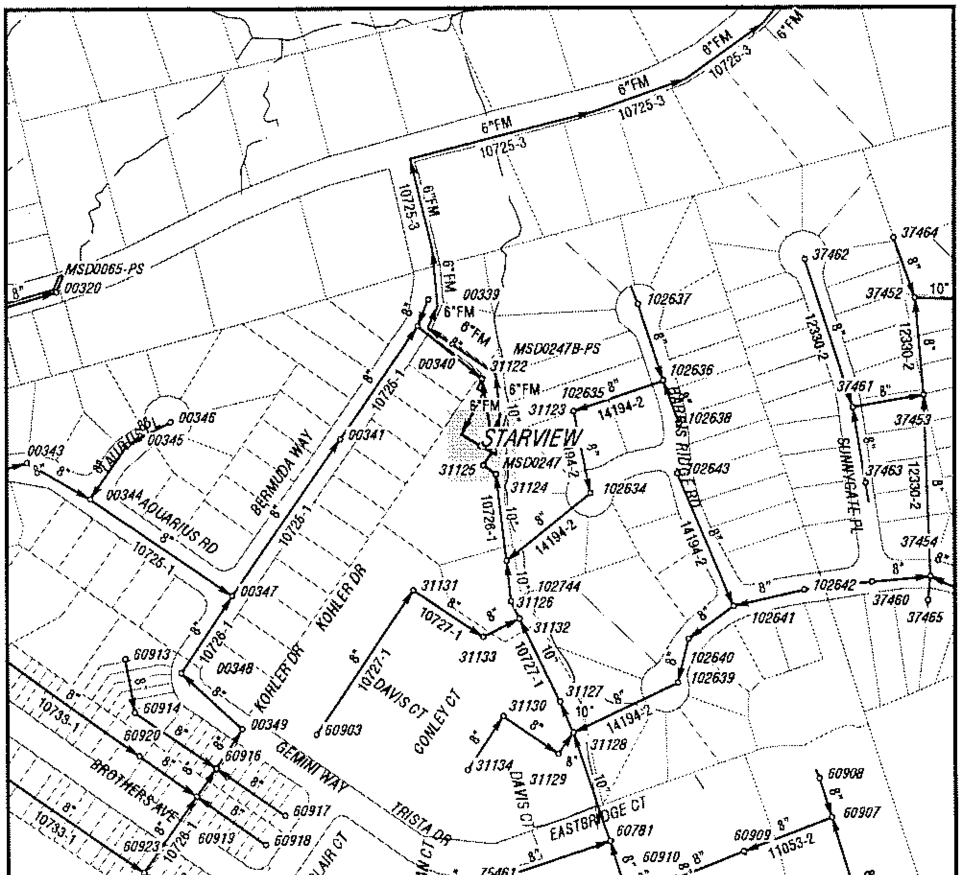
Yr	Num Overflows	Estimated Volume
2004	2	100,000 Gallons

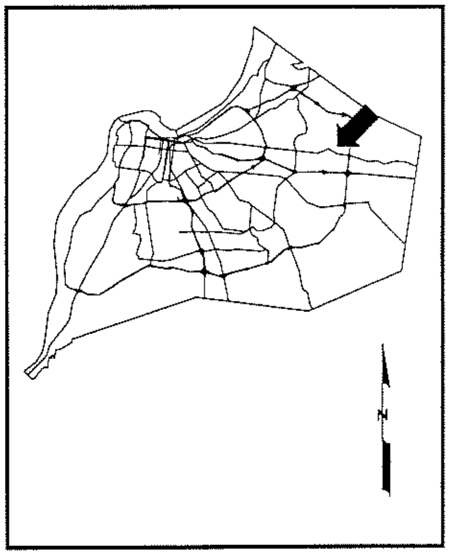
Background & History:

Pipe Size:
Inflow: 6"
Outflow: 6"

Upstream Collection System Length: 12,600 L.F.
Watershed: FLOYDS FORK
Discharge Type: CAPACITY
Discharged To: STREAM
Receiving Stream: FLOYDS FORK
Status: DOCUMENTED

Downstream Landuse:
SINGLE FAMILY RESIDENTIAL 11.3 ac.





Metro: MAL24
Atlas Map: AY240

Scale 1" = 400 '

MSD
Louisville-Jefferson County
Metropolitan Sewer District

CHENOWETH HILLS

MSD Facility MSD0263

Customer Service 587-0603 | **Report as of December 2005**

Service Area: CHENOWETH HILLS

Yr	Num Overflows	Estimated Volume
2002	1	5,000 Gallons

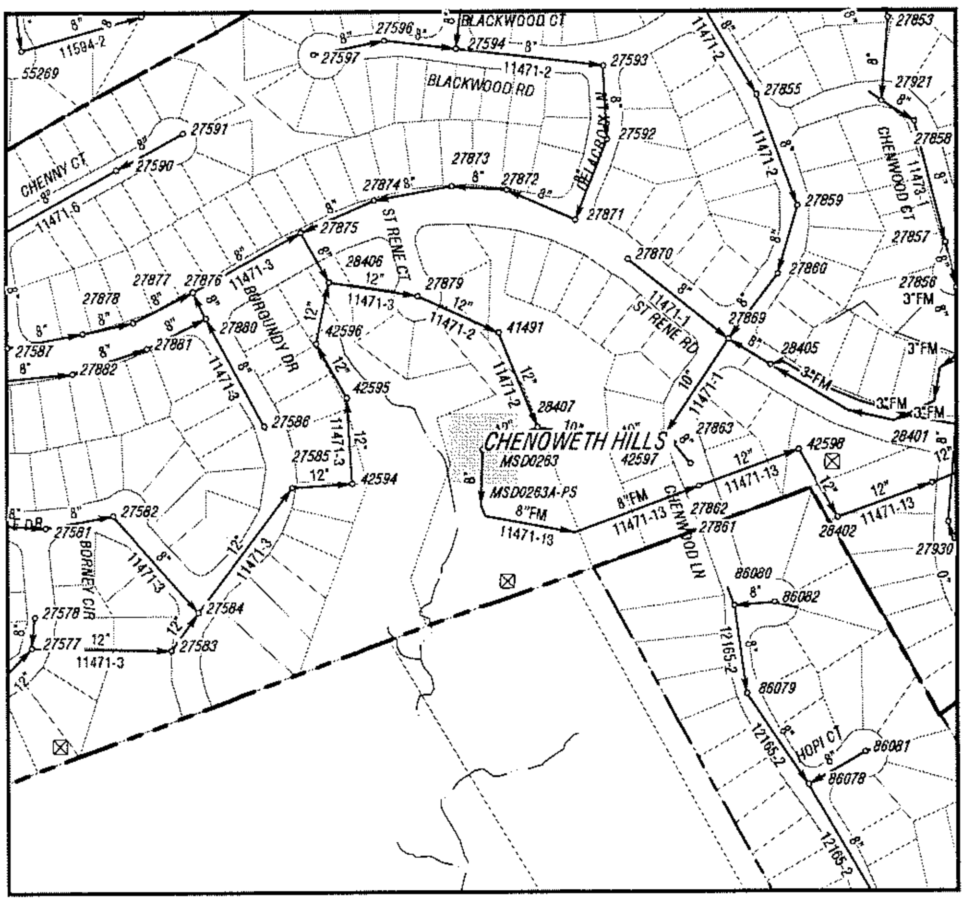
Background & History: This site was reported as an overflow during FY03. It will be monitored in the future.

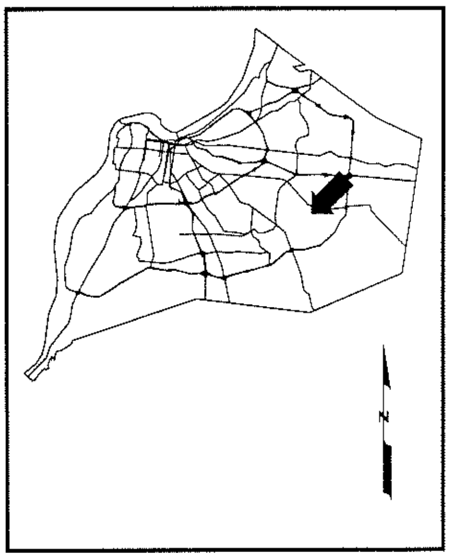
Pipe Size:
Inflow: 12"
Outflow: 8"

Upstream Collection System Length: 35,800 L.F.
Watershed: FLOYDS FORK
Discharge Type: CAPACITY
Discharged To: STREAM
Receiving Stream: CHENOWETH RUN
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	11.1 ac.
PARKS, CEMETERIES, ETC.	0 ac.





Metro: MAM23
Atlas Map: BK238

Scale 1" = 400 '

MSD

Louisville-Jefferson County
Metropolitan Sewer District

POLO FIELDS

MSD Facility MSD0285

Customer Service 587-0603

Report as of December 2005

Service Area: POLO FIELDS

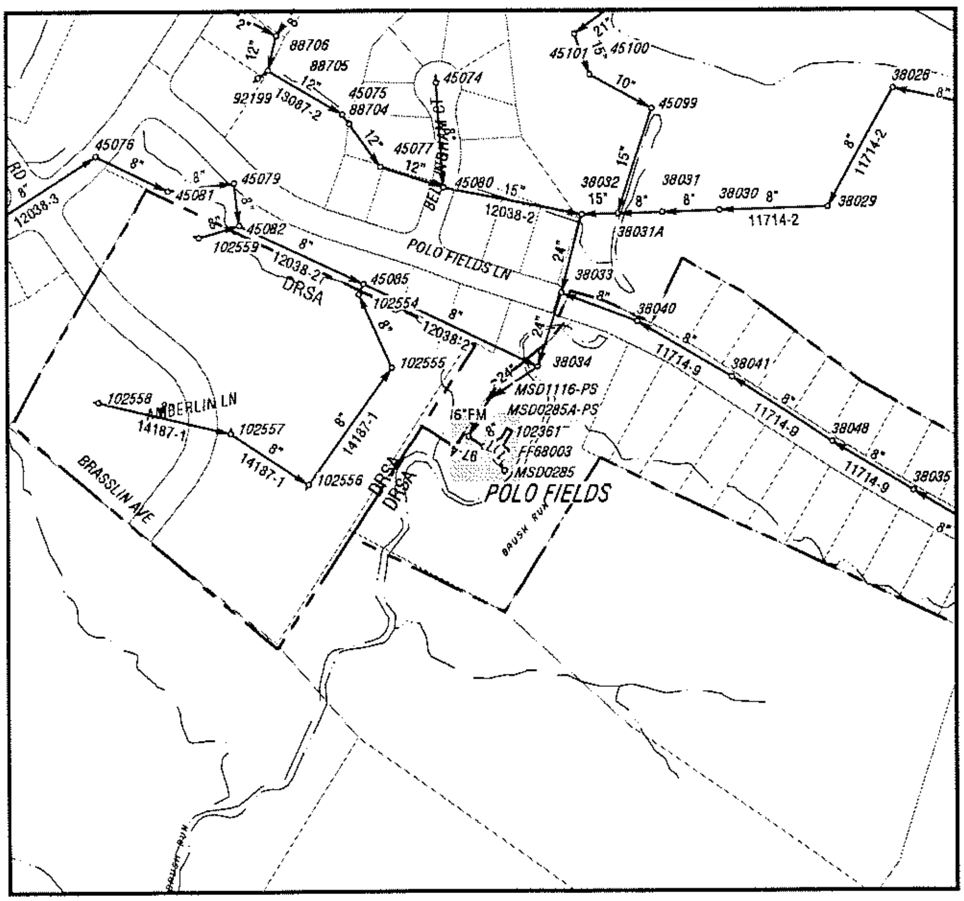
Yr	Num Overflows	Estimated Volume
2005	1	150,000 Gallons

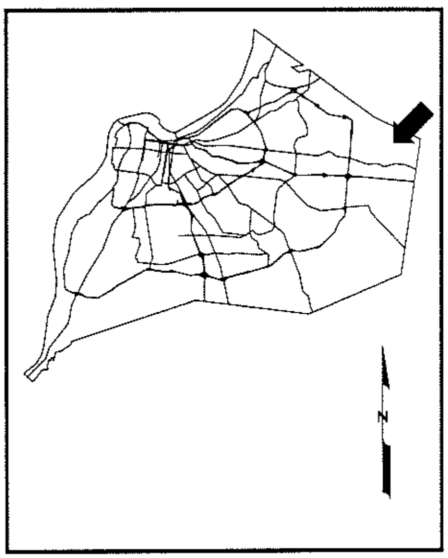
Background & History:

Pipe Size:
Inflow: 6"
Outflow: 8"

Upstream Collection System Length: 60,100 L.F.
Watershed: FLOYDS FORK
Discharge Type: CAPACITY
Discharged To: STREAM
Receiving Stream: BRUSH RUN
Status: DOCUMENTED

Downstream Landuse:
SINGLE FAMILY RESIDENTIAL 1.2 ac.





Metro: MAL26
Atlas Map: AW248

Scale 1" = 400'

WATTERSON WOODS WTP

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility MSD0298

Customer Service 587-0603 **Report as of December 2005**

Service Area: WATTERSON WOODS WTP

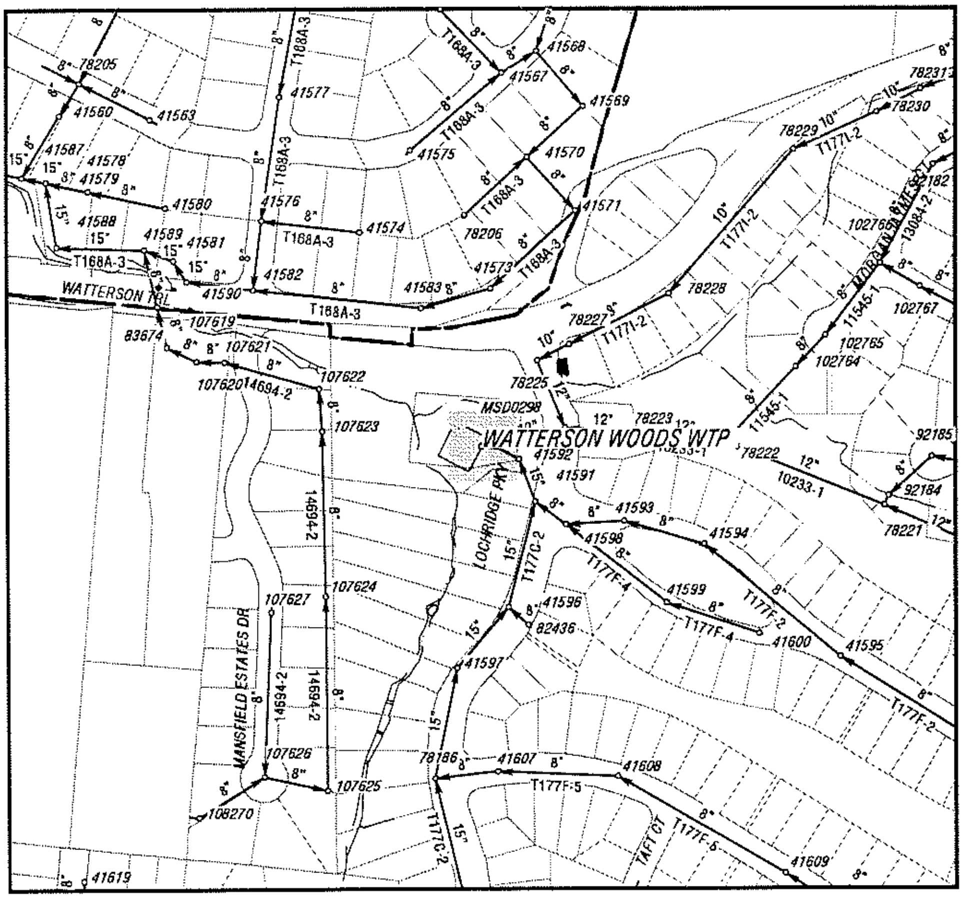
Yr	Num Overflows	Estimated Volume
2003	2	52,800 Gallons
2002	4	83,000 Gallons
2001	1	4,000 Gallons

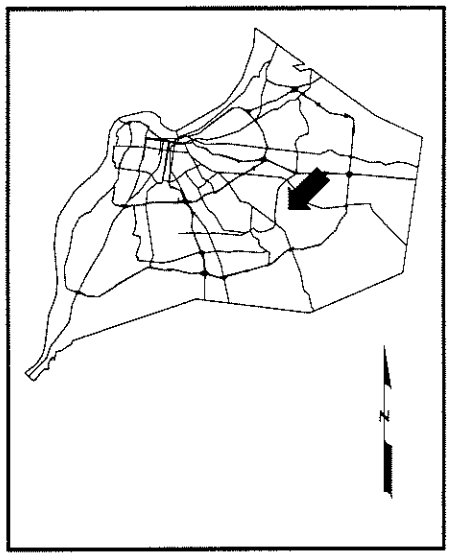
Background & History: This site was reported as an overflow during FY02 and will be monitored in the future.

Pipe Size:
Inflow: 12"

Upstream Collection System Length: 50,400 L.F.
Watershed: POND CREEK
Discharge Type: CAPACITY
Discharged To: GROUND
Receiving Stream: FERN CREEK
Status: DOCUMENTED

Downstream Landuse:





Metro: MAM22
Atlas Map: BK234

Scale 1" = 400 '

MSD

Louisville-Jefferson County Metropolitan Sewer District

LAKE FOREST

MSD Facility MSD0403

Customer Service 587-0603 | **Report as of December 2005**

Service Area: LAKE FOREST

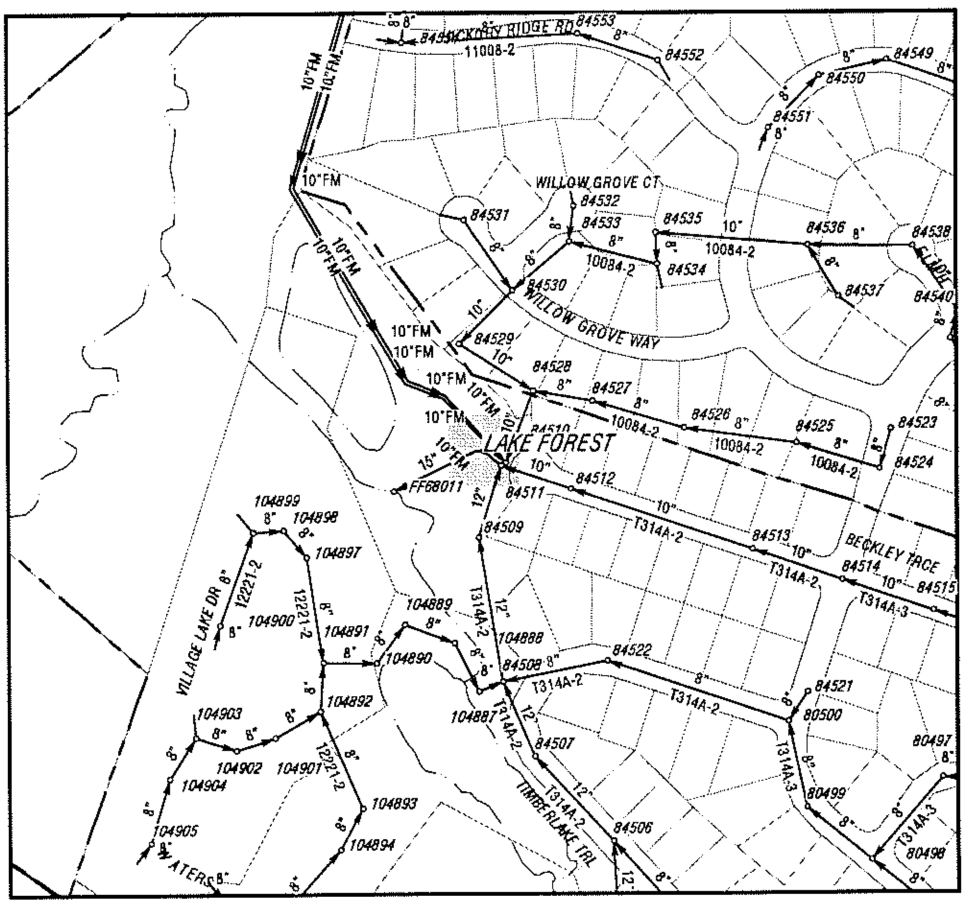
Yr	Num Overflows	Estimated Volume
2005	1	50,000 Gallons

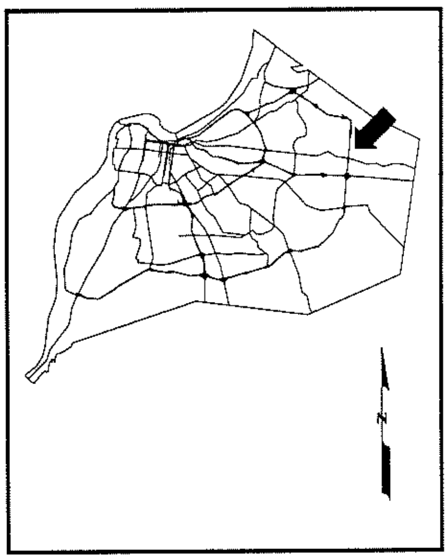
Background & History:

Pipe Size:
Inflow: 15"
Outflow: 15"

Upstream Collection System Length: 184,000 L.F.
Watershed: FLOYDS FORK
Discharge Type: CAPACITY
Discharged To:
Receiving Stream: CHENOWETH RUN
Status: DOCUMENTED

Downstream Landuse:
SINGLE FAMILY RESIDENTIAL 1.6 ac.





Metro: MAL25
Atlas Map: AY244

Scale 1" = 400 '

CREEL DR

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility MSD1001-LS

Customer Service 587-0603

Report as of December 2005

Service Area: BERRYTOWN WTP

Yr	Num Overflows	Estimated Volume
2004	1	6,000 Gallons

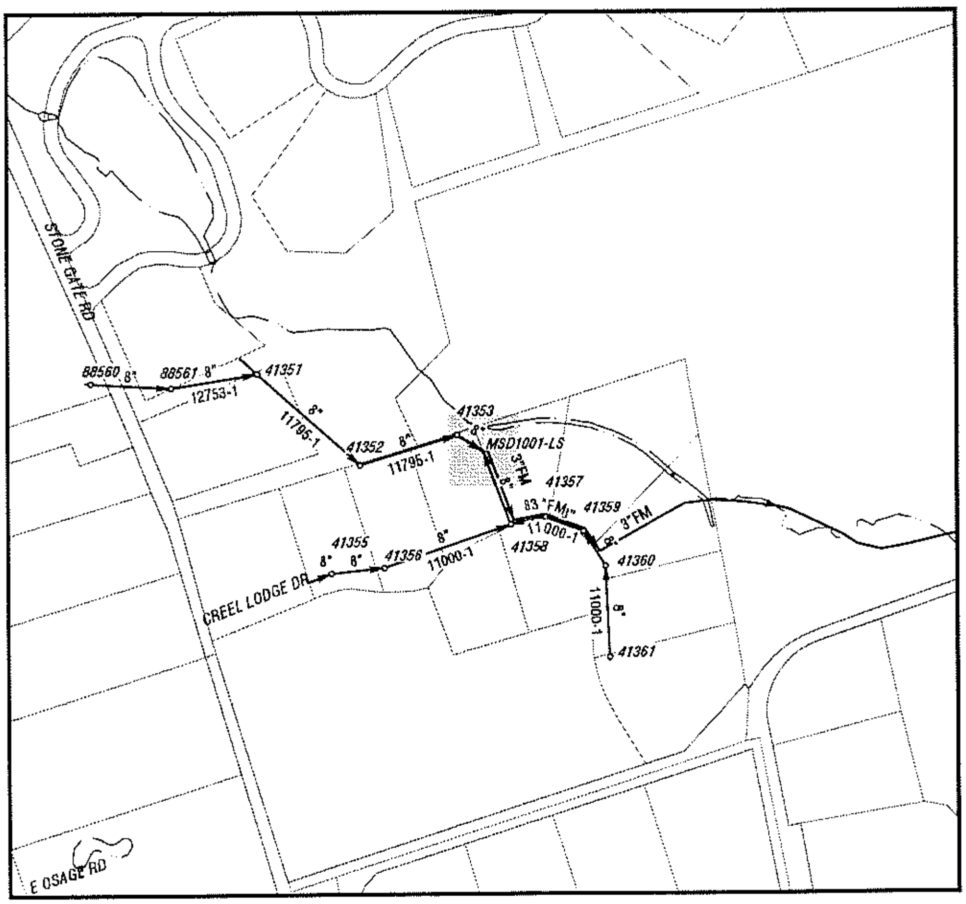
Background & History:

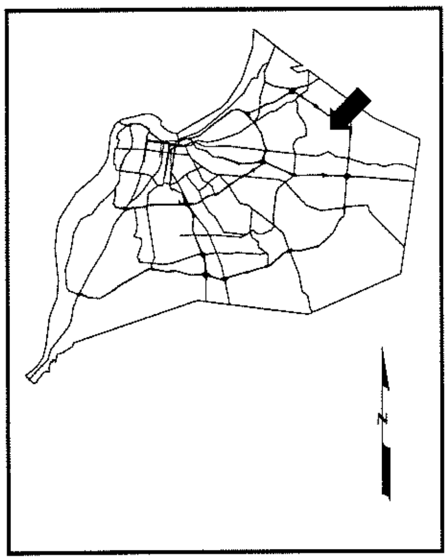
Pipe Size:
Inflow: 8"
Inflow: 8"
Outflow: 2.5"

Upstream Collection System Length: 2,010 L.F.
Watershed: GOOSE CREEK
Discharge Type: CAPACITY
Discharged To: STREAM
Receiving Stream: GOOSE CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	15.6 ac.
VACANT AND UNDEVELOPED	0.1 ac.
PARKS, CEMETERIES, ETC.	7 ac.





Metro: MAK24
Atlas Map: AU240

Scale 1" = 400 '

GUNPOWDER PS

MSD
Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility MSD1055-LS

Customer Service 587-0603

Report as of December 2005

Service Area: HUNTING CREEK NORTH

Yr	Num Overflows	Estimated Volume
2005	6	157,000 Gallons
2004	3	18,000 Gallons
2003	1	2,000 Gallons
2002	5	15,600 Gallons

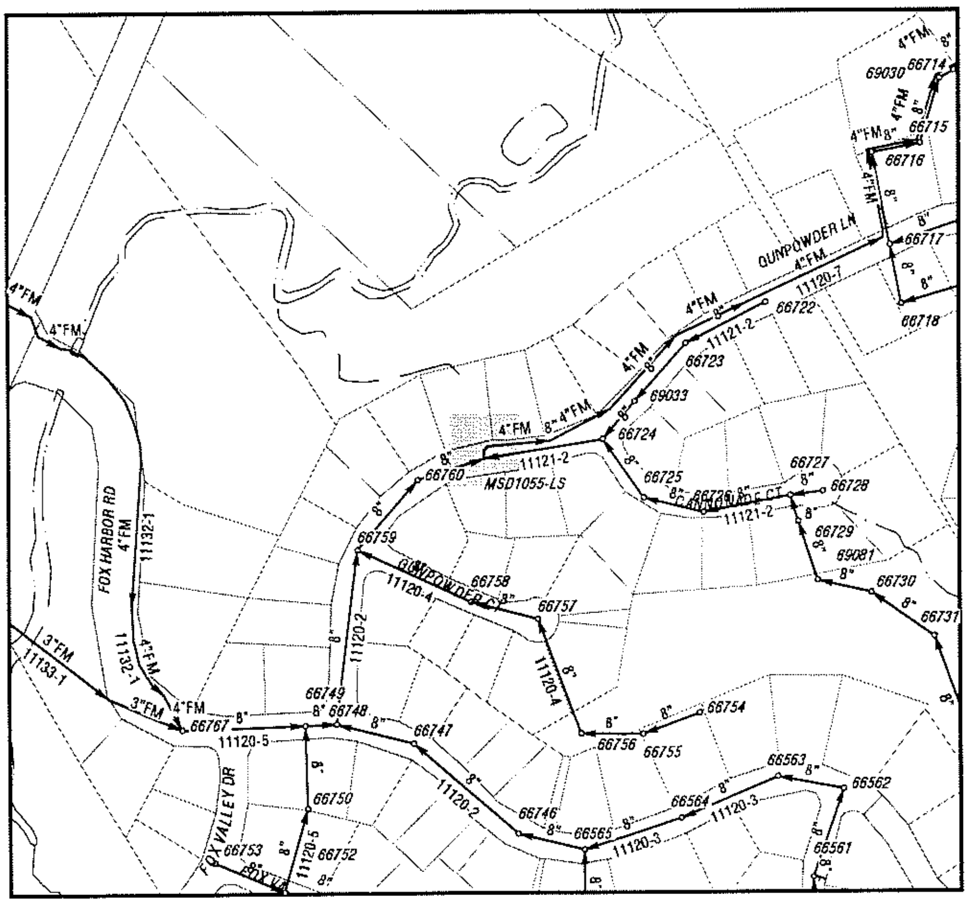
Background & History: During FY06, operations did work to improve ps efficiency.

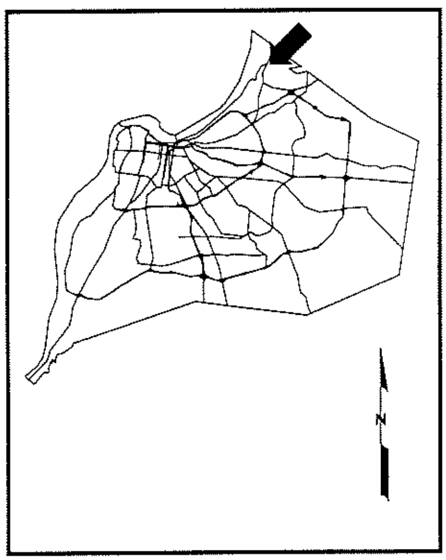
Pipe Size:
Inflow: 8"
Outflow: 4"

Upstream Collection System Length: 16,200 L.F.
Watershed: HARRODS CREEK
Discharge Type: PUMPED
Discharged To: DITCH
Receiving Stream: HARRODS CREEK
Status: DOCUMENTED

Downstream Landuse:

PARKS, CEMETERIES, ETC.	6.2 ac.
SINGLE FAMILY RESIDENTIAL	10.3 ac.





Metro: MAJ22
Atlas Map: AG232

Scale 1" = 400 '

RIDING RIDGE PS

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility MSD1060-LS

Customer Service 587-0603

Report as of December 2005

Service Area: HUNTING CREEK NORTH

Yr	Num Overflows	Estimated Volume
2005	1	4,000 Gallons
2004	1	3,500 Gallons
2003	1	1,000 Gallons
2002	3	9,000 Gallons

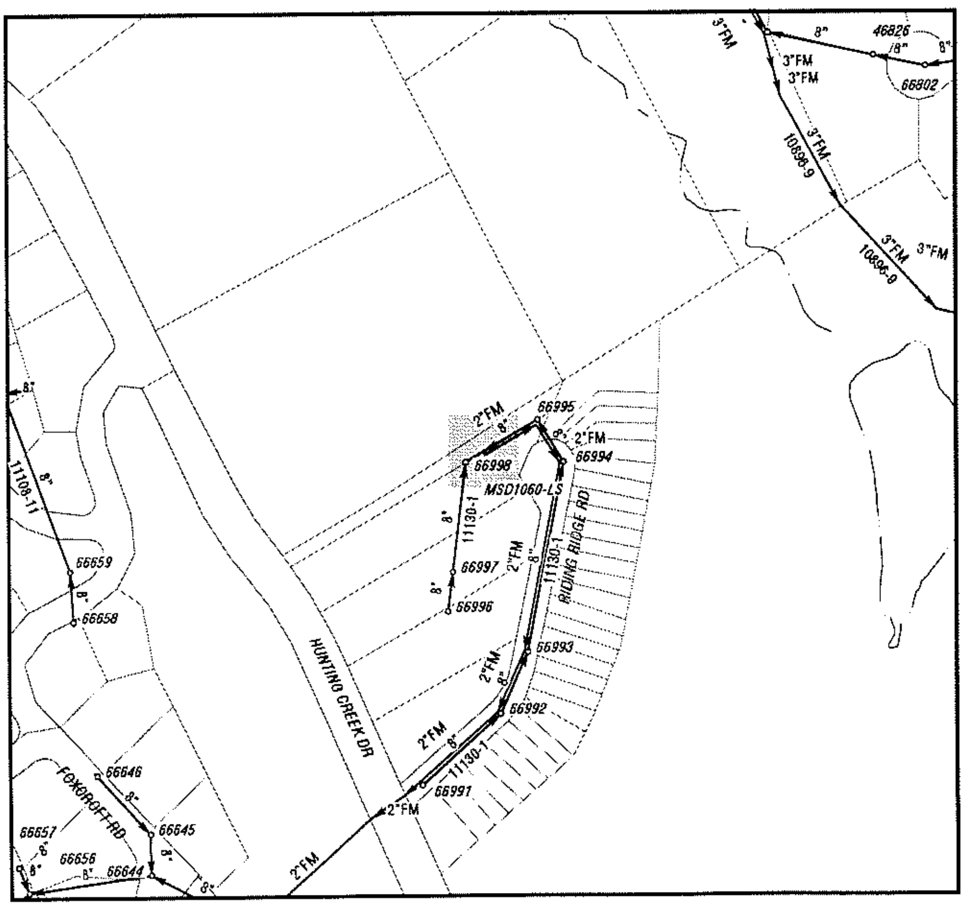
Background & History: Pump Station acquired in 1999 with City of Prospect system.

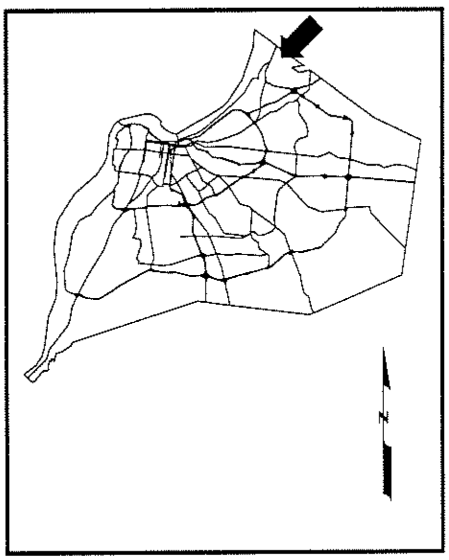
Pipe Size:
Inflow: 8"
Inflow: 8"
Outflow: 2"

Upstream Collection System Length: 1,340 L.F.
Watershed: HARRODS CREEK
Discharge Type: PUMPED
Discharged To: DITCH
Receiving Stream: HARRODS CREEK
Status: DOCUMENTED

Downstream Landuse:

VACANT AND UNDEVELOPED	0.2 ac.
SINGLE FAMILY RESIDENTIAL	14.9 ac.
PARKS, CEMETERIES, ETC.	6.2 ac.





Metro: MAJ22
Atlas Map: AG234

Scale 1" = 400 '

MSD

Louisville-Jefferson County Metropolitan Sewer District

DEEP CREEK PS

MSD Facility MSD1063-PS

Customer Service 587-0603

Report as of December 2005

Service Area: HUNTING CREEK SOUTH

Yr	Num Overflows	Estimated Volume
2005	9	130,000 Gallons
2004	14	229,000 Gallons
2003	6	39,500 Gallons
2002	12	39,400 Gallons
2001	3	8,500 Gallons

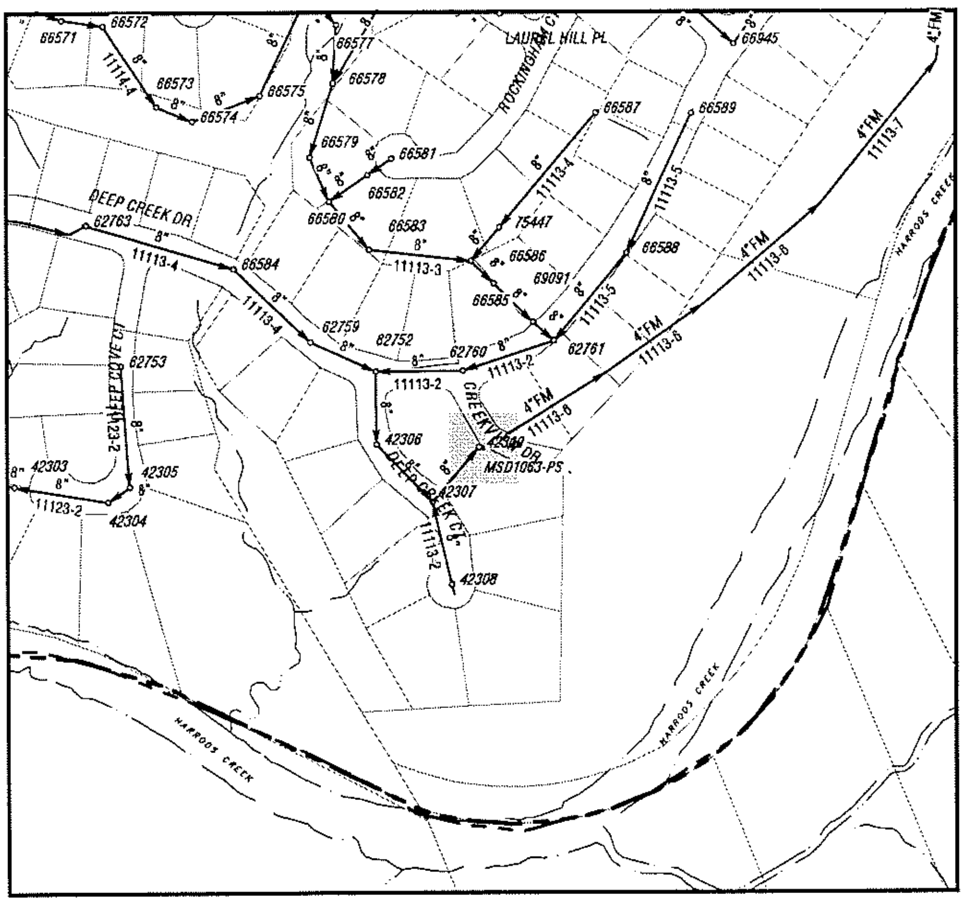
Background & History: This site is currently being monitored.

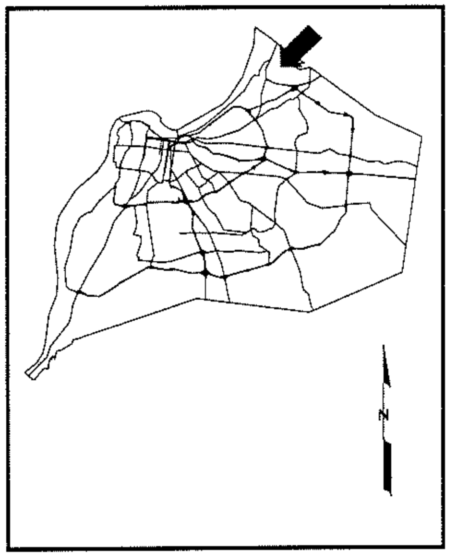
Pipe Size:
Inflow: 4"
Outflow: 4"

Upstream Collection System Length: 11,100 L.F.
Watershed: HARRODS CREEK
Discharge Type: CAPACITY
Discharged To: DITCH
Receiving Stream: HARRODS CREEK
Status: DOCUMENTED

Downstream Landuse:

VACANT AND UNDEVELOPED	7.5 ac.
SINGLE FAMILY RESIDENTIAL	2.5 ac.





Metro: MAJ22

Atlas Map: AI234

Scale 1" = 400 '

WESTOVER

MSD
Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility MSD1064-PS

Customer Service 587-0603

Report as of December 2005

Service Area: HUNTING CREEK SOUTH

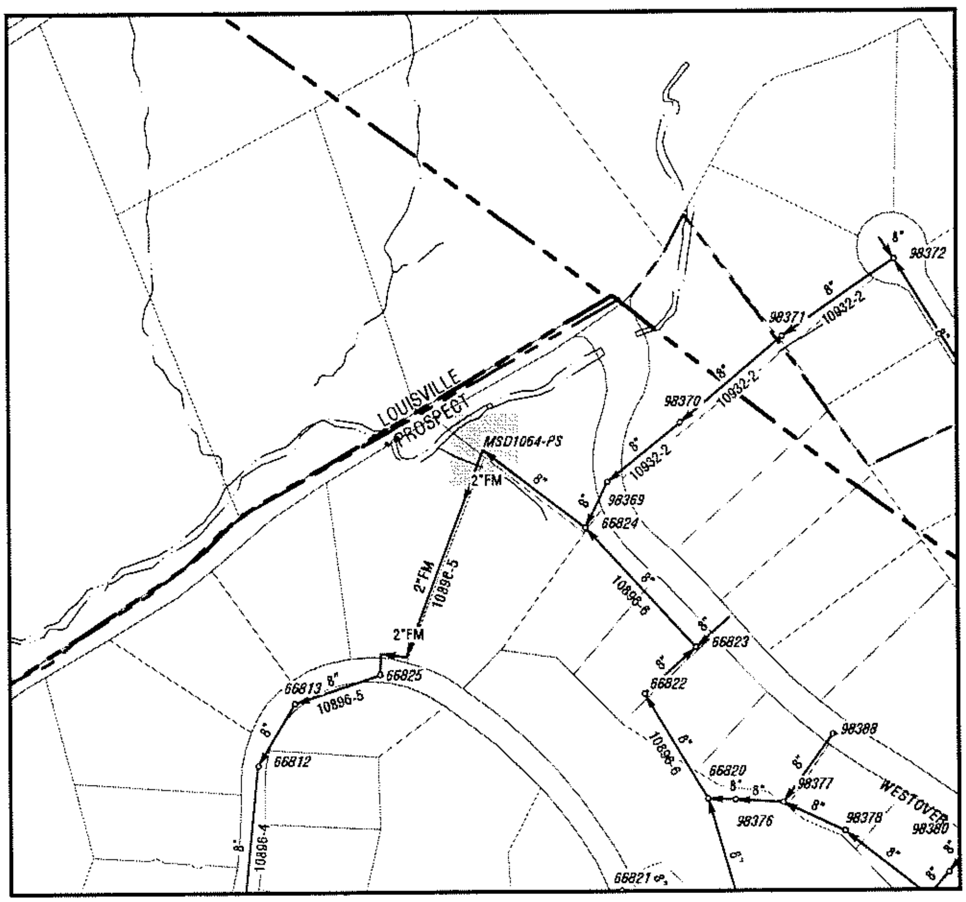
Yr	Num Overflows	Estimated Volume
2004	1	5,000 Gallons

Background & History:

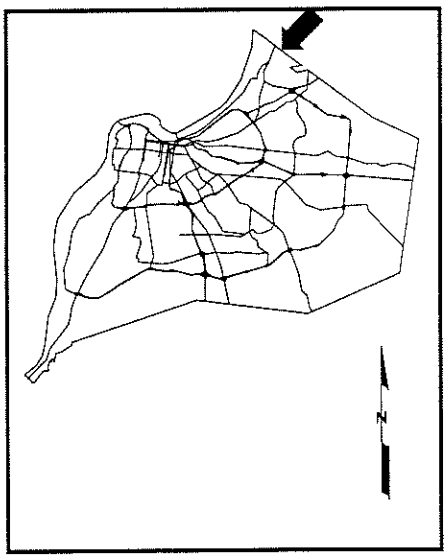
Pipe Size:
Inflow: 8"
Outflow: 2"

Upstream Collection System Length: 6,890 L.F.
Watershed: HARRODS CREEK
Discharge Type: CAPACITY
Discharged To: DITCH
Receiving Stream: HARRODS CREEK
Status: DOCUMENTED

Downstream Landuse:
SINGLE FAMILY RESIDENTIAL 20.4 ac.



Scale 1" = 400 '



Metro: MAI22
Atlas Map: AE234

FAIRWAY VIEW

MSD
Louisville-Jefferson County
Metropolitan Sewer District

MSD Facility MSD1065-PS

Customer Service 587-0603 | **Report as of December 2005**

Service Area: HUNTING CREEK SOUTH

Yr	Num Overflows	Estimated Volume
2004	1	50,000 Gallons
2003	1	300 Gallons
2002	1	500 Gallons

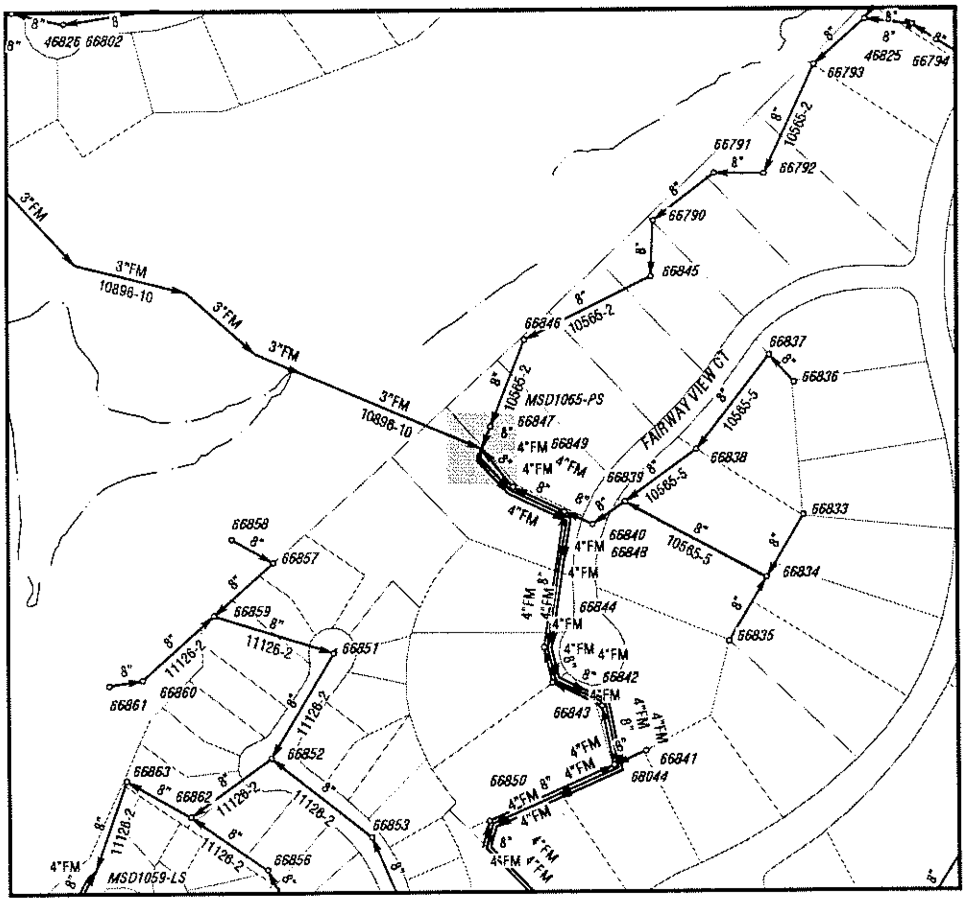
Background & History: This manhole was reported as an overflow during FY02. It will be monitored in the future.

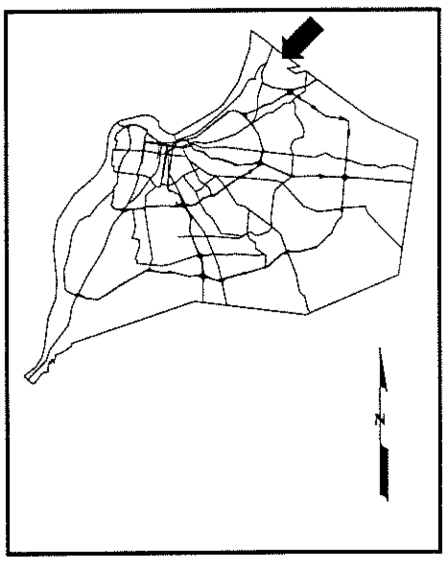
Pipe Size:
Inflow: 8"
Inflow: 3"
Inflow: 8"
Outflow: 4"
Outflow: 4"

Upstream Collection System Length: 30,000 L.F.
Watershed: HARRODS CREEK
Discharge Type: CAPACITY
Discharged To: DITCH
Receiving Stream: HARRODS CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	11.7 ac.
MULTI-FAMILY RESIDENTIAL	6.1 ac.
VACANT AND UNDEVELOPED	5 ac.





Metro: MAJ22
Atlas Map: AG234

Scale 1" = 400 '

HARRODS VIEW CIRCLE #1

MSD

Louisville-Jefferson County Metropolitan Sewer District

MSD Facility MSD1068-PS

Customer Service 587-0603

Report as of December 2005

Service Area: HUNTING CREEK SOUTH

Yr	Num Overflows	Estimated Volume
2004	1	20,000 Gallons

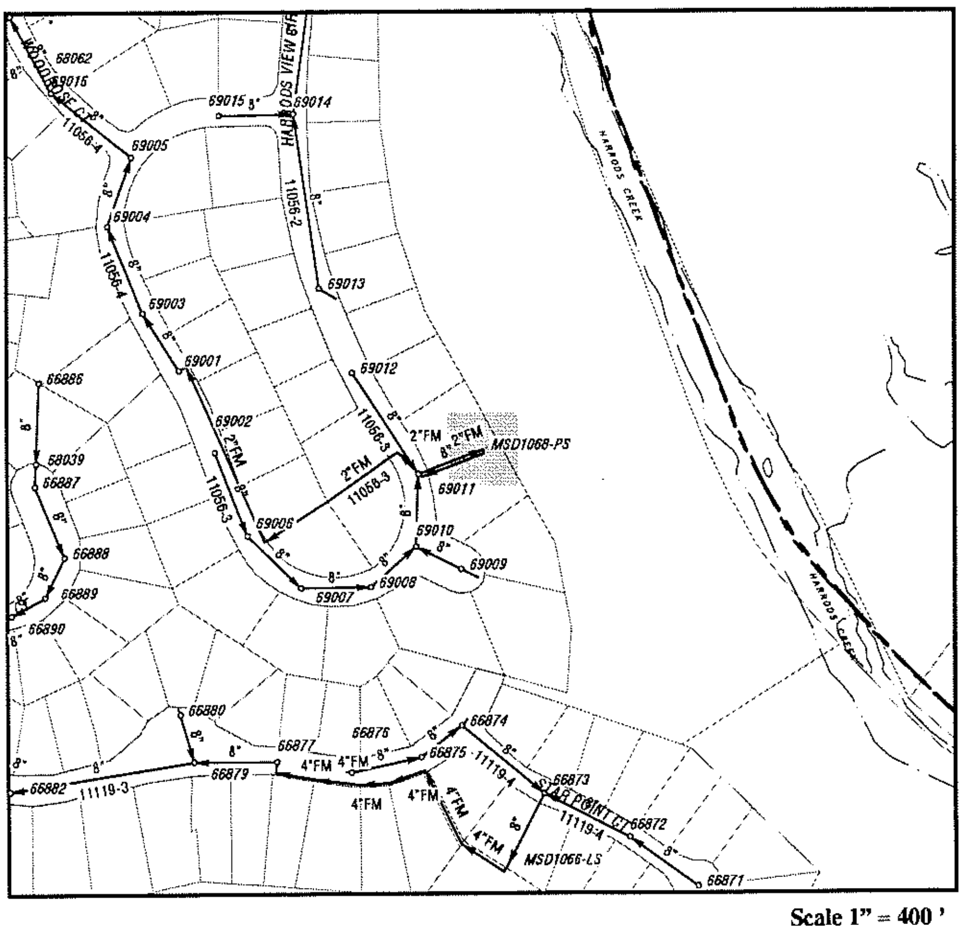
Background & History:

Pipe Size:
Inflow: 8"
Outflow: 2"

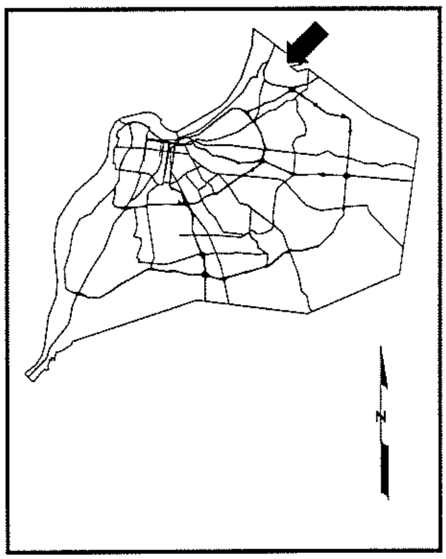
Upstream Collection System Length: 1,290 L.F.
Watershed: HARRODS CREEK
Discharge Type: PUMPED
Discharged To: STREAM
Receiving Stream: HARRODS CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	10.1 ac.
MULTI-FAMILY RESIDENTIAL	5.4 ac.
VACANT AND UNDEVELOPED	5.2 ac.



Scale 1" = 400 '



Metro: MAJ22

Atlas Map: AG234

ZABEL PS

MSD
Louisville-Jefferson County Metropolitan Sewer District

MSD Facility MSD1099-LS

Customer Service 587-0603

Report as of December 2005

Service Area: WATTERSON WOODS WTP

Yr	Num Overflows	Estimated Volume
2005	1	1,250 Gallons
2004	13	373,000 Gallons
2003	3	120,000 Gallons
2002	6	147,000 Gallons
2001	3	301,000 Gallons

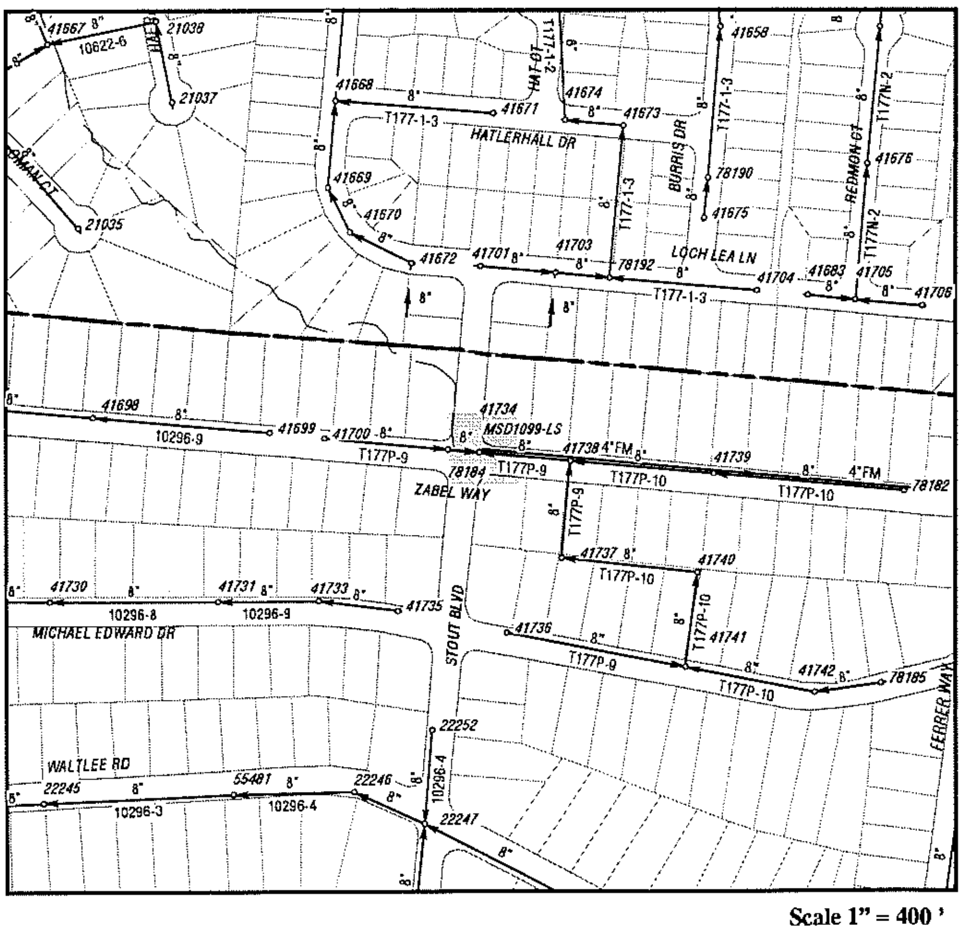
Background & History: This site was reported as an overflow during FY02. This PS is tributary to Watterson Woods (to be eliminated by Fern Creek Int #6. Change order could possibly eliminate this PS.

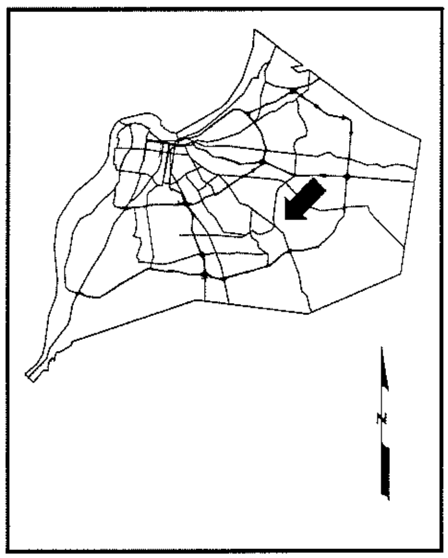
Pipe Size:
Inflow: 8"
Outflow: 4"

Upstream Collection System Length: 2,730 L.F.
Watershed: POND CREEK
Discharge Type: CONSTRUCTED
Discharged To: DITCH
Receiving Stream: FERN CREEK
Status: DOCUMENTED

Downstream Landuse:

SINGLE FAMILY RESIDENTIAL	22.4 ac.
MULTI-FAMILY RESIDENTIAL	1.2 ac.





Metro: MAM22

Atlas Map: BK234

Scale 1" = 400 '

MSD

Louisville and Jefferson County
Metropolitan Sewer District

SECTION 9

SECTION 9: SYSTEM IMPROVEMENTS

9.1 INTRODUCTION

This section includes a list of improvements which are proposed to be accomplished by December 31, 2008, as specified in Paragraph 24(a)(1) of the Consent Decree. These improvements include completion dates and cost estimates. These projects include: pump station rehabilitations, pump station eliminations, wastewater treatment plant elimination, interceptor condition assessment and repair or rehabilitation of the most significant defects, and relief sewer construction.

Table 1 - Proposed Capital Improvement Projects

Project	Treatment Plant	Estimated Cost	Abatement Date
Old Cannons Lane Sanitary Relief Sewer	Morris Forman	$260,000	June 30, 2006
Interceptor Condition Assessment Phase 1 Inspection & Rehabilitation(Middle Fork)	Morris Forman	$387,000	December 31, 2008
Middle Fork System Improvements Phase 1	Morris Forman	$500,000	December 31, 2008
Beechwood Village SSO Abatement Phase 2	Morris Forman	$800,000	December 31, 2008
Interceptor Condition Assessment Phase 1 Inspection & Rehabilitation (Sinking Fork)	Morris Forman	$92,000	December 31, 2008
Murray Hills Pump Station Upgrade	Morris Forman	$150,000	September 30, 2008
Interceptor Condition Assessment Phase 1 Inspection & Rehabilitation (Hikes Point)	Morris Forman	$460,000	December 31, 2008
Interceptor Condition Assessment Phase 1 Inspection & Rehabilitation (Goldsmith)	Morris Forman	$234,000	December 31, 2008
Interceptor Condition Assessment Phase 1 Inspection & Rehabilitation (Buechel Branch)	Morris Forman	$178,000	December 31, 2008
Interceptor Condition Assessment Phase 1 Inspection & Rehabilitation (Northern Ditch)	Morris Forman	$345,000	December 31, 2008
Northern Ditch Pump Replacement	Morris Forman	$1,300,000	November 30, 2006

Project	Treatment Plant	Estimated Cost	Abatement Date
Sonne Pump Station Pump Replacement	Morris Forman	$49,000	March 30, 2007
Fern Hill Subdivision Interceptor #8	Cedar Creek	$837,000	March 30, 2009
Old Henry Road Pump Station, Force Main & Interceptor	Floyds Fork	$3,268,000	June 30, 2006
Running Fox Sewer Replacement	West County	$150,000	August 30, 2006
Zabel Way Pump Station Elimination	West County	$150,000	September 30, 2008
Watterson Woods WTP Elimination	West County	$320,000	March 30, 2007
Fern Creek/Nottingham Interceptor #6	West County	$5,900,000	June 30, 2006
Broadfern Pump Station Upgrade	West County	$80,000	December 31, 2007
Rosa Terrace Pump Station Pump Replacement	West County	$36,000	June 30, 2007
Thurman Drive Pump Station Elimination	West County	$150,000	September 30, 2008

9.2 MORRIS FORMAN SYSTEM IMPROVEMENTS

9.2.1 Middle Fork System Improvements

Old Cannons Lane Sanitary Relief Sewer (MSD Budget ID # B06004)

This project involves the construction of 1,160 linear feet of 15-inch sewer in Old Cannons Lane that will divert approximately 80% of the flow from an upstream manhole above the surcharged 8-inch line and connecting directly to a 39-inch interceptor sewer to the south, and on the south side of Beargrass Creek. This project is anticipated to abate a frequently occurring sanitary sewer overflow at two manhole locations. This project is currently in under construction with a scheduled completion date of June 30, 2006, and the approximate cost for the project is $260,000.

Interceptor Condition Assessment Phase 1 (Middle Fork) (MSD Budget ID # H04272)

This project involves the inspection of 36,000 linear feet of the Middle Fork Interceptor from the intersection with Payne Street which is in the combined sewer area to east of the intersection with the I-264 Watterson Expressway to document its condition and locate defects, blockages, or other conditions contributing to inadequate operating conditions. MSD anticipates approximately $282,000 in inspection and $105,000 in rehabilitation work to the Middle Fork Interceptor as an immediate result of the findings in this report. Completion of the rehabilitation work is due by December 31, 2008.

Middle Fork System Improvements Phase 1 (MSD Budget ID # H04276)

Provide repairs and rehabilitation for the Middle Fork system. Perform improvements and repairs based on the results of the ICA and other MSD knowledge of the system. This project is estimated to cost $500,000 and shall be completed by December 31, 2008.

9.2.2 Beechwood Village System Improvements

Beechwood Village SSO Abatement Phase 2 (MSD Budget ID # H06301)

Continue the efforts in the Beechwood Village area to abate the discharges from the pumping operations associated with protecting the connected homes and building from system backups. Previous efforts have included rehabilitation of some sewers in the area, installation of backflow prevention devices, related drainage improvements that may convey the water discharged from properly installed sump pumps, manhole rehabilitation, and a pilot project to line property service laterals from the public portion of the connection to the house. Phase 2 will continue the efforts to reduce the frequency and volume of the pumped discharge for the area. This project is to be completed by December 31, 2008, and is estimated to cost $800,000.

Interceptor Condition Assessment Phase 1 (Sinking Fork) (MSD Budget ID # H04272)

This project involves the inspection of 8,400 linear feet of the Sinking Fork Interceptor from the Middle Fork Interceptor to the east side of the intersection with the I-264 Watterson Expressway to document their condition and locate defects, blockages, or other conditions contributing to inadequate operating conditions. MSD anticipates approximately $67,000 in inspection and $25,000 in rehabilitation work to the Sinking Fork Interceptor as an immediate result of the findings in this report. Completion of the rehabilitation work is due by December 31, 2008.

9.2.3 Ohio River Force Main / Muddy Fork System Improvements

Murray Hills Pump Station Upgrade (MSD Budget ID # F06297)

The Acushnet Road and Denbeige Court Pump Stations were a part of the Murray Hills Treatment Plant sewershed til the plant was decommissioned in 1993. Acushnet Road Pump Station was built in 1969 and has had problems with unauthorized discharges. Denbeige Court Pump

Station was built in 1970. Existing pumps and motors at both of these pump stations are worn and outdated. This project includes pump station upgrades to the Acushnet Road Pump Station and the Denbeige Court Pump Station. The expected cost for this project is $150,000 and shall be completed by September 30, 2008.

9.2.4 Hikes Point System Improvements

Interceptor Condition Assessment Phase 1 (Hikes Point) (MSD Budget ID # H04272)

This project involves the inspection of 47,000 linear feet of the Beargrass Interceptor and the Beargrass Relief Interceptor from the Nightingale Pump Station through the Southeast Diversion to the east side of the U.S. Army Corps of Engineers Breckenridge basin site to document their condition and locate defects, blockages, or other conditions contributing to inadequate operating conditions. MSD anticipates approximately $320,000 in inspection and $140,000 in rehabilitation work to the Beargrass Interceptor and the Beargrass Relief Interceptor as an immediate result of the findings in this report. Completion of the rehabilitation work is due by December 31, 2008.

Interceptor Condition Assessment Phase 1 (Goldsmith) (MSD Budget ID # H04272)

This project involves the inspection of 24,000 linear feet of the Goldsmith Interceptor to document their condition and locate defects, blockages, or other conditions contributing to inadequate operating conditions. MSD anticipates approximately $164,000 in inspection and $70,000 in rehabilitation work to the Goldsmith Interceptor as an immediate result of the findings in this report. Completion of the rehabilitation work is due by December 31, 2008.

9.2.5 Buechel Branch System Improvements

Interceptor Condition Assessment Phase 1 (Buechel Branch) (MSD Budget ID # H04272)

This project involves the inspection of 19,200 linear feet of the Buechel Branch of the Beargrass Interceptor to document their condition and locate defects, blockages, or other conditions contributing to inadequate operating conditions. MSD anticipates approximately $123,000 in inspection and $55,000 in rehabilitation work to the Buechel Branch of the Beargrass Interceptor as an immediate result of the findings in this report. Completion of the rehabilitation work is due by December 31, 2008.

9.2.6 Northern Ditch System Improvements

Interceptor Condition Assessment Phase 1 (Northern Ditch) (MSD Budget ID # H04272)

This project involves the inspection of 36,000 linear feet of the Northern Ditch Interceptor to document their condition and locate any defects, blockages, or other conditions contributing to inadequate operating conditions. MSD anticipates approximately $240,000 in inspection and

$105,000 in rehabilitation work to the Northern Ditch Interceptor as an immediate result of the findings in this report. Completion of the rehabilitation work is due by December 31, 2008.

Northern Ditch Pump Replacement Project (MSD Budget ID # C00158)

The Northern Ditch Pump Station (NDPS) consists of four submersible pumps each rated at 14,000 gallon per minute (GPM). In recent years, maintenance and operation costs have increased at the pump station due to the age and poor condition of the original equipment. It has also become difficult to obtain parts for the pumps and the control equipment. Many of the original equipment manufacturers are no longer in business. Additionally, with the Real Time Control Project scheduled to become operational in the summer of 2006, NDPS will receive additional flows from the Southeastern Diversion during some wet weather events. This project will replace the existing pumps, flap valves, pump columns, crane hoist and flow recording equipment. This project is also being reported as part of the interim CSO Long Term Control Plan. This project is currently under construction and is estimated to cost $1,300,000 with a completion date of November 30, 2006.

Sonne Pump Station Pump Replacement Project (MSD Budget ID # F02325)

The existing pumps and motors at the Sonne Pump Station are worn and outdated. This project will replace the existing centrifugal pumps and motors at this pump station to achieve the original design capacity to abate the known overflow at this site. It will be investigated to see if larger pumps can be installed or if impellors can be upsized. This will be based on the pump station configuration and whether the receiving system can accommodate additional flow. This effort may also require related pump station upgrades. This project is expected to cost $49,000 and is due to be completed March 30, 2007.

9.3 CEDAR CREEK SYSTEM IMPROVEMENTS

Fern Hill Subdivision Interceptor #8 Sanitary Sewer Project (MSD Budget ID # C94086)

This project involves the construction of approximately 8,200 linear feet of 8- to 15- inch gravity sewer and will provide sanitary sewer service to the area through the provision of the required interceptor. This project will eliminate the Fern Hill Wastewater Treatment Plant and the existing Holly Oaks and Exhibition Ct. Pump Stations, all known overflows. The project will also enable collector projects to be initiated to provide sewer service to un-sewered areas. The expected cost for this project is $837,000 with a completion date of March 30, 2009.

9.4 FLOYDS FORK SYSTEM IMPROVEMENTS

Old Henry Road Pump Station, Force Main, and Interceptor Project (MSD Budget ID # E03601)

Under this project, a submersible pump station on Long Creek Way near Champion Lake Dr has been constructed. This pump station, in conjunction with Old Henry Force Main North and South Projects, provide sanitary sewer service to the Old Henry Road area. This project will also allow for the elimination of the Eastpointe Pump Station and Cypress Springs Pump Station with future construction project. This project cost approximately $3,268,000 and will be completed by June 30, 2006.

9.5 WEST COUNTY SYSTEM IMPROVEMENTS

9.5.1 Pond Creek System Improvements

Running Fox Sewer Replacement (MSD Budget ID # C06308)

The existing sanitary sewer has a sag in the line. This location has a history of grease buildup and has been responsible for basement backups. This project involves the reconstruction of the sewer to remove the sag in the line. This project is due for completion by August 30, 2006, and is estimated to cost $150,000.

Zabel Way Pump Station Elimination (MSD Budget ID # C06295)

The existing Zabel Way Pump Station was built in 1971 and has a history of unauthorized discharges during wet weather events. This project shall eliminate the Zabel Way Pump Station by gravity. The estimated cost for this project is $150,000 with a completion date of September 30, 2008.

Watterson Woods WTP Elimination (MSD Budget ID # C06291)

This project was originally a part of the Fern Creek/Nottingham Interceptor #6. The Watterson Woods WTP is privately owned, but MSD operated. Due to easement and treatment plant acquisition issues which were delaying the completion of Interceptor #6, the elimination of the Watterson Woods Treatment Plant was made into a separate project. This project is scheduled for completion March 30, 2007, and is estimated to cost approximately $320,000.

Fern Creek/Nottingham Interceptor #6 (MSD Budget ID # C94082)

This project is in progress and includes the construction of approximately 15,125 LF of 8- to 24-inch gravity sewer and provided sanitary sewer service to the area. This project eliminated the Nottingham Hills (a known overflow), Fern Hill, and Wildwood Country Club Wastewater Treatment Plants. In addition, the project has eliminated the Nottinghamshire Pump Station, a known overflow, and will eliminate the Watterson Trail Pump Station. The project also enabled collector projects to be initiated to provide sewer service to un-sewered areas. This project to date has cost $5,900,000 to be completed by June 30, 2006.

Broadfern PS Upgrade (MSD Budget ID # F02327)

The existing pumps and motors at the Broadfern Pump Station are worn and outdated. This project will replace the existing pumps and motors at this pump station to achieve the original design capacity to abate the known overflow at this site. It will be investigated to see if larger pumps can be installed or if impellors can be upsized. This will be based on the pump station configuration and whether the receiving system can accommodate additional flow. This effort may also require related pump station upgrades. This project is expected to cost $80,000 with a completion date of December 31, 2007.

9.5.2 Mill Creek System Improvements

Rosa Terrace Pump Station Pump Replacement Project (MSD Budget ID # F02322)

The existing pumps and motors at the Rosa Terrace Pump Station are exhausted and outdated and inadequate for current capacity needs. This project will replace the existing centrifugal pumps and motors at this pump station and create additional needed capacity to abate the known overflow at this site. This effort may also require some suction and/or discharge piping modifications. This project is expected to cost $36,000 and will be completed by June 30, 2007.

Thurman Drive Pump Station Elimination (MSD Budget ID # B06299)

The Thurman Drive Pump Station is located in the Shively service area. This pump station was put into commission in 1962 and has had recent unauthorized discharge events. As a result, MSD shall eliminate the Thurman Drive Pump Station by gravity to an interceptor on the other side of I-65. This project will also take approximately 30 customers off septic tanks. The estimated cost for this project is $150,000 with a completion date of September 30, 2008.

MSD

Louisville and Jefferson County
Metropolitan Sewer District

SECTION 10

SECTION 10: SANITARY SEWER DISCHARGE PLAN - PROCESS FORWARD

10.1 INTRODUCTION

As specified in the Consent Decree, the interim Sanitary Sewer Discharge Plan (SSDP) to be submitted by September 30, 2007, will include specific projects, schedules, and timetables for remedial measures to eliminate unauthorized discharges in the Beechwood area and at the Southeastern Diversion Structure no later than December 31, 2011, and in the Hikes Point area and at the Highgate Springs Pump Station no later than December 31, 2013. The final SSDP to be submitted by December 31, 2008, will include specific projects, schedules, and timetables for remedial measures to eliminate unauthorized discharges from the SSS locations other than those identified in the Interim SSDP no later than December 31, 2024.

Because of the physical characteristics of MSDs sewer system, and permit responsibilities, various aspects of the wet weather program will be integrated. MSD has permit responsibility for stormwater, combined sewage and wastewater and therefore these components must be integrated. Additionally, portions of the separate sanitary sewer system flow into and through the combined sewer system, therefore the SSDP and CSO Long Term Control Plan are inter-related and must be integrated. Lastly, many activities of the Capacity Management Operations and Maintenance (CMOM) program are closely tied to the Nine Minimum Controls (NMC) activities being performed, therefore these activities must also be coordinated. For these reasons, MSD will coordinate program components and integrate them through implementation of a Wet Weather Framework to be completed by December 31, 2008. Integrating these initiatives will provide for successful development of wet weather plans for the programs, thereby providing an efficient, cost effective means of achieving the requirements of the Consent Decree.

10.2 WET WEATHER FRAMEWORK

MSD has established a Wet Weather Framework that presents a combined approach consisting of multiple components to execute the Wet Weather program. This Wet Weather Framework is illustrated in Figure 1. It includes a comprehensive Wet Weather Planning Process that is intended to be fully integrated with the activities involved in responding to the Consent Decree and meeting MSD's service mission related to reliable sewer and drainage services, while bringing wet weather CSO discharge points into compliance with requirements of environmental quality standards and objectives. The major components of this framework include Structural and Operational Solutions; Stakeholder Involvement; Water Quality Issues and System Characterization.

The backbone of the framework will be the stakeholder involvement. Effective input of Louisville community values is essential for the elements of the Wet Weather Program. The stakeholder process will provide for meaningful involvement in discharge abatement, alternative development, evaluation and prioritization. The stakeholder involvement activities will help establish performance objectives for the sanitary and combined sewer systems and the associated CMOM and Nine Minimum Controls programs. An early output of the stakeholder involvement process is also intended to provide community input on the details of plans for elimination of the four highest priority sanitary sewer discharge locations (Southeastern Diversion, Beechwood Village, Hikes Point, and Highgate Springs Pump Station).

As shown on Figure 1, an understanding of water quality issues and impacts will be a vital part of the stakeholder involvement process. It is expected that the discharge abatement plans will develop not only structural and operational solutions, but nonstructural alternatives as well. The intent is to consider a broad range of watershed issues in the development of the comprehensive Wet Weather Plan. Stakeholder input may help develop a holistic watershed solution as the most cost effective way to come into compliance with Clean Water Act and the terms of the Consent Decree.

Each component of the Wet Weather Framework will be executed in a parallel path, with key milestones and deliverables tied to progress in the stakeholder involvement process. This will ensure consistent direction and coordinated alternative development and evaluation among the NMC, CMOM, CSO, and SSO Programs.

10.3 WET WEATHER PLANNING PROCESS

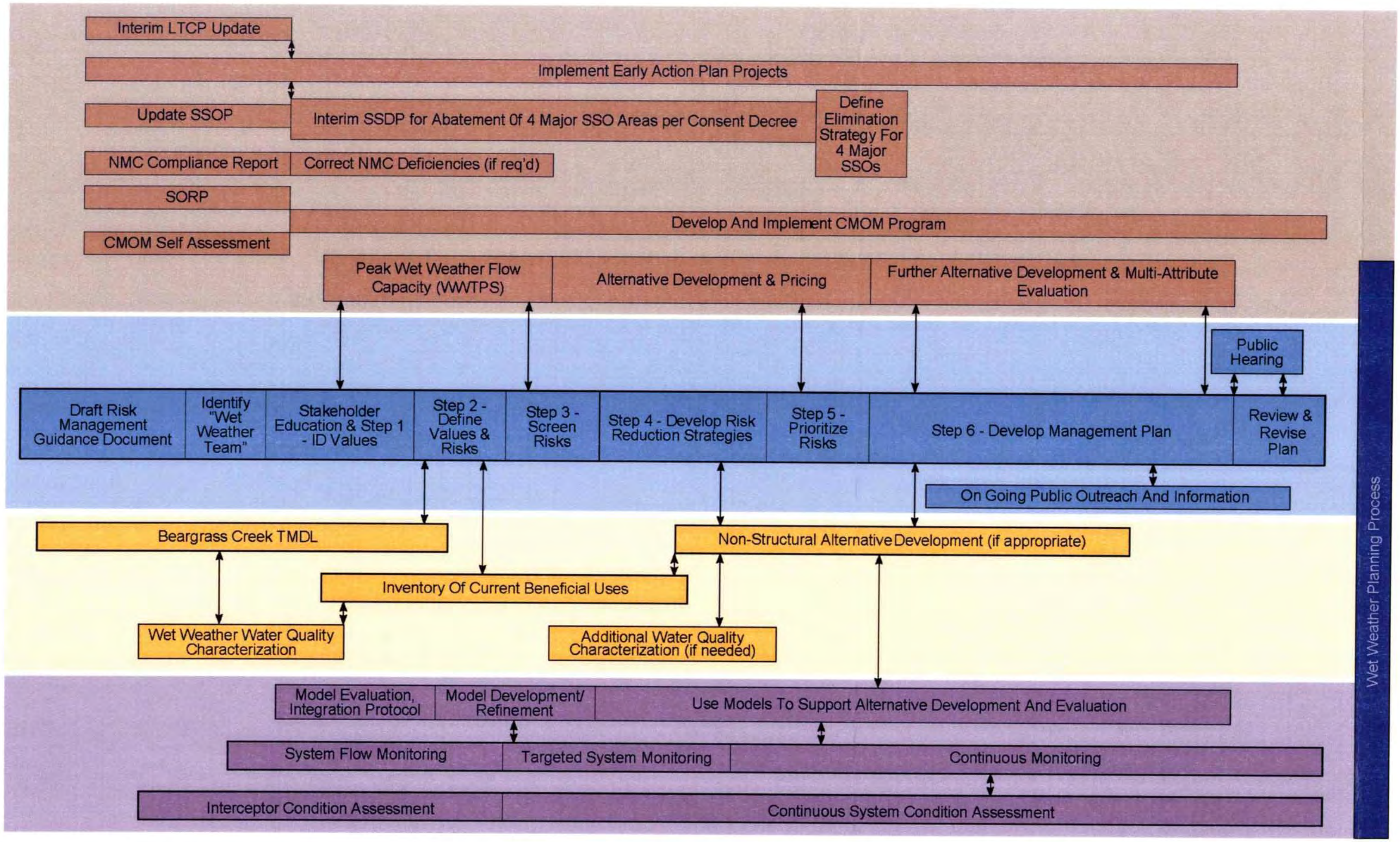
10.3.1 Overview

In the past, the traditional approach to wastewater planning has focused primarily on the technical elements, specifically on steady state (e.g., dry weather) operations, and meeting water quality standards based on dry weather conditions. Consequently, sanitary engineering texts and standards were developed for and tested on average flows, and extrapolated to peak daily flows, maximum flows and other conditions. Experience has demonstrated that wet weather flow management is more dynamic and must address site-specific conditions, highly variable flows and broader watershed discharges.

In addition to the technical elements of wastewater planning, most clean water agencies have relied on "traditional public involvement" often consisting of public information fact sheets and brochures, and public meetings in which alternative engineering approaches are presented to obtain feedback from the public. Public outreach and public education supplement the formal comments submitted during public comment periods or at formal public hearings. Citizen advisory groups have also been used with some success. The effectiveness of citizen advisory groups is highly dependent on the way they are used to provide planning and implementation guidance. Members of the citizen advisory groups are usually selected based on their ability to represent specific stakeholder segments. Generally these stakeholder representatives are not subject matter experts on engineering, wet weather management, public finance, aquatic life, or wastewater treatment plant operations, but they are asked to make technical choices associated with these subjects.

To provide more effective and meaningful stakeholder guidance, MSD will implement a value-based risk management approach to stakeholder involvement, as shown in Figure 2. In this approach, stakeholders are engaged in a structured process that emphasizes their role as subject matter experts in the area of community values. They remain involved through the entire planning process as risks are identified that threaten those community values (e.g. CSOs limiting surface water-based recreation) and risk mitigation strategies are developed, evaluated and prioritized to protect the community value that is at risk. The stakeholder involvement process is central to the entire Wet Weather Framework, as the stakeholder process develops the set of values used to evaluate, select and prioritize the solutions that will make up the Wet Weather Plan.

FIGURE 1
Wet Weather Framework



Project Completion Dates

Interim CSO LTCP – Feb. 12, 2006
Updated SSOP – Feb. 12, 2006
NMC Compliance Report – Feb. 12, 2006
SORP – Feb. 12, 2006
CMOM – Feb. 12, 2006
Interim SSDP – Sept. 30, 2007
CSO LTCP Update – Dec. 31, 2008
Final SSDP – Dec. 31, 2008

LEGEND

- Structural and Operational Solutions
- Stakeholder Involvement
- Water Quality Considerations
- System Characterization

MSD
Louisville and Jefferson County Metropolitan Sewer District

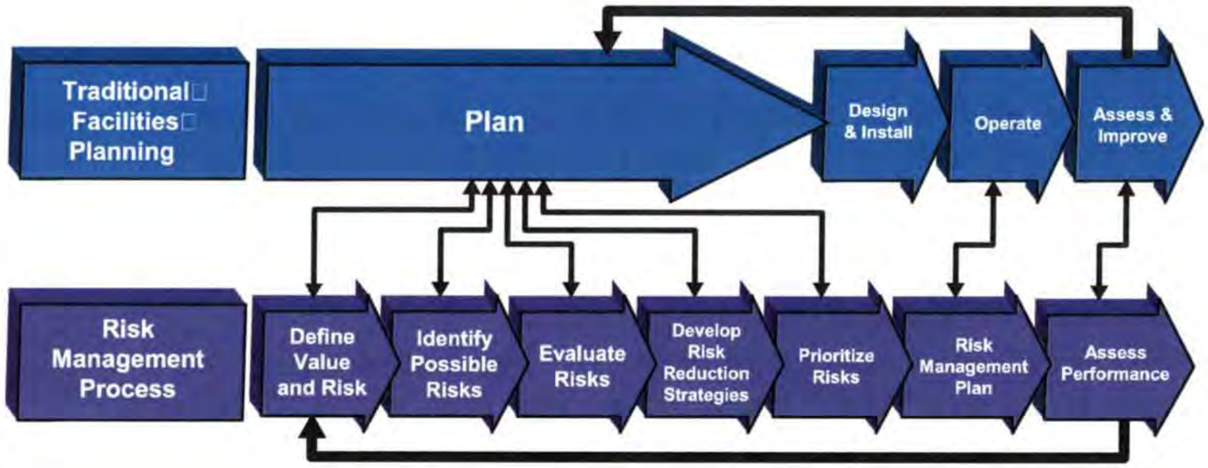


Figure 2 – Value-based Risk Management Stakeholder Involvement

10.3.2 MSD's Wet Weather Team Stakeholder Group

As stated in Paragraph 22 of the Consent Decree, MSD will "organize a Wet Weather Team (WWT) regarding CSOs and SSOs;". The Wet Weather Team:

"shall include all entities who have a stake in the outcome, and should be sufficiently multi-disciplinary to address the myriad of engineering, economic, environmental, and institutional issues that will be raised during the implementation of the remedial measures under this Consent Decree. The team will prepare a plan for funding the program and will develop a program for public information, education, and involvement."

The stakeholder group is the external portion of the overall Wet Weather Team. In assembling a representative stakeholder group, MSD will request participation from individuals recognized as community "opinion leaders" who are associated with various interest groups such as:

- Environmental advocacy,
- Business and industry,
- Elected officials,
- Local government agencies,
- Local community neighborhood groups,
- Recreation,
- Public Health,
- Environmental justice, and
- Organized labor.

The stakeholder participants will not be asked to formally represent a specific interest organization. Requiring formal representation of community organizations could inhibit the input and timeliness of participation. It will, therefore, be imperative to select individuals who are recognized as credible opinion leaders by the members of each interest group, so the larger group will accept their personal input as reasonable.

The stakeholder meetings will be lead by a professional facilitator and supported by the remainder of MSD's Wet Weather Team and other technical resources. The stakeholder decisions will be "consensus seeking" but not strict consensus-driven, recognizing inherently conflicting view points and the need to make timely decisions to achieve the CD schedule requirements.

To maximize the effectiveness of stakeholder input, essential and basic information will be provided to the group by MSD and other subject matter experts to develop a shared knowledge platform. Such information will include but not be limited to:

- How sewerage systems work, and how MSD's system is unique,
- The regulatory framework of the CWA, CSO Policy, and discharge permits etc.,
- The specific requirements of MSD's Consent Decree,
- MSD finances and how rates are determined, what impacts rates, and
- The overall planning process, what decisions must be made, and how their input as community value subject matter experts will shape those decisions.

Stakeholder input into the planning process will be continuous to ensure that community values and objectives are fully integrated into the development, evaluation, and selection of compliance strategies.

10.3.3 The Value-Based Risk Management Process

Wet weather management at MSD requires the integration of planning, design, construction and operation of collection systems and treatment facilities to minimize the water quality, aquatic biota and human health impacts from wet weather discharges. This can be achieved through development of performance objectives based on community values. Value-based performance objectives define the desired level of service and determine required system capacity and reliability. Comparison of current capabilities to the level of service requirements will determine where there are system deficiencies preventing desired performance outcomes.

Concepts traditionally developed for flood flow management, not sewage management, provide precedent for addressing sanitary conveyance high flow extremes. Modern flood management recognizes that value protection must consider the risks in terms of **severity** and **likelihood** of occurrence, then pick performance objectives and risk control strategies that best balance achieving competing value objectives.

The use of this systematic approach to aiding management decisions can be referred to as "value-based prioritization" of risk-reducing activities. This is a structured process to combine stakeholder input on the importance of potentially competing community values with the technical and scientific approaches, comparing activities that compete for limited resources. The outcome is a regulatory compliance approach that achieves performance objectives consistent with stakeholder defined community values.

Each of the steps in the value-based risk management process illustrated in Figure 3 are briefly described below, and then described and illustrated in more detail in subsequent paragraphs.

Figure 3 - Value-Based Risk Management Process

10.3.4 Step 1 - Define Value and Risk

Prior to the start of a risk management process, it will be important for MSD to have in place a clear understanding of its overall mission. In **Step 1** of the risk management process, that mission may be restated with a focus on the issue at hand (in this case management of wet weather flows). Stakeholders are engaged to identify the values the community wants to be protected. These values will subsequently be further refined into goals, objectives and performance measures consistent with the agency's mission.

- **Goals** are broadly stated results that help ensure the organization's mission is attained or the values are protected. Examples might include environmental protection, protecting public health and safety, regulatory compliance, or optimizing the use of available funds. They are not directly measurable.
- **Objectives** help explain the components of the goals and what is expected of them. They are usually expressed in terms such as maximize, minimize or maintain.
- **Performance measures** quantitatively and qualitatively explain the achievements made toward an objective or goal. Figure 4 illustrates that relationship between goals, objectives and measures. Some objectives may have a single measure, while others may have several.

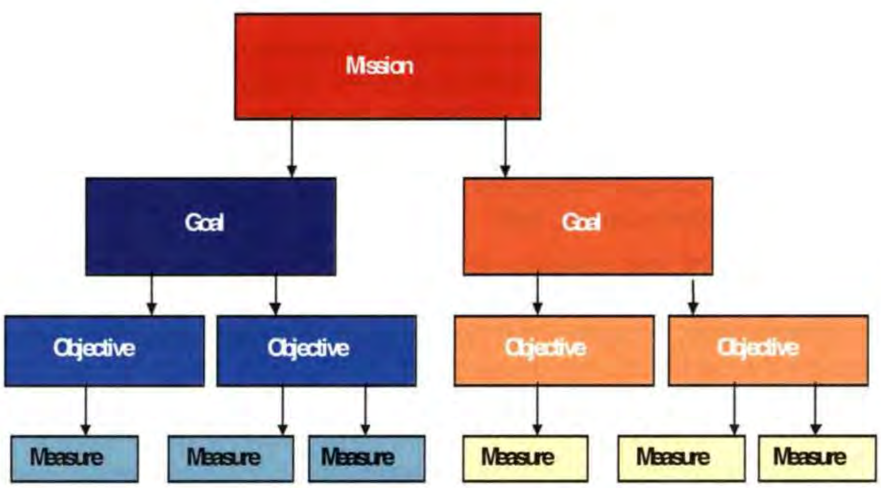


Figure 4 - Structure for developing goals, objectives and performance measures

In the Risk Management Process, a "risk" is defined as anything that can prevent an agency from protecting the Community's values or achieving the related goals. A model to evaluate techniques for protecting these values must have three basic components:

- Determination of what "risks" are associated with the decision that is being made,
- Quantitative means to measure how these risks relate to the values to be protected, and
- Method to quantify benefits and costs related to reduction in risks to values.

The completed evaluation model enables the consequences of various possible decisions to be measured, both qualitatively and quantitatively, in terms of their impact on an agency's ability to achieve its operational objectives and protect competing community values.

10.3.5 Step 2 - Identify Possible Risks

In **Step 2**, potential threats (risks) to achieving defined values these objectives are identified using a scenario-based approach. A scenario is an event, or sequence of events, that can lead to failure to achieve an objective. Each scenario includes a description of where and how the event occurs, the magnitude of its impact, and the type of resources that could be impacted.

Numerous factors, directly related and unrelated to sewerage, pose risks to the values. Common steps to defining the sewerage-related risks to the values include:

- Brainstorm with the stakeholder group the risks to each community value (e.g., pathogens in recreational waters threaten public health);
- Hypothesize with the stakeholder group the potential for sewerage impact on each community value (e.g., untreated sewer overflow could increase pathogens in recreational waters);
- Evaluate and document nature of each community sewerage-related risk (e.g., untreated sewer overflows discharge pathogens and could impact public health as a result of increased contact; non-point sources of pathogens could impact public health where no sewage is discharging). This is drafted by the technical resources of the WWT, then presented and discussed with the stakeholder group prior to finalization;
- Evaluate and document the probability of each community sewerage-related risk (e.g., the probability of sewer overflow from a combined sewer is high; probability of sewer overflow from a sanitary sewer is lower). This is drafted by the technical resources of the WWT, then presented and discussed with the stakeholder group. Specific documentation from MSD records and other utilities will assist in developing credible probability estimates and achieving stakeholder concurrence; and
- Evaluate and document the severity of each community sewerage-related risk (e.g., severity from treated sewage discharge is low; severity from dilute wet weather sewage discharge is intermediate; severity from first flush or undiluted sewage discharge is high). This is drafted by the technical resources of the WWT, then presented and discussed with the stakeholder group. Specific examples from MSD experience or other utilities may help develop credibility with the stakeholders. Third party experts (from outside agencies not connected to MSD) may also assist with establishing credible estimates of potential severity.
- Select and implement a process to "score" the sewerage-related risk factors.

10.3.5.1 Water Quality Standards Review

As part of Step 2, a thorough review of the current water quality standards will be conducted and presented to the stakeholder group to define the levels of pollutant load reductions that will be required to meet the current standards. Pollutant loadings from a variety of point and non point sources will also be developed to assist in defining performance expectations for the CSO controls. Preliminary indications of past water quality studies are that CSOs and SSOs are a couple of the many sources that can significantly impact the pollutant concentrations in the receiving waters. The stakeholder group will gain perspective on the factors that contribute to achieving water quality standards. Based on past studies it appears that control of CSOs and SSOs may not be sufficient to achieve the standards nor restore the water bodies to their full designated uses.

Risk factors commonly identified by sewerage utilities are summarized in Table 1.

Table 1 - Typical Community Sewerage Related Values and Risks

Community Value	Common Sewerage Associated Risks
Protection of the public health	Recreational use closures Fish consumption advisories Illness Sewer backups into buildings Sanitary sewer overflows Combined sewer overflows Catastrophic loss of treatment units
Protection of the environment	Nutrient discharges contributing to eutrophication of receiving water Organic discharge depressing dissolved oxygen levels in receiving water Solids discharges restricting access Floatables discharges affecting aesthetics and safety
Protection of real property	Sewage backups causing property damage High velocity sewage washing out equipment Sewage flooding destroying equipment Sewer collapse impacts transportation Sewer collapse impacts building foundations Street flooding making roads impassible
Provision of the community aesthetics	Septic sewage generating odors in populated locations Unscreened sewer overflows depositing objectionable materials (floatables) in visible areas
Meeting community sewer expansion needs	Perceived lack of sewer capacity results in building moratorium

Community Value	Common Sewerage Associated Risks
Affordability of sewer rates	Cost of capital improvements to treatment works Cost of capital improvements to the sewer systems Personnel costs of improved construction inspection Personnel costs of improved monitoring and documentation Increased O and M costs to implement MOM
Compliance with regulatory requirements	Misunderstanding of applicable regulations Changes in regulatory requirements Technically infeasible permit conditions

10.3.6 Step 3 - Risk Evaluation Measures

Developing scalable, objective measures of the risks provides a means of tracking progress towards their achievement, encouraging those activities that reduce the risks while discouraging measures that increase the risks. Steps to defining objective measures of the sewerage related risks include:

- Brainstorm, with the stakeholders, measures of each sewerage related risk. Some of these measures may be numeric; others may be objective categorization of the factors discussed in defining the probability and severity;
- Identify and document protocols for consistently evaluating impacts on each risk. Units of measurement must be practical, economical, and easy to maintain. This is where sampling, monitoring, data evaluation, and modeling tools should be considered. The technical resources of the WWT will identify available tools for presention to the stakeholder group for discussion and selection;
- Pilot test and/or peer review each identified risk measure. It is important to test that the protocol works consistently both for measuring the existing state of risk and for projecting the state of risk under alternative future control measures. This is completed by the technical resources of the WWT and presented to the stakeholder group for discussion;
- Seek stakeholder endorsement of the risk measurement protocol; and
- Refine and document the protocol for risk measurement.

In **Step 3**, the likelihood and consequence of each scenario are evaluated as illustrated in Figure 10.5. Likelihood is assessed based on past experience, as well as the evaluation team's knowledge of experiences of other similar agencies. Consequences are developed with the concurrence of the stakeholders. Each type of risk is assigned a "consequence score" using a series of "performance scales" that are developed with input from members of the WWT.

The process is focused by first screening those events that have a very low likelihood of occurring, or are already adequately protected against; have low consequences; and can quickly and inexpensively be dealt with or are already being addressed.

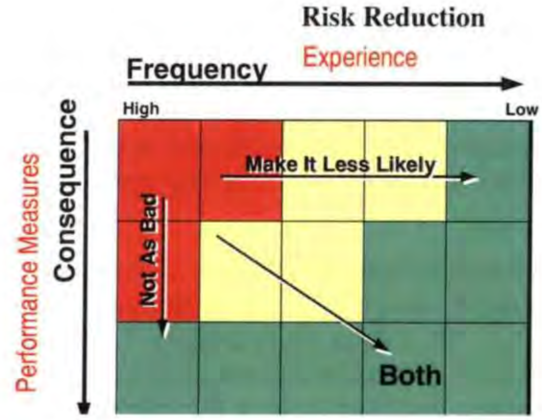


Figure 5 - Likelihood and Consequence Framework

This step requires the development of prioritization criteria to be used in estimating the probable severity of a given problem. These criteria will be used for two purposes: 1) to provide standard evaluation criteria while compiling problem areas and developing problem statements and 2) to develop a method for priority ranking of potential projects.

Screening criteria will be developed by the WWT, with the stakeholder group working closely with the technical resources of the entire WWT.

10.3.7 Step 4 - Develop Risk Reduction Strategies

In **Step 4**, methods of reducing the vulnerability for each risk scenario are brainstormed with the stakeholders and then further developed by the technical resources of the WWT. These methods fall within a range of options, which include risk elimination, risk prevention, risk mitigation, response to accidents and risk sharing (Figure 6). Stakeholder participation in brainstorming allows for identification and discussion of unconventional solutions or strategies. Preliminary cost estimates for each method of reducing risk are also prepared. This allows the estimation of values achieved at different levels of risk management.

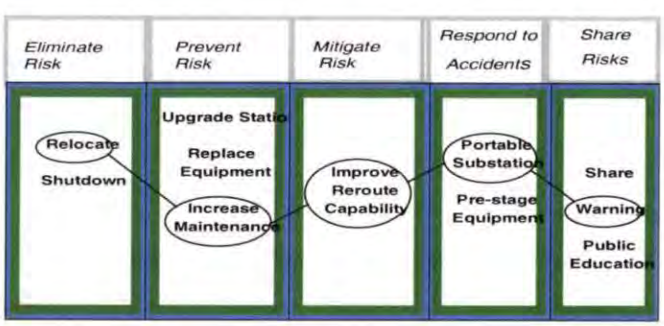


Figure 6 - Strategy Table for Risk Reduction

10.3.7.1 Identify Applicable Technologies and Non-Structural Approaches

To assist in the brainstorming efforts, the stakeholder group will be presented a matrix of available discharge abatement technologies and non-structural approaches that may be appropriate for the MSD system. The matrix will list known technologies and approaches that have been developed and implemented, what the performance objectives are, where they have been applied, and with what performance results. It is important that the matrix be comprehensive in scope and inclusive of technologies and approaches that may not appear to apply to the MSD system, so that a determination of non-applicability is clearly made at this point in the process.

Sources of data for the matrix would include experience of the Wet Weather Team members, and reports in the open literature, particularly technology reviews published by the US Environmental Protection Agency, the Water Environment Federation, and the International Water Pollution Control Association. The alternative matrix can be updated periodically based on new developments in the problem definition task or the appearance of new sources of review data. Particular attention will be paid to:

- Water quality benefits anticipated and how such benefits were established,
- Unit costs for capital and O&M, and
- Operational issues and problems for facilities that are now in operation.

10.3.7.2 Preliminary Screening of Alternative Abatement Strategies

After developing a wide range of potential risk reduction approaches, a preliminary screening of potential alternatives will be performed. This preliminary screening will be based on a variety of factors related to protecting community values, including an assessment of the potential hydraulic and pollutant load reduction, probable impacts on achieving water quality objectives, and probable costs. It is expected that a wide range of structural, non-structural, and operational alternatives will be developed and carried forward for further analysis.

To protect the wide range of community values expected to be identified, different abatement strategies and technologies may be applied to achieve the water quality objectives in different watersheds and different locations. The effectiveness of the SSDP program shall be measured in a number of ways, including such factors as:

- Estimates of cost effectiveness,
- Maintainability,
- Reliability,
- Implementation requirements,
- Compatibility with existing facilities and equipment,
- Water quality goals,
- Environmental impacts,
- Community disruption, and
- Health, safety, and welfare (both operating and general public).

Under a value-based risk management approach, direct measures of benefits to values are preferred. Many of these historically-considered factors will be refocused to deal with the direct measures of benefits and risks identified in previous steps.

10.3.7.3 Water Quality Models

To assist in direct evaluation of water quality impacts in the Beargrass Creek watershed, MSD began work on an integrated model system in 2000 that would simulate sewer overflows, non-point source runoff, and stream water quality. This system is called the Beargrass Creek Water Quality Tool (WQT). The WQT is an integrated system of several computer models that continuously simulate the quality and quantity of runoff, sewer overflows, and stream flows for periods of a year or more.

Initially, the WQT was to be used to evaluate CSO abatement measures so that projects were planned and selected on the basis of predicted water quality impacts in Beargrass Creek, rather than simply the volume of sewer overflow. Later, the WQT objectives were expanded to include the water quality studies that could, if needed, support Total Maximum Daily Load (TMDL) allocations in Beargrass Creek for pathogens and organic enrichment/low dissolved oxygen.

Development and calibration of the Beargrass WQT is scheduled for completion in 2007. MSD will use it for capital project evaluation and prioritization. The WQT will provide a means to evaluate scenarios to meet the needs of the CSO LTCP, SSDP, storm water permit requirements, and attainment of water quality standards in Beargrass Creek Region.

Water quality models developed by ORSANCO may be used to evaluate the impacts of risk reduction strategies although the ORSANCO models are not as detailed as the WQT, and not linked to specific MSD sewer and drainage models. The ORSANCO models will, however, consider upstream conditions in the Ohio River as it enters the MSD service area.

10.3.8 Step 5 - Prioritize Risks Reduction

In **Step 5**, the benefit, or amount of risk reduction, achieved by performing each project or activity is estimated. The results are expressed in "units of benefit," that may be monetary or non-monetary units. These "units of benefit" are then converted to an equivalent economic benefit of reducing or eliminating that risk, using stakeholder-determined weighting factors based on the priorities of the values previously identified in Step 1. The performance measure scales and consequences scores developed in Step 3 enable each risk-reduction method to be <u>quantitatively</u> rated.

For the various alternatives and scenarios, the pollutant load reductions due to SSO abatement or other watershed modifications will be evaluated through the use of water quality modeling tools to assess their impacts on receiving water quality. At this time, it is anticipated that the water quality model previously developed by ORSANCO will be used to evaluate impacts on the Ohio River. For the Beargrass Creek Region, the WQT currently being developed will be used to establish the water quality impacts on that receiving water.

10.3.8.1 Develop Detailed Cost / Performance Relationships for the Alternatives

Based on the alternative evaluation process conducted above, detailed cost estimates for the recommended structural, operational, and non-structural SSDP options will be prepared. A separate summary will be prepared for each of the unauthorized overflow locations and their service areas. Individual program costs will be carefully examined with respect to their potential to be incorporated into the existing Capital Improvements Program to optimize resource expenditures. The cost summary will be prepared on a present worth basis, based on capital expenditures and operating and maintenance cost estimates. However, because the overall plan will likely be implemented over an extended period of many years, total project costs will also be developed to reflect the true cost over time.

Quantitative ratings take much of the subjectivity and emotional aspects out of the decision-making process. These may be expressed in dollar terms as "willingness to pay" values. These indicate the investment that decision-makers are willing to make to reach full achievement of each operational objective. This also allows the selection of the target level of risk.

Steps to selecting a target level of risk include:

- Develop and test means of comparing and balancing the risks;
- Facilitate stakeholder review of the risk balancing alternatives;
- Refine the risk balancing. This step may require reiteration back through the risk measure protocol; and
- Recommend target levels of each risk. Recognize that target levels of risk may be defined on a time sequence, e.g., achieve risk target X within 1 year, risk target Y within 5 years, and ultimately further progress toward risk target Z.

10.3.9 Step 6 - Risk Management Plan

In **Step 6** the risk-reduction projects are ranked and prioritized using a benefit cost approach (Figure 10.7). Fact-based decisions can then be made using this analysis to select performance objectives. This allows the adoption of performance objectives that are consistent with the target levels of risk.

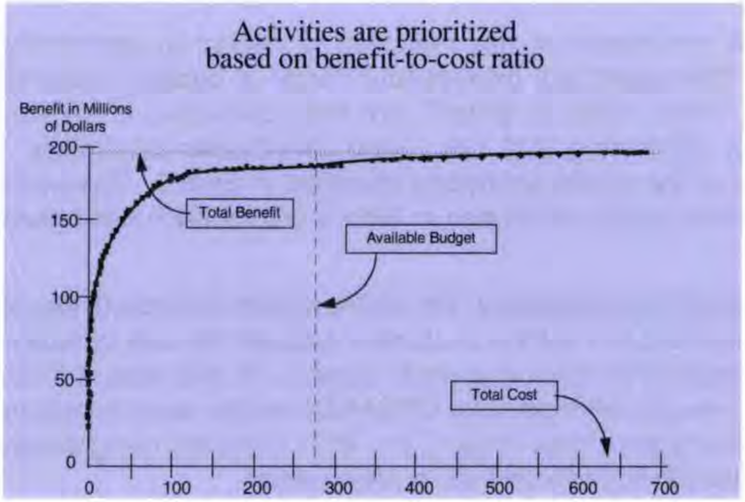


Figure 7 - Benefit to Cost Ratio

Steps to adopting performance objectives consistent with the target risk level include:

- Identify facility performance objectives consistent with the target risk level(s);
- Seek stakeholder acceptance of the performance objectives;
- Select final performance objectives and obtain regulatory approval if required; and

- Develop an implementation plan with milestones, regularly monitor implementation, and report back to stakeholders.

This framework and method is designed to allow the WWT members to systematically consider decision factors and to help guide MSD's discharge abatement plans and the community investment in wet weather management represented in those plans.

10.3.10 Integration with Wet Weather Planning Activities

The overall wet weather program development includes a suite of activities related to planning and implementation of CWA and CD compliance. As shown in Framework Figure 1, the wet weather program framework includes separate sewer system discharge abatement plans, CSO LTCP, full implementation of the CMOM Program, the elimination of the four major SSO areas, ongoing system condition assessment and asset management activities, and continued water quality monitoring and development of structural and non-structural approaches to achieving water quality standards.

Using the value-based risk management approach will provide MSD with meaningful input from a broad range of stakeholder opinion leaders. It will improve the outcome of the wet weather program and ensure broad community support for the costs and benefits that will result from implementation of the plan.

10.3.11 Other Public Participation

In addition to facilitating the stakeholder process, MSD will be actively engaged in a public participation process. MSD will:

- Review and document its present practice of public communication;
- Prepare an internal organizational chart for public participation;
- Document how the public is notified of public participation events;
- Identify potential industrial customers with interests in the project;
- Develop outlines of topics for discussion at the work groups;
- Establish schedules for and conduct regular meetings of project status;
- Coordinate with regulatory agencies and water quality standards authorities; and
- Generate and maintain records of PPP meetings, working sessions, and other communications conducted as part of the project.

MSD will also make the interim SSDP and final SSDP available for public review and comment, and hold a formal public hearing on the final SSDP.