SANITATION DISTRICT NO. 1

April 17, 2008

Acting Director of the Division of Enforcement
Department for Environmental Protection
300 Fair Oaks Lane
Frankfort, KY 40601

Chief, Environmental Enforcement Section
Environmental and Natural Resources Division
U.S. Department of Justice
601 D street NW
Washington, DC 20005
DOJ Case No. 90-5-1-1-08591

Chief, Water Program Enforcement Branch
Water Management Division
U.S. Environmental Protection Agency, Region 4
Atlanta Federal Center
61 Forsyth Street, S.W.
Atlanta, Georgia 30303

Re: Consent Decree Case No. 2:05-cv-00199-WOB

Dear Gentlemen:

Pursuant to the above-referenced Consent Decree, Sanitation District No. 1 (District) is required to submit a document outlining the framework that will be used to develop the Watershed Plans component of the Consent Decree:

> **39(a). Framework for Developing the Watershed Plans**. Within twelve months of entry of this Consent Decree, the District shall submit to the Cabinet/EPA for review and joint approval a Framework for developing the Watershed Plans.

The District was required to obtain public input on the Watershed Framework per paragraph 40(a) of the Consent Decree. This process and outcome is described in Appendix C of the enclosed document

A certification as required by the Consent Decree is also enclosed (Consent Decree paragraph 38). The Cabinet and EPA have 90 days from receipt to review submittals

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unless the District receives notification before the expiration of the 90-day period that review will take longer (Consent Decree paragraph 44).

I am confident in the integrity of the enclosed document, and I am certain that the framework presented not only satisfies regulatory requirements, but also provides a clear roadmap for making critical decisions about capital projects that will protect water resources and enhance the quality of life in Northern Kentucky.

I look forward to receiving your comments in the near future. If you have any questions or concerns, do not hesitate to contact me at 859-578-7465 or by e-mail at jeger@sd1.org.

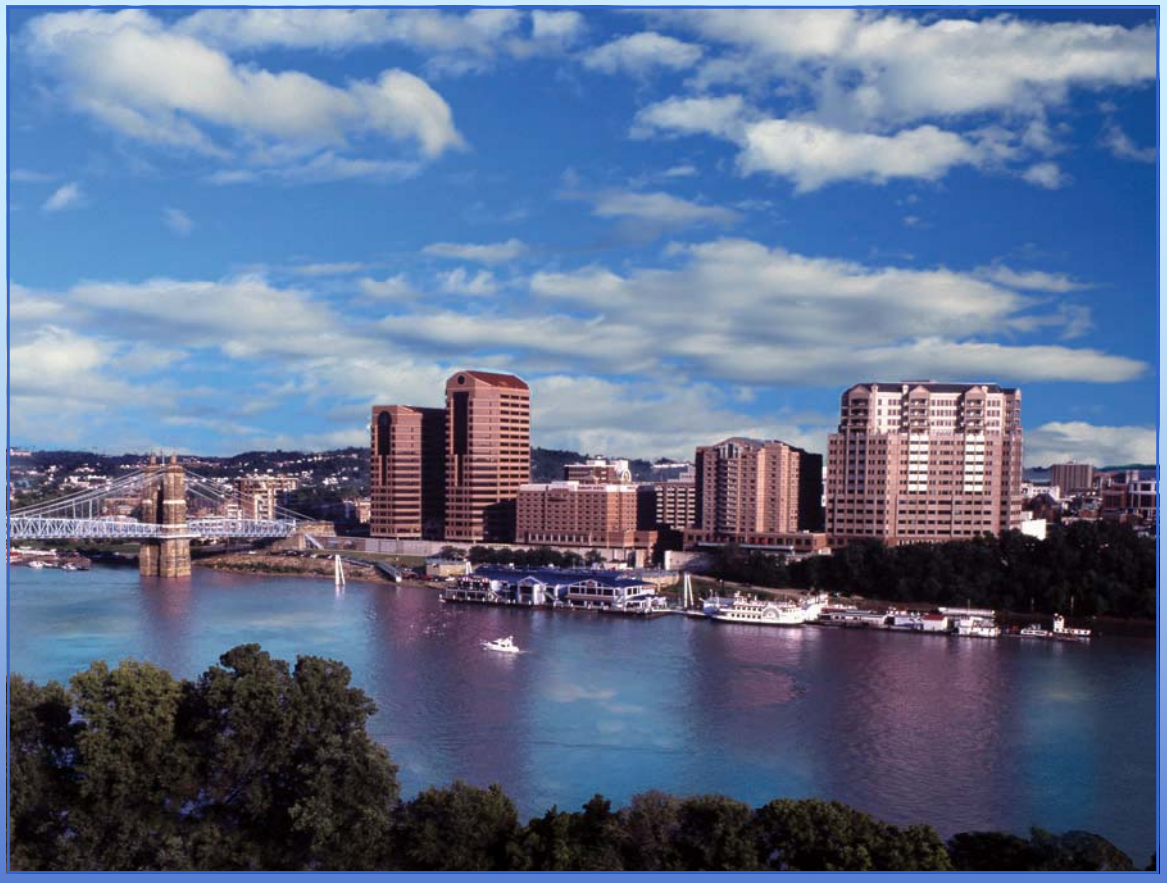
Best regards,

Jeffery A. Eger
General Manager

JAE/mm
Enclosures

FRAMEWORK FOR DEVELOPING WATERSHED PLANS FOR NORTHERN KENTUCKY

Sanitation District No. 1
April 17, 2008



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SANITATION DISTRICT NO. 1

CERTIFICATION

WATERSHED FRAMEWORK
Consent Decree Case No. 2:05-cv-00199-WOB

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering such information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Jeffery A. Eger
General Manager

4/14/08
Date

COMMONWEALTH OF KENTUCKY
)ss.
COUNTY OF Kenton

The foregoing instrument was acknowledged before me this 14 day of April, 2008 by Jeffery A. Eger, General Manager of Sanitation District. No. 1.

Kathleen A. Jerusch
NOTARY PUBLIC

Kenton County, Kentucky

My commission expires: 9-15-11

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FRAMEWORK FOR DEVELOPING WATERSHED PLANS FOR NORTHERN KENTUCKY

April 17, 2008

Sanitation District No. 1
1045 Eaton Drive
Ft. Wright, KY 41017

TABLE OF CONTENTS

LIST OF ACRONYMS AND ABBREVIATIONS

Cabinet	Kentucky Environmental and Public Protection Cabinet
CD	Consent Decree
CMOM	Capacity, Management, Operations, and Maintenance
CSO	Combined Sewer Overflow
CWA	Clean Water Act
DCWWTP	Dry Creek Wastewater Treatment Plant
District	Sanitation District No. 1
DOJ	U.S. Department of Justice
EPA	United States Environmental Protection Agency
I/I	Inflow and Infiltration
LTCP	Long-term Control Plan
Plans	Watershed Plans
SSO	Sanitary Sewer Overflow
SSOP	Sanitary Sewer Overflow Plan
SW	Storm Water
WAT!	Watershed Assessment Tool
WQ	Water Quality
WQS	Water Quality Standard

LIST OF DEFINITIONS

Basins: The four watershed study basins defined as watersheds in the Consent Decree.

Gray infrastructure: pipes, pumps, storage tanks, tunnels, and other "hard infrastructure" that is traditionally used to store and treat sewage and storm water.

Green infrastructure controls: "systems and practices that use or mimic natural processes to infiltrate, evapotranspirate (the return of water to the atmosphere either through evaporation or by plants), or reuse storm water on the site where it is generated" (Grumbles, 2007). Examples of green infrastructure include green roofs, trees and tree boxes, rain gardens, vegetated swales, pocket wetlands, infiltration planters, vegetated median strips, reforestation, and protection and enhancement of riparian buffers and floodplains.

Other watershed controls: systems and practices in addition to gray and green infrastructure that will reduce pollution from sources other than sewer overflows, such as land use planning, agricultural controls, regional storm water projects, and septic system maintenance and improvements.

Watersheds: The sixteen watersheds encompassing the District's service area, which lie within the four Consent Decree watershed study basins.

SECTION 1: INTRODUCTION

1.1 Regulatory Requirements

On April 18, 2007, the Consent Decree among Sanitation District No. 1 (District), U.S. Environmental Protection Agency (EPA), and the Kentucky Environmental and Public Protection Cabinet (Cabinet) became effective. The purpose of the Consent Decree is to address sanitary sewer overflows (SSOs) in the District's sanitary sewer system and combined sewer overflows (CSOs) in the combined sewer system to improve water quality throughout the District's service area. Pursuant to the District's Consent Decree, the District must develop, submit, and implement Watershed Plans to accomplish specific goals no later than December 31, 2025 as described in Section 2.4 of this document. This Framework describes how the District intends to produce the first Watershed Plans by April 19, 2009 for public review and subsequent submittal to the Cabinet and EPA by June 30, 2009 and to update those Plans every five years.

1.2 Overview and Structure

The goal of this Framework document is to describe the District's rationale and approach for structuring and developing the Watershed Plans. This document begins with a presentation of information on how the public and regulatory agencies will be engaged in the District's goal setting and decision-making process. This is followed by a discussion of ongoing work to characterize the District's infrastructure, overflows, and other sources of pollutants in the watersheds and the impacts of these sources on the creeks and rivers. This information is presented in a question and answer format.

The Framework document then describes the process the District will use to prioritize the selection of controls. This process includes the development of preliminary system-wide infrastructure solutions to address sources across the three-county area and the development of detailed, phased solutions for priority sources intended to be addressed in the first Watershed Plans. The system-wide solutions will provide the foundation for development of detailed solutions in future five-year updates to the Watershed Plans. The document also describes how the requirements for the CSO Long-term Control Plan (LTCP) and Sanitary Sewer Overflow Plan (SSOP) will be met, and how implementation schedules will be developed for the controls identified by the District.

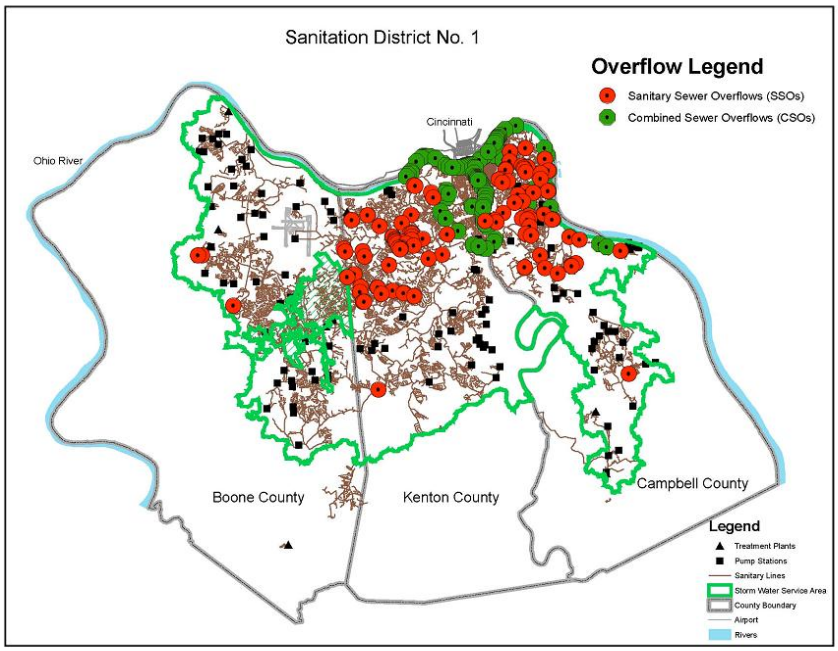
SECTION 2: Q&A

2.1 Why Has the District Established this Framework Document?

Raw sewage overflows pose a threat to human health and water quality of the creeks and rivers of the watersheds within the three-county area of Northern Kentucky (Figure 2.1). To identify the most cost-effective solutions to address sewer overflows, a substantial amount of information must be assembled. Until 1995, the numerous municipalities within the District's service area were responsible for the operation and maintenance of their own wastewater collection systems. By 1999, the District consolidated operation and maintenance of more than 30 municipalities and portions of three counties. Although the District has made significant progress in improving this infrastructure and reducing overflows, more work needs to be done to identify the cause of the overflows, understand their impacts, and develop proposed solutions. This work will include an assessment of new technologies, such as green infrastructure, that provide an environmentally-preferred way to reduce sewer overflows and provide greater watershed benefits (EPA et al., 2007).

Other pollutant sources such as urban and agricultural storm water runoff, failing septic tanks, straight pipe discharges, streambank erosion, and animal feeding operations are also contributing to water quality problems. The District is gathering information and developing tools to understand where these pollutant sources are located and how they are impacting water quality. This will allow the District to target resources at the most cost-effective infrastructure controls first, while assessing the feasibility and benefit of controlling other sources.

Figure 2.1 - Service Area for Sanitation District No. 1



Although many communities have entered into a Consent Decree to address sewer overflows, this is the country's first Consent Decree based on a watershed management approach. The watershed management approach is recognized by the EPA and others as achieving water quality improvements more quickly and cost-effectively. This approach:

- Provides a mechanism for assessing watershed problems that are not easily addressed within the Clean Water Act framework;
- Puts CSOs and SSOs into context with other pollutant sources; and
- Engages and educates stakeholders and establishes workable Plans that can be implemented for pollutant sources throughout the watershed.

This Framework document has been established to explain how the watershed management approach will allow the District to determine a combination of affordable infrastructure and watershed controls to improve water quality, eliminate SSOs, and comply with the CSO Policy (EPA, 1994).

2.2 What is the District's Watershed Management Approach?

The District's proposed watershed management approach is built upon EPA's draft guidance for developing watershed plans (EPA, 2005) and the Consent Decree. Following the recommended steps is important to allow time to:

- Build watershed partnerships so that different pollutant sources can be evaluated;
- Assess the effectiveness of green infrastructure and other watershed controls before committing scarce resources to expensive, potentially less cost-effective, gray infrastructure controls;
- Assemble and assess the data to support decision-making; and
- Implement controls and evaluate whether the controls are working and identify additional levels of control that are needed.

Figure 2.2 provides a conceptual overview of the District's watershed management program. This program includes goal setting; watershed planning; and infrastructure planning and compliance with regulatory permitting programs. Public participation will be a component of the goal setting and Watershed Plan (Plan) development process. The results of these processes are used to inform the prioritization of the gray infrastructure, green infrastructure, and other watershed controls that will be included in the Watershed Plans. Prioritized controls will then be implemented, performance assessed, and the planning cycle will begin again.

Watershed planning is being conducted across 16 watersheds, which comprise the four major watershed study basins (basins) in the Consent Decree, as shown in Figure 2.3. Infrastructure planning and compliance is being conducted across five primary sewersheds, as shown in Figure 2.4. The specific infrastructure and watershed planning processes are discussed under Sections 2.5 and 2.6.

The information from the planning processes is used to prioritize sewer overflows and to prioritize watersheds where controls should first be implemented. This allows the District to identify and implement the most efficient, cost-effective or higher-priority solutions first, while gathering more information to improve the decision-making process. The prioritization process will inform the selection of the locations for controls for the first Watershed Plans that will be submitted to the Cabinet and EPA by June 30, 2009. The District will use these Watershed Plans to implement controls, guide collection of additional information to fill identified data gaps, refine the watershed management program, and help shape the next set of Plans.

Figure 2.2– Processes within the District's Watershed Management Program

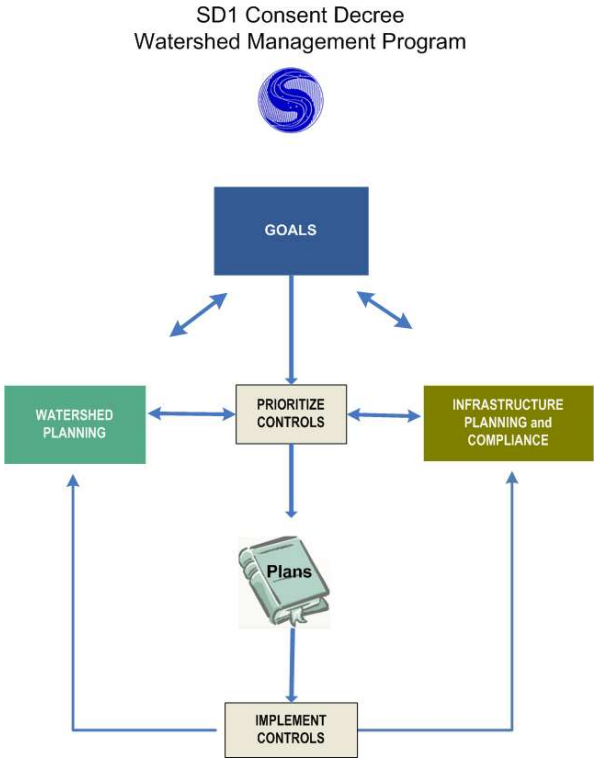


Figure 2.3 – Sixteen Watersheds in the Northern Kentucky Region

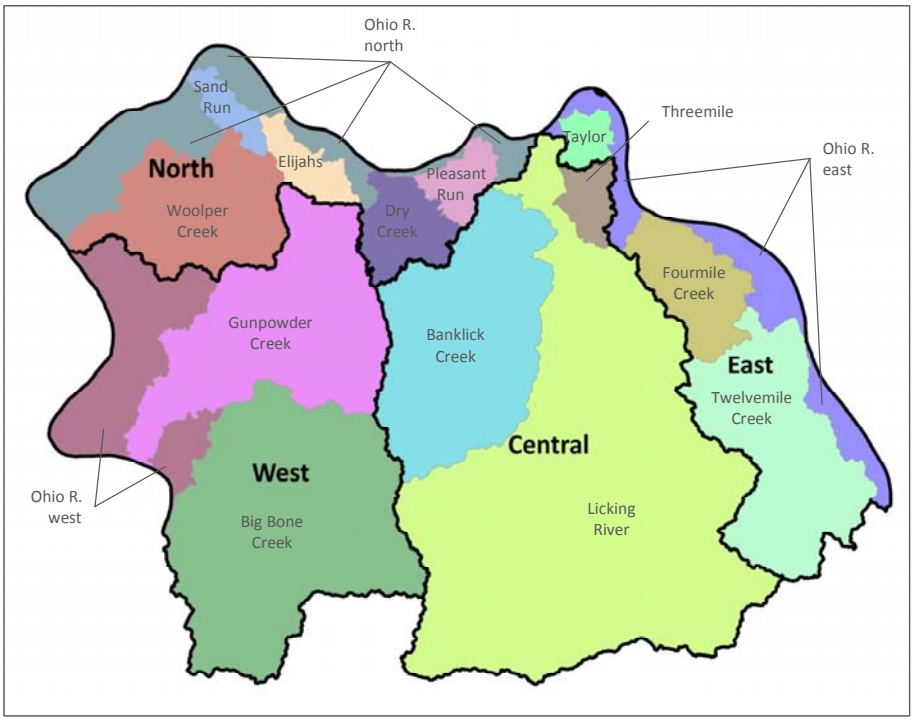
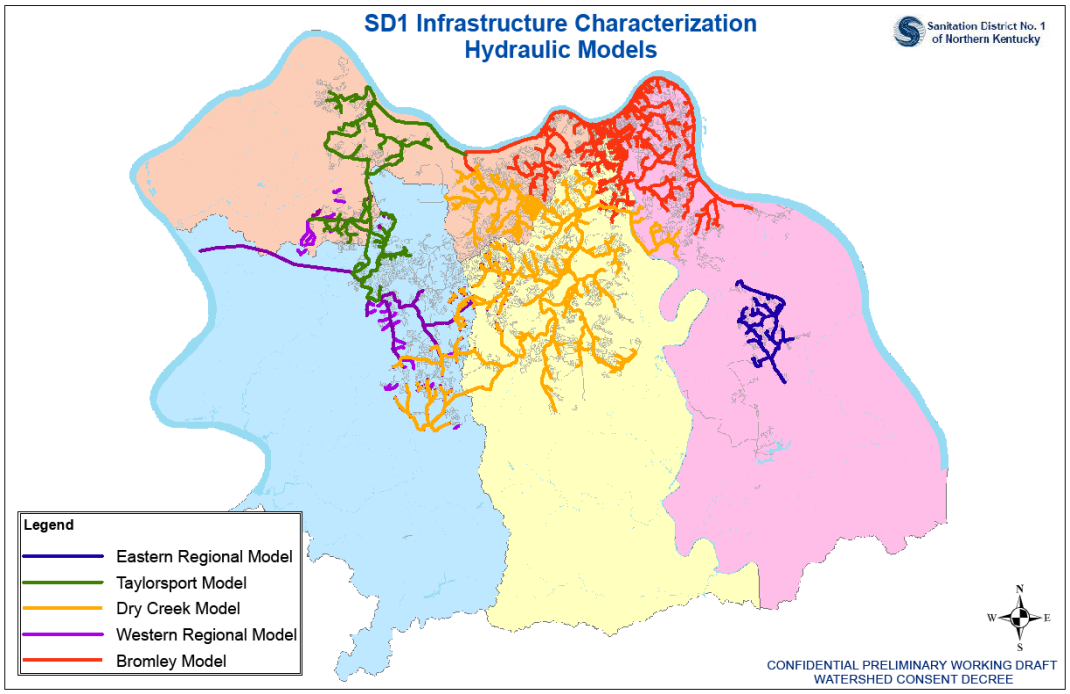


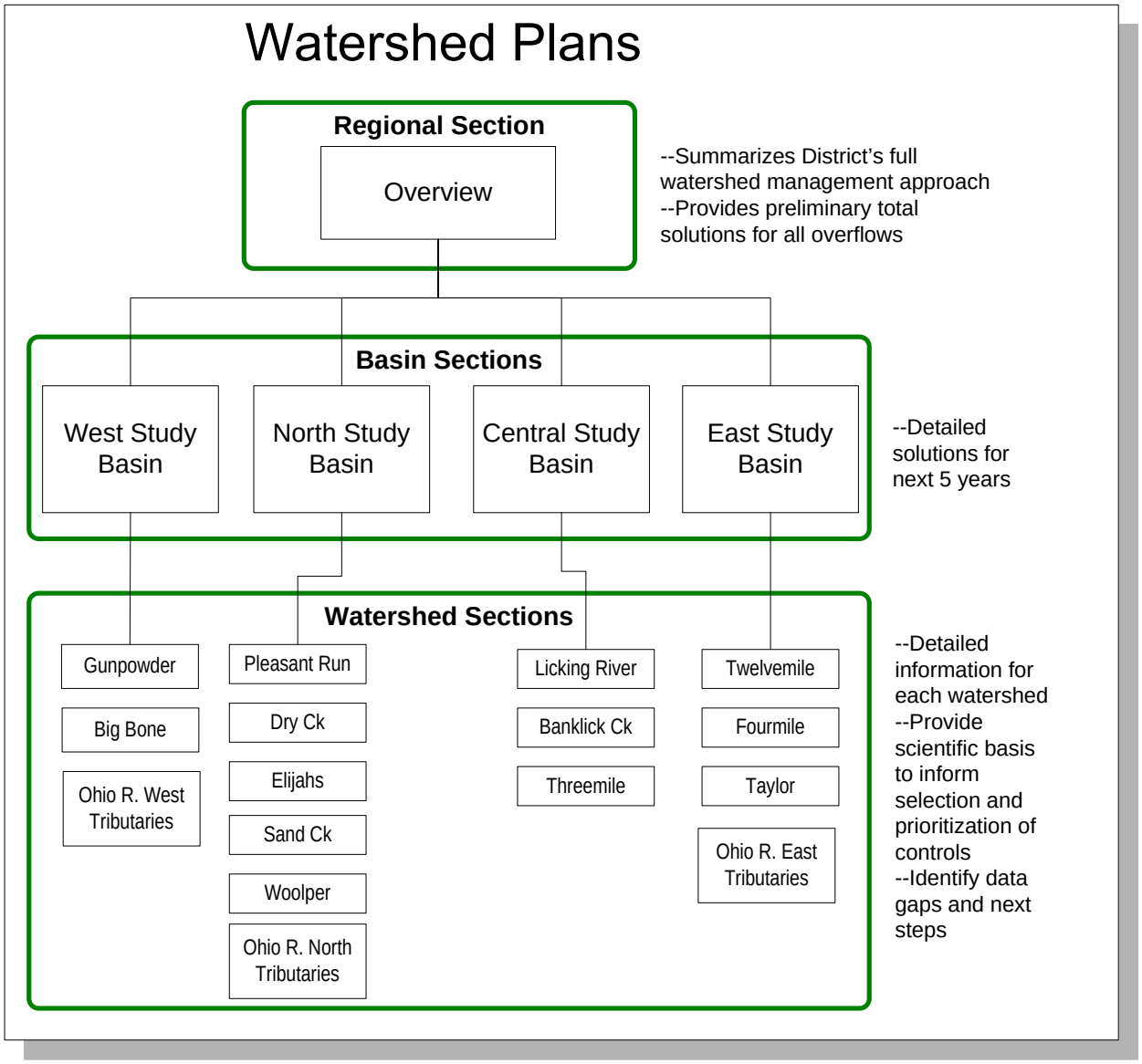
Figure 2.4 – Sewer Systems within the Four Study Basins



A key component of the District's watershed management program is communication of the planned improvements and the basis for their selection to a wide range of stakeholders. To foster this communication, a reporting structure targeting the needs of different stakeholder groups with appropriate levels of detail was developed. This Watershed Plan reporting structure is shown conceptually in Figure 2.5, and consists of three sections:

- The Regional Section will provide an overview of the full system solution and allow the District to present information on characterization, planning, and proposed solutions that span the boundaries of the four study basins and across sewersheds. This document will contain a summary of the elements for the CSO Long-term Control Plan and the Sanitary Sewer Overflow Plan and will target stakeholders interested in a single-point summary of the District's full watershed management program.
- The four Basin Sections will provide the detailed five-year improvement program for each of the four Consent Decree listed "watersheds." These five-year programs will be extracted from the full system solution (presented in the Regional Section) based on a prioritization process, cost-benefit analyses, and financial capability considerations. These Basin Sections will satisfy the formal Consent Decree requirement for Watershed Plans, and will contain detailed information on the elements for the CSO Long-term Control Plan and the Sanitary Sewer Overflow Plan. These sections will be the primary mechanism for subsequently presenting updated Plans on the required five-year cycle.
- The sixteen Watershed Sections will provide detailed information on the current water quality condition of each watershed within the District's service area, based on completed characterization efforts. Given the water quality drivers for many District decisions, these sections provide a key scientific basis to inform selection and prioritization of controls. These sections will also identify data gaps in each watershed and steps to be taken to fill those gaps through future data collection efforts. Finally, these sections will be used to communicate District solutions to local stakeholders, who typically associate their interests with their local watershed, rather than with a large study basin or District-wide collection systems.

Figure 2.5 – Watershed Plan Structure



2.3 How Will the District Engage the Public and the Regulatory Agencies in Decision-Making?

Involvement of stakeholders and the regulatory agencies in the watershed planning program is important for development of watershed plans (EPA, 2005). The District has established ongoing mechanisms to solicit and collect input from stakeholders and regulatory agencies throughout the entire watershed planning process. As shown in Figure 2.6, the stakeholders (public and watershed partners); the regulatory agencies; and the District's Strategic Advisory Team (advisory consultants specializing in infrastructure and watershed planning) will also provide key input at critical milestones such as the goal-setting process for the Watershed Plans and review of the Plans.

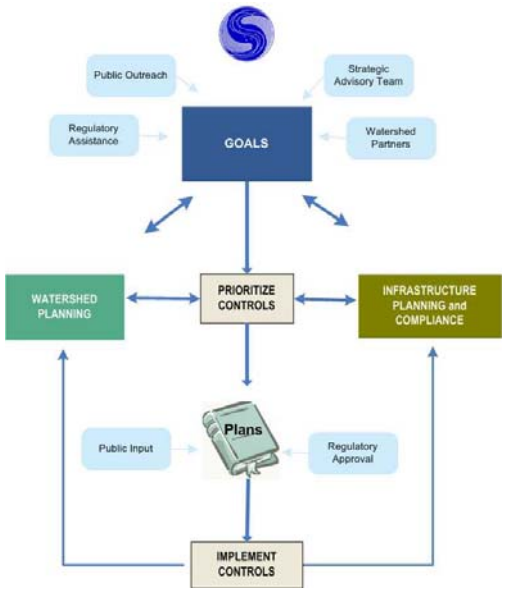
The Consent Decree specifies that the District include, as part of this input:

- A report on the public participation process for the CSO Long-term Control Plan[1];
- Involvement of stakeholders in the development of the Sanitary Sewer Overflow Plan[2]; and
- Opportunity to participate in public meetings and comment on the adequacy of the controls proposed in the Plans[3].

The District has chosen to accomplish this through a Watershed Summit approach; organizing interested stakeholders into a Watershed Community Council; coordinating with watershed partners; and using other public communication tools (e.g. website, billing inserts). A Watershed Summit held on August 30, 2007 provided an opportunity for the watershed partners to display information about their respective activities in the watershed; for the District to provide an update on Consent Decree activities; and for the public to provide input on various topic areas associated with the watershed program. The Watershed Community Council is composed of 55 members from a variety of stakeholder groups across the District's service area. These stakeholder groups include environmental organizations, home builders, the development community, local government agencies, elected officials, and citizens. The Council will provide public comment on the Framework and the Watershed Plans and will meet up to four times per year to review information associated with the program and provide input to the goal-setting and decision-making process[4]. District staff will continue to pursue and foster the development of watershed partners, and conduct meetings to learn of partner activities and to coordinate on potential pollutant source control options.

Regulatory agency participation is identified in nearly all the activities associated with the Consent Decree submittals, which are listed in Table 2.1.

Figure 2.6 – Public and Regulatory Agency Involvement in the Watershed Management Program



[1] Paragraph 39(b)(2)(D).
[2] Paragraph 39(b)(3)(E).
[3] Paragraphs 19 and 40.

[4] The first and second meetings of the Watershed Community Council were held on November 27, 2007 and February 26, 2008.

Table 2.1 Consent Decree Activities for Watershed Plans

Submittal	Date	CD Paragraph
Hold Watershed Summit	Aug. 30, 2007	40
Conduct Watershed Community Council Kickoff Meeting	Nov. 27, 2007	40
Conduct Second Watershed Community Council Meeting	Feb. 26, 2008	40
Obtain Public Input on Framework	Feb.–Mar., 2008	40
Submit Framework for Watershed Plans	Apr. 18, 2008	39(a)
Conduct Financial Affordability Analysis	Apr.-Dec., 2008	39(b)(2)(F)
Obtain Public Input on Watershed Plans (1st Round)	Apr.-May, 2009	40
Submit Watershed Plans (1st Round)	Jun. 30, 2009	39(b)
Obtain Public Input on Watershed Plans (2nd Round)	Apr.-May, 2014	40
Submit Watershed Plans Update (2nd Round)	Jun. 30, 2014	39(c)
Obtain Public Input on Watershed Plans (3rd Round)	Apr.-May, 2019	40
Submit Watershed Plans Update (3rd Round)	Jun. 30, 2019	39(c)
Obtain Public Input on Watershed Plans (4th Round)	Apr.-May, 2024	40
Submit Watershed Plans Update (4th Round)	Jun. 30, 2024	39(c)

2.4 How Will the District Establish Goals for Each Watershed?

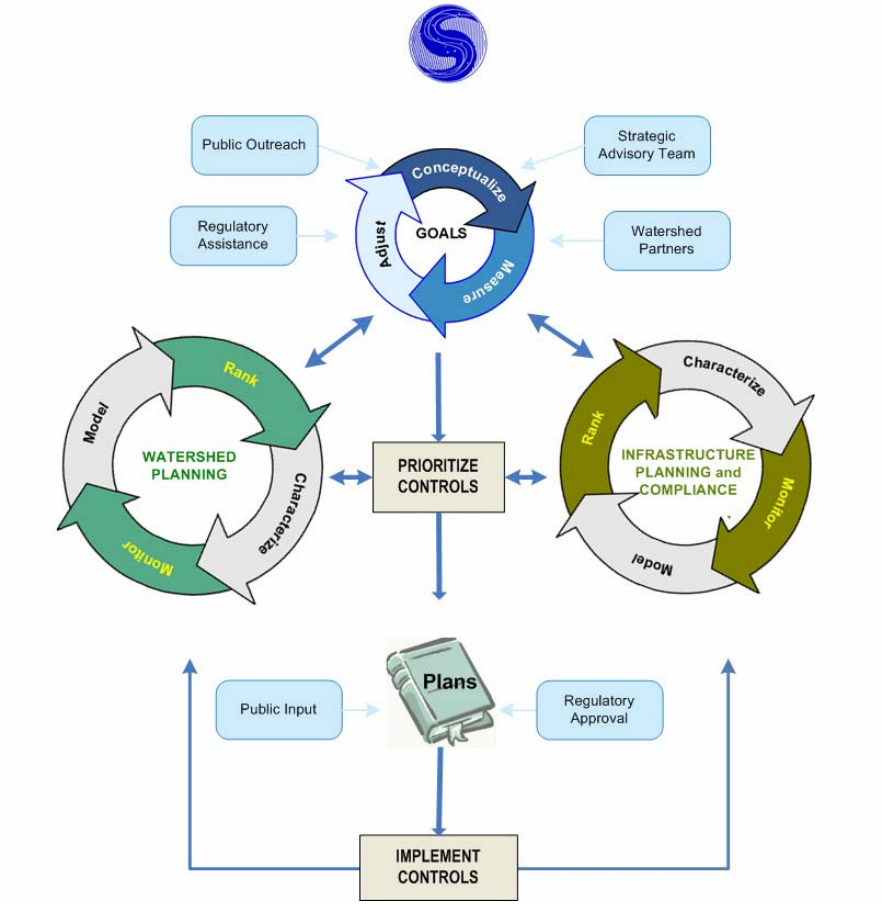
Goals for each watershed will be established and refined as part of the District's watershed management program, as shown in Figure 2.7. These goals will include overarching goals (such as eliminating recurring SSOs, complying with the CSO Policy no later than December 31, 2025 and improving water quality), additional proposed goals (such as promoting the use of green infrastructure when appropriate), and more watershed-specific goals (such as implementing forest buffers or regional storm water controls). Measures such as the number of overflow events, volume of overflows, days of potential recreational use, and percent of time water quality standards are attained will be established. It is anticipated that adjustment of the specific goals for individual watersheds may change as the program proceeds as part of the watershed planning process. The goal setting process also influences other components of the watershed management program. For example, new information from the watershed and infrastructure characterization could affect the watershed goals, and input obtained from the public, watershed partners, and regulatory agencies could affect the prioritization of controls.

Figure 2.7 also demonstrates how the goals determined above will be integrated into the cycles that exist for the infrastructure and watershed characterization processes. As described below, efforts in these cycles include characterization, monitoring to gather additional data, and development of models to calculate current conditions and forecast benefits of controls (including capital improvement projects that have already been constructed). Much of the initial infrastructure planning is also being conducted to support District compliance with the various programs specified in the Consent Decree, such as Nine Minimum Controls for the combined sewer system.[5]

The models developed in these cycles will be used to rank watersheds and pollutant sources to inform the development and prioritization of controls. This process is described in Section 2.7. Watershed Plans will then be developed as discussed previously in Section 2.2. Implementation of the Plans is described in Section 2.10. Results of the implementation are then used to inform the goals for subsequent infrastructure and watershed planning processes to establish the five-year updates to the Watershed Plans.

[5] Paragraph 35

Figure 2.7 – Goal-Setting, Watershed Planning, and Infrastructure Planning and Compliance Processes in the Watershed Management Program



2.5 What Work is Being Done to Characterize the Infrastructure?

Since consolidating the local cities' sewer systems starting in 1995, the District has invested substantial resources to understand the collection systems' infrastructure through inspection, monitoring, sampling, and modeling. A Regional Facility Plan was developed in 1995 and approved by the Kentucky Division of Water in 2001 (District, 2000). This Plan identified capital projects to improve the District's inherited aging and failing sewer system and address dry and wet weather capacity needs for current and future growth. In 2001, the District conducted a system-wide flow monitoring and sewer mapping and assessment program to more fully document and understand the collection systems, to understand their response to dry and wet weather flows, and to support development of hydraulic computer models of the collection systems.

This prior work was used to help define the extent of the current understanding of CSOs and SSOs and their potential impacts. This initial characterization was based on an evaluation of anticipated water quality impact potential, public risk, frequency and magnitude of annual discharges, and operation and maintenance history. A subset of locations identified through this initial evaluation account for an estimated 80% of the total annual overflow volume. Data gaps were identified to inform additional characterization efforts so that the District could improve system understanding and create effective and accurate tools for use in the development of the Watershed Plans.

As a result of the above activities and objectives, the District embarked on an intense program to further characterize their collection systems as the first step in developing the Watershed Plans. The program includes the placement of an extensive flow monitoring network across the entire system that consists of 245 flow monitors and 45 rain gauges. These monitors are planned to be in place until summer of 2008 to quantify and understand the collection systems' response under varying dry and wet weather conditions. In parallel to the monitoring program, the District is continuously performing field inspections of the sewer systems to gather more information. Ongoing Closed Circuit Television (CCTV) and sonar inspections as well as smoke and dye testing are being used to identify current and potential problems in the collection systems.

In addition to the ongoing flow monitoring and inspection programs, the District has instituted an outfall sampling program at 20 locations across the system to better characterize the composition of overflows during wet weather. The purpose of this program is to provide data on pollutant concentrations in the SSOs, CSOs, and storm water discharges. Sampling data will be evaluated along with the flow monitoring data and the collection systems' models to better understand how pollutant loads should be assigned to each outfall.

Following the conclusion of the monitoring and sampling programs for the overflows, the District will use the best available data to update and refine the hydraulic computer models of the collection systems. The outfall sampling data will be used to assign pollutant concentrations to each overflow. Water quality models of the receiving streams will be used to quantify the impacts of the overflows on instream water quality. The development of calibrated models and associated system knowledge based on the extensive characterization work will provide the District with accurate tools to establish a baseline condition for the overflows, rank their importance and priority, and assess the performance of proposed infrastructure controls. Additionally, tools will be developed to evaluate the potential benefits of green infrastructure controls in reducing sewer overflows, and to assess the performance of the controls once they are implemented.

2.6 What Work is Being Done to Characterize the Watersheds and Green Infrastructure?

Evaluation of watershed characteristics is important for understanding the relative impacts that sewer overflows and other pollutant sources have on water quality and public health, and for adopting realistic goals for water quality improvement. The District's service area, which is about 200 square miles, is contained within sixteen watersheds, which encompass 591 square miles. The District's understanding of these watersheds is continuing to improve. Because of the size of this area, however, the time and resources that are required to fully characterize the sources of pollutants and their impacts is significant. The District is therefore following EPA's recommended approach for watershed characterization (EPA, 2005).

The District initiated its watershed characterization program in 1995-1996 with the first evaluation of water quality in the lower portion of Banklick Creek and the lower Licking River. This evaluation determined that the CSOs were contributing to exceedances of the recreational use criteria in these water bodies, but were not impacting aquatic life (LTI, 1998). The District then participated in the Ohio River Valley Water Sanitation Commission's wet weather demonstration program to evaluate CSO impacts on the Ohio River (ORSANCO, 2002). This study again confirmed that CSOs were impairing recreational uses, but were not impacting aquatic life. A later study of the Banklick Creek watershed included an intensive water quality and biological monitoring program to assess conditions in the Banklick Creek watershed. Water quality models were developed and calibrated to identify and quantify sources, and determine the impact of point and nonpoint sources on instream water quality. This work indicated that multiple sources of pollutants were impairing recreational uses and had the potential to impair aquatic life in this watershed (LTI, 2004). The contribution of CSOs and SSOs to these impairments will be further assessed as part of the watershed management approach with the additional information described below.

More recently, the District has expanded its assessment of the watersheds in Northern Kentucky in preparation for development of the Watershed Plans. This included delineation of 16 watersheds as shown in Figure 2.3, and delineation of 128 subwatersheds. General watershed data such as political boundaries, hydrology, land cover, topography, wetlands, etc. were compiled into a Geographic Information System for mapping and analysis. Databases were established to store historic and new data for:

- Instream water quality (including continuously monitored data),
- Stream flow,
- Pollutant sources,
- Macroinvertebrates (bugs) and fish, and
- Meteorology.

The District is also in the process of developing Watershed Characterization Reports to document the characteristics of each watershed. These reports document the watershed features, including sensitive areas as required under the CSO Policy. Water body uses (such as swimming and fishing) and current conditions are described. The reports also document what is known (or not known) to date on the various sources of pollutants in the watershed.

The District has established a comprehensive monitoring program to collect instream water quality, habitat, macroinvertebrate and fish data to inform the watershed characterization process. This includes continued operation of the District's 13 continuous flow and instream water quality measurements and the addition of baseline (dry weather) data collection in every watershed. Event-based sampling (e.g. sampling over several days during and after a rainfall event) is more labor intensive and costly, and therefore is being conducted in the watersheds on a rotating basis. The District expects to complete the first round of event-based sampling (three wet weather surveys) by the end of 2009.

As part of evaluating the benefits of various watershed controls, the District is developing water quality tools. The District is producing two types of water quality assessment models: the Watershed Assessment Tool (WAT!) and detailed watershed and water quality models.

The WAT! estimates representative annual pollutant loads in a watershed based on the potential sources present within the watershed. This information enables the District to evaluate relative impacts of pollutants on water quality across subwatersheds and watersheds and to examine relative contributions of different sources. WAT! results can be combined with priority infrastructure rankings to help prioritize the planning of watershed and infrastructure controls. WAT! also serves as the organizing foundation of information to support the future development of more detailed watershed models as necessary to calculate compliance with water quality standards.

Detailed watershed and water quality models will be developed for the priority watersheds or watersheds with priority CSOs and SSOs as needed. Because the previous 1995-1996 study found that sewer overflows were causing exceedances of the recreational use criteria but not the aquatic life criteria, initial detailed models and control and elimination alternatives for sewer overflows will be focused on bacteria as the primary pollutant of concern (LTI, 1998). Models for other pollutants will be developed as needed in the next set of Watershed Plans.

The detailed water quality models will be used to calculate the fecal coliform concentrations in the streams that results from the various pollutant sources during typical, representative periods of rainfall (such as design storms, 1-year period, 5-year period, 10-year period, etc.). The calculated concentrations will then be compared to the fecal coliform water quality criteria to determine compliance on a recreational season and annual basis.[6] The models can also be used to answer questions associated with specific events, such as the number of hours after a rainfall event that standards could not be attained even with a high level of control, or if water quality standards cannot be met with cost-effective, affordable levels of control.

For the first set of Watershed Plans, model development includes refinement of the Banklick Creek watershed model and integration and updating of previous models for the Ohio River, lower Licking River, and lower Banklick Creek.

[6] E. coli will be used instead of fecal coliform when E. coli is added to Kentucky's Administrative Regulations as a bacterial indicator of water quality.

For example, the extent of the Ohio River model is being expanded to extend from the Campbell/Pendleton to the Boone/Gallatin county lines. Detailed models for other watersheds will be developed as warranted throughout the watershed planning program.

The District has also recently implemented a program to begin characterizing the potential effectiveness of green infrastructure controls as a part of its long-term plans for CSO and SSO control. Green infrastructure generally refers to the use of natural systems to help reduce and mitigate the amount of storm water runoff entering a collection system or stream. Specifically, green controls rely on reducing the amount of impervious area and maximizing infiltration, evapotranspiration (the return of water to the atmosphere either through evaporation or by plants), or onsite harvest and reuse of storm water. Examples of green infrastructure include green roofs, trees and tree boxes, rain gardens, vegetated swales, pocket wetlands, infiltration planters, vegetated median strips, reforestation, and protection and enhancement of riparian buffers and floodplains.

An initial task in the District's green infrastructure program is the development of an inventory of relevant CSO sewershed conditions such as land use, imperviousness, receiving stream characteristics, and associated CSO characteristics such as overflow volume and frequency. These data will be used for an evaluation of green infrastructure opportunities and the creation of planning-level maps for each of the combined sewersheds. Similar assessments of the separate sewer system will be made on a targeted basis.

The District will also conduct an area-wide assessment of soil characteristics of Northern Kentucky to identify areas where green infrastructure controls have the most potential for success. Throughout much of the District's separate sewer system, Northern Kentucky's underlying soils largely consists of clay soils and shallow bedrock. Clay soils typically exhibit low permeability, which may make the use of green infrastructure that relies on infiltration impractical. In portions of the District's combined sewer service area, however, the soils of some areas are expected to include more permeable sand and gravel materials. These areas may be more compatible with infiltration-based measures and offer a significant opportunity for CSO control strategies that use a combination of gray and green infrastructure.

Based on the evaluation of green infrastructure opportunities in the combined sewer system, the District anticipates that a number of potential pilot projects will become evident. Possible pilot projects will be assessed for their effectiveness and their benefit to cost ratios will be determined and included in the first set of watershed plans.

The District is in the early stages of its green infrastructure program and anticipates that the appropriateness and implementation of green infrastructure will be better defined once preliminary characterization work is completed.

2.7 What is the Process to Prioritize Controls?

The District's watershed management approach, described in Section 2.2, will support the prioritization of gray infrastructure controls, green infrastructure and other watershed controls in order for the District to determine a combination of cost-effective, affordable controls to improve water quality, eliminate SSOs, and comply with the CSO Policy. The District plans to implement a prioritization scheme based upon such factors as environmental impact, public risk, regulatory requirements, the degree of instream water quality improvement, public input, and cost-effectiveness.

In implementing the watershed management approach, the District will investigate the feasibility of controls on other pollutant sources as allowed for in the Consent Decree "to offset the level of CSO controls or to delay the elimination of an SSO…"[7]. The selection and prioritization of controls will meet the requirements of the CSO Long-term Control Plan (see Section 2.8) and the Sanitary Sewer Overflow Plan (see Section 2.9).

The first step in implementing the overall approach will consist of screening level assessments of the range of available controls and cost-benefit comparisons for different levels of control. Gray and green infrastructure evaluations will include consideration of controls that can be applied system-wide, regionally or to

[7] Paragraph 39(b)(4)

individual overflows. Watershed controls, including green infrastructure, will be considered at both the watershed and site-specific level. Figures 2.8 and 2.9 are conceptual examples showing how this information is anticipated to be used to develop gray infrastructure, green infrastructure and other watershed control options and combinations of these control options for watersheds where detailed water quality models are (Figure 2.8) and are not (Figure 2.9) available. These figures also demonstrate how a combination of different controls will be developed for use in the Watershed Plans.

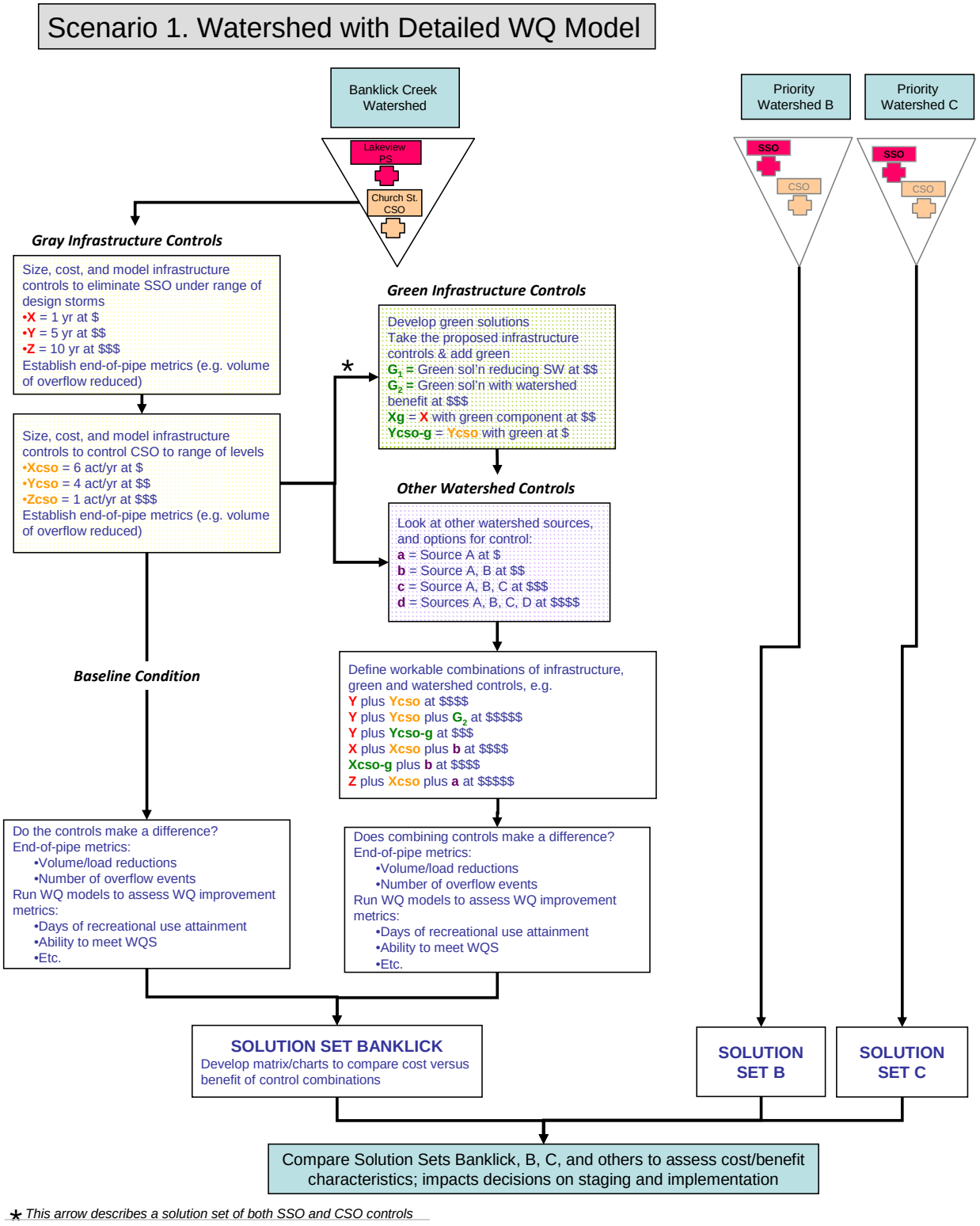
The models described in Section 2.5 will be used to size overflow controls comprised of gray infrastructure to determine the level of control necessary to eliminate SSOs. The models will also be used to determine the level of control necessary to comply with the CSO Policy. Sizing of SSO controls will be based on a level-of-service metric (e.g. size sufficient to control overflows during a particular storm or during a typical period of rainfall or to prevent recurring SSOs). CSO control sizing will be based on end-of-pipe metrics, such as the average number of overflows per year (e.g. zero, one to three, four to seven, and eight to twelve) as described in the CSO Policy. More detailed gray control solutions will then be developed in priority areas for a subset of the screening level alternatives that are deemed feasible. Improvement in instream water quality for the detailed solutions and estimated source load reductions will be assessed through application of water quality models (described in Section 2.6) or through evaluation of other metrics, such as pollutant load reductions. The results of these gray-only evaluations will form a "baseline" solution set to be used for comparison to solution sets that include gray, green and other watershed controls.

Green solutions include adding green technologies directly to the proposed infrastructure controls. Green solutions also include technologies that are not tied directly to the proposed infrastructure controls but provide a benefit by reducing storm water volume inflow to the collection system, improving the quality of the storm water, or providing greater watershed benefit. These solutions will be assessed in conjunction with other watershed source controls.

Options for controlling other watershed sources will be evaluated in the first set of Watershed Plans for the priority watersheds. Workable combinations of gray, green and other watershed controls will be identified. The benefit of these control solutions will be compared to the "baseline" solution set to identify the most effective solution set for each watershed. These comparisons will be conducted based on current and future conditions, so that the effects of changing land use can be considered in the Watershed Plans.

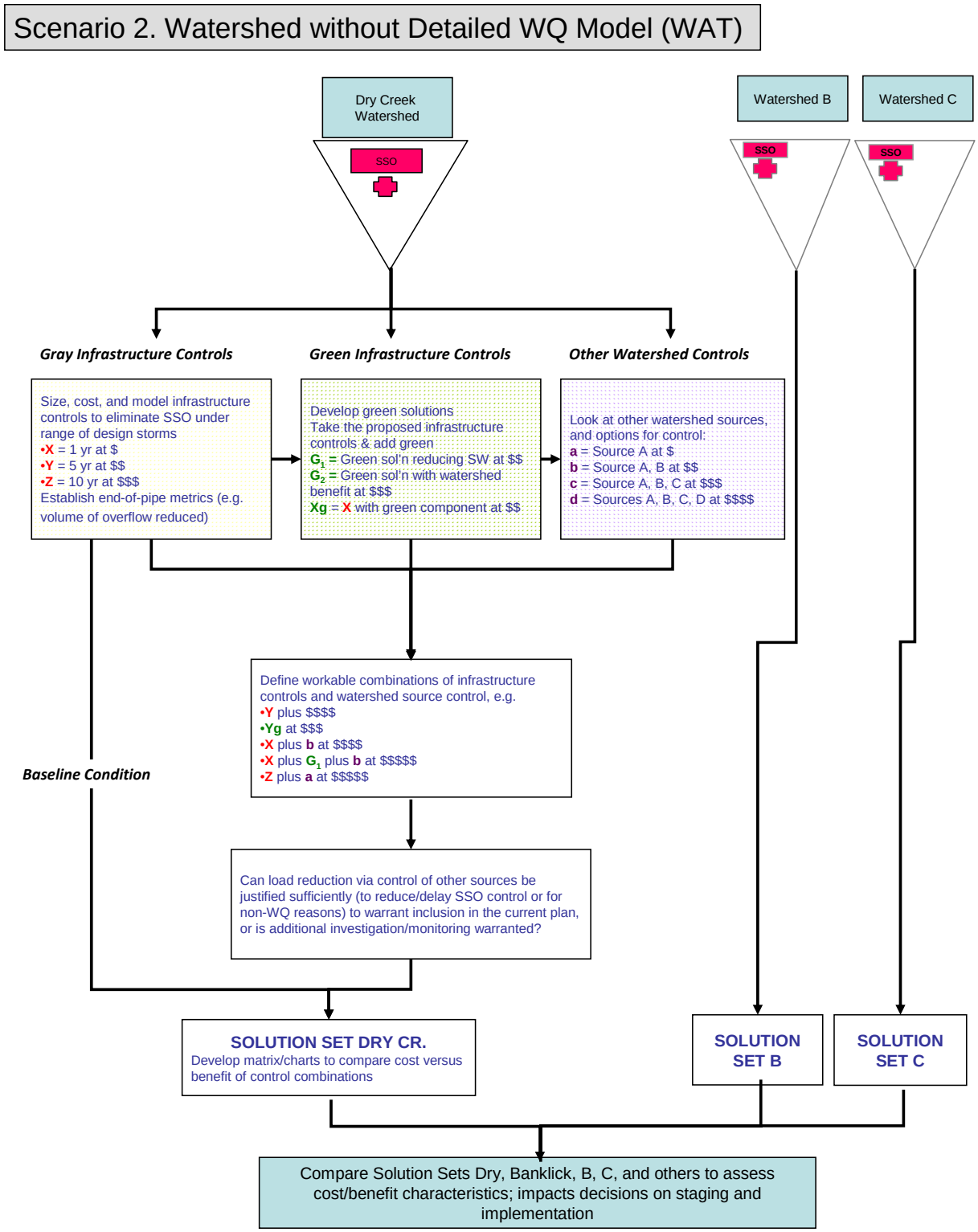
The solution sets for each watershed will be compared to each other so that their relative cost-benefit characteristics can be assessed, and the priorities for staging and implementing the controls in each watershed can be determined. Data gaps and other needs for refining the preliminary system-wide solutions will be characterized during this prioritization process and incorporated into future Watershed Plans.

Figure 2.8 – Conceptual Example of Evaluating Combinations of Controls for Watersheds with Detailed Water Quality Models



* *This arrow describes a solution set of both SSO and CSO controls*

Figure 2.9 – Conceptual Example of Evaluating Combinations of Controls for Watersheds without Detailed Water Quality Models



2.8 How Does This Meet CSO Long-term Control Plan Requirements?

The Consent Decree requires that the District develop Plans that provide for "the reduction and control of discharges from CSO Outfalls consistent with the CSO Control Policy" and that the Plans be developed "in conjunction with a watershed based approach providing for the evaluation of water pollution control needs on a watershed management basis and the coordination of CSO control efforts with other permitted point sources and nonpoint source control activities."[8] The Consent Decree also indicates that the Watershed Plans will include the elements of a Long-term Control Plan.[9] These elements are discussed below.

As explained in Section 2.5, the District initiated a preliminary prioritization process for investigating and characterizing CSOs as a first step in developing Watershed Plans. This process used system-wide collection systems' models the District developed in 2002 and was based on factors such as risk to public health, frequency of spills, total annual volume of spills, and vicinity to a stream. This initial prioritization process was then refined to include preliminary watershed priorities based on the water quality assessment tools described in Section 2.6. The prioritization process is being used to identify data gaps and to support the selection of priority areas for development of detailed, cost-effective and affordable CSO reduction solutions in the first Watershed Plans. Detailed solutions will be developed using a combination of end-of-pipe metrics and water quality models to calculate compliance with water quality standards for different levels of control for a typical period. The cost-effectiveness of the different levels of control will be evaluated using the "knee of the curve" analysis discussed in the CSO Policy, where controls are selected considering the diminishing incremental level of pollution reduction (and benefit to water quality) compared to increased costs.

Development of the CSO control plan may also require the review and revision of designated uses in accordance with the CSO Policy. This review of the physical, chemical, biological and economic factors affecting the attainment of the standards for existing designated uses will be conducted, if appropriate, in accordance with EPA guidelines (EPA, 2001) and the six factors in EPA's water quality standards regulation at 40 CFR 131.10(j). The factors that can affect attainment of designated uses include:

1. Naturally occurring pollutant concentrations.
2. Natural, ephemeral, intermittent, or low flow conditions or water levels.
3. Human-caused conditions or sources of pollution that cannot be remedied or would cause more damage than to leave in place.
4. Dams, diversions or other types of hydrological modifications when it is not possible to restore the water body or operate the modification in such a way that would result in attainment.
5. Physical conditions related to the natural features of the water body unrelated to water quality (for aquatic life).
6. Controls necessary to attain the use would cause substantial and widespread economic and social impact.

As described in the Consent Decree, the District may request that the Cabinet consider a change in designated uses based on the above factors.[10] Alternatively, the District may consider exceptions to water quality criteria for specific discharge points or water bodies consistent with 401 KAR 5:031 Sections 10 and 11 due to substantial and widespread economic and social impacts or the non-attainability of the standards due to scientific or other factors.

The Long-term Control Plan requirements for "characterization, monitoring, modeling activities, and design parameters as the basis for selection and design of effective CSO controls" will be conducted as part of the infrastructure characterization (Section 2.5) and watershed characterization planning processes (Section 2.6).[11] These activities are being conducted in accordance with EPA's documents entitled *Combined Sewer Overflows Guidance for Monitoring and Modeling* and *Combined Sewer Overflows Guidance for Long-term Control Plan (EPA, 1999, 1995)*. The District's

[8] Paragraph 39
[9] Paragraph 39(a)
[10] Paragraph 41
[11] Paragraph 39(a)(1)(B)

in-depth characterization, including flow monitoring and collection systems' model updates, will provide the foundation for CSO design parameters. In addition, the water quality sampling (instream and outfall) and detailed water quality models will support the selection of effective controls.

The Consent Decree also requires that the District develop a public participation process that solicits input from the public on development of the Watershed Plans and in the decision-making process. As described in Section 2.3, the District will obtain public comment on the draft Watershed Plans prior to submittal to the regulatory agencies and will also conduct a number of public participation activities, such as a Watershed Summit approach and meetings of the District's Watershed Community Council.

The presence of sensitive areas, including drinking water intakes, will be evaluated as part of the Watershed Characterization Report development described in Section 2.6. If sensitive areas are found, the District will evaluate options within the Watershed Plans for eliminating or relocating CSOs away from sensitive areas in accordance with the CSO Policy as part of the CSO control alternative evaluation process.

A preliminary analysis of maximizing treatment of combined sewage at the District's Dry Creek Wastewater Treatment Plant will be completed prior to the finalization of the Watershed Framework. The Dry Creek plant receives flows from both combined sewer and separate sewer systems and the initial analysis is being conducted as part of the assessment of compliance with the Nine Minimum Controls. This analysis will document the significant efforts that have already been undertaken to maximize current capacity at the Dry Creek plant and will also include the evaluation and identification of low-cost measures, if available, to further increase wet-weather treatment capacity. Subsequent to the Nine Minimum Controls analysis, the first set of Watershed Plans will include a more detailed analysis of the plant, including the identification of additional capital-intensive improvements, if available, that will work in concert with improvements in the collection systems to provide the most cost-effective method to maximize treatment of wet weather flows (both combined and separate) at the Dry Creek plant.

The required elements of the Long-Term Control Plan will be addressed and documented in the District's Watershed Plans.[12] Documentation will be submitted as part of those Plans that will allow the regulatory agencies to determine that the Plans have been developed in accordance with the Consent Decree. These Plans will also include cost/performance evaluations of the controls that are considered to "demonstrate the relationships among a comprehensive set of reasonable control alternatives."[13] The control alternatives will include preliminary system-wide infrastructure solutions for all CSOs, with detailed solutions focused on cost-effective controls for priority CSOs that will be addressed in the first five-year improvement program.

Once the controls proposed in the first five-year improvement program have been approved and the controls constructed, the District will revise its operation and maintenance program documents to incorporate the facilities and operating strategies associated with those controls (EPA, 1995). Each facility that is constructed will have a manual that details the equipment and features of the facility. A master operating strategy will also be developed to optimize operation of the controls across the sewer system.

2.9 How Does This Meet the Sanitary Sewer Overflow Plan Requirements?

The Consent Decree requires that the District develop Plans that "…specify remedial measures to eliminate SSOs and Unpermitted Discharges…[and] include expeditious and prioritized schedules, deadlines and timetables [to] …eliminate SSOs and Unpermitted Discharges as soon as practicable based on sound engineering judgment but in no event later than December 31, 2025. The Watershed Plans shall provide for more detail for all remedial measures to be implemented in the first 5 years after approval."[14] In addition, the

[12] Paragraph 39(a)
[13] Paragraph 39(a)(1)(E)
[14] Paragraph 39(b)

Consent Decree states that "The Framework shall describe the manner in which the District plans to prioritize, pursuant to the SSOP component of the Watershed Plans, the elimination of SSOs and Unpermitted Discharges…"[15] With the elimination of the Alexandria Treatment Plant, there are no plants experiencing prohibited bypasses.

As explained in Sections 2.5 and 2.8, the District initiated a preliminary prioritization process for investigating and characterizing known SSOs as a first step in developing Watershed Plans. This process used system-wide collection systems' models the District developed in 2002 and was based on factors such as risk to public health, frequency of spills, total annual volume of spills, and vicinity to a stream. This initial prioritization process was then refined to include preliminary watershed priorities based on the water quality assessment tools described in Section 2.6. The outcome of the refined prioritization process is being used to guide initial characterization efforts and support selection of priority infrastructure sewersheds for development of detailed solutions in the first Watershed Plans. The detailed SSO solutions in each priority watershed will be combined with CSO solutions and other watershed controls, where appropriate, to develop an affordable combination of infrastructure and watershed controls that will improve water quality, eliminate SSOs and comply with the CSO Policy.

The priority SSOs will be examined for cause such as blockages that can be prevented or insufficient wet weather conveyance capacity attributed to undersized infrastructure or excessive inflow and infiltration (I/I) contribution. For SSOs identified to be caused by blockages, one key feature of the District's Sanitary Sewer Overflow Plan is the implementation of an aggressive Capacity, Management, Operations, and Maintenance (CMOM) program that will include a prioritized and cost-effective preventative operations and maintenance program. The District's CMOM Self-Assessment report was submitted to the Cabinet, Department of Justice (DOJ), and EPA on October 17, 2007 (District, 2007) as required by the Consent Decree.[16] The CMOM program will help ensure that the collection systems maintain design capacity and that capacity reducing blockages are minimized.

SSOs identified to be caused by insufficient wet weather conveyance capacity and/or excessive I/I will then be addressed through alternatives analysis for elimination. Detailed analyses will be conducted for priority SSOs in the first Watershed Plans and alternatives will be developed and evaluated for a range of model-predicted levels of risk. The range of control technologies to be evaluated includes:

- Conveyance,
- Inflow and infiltration removal,
- Local storage,
- Regional storage,
- Other technologies as they become available, and
- Mixtures of technologies.

SSO elimination will be evaluated based on a level-of-service metric (e.g. size sufficient to control overflows during a particular storm or during a typical period of rainfall or to prevent recurring SSOs). This work consists of defining an acceptable risk of an overflow occurring beyond the selected period of rainfall based on affordability, public health impacts, and water quality standards compliance in conjunction with CSO control and other watershed controls. Costs will be developed for SSO elimination based on site-specific conditions. The selection of elimination solutions for the priority SSOs and the associated implementation schedules will be prioritized in conjunction with the other identified CSO and watershed controls, the solutions identified for other priority watersheds, and the projected water quality benefits for all projects identified in the watersheds.

While the detailed solutions included in the first Watershed Plans will focus on priority SSOs, all SSOs will be addressed with preliminary system-wide infrastructure solutions and expeditious and prioritized schedules that meet the requirements in the Consent Decree. Elimination alternatives for SSOs in non-priority areas for the first Watershed Plans will be evaluated by examining the same range of alternatives listed above. The costs for storage and conveyance controls, however, will be based on acceptable general planning level cost curves instead of costs that are tailored to site-specific conditions. The Plans in non-priority areas will also include assessment of areas

[15] Paragraph 39(a)(2)
[16] Paragraph 36

where the next set of Watershed Plans should focus and where more refined water quality models may be needed to help prioritize selection of controls. This approach fits well into the watershed management approach where priorities are based on an evaluation of benefits on a watershed basis.

As the Watershed Plans are developed, the District will continue to identify and confirm the locations of any additional SSOs, and eliminate SSOs through operation and maintenance or control activities. The ongoing characterization effort will include the recalibration of the District's collection systems' models using the extensive flow monitoring and rain gauge network that is scheduled to be in place for a one-year period (tentatively ending on June 30, 2008).

It is important to note that any integrated plan to address SSOs necessarily requires an evaluation of the wastewater treatment plant capacity for treating peak wet weather flows. As discussed in Section 2.8, this evaluation is being conducted for the Dry Creek wastewater treatment plant as part of the Nine Minimum Controls assessment for the CSOs. The first set of Watershed Plans will include a more detailed analysis of the plant, including the identification of cost-effective improvements, if available, that will work in concert with improvements in the collection systems to provide the most cost-effective method for addressing SSOs.

2.10 How Will the Watershed Plans be Implemented?

As outlined in the Consent Decree, the first Watershed Plans will be completed by June 30, 2009.[17] These Plans will identify the selected combination of affordable infrastructure and watershed controls that will improve water quality, eliminate SSOs, and comply with the CSO Policy. The affordability of controls is determined through a financial capability assessment that considers the potential impact of rate increases on the community, bonding capacity, schedule for implementation of controls, and other factors. The District's assessment of affordability is underway and is anticipated to be completed in 2008. The Plans will also provide the schedules for implementation of these controls.

A five-year improvement program will be detailed in these Plans to coincide with the required five-year updates to the Watershed Plans, as specified in the Consent Decree. The improvement program, implementation schedule, and phasing of controls will be based on the prioritization process, cost-benefit analyses and financial capability considerations described in this document.

The Watershed Plans will describe capital improvement projects and will include schedules for implementing combined and sanitary sewer overflow controls. They will also provide for implementation of green infrastructure and other watershed controls and associated schedules targeted at improving water quality.

Watershed controls described in the Watershed Plans may also be assessed through the establishment of pilot areas that will be monitored to evaluate the performance and effectiveness of controls and their applicability for other locations. The benefits of this process will continue to inform the next set of Watershed Plans, as this will:

- Provide feedback into the process (determine how well the controls work before incorporating them on a larger scale),
- Provide feedback on monitoring effectiveness, and
- Allow for phasing of controls.

The District will implement the selected green infrastructure or other watershed controls in conjunction with SSO and CSO controls. Throughout the implementation process, the District will coordinate with stakeholders and watershed partners, as well as with other opportunities such as large, planned construction projects within a watershed, to implement the required watershed controls and maximize benefits.

[17] The due date for the first Watershed Plans in the Consent Decree (December 31, 2008) was extended to June 30, 2009 by the United States District Court.

SECTION 3: REFERENCES

Consent Decree, 2007. The Commonwealth of Kentucky v. Sanitation District No. 1 of Northern Kentucky, No. C05-199-WOB, (E.D. Kentucky), April 18.

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Sanitation District No. 1 (District), 2000. Regional Facility Plan, Sanitation District No. 1, Boone, Campbell & Kenton Counties, Kentucky. May 2000.

Sanitation District No. 1 (District), 2007. Capacity, Management, Operation, and Maintenance Self-Assessment. October 17.

APPENDIX A:

Consent Decree, Paragraphs 39, 40, and 41

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Consent Decree, Paragraphs 39, 40, and 41

39. The District shall prepare and submit to the Cabinet/EPA for review and joint approval a Framework for Development of Watershed Plans, a Watershed Plan for each of the four (4) watersheds that comprise the District's service area as identified on the maps attached hereto as ***Exhibit F***, and Updated Watershed Plans within the time frames and as more particularly set forth in subparagraphs (a), (b), and (c) below. Each Watershed Plan shall include components for a LTCP and a Sanitary Sewer Overflow Plan ("SSOP"). The District shall develop these Watershed Plans for the purpose of the reduction and control of discharges from CSO Outfalls consistent with the CSO Control Policy, the elimination of SSOs and Unpermitted Discharges in the Sewer System, and the improvement of water quality in the receiving waters. In preparing these Watershed Plans, the District shall implement a prioritization scheme for remedial measures based upon such factors as environmental impact, public risk, regulatory requirements, the degree of water quality improvement expected to be achieved, public input, and cost effectiveness. The District shall prepare conventional, innovative or alternative designs as part of each Watershed Plan, including but not limited to: sewer rehabilitation, sewer replacement, sewer separation, relief sewers, above ground or below ground storage, high rate secondary treatment, illicit connection removal, remote wet weather secondary treatment facilities, and other appropriate alternatives. Designs shall be based on sound engineering judgment and shall be in accordance with generally accepted engineering design criteria and may include interim remedial measures to reduce pollutant loading and improve water quality in the short term while alternatives for final remedial measures are being developed, evaluated and implemented. In addition, the District may develop the LTCP component of the Watershed Plans in conjunction with a watershed based approach providing for the evaluation of water pollution control needs on a watershed management basis and the coordination of CSO control efforts with other permitted point sources and nonpoint source control activities. This watershed based approach may allow for a demonstration of attainment of water quality standards by the District's CSOs considering natural background conditions and pollution sources other than CSOs through any total maximum daily loads ("TMDLs") developed by the Cabinet.

(a) **Framework for Developing the Watershed Plans.** Within twelve months of entry of this Consent Decree, the District shall submit to the Cabinet/EPA for review and joint approval a Framework for developing the Watershed Plans.

(1) The Framework shall describe the manner in which the District plans to undertake the development of the LTCP component of the Watershed Plans, including, at a minimum, the following elements:

(A) An evaluation, if appropriate, of water pollution control needs on a watershed management basis and the coordination of CSO control efforts with other permitted point sources and nonpoint source control activities; this watershed based approach shall allow for a

demonstration that the District's CSOs comply with water quality standards considering natural background conditions and those pollution sources other than CSOs and shall take into consideration only those TMDLs expected to be finalized by the Cabinet prior to September 1,2008;

(B) Characterization, monitoring, modeling activities, and design parameters as the basis for selection and design of effective CSO controls (including controls to address those discharges resulting from the District's compliance with the requirements of the United States Army Corps of Engineers' Ohio River Flood Protection System Pumping Operations Manual, dated 1954 and revised 1988);

(C) A public participation process that actively involves the affected public in the decision-making to select long-term CSO controls consistent with provisions of Paragraph 40 below;

(D) Consideration of sensitive areas as a high priority for controlling overflows, including drinking water intakes;

(E) Evaluation of alternatives that will enable the District, in consultation with the Cabinet, EPA, and the public, to select CSO controls that will meet the requirements of the CWA;

(F) Cost/performance considerations to demonstrate the relationships among a comprehensive set of reasonable control alternatives;

(G) Operational plan revisions to include agreed-upon long-term CSO controls; and

(H) Maximization of treatment at the District's DCWWTP for wet weather flows.

(2) The Framework shall describe the manner in which the District plans to prioritize, pursuant to the SSOP component of the Watershed Plans, the elimination of SSOs and Unpermitted Discharges at locations other than those already identified on ***Exhibit E*** and addressed pursuant to the Pump Station Plan, and shall include schedules for the evaluation of WWTP peak flow treatment capacity for WWTPs that have experienced a prohibited bypass (as defined in 401 KAR 5:065**,** Section 1(13)(c)) within three (3) years before the date of entry of this Consent Decree and for any WWTP that will receive additional flow based on any SSOP project.

(3) If the District plans to identify and incorporate other permitted point sources and nonpoint sources contributing to water quality impairment into the Watershed Plans, the Framework shall describe the manner in which the

District plans to identify and incorporate such other permitted point sources and nonpoint sources and, where appropriate, how the District intends to insure that necessary controls are implemented at these sources.

(b) **Watershed Plans.** By December 31, 2008, the District shall submit a Watershed Plan for each of the four (4) Watersheds, which shall include components for a LTCP and a SSOP, to the Cabinet/EPA for review and joint approval. The LTCP component of the Watershed Plans shall conform to the CSO Control Policy, and, in developing the LTCP component, the District shall use as guidance EPA's "Guidance for Long-Term Control Plan," EPA 832-B- 95- 002, September 1995. The SSOP component of the Watershed Plans shall specify remedial measures to eliminate SSOs and Unpermitted Discharges at locations other than those already identified on ***Exhibit E*** and addressed pursuant to the Pump Station Plan. The Watershed Plans shall include expeditious and prioritized schedules, deadlines and timetables for remedial measures that will bring the District's CSOs into full compliance with the water quality standards criteria listed for the CSO demonstrative approach or the presumptive approach, and that will eliminate SSOs and Unpermitted Discharges, as soon as practicable based on sound engineering judgment but in no event later than December 31, 2025. The Watershed Plans shall provide more detail for all remedial measures to be implemented in the first five (5) years after approval.

(1) The LTCP component of each Watershed Plan shall meet the following goals:

(A) Ensure that if CSOs occur, they are only as a result of wet weather (this goal shall include addressing those discharges resulting from the District's compliance with the requirements of the united States Army Corps of Engineers' Ohio River Flood Protection System Pumping Operations Manual, dated 1954 and revised 1988);

(B) Bring all wet weather CSO discharge points into compliance with the technology-based and water quality-based requirements of the CWA; and

(C) Minimize the impacts of CSOs on water quality, aquatic biota, and human health.

(2) The LTCP component of each Watershed Plan shall include, at a minimum, the following elements:

(A) The results of any evaluation of water pollution control needs on a watershed management basis and the coordination of CSO control efforts with other permitted point sources and nonpoint source control activities and a demonstration that the District's CSOs comply with water quality standards considering natural background conditions and

pollution sources other than CSOs through those TMDLs finalized by the Cabinet prior to September 1, 2008;

(B) The results of characterization, monitoring, modeling activities, and the application of design parameters as the basis for selection and design of effective CSO controls (including controls to address those discharges resulting from the District's compliance with the requirements of the United States Army Corps of Engineers' Ohio River Flood Protection System Pumping Operations Manual, dated 1954 and revised 1988);

(C) The results of an evaluation of peak flow treatment capacity for the DCWWTP and any WWTP that will receive additional flow based on any LTCP project. In preparing such an evaluation, the District shall use as guidance the EPA publications "Improving POTW Performance Using the Composite Correction Approach," EPA CERI, October 1984, and "Retrofitting POTWs," EPA CERI, July 1989;

(D) A report on the public participation process;

(E) Identification of how the LTCP addresses sensitive areas, including drinking water intakes, as a high priority for controlling overflows;

(F) A report on the cost analyses of the alternatives considered, including a financial capability assessment based upon EPA's "Combined Sewer Overflows Guidance for Financial Capability Assessment and Schedule Development," EPA 832-B-97-004, February 1997, taking into account the economic capability of the communities the District serves;

(G) Operational plan revisions to include agreed-upon long-term CSO controls;

(H) Maximization of treatment at the District's existing WWTPs for wet weather flows;

(I) Identification of, and an implementation schedule for, the selected CSO controls; and

(J) A post-construction compliance monitoring program adequate to ascertain the effectiveness of CSO controls and to verify compliance of the District's CSOs with water quality-based CWA requirements.

(3) The SSOP component of each Watershed Plan shall include, at a minimum, the following elements:

(A) The results of an evaluation of WWTP peak flow treatment capacity for WWTPs that have experienced a prohibited bypass (as defined in 401

KAR 5:065, Section 1(13)(c)) within three (3) years before the date of entry of this Consent Decree and for any WWTP that will receive additional flow based on any SSOP project. In preparing such evaluation, the District shall use as guidance the EPA publications "Improving POTW Performance Using the Composite Correction Approach," EPA CERI, October 1984, and "Retrofitting POTWs," EPA CERI, July 1989.

(B) A map that shows the location of all known SSOs and Unpermitted Discharges. The map shall include the areas and sewer lines that serve as tributary to each SSO and Unpermitted Discharge. Smaller maps of individual tributary areas also may be included to show the lines involved in more detail.

(C) A description of each SSO and Unpermitted Discharge location that includes:

(i) The frequency of the event;

(ii) The annual volume of the event;

(iii) A description of the location of the event, *e.g.,* manhole, etc.;

(iv) The receiving stream;

(v) The immediate area and downstream land use, including the potential for public health concerns;

(vi) A description of any studies to investigate the event that were conducted within five (5) years of plan submission, that are being conducted at the time of plan submission, or that is proposed for the future; and

(vii) A description of any rehabilitation or construction work that was conducted within five (5) years of plan submission, that is being conducted at the time of plan submission, or that is proposed for the future to remediate or eliminate the SSO or Unpermitted Discharge.

(D) A prioritization of the SSO and Unpermitted Discharge locations identified above, based primarily on the frequency, volume and impact on the receiving stream and upon public health, and in coordination with any remedial activity performed pursuant to the CMOM Programs and any other component of a Watershed Plan and an evaluation of water pollution needs on a watershed management basis. Based upon this prioritization, the District shall develop remedial measures and

expeditious schedules for design, initiation of construction and completion of construction.

(E) A plan to involve stakeholders in the planning, prioritization and selection of projects consistent with provisions of Paragraph 40 below.

(4) If Watershed Plans identify any permitted point sources or nonpoint sources, other than CSOs and SSOs, that are contributing to water quality impairment, the Watershed Plans shall also identify planned control measures, if any, that the District plans to utilize and shall provide implementation schedules for these controls. If a control on these other sources of pollution is to be implemented to offset the level of CSO controls or to delay the elimination of an SSO or Unpermitted Discharge, other than through a final TMDL developed by the Cabinet, the Watershed Plan shall identify the means by which the District intends to insure that the control is implemented.

(c) **Updated Watershed Plans.** At least ninety days prior to the five (5) year anniversary of approval of each Watershed Plan, the District shall submit an Updated Watershed Plan to the Cabinet/EPA for review and joint approval. Existing Watershed Plans shall continue in effect until the Cabinet/EPA approves an updated plan. The District shall have the right to submit an Updated Watershed Plan to the Cabinet/EPA for review and joint approval at any time. Updated Watershed Plans shall be based upon the Framework for developing the Watershed Plans, as set forth in Paragraph 39(a) above, and shall take into consideration any TMDLs finalized by the Cabinet three (3) months prior to the update. The Updated Watershed Plans shall provide more detail for all remedial measures to be implemented over the successive five (5) year period based upon the approved schedule in the initial Watershed Plan or any revised scheduled approved by the Cabinet/EPA.

40. **Public Participation.** In the required public participation process to be developed in the Framework and the SSOPs, the District shall include procedures to advertise, convene a public meeting, and accept public comment on the development of each Watershed Plan, in accordance with the publication procedures of KRS Chapter 424, as follows:

(a) Within twelve months of entry of this Consent Decree, to obtain public input on the Watershed Plan process and potential consideration of projects; and

(b) Following development of a draft Watershed Plan or draft Updated Watershed Plan, but prior to submittal of a proposed Watershed Plan or Updated Watershed Plan to the Cabinet/EPA for approval, to obtain public input on such draft plans.

The District shall also hold informal workshops and other informational meetings to solicit input from the public and the Cabinet/EPA in the decision-making process. The number and format of such informal workshops and meetings shall be left to the District's discretion. The District may, in its discretion, also

form interest groups for each Watershed that may include members of the public, businesses, and/or governmental agencies that will be kept advised of progress on Watershed Plans through annual meetings.

41. Based on the factors described in 40 C.F.R. § 131.10(g) and on the report on the cost analysis on the alternatives considered as set forth in the LTCP components of the Watershed Plans, the District may request the Cabinet to consider a change to the designated uses of receiving waters and/or may request a modification of water quality standards for a receiving water body during wet weather pursuant to a Use Attainability Analysis (401 KAR 5:026), provided, however, that the Cabinet shall not be obligated to take any action on such a request by virtue of this Consent Decree.

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APPENDIX B:

Consent Decree Requirements Mapped to Framework

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Consent Decree Paragraph	Framework Reference(s)
39(a)(1)- "The Framework shall describe the manner in which…" the District develops the CSO long-term control plan	Section 2.8: How Does This Meet CSO Long-term Control Plan Requirements?
39(a)(1)(A)- Evaluation of CSO controls using a watershed based approach	• Section 2.2, paragraph 5: description of the Watershed Plan reporting structure • Section 2.6: What Work is Being Done to Characterize the Watersheds? • Section 2.7: What is the Process to Prioritize Controls?
39(a)(1)(B)- "Characterization, monitoring, modeling activities, and design parameters as the basis for selection and design of effective CSO controls…"	Section 2.5: What Work is being Done to Characterize the Infrastructure?
39(a)(1)(C)- Public participation process that involves the public in selection of CSO controls 40(a)- "Obtain public input on the Watershed Plan process and potential consideration of projects"	• Table 2.1: Consent Decree Activities for Watershed Plans • Section 2.3, paragraph 3: description of public participation activities • Section 2.8, paragraph 5: reiterates activities described in Section 2.3, paragraph 3 • Appendices C and D
39(a)(1)(D)- "Consideration of sensitive areas as a high priority for controlling overflows, including drinking water intakes"	• Section 2.6, paragraph 4: sensitive areas being addressed in Watershed Characterization Reports • Section 2.8, paragraph 6: commitment to evaluate eliminating or relocating CSOs away from sensitive areas
39(a)(1)(E)- Evaluation of alternatives to select CSO controls that meet the Clean Water Act requirements	Section 2.8: How Does This Meet CSO Long-term Control Plan Requirements?
39(a)(1)(F)- "Cost/performance considerations to demonstrate the relationships among a comprehensive set of reasonable control alternatives"	Section 2.8, paragraph 8:description of cost/performance consideration in development of the Watershed Plans
39(a)(1)(G)- "Operational plan revisions to include agreed-upon long-term CSO controls"	Section 2.8, paragraph 9: description of revision of operational plans and master operating strategy
39(a)(1)(H)- "Maximization of treatment at the District's DCWWTP for wet weather flows"	Section 2.8, paragraph 7: description of this analysis
39(a)(2)- "The Framework shall describe the manner in which…" the District will develop the Sanitary Sewer Overflow Plan	Section 2.9: How Does this Meet the Sanitary Sewer Overflow Plan Requirements?
39(a)(3)- "If the District plans to identify and incorporate…" other permitted point sources and nonpoint sources and ensure that controls are implemented	• Section 2.2, paragraph 5: description of the Watershed Plan reporting structure • Section 2.6: What Work is Being Done to Characterize the Watersheds? • Section 2.7: What is the Process to Prioritize Controls? • Section 2.10: How Will the Watershed Plans be Implemented?

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APPENDIX C:
Public Participation and Comments

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PUBLIC PARTICIPATION AND COMMENTS

This appendix describes the public participation process that the District used to obtain public input on the Watershed Framework and the comments that were received.

Public Participation Process

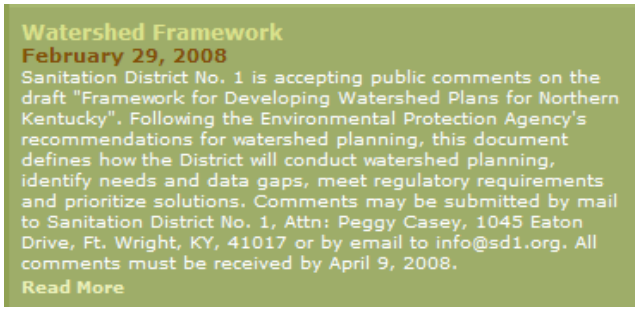
Public participation was solicited through the following venues: advisory committee, presentation and distribution at a Watershed Community Council meeting, website posting, blog posting, and presentations at various organizational venues.

Advisory Committee: As the District began conceptualizing the Framework and the Watershed Planning Process, a Strategic Advisory Committee of four national experts was formed to help guide the development of the Framework and the Watershed Plans. This Committee met three times between June 2006 and August 2007 and provided input that served to create the Watershed Planning Process depicted in Figure 2.7 on page 9.

Presentation and Distribution at a Watershed Community Council Meeting: As discussed in Section 2.3, the District formed a Watershed Community Council to obtain public input on the watershed planning process and to comply with the Consent Decree. The Council is composed of 55 members from a variety of stakeholder groups across the District's service area. At the second meeting of the Council on February 26, 2008, District staff presented the Framework document (Appendix D) and conducted a facilitated discussion among the members that were present about the Framework and activities related to watershed plan development. Copies of the February 26, 2008 draft Framework document were made available to the Council members along with the information necessary to access the District's blog for the Council.

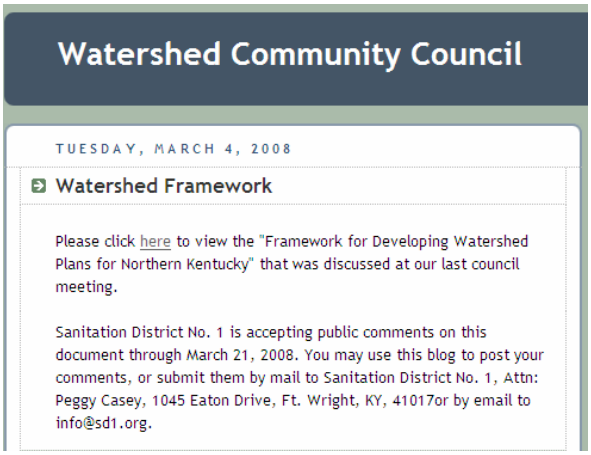
Website Posting: The February 26, 2008 draft of the Watershed Framework document was posted on the District's main homepage (www.sd1.org) on February 29, 2008, with a comment period deadline of March 21, 2008. This comment period was then extended until April 9, 2008. Figure C-1 is a screenshot of the posting which included a link ("Read More") to the draft Framework. This posting remained on the District's website until the Framework was transmitted to USEPA and the Kentucky Division of Water on April 18, 2008.

Figure C-1 – Website Posting of the February 26, 2008 Draft Watershed Framework Document at www.sd1.org



Blog Posting: The District created a blog (http://sd1wscc.blogspot.com/) for the Watershed Community Council to track information related to council activities and to solicit additional input from Council members on the development of the Framework and the Watershed Plans. A copy of the February 26, 2008 draft Framework was posted to the blog on March 4, 2008 along with a request for comments, as shown in Figure C-2. An email was distributed to the Watershed Community Council members on April 3, 2008 alerting them of the extended comment period.

Figure C-2 – Blog Posting of the February 26, 2008 Draft Watershed Framework Document at http://sd1wscc.blogspot.com/)



Presentations: In addition to the presentation to the Watershed Community Council (Appendix D), District staff presented the Watershed Framework approach to water professionals at the Kentucky-Tennessee Water Environment Association (WEA) Watershed Specialty Conference on January 30-31, 2008. On March 31, 2008, District staff provided a briefing on the Watershed Framework approach at the OKI (Ohio, Kentucky, Indiana Regional Council of Governments) Regional Conservation Council's annual meeting.

Framework Revisions

After the release of the February 26, 2008 draft Framework, the District continued to refine their approach for integrating green infrastructure into the watershed planning process. This approach included securing consultant assistance for green infrastructure planning services. District staff and the infrastructure, green infrastructure, and watershed consultants worked to refine the approach for integrating green infrastructure into the Watershed Plans. Based on these subsequent discussions, the District and its consultants realized the need to revise the Framework to better define the approach for integrating green infrastructure into the Watershed Planning process. The framework was updated to reflect the planned green infrastructure approach by including a description of the green characterization in section 2.6.

The District received one comment from the public during both the regular and extended comment period. This was a member of the Watershed Community Council who expressed concern over the purpose, role and involvement of the Council throughout the District's Consent Decree process, but stated support of the general concepts identified in the watershed approach.

APPENDIX D:

Watershed Framework Presentation to the Watershed Community Council February 28, 2008

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NKY Watersheds: Challenges and Solutions

Sanitation District No. 1 of Northern Kentucky
Watershed Community Council Meeting
February 26, 2008

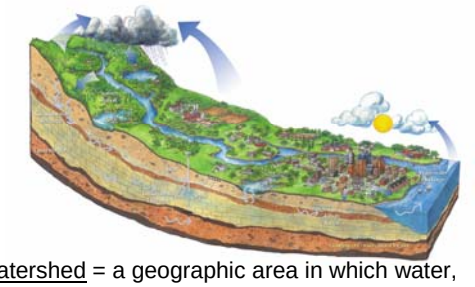
Presentation Overview

Watershed Challenges

Framework for the Development of Watershed Plans

Cost of Compliance

What is a Watershed?



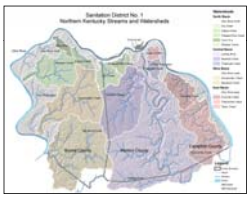
http://conservation-ontario.on.ca/source_protection/files/Watershed_labeled_hor.jpg

Watershed = a geographic area in which water, sediments, and dissolved materials drain to a common outlet, typically a point on a larger stream, river or lake

Northern Kentucky's Watersheds

Consent Decree definition of watersheds (Study Basins)

District's definition of watersheds



What Can Impact Water Quality Within a Watershed?

- Point sources:
  - Discharges from a specific point
  - CSO, SSO, industrial dischargers, treatment plants
- Nonpoint sources:
  - Diffuse sources, no specific "point"
  - Storm water runoff
  - Agricultural runoff, rural runoff, animals
  - Septic tanks

Combined Sewer Overflows (CSOs)

- Combined sewer systems are designed to convey domestic, commercial and industrial wastewater as well as storm water runoff through a single pipe system to a treatment plant
- Overflows are designed to occur when the combined system's capacity is exceeded to prevent flooding and basement backups of combined sewage

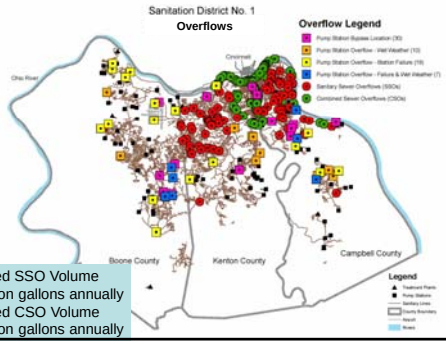
Sanitary Sewer Overflows

- Separate sewer systems are designed to convey only domestic, commercial and industrial wastewater (no runoff) through a pipe system to a treatment plant
- A sanitary sewer overflow (SSO) can occur when collection system capacity of the separate sanitary sewer system is exceeded due to wet weather, when normal dry weather flow is blocked, or when mechanical failures prevent the system from operating properly

Impacts of Point and Nonpoint Sources on Water Quality

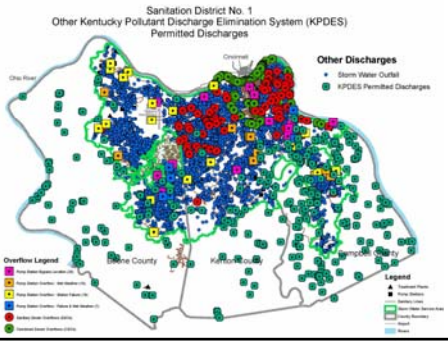
- High levels of bacteria make streams unsafe for contact recreation
- Excess nutrients, metals, and other pollutants can harm aquatic life (fish & bugs)
- Degraded stream habitat will harm aquatic life even if water quality is good

Challenge: Overflows



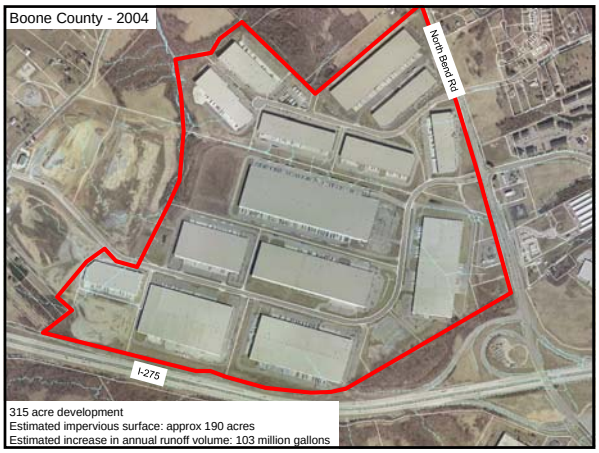
•Estimated SSO Volume
81 million gallons annually
•Estimated CSO Volume
1.4 billion gallons annually

Challenge: Other Discharges



Challenge: Traditional Development

- **Impact on Water Quality:**
  - Increased pollutant loading (auto fluids, lawn fertilizers, sediment, bacteria)
  - Loss of riparian area along creeks / streams to filter pollutants
  - Loss of floodplain
  - Loss of habitat



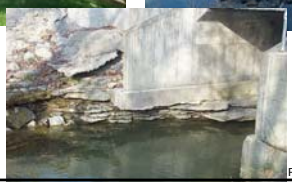
Challenge: Northern Kentucky Streams Erode Easily

- **General Stream Characteristics:**
  - Steep gradients
  - Shale bedrock easily erodes
  - Highly entrenched stream systems
  - Streams are dynamic

Challenge: Impact of Stream Erosion on Roadways / Bridges


Covert Run Creek


Banklick Creek


Ripple Creek

Challenge: Impact of Stream Erosion on Sanitary Sewers


Banklick Creek


Horsebranch Creek


Gunpowder Creek

*Contributes to SSOs

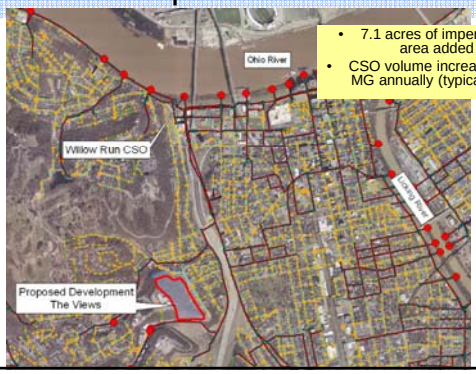
Challenge: Repairs and Replacements

Bromley/Crescent Springs Sewer Line Replacement

Challenge: Impact of New Development on CSOs

- 2.0 acres of impervious area added
- CSO volume increases 1.3 MG annually (typical year)

Challenge: Impact of New Development on CSOs

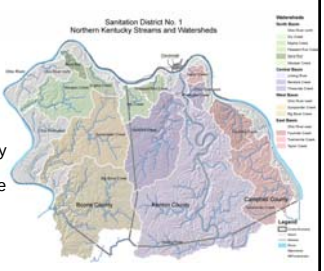


- 7.1 acres of impervious area added
- CSO volume increases 4.0 MG annually (typical year)

Challenge: Aging Sewer System

Solution: Watershed Management Approach

- The District's Consent Decree implements a unique watershed approach for evaluating and prioritizing projects for improving water quality, including those projects to address CSOs and SSOs
- "Watershed management is a way of coordinating existing programs geographically in order to manage the state's land and water resources more effectively and efficiently."
  - Kentucky Watershed Management Framework Document (1997)



Framework for Developing the Watershed Plans

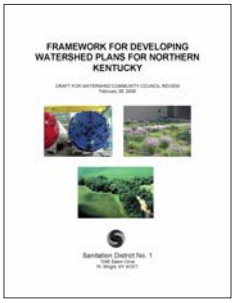
- "Within twelve months of entry of this Consent Decree, the District shall submit to the Cabinet/EPA for review and joint approval [of] a Framework for developing the Watershed Plans."

Framework for Developing the Watershed Plans

Adrienne Nemura
LimnoTech

Framework

- Provides a plan for how the District will:
  - Conduct watershed planning
  - Identify needs and data gaps
  - Meet regulatory requirements for CSOs and SSOs
  - Select controls based on cost-effectiveness and affordability
- Follow's EPA's recommendations for Watershed Planning
- Supports water-quality based decision-making



Framework Content

1. Why has the District established the Framework?
2. What is the watershed management approach?
3. How will the public and regulators be engaged in decision making?
4. How will the District establish goals for each watershed?
5. What work is being done to characterize infrastructure?
6. What work is being done to characterize watersheds?
7. What is the process to prioritize controls?
8. How does this meet CSO long term control plan requirements?
9. How does this meet SSOP requirements?
10. How will the Plans be implemented?

1. Why Has the District Established this Framework Document?

- Substantial amount of information needed for characterization and planning
- Sources other than sewer overflows are causing water quality problems
- Explains how the District will identify the combination of affordable infrastructure and watershed controls to meet Consent Decree requirements

2. What is the District's Watershed Management Approach?

- <u>SD1 Approach</u>
  - Build partnerships
  - Assemble and assess data
  - Implement highest priority controls first
  - Assess effectiveness
  - Identify additional levels of control, if needed

3. How Will the District Engage the Public and Regulatory Agencies in Decision-Making?

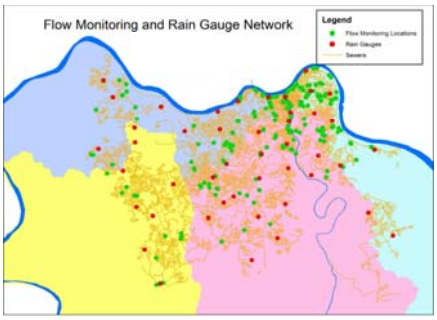
- Watershed Community Council
  - Meet up to 4 times per year
  - Review information on the program
  - Provide input on goal-setting & decision-making process
- Coordinate with watershed partners
- Utilize communication tools (website, billing inserts)
- Host community meetings
- Regularly scheduled meetings and conference calls with state and federal regulators

4. How Will the District Establish Goals for Each Watershed?

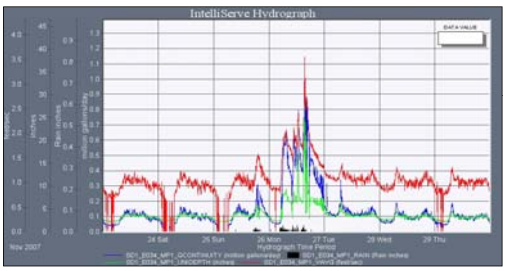
- Engage watershed partners, stakeholders, and others to set goals
  - Consent Decree goals
  - Community goals
  - Watershed-specific goals

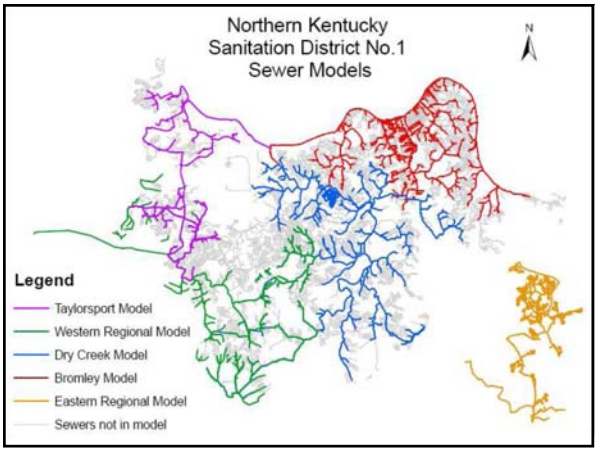
Woodlawn Creek at Waterworks Road

5. What Work is Being Done to Characterize the Infrastructure?



5. What Work is Being Done to Characterize the Infrastructure?





6. What Work is Being Done to Characterize the Watersheds?

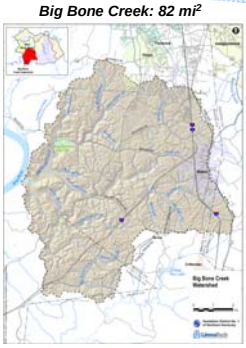
- Watershed monitoring
  - Water quality
  - Fish & bugs
  - Habitat

Plum Creek, Licking River Watershed

Woolper Creek, Woolper Creek Watershed

Watershed Characterization

Taylor Creek: 4 mi² ***Big Bone Creek: 82 mi²***



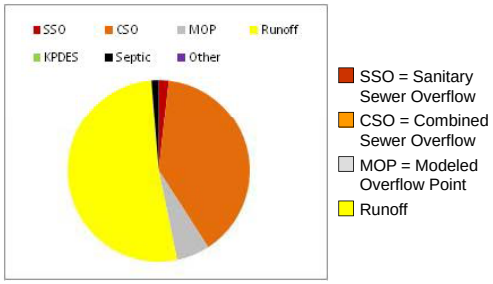
Stream Bank Erosion Project on Big Bone Creek Tributary

Before

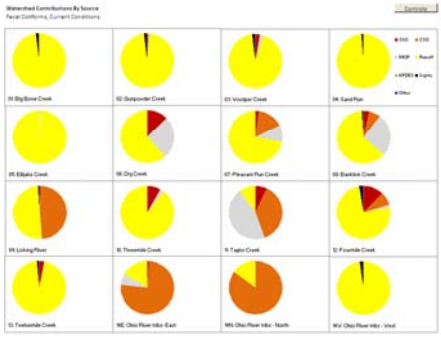
After

Photos courtesy of the Northern Kentucky University Center for Applied Ecology.

Watershed Ranking Watershed Assessment Tool (WAT!)

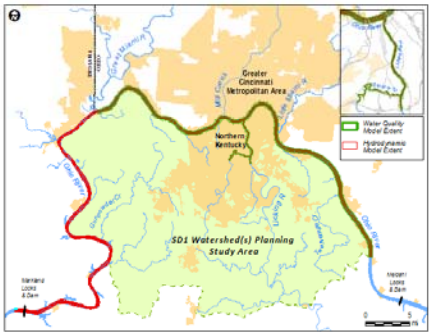


WAT! – Preliminary Results



[1] WAT is still under development, so all results presented here are for illustrative purposes. The results are subject to change and should therefore not be relied on or considered definitive.

Ohio River/Licking River/Banklick Model



7. What is the Process to Prioritize Controls?

Gray infrastructure

Green infrastructure

Watershed controls

Gray Infrastructure

- Pipes, pumps, storage tanks, tunnels, and other "hard infrastructure" that is traditionally used to store and treat sewage and storm water.

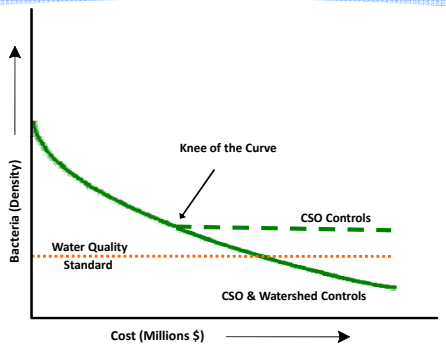
Green Infrastructure

- On-site management instead of end-of-pipe controls
- Mimics nature
- Examples include: green roofs, trees and tree boxes, rain gardens, vegetated swales, pocket wetlands, infiltration planters, vegetated median strips, reforestation, and protection and enhancement of riparian buffers and floodplains.

Watershed Controls

- Systems and practices in addition to gray and green infrastructure that will reduce pollution from sources other than sewer overflows.
- Examples include land use planning, agricultural controls, regional storm water projects, septic system maintenance and improvements.

Model Results and Cost Estimates will be Used to Determine a Combination of Affordable Infrastructure and Watershed Controls



8. How Does this Meet CSO Long-term Control Plan Requirements?

- EPA requires the reduction and control of discharges from CSO outfalls
- Long-term control plan eleme
  - Characterize system
  - Evaluate controls
  - Schedule / financing plan
  - Post-construction monitoring pl

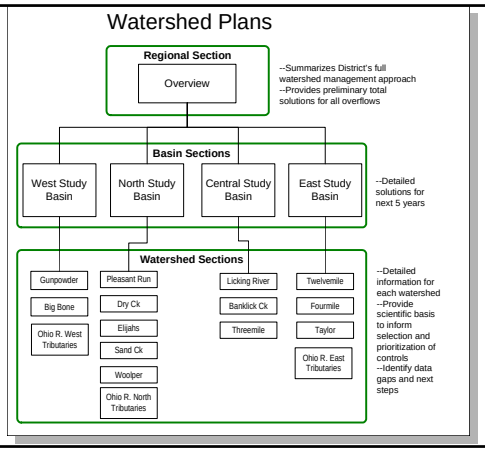
9. How does this meet SSOP Requirements?

- EPA requires the elimination of SSOs
- SSOP elements
  - Characterize system
  - Evaluate controls
    - Maintenance, operation, and management of collection system (blockages)
    - Capacity assurance (excess wet weather flow)

10. How Will the Watershed Plans be Implemented?

- Completion of the affordability and cost-benefit assessments
- Coordination with stakeholders and watershed partners
- Development of:
  - 5-year improvement program (detailed solutions)
  - Implementation schedule
  - Pilot projects

Watershed Plans



Consent Decree Requirements

- Watershed Framework due April 18, 2008
- Watershed Plans due June 30, 2009
  - Required to be updated every five years
  - U.S. EPA/State review and approval required for all Watershed Plans
- Public input required throughout planning process

Challenge: Cost of Compliance

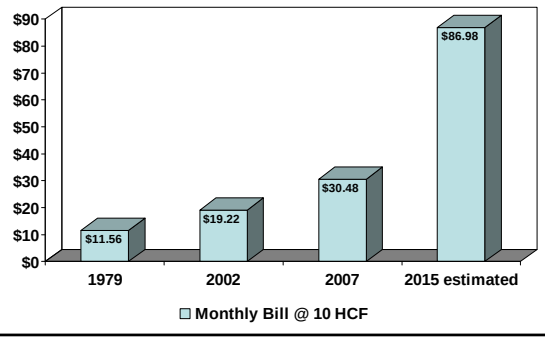
Financial Outlook

20-Year Projected Capital Budget

Estimated Total =

$1.1 Billion

Rate History



Discussion Groups

Fowler Creek - Tributary to Banklick Creek