MSD
Metropolitan Sewer District

Final Sanitary Sewer Discharge Plan
Volume 3 of 3
September 30, 2009

SSDP

PROJECT WIN
Waterway Improvements Now

Integrated Overflow Abatement Plan

VOLUME 3: FINAL SANITARY SEWER DISCHARGE PLAN

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FINAL SANITARY SEWER DISCHARGE PLAN (SSDP) GLOSSARY

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DEFINITIONS

Amended Consent Decree (ACD) - Specific to this document, a federal judicial order expressing a voluntary agreement ordered on April 10, 2009 and filed on April 15, 2009 that incorporates all elements of the original Consent Decree (see Consent Decree definition) as well as imposing new requirements to cease activities alleged by the government to be illegal.

Average Annual Overflow Volume (AAOV) - The total volume of overflow predicted to occur from a specific location or consolidation of locations, calculated using a continuous simulation of precipitation that occurs in a "typical year." For the purpose of this Integrated Overflow Abatement Plan (IOAP), calendar year 2001 represents the typical year, based on an evaluation of precipitation patterns in that year compared to long-term meteorological averages.

Average Daily Flow (ADF) - The calculated or assumed average daily flow within the sewer system attributed to users without rainfall derived inflow and infiltration (I/I) within a 24-hour period.

Avoidable - A legal term of art meaning that a consequence could have been prevented with the exercise of reasonable engineering judgment in facilities planning and implementation, and/or adequate management, operations, and maintenance practices.

Baseline - The existing conditions. An initial set of observations or data used as a comparison or starting point from which the magnitudes of an alternative's effects are measured.

Benefit - Cost Analysis - A formal process used to help appraise, or assess, the cost effectiveness of different alternatives. The higher the Benefit-Cost Ratio, the more effective the alternative is.

Best Management Practices (BMPs) - Schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants to Waters of the United States. BMPs also include treatment requirements, operating procedures, and practice to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Biochemical Oxygen Demand (BOD) - A measurement of the amount of oxygen used by the decomposition of organic material over a specified time period (usually 5 days) in a wastewater sample. Used as a measurement of the readily decomposable organic content of water.

Bypass - The intentional diversion of waste streams from any portion of a treatment facility as set forth in 40 Code of Federal Regulations (CFR), § 122.41(m)(1) and 401 Kentucky Administrative Regulations (KAR) 5:002, Section 1(36). The practice of bypassing secondary treatment units and recombining the bypass flow with the secondary effluent prior to discharge, known commonly as blending, recombination, or diversion, constitutes a "Bypass." The term Bypass shall specifically exclude (1) practices at MSD's Morris Forman Wastewater Treatment Plant (WWTP) that are in accordance with the KPDES permit and the CSO Control Policy and (2) any flow that exceeds the design capacity of a tertiary process at any WWTP in accordance with a Kentucky Pollutant Discharge Elimination System (KDPES) permit.

Chemical Treatment - Any water or wastewater treatment process involving the addition of chemicals to obtain a desired result, such as precipitation, coagulation, flocculation, sludge conditioning, disinfection, or odor controls.

Combined Sewer Overflow (CSO) - an outfall identified as a combined sewer overflow or CSO in MSD's KPDES permit for the Morris Forman WWTP from which MSD is authorized to discharge during wet weather.

- **Dry Weather CSO** - An overflow from a permitted outfall identified as a combined sewer overflow or CSO in MSD's Morris Forman WWTP KPDES permit that is not the result of a wet weather event.
- **Wet Weather CSO** - An overflow from a permitted outfall identified as a combined sewer overflow or CSO in MSD's Morris Forman WWTP KPDES permit that is the result of a wet weather event.

Combined Sewer System (CSS) - the portion of MSD's Sewer System designed to convey municipal sewage (domestic, commercial, and industrial wastewaters) and stormwater runoff through a single-pipe system to MSD's Morris Forman WWTP or CSOs.

Consent Decree - A judicial decree expressing a voluntary agreement between parties to a suit, especially an agreement by a defendant to cease activities alleged by the government to be illegal in return for an end to the charges.

Controls - Processes and/or activities which contribute to removal of pollutants from wastewater or to containing and conveying wastewater for treatment and discharge.

Dissolved Oxygen (DO) - A measurement of the amount of oxygen dissolved in water.

Fats, Oils, and Grease (FOG) – A general category of lipid-based wastewater constituents that often are responsible for sewer blockages and resulting back-ups or overflows.

Feasible Alternatives - The legal term of art used in the "Bypass" regulation to identify alternative controls which are both technically achievable and affordable (40 CFR 122.42m).

Fecal Coliform - Bacteria present in the feces of warm blooded animals typically used as an indicator of fecal contamination and the potential presence of pathogens.

Flow Equalization - Transient storage of wastewater for release to a sewer system or treatment process at a controlled rate to provide a reasonably uniform flow.

Geographic Information System (GIS) - A computer based system that is capable of storing, managing, and analyzing geographic spatial data. This capability includes producing maps, displaying the results of data queries, and conducting spatial analysis.

Gray Infrastructure - Constructed structures such as treatment facilities, sewer systems, stormwater systems, or storage basins. The term "gray" refers to the fact that such structures are typically made of, or involve the use of concrete.

Green Infrastructure - An adaptable term used to describe an array of materials, technologies, and practices that use natural systems—or engineered systems that mimic natural processes—to enhance overall environmental quality and provide utility services. As a general principal, green infrastructure techniques use soils and vegetation to infiltrate, evapotranspirate, and/or recycle stormwater runoff. Examples of green infrastructure include green roofs, porous pavement, rain gardens, and vegetated swales.

Infiltration - Groundwater that enters a wastewater system through such means as defects in pipes, pipe joints, connections, or manholes.

Inflow - Water other than wastewater that enters a wastewater system from sources such as stormwater, runoff, and drainage. Inflow is generally derived from surface water, as compared to infiltration that is generally derived from groundwater.

InfoWorks Collection Systems (CS) - Hydraulic modeling software developed by Wallingford Software used by MSD for collection system modeling.

Kentucky Department for Environmental Protection (KDEP) - Agency responsible for administering KPDES permits and receiving permit-related reports.

Kentucky Pollutant Discharge Elimination System (KPDES) Permit - Any National Pollutant Discharge Elimination System permit issued to MSD by the Cabinet pursuant to the authority of the Clean Water Act and Kentucky Revised Statues (KRS) Chapter 224 and the regulations promulgated thereunder.

Leadership in Energy and Environmental Design (LEED) - A rating system that is administered by the US Green Building Council (USGBC) and is currently the most accepted benchmark for the design, construction, and operation of high performance green buildings and neighborhood developments in the U.S. The five key areas include sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality.

Louisville and Jefferson County Metropolitan Sewer District (MSD) - The agency responsible for providing wastewater, stormwater, and flood protection services in Jefferson County. MSD is also responsible for response, mitigation, notification, and reporting of overflows, including unauthorized discharges.

Lower Gauge (LG) - A measure of the Ohio River's stage (elevation) below the McAlpine Lock and Dam. Gauge 0 is equal to an elevation of 373.2' above mean sea level. Normal pool elevation for the Ohio River is 384.5' or a lower gauge of 11.3.

National Pollutant Discharge Elimination System (NPDES) - A national program under the Clean Water Act that regulates discharges of pollutants from point sources to Waters of the United States. Discharges are illegal unless authorized by an NPDES permit.

Overflow - Any release of wastewater from MSD's sanitary or combined sewer system at locations not specified in any KPDES permit. This includes any Unauthorized Discharge and releases to public or private property that do not reach Waters of the United States, such as basement backups. However, wastewater backups into buildings caused by blockages, flow conditions, or malfunctions in a building lateral, other piping or conveyance system that is not owned or operationally controlled by MSD are not overflows for the purposes of the IOAP.

Pathogen - An organism capable of causing disease, including disease-causing bacteria, protozoa, and viruses.

Peak Flow - The maximum flow that occurs over a specific length of time (e.g., daily, hourly, instantaneous).

Peak Wet Weather Flow - The anticipated, calculated, or monitored maximum flow within the sewer system during an actual or synthetic rainfall event.

Primary Treatment - The practice of treatment by screening, sedimentation, and skimming adequate to remove at least 30 percent of both the biochemical oxygen demanding material and the suspended solids, as defined in 40 CFR Part 125.58(r). Primary treatment may also include disinfection, where appropriate or required.

Reasonable Engineering - As a legal term of art, this is the statutory and regulatory standard for judgment evaluating engineering practices.

Rim Elevation - The elevation of the top of a manhole cover. If the water surface elevation in a manhole is higher than the rim elevation, a sewer overflow will occur.

Risk Management - The process of identification, analysis and either acceptance or mitigation of risk. Essentially, risk management occurs anytime one analyzes the probability and consequences of an event happening, thereby quantifying the potential for losses and then takes the appropriate action (or inaction) given their objectives and risk tolerance.

Sanitary Sewer - A pipe or conduit (sewer) intended to carry wastewater or water-borne wastes from homes, businesses, and industries to the publicly owned treatment works.

Sanitary Sewer Overflow (SSO) - Any discharge of wastewater to waters of the United States from MSD's Sewer System through a point source not authorized by a KPDES permit, as well as any release of wastewater from MSD's Sewer System to public or private property that does not reach Waters of the United States, such as a release to a land surface or structure that does not reach Waters of the United States; provided, however, that releases or wastewater backups into buildings that are caused by blockages, flow conditions, or malfunctions in a building lateral, or in other piping or conveyance system that is not owned or operationally controlled by MSD are not SSOs.

Sanitary Sewer System (SSS) - The portion of MSD's sewer system designed to convey only municipal sewage (domestic, commercial, and industrial wastewaters) to MSD's WWTPs.

Secondary Treatment - A biological wastewater treatment technology required by the Clean Water Act for discharges from Publicly Owned Treatment Works, as that term is defined in 40 CFR Part 403.3(q). The minimum level of effluent quality attainable through the application of secondary treatment is established in 40 CFR Part 133.102 in terms of the parameters for 5-day biochemical oxygen demand ("BOD5") concentration and percent removal, total suspended solids ("TSS") concentration and percent removal, and pH.

Sensitive Areas - Areas of particular environmental significance or sensitivity as determined by the KPDES permitting authority in coordination with State and Federal agencies, that include Outstanding National Resources Waters, waters with threatened or endangered species and their habitats, waters with primary contract recreation, public drinking water intakes or their designated protection areas.

Sewer System - The wastewater collection, retention, and transmission system that MSD owns or operates, that are designed to collect, retain and convey municipal sewage (domestic, commercial and industrial wastewaters) to MSD's WWTPs or CSOs which is comprised of the CSS and the SSS.

Solids and Floatables (S&F) – Materials in sewage that are large enough to be visibly recognizable. Most solids and floatables in combined sewage are comprised of street litter and debris, but some plastic and paper products flushed down toilets stay in a visibly recognizable form, and are objectionable to some people.

Solution - A set of modifications to existing conditions in the hydraulic model developed to satisfy the overflow and surcharging requirements. Solutions are generally developed by trial and error modifications to the hydrological and hydraulic system at a given design storm. Modifications may include minimizing inflow and infiltration, modifications to conveyance (pipe diameter or pump capacity), added storage, system diversions or combinations thereof.

Surcharge - The condition within the sewer when the hydraulic grade line (water surface level) within the sewer system exceeds the crown of pipe elevation. The System Capacity Assurance Program (SCAP) defines a wet weather surcharge condition as a water surface level within the sewer that is less than two feet from the manhole rim elevation. If the sewer system is in an area of chronic backup complaints, then a surcharge condition is considered to be a water surface level within five feet of the manhole rim.

Upper Gauge (UG) - A measure of the Ohio River's stage (elevation) above the McAlpine Lock and Dam. Gauge 0 is equal to an elevation of 407.5' above mean sea level. Normal pool elevation for the Ohio River is 420.0' or an upper gauge of 12.5.

U.S. Environmental Protection Agency (EPA) - The federal agency responsible for enforcing the Clean Water Act, Safe Drinking Water Act and other federal environmental regulations.

Unauthorized Discharge - (a) any discharge of wastewater to waters of the United States from MSD's Sewer System or WWTPs through a point source not authorized by a KPDES permit and (b) any Bypass at MSD's WWTPs prohibited pursuant to the provisions of 40 CFR § 122.41(m)(2) and (4) or 401 KAR 5:065, Section 1(13)(a) and (c).

Water Quality Standards (WQS) - Standards that set the goals, pollution limits, and protection requirements for each waterbody. These standards are composed of designated (beneficial) uses, numeric and narrative criteria, and antidegradation policies and procedures.

Water Quality Treatment Center (WQTC) - The devices or systems used in the storage, treatment, recycling, and reclamation of municipal sewage that MSD owns or operates, and for which KPDES permits have been or will be issued to MSD. Treatment facilities may be referenced as Wastewater Treatment Plants (WWTPs) on enclosed maps or within the IOAP appendices due to MSD's transition to the WQTC terminology during IOAP development.

Waters of the United States - As defined in 40 CFR I22.2:

(a) All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;

(b) All interstate waters, including interstate "wetlands,"

(c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters**:**

(1) Which are or could be used by interstate or foreign travelers for recreational or other purposes; or

(2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or

(3) Which are used or could be used for industrial purposes by industries in interstate commerce;

(d) All impoundments of waters otherwise defined as waters of the United States under this definition;

(e) Tributaries of waters identified in paragraphs (a) through (d) of this definition;

(f) The territorial sea; and

(g) "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through ('1) of this definition.

Note that the intent of the regulations cited above excludes waste treatment systems, manmade ponds, and prior converted cropland from the definition of "Waters of the US." With respect to prior converted cropland, EPA maintains jurisdiction for purposes of the Clean Water Act.

Watershed Approach - A flexible framework used for managing water resources within a specified drainage area, or watershed. This approach includes stakeholder involvement and management actions supported by sound science and appropriate technology.

Watershed - Land area that drains to a common waterway, such as a stream, lake, estuary, wetland, or ultimately the ocean.

Wet Weather Event - A discharge from a combined or sanitary sewer system that occurs in direct response to rainfall or snowmelt.

Wet Weather Team (WWT) - An advisement group for MSD composed of four subgroups: The Stakeholder Group, MSD employees, a Technical Team, and the Facilitation Team. A WWT is required by the Consent Decree.

ACRONYMS AND ABBREVIATIONS

AAOV	Average annual overflow volume
ACD	Amended Consent Decree
ADF	Average daily flow
BG	Billion gallons
BGCMI	Beargrass Creek Middle Fork
BGCMU	Beargrass Creek Muddy Fork
BGCSF	Beargrass Creek South Fork
BMP	Best management practice
BOD	Biochemical oxygen demand
CCTV	Closed-circuit television
CDS	Continuous Deflection Separator
CFR	Code of Federal Regulations
cfs	Cubic feet per second
cfu	Colony forming unit
CMF	Central Maintenance Facility
CMOM	Capacity, Management, Operations, and Maintenance
COD	Chemical oxygen demand
CSO	Combined sewer overflow
CSS	Combined sewer system
CWA	Clean Water Act
DMR	Discharge monitoring report
DO	Dissolved oxygen
DWF	Dry weather flow

E. Coli	Escherichia Coli
EAP	Early Action Plan
ENR-CCI	Engineering News Record – Construction Cost Index
EPA	U.S. Environmental Protection Agency
FOG	Fats, oils, and grease
FY	Fiscal year
GIS	Geographic Information System
gpd	Gallons per day
GPS	Global Positioning Satellite
HEC RAS	hydraulic water flow modeling software
I&FP	Infrastructure and Flood Protection
I/I	inflow and infiltration
IOAP	Integrated Overflow Abatement Plan
IWD	Industrial Waste Department (also known as ICAM)
JCPS	Jefferson County Public Schools
JTown	Jeffersontown
KDEP	Kentucky Department of Environmental Protection
KPDES	Kentucky Pollutant Discharge Elimination System
KRS	Kentucky Revised Statute
LEED	Leadership in Energy and Environmental Design
LF	Linear feet
LG	Lower gauge
LG&E	Louisville Gas & Electric
LOJIC	Louisville and Jefferson County Information Consortium
LS	Lift station
LTCP	Long-Term Control Plan
LTMN	Long Term Monitoring Network
LWC	Louisville Water Company
MHI	Median Household Income
MG	Million gallons
mgd	Million gallons per day
mg/l	Milligrams per liter
ml	Milliliter
MOP	Modeled overflow point
MS4	Municipal Separate Storm Sewer System
MSD	Louisville and Jefferson County Metropolitan Sewer District

NEXRAD	Next-Generation Radar
NMC	Nine Minimum Controls
NOAA	National Oceanographic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance
OR	Ohio River
ORFM	Ohio River Force Main
ORSANCO	Ohio River Sanitation Commission
OSHA	Occupational Safety and Health Administration
PE	Professional Engineer
PM	Preventive maintenance
POTW	Publicly owned treatment works
Project DRI	Project Drainage Response Initiative
Project WIN	Project Waterway Improvements Now
PS	Pump station
PIO	Public Information and Outreach
PVC	Polyvinyl chloride
QA/QC	Quality Assurance / Quality Control
QAPP	Quality Assurance Project Plan
RBP	Stream Rapid Bioassessment Protocol
RDI/I	Rainfall-derived infiltration and inflow
ROW	Right-of-way
RTC	Real time control
S&F	solids and floatables
SAP$_{TM}$	Systems Analysis Program (MSD's financial management software)
SCADA	Supervisory Control and Data Acquisition
SCAP	Louisville Metro Sewer Capacity Assurance Plan
SED	Southeastern Diversion Structure
SIU	Significant Industrial User
SOP	Standard Operating Procedure
SORP	Sewer Overflow Response Protocol
SSDP	Sanitary Sewer Discharge Plan
SSES	Sanitary Sewer Evaluation Survey
SSO	Sanitary sewer overflow
SSOP	Sanitary Sewer Overflow Plan
SSS	Sanitary sewer system

SWMM	Stormwater and Wastewater Management Model
TMDL	Total maximum daily load
TSS	Total suspended solids
UAA	Use Attainability Analysis
UG	Upper Gauge
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
WDR	Waste Discharge Regulations
WEF	Water Environment Federation
WERF	Water Environment Research Foundation
WQT	water quality tool
WQTC	Water Quality Treatment Center
WWT	Wet Weather Team

MODELING AND FLOW MONITORING BASINS

BB	Buechel Branch	MC	Mill Creek
CC	Cedar Creek	MF	Middle Fork Beargrass Creek
FF	Floyds Fork	ND	Northern Ditch
HC	Hite Creek	ORFM	Ohio River Force Main
HP	Hikes Point	PC	Pond Creek
JT	Jeffersontown		

REGIONAL WATER QUALITY TREATMENT CENTERS

	KPDES No.	MSD No.
Cedar Creek	KY0098540	MSD0289
Floyds Fork	KY0102784	MSD0294
Hite Creek	KY0022420	MSD0202
Jeffersontown	KY0025194	MSD0255
Morris Forman	KY0022411	MSD0278
Derek R. Guthrie	KY0078956	MSD0277

(Formerly known as the West County Wastewater Treatment Plant)

SMALL WATER QUALITY TREATMENT CENTERS

	KPDES No.	MSD No.
Bancroft	KY0039021	MSD0290
Berrytown	KY0036501	MSD0209
Chenoweth Hills	KY0029459	MSD0263
Glenview Bluff	KY0044261	MSD0207
Hunting Creek North	KY0029106	MSD0291
Hunting Creek South	KY0029114	MSD0292
Ken Carla	KY0022497	MSD0208
Lake Forest / Beckley Woods	KY0042226	MSD0403
Lake of the Woods	KY0044342	MSD0251
McNeely Lake	KY0029416	MSD0228
Shadow Wood	KY0031810	MSD0404
Silver Heights	KY0028801	MSD0258
Starview	KY0031712	MSD0247
Timberlake	KY0043087	MSD0293
Yorktown	KY0036323	MSD0271

FINAL SANITARY SEWER DISCHARGE PLAN (SSDP)

EXECUTIVE SUMMARY

INTRODUCTION

On August 12, 2005, the Louisville and Jefferson County Metropolitan Sewer District (MSD) entered into a Consent Decree in Federal Court with the United States Environmental Protection Agency (EPA) and the Kentucky Environmental and Public Protection Cabinet. The Consent Decree was developed in response to an enforcement action taken by EPA and the Kentucky Department of Environmental Protection (KDEP) alleging violations of the Clean Water Act (CWA) primarily related to sewer overflows. One of the requirements of the Consent Decree is the development and submittal of a Final Sanitary Sewer Discharge Plan (Final SSDP).

On December 1, 2008, a draft Amended Consent Decree (ACD) was released for public comment. The draft ACD addressed alleged violations of the CWA primarily related to water quality treatment center (WQTC) performance, record-keeping, and reporting. The public comment period closed on the draft ACD December 31, 2008. The ACD was entered into Federal Court on April 15, 2009.

The Consent Decree amendments were negotiated over several months, and the terms of the draft amendments were known to MSD during the final stages of development of this Integrated Overflow Abatement Plan (IOAP). For the purposes of the IOAP, except where specifically noted otherwise, the term “Consent Decree” will be understood to mean the ACD as it was entered into Federal Court April, 15, 2009.

Volume 3 of the IOAP is the Final SSDP. The Consent Decree requires the Final SSDP to include conventional and innovative solutions to eliminate SSOs as part of the plan. The Final SSDP when implemented will accomplish the following objectives:

- Achieve legal and regulatory compliance
- Reduce potential negative impacts on public health
- Reduce potential negative impacts on receiving waters
- Reduce future costs of operation

The Final SSDP contains details on the historical problems within the separate Sanitary Sewer System (SSS) areas and the long-term projects and programs to correct these problems as required by the Consent Decree. The Final SSDP is organized into four chapters that present a comprehensive overview of MSD’s previous and ongoing programs and projects, a history of Sanitary Sewer Overflows (SSOs), characteristics of the sanitary sewer system, development of control alternatives, and final recommended programs and projects.

FINAL SANITARY SEWER DISCHARGE PLAN DOCUMENT ORGANIZATION

The following is a summary of each chapter.

Chapter 1 Final Sanitary Sewer Discharge Plan Introduction

This chapter describes the relationship to the current Final SSDP planning process and presents summaries of previous and ongoing MSD projects and programs,. The chapter also reviews the role of public participation as well as the overall planning approach to SSO elimination.

Historically, MSD has been very active in SSO elimination and addressing SSOs that are documented in studies and reports. The following plans and programs have significant importance in developing the Final SSDP:

- Updated Sanitary Sewer Overflow Program
- Capacity, Management, Operations and Maintenance Programs
- Sewer Overflow Response Protocol (SORP)
- Interim Sanitary Sewer Discharge Plan

During 2007, MSD developed an Interim SSDP in accordance with the requirements of the Consent Decree. MSD initially submitted the Interim SSDP to the EPA and KDEP on September 28, 2007, and received comments on January 8, 2008. MSD resubmitted the revised Interim SSDP on March 7, 2008, and received approval on July 24, 2008. The Interim SSDP defines the plan for eliminating SSOs in the Beechwood Village area, the Hikes Point area, at the Highgate Springs Pump Station, and at the Southeastern Diversion Structure. The projects defined by the Interim SSDP include approximately $200 million in capital costs that will be expended by December 31, 2013.

The overall approach to SSO elimination planning is highly dependent on hydraulic models. Hydraulic models are the mathematical representations of a sewer system. They are used to characterize the existing sewer conditions, evaluate potential solutions, and determine the sizing of technically feasible alternatives for conveyance, storage, and/or treatment to relieve excess wet weather flows and eliminate SSOs. Additionally, benefit-cost evaluations are used to select appropriate control technologies to eliminate each SSO, to optimize the level of control provided for each SSO, and to assist in prioritizing the order of project implementation. Based on parameters from the hydraulic models, overflow elimination alternatives are sized by developing conceptual designs.

For the Final SSDP, costs were estimated using a standardized estimating tool that incorporated extensive databases calibrated with actual costs from similar projects. Benefits were based on a values-based risk management approach to SSO elimination. Typically, the project that eliminated SSOs with the best overall benefit-cost ratio was selected by MSD as the optimal solution for each area impacted by SSOs.

Chapter 2 System Characterization

This chapter defines the objectives of the system characterization program and provides a compilation and analysis of unauthorized discharges in the separate SSS. This chapter includes MSD service area maps showing the unauthorized discharge areas and associated WQTCs, collection system modeling, and system monitoring. This chapter also describes the computer modeling process used to simulate and evaluate separate SSS areas.

MSD developed the Hydraulic Sewer System Modeling Guideline Manual (Appendix 2.4.3, Volume 2) to define procedures to ensure the detail, quality, and functionality of the sewer models while providing consistent model development criteria. A full set of modeling standards was developed prior to Final SSDP modeling. Standards included calibration standards, flow monitoring data protocols, use of previous models, input and export standards, quality assurance / quality control (QA/QC) procedures, and modeling techniques for rainfall-derived inflow and infiltration (RDI/I) and pump facilities.

As described within the Chapter, two storm distributions were considered for the Final SSDP modeling: 1) the Natural Resources Conservation Service distribution and; 2) the National Oceanographic and Atmospheric Administration (NOAA) "short-duration precipitation," also known as the "cloudburst" distribution. Based on an analysis of over fifty years of historical weather patterns for Louisville Metro, MSD determined that a three-hour, high-intensity cloudburst storm reflected the most appropriate storm pattern to use in SSO control evaluation.

During system characterization, a broad range of design storms and conditions were analyzed, ranging from storms with a 50 percent or greater probability of occurring in any given year to storms with a 10 percent probability of occurring in any given year. This allowed modelers the opportunity to validate models and determine the extent of various deficiencies, such as surcharging, at several different storm levels. During the evaluation, MSD assessed existing gravity sewer conditions, determined pump station capacity, consolidated past flow monitoring data, performed new flow monitoring specific to the Final SSDP modeling and maintained a rain gauge and radar rainfall network. Other key items outlined in Chapter 2 are outlined below.

Model Calibration and Validation – Model calibration is the process of comparing model predicted results to measured flow monitoring, rainfall, and other system data. Once calibrated, the model is then "validated." Model calibration requires comparison to a single wet weather event. Model validation cross-checks the model performance against a variety of historical data sources, (primarily observed SSO locations and surcharged pipes) to verify that the model predicts what has been observed during storms other than the calibration event.

Modeled Overflow Points (MOPs) – After validation, the models were simulated again at a 50 percent probability level (a 1.82-inch cloudburst storm) to identify any SSOs predicted by the models that were not associated with previously-known locations. These predicted SSO locations were subject to field investigation during wet weather events. Based on these investigations, several new SSOs were documented, and the models were re-validated.

RDI/I Reduction – RDI/I reduction was considered as an integral part of every solution. MSD developed a method to predict RDI/I reduction in specific basins, defined by the flow monitoring

process, for use in the modeling and optimization process. Actual RDI/I reduction will depend on the level of sewer rehabilitation, and is especially dependent on the success of efforts to reduce infiltration and inflow (I/I) sources on private property. MSD is executing an on-going I/I Program for systemic improvements within the collection system. During implementation of the Final SSDP, post-construction monitoring will be used to demonstrate the impacts of I/I improvements on RDI/I reduction. An adaptive management approach will be used to modify a project's scope if the actual RDI/I reduction is significantly different than the predicted RDI/I reduction used in initial project development.

Build-out Development – In preparing conceptual designs of project alternatives, the potential for future development was considered. Flows predicted from future development were estimated for full build-out of un-developed areas that drain by gravity to known or suspected SSOs. Build-out considerations were limited to developable land consistent with current land use and growth planning documents for Louisville Metro.

This chapter concludes with the identification, validation, and characterization of SSOs subject to control under the Final SSDP. After model calibration, validation and the field investigation of the MOPs, a total of 173 SSO locations were listed as validated SSOs within the MSD system and are considered for the Final SSDP solution projects.

Chapter 3 Development and Evaluation of Alternatives for SSO Elimination

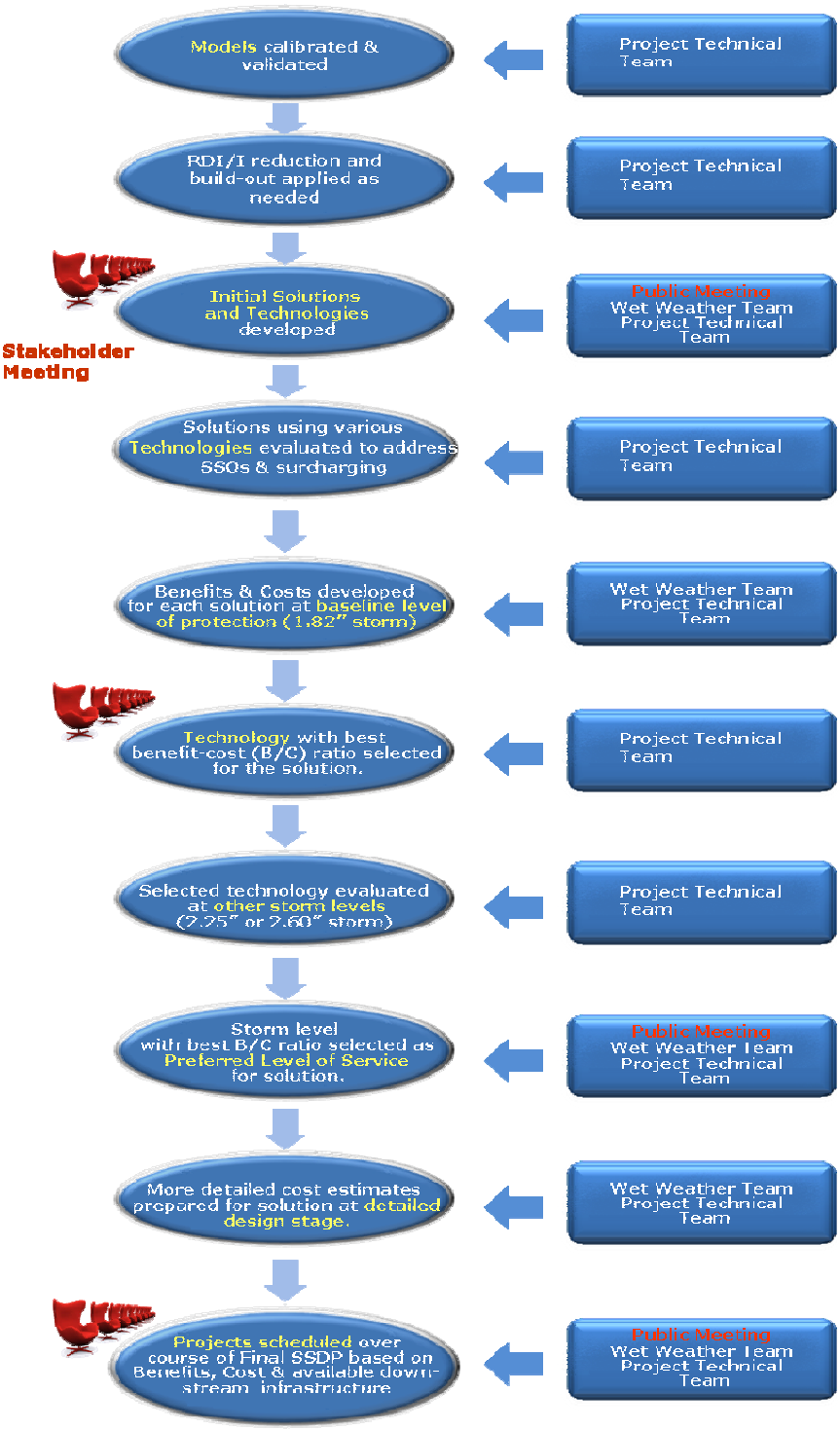
This chapter presents the methodologies used to evaluate the various SSO elimination alternatives. The chapter defines and discusses strategies and technologies available to control and eliminate SSOs in the separate SSS. The range of technology approaches available for the development of SSO elimination strategies and alternatives include:

- Source control through I/I flow reduction;
- Peak flow storage alternatives (constructed tanks or oversized pipes);
- Increased conveyance capacity (through larger pipe diameter, parallel relief sewers, or new or expanded pump stations);
- Flow diversion to other portions of the system that have available capacity;
- Expanded wastewater treatment capacity, provided either at existing regional treatment facilities or remotely as high-rate wet weather treatment facilities.

The chapter also provides the methodology for estimating costs and developing benefits for each solution considered. Figure ES.1 is a flow chart of the sequential SSO solution development process:

Finally, this chapter provides a summary of SSO technology alternative evaluations in each modeled area. The evaluation criterion includes feasibility screening, computer modeling, quality control, cost estimates, and a benefit-cost analysis. The initial SSO alternatives list considered 132 technology-based gray infrastructure projects addressing SSOs across the entire SSS. As a result of the structured evaluation and decision process, 49 preferred solutions were selected to proceed to the level of protection optimization process to develop final projects that represent the recommended solutions.

FIGURE ES.1 FINAL SSDP SSO SOLUTION DEVELOPMENT PROCESS



Chapter 4 Selection of Final Sanitary Sewer Discharge Plan

This chapter describes the application of the values-based risk management process utilized to optimize and prioritize the Final SSDP alternatives. The chapter describes the selection process for the final plan, including selected site-specific levels of protection, prioritization of projects, implementation schedules to comply with Consent Decree requirements, and measures to evaluate success of projects.

As previously described, the technology selection was determined based on a 1.82-inch cloudburst storm. In Chapter 4, the technology solution is fully described and the selection of the 1.82-inch cloudburst level was re-sized to prevent SSOs during a 2.25-inch cloudburst storm and also a 2.60-inch cloudburst storm under some conditions. For the re-sized facilities corresponding to each storm, the costs and benefits were re-evaluated and a new benefit-cost ratio was determined. Typically, the level of protection with the highest benefit-cost ratio was chosen as the final solution.

FINAL RECOMMENDED PROJECTS

The final projects selected to address SSOs include a mixture of source control (including I/I reduction efforts), wet weather storage, system diversion, and flow conveyance/transport. This mix of control options is the result of the process using community value based benefit-cost analyses as defined by the Wet Weather Team (WWT) Stakeholder Group. Consistent with the Final Combined Sewer Overflow Long-Term Control Plan (Final CSO LTCP), the Final SSDP project alternatives are designed to be built around MSD's existing infrastructure, which may include large diameter pipes and WQTCs, and draw on synergistic benefits from other MSD projects.

Overall, the Final SSDP includes 49 projects: 38 gray infrastructure projects, eight I/I reduction projects, and three SSO investigation projects. The Interim SSDP includes six gray infrastructure projects which are incorporated into the Final SSDP solutions. The gray infrastructure projects, including the six Interim SSDP projects, are divided into a combination of the following categories, (some projects fall into more than one category):

- 23 conveyance capacity upgrades
- 11 storage projects, inline and offline, many with pipe upgrades as well
- Upgrades or replacements to 12 pump stations
- Elimination of 18 pump stations
- Elimination of 6 small WQTCs, including 5 in the Prospect area
- Expansion of a WQTC

The site-specific level of protection for the 38 Final SSDP gray infrastructure projects as determined by the value-based benefit-cost analysis resulted in the following:

- 24 projects eliminate SSOs up to the 1.82-inch cloudburst storm
- 5 projects eliminate SSOs up to the 2.25-inch cloudburst storm
- 9 projects eliminate SSOs up to the 2.60-inch cloudburst storm

The suite of projects selected for the Final SSDP for SSO control will result in the elimination of capacity-related SSOs up to the site-specific level of protection. In an average year the SSO projects are anticipated to eliminate SSOs at an average of 145 SSO locations that currently discharge an estimated 290 million gallons (MG) of overflow volume per year, based on 2005–2007 data normalized for rainfall. In terms of water quality, SSO projects will annually eliminate 100 tons of 5-day biochemical oxygen demand (BOD_5) and approximately 200 tons of suspended solids.

Table ES.1 represents the final projects chosen for eliminating SSOs at the selected site-specific design level of protection. The table includes a list of projects, SSOs controlled by that project, selected level of protection, capital costs, and scheduled project completion year. In total, there are 214 documented, suspected, and modeled SSOs addressed by the 55 projects (49 Final SSDP and six Interim SSDP) listed in Table ES.1 and displayed in Figure ES.2. Projects are listed by modeled area.

Cedar Creek
Hite Creek
Floyds Fork
Jeffersontown
Middle Fork
Southeastern Diversion
Pond Creek
Ohio River Force Main
Mill Creek
Small WQTC Area
CSS Area
Other Project
Interim SSDP Projects

The implementation schedule to achieve Consent Decree requirements and final project implementation is shown in Figure ES.3. The Final SSDP is being developed based on front-end consideration of source control. This means that traditional gray infrastructure in the Final SSDP were sized after considering the anticipated flow-reduction benefits of source control including reduction of private sources of I/I. Ultimate sizing of each project will be analyzed in design with adjustments to account for realized I/I reductions through source control. The following list represents the general order of priority that was used to set the implementation schedule for the IOAP Final SSDP projects, in descending order:

- Interim SSDP projects and milestones from previously approved submittals
- "Enabling projects" required to implement Consent Decree or Milestone projects
- Source control solutions (especially targeted I/I reduction locations)
- Downstream projects that need to be constructed to capture additional flow when smaller upstream projects are constructed
- Capital Improvement Projects already under design that address SSOs
- Remaining projects rank-ordered based on benefit-cost ratio and scheduled in that order at specific times to assist with cash flow leveling

The capital cost, in 2008 dollars, to implement the Final SSDP is $219,687,000, allocated as follows:

- Gray Infrastructure Program $168,687,000
- I/I Reduction Program $ 51,000,000

MEASURES OF SUCCESS

Measures of success are a means to demonstrate compliance with the Consent Decree requirements and to quantify the benefits achieved from SSO elimination projects. The success of the Final SSDP in meeting Consent Decree compliance requirements will be measured incrementally as the plan is implemented and also at plan completion in December 2024. A review of the Final SSDP projects after completion will evaluate how well the project accomplished the performance goals.

The performance goals to be tracked under the Final SSDP include:

- No wet weather capacity related SSOs from the system within the selected level of protection.
- No wet weather capacity related system surcharges causing basement back-ups within the selected level of protection and within the pre-remediation zone of influence.
- Secondary treatment of all flow within the selected level of protection.
- Project flow monitoring performed and documented. Post-construction flow rates are comparable to projected flow rates established in the design process.

If any of these measures are deemed to not be met for a defined level of protection storm event, MSD will utilize the adaptive management process to improve the performance of the impacted projects to achieve the intended goal. These improvements could include additional storage or targeted RDI/I reduction measures upstream of the solution.

MSD anticipates that new SSO locations could be found over time, as sewer system conditions change. As a result, if capacity related, existing solutions may be modified to address new SSO locations on a case-by-case basis through the adaptive management process (e.g., new SSOs will be added to the SORP investigation list and monitored. If necessary, hydraulic models will be re-validated to the new SSOs and used to analyze solution modifications.)

TABLE ES.1

SSDP FINAL PROJECTS

SSDP Recommended Project Name/Location	SSO(s) Controlled	Technology	Selected Level of Protection	Capital Cost $[1]	Scheduled Completion Year
Cedar Creek Area					
Idlewood Inline Storage	28998, 28984, 63094, 63095, 70158	Inline Storage	1.82-inch	$2,317,000	2023
Fairmount Rd. PS Improvements	Fairmount Road PS (81316 & 97362)	PS Upgrades	2.60-inch	$874,000	2023
Little Cedar Creek Interceptor Improvements	67997, 67999, 86423, 89195, 89197	Pipe Upgrades	1.82-inch	$1,875,000	2024
Bardstown Rd. PS Improvements	88545	PS Upgrades	2.25-inch	$281,000	2021
Running Fox PS Elimination	MSD1080-LS	Diversion	1.82-inch	$96,000	2010
Hite Creek Area					
Meadow Stream PS Inline Storage	Meadow Steam PS (91087 & MSD1082-PS)	Inline Storage	1.82-inch	$974,000	2016
Floydsburg Rd. I/I Investigation & Rehabilitation	Floydsburg Road (MSD1086-PS, 90776, 108956, 108957, 108958)	I/I Reduction	1.82-inch	$57,000	2010
Kavanaugh Rd. PS Improvements	Kavanaugh Road (MSD1085-PS)	PS & Force Main Upgrades	2.60-inch	$1,110,000	2024
Floyds Fork Area					
Woodland Hills PS Diversion	33003, 65531	Diversion	1.82-inch	$20,000	2011
Eden Care PS SSO Investigation	Eden Care PS (MSD1105-PS)	Monitor	Monitor	--	2012
Ashburton PS Improvements & Diversion	Olde Copper Court PS (MSD0165-PS), Ashburton PS (MSD0166-PS)	Upgrade Force Main & Pipes	1.82-inch	$118,000	2021
Jeffersontown Area					

TABLE ES.1

SSDP FINAL PROJECTS

SSDP Recommended Project Name/Location	SSO(s) Controlled	Technology	Selected Level of Protection	Capital Cost $[1]	Scheduled Completion Year
Jeffersontown WQTC Elimination	28390, 28391, 28392, 28395, 31733, Jeffersontown WQTC (28173 & 64505 & MSD0255 & IS028-SI)	Offline Storage & Pipe Upgrades, WQTC Elimination	1.82-inch	$23,737,000	2015
Chenoweth Hills WQTC Elimination, Chenoweth Run and Chippewa PS Improvements	Chenoweth Run PS (MSD0196-PS & 86052 & 64096), Chippewa PS (92061), Chenoweth Hills WQTC PS (MSD0263A-PS), Chenoweth Hills WQTC (MSD0263)	PS & Force Main Upgrades, WQTC Elimination	1.82-inch	$3,140,000	2015
Dell Rd. and Charlane Pkwy Interceptor Improvements	Charlane Pky (28250, 28249, 28340, 28336, 104289), Dell Rd. (28413, 28414, 28415, 28416, 28417)	Pipe Upgrades	1.82-inch	$917,000	2022
Raintree & Marian Ct. PS Eliminations	28719, 28711, Marian Court PS (28729), Raintree PS (MSD0149-PS)	Diversion, Pipe Upgrades	1.82-inch	$1,005,000	2021
Monticello PS Elimination	Monticello Place PS (MSD0151-PS & 27969)	Diversion	2.60-inch	$207,000	2022
Middle Fork Area					
Middle Fork Relief Interceptor, Wet Weather Storage, and UMFLS Diversion	02932, 02933, 02935, 08537, 23211, 23212, 27005, 45835, 47583, 47593, 47596, 47603, 47604, 51221, 51161, 51160, 90700, IS021A-SI, 08935-SM	Offline Storage & Pipe Upgrades	1.82-inch	$26,627,000	2 Phases - 2013, 2023
Goose Creek Pump Station Improvements & Wet Weather Storage	Devondale PS (21628-W), Goose Creek PS (46891 & 62418 & 91629 & 91630 & 105936), Saurel PS (43472)	Offline Storage, PS & Force Main Upgrades	2.25-inch	$2,844,000	2024
Anchor Estates Inline Storage & PS Eliminations	Vannah PS (01106), Anchor Estates #1 Pump Station (00746 & 00056-W), Anchor Estates #2 PS (MSD0057-LS)	Inline Storage & Diversion	2.60-inch	$1,909,000	2 Phases - 2013, 2016
Hurstbourne I/I Investigation & Rehabilitation	01793	I/I Reduction	1.82-inch	$536,000	2011
Southeastern Diversion Area					
Parkview Estates I/I Investigation & Rehabilitation	47250	I/I Reduction	1.82-inch	$285,000	2011

TABLE ES.1

SSDP FINAL PROJECTS

SSDP Recommended Project Name/Location	SSO(s) Controlled	Technology	Selected Level of Protection	Capital Cost $[1]	Scheduled Completion Year
Klondike Interceptor	25676 (Alcona), 26650, 26651	Pipe Upgrades	2.25-inch	$558,000	2015
Sutherland Interceptor	Sutherland (16649)	Pipe Upgrades	2.60-inch	$412,000	2023
Beargrass Interceptor Rehab Ph. 2	51594	Pipe Rehab	1.82-inch	$57,000	2010
Pond Creek Area					
Charleswood Interceptor Extension	25477, 25478, Cooper Chapel PS (25480 & MSD0130-PS)	Pipe Upgrades	1.82-inch	$603,000	2022
Cinderella PS Elimination	Cinderella PS (60679 & MSD1013-PS), 35309	Diversion	1.82-inch	$2,205,000	2023
Lantana PS I/I Investigation & Rehabilitation	Lantana Drive #1 PS (25484 & 93719 & MSD0101-PS)	Offline Storage & Pipe Upgrades	1.82-inch	$20,000	2011
Government Center PS Elimination	Government Center PS (MSD0180-PS)	Diversion	1.82-inch	$1,225,000	2024
Avanti Pump Station Elimination	Avanti PS (21229-W)	Diversion	2.60-inch	$31,000	2010
Lea Ann Way System Improvements	19360, 19369, 29933, 29948, 29943, 31083, 31084, 79076, Lea Ann Way PS (MSD1010-PS)	Pipe Upgrades	1.82-inch	$827,000	2015
Outer Loop & Caven Ave Wet Weather Storage	27116, 70212, 17724, Caven Ave PS (MSD0133-PS)	Offline Storage & Pipe Upgrades	1.82-inch	$6,084,000	2 Phases – 2016, 2024
Leven PS Elimination	Leven PS (36419 & MSD1019-PS)	Diversion	1.82-inch	$376,000	2022
Edsel PS I/I Investigation & Rehabilitation	Edsel PS (92098 & MSD1048-PS)	I/I Reduction	1.82-inch	$367,000	2011
ORFM Area					

TABLE ES.1

SSDP FINAL PROJECTS

SSDP Recommended Project Name/Location	SSO(s) Controlled	Technology	Selected Level of Protection	Capital Cost $[1]	Scheduled Completion Year
Mellwood System Improvements & PS Eliminations	26752, 41374, 41416, Mockingbird Valley PS (MSD0007-PS), Winton PS (MSD0010-PS), Mellwood Avenue PS (24472 & MSD0023-PS), Canoe Lane PS (24152-W & MSD0024-PS)	PS Upgrades, Pipe Upgrades & Diversion	2.25-inch	$3,055,000	2 Phases – 2012, 2024
Leland Rd. SSO Investigation	96020	Condition Assessment	Monitor	--	2012
Derington Ct. PS I/I Investigation & Rehabilitation	Derington Court PS (MSD0095-PS)	I/I Reduction	1.82-inch	$265,000	2012
Prospect Area WQTC Eliminations, Harrods Creek PS, and ORFM System Improvements	40870, 40871, 40872, Barbour Lane PS (42680 & 65633 & 65635), West Goose Creek PS (22436 & MSD0123-PS), Phoenix Hill PS (MSD1044-PS), Glenview Hills PS (MSD0183-PS), Barbour Lane PS (MSD0192-PS), New Market PS (MSD0193-PS), Deep Creek PS (MSD1063-PS), Hunting Creek South WQTC (MSD0292)	PS and Pipe Upgrades, Diversion, WQTC eliminations	2.25-inch	$34,062,000	2 Phases - 2015, 2016
Mill Creek Area					
Shively Interceptor	04498, 04542, Pioneer PS (81814-W), Fern Lea PS (MSD0047-PS), Garr's Lane PS (MSD0050-PS)	Pipe Upgrades	2.60-inch	$16,419,000	2014
East Rockford PS Relocation	East Rockford PS (04699-W)	Pump Station Replacement and Relocation	1.82-inch	$1,044,000	2021
Small WQTC Area					
Lucas Ln. PS Inline Storage	Lucas Lane PS (MSD0199-LS)	Inline Storage	1.82-inch	$183,000	2021

TABLE ES.1

SSDP FINAL PROJECTS

SSDP Recommended Project Name/Location	SSO(s) Controlled	Technology	Selected Level of Protection	Capital Cost $[1]	Scheduled Completion Year
Riding Ridge PS Improvements	Riding Ridge PS (MSD1060-LS)	PS Upgrades	1.82-inch	$27,000	2014
Gunpowder PS Inline Storage	Gunpowder PS (MSD1055-LS)	Inline Storage	1.82-inch	$176,000	2021
Fox Harbor Inline Storage	Fox Harbor #1 and #2 PS (62769)	Inline Storage	2.60-inch	$328,000	2021
Fairway View PS Improvements	Fairway View PS (MSD1065-PS)	PS Upgrades	1.82-inch	$87,000	2014
Lake Forest PS SSO Investigation	Lake Forest PS (MSD1169-LS)	Monitor	Monitor	--	2012
St. Rene Rd. PS Inline Storage	94187	Inline Storage	1.82-inch	$30,000	2021
CSS Area					
Sonne PS I/I Investigation & Rehabilitation	Sonne Avenue PS (MSD0042-PS)	I/I Reduction	1.82-inch	$265,000	2011
Camp Taylor System Improvements	08717, 13931, 13943, 36763, 44396, 44397, 66349, 104223, 104231	SSES, Sewer Rehabilitation & Replacement, Offline Storage	2.60-inch	$28,279,000	4 Phases - 2011, 2013, 2017, 2023
Hazelwood PS I/I Investigation & Rehabilitation	Hazelwood PS (55665)	I/I Reduction	1.82-inch	$173,000	2011
Other Project					
CPE/CCP Modifications to WQTC	--	--	--	$2,600,000	2011
			FINAL SSDP TOTAL	**$168,687,000**	

Legend: LS –Lift station, PS – Pump Station, CSO – Combined Sewer Overflow, SSO – Sanitary Sewer Overflow, CSS- Combined Sewer System, WQTC – Water Quality Treatment Center, SSES – Sanitary Sewer Evaluation Study, I/I – Inflow and Infiltration, ORFM – Ohio River Force Main, CPE - Comprehensive Performance Evaluation, CCP -Composite Correction Plan

TABLE ES.1

SSDP FINAL PROJECTS

SSDP Recommended Project Name/Location	SSO(s) Controlled	Technology	Capital Cost $[1]	Scheduled Completion Year
Interim SSDP Projects				
Beechwood Village Sanitary Sewer Replacement	21061, 21089, 21101, 21153, 21156	Sewer Replacement	$11,800,000	2011
Hikes Lane Interceptor and Highgate Springs PS	17571, 18134, 18298, 18302, 18318-W, 18434, 18471, 18483, 18505, 18595, 49236, 49672, 49673, 49224, MSD0012-PS	PS Elimination and New Interceptor	$21,216,000	2012
Northern Ditch Diversion Interceptor	MSD0271	New Interceptor / WQTC Elimination	$20,397,000	2011
Sinking Fork Relief Sewer	21103, 25012, 63319	New Relief Sewer	$1,690,000	2010
Southeastern Diversion Structure and Interceptor	08426, 08427, 08430, 08431, 30701, 30702, 49647, 63779, 30680, 30681, 72571-X	New Relief Sewer and Flow Control Modifications	$1,744,000	2012
Derek R. Guthrie WQTC	22370, 22385, 32682, 32688, 59169, MSD0277	WQTC Upgrade	$102,700,000	2011
		INTERIM SSDP TOTAL	**$159,547,000**	
Note: Derek R. Guthrie WQTC (formerly known as the West County Wastewater Treatment Plant)				

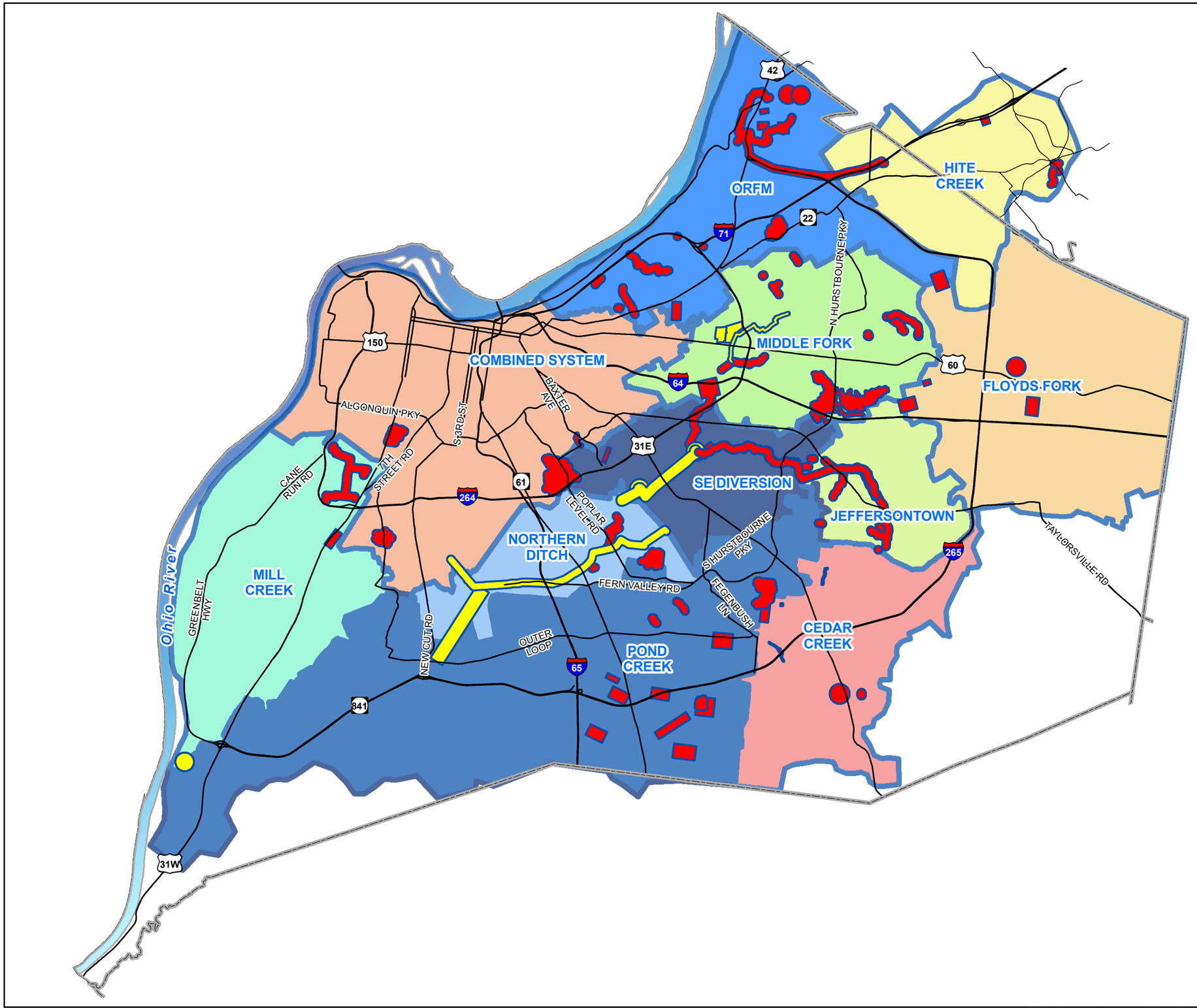
[1] Detailed cost evaluations are included in Appendix 4.1.2, Final SSDP Project Cost Estimates

Integrated Overflow Abatement Plan

Vol. 3 - Sanitary Sewer Discharge Plan

Final SSDP Project Areas

Figure ES.2



Legend

- Jefferson County Boundary
- Major Roads

IOAP Project Areas

- ISSDP
- SSDP

Credits Catchment Areas

- CEDAR CREEK
- COMBINED SYSTEM
- FLOYDS FORK
- HITE CREEK
- JEFFERSONTOWN
- MIDDLE FORK
- MILL CREEK
- NORTHERN DITCH
- ORFM
- POND CREEK
- SE DIVERSION
- Ohio River

1 inch = 14,000 feet
Scalable when printed on 11" X 17" paper

Some boundaries are uniquely symbolized within the map.

Map Revision
May 7, 2009

N

LOJIC Louisville/Jefferson County Information Consortium

MSD Metropolitan Sewer District

PROJECT WIN Watershed Improvements Now

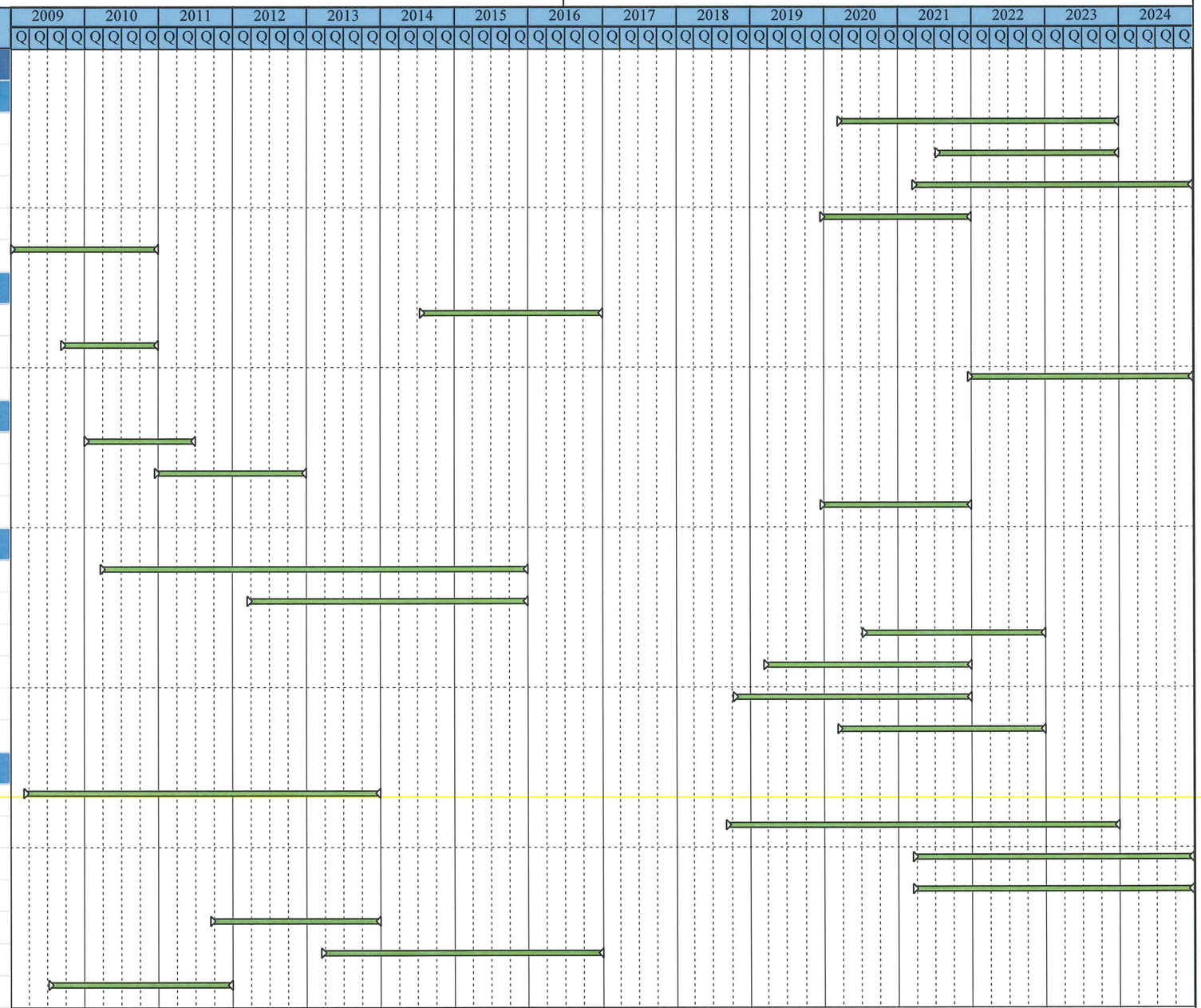
This document was developed in color. Reproduction in black and white may not represent the data as intended.

Figure ES.3

Final Sanitary Sewer Discharge Plan Implementation Schedule

Figure ES.3

Project Name	Finish
Sanitary Sewer Discharge Plan	31-Dec-24
Cedar Creek Area	31-Dec-24
Idlewood Inline Storage	31-Dec-23
Fairmount Rd PS Improvements	31-Dec-23
Little Cedar Creek Interceptor Improvements	31-Dec-24
Bardstown Rd PS Improvements	31-Dec-21
Running Fox PS Elimination	31-Dec-10
Hite Creek Area	31-Dec-24
Meadow Stream PS Inline Storage	31-Dec-16
Floydsburgh Rd I/I Investigation & Rehabilitation	31-Dec-10
Kavanaugh Rd PS Improvements	31-Dec-24
Floyds Fork Area	31-Dec-21
Woodland Hills PS Diversion	30-Jun-11
Eden Care PS SSO Investigation	31-Dec-12
Ashburton PS Improvements & Diversion	31-Dec-21
Jeffersontown Area	31-Dec-22
Jeffersontown WQTC Elimination	31-Dec-15
Chenoweth Hills WQTC Elimination & PS Improvemets	31-Dec-15
Dell Rd & Charlane Pkwy Interceptor Improvements	31-Dec-22
Raintree & Marian Ct Ph 1-PS Eliminations	31-Dec-21
Raintree & Marian Ct Ph 2-Pipe Upgrades	31-Dec-21
Monticello PS Elimination	31-Dec-22
Beargrass Creek Middle Fork Area	31-Dec-24
UMF #1-Buechel Basin	31-Dec-13
UMF #2-PS Diversion & Storage	31-Dec-23
Goose Creek PS Ph 1-Devondale PS WW Storage	31-Dec-24
Goose Creek PS Ph 2-PS & Force Main Upgrades	31-Dec-24
Anchor Estates-Vannah PS Elimination	31-Dec-13
Anchor Estates-Anchor Ests PS 1&2 Eliminations	31-Dec-16
Hurstbourne I/I Investigation & Rehabilitation	31-Dec-11



All Projects

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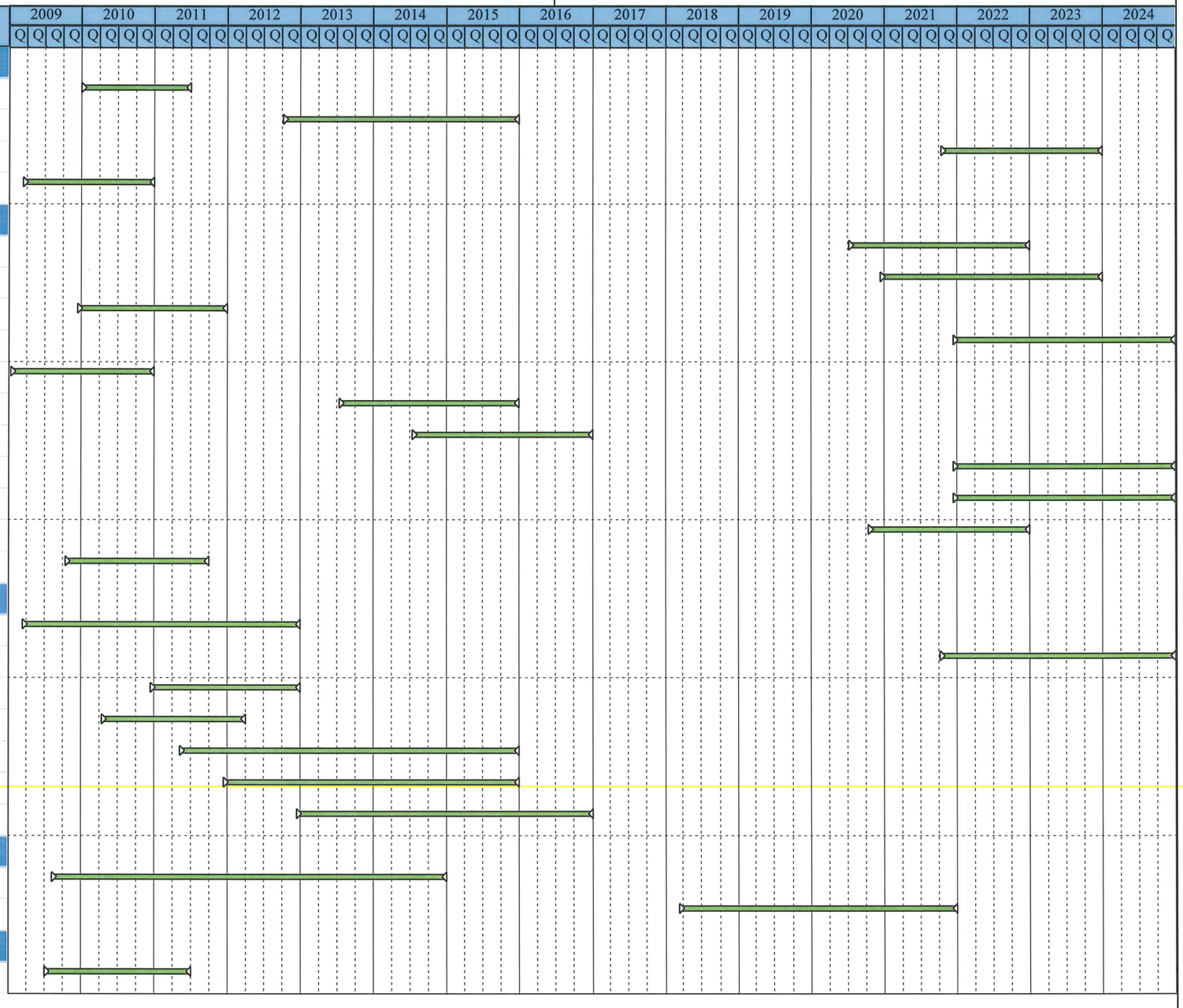
Final Sanitary Sewer Discharge Plan Implementation Schedule

Figure ES.3

Project Name	Finish
Southeastern Diversion Area	31-Dec-23
Parkview Estates I/I Investigation & Rehabilitation	30-Jun-11
Klondike Interceptor	31-Dec-15
Sutherland Interceptor	31-Dec-23
Beargrass Interceptor Rehabilitation Ph 2	31-Dec-10
Pond Creek Area	31-Dec-24
Charleswood Interceptor Extension	31-Dec-22
Cinderella PS Elimination	31-Dec-23
Lantana PS I/I Investigation & Rehabilitation	31-Dec-11
Government Center PS Elimination	31-Dec-24
Avanti PS Elimination	31-Dec-10
Lea Ann Way System Improvements	31-Dec-15
Outer Loop & Caven Area Pipe Upgrades	31-Dec-16
Outer Loop WW Storage	31-Dec-24
Caven Ave WW Storage	31-Dec-24
Leven PS Elimination	31-Dec-22
Edsel PS I/I Investigation & Rehabilitation	30-Sep-11
Ohio River Force Main Area	31-Dec-24
Mellwood Sys 1-Mellwood PS & Force Main	31-Dec-12
Mellwood Sys 2-Winton & Mockingbird PS Elims & Pipe Upgrds	31-Dec-24
Leland Rd SSO Investigation	31-Dec-12
Derington Ct PS I/I Investigation & Rehabilitation	31-Mar-12
Prospect #1 - WQTC Eliminations	31-Dec-15
Prospect #2 - Harrods Creek PS	31-Dec-15
Prospect #3 - ORFM System Improvements	31-Dec-16
Mill Creek Area	31-Dec-21
Shively Interceptor	31-Dec-14
East Rockford PS Relocation	31-Dec-21
Combined Sewer System Area	31-Dec-23
Sonne PS I/I Investigation & Rehabilitation	30-Jun-11



All Projects

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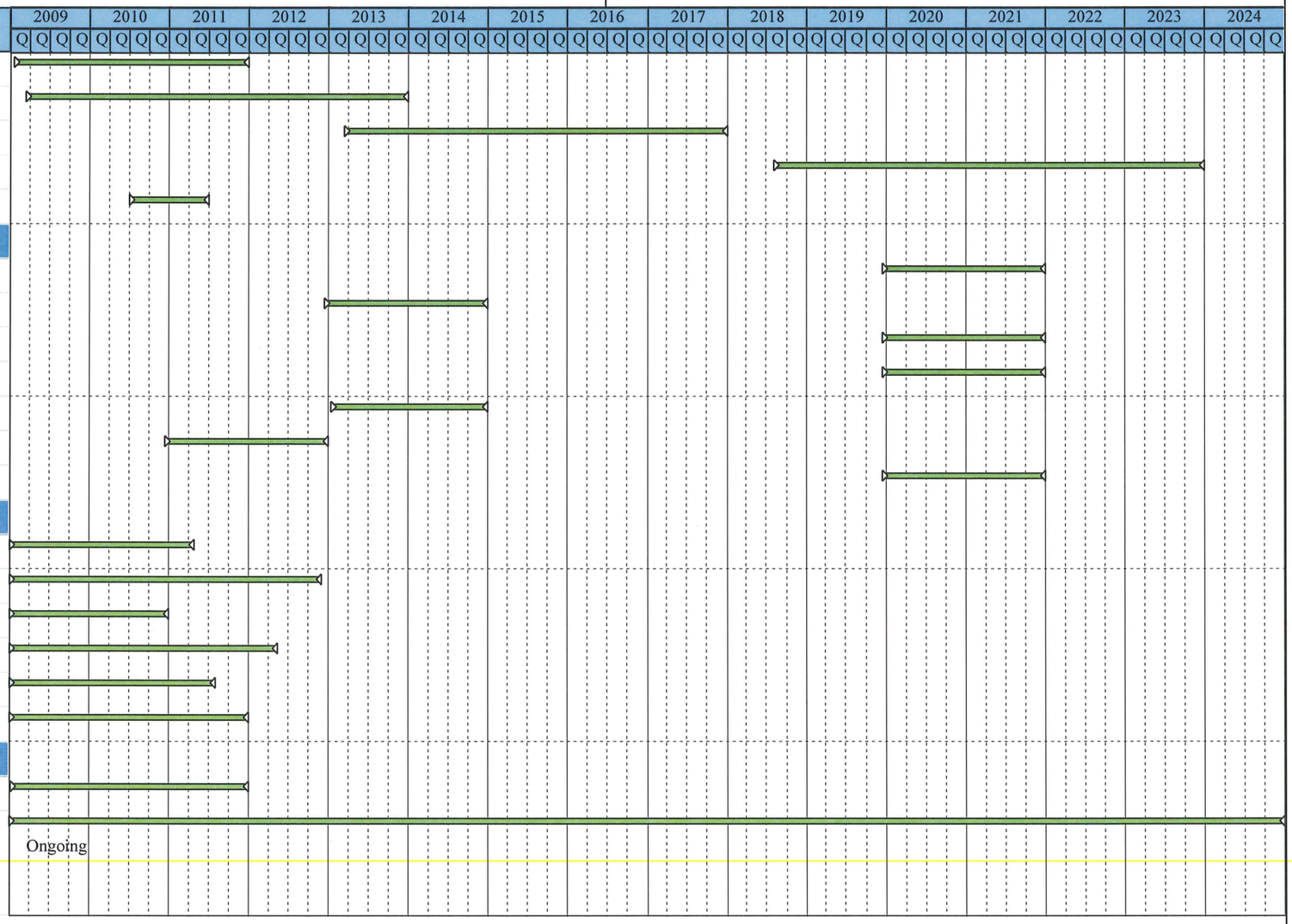
Final Sanitary Sewer Discharge Plan Implementation Schedule

Figure ES.3

Project Name	Finish
Camp Taylor #1 - SSES	31-Dec-11
Camp Taylor #2 - Replace Sewers	31-Dec-13
Camp Taylor #3 - Replace Sewer & Rehabilitation	31-Dec-17
Camp Taylor #4 - Rehabilitation & Off Line Storage	31-Dec-23
Hazelwood PS I/I Investigation & Rehabilitation	30-Jun-11
Small WWTP Area	31-Dec-21
Lucas Ln PS Inline Storage	31-Dec-21
Riding Ridge PS Improvements	31-Dec-14
Gunpowder PS Inline Storage	31-Dec-21
Fox Harbor Inline Storage	31-Dec-21
Fairway View PS Improvements	31-Dec-14
Lake Forest PS SSO Investigation	31-Dec-12
St. Rene Rd PS Inline Storage	31-Dec-21
Interim SSDP Projects	27-Nov-12
Beechwood Village Sanitary Sewer Replacement	27-Apr-11
Hikes Lane Interceptor & Highgate Springs PS	27-Nov-12
Sinking Fork Relief Sewer	30-Dec-10
Southeast Diversion Structure & Interceptor	12-May-12
Northern Ditch Diversion Interceptor	31-Jul-11
Derek R. Guthrie WQTC	31-Dec-11
Other Projects	30-Dec-24
CPE/CCP Modifications To WQTC	31-Dec-11
I/I Reduction Program	30-Dec-24



All Projects

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