

**Public Hearing Presentation and Public Comments**  
**June 12, 2012**

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## **System Overview**

### **Physical Description**

The sanitary sewer system of Jefferson County was created in the early 1900's to protect public health and allow the continued development of the Birmingham area. As the metropolitan area developed, the system grew along with it.

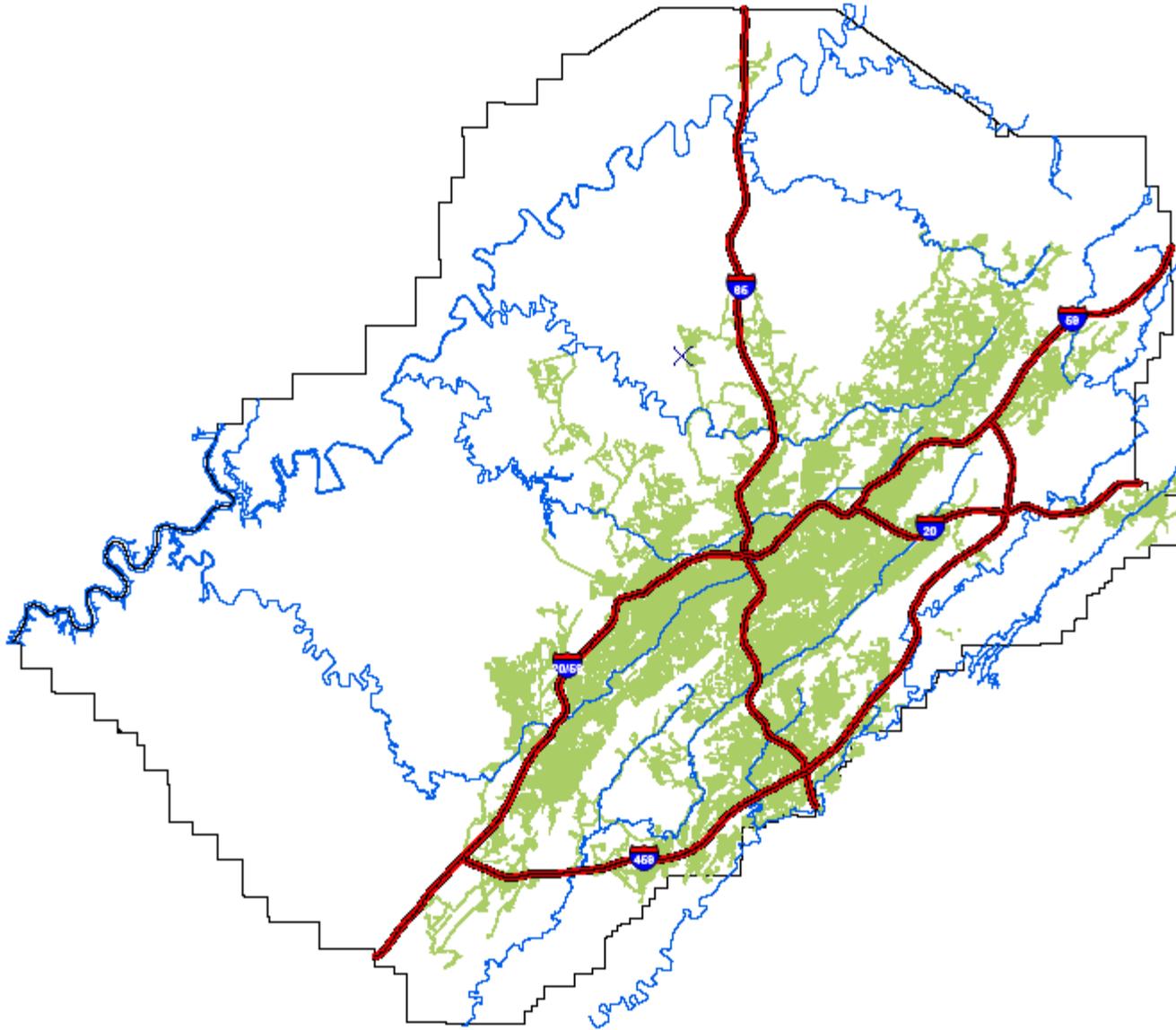
### **Collection**

The sanitary sewer collection system covers 115<sup>1</sup> square miles as shown in Figure 1, serving twenty-three municipalities, unincorporated Jefferson County and small portions of Shelby and Saint Clair Counties. The system includes 3,145 miles of sewer lines and 177 pump stations. System piping ranges from 6 inches up to 12 feet in diameter, with some pipe remaining from the 1930's and 1940's.

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<sup>1</sup> Based on 100-foot buffer of active sewer

Figure 1  
Sewer Service Area



## **Treatment**

The system includes nine permitted wastewater treatment plants (WWTPs) and one pre-treatment plant. Average treatment capacity is approximately 200 million gallons per day (MGD) with peak treatment and storage capacity in excess of 700 MGD. On average, 40 billion gallons of sewage is treated and discharged per year, or 110M gallons<sup>2</sup> per day.

These plants discharge into local tributaries of the Black Warrior and Cahaba River watersheds. Almost all of these waterways originate within Jefferson County and include the Cahaba River, Little Cahaba River, Village Creek, Valley Creek, Five Mile Creek, Turkey Creek and Cane Creek.

## **Operations**

The Environmental Services Department (ESD) of Jefferson County is responsible for the administration and operations of the sewer system. Its mission is to provide effective and efficient service to its customers while protecting public health and the environment.

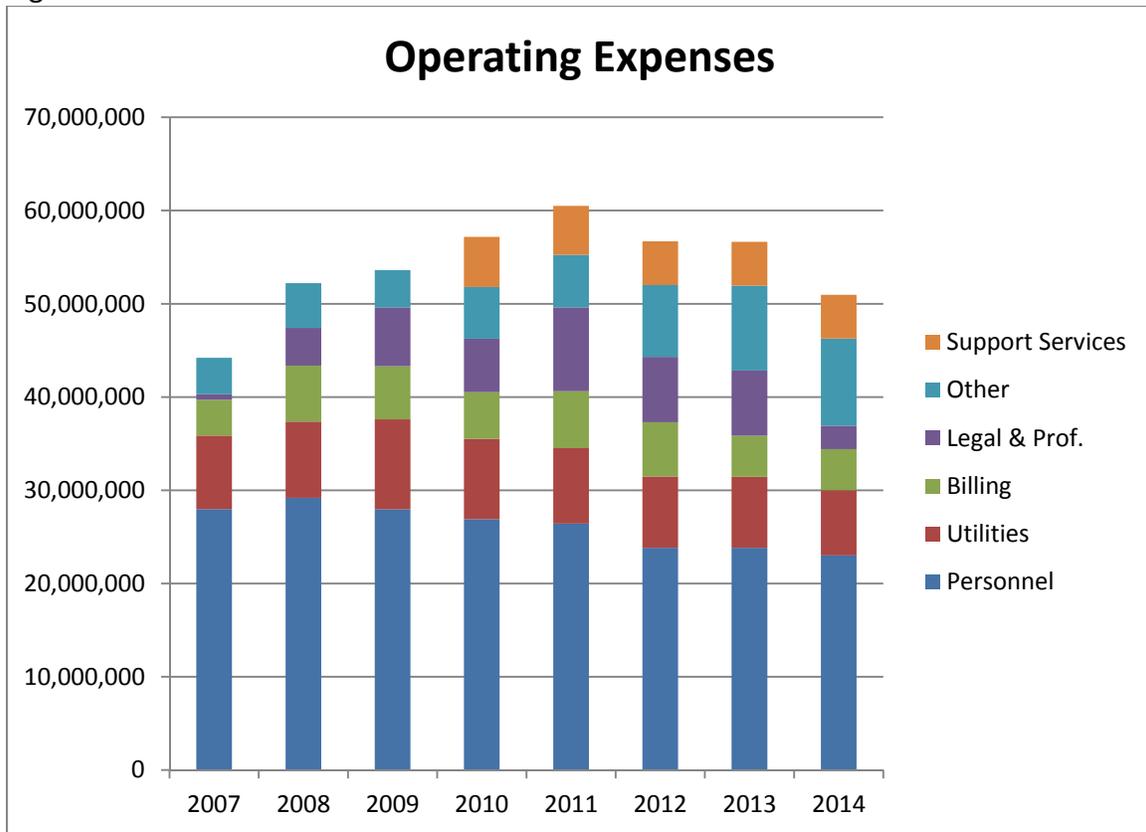
## **Budget**

The ESD operating budget includes personnel, utilities, legal and professional, billing, indirect and other expenses necessary to run the system. Current annual operating expenses are estimated at \$55.6M. ESD has implemented measures to reduce operating expenses over the past several years, particularly through the reduction of energy and personnel expenses. Historical as well as estimated future operating expenses are shown in Figure 2 below.

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<sup>2</sup> Five-year average from 2006-2011

Figure 2<sup>3</sup>



Due to the nature of the system, a significant portion of these expenses are relatively fixed. Energy expenses, while highly variable during 30 to 60 annual storm events, are relatively constant. Other peak flow facilities and collection system assets, although not in continuous of full use, must be maintained and available throughout the year.

It should be noted that legal and other professional expenses have increased significantly since 2008. Those expenses are expected to return near pre-2008 levels after resolution of the County’s bankruptcy case and any subsequent litigation.

**Staffing**

ESD staffs to meet the needs of its operations and operates on a 24-hour basis. ESD is comprised of three functional areas as follows:

Administration – responsible for capital and operating budget compilation and oversight, system planning, engineering, policy direction, billing and collection services (including oversight of wastewater billing performed by BWWB and Bessemer) and overall management of the department

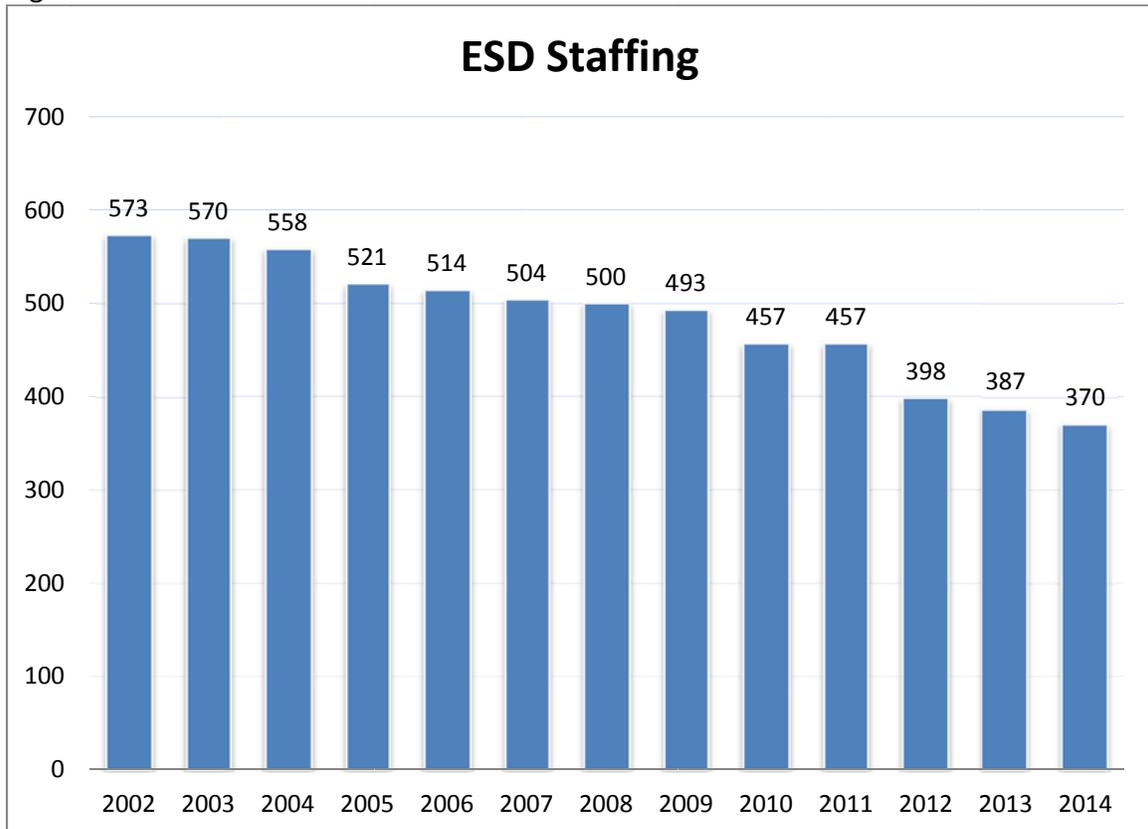
<sup>3</sup> Based on actual expenses from 2007 to 2011 and estimated from 2012 to 2014

Collection System – responsible for field operations, construction and maintenance services for the sanitary sewer collection system and pump stations

Treatment – responsible for the operations and maintenance of the wastewater treatment plants (WWTPs), laboratory services and compliance monitoring

From 2002 to the present, ESD has reduced staffing levels from 573 to 398 as shown in Figure 3 while providing comparable levels of service. In addition, overtime expenses have been reduced by over 70% since 2009.

Figure 3<sup>4</sup>



In 2011, ESD prepared a 5-year personnel plan, the purpose of which was to evaluate current operations and staffing levels; identify efficiencies which could be achieved through restructuring, contracting, implementation of automation and technology, and improved operational reliability; and set staffing level targets. By 2014, execution of this plan is expected to achieve \$3.9M in annual personnel savings.

To date, ESD is ahead of the staffing targets established in the plan by over 30 positions. ESD expects to continue to meet the staffing goals and achieve these savings as

<sup>4</sup> Actual filled positions from 2002 to 6/2012 and estimated 2013 to 2014

scheduled; however, significant capital improvements in the near future will be necessary to fully implement the plan, and it is not currently clear that funds will be available to construct these capital improvements.

## **System Usage**

### **Customer Base**

The sewer system serves approximately 145,000 of the residential and commercial connections in Jefferson County. These users receive water service from the Birmingham, Bessemer, Trussville, Irondale, Leeds, Graysville, Warrior River and Mulga water utilities. Of these, the Birmingham and Bessemer systems, through contractual agreements, provide combined water and sewer billing, while the remaining systems are billed directly by the County for sewer service only.

### **Accounts**

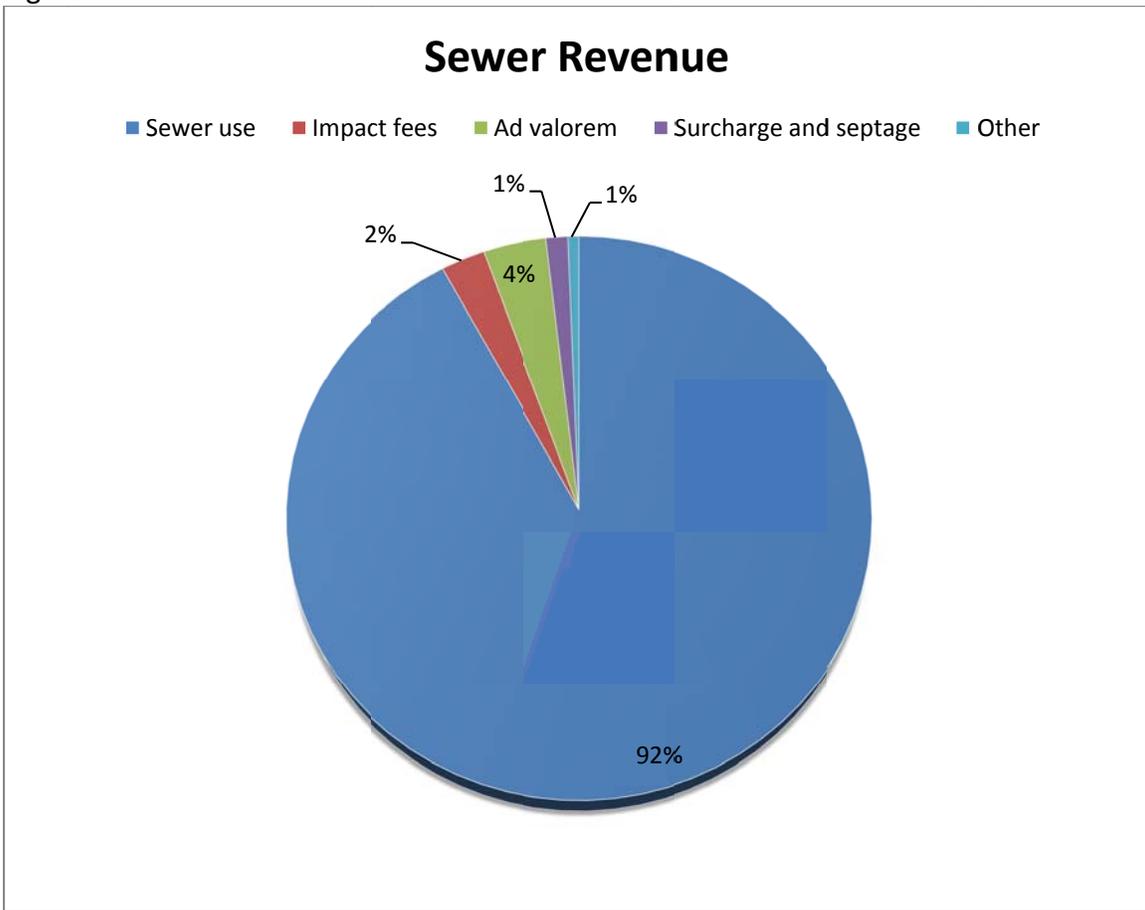
Sewer users include approximately 131,000 residential customers primarily including single-family homes and duplexes. The approximately 14,000 non-commercial users include larger multi-family residences, retail, office, restaurant, hotel and industrial users.

The total number of accounts has remained relatively stable over the past ten years. However, sewer accounts within the Birmingham system have declined by approximately five percent over the period, while the remaining smaller systems have increased by about the same number of accounts. It is anticipated that account growth will continue to remain near current levels, if decline slightly, in the next five to ten years.

### **Revenue**

Annual revenues are currently approximately \$161.6M. Revenues are received from a combination of taxes, user charges and fees as shown in Figure 4 and described in further detail below.

Figure 4



### ***Charges***

**Sewer Use:** Connected sewer users are charged on the basis of metered water consumed at the rate of \$7.40 per 100 cubic feet (\$9.89 per 1,000 gallons). Residential users are provided a 15-percent “watering credit” for water that is assumed not to return to sewer to allow for outdoor water usage. Non-residential users are not allowed this credit. This revenue stream is the vast majority of the revenue received and is subject to high variability.

**Impact Fees:** New connections to the system are charged a fee based on the estimated volume of the connections to the system. For a typical residential home, this fee is about \$3,600. This charge has, in the past, represented a significant source of income (up to \$10M/year) but has declined significantly (as low as \$3.5M/year in 2010) with the economy.

**Industrial Surcharge:** In addition to their volumetric usage, high-strength users (approximately 30 industries) are charged based on the strength of their waste. It should be noted that the current rates have remained unchanged since 1991.

Septage: Septage charges include a volumetric charge for waste delivered directly to the WWTPs. These wastes typically include pumped septic tank and grease trap waste and, infrequently, other miscellaneous liquid waste. It should be noted that these rates have also remained unchanged since 1991. Additionally, grease trap waste, which has only been routinely received over the past five years, is difficult to treat and should be charged at a higher rate than regular septage.

Ad valorem Tax: By legislative act, the system receives the proceeds of a 0.7 mil tax on real property. This tax is dedicated by law to pay for operating expenses.

Interest: Interest is periodically received on the balance of remaining bond proceeds. In the past, this represented a significant source of income in excess of \$20M per year, but with the decline of interest rates and fund balances this source is now slightly in excess of \$1M per year.

Other Fees: Minor sources of revenue include a collection of primarily administrative fees such as connection/disconnection, document and grease control fees.

Minimum/Fixed Charge: The current rate structure provides for a small fixed charge to be applied when the user has no usage. This fee is based on meter size, but for the typical residential user is \$2/month. The system incurs fixed expenses to provide service for each account regardless of volumetric usage. This charge has remained unadjusted for an extended period of time and should be evaluated for its adequacy and possible conversion to a fixed, rather than minimum, charge.

### ***Classes***

As noted above customer classes include residential, non-residential and special (high-strength industrial, outside waste). Although 90% of users are in the residential class, the non-residential class accounts for 60% of sewer use revenue.

## **Volume**

The volume of water, both billed and received for treatment, significantly affects both the revenues and expenses of the system.

### **Metered**

As noted above, sewer use charges are based on metered consumption as read by the various water utilities. This total volume can fluctuate significantly from year to year based on factors such as rainfall and economic demand.

Additionally, the system has experienced in excess of 3% decline per year in average consumption. This phenomenon has been observed across the country due to the use of more efficient plumbing fixtures and appliances and a general mindset toward water conservation. Elasticity of demand due to increasing rates has almost certainly also contributed to the observed decline in consumption.

Since revenues are almost exclusively dependent on volumetric usage, declining usage must be addressed in order to provide a consistent revenue stream. This will almost certainly have to include a conversion of some portion of the current rate structure to a fixed charge.

## **I/I**

A significant portion of the water received and treated (50-60% of the volume) comes from external sources of water and not from the water that enters and exits through plumbing. Most of this extraneous water comes from infiltration and inflow (I/I) that enters the system through defects in the collection system. Infiltration includes groundwater that seeps into cracks in the pipes, and rises and falls with changes in the water table. Inflow includes direct sources of rain and surface water that typically enter through storm sewer cross-connections, downspouts, sump pump and other direct sources.

This I/I creates extreme variations in the volume of water received at the WWTPs – often in excess of five times the normal volume. These peak flows increase expenses through increased pumping demand and the facilities necessary to store and treat these additional flows.

Substantial expense was incurred under the Consent Decree to address I/I, but I/I management will remain an ongoing expense and challenge for the system. Future capital decisions will have to be based on a business case analysis for removing versus treating this I/I.

## **System Performance**

### **Regulations**

The system is subject to environmental regulations to protect public health and the environment as administered by state and federal authorities. ESD files over 30 reports per year to environmental regulators and meets and/or reports on over 24,000 specific parameters each year. In addition, ESD regularly meets with state and federal regulators to discuss ongoing and future regulatory compliance issues with the Clean Water Act and the County's sanitary sewer Consent Decree.

### **Clean Water Act**

The Clean Water Act was enacted in 1970s to regulate discharges into waters of the state and is the primary regulatory driver for the system. Through administration by the

states, the National Pollutant Discharge Elimination System (NPDES) has been established to regulate the quantity, quality and location of these discharges. The State of Alabama, through the Alabama Department of Environmental Management, issues and monitors these NPDES permits. Violations of these permits are violations of the Clean Water Act and subject to enforcement action and potential fines of up to \$25,000 for each occurrence.

### **Consent Decree**

In the 1990s, citizen plaintiffs, later joined by the United States Environmental Protection Agency and the Department of Justice, filed suit against the County for violations of the Clean Water Act. In 1996, the County entered into a Consent Decree to address these violations.

### ***Background***

Up to the 1990s, the County's routinely violated its NPDES permits through the discharge of raw wastewater into the local waterways. These occurred through direct bypasses (often hundreds of millions of gallons of untreated sewage) at the WWTPs and in the collection system, as well as sanitary sewer overflows (SSOs) which typically occurred from manholes in the system. These bypasses and SSOs were primarily the result of excessive I/I in the system.

### ***Requirements***

The Consent Decree required the elimination of bypasses and the reduction of SSOs in the system. The County also agreed to acquire the sanitary sewer collection systems of the twenty-one surrounding municipalities to create a unified system, increasing the system from 600 miles to almost 3,000 miles of sewer. These municipal systems were donated to the County in 1998. Although these assets were donated, for accounting and other purposes they were valued in excess of \$1.4B. As a whole, however, these assets were subsequently determined to be in worse condition than assumed. From a practical and cash-flow, if not accounting, perspective these assets have been a net liability to the system.

The County was required to develop a plan to assess the system, identify projects to correct deficiencies, commit to construct these projects and purchase \$30M in stream buffer property. This plan formed the basis for the more than \$1.5B expended under the Decree.

### ***Work Performed***

As a direct part of the Consent Decree, the County committed and executed more than 200 projects totaling \$1.5B from 1997 to 2007. Of the more than 600 deadlines imposed, the County met all but one on time.

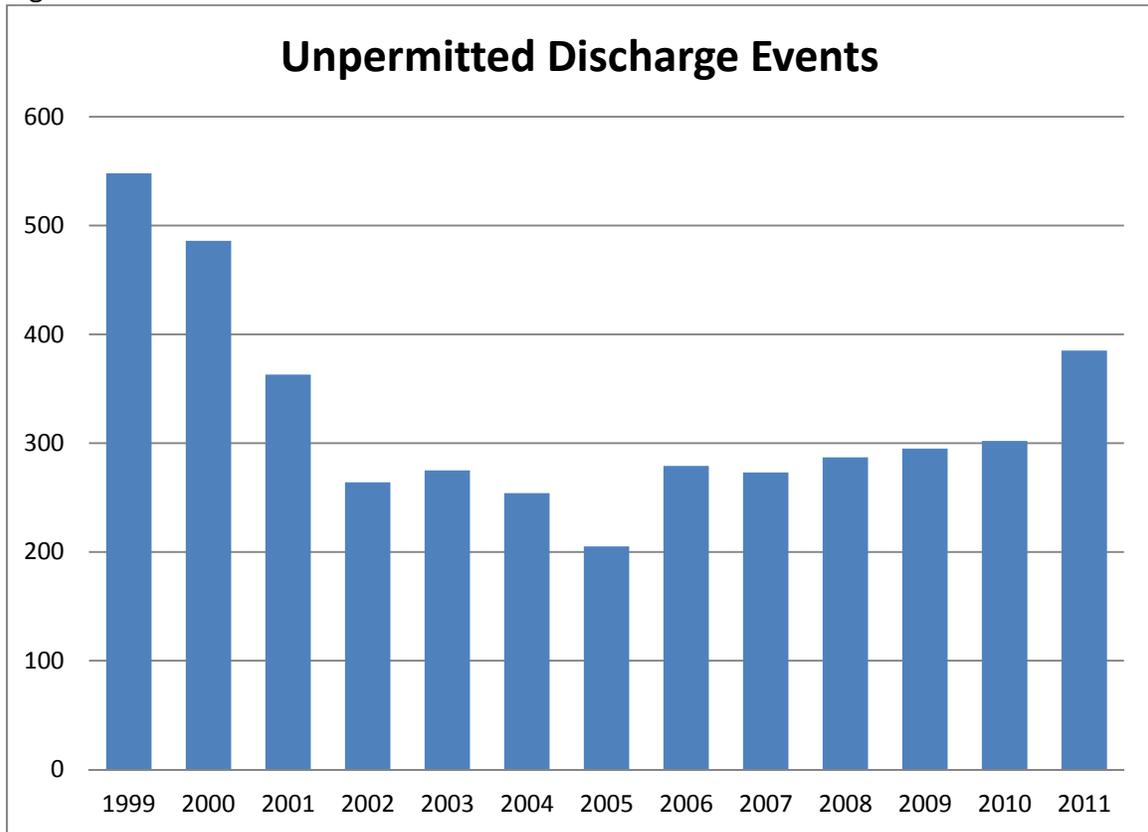
All of the automatic bypasses were eliminated by the work, and approximately 25% of the collection system was rehabilitated or replaced. Despite, however, some relative

success, much of the work done under the Consent Decree by the past ESD administration was unnecessary, poorly conceived, poorly managed and performed with little regard for the total cost.

**Status**

All of the work contemplated and committed to under the Consent Decree has been completed, and since 2001, the reduction in the annual volume of bypasses and SSOs (unpermitted discharges) from levels in 1996 has often exceeded 99%. The total number of SSOs has been reduced from a peak of 548 per year in 1999 to the current level of approximately 310 per year as shown in Figure 5.

Figure 5



Most of the basins within the system now perform well, and five of the nine basins have now been terminated from the Decree. ESD expects to continue efforts to remove the remainder of the basins over the next two to three years.

**Discharges**

Discharges from the system occur in three primary areas: permitted outfalls at the WWTPs and unpermitted discharges as SSOs or house backups.

## **Outfalls**

NPDES permits establish specific limits for pollutant concentrations allowed to be discharged for a number of parameters. This means that ESD is required to meet hundreds of specific limitations each week. The WWTPs perform very well in this regard, achieving a compliance rate<sup>5</sup> in excess of 99%. In addition, these WWTPs have received numerous awards from state and national organizations in recognition of this continued compliance.

## **SSOs**

SSOs have been significantly reduced from their peak in both volume and number of occurrences, and most portions of the system perform well in this regard as evidenced by the termination from the Consent Decree. In particular, though, the Valley Creek system overflow rate is not satisfactory to ESD, and it is currently formulating a comprehensive plan to address these SSOs as economically and efficiently as possible.

## **Backups**

Backups can and do occur inside a customer's structure due to blockages in the County's system, although the majority occur as the result of a problem in the customer's service line. Nevertheless, these backups from the County create a significant customer service problem, as well as financial and public health problem to remove and remediate sewage from a customer's home.

## **System Maintenance**

### **Routine**

To prevent blockages which lead to SSOs and backups, the sewer system must be continually maintained. The County maintains and staffs a fleet of cleaning and inspection equipment to keep the system operating and respond to problems when they occur.

### **Cleaning**

ESD routinely cleans sewer lines to remove debris, roots, grease and other obstructions which accumulate in the system. When backups and SSOs occur, these crews respond, contain the overflow, correct the problem and mitigate the spill.

ESD is currently working with a nationally-recognized sewer maintenance consultant to evaluate and refine its cleaning operations. We expect the improved cleaning operations will substantially reduce SSOs in the near future.

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<sup>5</sup> Based on "wastewater treatment effectiveness rate" from American Water Works Association [Benchmarking Performance Indicators for Water and Wastewater Utilities: 2007 Annual Survey Data and Analyses Report](#)

## **Inspection**

The system must also be inspected to assess its condition and identify defects. This provides staff the information they need to plan and prioritize work to the system. ESD has recently implemented a standardized inspection system to facilitate condition assessment across the system.

## **Long-term**

As the system continues to age, equipment and piping deteriorate. Despite the work done under the Consent Decree, most of the system was not improved, and the remainder is now seven to fifteen years older than when the work was performed.

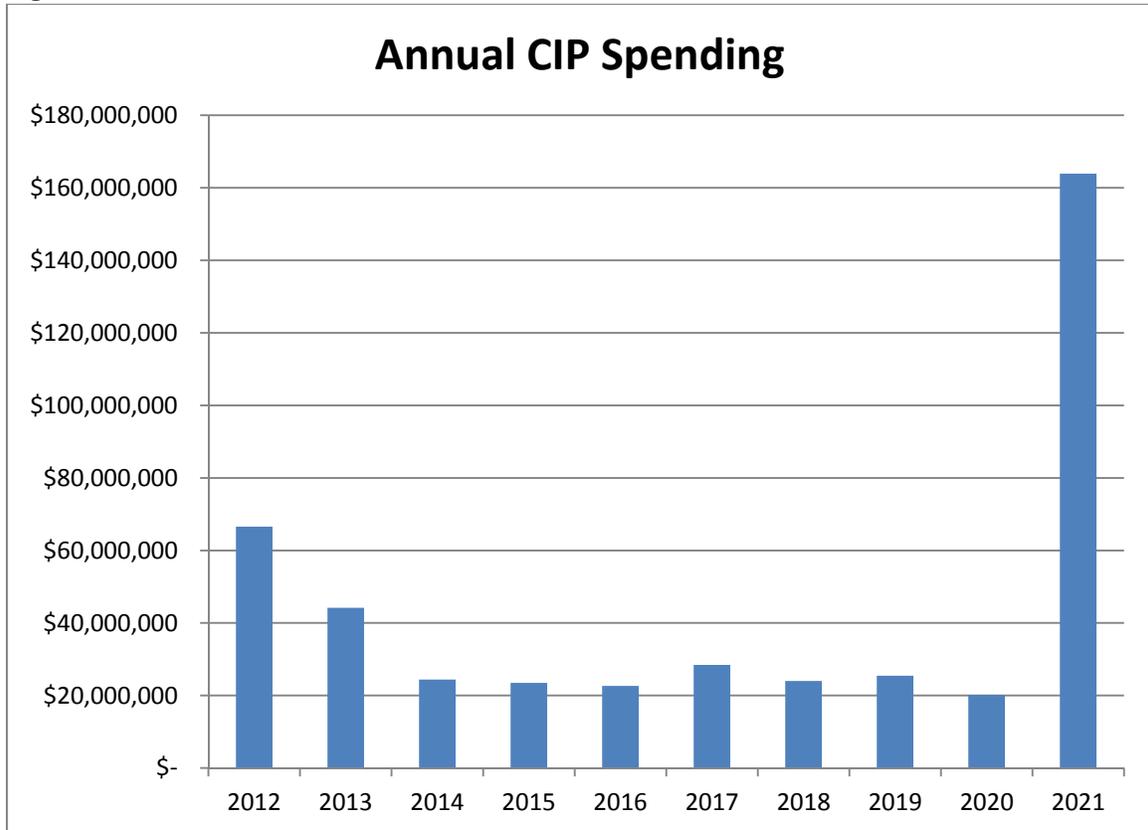
As pipes age they crack, corrode and eventually collapse, creating SSOs. As equipment ages, it becomes less efficient and fails, creating permit violations at the WWTPs. Long-term maintenance is designed to address these issues apart from the work needed to clean and inspect the system. This work is planned for in ESDs Capital Improvement Program (CIP). It includes work necessary to keep the system in working order, maintain compliance with existing regulations and meet new regulations as they are required.

ESDs CIP is continually reevaluated and updated. At present, the CIP contemplates annual average capital expenditures<sup>6</sup> of \$36M for the next five years as shown in Figure 6. CIP spending is heavily influenced by TMDL compliance projects (discussed below) in the first and last years of the period. System renewal expenses average approximately \$22M per year.

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<sup>6</sup> In project value

Figure 6



### **Rehabilitation**

If a pipe or asset is not badly deteriorated, its life can be extended much more economically through rehabilitation. In the case of a pipe, a liner is placed inside the existing pipe, stabilizing the cracks in the original pipe and significantly extending the life of the asset.

Under the Consent Decree, approximately 85% of the work involved rehabilitation rather than replacement. ESD expects this ratio will continue in its CIP.

### **Replacement**

Assets which are out-dated, severely deteriorated or undersized often require full replacement. For pipes, ESD forecasts a replacement rate consistent with prior work. Many of the WWTP assets constructed under the Consent Decree are approaching the end of their useful life. This life cycle will require significant investment in replacement equipment in the near future.

### **Asset Management**

ESD realizes the need for significant investment in the system. Current management, however, is committed not to repeat the mistakes made under the Consent Decree and to establish a comprehensive system whereby capital improvements are performed in a rational, methodical, defensible and prioritized manner. To accomplish this, ESD is

currently in the process of establishing comprehensive asset management systems for its WWTP and collection system assets.

### **Document**

In order to properly maintain an asset, its condition must be known. For WWTP assets, the new asset management system will provide a comprehensive maintenance history as well as aid in scheduling the correct routine maintenance needed to extend the life of these assets. For the collection system, a program is being established to standardize condition assessment and schedule system-wide inspection.

### **Prioritize**

Even if it were desirable, the County and its ratepayers do not have unlimited resources to fix all of the defects in the system, so it must prioritize the work. Asset management systems currently being put into place will prioritize assets based on how critical they are and what happens if they fail.

Another critical part of asset management will be to use all of the information available to make informed decisions. During the Consent Decree work, the County failed to use extensive data from its flow monitoring network to prioritize or evaluate the work it was doing. Asset management will bring this and many other pieces of information together to make informed decisions and, after the work is complete, evaluate whether those decisions were correct.

### **New Requirements**

In addition to existing regulatory requirements, new laws and regulations have been and will continue to be enacted which will require additional capital and operational expense.

### **TMDLs**

ADEM has adopted new water quality standards based on Total Maximum Daily Loads (TMDL) for the Cahaba River. These standards will require very stringent effluent limitations for total phosphorous at the Cahaba River and Trussville WWTPs. These standards will be legally implemented in revised NPDES permits which ESD expects will be finalized in the very near future. These permits will require ESD to construct improvements totaling \$34.3M within two years and an additional \$140M within 10 years.

### **Unknown**

Future regulations will almost certainly require new and stricter discharge limits. Current CIP planning does not include these future costs.