Integrated Overflow Abatement Plan

2012 MODIFICATION: MAY 2014
VOLUME 1 OF 3

Louisville and Jefferson County
Metropolitan Sewer District
700 West Liberty Street
Louisville, KY 40203

RESOLUTION OF
THE BOARD OF THE LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT
AUTHORIZING THE EXECUTIVE DIRECTOR TO SUBMIT FOR APPROVAL THE INTEGRATED OVERFLOW ABATEMENT PLAN 2012 MODIFICATION TO UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, THE KENTUCKY DEPARTMENT FOR ENVIRONMENTAL PROTECTION AND THE UNITED STATES DEPARTMENT OF JUSTICE

WHEREAS, the Board of the Louisville and Jefferson County Metropolitan Sewer District ("MSD") entered into a Consent Decree with United States Environmental Protection Agency, the Kentucky Department for Environmental Protection and the United States Department of Justice on August 12, 2005, and subsequently amended on April 15, 2009 ("Amended Consent Decree"); and

WHEREAS, the Amended Consent Decree requires that MSD prepare and submit plans to comply with KPDES permits and upgrade the separate sewer system, combined sewer system and water quality treatment centers (WQTCs) to adequately address sanitary sewer overflows ("SSOs") and unauthorized discharges, and discharges from combined sewer overflows ("CSOs") locations identified in the Morris Forman WQTC KPDES permit; and

WHEREAS, MSD previously prepared and submitted an Integrated Overflow Abatement Plan ("IOAP") to control SSOs, unauthorized discharges, and CSOs as required by the Amended Consent Decree, and state and federal law, which was subsequently approved by the United States Department of Justice on September 30, 2009; and

WHEREAS, MSD's Wet Weather Team which includes a broad range of community stakeholders, MSD staff and consultants has identified the need for modifications to the IOAP to incorporate through an adaptive management process additional information developed from continued flow monitoring, enhanced hydraulic modeling, and a detailed review of project types, size, location, and schedule; and

WHEREAS, the staff of MSD presented the proposed IOAP 2012 Modification to the Board on February 11, 2013; and

WHEREAS, the staff of MSD presented the proposed IOAP 2012 Modification at several public meetings Between September 27, 2011, and February 5, 2013; held a public hearing to receive both written and oral public comments on the IOAP 2012 Modification on March 26, 2013; received oral and written public comments during the period starting on March 13, 2013, and concluding on April 12, 2013;

THEREFORE BE IT HEREBY RESOLVED that the Executive Director is hereby authorized to submit to the United States Environmental Protection Agency, the Kentucky Department for Environmental Protection and the United States Department of Justice, the IOAP 2012 Modification as presented to the Board on May 13, 2013.

Adopted in open session this 13th day of May, 2013.

LOUISVILLE & JEFFERSON COUNTY
METROPOLITAN SEWER DISTRICT

James Craig

James Craig, Chair

Attest:

Chad Collier

Chad Collier, Secretary-Treasurer

**RESOLUTION OF
THE BOARD OF THE LOUISVILLE AND JEFFERSON COUNTY
METROPOLITAN SEWER DISTRICT
AUTHORIZING THE EXECUTIVE DIRECTOR TO SUBMIT THE
INTEGRATED OVERFLOW ABATEMENT PLAN FOR APPROVAL
TO UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, THE
KENTUCKY DEPARTMENT OF ENVIRONMENTAL PROTECTION AND THE
UNITED STATES DEPARTMENT OF JUSTICE**

WHEREAS, the Board of the Louisville and Jefferson County Metropolitan Sewer District ("MSD") entered into a Consent Decree, as may be amended, with United States Environmental Protection Agency, the Kentucky Department of Environmental Protection and the United States Department of Justice on August 12, 2005; and

WHEREAS, the Consent Decree requires that MSD prepare and submit plans to control combined sewer overflows ("CSOs") and sanitary sewer overflows ("SSOs"); and

WHEREAS, MSD has prepared an Integrated Overflow Abatement Plan ("IOAP") to control both CSOs and SSOs as required by the Consent Decree, and state and federal law; and

WHEREAS, the IOAP was drafted by MSD's Wet Weather Team which includes a broad range of community stakeholders, MSD staff and consultants; and

WHEREAS, the staff of MSD presented the IOAP to the Board on October 27, 2008; and

WHEREAS, the staff of MSD presented the IOAP at several public meetings on November 10, 12, and 20, 2008; and

WHEREAS, the staff of MSD held a public hearing to receive both written and oral public comments on the IOAP on December 2, 2008; and

WHEREAS, the staff of MSD received written public comments during the period starting on October 1, 2008, and concluding on December 5, 2008; and

WHEREAS, the IOAP must be submitted to the USEPA and the Commonwealth by

December 31, 2008, as required by the Consent Decree;

THEREFORE BE IT HEREBY RESOLVED that the Executive Director is hereby authorized to submit to the USEPA and the Commonwealth by December 31, 2008, the IOAP as presented to the Board on October 27, 2008, as modified after the public hearing on December 2, 2008, and the conclusion of the public comment on December 5, 2008, and with the following scope:

The Louisville and Jefferson County Metropolitan Sewer District's Integrated Overflow Abatement Plan is a long-term plan to control combined sewer overflows (CSOs) and sanitary sewer overflows (SSOs) in the community. The IOAP is expected to improve water quality in both Jefferson County streams and the Ohio River. The expected water quality benefits of the IOAP include: (a) reductions in the peak levels of bacteria in the Ohio River, the Beargrass Creek and other Jefferson County waterways; and (b) a reduction in the duration of wet weather impairment of local waterways (i.e., the number of days that bacteria levels exceed water quality standards during periods of wet weather). The IOAP—in coordination with other community water quality initiatives (further described below)—will also improve water quality under ambient conditions.

The specific benefits anticipated from the IOAP include the following:

- The suite of projects selected for the Long Term Control Plan (LTCP) for CSOs will result in approximately 96 percent capture and treatment of wet weather combined sewage during an average year. (As a point of reference, the "presumptive approach" in EPA's CSO Control Policy is based on a minimum of 85 percent wet weather capture.)
- Remaining CSO loads (after removing background) will no longer cause water quality standard violations in the Ohio River.

Peak fecal coliform counts are modeled to be reduced by 54 percent.

- At the mouth of Beargrass Creek, peak fecal coliform counts are modeled to be reduced by 18 percent. The control level associated with these reductions exceeds the EPA CSO Control Policy "presumptive approach" 85 percent wet weather capture threshold and reflects a point of significantly diminishing returns under the "knee of the curve" benefit-cost analysis.
- The suite of projects selected for the Sanitary Sewer Discharge Plan (SSDP) for SSOs will result in the elimination of capacity-related SSOs up to the site-specific level of protection (described below).
- The SSO projects are anticipated to eliminate an average of 145 SSO events per year, based on 2005–2007 data.
- In terms of water quality, SSO projects are estimated to eliminate an average of 290 million gallons of overflow volume per year (average of 2005–2007 normalized for rainfall), eliminating 100 tons of 5-day biochemical oxygen demand (BOD5) and almost 200 tons of solids annually.

Along with delivering water quality improvements from sewer overflow control, MSD participates in other community water quality improvement efforts. Sewer overflow control is essential to improving water quality, but overflow control alone is not enough to meet water quality standards. In light of this challenge, MSD will continue to leverage its role in supporting broader water quality improvement efforts in the community. The IOAP will be one of the key elements of MSD's participation in those water quality improvement efforts. In particular, the IOAP will be complementary to other wet weather and water quality programs managed by MSD and/or by other community partners. These complementary efforts include, but are not limited to, the Mayor's "Go Green Louisville" Initiative, the Partnership for a Green City, Metro Louisville's Municipal Separate Storm Sewer System (MS4) discharge permit, and initiatives of Jefferson County Public Schools (JCPS), private developers, and other entities.

The specific ways in which MSD is collaborating with other entities on community water quality improvement initiatives include the following:

- Partnership for a Green City: MSD is actively working with Louisville Metro Government, JCPS, and the University of Louisville to improve water quality through the Partnership for a Green City. The Partnership has established a Stormwater Committee that will be identifying opportunities to improve water quality associated with planned capital projects.

- Louisville Metro Government: MSD is an active participant in the Mayor's Go Green Louisville Initiative, which includes in its vision a commitment to focus on financially sustainable measures that improve air and water quality, land use, and energy efficiency. In coordination with this initiative, MSD is partnering with Louisville Metro Government on several green infrastructure demonstration projects in the IOAP.

- MS4 Program: MSD will coordinate IOAP implementation with the agencies that share implementation of the MS4 Program—including Metro Louisville government, small cities that handle their own drainage, and the Kentucky Department of Transportation. The MS4 program will draw upon the opportunities identified through the green infrastructure analysis conducted by MSD's IOAP technical team and the ideas suggested by WWT members during the development of the IOAP. MSD further anticipates implementing demonstration projects, such as rain gardens in the separate sewer area, under the MS4 as part of a coordinated effort with the IOAP to test and evaluate green infrastructure approaches to wet weather management.

The IOAP—as part of MSD's consent decree response—will be a federally enforceable action plan for sewer overflow abatement. Although many IOAP projects and programs will provide multiple benefits to the community, the scope of the IOAP is limited to commitments that directly relate to MSD programs and activities to address combined sewer overflow (CSO) and sanitary sewer overflow (SSO) issues. Other community water quality programs, which may be partly or completely out of MSD's control, can provide synergistic benefits with the IOAP, but they do not fall under the same federal enforcement. These programs may, however, have different mechanisms for ensuring accountability (e.g., the State of Kentucky oversees the MS4 stormwater permit that MSD and several other agencies hold). As noted above, MSD anticipates coordinating IOAP implementation with the water quality improvement initiatives of Louisville Metro Government and other public and private entities, even though these broader initiatives may not explicitly be part of the IOAP.

Adopted in open session this 15th day of December, 2008.

LOUISVILLE & JEFFERSON COUNTY
METROPOLITAN SEWER DISTRICT

Beverly G. Wheatley

Beverly Wheatley, Chairperson of the Board

Dana Price

Dana Price, Board Secretary

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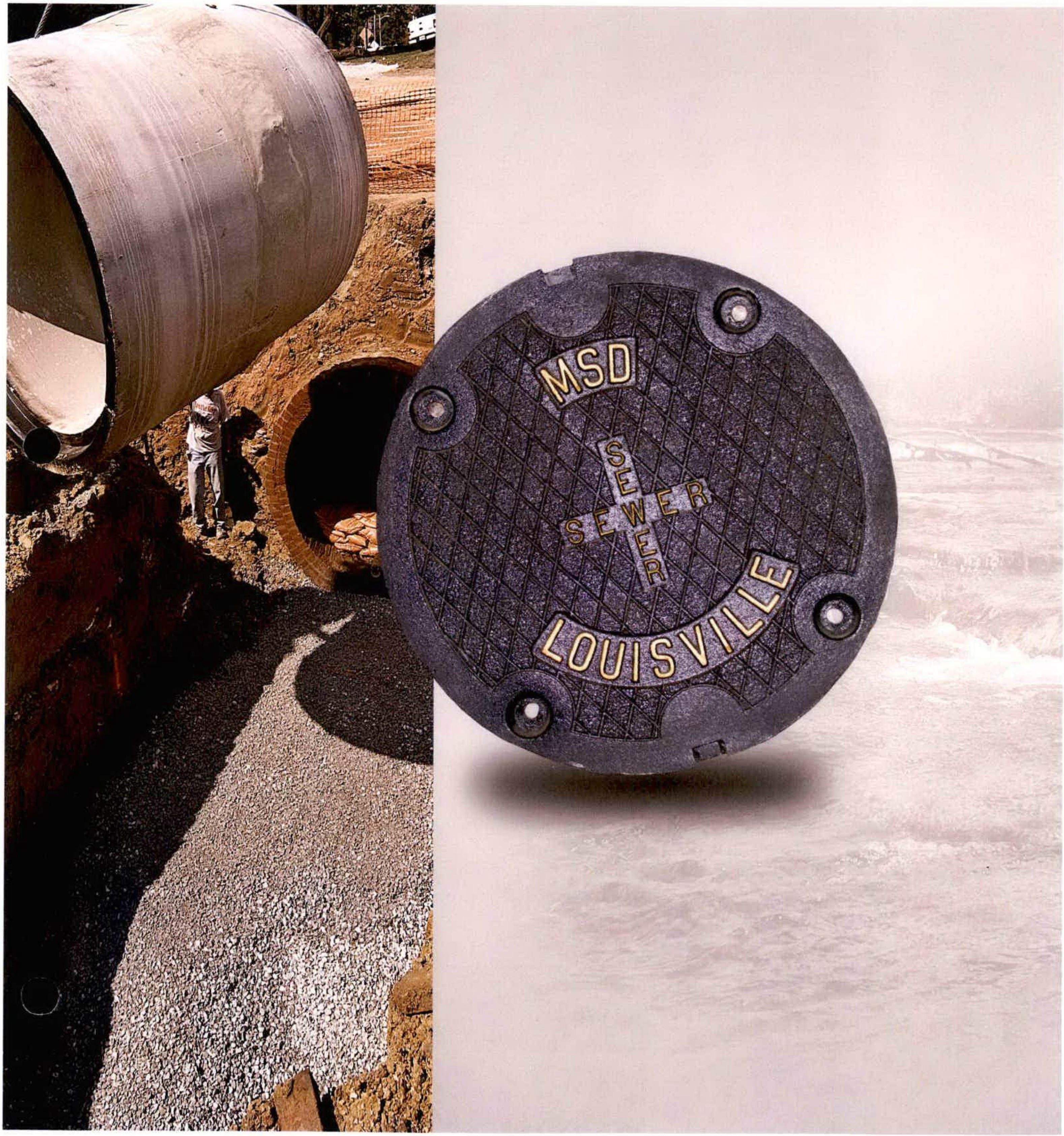

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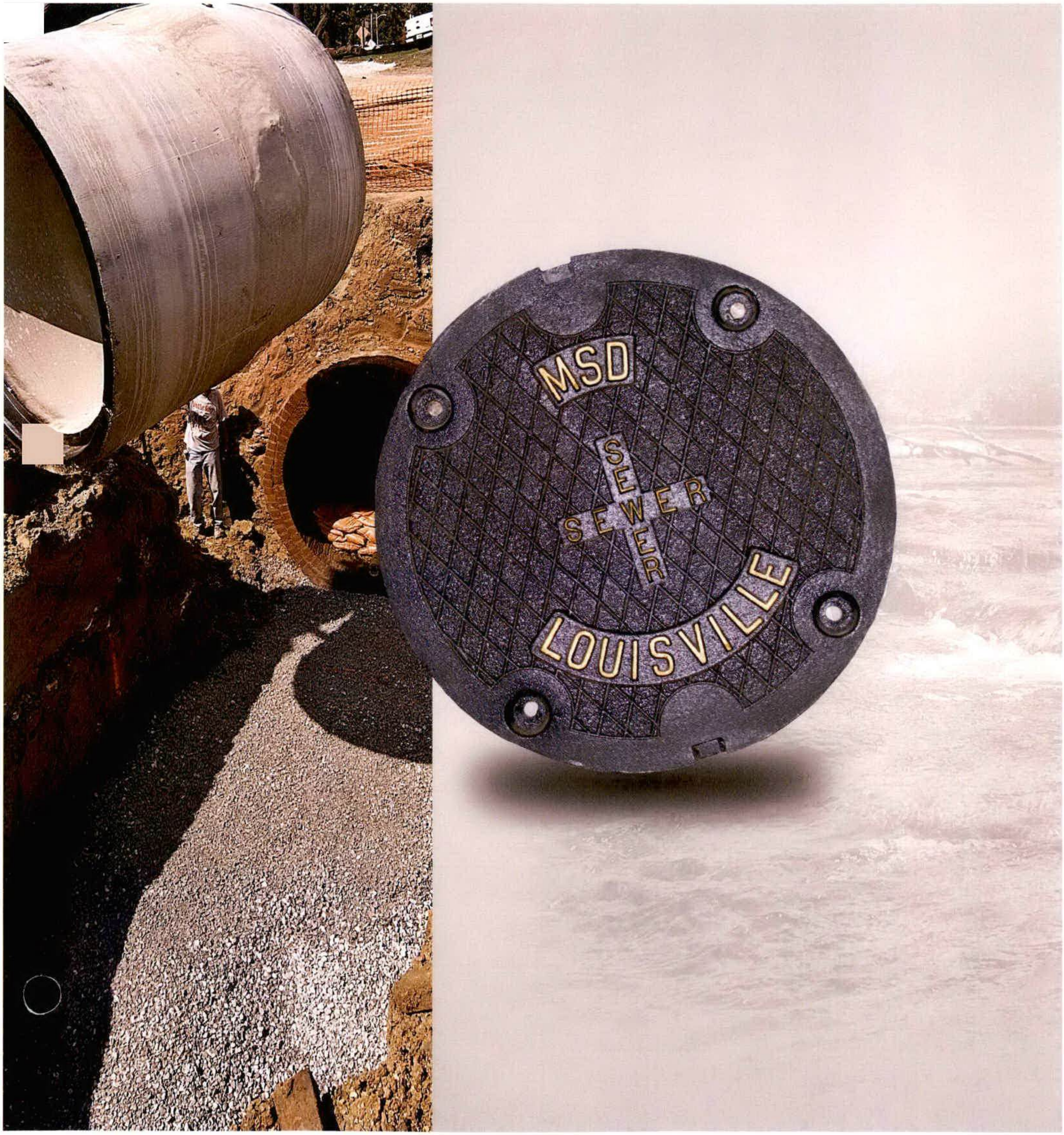
Glossary



INTEGRATED OVERFLOW ABATEMENT PLAN (IOAP) 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 <u>not</u> 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 (formerly WWTP)
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

Executive Summary

INTEGRATED OVERFLOW ABATEMENT PLAN

EXECUTIVE SUMMARY

SCOPE AND DESIRED OUTCOMES

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. The stated objective of the Consent Decree is to further the objectives of the CWA; eliminate unauthorized discharges from MSD's separate sewer system (SSS), combined sewer system (CSS), and water quality treatment centers (WQTCs); and to address discharges from MSD's combined sewer overflow (CSO) locations identified in the Kentucky Pollutant Discharge Elimination System (KPDES) permit for the Morris Forman WQTC. The Consent Decree outlines the compliance program and schedules for achieving specific objectives, including the development of discharge abatement plans.

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 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.

This IOAP is a major part of MSD's response to the Consent Decree. The IOAP is a long-term plan to control CSOs and eliminate sanitary sewer overflows (SSOs) and other unauthorized discharges from MSD's sewerage system. The IOAP is expected to improve water quality in both Beargrass Creek and the Ohio River through and below Jefferson County. The expected water quality benefits of the IOAP include: (a) reductions in the peak levels of bacteria in the Ohio River and Beargrass Creek; and (b) a reduction in the amount of time that average bacteria levels to exceed water quality standards.

ADAPTIVE MANAGEMENT

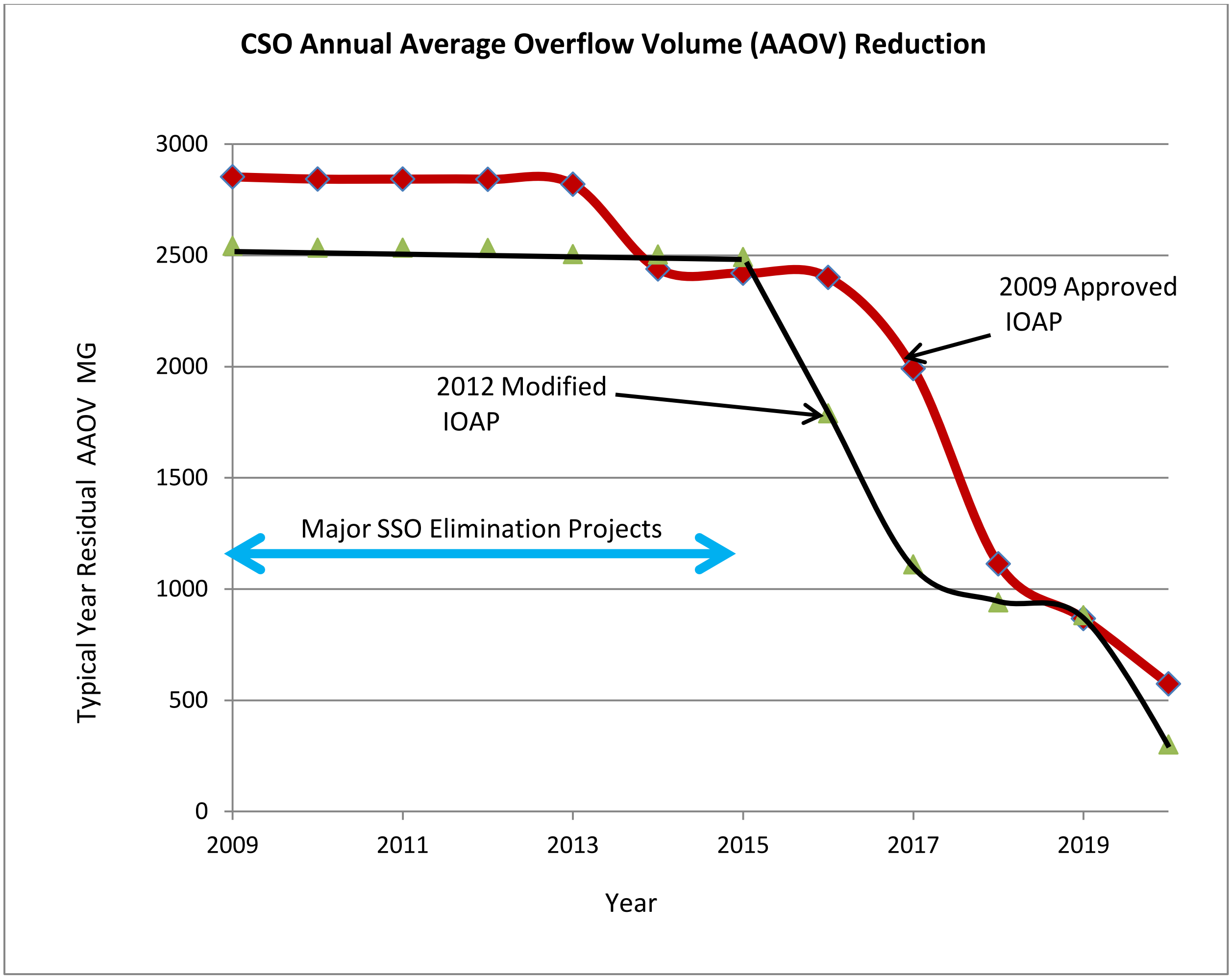
Recognizing the long-term nature of the IOAP, MSD committed to an approach of adaptive management, intending to make mid-course corrections as we learn more about the performance of our projects and the related response of our sewerage system. In 2011, MSD took advantage of four more years of flow monitoring data to perform a planned recalibration of the hydraulic models used to develop, evaluate, and design overflow abatement projects. As a result of this recalibration MSD found opportunities to revise the proposed suite of projects, providing increased levels of overflow abatement, faster, and for approximately the same cost. The 2012 IOAP Modification incorporated herein describes the project changes in technology, size, and schedule, and the resultant benefits of making those changes.

MSD developed a programmatic justification for this 2012 IOAP Modification utilizing the same benefit/cost methodology defined by the Wet Weather Team for the 2009 approved plan, as outlined in Volume 1 Chapter 2. This justification demonstrates the proposed modifications achieve a higher overall benefit to the community through earlier overflow reduction, increased use of green infrastructure and acknowledgement of pertinent public input.

A table showing the complete list of LTCP projects comparing the level of control, facility size, cost, and schedule for each of the projects in the 2009 approved IOAP and the 2012 IOAP Modification is included as Table ES.1 at the end of this Executive Summary. A similar table for the SSDP projects is included as Table ES.2 at the end of this Executive Summary. A schedule for all the projects in the LTCP and SSDP is also included at the end of this Executive Summary as Figure ES.1.

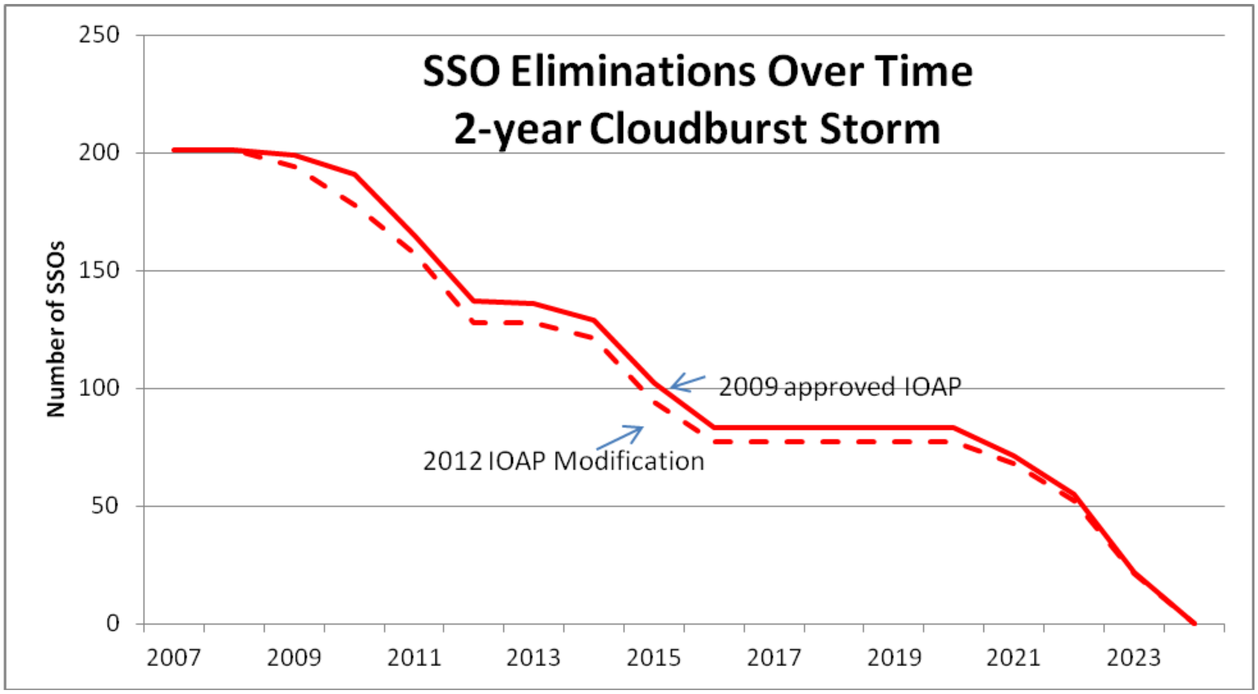
MSD has evaluated the impacts of the proposed modifications on the overflow reduction timing and overall overflow reduction performance as compared to the 2009 IOAP. Figure ES.2 below illustrates the effect of the proposed modifications on the timing of CSO elimination. The curve labeled “2009 Approved IOAP” shows the timing of average annual overflow volume (AAOV) reductions for the approved plan. The curve labeled “2012 Modified IOAP” shows that the proposed modifications achieve AAOV reductions earlier than was projected in the 2009 approved IOAP. In addition, residual AAOV is significantly lower in the 2012 Modified IOAP, reflecting a higher overall level of CSO control. Note that the apparent delay in achieving significant AAOV reductions is due to the need to focus initially on major SSO reductions required by the ACD and described in the Interim Sanitary Sewer Discharge Plan. Significant AAOV reductions were achieved prior to 2009 through the implementation of the first two phases of the Real Time Control (RTC) project, early action sewer separations, etc.

FIGURE ES.2 - CSO AAOV REDUCTION THRU 2020



MSD has similarly evaluated the impacts of the proposed modifications on the SSO overflow reduction timing and overall overflow reduction performance as compared to the 2009 IOAP. Figure ES.3 illustrates the effect of the proposed modifications on the timing of SSO elimination for the 1.82-inch cloudburst storm. Figure ES.3 shows that the number of SSO locations eliminated is the same, and the SSO eliminations occur quicker than originally proposed. In addition, more SSOs are eliminated to a higher level of control than proposed in 2009.

FIGURE ES.3 – SSO LOCATION REDUCTION THRU 2024



Figures ES.2 and ES.3 demonstrate that the proposed changes result in a more effective overflow abatement program with higher community benefit and more expeditious overflow reduction as a program.

CSO Benefits

The suite of projects selected for the Final CSO Long-Term Control Plan (LTCP) will result in approximately 98 percent capture and treatment of wet weather combined sewage during an average year. This benefit represents an 89 percent reduction in CSO volume compared to conditions in 2008. As a point of reference, the presumptive approach for compliance with water quality standards in EPA's CSO Control Policy is based on a minimum of 85 percent capture and treatment of wet weather combined sewage. Of the wet weather combined sewage captured and treated, approximately 70 percent receives secondary treatment at either the Morris Forman WQTC or the Derek R. Guthrie WQTC. The remainder of the wet weather flow receives primary treatment only.

Remaining CSO loads will no longer cause fecal coliform water quality standards violations in the Ohio River. Downstream from Morris Forman WQTC, peak fecal coliform counts are modeled to be reduced by 54 percent, from 100,000 colony-forming units (cfu) per 100 milliliter (cfu/100mL) to 46,000 cfu/100 mL. If CSOs were eliminated, background sources (e.g. upstream Ohio River, stormwater runoff, and other sources) would continue to cause standards to be exceeded 33 percent of the recreation contact season (May to October).

Remaining CSO loads (after removing background) will result in 100 percent compliance with fecal coliform water quality standards in Beargrass Creek. At the mouth of Beargrass Creek, peak fecal coliform counts are modeled to be reduced by 18 percent, from 44,300 cfu/100mL to 37,400 cfu/100 mL. Reducing fecal coliform loads from CSO sources by 85 percent (compared to 2008 levels) results in a reduction of total loads on Beargrass Creek of approximately 30 percent. This is reflective of the preponderance of loads from stormwater runoff and other sources unrelated to CSOs.

SSO Benefits

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

Along with delivering water quality improvements from sewer overflow control, MSD participates in other community water quality improvement efforts. Sewer overflow control is essential to improving water quality, but overflow control alone is not sufficient to meet water quality standards. In light of this challenge, MSD continues to leverage its role in supporting broader water quality improvement efforts in the community. The IOAP will be one of the key elements of MSD's participation in those water quality improvement efforts.

Integration with Other Water Quality Programs

The IOAP is a part of MSD's Consent Decree response and will be a federally enforceable action plan for sewer overflow abatement. Although many IOAP projects and programs will provide multiple benefits to the community, the scope of the IOAP is limited to commitments that directly relate to MSD programs and activities to address CSO and SSO issues. Other community water quality programs, which may be partly or completely out of MSD's control, can provide synergistic benefits with the IOAP, but they do not fall under the same federal enforcement. These programs may, however, have different enforcement mechanisms. As noted above, MSD anticipates coordinating IOAP implementation with the water quality improvement initiatives of Louisville Metro Government and other public and private entities, even though these broader initiatives may not explicitly be part of the IOAP.

The ancillary information provided by MSD that is not related to overflow abatement projects or the specific requirements of the Consent Decree is being provided and should be considered as supplemental, background information. It is not being submitted in response to any requirements, obligations or commitments to any specific actions or time frames that are required under the provisions of the Consent Decree. This supplemental information should not be considered as a commitment by MSD to any project not required by the Consent Decree.

Values-Based Performance Evaluation Framework

In accordance with the Consent Decree, MSD established a Wet Weather Team (WWT) comprised of a broad range of community stakeholders, MSD staff, and consultants. Through a series of 23 meetings over the course of more than two years, the WWT developed a values-based performance evaluation framework to use in evaluating, selecting, and prioritizing alternative approaches to overflow abatement. This analytic framework includes both a robust benefit-cost scoring methodology for evaluating and selecting project alternatives and a systematic process for evaluating the IOAP programmatically. The WWT identified and agreed upon the following eleven community values that underpin the analysis and selection of alternatives for the IOAP.

Project-Specific Values	Programmatic Value
• Asset protection • Eco-friendly solutions • Environmental enhancement • Public health enhancement • Regulatory performance	• Customer Satisfaction • Economic vitality • Education • Environmental justice and equity • Financial equity • Financial stewardship

Using the structured decision-making process as framed by the WWT, MSD developed and evaluated overflow abatement control options for the IOAP centered on managing risks to these community values. In particular, MSD's technical team analyzed each project alternative considered for the IOAP in terms of potential benefits and costs, where "benefits" are quantified using the anticipated reduction in risks to the community values, and "costs" reflect the total capital and operational costs of the alternative. The benefit-cost analysis influences the selection of site-specific abatement approaches or technologies, site-specific levels of protection (within the boundary conditions for CSOs and SSOs described below), and the relative priority of projects for implementation.

In developing the 2012 IOAP Modification, MSD continued to use the same benefit-cost analysis approach for alternative selection, level of control analysis, and project prioritization. The technical team maintained close contact with the WWT Stakeholder Group, and met with them during development of the modifications to ensure that the intent of the decision making process was adhered to.

Several of the WWT's community values relate to financial considerations, including the cost-effectiveness of individual solutions and the program as a whole (financial stewardship), the affordability of the program's total costs for the community (economic vitality), and how the costs are allocated among different segments of the population (financial equity). The WWT used the results of the values-based benefit-cost analysis of project alternatives to provide context to discussions about the appropriate level of investment in the IOAP.

The WWT's discussions about total program costs and the selection of projects for the IOAP have considered, as directed in EPA's CSO Control Policy, a "knee of the curve" analysis to determine where the increment of pollution reduction achieved in the receiving water diminishes compared to the increased costs (59 Code of Federal Regulations {CFR} 18688). In addition to this analysis, the community's level of investment in the IOAP has been considered in the context of anticipated future requirements and other needs for MSD services, including stormwater compliance needs associated with Louisville Metro's MS4 stormwater permit and requirements to meet the forthcoming total maximum daily load (TMDL) allocations for Beargrass Creek. This consideration of other water quality investment needs is important since sewer overflow control alone will not be sufficient to meet water quality standards.

The technical team's analysis of the IOAP according to the WWT's programmatic values yielded the following conclusions.

<u>Customer Service</u>: The IOAP ensures service continuity by eliminating several small WQTCs and pump stations and by incorporating redundant equipment and standby generators in the proposed projects. Odor control guidelines have been consistently applied across all projects. Most storage basins proposed in the IOAP will be covered to minimize odors. Other storage basin and pump station improvement projects incorporate odor control equipment.

<u>Economic Vitality</u>: MSD's current rates are near the national average. The anticipated annual rate increases of 5 to 6.5 percent are consistent with initial estimates of program costs, and they include allowances for future MSD programs as well as IOAP implementation. Even with these rate increases, MSD's rates are anticipated to remain at or near the national average, assuming other communities face similar inflation and regulatory pressures. These estimates are based on current data; many unknown factors (such as, bond market, construction market conditions, etc.) will also affect future rates.

<u>Education</u>: Education is an integral and essential component of the IOAP. It supports a number of IOAP objectives, including promoting and sustaining participation in green infrastructure and source control efforts, and building a sense of personal responsibility and support for clean water initiatives.

<u>Environmental Justice and Equity</u>: The site selection process followed uniform criteria across the county, with most solutions placed near overflow points and with no homes or private businesses permanently displaced. Furthermore, the configuration of facilities was based on a uniform application of written design criteria and odor control criteria. Other nuisance conditions, such as noise, dust, and traffic disruptions will be minimized during the design and construction phases of projects.

Financial Equity: MSD's rate structure is based on a cost-of-service model tempered by consideration of customers' ability to pay. The rate increases proposed to fund the IOAP and other MSD programs will continue to be based on the cost of service, but the MSD Board supports the existing low income, senior citizen discount program, and has discussed the possibility that this discount program be expanded. The MSD Board also implemented subsidies and incentives for green infrastructure and inflow and infiltration (I/I) control based on their business value for overflow abatement.

Financial Stewardship: As described above, the IOAP is based upon a rigorous benefit-cost analysis that considered a broad range of technology alternatives and different levels of control that met or exceeded regulatory guidelines. The "knee of the curve" evaluations of IOAP projects demonstrated that the IOAP provides a high level of control, but does not exceed the point of diminishing returns.

As noted previously, the WWT included a diverse group of community stakeholders. This WWT Stakeholder Group included 20 community opinion leaders from local government, industry WWT environmental advocacy groups, education, public health and many other areas of interest. The Stakeholder Group played a key role in developing the framework for alternative evaluation, selection, and prioritization. Prior to final submittal of the IOAP, the WWT Stakeholder Group developed a memorandum expressing support for the IOAP. This WWT Support Memorandum is attached at the end of this Executive Summary (Attachment 1). The support from the WWT Stakeholder Group is based on their understanding of the plan as represented by an "IOAP Vision." The IOAP Vision is also attached at the end of the Executive Summary (Attachment 2). The WWT Stakeholder Group continues to meet and provide input relative to IOAP implementation. They also had the opportunity to review the 2012 IOAP Modifications, and developed a similar memorandum expressing support for this submittal. The updated WWT Support Memorandum was approved by the WWT Stakeholder Group on January 30, 2013. This Memorandum is included at the end of the Executive Summary as Attachment 3.

Control Levels for CSOs and SSOs

Under the CWA, CSOs are permitted discharges in wet weather, as long as they are managed to avoid degradation of water quality in the receiving streams. EPA's CSO Control Policy[1] has guidelines for establishing abatement targets for CSOs, one of which is the presumptive approach of establishing controls that provide for the elimination or capture and treatment of at least 85 percent of wet weather combined sewage. Under this approach, CSOs are presumed to be adequately controlled to comply with water quality standards. Regardless of the approach

[1] EPA's Combined Sewer Overflow Control Policy is available at http://cfpub1.epa.gov/npdes/cso/cpolicy.cfm.

that the community follows to establish abatement targets, implementation of the plans should provide that CSOs, in the absence of other loads, do not by themselves cause a violation of water quality standards.

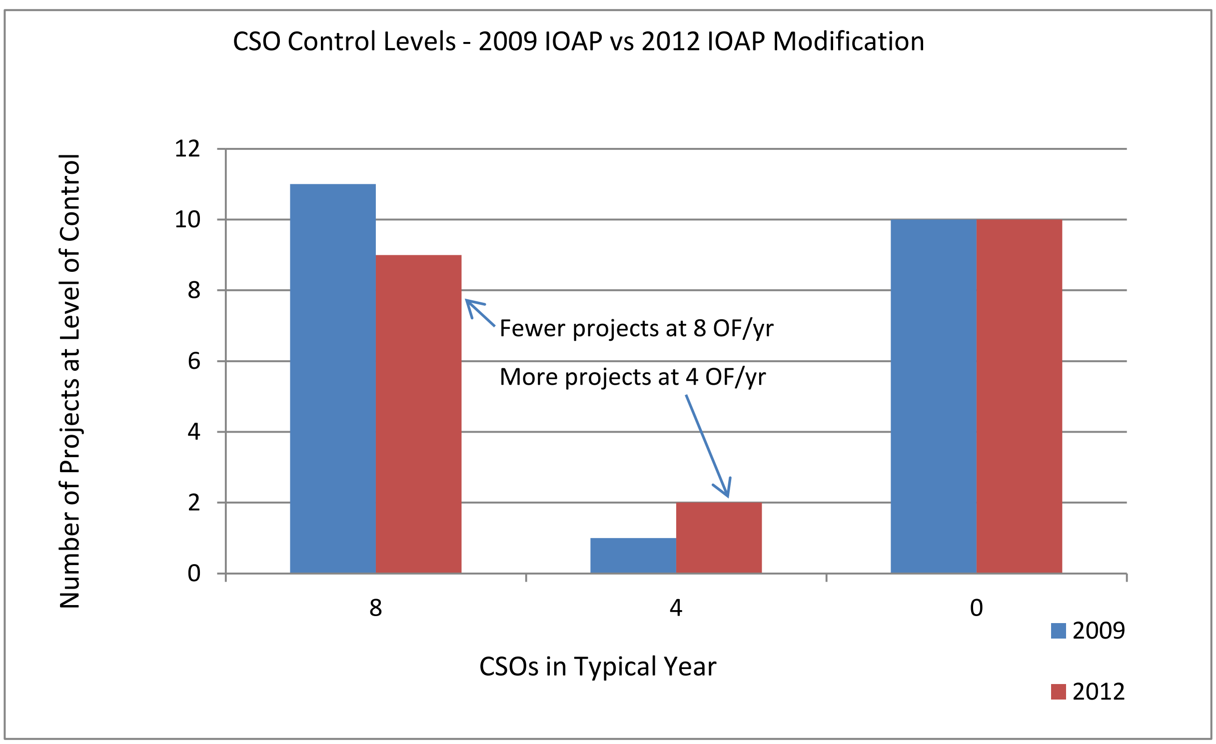
Using the values-based performance evaluation and risk management decision process described previously, MSD has elected to provide a level of CSO control that greatly exceeds EPA's presumptive approach of 85 percent capture of wet weather combined sewage. This level of overflow control represents a 96 percent capture of wet weather combined sewage, and an 85 percent reduction in overflow volumes as compared to 2008 levels.

CSO projects in the 2012 IOAP Modification have the following levels of control:

- Ten projects result in no overflows in a typical year; these locations would only overflow as a result of very large storms.
- Two projects would result in four overflows per year in a typical year.
- Nine projects result in eight overflows per year in a typical year.

Figure ES.4 below illustrates the improvement in level of protection offered by the projects of the 2012 IOAP Modification as compared to the 2009 approved IOAP.

FIGURE ES.4



MSD's strategy for SSO control reflects the fact that SSOs, unlike wet-weather CSOs, are considered to be unauthorized discharges that must be eliminated according to EPA. Given the variable impacts of rainfall on sewage flows, elimination of unauthorized discharges must be framed in the context of a "design storm" that will be community-specific.

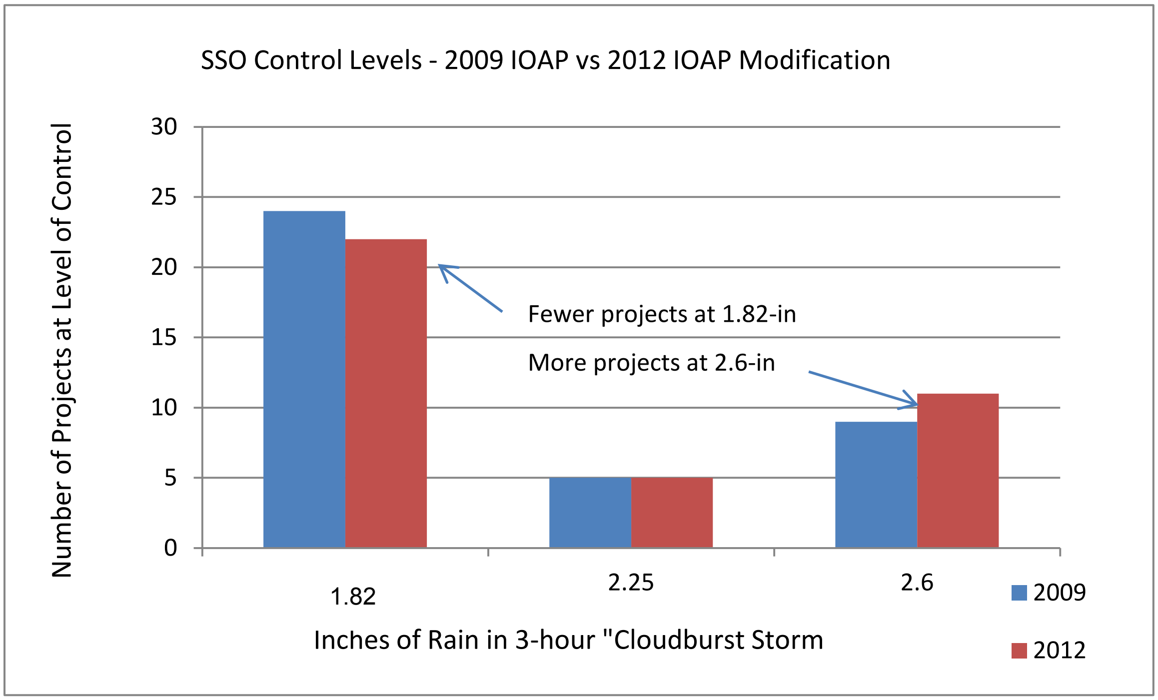
In the IOAP, the values evaluation framework has been used to evaluate a range of site-specific design storms to establish the appropriate level of control of SSOs. Consistent with an analysis of sixty years of historical weather patterns for Louisville Metro, the IOAP uses a three-hour "cloudburst" storm, with a statistically anticipated rainfall of 1.82-inches, as the minimum design storm considered. There is a 50 percent probability that a storm this large will occur in this area in any given year. The Cities of Atlanta, Cincinnati, and Knoxville used similar statistically probable design storms as the minimum protection level for SSO control. The approach of using the values evaluation framework to determine the SSO control level means that solutions to address certain SSOs have been designed to protect against larger storms (such as, a 2.25-inch cloudburst storm instead of a 1.82-inch cloudburst storm) because they yield a higher benefit-cost ratio in the analysis of project alternatives.

SSO projects in the 2012 IOAP Modification have the following levels of control:

- Twenty-two projects eliminate overflows up to a 1.82-inch cloudburst storm.
- Five projects eliminate overflows up to a 2.25-inch cloudburst storm.
- Eleven projects eliminate overflows up to a 2.60-inch cloudburst storm.

Figure ES.5 below illustrates the improvement in level of protection offered by the projects of the 2012 IOAP Modification as compared to the 2009 approved IOAP. Note that SSES projects are not included in this level of control analysis.

FIGURE ES.5



COMPONENTS OF MSD'S INTEGRATED OVERFLOW ABATEMENT PLAN

Control options in the IOAP, known as the IOAP toolkit, include source control such as green infrastructure and I/I reduction efforts, storage, conveyance/transport, treatment, and sewer separation. MSD's technical team used the benefit-cost tool to compare the project alternatives and program elements considered for inclusion in the IOAP. The specific mix of control options for individual CSO or SSO locations in the IOAP is driven by the benefit-cost analysis of how the project alternatives affect the WWT's community values and site-specific considerations. Project alternatives are built around MSD's existing infrastructure such as large diameter pipes and WQTCs and draw on synergistic benefits from other MSD projects (for instance the Interim SSDP projects). Furthermore, project budgets include an enhanced site restoration allowance to fund localized opportunities to reduce historical overflow impacts on aquatic and riparian environments near the sites of overflow abatement projects.

Green Infrastructure and Gray Solutions, Initiatives and Programs in the Final CSO LTCP

Driven by the values-based benefit-cost analysis, the IOAP reflects a balanced mix of green infrastructure and gray solutions to prevent and control sewer overflows. "Green infrastructure" solutions include options such as vegetated roofs, rain gardens, rain barrels, porous pavement, and bioretention, while "gray" solutions include options such as storage, treatment, conveyance/transport, and sewer separation. As a guiding principle, MSD's IOAP has been developed based on front-end consideration of source control and green infrastructure. This means that more traditional "gray" infrastructure in the IOAP has been sized after considering both (1) the anticipated flow-reduction benefits of programmatic and site-specific green infrastructure solutions and (2) the anticipated effectiveness of other source control approaches, including reduction of private sources of I/I.

Green solutions in the IOAP will be implemented as soon as possible, to allow data to be gathered on the flow reduction benefits that occur. Approximately 17 percent of the Final CSO LTCP budget is allocated to green infrastructure, and most of that is planned to support projects in the first six years of IOAP implementation. Prior to the final design of supporting gray solutions, the actual flow reduction performance will be documented and compared against the estimated targets. The final sizing of the gray solutions will then be based on actual documented performance of green infrastructure solutions, as well as any further green and source control investments justified by performance information. Green infrastructure investments are estimated to reduce the initial costs of CSO gray infrastructure projects by $40 million; potential future savings could double or triple this amount. A more detailed discussion of the green infrastructure program is presented in Volume 2.

Table ES.3 shows the 22 gray infrastructure projects to control CSOs defined in the IOAP.

TABLE ES.3
GRAY INFRASTRUCTURE PROJECTS TO CONTROL CSOS (2012 MODIFICATION)

Number of Projects	Project Type
3	Sewer separation projects
14	Storage basin projects includes in-line and off-line storage. Most in-line storage projects have a RTC component
1	Replacement and expansion of the Nightingale Sanitary Pump Station
2	Conveyance expansion projects
1	"Green infrastructure only" project (with one other under consideration)
1	One high-rate wet weather treatment (screening, settling, and disinfection) with in-line and off-line storage.

In addition to these 22 CSO control projects, MSD will implement five projects at flood pump stations. These projects will eliminate a major cause of dry weather overflows related to operation of the flood pump stations in compliance with the U.S. Army Corps of Engineers (USACE) Flood Protection System Pumping Operations Manual.

Green Infrastructure Program

The IOAP includes both an annual Green Infrastructure Program and an initial set of green infrastructure demonstration projects. The Green Infrastructure Program is front-end loaded to maximize benefits on downsizing future gray infrastructure. For example, the IOAP project schedule calls for a $40 million investment in green infrastructure programs and projects during the first six years.

Programmatic green infrastructure components in the IOAP include a downspout disconnect program, green roof construction subsidies or incentives, green roads and alleys partnership incentives, and pervious pavement sidewalks and parking. MSD has based the proposed incentives and subsidies on a “business case” analysis of the financial benefit of green infrastructure in terms of costs per gallon of flow removed from the CSS. Through the anticipated green infrastructure partnership, incentive, and education programs, MSD's initial $40 million investment in green infrastructure has the potential to leverage $60 million more from other private and public funding sources, thereby yielding up to $100 million in green infrastructure projects.

MSD plans to construct a series of new green infrastructure demonstration projects across Louisville Metro. The proposed green infrastructure projects in the CSS area will be part of MSD’s IOAP, while the proposed green infrastructure projects outside the CSS area will be a part of the community’s MS4 stormwater program and not a part of this IOAP. These demonstration projects are designed to achieve three main objectives: (1) improve water quality and reduce sewer overflows, (2) provide data on green infrastructure effectiveness, and (3) educate the community about the value and benefits of green infrastructure.

All proposed green infrastructure demonstration projects will incorporate a monitoring component, so that the effectiveness of the pilot projects can be regularly tracked. Project reports will document lessons learned and successes and be the mechanism for reporting to regulators and the public. MSD will use these monitoring results to guide future IOAP implementation, under the IOAP’s adaptive management plan (further described below).

This IOAP vision currently reflects a minimum commitment to 19 green infrastructure demonstration projects. A complete list of demonstration projects completed and other green infrastructure projects completed and underway as of October 2012 can be found in Volume 2, Chapter 5. Source Control and Gray Solutions, Initiatives and Programs in the Final SSDP.

Similar to the integrating of green infrastructure with gray infrastructure in the Final CSO LTCP, MSD will implement an annually-funded I/I reduction program to reduce clear water intrusion into the sewers. I/I is one of the main causes of SSOs, so eliminating the source can be an effective way of reducing SSOs. To be effective, an I/I elimination program must deal with collection system defects in both the public and the privately owned portions of the sewer system. MSD's program includes an active private side I/I reduction approach currently implemented through voluntary, subsidized programs.

Prior to the final design of supporting gray solutions, the actual flow reduction performance from source control programs will be documented and compared against the estimated targets. The final sizing of the gray solutions will then be based on actual documented performance of source control solutions. Approximately 15 percent of the Final SSDP budget is allocated to I/I reduction and other source control programs. In addition, the Final SSDP includes eight specific I/I reduction projects targeting overflows that appear to be controllable through source control alone.

Table ES.4 shows the technology components of the 47 gray infrastructure projects to control SSOs defined in the Final SSDP. Note that some projects have multiple components, so those projects will be counted in more than one category.

TABLE ES.4
GRAY INFRASTRUCTURE PROJECT COMPONENTS TO CONTROL SSOS (2012 MODIFICATION)

Number of Projects Including Component	Project Type
19	Conveyance capacity upgrades and interceptor relief projects
9	Storage projects (in-line and off-line storage, many with pipe upgrades also)
13	Pump station upgrades or replacements.
12	Pump Station eliminations
7	Small WQTC eliminations including 5 in the Prospect Area
Note: Final SSDP projects also include the potential elimination of the Jeffersontown WQTC. Interim SSDP projects include the replacement of the SSS in the Beechwood Village area, the decommissioning of the Highgate Springs Pump Station, construction of an interceptor to eliminate pumped overflows in the Hikes Point area, construction of a relief sewer and a diversion interceptor to route wet weather flows to the Derek R. Guthrie WQTC (formerly known as the West County Wastewater Treatment Plant), and an expansion of the wet weather capacity of the Derek R. Guthrie WQTC.	

Control of Private Sources of I/I

MSD's technical team analyzed methods to control private sources of I/I into the SSS and proposed several potential options. This analysis indicates that private-side I/I control must be an essential part of the IOAP implementation, because it will reduce the overall anticipated costs of overflow abatement.

Private source options include mitigating building laterals, downspouts, sump pumps, and foundation drains. The technical team also analyzed options requiring inspections of private properties. The required inspection options include: during the property transfer process, when building permits are issued, when contractors install roof and gutter systems, when plumbers connect sump pumps, and/or at other times. MSD would seek some form of cost share as well as conduct an aggressive education campaign. The MSD Board approved changes to the Wastewater and Stormwater Discharge Regulations that allow MSD to take specific action in this regard. MSD will develop specific policies to guide implementation of these measures.

Public Information, Education, and Involvement Program

Education and public involvement are critical to the long-term implementation success of the IOAP. MSD uses the term “Project WIN” (Waterway Improvements Now) to describe its Consent Decree response activities to the public.

The ongoing public information, education, and involvement program for Project WIN is designed to accomplish the following objectives:

- Generate a sense of personal ownership and responsibility for clean water;
- Promote and sustain participation in critical voluntary programs in the IOAP, including private-side I/I control and green infrastructure;
- Promote public acceptance and support for the financial investments required to achieve consent decree and CWA compliance; and
- Encourage support for other agency programs or legislation that supports overflow abatement efforts.

To achieve these objectives, the Project WIN education and public involvement program uses a wide range of communication media. These public involvement efforts are focused on several key audiences; including property owners, schools and children, and target groups such as, project neighborhoods, builders, and restaurants. Focusing education efforts on children is important to ensure the long-term sustainability of voluntary programs in the IOAP. MSD uses five key messages to promote Project WIN:

1. Value clean water.
2. Your investment is paying dividends, and our water is getting cleaner.
3. Protecting public health is critically important.
4. MSD and many community partners are working hard to improve water quality.
5. <u>You</u> can make a difference in improving water quality.

Post-Construction Compliance Monitoring

MSD's IOAP will use an adaptive management implementation approach based on monitoring and evaluation efforts. MSD's post-construction compliance monitoring and evaluation plan for the IOAP includes: (a) water quality monitoring, (b) sewer flow monitoring, (c) overflow events analysis, (d) gray and green infrastructure project performance monitoring, and (e) measurement of the effectiveness of source control and behavior-change efforts. A part of the post-construction compliance monitoring program will be a periodic recalibrating of sewer system models that will support project performance evaluation and resultant project re-sizing based on monitoring results.

In 2011, MSD took advantage of four more years of flow monitoring data to perform a planned recalibration of the hydraulic models used to develop, evaluate, and design overflow abatement projects. As a result of this recalibration MSD found opportunities to revise the proposed suite of projects, providing increased levels of overflow abatement, faster, and for approximately the same cost. The 2012 IOAP Modification incorporated herein describes the project changes in technology, size, and schedule, and the resultant benefits of making those changes.

MSD will continue to adapt the CSO management and SSO elimination approaches based on the monitoring and evaluation results. Adjustments may include recalibrating models, "right-sizing" gray solutions, reevaluating the effectiveness of green solutions, and adjusting the types and characteristics of projects planned for later phases of implementation, supplementing existing control projects with additional storage or conveyance, and including additional investments in green infrastructure or source control beyond those proposed in the initial program. At this time, there is recognition that historical weather trends may not be as reliable as in the past due to potential changes in the climate. The IOAP's adaptive management approach will allow MSD to continue to monitor rain events and weather pattern developments and adjust its plans as more technical data become available.

Future Development Considerations

Solutions in the IOAP consider future development based on the community's long-term landuse plan, Cornerstone 2020.[2] IOAP solutions are designed to accommodate the anticipated impacts of population growth and landuse development. The solutions consider the effects of growth on connections to existing infrastructure that is upstream from existing overflow points. However, the IOAP is not intended to provide capacity for all future growth that is predicted by Cornerstone 2020. Cases where the growth outlined in Cornerstone 2020 would logically be provided by new infrastructure and is not hydraulically dependent on or connected

[2] For more information about the Cornerstone 2020 plan, see www.louisvilleky.gov/PlanningDesign/Cornerstone+2020.htm.

to the IOAP solution, have not been considered part of the IOAP. Moreover, the IOAP solutions are designed and sized to account for the impacts of anticipated growth on existing infrastructure, but the IOAP itself is not intended to build the capacity needed for growth.

IOAP Funding Plan

To meet the requirements of the Consent Decree, the funding plan is designed to cover the IOAP capital projects that will be constructed to improve MSD's sewer infrastructure. The IOAP funding plan is based on the following four principles:

1. Rates and fees for the IOAP must pay MSD's operating costs and debt service.
2. MSD's current bond rating (AA) should, at a minimum, be maintained.
3. Rates and fees should allow for continued economic development in the community and a strong local economy.
4. Rates must be affordable for MSD's customers.

For IOAP implementation, these funding plan principles affect the amount of money MSD may borrow at one time and the level of increases in rates and fees needed to fund capital and operating expenses.

MSD will fund the IOAP primarily through a combination of annual rate increases and bond issues or other loans. MSD also plans to pursue grants, line-item appropriations, and public/private partnerships (e.g., recapture agreements) to help pay for capital construction costs, as appropriate; however, the funding plan is not built around these funding sources since they are less certain. By estimates, the Consent Decree will cost $843 million in capital expenditures; as a result, average sewer bills for residential customers are expected to increase from 5.5 to 6.5 percent annually through 2025. Due to the Consent Decree capital construction expenses, this means that the average monthly residential sewer and Consent Decree surcharge bill would increase from $29.58 in 2008 to approximately $77.42 by 2025. Along with these rate increases, MSD expects to borrow approximately $938 million between 2009 and 2025 based on the estimates of capital costs; this would increase MSD's debt service payments from $94 million annually to $127 million annually by 2025, assuming interest rates at four percent for new issues. A mixture of fixed and variable rate borrowings is anticipated. These rate increases and loans would be used to address both IOAP construction costs and other MSD capital needs for infrastructure renewal, replacement, and expansion.

Estimates of IOAP costs appear to be within the community's ability to pay, as indicated by affordability analysis completed using EPA guidelines. MSD recognizes, however, the rate increases could nevertheless be difficult for some segments of the population to afford, especially in the context of other living expenses. For this reason, the WWT considered potential discount options to customers that face financial hardship. The MSD Board adopted a discount program for low-income senior citizens that provided over $600,000 of rate assistance in FY 2012. The MSD Board has also considered other discount programs for other impacted groups, but has not implemented them at the time of this 2012 IOAP Modification preparation.

As noted above, MSD will construct the capital projects to meet the regulatory requirements of the Consent Decree and achieve compliance with the CWA. Many of the elements of the IOAP—including the Project WIN education program, operations and maintenance of IOAP projects, and monitoring and evaluation programs—will also continue past the construction phase of the IOAP. MSD is committed to making sure that the IOAP programs and projects provide for long-term improvements in water quality in Louisville Metro.

An Approvable IOAP

MSD has developed the IOAP in conformance with the Consent Decree, the CSO Control Policy, and other applicable regulations. The following presents the "road map" of compliance factors for both the Final CSO LTCP and the Final SSDP.

An Approvable Final CSO LTCP

The MSD Final CSO LTCP as submitted on June 19, 2009, is fully compliant with the Consent Decree and the requirements of the CSO Policy. This 2012 IOAP Modification provides a higher level of CSO control and a lower final residual AAOV, confirming that it is also fully compliant with the Consent Decree and the CSO Control Policy. MSD's water quality compliance approach is based on EPA's Demonstration Approach in that water quality modeling demonstrates that both Beargrass Creek and the Ohio River would be in full compliance with existing water quality standards if all background loads were removed. The IOAP projects, when fully implemented, are projected to capture 96 percent of the wet weather combined sewage generated in the service area. This flow will be treated with at least the equivalent of primary clarification, control of solids and floatables, and disinfection. The innovative and site-specific approach includes implementation of green infrastructure and public education. The Final CSO LTCP is also fully compliant with the three goals required in the Consent Decree [paragraph 25. (b) (2) A (i); (ii) and (iii)].

Both the Consent Decree and the CSO Policy require specific elements of the Final CSO LTCP as noted in the Table ES.5; MSD has fully complied with both the Consent Decree and the CSO Policy through the full inclusion of each of these elements in the Final CSO LTCP.

TABLE ES.5
FINAL CSO LTCP ELEMENTS AS REQUIRED BY THE CONSENT DECREE

Requirement Per Consent Decree Paragraph 25 (b) (2)	IOAP and Final CSO LTCP Chapters and Sections	Compliance with CSO Policy and Consent Decree
(i) Results of 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 MSD's compliance with the requirements of the USACE Ohio River Flood Protection System Pumping Operations Manual, dated 1954 and revised 1988).	Volume 2 - Final CSO LTCP: Chapter 2 for an evaluation of the controls to address flood pumping issues, Chapter 3 for the alternative analysis Chapter 4 and 5 for the selection of effective CSO Controls including modifications to the flood pumping system, where required, to implement revised operating procedures at the flood pump stations.	**Yes** – the proposed plan is based on an extensive process in which every alternative accounted for data and was reviewed by WWT.
(ii) Results of an evaluation of WQTC peak flow treatment capacity for any WQTC other than the Morris Forman WQTC that will receive additional flow based on any LTCP project. Such evaluation shall be consistent with the EPA publications "Improving POTW Performance Using the Composite Correction Approach and "Retrofitting POTWs"	No existing treatment plants other than the Morris Forman WQTC will receive any additional flow as a result of the Final CSO LTCP. Volume 2, Chapter 3.3 Evaluation of CSO Control Alternatives; Table 3.1.1 shows treatment alternatives; Chapter 3.2.7.5 Utilization of Morris Forman WQTC; Chapter 3.2.7.5 Satellite treatment alternatives; Table 3.3.1.	**Yes** – peak flow treatment capacity will be available with use of storage, real time control (RTC), and treatment.
(iii) Report on the Public Participation Process	Volume 1 - IOAP, Chapter 3	**Yes** – the WWT and the general public were actively involved in the decision making to select the long-term CSO controls.
(iv) Identification of how the LTCP addresses sensitive areas as the highest priority for controlling overflows	Volume 2, Chapter 1.6.6.7; Chapter 2.8; and Chapter 3.2.7.6.	**Yes** – while all receiving waters considered in the Final CSO LTCP are categorized sensitive under CSO Policy criteria, MSD performed further prioritization of stream reaches based on ecological characteristics.
(v) Report on the cost analyses of the alternatives considered	Volume 1, Chapter 2 Volume 1, Chapter 6 presents rate and affordability impacts Volume 2, Chapter 3.3.2, and Chapter 4 and 5.	**Yes** – application of cost to community value framework for a cost-benefit and a knee of the curve analysis were part of the development of project alternatives and choices. Affordability and phases were also accounted in the development of the schedule.

TABLE ES.5
FINAL CSO LTCP ELEMENTS AS REQUIRED BY THE CONSENT DECREE

Requirement Per Consent Decree Paragraph 25 (b) (2)	IOAP and Final CSO LTCP Chapters and Sections	Compliance with CSO Policy and Consent Decree
(vi) Operational plan revisions to include agreed upon long term controls	Volume 1, Chapter 6	**Yes** – operational plan budgets adequate resources to operate and maintain the Final CSO LTCP projects.
(vii) maximization of treatment and evaluation of treatment capacity at Morris Forman WQTC	Volume 2, Chapter 3.2.7.5 Utilization of Morris Forman WQTC Chapter 3.3 Evaluation of CSO Control Alternatives Appendix 3.2.20 Morris Forman WQTC Wet Weather SOP Procedures Appendix 3.2.21 Morris Forman WQTC Expansion Tech Memo;	**Yes** – Wet Weather flow capacity has been maximized and verified through extensive testing. Additional peak flow treatment capacity will be available with use of storage, RTC and a new retention treatment basin.
(viii) Identification of an implementation schedule for the selected CSO control	Volume 2, Chapter 4 and 5, Final CSO LTCP and selected Project Final Recommended Project List	**Yes** – All projects completed by Consent Decree deadline of December 31, 2020.
(ix) A post-construction compliance monitoring program adequate to verify compliance with water quality-based CWA requirement and ascertain the effectiveness of CSO controls	Volume 1 Chapter 6.5.	**Yes** – a full suite of monitoring will be implemented in order to determine efficacy and adapt plan as appropriate.

An Approvable Final SSDP

The MSD Final SSDP as submitted on June 19, 2009, is fully compliant with all the requirements of the Consent Decree under paragraph 25 (a) (3) A. and B, as shown in Table ES.6. The 2012 IOAP Modifications provide a higher level of control (as indicated by the design events used for project sizing) and is therefore also fully compliant with the Consent Decree. The combined, sustained and phased implementation includes both a gray infrastructure plan and a source control program including a private sewer program intended to reduce I/I. This SSDP, in conjunction with the Sewer Overflow Response Protocol (SORP) and public education aimed at individual responsibility and behavior modification (as it relates to fats, oil and grease {FOG}, private sewer maintenance and rehabilitation and illicit cross connections and drainage) will eliminate unauthorized discharges from the SSS, CSS and WQTCs by December 31, 2024.

In addition, the Consent Decree requires that the results of an evaluation of the WQTC peak flow treatment capacity for any WQTC that will receive additional flow based on any Interim SSDP or Final SSDP project. These analyses were fully developed and can be found in Volume 1, Chapter 4.

TABLE ES.6
FINAL SSDP ELEMENTS AS REQUIRED BY THE CONSENT DECREE

Requirement Per Consent Decree Paragraph 25(a)(3)	IOAP and Final SSDP Chapters and Sections	Compliance With Consent Decree
(3) The long-term SSDP projects, including schedules, milestones, and deadlines	Volume 1 – IOAP, Chapter 4.3, Chapter 6.3; Volume 3 – Final SSDP, Chapter 4 1 and Chapter 5.	**Yes –** The Final SSDP describes 41gray infrastructure projects, I/I reductions studies, and a source control program to eliminate 214 documented, suspected, and modeled SSOs. The project schedule shows milestones and completion dates for each of these projects.
(3) Results of an evaluation of WQTC peak flow treatment capacity for any WQTC that will receive additional flow based on any Interim or Final SSDP project. Such evaluation shall be consistent with the EPA publications "Improving POTW Performance Using the Composite Correction Approach and "Retrofitting POTWs"	Volume 1, Chapter 4.4	**Yes -** All the plants that could receive additional flow as a result of SSO elimination have been evaluated.
(A) A map that shows the location of all known Unauthorized Discharges. The map shall include the areas and sewer lines that serve as a tributary to each Unauthorized Discharge. Smaller maps of individual tributary areas also may be included to show the lines involved in more detail.	Volume 3 – Final SSDP, Chapter 2.5, Figures 2.5.3 through 2.5.15.	**Yes –** The network branch maps show all 214 SSOs, with sufficient detail to see tributary sewers.
(B.i) A description of each Unauthorized Discharge location that includes the frequency of the Unauthorized Discharge	Volume 3 – Final SSDP, Appendix 4.5.1 - SSO Fact Sheets as well as in the Project Fact Sheets.	**Yes –** Discharge location as well as frequency is listed for each individual documented SSO in Appendix 4.5.1. Additionally, discharge location is located in the Project Fact Sheets.
(B.ii) The annual volume released from the Unauthorized Discharge	Volume 3 Final SSDP, Appendix 4.5.1 - SSO Fact Sheets.	**Yes –** Total annual volume is listed for each individual documented SSO in Appendix 4.5.1.
(B.iii) A description of the type of Unauthorized Discharge location	Volume 3 Final SSDP, Chapter 2.4, Table 2.4.2 as well as in the Project Fact Sheets.	**Yes –** Table 2.4.2 contains this information and in the Project Fact Sheets.
(B.iv) The receiving stream	Volume 3 Final SSDP, Chapter 2.4, Table 2.4.2 as well as in the Project Fact Sheets.	**Yes –** Table 2.4.2 contains this information and in the Project Fact Sheets.
(B.v.) The immediate and downstream land use, including the potential for public health concerns	Volume 3 – Final SSDP, Chapter 2.2.1, Appendix 4.5.1 - SSO Fact Sheets	**Yes –** Descriptions of the WQTC service areas describe landuse and the history of sewer system development in the area. Downstream landuse acreage is listed for each individual documented SSO in Appendix 4.5.1

TABLE ES.6
FINAL SSDP ELEMENTS AS REQUIRED BY THE CONSENT DECREE

Requirement Per Consent Decree Paragraph 25(a)(3)	IOAP and Final SSDP Chapters and Sections	Compliance With Consent Decree
(B.vi) A description of any previous (within the last 5 years) current, or proposed studies to investigate the Unauthorized Discharge	IOAP Volume 3 – Final SSDP, Chapter 1.3.	**Yes –** Chapter 1 summarizes MSD's previous and current SSO elimination efforts.
(B.vii) A description of any previous (within the last 5 years) current or proposed rehabilitation or construction work to remediate or eliminate the Unauthorized Discharge	Volume 3 – Final SSDP, Chapter 1.3. Chapter 2.2 and 2.3.	**Yes –** Chapter 1 summarizes MSD's previous rehabilitation efforts. In Chapter 2, The descriptions of the WQTC service areas include summary descriptions of previous construction work, and the descriptions of the model development describes those on-going or currently planned projects that contribute to SSO elimination.
(C) A prioritization of Unauthorized Discharge locations based on the frequency, volume, and impact on the receiving stream and upon public health, in coordination with CMOM programs	Volume 1, Chapter 6.3, Volume 3 – SSDP Chapter 4.2.1.	**Yes –** The referenced chapters describe the schedule prioritization process, based in part on the benefit-cost ratio that includes the required parameters in the benefit calculation.
(C) Schedules for design and construction, phased based on sound engineering judgment, and in no case extending beyond December 31, 2024	Volume 1, Chapter 6.3, Volume 3 Final SSDP, Chapter 4.2 and Chapter 5.	**Yes** – Schedules are included that show the required phases, and this schedule shows completion by December 31, 2024.
(D) A plan to involve stakeholders in the planning, prioritization and selection of projects.	Volume 1, Chapter 3.2, Volume 3 – Final SSDP, Chapter 4.3	**Yes** – The IOAP included a robust stakeholder involvement process that included participation in decisions on selection and prioritization of projects.

"NO SURPRISES" FOR APPROVING AGENCIES

Throughout the development of the IOAP, meetings were scheduled with those regulatory agencies having jurisdiction over the program to facilitate open communication between MSD and the regulators regarding progress and compliance with Consent Decree requirements. Electronic reporting updates requested by KDEP and EPA have been developed and implemented to provide current information. Additionally, reports are prepared for each of the four quarters of the calendar year and are submitted to EPA and KDEP within 30 days of the end of the new quarter and are posted on MSD's Project WIN website in Library section for public review. These reports include specific information about activities consistent with the requirements of the Consent Decree and the progress toward the development of the Final CSO LTCP.

In addition to these reports, MSD initiated periodic face-to-face meetings with technical team members from the KDEP and EPA to discuss the progress of the Project WIN Overflow Abatement Program. The intent of these meetings was to ensure that there are no surprises when the IOAP was submitted, and that the IOAP met all the parameters to allow approval.

SUPPORTING INFORMATION

Attachment 1 WWT Support Memorandum

Attachment 2 IOAP Stakeholder Group Vision

Attachment 3 Updated WWT Support Memorandum January 30, 2013

Tables

ES.1 and ES.2

TABLE ES.1 2012 FINAL LTCP PROJECT SUITE

ACD Project Number	Project Name	Receiving Stream	2009 Overflows Controlled	2009 Level of Control	2009 Size (MG)	2009 Cost	2012 Overflows Controlled	2012 LOC	2012 Revised Size (MG)	2012 Revised Cost (in 2008 dollars)	2009 Completion Date	Proposed Completion Date	Explanation for Proposed Revisions or Comments
L_OR_MF_172_S_09B_B_A_0	**Adams Street Sewer Separation**	Ohio River	CSO172	0	0.12	$983,000	CSO172	0	Sewer Separation	$20,000	12/31/2012	12/31/2012	Project modification request to revise this project to a sewer separation has been previously submitted and accepted. Upon inspection of the sewer system, all but two catch basins were found to have been separated already during recent redevelopment. Project Completed - Monitoring Ongoing
L_OR_MF_058_S_08_A_A_0	**CSO058 In-line Storage and Green Infrastructure**	Ohio River	CSO058	0	Sewer Separation	$1,361,000	N/A	8	Weir Modifications As Part of 13th & Rowan Solution	N/A	12/31/2014	12/31/2014 (Weir Modification) 12/21/2020 (w/ 13th & Rowan Solution)	The overflow from this CSO will be addressed in the 13th & Rowan storage basin. Modeling indicates that the overflow is caused by interceptor surcharging. Separation of the small drainage area upstream of the CSO would be ineffectual. Weir modifications for CSO058 will be performed in 2014. Costs associated with modifications and CSO058 are included in the 13th & Rowan solution.
L_SO_MF_093_S_08_A_A_0	**CSO093 Structural Modifications & Green Infrastructure**	South Fork	CSO093	0	Sewer Separation	$952,000	CSO093	0	Structural Modifications & Green Infrastructure	$488,000	12/31/2015	12/31/2015	The project modification involves the re-construction of the CSO structure to replace the existing leaping weir with a more conventional overflow weir.
L_MI_MF_140_S_08_A_A_0	**CSO140 In-Line Storage & Green Infrastructure Controls**	Middle Fork	CSO140	0	Sewer Separation	$3,150,000	CSO140	0	Pipe upgrade & Green Infrastructure	$574,000	12/31/2015	12/31/2015	The project modification involves the re-construction of the CSO structure to increase the low flow line to a 42-inch diameter opening which will increase the conveyance capacity.
L_OR_MF_160_S_08_A_A_0	**CSO160 In-Line Storage & Green Infrastructure**	Ohio River	CSO160	0	Sewer Separation	$237,000	CSO160	0	Inline Storage & Weir Modifications	$231,000	12/31/2015	12/31/2015	The project modification involves the creation of in-line storage provided by a combination of raising the existing overflow weir and installing 88 feet of 72-inch diameter pipe.
L_MI_MF_127_M_09B_B_A_8	**I-64 and Grinstead Drive Storage Basin****	Middle Fork	CSO125, CSO126, CSO127, CSO166	8	2.74	$12, 950,000	CSO125, CSO126, CSO127, CSO166	4	8.5 plus stormwater diversions	$38,590,000	12/31/2014	12/31/2020	Public comments received requested serious consideration for green infrastructure utilization in the basin drainage area along with intensive public involvement. Due to the size of the drainage area and the increased size and cost of the basin, additional time is needed to evaluate green infrastructure opportunities and right-size this project appropriately.
L_OR_MF_015_M_13_B_B_8	**Bells Lane Wet Weather Treatment Facility (formerly known as Paddy's Run)**	Ohio River	CSO015, CSO191	8	50 MGD	$24,940,000	CSO015, CSO191	8	50 MGD/ 25 MG Storage	$68,472,000	12/31/2014	12/31/2016	Optimization of flow through Morris Forman's Main Diversion Structure and MSD's Real Time Control strategy added storage volume requirements. Additional time for construction is being requested due to size increase, moving the site, offline storage and integration of Southwestern Pump Station.
L_OR_MF_020_S_09B_B_A_8	**Story Avenue and Main Street Storage Basin**	Ohio River	CSO020	8	0.13	$1,580,000	CSO020	8	5.42	$12,576,000	12/31/2013	12/31/2020	Story and Main & 13th and Rowan basins are linked together functionally. Story & Main grew substantially in size due to more conservative operational assumptions for Starkey PS. MSD proposes to split out and accelerate the schedule of CRD/CSO 22/CSO 23/CSO054 projects using green infrastructure and localized storage. Additional time is requested to right size the Story/Main and 13th/Rowan basins once the impacts of green infrastructure and upstream storage are realized and monitored.
L_SO_MF_130_S_09B_B_A_8	**Story Avenue and Spring Street Storage Basin**	South Fork	CSO130	8	0.01	$1,077,000	CSO130	8	Green Infrastructure	$896,000	12/31/2016	12/31/2016	A project modification request to use a suite of green infrastructure projects in lieu of the storage basin is anticipated in early 2012. No schedule change for overflow reduction is anticipated.
L_OR_MF_155_M_09B_B_B_4	**13th Street and Rowan Street Storage Basin**	Ohio River	CSO022, CSO023, CSO050, CSO051, CSO052, CSO053, CSO054, CSO055, CSO056, CSO150, CSO155 and Central Relief Drain CSO's (11 total w/ AAOV)	4	14.44	$49,680,000	CSO022, CSO023, CSO050, CSO051, CSO052, CSO053, CSO054, CSO055, CSO056, CSO058, CSO150, CSO155	8	4.36	$27,863,000	12/31/2020	12/31/2020	MSD proposes to split CRD & 13th and Rowan projects into separate projects. The storage basin and CRD projects are proposed to remain on the same schedule. CSO 58 will also be included with this project and weir modifications for CSO 58 are included with the revised cost.
L_OR_MF_211_M_13_B_A_8	**Southern Outfall In-line Storage (SOR1) at 43rd Street**	Ohio River	N/A	N/A	NA	NA	CSO016/210	8	11.4	$3,544,000	12/31/2018	12/31/2018	New stand-alone project. Optimized operating rules between Paddy's Run HRT and Morris Forman's Main Diversion Structure demonstrated that only inline storage was needed at Southern Outfall Retention 1 and Southern Outfall Retention 2. MSD proposes eliminate the Algonquin storage basin portion of the project and complete the two inline storage basins by the original completion date. Costs of the total SOR1 and SOR2 projects combined were developed with the costing tool and split evenly amongst the 2 projects in this spreadsheet.

ACD Project Number	Project Name	Receiving Stream	2009 Overflows Controlled	2009 Level of Control	2009 Size (MG)	2009 Cost	2012 Overflows Controlled	2012 LOC	2012 Revised Size (MG)	2012 Revised Cost (in 2008 dollars)	2009 Completion Date	Proposed Completion Date	Explanation for Proposed Revisions or Comments
L_OR_MF_211_M_13_B_A_8	**Southern Outfall In-line Storage (SOR2) at 12th Street and Wilson**	Ohio River	N/A	N/A	NA	NA	CSO211	8	4.7	$3,544,000	12/31/2018	12/31/2018	New stand-alone project. Optimized operating rules between Paddy's Run HRT and Morris Forman's Main Diversion Structure demonstrated that only inline storage was needed at Southern Outfall Retention 1 and Southern Outfall Retention 2. MSD proposes eliminate the Algonquin storage basin portion of the project and complete the two inline storage basins by the original completion date. Costs of the total SOR1 and SOR2 projects combined were developed with the costing tool and split evenly amongst the 2 projects in this spreadsheet.
L_OR_MF_211_M_13_B_A_8	**Algonquin Parkway Storage Basin/In-line Storage**	Ohio River	CSO016, CSO210, CSO211	8	4.84	$17,300,000	N/A	N/A	N/A	N/A	12/31/2018	Eliminated	Offline storage eliminated. Optimized operating rules between Paddy's Run HRT and Morris Forman's Main Diversion Structure demonstrated that only inline storage was needed at Southern Outfall Retention 1 and Southern Outfall Retention 2. MSD proposes to eliminate the Algonquin storage basin portion of the project.
L_SO_MF_097_M_13_A_A_8	**Beargrass Creek Parallel Interceptor**	N/A	N/A	N/A	N/A	$12,994,000	N/A	N/A	N/A	N/A	12/31/2017	Eliminated	Consolidation of Calvary/Creekside Basin with Logan Street Basin makes the parallel interceptor unnecessary.
L_SO_MF_097_M_09B_B_D_8	**Calvary Creekside Storage Basin**	South Fork	CSO097, CSO106, CSO110, CSO111, CSO137, CSO148, CSO151	8	3.46	$13,720,000	N/A	N/A	N/A	N/A	12/31/2017	Eliminated	Basin volume now addressed through Logan Street. Project is proposed to be eliminated.
L_OR_MF_155_M_09B_B_B_4	**Central Relief Drain (CRD) CSO In-Line Storage, Green Infrastructure & Distributed Storage**	Ohio River	N/A	N/A	N/A	N/A	Central Relief Drain CSOs (13 total with an AAOV: CSO028, CSO029, CSO034, CSO036, CSO178, CSO181, CSO193, CSO195, CSO196, CSO197, CSO199, CSO200, CSO202)	8	Diversion, Weir Modifications & Green Infrastructure	$2,184,000	N/A	12/31/2018	New project. MSD proposes to split CRD & 13th and Rowan projects into separate projects. The storage basin and CRD projects are proposed to remain on the same schedule.
L_MU_MF_154_M_09B_B_A_8	**Clifton Heights Storage Basin**	Muddy Fork	CSO132, CSO154, CSO167	8	6.55	$13,870,000	CSO088, CSO131, CSO132, CSO154, CSO167	4	7	$19,575,000	12/31/2018	12/31/2018	No changes are proposed for this project schedule.
L_SO_MF_083_M_09B_B_A_8	**Lexington Road and Payne Street Storage Basin**	South Fork	CSO082, CSO084, CSO118, CSO119, CSO120, CSO121, CSO141, CSO153	8	7.31	$25,200,000	CSO082, CSO083, CSO084, CSO118, CSO119, CSO120, CSO121, CSO141, CSO153	0	8.18	$25,904,000	12/31/2020	12/31/2020	No changes are proposed for this project schedule.
L_SO_MF_092_M_09B_B_D_8	**Logan and Breckinridge Street Storage Basin**	South Fork	CSO091, CSO113, CSO117, CSO146, CSO149, CSO152	8	11.83	$30,320,000	CSO091, CSO097, CSO106, CSO110, CSO111, CSO113, CSO117, CSO137, CSO146, CSO148, CSO149, CSO151, CSO152	8	16.6	$48,243,000	12/31/2017	12/31/2017	A review of project approach and benefit/cost results eliminated the Calvary Creekside basin, consolidating storage to the Logan Street basin location. No changes to schedule are proposed.
L_SO_MF_018_S_03_A_A	**Nightingale Pump Station Replacement & Storage**	South Fork	CSO018	0	60 MGD/0 MG	$15,710,000	CSO018	0	33 MGD/7.7 MG	$22,123,000	12/31/2016	12/31/2016	Pump Station size was reduced as a result of adding storage.
L_OR_MF_190_S_09B_B_A_8	**18th and Northwestern Pky. Storage Basin**	Ohio River	CSO190	8	1.31 MG	$4,514,000	CSO190	8	1.24	$4,486,000	12/31/2017	12/31/2017	Project slightly smaller
L_OR_MF_105_M_13_B_A_0	**Southwestern Parkway Storage Basin**	Ohio River	CSO104, CSO105, CSO189	0	5.08	$17,620,000	CSO104, CSO105, CSO189	0	11.07	$30,937,000	12/31/2018	12/31/2018	No changes are proposed for this project schedule.
	NO CHANGE												
L_SO_MF_108_S_09A_B_A_4	**CSO108 Dam Modification**	South Fork	CSO108	N/A	N/A	$150,000	CSO108	N/A	N/A	$150,000	12/31/2010	12/31/2010	Project Completed - Monitoring Ongoing
L_MI_MF_123_S_08_A_A_0	**CSO123 Downspout Disconnection**	Middle Fork	CSO123	N/A	N/A	$315,000	CSO123	N/A	N/A	$315,000	12/31/2012	12/31/2012	Project Completed - Monitoring Ongoing
L_MI_MF_206_S_08_A_A_0	**CSO206 Sewer Separation**	Middle Fork	CSO206	N/A	N/A	$3,842,000	CSO206	N/A	N/A	$3,842,000	12/31/2013	12/31/2013	Project Completed - Monitoring Ongoing
L_OR_MF_019_S_13_B_A_8	**Portland Wharf Storage Basin**	Ohio River	CSO019	8	6.37 MG	$20,000,000	CSO019	8	6.37	$20,000,000	12/31/2019	12/31/2019	

TABLE ES.1 2012 FINAL LTCP PROJECT SUITE

ACD Project Number	Project Name	Receiving Stream	2009 Overflows Controlled	2009 Level of Control	2009 Size (MG)	2009 Cost	2012 Overflows Controlled	2012 LOC	2012 Revised Size (MG)	2012 Revised Cost (in 2008 dollars)	2009 Completion Date	Proposed Completion Date	Explanation for Proposed Revisions or Comments
L_OR_MF_019_S_03_A_B	**34th Street Flood Pump Station**	Ohio River	CSO019	N/A	N/A	$541,000	CSO019	N/A	N/A	$541,000	12/31/2012	12/31/2012	Project Completed - Monitoring Ongoing
L_OR_MF_022_M_03_A_A	**4th Street Flood Pump Station**	Ohio River	CSO022, CSO023	N/A	N/A	$944,000	CSO022, CSO023	N/A	N/A	$944,000	12/31/2012	12/31/2012	Project Completed - Monitoring Ongoing
L_OR_MF_019_S_03_A_A	**27th Street Flood Pump Station**	Ohio River	CSO019	N/A	N/A	$476,000	CSO019	N/A	N/A	$476,000	6/30/2013	6/30/2013	Project Completed - Monitoring Ongoing
L_OR_MF_189_M_03_A_A	**Shawnee Flood Pump Station**	Ohio River	CSO104, CSO105, CSO189	N/A	N/A	$411,000	CSO104, CSO105, CSO189	N/A	N/A	$411,000	6/30/2013	6/30/2013	Project Completed - Monitoring Ongoing
L_OR_MF_190_S_03_A_A	**17th Street Flood Pump Station**	Ohio River	CSO190	N/A	N/A	$625,000	CSO190	N/A	N/A	$625,000	12/31/2014	12/31/2014	

ACD Project Number	Project Name	Receiving Stream	Overflows Controlled	2009 Level of Control Depth (in)	2009 Level of Control Storm	2009 Size (MG)	2009 Cost	2012 Level of Control Depth (in)	2012 Level of Control Storm	2012 Revised Size (MG)	2012 Revised Cost (in 2008 dollars)	2009 Completion Date	Proposed Completion Date	Explanation for Proposed Revisions or Comments
CEDAR CREEK AREA														
S_CC_CC_70158_M_09A_C	**Idlewood Inline Storage**	CEDAR CREEK	28998, 28984, 63094, 63095, 70158	1.82	2-Year, 3-Hour	N/A	$2,317,000	1.82	2-Year, 3-Hour	N/A	$2,317,000	12/31/2023	12/31/2023	
S_FF_CC_81316_M_03_C_A	**Fairmount Road Pump Station Off-Line Storage**	BIG RUN	Fairmount Road PS (81316 & 97362)	N/A	N/A (New Project)	N/A	N/A	1.82	2-Year, 3-Hour	3.4 MG	$13,439,000	N/A	12/31/2015	Project needed to accommodate flows from eliminated Jeffersontown WQTC and acknowledge capacity at Cedar Creek WQTC.
S_CC_CC_67997_M_01_C	**Little Cedar Creek Interceptor Improvements**	LITTLE CEDAR CREEK	67997, 67999, 86423, 86424, 89195, 89196, 89197	1.82	2-Year, 3-Hour	Pipe Upgrades	$1,875,000	1.82	2-Year, 3-Hour	N/A	$1,875,000	12/31/2024	12/31/2024	
S_CC_CC_MSD1025_S_03_B	**Bardstown Rd. PS Improvements**	BIG RUN	88545	2.25	5-Year, 3-Hour	N/A	$281,000	2.25	5-Year, 3-Hour	N/A	$281,000	12/31/2021	12/31/2021	
S_CC_CC_MSD1080_S_01_C	**Running Fox PS Elimination**	LITTLE CEDAR CREEK	MSD1080-LS	1.82	2-Year, 3-Hour	N/A	$96,000	1.82	2-Year, 3-Hour	N/A	$77,000	12/31/2010	12/31/2010	Project Completed
HITE CREEK AREA														
S_HC_HC_MSD1082_S_09A_C	**Meadow Stream Pump Station & Force Main Upgrade**	FLOYDS FORK, SOUTH FORK HARRODS CREEK	Meadow Steam PS (91087, MSD1082-PS)	1.82	2-Year, 3-Hour	0.5	$974,000	2.60	10-Year, 3-Hour	3.89 MGD PS & New 18" Force Main	$974,000	12/31/2016	12/31/2012	Project changed from a small storage basin to a pump station upgrade and new force main due to the capacity needs of Crestwood. The City paid the additional costs beyond MSD's overflow control commitment. Project Completed - Monitoring Ongoing
S_HC_HC_MSD1086_M_07_C_A	**Floydsburg Rd. SSES, Rehabilitation and Pump Station Upgrade**	FLOYDS FORK	Floydsburg Road (MSD1086-PS, 90776, 108956, 108957, 108958)	1.82	2-Year, 3-Hour	N/A	$57,000	1.82	2-Year, 3-Hour	N/A	$57,000	12/31/2010	12/31/2010	Project Completed - Monitoring Ongoing
S_HC_HC_MSD1085_S_03_A	**Kavanaugh Rd. PS Improvements**	HITE CREEK	Kavanaugh Rd (MSD1085-PS)	2.60	10-Year, 3-Hour	N/A	$1,110,000	2.60	10-Year, 3-Hour	N/A	$1,110,000	12/31/2024	12/31/2024	
FLOYDS FORK AREA														
S_FF_FF_NB01_S_01_C_A	**Woodland Hills PS Diversion**	POPE LICK	33003, 65531	1.82	2-Year, 3-Hour	N/A	$20,000	1.82	2-Year, 3-Hour	N/A	$20,000	12/31/2011	12/31/2011	Project Completed - Monitoring Ongoing
S_FF_FF_NB02_S_13_C	**Eden Care PS SSO Investigation**	FLOYDS FORK	Eden Care PS (MSD1105-PS)	N/A	N/A (Monitor)	N/A	N/A	N/A	N/A	N/A	$0	N/A	Eliminated	Only one overflow had been documented at this location. MSD cleaned the sewers in the vicinity and has not documented an overflow in over 3 years. No further action is deemed necessary.
S_FF_FF_NB03_M_01_C_A	**Ashburton PS Improvements & Diversion**	FLOYDS FORK	Olde Copper Court PS (MSD0165-PS), Ashburton PS (MSD0166-PS)	1.82	2-Year, 3-Hour	N/A	$118,000	1.82	2-Year, 3-Hour	N/A	$118,000	12/312021	12/312021	Project Completed
JEFFERSONTOWN AREA														
S_JT_JT_NB01_M_01_C_A	**Jeffersontown WQTC Elimination**	CHENOWETH RUN	28390, 28391, 28392, 28395, 28551, 31733, Jeffersontown WQTC (28173 & 64505 & MSD0255 & IS028-SI)	1.82	2-Year, 3-Hour	N/A	$23,737,000	1.82	2-Year, 3-Hour	N/A	$23,737,000	12/31/2015	12/31/2015	
S_JT_JT_NB01A_M_03_C	**Chenoweth Hills WQTC Elimination & PS Improvements**	CHENOWETH RUN	Chenoweth Run PS (MSD0196-PS & 86052 & 64096), Chippewa PS (92061), Chenoweth Hills WQTC PS (MSD0263A-PS), Chenoweth Hills WQTC (MSD0263)	1.82	2-Year, 3-Hour	N/A	$3,140,000	1.82	2-Year, 3-Hour	N/A	$3,140,000	12/31/2015	12/31/2015	
S_JT_JT_NB02_M_01_C	**Dell Rd & Charlane Project Pkwy Interceptor**	BEATTY BROOK	Charlane Pkwy (28250, 28249, 28340, 28336, 104289), Dell Rd. (28413, 28414, 28415, 28416, 28417)	1.82	2-Year, 3-Hour	Pipe Upgrades	$917,000	1.82	2-Year, 3-Hour	N/A	$917,000	12/31/2022	12/31/2022	
S_JT_JT_NB03_M_01_C	**Raintree & Marian Ct PS Eliminations and Pipe Upgrades (2 Phases)**	BEATTY BROOK	28719, 28711, Marian Court PS (28729), Raintree PS (MSD0149-PS)	1.82	2-Year, 3-Hour	N/A	$1,005,000	1.82	2-Year, 3-Hour	N/A	$1,005,000	12/31/2021	12/31/2021	
S_JT_JT_NB04_M_01_A	**Monticello PS Elimination**	FERN CREEK	Monticello Place PS (MSD0151-PS & 27969)	2.60	10-Year, 3-Hour	N/A	$207,000	2.60	10-Year, 3-Hour	N/A	$207,000	12/31/2022	12/31/2022	

Table ES.2 2012 SSDP Final Project Suite

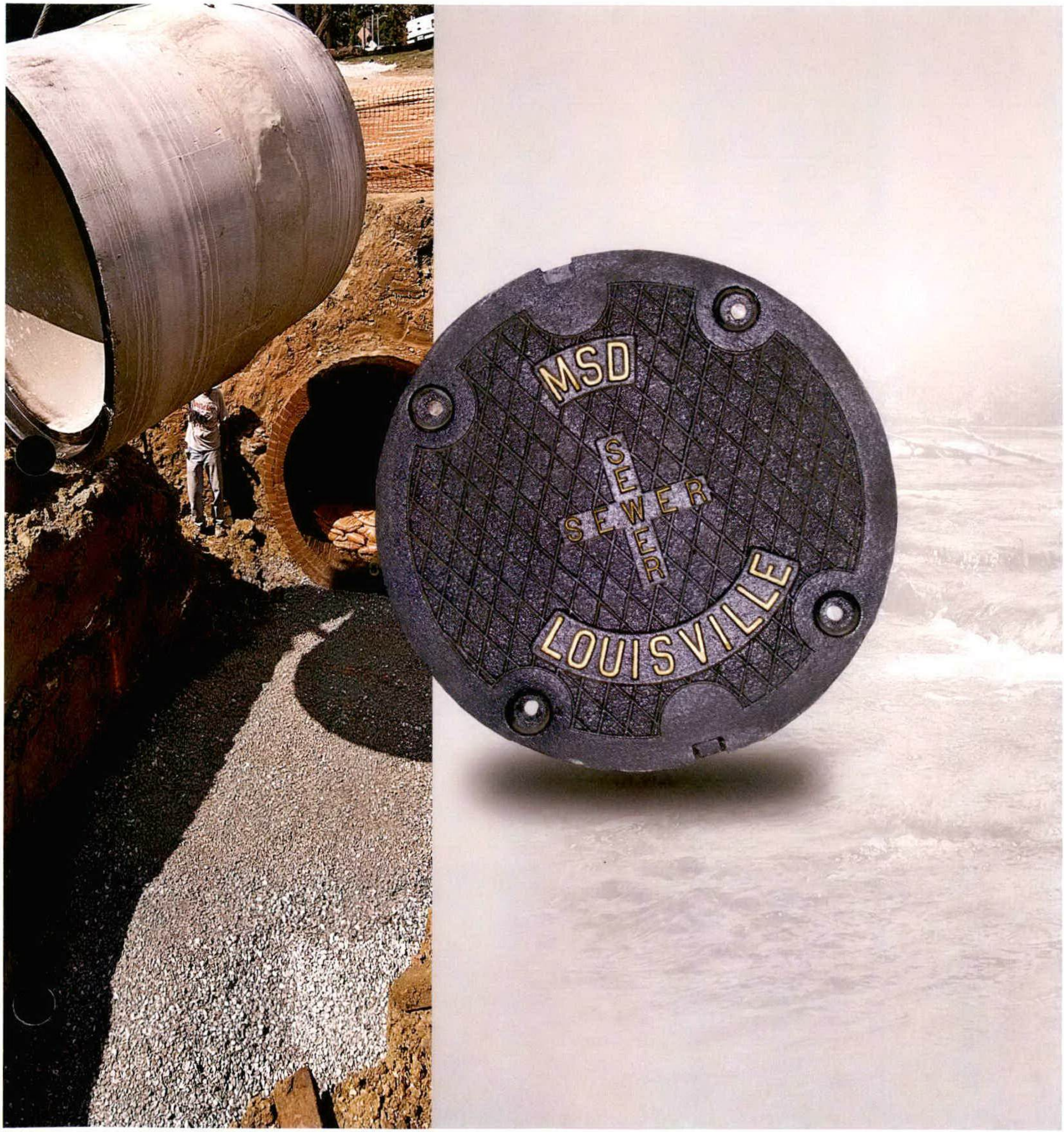
ACD Project Number	Project Name	Receiving Stream	Overflows Controlled	2009 Level of Control Depth (in)	2009 Level of Control Storm	2009 Size (MG)	2009 Cost	2012 Level of Control Depth (in)	2012 Level of Control Storm	2012 Revised Size (MG)	2012 Revised Cost (in 2008 dollars)	2009 Completion Date	Proposed Completion Date	Explanation for Proposed Revisions or Comments
MIDDLE FORK AREA														
S_MISF_MF_NB01_M_01_C_A1	**Middle Fork Relief Interceptor, Wet Weather Storage, and Upper Middle Fork LS Diversion (2 Phases)**	MIDDLE FORK BEARGRASS CREEK	02932, 02933, 02935, 08537, 23211, 23212, 27005, 51180, 51221, 51160, 51161, 45835, 47583, 47593, 47596, 47603, 47604, 90700, IS021A-SI, Middle Fork at Breckenridge (08935-SM)	1.82	2-Year, 3-Hour	1.6	$26,333,500	1.82	N/A	N/A	$26,333,500	12/31/2013, 12/31/2023	12/31/2013, 12/31/2023	
S_MI_MF_NB04_M_03_B	**Goose Creek PS Improvements & Wet Weather Storage (2 Phases)**	GOOSE CREEK	Devondale PS (21628-W), Goose Creek PS (46891, 62418, 62420, 91629, 91630, 105936), Saurel PS (43472)	2.25	5-Year, 3-Hour	0.5	$7,558,000	2.25	5-Year, 3-Hour	N/A	$7,558,000	12/31/2024	12/31/2024	
S_MI_MF_NB06_M_01_A_A - 1, S_MI_MF_NB06_M_01_A_A - 2	**Anchor Estates PS Eliminations (2 Phases)**	MIDDLE FORK BEARGRASS CREEK	Vannah PS (01106), Anchor Estates #1 PS (00746 & 00056-W), Anchor Estates #2 PS (MSD0057-LS)	2.60	10-Year, 3-Hour	N/A	$1,909,000	2.6	10-Year, 3-Hour	N/A	$1,909,000	12/31/2013, 12/31/2016	12/31/2013, 12/31/2016	Phase 1 Completed - Vannah PS Eliminated
S_MI_MF_NB07_S_07_C	**Hurstbourne I/I Investigation & Rehabilitation**	HURSTBOURNE CREEK	01793	1.82	2-Year, 3-Hour	N/A	$536,000	1.82	2-Year, 3-Hour	N/A	$536,000	12/31/2011	12/31/2011	Project Completed - Monitoring Ongoing
SOUTHEAST DIVERSION AREA														
S_SD_MF_NB03_S_07_C	**Parkview Estates I/I Investigation & Rehabilitation**	SOUTH FORK BEARGRASS CREEK	47250	1.82	2-Year, 3-Hour	N/A	$285,000	1.82	2-Year, 3-Hour	N/A	$285,000	12/31/2011	12/31/2011	Project Completed - Monitoring Ongoing
S_SD_MF_NB04_S_01_B_A	**Klondike Interceptor**	SOUTH FORK BEARGRASS CREEK	25676 (Alcona), 26650, 26651	2.25	5-Year, 3-Hour	Pipe Upgrades	$558,000	2.25	5-Year, 3-Hour	N/A	$558,000	12/31/2015	12/31/2015	
S_SD_MF_NB05_M_01_A	**Sutherland Interceptor**	SOUTH FORK BEARGRASS CREEK	Sutherland (16649)	2.60	10-Year, 3-Hour	Pipe Upgrades	$412,000	2.60	10-Year, 3-Hour	N/A	$412,000	12/31/2023	12/31/2023	
S_SD_MF_NB06_S_13_C	**Beargrass Interceptor Rehab Ph. 2**	SOUTH FORK BEARGRASS CREEK	51594	1.82	2-Year, 3-Hour	N/A	$57,000	1.82	2-Year, 3-Hour	N/A	$57,000	12/31/2010	12/31/2010	Monitoring Ongoing
POND CREEK AREA														
S_PO_WC_PC03_M_01_C	**Charleswood Interceptor Extension**	FISHPOOL CREEK	25477, 25478, Cooper Chapel PS (25480 & MSD0130-PS)	1.82	2-Year, 3-Hour	Pipe Upgrades	$603,000	1.82	2-Year, 3-Hour	N/A	$1,600,000	12/31/2022	12/31/2022	
S_PO_WC_PC04_M_01_C	**Cinderella PS Elimination**	FISHPOOL CREEK	Cinderella PS (60679 & MSD1013-PS), 35309	1.82	2-Year, 3-Hour	N/A	$2,205,000	1.82	2-Year, 3-Hour	N/A	$2,205,000	12/31/2023	12/31/2023	
S_PO_WC_PC05_M_07_C	**Lantana PS I/I Investigation & Rehabilitation**	PENNSYLVANIA RUN	Lantana Drive #1 PS (25484 & 93719 & MSD0101-PS)	1.82	2-Year, 3-Hour	N/A	$20,000	N/A (SSES/Rehab)	N/A (SSES/Rehab)	N/A	$20,000	12/31/2011	12/31/2011	Project Completed - Monitoring Ongoing
S_PO_WC_PC06_M_01_C	**Government Center PS Elimination**	PENNSYLVANIA RUN	Government Center PS (MSD0180-PS)	1.82	2-Year, 3-Hour	N/A	$1,225,000	1.82	2-Year, 3-Hour	N/A	$1,225,000	12/31/2024	12/31/2024	Project Completed - Monitoring Ongoing
S_PO_WC_PC07_M_01_A	**Avanti PS Elimination**	LITTLE CEDAR CREEK	Avanti PS (21229-W)	2.60	10-Year, 3-Hour	N/A	$31,000	2.6	10-Year, 3-Hour	N/A	$31,000	12/31/2010	12/31/2010	Project Completed - Monitoring Ongoing
S_PO_WC_PC08_M_01_C	**Lea Ann Way System Improvements**	FERN CREEK	19360, 19369, 29933, 29948, 29943, 31083, 31084, 79076, Lea Ann Way PS (MSD1010-PS)	1.82	2-Year, 3-Hour	Pipe Upgrades	$827,000	1.82	2-Year, 3-Hour	Additional Pipe Upgrades	$827,000	12/31/2015	12/31/2015	Additional overflows have been occurring in recent years. Therefore, additional sewer inspection and rehabilitation are underway. Contingency plans have been developed and are dependent upon the efficacy of rehabilitation of wet weather flows.
S_PO_WC_PC09_M_09B_C	**Outer Loop Wet Weather Storage**	FISHPOOL CREEK	70212, 17724	1.82	2-Year, 3-Hour	1.42	$4,280,000	2.60	10-Year, 3-Hour		$0	12/31/2024	Eliminated	Due to improvements in the Pond Creek hydraulic model calibration, this storage basin is no longer necessary.
S_PO_WC_PC09_M_09B_C	**Caven Ave Pump Station Elimination**	FISHPOOL CREEK	27116, Caven Ave PS (MSD0133-PS)	1.82	2-Year, 3-Hour	0.21	$731,000	2.60	10-Year, 3-Hour	PS Elimination	$1,800,000	12/31/2024	12/31/2016	Recent new pipeline constructed to eliminate a nearby package treatment plant makes the elimination of the pump station the most cost effective overflow solution.
S_PO_WC_PC10_M_01_C	**Leven PS Elimination**	PENNSYLVANIA RUN	Leven PS (36419 & MSD1019-PS)	1.82	2-Year, 3-Hour	N/A	$376,000	1.82	2-Year, 3-Hour	N/A	$376,000	12/31/2022	12/31/2022	
S_PO_WC_PC11_M_07_C	**Edsel PS I/I Investigation & Rehabilitation**	FERN CREEK	Edsel PS (92098 & MSD1048-PS)	1.82	2-Year, 3-Hour	N/A	$367,000	1.82	2-Year, 3-Hour	N/A	$367,000	12/31/2011	12/31/2011	Project Completed - Monitoring Ongoing

ACD Project Number	Project Name	Receiving Stream	Overflows Controlled	2009 Level of Control Depth (in)	2009 Level of Control Storm	2009 Size (MG)	2009 Cost	2012 Level of Control Depth (in)	2012 Level of Control Storm	2012 Revised Size (MG)	2012 Revised Cost (in 2008 dollars)	2009 Completion Date	Proposed Completion Date	Explanation for Proposed Revisions or Comments
ORFM AREA														
S_OR_MF_NB01_M_01_B	**Mellwood PS and Forcemain Improvements, System Improvements & PS Eliminations (2 Phases)**	MUDDY FORK BEARGRASS CREEK	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)	2.25	5-Year, 3-Hour	N/A	$3,055,000	2.25	5-Year, 3-Hour	N/A	$3,055,000	12/31/2012, 12/31/2024	12/31/2012, 12/31/2024	Phase 1 Project Completed - Monitoring Ongoing
S_OR_MF_NB02_S_13_C	**Leland Road SSO Investigation**	CHERRYWOOD CREEK	96020	N/A	N/A	N/A	N/A	N/A (Rehab & Monitoring)	N/A (Rehab & Monitoring)	N/A	$0	N/A	Eliminated	Only one overflow had been documented at this location. MSD cleaned the sewers in the vicinity and has not documented an overflow in over 3 years. No further action is deemed necessary.
S_OR_MF_NB03_S_07_C	**Derington Ct. PS I/I Investigation & Rehabilitation**	GOOSE CREEK	Derington Court PS (MSD0095-PS)	1.82	2-Year, 3-Hour	N/A	$265,000	1.82	2-Year, 3-Hour	N/A	$265,000	12/31/2012	12/31/2012	Project Completed - Monitoring Ongoing
S_OR_MF_NB04_M_03_B_B	**Prospect WQTC Eliminations, Harrods Creek PS, and ORFM System Improvements (3 Phases)**	LITTLE GOOSE CREEK	40870, 40871, 40872, 89646, Barbour Lane PS (42680, 65633, 65635, MSD0192-PS), West Goose Creek PS (22436 & MSD0123-PS), Phoenix Hill PS (MSD1044-PS), Glenview Hills PS (MSD0183-PS), New Market PS (MSD0193-PS), Deep Creek PS (MSD1063-PS), Hunting Creek South WQTC (MSD0292)	2.25	5-Year, 3-Hour	N/A	$31,368,000	2.25	5-Year, 3-Hour	N/A	$31,368,000	12/31/2015, 12/31/2016	12/31/2015, 12/31/2016	
MILL CREEK AREA														
S_MC_WC_NB01_M_01_A	**Shively Interceptor**	LYNNVIEW DITCH	04498, 04542, Pioneer PS (81814-W), Fern Lea PS (MSD0047-PS), Garr's Lane PS (MSD0050-PS)	2.60	10-Year, 3-Hour	Pipe Upgrades	$16,419,000	2.6	10-Year, 3-Hour	N/A	$16,419,000	12/31/2014	12/31/2014	Project Completed - Monitoring Ongoing
S_MC_WC_NB02_S_03_C	**East Rockford PS Relocation**	MILL CREEK	East Rockford PS (04699-W)	1.82	2-Year, 3-Hour	N/A	$1,044,000	1.82	2-Year, 3-Hour	N/A	$1,044,000	12/31/2021	12/31/2021	Project Completed
SMALL WQTC AREA														
S_FF_BT_NB01_S_09A_C_A	**Lucas Ln. PS Inline Storage**	GOOSE CREEK	Lucas Lane PS (MSD0199-LS)	1.82	2-Year, 3-Hour	N/A	$183,000	1.82	2-Year, 3-Hour	N/A	$183,000	12/31/2021	12/31/2021	
S_HC_HN_NB01_S_03_C_A	**Riding Ridge PS Improvements**	HARRODS CREEK	Riding Ridge PS (MSD1060-LS)	1.82	2-Year, 3-Hour	N/A	$27,000	1.82	2-Year, 3-Hour	N/A	$27,000	12/31/2014	12/31/2014	
S_HC_HN_NB02_S_09A_C_B	**Gunpowder PS Inline Storage**	HARRODS CREEK	Gunpowder PS (MSD1055-LS)	1.82	2-Year, 3-Hour	N/A	$176,000	1.82	2-Year, 3-Hour	N/A	$176,000	12/31/2021	12/31/2021	
S_HC_HN_NB03_S_09A_A_A	**Fox Harbor Inline Storage**	HARRODS CREEK	Fox Harbor #1 and #2 PS (62769)	2.60	10-Year, 3-Hour	N/A	$328,000	2.60	10-Year, 3-Hour	N/A	$328,000	12/31/2021	12/31/2021	
S_HC_HS_NB01_S_03_C_A	**Fairway View PS Improvements**	HARRODS CREEK	Fairway View PS (MSD1065-PS)	1.82	2-Year, 3-Hour	N/A	$87,000	1.82	2-Year, 3-Hour	N/A	$167,000	12/31/2014	12/31/2014	
S_FF_LF_NB01_S_13_C_A	**Lake Forest PS SSO Investigation**	CHENOWETH RUN	Lake Forest PS (MSD1169-LS)	N/A	N/A	N/A	N/A	N/A (Monitoring)	N/A (Monitoring)	N/A	$77,000	12/31/2012	12/31/2012	Monitoring Ongoing
S_FF_CH_NB01_S_09A_C_A	**St. Rene Rd. PS Inline Storage**	CHENOWETH RUN	94187	1.82	2-Year, 3-Hour	N/A	$30,000	1.82	2-Year, 3-Hour	N/A	$30,000	12/31/2021	12/31/2021	
CSS AREA														
S_OR_MF_42007_S_07_C	**Sonne PS I/I Investigation**	PADDY RUN	Sonne Avenue PS (MSD0042-PS)	1.82	2-Year, 3-Hour	N/A	$265,000	1.82	2-Year, 3-Hour	N/A	$265,000	12/31/2011	12/31/2011	Project Completed - Monitoring Ongoing
S_SF_MF_30917_M_09_A	**Camp Taylor System Improvements (Four Phases)**	MUDDY FORK BEARGRASS CREEK	08717, 13931, 13943, 36763, 44396, 44397, 66349, 104223, 104231	2.60	10-Year, 3-Hour	Pipe Upgrades	$28,279,000	2.60	10-Year, 3-Hour	Pipe Upgrades	$28,279,000	Dec 31, 2012, 2013, 2017 & 2024	Multiple (Same as 2009)	Project approach is similar to 2009, but the project area targeted for inspection and rehabilitation is larger.
S_MC_MF_55665_S_07_C	**Hazelwood PS I/I Investigation & Rehabilitation**	MANSLICK BRANCH	Hazelwood PS (55665)	1.82	2-Year, 3-Hour	N/A	$173,000	1.82	2-Year, 3-Hour	N/A	$173,000	12/31/2011	12/31/2011	Project Completed - Monitoring Ongoing

Table ES.2 2012 SSDP Final Project Suite

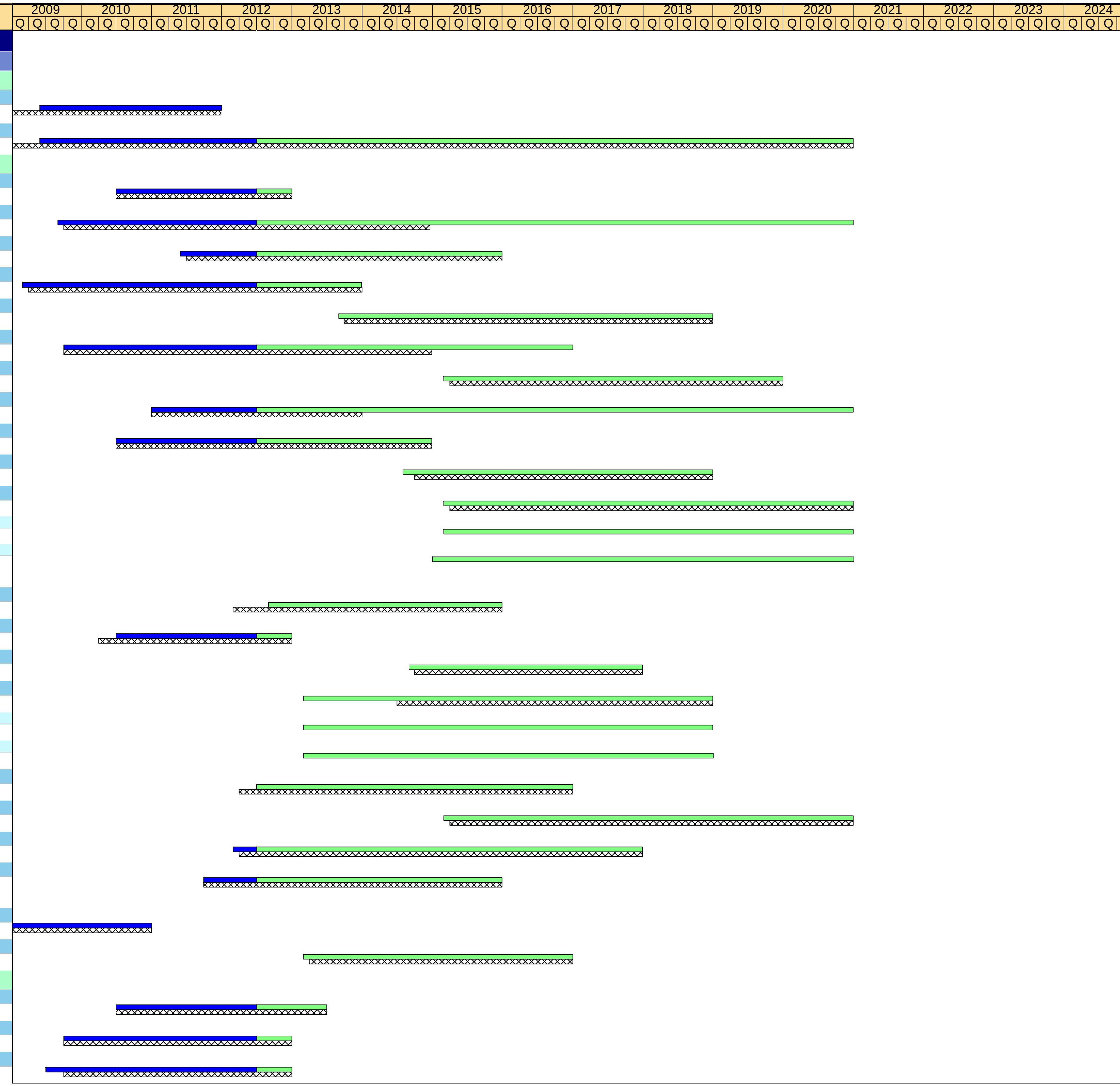
ACD Project Number	Project Name	Receiving Stream	Overflows Controlled	2009 Level of Control Depth (in)	2009 Level of Control Storm	2009 Size (MG)	2009 Cost	2012 Level of Control Depth (in)	2012 Level of Control Storm	2012 Revised Size (MG)	2012 Revised Cost (in 2008 dollars)	2009 Completion Date	Proposed Completion Date	Explanation for Proposed Revisions or Comments
INTERIM SSDP														
HIKES LANE INTERCEPTOR /HIGHGATE SPRINGS PS	**Hikes Lane Interceptor and Highgate Springs**	SOUTH FORK BEARGRASS CREEK AND WEDGEWOOD DITCH	18134, 18298, 18302, 18434, 18471, 18483, 18505, 18595, 49224, 49236, 49672, 49673, MSD0012-PS								$21,216,000		11/27/2012	This project includes improvements to the Hikes Point Sewer System and eliminates the Highgate Springs Pump Station. In the general Hikes Point area includes improvements of 3,500 LF of new or replacement sewers, and decommissioning the Highgate Springs Pump Station. The new Hikes Lane Interceptor consists of 10,000 LF of 72-inch sewer that connects to Southeastern Interceptor. Project Completed - Monitoring Ongoing
SOUTHEASTERN DIVERSION STRUCTURE & INTERCEPTOR	**Southeastern Diversion Structure and Interceptor**	SOUTH FORK BEARGRASS CREEK	08426, 08427, 08430, 08431, 30680, 30681, 49647								$1,744,000		5/12/2012	This project includes improvements to the Southeast Diversion Structure for increased flows due to the Hikes Lane Interceptor and other Final SSDP projects. The project consists of a new parallel Southeastern Interceptor relief sewer, two flow control junction boxes, and modifications to the existing Southeastern Diversion Structure (including removing control weirs and reprogramming Real Time Control gates). Project Completed - Monitoring Ongoing
NORTHERN DITCH DIVERSION INTERCEPTOR	**Northern Ditch Diversion Interceptor**	NORTHERN DITCH	MSD0271 (Yorktown)								$20,397,000		7/31/2011	This project includes construction of a new Northern Ditch Diversion Interceptor which will allow flow from upstream projects to reach the Derek R. Guthrie WQTC. The project consists of 13,000 LF of 84-inch pipe constructed long Greasy Ditch. Project Completed - Monitoring Ongoing
SINKING FORK RELIEF SEWER	**Sinking Fork Relief Sewer**	MIDDLE FORK BEARGRASS CREEEK AND UPPER SINKING FORK	21103, 25012, 63319								$1,690,000		12/23/2009	This project includes conveying flow from some of the new Beechwood Village sewers and providing additional wet weather capacity downstream of the Beechwood Village East area to accommodate upstream SSDP projects. The project includes installing 2,800 LF of 24-inch relief sewer. Project Completed
BEECHWOOD VILLAGE SANITARY SEWER REPLACEMENT	**Beechwood Village Sanitary Sewer Replacement**	UPPER SINKING FORK	21061, 21089, 21101, 21153, 21156								$11,800,000		4/27/2011	This project includes replacing or rehabilitating the entire local system, including 23,700 LF of sewer pipe and 580 homeowner's service connections. The project will be completed in two phases, East and West. Project Completed
DEREK R GUTHRIE WATER QUALITY TREATMENT CENTER	**Derek R. Guthrie WQTC**	OHIO RIVER, BLACK POND CREEK, ALVEY DITCH, MENDORA BRANCH, MILL CREEK	Wet Weather SSOs	4.50	10-Year, 24-Hour	100 MGD HRT	$102,700,000	4.50	10-Year, 24-Hour	100 MGD HRT	$102,700,000	12/31/2011	11/27/2012	Full high rate treatment capacity not yet available for flows to be seen by 2024 due to extreme wet weather in 2011, but current flows and overflow eliminations can be accommodated with current treatment capacity. Project Completed - Monitoring Ongoing

Figure
ES.1



MSD Integrated Overflow Abatement Plan Implementation Schedule (01 Jan 2009- 31 Dec 2024)

Activity Name	Scheduled Finish	2009 IOAP Completion	2012 IOAP Modification
MSD IOAP ANNUAL SCHEDULE	31-Dec-24	31-Dec-24	31-Dec-24
LONG TERM CONTROL PLAN	01-Jan-21	31-Dec-20	31-Dec-20
GREEN DEMONSTRATION PROJECTS	31-Dec-20	31-Dec-20	31-Dec-20
GREEN INFRASTRUCTURE DEMONSTRATION PROJECTS	31-Dec-11 A	31-Dec-11	31-Dec-11
GREEN INFRASTRUCTURE DEMONSTRATION PROJECTS	31-Dec-11 A	31-Dec-11	31-Dec-11
GREEN INFRASTRUCTURE PROGRAM	31-Dec-20	31-Dec-20	31-Dec-20
GREEN INFRASTRUCTURE PROGRAM	31-Dec-20	31-Dec-20	31-Dec-20
GRAY INFRASTRUCTURE PROJECTS	01-Jan-21	31-Dec-20	31-Dec-20
CSO 123 DOWNSPOUT DISCONNECTION	31-Dec-12	31-Dec-12	31-Dec-12
CSO 123 DOWNSPOUT DISCONNECTION	31-Dec-12	31-Dec-12	31-Dec-12
I-64 AND GRINSTEAD DRIVE STORAGE BASIN	31-Dec-20	21-Dec-14	31-Dec-20
I-64 AND GRINSTEAD DRIVE STORAGE BASIN	31-Dec-20	21-Dec-14	31-Dec-20
CSO 140 INCREASE PIPE CONVEYANCE	31-Dec-15	31-Dec-15	31-Dec-15
CSO 140 INCREASE PIPE CONVEYANCE	31-Dec-15	31-Dec-15	31-Dec-15
CSO 206 SEWER SEPARATION	30-Dec-13	31-Dec-13	30-Dec-13
CSO 206 SEWER SEPARATION	30-Dec-13	31-Dec-13	30-Dec-13
CLIFTON HEIGHTS STORAGE BASIN	31-Dec-18	31-Dec-18	31-Dec-18
CLIFTON HEIGHTS STORAGE BASIN	31-Dec-18	31-Dec-18	31-Dec-18
BELL'S LANE WET WEATHER TREATMENT FACILITY AND IN LINE STORAGE	31-Dec-16	31-Dec-14	31-Dec-16
BELL'S LANE WET WEATHER TREATMENT FACILITY AND IN LINE STORAGE	31-Dec-16	31-Dec-14	31-Dec-16
PORTLAND WHARF STORAGE BASIN	31-Dec-19	31-Dec-19	31-Dec-19
PORTLAND WHARF STORAGE BASIN	31-Dec-19	31-Dec-19	31-Dec-19
STORY AVENUE AND MAIN STREET STORAGE BASIN	31-Dec-20	31-Dec-13	31-Dec-20
STORY AVENUE AND MAIN STREET STORAGE BASIN	31-Dec-20	31-Dec-13	31-Dec-20
CSO 058 IN-LINE STORAGE AND GREEN INFRASTRUCTURE CONTROLS	31-Dec-14	31-Dec-14	31-Dec-14
CSO 058 IN-LINE STORAGE AND GREEN INFRASTRUCTURE CONTROLS	31-Dec-14	31-Dec-14	31-Dec-14
SOUTHWESTERN PARKWAY STORAGE BASIN	31-Dec-18	31-Dec-18	31-Dec-18
SOUTHWESTERN PARKWAY STORAGE BASIN	31-Dec-18	31-Dec-18	31-Dec-18
13TH STREET AND ROWAN STREET STORAGE BASIN	01-Jan-21	31-Dec-20	31-Dec-20
13TH STREET AND ROWAN STREET STORAGE BASIN	31-Dec-20	31-Dec-20	
13TH STREET AND ROWAN STREET STORAGE BASIN	31-Dec-20		31-Dec-20
13TH STREET AND ROWAN STREET STORAGE BASIN	31-Dec-20		31-Dec-20
CENTRAL RELIEF DRAIN IN-LINE STORAGE, GREEN INFRASTRUCTURE AND DISTRIBUTED STORAGE	01-Jan-21		31-Dec-18
CENTRAL RELIEF DRAIN IN-LINE STORAGE, GREEN INFRASTRUCTURE AND DISTRIBUTED STORAGE	01-Jan-21		31-Dec-18
CSO 160 IN-LINE STORAGE AND GREEN INFRASTRUCTURE CONTROLS	31-Dec-15	31-Dec-15	31-Dec-15
CSO 160 IN-LINE STORAGE AND GREEN INFRASTRUCTURE CONTROLS	31-Dec-15	31-Dec-15	31-Dec-15
ADAMS STREET SEWER SEPARATION AND STORAGE BASIN	31-Dec-12	31-Dec-12	31-Dec-12
ADAMS STREET SEWER SEPARATION AND STORAGE BASIN	31-Dec-12	31-Dec-12	31-Dec-12
18TH AND NORTHWESTERN PKY STORAGE BASIN	31-Dec-17	31-Dec-17	31-Dec-17
18TH AND NORTHWESTERN PKY STORAGE BASIN	31-Dec-17	31-Dec-17	31-Dec-17
ALGONQUIN PARKWAY STORAGE BASIN	01-Jan-19	31-Dec-18	31-Dec-18
ALGONQUIN PARKWAY STORAGE BASIN	31-Dec-18	31-Dec-18	
SOUTHERN OUTFALL IN-LINE STORAGE (SOR 1)	31-Dec-18		31-Dec-18
SOUTHERN OUTFALL IN-LINE STORAGE AT 43RD ST. (SOR 1)	31-Dec-18		31-Dec-18
SOUTHERN OUTFALL IN-LINE RETENTION (SOR 2)	01-Jan-19		31-Dec-18
SOUTHERN OUTFALL IN-LINE RETENTION AT 13TH AND WILSON AVE. (SOR	01-Jan-19		31-Dec-18
NIGHTINGALE PUMP STATION AND STORAGE BASIN	31-Dec-16	31-Dec-16	31-Dec-16
NIGHTINGALE PUMP STATION AND STORAGE BASIN	31-Dec-16	31-Dec-16	31-Dec-16
LEXINGTON ROAD AND PAYNE STREET STORAGE BASIN	31-Dec-20	31-Dec-20	31-Dec-20
LEXINGTON ROAD AND PAYNE STREET STORAGE BASIN	31-Dec-20	31-Dec-20	31-Dec-20
LOGAN STREET AND BRECKENRIDGE ST STORAGE BASIN	31-Dec-17	31-Dec-17	31-Dec-17
LOGAN STREET AND BRECKENRIDGE ST STORAGE BASIN	31-Dec-17	31-Dec-17	31-Dec-17
CSO 093 STRUCTURAL MODIFICATIONS AND GREEN INFRASTRUCTURE	31-Dec-15	31-Dec-15	31-Dec-15
CSO 093 STRUCTURAL MODIFICATIONS AND GREEN INFRASTRUCTURE CONTROLS	31-Dec-15	31-Dec-15	31-Dec-15
CSO 108 DAM MODIFICATIONS	31-Dec-10 A	31-Dec-10	31-Dec-10
CSO 108 DAM MODIFICATIONS	31-Dec-10 A	31-Dec-10	31-Dec-10
STORY AVENUE AND SPRING STREET GREEN INFRASTRUCTURE CONTROLS	31-Dec-16	31-Dec-16	31-Dec-16
STORY AVENUE AND SPRING STREET GREEN INFRASTRUCTURE CONTROLS	31-Dec-16	31-Dec-16	31-Dec-16
FLOOD PUMP STATION PROJECTS	31-Dec-14	31-Dec-14	31-Dec-14
27TH STREET FLOOD PUMP STATION	30-Jun-13	30-Jun-13	30-Jun-13
27TH STREET FLOOD PUMP STATION	30-Jun-13	30-Jun-13	30-Jun-13
34TH STREET FLOOD PUMP STATION	31-Dec-12	31-Dec-12	31-Dec-12
34TH STREET FLOOD PUMP STATION	31-Dec-12	31-Dec-12	31-Dec-12
4TH STREET FLOOD PUMP STATION	31-Dec-12	31-Dec-12	31-Dec-12
4TH STREET FLOOD PUMP STATION	31-Dec-12	31-Dec-12	31-Dec-12

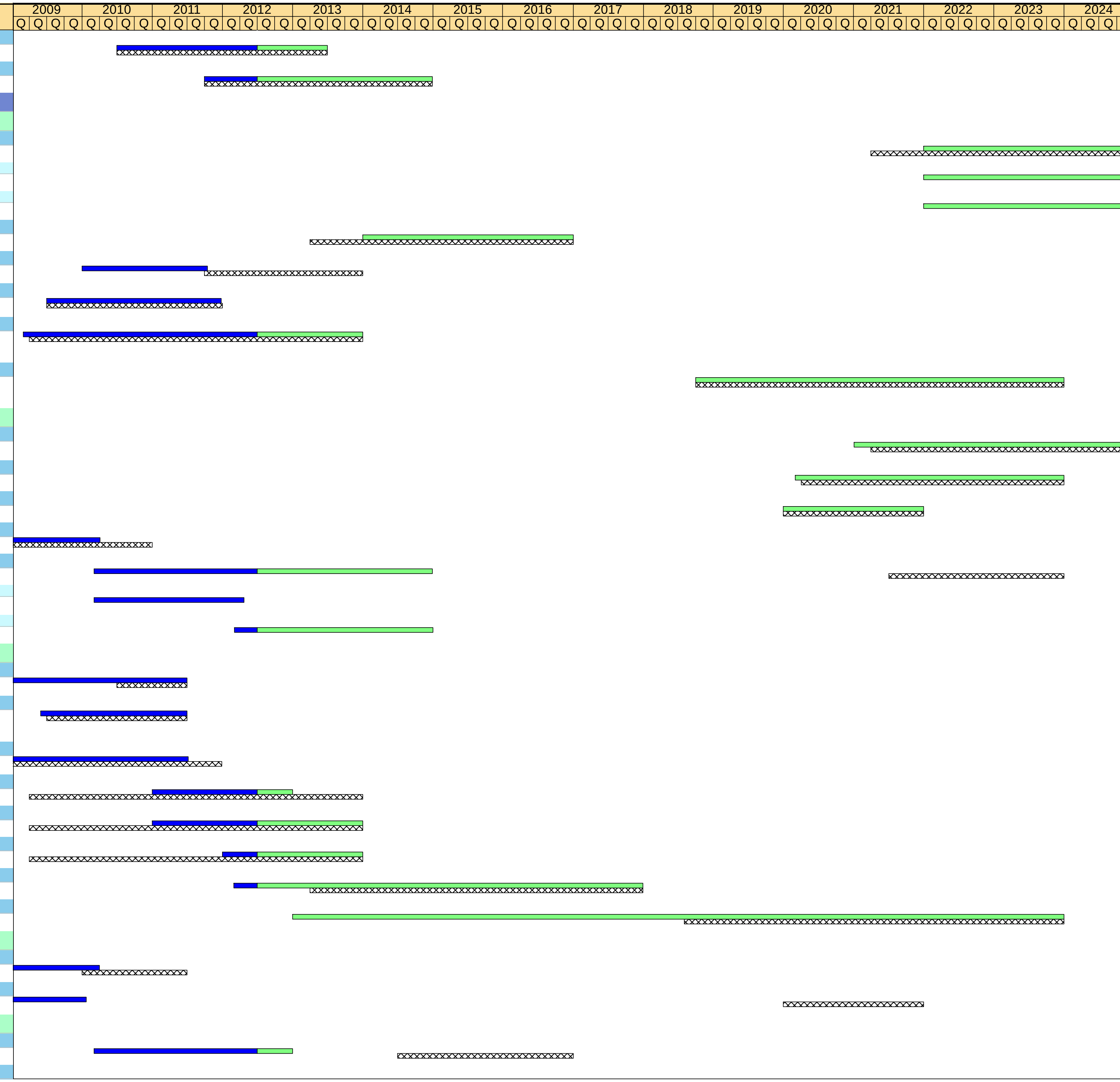


Approved 2009 IOAP
Remaining Work
Completed Work

Date Date: 01-Jul-12

MSD Integrated Overflow Abatement Plan Implementation Schedule (01 Jan 2009- 31 Dec 2024)

Activity Name	Scheduled Finish	2009 IOAP Completion	2012 IOAP Modification
SHAWNEE FLOOD PUMP STATION	30-Jun-13	30-Jun-13	30-Jun-13
SHAWNEE FLOOD PUMP STATION	30-Jun-13	30-Jun-13	30-Jun-13
17TH STREET FLOOD PUMP STATION	31-Dec-14	31-Dec-14	31-Dec-14
17TH STREET FLOOD PUMP STATION	31-Dec-14	31-Dec-14	31-Dec-14
SANITARY SEWER DISCHARGE PLAN	31-Dec-24	31-Dec-24	31-Dec-24
BEARGRASS CREEK MIDDLE FORK AREA	31-Dec-24	31-Dec-24	31-Dec-24
GOOSE CREEK PUMP STATION	31-Dec-24	31-Dec-24	31-Dec-24
GOOSE CREEK PUMP STATION	31-Dec-24	31-Dec-24	
GOOSE CREEK PS PH1 - DEVONDALE PS WW STORAGE	31-Dec-24		31-Dec-24
GOOSE CREEK PS PH1 - DEVONDALE PS WW STORAGE	31-Dec-24		31-Dec-24
GOOSE CRK PS PH2 - PS & WET WEATHER STORAGE	31-Dec-24		31-Dec-24
GOOSE CRK PS PH2 - PS & WET WEATHER STORAGE	31-Dec-24		31-Dec-24
ANCHOR ESTATES- ANCHOR ESTS PS 1 & 2 PS ELIMINATIONS	31-Dec-16	31-Dec-16	31-Dec-16
ANCHOR ESTATES- ANCHOR ESTS PS 1 & 2 PS ELIMINATIONS	31-Dec-16	31-Dec-16	31-Dec-16
ANCHOR ESTATES- VANNAH PS ELIMINATION	15-Oct-11 A	31-Dec-13	31-Dec-13
ANCHOR ESTATES- VANNAH PS ELIMINATION	15-Oct-11 A	31-Dec-13	31-Dec-13
HURSTBOURNE I&I INVESTIGATION & REHABILITATION	27-Dec-11 A	31-Dec-11	31-Dec-11
HURSTBOURNE I&I INVESTIGATION & REHABILITATION	27-Dec-11 A	31-Dec-11	31-Dec-11
MIDDLE FORK RELIEF INTERCEPTOR, WET WEATHER STORAGE, AND UMFLS DIVERSION 1 -	31-Dec-13	31-Dec-13	31-Dec-13
MIDDLE FORK RELIEF INTERCEPTOR, WET WEATHER STORAGE, AND UMFLS DIVERSION 1 - BUECHEL BASIN	31-Dec-13	31-Dec-13	31-Dec-13
MIDDLE FORK RELIEF INTERCEPTOR, WET WEATHER STORAGE, AND UMFLS DIVERSION 2 I	31-Dec-23	31-Dec-23	31-Dec-23
MIDDLE FORK RELIEF INTERCEPTOR, WET WEATHER STORAGE, AND UMFLS DIVERSION 2 PS & WET WEATHER STORAGE	31-Dec-23	31-Dec-23	31-Dec-23
CEDAR CREEK AREA	31-Dec-24	31-Dec-24	31-Dec-24
LITTLE CEDAR CREEK INTRECEPTOR IMPROVEMENTS	31-Dec-24	31-Dec-24	31-Dec-24
LITTLE CEDAR CREEK INTRECEPTOR IMPROVEMENTS	31-Dec-24	31-Dec-24	31-Dec-24
IDLEWOOD INLINE STORAGE	31-Dec-23	31-Dec-23	31-Dec-23
IDLEWOOD INLINE STORAGE	31-Dec-23	31-Dec-23	31-Dec-23
BARDSTOWN RD PS IMPROVEMENTS	31-Dec-21	31-Dec-21	31-Dec-21
BARDSTOWN RD PS IMPROVEMENTS	31-Dec-21	31-Dec-21	31-Dec-21
RUNNING FOX PS ELIMINATION	05-Apr-10 A	31-Dec-10	31-Dec-10
RUNNING FOX PS ELIMINATION	05-Apr-10 A	31-Dec-10	31-Dec-10
FAIRMOUNT RD PS IMPROVMENTS	01-Jan-15	31-Dec-23	31-Dec-23
FAIRMOUNT RD PS IMPROVMENTS	31-Dec-14	31-Dec-23	
FAIRMOUNT RD PS IMPROVEMENTS	24-Apr-12 A		31-Dec-23
FAIRMOUNT RD PS IMPROVEMENTS	24-Apr-12 A		31-Dec-23
FAIRMOUNT RD PS IMPROVEMENT PH 2	01-Jan-15		31-Dec-15
FAIRMOUNT STORAGE BASIN	01-Jan-15		31-Dec-15
COMBINED SEWER SYSTEM AREA	31-Dec-23	31-Dec-23	31-Dec-23
HAZELWOOD PS I&I INVESTIGATION & REHABILITATION	30-Jun-11 A	30-Jun-11	30-Jun-11
HAZELWOOD PS I&I INVESTIGATION & REHABILITATION	30-Jun-11 A	30-Jun-11	30-Jun-11
SONNE PUMP STATION I&I INVESTIGATION & REHABILITATION	30-Jun-11 A	30-Jun-11	30-Jun-11
SONNE PUMP STATION I&I INVESTIGATION & REHABILITATION	30-Jun-11 A	30-Jun-11	30-Jun-11
CAMP TAYLOR SSES	08-Jul-11 A	31-Dec-11	31-Dec-13
CAMP TAYLOR SSES	08-Jul-11 A	31-Dec-11	31-Dec-13
CAMP TAYLOR SANITARY SEWER #1A	31-Dec-12	31-Dec-13	31-Dec-13
CAMP TAYLOR SANITARY SEWER #1A	31-Dec-12	31-Dec-13	31-Dec-13
CAMP TAYLOR SANITARY SEWER #1B	31-Dec-13	31-Dec-13	31-Dec-13
CAMP TAYLOR SANITARY SEWER #1B	31-Dec-13	31-Dec-13	31-Dec-13
CAMP TAYLOR SANITARY SEWER #2	31-Dec-13	31-Dec-13	31-Dec-13
CAMP TAYLOR SANITARY SEWER #2	31-Dec-13	31-Dec-13	31-Dec-13
CAMP TAYLOR #3- SEWER REHABILITATION	31-Dec-17	31-Dec-17	31-Dec-17
CAMP TAYLOR #3- SEWER REHABILITATION	31-Dec-17	31-Dec-17	31-Dec-17
CAMP TAYLOR #4-SEWER REHABILITATION & REPLACEMENT	31-Dec-23	31-Dec-23	31-Dec-23
CAMP TAYLOR #4-SEWER REHABILITATION & REPLACEMENT	31-Dec-23	31-Dec-23	31-Dec-23
FLOYDS FORK AREA	01-Apr-10 A	31-Dec-21	01-Apr-10
WOODLAND HILL PS DIVERSION	01-Apr-10 A	30-Jun-11	01-Apr-10
WOODLAND HILL PS DIVERSION	01-Apr-10 A	30-Jun-11	01-Apr-10
ASHBURTON PS IMPROVEMENTS AND DIVERSION	22-Jan-10 A	31-Dec-21	22-Jan-10
ASHBURTON PS IMPROVEMENTS AND DIVERSION	22-Jan-10 A	31-Dec-21	22-Jan-10
HITE CREEK AREA	31-Dec-24	31-Dec-24	31-Dec-24
MEADOW STREAM PS AND FORCE MAIN	31-Dec-12	31-Dec-16	31-Dec-16
MEADOW STREAM PS AND FORCE MAIN	31-Dec-12	31-Dec-16	31-Dec-16
KAVANAUGH RD PS IMPROVEMENTS	31-Dec-24	31-Dec-24	31-Dec-24



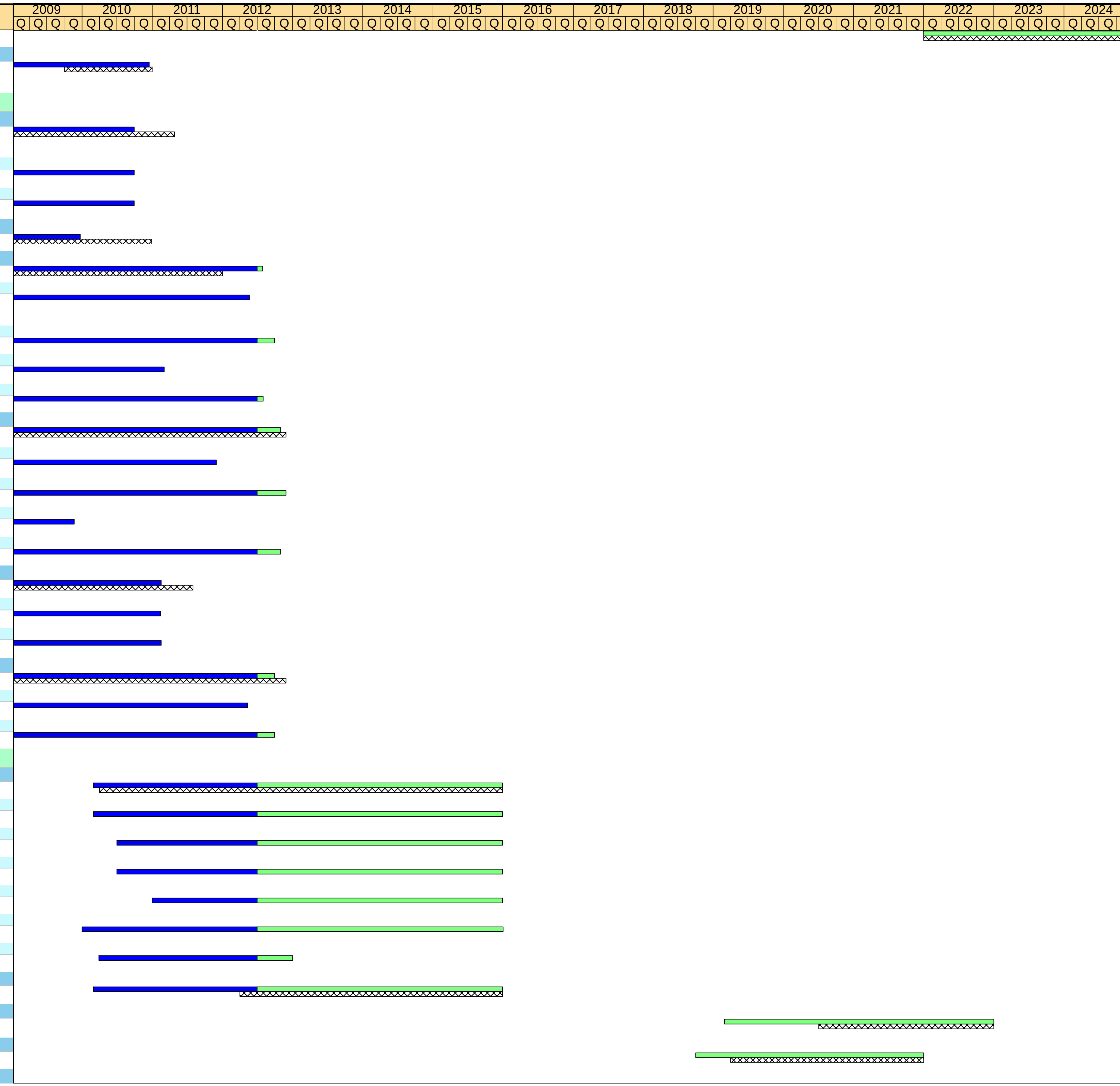
Approved 2009 IOAP   Remaining Work

Completed Work

Date Date: 01-Jul-12

MSD Integrated Overflow Abatement Plan Implementation Schedule (01 Jan 2009- 31 Dec 2024)

Activity Name	Scheduled Finish	2009 IOAP Completion	2012 IOAP Modification
KAVANAUGH RD PS IMPROVEMENTS	31-Dec-24	31-Dec-24	31-Dec-24
FLOYDSBURG RD SSES, REHAB AND PUMP STATION UPGRADE	17-Dec-10 A	31-Dec-10	31-Dec-10
FLOYDSBURG RD SSES, REHAB AND PUMP STATION UPGRADE	17-Dec-10 A	31-Dec-10	31-Dec-10
INTERIM SSDP PROJECTS	27-Nov-12	27-Nov-12	27-Nov-12
ISSDP BEECHWOOD VILLAGE SANITARY SEWER REPLACEMENT	29-Sep-10 A	27-Apr-11	27-Apr-11
ISSDP BEECHWOOD VILLAGE SANITARY SEWER REPLACEMENT	29-Sep-10 A	27-Apr-11	
BEECHWOOD VILLAGE SANITARY SEWER REPLACEMENT (WEST)	29-Sep-10 A		27-Apr-11
BEECHWOOD VILLAGE SANITARY SEWER REPLACEMENT	29-Sep-10 A		27-Apr-11
BEECHWOOD VILLAGE SANITARY SEWER REPLACEMENT (EAST)	29-Sep-10 A		27-Apr-11
BEECHWOOD VILLAGE SANITARY SEWER REPLACEMENT	29-Sep-10 A		27-Apr-11
SINKING FORK RELIEF SEWER	23-Dec-09 A	30-Dec-10	23-Dec-09
SINKING FORK RELIEF SEWER	23-Dec-09 A	30-Dec-10	23-Dec-09
ISSDP DEREK R GUTHRIE WATER QUALITY TREATMENT CENTER	30-Sep-12	31-Dec-11	27-Nov-12
ISSDP DEREK R GUTHRIE WATER QUALITY TREATMENT CENTER	30-Jul-12	31-Dec-11	
DEREK R GUTHRIE WQTC WET WEATHER TREATMENT FACILITY	20-May-12 A		27-Nov-12
DEREK R GUTHRIE WQTC WET WEATHER TREATMENT FACILITY	20-May-12 A		27-Nov-12
WCWTP: WW FLOW EQU & TMT	30-Sep-12		27-Nov-12
WCWTP: WW FLOW EQU & TMT	30-Sep-12		27-Nov-12
DRGWQTC: BLOWER PACKAGE	03-Mar-11 A		27-Nov-12
DRGWQTC: BLOWER PACKAGE	03-Mar-11 A		27-Nov-12
DRGWQTC: WET WEATHER EQUALIZATION BASIN	31-Jul-12		27-Nov-12
DRGWQTC: WET WEATHER EQUALIZATION BASIN	31-Jul-12		27-Nov-12
ISSDP HIKES LANE INTERCEPTOR /HIGHGATE SPRINGS PS	27-Nov-12	27-Nov-12	27-Nov-12
ISSDP HIKES LANE INTERCEPTOR /HIGHGATE SPRINGS PS	30-Oct-12	27-Nov-12	
HIKES POINT INTERCEPTOR	30-Nov-11 A		27-Nov-12
HIKES POINT INTERCEPTOR	30-Nov-11 A		27-Nov-12
HIKES POINT INTERCEPTOR PHASE 2	27-Nov-12		27-Nov-12
HIKES POINT INTERCEPTOR PHASE 2	27-Nov-12		27-Nov-12
CARSON & RIBBLE RELIEF	20-Nov-09 A		27-Nov-12
CARSON & RIBBLE RELIEF	20-Nov-09 A		27-Nov-12
HIKES POINT RELIEF EFFORT	31-Oct-12		27-Nov-12
HIKES POINT RELIEF EFFORT	31-Oct-12		27-Nov-12
ISSDP NORTHERN DITCH DIVERSION INTERCEPTOR	16-Feb-11 A	31-Jul-11	31-Jul-11
ISSDP NORTHERN DITCH DIVERSION INTERCEPTOR	16-Feb-11 A	31-Jul-11	
NORTHERN DITCH DIVERSION INTERCEPTOR	16-Feb-11 A		31-Jul-11
NORTHERN DITCH DIVERSION INTERCEPTOR	16-Feb-11 A		31-Jul-11
NORTHERN DITCH DIVERSION INTERCEPTOR PH 2	16-Feb-11 A		31-Jul-11
NORTHERN DITCH DIVERSION INTERCEPTOR PH 2	16-Feb-11 A		31-Jul-11
ISSDP SOUTHEAST DIVERSION STRUCTURE & INTERCEPTOR	30-Sep-12	27-Nov-12	30-Sep-12
ISSDP SOUTHEAST DIVERSION STRUCTURE & INTERCEPTOR	28-Sep-12	27-Nov-12	
SOUTHEAST DIVERSION STRUCTURE & INTERCEPTOR	12-May-12 A		12-May-12
SOUTHEAST DIVERSION STRUCTURE & INTERCEPTOR	12-May-12 A		12-May-12
SOUTHEAST DIVERSION STRUCTURE & INTERCEPTOR Phase 2	30-Sep-12		30-Sep-12
SOUTHEAST DIVERSION STRUCTURE & INTERCEPTOR Phase 2	30-Sep-12		30-Sep-12
JEFFERSONTOWN AREA	31-Dec-22	31-Dec-22	31-Dec-22
JEFFERSONTOWN WQTC ELIMINATION	01-Jan-16	31-Dec-15	31-Dec-15
JEFFERSONTOWN WQTC ELIMINATION	31-Dec-15	31-Dec-15	
JEFFERSONTOWN WQTC ELIMINATION	31-Dec-15		31-Dec-15
JEFFERSONTOWN WQTC ELIMINATION	31-Dec-15		31-Dec-15
JEFFERSONTOWN FORCE MAIN	31-Dec-15		31-Dec-15
JEFFERSONTOWN FORCE MAIN	31-Dec-15		31-Dec-15
GRAND AVENUE PUMP STATION	31-Dec-15		31-Dec-15
GRAND AVENUE PUMP STATION	31-Dec-15		31-Dec-15
UPPER BILLTOWN RD INTERCEPTOR	31-Dec-15		31-Dec-15
UPPER BILLTOWN RD INTERCEPTOR	31-Dec-15		31-Dec-15
BILLTOWN RD INTERCEPTOR SS	01-Jan-16		31-Dec-15
BILLTOWN RD INTERCEPTOR SS	01-Jan-16		31-Dec-15
BILLTOWN RD PS, FM & INT	31-Dec-12		31-Dec-12
BILLTOWN RD PS, FM & INT	31-Dec-12		31-Dec-12
CHENOWETH HILLS WQTC ELIMINATION & PS IMPROVEMENTS	31-Dec-15	31-Dec-15	31-Dec-15
CHENOWETH HILLS WQTC ELIMINATION & PS ELIMINATION	31-Dec-15	31-Dec-15	31-Dec-15
DELL RD & CHARLANE PKWY INTERCEPTOR IMPROVEMENTS	31-Dec-22	31-Dec-22	31-Dec-22
DELL RD & CHARLANE PKWY INTERCEPTOR IMPROVEMENTS	31-Dec-22	31-Dec-22	31-Dec-22
RAINTREE & MARIAN CT PH1 - PS ELIMINATION	31-Dec-21	31-Dec-21	31-Dec-21
RAINTREE & MARIAN CT PH1 - PS ELIMINATION	31-Dec-21	31-Dec-21	31-Dec-21
RAINTREE & MARIAN CT PS ELIMINATION	31-Dec-21	31-Dec-21	31-Dec-21



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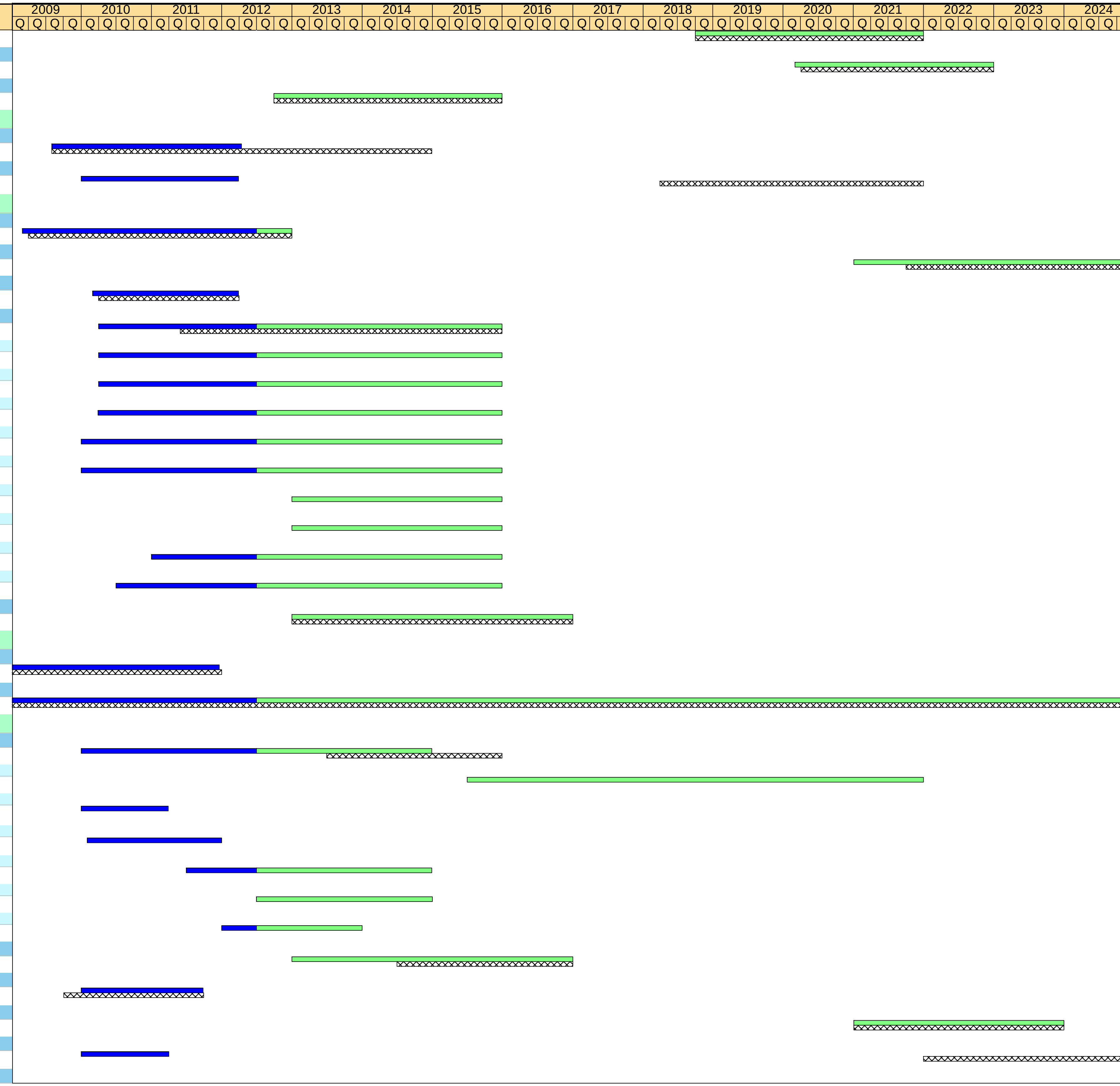
Date Date: 01-Jul-12

MSD Integrated Overflow Abatement Plan Implementation Schedule (01 Jan 2009- 31 Dec 2024)

Activity Name	Scheduled Finish	2009 IOAP Completion	2012 IOAP Modification
RAINTREE & MARIAN CT PS ELIMINATION	31-Dec-21	31-Dec-21	31-Dec-21
MONTICELLO PS ELIMINATION	31-Dec-22	31-Dec-22	31-Dec-22
MONTICELLO PS ELIMINATION	31-Dec-22	31-Dec-22	31-Dec-22
KLONDIKE INTERCEPTOR	31-Dec-15	31-Dec-15	31-Dec-15
KLONDIKE INTERCEPTOR	31-Dec-15	31-Dec-15	31-Dec-15
MILL CREEK AREA	13-Apr-12 A	31-Dec-21	31-Dec-21
SHIVELY INTERCEPTOR	13-Apr-12 A	31-Dec-14	31-Dec-14
SHIVELY INTERCEPTOR	13-Apr-12 A	31-Dec-14	31-Dec-14
EAST ROCKFORD LANE PS RELOCATION	30-Mar-12 A	31-Dec-21	31-Dec-21
EAST ROCKFORD LANE PS RELOCATION	30-Mar-12 A	31-Dec-21	31-Dec-21
OHIO RIVER FORCE MAIN AREA	31-Dec-24	31-Dec-24	31-Dec-24
MELLWOOD SYS 1 - MELLWOOD PS & FORCE MAIN	31-Dec-12	31-Dec-12	31-Dec-12
MELLWOOD SYS 1 - MELLWOOD PS & FORCE MAIN	31-Dec-12	31-Dec-12	31-Dec-12
MELLWOOD SYS 2 - WINTON & MOCKINGBIRD PS ELIM & PIPE UPGRADES	31-Dec-24	31-Dec-24	31-Dec-24
MELLWOOD SYS 2 - WINTON & MOCKINGBIRD PS ELIM & PIPE UPGRADES	31-Dec-24	31-Dec-24	31-Dec-24
DERINGTON CT PS I/I INVESTIGATION & REHABILITATION	30-Mar-12 A	31-Mar-12	31-Mar-12
DERINGTON CT PS I/I INVESTIGATION & REHABILITATION	30-Mar-12 A	31-Mar-12	31-Mar-12
PROSPECT WQTC ELIMINATIONS	31-Dec-15	31-Dec-15	31-Dec-15
PROSPECT WQTC ELIMINATIONS	31-Dec-15	31-Dec-15	
HARROD'S CREEK PS & FM	31-Dec-15		31-Dec-15
HARRODS CREEK PS & FM	31-Dec-15		31-Dec-15
HARRODS CREEK INT	31-Dec-15		31-Dec-15
HARRODS CREEK INT	31-Dec-15		31-Dec-15
HARRODS CREEK INT PH 2	31-Dec-15		31-Dec-15
HARRODS CREEK INT PH 2	31-Dec-15		31-Dec-15
RIVER ROAD INT	31-Dec-15		31-Dec-15
RIVER ROAD INT	31-Dec-15		31-Dec-15
TIMBERLAKE & HUNTING CREEK S WQTC ELIM	31-Dec-15		31-Dec-15
TIMBERLAKE & HUNTING CREEK S WQTC ELIM	31-Dec-15		31-Dec-15
KEN CARLA WQTC ELIM	31-Dec-15		31-Dec-15
KEN CARLA WQTC ELIM	31-Dec-15		31-Dec-15
HARRODS CREEK FORCE MAIN PH 3	31-Dec-15		31-Dec-15
HARRODS CREEK FORCE MAIN PH 3	31-Dec-15		31-Dec-15
SHADOW WOOD WWTP ELIM	31-Dec-15		31-Dec-15
SHADOW WOOD WWTP ELIM	31-Dec-15		31-Dec-15
N HUNTING CREEK PS & FM	31-Dec-15		31-Dec-15
N HUNTING CREEK PS & FM	31-Dec-15		31-Dec-15
PROSPECT #3- ORFM SYSTEM IMPROVEMENTS	31-Dec-16	31-Dec-16	31-Dec-16
PROSPECT #3 - ORFM SYSTEM IMPROVEMENTS	31-Dec-16	31-Dec-16	31-Dec-16
OTHER PROJECTS	30-Dec-24	31-Dec-24	30-Dec-24
CPE/CCP MODIFICATIONS TO WQTC	19-Dec-11 A	31-Dec-11	31-Dec-11
CPE/CCP MODIFICATIONS TO WQTC	19-Dec-11 A	31-Dec-11	31-Dec-11
I/I REDUCTION PROGRAM	30-Dec-24	31-Dec-24	30-Dec-24
I/I REDUCTION PROGRAM	30-Dec-24	31-Dec-24	30-Dec-24
POND CREEK AREA	31-Dec-23	31-Dec-24	31-Dec-24
LEE ANN WAY PUMP STATION IMPROVEMENTS	31-Dec-21	31-Dec-15	31-Dec-15
LEE ANN WAY PUMP STATION IMPROVEMENTS	31-Dec-14	31-Dec-15	
LEA ANN WAY SANITARY SEWER I/I REHAB	31-Dec-21		31-Dec-15
LEA ANN WAY SANITARY SEWER I/I REHAB	31-Dec-21		31-Dec-15
LEE ANN WAY PS SYSTEM SSES	30-Mar-11 A		31-Dec-15
LEE ANN WAY PS SYSTEM SSES	30-Mar-11 A		31-Dec-15
LEE ANN WAY PH 2 ICA	31-Dec-11 A		31-Dec-15
LEE ANN WAY PH 2 ICA	31-Dec-11 A		31-Dec-15
LEE ANN WAY SSR PH 1	31-Dec-14		31-Dec-15
LEE ANN WAY SSR PH 1	31-Dec-14		31-Dec-15
LEE ANN WAY SSR PH 2	01-Jan-15		31-Dec-15
LEE ANN WAY SSR PH 2	01-Jan-15		31-Dec-15
LEE ANN WAY INTERCEPTOR I/I REHAB	31-Dec-13		31-Dec-15
LEE ANN WAY INTERCEPTOR I/I REHAB	31-Dec-13		31-Dec-15
OUTER LOOP & CAVEN AREA PIPE UPGRADES	31-Dec-16	31-Dec-16	31-Dec-24
OUTER LOOP & CAVEN AREA PIPE UPGRADES	31-Dec-16	31-Dec-16	31-Dec-24
EDSEL PS I/I INVESTIGATION & REHABILITATION	27-Sep-11 A	30-Sep-11	30-Sep-11
EDSEL PS I/I INVESTIGATION & REHABILITATION	27-Sep-11 A	30-Sep-11	30-Sep-11
CINDERELLA PS ELIMINATION	31-Dec-23	31-Dec-23	31-Dec-23
CINDERELLA PS ELIMINATION	31-Dec-23	31-Dec-23	31-Dec-23
GOVERNMENT CENTER PS ELIMINATION	01-Apr-11 A	31-Dec-24	31-Dec-24
GOVERNMENT CENTER PS ELIMINATION	01-Apr-11 A	31-Dec-24	31-Dec-24
AVANTI PS ELIMINATION	28-Jul-09 A	31-Dec-10	31-Dec-10

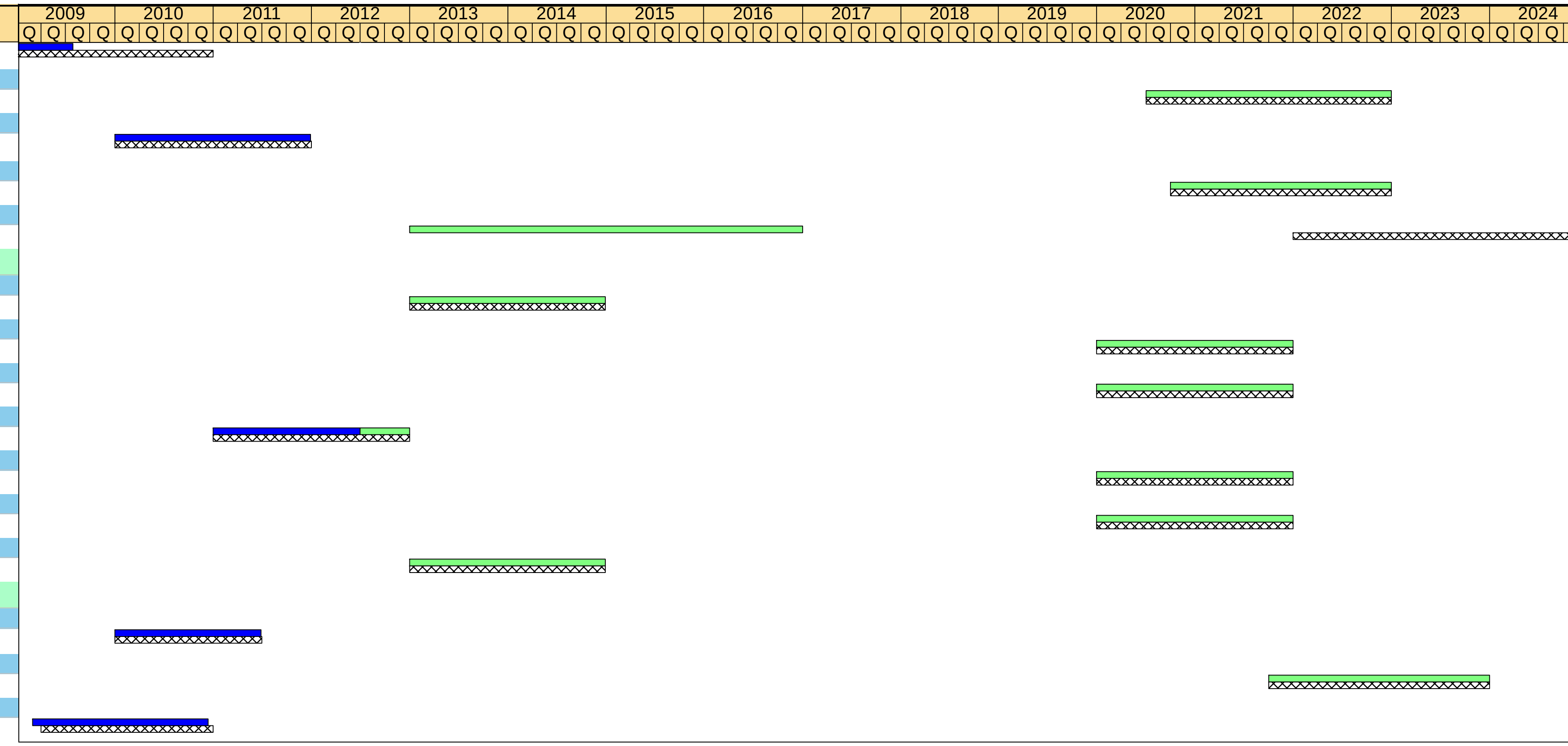


Approved 2009 IOAP | Remaining Work | Completed Work

Date Date: 01-Jul-12

MSD Integrated Overflow Abatement Plan Implementation Schedule (01 Jan 2009- 31 Dec 2024)

Activity Name	Scheduled Finish	2009 IOAP Completion	2012 IOAP Modification
AVANTI PS ELIMINATION	28-Jul-09 A	31-Dec-10	31-Dec-10
CHARLESWOOD INTERCEPTOR EXTENSION	31-Dec-22	31-Dec-22	31-Dec-22
CHARLESWOOD INTERCEPTOR EXTENSION	31-Dec-22	31-Dec-22	31-Dec-22
LANTANA PS I/I INVESTIGATION & REHABILITATION	29-Dec-11 A	31-Dec-11	29-Dec-11
LANTANA PS I/I INVESTIGATION & REHABILITATION	29-Dec-11 A	31-Dec-11	29-Dec-11
LEVEN PS ELIMINATION	31-Dec-22	31-Dec-22	31-Dec-22
LEVEN PS ELIMINATION	31-Dec-22	31-Dec-22	31-Dec-22
CAVEN AVENUE WW STORAGE	31-Dec-16	31-Dec-24	31-Dec-16
CAVEN AVENUE PS ELIMINATION	31-Dec-16	31-Dec-24	31-Dec-16
SMALL WWTP AREA	31-Dec-21	31-Dec-21	31-Dec-21
RIDING RIDGE PS IMPROVEMENTS	31-Dec-14	31-Dec-14	31-Dec-14
RIDING RIDGE PS IMPROVEMENTS	31-Dec-14	31-Dec-14	31-Dec-14
LUCAS LN PS INLINE STORAGE	31-Dec-21	31-Dec-21	31-Dec-21
LUCAS LN PS INLINE STORAGE	31-Dec-21	31-Dec-21	31-Dec-21
ST. RENE RD PS INLINE STORAGE	31-Dec-21	31-Dec-21	31-Dec-21
ST. RENE RD PS INLINE STORAGE	31-Dec-21	31-Dec-21	31-Dec-21
LAKE FOREST PS IMPROVEMENTS	31-Dec-12	31-Dec-12	31-Dec-12
LAKE FOREST PS IMPROVEMENTS	31-Dec-12	31-Dec-12	31-Dec-12
GUNPOWDER PS INLINE STORAGE	31-Dec-21	31-Dec-21	31-Dec-21
GUNPOWDER PS INLINE STORAGE	31-Dec-21	31-Dec-21	31-Dec-21
FOX HARBOR INLINE STORAGE	31-Dec-21	31-Dec-21	31-Dec-21
FOX HARBOR INLINE STORAGE	31-Dec-21	31-Dec-21	31-Dec-21
FAIRWAY VIEW PS IMPROVEMENTS	31-Dec-14	31-Dec-14	31-Dec-14
FAIRWAY VIEW PS IMPROVEMENTS	31-Dec-14	31-Dec-14	31-Dec-14
SOUTHEASTERN DIVERSION AREA	31-Dec-23	31-Dec-23	31-Dec-23
PARKVIEW ESTATES I/I INVESTIGATION & REHABILITATION	28-Jun-11 A	30-Jun-11	30-Jun-11
PARKVIEW ESTATES I/I INVESTIGATION & REHABILITATION	28-Jun-11 A	30-Jun-11	30-Jun-11
SUTHERLAND INTERCEPTOR	31-Dec-23	31-Dec-23	31-Dec-23
SUTHERLAND INTERCEPTOR	31-Dec-23	31-Dec-23	31-Dec-23
BEARGRASS INTERCEPTOR REHABILITATION PH 2	14-Dec-10 A	31-Dec-10	31-Dec-10
BEARGRASS INTERCEPTOR REHABILITATION PH 2	14-Dec-10 A	31-Dec-10	31-Dec-10

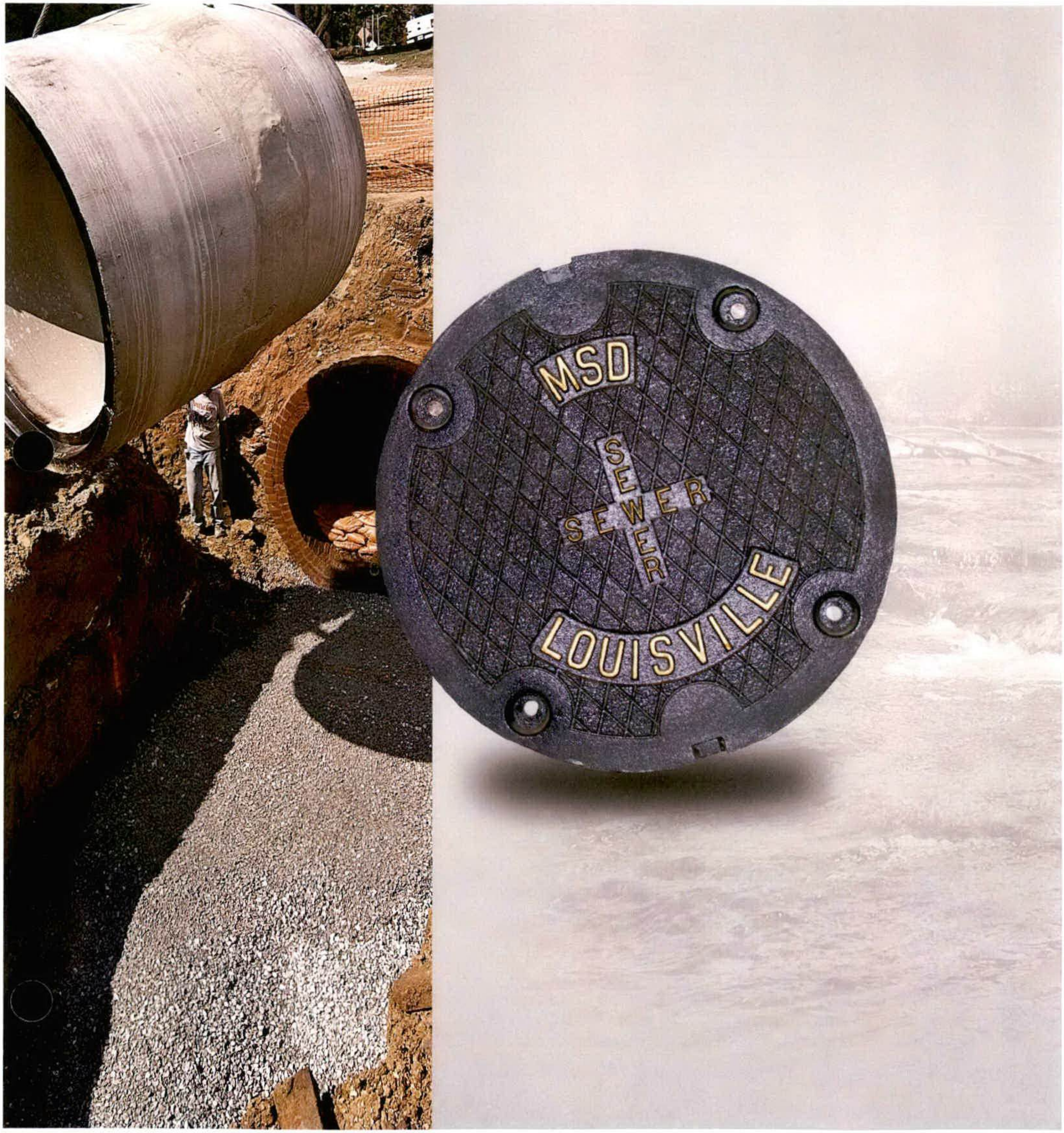


Approved 2009 IOAP
Remaining Work
Completed Work

Date Date: 01-Jul-12

Executive Summary

Attachment 1



MEMORANDUM

TO: Louisville and Jefferson County Metropolitan Sewer District Board

FROM: Stakeholder Members of the Wet Weather Team

DATE: December 10, 2008

SUBJECT: Draft Integrated Overflow Abatement Plan

As stakeholder members of MSD's Wet Weather Team (WWT), we wish to indicate our support for the Final Integrated Overflow Abatement Plan (IOAP) as MSD transmits the plan to the U.S. Environmental Protection Agency (EPA) and the Kentucky Environmental and Public Protection Cabinet. The attached document, "Vision for MSD's Integrated Overflow Abatement Plan," summarizes the Wet Weather Team's common understanding of the high-level architecture and components of the IOAP. As stakeholder members of the WWT, we played an active role in developing the IOAP Vision. Our support for the IOAP is based on the expectation that the complete plan is fully reflective of and consistent with the IOAP Vision. We support this vision for improving wet weather sewer overflow management in our community. In this memorandum, we review the composition and charge of the Wet Weather Team, describe the results of the stakeholder subgroup's deliberations, and outline our support for the IOAP.

Wet Weather Team Composition and Charge

The Wet Weather Team consists of community representatives, elected officials, MSD personnel, and technical consultants. The nineteen stakeholders on the Wet Weather Team include individuals recognized as community opinion leaders associated with environmental advocacy, business and industry, elected officials, local government, community neighborhood, recreation, public health, environmental justice, and organized labor interests. WWT stakeholders have not formally represented their specific affiliated organizations as part of the team, but rather have provided input reflective of the broad interest areas in which they lead.

MSD chartered the stakeholder subgroup of the Wet Weather Team to "provide guidance on the development of an integrated Wet Weather Program that will comply with applicable regulatory requirements and will minimize the impacts of wet weather discharges on water quality, aquatic biota, and human health." Through MSD's consent decree with EPA and the Kentucky Environmental and Public Protection Cabinet, the WWT was charged with two primary tasks: (1) preparing a plan for funding MSD's overflow abatement program and (2) developing a program for public information, education, and involvement. In addition to these tasks, MSD sought guidance from WWT stakeholders on MSD's overall investment, policy, and performance choices in the development of the IOAP.

Results of the Wet Weather Team's Deliberations

The Wet Weather Team met 22 times from July 2006 through December 2008 and provided input on all major components of the IOAP, as well as the analytic framework and the public involvement process MSD used to develop the IOAP. The WWT also met to review the public comments submitted on the Draft IOAP and discuss the changes proposed for the Final IOAP. There are four areas of the WWT stakeholder subgroup's deliberations that we would like to highlight, as follows.

1. Development of the Analytic Framework: The WWT stakeholders, along with other WWT members, identified and agreed upon a set of community values to use in the development of MSD's IOAP. We also advised MSD's technical team on a performance evaluation framework for using those values to evaluate project alternatives for MSD's IOAP. The performance evaluation framework includes both a benefit-cost scoring methodology for selecting the best alternatives at the project level and a systematic process for considering values that relate to the program as a whole. (This analytic framework is further described in the attached Vision.) We believe that this analytic framework is rigorous, transparent, and replicable, and that it provides an effective way to understand and balance tradeoffs among potentially conflicting community interests.

2. Application of the Analytic Framework: The WWT stakeholder subgroup has reviewed examples of how MSD's technical team has used the values-based performance evaluation framework to evaluate project alternatives to address combined sewer overflow (CSO) and sanitary sewer overflow (SSO) problems in our community. Moreover, we have also reviewed and provided input on how the technical team has evaluated the IOAP according to the WWT's programmatic community values—customer satisfaction, economic vitality, education, environmental justice and equity, financial equity, and financial stewardship. We believe that the analytic framework has been applied consistent with the WWT's expectations in the development of the IOAP and has produced a robust, replicable, and transparent analysis.

3. IOAP Vision: We helped develop the attached "Vision for MSD's Integrated Overflow Abatement Plan" along with the MSD personnel and technical consultants who are on the Wet Weather Team. The IOAP Vision summarizes the WWT's common understanding of the high-level architecture and components of the IOAP, and it documents the WWT's consensus about several crucial aspects of the IOAP. The Vision outlines and provides highlights of the expected water quality benefits of the IOAP; the levels of control for CSOs and SSOs in our community; the range of control options in the IOAP; the analytic framework and process used to select control options; the public information, education, and involvement program (known as "Project WIN"); the monitoring, evaluation, and adaptive management plan; future development considerations relevant to the IOAP; and the IOAP funding plan. As stakeholder members of the WWT, we support this vision for improving wet weather sewer overflow management in our community.

4. Summary of IOAP Projects: We believe the project mix and outcomes that form the backbone of the IOAP (as captured in the attached IOAP Vision) reflect responsiveness to MSD's consent decree and provide for a critical, first increment of water quality improvement for our community, while ensuring wise and effective use of our community's resources. The IOAP Vision draws on front end consideration of and investment in green infrastructure and other source control approaches, including "private side" inflow and infiltration (I&I) control. These early investments will act to test and demonstrate the effectiveness of these approaches, creating the prospect, based on demonstrated performance, for expanding their role and lowering community costs as MSD implements the IOAP. We understand that MSD, consistent with the Post-Construction Compliance Monitoring Plan, will closely monitor and report on the efforts for both regulatory and public education purposes. We further understand that MSD, over the coming months, will work with community members to further articulate and enhance the scope and scale of its IOAP public education and outreach program, including developing a robust approach for measuring the effectiveness of the program.

As MSD moves forward in coming years with IOAP implementation, we do anticipate the program will face, as all programs of this type do, project-specific challenges related to local community understanding and acceptance. In this context, we understand MSD is committed to using focused and sustained neighborhood education and outreach efforts to support project-specific and overall program implementation and will strive to address localized needs consistent with overall IOAP requirements. At the same time, we believe all localities throughout the MSD system must keep in mind that individual IOAP project locations and types have emerged from a rigorous and consistently applied technical analysis. The IOAP projects exist as critical building blocks for an overall community program framed by federal and state regulatory requirements, community water quality and public health improvement objectives, and overall rate payer capacity.

The stakeholder subgroup of the Wet Weather Team appreciates the opportunity to have contributed to MSD's IOAP development efforts. During our final meeting on December 4, 2008, we discussed the importance of an overarching, sustained community water quality education initiative directed at enhancing appreciation for water quality improvements and building understanding of the actions all members of the community can take to improve water quality. We understand this effort is substantially broader in scope than the CSO and SSO improvements addressed by the IOAP, but we believe it is important to take this opportunity to raise awareness for this need, particularly as our community turns its attention to stormwater management in the context of the multi-jurisdictional Municipal Separate Storm Sewer System (MS4) permit. We appreciate MSD's willingness to be a contributor to such an effort, even as we recognize the need for broader involvement and leadership throughout the Louisville community and across Louisville Metro Government.

We look forward to the MSD Board's review of the Final IOAP and MSD's submittal of the Final IOAP to EPA and the State of Kentucky by December 31, 2008. Thank you for the opportunity to contribute to this critical community improvement initiative. Please feel free to contact us individually or collectively with any questions or perspectives you may have.

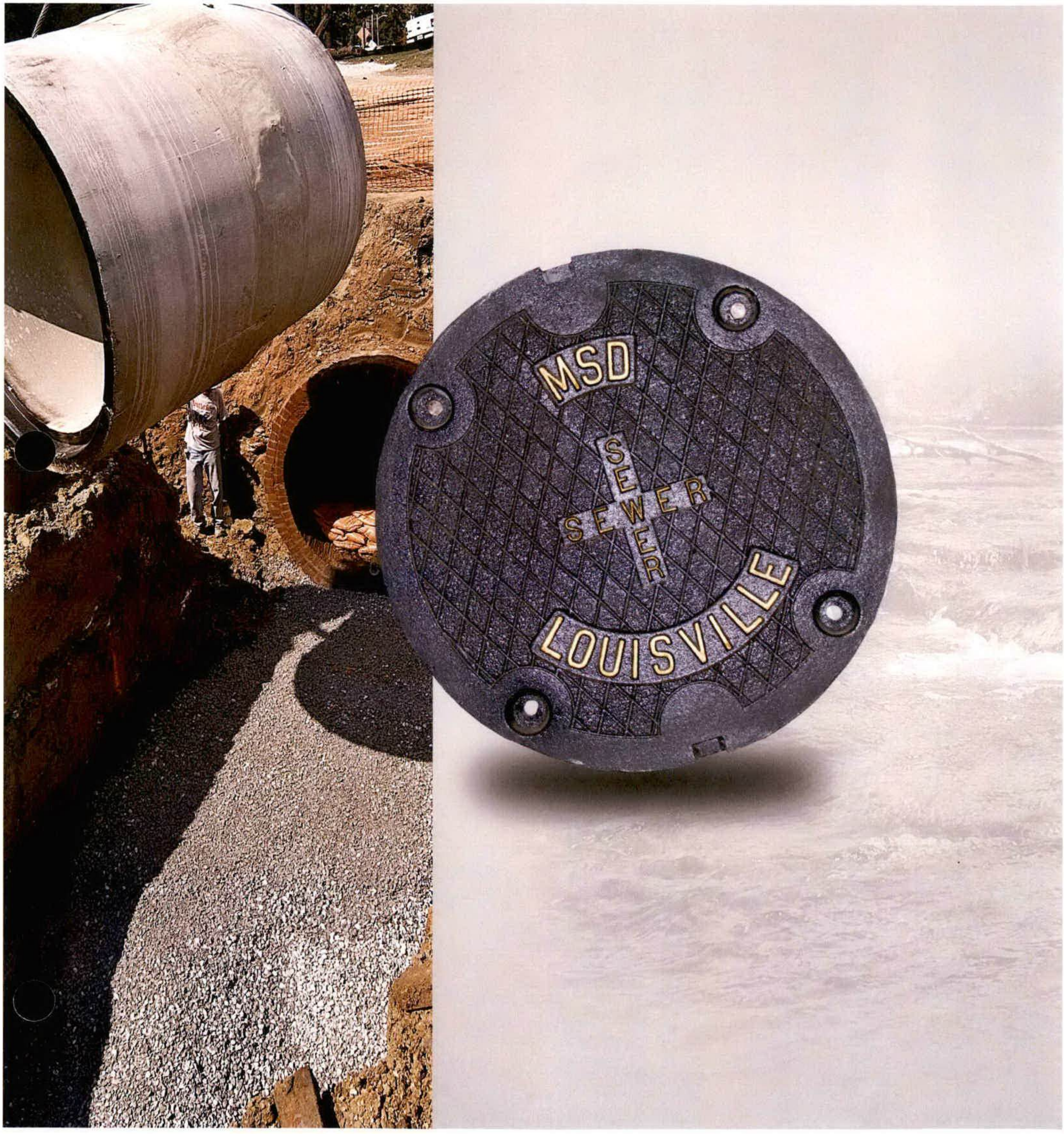
Stakeholder Members of the Wet Weather Team

Member	**Organization***
Steve Barger	Labor
Susan Barto	Mayor of Lyndon
Stuart Benson	Louisville Metro Council, District 20
Charles Cash	Louisville Metro Planning & Design Services
Allan Dittmer	University of Louisville
Laura Douglas	E.ON U.S. LLC
Faye Ellerkamp	City of Windy Hills
Arnita Gadson	West Jefferson County Community Task Force / Kentucky Environmental Quality Commission
Mike Heitz	Louisville Metro Parks Department
Tom Herman	Zeon Chemicals
Rick Johnstone	Deputy Mayor, Louisville Metro Mayor's Office
Bob Marrett	CMB Development Company, LLC
Kurt Mason	Jefferson County Soil and Water Conservation District
Judy Nielsen	Louisville Metro Department of Public Health and Wellness
Lisa Santos	Irish Hill Neighborhood Association
Bruce Scott	Kentucky Waterways Alliance
David Tollerud	University of Louisville, School of Public Health and Information Sciences
Tina Ward-Pugh	Louisville Metro Council, District 9
David Wicks	Jefferson County Public Schools

*Stakeholders on the Wet Weather Team do not formally represent their specific affiliated organizations, but rather seek to provide input reflective of the broad interest areas in which they lead. Along with the stakeholder subgroup, the Wet Weather Team includes MSD personnel and technical consultants.

Executive Summary

Attachment 2



Vision for MSD's Integrated Overflow Abatement Plan
December 10, 2008

This document summarizes the vision for MSD's Integrated Overflow Abatement Plan (IOAP), as understood and endorsed by the Wet Weather Team (WWT).

Scope of the Integrated Overflow Abatement Plan and Expected Water Quality Benefits

The Louisville and Jefferson County Metropolitan Sewer District's Integrated Overflow Abatement Plan is a long-term plan to control combined sewer overflows (CSOs) and sanitary sewer overflows (SSOs) in the community. The IOAP is expected to improve water quality in both Jefferson County streams and the Ohio River. The expected water quality benefits of the IOAP include: (a) reductions in the peak levels of bacteria in Beargrass Creek and other Jefferson County waterways; and (b) a reduction in the duration of wet weather impairment of local waterways (i.e., the number of days that bacteria levels exceed water quality standards during periods of wet weather). The IOAP—in coordination with other community water quality initiatives (further described below)—will also improve water quality under ambient conditions.

The specific benefits anticipated from the IOAP include the following:

- The suite of projects selected for the Long Term Control Plan (LTCP) for CSOs will result in approximately 95 percent capture and treatment of wet weather combined sewage during an average year. (As a point of reference, the "presumptive approach" in EPA's CSO Control Policy is based on a minimum of 85 percent wet weather capture.)
- Remaining CSO loads (after removing background) will no longer "cause or contribute" (as defined in EPA's CSO Control Policy) to water quality standard violations in the Ohio River. Peak fecal coliform counts are modeled to be reduced by 54 percent, from 100,000 colony forming units per 100 milliliter (cfu/100mL) to 46,000 cfu/100 mL (downstream from Morris Forman Wastewater Treatment Plant).
- In Beargrass Creek peak fecal coliform counts are modeled to be reduced by 18 percent, from 44,300 cfu/100mL to 37,400 cfu/100 mL (at the mouth of Beargrass Creek). The control level associated with these reductions exceeds the EPA CSO Control Policy "presumptive approach," 85 percent wet weather capture threshold and reflects a point of significantly diminishing returns under the "knee of the curve" benefit-cost analysis.
- The suite of projects selected for the Sanitary Sewer Discharge Plan (SSDP) for SSOs will result in the elimination of capacity-related SSOs up to the site-specific level of protection (described below).
- The SSO projects are anticipated to eliminate an average of 145 SSO events per year, based on 2005–2007 data.
- In terms of water quality, SSO projects will eliminate an average of 290 million gallons of overflow volume per year (average of 2005–2007 normalized for rainfall), eliminating 100 tons of 5-day biochemical oxygen demand (BOD5) and almost 200 tons of solids annually.

Along with delivering water quality improvements from sewer overflow control, MSD participates in other community water quality improvement efforts. Sewer overflow control is essential to improving water quality, but overflow control alone is not enough to meet water quality standards. In light of this challenge, MSD will continue to leverage its role in supporting broader water quality improvement efforts in the community. The IOAP will be one of the key elements of MSD's participation in those water quality improvement efforts. In particular, the IOAP will be complementary to other wet weather and water quality programs managed by MSD and/or by other community partners. These complementary efforts include, but are not limited to, the Mayor's "Go Green Louisville" Initiative, the Partnership for a Green City, Metro Louisville's Municipal Separate Storm Sewer System (MS4) discharge permit, and initiatives of Jefferson County Public Schools (JCPS), private developers, and other entities.[1]

The specific ways in which MSD is collaborating with other entities on community water quality improvement initiatives include the following:

- Partnership for a Green City: MSD is actively working with Louisville Metro Government, JCPS, and the University of Louisville to improve water quality through the Partnership for a Green City. The Partnership has established a Stormwater Committee that will be identifying opportunities to improve water quality associated with planned capital projects.
- Metro Government: MSD is an active participant in the Mayor's Go Green Louisville Initiative, which includes in its vision a commitment to focus on financially sustainable measures that improve air and water quality, land use, and energy efficiency. In coordination with this initiative, MSD is partnering with Louisville Metro Government on several green infrastructure demonstration projects in the IOAP.
- MS4 Program: MSD will coordinate IOAP implementation with the agencies that share implementation of the MS4 Program—including Metro Louisville government, small cities that handle their own drainage, and the Kentucky Department of Transportation. The MS4 program will draw upon the opportunities identified through the green infrastructure analysis conducted by MSD's IOAP technical team and the ideas suggested by WWT members during the development of the IOAP. MSD further anticipates implementing demonstration projects, such as rain gardens in the separate sewer area, under the MS4 as part of a coordinated effort with the IOAP to test and evaluate green infrastructure approaches to wet weather management.

The IOAP—as part of MSD's wet weather consent decree response—will be a federally enforceable action plan for sewer overflow abatement. Although many IOAP projects and programs will provide multiple benefits to the community, the scope of the IOAP is limited to commitments that directly relate to MSD programs and activities to address combined sewer overflow (CSO) and sanitary sewer overflow (SSO) issues. Other community water quality programs, which may be partly or completely out of MSD's control, can provide synergistic benefits with the IOAP, but they do not fall under the same federal enforcement. These programs may, however, have different mechanisms for ensuring accountability (e.g., the State of Kentucky oversees the MS4 stormwater permit that MSD and several other agencies hold). As noted above, MSD anticipates coordinating IOAP implementation with the water quality improvement initiatives of Louisville Metro Government and other public and private entities, even though these broader initiatives may not explicitly be part of the IOAP.

Values-Based Performance Evaluation Framework Used to Develop the IOAP

MSD developed the IOAP using a values-based performance evaluation framework established by the Wet Weather Team. This analytic framework includes both a robust benefit-cost scoring methodology for evaluating and selecting project alternatives and a systematic process for evaluating the IOAP programmatically. The Wet Weather Team identified and agreed upon the following eleven community values that underpin the analysis and selection of alternatives for the IOAP.

[1] More information about these initiatives is available on the following websites: Go Green Louisville (www.louisvilleky.gov/GoGreen), Partnership for a Green City (www.partnershipforagreencity.org), and MS4 program (www.msdlouky.org/insidemsd/wwwq/ms4).

Project-Specific Values

- Asset protection
- Eco-friendly solutions
- Environmental enhancement
- Public health enhancement
- Regulatory performance

Programmatic Values

- Customer satisfaction
- Economic vitality
- Education
- Environmental justice and equity
- Financial equity
- Financial stewardship

Using the structured decision-making process as framed by the Wet Weather Team, MSD developed and evaluated overflow abatement control options for the IOAP based on managing risks to these community values. In particular, MSD's technical team analyzed each project alternative considered for the IOAP in terms of potential benefits and costs, where "benefits" are quantified based on the anticipated reduction in risks to the community values and "costs" reflect the total capital and operational costs of the alternative. The benefit-cost analysis influences the selection of site-specific abatement approaches or technologies, site-specific levels of protection (within the boundary conditions for CSOs and SSOs described below), and the relative priority of projects for implementation.

Several of the Wet Weather Team's community values relate to financial considerations, including the cost-effectiveness of individual solutions and the program as a whole (financial stewardship), the affordability of the program's total costs for the community (economic vitality), and how the costs are allocated among different segments of the population (financial equity). The Wet Weather Team has used the results of the values-based benefit-cost analysis of project alternatives to provide context to discussions about the appropriate level of investment in the IOAP.

The WWT's discussions about total program costs and the selection of projects for the IOAP have considered, as directed in EPA's CSO Control Policy, a "knee of the curve" analysis to determine where the increment of pollution reduction achieved in the receiving water diminishes compared to the increased costs. In addition to this analysis, the community's level of investment in the IOAP has been considered in the context of anticipated future requirements and other needs for MSD services, including stormwater compliance needs associated with Metro Louisville's MS4 permit and requirements to meet the forthcoming total maximum daily load (TMDL) allocations for Beargrass Creek. This consideration of other water quality investment needs is important since sewer overflow control alone will not be sufficient to meet water quality standards.

The technical team's analysis of the IOAP according to the WWT's programmatic values yielded the following conclusions.

- <u>Customer Satisfaction:</u> The IOAP ensures service continuity by eliminating several small wastewater treatment plants and pump stations and by incorporating redundant equipment and standby generators. Odor control guidelines have been consistently applied across all projects. Most storage basins proposed in the IOAP will be covered. Other storage basin and pump station improvement projects incorporate odor control equipment.
- <u>Economic Vitality:</u> MSD's current rates are near the national average. The anticipated annual rate increases of 5–6.5 percent are consistent with initial estimates of program costs, and they include allowances for future MSD programs as well as IOAP implementation. Even with these rate increases, MSD's rates are anticipated to remain at or near the national average, assuming other communities face similar inflation and regulatory pressures. These estimates are based on current data; many unknown factors (e.g., bond market, climate change, etc.) will also affect future rates.

- Education: Education is an integral and essential component of the IOAP. It supports a number of IOAP objectives, including promoting and sustaining participation in green infrastructure and source control efforts, and building a sense of personal responsibility and support for clean water initiatives.
- Environmental Justice and Equity: The site selection process followed uniform criteria across the county, with most solutions placed near overflow points and with no homes or private businesses permanently displaced. Furthermore, the configuration of facilities was based on a uniform application of written design criteria and odor control criteria. Other nuisance conditions will be minimized during the design and construction phases of projects.
- Financial Equity: MSD's rate structure is based on a cost-of-service model tempered by consideration of customers' ability to pay. The rate increases proposed to fund the IOAP and other MSD programs will continue to be based on the cost of service, but MSD will recommend to the Board that the existing low income, senior citizen discount program be expanded. The IOAP also proposes subsidies and incentives for green infrastructure and infiltration and inflow (I&I) control based on their business value for overflow abatement.
- Financial Stewardship: As described above, the IOAP is based upon a rigorous benefit-cost analysis that considered a broad range of technology alternatives and different levels of control that met or exceeded regulatory guidelines. The "knee of the curve" evaluations of IOAP projects demonstrated that the IOAP provides a high level of control, but does not exceed the point of diminishing returns.

Control Levels for Combined Sewer Overflows and Sanitary Sewer Overflows

Under the Clean Water Act, CSOs are permitted discharges in wet weather, as long as they are managed to avoid degradation of water quality in the receiving streams. EPA's CSO Control Policy[2] sets specific abatement targets for CSOs. To be permitted, wet-weather CSOs must be controlled so that either water quality standards are achieved or the permit-holder can show that the CSO discharges do not cause or contribute to exceedances of water quality standards. Based on EPA's CSO Control Policy, EPA may respond to MSD's proposed strategy for controlling wet weather CSO discharges indicating a need for a temporary variance or suspension of water quality standards during wet weather. Variances are temporary, not permanent, solutions to achieve compliance with the Clean Water Act. As stated in EPA's CSO Control Policy, variances are reviewable generally every three years.

CSO projects in the IOAP have the following levels of control:

- 6 projects result in no overflows in a typical year; these locations would only overflow as a result of very large storms.
- 1 project would result in four overflows per year in a typical year.
- 11 projects result in eight overflows per year in a typical year.

MSD's strategy for SSO control reflects the fact that SSOs, unlike wet-weather CSOs, are unauthorized discharges that must be "eliminated" under the Clean Water Act. In the IOAP, the values evaluation framework has been used to evaluate a range of site-specific design storms to establish the appropriate level of control of SSOs. Consistent with an analysis of sixty years of historical weather patterns for Jefferson County, the IOAP uses a three-hour "cloud burst" storm, with a statistically anticipated rainfall of 1.82 inches, as the minimum design storm considered. The Cities of Atlanta, Cincinnati, and Knoxville used similar design storms as the minimum protection level for SSO control. The approach of using the values evaluation framework to determine the SSO control level means that solutions to address certain SSOs have been designed to protect against larger storms (e.g., a 2.25-inch cloudburst storm

[2] EPA's Combined Sewer Overflow Control Policy is available at http://cfpub1.epa.gov/npdes/cso/cpolicy.cfm.

instead of a 1.82-inch cloudburst storm) because they yield a higher benefit-cost ratio in the analysis of project alternatives.

SSO projects in the IOAP have the following levels of control:

- 30 projects eliminate overflows up to a 1.82-inch cloudburst storm.
- 9 projects eliminate overflows up to a 2.25-inch cloudburst storm.
- 7 projects eliminate overflows up to a 2.60-inch cloudburst storm.

Components of MSD's Integrated Overflow Abatement Plan

Control options in the IOAP (the IOAP "toolkit") include source control (including green infrastructure and infiltration and inflow [I&I] reduction efforts), storage, conveyance/transport, treatment, and sewer separation. MSD's technical team has used the benefit-cost tool to compare the project alternatives and program elements considered for inclusion in the IOAP. The specific mix of control options for individual CSO or SSO locations in the IOAP is driven by the benefit-cost analysis of how the project alternatives affect the WWT's community values and site-specific considerations. Project alternatives are built around MSD's existing infrastructure (e.g., large diameter pipes and wastewater treatment plants) and draw on synergistic benefits from other MSD projects (e.g., the "Big Four" SSO projects). Furthermore, project budgets include an enhanced site restoration allowance to fund localized opportunities to reduce historical overflow impacts on aquatic and riparian environments near the sites of overflow abatement projects.

Driven by the values-based benefit-cost analysis, the IOAP reflects a balanced mix of green and gray solutions to prevent and control sewer overflows. "Green" solutions include options such as green roofs, rain gardens, rain barrels, porous pavement, and bioretention, while "gray" solutions include options such as storage, treatment, conveyance/transport, and sewer separation. As a guiding principle, MSD's IOAP has been developed based on front-end consideration of source control and green infrastructure. This means that more traditional "gray" infrastructure in the IOAP has been sized after considering both (1) the anticipated flow-reduction benefits of programmatic and site-specific green infrastructure solutions and (2) the anticipated effectiveness of other source control approaches, including reduction of private sources of I/I. Green solutions in the IOAP will be implemented as soon as possible, to allow data to be gathered on the flow reduction benefits that occur. Prior to the final design of supporting gray solutions, the actual flow reduction performance will be documented and compared against the estimated targets. The final sizing of the gray solutions will then be based on actual documented performance of green solutions, as well as any further green and source control investments justified by performance information. Green infrastructure investments are estimated to reduce the initial costs of CSO gray infrastructure projects by $40 million; potential future savings could double or triple this figure.

As defined in the IOAP, the 19 gray infrastructure projects to control CSOs include:

- 4 sewer separation projects;
- 13 storage basin projects (This includes in-line and off-line storage; most in-line storage projects have a Real-Time Control component.);
- Replacement and expansion of the Nightingale Sanitary Pump Station; and
- 1 high-rate wet weather treatment project (screening, settling, and disinfection).

The 46 gray infrastructure projects to control SSOs in the IOAP include:

- 15 conveyance capacity upgrades and interceptor relief projects;
- 19 storage projects (in-line and off-line storage, many with pipe upgrades also);
- 1 sewer replacement project for Beechwood Village (one of the "Big 4 SSOs");and
- 11 pump station and wastewater treatment plant upgrades, eliminations, or replacements. These projects include expanding the wet weather capacity of the Derek R. Guthrie Water Quality Treatment Center, elimination of 5 small wastewater treatment plants in the Prospect area, and potentially the elimination of the Jeffersontown Wastewater Treatment Plant.

The IOAP includes both an annual green infrastructure program and an initial set of green infrastructure demonstration projects. The green infrastructure program is front-end loaded to maximize benefits on downsizing future gray infrastructure. For example, the IOAP project schedule calls for a $40 million investment in green infrastructure programs and projects during the first six years. Programmatic green infrastructure components in the IOAP include a downspout disconnect program, green roof construction subsidies or incentives, green roads and alleys partnership incentives, and pervious pavement sidewalks and parking. MSD has based the proposed incentives and subsidies on a "business case" analysis of the financial benefit of green infrastructure in terms of costs per gallon of flow removed from the combined sewer system. Through the anticipated green infrastructure partnership, incentive, and education programs, MSD's initial $40 million investment in green infrastructure has the potential to leverage $60 million more from other private and public funding sources, thereby yielding up to $100 million in green infrastructure projects.

MSD plans to construct a series of new green infrastructure demonstration projects across Jefferson County. The proposed green infrastructure projects in the combined sewer area will be part of MSD's IOAP, while the proposed green infrastructure projects outside the combined sewer area will be a part of the community's MS4 stormwater program. These demonstration projects are designed to achieve three main objectives: (1) improve water quality and reduce sewer overflows, (2) provide data on green infrastructure effectiveness, and (3) educate community members about the value and benefits of green infrastructure. All green infrastructure demonstration projects in the IOAP will incorporate a monitoring component, so that the effectiveness of the projects can be tracked over time and regularly reported to regulators and the public. MSD will then use these monitoring results to guide future IOAP implementation, under the IOAP's adaptive management plan (further described below).

This vision currently reflects a minimum commitment to 18 green infrastructure demonstration projects in the IOAP. These proposed new green infrastructure demonstration projects (which are subject to partnership and regulatory approval) include:

- 6 bioswale and biofiltration projects (e.g., green parking lots and green streets);
- 4 rain gardens;
- 3 pervious concrete alleys; and
- 5 infiltration dry wells.

MSD plans to expand and enhance this proposed suite of demonstration projects in response to feedback from WWT members that the initial projects might not be sufficient to achieve the objective of educating the public and building support for green infrastructure. In particular, MSD will look to enhance the distribution of demonstration projects in Jefferson County (including considering green infrastructure projects in each Metro Council District) and the numbers of individual project types.

MSD's technical team has analyzed potential options to control private sources of I/I into the sanitary sewer system, including building laterals, downspouts, sump pumps, and foundation drains. This analysis indicates that private-side I/I control is an essential part of the IOAP, and it will reduce the overall anticipated costs of overflow abatement. The technical team has analyzed options for adopting a requirement for inspections of private properties (e.g., during the property transfer process, when building permits are issued, when contractors install roof and gutter systems, when plumbers connect sump pumps, and/or at other times), along with providing some form of cost share and conducting an aggressive education campaign. MSD will work with Metro Government to support further development and adoption of an ordinance supporting these requirements. Although I&I reduction is particularly relevant to SSO control (since the sanitary sewer system was not designed to accept inflow), it may be useful to have similar requirements for the combined sewer system.

Public Information, Education, and Involvement Program

Education and public involvement are critical to the long-term implementation success of the IOAP. MSD uses the term "Project WIN" (Waterway Improvements Now) to describe its consent decree response activities to the public. The ongoing public information, education, and involvement program for Project WIN is designed to accomplish the following objectives:

1. Generate a sense of personal ownership and responsibility for clean water;
2. Promote and sustain participation in critical voluntary programs in the IOAP, including private-side I&I control and green infrastructure;
3. Promote public acceptance and support for the financial investments required to achieve consent decree and Clean Water Act compliance; and
4. Encourage support for other agency programs or legislation that supports overflow abatement efforts.

To achieve these objectives, the Project WIN education and public involvement program uses a wide range of communication media. In particular, the program includes the following elements:

- Public meetings and community events;
- Enhanced web portal for Project WIN;
- Speaker's bureau and technical support;
- Print and electronic media (e.g., print advertisements, press releases, targeted brochures and pamphlets, reports, newsletters, billing inserts, public TV video, radio announcements, etc.);
- Recognition programs;
- Demonstration projects;
- Tours, demonstrations, and workshops;
- Enhanced school partnerships; and
- Annual effectiveness monitoring through direct mail and phone surveys.

These public involvement efforts are focused on several key audiences, including the general public, schools and children, and target groups such as property owners, project neighborhoods, builders, and restaurants. Focusing education efforts on children is important to ensure the long-term sustainability of voluntary programs in the IOAP. For the general public, MSD is using five key messages:

1. Value clean water.
2. Your investment is paying dividends, and our water is getting cleaner.
3. Protecting public health is critically important.

4. MSD and many community partners are working hard to improve water quality.
5. You can make a difference in improving water quality.

Post-Construction Compliance Monitoring

MSD's IOAP will use an adaptive management implementation approach based on monitoring and evaluation efforts. MSD's post-construction compliance monitoring and evaluation plan for the IOAP includes: (a) water quality monitoring, (b) sewer flow monitoring, (c) overflow events analysis, (d) gray and green infrastructure project performance monitoring, and (e) measurement of the effectiveness of source control and behavior-change efforts. MSD will prepare both required regulatory and public education reports from these data and adapt the CSO management and SSO elimination approaches based on the monitoring and evaluation results. Adjustments may include recalibrating models, "right-sizing" gray solutions, reevaluating the effectiveness of green solutions, and adjusting the types and characteristics of projects planned for later phases of implementation, including additional investments in green infrastructure and source control beyond those proposed in the initial program. At this time there is recognition that historical weather trends may not be as reliable as in the past due to potential changes in the climate. The IOAP's adaptive management approach will allow MSD to monitor evolving weather pattern developments and adjust its plans as more data become available.

Future Development Considerations

Solutions in the IOAP consider future development based on the community's long-term land-use plan, Cornerstone 2020.[3] IOAP solutions are designed to accommodate the anticipated impacts of population growth and land-use development in that the solutions consider the effects of growth on connections to existing infrastructure that is upstream from existing overflow points. The IOAP is not, however, intended to provide capacity for all future growth predicted by Cornerstone 2020. Cases where the growth outlined in Cornerstone 2020 would logically be provided by new infrastructure, and not hydraulically dependent on or connected to the IOAP solution, have not been considered part of the IOAP. In summary, the solutions in the IOAP have been designed and sized to account for the impacts of anticipated growth on existing infrastructure, but the IOAP itself is not intended to build the capacity needed for growth.

MSD's Capacity, Management, Operations, and Maintenance (CMOM) Program, which is part of MSD's Consent Decree response but separate from the IOAP, includes standard operations and maintenance activities practices designed to, among other things, investigate capacity-constrained areas of the sewer system. The CMOM program also includes a System Capacity Assurance Program focused on providing capacity for current and future service needs.

Continued development in the community will require MSD to implement measures to reduce wet-weather flows. MSD will use a three-to-one offset of wet-weather flows from new development. This means that existing flows entering MSD's sanitary sewer systems will be reduced at a ratio of three gallons for every new gallon added. MSD's flow reduction efforts will be designed to correct deficiencies in the existing sewer system in the same geographic areas (sewersheds) of the system affected by the flows from new development. MSD will track flow reduction "credits" to ensure that the flow reductions occur in the appropriate geographic locations to offset the new flows. (This three-to-one offset approach is based on the City of Knoxville's Capacity Assurance Program.) The MSD Board will develop the fee structure for the offset plan.

[3] For more information about the Cornerstone 2020 plan, see www.louisvilleky.gov/PlanningDesign/Cornerstone+2020.htm.

Funding Plan

The funding plan for the IOAP is designed to cover the 15-year period over which IOAP capital projects will be constructed to improve MSD's sewer infrastructure to meet the requirements of the consent decree. The IOAP funding plan is based on the following three principles:

- Rates and fees for the IOAP must pay MSD's operating costs and debt service.
- MSD's current bond rating (AA) should, at a minimum, be maintained.
- Rates and fees should allow for continued economic development in the community and a strong local economy.

These principles for the funding plan affect the amount of money MSD may borrow at any one time and the level of increases in rates and fees needed to fund capital and operating expenses for IOAP implementation.

MSD will fund the IOAP primarily through a combination of annual rate increases and bond issues or other loans. MSD also plans to pursue grants, line-item appropriations, and public/private partnerships (e.g., recapture agreements) to help pay for capital construction costs, as appropriate; however, the funding plan is not built around these funding sources since they are less certain. Using the estimate that the consent decree will cost $843 million in capital expenditures, average bills for residential customers are expected to increase from 5 to 6.5 percent annually through 2021. This means that the average residential bill would increase from $29.58 in 2008 to approximately $63.12 by 2024 due to the consent decree capital construction expenses. Along with these rate increases, MSD expects to borrow approximately $1.25 billion by 2024 based on the estimates of capital costs; this would increase MSD's debt service payments from $94 million annually to $163 million annually by 2025.[4] A mixture of fixed and variable rate borrowings is anticipated. These rate increases and loans would be used to address both IOAP construction costs and other MSD capital needs for infrastructure renewal, replacement, and expansion.

Estimates of IOAP costs appear to be within community tolerance for rate increases; however, the rate increases could nevertheless be difficult for some segments of the population to afford, especially in the context of other expenses. For this reason, the Wet Weather Team has considered potential ways to provide discounts to customers that face financial hardship. In the IOAP funding plan, MSD proposes a few changes to MSD's existing rate structure for the Board to consider. These changes are designed to accomplish two objectives: (1) provide discounts for low-income populations and (2) ensure steady and predictable revenue flows overall. The specific rate structure changes currently under study and reflected in the IOAP funding plan include the following:

- Residential customer billing based on winter consumption;
- Potentially billing customers on a monthly basis (in coordination with the Louisville Water Company).
- Expansion of the senior citizens discount program.

As noted above, MSD will construct the capital projects in the IOAP over a 15-year period, in order to meet the regulatory requirements of the consent decree and achieve compliance with the Clean Water Act. Many of the elements of the IOAP—including the Project WIN education program, operations and maintenance of IOAP projects, and monitoring and evaluation programs—will also continue past the construction phase of the IOAP. MSD is committed to making sure that the IOAP programs and projects provide for long-term improvements in water quality in Louisville and Jefferson County.

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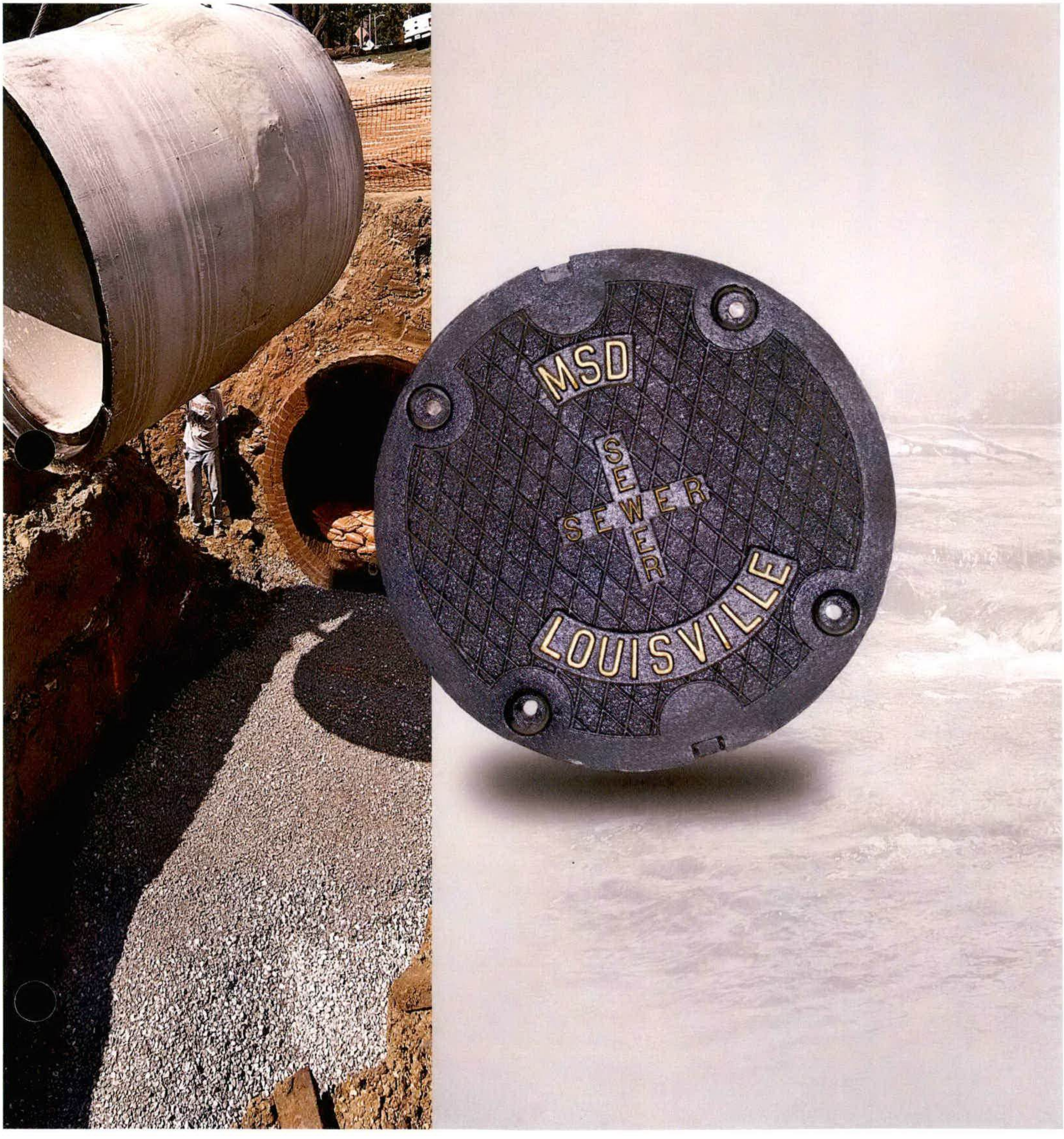
[4] This estimate assumes that interest rates are in the 5 to 6 percent range.

Executive Summary

Attachment 3



MEMORANDUM

TO: Louisville and Jefferson County Metropolitan Sewer District Board

FROM: Stakeholder Members of the Wet Weather Team

DATE: January 30, 2013

SUBJECT: Draft Integrated Overflow Abatement Plan 2012 Modifications

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As stakeholder members of MSD's Wet Weather Team (WWT), we wish to indicate our support for the Final Integrated Overflow Abatement Plan (IOAP) 2012 Modifications as MSD transmits the plan modifications to the U.S. Environmental Protection Agency (EPA) and the Kentucky Environmental and Public Protection Cabinet. The attached documents, "Vision for MSD's Integrated Overflow Abatement Plan," and "2012 IOAP Project Modifications" summarize the Wet Weather Team's common understanding of the high-level architecture and components of the IOAP and the proposed 2012 Modification. As stakeholder members of the WWT, we played an active role in developing the IOAP Vision and are pleased to see that the principles of this Vision have been retained in the 2012 Modification. Our support for the IOAP and the 2012 Modification is based on the expectation that the complete plan is fully reflective of and consistent with the IOAP Vision and the 2012 IOAP Project Modifications documents attached. We support this vision for improving wet weather sewer overflow management in our community. In this memorandum, we review the composition and charge of the Wet Weather Team, describe the results of the stakeholder subgroup's deliberations, and outline our support for the IOAP.

Wet Weather Team Composition and Charge

The WWT consists of community representatives, elected officials, MSD personnel, and technical consultants. The stakeholders on the WWT include individuals recognized as community opinion leaders associated with environmental advocacy, business and industry, elected officials, local government, community neighborhood, recreation, public health, environmental justice, and organized labor interests. WWT stakeholders have not formally represented their specific affiliated organizations as part of the team, but rather have provided input reflective of the broad interest areas in which they lead.

MSD chartered the stakeholder subgroup of the WWT to "provide guidance on the development of an integrated Wet Weather Program that will comply with applicable regulatory requirements and will minimize the impacts of wet weather discharges on water quality, aquatic biota, and human health." Through MSD's consent decree with EPA and the Kentucky Environmental and Public Protection Cabinet, the WWT was charged with two primary tasks: (1) preparing a plan for funding MSD's overflow abatement program and (2) developing a program for public information, education, and involvement. In addition to these tasks, MSD sought guidance from WWT stakeholders on MSD's overall investment, policy, and performance choices in the development of the IOAP.

Results of the Wet Weather Team's Deliberations

The WWT met 22 times from July 2006 through December 2008 and provided input on all major components of the IOAP, as well as the analytic framework and the public involvement process MSD used to develop the IOAP. The WWT also met to review the public comments submitted on the Draft

IOAP and discuss the changes proposed for the Final IOAP. There are four areas of the WWT stakeholder subgroup's deliberations that we would like to highlight, as follows.

1. Development of the Analytic Framework: The WWT stakeholders, along with other WWT members, identified and agreed upon a set of community values to use in the development of MSD's IOAP. We also advised MSD's technical team on a performance evaluation framework for using those values to evaluate project alternatives for MSD's IOAP. The performance evaluation framework includes both a benefit-cost scoring methodology for selecting the best alternatives at the project level and a systematic process for considering values that relate to the program as a whole. (This analytic framework is further described in the attached Vision.) We believe that this analytic framework is rigorous, transparent, and replicable, and that it provides an effective way to understand and balance tradeoffs among potentially conflicting community interests.

2. Application of the Analytic Framework: The WWT stakeholder subgroup has reviewed examples of how MSD's technical team has used the values-based performance evaluation framework to evaluate project alternatives to address combined sewer overflow (CSO) and sanitary sewer overflow (SSO) problems in our community. Moreover, we have also reviewed and provided input on how the technical team has evaluated the IOAP according to the WWT's programmatic community values—customer satisfaction, economic vitality, education, environmental justice and equity, financial equity, and financial stewardship. We believe that the analytic framework has been applied consistent with the WWT's expectations in the development of the IOAP and has produced a robust, replicable, and transparent analysis.

3. IOAP Vision: We helped develop the attached "Vision for MSD's Integrated Overflow Abatement Plan" along with the MSD personnel and technical consultants who are on the Wet Weather Team. The IOAP Vision summarizes the WWT's common understanding of the high-level architecture and components of the IOAP, and it documents the WWT's consensus about several crucial aspects of the IOAP. The Vision outlines and provides highlights of the expected water quality benefits of the IOAP; the levels of control for CSOs and SSOs in our community; the range of control options in the IOAP; the analytic framework and process used to select control options; the public information, education, and involvement program (known as "Project WIN"); the monitoring, evaluation, and adaptive management plan; future development considerations relevant to the IOAP; and the IOAP funding plan. As stakeholder members of the WWT, we support this vision for improving wet weather sewer overflow management in our community.

4. Summary of IOAP Projects: We believe the project mix and outcomes that form the backbone of the IOAP (as captured in the attached IOAP Vision) reflect responsiveness to MSD's consent decree and provide for a critical, first increment of water quality improvement for our community, while ensuring wise and effective use of our community's resources. The IOAP Vision draws on front end consideration of and investment in green infrastructure and other source control approaches, including "private side" inflow and infiltration (I&I) control. These early investments will act to test and demonstrate the effectiveness of these approaches, creating the prospect, based on demonstrated performance, for expanding their role and lowering community costs as MSD implements the IOAP. We understand that MSD, consistent with the Post-Construction Compliance Monitoring Plan, will closely monitor and report on the efforts for both regulatory and public education purposes. We further understand that MSD, over the coming months, will work with community members to further articulate and enhance the scope

and scale of its IOAP public education and outreach program, including developing a robust approach for measuring the effectiveness of the program.

After IOAP approval in September 2009, the WWT Stakeholder Group continued to meet twice per year for progress reports and updates. When the need for the 2012 IOAP Modifications became apparent, MSD invited the original members of the WWT Stakeholder Group to continue to serve as a sounding board, ensuring the modifications to the plan and specific project designs remain true to values, priorities and financial plan that was originally developed. Most of the original members chose to continue their active participation in the process.

As MSD moves forward in coming years with IOAP implementation, we do anticipate the program will face, as all programs of this type do, project-specific challenges related to local community understanding and acceptance. In this context, we understand MSD is committed to using focused and sustained neighborhood education and outreach efforts to support project-specific and overall program implementation and will strive to address localized needs consistent with overall IOAP requirements. At the same time, we believe all localities throughout the MSD system must keep in mind that individual IOAP project locations and types have emerged from a rigorous and consistently applied technical analysis that has been continued through the 2012 IOAP Modifications. The IOAP projects exist as critical building blocks for an overall community program framed by federal and state regulatory requirements, community water quality and public health improvement objectives, and overall rate payer capacity.

The stakeholder subgroup of the WWT appreciates the opportunity to have contributed to MSD's IOAP development efforts. During our meeting on December 4, 2008, we discussed the importance of an overarching, sustained community water quality education initiative directed at enhancing appreciation for water quality improvements and building understanding of the actions all members of the community can take to improve water quality. We understand this effort is substantially broader in scope than the CSO and SSO improvements addressed by the IOAP, but we believe it is important to take this opportunity to raise awareness for this need, particularly as our community turns its attention to stormwater management in the context of the multi-jurisdictional Municipal Separate Storm Sewer System (MS4) permit. We appreciate MSD's willingness to be a contributor to such an effort, even as we recognize the need for broader involvement and leadership throughout the Louisville community and across Louisville Metro Government.

We look forward to the MSD Board's review of the 2012 IOAP Modifications and MSD's submittal of the 2012 IOAP Modifications to EPA and the State of Kentucky. Thank you for the opportunity to contribute to this critical community improvement initiative. Please feel free to contact us individually or collectively with any questions or perspectives you may have.

Unanimously Adopted at the January 30, 2013 WWT Meeting
Stakeholder Members of the Wet Weather Team

Member	Organization*
Steve Barger	Labor (retired)
Susan Barto	Mayor of Lyndon
Stuart Benson	Louisville Metro Council, District 20
Jim Mims	Louisville Metro Planning & Design Services
Allan Dittmer	University of Louisville
Arnita Gadson	Kentucky Environmental Quality Commission
Mike Heitz	Louisville Metro Parks Department
Tom Herman	Zeon Chemicals
Rick Johnstone	Deputy Mayor, Louisville Metro Mayor's Office (retired)
Bob Marrett	CMB Development Company, LLC
Kurt Mason	Jefferson County Soil and Water Conservation District
Lisa Santos	Irish Hill Neighborhood Association
Bruce Scott	Kentucky Waterways Alliance
David Tollerud	University of Louisville, School of Public Health and Information Sciences
Tina Ward-Pugh	Louisville Metro Council, District 9
David Wicks	Jefferson County Public Schools (retired)

*Stakeholders on the Wet Weather Team do not formally represent their specific affiliated organizations, but rather seek to provide input reflective of the broad interest areas in which they lead. Along with the stakeholder subgroup, the Wet Weather Team includes MSD personnel and technical consultants.

Chapter 1

Refer to Volume 2, Chapter 5, and Volume 3 Chapter 5 for detailed overflow volume, frequency and project information

CHAPTER 1: INTRODUCTION

Special Note: This chapter was developed in 2008. The statistical data for the CSO's reported, specifically related to individual CSO overflow volumes and frequency in a typical rainfall year, were derived from the CSS model calibrated in 2007. Since then, a more detailed calibration and validation effort has adjusted the average annual overflow volumes and frequencies in the typical year. This information is provided in Volume 2, Chapter 5. The vast majority of the physical system characterization in this chapter is still accurate.

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SUPPORTING INFORMATION

Appendix 1.1.1 Consent Decree – August 12, 2005
Appendix 1.1.2 Amended Consent Decree – April 15, 2009

CHAPTER 1: INTRODUCTION

On August 12, 2005, 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 Kentucky Department of Environmental Protection (KDEP) alleging violations of the Clean Water Act (CWA) primarily related to sewer overflows. A copy of the Consent Decree is included in Appendix 1.1.1. One of the requirements of the Consent Decree is the development and submittal of a Combined Sewer Overflow (CSO) Long-Term Control Plan (LTCP) and a Sanitary Sewer System (SSS) Sanitary Sewer Discharge Plan (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. 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. 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). A copy of the ACD is included in Appendix 1.1.2.

The purpose of the Consent Decree is to further the objectives of the CWA to eliminate unauthorized discharges from MSD’s sanitary sewer system (SSS), combined sewer system (CSS), and water quality treatment centers (WQTC) and to address discharges from MSD’s CSO locations identified in the Kentucky Pollutant Discharge Elimination System (KPDES) discharge permit for the Morris Forman WQTC. The Consent Decree also outlines the compliance program and schedules to achieve specific objectives, two of which are the submittal of a Final CSO LTCP to control CSOs, and a Final Sanitary Sewer Discharge Plan (SSDP) to eliminate unauthorized discharges.

This IOAP, prepared in accordance with the requirements of the Consent Decree, presents MSD’s comprehensive plan to reduce and mitigate the effects of wet weather CSOs, and to eliminate sanitary sewer overflows (SSO) and other unauthorized discharges. This comprehensive plan integrates these into one coordinated response.

The IOAP consists of three volumes: Volume I, Integrated Overflow Abatement Plan; Volume II, Final CSO LTCP; and Volume III, Final SSDP. Each volume details distinct aspects of the IOAP. Volume 1 provides a program overview and refers the reader to other volumes for more detailed discussion. Section 1.4 of this plan provides a brief explanation of the plan’s structure and each volume’s contents.

The ancillary information provided by MSD that is not related to overflow abatement projects or the specific requirements of the Consent Decree is being provided and should be considered as supplemental, background information. It is not being submitted in response to any requirements, obligations or commitments to any specific actions or time frames that are required under the provisions of the Consent Decree. This supplemental information should not be considered as a commitment by MSD to any project not required by the Consent Decree.

1.1 BACKGROUND

MSD has approximately 600 employees whose mission is to build, maintain, and operate the wastewater and stormwater facilities for the people of the Louisville Metro, Kentucky area. Louisville Metro has over 3,200 miles of sewers, approximately 500 miles being over 100 years old. The oldest sewers in the system are primarily in the CSS built between the 1860s to the 1950s. Beginning in 1955, all of the sewer systems built in the Louisville Metro area have been separate sanitary sewers.

The 385 square mile service area managed by MSD includes Jefferson County and extends into portions of Oldham County. Geographically, the MSD service area encompasses 11 watersheds, all of which are part of the larger Ohio River Watershed.

Currently, MSD serves approximately 220,000 customer accounts and 700,000 people. The collection system operated and maintained by MSD includes:

- 6 regional water quality treatment centers
- 15 small water quality treatment centers
- 76,000 manholes
- 288 sanitary sewage pumping stations
- 162 miles of force mains
- Ohio River Flood Protection System, including 16 flood pumping stations and 29 miles of floodwall.

Figure 1.1.1 at the end of the chapter illustrates the major components of MSD's system.

1.2 WET WEATHER OVERFLOWS DESCRIPTION

The IOAP addresses two types of active sewer systems within the MSD system: the CSS and the SSS. CSSs collect and transport both sanitary sewage and stormwater runoff through a single-pipe system. SSSs collect and transport only sanitary sewage to MSD's WQTCs. In general, the discharge or release of wastewater from either type of system into the environment before it reaches a WQTC is commonly referred to as an overflow. The following sections discuss when the overflow is a permitted authorized discharge, or a non-permitted unauthorized discharge.

1.2.1 Combined Sewer Systems (CSS) and Overflows

During dry weather, CSSs collect and convey domestic, commercial, and industrial wastewaters directly to a WQTC. During wet weather events such as precipitation or snowmelt, the resulting stormwater enters the system along with the dry weather flow. As a result, the stormwater is "combined" with the sanitary sewage. Generally, combined sewers are large enough to carry both sanitary sewage plus the stormwater for a specific wet weather event or condition. During wet weather, the design conditions determine the volume of stormwater that can enter the CSS and not exceed the CSS and wastewater treatment capacity. CSSs discharge excess water beyond that which can be conveyed or treated directly, through a permitted overflow, to a surface water body such as a river or stream. Such an event is called a CSO.

A CSO is an authorized discharge if it occurs through a permitted outfall, and is due to wet weather. Louisville Metro's CSOs are addressed in the Morris Forman WQTC KPDES permit number KY0022411. Though wet weather CSO events are permitted, they must be controlled and resultant water quality impacts mitigated under the requirements of the CWA and the Consent Decree.

The Consent Decree requires MSD to reduce the frequency and volume of wet weather CSO events, thus reducing receiving system impacts in accordance with CSO policy and the CWA. Dry weather overflows, and overflows from the CSS at locations other than permitted outfalls, are unauthorized discharges. MSD is also required to eliminate unauthorized discharges from the CSS regardless of impact.

1.2.2 Sanitary Sewer Systems (SSS) and Overflows

Modern standards of practice require the construction of a separate SSS for urbanized communities. A separate SSS collects and conveys domestic, commercial, and industrial wastewater. A separate SSS is not intended to collect or convey stormwater runoff from precipitation or snowmelts, although it is virtually impossible to prevent some stormwater from entering a SSS. Inflow and Infiltration (I/I) are inherent and some groundwater and stormwater will find its way into the system. Therefore, reasonable quantities of I/I are predicted and accounted for in modern sewer system design practices. However, a variety of factors can affect the performance of a sanitary sewer and cause problems. Examples include blockage of the sewer by tree roots, excessive I/I beyond that accounted for in the design, or sewer pipe breaks and mechanical failures at pump stations.

An SSO is a discharge of untreated or partially treated sewage through a point source not authorized by a KPDES permit. An SSO may include releases of untreated or partially treated sewage from the SSS to public or private property that do not reach the Waters of the United States, such as overflows out of manholes and onto city streets, sidewalks, and other terrestrial locations. Although an SSS can back up into buildings, including private residences and basements, the backup must be caused by problems in the publicly owned portion of the SSS to be considered an SSO. For example, wastewater releases and backups into buildings caused by blockages, flow conditions, malfunctions in a building lateral or other piping and conveyance systems not owned or operationally controlled by MSD are not SSOs.

1.3 GOVERNING LAWS AND CONSENT DECREE

The CWA of 1972, as amended, is the law governing most of MSD's operations, and is the basis for the Consent Decree that led to this IOAP. The overall goal of the CWA is to restore our nation's waters to a condition that is "fishable and swimmable." This seemingly simple objective resulted in a large body of regulations, policies and guidelines, managed by the EPA and the states (such as Kentucky) with delegated authority in this area.

One important policy that impacts the CSO LTCP development is the EPA National CSO Control Policy, which outlines expectations and approaches for management of CSOs, and establishes the regulatory compliance approach MSD is using in addressing CSOs. There is no comparable policy relative to unauthorized discharges from the CSS or SSS, so the approach to addressing unauthorized discharges is based on establishing design conditions for the level of protection intended for the sewer system, and then eliminating any unauthorized discharges that fall within that design condition. Volume 1 Chapter 5 details the IOAP regulatory framework and compliance approaches.

The Consent Decree is in response to an enforcement action taken by the EPA and the KDEP alleging violations of the CWA, primarily related to sewer overflows and unauthorized discharges. The Consent Decree is a legally binding agreement between all parties that represents a settlement of the enforcement action in exchange for a commitment to take on specified actions within a specified period. The Consent Decree requires a number of Early Action Items, along with a requirement to develop a Final CSO LTCP to control CSOs from the CSS, and a Final SSDP to eliminate unauthorized discharges from the SSS and CSS. Both plans (now consolidated into this IOAP) were submitted for approval prior to the December 31, 2008, requirement of the original Consent Decree. The first submittal of the IOAP recognized the potential need to update and resubmit the IOAP after the ACD was finalized. The ACD was finalized and filed with the Federal Court on April 15, 2009. In response to this action, and also to address informal questions and requests for clarifications from EPA and KDEP, the IOAP has been revised and resubmitted for continued consideration by the appropriate regulatory agencies.

1.3.1 Final CSO LTCP Requirements

The Consent Decree specifies that the Final CSO LTCP shall meet the following goals:

- Ensure that if CSOs occur, they are only due to wet weather (this goal shall include addressing those discharges resulting from MSD's compliance with the requirements of the United States Army Corps of Engineers' (USACE) "Ohio River Flood Protection System Pumping Operations Manual," dated 1954 and revised 1988).
- Bring all wet weather CSO discharge points into compliance with the technology-based and water quality-based requirements of the CWA.
- Minimize the impacts of CSOs on water quality, aquatic biota, and human health.

As specified by the Consent Decree, the Final CSO LTCP shall include, at a minimum, the following elements:

- The results of characterization, monitoring, modeling activities, and design parameters as the basis for selection and design of effective CSO controls (including control to address those discharges resulting from MSD's compliance with the requirements of the USACE' "Ohio River Flood Protection System Pumping Operations Manual," dated 1954 and revised 1988).
- The results of an evaluation of WQTC peak flow treatment capacity for any treatment facility, other than the Morris Forman WQTC, that will receive additional flow based on any LTCP project. Such evaluation shall be consistent with the EPA publications "Improving POTW Performance Using the Composite Correction Approach," (EPA CERI, October 1984), and "Retrofitting POTWs," (EPA CERI, July 1989).
- A report on the public participation process.
- Evaluation of how the Final CSO LTCP addresses sensitive areas as the highest priority for controlling overflows.
- A report on the cost analysis of the alternatives considered.
- Operational plan revisions to include agreed-upon long-term CSO controls.
- Maximization of treatment and evaluation of treatment capacity at the Morris Forman WQTC.
- Identification of an implementation schedule for the selected CSO controls.
- A post-construction compliance monitoring program adequate to verify compliance with water quality-based CWA requirements and ascertain the effectiveness of CSO controls.

The EPA has developed guidance documents to assist in preparing CSO LTCPs in compliance with the CSO policy. The Consent Decree requirements generally follow the existing guidance documents, with some additional requirements to address specific MSD issues such as overflows from the flood pump stations.

1.3.2 Final SSDP Requirements

Based upon the Consent Decree the Final SSDP shall identify remedial measures to eliminate unauthorized discharges from the SSS and CSS at locations other than those identified in the Interim SSDP.

Furthermore, the Final SSDP shall include, at a minimum, the following elements:

- The results of an evaluation of WQTC peak flow treatment capacity for any treatment facility that will receive additional flow based on any interim or Final SSDP project. The Consent Decree also required peak flow treatment capacity evaluations for the Lake Forest WQTC, the Timberlake WQTC, and any WQTC that may receive additional flow resulting from the elimination or modification of the Jeffersontown WQTC. Such evaluations shall be consistent with the EPA publications "Improving POTW Performance Using the Composite Correction Approach," (EPA CERI, October 1984), and "Retrofitting POTWs," (EPA CERI, July 1989).
- A map that shows the location of all known unauthorized discharges. The map shall include the areas and sewer lines that serve as a tributary to each unauthorized discharge. Smaller maps of individual tributary areas also may be included to show the lines involved in more detail.
- A description of each unauthorized discharge location that includes:
- The frequency of the discharge;
- The annual volume of the discharge;
- A description of the type of discharge, such as, manhole, pump station, constructed discharge pipe, etc.;
- The receiving stream;
- The immediate area and downstream land use, including the potential for public health concerns;
- A description of any previous (within the last five years), current, or proposed studies to investigate the discharge; and
- A description of any previous (within the last 5 years), current, or proposed rehabilitation or construction work to remediate or eliminate the discharge.

- A prioritization of the unauthorized discharge locations identified above, based upon the frequency, volume, and impact on the receiving stream and upon public health, and in coordination with the Capacity, Management, Operations, and Maintenance (CMOM) programs. Based upon this prioritization, MSD shall develop long-term SSDP projects including expeditious schedules for design, milestones, initiation of construction deadlines, and completion of construction deadlines. Such schedules shall be phased based on sound engineering judgment and in no case shall extend beyond December 31, 2024.
- A plan to involve stakeholders in the planning, prioritization and selection of projects.

Since there are no official EPA policies relative to unauthorized discharges, there is not a guidance document available to assist in developing the Final SSDP. The requirements of the Consent Decree for eliminating unauthorized discharges from the SSS closely match the requirements for a CSO LTCP, so that guidance document was used, where appropriate, to help in developing the Final SSDP.

1.4 INTEGRATED OVERFLOW ABATEMENT PLAN REPORT ORGANIZATION

As described previously, the IOAP is a three-volume document. Each volume details distinct aspects of the comprehensive program.

1.4.1 Volume 1 Integrated Overflow Abatement Plan

The first volume describes overarching, programmatic aspects that are common to all parts of the IOAP as well as the requirements, processes, and factors influencing the development of the Final CSO LTCP (Volume 2) and Final SSDP (Volume 3).

1.4.1.1 Chapter 1 - Introduction

The Introduction provides a general description of wet weather overflows and the requirements of the Consent Decree. It also includes an overview of each of the IOAP's three volumes.

1.4.1.2 Chapter 2 - IOAP Approach

This chapter describes MSD's organizational vision and the watershed approach as it relates to the IOAP. Chapter 2 also describes the Waterway Improvements Now (Project WIN) program and elaborates on its strategic character. The IOAP's supporting methods, programs, and initiatives, including the role of community values in the values-based risk management process are detailed. This process provides input to the benefit/cost analysis that is the basis for the structured decision-making process used to evaluate and select which projects are priorities and will be implemented to achieve the IOAP goals.

1.4.1.3 Chapter 3 - Public Participation and Agency Interaction

The Consent Decree requires that MSD assemble a Wet Weather Team (WWT) to, among other things, "develop a program for public information, education, and involvement." These three components are collectively referred to as public participation. Chapter 3 describes the role of the public participation program in engaging Louisville Metro's citizens to assist in developing, evaluating, and selecting the projects that comprise the IOAP. Chapter 3 also describes the ongoing public information, education, and outreach program planned to sustain citizen participation effectiveness in source control and green solutions. The ongoing program will make use of lessons learned and consensus building activities to change MSD's customers' daily activities in a way that contributes to overflow abatement and water quality improvement objectives.

1.4.1.4 Chapter 4 - Integrated Overflow Abatement Program

This chapter describes the overall action plan for addressing all the Consent Decree requirements. Included in these requirements is the Early Action Plan (EAP) implementation. The EAP includes an update of the compliance report for the Nine Minimum Controls (NMC) program, Sewer Overflow Response Protocol (SORP) revisions and implementation, completion of specified capital projects, and development and implementation of a CMOM program. In addition, the chapter includes an overview discussion of the development and implementation of the Interim LTCP, the Updated Sanitary Sewer Overflow Plan (SSOP), and the Interim SSDP. Many of these activities occurred in parallel to preparation of the IOAP, and in many cases, the implementation precedes completion of the IOAP; however, these activities are considered an integral part of the overall plan to achieve the required control of overflow and unauthorized discharges from the combined and sanitary sewer systems. Finally, Chapter 4 provides a consolidated summary of the projects and programs recommended in the Final CSO LTCP and the Final SSDP.

1.4.1.5 Chapter 5 - Regulatory Compliance

This chapter describes the framework of regulatory requirements that the IOAP must satisfy. This chapter also draws a roadmap showing how the IOAP achieves compliance with these regulations, and creates an approvable LTCP and SSDP.

1.4.1.6 Chapter 6 - IOAP - Implementation

This chapter presents the plan for implementation of the IOAP and consolidating the projects identified in the Final CSO LTCP and Final SSDP into one comprehensive overflow abatement program. Discussion includes project prioritization, scheduling, logistics, funding options, and financial impacts on the community. This chapter also includes post-construction monitoring procedures to verify compliance with the consent decree.

1.4.2 Volume 2 Final CSO LTCP

The second volume of the IOAP focuses on the control and mitigation of the CSOs.

1.4.2.1 Chapter 1 - Introduction

This chapter includes a history of EPA's Control Policy for CSOs and a summary of the policy's key elements. This chapter also provides general descriptions of the current CSO control efforts, control processes, and criteria for success. Sections outlining the public's participation and agency interactions specifically relative to the Final CSO LTCP are included.

1.4.2.2 Chapter 2 - System Characterization

This chapter provides extensive analysis of CSO areas. Analysis includes existing baseline conditions of the CSO area, monitoring of CSO flows, CSO quality sampling, and combined modeling of the sewer system and receiving waters.

1.4.2.3 Chapter 3 - Development and Evaluation of Alternatives for CSO Control

This chapter discusses the approach and factors used to identify, develop, evaluate, and select projects that make up the recommended projects and programs in the Final CSO LTCP.

1.4.2.4 Chapter 4 - Selection of the Final CSO Long-Term Control Plan

This chapter includes an explanation of the values-based risk management process used to select and prioritize the Final CSO LTCP alternatives. Issues discussed include community values, benefit/cost analysis, environmental impact, technical concerns, prioritization of projects, and implementation schedules compatible with the Consent Decree requirements.

1.4.2.5 Chapter 5 – 2012 Project Modifications

This chapter includes requested project modifications to the approved 2009 IOAP project suite resulting from the ongoing adaptive management strategy. The project modification approach centers around the utilization of monitoring data, improved modeling and a better operation understanding of MSD's sewer system. The full project suite related to the Final LTCP is defined including all proposed schedule and budget revisions.

1.4.3 Volume 3 Final SSDP

The third volume of the IOAP focuses upon the elimination of unauthorized discharges from both the CSS and the SSS.

1.4.3.1 Chapter 1 - Introduction

This chapter presents summaries of previous projects and programs and describes their relationship to the current planning process. Previous projects and programs include the Updated SSOP, the CMOM program, the SORP, and the Interim SSDP. This chapter also reviews the role of public participation and agency interaction with specific Final SSDP issues. The final section of this chapter describes in general terms the approach used to evaluate the projects and programs of the Final SSDP.

1.4.3.2 Chapter 2 - System Characterization

This chapter defines the goals of the system characterization program and provides an extensive compilation and analysis of unauthorized discharges in the SSS. This chapter includes service area maps of the unauthorized discharge areas, associated WQTCs, collection system modeling, and system monitoring. This chapter also includes a description of the computer models used to simulate the SSS areas.

1.4.3.3 Chapter 3 - Development and Evaluation of Alternatives for SSO Elimination

This chapter presents the methodologies used to evaluate the various discharge elimination solutions. It also defines and discusses strategies and technologies available to control and eliminate unauthorized discharges in the SSS. Based on these strategies and technologies, alternatives are developed for elimination of the unauthorized discharge. Finally, this chapter provides a summary of the evaluation for each discharge abatement alternative. The evaluation criterion includes feasibility screening, computer modeling, quality control, level of protection, cost estimates, and a benefit/cost analysis.

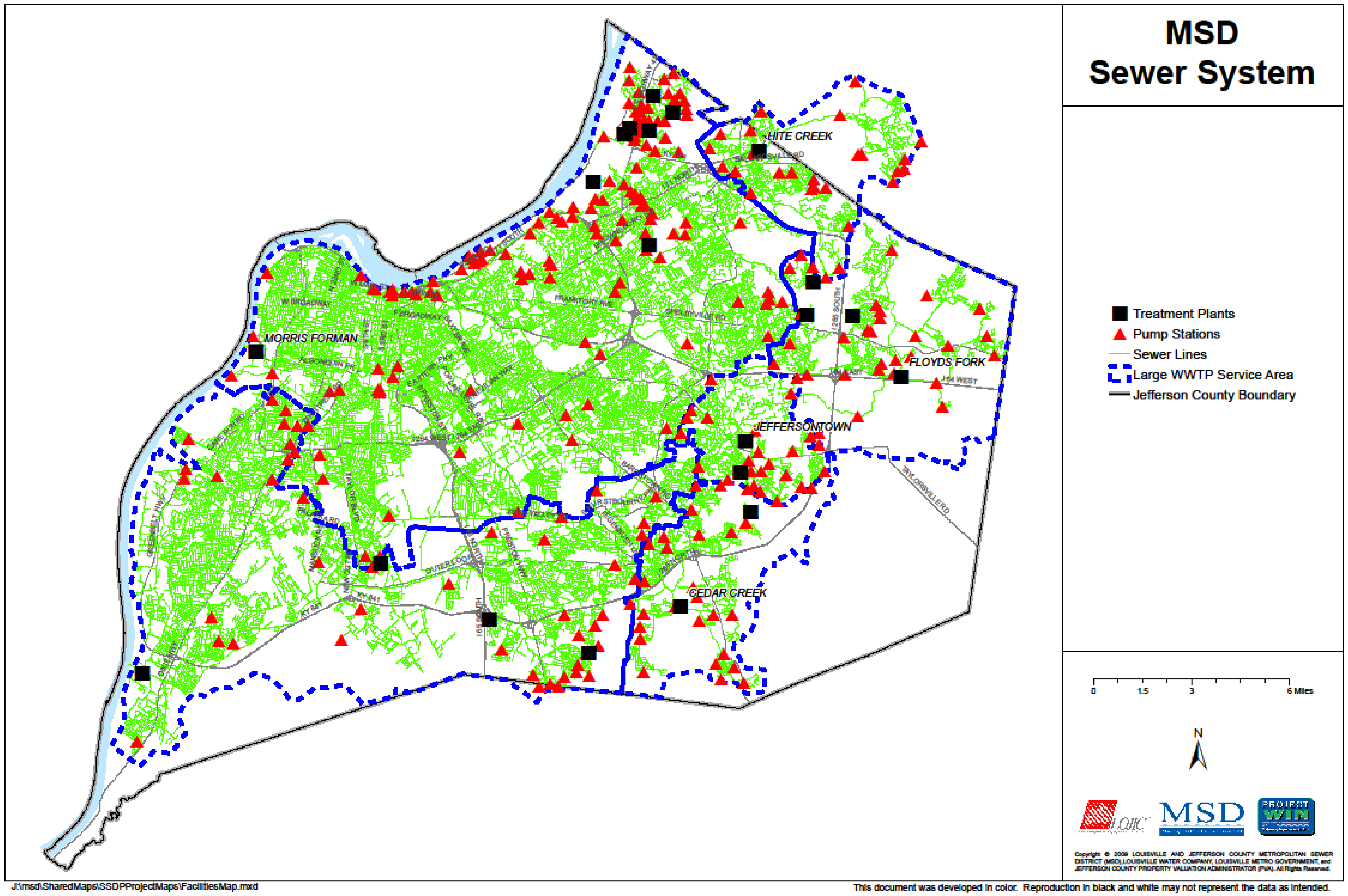
1.4.3.4 Chapter 4 - Selection of the Final Sanitary Sewer Discharge Plan

This chapter includes an explanation of the values-based risk management process used to select and prioritize the Final SSDP alternatives. The final section examines the various issues associated with implementation of the alternative(s) selected as integral to the Final SSDP. Issues discussed include community values, benefit/cost analysis, environmental impact, technical concerns, prioritization of projects, and implementation schedules compatible with the Consent Decree requirements.

1.4.3.5 Chapter 5 – 2012 Project Modifications

This chapter includes requested project modifications to the approved 2009 IOAP project suite resulting from the ongoing adaptive management strategy. The project modification approach centers around the utilization of monitoring data, improved modeling and a better operation understanding of MSD's sewer system. The full project suite related to the Final SSDP is defined including all proposed schedule and budget revisions.

FIGURE 1.1.1 - MSD SEWER SYSTEM



Chapter 2

CHAPTER 2: INTEGRATED OVERFLOW ABATEMENT PLAN (IOAP) APPROACH

Special Note: This chapter was developed in 2008. The statistical data for the CSO's reported, specifically related to individual CSO overflow volumes and frequency in a typical rainfall year, were derived from the CSS model calibrated in 2007. Since then, a more detailed calibration and validation effort has adjusted the average annual overflow volumes and frequencies in the typical year. This information is provided in Volume 2, Chapter 5. The vast majority of the physical system characterization in this chapter is still accurate.

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CHAPTER 2: INTEGRATED OVERFLOW ABATEMENT PLAN (IOAP) APPROACH

2.1 PROJECT WIN

Louisville and Jefferson County Metropolitan Sewer District (MSD) initiated the Project WIN (Waterway Improvements Now) program to address the need for comprehensive planning, coordination, and reporting on Consent Decree response activities. Project WIN's mission is to provide oversight management of all the activities required to comply with the terms and conditions of the Consent Decree. Oversight management requires initiating, organizing, coordinating and managing a diverse set of elements, programs, and projects to successfully implement solutions to all Consent Decree obligations.

Planned upgrades under Project WIN will allow Louisville Metro to comply with Clean Water Act (CWA) regulations. The implementation of the Consent Decree program will continue for many years. Branding the Integrated Overflow Abatement Program (IOAP) as Project WIN provides identification and distinction for MSD staff and the public. As the program progresses the stakeholders will be able to identify with the results. Branding the program as Project WIN identifies this as a special project with a beginning and an end that requires special attention and increased funding. The Project WIN branding also separates this program from the ongoing operations, maintenance, repair, and replacement programs.

Project WIN's goals are as follows:

- Identify, design, and implement projects and programs that reduce combined sewer overflow (CSO) events and mitigate their impact to comply with the CWA and the CSO Policy;
- Identify, design, and implement projects and programs that eliminate unauthorized discharges in both the separate sanitary sewer system (SSS) and the combined sewer system (CSS), providing the level of protection indicated by the selected design event;
- Select projects and programs that satisfy the Consent Decree requirements, and at the same time support and protect a broad spectrum of community values; and
- Implement the projects and programs in a manner that will efficiently use MSD's available resources while creating benefits related to Louisville's community values.

2.1.1 Project WIN Scope

Project WIN is an umbrella program that manages both the operating programs and the overflow abatement capital programs required for Consent Decree compliance. Because of the overarching character of Project WIN, its scale encompasses a broad range, from small projects addressing specific overflow sites to strategic, area-wide projects and programs. A brief description of both programs follows:

Operating Programs

- Sewer Overflow Response Protocol (SORP) – MSD advanced the existing SORP program in accordance with requirements of the Consent Decree. Project WIN also provided the initial framework for training MSD staff on SORP requirements and procedures. Project WIN provides the vehicle to monitor SORP activities, manage the SORP reporting functions, develop the annual updates to the SORP program, and assist MSD manage and deliver the ongoing SORP training program.
- Nine Minimum Controls (NMC) – MSD enhanced the existing NMC program in accordance with the requirements of the Consent Decree. Project WIN continues to assist the impacted operating divisions in implementing the NMC program, tracks activities and performance of the NMC program, and provides quarterly and annual reporting to the Environmental Protection Agency (EPA) and the Kentucky Department of Environmental Protection (KDEP) in accordance with Consent Decree requirements.
- Capacity, Management, Operations and Maintenance (CMOM) – MSD developed a CMOM Self-Assessment in accordance with requirements of the Consent Decree. Project WIN assists MSD's impacted divisions in implementing the comprehensive CMOM program, tracks activities and performance of the CMOM program, and provides quarterly and annual reporting to EPA and KDEP in accordance with Consent Decree requirements.

Overflow Abatement Capital Programs

- Interim Long Term Control Plan (LTCP) – MSD submitted an Interim LTCP in accordance with the requirements of the Consent Decree. The Interim LTCP defined the short-term action plan for CSO abatement activities that continued during the development of the Final CSO LTCP. Project WIN monitored progress, managed the project completion certification process, and provided quarterly and annual reporting to EPA and KDEP in accordance with the Consent Decree.
- Updated Sanitary Sewer Overflow Plan (SSOP) – MSD submitted an Updated SSOP in accordance with the requirements of the Consent Decree. The Updated SSOP defined the short-term action plan for sanitary sewer overflow (SSO) abatement activities that were continued during the development of the Final Sanitary Sewer Discharge Plan

(SSDP). Project WIN monitored progress, managed the project completion certification process, and provided quarterly and annual reporting to EPA and KDEP in accordance with the Consent Decree.

- Interim SSDP – MSD developed an Interim SSDP in accordance with the requirements of the Consent Decree. The Interim SSDP defined the abatement plan for eliminating unauthorized discharges in the Beechwood Village area, the Hikes Point area, the Highgate Springs Pump Station, and the Southeastern Diversion. Project WIN managed the preliminary engineering and final design of some of the elements of the Interim SSDP, and monitored progress for those portions of the Interim SSDP managed by MSD's Engineering Division. Project WIN will continue to monitor progress of the implementation of all projects contained in the Interim SSDP, and will coordinate progress reports on a quarterly and annual basis. Project WIN will also manage the project certification process upon completion of each project identified in the Interim SSDP.
- Overflow Abatement Plans – MSD developed the IOAP, which consolidates the CSO Final LTCP and the Final SSDP. Project WIN will continue to monitor progress of the IOAP implementation, provide quarterly and annual reporting to EPA and KDEP in accordance with the Consent Decree, and manage the certification process following completion of each capital project.

2.1.2 Boundary Conditions

While Project WIN's scope is broad, the focus remains on Consent Decree compliance - primarily sewer overflow abatement. Project WIN does not address every facet of MSD's involvement in water quality and wet weather management. For instance, Project WIN does not address non-point source pollution, which is a result of stormwater runoff in the separate sewer system area. The non-point source pollution issue is addressed under Louisville Metro's Municipal Separate Storm Sewer System (MS4) stormwater permit. In Louisville Metro's MS4 stormwater permit, MSD is a co-permittee with several other government agencies, each with jurisdiction over specific elements of the MS4 system.

In addition, Project WIN is not directly responsible for stream restoration, aquatic and riparian habitat improvement, or development and maintenance of water-based recreation activities. However, during the development and implementation of Project WIN's activities that impact water quality and habitat conditions, stream restoration, habitat improvements, and recreation activities will be considered. Where practical, site restoration following construction will be targeted to improve the aquatic and riparian environment, under the general principal of "always leave the site better than it was before construction started."

2.2 INTEGRATED OVERFLOW ABATEMENT PLAN VISION

As noted above, the IOAP is a major component of Project WIN's responsibilities. The IOAP is a long-term plan to control CSOs and unauthorized discharges in both the CSS and SSS. Implementing the IOAP is expected to improve water quality in both Louisville Metro streams and the Ohio River. The expected water quality benefits of the IOAP include reductions in the peak levels of bacteria in the Ohio River and Beargrass Creek and a reduction in the number of days that bacteria levels exceed water quality standards during periods of wet weather. Due to the smaller size of the Beargrass Creek watershed, and the greater percentage of pollutant loads contributed by overflows, the water quality improvements will be more noticeable in Beargrass Creek than in the Ohio River.

Sewer overflow control is essential to improving water quality, specifically for bacteria, pathogens and in some cases dissolved oxygen and metals, and is an important component of an overall approach to meeting water quality standards. Water quality monitoring and modeling clearly demonstrates that overflow control alone is not enough to consistently meet water quality standards. In light of this challenge, MSD plans to use the IOAP as one of its key contributions to broader water quality improvement efforts in the community. In particular, the IOAP will complement other wet weather and water quality programs managed by MSD and/or by other community partners. The current complementary programs and efforts include; the Mayor's Green City Initiative, the Partnership for a Green City, Louisville Metro's Municipal Separate Storm Sewer System (MS4) stormwater permit, and initiatives of Jefferson County Public Schools (JCPS), private developers, and other entities.

The IOAP is a response to a Consent Decree negotiated with EPA and KDEP. As such, the IOAP will be a federally enforceable action plan for sewer overflow abatement. The IOAP must, therefore, limit its scope to commitments that directly relate to MSD programs and activities to address CSO and unauthorized discharge issues. Other community water quality programs, which may be partly or completely out of MSD's control, can provide synergistic benefits with the IOAP, but these programs do not fall under the same level of federal enforcement. On the other hand, these programs may have different mechanisms for ensuring accountability (for example, the KDEP oversees the MS4 stormwater permit that MSD and several other agencies hold as co-permittees).

2.2.1 Values-Based Evaluation Process

In compliance with requirements of the Consent Decree, MSD formed a diverse Wet Weather Team (WWT) to assist in the development of the IOAP. The WWT vetted and agreed upon a values-based performance evaluation framework to evaluate and select alternatives for the IOAP. Volume 1, Chapter 3 provides more information about the WWT.

The WWT and a Stakeholder Group identified eleven community values to underpin the analysis and selection of alternatives for the IOAP as shown in Table 2.2.1.

TABLE 2.2.1

IOAP WET WEATHER TEAM COMMUNITY VALUES

Project-Specific Values	Programmatic Values
Environmental Enhancement	Economic Vitality
Public Health Enhancement	Financial Stewardship
Regulatory Performance	Education
Asset Protection	Environmental Justice And Equity
Eco-Friendly Solutions	Customer Satisfaction
	Financial Equity

Using this structured decision-making process as framed by the WWT, MSD developed and evaluated overflow abatement control options for the IOAP based on managing risks according to these community values. In particular, MSD analyzed each IOAP project alternative in terms of potential benefits and costs. Benefits are quantified based on the anticipated reduction in risks to the community values, and costs reflect the total of both capital and operational costs of the alternative. As a result, the benefit-cost analysis influences the selection of site-specific abatement approaches or technologies, site-specific levels of protection (within the boundary conditions for CSOs and unauthorized discharges), and the relative priority of projects for implementation.

Several of the WWT's community values relate to financial considerations These include the cost-effectiveness of individual solutions and the program as a whole (financial stewardship), the affordability of the program's total costs for the community (economic vitality), and how the costs are allocated among different segments of the population (financial equity). MSD and the WWT used the results of the values-based benefit-cost analysis of project alternatives to support informed discussions with the Stakeholder Group and the public about the appropriate level of investment in the IOAP.

As directed in EPA's CSO Control Policy, discussions about total program costs and the selection of projects for the IOAP consider a "knee of the curve" analysis to determine where the increment of pollution reduction achieved in the receiving water diminishes compared to the increased costs. A further discussion of the knee of the curve concept is contained in Section 2.5.7 of this chapter. A presentation of the results of the IOAP knee of the curve analyses can be found in Volume 1, Chapter 5, Section 5.2.3. In addition to this analysis, the community's level of investment in the IOAP has also been considered in the context of anticipated future requirements and other needs for MSD services. These requirements include stormwater compliance needs associated with Louisville Metro's MS4 stormwater permit, and requirements to meet the forthcoming total maximum daily load (TMDL) allocations for Beargrass Creek. The consideration of various water quality investment needs is important since sewer overflow control alone will not be sufficient to meet water quality standards.

2.2.2 Levels of Control

Under the CWA, CSOs are permitted discharges in wet weather, as long as they are managed to avoid degradation of water quality in the receiving streams. EPA's CSO Control Policy sets specific abatement targets for CSOs. To be permitted, wet-weather CSOs must be controlled so that either water quality standards are achieved or the permit-holder can show that the CSO discharges do not cause or contribute to exceedances of water quality standards. Under the CSO Policy, controlling overflows to four events per year or less, or capturing and treating 85 percent or more of wet weather flows is "presumed" to achieve the target water quality standard exceedances. Volume 1, Chapter 5 of the IOAP discusses in detail the MSD's regulatory compliance strategy for CSO control.

MSD's strategy for unauthorized discharges reflects the fact that unauthorized discharges must be eliminated under the CWA. From a practical perspective no sewer system can be designed to avoid all possibility of overflows during extreme weather events. A design event must be defined that reflects the level of protection consistent with community values and cannot be shown to cause or contribute to water quality exceedences.

The IOAP used the values-based benefit/cost evaluation framework to determine design events that reflect an appropriate level of control of sewer overflows for the Louisville Metro community. The decision to develop site-specific levels of control based on benefit/cost evaluations was made by MSD in consultation with the Stakeholder Group that is a part of the WWT. While site-specific levels of control were determined to best meet the objectives of the community, the WWT Stakeholder Group strongly supported the identification of boundary conditions representing the minimum level of protection acceptable to the community, and the maximum level of protection determined to be reasonable, given competing demands on environmental protection community resources.

- Minimum Level of Protection: A storm event with a 50 percent probability of occurring in any given year (commonly referred to as a two-year storm) was identified as the minimum level of protection acceptable to the community. The cities of Atlanta and Knoxville set the precedent for selecting a design storm with a 50 percent probability of being exceeded in any given year as the minimum protection level for unauthorized discharges. Using the values evaluation framework approach to determine the design storm control level means that solutions to address an individual unauthorized discharge location would be designed to protect against larger storms (for example, a 2.25-inch cloudburst storm instead of a 1.82-inch cloudburst storm) if that would yield a higher benefit-cost ratio in the analysis of project alternatives.
- Maximum Level of Protection: A storm event with a ten percent probability of occurring in any given year (commonly referred to as a 10-year storm) was selected as the maximum level of protection considered reasonable. A storm of this severity happens

infrequently, but when it does occur, it often causes high levels of non-point source pollution that overwhelms the potential impacts of SSOs. The WWT Stakeholder Group understood the need to focus environmental protection community resources on the pollution sources that give the greatest return on invested dollars. Protecting against SSOs in a storm with a ten percent probability of occurring in any year was identified as the upper limit of protection that the community believes is reasonable, given the potential for other, more cost-effective controls on other sources of pollution.

Based on an analysis of over 60 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 overflow control evaluation. This was based on the analysis previously referenced, and observations that hydraulic modeling conducted using the cloudburst storm more closely correlated with historically documented overflow locations throughout the system. To evaluate different levels of control, MSD evaluated a 1.82-inch cloudburst storm, a 2.25-inch cloudburst storm, and a 2.60-inch cloudburst storm. The 1.82-inch cloudburst storm has a 50 percent probability of being exceeded in any given year. The 2.25-inch cloudburst storm has a 20 percent probability of being exceeded, and the 2.60-inch cloudburst storm has a 10 percent probability of being exceeded in any given year.

2.2.3 Components of MSD’s Integrated Overflow Abatement Plan Toolkit

Control options in the IOAP “toolkit” include source control, storage, conveyance and transport, treatment, and sewer separation. As stated above, MSD used a benefit-cost analysis approach to compare the project alternatives and program elements considered for inclusion in the IOAP. The specific mix of control options for individual CSO or unauthorized discharge locations is driven by the benefit-cost analysis of how the project alternatives affect the community values identified by the WWT, and site-specific considerations. Therefore, project alternatives are built around MSD’s existing infrastructure (for example, large diameter pipes and water quality treatment centers [WQTCs]) and draw on synergistic benefits from other MSD projects.

Driven by the values-based benefit-cost analysis, the IOAP will reflect a balanced mix of “green infrastructure” and “gray” facilities to prevent and control sewer overflows. Green infrastructure includes options such as green roofs, rain gardens, rain barrels, porous pavement, and bioretention. Green infrastructure reduces CSOs by providing pathways for stormwater to soak into the ground, rather than run off to the CSS. Gray facilities control CSOs using storage basins, treatment plants, conveyance and transport through sewers and pump stations, and sewer separation. In addition to site-specific green infrastructure projects, the IOAP defines programmatic green infrastructure investments that reduce flow at multiple sites (for example, a rain barrel program) and involve partnerships with other public and private entities.

MSD’s analyzed potential options to control private sources of infiltration and inflow (I/I) into the SSS including building laterals, downspouts, sump pumps, and foundation drains. Private-side I/I control will be an important part of the IOAP. In 2012 the MSD Board adopted changes to the

Wastewater and Stormwater Discharge Regulations (WDRs) clarifying the prohibition of clear water discharges to the SSS, and providing for MSD's right of entry to inspect for illicit connections and authorizing the imposition of penalties for violations of the WDRs specifically related to illicit connections of clear water sources of infiltration and inflow. The next steps in implementing a private source I/I reduction program include the development of enforcement policies and standard operating procedures for consideration by the Board. The MSD Board may also choose to continue or even expand the existing Plumbing Modification Program to provide incentives and financial assistance to property owners who need to reduce clear water discharges to the SSS. Any changes to implementation actions relative to MSD's WDRs, or MSD's incentives and assistance programs will be accompanied by a proactive outreach and education program to maximize the benefits of those changes.

As a guiding principle, MSD's IOAP will use front-end consideration of source control and green infrastructure. Overall, this means that more traditional gray infrastructure in the IOAP will be "right-sized" after considering both the anticipated flow-reduction benefits of programmatic and site-specific green infrastructure solutions, and the anticipated effectiveness of other source control approaches, including reduction of private sources of I/I. Prior to the final design of supporting gray solutions, the actual flow reduction performance will be documented and compared against the estimated targets. The final right-sizing of the gray solutions will be based on actual documented performance of the green infrastructure solutions previously implemented. Green infrastructure solutions in the IOAP will be implemented early in the schedule, to allow data to be gathered on the flow reduction benefits that occur.

MSD's IOAP will use an adaptive management implementation approach based on monitoring and evaluation efforts. MSD's post-construction compliance monitoring and evaluation plan for the IOAP will include water quality monitoring, sewer flow monitoring, overflow events analysis, gray and green infrastructure project performance monitoring, and measurement of the effectiveness of source control and behavior-change efforts. MSD will adapt its CSO management and unauthorized discharge elimination approaches based on the monitoring and evaluation results; this is expected to include right-sizing gray solutions, re-evaluating the effectiveness of green solutions, and adjusting the types and characteristics of projects planned for later phases of implementation. Adaptive management is the logical approach at this time because there is recognition that historical weather trends may not be as reliable as in the past due to potential climate changes. MSD will continue to monitor developments and adjust plans as more data become available. This 2012 IOAP Modification is the first adaptive management revision being made to the approved 2009 IOAP.

2.2.4 Public Information and Outreach

Public information and outreach is critical to the success of the IOAP. The IOAP education plan will accomplish three objectives:

1. Generate a sense of personal ownership and responsibility required for the sustainability of critical voluntary programs in the IOAP.

2. Promote public acceptance and support for the financial investments required to achieve consent decree and CWA compliance.
3. Encourage support for other agency programs or legislation that supports overflow abatement efforts.

Education is particularly important to promote and sustain participation in green infrastructure programs (for example, rain gardens and rain barrels) and in efforts to control private sources of I/I into the sewer system. IOAP Volume 1, Chapter 3 focuses on public participation and agency interaction.

2.2.5 Future Development Considerations

Solutions in the IOAP will consider future development or build-out based on the community's long-term landuse plan, Cornerstone 2020.[1] The IOAP is not in itself a landuse planning document, however, and MSD does not have jurisdiction over landuse planning. MSD will work with existing landuse plans developed and administered by the Louisville Metro Planning and Design Services Department.

IOAP solutions will accommodate the projected impacts of population growth and landuse development. Solutions will consider the effects of growth on connections to existing infrastructure that is upstream from existing overflow points. Cases where the growth outlined in Cornerstone 2020 would logically provide new infrastructure and is not hydraulically dependent on or connected to the IOAP solution will not be part of the IOAP projects. Moreover, the solutions in the IOAP will account for the impacts of anticipated growth on existing infrastructure; nevertheless, the IOAP itself will not build the capacity needed for growth.

2.2.6 Funding Plan

The IOAP funding plan is based on the principle that rates and fees must pay MSD's operating costs and debt service, and must adequately maintain a satisfactory bond rating. Furthermore, MSD's rates and fees must allow for continued economic development in the community. In particular, a strong local economy will be important to sustain the affordability of the IOAP. These principles for the funding plan will affect the amount of money MSD may borrow at any one time and the level of increases in rates and fees needed to fund capital and operating expenses for IOAP implementation.

[1] For more information about the Cornerstone 2020 plan, see http://www.louisvilleky.gov/PlanningDesign/Cornerstone+2020.htm.

2.2.7 Action Plan

MSD is creating in the IOAP an action plan that considers both the requirements of the Consent Decree and the goals and objectives of the surrounding community. MSD recognizes that a program, not a project, is needed to control CSOs and unauthorized discharges.

MSD has chosen to implement a comprehensive, integrated, and long-term program that will abate CSOs and unauthorized discharges, improve Louisville Metro's water quality, protect public health, enhance the overall environment, all while considering financial constraints, other water quality programs, and the need to continue to provide sewer service to meet the community's future population and economic growth objectives. The following sections describe in more detail the approach used in developing the IOAP to maximize water quality benefits, protect important community values, and focus resources on the high-value and high-priority concerns and solutions.

As noted previously, this 2012 IOAP Modification represents the first adaptive management revisions being made to the approved 2009 IOAP. While projects and schedules are being revised, the approach to develop, evaluate, select, and prioritize projects and programmatic activities remain based on the same set of community values, and the same risk management approach to protecting and enhancing those values in determining what revisions should be implemented.

2.3 WATERSHED APPROACH

For many years, MSD has promoted the use of a watershed approach for improving water quality. The watershed approach, as it is commonly defined, provides a holistic framework for managing all the factors that influence water quality with a specific drainage area. The watershed approach typically involves stakeholders in the watershed to coordinate projects, programs, and strategies into an integrated plan of action. The watershed approach is multi-scale ranging from a site-specific end-of-pipe solution, to a regional scale source reduction program, and from voluntary neighborhood action groups to massive public works facility construction. The watershed approach is inherently flexible, incorporating both gray and green infrastructure solutions, adaptable to developing conditions, and dependent on a wide range of interagency and other stakeholder partnerships. Figure 2.3.1 at the end of this chapter is a map of the IOAP Watershed Boundaries.

During the years of 1985 – 2005, MSD pursued an active watershed management program. MSD sewer system expansion programs resulted in the elimination of over 40,000 failing septic tanks, thereby addressing serious public health and water quality issues affecting both the groundwater and surface water resources of Louisville Metro. In addition, MSD eliminated over 300 small, poorly performing WQTCs constructed by others (mainly private developers), and consolidated those flows into modern, well-operated regional treatment plants thereby addressing widely distributed sources of surface water pollution. As the lead agency for drainage and flood control, MSD also developed requirements for stormwater runoff management and retention, which reduced stormwater pollution reaching the surface waters of the Louisville Metro. In this role, MSD also took the lead role in developing and managing a comprehensive erosion prevention and sediment control ordinance to protect Louisville Metro surface waters from the impacts of construction-related runoff pollution.

While MSD fully embraces the watershed approach, MSD has modified the traditional watershed approach to accommodate the fixed schedules and firm commitments required by the Consent Decree. Given the nature of potential penalties for failure to perform, MSD is required to implement a response that keeps the vital activities under its direct control, thereby controlling its own destiny, and ensuring timely, consistent, and sustained compliance.

The ideal watershed approach to water quality improvement would allow consideration of both point and non-point sources of pollution, and coordinate efforts between the CSO and non-point source abatement efforts of a wide variety of stakeholders. Since MSD is not the sole permittee included in the Louisville Metro MS4 stormwater permit, including MS4 issues into a Consent Decree response would either create federally-enforceable obligations for entities not named in the Consent Decree, or require MSD to rely on actions beyond its control, and potentially pay penalties resulting from the failure of other co-permittees to perform in accordance with strict schedules.

In developing a modified watershed approach, MSD recognizes certain regulatory boundaries that are not consistent with a traditional watershed approach. For example, in the CWA, pollutant loads originating from CSOs and pollutant loads resulting from unauthorized discharges are treated differently. CSO control is primarily driven by public health and water quality concerns, and CSO pollutant loads are usually well suited to the cost optimization offered through “load trading” that is central to the watershed approach. Control of unauthorized discharges, however, is driven primarily by regulatory permitting issues, with little or no direct connection to pollution loads or water quality. Unauthorized discharges, therefore, are not amenable to load trading concepts that maximize water quality benefits at the lowest practical cost.

MSD’s modified watershed approach deals with these issues through adaptation and compromise. CSO abatement is accomplished through a combination of green and gray infrastructure that optimizes benefit/cost evaluations for those activities that MSD controls, and are related directly to overflow abatement. MSD will form partnerships with other government agencies and other stakeholders of all types and sizes, but will rely on post-construction compliance monitoring to confirm the actual effectiveness of partner actions.

Elimination of unauthorized discharges will incorporate a combination of source control and gray control infrastructure. Effective source control will require a strong partnership with MSD’s customers, to ensure that private property I/I sources are controlled to the same level as is implemented in MSD-owned facilities. Green infrastructure programs will also be implemented in the separate sewer system areas, recognizing that these programs can indirectly influence sewer system wet weather flows.

The final product of a typical watershed approach is a plan that prioritizes and coordinates a variety of participant's efforts to keep clean and protect the community's waterways consistent with the community values. The IOAP modified watershed approach provides this kind of plan, with some constraints on the type of commitments received from other community partners. The IOAP will provide watershed-based assessment and management information programs including analyses, project alternatives and schedules, criteria to measure progress, and resources for plan development and implementation.

2.4 OVERFLOW ABATEMENT TECHNOLOGY

In the development of overflow abatement strategies and alternatives, a wide range of technology approaches are available. These approaches include:

- Source control through I/I reduction or stormwater runoff reduction through implementation of green infrastructure,
- A wide variety of conventional constructed facilities commonly referred to as gray infrastructure, including:
- Sewer separation (converting the CSS to a separated sewer system).
- Peak flow storage (either with constructed tanks, or oversized pipes providing “in-line” storage);
- Increased conveyance capacity (through increased pipe sizes, parallel relief sewers, new or expanded pump stations);
- Flow diversions to other portions of the system that have available capacity; and
- Expanded wastewater treatment capacity, either provided at existing regional treatment facilities or provided remotely as high-rate wet weather treatment facilities.

Volumes 2 and 3 of the IOAP provide a detailed description of available technologies.

While not a technology, an additional overflow abatement approach is modification of customer behaviors. This includes activities that reduce water usage during wet weather events and reduce pollutant loading in stormwater runoff. Behavior modification can reduce the discharge of conventional pollutants, such as biochemical oxygen demand (BOD), total suspended solids (TSS), and other pollutants of concern, including those from industrial, commercial, and household sources. Behavior modification is also one of the most important factors in reducing the introduction of materials into the sewer system (primarily fats, oils, and grease {FOG}) that can cause blockages in sewers.

2.5 PROJECT EVALUATION APPROACH

The IOAP used a structured decision-making process to provide a well-documented, fully auditable system for selecting overflow abatement alternatives. The Water Environment Federation's (WEF) document, "Guide to Managing Peak Wet Weather Flows in Municipal Wastewater Systems*"* (WEF 2006) recommends this approach.

Figure 2.5.1 at the end of the chapter illustrates the general process followed in the development and evaluation of projects. As illustrated, the general process for alternative development and evaluation follows these steps:

- Identify the potential control locations (CSOs and unauthorized discharges);
- Develop abatement concepts and test the concepts with stakeholders and the public;
- Develop alternative approaches to abate overflows;
- Evaluate each alternative using the project-specific values in a benefit cost analysis;
- Select the suite of preferred projects, and then evaluate that suite of projects against the programmatic community values; and
- Compare final list of projects to affordability guidelines, and recommend a plan for consideration by the MSD Board.

2.5.1 Values-Based Risk Management

To determine the benefits in a structured benefit/cost analysis, the approach recommended by the WEF guidance document involves the use of a risk-management approach designed to protect against threats to a set of values that the community wishes to protect. Risk management is a well-established process that recognizes the existence of risk and evaluates the ways to eliminate, reduce, and mitigate the consequences of those risks. In this context, a reduction in risk results in quantifiable benefits factored into the benefit cost evaluation for each alternative.

In a formal risk management approach, risk is defined as the product of the probability of a threat occurring times the consequence if that threat does occur:

Risk = Probability x Consequence

An important part of any risk management program is determining the measurement scales for consequence. The WEF guidance document recommends developing the consequence metric in the context of the potential threats to key community values.

A risk management program evaluates the level of risk associated with specific threats, and if the level of risk is unacceptable, determines actions to reduce the risk of a particular threat to an acceptable level. In other words, any action or effect that lowers the threat's probability, mitigates its impact, or both will reduce risk.

The field of risk management recognizes four general strategies to manage risk:

- Avoid the risk by eliminating it or reducing its probability of occurring;
- Mitigate the risk by reducing the probable consequence;
- Transfer or share the risk with another party; and
- Accept the risk and any related losses should the event occur.

The basis for any risk management program is the identifying the threat, and, therefore, what must be protected. For the overflow abatement program, MSD, following the guidance of the WEF document, selected a wide range of community values as the elements to protect. Additionally, MSD used quantifiable risk reduction as the benefit score in the structured benefit/cost evaluation.

2.5.2 Community Values

Protecting Louisville Metro's community values is the focus of the IOAP and exerts influence through the entire program. Community values are issues of interest and concern that citizens want to protect and serve as program anchoring points and decision process inputs. Louisville Metro's community values influence the entire IOAP through the processes to set goals, define objectives, and evaluate alternatives. For these reasons, knowledge of community value characteristics, creation, and function is critical to understanding the IOAP.

Community values are categories of criteria used to assess threats and evaluate alternatives. Another way to define a community value is to consider it an outcome or goal. For example, the goal of a community value named Asset Protection would be to reduce basement backups due to sewer surcharging. The IOAP would evaluate this goal during alternative development using the percentage of sewers that surcharge to within six feet of the ground as a criterion. Therefore, reducing the percentage of surcharging sewers due to implementing an alternative is a measurable criterion for the Asset Protection goal.

The community values evaluation process allows the WWT to quantify a wide range of dissimilar problems, calculate the risk that the problem may have associated threats, and evaluate the benefits of each alternative using a consistent scale of measurement. Values-based risk management is a decision and prioritization process that systematically considers multiple objectives. This process is the mechanism by which the WWT Stakeholder Group, acting as representatives of the public, advise MSD on the design and implementation of the IOAP. The IOAP Volume 1, Chapter 3 addresses in detail the WWT formation and the makeup of the Stakeholder Group. It also addresses how the WWT Stakeholder Group's composition and role has changed during the initial implementation phase of the IOAP, and how the overall WWT will be involved in ongoing implementation decisions. Chapter 3 describes the plans for continuing public information, education and outreach in response to changing needs as project and program implementation moves into different stages.

The creation of the community values began with consideration of MSD's vision, mission statement, and responsibilities. Using these as guides the stakeholders identified an initial, tentative list of issues deemed important to the community that may be affected by IOAP projects. These initial community values were refined with assistance from a technical team. Part of the refinement process included identifying and defining objectives for each community value. Essentially, a community value's objectives serve as both a practical definition, and as a measurable criterion for the risk management process. For example, reducing pathogen concentrations in streams is a measurable criteria related to the community value (goal) of Public Health Enhancement. The process of identifying, defining, and refining continued until the WWT reached a consensus regarding the content, wording, and meaning of each. The WWT produced a final list of eleven issues, which became the community values as outlined in Section 2.2.1.

Of the eleven community values, five values are considered to be project-specific values, and the remaining six are programmatic values. The difference between the two types of values is primarily in how they are used in the decision process. A project-specific community value affects a specific project, or problem site. The risk management evaluation process used project-specific values to select individual projects for overflow abatement. In contrast, a programmatic community value effects a specific neighborhood, the community, a watershed, or the entire project area.

The programmatic community values are a broader, all encompassing group as opposed to the project–specific values. An alternative may produce both project specific effects, and programmatic effects. This dichotomy allows the evaluation of an alternative's effects and impacts at two levels simultaneously.

Every alternative is evaluated with respect to each community value. An initial evaluation uses the five project-specific values while a secondary evaluation uses the remaining six programmatic values to ensure that the entire suite of recommended projects supports the programmatic value set. See Table 2.5.1 on the next two pages.

TABLE 2.5.1

IOAP WET WEATHER TEAM COMMUNITY VALUES

PROJECT-SPECIFIC VALUES
Environmental Enhancement:
Protect and improve existing habitats, plant and animal species, and public enjoyment of its natural resources by reducing and preventing the discharge of pollutants into the environment. Criteria used to measure the goal's objectives include aquatic habitat protection, surface water dissolved oxygen, aesthetics, stream flow, and biochemical oxygen demand reduction.
Public Health Enhancement:
Protect and improve the health and safety of neighborhoods by minimizing the potential for encountering waterborne pathogens. Criteria used to measure the goal's objectives include peak flow measurements and characteristics of the release.
Regulatory Performance:
Achieve compliance with the Clean Water Act, Clean Air Act, and the Consent Decree. Criteria used to measure the goal's objectives include discharge frequency, discharge peak flow rates, average annual overflow volume, and release point characteristics.
Asset Protection:
Prevent property damage and financial loss to property owners by reducing surface flooding due to stormwater drainage and reducing the number of basement backups resulting from sewer surcharging. Criteria used to measure the goal's objectives include flood damage and basement backups.
Eco-Friendly Solutions:
Implement alternatives that minimize detrimental impacts on the community, its habitat, and energy use, while at the same time maximizing the environmental benefits derived from them. Emphasis is on solutions that provide multiple benefits and those that mimic or use natural processes and cycles. Criteria used to measure achievement of the goal's objectives include energy consumption, use of natural systems, multi-use facilities, pollutant control, construction techniques, landuse, and permeable surfaces.

TABLE 2.5.1

IOAP WET WEATHER TEAM COMMUNITY VALUES

PROGRAMMATIC VALUES
Economic Vitality:
Ensure that the community's total cost burden of implementing the IOAP is represented by affordable rates. While wastewater service rates and development fees should remain affordable, they must also provide adequate funds for continued development and growth. Factors considered in evaluating achievement of the objectives of this value include comparison of the resulting rates with EPA affordability criteria, which use residential and financial capability indicators. The evaluation will consider the costs for Consent Decree related costs, in addition to related costs for general sewer service, and drainage and flood protection costs. The likely burden of other utility services will also be addressed, even though these are not specifically considered in the EPA affordability criteria.
Financial Stewardship:
Maximize the benefits gained from the IOAP's various alternatives by the efficient use of all available resources. The benefit-cost ratio, used in conjunction with the values based risk management approach; provide a systematic process to ensure achievement of this community value. Criteria are based primarily on the cost-effectiveness of the solution set developed considering benefit cost evaluations of first cost and total present worth costs. The solution set will also consider other indicators of cost effectiveness, such as dollars per gallon of annual average overflow reduced.
Education:
Enhance the community's knowledge, values, and opinions to the extent that they will promote and demonstrate pollution prevention behaviors. Example behaviors may include understanding and support of investments that address sewer overflows and water quality issues, the implementation of technologies such as a rain gardens and rain barrels, and voluntary disconnection of down spouts. Criteria include, but are not limited to, the number of people contacted by various means, their knowledge of issues, and number of pollution prevention devices installed.
Environmental Justice and Equity:
Ensure a fair, balanced, and impartial distribution of the IOAP's capital investments, facilities, and services. The socioeconomic status of a neighborhood should not influence the type of projects chosen for the area, nor the manner of their implementation. Criteria include, but are not limited to, the distribution of resources, project impacts and benefits, consistent application of project development criteria, improvements to the quality of life, and an equal adoption of responsibilities.
Customer Satisfaction:
Respond quickly and efficiently to customer needs, concerns, and questions as necessary. Criteria include, but are not limited to, providing adequate sewer capacity, improving the reliability of sewer service, implementing response procedures to unauthorized overflows, and notifying customers regarding issues of concern.
Financial Equity:
Distribute cost associated with the IOAP fairly and reasonably. The user's rate fees should be commensurate with the demands that user places on the system. Criteria include, but are not limited to, the fair assignment of cost, the volume and type of waste introduced into the system, and socio-economic status.

2.5.3 Threat Identification and Characterization

The first task in risk management is to identify and define the various threats. Threats are caused by a specific problem, typically a CSO or unauthorized discharge. The threats are characterized by analyzing the probability and consequence of each specific problem occurring, within the context of the community values. The products of this analysis are the completed performance measurement tables.

Performance measurement tables are worksheets used to evaluate an existing problem's risk as defined by the probability of occurrence and the severity of the consequence. The reduction in the risk is defined as the benefit created by each proposed alternative. The public health enhancement, regulatory performance, and asset protection performance measurement tables incorporate a two-dimensional matrix of a threat's probability and severity, illustrated by Table 2.5.2 on the next page. This allows calculation of the risk score associated with each possible combination of probability and severity. Each project-specific community value is represented by its own corresponding performance measurement table.

Appendix 2.5.1 Benefit-Cost Model Instructions includes the complete set of performance measurement tables, along with instructions on how to use them.

Refer to Volume 2, Chapter 5, and Volume 3 Chapter 5 for detailed overflow volume, frequency and project information

TABLE 2.5.2

PERFORMANCE MEASUREMENT TABLE FOR WQTC REGULATORY PERFORMANCE

Alternative #1													
Value:	Regulatory Performance - WWTP												
	Measure			Impact						Rationale	Measurement Method		
Performance Measure	WWTP Peak Flows	Peak flow delivered to WWTP versus rated peak hour capacity of plant		Peak flow exceeds rated capacity by more than 50%	Peak flow exceeds rated capacity by 25 - 50%	Peak flow exceeds rated capacity by 10 - 25%	Peak flow exceeds rated capacity by less than 10%	Peak flow is within rated capacity	Peak flow is less than 80% of rated capacity	WWTPs have ability to handle small short term peaks without exceeding discharge standards, but significant peaks may result in process washout and associated failure of discharge permit limits. Peak flows less than 80% of rated capacity allow plant to pe	Measurement will be from analyzing plant influent flows against pre-determined plant stress-test results and operating criteria.		
	Event Recurrence Interval			Most Severe Impact				Least Impact	No Impact				
				5	4	3	2	1	0	Assumptions	Base Case Score	Alternative Score	Total Score
Frequency	6-10 per year	Most Likely	5	25	20	15	10	5	0				0
	2 -5 per year		4	20	16	12	8	4	0				0
	1-2 year recurrence interval		3	15	12	9	6	3	0				0
	3-5 year recurrence interval		2	10	8	6	4	2	0				0
	>5 year recurrence interval	Least Likely	1	5	4	3	2	1	0				0
	Not possible	Not Possible	0	0	0	0	0	0	0	Average Total Score			0
Note - This value sheet calculates the average benefit over the recurrence intervals. A correction calculation is included in order to obtain a maximum score of 25.										Corrected Score			0

Acronyms
AAOV - Average annual overflow volume
CSO - Combined sewer overflow
ml - Milliliters
SSO - Sanitary sewer overflow
WQS - Water quality standards
WWTPs - Wastewater treatment plants

In contrast to this, the eco-friendly solutions and environmental enhancements performance measurement tables are one-dimensional. Measuring alternatives against these values involves comparing alternative characteristics against a set of impact criteria. Since the analysis is based on fixed characteristics of the alternative, the probability of an effect is "1" which means there is always an effect. However, the magnitude of the effect is variable. Furthermore, the effect could be beneficial or detrimental. As a result, the one-dimensional community values have an impact scale ranging from negative "5" to positive "5."

Table 2.5.3 at the end of the chapter illustrates a one-dimensional measurement table on Page 1 of the table, and the rationale for the performance measures on Page 2 of the table.

2.5.4 Base Line Threat Estimation and Risk Calculation

Once a threat has been identified and its characteristics defined, it can be evaluated. For evaluation, it is necessary to estimate the threat's probability and severity. To do this, the event's frequency and the magnitude of its impact must be quantified. The values based risk management process uses probability and impact indices of "1" through "5." With regard to probability, a value of "1" represents low probability events that do not occur often while a value of "5" represents high probability events that occur frequently. On the impact, or severity index, a value of "1" is an event that produces a minimal effect, or impact. A value of "5" would be an event of significant impact. After a threat's frequency and impact have been quantified using the corresponding index, the two values are used to calculate the threat's risk score. The risk score is calculated or quantified as follows:

$$\text{Risk Score} = \text{Probability} \times \text{Severity}$$

For example, a threat with a high probability of "5" and a medium severity of "3" would produce a base-line risk score of "15."

2.5.5 Evaluation of the Alternatives

The third stage is the evaluation of an alternative's benefits. Using the risk scores calculated by the performance measurement tables, it is possible to compare the risk reduction that would result from the implementation of each alternative relative to the existing base conditions. As discussed above, each alternative produces numerous effects of an economical, environmental, and regulatory nature. Consequently, each effect may cause a corresponding change to an event's associated risk. The evaluation begins by calculating the base risk associated with each aspect, or criteria, of the existing condition. A comparable calculation is performed for the risk associated with each aspect of conditions that would be created by implementing the alternative. The extent of improvement or relative magnitude of the benefit of each effect is quantified by a performance score, which is the difference between the existing and alternative conditions.

The performance score is calculated as:

Performance Score = Base Risk Score – Alternative's Risk Score

Performance scores indicate the relative magnitude of the benefit generated by the alternative. For example, a Performance Score of "22" represents a significant risk reduction, while a score of "1" represents a slight risk reduction. In some cases, the Performance Score can be a negative value which indicates a detrimental effect. This method compares the benefits derived from each alternative against a standardized set of conditions and criteria - the community values. The sum of an alternative's performance scores for each of the community values is converted to one number called the Benefit Score.

To determine a Benefit Score, the relative importance of each community value must be considered. Each community value is assigned a weighting factor by the WWT Stakeholder Group indicating its relative importance. The higher the weighting factor, the more important the community value. While the theoretical range in weighting factors is from one – ten, the WWT Stakeholder Group determines which of the community values identified are important, so the effective range in weighting is from six – ten. Details of the weighting factor determination are in the Volume 1, Appendix 3.2.9.

The weighting factor acts as a multiplier either increasing or decreasing an alternative's Benefit Score. For example, if an alternative's regulatory compliance Benefit Score is calculated as "15" using its full performance measurement table, the alternative's weighted Benefit Score is 15 × 8 = 120 because the regulatory compliance value was given a weighting factor of eight.

The five final weighted Benefit Scores, one for each project-specific community value, are combined into a total weighted Benefit Score for each alternative. The total weighted Benefit Score is then divided by the cost of the alternative's implementation producing the Benefit/Cost Ratio. This process ranks alternatives by the benefits they generate per dollar of cost.

2.5.6 Benefit-Cost Analysis

The scope of the IOAP covers over 100 CSOs, and over 200 locations with documented or suspected unauthorized discharges. Often several alternatives are proposed for abating overflows at each of these locations. As a result, there are literally hundreds of potential alternatives that could be implemented. In addition, alternatives rarely have the same financial cost associated with them. Hence, choosing the best combination of alternatives can be difficult. Two essential questions are (1) how to prioritize the potential alternatives, and (2) to what extent or scope should MSD implement the alternatives? The benefit-cost analysis systematically answers these two questions, forming the basis for prioritizing potential alternatives and determining the scope of the IOAP.

A benefit/cost analysis considers the relationship of an alternative's benefits as defined by the values-based risk management evaluation to its implementation cost. The process requires two components (1) the alternative's total weighted benefit score discussed previously, and (2) the implementation costs. Note that project costs were expressed in hundreds of thousands, to avoid the appearance of benefit/cost values well below one. Since the benefit/cost scores were used to compare alternatives, the units of expression are not a factor in the decision process, as long as they are consistent between all alternatives.

For the purpose of alternative selection, the cost of each alternative was estimated using a spreadsheet-based cost model. This cost model was originally developed for the Metropolitan Sewer District of Greater Cincinnati. The cost model has subsequently been used as a standard in a number of other locations, with refinements and calibrations used to tailor the model for each specific location. The cost model considers several factors associated with implementing an alternative. Examples include construction cost, administrative cost, land purchases and easements, operation and maintenance, and salvage value. The cost model users guide, and an example of the input and output sheets, is contained in Appendix 2.5.2 IOAP Cost Model. While the cost model example sheets show actual estimated dollars, for the purpose of developing the benefit/cost ratio, the costs were expressed in hundreds of thousands, as explained previously.

Note that after projects were selected for implementation under the Final CSO LTCP and the Final SSDP the project cost estimates were refined to provide a higher level of accuracy for budgeting. The process of evaluating and refining the estimates is described in Appendix 2.5.3 MSD Cost Model Review and Update.

The ratio of the alternatives' benefit score to its cost is referred to as a benefit/cost ratio. Related alternatives are ranked in descending order according to their benefit to cost ratio. The alternative with the highest benefit to cost ratio is usually the preferred alternative for each problem site.

The benefit/cost analysis is a tool to support the decision process, but is not the only factor considered. In some cases an alternative that is not the highest ranked benefit/cost value may be selected due to other considerations. An example relates to the selection of storage or remote high-rate treatment systems in the combined sewer system. In most cases, storage alternatives have higher benefit cost scores than the remote high-rate treatment. Implementing a program that adds significant storage to the system without adding additional treatment capacity could result in a condition of inadequate treatment capacity that cannot ensure all storage systems can be emptied before storing the next storm. In this case, selecting remote high-rate treatment may be necessary at some sites, even if it is not the highest benefit/cost score for that particular location. It must be emphasized that the benefit/cost evaluation is a vital tool in the selection of alternatives, but it does not dictate decisions or priorities if other factors must be considered.

2.5.7 Knee of the Curve Evaluation

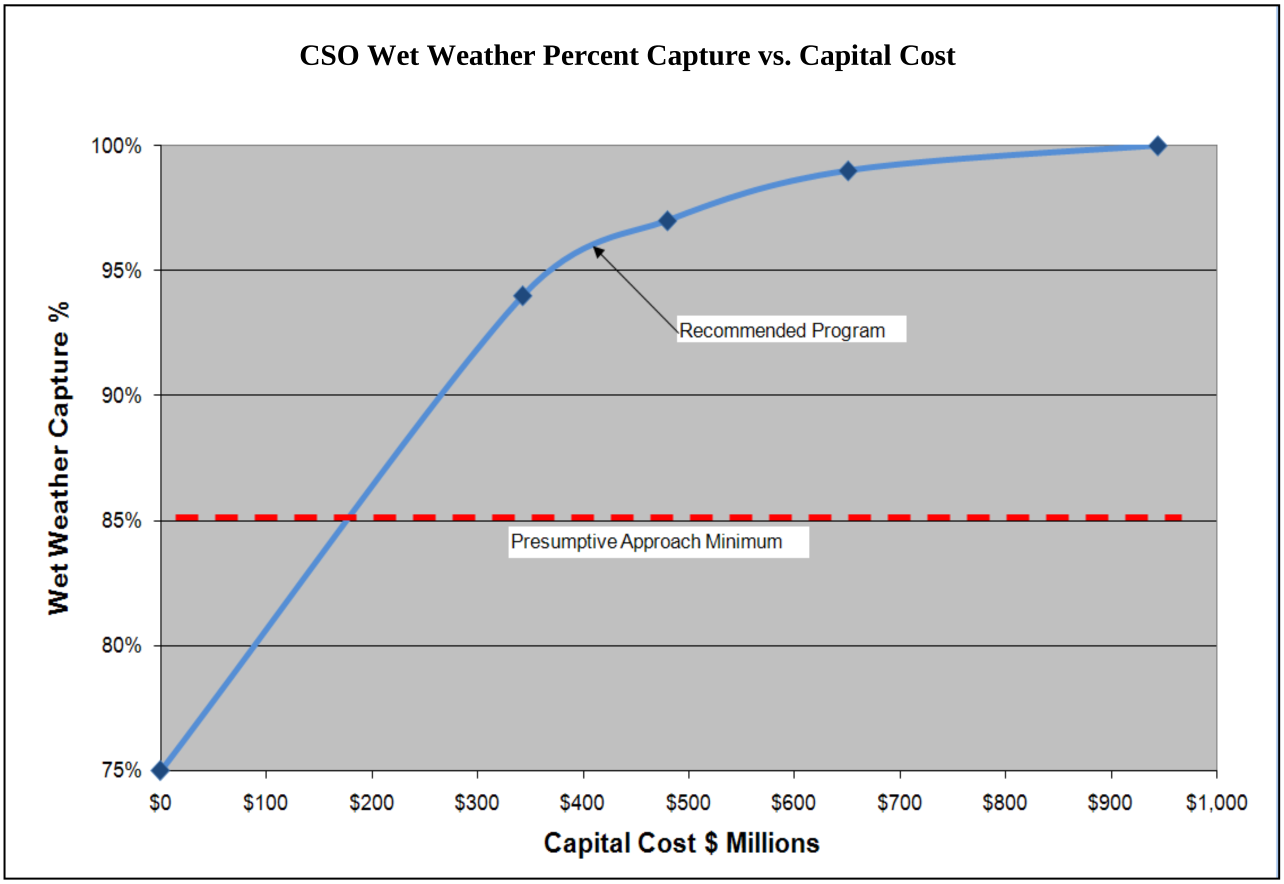
In evaluating the alternatives for CSO control, the CSO Control Policy recognizes that projects developed to improve water quality often reach a point of diminishing returns. This is observed when evaluating individual projects at the same level of control (for example, four overflows per year) and even more importantly, when evaluating the benefits of higher or lower levels of control. A knee of the curve evaluation for different levels of CSO control was used to validate the level of control decisions made based on the Benefit-Cost analysis described previously.

The CSO Policy and EPA guidelines for development of LTCPs recognize this phenomenon, and advocate the use of a knee of the curve evaluation. To develop a knee of the curve plot, the benefits of a project or suite of projects is plotted against the cumulative cost to implement them. The knee of the curve is the name given to a particular region of the benefit (or benefit-cost) vs. cumulative spending line graph. Figure 2.5.2 shows a knee of the curve plot from Volume 2, Chapter 4 that illustrates evaluating the cost to achieve different levels of wet weather capture. Data points on the curve represent costs and wet weather capture developed for system-wide implementation of controls to achieve eight, four, two, and zero overflows per year. The point of the curve noted marks the point of diminishing returns. Beyond this point, implementing additional alternatives, and incurring the cost of those alternatives, does not produce a commensurate increase in benefits.

For SSDP evaluation, the level of control analysis is slightly different. Since there is no EPA policy guidance for SSO elimination, an optimization step was used to select levels of control based on Benefit-Cost ratio.

To validate these selections, the cost of SSO control to different design storms was plotted against the cumulative Benefit-Cost scores of all SSO elimination projects sized to that storm. A more detailed presentation of these concepts is in Volume 1, Chapter 5, Section 5.3.

FIGURE 2.5.2 - EXAMPLE KNEE OF CURVE GRAPH



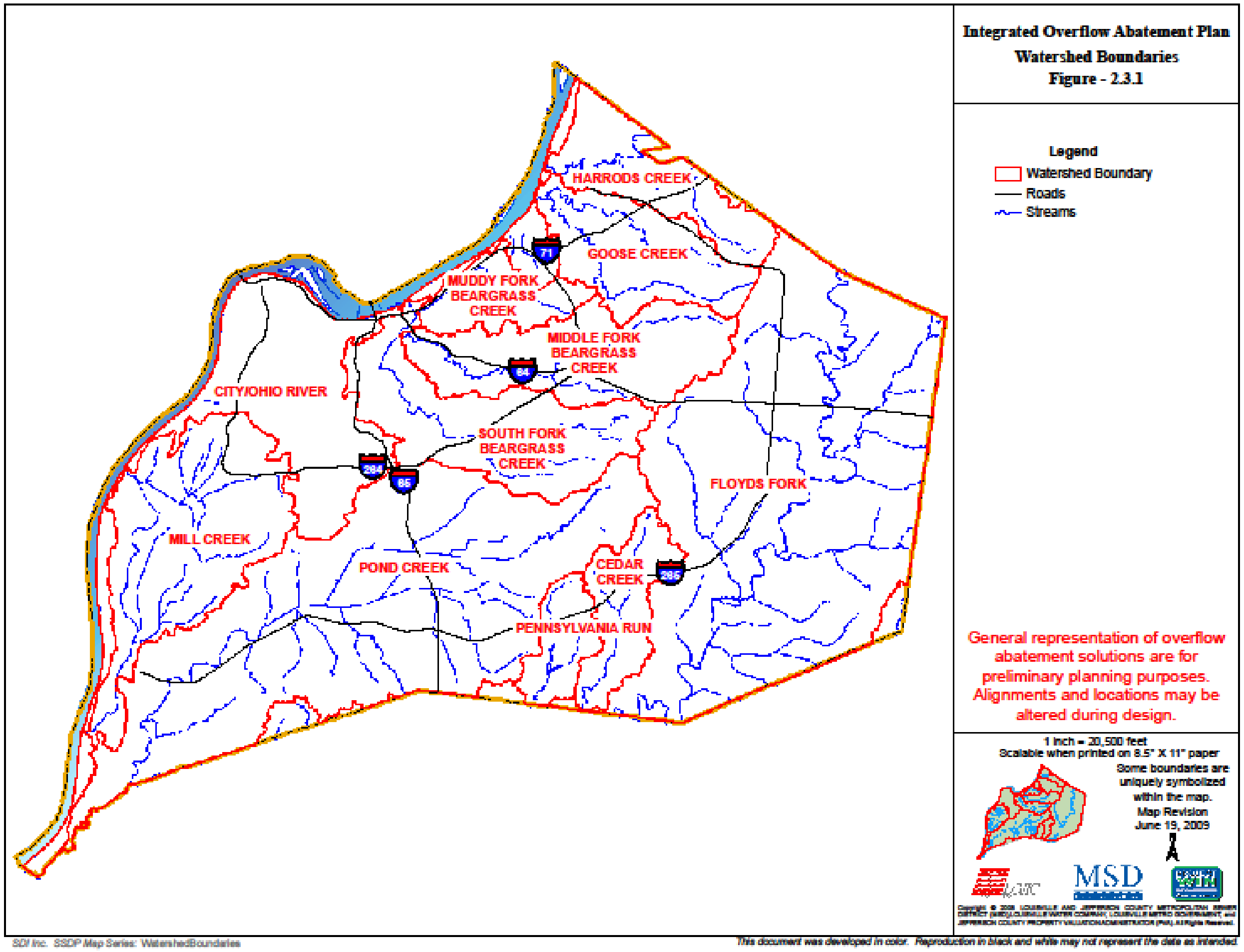
2.6 MEASURES OF SUCCESS

Compliance with all the obligations of the Consent Decree and the CWA is the most obvious measure of success for the IOAP. The WWT Stakeholder Group identified a number of other measures of success as represented by the community values that the IOAP protects. To be considered a complete success, all these measures of success must be achieved.

A detailed description of how this Consent Decree and CWA compliance will be documented is contained in Volume 1, Chapter 5. A summary of some of the critical measures of success are presented as follows:

- Compliance with all reporting and construction milestones contained in the Consent Decree;
- Development of CSO control plans that provide cost-effective levels of CSO control, maximizing water quality improvements within the levels of investment supported by the overall benefits received;
- Development of unauthorized discharge elimination plans that achieve elimination to the designated level of control represented by the selected design event in the most cost-effective manner;
- Acceptance by the regulatory agencies, MSD's rate-payers and other stakeholders, of the IOAP program as representing an appropriate level of control for CSOs and unauthorized discharges; and
- Acceptance by the regulatory agencies, MSD's rate-payers, and other stakeholders, of the IOAP implementation schedule as being both expeditious in dealing with overflow abatement issues and also responsible in the cash flow requirements relative to the Louisville Metro community's ability to pay.

FIGURE 2.3.1 - WATERSHED BOUNDARIES



Refer to Volume 2, Chapter 5, and Volume 3 Chapter 5 for detailed overflow volume, frequency and project information

FIGURE 2.5.1 - PROJECT DEVELOPMENT AND EVALUATION PROCESS

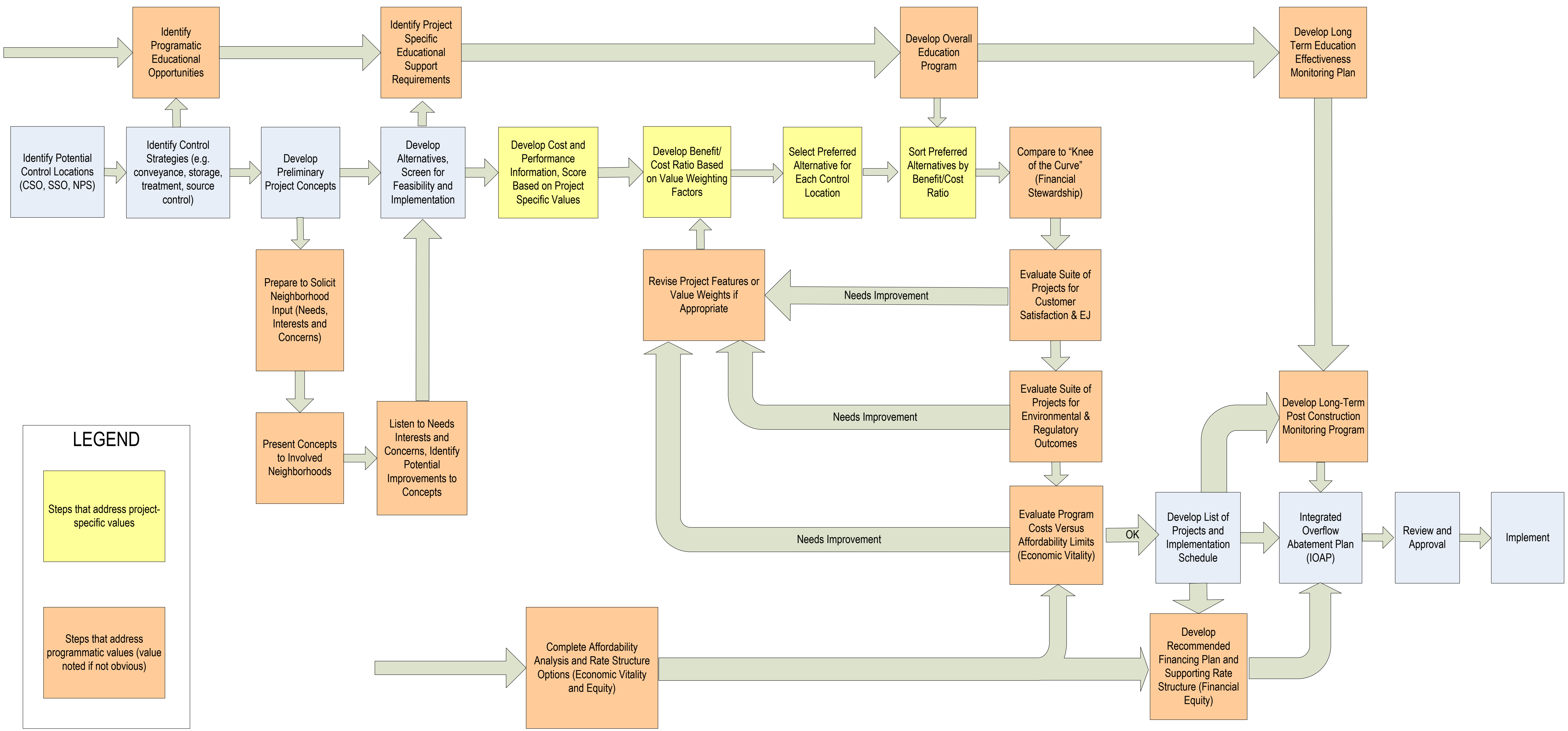


TABLE 2.5.3

ONE-DIMENSIONAL MEASUREMENT TABLE - PAGE 1

L_OR_MF_172_S_08_A_A	**Sewer Separation - Construct New Stormwater Sewer System**												
Value:	**Environmental Enhancement**												
						Scoring							
Aspect	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**Assumptions**	**Score Per Aspect**
Aquatic and Terrestrial Habitat Protection	Elimination of habitat for rare or endangered species	Elimination of significant amount of common habitat	Elimination of minor amount of common habitat	Significant habitat impairment	Minor impairment to existing habitat	No impact on habitat	Minor enhancement of existing habitat	Significant enhancement of existing habitat	Creation of minor amount of common habitat	Creation of significant amount of common habitat	Creation of critical habitat for rare or endangered species	We utilize expertise of sub-consultants Redwing Ecological Services and/or LimnoTech to score Environmental Enhancement aspects.	0
Aesthetics - Solids and Floatables (S&F)	75%+ reduction in volume of flow with no S&F capture	50 - 75% of flow with no S&F removal	25 - 50% of flow with no S&F removal	10 - 25% of flow with no S&F removal	Reduces efficiency of existing S&F control device, 0 - 10% of flow with no S&F removal	No change in S&F removal	0 - 10% of discharged flow treated with positive S&F removal (screens)	10 - 25 % of discharged flow treated with positive S&F removal (screens)	25 - 50% of discharged flow treated with positive S&F removal (screens)	50 - 75% of discharged flow treated with positive S&F removal screens	75% + of discharged flow treated with positive S&F removal (screens)	Stormwater first-flush considered to be high in runoff pollutants	-5
Aesthetics - Odor and Air Emissions	Create annoying odor source affecting > 20 customers often	Create annoying odor source affecting <20 customers often, or >20 customers occasionally	Create annoying odor source affecting <20 customers occasionally	Create detectable odor source affecting > 50 customers often	Create detectable odor source affecting < 50 customers occasionally	No impact on odors	Eliminate detectable odor source affecting < 50 customers occasionally	Eliminate detectable odor source affecting > 50 customers often	Eliminate annoying odor source affecting <20 customers occasionally	Eliminate annoying odor source affecting <20 customers often, or >20 customers occasionally	Eliminate annoying odor source affecting >20 customers often	Sewer separation project has no impact on odor	0
Dissolved Oxygen Impacts	Reduction of in-stream DO by 2 mg/l + during critical flow periods	Continuous reduction of in-stream DO of 2 mg/l +	Continuous reduction of in-stream DO of 0 - 2 mg/l, possible reduction of in-stream DO 2 - 4 mg/l during critical conditions	Intermittent reduction of in stream DO 2 mg/l + possible during non-critical conditions, reduction of DO 0 - 2 mg/l during critical conditions	Intermittent reduction of in stream DO 0 - 2 mg/l possible during non-critical conditions	No DO impacts	Intermittent improvement of in-stream DO 0 - 2 mg/l	Intermittent improvement of in-stream DO 2 mg/l +, intermittent critical condition improvements 0 - 2 mg/l	Continuous improvement of in-stream DO 0 - 2 mg/l, intermittent critical condition improvements 2-4 mg/l	Continuous improvement of in-stream DO 2 mg/l +	Continuous improvement of critical condition in-stream DO 2 mg/l +	We utilize expertise of sub-consultants Redwing Ecological Services and/or LimnoTech to score Environmental Enhancement aspects.	0
Downstream Impacts	75%+ increase in annual BOD or nutrient loads	50 - 75% increase in annual BOD or nutrient loads	25 - 50% increase in annual BOD or nutrient loads	10 - 25% increase in annual BOD or nutrient loads (CSO + runoff)	Potential 0 - 10 % increase in annual average BOD or nutrient loads (CSO + runoff)	No impact on BOD or nutrient loads (CSO + runoff)	0 - 10% reduction in annual BOD or nutrient loads (CSO + runoff)	10 - 25% reduction in annual BOD or nutrient loads (CSO + runoff)	25 - 50% reduction in annual BOD or nutrient loads (CSO + runoff)	50 - 75% reduction in annual BOD or nutrient loads (CSO + runoff)	75%+ reduction in annual BOD or nutrient loads (CSO + runoff)	Storm water first-flush considered to be high in runoff pollutants	-5
Stream Flow Impacts (Peak flows)	25% + increase in peak flows	10% - 25% increase in peak flows	Up to 10% increase in peak flows	Frequent increase in flow during critical conditions	Possible increase in average flow, or minor increase in high flow peaks	No impact on peak flows	Minor reduction in flows - no significant peak reduction	Minor reduction in peak flows under some conditions	Up to 10% reduction in peak flows	10% - 25% reduction in peak flows	25%+ reduction in peak flows	Average annual flow rate is insignificant compared to annual stream flow rate.	0
Stream Flow Impacts (DWF only)	25%+ decrease in flow during critical conditions.	10% - 25% decrease in flow during critical conditions	0-10% permanent decrease in flow during critical conditions	Frequent decrease in flow during critical conditions	Possible decrease in average flow	No impact on average or base stream flow	Intermittent increase in stream flow - not timed to critical conditions	Intermittent increase in stream flow - often improves critical conditions	0 - 10% permanent increase in stream flow during critical conditions	10 - 25 % permanent increase in stream flow during critical conditions	25%+ permanent increase in stream flow during critical conditions.	No impact on stream flow during critical conditions.	0
Instructions: (1.) Score each alternative for each of the seven aspects of the value. Scores can be positive or negative, depending on the impact of the alternative on the value. (2.) Total the scores for each aspect to get the total score for this alternative in this value. (3.) Shaded area represents "fatal flaw." Alternatives that score in this area should not be proposed.											**Total Raw Score Calculated**		**-10**
											Corrected Score		**-10**
											Note: The total score calculated may be more than 25. In the instances where this might occur, a default maximum score of 25 will be calculated.		

TABLE 2.5.3

RATIONALE FOR THE PERFORMANCE MEASURES - PAGE 2

Aspect	Rationale	Measurement Method
Aquatic and Terrestrial Habitat Protection	Wet weather projects may affect both aquatic and terrestrial habitat through changes in base flow, peak flow, water quality, tree cover, channel shape, and characteristics etc. Predictive models used to evaluate wet weather control measures have a limited ability to predict biological diversity changes, erosion impacts etc., so surrogate metrics must be used to estimate future positive and negative impacts.	Project definition may specifically address changes in channel shape and configuration, tree cover etc. Predictive models will address DO and other water quality impacts. Flow models will predict base flow and peak flow rates to allow estimates of changes in erosion and water surface area.
Aesthetics - Solids and Floatables	Most CSOs have some form of solids and floatables control baffles. Improvements in capture rates can be expected with screening or other advanced treatment options. Storm water retention, constructed wetlands, and other control systems may provide solids and floatables removal as well. While reduction in solids and floatables removal efficiency is not likely, penalty points will be assessed if this is possible with any alternative.	Current solids and floatables removal efficiency has been estimated for all sites with control technology. Improvements in removal efficiencies will be estimated for all alternatives that add screening or other advanced treatment technologies. Where treatment is proposed for storm water discharges removals will be estimated based on published removal data.
Aesthetics - Odor and Air Emissions	Odors and air emissions can be generated in storage systems, pump stations, force mains, and long flat sewers. Odors are generally characterized by both the intensity and the quality of the odor. Detectable and annoying are two common descriptors of different intensities and qualities of odors from sewage handling facilities.	Odor emissions from sewage handling facilities can be modeled for intensity, quality, and geographic spread. For planning purposes this level of evaluation is not common, and will not be done except in very rare circumstances. The potential for odor and air emissions will be estimated based on typical applications and model predictions for storage time, number of events, average flow velocities etc.
Dissolved Oxygen Impacts	Dissolved oxygen in streams is dependent on a variety of factors including BOD load, nutrient load, stream flow velocity, water temperature, etc.	For BGC the Water Quality Tool will be used to estimate the impacts of various loading conditions, flows, temperatures, etc. Probable impacts of individual projects will be estimated based on comparisons to the various stream condition scenarios.
Downstream Impacts	Downstream impacts refer to conditions in the Ohio River below Louisville Metro. Nutrient loadings in the Ohio (not just Louisville metro) have been identified as the source of 30 - 45% of the total nutrient loads reaching the Gulf of Mexico. BOD is not likely to persist in the river long enough to get to the Gulf, but can have detrimental impacts far downriver.	Pollutant removals will be estimated based on reductions in annual average loads, since the downstream impacts are primarily long-term and cumulative.
Stream Flow Impacts (Peak flows)	Extremely high peak flows as are often caused by urbanization of a watershed can erode the streambed, damage aquatic and terrestrial habitat, make water based recreation unsafe or impractical.	Predictive models can estimate flow peaking factors from individual sources, and the Water Quality Tool has a hydraulic component to estimate stream flows during various storm events.
Stream Flow Impacts (DWF only)	Diversion of flows away from a stream due to abandonment of a treatment plant etc. can reduce base flows in a stream. Alternatively, other control measures such as groundwater pumping can increase base flows with beneficial results.	Predictive models can estimate flows from individual sources, and the Water Quality Tool has a hydraulic component to estimate stream flows during various dry weather events.

Acronyms

BGC - Beargrass Creek
BOD - Biological oxygen demand
CSO - Combined sewer overflow
DO - Dissolved oxygen
DWF - Dry weather flow
mg/l - Milligram per liter
S&F - Solids and floatables

Chapter 3

CHAPTER 3: PUBLIC PARTICIPATION AND AGENCY INTERACTION

Special Note: This chapter was developed in 2008. The statistical data for the CSO's reported, specifically related to individual CSO overflow volumes and frequency in a typical rainfall year, were derived from the CSS model calibrated in 2007. Since then, a more detailed calibration and validation effort has adjusted the average annual overflow volumes and frequencies in the typical year. This information is provided in Volume 2, Chapter 5. The vast majority of the physical system characterization in this chapter is still accurate.

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SUPPORTING INFORMATION

CHAPTER 3: PUBLIC PARTICIPATION AND AGENCY INTERACTION

Chapter 3 describes the Louisville and Jefferson County Metropolitan Sewer District's (MSD) strategy and planning process to facilitate stakeholder relationships among local community leaders, citizens, organizations, and regulatory agencies to develop a comprehensive Integrated Overflow Abatement Plan (IOAP). This chapter outlines the public participation and outreach program during the development of the IOAP as well as the ongoing program of public notification, education, and outreach that encourages sustainability of the program. The program focuses on four key components: Public Notification, Wet Weather Team (WWT) Engagement, General Programmatic Outreach and Educational Activities, and Regulatory Reporting and Agency Meetings.

The program implemented by MSD includes notification of the public, outreach, and education to the public and stakeholders, and engagement of specific stakeholders and the public to establish the priorities and make choices for the overflow abatement infrastructure program. The program is comprehensive and multifaceted. In the course of this chapter, this program will be referred to as the public program.

3.1 INTRODUCTION

Public participation and agency interaction are a vital component of MSD's Consent Decree response. An informed and involved public is essential to ensure that the response plan developed is consistent with the values of the community served, and will be supported by the customers who will pay for implementation of the plan as part of their MSD service fees. Open communication with regulatory agencies is also vital to keep the plan development on-track, resulting in an approach to compliance that presents no surprises to the agencies that are facilitating plan review and approval. This chapter describes MSD's past, current, and proposed future program for public participation and agency interaction.

3.1.1 Branding of Project WIN

Project Waterway Improvements Now, or Project WIN, encompasses the MSD response to the Consent Decree, including the development of the integrated overflow abatement plans. These plans include the Final Combined Sewer Overflow (CSO) Long-Term Control Plan (LTCP) and Final Sanitary Sewer Discharge Plan (SSDP), as well as the implementation of the Nine Minimum Controls (NMC), Capacity, Management, Operations and Maintenance (CMOM), and the Sewer Overflow Response Plan (SORP). IOAP development also includes the construction of the Early

Action Plan (EAP) projects and the public program to notify and engage the public in the MSD wet weather program.

The implementation of the Consent Decree program will continue for many years. Branding the overflow abatement program as Project WIN is intended to provide identification and distinction. With this branding, it is expected that the public will better understand the magnitude and long-term cost of the program and as the program progresses be able to attribute the results to this program as well. Further, the branding of Project WIN separates this program from the regular sewer operations, maintenance, repair and replacement program that are part of the ongoing programs of the utility. Additionally, the branding identifies this as a special project with a beginning and an end and that it requires special attention and increased funding.

The branding for Project WIN began on April 29, 2007, by an eight-page insert in the Louisville Metro newspaper *The Courier-Journal* to maximize the exposure of Project WIN initiatives throughout the MSD service area. The publication provided information on the proposed rate increase, Project WIN initiatives, and a discussion of the Consent Decree. Included in the insert was a list of scheduled public meetings, annotated diagrams and definitions of sanitary sewer overflows (SSO) and CSO; examples of activities that the typical homeowner can perform to help alleviate sewer overflow problems; and a general warning to avoid waterways during and for 48 hours after rainstorms.

3.1.2 Consent Decree Public Program Requirement

The Consent Decree specifically discusses public programs only in the context of forming a WWT to develop a funding plan, and a program of public education, information, and outreach. Since the Consent Decree also requires preparation of a LTCP, an SSDP, and updates to the NMC Compliance Report and the SORP, the public program requirements of all those documents are also included in the Consent Decree response.

The public program, as required by the CSO policy and then adapted for the SSO program, is based on two concepts; public notification and public participation:

- Public notification of overflows is required by the CSO Policy (NMC 8) and the SORP because the public has a right to know if overflows are occurring or will occur, the location of the overflows and the potential public health, environmental, and recreational impacts of the overflows, thereby allowing them to make informed choices about their family’s activities in and around potentially impacted waters, and
- Public participation includes engagement in the decisions and selection of long-term controls to meet the requirements of the Clean Water Act (CWA) with the intent to ensure long-term financial, political, and practical support of the implementation of the overflow abatement program.

In the public outreach components of the CSO Policy, NMCs, and the LTCP Guidance, public education is not specifically addressed; yet it is an essential component of an effective public program. In a public education campaign, obtaining meaningful engagement and participation requires educating the public so they understand the real impacts for their families, businesses, and overall quality of life.

In addition to the CSO Policy requirements, the MSD public program is essential to both CSO and SSO control programs. A public outreach and education program ensures public acceptance of the priorities and choices of the infrastructure program and the public willingness to pay for the infrastructure program and the cost of overflow abatement over a long period. Additionally, a public education and outreach program encourages behavior changes and explains how these changes will enhance the ability of the sewerage infrastructure to abate overflows, which is essential to sustainable overflow abatement.

The recommended overflow abatement program will not eliminate all overflows under all conditions nor will it guarantee that harmful pollutants do not reach the surface waters under some conditions. Therefore, behavior changes related to commercial and individual housekeeping are necessary. For instance, control of Fats, Oil and Grease (FOG), elimination of illegal clear water connections to the sanitary sewers, and gardening and drainage and consumer practices can maximize the potential for the sewerage infrastructure to abate overflows.

3.1.3 Essential Public Program Components

As noted in Section 3.1.2, the Consent Decree requires MSD to implement the NMCs, develop a LTCP for CSO control, an SSDP for control of unauthorized discharges, and a SORP. Each of these elements has public program components. For example, the seventh NMC requires pollution prevention, which often includes education and outreach. The eighth NMC requires public notification of overflows and the impacts of the overflows. The LTCP requires public participation in the development of the plan. The SORP is intended to ensure a timely and effective method of notifying the potentially impacted public of sewer overflows (both combined and separate).

Therefore, these essential program elements have been included in the Consent Decree for both the CSO LTCP program and the development of the SSDP and are the basis of the requirements for the development and long-term implementation of a public program. Table 3.1.1 outlines the policy requirements and purpose for the various public programs.

TABLE 3.1.1

PURPOSE OF PUBLIC PROGRAMS

Policy Or Consent Decree Requirements	Purpose
CSO Policy - NMC 3 Modification of Pretreatment Program and NMC 7 Pollution Prevention	Keep contaminants from entering the combined sewer system (CSS) and thus the receiving waters including: • Source control • Recycling Many of the measures require housekeeping and behavior changes for industries, individuals, business, and governments. To realize behavior changes, education and outreach is necessary.
CSO Policy – NMC 8 Public Notification of CSO occurrences and impacts	Inform the public about the potential for overflows, actual overflows, locations and possible health and environmental impacts of overflows. The principal reason for notification is to reduce exposure to potential health risks. Public notification also educates the public about CSO and builds support for the overflow abatement program.
CSO Policy – LTCP Public Participation	Actively involve the affected public in the decision making to select long-term CSO controls. The expectation is that issues and expected conflicts will be identified and addressed in the planning process minimizing the potential for long delays or unforeseen costs. The expected benefit is financial, political and practical support of the implementation of the long-term control plan.
Consent Decree – SORP – Notifying the potentially impacted public	Establish timely and effective methods and means of notifying the potentially impacted public about unauthorized discharges, including wet weather SSOs and dry weather CSOs. The principal reason for notification is to reduce exposure to potential health risks. This ensures that sanitary sewer overflows are included in notification plans described under NMC 8.
Consent Decree – Organize a WWT	Include entities who have a stake in the program outcome and the team should be sufficiently multidisciplinary to address a myriad of engineering, economic and environmental, and institutional issues that will be raised during the implementation of the remedial measures under the Consent Decree. The WWT will prepare a plan for funding the program and develop a program for public information, education and involvement.

Based on these requirements, MSD has developed a comprehensive program, which it has implemented since August 2005. As noted in the Introduction, the four major components of this public program are as follows:

1. Public Notification
2. WWT Engagement
3. Public Meetings During Overflow Abatement Planning and Implementation
4. General Programmatic Outreach and Educational Activities

Coordinated together, these four components incorporate all aspects of the public program and account for the overlapping requirements of the NMC, the SORP, and the requirements of the LTCP and Amended Consent Decree as illustrated in Table 3.1.2.

TABLE 3.1.2

RELATIONSHIP OF REQUIREMENTS AND PROGRAM COMPONENTS

Program Components	NMC 3 & 7	NMC 8	LTCP Public Participation	SORP Public Notification	WWT
Public Notification		X	X	X	
WWT Engagement			X		X
Public Meetings During Overflow Abatement Planning and Implementation	X	X	X	X	X
General Programmatic Outreach and Educational Activities	X	X	X	X	

MSD has woven a comprehensive program that reaches a vast audience and covers the issues and requirements related to the wet weather overflow abatement program. Although the description of this overall program is broken down into the above components, in actual implementation, the components are interwoven for efficiency and delivery of the messages. Moreover, the comprehensive program is intended to ensure that the messages are all-inclusive, concise, and not repetitive.

The last component of the public program, required by the Consent Decree, is the regulatory reporting and the regulatory agency interaction. The purpose of the reporting is to show compliance with the wet weather overflow abatement program requirements. The expectation is that comprehensive reports and regular agency meetings will maximize the potential for the overflow abatement program to be fully compliant with Consent Decree and other regulatory requirements.

3.2 PROGRAM IMPLEMENTATION BETWEEN AUGUST 2005 AND SEPTEMBER 2009

This section describes the public program activities that occurred during the development and approval of the IOAP.

3.2.1 Public Notification

The purpose of public notification is to inform the public of potential sewer overflows, the location, and the possible public health and environmental effects of the overflows. The public notification of the potential or actual sewer overflows also advises the public to curtail recreational activities or commercial activities in areas directly or indirectly affected by overflows. Overall, the intent of notification is to reduce the public's exposure to potential health risks.

A secondary purpose of the public notification is to develop long-term support for overflow abatement programs. The notification serves to inform the public that overflows do exist and can interrupt the use of the waters. Over time, a concise message will bring about behavior modifications that should result in public support of investment in both concrete (gray) and natural (green) infrastructure that will reduce the occurrence of overflows and interruption of use of the waters. Notification activities are both event-based and programmatic. Event notification, for both CSOs and SSOs, focuses on warnings, and delivering information about the potential public health impacts where the overflows occurred. Programmatic notification is a comprehensive approach to enhancing the public's knowledge and awareness of overflows. This awareness should include why, how and where overflows occur, as well as solutions and mitigation techniques to abate these overflows.

MSD's public notification efforts implemented to-date include permanent CSO and SSO warning signs, overflow advisory signs, email notification of events (public and regulators), and web page notification. Electronic notification via the MSD website, list-serve e-mail list, and other electronic media broaden the opportunity for notification and awareness.

3.2.1.1 Warning Signs

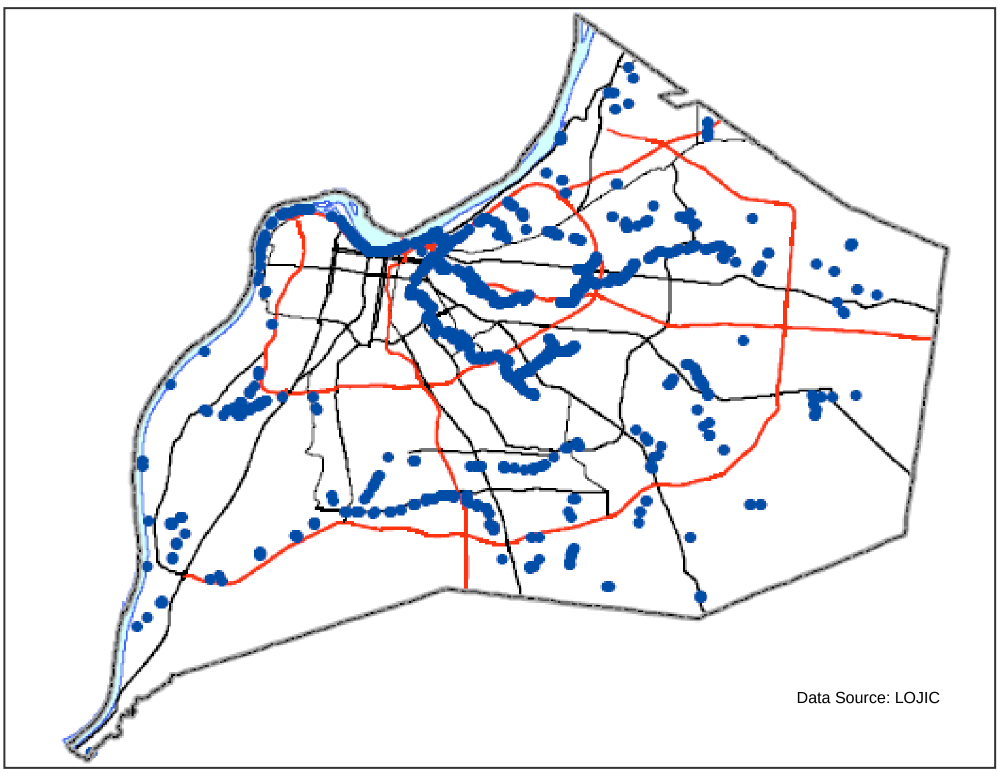
Bilingual Overflow Advisory Sign Installed by MSD

MSD has installed approximately 1,100 Overflow Advisory signs along the creeks and the Kentucky side of the Ohio River within both the combined and separate sanitary sewer systems as outlined in the NMC Compliance Report and the SORP. In the combined sewer system (CSS) area, approximately 300 signs were installed by September 30, 2006. In the separate sewer system area, approximately 800 additional signs were installed by October 30, 2006. The installation criteria can be found in Table 9.2 of the NMC Compliance Report dated September 15, 2006. To enhance public participation, the signs are bilingual and contain internationally recognizable graphics for those who cannot read either English or Spanish. The signs are widely publicized in MSD's CSO and SSO brochures and have been discussed at numerous public presentations

MSD conducted a Recreational Contact Survey to determine the extent of potential human contact to impacted waterways during the recreational season. The survey documented visual observations of recreational use in key locations along Beargrass Creek and the Ohio River within Louisville Metro. MSD analyzed the results of the survey to determine if additional signage, information, displays, or other public notification efforts are warranted at locations of high use. A further discussion of the Recreational Contact Survey can be found in Volume 2 Chapter 2.

To ensure continued notification and recognition, MSD staff annually inspects the installed signs. Based on annual work orders, all signs are inspected, repaired, replaced, relocated, or cleaned as appropriate. To aid in the tracking of these signs an inventory in the Hansen Asset Management software is maintained. Figure 3.2.1 shows the location for the signs, published in February 2007.

FIGURE 3.2.1 - OVERFLOW ADVISORY SIGN LOCATIONS WITHIN LOUISVILLE METRO, KY



3.2.1.2 Project WIN Website

The Project WIN section is a sub-website of the MSD website. It contains a vast amount of information for the public and other interested parties. The Project WIN section is maintained so that the public has access to accurate and timely information. The Project WIN website includes the following:

- Information about Project WIN, the program history and background
- Tips & Resources describing what individuals can do on their own property
- FAQs (Frequently Asked Questions)
- Public Document Repository that contains the Consent Decree planning documents, approved submittals and reports
- Water Quality Treatment Center Reports
- WWT Document Repository
- Project WIN E-mail Notification System
- Integrated Overflow Abatement Plan

The Project WIN website was significantly revised in 2012 to add content and make navigation more user-friendly.

3.2.1.3 Electronic Notification

The programmatic approach to public notification includes a wide variety of electronic communication forms as documented below.

Website: From MSD's Home Page (www.msdlouky.org) there is a link to Project WIN. The Project WIN site includes a link to sign up for overflow advisory email that sends a warning when significant precipitation has caused overflows in MSD's system. Since it is electronic and contains "real time" information, the website is an important component of public notification. The Project WIN website provides important information on the condition of area streams and shows a warning if overflows are likely to happen or have happened in the past 48 hours. Section 3.2.1 describes the MSD and Project WIN website in more detail.

Web Page Stoplights and Supplemental Information: The Project WIN website maintains overflow alert messages in the form of screen crawls. The website's home page features a simulated traffic light to inform the public of the overflow advisory level current conditions:

- "Green" for conditions are normal
- "Yellow" when a dry weather overflow greater than 1,000 gallons has occurred
- "Red" when rainfall occurs and conditions for overflows is likely

MSD's rain gauge network is utilized to automatically trigger the "red" condition when any rain gauge tributary to the CSO area receives more than 0.1-inches of rain, or any other rain gauge in Louisville Metro receives more than 0.75 inches of rain. The notification alert lights remain on the website for 48 hours after the rainfall has ended to reinforce the message that the public should avoid water body contact. The screen crawl is located below the notification lights with up-to-date information about weather conditions and alerts about contact with waters.

Blending Events Notification: On February 12, 2008, MSD added a notification of blending events at the Jeffersontown WQTC to the Project WIN website. See example to the right.

Jeffersontown WQTC
Blended Flow Data

As of 2/12/08, MSD is providing near real time flow information on blended flow from this plant. Up to 60 days of historical data is presented below. You may also view all historical data.

Start Date/Time	End Date/Time	Amount (Gal.)

E-mail Notifications: The public can voluntarily sign up to receive automatic email alerts about the potential overflows. On the MSD Home Page, customers learn about the conditions that trigger alerts, and can register by clicking on the Project WIN E-mail Notification link for the notification message.

Press and Public Service Announcements: MSD offers the Project WIN e-mail notification messages to radio, TV, and other local media (if they sign up to receive them) for public service announcements.

3.2.1.4 Written Notices

MSD utilizes many forms of written notification to communicate with customers and regulatory agencies as documented in the most current version of the Sewer Overflow Response Protocol (SORP) available through the Project WIN website. Examples of the written notifications to customers are described below.

Door Hangers: MSD uses many types of door hangers for notification to residents. One of these door hangers is distributed to homeowners following a sewer backup that has the potential to cause basement or surface flooding. Another door hanger is distributed to neighborhoods that could be affected by dry weather overflows that reach receiving waters in significant quantities. Examples of the door hangers are included in Appendix 3.2.1.

Direct Mail Within 500 feet of Waterways: In September 2006, MSD initiated an annual public notification via a letter sent to each customer within 500 feet of Beargrass Creek and the Kentucky side of the Ohio River near the mouth of Beargrass Creek, as determined by GIS plot. The purpose of the notification is to provide general awareness and warning information about overflows and steps the public should take to protect its' health. The targeted notification focuses on the customers most impacted by the CSOs with messages such as to avoid full immersion in waters, not to swallow contaminated water and to wash hands thoroughly with soap and warm water. In 2006, MSD also developed a brochure titled Controlling CSOs in Louisville which was included with the initial notification. The updated brochure can be accessed at www.msdprojectwin.org/How-You-Can-Help.aspx. The 2006 version is included in Appendix 3.2.2.

Water Quality Warnings Prior to Onset of Recreational Season: In 2006, MSD began providing annual public notification in the form of bill inserts, newsletters, and newspaper advertisements. These notifications are targeted in the spring to coincide with the beginning of recreational season. This notification provides a general overview of the potential for sewer overflows and informs about water body contact and public health concerns. An example is included in Appendix 3.2.3.

Brochures: MSD also has created brochures on SSOs and CSOs. Brochures are distributed at public meetings; other public events and supplied to the Metro Council members for distribution at their District meetings. Both of these brochures define and describe CSOs and SSOs, warn about potential public health impacts, and advise against contact with either the overflows or the surface waters after an overflow. Additionally, the brochures include a graphic depicting the warning signage to reinforce the recognition of the signs. The brochures direct the public to the MSD website for up-to-date information about overflows, and include the MSD customer service phone number. Examples of the 2006 brochures are included as Appendices 3.2.4 CSO Brochure and 3.2.5 SSO Brochure. Updated versions can be accessed at www.msdprojectwin.org/How-You-Can-Help.aspx.

Newsletters and Other MSD Publications: MSD has three regular publications that have been used to disseminate Project WIN information. These publications are MSD's "Update," "Crosscurrents," and the MSD Annual Report. The "Update" is a monthly publication with a regular feature section on Project WIN and progress to-date on the overflow abatement program. The "Update" is distributed to over 2,000 subscribers plus several 1,000 more that download it from MSD's website. The "Crosscurrents" is a quarterly newsletter that also includes up-to-date information about CSOs and SSOs in a Project WIN section. The Annual Report provides an overview of MSD operations for the year. While these publications are not real time notification in the same sense as the website, signs, or email notifications, they provide consistent reminders about important issues relative to health impacts of sewer overflows, and are an integral part of the notification process. All of these newsletters and publications are available for download on MSD's main website at www.msdlouky.org.

Public Meetings: MSD promotes a robust public information program and participates in numerous public meetings that are setup around the Louisville Metro region and at other public events. Public meetings are held on a variety of topics. The MSD spokesperson typically presents information about MSD operations, highlights issues of wet weather overflows, focuses on the warning signs, and provides instructions for using MSD's website. As with the newsletters, public meetings do not typically provide real time notification, but do serve as another outreach opportunity to inform the public about sewer overflow impacts.

Media and Newspaper Articles: As part of the general media coverage of MSD, or in response to specific Project WIN press releases, the media has printed articles about overflows and public meetings. MSD has no control over whether outreach or a press release to the media will result in a news story because other events can get the attention of the media. MSD has been fortunate that many articles about the overflow abatement program are generally printed with a notice and warning included. (See Appendix 3.2.6 for an example list of some of these articles.)

3.2.2 The Wet Weather Team

The Consent Decree contains a provision for stakeholders to participate in the development of the Final LTCP and the Final SSDP through inclusion in the WWT. MSD engaged Ross & Associates Environmental Consulting, Ltd., from Seattle WA to facilitate the WWT process (See Appendix 3.2.7 for Ross and Associates Qualifications).

The Consent Decree states that the WWT "will prepare a plan for funding the program, and will develop a program for public information, education and involvement." MSD subsequently expanded the role of the WWT to assist in developing a framework for decision-making that includes consideration of community values, priorities, and level of service in determining community investments required. The WWT has become the first line of the public involvement and participation for the development of the Discharge Abatement Plans (as required by the Consent Decree).

The two Discharge Abatement Plans are the Final SSDP and the Final CSO LTCP. The Consent Decree, founded on the CSO Policy and other regulatory policy and guidance, requires that each of these discrete plans engage stakeholders in the planning, prioritization and selection of projects for the plans. The WWT Stakeholder Group has proven to be a valuable part of this public process.

3.2.2.1 WWT Charter

In July 2006, the WWT Stakeholder Group was chartered to assist with the development of an integrated overflow abatement program that complies with the CWA requirements and addresses the community's problems with sewer overflows that occur during wet weather conditions. Appendix 3.2.8 provides a copy of the adopted WWT Stakeholder Group Charter.

The Charter states that the WWT Stakeholder Group is expected to provide guidance on the development of an integrated Wet Weather Program (now referred to as the IOAP) that will comply with applicable regulatory requirements and will minimize the impacts of wet weather discharges on water quality, aquatic biota, and human health. The WWT Stakeholder Group is charged with preparing a plan for funding MSD's Wet Weather Program, and developing a program for public information, education and involvement.

Other objectives of the WWT Stakeholder Group are to advise MSD on the overall investment, policy, and performance choices in the development and implementation of the Wet Weather Program. As MSD has developed Discharge Abatement Plans, it has called upon the WWT

Stakeholder Group for input regarding the components of the discharge abatement plans, asset management activities, water quality monitoring, and related wet weather control efforts.

3.2.2.2 List of Participants

The Stakeholder Group of the WWT are community opinion leaders associated with diverse interest groups, including environmental advocacy, business and industry, elected officials; local government; community neighborhood; recreation public health; environmental justice, and organized labor. MSD is fortunate to have a dedicated and diverse complement of personnel, community representatives (see Table 3.2.1), and local elected officials who participated in the WWT since 2006.

TABLE 3.2.1

ORIGINAL WET WEATHER TEAM MEMBERSHIP

Name	Organization
Stakeholder Representatives	
Steve Barger	Labor
Susan Barto	Mayor of Lyndon
Stuart Benson	Louisville Metro Council, District 20
Charles Cash	Louisville Metro Planning and Design Services Department
Allan Dittmer	University of Louisville
Laura Douglas	E.ON US. LLC
Faye Ellerkamp	City of Windy Hills
Arnita Gadson	Kentucky Environmental Quality Commission / W. Jefferson County Community Task Force
Mike Heitz	Louisville Metro Parks Department
Tom Herman	Zeon Chemicals
Rick Johnstone	Deputy Mayor, Louisville Metro Mayor’s Office
Bob Marrett	CMB Development Company, LLC
Kurt Mason	Jefferson County Soil and Water Conservation District
Judy Nielsen	Louisville Metro Health Department
Lisa Santos	Irish Hill Neighborhood Association
Bruce Scott	Kentucky Waterways Alliance
David Tollerud	University of Louisville, School of Public Health & Information Sciences
Tina Ward-Pugh	Louisville Metro Council, District 9
David Wicks	Jefferson County Public Schools
Louisville & Jefferson County Metropolitan Sewer District Personnel	
Angela Akridge	Project WIN Program Manager
Brian Bingham	Regulatory Management Services Director

TABLE 3.2.1

ORIGINAL WET WEATHER TEAM MEMBERSHIP

Name	Organization
Derek Guthrie/Mark Johnson	Director of Engineering/Operations & Chief Engineer
Bud Schardein	Executive Director
Technical Support	
Gary Swanson	CH2M HILL
Reggie Rowe	CH2M HILL
Facilitation Support (not part of the WWT)	
Rob Greenwood	Ross and Associations Environmental Consulting Ltd
Jennifer Tice	Ross and Associations Environmental Consulting Ltd
Kate Weinberger	Ross and Associations Environmental Consulting Ltd

3.2.2.3 Rules of Engagement

The WWT stakeholders do not formally represent their specific affiliated organizations but were asked to provide input that reflects the broad interest area of which they are experts and leaders. The WWT members listed above participated in the entire process. The Charter was clear that the values-based risk management process supported by third party facilitation would be employed to obtain input from the WWT Stakeholder Group for the development of the IOAP.

3.2.2.4 Consensus Seeking Process

The WWT structured values-based decision making process that the WWT helped develop allowed the systematic consideration of potentially competing values as they related to technical and management options. The WWT process was completely open and consensus seeking. However, the schedule to complete the overflow abatement plans, as required by the Consent Decree, did not provide enough time for the facilitator to guarantee a full consensus on all issues. In areas where full consensus was not achieved, the range of views was documented. A statement of support for the IOAP from the WWT Stakeholder Group was presented to the MSD Board in October 2008 and then again in December 2008. The MSD Board, as the governing body of the agency, made the ultimate decisions.

The WWT Stakeholder Group was the backbone of the public participation process to ensure that MSD developed an IOAP that would comply with the requirements of the Consent Decree for the Final LTCP and the Final SSDP. All WWT stakeholders were expected to do the following:

- Participate fully and honestly in meetings, act in good faith, and strive for consensus;
- Reach out to constituencies whose interests they reflect and as appropriate to other stakeholders to communicate about the project status and gather input and ideas for the projects; and
- Participate in the identification, review, and analysis of options.

3.2.2.5 Approach to Meetings and Use of Facilitator and Consultants

The WWT Stakeholder Group was a critical component in the development of Project WIN, not only as part of the public program required by the Consent Decree and CSO Policies, but also because the WWT Stakeholder Group was critical to the development of the values-based decision process. The values-based decision process formed the basis of the detailed content and specifics of the Final CSO LTCP and the Final SSDP. Consequently, MSD made a considerable effort to seek out and obtain the appropriate members of the team, to bring in a nationally recognized facilitator (Ross & Associates), and to support the entire process with a highly skilled technical team. With this in place, the WWT Stakeholder Group met regularly; every four to six weeks, for a total of 22 meetings between July 2006 and December 2008. The team reconvened in May 2009 for its 23rd meeting, to review questions and requests for additional information resulting from informal meetings and communications with the regulatory reviewers, and provide input on proposed revisions to the IOAP in response.

Each meeting had a set agenda that included presentations from MSD, the technical team, and the facilitators. The content of these presentations included the most recent developments and progress on projects, rates issues, and other relevant topics. Each meeting also afforded the opportunity for the WWT Stakeholder Group to engage each other in discussion and pose questions and issues to MSD and the consultant team.

All meetings were open to the public, and attended at various times by MSD staff and contractors, neighborhood representatives, members of the press, and other interested parties. These guests or observers were allowed to observe the WWT Stakeholder Group meeting, and were afforded the opportunity to provide comments at designated times. In general, the meeting format was as follows:

- Review agenda and ground rules
- Updates and announcements from MSD and WWT Stakeholder Group
- Specific discussions and presentations consistent with the objectives of the meeting
- Observer comments
- Wrap up and next steps

WWT meeting summaries, presentations, handouts, and documents are posted on the Project WIN website, in the WWT Document Repository. Documents are named and organized consistent with the WWT meeting in which the document was provided to the WWT. Appendix 3.2.9 of this report includes a copy of all the information / materials presented to the WWT Stakeholder Group, in chronological order. The Appendix mirrors the Project WIN website content at the time this IOAP was submitted.

3.2.2.6 List of Meetings and Topics Covered

The following is a brief description of the topics covered at each WWT Stakeholder Group meeting during 2006 - 2009.

- July 20, 2006 – This meeting provided an overview of the Consent Decree, MSD's infrastructure system, and the infrastructure upgrade program followed over the previous ten years.
- August 15, 2006 – This meeting was held at the Morris Forman WQTC. Prior to the meeting, guided tours of the plant were held for WWT members. The meeting presented information on the CWA, introducing the concepts of water quality standards, beneficial uses of surface water, and the sources of pollution that threaten those uses. A financial overview presented MSD's operating and capital budgets, MSD's rates and charges, and MSD's staffing levels. A presentation on MSD's RTC Program introduced the first of the CSO control technologies that was being considered during development of the overflow abatement plans.
- September 12, 2006 – This meeting introduced the concepts of values-based risk-management planning. The overall concepts were discussed, and an example of an analytical tool was presented. The WWT began the process of identifying community values that would be used in alternative evaluation.
- December 5, 2006 – This meeting continued the discussion of community values, and began defining baseline conditions and objectives for the non-financial values identified in September. An update on public involvement plans was also presented.
- January 18, 2007 – This meeting provided concrete examples of how the community values would be used in developing benefit-cost analyses, using specific examples and draft performance scales for a selection of non-financial values. The WWT also engaged in a discussion of the baseline conditions and long-term objectives for the financial values identified in previous discussions.
- February 13, 2007 – This meeting presented specific problems and example response strategies for the Beechwood Village area. This provided the WWT team with a better understanding of how the benefit-cost analyses would help evaluate control alternatives. The WWT also began a detailed review of the draft performance measures to be used in the risk-management approach to value protection. A preliminary discussion was held on the relative weights of the identified values.

- March 15, 2007 – This meeting continued the discussion on problems and potential responses in the Beechwood Village area. Further discussion on relative weights of the values helped clarify the process for establishing final weighting factors in the future. Reviews of performance measures for additional values occupied the bulk of the meeting time. A brief update on the planned public participation efforts was also held.
- April 19, 2007 – This meeting continued the discussion of performance measures for additional community values. The values were categorized as “project-specific” or “programmatic” and the WWT discussed the different ways these categories would be used. The WWT continued discussions on a weighting system for the values, considering the project-specific and the programmatic values.
- May 22, 2007 – This meeting presented specific examples of the values-based risk management approach using a draft version of the evaluation tool. This allowed an evaluation of the impact of the value weighing system on the benefit-cost analysis.
- June 21, 2007 – This meeting developed a final draft weighting system for the community values. A presentation on CSO control strategies began the process of familiarizing the WWT with the technologies and approaches to controlling CSOs. Information was also presented to the WWT relative to the Interim SSDP conceptual approach, and the applicability of “green infrastructure” to wet weather planning.
- August 2, 2007 – This meeting introduced the approach to green infrastructure planning. It also began discussions on the approach to identifying appropriate technologies and developing projects under the Final CSO LTCP.
- September 20, 2007 – This meeting began discussions on the approach to identifying appropriate technologies and developing projects under the Final SSDP. A presentation on the Post Construction Compliance Monitoring Plan was given.
- October 18, 2007 – This meeting continued discussions on SSO elimination approaches, with a focus on I/I removal. Project WIN funding methods were discussed, as the first in a series of discussions about the funding approaches. The draft outline of the IOAP was also distributed for comment.
- December 6, 2007 – This meeting continued the discussion of I/I control approaches, and dealt specifically with the concept of a potential private property ordinance that Louisville Metro government could choose. Further discussions of funding approaches were held.
- January 15, 2008 – In this meeting the preliminary results of water quality modeling for the Ohio River and Beargrass Creek were presented. A discussion on the regulatory compliance impacts of the model results was held. This meeting also covered a presentation on the impacts of the different financing methods discussed previously and the start of discussions about potential refinements to the MSD rate structure.
- February 26, 2008 – This meeting included a report and brainstorming discussion on green infrastructure opportunities in the community.

- April 3, 2008 – This meeting focused on presentations that included a discussion on rates, fees, and funding mechanisms, and the emerging vision for the IOAP approach. Examples of the detailed benefit-cost scoring analysis were presented for Final CSO LTCP and Final SSDP alternatives.
- May 15, 2008 – This meeting included a presentation on the Post Construction Compliance Monitoring Plan, and an update on the status of the green infrastructure evaluation and program development.
- June 19, 2008 – This meeting included a presentation on the Public Involvement and Outreach Program, and further discussion of the integration of green infrastructure into the Final CSO LTCP.
- July 15, 2008 – This meeting continued discussions on the emerging vision for the IOAP, continued discussion of the probable rate impacts of the IOAP, and presented a draft version of the preferred project lists for both the Final CSO LTCP and Final SSDP.
- September 23, 2008 – This meeting presented the proposed LTCP and SSDP project lists, program schedule, total budget, and rate impacts of the IOAP. The WWT also discussed a draft WWT stakeholder support memo to the MSD Board.
- December 4, 2008 – This meeting presented the results of the 30-day public comment period and the proposed responsiveness summary.
- May 11, 2009 – This meeting reviewed questions and requests for additional information resulting from informal meetings and communications with the regulatory reviewers, and provided input on proposed revisions to the IOAP in response.

All information provided to the WWT is available on the Project WIN website, at www.msdprojectwin.org.

3.2.2.7 WWT Establishes Community Values

The Consent Decree requires the development of overflow abatement plans, specifically an updated LTCP and a SSDP. For the development of an SSDP, the requirement is "A plan to involve stakeholders in planning, prioritization, and selection of projects." For the LTCP, the public must be part of the process for "selecting CSO controls that will meet the requirements of the Act." MSD specifically asked the WWT Stakeholder Group to help develop an overall plan for overflow abatement that takes into account community values.

Values represented the anchoring point of the IOAP development process; they define the vision for what the wet weather program will be designed to protect or enhance. In this way, the community values directly relate to investment choices that result in infrastructure choices. The first step and the foundation of the process relied on the stakeholder's definition of values and the relative weight of the values. The WWT further refined the values by identifying the objectives, which are goals or focus areas for the values. The objectives also serve as clarifying points in a practical definition of the values.

The steps of the values-based decision making process were as follows:

- WWT stakeholders defined values and relative weights for the values;
- The technical team developed draft performance measures and scales based on the "focus areas" or objectives the WWT Stakeholder Group identified for the values;
- WWT stakeholders reviewed and helped refine the performance measurement scales;
- The technical team used the performance scales to evaluate alternatives; and
- WWT Stakeholder Group reviewed the results and refined scoring considerations.

The interactive process, with the essential engagement of the WWT Stakeholder Group, was critical because not only did it improve the Final CSO LTCP and the Final SSDP, it also clarified how the values and the performance measures would guide investment and infrastructure choices. A more detailed discussion of the values-based decision process is contained in Volume 1, Chapter 2.

3.2.2.8 Key Public Program Messages Identified by the WWT

The WWT Stakeholder Group was charged with the development of a plan for a public program that not only educates the public about the overflow abatement programs, but also supports and sustains education and active participation in sewer overflow reduction measures. Key messages developed by the WWT Stakeholder Group provided a structure and underpinning for all the outreach, education, and notification program communications during the development of the integrated overflow abatement plans. With these key messages in mind, MSD's interaction with the engaged stakeholders, commercial and industrial interests, elected officials, and the public focused on the maximum benefit of the overflow abatement.

The following are the key messages that were developed with significant input by the WWT Stakeholder Group, and were used during the planning process.

- Value Clean Water - Clean water benefits us all in many ways. We all have a stake in protecting and enhancing the quality of our water resources.
- Protect Public Health - Our streams have an increased risk to public health during, and immediately after, wet weather events due to high bacterial levels. We are working to correct this condition but it is a big job and it will take us all working together to achieve results.
- Support Investment Needs - Our community needs to take steps to improve water quality. It is both a benefit to the community and a regulatory requirement. This is a big job, requiring significant investment by our ratepayers. We request your understanding and support for the rate increases necessary to complete this important undertaking.

- Maintain Positive MSD Image - MSD is working hard to provide clean water. MSD supports a clean, green, and growing community and will ensure that public funds are spent accordingly.
- Provide Wet Weather Plan Input - Public participation and input are critical to the development and success of the community's long-term plan to abate overflows.

Slightly different messages will be used to guide the public program during the implementation phase. During implementation, MSD will maintain focus on requesting input and involvement while also promoting sustained participation in activities that contribute to overflow abatement and water quality improvement.

3.2.2.9 Importance of Public Education and Personal Responsibility

In the course of discussing the integrated overflow abatement program and the public program, the WWT Stakeholder Group took a clear position that a public program which attempts to modify individual consumer, housekeeping, gardening and other behaviors is critical to the optimal functionality of the MSD sewerage infrastructure to abate overflows. The WWT Stakeholder Group took the consensus position on numerous occasions that a component of the overflow abatement program should be an aggressive public program to help people understand the causes of overflows, their individual role in causing overflows, and their personal responsibility to take ownership to solve the overflow problems.

Education was also identified as one of the programmatic values used in evaluating IOAP project components. The WWT Stakeholder Group has endorsed the public program that reaches out to homeowners, community groups, and the public to provide the following tips and encouragement to take actions to prevent or reduce overflows:

- Conserve water during periods of heavy rains by deferring washing clothes or using automatic dishwashers if possible;
- Use a rain barrel to capture stormwater runoff and store the rainwater for gardening uses later when the weather is dry; and
- Keep FOG out of household drains.

The WWT Stakeholder Group has specifically stated that source control for SSOs and CSOs should be an essential part of the control program. The WWT Stakeholder Group advised that the MSD public program should reflect that there are two sides to effective wet weather management, one public and one private. While MSD is charged with I/I reduction and overflow abatement actions in MSD-owned facilities, the behaviors and actions of residential, commercial, and industrial customers all play an important role in overflow abatement.

3.2.2.10 Focus on Green Infrastructure

The WWT Stakeholder Group strongly encouraged MSD to integrate green infrastructure into the plan for overflow abatement. Green infrastructure includes rain gardens, green roofs, porous pavement, and other surfaces and landscapes that allow rainwater to infiltrate into the ground. The overflow abatement benefits of green infrastructure come through a reduction of the impervious surfaces that allow for the rapid runoff of rainwater into both combined sewers and storm drainage facilities. Green infrastructure also offers many other benefits to the community including a reduction in air pollution, reversal of some of the "heat island" effects of urbanization, etc.

Implementation of green infrastructure in the combined sewer areas of MSD could reduce the frequency and volume of expected CSOs allowing for a reduction of the size of the gray infrastructure (sewers, retention basins, pump stations, and treatment facilities) that are required. The WWT Stakeholder Group encouraged MSD to be aware of green infrastructure as a potentially cost-effective solution, to explore all opportunities for green infrastructure, and to work in partnership with the Mayor's office and other regional initiatives such as the Partnership for Green City, to not only create a vision for green infrastructure but to make it happen. At the same time, the WWT Stakeholder Group encouraged MSD to make investments in green infrastructure based on a business case analysis. That is, green infrastructure projects and an overall green infrastructure program should be defensible as a good use of public funds when compared to the cost-effectiveness of the gray infrastructure components it supports.

3.2.2.11 Wet Weather Team "Idea Lists"

During the course of the 23 Stakeholder Group meetings, numerous ideas for specific education programs and potential overflow abatement solutions were identified. The facilitation team kept a running record of these ideas, and periodically distributed them to the technical team for consideration as the potential solutions were identified and evaluated. At the end of the alternative evaluation process, the technical team reviewed the idea's list and prepared responses to each of the items prepared. These responses included a "crosswalk" document that identified the items as "considered and included in final solutions," "considered and evaluated, but not selected for implementation," "outside the scope of the IOAP but referred to other related programs for consideration," and "outside the scope of the IOAP." This crosswalk response was discussed with the WWT Stakeholder Group at the September 2008 meeting and provided documentation for the Stakeholder Group that their ideas had been carefully considered in the development of the IOAP.

3.2.2.12 Continued Engagement

At the May 11, 2009, WWT Stakeholder Group meeting, a plan was developed for continued engagement during implementation of the IOAP. To keep the members of the WWT Stakeholder Group informed, MSD will provide the group with e-mail notifications when important documents, such as Quarterly Reports, are posted on the Project WIN web page. Quarterly Reports and similar documents present progress reports on IOAP implementation, and will also address substantive changes made to the IOAP program. In addition, MSD will invite the WWT Stakeholder Group in for semi-annual progress meetings, to allow for face-to-face dialog regarding IOAP maintenance and progress. MSD will also invite the members of the WWT Stakeholder Group to any IOAP-related public meetings, to any ground-breaking or ribbon-cutting ceremonies, and to tours of construction or completed facilities, as appropriate.

3.2.3 Project WIN Public Meetings during Overflow Abatement Planning

The WWT Stakeholder Group's input was essential in defining the goals and objectives of the IOAP infrastructure program and the public program. With the goals and objectives in hand, the technical team of consultants and MSD staff conceptualized and prepared approaches for the broader public to review and provide comment at public meetings. While these public meetings were not specifically required by the Consent Decree or by EPA guidance, MSD and the WWT Stakeholder Group believed it would be valuable to have frequent contact with the public to validate the guidance provided by the WWT Stakeholder Group. In addition, individual WWT Stakeholder Group members attended the public meetings and provided input on the content and format of the meetings and how to advertise them. As a result, there were four rounds of public meetings, each held at the decisions and selection of priorities phases of the planning process. Following is a detailed description of the four public meetings.

3.2.3.1 Meetings to Introduce and Describe Project WIN

Introductory meetings were held in Spring 2007 to inform the public about the history and evolution of Louisville Metro's sewer system, Project WIN program components, how the potential for sewer rate increases relate to the required Consent Decree response, and what individual property owners can do to help improve stream water quality. The mechanisms for communicating this message included a presentation, summary handouts, and brochures on the various programs discussed. Question and answer sessions followed each set of presentations. A copy of the presentation is included in Appendix 3.2.10. Copies of the handouts, and all the brochures distributed at the Project WIN meetings are available on the Project WIN website in the Public Document Repository. The four rounds of public meetings were held on the dates and at the locations listed in Tables 3.2.2 – 3.2.5.

TABLE 3.2.2

ROUND 1 INTRODUCTORY MEETINGS HELD IN SPRING 2007

Date	Location
April 24, 2007	Southwest Government Center
May 10, 2007	NIA Center
May 14, 2007	East Government Center
May 16, 2007	Central Government Center
May 24, 2007	Girl Scouts Building
May 29, 2007	Southwest Government Center

3.2.3.2 Meetings to Provide a Project WIN and Rate Increase Update

As part of preparing the discharge abatement plans, MSD conducted a second round of Project WIN meetings during Fall 2007. The second round of public meetings provided an update on Project WIN progress and obtained feedback from customers on the proposed Project WIN rate increase. The meetings also provided opportunity to describe the CSO and SSO issues that MSD is addressing, illustrating these issues through a series of maps with the locations of the CSOs and SSOs, and the likely locations for abatement projects in the future. An overview of available control technologies and approaches also gave the public an indication of the types of projects that may be occurring in their neighborhoods in the future. Ample time was available for feedback from the public on issues that affect their neighborhood.

The mechanisms for communicating this message included a presentation, summary handouts, and brochures on the various programs discussed. Question and answer sessions followed each set of presentations. A copy of the presentation is included in Appendix 3.2.10. Copies of the handouts, and all the brochures distributed at the Project WIN meetings are available on the Project WIN website in the Public Document Repository. Meetings were held on the dates and at the locations listed in Table 3.2.3.

TABLE 3.2.3

ROUND 2 MEETINGS IN FALL 2007

Date	Location
October 30, 2007	Fern Creek Firehouse
November 12, 2007	East Government Center
November 13, 2007	Fairdale Playtorium Center
November 20, 2007	Sun Valley Community Center
November 27, 2007	Clifton Center
December 4, 2007	Shawnee Golf Course Club House

3.2.3.3 Meetings to Present Preliminary Facility Plans and Locations

The third round of public meetings, in Spring 2008, was specifically designed to give the public and impacted neighborhoods details on the types, locations, and size of facilities that would be constructed and information on proposed schedules The meetings provided public notice that these facilities are under serious consideration and engaged the public in some discussion about these facilities and the proposed schedule for construction to determine if there are any barriers to these plans or flaws in the plans. The meetings also provided the public with information about the remaining steps of the process, specifically the final series of public meetings, to be held in Fall of 2008, in which formal comments would be accepted and response to comments would be developed. A copy of the presentation is included in Appendix 3.2.10.

Copies of the handouts, and all the brochures distributed at the Project WIN meetings are available on the Project WIN website in the Public Document Repository. Meetings were held on the dates and at the locations listed in Table 3.2.4.

TABLE 3.2.4

ROUND 3 FACILITY PLAN PRESENTATIONS SPRING 2008

Date	Location
May 6, 2008	Shawnee Golf Course Club House
May 13, 2008	Okolona Fire House
May 14, 2008	MSD Board Room
May 14, 2008	Long Run Golf Course Club House
May 27, 2008	Sun Valley Community Center
May 28, 2008	Swiss Hall
May 29, 2008	Jeffersontown Fire House

3.2.3.4 Meetings to Present Proposed IOAP Program

The fourth round of public meetings, in November 2008, was specifically designed to present to the public the IOAP program in a forum that allowed questions and answers. The presentations included an overview of the overflow abatement program, including project lists, budgets, schedules, and potential rate impacts. A copy of the presentation is included in Appendix 3.2.10. Copies of the handouts, and all the brochures distributed at the Project WIN meetings can be found on the Project WIN website in the Public Document Repository. Meetings were held on the dates and at the locations listed in Table 3.2.5.

TABLE 3.2.5

ROUND 4 IOAP PUBLIC PRESENTATIONS NOVEMBER 2008

Date	Location
November 10, 2008	Southwest Government Center
November 12, 2008	Jeffersontown Fire House
November 20, 2008	East Government Center

3.2.3.5 Public Comment Period and Public Hearing to Take Testimony on Content of Draft IOAP

The draft IOAP including the Final CSO LTCP and the Final SSDP was distributed for public comment on October 31, 2008. Copies of the draft IOAP were available for review at all branches of the Louisville Free Public Library system, at MSD's main office at 600 West Liberty Street. The draft IOAP was also available for downloading from the Project WIN website. Due to the size of the files, the appendices were not available for download; therefore a DVD copy of the appendices was made available for $10.00 through MSD Customer Relations.

The public notice was published in the legal notices section of *The Courier-Journal*, the major daily newspaper for the Louisville Metro region, 15 days in advance of the October 31 release date. The public notice announced the availability of the draft plan; the public hearing date, time and location, and the deadline for the acceptance of comments on the plan (see Appendix 3.2.11 for a copy of the notice.) The legal notice was repeated on the release date, and again two weeks prior to the public hearing. MSD also posted an announcement about the public hearing and comment period on the MSD and Project WIN websites. The deadline for accepting comments on the plan was December 5, 2008.

The public hearing on the plan was held on December 2, 2008, at the MSD Board Room. The purpose of the public hearing was to receive formal comments from the public about the content of the final overflow abatement plans, including the Final CSO LTCP and the Final SSDP. The hearing was not structured as a dialog. The MSD Executive Director of MSD was the Hearing Officer and an independent court reporter was present to take verbatim notes. At the onset of the hearing, the Hearing Officer, Mr. H.J. Schardein, Jr., read a prepared statement about the purpose of the IOAP, the rules of the hearing, the deadline for the written comments, the proposed schedule for response to both written and oral comments, and the proposed adoption date of the revised plan. The statement is included in the transcript of the hearing. As with most public hearings each person who wanted to comment completed a request card.

Five people provided comments; the list is attached in Appendix 3.2.12 along with the transcript of the hearing. Each commenter was provided ample time to comment on the plan as official testimony. Neither questions nor clarifications were asked of the persons commenting, nor were they answered by MSD, in accordance with the rules of the hearing.

A complete set of all written and e-mail comments is included in Appendix 3.2.13. A summary of all written and oral comments received, and MSD's response to those comments is contained in the Responsiveness Summary attached at the end of this Chapter.

3.2.4 General Programmatic Outreach and Educational Activities

Between August 2005 and September 2009, MSD expanded its historical outreach and education activities to include a specific program for Project WIN. The program serves several purposes:

- Promote voluntary participation in private-side I/I control, green infrastructure, and behavior modification to prevent pollution (consistent with NMC 3 and 7);
- Develop and maintain continued support for financial investment required to comply with the requirements of the Consent Decree;
- Instill a sense of value and personal ownership and responsibility for clean water;
- Educate children to ensure a long-term sustainability of voluntary participation; and
- Comply with the Consent Decree, the NMCs, the IOAP and the SORP.

The comprehensive approach used a variety of tools and media to reach out to these groups and deliver the specific messages. Table 3.2.6 shows the wide range of media contacted by MSD between August 2005 and September 2009.

TABLE 3.2.6

COMPREHENSIVE PUBLIC PROGRAM USES WIDE RANGE OF MEDIA

AUDIENCE	Public Meeting & Community Events	Web Portal To Project WIN Information	Speaker's Bureau & Technical Support	Print Advertisement, Press Releases	Targeted Brochures, Pamphlets, FAQs, Etc	Reports, Newsletters & Billing Inserts	Demonstration Projects	Direct Mail	Signage At Overflows	Tours, Demonstrations, Workshops
General Public	√	√	√	√	√	√	√	√	√	√
Homeowners	√	√	√	√	√	√	√	√	√	√
Targeted Neighborhoods	√		√				√	√	√	√
Builders		√	√				√			
Restaurants		√	√		√		√			
Schools		√	√				√		√	√

3.2.4.1 Other Public Meetings Held By MSD

In addition to the WWT Stakeholder Group meetings and the Project WIN meetings focused on IOAP development, MSD developed a broad public outreach presentation aimed at educating the public on MSD's primary business functions with emphasis on wastewater, stormwater, and flood protection. During the period from September 2006 (when MSD submitted an updated

NMC, SSOP, and LTCP to the State and EPA) and the end of 2008, MSD participated in or initiated numerous public meetings. A portion of the outreach presentation contains information related to the Consent Decree, including potential program direction and anticipated costs. Table 3.2.7 provides a chronological summary of the general outreach meetings from September 2005 through December 2008.

TABLE 3.2.7

SUMMARY OUTREACH MEETINGS, SEPTEMBER 2005 - DECEMBER 2008

Date	Location / Summary
2006	
July 25, 2006	Jefferson Memorial Forest ECO summer Camp - Student tour of Floyds Fork WQTC.
August 2, 2006	University of Louisville Environmental Science Department Whitney Young Scholars – tour of Floyds Fork WQTC
September 20, 2006	California Neighborhood Coalition – MSD representatives attended a neighborhood meeting as guest panelist to discuss Project WIN and address questions and concerns.
September 21, 2006	City of Rolling Fields Council Meeting – At the request of Mayor Bill Conway, attended a council meeting and talked about MSD community priorities. Staff brought map to show previous work and proposed / unbudgeted capital work in the Rolling Fields city limits.
September 26, 2006	Tour of sewer system and Southwestern Outfall – for *The Courier-Journal* Newspaper
October 09, 2006	District 20 Town Hall Meeting, Middletown Fire Department.
October 10, 2006	Councilwoman Bryant-Hamilton Neighborhood – meeting at the Shawnee Park Golf Course Clubhouse
October 12, 2006	Old Louisville Neighborhood Association Meeting – MSD attended to discuss Consent Decree and other priorities for the community.
October 16, 2006	Highland Business Association – MSD gave presentation about MSD's Consent Decree and priorities for the community.
October 17, 2006	District 14 Community Meeting – at Sun Valley Community Center
October 24, 2006	Meeting with City of Hurstbourne – MSD gave 20-minute presentation on the Consent Decree and other MSD priorities. After presentation, the City Administrator Ron Howard requested that MSD talk about flooding that occurred in September 2006. There were 24 homes that flooded in the city; many had never flooded before 2006.
October 24, 2006	Councilman Engel District 22 Public Town Forum meeting – Fern Creek Community Center
October 26, 2006	Natural Solutions Workshop – MSD partnered with Metro Parks, Natural Resource Conservation Service, and Spence Native Nursery. MSD organized a 2-day workshop on natural solutions: subjects included porous paving, riparian buffers, native plants, rain gardens, and rain barrels. MSD also gave opening and closing remarks to emphasize the importance of Natural Solutions and their relationship to success with the Consent Decree.
October 30, 2006	City of Hurstbourne Acres – At the request of Representative Brinkman, MSD gave a presentation on the Consent Decree and other MSD priorities and discussed drainage concerns with residents in.
November 1, 2006	Meeting with Treeline Estates – MSD gave Consent Decree presentation and discussed Floodplain Issues with residents.
November 1, 2006	2006 Kentucky Restaurant Association Exposition – MSD participated at the Churchill Downs Race Track. MSD distributed FOG educational materials, as well as pollution prevention information to expo attendees and members of the race going public.
November 2, 2006	Camp Taylor Neighborhood Association Meeting – at Councilman King's request, MSD gave a presentation on the Consent Decree and provided an update about projects scheduled for the Camp Taylor area.
November 04, 2006	Rain Barrel Painting Event – at the Beargrass Creek Pump Station where 20 rain barrels were distributed during the family event.
November 14, 2006	Councilman Kramer's District 11 Town Hall meeting – in Hikes Point
November 14, 2006	Beechwood Village City Meeting – at Mayor Louden's request MSD attended this council meeting to give an update on the portable pumps, Tyne Rd Drainage Response Initiative (DRI) project, future Consent Decree Sanitary Sewer project and other initiatives that may affect the neighborhood.
November 28, 2006	Bellarmine College – spoke to business school class about Business Leadership, Community Outreach, and MSD's Consent Decree and future initiatives.
December 13, 2006	Mill Creek Watershed Presentation on Consent Decree, Stormwater Management, and Rain Gardens and Barrels.

Date	Location / Summary
2007	
January 17, 2007	Douglass Hills Estates Neighborhood meeting – Middletown City Hall
January 20, 2007	Councilman Kramer's Neighborhood Meeting – at Saint Michael Orthodox Church
January 27, 2007	Butchertown Greenway Invasive Vegetation Removal with 50 Volunteers
February 20, 2007	Kentucky Street Blockwatch meeting – Blockwatch group requested MSD to attend their monthly meeting to discuss Sept. 22, 2006 flood event, the Plumbing Modification Program, and to discuss Consent Decree issues
February 24, 2007	Beargrass Greenway Invasive Vegetation Removal with 45 Volunteers
March 09, 2007	Living Lands and Waters Professional Development for Teachers Workshops – including riparian buffer restoration and best stormwater management practices
March 12, 2007	Newburg Neighborhoods walk – with Council member, Metro Police and the Department of Neighborhoods.
March 16, 2007	Living Lands and Waters Professional Development for Teachers Workshops – including riparian buffer restoration and best stormwater management practices
March 17, 2007	Living Lands and Waters Professional Development for Teachers Workshops – including riparian buffer restoration and best stormwater management practices
April 03, 2007	Councilman Engel and Councilman Kramer Joint District Meetings – MSD discussed Consent Decree and drainage issues.
April 28, 2007	The Salt River Group – reserved the Floyds Fork WQTC education center for a group meeting. MSD gave an overview of Consent Decree and discussed regional priorities with the group.
April 23, 2007	Scottsdale Neighborhood Association Meeting – Councilwoman Welch District 13 requested MSD to attend their meeting and give a presentation on the Consent Decree and drainage.
April 22, 2007	Party for the Planet: Earth Day 2007 – at the Louisville Zoo. MSD sponsored a display booth to demonstrate how everyday activities can cause water pollution if not done correctly and how everyone can prevent water pollution by doing the right thing with chemicals and waste in their own yard.
April 29, 2007	Neighbors of Jefferson Memorial Forest Presentation on Native Plants, Rain Gardens, and Barrels
May 8, 2007	Rain Garden Workshop – held in MSD's Board Room. Presenters from MSD, Minneapolis, MN, and Madison, WI
May 12, 2007	Community-wide volunteer project to label storm drains that go directly to Chenoweth Run Creek – 10434 Watterson Trail (next to City Hall) at the Jeffersontown Farmers Market Pavilion. Beechwood Neighborhood Festival Rain Barrel Display and Raffle
May 14-18, 2007	The River Education Center – was in Louisville. MSD co-sponsored the ORSANCO Floating Classroom. Six elementary schools of Jefferson County Public Schools (JCPS) kids cruised on the river and participated in hands-on experiments in water sampling, wildlife study, mapping, etc. Farnsley Middle School Outdoor Classroom Installation with 60 students and 25 faculty/parents
May 18-19, 2007	St. Peter Claver Rain Garden – Lampton Street, installation with 20 Youthbuild and Green Team students
May 29, 2007	EarthSave Louisville – Taste of Health at Louisville Slugger Field. MSD sponsored a booth and distributed MSD handouts and educational brochures along with sample bags of Louisville Green fertilizer. The information presented also demonstrated how to prevent non-point source pollution in everyday activities that can cause water pollution.
May 31, 2007	2379 Gladstone – Residential rain garden installed. Presentation made to the Mayor of the City of Kingsley.
June 11-12, 2007	Youthbuild E-Corps Class – on rain gardens, native plants, urban ecosystems
June 16, 2007	Ohio River Sweep – MSD joined with Louisville Metro in locally coordinating the trash and debris pickup along the banks of the Ohio River.
June 23, 2007	First free rain barrel distribution of 60 barrels.
July 11, 2007	Home Builders Association Louisville (HBAL) – current sewer issues i.e. action plan updates, Consent Decree, capacity requests, I/I fixes ,etc.
July 16-18, 2007	Five Cities Water Professional Conference
July 17, 2007	District 20 Town Hall Meeting
July 24, 2007	Clifton Community Council - Meeting to discuss Consent Decree Impact on projects
July 25, 2007	Meeting with JCPS to discuss Green Solution Opportunities
July 28, 2007	Rain Barrel Distribution
August 1, 2007	Metro Council Budget Meeting – Rate Increase for Project WIN
August 9, 2007	Metro Council Vote on Rate Increase.
August 15, 2007	Kentucky State Fair – Press Conference to Announce MSD Participation in 2007 State Fair Exhibit Hall
August 16-26, 2007	Kentucky State Fair - Environmental Display
August 16-26, 2007	Kentucky State Fair – Booth on Main Street – Project WIN Education
August 22, 2007	Southern Indiana Public Works conference on Pervious Concrete
August 27, 2007	District 22 and 23 Public Town Forum
August 28,2007	Green Initiatives and Metro Government agency to form partnerships and identify sustainable community practices and implementation
August 2007	Rain Garden Manual Publication for Distribution to Homeowners

Date	Location / Summary
September 11, 2007	Urban Ecosystems and Environmental Best Management Practices (BMP) Presentation to Clifton Neighborhood Association
September 18, 2007	Stormwater Management, Native Plants and Ecosystems Presentation – to the University of Louisville Urban Watershed Class
September 21, 2007	Stormwater Management, Native Plants and Ecosystems Presentation to Male High School
September 23, 2007	Beargrass Creek Clean Sweep.
September 25, 2007	Mayors Water Summit - San Francisco CA - Louisville Metro's Consent Decree
October 2007	MSD co-sponsored a visit from ORSANCO's water quality education and demonstration boat - the P.A. Denny. The boat was docked at the Louisville waterfront for a week in October, providing education opportunities for JCPS students and the public.
October 1, 2007	District 20 Town Hall Meeting
October 1, 2007	Joint Agencies Discussion on low impact development (LID)/Green Infrastructure
October 2, 2007	Presentation on Consent Decree, addressed rate increase and senior citizen discount
October 2, 2007	JCPS – meeting to discuss development of green infrastructure concept plans for three elementary schools located in the CSO area.
October 3, 2007	Environmental task force meeting - task force includes representatives of all government agencies with focus on partnerships and green building initiative.
October 9, 2007	City of Thornhill - Presentation on Consent Decree initiatives and any current or planned projects for area
October 13, 2007	Rain Barrel Distribution
October 15, 2007	Site meeting with developer – to discuss green alternatives and sanitary sewer issues within combined sewer area relating to the Consent Decree. Provided guidance on implementation of LID methods.
October 18, 2007	Crime Prevention Summit at Brandeis Elementary School - MSD staffed a table, distributed Project WIN educational materials, raffled one rain barrel, and encouraged participation at upcoming scheduled events.
October 19, 2007	Met with Metro Public Works – to explore partnering in a high profile beautification project, and proposal for alternative plan to install a bio-retention swale and curb inlets to direct stormwater flows away from the CSS to reduce CSOs. Opportunity for community education of green solutions in urbanized high traffic area.
October 24, 2007	Met to discuss green infrastructure possibilities – at the MSD facilities Beargrass Creek /Letterle Pump Station
October 25, 2007	Jefferson County League of Cities – presentation on the Consent Decree and recent rate increase
October 29, 2007	Bellarmine College – Executive Director's speaking engagement with college students to discuss the role of leadership in business and current Consent Decree initiatives in our community.
November 1, 2007	Climate change committee - Discussed how to involve partnering to achieve mutual environmental benefits.
November 6, 2007	Sustainable Cities Forum – Keynote Speaker
November 8, 2007	MSD participated in the 2007 Kentucky Restaurant Association Exposition on November 8, 2007, at Churchill Downs Race Track. MSD distributed FOG educational materials, as well as information on Project WIN to expo attendees and race going members of the public.
November 10, 2007	Rain Barrel Distribution
November 13, 2007	Meeting about Green Opportunities and Partnerships between Metro agencies
November 17, 2007	Butchertown Greenway Invasive Vegetation Removal and Native Tree and Shrub Planting.
November 27, 2007	Metro Council Transportation & Public Works Committee - Presented overview of Consent Decree and the importance of continued support by Metro Council for future Consent Decree rate increases and bond rating for the community
November29, 2007	Ad campaign sponsorship 2008 - Met to discuss the focus of the High School marketing/advertising campaign to increases awareness about Project WIN initiatives and encourage community involvement.
December 11, 2007	Beechwood Wood Village Council Meeting - Updated residents on Consent Decree Project status
December 13, 2007	Met with the Louisville Metro Housing Authority – to present MSD's obligations required by the Consent Decree and explore partnership and opportunities for implementing Green Infrastructure for Government owned properties.
December 14, 2007	MSD hosted a workshop on Pervious Concrete Hydrological Design and Resources training – for the Kentucky Ready Mixed Concrete Association & The Kentucky Concrete Pavement Association.
December 15, 2007	Rain Barrel Distribution
2008	
January 3, 2008	Meeting with Metro Public Works – about bioswales for Meyzeek Middle School.
January 19, 2008	The theme for the 2008 KY Derby Festival Conference is "Going Green"! The KY Derby festival committee requested a representative from MSD to sit on the panel and talk about Green Initiatives.
January 24, 2008	Keynote Speaker for Annual Meeting of Salt River Watershed Basin.
January 26, 2008	Volunteer event -- Invasive Plant Removal with Living Lands and Waters and Metro Parks along Butchertown Greenway.
February 6, 2008	Presentation on Consent Decree, Disconnect Down Spouts – Douglass Blvd. Neighborhood Association.

Date	Location / Summary
February 8,15,22,28	Storm Water Management and Rain Garden Design Class for Louisville Youthbuild
February 5, 2008 – April 22, 2008	MSD sponsored the 2008 Advertising Federation High School campaign. The Challenge: Marketing challenge to create a marketing/advertising campaign that increases awareness about MSD's Project WIN and encourages our community to prevent both point and non-point sources of water pollution when possible.
February 21, 2008	Kentucky Nurseryman Association – Keynote Address
February 23, 2008	Volunteer event – Invasive Plant Removal with Metro Parks and Living Lands and Waters
March 3, 2008	Rain Garden Workshop, – Jefferson Memorial Forest
March 7,14,	Storm Water Management and Rain Garden Design Class for Louisville Youthbuild
March 15, 2008	X-Stream Clean Sweep - 14 sites countywide, 140 volunteers
March 25, 2008	Presentation on Consent Decree, etc. – Neighborhood Institute
April 2, 2008	Presentation on Native Plants, Rain Gardens and Rain Barrels for Stormwater Management for Floyds Fork Watershed Group
April 14, 2008	Rain Barrel Sales are on-going. During this period, 263 rain barrels were distributed.
April 19, 2008	Rain Garden Workshop for Louisville Nature Center/Rain Garden Installation at Louisville Nature Center
May 10, 2008	Public presentation on Native Plants, Rain Gardens and Rain Barrels for Stormwater Management - Louisville Nature Center
May 18, 2008	Presentation on Native Plants, Rain Gardens and Rain Barrels for Stormwater Management for Old Louisville Neighborhood Association
June 3, 2008	Urban Stormwater Class for Youthbuild E-Corps
June 12, 2008	Presentation for Deer Park Neighborhood Association
June 20, 2008	Presentation on Urban Stormwater, Rain Gardens, Rain Barrels for Sierra Club
June 21, 2008	Ohio River Sweep ORSANCO
June 28, 2008	Rain Garden/Rain Barrel Workshop for Bernheim Arboretum and Research Forest
July 19, 2008	Rain Garden & Rain Barrel Workshop for Louisville Nature Center
July 21, 2008	Presentation on Urban Stormwater, Rain Gardens and Rain Barrels for Germantown Neighborhood Association
July 29, 2008	Field trip to Floyds Fork Water Quality Treatment Center – Whitney Young Scholars
August 12, 2006	Sustainable Cities Series – Presentation on what you can do to help our waterways.
August 14 – 24, 2008	Educational exhibit at the KY State Fair - exploring the underground world of sewers
September 27, 2008	Beargrass Creek Clean Sweep with Metro Parks and Natural Resource Conservation Service
October 7, 2008	Presentation on Urban Storm Water, Native Plants, Rain Gardens and Rain Barrels Crescent Hill Library
October 11, 2008	Rain Garden Installation and On-site Workshop, 2105 and 2107 Dorothy Street, Douglass Blvd. Neighborhood Association
October 13, 2008	Presentation on Urban Storm Water, Native Plants, Rain Gardens for Indian trail/Preston Neighborhood Annual Meeting
October 14, 2008	Presentation on Urban Storm Water, Native Plants, Rain Gardens for Beckham Bird Club
November 19, 2008	Greening of Earth: Whose Responsibility? Common Experience Series, Indiana University Southeast

MSD continues to sponsor and attend public meetings throughout the community. These meetings are documented in the Annual Reports that can be accessed through the Library section of the Project WIN website at www.msdprojectwin.org.

3.2.4.2 Other Public Events in Which MSD Participates

MSD is active across the Louisville Metro region participating in fairs and public events not only to communicate, but also to reach out to the public and ensure that everyone is familiar with MSD and the mission of the sewer district. The more the public is familiar with MSD, the Project WIN logo, the image, MSD's mission, and the issues related to stream water quality, the more they will be open to listening, and participating in MSD-sponsored meetings. In some cases, these events engage the public as volunteers to paint storm drains, plant trees or clean up the river or creeks. These are especially important events to reinforce the value of clean rivers and creeks with the public.

Participation in the public events also gives MSD the opportunity to deliver timely messages to the public that range from rate increases, overflows, non-point source pollution, and stormwater pollution in the community, housekeeping, gardening, and other consumer practices that can support the mission of clean water. MSD takes maximum advantage of the opportunities to reach the public about public health, clean stream water, infrastructure investment, and individual behaviors. This practice will continue throughout the various stages of Project WIN. Table 3.2.8 provides a representative list of the other meetings in which MSD participated.

TABLE 3.2.8
OTHER PUBLIC MEETINGS

Date	Location
July 17, 2006	Carter Elementary School cafeteria – 3600 Bohne Avenue
August 21, 2006	Fairdale High School's small gym – 1001 Fairdale Road
September 18, 2006	Iroquois High School gym – 4615 Taylor Boulevard
October 16, 2006	Waggener High School's small gym – 330 Hubbards Lane
November 20, 2006	Portland Community Center Gym – 640 N 27th Street
February 19, 2007	Sun Valley Community Center – 6505 Bethany Lane
March 19, 2007	Fern Creek High gym – 9115 Fern Creek Road
April 16, 2007	Central High gym – 1130 W. Chestnut Street
May 21, 2007	Westport Middle – 8100 Westport Road
June 18, 2007	Carter Elementary café – 3600 Bohne Avenue
October 16, 2007	Greenwood Elementary – 5801 Greenwood Road
October 24, 2007	Conway Middle School – 6300 Terry Road
November 13, 2007	Doss High School – 7601 St. Andrews Church Road
November 21, 2007	Greenwood Elementary – 5801 Greenwood Rd
October 3, 2007	Hill St. Baptist Church – 2203 Dixie Highway
October 15, 2007	Seneca High School – 3510 Goldsmith Lane
November 19, 2007	Eastern High School – 12400 Old Shelbyville Road
January 15, 2008	Incarnation Catholic Church – 2229 Lower Hunters
February 19, 2008	Hillview Baptist Church – 5319 Dixie Highway
March 18, 2008	Beechland Baptist Church – 4613 Greenwood Road
January 28, 2008	Stuart Middle School large gym – 4601 Valley Station Road
February 18, 2008	Atherton High School small gym – 3000 Dundee Road
March 17, 2008	Butler High School small gym – 2222 Crums Lane
April 21, 2008	Fairdale High School small gym, 1001 Fairdale Road
May 19, 2008	Jeffersontown High School gym, 9600 Old Six Mile Lane
June 16, 2008	Knight Middle School large gym, 9803 Blue Lick Road
April 15, 2008	Shively Christian Church - 1822 Kendall Lane
May 20 2008	St. Lawrence Catholic Church - 1925 Lewiston Drive
June 17, 2008	Ormsby Heights Baptist Church - 2120 Lower Hunters Trace
July 15, 2008	Rockford Lane Baptist Church - 2006 Rockford Lane
August 19, 2008	Mt. Everest Baptist Church - 6012 Mt. Everest Drive
September 16, 2008	St. Paul Catholic Church - 6901 Dixie Highway
July 21, 2008	Carter Elementary School cafeteria, 3600 Bohne Avenue
August 18, 2008	T.J. Middle School large gym, 1501 Rangeland Road
September 15, 2008	Central High School large gym, 1130 W. Chestnut Street
October 20, 2008	Waggener High small gym, 330 Hubbards Lane
November 17, 2008	Pleasure Ridge Park large gym, 5901 Greenwood Road
October 21, 2008	St. Polycarp Catholic Church - 7718 Columbine Drive
November 18, 2008	PRP High School - 5901 Greenwood Road

3.2.4.3 Project WIN Seasonal Communications

MSD has also developed a program of communication to provide specific messages on a recurring basis. These communications began implementation as magazine and print advertisements in 2007, and similar efforts are anticipated to continue for many years to come. The approach taken with the public program communications is to divide the calendar year into four seasons. The targeted messages are to specific audiences, which are subsets of the public. These seasons are:

- The Rainy Season: February through April;
- The Summer Season: May through July;
- The Fall Season: August through October;
- The Holiday Season: November through January.

To introduce this program, MSD mailed a "Seasonal Tips" postcard to customer accounts with five tips about how to help with control of overflows and preventing water pollution (See Appendix 3.2.14.) The activities and public messages are seasonal. See below for examples:

- During the rainy season, the focus is on runoff issues; therefore, the message is about gardening practices, deferring the use of washing machines and dishwashers during and immediately after a rain event to conserve water and provide capacity in the sewer, and encourage the use of rain barrels. This message focuses on homeowners and gardeners.
- During the Summer season, the focus is on ensuring that water body contact and other recreation in and around the water is healthy. Consequently, the message is tailored to those who live near waters and those who recreate (water skiing, fishing, and boating) in or on the water.
- In the Fall, many households and commercial establishments are undertaking maintenance and cleanup in preparation for the Winter and the holiday/entertainment season. The message shifts to proper disposal of hazardous materials and cleaning materials, pool and spa cleaning, and other maintenance activities. The message focuses on homeowners, consumers, and owners of pools and spas.
- During the holiday season, the focus is on cooking and entertainment. FOG control is the focus of the holiday season. The message about FOG is tailored to seasonal cooking and entertainment.
    - At the beginning of each New Year, it is human nature to resolve to do and be better. MSD provided a list of New Year's Resolutions for the public to resolve to undertake as part of the WINing Team. MSD employees distributed copies of the poster to libraries, commercial buildings, restaurants, stores, and other gathering places.

The New Year's Resolution Poster and examples of the advertisements are included in Appendix 3.2.15 New Year's Resolution Poster.

3.2.4.4 Project WIN in MSD Newsletters

MSD has two newsletters that contain specific public information about Project WIN and the overflow abatement program; these are the "Update," and "Crosscurrents." Both publications are posted on MSD's website for download.

The "Update" is a monthly newsletter aimed at both customers and employees of MSD. This newsletter provides MSD with the opportunity to disseminate quickly information about items addressed at the MSD Board meeting. For example, the March 2008 "Update" varies from articles about Black Achievers at MSD consistent with the Black History Month, an article that calls for volunteers to participate in an XStream Cleanup on March 15, to announcements about public workshops on the Ohio River sponsored by MSD with Living Lands and Water.

MSD prepares the "Crosscurrents" newsletter for customers. It is direct mailed as well as posted on the MSD website. This gives MSD the opportunity to include a specific article each quarter on the status of Project WIN and some specific tips for individuals about how to be a part of the WINning Team.

In addition, MSD publishes an Annual Report targeted at customers and elected officials. Project WIN has been discussed extensively in the Annual Reports published since the Consent Decree was filed.

3.2.4.5 Brochures and Other Printed Materials

MSD has created the following three main brochures to use in the public program:

- CSO Brochure: Updated in September 2006
- SSO Brochure: Updated in May 2008
- FOG Brochure: Updated in May 2008

Each of the brochures define and describe a specific problem, explain the options for correction, and provide public notification about the potential public health impact of overflows and caution about water body contact. MSD provides brochures at all public meetings at which it presents, both those organized by MSD or by another organization. In addition, the brochures are provided to Metro Council members for distribution to their District, and to neighborhood association representatives. Each brochure has the MSD and Project WIN logo and the MSD Project WIN website address for more information.

Other printed materials available to the public include:

- A FOG postcard with plastic grease scraper (Appendix 3.2.16)
- January 2008 issue of *Today's Woman*, providing a set of New Year's Resolutions for residents to follow to help provide for a cleaner environment
- Advertisements in magazines and newspapers to inform and educate the public
  - March 2008 issue of *Today's Woman* to inform the public on how to play it safe around sewer overflows
  - Information on Project WIN in the January, February and March 2008 issues of *Business First*
  - Information on Project WIN in the January, February and March 2008 issues of the *Louisville Magazine*
  - Advertisement for *The Courier-Journal* promoting water quality issues and the Consent Decree

In addition, *Louisville Magazine* did a story about the Consent Decree and MSD's focus for our community in August 28, 2006.

MSD developed and published an eight-page insert on April 29, 2007 for the Louisville Metro *The Courier-Journal* newspaper to maximize the exposure of Project WIN initiatives throughout the MSD service area. This publication provided information on the proposed rate increase, Project WIN initiatives, and a discussion of the Consent Decree. It also included a list of scheduled public meetings, annotated diagrams and definitions of SSOs and CSOs; examples of activities that the typical homeowner can perform to help alleviate sewer overflow problems; and a general warning to avoid waterways during and for 48 hours after rainstorms. This piece was substituted in place of a bill insert.

3.2.4.6 Pretreatment and Commercial Public Outreach Programs

As described previously under the NMC discussion, MSD is required to review and revise the Industrial Pretreatment Program as appropriate. While the Industrial Pretreatment Program addresses a broad scope of industrial discharge issues, one focus area of the pretreatment program has been FOG control to prevent blockages of the combined and separate sewer. FOG control is a mainstream program, and most clean water agencies around the country have a commercial FOG program aimed at commercial bakeries, restaurants, and other businesses that prepare or process food. MSD continues working with a FOG consultant to develop updated brochures and technical information.

3.2.4.7 Pollution Prevention Outreach and Education Programs

Pollution prevention outreach is also a component of one of the nine NMCs. A part of any pollution prevention program is public education about pollution prevention activities that can be implemented at home or at work. The difference between the outreach of pretreatment review and the pollution prevention outreach is the focus on industrial or commercial establishments (pretreatment) as opposed to government or personal actions that prevent pollutants from entering the waste stream. Often, pollution prevention programs are the same as public outreach or education programs because preventing the pollutant from entering the waste stream can only be accomplished if the public is aware. Consequently, many pollution prevention activities include a public program to develop public awareness using some of the programs previously discussed, including the seasonal tips, the New Year's Resolutions, and the FOG scrappers for home use. Other specific MSD activities to prevent pollution include the following:

- Coordination of MSD's role in activities performed by Louisville Metro such as, street sweeping, Operation Brightside (litter prevention and collection campaigns), and other Louisville Metro pollution prevention programs.
- Implementation of the Hazardous Materials Ordinance, which requires users with hazardous materials on site to submit a spill prevention and control plan. Continued response to spills of hazardous materials and incidents involving discharges to the sewer system and provide spill mitigation kits to the Louisville Metro and Suburban Fire Departments to use to absorb vehicle fluids rather than flushing to the sewer.
- Implementation of the Erosion Prevention and Sediment Control Ordinance.
- Facilitation or sponsorship of clean sweep events at which volunteers remove trash and debris from the waterways in Louisville Metro.
- Design and assist with the installation of several rain gardens within the CSS (including one currently being constructed at MSD's Main Office Building) to minimize stormwater runoff, thus reducing non-point source pollution.
- Development of a rain barrel distribution program to reduce runoff, particularly within the CSS, and thus reducing non-point source pollution.
- Installation of a strip of pervious concrete in the street along the curb-line at MSD's main office in downtown Louisville and around catch basin inlets in MSD's parking lot as a pilot demonstration project. Pervious pavement allows stormwater to be directed into the soils rather than to the combined sewer or creeks, thus reducing overflows and pollution carried by runoff.
- Completion and distribution of informational pieces, targeted to inform customers and residents on activities that they can practice within their homes to assist in the reduction of overflows within the collection system.

- Promotion of Green Infrastructure initiatives within Louisville Metro, such as pervious pavement, bioswales and rain gardens.
- Continuation of coordination with Louisville Metro staff for programs such as, "Adopt-a-Highway" cleanup programs, and litter pick-up activities to maximize the efficiency of those operations and determine the amounts of materials as they relate to preventing solids and floatables from entering the CSS.

3.2.4.8 District-Wide General Programs

Before the Consent Decree, MSD had an active public outreach and education program. With the Consent Decree and the creation of Project WIN, MSD has continued the District-wide public program which is focuses on a *"Clean, Green, Growing Community"* including Project DRI (Drainage Improvement Now), learning about wastewater and infrastructure, and promoting the use of Louisville Green.

MSD also continues to invest in both formal and informal public education of primary and secondary level students through a variety of programs. Two key messages are to value clean stream water, and take personal responsibility for protecting the rivers and streams of Louisville Metro.

MSD participation is intended to prepare students to be active public participants and ratepayers of tomorrow. MSD includes in the information distributed to students many of the housekeeping, gardening, and consumer behavior concerns that are targeted to property and homeowners.

These educational programs include the following:

- Urban Watershed Program in cooperation with JCPS Center for Environmental Education, using rafts to take students into urban waterways to discuss water quality and how water is managed in an urban area.
- Professional development and teaching support materials for teachers needing additional background and information regarding water quality issues and the use of outdoor classrooms.
- Support for the Floyds Fork Environmental Education Center at the Floyds Fork WQTC as a resource for teachers wishing to visit the plant.
- Tours of other regional WQTCs closer to schools not located in the Floyds Fork area.
- Louisville Metro Brightside, a one day youth summit held bi-annually to allow elementary and secondary school students and teachers to focus on obtaining knowledge and skills related to environmental issues.
- Speakers Bureau providing in-class lectures and demonstrations about wastewater collection and treatment, water quality, and green infrastructure.

- Eco Drama, a program open to all second grade students in Louisville Metro, focusing on water quality issues and storm drain basins.
- Support for the design and implementation of outdoor classrooms.
- Support for environmental education programs at Portland and Cane Run Elementary Environmental Education Magnet Schools and the environmental sciences program at Eastern High School (planned to be expanded to all JCPS high schools in the future).

MSD continues in-house training programs for employees related to the SORP and Consent Decree requirements. Copies of the Consent Decree and supporting information were distributed to employees and the basic elements and obligations of the Consent Decree were reviewed. As documentation is updated, it is posted and made available on the Project WIN website. New employee training has also been modified to include information regarding the Consent Decree. Further, each training module includes general messages about Project WIN, such as the Seasonal Tips about household, garden and vehicle washing best management practices, the New Year's Resolutions, and information about upcoming Project WIN meetings. MSD employees are also Project WIN customers and ambassadors. The expectation is that by including this public program information into SORP training that the employees will not only understand and use best practices but also will pass along this information to their neighbors.

The MSD Call Center or the Online Inquire system (Customer First) is another method for informing the public about water quality and sewer overflow issues. The MSD Customer Relations Call Center (CRCC) personnel are trained to answer questions from the public about sewer overflows. The CRCC is available 24 hours a day, 7 days a week.

Customer First

FAQs have been developed for use by the CRCC and are posted on the MSD website. The posting on the website is accessible within the Project WIN sub-website or from the MSD Home Page. The FAQs are revised when needed to ensure that they contain the most up-to-date information and expanded information about the status of the overflow abatement program, Project WIN.

MSD, often in partnership with Louisville Metro government or other community partners, has several other ongoing public programs related to the goals and objectives of Project WIN including information and outreach about the following:

- Project DRI, a successful initiative that has focused on preventing flooding through infrastructure and other solutions to drainage across the Louisville Metro region.
- Louisville Green, a fertilizer produced by MSD and sold to the public.
- Greener Solutions, rain gardens and rain barrels as a sustainable way to accomplish infiltration of runoff, including a "How to Guide for Building Your Own Rain Garden."
- Special events such as medicine take-back events (May 2008 at six locations) and tree planting and clean sweep events.

To promote and announce all of these programs, MSD posts specific information on the website. Announcements and articles are also published in monthly or quarterly newsletters, and in some cases, MSD prepares special flyers and announcements for the press. All of these programs promote "Clean, Green, and Growing Communities" that specifically protect the water resources of the Louisville Metro region.

3.3 PROGRAM IMPLEMENTATION BETWEEN OCTOBER 2009 AND JUNE 2013

During the development of the IOAP, the primary focus areas of the public program were related to notifications of overflow events, education and input on Consent Decree response strategies, and building support for the community investments required to achieve the requirements of the Consent Decree. As the IOAP moved from the planning stage to implementation, the public program remained a vital part of MSD's response strategy. This section describes the public program activities that occurred since approval of the IOAP.

3.3.1 Public Notification

MSD continued the public notification efforts outlined in Section 3.2. Modifications and/or enhancements to those efforts are documented below.

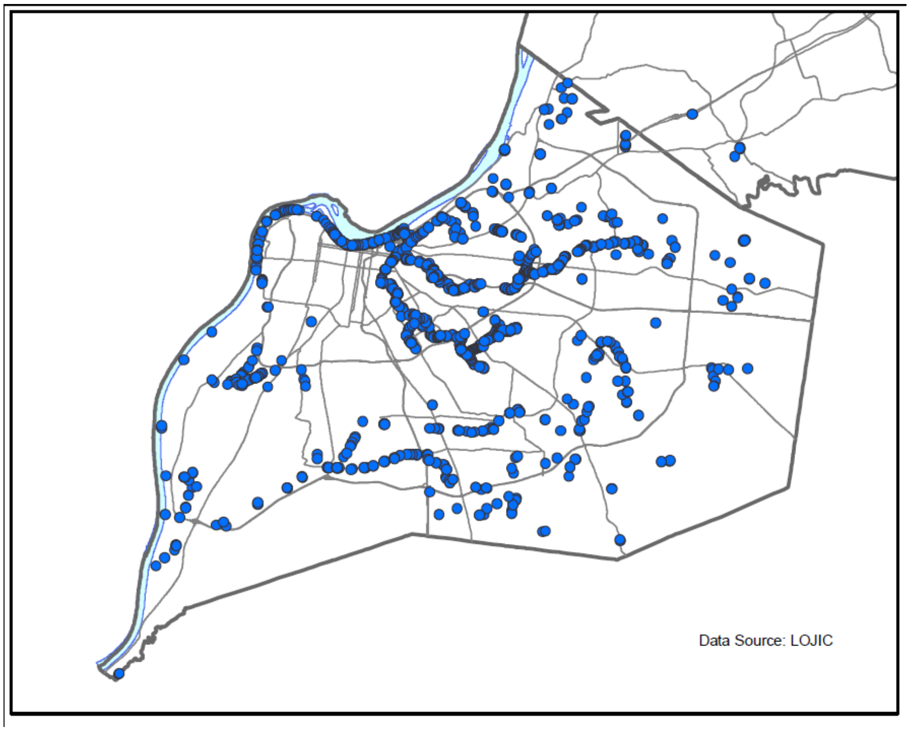
3.3.1.1 Warning Signs

Approximately 1,200 Overflow Advisory signs have been installed along the creeks and the Kentucky side of the Ohio River within both the combined and separate sanitary sewer systems. In the CSS area, approximately 250 signs are installed. In the separate sewer system area, approximately 950 are installed. Refer to the approved SORP for additional information.

Figure 3.3.1 shows the location for the signs, published in October 2012.

Bilingual Overflow Advisory Sign Installed by MSD

FIGURE 3.3.1 OVERFLOW ADVISORY SIGN LOCATIONS WITHIN LOUISVILLE METRO, KY



3.3.1.2 Project WIN Website

MSD continued to maintain the Project WIN website as a sub-website of the main MSD website. The Project WIN website was revamped to be more user-friendly. The following framework was used to display notification, education and outreach materials for the interested public. Refer to the website for additional information at www.msdprojectwin.org.

- Home: Project WIN E-mail Notification System sign-up and Quick-links to major subsections defined below
- About Us: Information about Project WIN, the Federal Consent Decree, Louisville's Sewer Overflows, the IOAP and the WWT
- How You Can Help: Tips & Resources describing what individuals can do on their own property and within our community, education materials and a Just for Kids page
- Projects: Interactive Viewing Tool displays sewer overflow abatement projects defined in the approved IOAP

- Library: repository that contains the Consent Decree planning documents, approved submittals, WQTC Reports, technical program reports and public meeting documentation
- Public Input: Notification and documentation of IOAP Project Review and Public Input meetings

3.3.1.3 Electronic Notification

MSD continued the programmatic approach to public notification via electronic communication forms as previously documented in Section 3.2.1.3.

3.3.1.4 Written Notices

MSD continued the written notification approach to communicate with customers and regulatory agencies as previously documented in Section 3.2.1.4.

3.3.2 The Wet Weather Team

MSD continued the WWT Stakeholder Group efforts outlined in Section 3.2.2. Modifications and/or enhancements to those efforts are documented below.

3.3.2.1 Continued Engagement

MSD continued to engage the WWT Stakeholder Group in the planning and implementation of the IOAP. A broad-based community input program does not replace the need for the focused participation of an active, well informed Stakeholder Group.

As part of the adaptive management approach outlined in the approved 2009 IOAP, MSD expanded the monitoring network throughout its sewer system. This data was utilized to recalibrate the hydrologic and hydraulic models used to size overflow abatement projects and refine individual project approaches and sizes based on an improved understanding of the sewer system operation and the relationship of certain overflows to one another.

MSD utilized the same benefit/cost methodology defined by the WWT Stakeholder Group for the 2009 approved plan to develop the programmatic justification for a proposed 2012 IOAP Modification. The justification demonstrated the proposed modifications achieve a higher overall benefit to the community through earlier overflow reduction, increased use of green infrastructure and acknowledgement of pertinent public input.

A smaller group of the original WWT Stakeholder Group was assembled to serve as a sounding board, ensuring the modifications to the plan and specific project designs remain true to values, priorities and financial plan that was originally developed. It was critical to continue working with the same people to leverage the two and ½-year education process which occurred during development of the IOAP. Due to the approved IOAP schedule of projects, particularly the timing of projects slated for modification, there was not time available to bring new members into the WWT Stakeholder Group and get them up to speed on all that occurred during IOAP planning and approval.

3.3.2.2 WWT Stakeholder Group Charter

In May 2012, the WWT Stakeholder Group project description was revised to acknowledge continued expectations and membership moving forward. Refer to Appendix 3.3.1 for a copy of the WWT Stakeholder Group Project Description, Revised May 2012.

3.3.2.3 List of Participants

Each member from the WWT Stakeholder Group was contacted to thank them for service to the community as a member of the WWT Stakeholder Group, and to invite their continued participation in guiding the implementation of the IOAP and other Amended Consent Decree response activities. The list of individuals that chose to continue participation is listed in Appendix 3.3.1 the WWT Stakeholder Group Project Description, Revised May 2012.

3.3.2.4 Wet Weather Team Stakeholder Group Membership Moving Forward

Per the Amended Consent Decree, the WWT includes “MSD personnel such as WQTC operators and engineering personnel, local political officials, the general public, including rate payers and environmental interests. Private consulting resources are also included.” Since the WWT Stakeholder Group will remain active through the year 2024, it is likely that attrition of members will occur. If any of the categories required by the Amended Consent Decree become under-represented, MSD will replace members to ensure that all requirements are met.

If replacement of the WWT Stakeholder Group members is required, under Paragraph 23 of the Amended Consent Decree it is the responsibility of the Regulatory Services Director to select those replacements. Consistent with the original selection criteria, a replacement should be a recognized community opinion leader associated with the specific interest group needing representation. The replacement should also be free of any personal or organizational conflict of interest per the MSD Ethics Policy governing MSD staff. (Even though the Stakeholder Group members are not MSD staff, it is deemed important for the credibility of the group that no real or perceived conflicts of interest exist). In addition, the replacement should not be a party to any active legal action against MSD or any other members of the WWT Stakeholder Group, or in the last ten years have been a party to a legal action against MSD or any other member of the WWT Stakeholder Group which was lost, dismissed, or voluntarily abandoned without a settlement.

3.3.2.5 Approach to Meetings and Use of Consultants

MSD continued the WWT Stakeholder approach to meetings and use of consultants, as previously documented, with one modification, as follows.

WWT Stakeholder Group meetings continue to be scheduled twice per year, for two or three hours per meeting, based on the issues and time urgency of decisions that need to be made during implementation. These meetings will be scheduled in coordination with IOAP Project Review and Public Input meetings. Technical consultants will continue to be utilized; however, facilitation will be performed by MSD staff.

Information provided to the WWT Stakeholder Group is posted to the Project WIN website, at www.msdprojectwin.org.

3.3.2.6 WWT Establishes Community Values

The values-based decision process developed by the WWT Stakeholder Group and utilized to develop the Final CSO LTCP and the Final SSDP, was the same process used to develop the 2012 IOAP Modification. A more detailed discussion of this process is contained in Volume 1, Chapter 2.

3.3.3 Project WIN Public Meetings during Overflow Abatement Plan Implementation

Following approval of the IOAP, MSD continued to seek public input on specific projects as they moved through the planning and design process. Two of the largest projects in the IOAP were the early focus as described below:

- Derek R. Guthrie WQTC wet weather expansion project. Conducted an “open house” on October 3, 2009. Invitations were sent to local residents, elected officials and other interested parties, and notices of the open house were posted on MSD’s website. The purpose of the open house was to explain upcoming improvement projects, and receive public input on the planned modifications.
- Jeffersontown WQTC blending elimination plan. Conducted two public meetings on this project to review the alternatives evaluated and the preferred suite of projects selected.
  - Jeffersontown Community Center on March 16, 2010.
  - Sun Valley Community Center on March 17, 2010.

Public attendance at these meetings was less than desired. A higher level of public input on specific projects and public support for program funding is necessary to sustain the program through 2024. MSD, with input from the WWT Stakeholder Group, developed a more robust framework for seeking public input on specific projects as they move through the design process and for plan updates proposed due to green infrastructure and I/I removal right-sizing initiatives.

3.3.3.1 Project Review and Public Input Meeting Process

IOAP projects will be designed and constructed over a 19-year period, from 2005 through 2024. As projects move out of planning and into design over the course of many years, challenges may occasionally occur. These challenges include, but are not limited to, the following examples: land availability, easement attainment, permitting limitations, and technology advancements such as the introduction of green infrastructure. As a result, a more robust Project Review and Public Input process was implemented in 2011, containing the following elements:

- Periodic IOAP meetings, initially scheduled quarterly, with frequency adjusted based on attendance, numbers of projects moving from one stage to another, or as experience indicates the effectiveness.
- Meetings are publicized via a variety of methods including but not limited to: general notice on MSD's website and the Project WIN website; specific email invitation to WWT Stakeholder Group members, Metro Council members, and KDOW, requesting forwarding to other interested parties; and/or direct mail.
- MSD utilizes various methods and/or combinations of communication methods to take advantage of technology advancements and social media availability to find the combination that produces the most cost effective means of delivering the invitations and garnering public meeting attendance and/or support for program implementation.
- The presentations are recorded for replay on Metro TV and streamed from the Project WIN website. Copies of the presentations given at the Project WIN meetings are also available on the Project WIN website.
- The public is provided multiple methods for submitting questions and comments, including documentation on a standard form at the meetings, voicing concerns at the meeting on camera for replay on Metro TV and streaming on MSD's Project WIN website, submission via email and written letter via standard mail submission.
- MSD documents and responds in writing to each question and comment received. Comments and responses of general interest are posted to Project WIN website, with personal information excluded. If an answer does not satisfy the questioner, the issue can be presented to the MSD Board in accordance with Board policy on receiving public comment.

3.3.3.2 Project Review and Public Input Meetings Held

During 2011 – 12, MSD conducted the following IOAP Project Review and Public Input meetings under the new format outlined in the section above. Refer to the Project WIN website for detailed documentation of each meeting.

TABLE 3.3.1

IOAP PROJECT REVIEW AND PUBLIC INPUT MEETINGS

Date	Location	Topics
September 27, 2011	MSD Main Office, 700 West Liberty Street	IOAP Program Overview, Logan Street CSO Basin project, Jeffersontown WQTC Elimination project, Prospect WQTC Elimination project
January 24, 2012	Girl Scouts of Kentuckiana, 2115 Lexington Road	IOAP Program Overview, I-64 & Grinstead Drive CSO Basin project, Derek Guthrie WQTC and Hite Creek WQTC Action Plans
May 10, 2012	NIA Center, 2900 West Broadway	Proposed IOAP 2012 Modifications, 18th & Northwestern Parkway basin project, Paddy's Run High Rate treatment project, Southern Outfall Relief Inline Storage projects.
May 15, 2012	Jeffersontown Community Center, 10617 Taylorsville Road	Proposed IOAP 2012 Modifications, Billtown Road Project, Jeffersontown WQTC Elimination project,
May 17, 2012	Harrods Creek Fire Department, 8905 US Hwy 42	Proposed IOAP 2012 Modifications, Prospect WQTC Elimination project
August 14, 2012	Camp Taylor Elementary School, 1446 Belmar Drive	Proposed IOAP 2012 Modifications, Camp Taylor Sewer Rehabilitation and Replacement projects, Butchertown Neighborhood Green Infrastructure project

3.3.3.3 Public Comment Period and Public Hearing to Take Testimony on Content of Draft IOAP

The following meetings were held between November 2012 – February 2013 to review the Proposed IOAP 2012 Modifications with the interested public. The meetings were advertised via general notice on MSD's webpage and the Project WIN webpage; including a specific email invitation to WWT Stakeholder Group members, Metro Council members, and KDOW, requesting forwarding to other interested parties; and/or direct mail.

TABLE 3.3.2

PROPOSED IOAP 2012 MODIFICATIONS PUBLIC INPUT MEETINGS

Date	Location	Topic
November 8, 2012	Louisville Urban League, 1535 West Broadway	Proposed IOAP 2012 Modifications
November 13, 2012	East Government Center, 200 N Juneau Drive	Proposed IOAP 2012 Modifications
November 15, 2012	Southwest Government Center, 7219 Dixie Highway	Proposed IOAP 2012 Modifications
January 8, 2013	Shively Community Center, 3920 Dixie Hwy	Proposed IOAP 2012 Modifications
January 22, 2013	Krammerer Middle School, 7315 Westport Rd	Proposed IOAP 2012 Modifications
January 29, 2013	Shawnee Community Center, 607 S 37th St	Proposed IOAP 2012 Modifications
February 5, 2013	Moore Traditional High School, 6415 Outer Loop	Proposed IOAP 2012 Modifications

The proposed IOAP 2012 Modification including the Final CSO LTCP and the Final SSDP were distributed for public comment in March 2013. Copies of Volume 1 with redline markups was available for review at all branches of the Louisville Free Public Library system, and at MSD's main office at 700 West Liberty Street. The proposed IOAP 2012 Modification in full with appendices was also available for downloading from the Project WIN website.

The public notice was published in the legal notices section of *The Courier-Journal*, the major daily newspaper for the Louisville Metro region February 24, 2013 15 days in advance of the release date. The public notice announced the availability of the draft plan; the public hearing date, time and location, and the deadline for the acceptance of comments on the plan (see Appendix 3.2.11 for a copy of the notice). The legal notice was repeated on the release date, March 10, 2013. MSD posted an announcement about the public hearing and comment period on the MSD and Project WIN websites. The deadline for accepting comments on the proposed IOAP 2012 Modification was April 12, 2013.

The public hearing on the proposed IOAP 2012 Modification was held on March 26, 2013 in the MSD Board Room. The purpose of the public hearing was to receive formal comments from the public about the proposed IOAP 2012 Modification. As with the previous public hearing on the 2009 Plan, the hearing was not structured as a dialog. The MSD Executive Director was the Hearing Officer and an independent court reporter was present to take verbatim notes. At the onset of the hearing, the Hearing Officer, read a prepared statement about the purpose of the IOAP and the proposed IOAP 2012 Modification, the rules of the hearing, the deadline for the written comments, the proposed schedule for response to both written and oral comments, and the proposed adoption date of the revised plan. The statement was included in the transcript of the hearing. As with most public hearings, each person who desires to comment was asked to complete a request card. This meeting was taped by Metro TV Productions as video documentation and made available on the Project WIN website.

Each commenter was provided ample time to comment on the proposed IOAP 2012 Modification as official testimony. Neither questions nor clarifications were asked of the persons commenting, nor were they answered by MSD, in accordance with the rules of the hearing.

A complete set of all received comments is included in Appendix 3.2.13. A summary of all written and oral comments received, and MSD's response to those comments is contained in the Responsiveness Summary attached at the end of this Chapter.

3.3.4 General Programmatic Outreach and Educational Activities

MSD continued the Project WIN outreach and education activities as previously documented in Section 3.2.4. Refer to the Project WIN website, Library Section, Annual and Quarterly Reports for specific activities completed during this timeframe.

3.3.4.1 Other Public Meetings Held By MSD

MSD continued to host and attend public meetings in addition to the WWT Stakeholder Group meetings and the Project WIN meetings focused on IOAP development as previously documented. Refer to the Project WIN website, Library Section, Annual and Quarterly Reports for specific activities completed during this timeframe.

3.3.4.2 Other Public Events in Which MSD Participates

MSD continued to participate in fairs and public events not only to communicate, but also to reach out to the public and ensure that everyone is familiar with MSD and the mission of the sewer district as previously documented. Refer to the Project WIN website, Library Section, Annual and Quarterly Reports for specific activities completed during this timeframe.

3.3.4.3 Project WIN Seasonal Communications

MSD continued to focus seasonal specific messages to the public as previously documented. Refer to the Project WIN website, Library Section, Annual and Quarterly Reports for specific activities completed during this timeframe.

3.3.4.4 Project WIN in MSD Newsletters

MSD continued to publish two newsletters that contain specific public information about Project WIN and the overflow abatement program as previously documented. These are the “Update,” and “Crosscurrents.” Both publications are posted on MSD’s website for download. Refer to the Project WIN website, Library Section, Annual and Quarterly Reports for specific activities completed during this timeframe.

In addition, MSD publishes an Annual Report targeted at customers and elected officials. Project WIN has been discussed extensively in the Annual Reports published since the Consent Decree was filed.

3.3.4.5 Brochures and Other Printed Materials

MSD continued to provide program specific brochures and other printed materials as previously documented. Refer to the Project WIN website, Library Section, Annual and Quarterly Reports for specific activities completed during this timeframe.

3.3.4.6 Pretreatment and Commercial Public Outreach Programs

MSD continued the Industrial Pretreatment and commercial public outreach programs as previously documented. Refer to the Project WIN website, Library Section, Annual and Quarterly Reports for specific activities completed during this timeframe.

3.3.4.7 Pollution Prevention Outreach and Education Programs

MSD continued the public education focus on pollution prevention activities that can be implemented at home or at work as previously documented. In addition, a significant emphasis was placed on educating the community at large on the benefits, best practices and limitations of Green Infrastructure, particularly as it pertains to stormwater runoff control and sewer overflow reduction within the CSS. Refer to the Project WIN website, Library Section, Annual and Quarterly Reports for specific activities completed during this timeframe.

3.3.4.8 District-Wide General Programs

MSD continued the district-wide general education programs as previously documented. Refer to the Project WIN website, Library Section, Annual and Quarterly Reports for specific activities completed during this timeframe.

3.4 FUTURE PUBLIC PROGRAM FROM JULY 2013 - DECEMBER 2024

During the development of the IOAP, the primary focus areas of the public program were related to notifications of overflow events, education and input on Consent Decree response strategies, and building support for the community investments that will be required to achieve the requirements of the Consent Decree. As the IOAP moves from the planning to the implementation stage, the public program will remain a vital part of MSD's response strategy. While the future objectives of the public program will have a slightly different focus, MSD anticipates that the future program will continue many of the practices that have been successful over the past few years.

3.4.1 Objectives of the Future Public Program

The objectives of a public program during the IOAP implementation stage are expected to be as follows:

- Continue the required notifications of overflow events intended to protect public health (NMC 8 and SORP requirements).
- Instill a sense of value, personal ownership, and responsibility for clean stream water:
  - Promote sustained voluntary participation in private-side I/I control and green infrastructure programs to reduce loadings on the sewer system
  - Reinforce the need to reduce water use during rain events
  - Encourage behavior modification to prevent pollution through source control by residential and industrial/commercial customers (NMC 3 and 7)
- Maintain continued support and understanding of the required financial investment.

- Educate children (and teachers) through formal and informal measures to ensure a depth of knowledge of water quality issues, promote the personal use of best practices to reduce sewer overflows, and instill deeply rooted values around water quality, thereby reinforcing the long-term sustainability of voluntary participation.
- Continue support to customers through neighborhood-specific informational needs as sewer system evaluation studies are conducted, construction projects are planned, or as targeted source reduction programs require homeowner participation in plumbing modifications and similar activities.
- Continue the engagement of the WWT Stakeholder Group as described in Section 3.2.2 and 3.3.2.

The following sections describe in more detail how MSD's future public program will address each of these objectives.

3.4.2 Public Notification

MSD will continue public notification to inform the public of potential sewer overflows, the location, and the possible public health and environmental effects of the overflows. The public notification of the potential or actual sewer overflows will continue to advise the public to curtail recreational activities or commercial activities in areas directly or indirectly affected by overflows. Overall, the intent of the ongoing notification is to reduce the public's exposure to potential health risks. A secondary purpose of the public notification is to develop long-term support for overflow abatement programs and personal behavior modifications that can reduce overflows and the resultant interruption of use of the waters.

Notification activities will continue to be both event-based and programmatic. Event notification, for both CSOs and SSOs, will focus on warnings, and delivering information about the potential public health impacts where the overflows occurred. MSD will continue a comprehensive approach to enhancing the public's knowledge and awareness of overflows. This awareness will include why, how and where overflows occur, as well as solutions and mitigation techniques to abate these overflows.

MSD will continue it's public notification efforts implemented to-date including permanent CSO and SSO warning signs, overflow advisory signs, email notification of events, and web page notification. Electronic notification via the MSD website, list-serve e-mail list, and other electronic and print media will continue to broaden the opportunity for notification and awareness.

3.4.2.1 Warning Signs

MSD will continue to maintain approximately 1,200 Overflow Advisory signs along the creeks and the Kentucky side of the Ohio River. Sign locations will be reviewed annually, with signs added or subtracted based on changes in overflow location, land use, stream accessibility, etc.

MSD staff will inspect the installed signs annually. Signs will be repaired, replaced, relocated, or cleaned as appropriate. To aid in the tracking of these signs, an inventory is maintained in the Hansen Asset Management software.

Overflow Advisory Sign on the Kentucky side of the Ohio River.

3.4.2.2 Project WIN Website

The Project WIN website is a sub-section of the MSD website, located at www.msdprojectwin.org. MSD's website and the Project WIN website will continue to provide alerts about potential sewer overflows. Other relevant and timely information will continue to be displayed on this Project WIN Home Page.

The Project WIN website will continue to contain the Consent Decree, Public Information and outreach materials, including copies of PowerPoint presentations from IOAP-related public meetings required annual reports to EPA and the State, and quarterly and technical reports under the Final CSO LTCP, CMOM, NMC, and SORP.

The Project WIN website will also be updated with appropriate copies of correspondence with EPA and KDEP related to proposed project changes that may result from "right-sizing" following the evaluation of the effectiveness of green infrastructure and I/I removal programs. Correspondence with regulators and other information relative to IOAP changes resulting from previously unforeseen conditions or emerging opportunities will also be posted on the Project WIN website.

MSD will develop performance metrics relative to the participation and effectiveness of green infrastructure and I/I reduction programs in Louisville Metro. These metrics will be trended and publicly displayed, either on the Project WIN website, or on a more broadly-based website that will be linked from the Project WIN site.

3.4.2.3 Electronic Notification

MSD will continue the programmatic approach to public notification including a wide variety of electronic communication forms as documented below.

Website: From MSD's Home Page, the public can access the Project WIN section of the website. Clicking the Project WIN logo brings up the Project WIN site, which includes a link to sign up for overflow advisory emails warning when significant precipitation has caused overflows in MSD's system. Since it is electronic and contains "real time" information, the website is an important component of public notification. The Project WIN website provides important information on the condition of area streams, and shows a warning if overflows are likely to be happening or have happened in the past 48 hours.

Web Page Stoplights and Supplemental Information: Overflow alert messages in the form of screen crawls are maintained on the Project WIN website. The website's Home Page features a simulated traffic light to inform the public of the overflow advisory level as current conditions:

- "Green" for no overflows;
- "Yellow" if a dry weather overflow greater than 1,000 gallons has occurred; and
- "Red" when rainfall occurs and conditions for overflows is likely.

The rain gauge network is utilized to automatically trigger the "red" condition when any rain gauge tributary to the CSO area receives more than 0.1-inches of rain, or any other rain gauge in the county receives more than 0.75 inches of rain.

- The notification alert lights remain on the website for 48 hours after the rainfall or dry weather overflow has ended to reinforce the message that the public should avoid water body contact.
- The screen crawl is located below the notification lights with up-to-date information about weather conditions and alerts about contact with local waterways.

Blending Events Notification: On February 12, 2008, MSD added a notification of blending events at the Jeffersontown WQTC to the Public WIN website. The blending notification is in addition to the overflow alert. This blending notification will remain active until the Jeffersontown WQTC is decommissioned in 2015.

Jeffersontown WQTC
Blended Flow Data

As of 2/12/08, MSD is providing near real time flow information on blended flow from this plant. Up to 60 days of historical data is presented below. You may also view all historical data.

Start Date/Time	End Date/Time	Amount (Gal.)

E-mail Notifications: The public can voluntarily sign up to receive automatic email alerts about the potential overflows based on wet weather conditions. On the MSD Home Page, customers can register by clicking on the Project WIN E-mail Notification list message.

Press and Public Service Announcements: Project WIN messages will continue to be provided to radio, TV, and other local media for announcements.

3.4.2.4 Written Notices

MSD will continue to utilize many forms of written material as outlined in Section 3.2 to communicate with customers. Briefly, the notices include, but are not limited to, the following:

- Door Hangers
- Direct Mail within 500 ft. of Waterways

- Water Quality Warnings Prior to Onset of Recreational Season
- Brochures
- Newsletters and Other MSD Publications
- Public Meetings
- Media and Newspaper Articles

3.4.3 The Wet Weather Team

MSD will continue the WWT Stakeholder Group efforts outlined in Section 3.2.2 and 3.3.2.

3.4.4 Project WIN Public Meetings during Overflow Abatement Plan Implementation

MSD will continue to seek public input on specific projects as they move through the design process and for plan updates proposed due to green infrastructure and I/I removal right-sizing initiatives as outlined in Section 3.3.3.

3.4.5 Personal Responsibility and Behavior Modification

A public education and outreach program is essential to achieving behavioral changes and create a sustainable overflow abatement program. While MSD understands the value and supports the concept of a broad-based, community-wide environmental education program, the messages essential to implementation of the IOAP are more limited. MSD will continue to reach out to the public about personal behaviors and individual actions and how people impact the results of the overflow abatement program. These messages will continue to focus on private sewers, household and gardening practices, consumer behavior, sustainability, and green infrastructure.

The recommended Gray Infrastructure Program will not eliminate all overflows under all conditions nor will it guarantee that harmful pollutants do not reach the surface waters under some conditions. Behavior changes related to commercial and individual housekeeping (for example, control of FOG, elimination of illegal clear water connections to the sanitary sewers, etc.), gardening, and drainage and consumer practices can maximize the potential for the sewerage infrastructure to abate overflows. MSD will continue to implement a public outreach program to inform and educate the general public and specific targeted audiences to add value to and ensure optimal results of the (gray) infrastructure program. The IOAP program assumes a high-level of individual actions to reduce I/I, control stormwater volumes through green infrastructure, and reduce pollutant loads on our streams through active pollution prevention implemented at the level of individual homes and businesses.

3.4.5.1 Sustainability of Green Infrastructure Initiatives

Sustainability goes hand-in-hand with green infrastructure; both are focused on a long-term ability to improve our waterways and reduce impacts on the natural environment so that we can maintain a high quality of life. The WWT has focused on participation of individuals and integration of green infrastructure as two essential aspects of the Project WIN program in order to assure that it is sustainable and produces results.

Green infrastructure can make parts of Louisville Metro act more like a sponge and less like a funnel. Green infrastructure includes anything from rain barrels and gardens that capture rain, to rooftops covered by plants that absorb moisture, to new designs for streets and parking lots that direct rain into the ground, to planting more trees and restoring wetlands. The green solutions are especially suited for areas with combined sewers because keeping stormwater from pouring into sewer lines will directly reduce overflows.

MSD will continue to explore reasonable feasible, and cost-effective (as compared to gray infrastructure control) opportunities for green infrastructure, and will work in partnership with the Mayor's office and other regional initiatives such as the Partnership for Green City, to not only create a vision for green infrastructure, but also to make it happen. Louisville Metro Government, JCPS, the University of Louisville, and MSD have recently formed a formal partnership to coordinate planned construction programs and to identify opportunities to better leverage public agency green infrastructure initiatives. MSD will continue its leadership in the Rain Garden Program, the Rain Barrel program, and the tree planting program. It will also continue to work with the Louisville Metro Parks department on riparian buffers and conservation easements.

The message of "*Clean, Green, Growing Community*" will continue to be delivered and demonstrated to the public to support engagement and adoption of the green infrastructure practices and programs. The long-term objective is that green infrastructure will be integrated across Louisville Metro programs and across the population of the region as part of daily life and plans for the future.

3.4.5.2 Participation in Private I/I Initiatives

I/I is the major cause of SSOs. MSD data, along with data collected from other clean water utilities and national reports, all indicate that I/I from private sewers (laterals which connect the private building to the public sewer) cause at least 50 percent of I/I in most collection systems. Therefore, the more success MSD has in the reduction or control of I/I, the smaller the SSO control facilities can be. Successful I/I control also will benefit the community with savings in capital construction, operations and maintenance (O&M), and reduced disruption in neighborhoods.

MSD's experience with sewer rehabilitation suggests that while public side I/I removal can be effective, maintenance of private sewers and elimination of illicit connections would greatly increase I/I removal effectiveness. Consequently, the WWT Stakeholder Group has encouraged MSD to work with the Louisville Metro Council to adopt a local ordinance to inspect and repair private sewers. Regardless of whether an ordinance is adopted or not, a broad based outreach program that informs and educates the public about MSD's current *Wastewater and Stormwater Discharge Regulation*s (WDRs) prohibitions of clear water discharges to sanitary sewers will be necessary to ensure that private-side I/I is effectively reduced.

In April 2010, MSD announced a program to provide for the repair or replacement of private sewer laterals as a service and an additional measure of I/I control on single family residential properties. This program will both tighten up a leaking sewer system, public and private, and provide financial assistance to customers on fixed or lower incomes to replace a sewer line that probably has caused them sewer backups in the past.

3.4.5.3 Pretreatment and Pollution Prevention

Consistent with NMC 3, MSD administers a comprehensive Industrial Pretreatment program. As part of the continued application of this program, the MSD public program will continue to focus on FOG for both industrial and commercial businesses. FOG control is a mainstream program, and most clean water agencies around the country have a commercial FOG program aimed at commercial bakeries, restaurants and other business that prepare or process food. MSD will continue working with its industrial and commercial customers, with particular attention given to food service establishments, to ensure that they understand their obligations under MSD's Wastewater/Stormwater Discharge Regulations (WDR) and to provide them with the information and technical support needed to prevent FOG-related sewer blockages. MSD will also continue the active residential FOG information program through the continued distribution of brochures ("Fat-Free Sewers") and other items as appropriate at public events where MSD participates.

In the ongoing public program, pollution prevention (NMC 7) will be a prominent component of the program. The difference between the Industrial Pretreatment program and the pollution prevention program is that pretreatment focuses on industrial or commercial establishments and the pollution prevention program focuses on government or personal actions that prevent pollutants from entering the waste stream. Often pollution prevention programs are the same as public outreach or education programs, since preventing the pollutant from entering the waste stream can only be accomplished if the public is aware. Pollution prevention also can be an important component of a Municipal Separate Storm Sewer System (MS4) program. MSD will continue its existing pollution prevention program including the following:

- Cooperation with related activities performed by Louisville Metro such as street sweeping, Operation Brightside litter pick-up programs and other Metro pollution prevention programs activities. MSD will work to maximize the efficiency of those operations and determine the amounts of solids and floatables that are prevented from entering the CSS and the SSS.
- Continued implementation of the Hazardous Materials Ordinance, which requires users with hazardous materials on site to submit a spill prevention and control plan.

- Continued response to spills of hazardous materials and incidents involving discharges to the sewer system and providing spill mitigation kits to the Louisville Metro and Suburban Fire Departments to absorb vehicle fluids rather than flushing to the sewer.
- Continued implementation of the Erosion Prevention and Sediment Control Ordinance.
- Facilitation of annual clean sweep events to remove trash and debris from the waterways in Louisville Metro.
- Improvement and distribution of informational outreach materials that are targeted to inform customers and residents about activities that can be practiced within their homes to assist in the reduction of overflows and/or the reduction of pollutants contributed to the combined or separate systems.

3.4.5.4 Support for Sustained Investment

The hundreds of millions of dollars of public money needed to implement the overflow abatement program indicate the need for a comprehensive, ongoing public outreach and education program. Since the overall community investment in environmental enhancement extends beyond the boundaries of overflow abatement, MSD anticipates participating in a broad-based, comprehensive program of community-wide environmental education. One objective of an ongoing public outreach program is to ensure understanding and acceptance of the need to control sewer overflows, so that over a long period there continues to be a willingness to pay for the infrastructure (of various types) needed to protect and enhance our environment.

MSD's public outreach program successfully gained the approval of elected officials to enter into debt and raise rates to cover that debt in order to finance Project WIN projects. MSD fully understands that it was not only the WWT team process, but also the public meetings and the public hearing that helped MSD establish the priorities and schedule for the overflow abatement program. Continued participation of the public and a continued public outreach program will be essential throughout the entire Project WIN program in order to continue the support for ongoing rate increases that will be necessary. The ongoing public program will utilize the same media strategy (public meetings. newsletters, website, brochures, bill inserts and press and other electronic media) to continue to tell the story of what, why, where, how and most importantly the progress, benefits, and results of Project WIN.

3.4.5.5 Educate Children

To ensure the sustainability of all the programs required for Consent Decree compliance, the active support and participation of all MSD's customers must continue for generations to come. An active program supporting environmental education in our schools can help create good stewards of the environment. MSD understands that the educational objectives of Project WIN are just a piece of a comprehensive program of environmental education that requires the support of a wide range of public agencies and private businesses and interest groups.

MSD has pursued many diverse initiatives in the area of environmental education since the inception of Project WIN. These initiatives include the offer to use MSD facilities as "classrooms" in partnership with individual schools. We have learned that this type of "offering" approach is difficult to sustain, much less expand, as its dependent in large amount on the individual teacher's desires at any particular school at any given time.

In moving forward, MSD intends to pursue strategic partnerships with entities already involved in the in education of primary and secondary level students to leverage opportunities for ensuring the delivery of information about our environment. MSD's goal will be to support a broad-based comprehensive program to instill in its future customers an understanding of the value of clean stream water, and the role that personal responsibility plays in protecting the rivers and streams of Louisville Metro.

3.4.5.6 Neighborhood Specific Information Needs

In addition to service area wide initiatives, MSD's public program will also support the specific information needs of neighborhoods. Examples of the initiatives that will be implemented on a neighborhood basis are as follows:

- IOAP project-specific meetings conducted during the design phase to get neighborhood input on project constraints, opportunities, and preferences relative to the project.
- "Pardon Our Dust" meetings informing people about upcoming construction projects that may affect their neighborhood.
- Sanitary Sewer Evaluation Study (SSES) program notifications, informing residents about upcoming sewer evaluation projects such as smoke testing, sewer cleaning, and closed-circuit television (CCTV) inspection that may involve partial street closures, access to back-yard manholes, or require specific actions to be taken by homeowners.
- Private property I/I reduction programs that may include voluntary or mandatory inspections of sewer laterals, basement connections, and downspout connections requiring MSD staff or contractors access to private property.
- Green infrastructure focus areas to encourage widespread use of green infrastructure practices such as downspout disconnects, installation of rain barrels and rain gardens, and pervious pavement on driveways and sidewalks in areas of the CSS where the potential for a high level of runoff reduction has been identified and assumed in the sizing of gray control components.

3.4.6 Program Messages

Consistent messages are an important part of any public program. Consistency provides for repetition and reinforcement of messages, maximizing the opportunities for retention of the message, and for sustainable behavior changes resulting from the public program.

In addition, MSD's intent to make the Project WIN public program a part of an overall community-wide environmental education program, the Project WIN public program is similarly a subset of MSD's overall public program, so the messages of Project WIN must also be consistent with MSD's general program of "*Clean, Green, Growing Community.*" Some general principles of the Project WIN messages are as follows:

- Convey positive messages, as often as is feasible.
- Educate and create sense of being part of a WINning team, especially when focused on modification of personal behavior and habits.
- Maintain compliance with the letter and intent of regulatory requirements (that is, do not allow a positive message to "sugar-coat" a tough regulatory requirement to the point that the intent of the regulation is lost).
- Support the Project WIN capital plan and operating initiatives.

Consistent with these general principles, some specific program-wide messages will be used time after time. This program is intended not only to inform the public but also to educate the public about its part in achieving the CWA goals as part of the WINning Team. The program has taken the key messages as developed by the WWT Stakeholder Group and refined them for the ongoing outreach and education to the public as follows.

Our Community Values Clean Streams and Rivers - Our streams and rivers provide an intrinsic value to our community. Clean, healthy, and diverse streams and rivers provide a high quality of life for Louisville Metro.

Protecting Public Health is Our Primary Concern - Project WIN is working to ensure our streams and rivers are healthy and clean. There will be times when one has to be careful about contact with waters. Working together, we can ensure clean waterways for your family's health and enjoyment.

Your Investment Is Producing Results - Recognize the value and results of the investment in clean streams and rivers. Clean waterways are worth the investment.

Be Part of a WINning Team - Focus on personal behavior, each person can make a difference. Participate in our team projects and initiatives. Provide feedback to MSD.

Supplementing these general messages will be a seasonal approach to specific themes. Consistent with the seasonal messages conveyed by MSD during the IOAP development, the calendar year will be divided into four seasons and messages/activities will be targeted to specific audiences that are subsets of the public.

These seasons are:

- The Rainy Season: February through April;
- The Summer Season: May through July;
- The Fall Season: August through October;
- The Holiday Season: November through January.

The activities and public messages are consistent with the season, as described previously in Section 3.1.

3.4.7 Future Approaches and Available Media

MSD recognizes the need for a broad-based, comprehensive program of environmental education for our entire community. This represents a mission far beyond the relatively narrow overflow abatement objectives of Project WIN. MSD supports the concept of an over-arching organization to spearhead and be responsible for the community-wide environmental education program. This program will likely be implemented through an organization already focused on education as its mission, such as the University of Louisville. MSD's early efforts to initiate this program were not successful, so MSD will continue its current Project WIN public outreach and education efforts in cooperation with the University of Louisville, the JCPS, and the Louisville Metro Office of Sustainability, while continuing to encourage a coalition of agencies and programs (including the MS4 program) to both fund and guide the environmental education program.

Since there is no assurance that this over-arching environmental education program will ever be developed, MSD must continue with the more focused Project WIN public program. The Project WIN public program has a wide variety of audiences and a corresponding variety of media approaches to connect with those audiences. The audience for the Project WIN future program will be a comprehensive cross-section of the Louisville Metro region.

In the future, the Project WIN public program will use a variety of tools and media sources to reach out to various groups and deliver the specific messages. Table 3.3.1 shows the wide range of media approaches that MSD anticipates to be used. Over the course of the program, it is expected that enhancements will be made as the technology improves, as the community environmental education program becomes a reality, and as the effectiveness of the tools is measured.

TABLE 3.3.1

MEDIA APPROACHES FOR VARIOUS AUDIENCES

AUDIENCE	Public Meeting & Community Events	Web Portal to Project WIN Information	Speaker's Bureau & Technical Support	Print Advertisement, Press Releases	Public TV Video, TV & Radio PSA	Recognition Program	Targeted brochures, pamphlets, FAQs, etc	Reports, Newsletters & Billing Inserts	Demonstration Projects	Direct Mail & Phone Surveys	Educational Programs and Curriculum Support Material	Signage at Overflows	Tours, Demonstrations, Workshops
General Public	√	√	√	√	√	√	√	√	√	√		√	√
Homeowners	√	√	√	√	√	√	√	√	√	√		√	√
Targeted Neighborhoods	√		√			√	√		√	√		√	√
Builders		√	√			√	√		√	√			√
Restaurants		√	√			√	√		√	√			√
Schools	√	√	√				√		√		√		√
MSD Employees		√				√	√	√	√				√
Green Infrastructure Partners	√	√	√			√	√		√		√		√

3.4.8 Annual Calendar of Events

The proposed events that are envisioned during Project WIN implementation will be posted on the Project WIN website. MSD's customers will be encouraged to review the website calendar and request or suggest MSD's participation in other community events. The program will be continually evaluated for its effectiveness, and evolve as indicated by changing needs, opportunities, or as technology advances dictate.

3.5 REPORTING AND AGENCY MEETINGS

During the development of the overflow abatement plans, there was frequent and scheduled regulatory agency interaction designed to facilitate open communication between MSD and the regulators regarding the progress of Project WIN and the compliance with the Consent Decree requirements. It is anticipated that future meetings will be scheduled as needed.

3.5.1 Quarterly and Annual Reports

Consistent with the requirements of the Consent Decree, MSD prepared regular reports for the State of Kentucky and EPA Region 4. Thus far, MSD has prepared seven annual reports, Fiscal Year (FY) 2006, 2007, 2008, 2009, 2010, 2011 and 2012; and quarterly reports for the State and EPA. These reports are available on the MSD website under the Project WIN, Public Document Repository.

Reports are prepared for each of the four quarters of the calendar year: January through March; April through June; July through September; and October through December. Reports are submitted to EPA and the KDEP within 30 days of the end of each quarter. The reports include specific information about activities consistent with the requirements of the Consent Decree, including the progress on the Early Action Projects and the progress toward the development of the overflow abatement plans, which include the Final CSO LTCP and the Final SSDP. These reports are available on the Project WIN Public Document Repository and will be for the duration of the Consent Decree.

3.5.2 Meetings with State and Federal Consent Decree Partners

In addition to quarterly and annual reports, MSD has initiated periodic face-to-face meetings with technical team members from the KDEP and EPA to discuss the progress of the Project WIN overflow abatement program. Since 2008, these specific meetings of the technical team took place:

- February 25, 2008, in Southern KY with EPA Region 4 and the KDEP staff;
- April 16, 2008, in Louisville Metro with the EPA Region 4 and KDEP staff;
- June 12, 2008, in Louisville Metro with KDEP staff;
- February 11, 2009, in Louisville Metro with and KDEP staff;
- May 10, 2011, in Louisville Metro with and KDEP staff;
- February 17, 2012, in Atlanta with EPA Region 4 staff and KDEP staff by telephone;
- July 25, 2012, in Louisville Metro with and KDEP staff; and
- November 28, 2012, in Louisville Metro with EPA Region 4 and KDEP staff.

Regular meetings with the regulatory agencies facilitate communication and understanding of the priorities and requirements of the overflow abatement program and coordination between agencies. A copy of the agendas from each of these three meetings is included in Appendix 3.4.1.

3.5.3 Conference Calls

Conference calls were initially scheduled on a bi-weekly basis between technical staff from MSD, EPA, and KDEP. These calls ensured regular communication about the progress of both the technical analysis and the public program overflow aspects of abatement plans. In addition to reporting on the progress of the plans, MSD answered questions posed by KDEP and EPA. The conference calls encourage partnerships and open-communication to ensure common goals and perspectives and to reach success. Additionally, the process is more efficient with no surprises for both parties. A scheduled appointment also clears up confusion about monthly or quarterly reports. Over the period of development of the overflow abatement plans, all parties have felt free to informally reach out to each other via e-mails and phone calls to ask questions and clarify technical issues. These calls continue to occur on a monthly basis and focus on program implementation challenges, project-specific concerns and follow-up to consent decree reporting.

3.6 MEASURING EFFECTIVENESS

The public program is required by the NMCs, the LTCP, the SORP, and the Consent Decree. The NMCs and the LTCP requirements under the CSO Policy require that the effectiveness of the controls be measured to determine if they have met the goals of the Policy and the requirement of the CWA. This is not intended as a pass/fail system; rather this is an adaptive management approach to water quality attainment.

3.6.1 Evaluation of the Effectiveness of the Public Program

As described in the previous sections of this chapter, the public program has two distinctly different phases. The first phase is the public program that MSD implemented during the development of the IOAP. The second phase is the public program that MSD will implement in support of the IOAP as it moves forward. Similarly, the measures of effectiveness are different for the two phases.

3.6.1.1 Evaluation of Effectiveness during Development of the IOAP

The effectiveness of the public program during IOAP development is indicated by the following:

- Public support for rate increases to carry out the plan;
- Stakeholder group participation in the WWT, and the effectiveness of that participation;
- Number of informed comments received during the public comment period; and
- Support for the adoption of the IOAP.

<u>Public Support for Rate Increases</u> - The first measure has already validated the effectiveness of the public program. Between the Fall of 2005 and the Summer of 2007, the public program reached so many people that the Louisville Metro Council passed the rate increase of 33 percent with only one dissenting member. The Metro Council was able to vote this way because constituents understood the need for wet weather overflow abatement, attended the meetings, read and understood the flyers, bill stuffers, magazines and newspaper articles, and advertisements. MSD has continued to receive approval from the MSD Board for the rate increases outlined in Chapter 6 of this Volume 1. Public comment at the official rate hearings has been minimal, but an increasing number of comments related to rates have been received at the Project Review and Public Input meetings. This may indicate that future rate increases

could face more public opposition, making public education a continuing need throughout the IOAP implementation.

Effectiveness of Stakeholder Participation in the WWT - The second measure has also proven the effectiveness of that part of the public program. MSD has been fortunate to have a talented and fully engaged WWT. The 19 members of the WWT Stakeholder Group demonstrated an admirable record of attendance during 23 meetings spread over more than two years. This team has provided the guidance that MSD needed to develop the IOAP. The process of establishing values, goals and objectives for the IOAP was the critical step for the public process to develop priorities for the program, as called for in the guidance for the LTCP and SSDP development.

As a further indication of the effectiveness of the WWT Stakeholder Group, at the WWT meeting of December 4, 2008, the WWT Stakeholder Group expressed interest in extending their participation into 2009, to allow WWT review of regulatory review comments, and development of MSD's response to those comments. Subsequently, at the May 8, 2012, meeting, 16 members agreed to continue serving through program implementation.

Informed Public Comment - The third measure relates to the public comments received. This performance of the public program in this regard is indicative of the risks that result from misinformation given to the public. Prior to the Project WIN meeting held on November 10, 2008, a series of e-mail and automated phone messages were delivered to residents of southwestern Louisville Metro. These e-mails and phone messages conveyed incorrect information about one specific component of the IOAP. The misinformation was that MSD's plan included a project to eliminate the Jeffersontown WQTC and send all resulting flows to the Derek R. Guthrie WQTC (formerly known as the West County Wastewater Treatment Plant), thereby allowing economic growth to continue in Jeffersontown while inhibiting the potential for growth in the southwestern part of Louisville Metro.

As a result of the broad dissemination of misinformation, the November 10 Project WIN meeting was attended by over 150 people, many of whom were angry about what they believed to be contained in the IOAP. Over the course of the meeting, MSD attempted to correct the misinformation previously conveyed by others. Given that several e-mail comments were received the day after this meeting expressing opposition to any plan to send sewage from the Jeffersontown area to the Derek R. Guthrie WQTC, it appears that MSD's message was not understood or believed by all.

MSD expended a considerable effort after the November 10 meeting reaching out to elected officials, residents of the area, and some of the parties who initiated the misinformation campaign in the first place. A measure of effectiveness of this effort may be reflected in the fact there were no comments at the public hearing that reflected the level of concern expressed at the public meeting November 10.

With the exception of the Jeffersontown flow diversion issue, the public comments received indicated a high-level of understanding and support for the plan. Several comments specifically expressed support for the plan. Several comments offered suggestions for site-specific considerations, indicating a detailed review and understanding of the plan's contents. MSD noted that no comments were received relative to the level of control proposed for either CSOs or SSOs. MSD also observed that only a few comments indicated concern about the cost of the program, and then only in very general terms.

Overall, MSD believes the public comments received indicate that the public program was generally very effective in developing good community understanding of the IOAP, allowing informed and generally supportive comments during the public comment period.

Approval of the IOAP – MSD notes with pride that the Stakeholder Group of the WWT unanimously approved a statement of support for the IOAP. The absence of public opposition to the IOAP (with the exception of the misinformation that led to opposition of the Jeffersontown flow diversion concept) supports MSD's belief that the general public was well informed and supportive of the IOAP. Finally, the MSD Board, on December 15, 2008, unanimously approved a resolution authorizing submittal of the IOAP to the regulatory agencies.

Similarly, on January 30, 2013, the WWT Stakeholder Group unanimously approved a statement of support for the 2012 IOAP Modifications. The MSD Board, on May 13, 2012 unanimously approved a resolution authorizing submittal of the 2012 IOAP Modifications to the regulatory agencies.

3.6.1.2 Evaluation of Effectiveness During Implementation of the IOAP

Performance measures indicating the effectiveness of the public program during the implementation of the IOAP include the following:

- Continued support for rate increases needed to fund the program;
- Behavior changes that contribute to source reduction through private-side I/I reductions and sustained participation in green infrastructure projects; and
- Reductions in sewage flow measured as part of the post-construction compliance monitoring plan.

Continued Support for Rate Increases – While MSD was successful in implementing a 33 percent rate increase in 2007, to continue to fund IOAP implementation annual rate increases ranging from 5.5 to 6.5 percent per year are anticipated. MSD's ability to implement these needed rate increases will be a key measure of the effectiveness of the on-going public program. As noted previously, MSD is noticing an increasing number of negative comments relative to rate increases at the Project Review and Public Input meetings. This may indicate the need to focus more on the legal imperatives and the public benefits of the IOAP program.

Behavior Changes that Contribute to Source Reduction – MSD is relying on behavior changes to contribute significantly to source control efforts in the CSS and SSS areas. Specific measures of behavior changes are discussed in detail in Section 3.6.2 below.

Reductions in Measured Sewage Flows – The ultimate measure of effectiveness of the public program will come through the post-construction compliance monitoring program described in Volume 1, Chapter 6. The "right-sizing" of gray components depends on measurements of flow, and comparison to the previously calibrated flow models. If the flows actually measured are less than those that are predicted by the calibrated flow models that will indicate that source control has been effective, and by inference it can be concluded that the public programs have been effective at changing behaviors that contribute to sewer overflows.

3.6.2 Measures Reaching All Aspects of the Program

The following section describes performance measures that will provide feedback on the effectiveness of the public program in conveying behavior changes messages to MSD's customers. These measures will be used to continuously improve the public program approaches, to better achieve the overall objective of the program, which is overflow abatement.

One direct measurement of the program effectiveness is to determine how many homeowners have inspected their private sewers and how many have made repairs of the sewer. This direct measurement would validate the public outreach regarding the potential new ordinance and the importance of it for overflow abatement. The indirect measurements will measure the potential support of the program and the potential for long-term behavior changes and sustainable solutions.

3.6.2.1 Rain Barrel Program as a Surrogate for Information Received

The rain barrel program was originally proposed as a surrogate for success of distributing information to the public and an example of an indirect measurement of success of the public program. The messages about personal housekeeping and gardening behaviors are usually accompanied by the offer of rain barrels; when the public asks and pays for the rain barrels, this is a positive measurement that the messages are reaching the public.

While MSD had planned to report on trends in rain barrels given away by MSD or sold through subsidized vendors, the market demand for rain barrels quickly overwhelmed MSD's ability to supply them. Rain barrels are now offered for sale at local hardware and building supply stores. Many local nurseries also offer versions of rain barrels. As a result of this market diversification MSD is no longer able to track rain barrel distribution as a surrogate measure of success. The community acceptance of rain barrels, however, is a positive indication that the community is embracing some personal responsibility for wet weather control.

3.6.2.2 Participation in Clean Up and Tree Planting Events

Other positive and indirect measurements of the public program are the number of and participation in tree planting, street sweeping, waterway cleanup, and other similar civic events. The measurement is even more telling if the participation in these events increases. Such increased number of events or participation in the events would indicate that the comprehensive community-wide education program is successfully reaching more and broader members of the public. MSD reports on these activities in the Quarterly and Annual Reports available in the Library section of the Project WIN website, located at www.msdprojectwin.org.

3.6.2.3 Characterize Public Who Has Been Reached

The varied approach for the public program plan means that various methods are used to target different segments of the public. Each aspect of the program, starting in 2009, will characterize the targeted public and the messages that are being delivered. This will provide a baseline for understanding, over time, if the public is reacting to these messages with changed behavior.

When MSD advertises, the media can supply the statistics of who is “reached” by the advertisements. Again, the characterization of the target public will support the understanding of the effectiveness and the determination of whether this is an appropriate media outlet for MSD’s messages.

MSD has experimented with a variety of advertising media, including print and electronic versions. Statistics on website views, readership, etc. have been evaluated as part of an adaptive management approach to public outreach and education. MSD will continue to explore a diverse approach to public outreach and education, and will attempt to characterize the public reached and the effectiveness of the delivery approach. MSD reports on current public outreach efforts and effectiveness in Quarterly and Annual Reports available in the Library section of the Project WIN website, located at www.msdprojectwin.org.

3.6.2.4 What Has Been Feedback From Public?

Public feedback is important and in a local government agency can take several forms, including votes from elected officials based on what their constituents have asked, feedback from opinion leaders such as the feedback given by the members of the WWT or others which is offered opportunistically (in an informal setting), or formally with surveys or in meetings. Surveys that are not targeted but are setup to get a broad statistically varied public; and anecdotal feedback that is most often informal and indirect is also effective.

Local government relies on the vote of the elected officials to provide direct feedback, and MSD will be no different. MSD management have and will continue to seek the feedback of community opinion leaders, generally in an informal way to determine the reception of the messages delivered in the public program, and the methods of delivery. The continued participation of the WWT and their feedback on these issues will be important to this overall measurement of effectiveness.

For information that is more precise, and to ensure that the public program is on the right track, MSD will institute a bi-annual customer survey starting in 2009. The results will be reported in the Project WIN Annual Report, as will the adjustments and adaptations that are indicated by this feedback method.

The first customer survey was intended to be a baseline evaluation, in some ways measuring the effectiveness of the previous public outreach and education efforts, but more importantly to be used to measure progress in creating public understanding. In 2011, a second similar customer survey was completed in a joint effort between Project WIN and the MS4 program. The results of the second survey showed little change in the general public's understanding of water quality issues. MSD is reconsidering the form and format of future surveys, to improve the clarity of the questions and the value of the responses. Reports on the bi-annual surveys will be contained in Annual Reports for the years that surveys are conducted. These Annual Reports are available for review in the Library section of the Project WIN website, located at www.msdprojectwin.org.

3.6.3 Other Measurements of Effectiveness of the Public Program

The long-term effectiveness of the public program cannot be fully measured in one year or even five. The goal of the continued efforts is to make these messages commonly accepted and sustainable without MSD initiation. When these messages are used in everyday and broad-based communication, we will achieve one measure of effectiveness. Here are two examples:

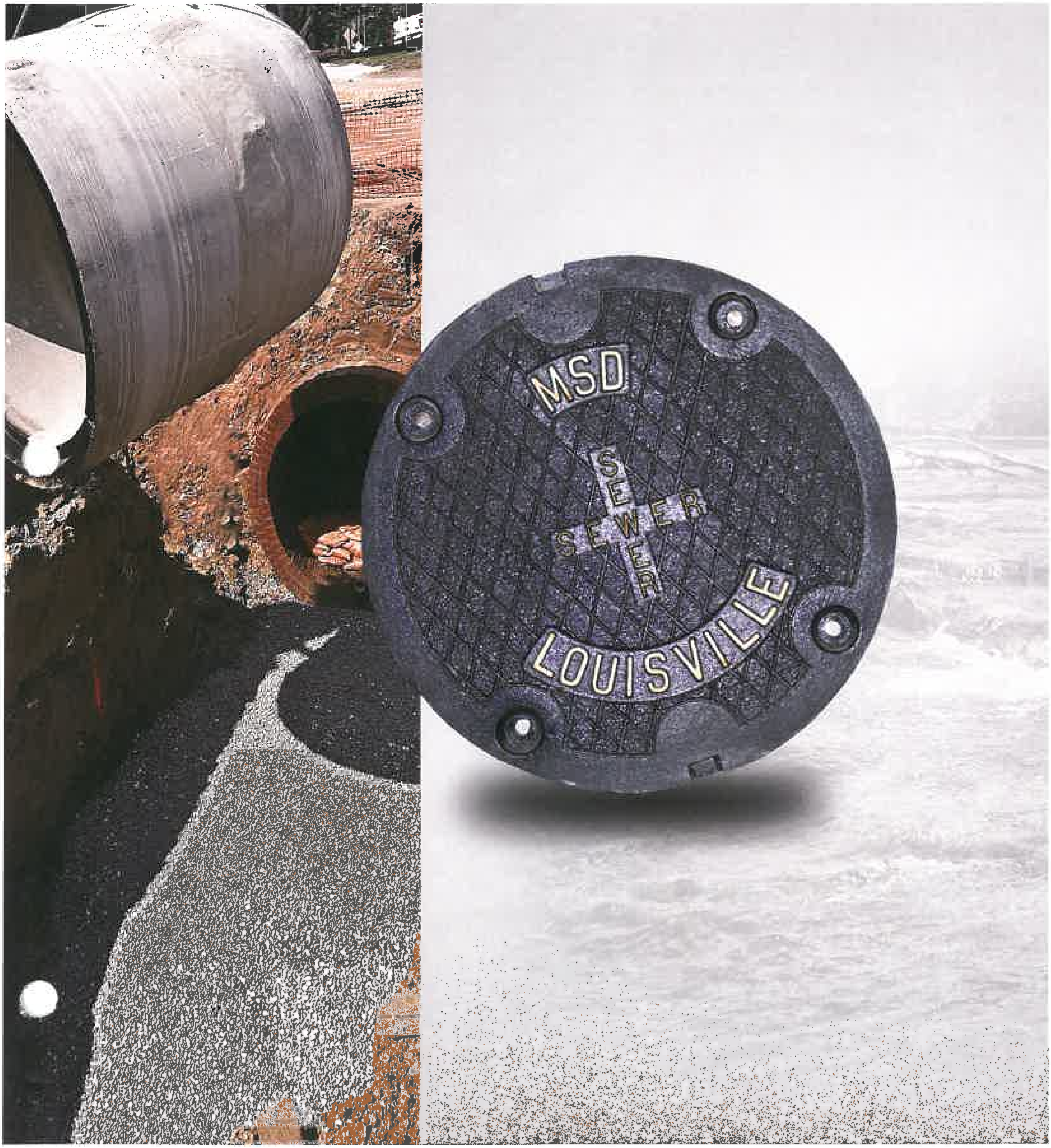
- When we commonly see messages at gardening centers about taking care to use appropriate amounts of chemical and fertilizers and to use them at the appropriate time to protect our local waterways, we will know that we have developed a sustainable message.
- When the gardening section and the home and food sections of the newspapers and other electronic mass media carry our messages about FOG, use of pesticides and fertilizers, and other household practices, we will know that these messages are in the mainstream and sustainable.

Another long-term measurement of effectiveness will be the planning and implementation of green infrastructure by both the public and private developers. This will come about due to messages not only from MSD, but also across public and private organizations. However, the actual understanding that green infrastructure is not just a concept, but also can improve our water quality and our quality of life, can be attributed to specific messages of MSD's public program. This measurement will be over the life of the program.

In addition to the flow measurements conducted as part of the post-construction program, another long-term measurement of the effectiveness of the public program will be to trend the number of SSOs and basement back-ups attributable to grease blockages. This measures an overflow related outcome that depends in large part of changes in person behavior. This is an important factor, because the program has been designed with the expectation that there will be changes in personal behaviors and practices to support the gray and green infrastructure in the IOAP.

Chapter 3

Attachment 1



RESPONSIVENESS SUMMARY

APPROACH TO PUBLIC COMMENT

The Draft IOAP was released for public comment October 31, 2008. A series of three informational meetings were held on November 10, November 12, and November 20, 2008, to present the Draft IOAP to the public, and answer questions. The intent of these meetings was to inform the public of the content of the IOAP to facilitate meaningful participation in the public comment process. The public comment period was scheduled to close at 5:00 pm on December 5, 2008. The comment period was extended to 5:00 pm on December 10 for persons whose email comments were deleted in error, as explained below.

Public comment was received through three primary mechanisms, written comments mailed or delivered in person, email comments, and testimony at a formal public hearing. In addition, one comment was faxed. In total, 18 comments were received by email; one was faxed; and one was hand-delivered. Unfortunately, six emails were held in MSD's spam blocker, and the emails rejected. MSD was able to recover the email addresses of the originators and the subject lines but could not open mail to read the message. MSD sent an email apology to each of the originators, and requested they resubmit their comments by December 10, 2008. Of the six deleted messages, only one resubmitted their comments by the extended deadline. Based on the timing and subject lines of the rejected emails, it appears that five of them were in response to the public meeting on November 10, and the other one appeared to be spam.

Five people spoke at the public hearing held on December 2, 2008, although one of the speakers did not comment, stating his intention to provide written comments instead. A summary of all the comments received with MSD's responses follows:

No.	Name	Organization (if applicable)	Comment Summary	Response, or Location Herein Where Comment is Addressed
Comments Received via Email, Hand Delivery, or Fax				
1	**Scott Harrington**	Assistant to 25th District Councilman Doug Hawkins	Requesting contact information for EPA, should commenter want to submit comments to EPA rather than MSD	Email response sent directly, informing that comments must be submitted to MSD to be considered in the IOAP.
2	**Pamela Wood**		Opposition to the potential diversion of the Jeffersontown WWTP flows to the West County WWTP	See "Jeffersontown Flow Diversion" following this table.
3a	**Tommy and Marilyn Fordent**		Opposition to the potential diversion of the Jeffersontown WWTP flows to the West County WWTP	See "Jeffersontown Flow Diversion" following this table.
3b			Concern about costs and rates	Affordability analysis in Volume 1 Chapter 6 addresses the communities' ability to pay projected rates.
4	**Ann Miller**		Opposition to the potential diversion of the Jeffersontown WWTP flows to the West County WWTP	See "Jeffersontown Flow Diversion" following this table.
5	**Sharon Vertrees**		Opposition to the potential diversion of the Jeffersontown WWTP flows to the West County WWTP	See "Jeffersontown Flow Diversion" following this table.
6a	**Greg Sullinger**		Opposition to the potential diversion of the Jeffersontown WWTP flows to the West County WWTP	See "Jeffersontown Flow Diversion" following this table.
6b			Concern about siting new facility in a low lying area that is prone to flooding	See "West County WWTP Wet Weather Capacity Expansion" following this table.
7	**Mary Lo Smith**		Opposition to the potential diversion of the Jeffersontown WWTP flows to the West County WWTP	See "Jeffersontown Flow Diversion" following this table.
8a	**Teena Halbig**	Floyd's Fork Environmental Association	Eliminate the Jeffersontown WWTP as soon as possible, and cease the practice of blending immediately	See "Jeffersontown Flow Diversion" following this table.
8b			Preference for the Salt River plant site alternative	See "Jeffersontown Flow Diversion" following this table.
8c			Concern that diverting Jeffersontown WWTP flows to Morris Forman WWTP or West County WWTP will increase CSOs	See "Jeffersontown Flow Diversion" following this table.
8d			Concern that a request for unedited tape from public meeting Nov. 12, 2008, was not provided	A transcript of the meeting (unedited) was provided.
8e			MSD does not factor groundwater in water runoff calculations from development	Not pertinent to the analyses in the IOAP
8f			Karst geology is not considered in site locations	In general, facilities are located near the overflow points being addressed. Subsurface conditions, including karst

No.	Name	Organization (if applicable)	Comment Summary	Response, or Location Herein Where Comment is Addressed
				geology are considered in the final design of the facilities.
8g			Concern that public hearing and public comment period is negated, as many items are "fixed" by the draft Amended Consent Decree currently out for public comment.	The draft Amended Consent Decree adds deadlines for the elimination of the practice of blending at the Jeffersontown WWTP, the elimination of five WWTPs in the Prospect area, and several operational considerations. This Amended Consent Decree was advertised for public comment December 1, 2008, with the comment period closing December 31, 2008. The draft Amended Consent Decree may be modified if warranted. Most of the decisions in the IOAP are not affected in any way by the modified terms of the draft Amended Consent Decree.
8h			MSD should have a removal plan for all package plants, with a priority on the Berrytown and Hillridge plants.	The IOAP addresses the elimination of package plants only where required by the draft Amended Consent Decree, or where elimination is part of an SSO elimination project. Elimination of package plants is addressed in MSD's Watershed Action Plans. It should be noted that MSD does not own the Hillridge plant, and therefore can not plan to eliminate it.
8i			MSD should begin sampling for pollutants of emerging concern, such as hormones, antibiotics. A petition is attached supporting this request.	These pollutants are not currently incorporated into applicable water quality standards, and therefore are not within the scope of the IOAP. This petition would be more appropriately addressed to KDEP.
9	**Delores Collins, President, Anne M McMahon, Board member**	Clifton Heights Community Council	Request that Clifton Heights Community Council and other neighborhood groups be consulted regarding site restoration of a planned project in their neighborhood.	A reminder to the design team to meet with this and other groups has been added to the project fact sheet for the referenced project.
10	**Spam**		Spam was received on the Comment IOAP email site.	Spam
11	**Marilyn Kueber**	Community of Hikes Point	Concern about potential disruption of a designated Wildlife Protection Area (WPA).	The project that eliminates the Jeffersontown WWTP currently includes a force main that routes through the WPA. MSD has reviewed the route and determined that re-routing around the WPA can be done with little or no additional cost. The project map will be modified to show routing the pipe around the WPA. This project may not be built, pending the decision on the approach to eliminating blending at the Jeffersontown WWTP. See Jeffersontown Flow Diversion" following this table.

No.	Name	Organization (if applicable)	Comment Summary	Response, or Location Herein Where Comment is Addressed
12a	**Dr. David Wicks**	Stakeholder Group Member	Extensive comments about the public program and public education approach. Specific comments will be detailed in the response.	See "Public Program Plan" following this table.
12b			Suggests expansion of rain garden and rain barrel programs beyond that described as demonstration projects.	Green infrastructure budget includes annual allocations for both rain garden and rain barrel programs that will expand well beyond the demonstrations.
13a	**James H. Colliver, Chair**	Jefferson County Soil & Water Conservation District	Formal notice of support for the IOAP.	Support noted and appreciated.
13b			Suggestion of passive soil modifications (such as deep soil aeration) play a role in an expanded green infrastructure program that includes increased coverage of rain gardens, tree canopy and native grass plantings.	Suggestion regarding soil modifications has been incorporated into the scope of the green infrastructure program described in Volume 2, Chapter 3. Current budget includes annual expenditures in rain gardens, tree plantings, etc that will expand this coverage well beyond the demonstration projects currently defined.
14	**Dwight Maddox**		Question regarding the Meadow Stream Pump Station In-Line Storage schedule	Schedule calls for construction to start early in 2011, and be completed by late spring of 2012.
14a			Will property owners be notified prior to the start of the project?	Yes – MSD's typical approach to construction includes a "pardon our dust" meeting with the neighborhood prior to the start of construction. If individual homeowners have the potential for significant impacts, MSD's Project Manager will have one-on-one discussions prior to the start of construction.
14b			Will the 2 120-inch pipes be underground?	Yes – they will be entirely underground.
14c			Will existing easements be sufficient?	Based on the size of the pipes (10-feet diameter) and the width of the existing permanent easement (15-feet), it appears that additional easement will have to be obtained as part of the final design process. It is also likely that temporary construction easements will be needed.
14d			Will explosives be necessary?	That area of the service area has a variable layer of soil over limestone rock. Depending on the depth to rock, the use of explosives may be required. This won't be determined until the geotechnical investigation is completed as part of final design.
14e			If explosives are used, will property owners be notified?	Yes – any use of explosives includes notification of nearby property owners. Contractors who use explosives typically conduct a detailed a pre-blast documentation of

No.	Name	Organization (if applicable)	Comment Summary	Response, or Location Herein Where Comment is Addressed
				the condition of nearby homes and other structures to satisfy the conditions of their insurance policies that cover this activity.
15a	**Tina Ward-Pugh**	9th District Councilwoman and Stakeholder Group Member	Strong support for IOAP and the public outreach and involvement efforts	Support noted and appreciated.
15b			Request for detailed green infrastructure plan and measurement of the benefits obtained from the green infrastructure investment	Green infrastructure plan is intentionally flexible, since it relies on voluntary participation by others. The post-construction compliance monitoring plan in Volume 1 Chapter 6 details a measurement approach that is consistent with that recommended by Councilwoman Ward-Pugh.
15c			Suggestion that targeted areas be used to focus initial efforts, providing high visibility and more significant benefit measurement. 9th District offered as an early focus area.	Discussion in Volume 2, Chapter 3 Section 3.2.5.7 includes focused areas to concentrate initial green infrastructure efforts. One of these focus areas is defined as the "Northeast Focus Area" which includes Clifton, and Clifton Heights, in the 9th District.
16	**Virginia Delaney**		Desire to have rain gardens included as part of the IOAP solutions	Rain gardens are part of the green infrastructure program described in Volume 2 Chapter 3. Subsidies and incentives for rain gardens will be developed within the established project budgets. This program is anticipated to be in place early in 2009.
17a	**Leslie Barras**	Clifton Community Council Board	General support for the implementation of the IOAP as a way to reduce discharges to Beargrass Creek and mitigate current public health risks.	Expression of support is noted and appreciated.
17b			Suggest source reduction through modifications to MSD plan review process.	Development standards are the responsibilities of Louisville Metro Planning and Design Services. MSD's responsibility in plan review is focused on sewer system capacity and runoff. Issues relative to development standards and the overall plan review process are most appropriately handled through the multi-agency Municipal Separate Storm Sewer System (MS4) permit currently in the renewal process. Since this permit includes all the parties who need to participate in changing the development standards and plan review process, this comment has been forwarded to that working group for their consideration. Changes to development standards are being considered as part of a revised stormwater program being developed as part of the permit renewal

No.	Name	Organization (if applicable)	Comment Summary	Response, or Location Herein Where Comment is Addressed
				process.
17c			Suggested source reduction through active program of downspout disconnection, including a multi-neighborhood initiative called Project GRaB.	The green infrastructure program includes an active downspout disconnect component. Discussion in Volume 2, Chapter 3, Section 3.2.5.7 includes focused areas to concentrate initial green infrastructure efforts. One of these focus areas is defined as the "Northeast Focus Area" which includes Clifton, and Clifton Heights. As this program is implemented MSD will look to Project GRaB as a potential partner in this important effort.
17d			Suggest stream restoration SEP funds not be used for litter and trash pick-up, but be used to actually restore form and function to a portion of a creek.	This comment is intended for the Amended Consent Decree, and is not within the scope of the IOAP.
17e			Suggestion that Section 106 of the National Historic Preservation Act (NHPA) be followed for all projects under the IOAP, consultation with the Metro Historic Preservation Office and State Historic Preservation Officer, that archaeological surveys be conducted by qualified professionals where indicated, and that money be budgeted under "advance site restoration" to address these issues.	Since the IOAP is being developed under a Federal Consent Decree and is subject to EPA review and approval, MSD has assumed that Section 106 of the NHPA applies to all projects in the IOAP. MSD has held training on Section 106 for its project managers, and has initiated discussions with members of the Kentucky Heritage Council regarding the projects in the IOAP. Compliance with Section 106 is required to be handled on a project-by project basis, and MSD intends to fully comply with all applicable regulations in this regard. Project budgets include allowances and contingencies to address historic and archaeological preservation measures.
18	**J.R Reamy**		Opposition to the potential diversion of the Jeffersontown WWTP flows to the West County WWTP	See "Jeffersontown Flow Diversion" following this table.
19a	**Lisa Santos**	Irish Hill Neighborhood Association	Concern about erosion at outlet of CSO 140 Sewer Separation Project	A notation about erosion protection at the outlet will be added to the project cost estimate summary. The costs of this feature are already covered by the project budget.
19b			Concern about siting of storage basin near Lexington Road and Payne St.	A notation will be added to the project description on the project cost estimate summary explaining that the project budget includes line-item costs for coordination with development plans and flood plain compensation areas for the River Metals Site. This storage basin can be located under parking lots etc., and does not need to interfere with any environmental remediation efforts

No.	Name	Organization (if applicable)	Comment Summary	Response, or Location Herein Where Comment is Addressed
				planned.
19c			Recommendation that the storage basin proposed at I-64 and Grinstead be relocated to avoid conflicts with future efforts to restore a historic meander to Beargrass Creek in that area.	A notation will be added to the project description on the project cost estimate summary explaining that a line item has been added to the project budget to provide for locating the tank out of the abandoned channel area, and providing for advanced site restoration that complements and does not interfere with future plans to restore this area.
20a	**Jason Flickner**	Kentucky Waterways Alliance	Several general comments very supportive of the wet weather team process, the project evaluation and alternative selection process, and MSD's expansion of the sewer overflow issues to address private-side I/I, green infrastructure, and site restoration.	Comments acknowledged and appreciated. The Immediate Past President of KWA was a member of the Stakeholder Group and his participation and unique perspective was very helpful to the technical team.
20b			Concern about the lack of specificity in the scope and scale of the public education, outreach and involvement program. Also believes the evaluation framework is weak for this particular program.	See "Public Program Plan" following this table.
20c			Recommendation that site restoration take steps to reverse historical degradation of riparian areas.	Projects near waterways have budgeted amounts for "advanced site restoration" to accomplish the goals stated. Some projects have specific restoration recommendations, and while others will be developed as part of project final design.
20d			Noted that MSD is the administrator of the MS4 permit program, and many recommendations that were deemed out of scope by the IOAP team should be considered as part of the MS4 program.	Noted. The Stakeholder "ideas list" has been forwarded to MSD's MS4 team for consideration and potential inclusion in the stormwater management program.
20e			Identification of a potential location for a demonstration rain garden as part of the Germantown-Paristown Neighborhood Association (GPNA) proposal for a rain garden at the intersection of Ellison Avenue, Swan Street, and Dandridge Avenue.	This location has been noted, and MSD will contact GPNA. While the IOAP has identified 4 demonstration rain gardens, the green infrastructure program includes funding for MSD participation in a large number of rain gardens, and it is likely that MSD will participate in the GPNA rain garden if soil conditions are appropriate.
20f			Broad statement regarding incorporation of green infrastructure into gray projects where possible, and re-establish and maintain natural riparian and in-stream conditions.	Recommendations are broad and not site specific. MSD has committed to consideration of "advanced site restoration" for all IOAP projects, and working with neighborhood organizations on site specific actions.
20g			Advanced site restoration recommendations for the storage	See response for 19c.

No.	Name	Organization (if applicable)	Comment Summary	Response, or Location Herein Where Comment is Addressed
			basin at I-64 and Grinstead Drive.	
20h			Recommendations for eco-friendly construction of the Nightingale Pump Station replacement, and habitat restoration along both South Fork and Wood Creek. Also protect against erosion.	A notation will be added to the project description on the project cost estimate summary explaining that the project budget includes line-item costs for green construction, habitat restoration and erosion protection as noted.
20i			Recommendation that the storage basin at Lexington and Payne Street not be located on the low area targeted for flood plain credits from developing the River Metals property.	See response for 19b
20j			Recommendation that the riparian areas of the Sinking Fork and Middle Fork near the Beechwood Village pumped SSO locations be restored to a natural condition.	Project budgets were previously established for this project as part of the Interim Sanitary Sewer Discharge Plan, and did not include this extensive stream restoration. MSD will take this recommendation under advisement, but this type of stream restoration is not part of the overflow abatement project.
Oral Comments Received at the Public Hearing December 2, 2008				
21	**Monica Orr**	Cherokee Triangle Association	Recommendation to include tree planting in the plan, and an offer to be one of the partners in restoring the urban tree canopy.	Tree planting is part of the plan, with an annual allowance in the green infrastructure budget. MSD will note the Cherokee Triangle Association's willingness to participate in this program, when it begins implementation sometime in 2009.
22a	**Ray Pierce**	Flowerville/Emont Pierce Neighborhood Association	How many MSD Board members are in attendance?	There were no MSD Board members in attendance at the public hearing.
22b			Does MSD have any money in the green roof on the 444 Building?	MSD has not provided any financial assistance relative to the green roof on the 444 Building.
22c			Concern about the cost of MSD services, the cost of negotiated settlements with EPA/KDEP and other cost-related concerns not directly linked to the IOAP.	Volume 1, Chapter 6 discusses the costs, projected rates, and community affordability of the proposed IOAP.
22d			Concern about a large sewer overflow that occurred during a major rainstorm in April, despite the fact that sewers in the area are new and should have been designed not to overflow.	The overflow cited occurred on the Pond Creek Interceptor that is over 20 years old, and drains a large portion of western and southern Jefferson County. Many of the sewers that connect to the Pond Creek Interceptor

No.	Name	Organization (if applicable)	Comment Summary	Response, or Location Herein Where Comment is Addressed
				are old and in need of repair. High flows occurred in these old sewers as a result of the April storm, overloading the wet weather capacity of the system. The IOAP addresses repairing or replacing some of these sewers to reduce wet weather flows, and also provides additional wet weather capacity at the West County WWTP to mitigate overflows of the type cited.
23a	**Charles Eaves**		Questioned if a CSO project planned along Frankfort Avenue is going to happen in the next year.	There are no CSO projects planned for the Frankfort Avenue area next year. CSO 087 was separated and eliminated in 2006, and CSO 093 and 140 separations are planned to start design in 2011, with construction completion in 2015.
23b			Comment supporting the use of Project Labor Agreements (PLA) for major projects, and the desire for the IOAP to provide local jobs.	PLAs are customarily used for very large projects. The projects in the IOAP are all less than $50 million construction cost, which would usually be considered too small for a PLA. MSD does, however, require prevailing wages for projects over the Davis/Bacon Act threshold. In addition, MSD has a local bid preference for contractors located in Jefferson County.
24a	**Lonnie Calvert**	Laborers International Union of North America	Questioned if MSD is building a new wastewater treatment plant in southwest Jefferson County?	MSD is not building a new plant in southwest Jefferson County, but will be expanding the West County WWTP.
24b			Support for the use of Project Labor Agreements, and requiring prevailing wages be paid for all jobs over the statutory threshold.	See answer to 23b
24c			Recommendation that MSD include contract provisions regarding apprenticeship programs.	Changes to contract provisions are not implemented on a project by project basis. A policy change of this type is outside the scope of the IOAP, but will be forwarded to the MSD Board Policy Committee for consideration.
24d			Recommendation that MSD develop responsible bidder ordinances.	MSD's current bidding documents allow the evaluation of a bidder's responsibility. An ordinance legislating this is outside the scope of the IOAP. See the answer to 24c.
25	**Timothy Childers**		Statement about MSD rate increases.	Concern noted. No action requested or required.

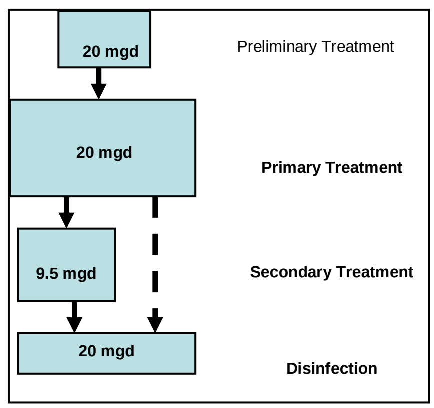
DETAILED RESPONSE TO COMMENTS

The following provides a more detailed response to some of the comments noted above that require a more extensive explanation than can be addressed in a summary table.

Jeffersontown WWTP Flow Diversion:

At the Project WIN public meeting on November 10, 2008, many residents of southwestern Jefferson County expressed concern about the potential to eliminate the Jeffersontown WWTP and divert the flows to the West County WWTP. Specific concerns related to the loss of treatment capacity at the West County WWTP and the potential impact this could have on economic growth and development in the southwestern part of the county. Other concerns were expressed regarding odor and public health impacts.

The draft Amended Consent Decree requires the elimination of "blending" (bypassing a portion of the flow around the secondary treatment system, providing only preliminary and primary treatment followed by disinfection) at the Jeffersontown WWTP by December 31, 2015. Recognizing that several alternative approaches to achieving this are still under evaluation, the draft Amended Consent Decree requires MSD to determine the approach by March 31, 2010. Some of the alternatives that have been evaluated in the past include the following:



- Expand and upgrade the plant on-site to handle wet weather flows and provide for continued economic growth in the plant's service area.

- Eliminate the plant and divert all current and future flows to the Floyd's Fork WWTP.

- Eliminate the plant and divert all current and future flows to the Cedar Creek WWTP.

- Eliminate the plant and divert all current and future flows to a new regional WWTP located on the Salt River.

- Eliminate the plant and divert dry weather flows to the Morris Forman WWTP, and a portion of the wet weather flows to the expanded West County WWTP. This is the project currently described in the IOAP, as a "place-holder" to ensure that project budgets and other resources are in place to comply with the requirements of the draft Amended Consent Decree once a final decision on approach is determined.

The first three options (and several related combinations of splitting flows between the three plants) all require plant expansions, and all will continue to discharge flows into the Floyd's Fork watershed. Of those three options, expanding the plant on-site, with some limited diversions of flows to the other two plants, is the lowest-cost alternative. Pursuing an expansion to the Jeffersontown WWTP will require a revised waste load allocation (WLA) for the Floyd's Fork watershed. KDEP is currently working on a Total Maximum Daily Load (TMDL) determination for several parameters in the Floyd's Fork Watershed. Until this TMDL is complete, KDEP is unlikely to issue any revised WLA, or allow any additional loading to be planned for the Jeffersontown WWTP. KDEP has not given MSD a firm completion date for the TMDL. As a result, MSD cannot rely on the acceptability of an expansion of the plant until future effluent limits are established.

The next option, elimination of the Jeffersontown WWTP and diversion to a new regional plant on the Salt River in Bullitt County, requires the state legislature to establish a new multi-county regional sewer authority that would take these flows in addition to flows from Bullitt, Spencer, Shelby and Oldham Counties. This plan has been under consideration for the past two legislative sessions but has not yet passed. MSD cannot rely on this option until it is known what action, if any, the legislature takes in this regard. If the regional sewer authority is not established at the next legislative session, schedule constraints dictate that plans for eliminating blending at the Jeffersontown WWTP will need to proceed in a different direction.

The final option involves elimination of the Jeffersontown WWTP, and pumping flows to the new Hike's Lane Interceptor. This would allow dry weather flows to be routed to the Morris Forman WWTP, which has approximately 40 MGD of dry weather capacity available. Taking dry weather flow to the Morris Forman WWTP would ensure that the dry weather capacity at the West County WWTP remains available to enable economic growth and development in that area of the county. During wet weather, flows from the Jeffersontown WWTP would be stored in two proposed flow equalization basins, one at the current plant site, and one in the Buechel area. As conveyance capacity becomes available in the Hike's Lane and downstream interceptors, the wet weather flow would be conveyed to the West County WWTP and treated in the new wet weather treatment facilities. The new wet weather treatment facilities are described further under "West County WWTP Wet Weather Capacity Expansion". The option to eliminate the Jeffersontown WWTP and pump the flow to the Hike's Lane Interceptor is available to MSD now, and does not rely on any action of the state legislature or any state agency. This option was therefore included as a place-holder in the IOAP.

As mentioned previously, the draft Amended Consent Decree requires the elimination of blending at the Jeffersontown WWTP by December 31, 2015. Recognizing that some of the viable alternatives to accomplish this rely on actions outside the control of MSD, the draft Amended Consent Decree gives MSD until March 31, 2010, to decide on an approach to eliminate blending. That decision will be documented separately from the IOAP.

West County WWTP Wet Weather Capacity Expansion:

Some comments questioned the plans for adding wet weather treatment capacity in the southwestern part of Jefferson County. In 2006, MSD submitted an Interim Sanitary Sewer Discharge Plan (ISSDP) to address some of the largest sanitary sewer overflows on an accelerated schedule. This plan was reviewed by EPA and KDEP, and revised in response to their comments. The ISSDP was approved by EPA and KDEP on July 24, 2008. MSD's approach to eliminating the SSOs addressed in the ISSDP included capturing the overflows in new gravity sewers, and sending the flows through the existing Northern Ditch Interceptor. The plan then called for constructing the Northern Ditch Diversion Interceptor, a gravity sewer that will provide the controllable option to connect the Northern Ditch Interceptor to the Pond Creek Interceptor, and sending those flows to the West County WWTP. The Northern Ditch Diversion Interceptor is a pipe that was first planned for in 1964. The Pond Creek Interceptor was sized to accept this flow, and the construction of the Pond Creek Interceptor provided a 72-inch stub-out for a future connection of the Northern Ditch Diversion Interceptor. The figure on the following page illustrates the flow routing concept and the facilities required to implement it.

The ISSDP also identified the need for expanded wet weather treatment capacity at the West County WWTP. The West County WWTP currently has a dry weather capacity of 30 MGD and a wet weather peak flow capacity of 96 MGD with all treatment units in service. An expansion of the wet weather treatment facilities will bring wet weather capacity up to 200 MGD, without changing the dry weather capacity. Additional dry weather capacity is not needed, since the plant currently has adequate dry weather capacity to accommodate growth in the service area project through 2020, and dry weather flows continue to go to the Morris Forman WWTP.

The plant expansion includes the following facilities:

- 3 bar screens in a new screening facility, providing a firm capacity of 340 MGD
- 8 raw sewage pumps in the existing raw sewage pump station, providing a firm capacity of 200 MGD
- 3 wet weather pumps in a new wet weather pump station, providing an initial firm capacity of approximately 100 MGD, with an ultimate firm capacity of 145 MGD.
- 2 short-term detention basins
- 1 flow equalization basin with an approximate capacity of 17 million gallons
- 2 grit removal units, equal in size to the 2 existing units
- 1 aeration basin, equal in size to each of the 4 existing basins
- 6 clarifiers, equal in size to the existing 6 clarifiers
- 2 chlorine contact basins, equal in size to the existing basins

Hydraulic modeling predicts that 200 MGD of wet weather capacity will be adequate for all but the largest storms in a typical year. This implies that the flow equalization basin will normally be empty, and will be used only in 2 or 3 large storms per year, and only for a few days per storm. This will minimize the possibility for noticeable off-site odors and will eliminate the potential for mosquito and other nuisance insect breeding and ensure the plant is a good neighbor.

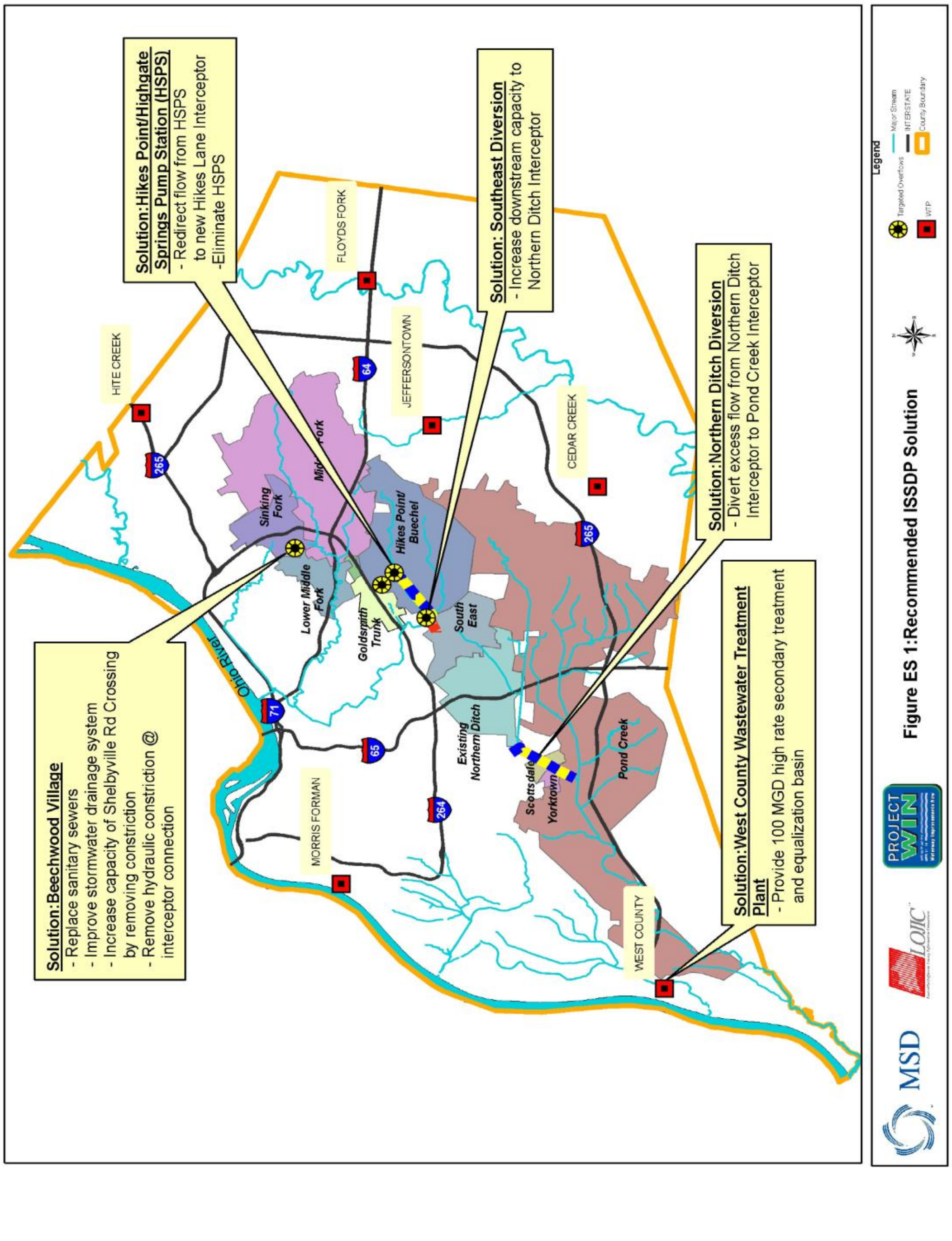


Figure ES 1:Recommended ISSDP Solution

Public Program Plan:

Comments from Dr Wicks and from the Kentucky Waterways Alliance (KWA) suggest that the public involvement program described in the IOAP is not sufficiently detailed and should lay out specific programs, budgets, and organizational structure. They describe desired components of a comprehensive community-wide environmental education program that exceed that presented by the IOAP. They also suggest that a more extensive programmatic evaluation framework be developed to ensure that the public outreach and education is effective.

MSD agrees with the importance of an overarching, sustained community water quality education initiative directed at enhancing appreciation for water quality improvements and building understanding of the actions all members of the community can take to improve water quality. To be most effective, this effort is substantially broader in scope than the CSO and SSO improvements addressed by the IOAP, particularly as our community turns its attention to stormwater management in the context of the multi-jurisdictional Municipal Separate Storm Sewer System (MS4) permit. MSD is willing to be a contributor to such an effort, but recognize the need for broader involvement and leadership throughout the Louisville community and across Louisville Metro Government.

It is MSD's belief that the optimal approach to water quality education would be through an agency with education as its focus. MSD would be an enthusiastic supporter of an organization formed to conduct community-wide environmental education. As a financial supporter, MSD would expect to have messages that are important for the IOAP and the MS4 programs integral to the program. We would expect that other financial supporters would also have their own messages that they need to have conveyed to the community, and that these messages would be complementary and synergistic.

Within the context of the IOAP, MSD has attempted to describe what is needed, that is, the messages that need to be conveyed, and the outcomes desired. MSD has also described a variety of educational tools and approaches that it has used in the past. MSD has not described specific organizational structure, position descriptions etc., expecting that MSD's organization would change and adapt to new approaches and new challenges. MSD has avoided describing specific programs due to the need to avoid commitments that are outside MSD's control (such as a specific program to reach all 8th graders in the Jefferson Count Public Schools).

MSD will modify the text in Volume 1 Chapter 3 to reflect the following changes:

- MSD encourages and will provide a portion of the financial support needed to develop a community-wide environmental education program, housed outside of MSD, possibly at the University of Louisville. MSD will use this program to support the IOAP and MS4 programs, and any other MSD program that would benefit from a more environmentally aware and involved population. MSD's budget commitment will depend on the nature of the program, and the extent that it can replace or improve existing programs supported by MSD.

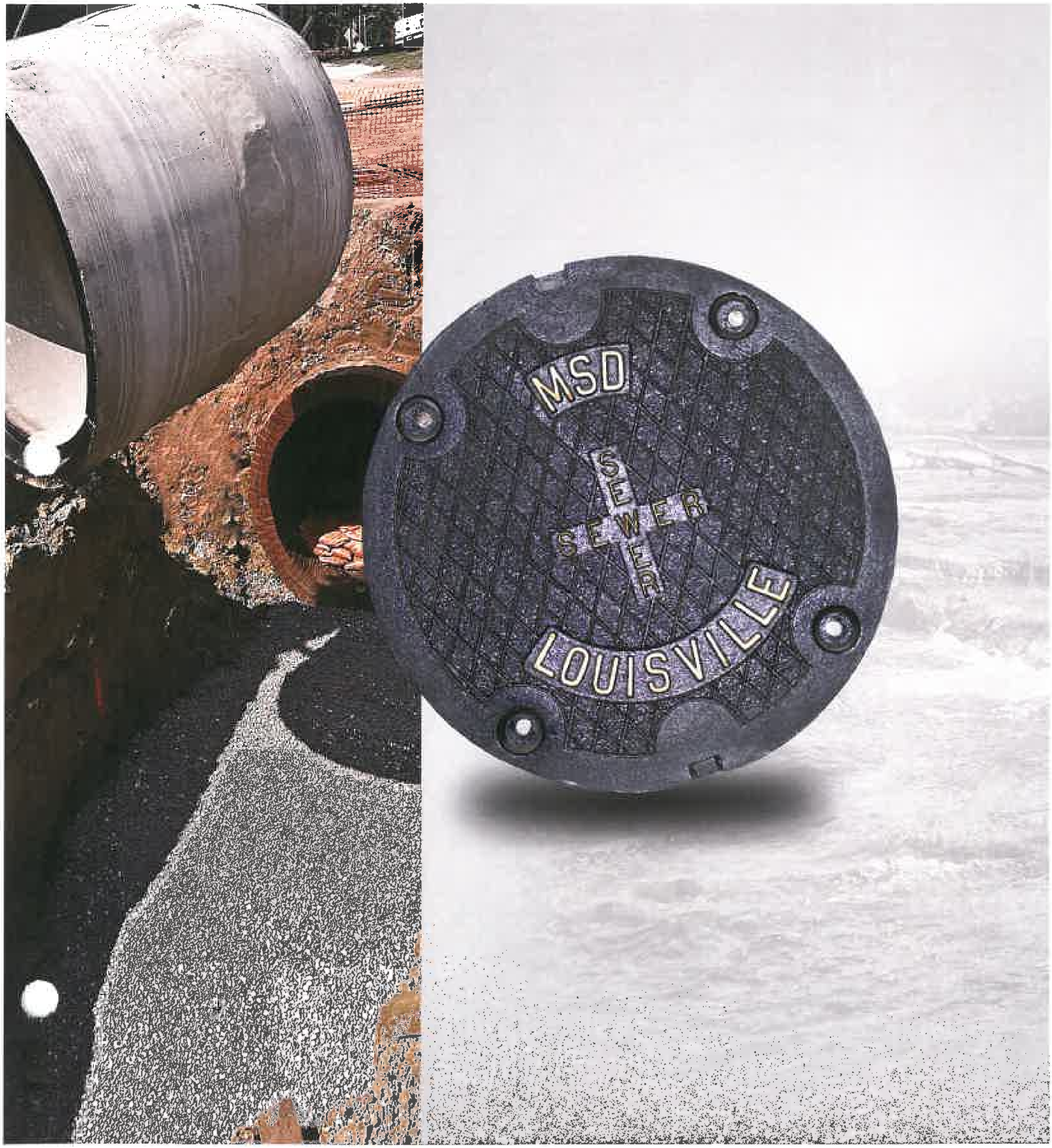
- MSD will encourage other local government agencies to participate in the community-wide environmental education program as well, to derive economies of scale and synergistic messages.

- MSD will support the development of robust educational evaluation systems, initiated and managed by professionals in this field.

- MSD will continue its active programs of community outreach and education for projects and programs that do not fit within a broader community education approach.

Chapter 3

Attachment 2



RESPONSIVENESS SUMMARY – NOVEMBER 2012 MODIFICATION

As this 2012 IOAP Modification was being developed, MSD conducted 13 informational meetings over the time period of September 2011 through February 2013. These meetings were held across the service area in a wide variety of public venues. The meetings were an opportunity for the public to learn about the IOAP, the proposed modification, and specific projects that were planned for the neighborhoods in the vicinity of each of the public meetings. At these meetings MSD made informational presentations, solicited public input and responded to comments. These meetings were videotaped and shown on Insight Cable Metro TV. The taped presentations are posted on the Project WIN web site at:

http://msdprojectwin.org/Public-Input.aspx.

MSD also invited written comments for those who had questions after the public meetings. Comments and questions pertinent to the IOAP Modification were responded to in writing. Copies of the presentations made, the questions received and the corresponding written responses are also posted on the Project WIN web site and can be viewed at:

http://msdprojectwin.org/Library.aspx.

The draft of the 2012 IOAP Modification was released for public comment on March 13, 2013. Copies of Volume 1 were available at each branch of the Louisville Free Public Library for the entire 30-day comment period, that closed on April 12, 2013. Along with hard copies of Volume 1, each library had a DVD of all three volumes of the document. Copies of the document were also available for public inspection at MSD Main Office Building during regular business hours. All three copies of the draft document were also available on-line, posted on MSD's Project WIN web site. During the 30-day comment period no written or emailed were received pertinent to the 2012 IOAP Modification.

A public hearing was held on March 26, 2013, at MSD's Main Office Building. The purpose of the hearing was to provide another venue to receive public comments on the 2012 IOAP Modification. The meeting was video recorded and shown on Insight Cable Metro TV. The recording is also posted on the MSD Project WIN Public Input web site noted previously. A transcript of the hearing is also posted on the Project WIN Public Input web site. Two speakers registered to speak at the public hearing. A summary of the comments received and MSD's responses follows:

TABLE 3.1.1

PURPOSE OF PUBLIC PROGRAMS

No.	Name	Organization (if applicable)	Comment Summary	Response
1	Bud Hixon	Bad Water Journal (web site)	Would like MSD to provide more focus on the impact of industrial dischargers releasing effluent to the sewer system in areas that could eventually be released to the environment through CSOs.	This comment is similar to a comment made by Mr. Hixon at an IOAP public meeting held January 24, 2012. The original question, MSD's response, and a summary of Significant Industrial Users (SIUs) is posted on MSD's Project WIN website at: http://msdprojectwin.org/Library.aspx under "IOAP Public Input Meetings, 2112". As noted in the January 2012 response, some SIUs are required to suspend discharge during wet weather, and others have voluntarily agreed to do so when MSD notifies them that overflows are likely. In the annual reports submitted to USEPA, KDEP, and USDOJ, MSD reports on SIUs, the pollutants of concern discharged, and comments about wet weather practices are included. These annual reports are available on MSD's Project WIN website at http://msdprojectwin.org/Library.aspx under "Consent Decree Reporting, Annual Reports".
2	Bud Hixon	Bad Water Journal (web site)	Interested in alternatives to the proposed storage basin planned for a location near the junction of I64 and Grinstead Drive. Would like preliminary meetings with MSD prior to finalizing approach.	The storage basin at I-64 and Grinstead Drive is one of the projects that changed significantly in the 2012 IOAP Modification. After model recalibration resulted in a significant increase in basin size, MSD held a public input meeting at a location very close to the proposed basin site. MSD received significant comment about the desire to reduce or eliminate the basin through the use of green infrastructure practices. As a result of this public input MSD proposed delaying this project approximately 4 years to allow green infrastructure alternatives to be developed, evaluated, implemented and proven. A "right-sizing" activity will be conducted prior to final selection of the basin size, after the benefits of the green infrastructure implementation can be quantified. MSD will hold additional public meetings in the area to involve the public in final basin configuration, site restoration, etc.

No.	Name	Organization (if applicable)	Comment Summary	Response
3	Carletta Bell	Resident of Petersburg Estates subdivision	Expressed concern over potential nuisance conditions anticipated from the 3-cell Buechel Surge Basin now under construction. Would like this basin covered to avoid the potential for odors, insects, rodents etc. References were made to other basins in the IOAP that are covered.	During IOAP development MSD used a state of the art air dispersion model to evaluate the potential for nuisance odors from surge basins. The model considered the frequency of use, anticipated pollutant concentrations in the basins, the expected residence time in the basin, local meteorological conditions, and the proximity to "sensitive receptors" like residences, restaurants etc. The criteria resulting from application of this model were consistently applied to potential storage basin projects throughout the service area, resulting in some storage basins being covered, and other basins not covered. MSD's modeling clearly showed that an uncovered basin would not cause nuisance odors in the location and configuration proposed for the Buechel Surge Basin. In response to concerns from local residents and businesses, however, MSD decided to add carbon adsorption odor control to the screening facility, and sodium hypochlorite addition to the first cell to oxidize reduced-sulfur and other potentially odorous compounds in the wastewater/stormwater mix that will enter the basin. Since the basin will normally be completely dry and the wastewater/stormwater that enters intermittently during rain events is not intended to stay in the basin longer than 24 – 48 hours insects and rodents will not be a problem. MSD believes that the size, location, and design features of the Buechel Surge Basin are sufficient to preclude the development of nuisance conditions in the area, and the cost to cover this basin would be unwarranted and a poor use of public funds.

The comments received during the formal public notice period have been addressed by MSD, primarily through actions already completed as a result of previous public input. The actions include changes to a project already under construction, reconsideration of design criteria for another project, and increased reporting and public disclosure of information related to significant industrial users who discharge to the combined sewer system. No further actions are necessary to respond to the comments made during the public notice period.

Chapter 4

CHAPTER 4: INTEGRATED OVERFLOW ABATEMENT PROGRAM

Special Note: This chapter was developed in 2008. The statistical data for the CSO's reported, specifically related to individual CSO overflow volumes and frequency in a typical rainfall year, were derived from the CSS model calibrated in 2007. Since then, a more detailed calibration and validation effort has adjusted the average annual overflow volumes and frequencies in the typical year. This information is provided in Volume 2, Chapter 5. The vast majority of the physical system characterization in this chapter is still accurate.

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- TM 3 Process Alternatives
- TM 4 Selected Alternatives
- TM 5 Site Assessment
- TM 6 Cost Estimate
- TM 7 Project Delivery Evaluation
- TM 8 Final Report

Appendix 4.4.2 Preliminary Engineering Report for the Floyds Fork WQTC
Appendix 4.4.3 Comprehensive Performance Evaluations and Composite Correction Reports

CHAPTER 4: INTEGRATED OVERFLOW ABATEMENT PROGRAM

4.1 DISCHARGE ABATEMENT PROGRAMS

As discussed in Chapter 2 of this volume, the Integrated Overflow Abatement Program (IOAP) is an integration of the Final Sanitary Sewer Discharge Plan (SSDP) and the Final Combined Sanitary Sewer (CSO) Long-Term Control Plan (LTCP), both of which are requirements of the Consent Decree. The Consent Decree also required that Louisville and Jefferson County Metropolitan Sewer District (MSD) submit reports detailing prerequisite, or precursor programs also intended to abate and mitigate overflows. The updated Sanitary Sewer Overflow Plan (SSOP) and the Interim SSDP both address the Sanitary Sewer System (SSS) programs. The Interim LTCP addresses the Combined Sewer System (CSS). In addition to these programs, the Early Action Plan (EAP) reported on activities related to the entire sewer system. The following is a brief overview of these precursor programs.

4.1.1 Updated Sanitary Sewer Overflow Plan

MSD has focused collection system repair and rehabilitation efforts on wet weather infiltration and inflow (I/I) issues that contribute to SSOs. The projects have been successful in reducing sanitary sewer overflow (SSO) volume and frequencies, but have not completely eliminated overflows. The Updated SSOP was MSD’s centralized program for managing the investigation, prioritization, and rehabilitation of the separate SSS. The program goals were to reduce SSOs, basement backups, and other unauthorized discharges. The Updated SSOP was submitted on February 10, 2006 to the U.S. Environmental Protection Agency (EPA) and Kentucky Department of Environmental Protection (KDEP), however, no review or approval was required by the Consent Decree.

The Updated SSOP-related studies included flow monitoring; Sanitary Sewer Evaluation Studies (SSES); hydraulic modeling; rehabilitation, repair or replacement projects; and post-rehabilitation flow monitoring. Since 1997, 32 projects costing nearly $16.5 million and impacting 2.5 million feet of sewers have been completed and documented within the Updated SSOP. This includes more than $9 million focused on rehabilitation projects. The Updated SSOP document serves as the obvious foundation for the Final SSDP by providing both data for evaluating current conditions and experience in adopting preferred solutions.

4.1.2 Interim Sanitary Sewer Discharge Plan

On September 28, 2007, MSD submitted to the EPA and KDEP the Interim SSDP identifying remedial measures for specific unauthorized discharges (specified in Paragraph 25(a) (2) of the Consent Decree) in the separate SSS. Comments were received on January 8, 2008, and the Interim SSDP was resubmitted on March 7, 2008. Approval of the Interim SSDP was received

July 24, 2008. The approved Interim SSDP can be downloaded from the ""Library" section of the Project WIN website at: http://msdprojectwin.org/.

The Interim SSDP identifies all corrective measures necessary for remediation of the unauthorized discharges of the five Beechwood Village pumped SSO locations and Southeastern Diversion Structure by December 31, 2011; and for the five Hikes Point pumped SSO locations and the Highgate Springs Pump Station by December 31, 2013. The estimated capital cost to implement the Interim SSDP is approximately $200 million.

4.1.3 Interim Long Term Control Plan

In accordance with the Consent Decree, the Interim LTCP addresses discharges from CSO locations identified by the Kentucky Pollutant Discharge Elimination System (KPDES) for the Morris Forman Water Quality Treatment Center (WQTC). The Interim CSO LTCP is a modification of the preceding 1996 and 1997 Draft CSO LTCP. As such, the Interim LTCP includes summaries of notable work completed as components of those documents. The Interim CSO LTCP can be downloaded from the Project WIN website at: http://msdprojectwin.org.

4.1.4 Early Action Plan

The Consent Decree required MSD to implement an EAP. MSD's EAP consists of programs that can be implemented immediately without significant engineering and design components, and projects in the process of being implemented when the Consent Decree was issued. The purpose of the EAP is the immediate reduction of overflow events through improved operation and control of MSD's collection, conveyance, and treatment system. MSD's interaction with government agencies, customers, and internal communications are included as a part of the improvement process.

Outlined in this section are the following four required components of the EAP:

- Nine Minimum Controls (NMC) Compliance Report
- Capital Improvement Projects already underway when the Consent Decree was issued
- Capacity, Management, Operations, and Maintenance (CMOM) Self Assessment Report
- Sewer Overflow Response Protocol (SORP)

4.1.4.1 Nine Minimum Controls

The NMCs are technology-based actions or measures designed to reduce the number of CSO events and to mitigate the effects on water quality. Implementing the NMCs is among the first steps in a CSO control policy because by definition they do not require significant engineering studies or major construction, and typically require less than 2 years to implement.

In 1997, MSD prepared and submitted to the KDEP a NMC Compliance Report, which summarized NMC activities completed to-date, showing compliance with EPA's CSO Control Policy. Since 1997, MSD has continued to implement the NMC program and has prepared regular updates to the original Combined Sewer Operational Plan. In June of 2003, MSD prepared the NMC Compliance Report Update, which summarized the continuation of implementation of NMC activities from January 1997 through June 2003.

As required by paragraph 24(a) of the Consent Decree, MSD submitted an updated NMC Compliance Report to the EPA and the KDEP on February 10, 2006, and received comments from the EPA and KDEP on May 5, 2006. MSD submitted a revised report to the EPA and KDEP on June 3, 2006, and received a letter of disapproval on August 22, 2006. A second revision of the updated NMC Compliance Report was subsequently submitted to the EPA and KDEP on September 15, 2006. MSD received an approval letter dated February 22, 2007, for the updated NMC Compliance Report. The approved NMC Compliance document can be viewed at http://msdprojectwin.org.

4.1.4.2 Capital Improvement Projects

Paragraph 24(b) of the Consent Decree requires the implementation of specific projects to be completed and/or initiated prior to the implementation of the Final CSO LTCP and Final SSDP. Capital Improvement Projects were classified into five types: SSO projects, backup power generator installations, solids and floatables control device installations, sewer separations, and the real time control (RTC) system. The following sections outline each of the five project types.

SSO Projects

Paragraph 24(b)(1) of the Consent Decree requires the implementation of specific SSO projects. SSO projects completed prior to August 12, 2005, are included in Table 4.1.1 below. Those projects, as a group, were certified as complete on September 9, 2005, through a separate transmittal to the KDEP and EPA. Projects completed after August 12, 2005, are discussed in the following text.

TABLE 4.1.1

SSO PROJECTS

SSO Location	WTP Service Area	Abatement Date		Certified Completion Date
		Quarter	Year	
7204 Preston Hwy	West County WQTC	1	2002	September 9, 2005
West Goose Creek Pump Station	Morris Forman WQTC	3	2002	September 9, 2005
Park Ridge Woods Pump Station	West County WQTC	4	2002	September 9, 2005
Vagabond and Siesta	West County WQTC	2	2002	September 9, 2005
Melody Pump Station	Morris Forman WQTC	1	2003	September 9, 2005
Cedar Creek WQTC	Cedar Creek WQTC	1	2003	September 9, 2005
12700 Abbey Lane	West County WQTC	2	2003	September 9, 2005
Fairway View Pump Station	Hunting Creek South WQTC	2	2003	September 9, 2005
Old Copper Pump Station	Floyds Fork WQTC	1	2004	September 9, 2005
Running Creek WQTC	Running Creek WQTC	1	2004	September 9, 2005
Savage Drive Pump Station	West County WQTC	1	2004	September 9, 2005
Woodland Hills Pump Station	Morris Forman WQTC and Floyds Fork WQTC	2	2004	September 9, 2005
English Station WQTC	English Station WQTC	2	2004	September 9, 2005
Jarvis Lane Pump Station	Morris Forman WQTC	2	2005	September 9, 2005
Hurstbourne Lane Pump Station	Morris Forman WQTC	2	2005	September 9, 2005
Hite Creek WQTC	Hite Creek WQTC	4	2005	January 30, 2006
Shelbyville and Marshall	Morris Forman WQTC	4	2005	January 30, 2006
Canoe Lane Pump Station	Morris Forman WQTC	2	2006	July 28, 2006
Gunpowder Pump Station	Hunting Creek North WQTC	2	2006	July 28, 2006

Please refer to MSD's Quarterly and Annual Reports for projects completed since December 2008. The reports can be found in the Library section of the Project WIN website at www.msdprojectWIN.org.

Backup Power Generator Installations

Paragraph 24(b)(2) of the Consent Decree requires the installation of backup power at two specific facilities of the combined sewer system (CSS). Table 4.1.2 lists these projects and the dates they were certified as complete.

TABLE 4.1.2

BACKUP GENERATOR PROJECTS

Project Location	Completion Date		Certified Completion Date
	Quarter	Year	
34th Street Pump Station	1	2006	April 30, 2006
Starkey Street Pumping Station	2	2006	July 28, 2006

In addition to the backup generators specifically required by the Consent Decree, MSD has been actively adding to the fleet of mobile generators, and has added fixed generators to eight additional pump stations. These standby generators were identified in the CMOM Self-Assessment Report discussed in Section 4.1.4.3.

Solids and Floatables Control Device Installations

Paragraph 24(b)(3) of the Consent Decree requires the installation of solids and floatables (S & F) control devices at 15 specific CSO locations. Table 4.1.3 provides a listing of the projects and the date they were certified as complete.

TABLE 4.1.3

SOLIDS AND FLOATABLES CONTROL PROJECTS

CSO Location (ID #)	Completion Date		Certified Completion Date
	Quarter	Year	
109	4	2004	September 9, 2005
113	4	2004	September 9, 2005
125	4	2004	September 9, 2005
126	4	2004	September 9, 2005
127	4	2004	September 9, 2005
144	4	2004	September 9, 2005
166	4	2004	September 9, 2005
28	1	2005	September 9, 2005
30	1	2005	September 9, 2005
34	1	2005	September 9, 2005
54	1	2005	September 9, 2005
119	1	2005	September 9, 2005
83	2	2005	September 9, 2005
121	2	2005	September 9, 2005
82	3	2005	September 9, 2005

Sewer Separations

Paragraph 24(b)(4) of the Consent Decree requires the elimination of three specific CSO locations through the implementation of sewer separation projects. Table 4.1.4 provides a listing of the projects and the dates they were certified as complete.

TABLE 4.1.4

SEWER SEPARATION PROJECTS

CSO Location (ID #)	Completion Date		Certified Completion Date
	Quarter	Year	
209	3	2005	October 28, 2005
87	3	2006	October 7, 2006
147	3	2007	October, 2006

Real Time Control (RTC) System

As required by paragraph 24(b)(5) of the Consent Decree, MSD was required to implement the initial phase of a fully operational RTC System. The estimated reduction of the CSS's average annual overflow volume (AAOV) due to the initial phase was required to be at least 10 percent. Testing and verification of the RTC system was completed on August 12, 2006, confirming that the ten percent reduction was achieved, and the system was placed into operation in accordance with the Consent Decree.

The RTC software has been configured and installed at the Computer Room at Morris Forman WQTC. Additionally, system modifications were completed at the Southeastern Diversion Structure, Nightingale Pump Station, Southwestern Pump Station Sluice Gate Chamber, Sneads Branch In-line Storage site, and the Upper Dry Run Trunk System storage basins (Brady Lake and Executive Inn). The initial phase of the RTC System was certified as complete on September 11, 2006.

4.1.4.3 Capacity, Maintenance, Operations and Management Self-Assessment

According to the EPA, the purpose of the CMOM Program is to:

"*Incorporate many of the standard operation and maintenance activities that are routinely implemented by the owner or operator with a new set of information management requirements in order to better manage, operate, and maintain collection systems, Investigate capacity constrained areas of the collection system, proactively prevent SSOs and respond to SSO events.*"

Like many sewer districts, MSD has used techniques outlined in CMOM to audit its system. In 2003, MSD initiated a *CMOM Challenge Analysis* as the first step in a comprehensive Self-Audit Program. The CMOM Self Assessment Report was originally submitted to the EPA on February 10, 2006, re-submitted on May 12, 2006, and approved on August 22, 2006. The approved report can be downloaded from MSD's Project WIN website at: http://msdprojectwin.org/.

The self-assessment process identifies the many activities that were performing well. It also identifies six program areas and activities that would benefit from improvement, namely:

- Program 1. Continuous Sewer System Assessment
- Program 2. Infrastructure Rehabilitation
- Program 3. System Capacity Assurance Plan
- Program 4. Pump Station Preventive Maintenance Program
- Program 5. Gravity Line Preventive Maintenance Program
- Program 6. Sewer Use Ordinance Legal Support Program

MSD has implemented improvements to all these programs, in accordance with the schedule in the approved CMOM Self-Assessment Report. MSD continues to expand and improve the CMOM program, and reports to KDEP and EPA on CMOM activities quarterly. One element of the CMOM program that directly impacts overflow abatement activities is the System Capacity Assurance Plan (SCAP).

System Capacity Assurance Plan (SCAP)

The objective of the SCAP is to enable MSD to authorize new sewer service connections or increases in flow from existing sewer service connections while making system improvements in accordance with the May 2006 CMOM Self-Assessment Report recommendations. The SCAP applies to the separate SSS only and works hand-in-hand with the Final SSDP to provide that MSD's efforts for overflow abatement are successful. The SCAP is the basis for coordinating capacity decision criteria for each sewershed within the separate SSS. Providing wastewater collection, conveyance, and treatment that will meet the expansion needs of MSD's customers, while protecting the environment and meeting regulatory requirements, are top priorities of MSD's facility improvement efforts.

New service connections will contribute additional flow that utilizes available capacity in the system. Since capacity deficiencies have been identified as the cause for a significant portion of wet weather SSOs, it is important that MSD's SCAP can provide that new flow connections do not cause or contribute to SSOs. A copy of the SCAP is included in Appendix 4.1.1. In addition, the current SCAP can be downloaded from MSD's Project WIN website at: http://msdprojectwin.org/.

4.1.4.4 Sewer Overflow Response Protocol (SORP)

Paragraph 24(d) of the Consent Decree required MSD to include an updated SORP as a component of the EAP. MSD submitted an updated and enhanced SORP to the EPA and KDEP on May 12, 2006, and received a letter approving that plan on August 22, 2006. The SORP is reviewed annually, and revised if needed. The current approved SORP document can be viewed and downloaded from the MSD Project WIN website at: http://msdprojectwin.org/.

The purpose of the SORP is to provide guidance to MSD personnel regarding response to overflows, mitigation of the overflow's impact, public notification, and reporting of the overflow. Utilizing a SORP enables MSD to respond to overflows in a consistent and effective manner and reduces an overflow's impact on the environment and human health.

The SORP provides guidance for the following:

- Overflow Response Protocol - detailing the steps taken once MSD is alerted of a potential overflow event.
- Initial Response and Mitigation - detailing the steps taken by MSD once an overflow initiates in publicly-owned systems, such as filtration, flow diversion, portable generators, pump and haul activities, containment, diversion and other corrective actions.
- Cleanup - detailing the steps taken by MSD once an overflow ceases to clean up the site, minimizing public health and environmental risks.
- Public Notification and Communication - detailing the steps taken by MSD to warn the public and limit access to areas impacted by the overflow.
- Regulatory Reporting and Data Management - detailing the steps taken by MSD to provide transmission of the unauthorized discharge's data to KDEP and EPA within the required timeframe. The transmission includes estimates of volume and duration of the overflow.
- Staff Training and Communication - detailing the steps taken such that knowledge of SORP procedures and practices is transferred to all of MSD's employees.

4.2 COMBINED SEWER SERVICE AREA IMPROVEMENTS

Prior to implementation of the approved 2009 IOAP, he MSD CSS had 106 CSO discharge points, spatially distributed across 37 square miles of Louisville Metro. A total of 198 CSO control alternatives were originally proposed and an initial screening pared this list to 136 viable alternatives that consisted of different types of control technologies, wide-spread geographic siting, and numerous consolidations of CSO structures such as outfall, localized, or regionalized solutions.

In order to normalize the evaluation process, the performance level for comparison of these 141 alternatives was initially set at four overflow events per year. Using criteria that included benefit-cost ranking, CSS operation improvement opportunities, and expansion of wet weather treatment facilities, 23 projects were selected to proceed to a more stringent process-forward evaluation. Table 4.2.1 provides a breakdown of the technologies utilized in the 22 optimized gray infrastructure project technologies, including four additional gray project technologies identified during the optimization process, and the text following provides more information on the specific projects of each type.

The following discussion reflects the updated suite of projects resulting from this 2012 IOAP Modification. For more detail about the adaptive management approach followed and a summary of the LTCP project changes see Volume 1, Chapter 6.5.

TABLE 4.2.1

OPTIMIZED CSO CONTROL GRAY INFRASTRUCTURE PROJECT TECHNOLOGIES SELECTED (2012 MODIFICATION)

Project Type	Number of Projects	Receiving Stream(s)
Pump Station Expansion	1	Beargrass Creek South Fork
Sewer Separation	3	Beargrass Creek Middle Fork Ohio River
Off-line Storage	7	Beargrass Creek Middle Fork Beargrass Creek Muddy Fork Beargrass Creek South Fork Ohio River
Hybrid Technology: Off-line Storage w/In-line Storage (RTC)	2	Ohio River
Hybrid Technology: Treatment w/ Off-line and In-line Storage (RTC)	1	Ohio River
In-Line Storage	3	Beargrass Creek South Fork Ohio River
Hybrid Technology: Green Infrastructure with In-Line Storage, Conveyance Improvements, Distributed Storage	5	Beargrass Creek Middle Fork Beargrass Creek South Fork Ohio River
TOTAL	**22**	

Pump Station Expansion: this project is associated with CSO 018. This project scope is to replace the aging 27 million gallons per day (mgd) Nightingale Pump Station flow diversion facility on the South Fork of Beargrass Creek. Currently, flow is diverted from this sewershed into the Ohio River sewershed. This Final CSO LTCP proposes construction of a new 33 mgd pump station that will achieve improvement in several CSS operating conditions. Diverting additional flow out of the Beargrass Interceptor reduces the size of downstream storage basins. It also off loads wet weather flow from the Ohio River Interceptor and from the Morris Forman WQTC, since it routes wet weather flows through the much larger Southwestern Interceptor, and eventually to a new wet weather treatment facility located near the Paddy's Run Flood Pump Station.

Sewer Separation: A total of three sewer separation projects are recommended at CSO 123, CSO 172, and CSO 206. Each project is designed to provide new stormwater collection piping; transfer existing catch basins and/or construct new catch basins; and disconnect downspouts where feasible. The existing combined pipes will be converted to sanitary only pipes.

Off-Line Storage: A total of seven off-line storage projects are recommended, ranging from 1.31 million gallons (MG) to 16.6 MG, positively impacting all receiving waters. The control types for these storage projects include outfall specific controls at CSOs 020, 190, and localized consolidation of 44 other active CSOs. In total, 46 active CSOs are being controlled through seven off-line storage projects, all below-grade, covered concrete tanks, storing a total of 54.5 MG of combined sewage, distributed across the associated receiving streams:

- Ohio River 11.1 MG
- Beargrass Creek Muddy Fork 4.28 MG
- Beargrass Creek Middle Fork 15.3 MG
- Beargrass Creek South Fork 24.7 MG

System pump-back operation into the Morris Forman WQTC tributary CSS was conceptually designed for 24-hour pump out of the tanks; however, final design can configure pumping units for a variety of return scenarios. It is envisioned that an integrated control system, inclusive of Morris Forman WQTC capacity and interceptor transport capacities, will input variables into a system storage pump back. If necessary, odor control facilities can be incorporated into final design should odor generation be a concern of facility operation.

Hybrid Technology: Off-line Storage w/In-line Storage (RTC): Hybrid technologies are recommended at CSOs 019 and 105, which discharge into the Ohio River. These two below-grade covered concrete tanks plus their respective in-line storage control gates and dams can store up to 28.3 MG of combined sewage, allocated as follows:

- Off-line Storage 17.4 MG
- In-line Storage (RTC) 10.6 MG

Hybrid Technology: Treatment w/ Off-line and In-Line Storage: One hybrid technology treatment with off-line and in-line storage is recommended at CSO 015 which manages flow from two CSOs that discharge into the Ohio River. The proposed treatment process is 50 MGD of equivalent primary treatment utilizing a Retention Treatment Basin, plus 25 MG of off-line storage. In-Line storage is provided by modifying the operating strategy for the existing SWOR and SWOR2 RTC sites. Depending on the success of the modified operating strategies, post-construction compliance monitoring may dictate one or more additional in-line storage locations to be added to the CSO 015 basin. Effluent water quality produced by this technology is discussed in Volume 2, Chapter 3.3.3. Operation of the treatment plant is specific to wet weather events only. The facility will be located adjacent to the Southwestern Outfall near the Paddy's Run Flood Pump Station.

In-Line Storage: In addition to the potential additional in-line storage locations in the CSO 015 basin, three in-line storage projects are proposed, including the installation of a bending weir at CSO 108, and two in-line control structures (either inflatable dams or controllable gates) in the Southern Outfall upstream from the Main Diversion Structure. The bending weir at CSO 108 will raise the elevation of the overflow point by one foot, providing in-line storage in the upstream pipe to reduce the overflow frequency to four overflows per year in the typical year.

The two in-line storage projects in the Southern Outfall, named SOR 1 and SOR 2 were part of the Algonquin Parkway Storage Basin and In-line Storage Project. As a result of the adaptive management review of operating rules surrounding the Main Diversion Structure sluice gates and the Southwestern Pump Station flow control, the Algonquin Parkway Storage Basin has been deleted, and the SOR 1 and SOR 2 separated into two new projects. These projects will store 11.4 MG and 4.7 MG, respectively, and will reduce the overflow frequencies from CSO 016, CSO 210, and CSO 211 to less than eight overflows per year in a typical year without requiring the storage originally proposed in the Algonquin Parkway Storage Basin.

Hybrid Technology: Green Infrastructure with In-Line Storage, Conveyance Improvements, Distributed Storage

As a result of the adaptive management evaluation conducted for the 2012 IOAP Modifications, six projects have been developed that incorporate green infrastructure along with in-line storage, distributed storage, or conveyance capacity increases to achieve the required levels of CSO control. The largest of these projects is the Central Relief Drain (CRD) Green Infrastructure and Localized Storage Project. The CRD receives CSO from 21 total CSOs. Of these, only nine overflow in the typical year. These CSOs were originally included in the 13th Street and Rowan Street Storage Basin. Since the CRD is a very deep pipe, including CRD flows in this project resulted in the entire project needing to be very deep, thereby increasing the cost of the storage basin project significantly. The adaptive management review identified the opportunity to separate these projects, resulting in a significant cost savings overall.

The approach to CRD CSO control will include a highly interactive, adaptive management evaluation that incorporates data from recently installed flow and level monitors on each of the CSOs in this sewershed. The controls will be implemented incrementally, starting with static weir raises or bending weir installations to increase the in-line storage in the pipes. In parallel, green infrastructure opportunities will be identified, evaluated and implemented to reduce the stormwater volumes entering the CSS in this area. Continued monitoring and model recalibration in the area will either confirm that in-line storage and green infrastructure have controlled these CSOs to less than eight overflows per year, or that additional off-line storage is required to achieve the required levels of control. If off-line storage is required it is anticipated that this will be provided through construction of medium-diameter pipes with an orifice-controlled outlet in parallel with existing conveyance lines to provide short-term peak-shaving from the system. This approach to off-line storage is referred to as “distributed storage” to differentiate it from other storage approaches.

Other green infrastructure hybrids include projects at CSO 093, CSO 130, CSO 140, and CSO 160. In each of these locations the gray infrastructure project proposed in the approved 2009 IOAP has been replaced with a combination of green infrastructure stormwater management technologies, coupled with flow control technologies such as in-line storage, conveyance capacity upgrades, etc.

Integration of these recommended CSO control alternatives into the CSS reduces CSO discharge by 89 percent over the 2008 baseline, and provides 98 percent capture and treatment of combined sewage flows generated during wet weather events. Table ES.1 summarizes the 22 projects on the Final Recommended Project List.

TABLE 4.2.2

FINAL CSO LTCP RECOMMENDED GRAY INFRASTRUCTURE PROJECT LIST

(2012 MODIFICATION)

Final CSO LTCP Recommended Gray Infrastructure Project List

Refer to Table ES.1

Project Name and Project ID	Watershed	CSOs Controlled	Technology	Storage Volume or Treatment/Pumping Rate	Capital Cost (2008 Dollars)	Completion Date
CSO108 Dam Modification L_SO_MF_108_S_09A	South Fork	CSO108	In-Line Storage	NA	[illegible]	12/31/2010
CSO123 Downspout Disconnection L_MI_MF_123_S_08	Middle Fork	CSO123	Sewer Separation	NA	$315,000	12/31/2012
Adams Street Sewer Separation L_OR_MF_172_S_09B	Ohio River	CSO172	Sewer Separation	N/A	$20,000	12/31/2012
Story Avenue and Main Street Storage Basin L_OR_MF_020_S_09B	Ohio River	CSO020	Off-Line Storage	5.42 MG	$12,576,000	12/31/2020
CSO206 Sewer Separation L_MI_MF_206_S_08	Middle Fork	CSO206	Sewer Separation	NA	$3,842,000	12/31/2013
Bells Lane Wet Weather Treatment Facility L_OR_MF_015_M_13	Ohio River	CSO015, CSO191	Treatment with Off-Line Storage	50 mgd Treatment with 25 MG Storage	$$34,400,000	12/31/2016
I-64 and Grinstead Drive Storage Basin L_MI_MF_127_M 09B	Middle Fork	CSO127, CSO125, CSO126, CSO166	Off-Line Storage	15.33 MG	$48,951,000	12/31/20
CSO140 In-Line Storage and Green Infrastructure Controls L_MI_MF_140_S_08	Middle Fork	CSO140	Green Infrastructure and Conveyance Improvement Storage	TBD	$574,000	12/31/2015

TABLE 4.2.2

FINAL CSO LTCP RECOMMENDED GRAY INFRASTRUCTURE PROJECT LIST

(2012 MODIFICATION)

Final CSO LTCP Recommended Gray Infrastructure Project List

Refer to Table ES.1

Project Name and Project ID	Watershed	CSOs Controlled	Technology	Storage Volume or Treatment/Pumping Rate	Capital Cost (2008 Dollars)	Completion Date
CSO093 Structural Modification and Green Infrastructure Controls L_SO_MF_093_S_08	South Fork	CSO093	Green Infrastructure and In-Line or Distributed Storage	N/A	$[illegible]48,000	12/31/2015
CSO160 In-Line Storage and Green Infrastructure L_OR_MF_160_S_08	Ohio River	CSO160	Green Infrastructure and In-Line or Distributed Storage	N/A	$231,000	12/31/2015
Nightingale Pump Station Replacement and Storage L_SO_MF_018_S_03	South Fork	CSO018	Pump Station Expansion	33 MGD, 2.7 MG Off-Line storage	$14,586,000	12/31/2015
Story Avenue and Spring Street Green Infrastructure L_SO_MF_130_S_09B	South Fork	CSO130	Green Infrastructure	N/A	$896,000	12/31/2016
Logan Street and Breckinridge Street – Calvary Cemetery Storage Basin L_SO_MF_092_M_09B	South Fork	CSO 113, CSO152, CSO091, CSO 097, CSO 106, CSO 110, CSO 117, CSO 137, CSO146, CSO 148, CSO149, CSO 151, and 11 Sneads Branch Relief Sewer CSOs	Off-Line Storage	16.6 MG	$48,243,000	12/31/2017
18th and Northwestern Pky. Storage Basin L_OR_MF_190_S_09B	Ohio River	CSO190	Off-Line Storage	1.24MG	$4, 486,000	12/31/2017

TABLE 4.2.2

FINAL CSO LTCP RECOMMENDED GRAY INFRASTRUCTURE PROJECT LIST

(2012 MODIFICATION)

Final CSO LTCP Recommended Gray Infrastructure Project List

Refer to Table ES.1

Project Name and Project ID	Watershed	CSOs Controlled	Technology	Storage Volume or Treatment/Pumping Rate	Capital Cost (2008 Dollars)	Completion Date
Clifton Heights Storage Basin L_MU_MF_154_M_09B	Muddy Fork	CSO [illegible], CSO[illegible], CSO154, CSO132 and CSO167	Off-Line Storage	[illegible] MG	$[illegible]	12/31/2018
Southern Outfall Retention 1 (SOR 1) L_OR_MF_211_M_13	Ohio River	CSO 016, CSO [illegible] and CSO 211	In-Line Storage with RTC	11.4 MG	$3,898,000	12/31/2018
Southern Outfall Retention 2 (SOR 2) L_OR_MF_211_M_13	Ohio River	CSO [illegible], CSO [illegible] and CSO 211	In-Line Storage with RTC	4.7 MG	$3,898,000	12/31/2018
Southwestern Parkway Storage Basin L_OR_MF_105_M_13	Ohio River	CSO105, CSO104, and CSO189	Off-Line Storage with RTC	11.07 MG Off-line storage with 8.8 MG In-line Storage	$30,937,000	12/31/2018
Portland Wharf Storage Basin L_OR_MF_019_S_13	Ohio River	CSO019	Off-Line Storage with RTC	6.37 MG Off-line Storage with 1.8 MG In-line Storage	$20,000,000	12/31/2019
13th Street and Rowan Street Storage Basin L_OR_MF_155_M_09B	Ohio River	CSO022, CSO023, CSO050, CSO051, CSO052, CSO053, CSO054, CSO055, CSO056, CSO150, CSO16	Off-Line Storage	4.36 MG	$27,863,,000	12/31/2020

TABLE 4.2.2

FINAL CSO LTCP RECOMMENDED GRAY INFRASTRUCTURE PROJECT LIST

(2012 MODIFICATION)

Final CSO LTCP Recommended Gray Infrastructure Project List

Refer to Table ES.1

Project Name and Project ID	Watershed	CSOs Controlled	Technology	Storage Volume or Treatment/Pumping Rate	Capital Cost (2008 Dollars)	Completion Date
CRD CSO Green Infrastructure & Localized Storage	Ohio River	21 total CSOs, with 9 having AAOV (CSO 028, CSO 029, CSO034, CSO 178, CSO 181, CSO195, CSO 197, CSO 202) CSO 200 diverted to Sneads Branch	Diversion, In-Line Storage, Green Infrastructure and Localized Storage	N/A	$2,184,000	12/31/2018
Lexington Road and Payne Street Storage Basin L_SO_MF_083_M_09B	South Fork	CSO084, CSO118, CSO119, CSO120, CSO121, CSO141, CSO153 & CSO082	Off-Line Storage	8.18 MG	$25,904,000	12/31/2020

4.3 SANITARY SEWER SERVICE AREA IMPROVEMENTS

A wide range of technology approaches were considered at the baseline level (refer to Volume 3, Chapter 3 for the preferred solution process). The approaches included:

- Source control through I/I reduction
- Conventional constructed facilities commonly referred to as gray infrastructure, including:
- Peak flow storage (constructed tanks, or oversized pipes providing “in-line” storage)
- Increased conveyance capacity (increased pipe sizes, parallel relief sewers, new or expanded pump stations)
- Flow diversions to other portions of the system that have available capacity
- Expanded wastewater treatment capacity (provided at existing regional treatment facilities or provided remotely as high-rate wet weather treatment facilities)

The final projects selected for reducing SSOs include a mixture of source control (including I/I reduction efforts), wet weather storage, system diversion, and conveyance/transport. The following discussion reflects the updated suite of projects resulting from this 2012 IOAP Modification. For more detail about the adaptive management approach followed and a summary of the SSDP project changes see Volume 1 Chapter 6.5.

Overall, the Final SSDP includes 35 gray infrastructure projects, nine I/I reduction projects and three SSO investigation projects. The gray infrastructure projects (both the Interim SSDP and the Final SSDP) include the following technologies (note that some projects include multiple technologies, and are counted more than once in the list below):

- 19 conveyance capacity upgrades and interceptor relief projects;
- 9 storage projects, both in-line and off-line, many with pipe upgrades as well;
- 13 pump station upgrades or replacements,
- 12 pump station eliminations;
- Elimination of seven small WQTCs, including five in the Prospect area; and
- Expansion of one WQTC.

The site-specific level of protection for the Final SSDP, selected through the use of the value-based benefit-cost analysis resulted in the following:

- Nineteen projects address overflows up to a 1.82-inch three-hour cloudburst storm
- Five projects address overflows up to a 2.25-inch three-hour cloudburst storm
- Eleven projects address overflows up to a 2.60-inch three-hour cloudburst storm

Table ES.2 represents the final projects chosen for addressing SSOs at the selected site-specific design level of protection. The table includes a list of projects, SSOs controlled by that project, chosen design level, capital costs, and scheduled project completion year. In total, there are 214 documented, suspected, and modeled SSOs controlled by the projects listed in Table ES.2. Note that Table ES.2 includes both the Final SSDP projects and the Interim SSDP projects. Projects are listed by modeled watershed. For each of the projects listed in Table ES.2, project maps and fact sheets with information pertaining to the project details and overflows addressed by the projects are included in Volume 3.

TABLE 4.3.1

SSDP FINAL PROJECTS (2012 MODIFICATION)

SSDP Final Project List

Refer to Table ES.2

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
Fairmount Rd. Offline Storage	Fairmount Road PS (81316 & 97362)	Offline Storage	1.82-inch	$11,285,000	2015
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 and Force Main Upgrade	Meadow Steam PS (91087 & MSD1082-PS)	PS & Force Main Upgrades	2.60-inch	$974,000	2012
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 (Eliminated based on lack of overflow confirmation)	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

Refer to Volume 2, Chapter 5, and Volume 3 Chapter 5 for detailed overflow volume, frequency and project information

TABLE 4.3.1

SSDP FINAL PROJECTS (2012 MODIFICATION)

SSDP Final Project List

Refer to Table ES.2

SSDP Recommended Project Name/Location	SSO(s) Controlled	Technology	Selected Level of Protection	Capital Cost $[1]	Scheduled Completion Year
Jeffersontown Area					
Jeffersontown WQTC Elimination	28390, 28391, 28392, 28393, 31783, 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 (MSD0106-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 PS 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

TABLE 4.3.1

SSDP FINAL PROJECTS (2012 MODIFICATION)

SSDP Final Project List

Refer to Table ES.2

SSDP Recommended Project Name/Location	SSO(s) Controlled	Technology	Selected Level of Protection	Capital Cost $[1]	Scheduled Completion Year
Southeastern Diversion Area					
Parkview Estates I/I Investigation & Rehabilitation	47250	I/I Reduction	1.82-inch	$285,000	2011
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
Caven Ave PS Elimination	27116, 70212, 17724, Caven Ave PS (MSD0133-PS)	Diversion	2.60-inch	$320,000	2016
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

TABLE 4.3.1

SSDP FINAL PROJECTS (2012 MODIFICATION)

SSDP Final Project List

Refer to Table ES.2

SSDP Recommended Project Name/Location	SSO(s) Controlled	Technology	Selected Level of Protection	Capital Cost $[1]	Scheduled Completion Year
ORFM Area					
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 (eliminated due to lack of SSO confirmation)	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

TABLE 4.3.1

SSDP FINAL PROJECTS (2012 MODIFICATION)

SSDP Final Project List

Refer to Table ES.2

SSDP Recommended Project Name/Location	SSO(s) Controlled	Technology	Selected Level of Protection	Capital Cost $[1]	Scheduled Completion Year
Small WQTC Area					
Lucas Ln. PS Inline Storage	Lucas Lane PS (MSD[illegible]-LS)	Inline Storage	1.82-inch	$183,000	2021
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 #[illegible])	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 Projects					
CPE/CCP Modifications to WQTC	--	--	--	$2,600,000	2011
			FINAL SSDP TOTAL	**$174,208,000**	

Refer to Volume 2, Chapter 5, and Volume 3 Chapter 5 for detailed overflow volume, frequency and project information

TABLE 4.3.1

SSDP FINAL PROJECTS

SSDP Final Project List

Refer to Table ES.2

SSDP Recommended Project Name/Location	SSO(s) Controlled	Technology	Capital Cost $[1]	Scheduled Completion Year
Interim SSDP Projects				
Beechwood Village Sanitary Sewer Replacement	2106[illegible], 210[illegible]9, 21101, 211[illegible], 21[illegible]6	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, MSD0124PS	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	2012
		INTERIM SSDP TOTAL	**$159,547,000**	

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

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

4.4 WASTEWATER CAPACITY EVALUATIONS

4.4.1 Background and Summary

MSD has implemented a SCAP to confirm capacities of its treatment plants, pump stations, and conveyance system; identify treatment and hydraulic constrictions at the water quality treatment centers and conveyance system; and identify potential capacity improvements that support MSD's performance objectives. Due to MSD's ongoing SCAP, several technical memoranda, and reports have been previously prepared to document this information. These memoranda were initially used to document the existing capacity of the WQTCs during alternative development. As mentioned earlier, a copy of the SCAP is included in Appendix 4.1.1. The SCAP is updated periodically. The current SCAP can be viewed in the Library Section of the Project WIN website at www.msdprojectwin.org.

This section addresses regional WQTCs and small WQTCs that may receive additional flow due to SSO abatement projects. If the selected alternatives for SSO abatement result in an increase in flows to the WQTCs, it is anticipated that these plants may require operational changes or capital improvements as part of the overall program to avoid bypasses resulting from flow peaks exceeding the available capacity of one or more unit processes. In accordance with the Consent Decree, a Comprehensive Performance Evaluation has been done for these WQTCs in accordance with applicable portions of the EPA publications, "Improving POTW Performance using the Composite Correction Approach," EPA CERI, October 1984, and "Retrofitting POTWs" EPA CERI, July 1989.

SSOs have been documented in several treatment facilities service areas within the MSD system, including:

- Morris Forman WQTC
- Derek R. Guthrie WQTC (Formerly known as the West County Wastewater Treatment Plant)
- Floyds Fork WQTC
- Cedar Creek WQTC
- Hite Creek WQTC
- Jeffersontown WQTC
- Berrytown WQTC
- Hunting Creek South WQTC
- North Hunting Creek WQTC
- Lake Forest WQTC
- Chenoweth Hills WQTC

The Consent Decree specifically excludes the Morris Forman WQTC from the requirement for a Comprehensive Performance Evaluation, but requires maximizing wet weather treatment and an evaluation of the plant wet weather capacity. The Derek R. Guthrie WQTC and Floyd's Fork WQTC are both in the process of expanding treatment capacity, so a Comprehensive Performance Evaluation is not appropriate. The Consent Decree also specifically required a Comprehensive Performance Evaluation be conducted on the Jeffersontown WQTC due to the practice of "blending" at the plant. If the Jeffersontown WQTC is eliminated, a Comprehensive

Performance Evaluation also would be required on any plant that will receive additional flows (except for the Morris Forman WQTC and Derek R. Guthrie WQTC which are specifically excluded from this requirement). In addition, the Consent Decree requires Comprehensive Performance Evaluations be developed at the Lake Forest WQTC and Timberlake WQTC due to past discharge permit violations, and established a requirement for phosphorus removal at five plants in the Prospect area.

Table 4.4.1 lists the WQTCs that were evaluated through a Comprehensive Performance Evaluation and gives the reason each plant was evaluated, and the planned elimination date for the facility, if appropriate.

TABLE 4.4.1

COMPREHENSIVE PERFORMANCE EVALUATIONS

WQTC Comprehensive Performance Evaluations						
WQTC Name	**Documented SSOs?**	**Reason for Consideration (if applicable)**	**Phosphorus Limit**	**Type 3**	**Proposed Elimination Year**	**Flow Directed To**
Morris Forman	X	N/A - CD exclusion		N/A		
Derek R. Guthrie	X	N/A - Expansion Planned		Expansion Pending		
Floyds Fork	X	N/A - Expansion Planned	Current KPDES	Expansion Pending		
Cedar Creek	X	Could receive added flow	Current KPDES	Not needed		
Hite Creek	X	Could receive added flow	Current KPDES	Expansion 2015+		
Jeffersontown	X	Secondary bypass/blending	Current KPDES	Eliminate	2015	MFWQTC / DRGWQTC
Berrytown	X	Could receive added flow		Elimination planned	2014*	FFWQTC
Lake Forest	X	Effluent discharge violations		Eliminate	2012	FFWQTC
Chenoweth Hills	X	Could receive added flow		Eliminate	2015	CCWQTC
Hunting Creek South	X	Could receive added flow	Added by Consent Decree	Eliminate	2015	HCWQTC
North Hunting Creek	X	Could receive added flow	Added by Consent Decree	Eliminate	2015	HCWQTC
Ken Carla		MSD SCAP consideration	Added by Consent Decree	Eliminate	2015	HCWQTC
Starview		MSD SCAP consideration		Elimination planned	2014*	FFWQTC
Timberlake		Effluent discharge violations	Added by Consent Decree	Eliminate	2015	HCWQTC

* Elimination not related to overflow abatement, schedule is approximate and is not a commitment

As noted previously, the Morris Forman WQTC was specifically excluded from requiring a Comprehensive Performance Evaluation. The Derek R. Guthrie WQTC will undergo a 100 mgd expansion in wet weather treatment capacity as documented in the Interim SSDP. Since the Composite Correction Approach identified in the EPA documents referenced is intended to address only those plants that do not require major construction, the Composite Correction Approach does not apply to this plant. To satisfy the implied Consent Decree requirement for a Composite Correction Approach evaluation, a copy of the Preliminary Engineering Report for the Derek R. Guthrie WQTC expansion is included in Appendix 4.4.1, WCWTP Flow Equalization and Treatment Preliminary Engineering Report. Flow projections used to size the treatment and flow equalization basins planned for the Derek R. Guthrie WQTC system include additional wet weather flows anticipated to be captured in the Pond Creek and Mill Creek watersheds. Flow projections also include wet weather flows diverted from the Middle Fork watershed that currently flow through the CSS to the Morris Forman WQTC. In addition, the potential closure of the Jeffersontown WQTC will result in the diversion of wet weather flows from that watershed into the Derek R. Guthrie WQTC system. Note that dry weather flows from the Middle Fork watershed and from the Jeffersontown WQTC will be routed to the Morris Forman WQTC. Only the wet weather flows from these basins will be routed to the Derek R. Guthrie WQTC. Since the expansion of the Derek R. Guthrie WQTC has been addressed previously in the Interim SSDP, it will not be addressed further in this Section.

The Floyds Fork WQTC is planned to have a significant expansion of overall treatment capacity, primarily to address growth pressures in the watershed, and to allow decommissioning of the Lake Forest WQTC, Starview WQTC, and the Berrytown WQTC. While the Floyds Fork WQTC expansion is primarily driven by the need to accommodate new customer connections, the design conditions used in sizing new facilities also consider the addition of wet weather flows resulting from SSO eliminations anywhere in the expanded service area. Similar to the Derek R. Guthrie WQTC, the Composite Correction Approach is not applicable to the Floyds Fork WQTC expansion. To satisfy the implied Consent Decree requirement for a Composite Correction Approach report, a copy of the Preliminary Engineering Report for the Floyds Fork WQTC expansion is included in Appendix 4.4.2.

Many of the small WQTCs that have SSOs in their watersheds are scheduled for elimination as part of MSD's long-term strategic plan to eliminate small WQTCs in its service area. Over the past 20 years, MSD has eliminated over 300 small treatment plants. Berrytown WQTC, Starview WQTC, and Lake Forest WQTC were originally scheduled for elimination by December 31, 2011 assuming resolution of outstanding wasteload allocation questions in the Floyds Fork watershed. Since the wasteload allocation was substantially delayed, the Floyd's Fork WQTC was not be able to take the additional flows until late 2012. In addition, a portion of the project needed to take two of these plants off-line was to be constructed under an existing recapture agreement with a developer. Due to the recession that started in 2008, this developer-funded portion of the project has not been constructed, and MSD is in the process of voiding the recapture agreement so the project can be completed without developer participation. The revised schedule for completion of the entire plant elimination project is now estimated to be in 2014, pending resolution of the legal issues surrounding voiding a recapture agreement. Note that these plants are being eliminated for reasons other than overflow abatement, and the elimination schedule is provided for information, but is not a commitment. The flows from these plants will be routed to the expanded Floyds Fork WQTC. The Lake Forest WQTC was taken off line in late 2012, and flows are currently being treated at the Floyds Fork WQTC. Hunting Creek South, North Hunting Creek, Ken Carla, Shadowood, and Timberlake WQTCs will be eliminated by December 31, 2015 and the flows will be routed to the Hite Creek WQTC. Considerations of these additional flows are included in the Comprehensive Performance Evaluation for the Hite Creek WQTC. The Chenoweth Hills WQTC is scheduled to be eliminated by December 31, 2015, with flows routed to the Cedar Creek WQTC.

A Comprehensive Performance Evaluation was conducted at each plant that could receive more flow as a result of SSO elimination with the exception of the Morris Forman WQTC, Derek R. Guthrie WQTC, and the Floyds Fork WQTC, as noted previously. The Comprehensive Performance Evaluations were completed to identify wet weather performance improvements that may be necessary to keep the plants in compliance with discharge permit requirements and avoid bypassing one or more unit processes despite receiving additional flows as a result of SSO elimination. For those plants scheduled to be eliminated in the near future, the Comprehensive Performance Evaluation focused on operational or low-cost improvements (known in the Composite Correction Approach as “Type 1” and “Type 2”) to be able to reduce or mitigate the potential for plant bypasses or effluent standard violations that increased wet weather could cause prior to plant elimination. Where facilities modifications have been recommended, a Composite Correction Program is required to develop the implementation plan and schedule for the modifications. Comprehensive Performance Evaluations and the associated Composite Correction Programs for these plants are included in Appendix 4.4.3.

Since these plants have the potential to receive additional wet weather flow as a result of SSO reduction, they were evaluated under various wet weather conditions. Influent flows at each plant were simulated for the 1.82-inch three-hour cloudburst storm, the 2.25-inch three-hour cloudburst storm, and the 2.60-inch three-hour cloudburst storm, assuming “worst case” conditions (all SSOs eliminated by conveyance expansion without adding any peak flow storage to the system). For the plants evaluated, the wet weather rate limiting factor was usually (but not always) the surface overflow rate of the final clarifiers. In general, the peak hour capacity of the WQTCs was calculated using peak clarifier surface overflow rate of 1,000 gallons per day per square foot (gpd/sf) clarifier, based on the most current edition of the “Recommended Standards for Wastewater Facilities” published by the Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers (commonly known as the 10-States Standards). For the purpose of this analysis, shallow clarifiers (less than 8-feet in depth) were evaluated using a de-rated value of 800 gpd/sf of clarifier surface overflow rate, recognizing the reduced capacity for solids capture in shallow clarifiers.

The Comprehensive Performance Evaluations showed that, for most of the WQTCs, operational changes or minor facility modifications (Type 1 and Type 2) would not be sufficient to allow the plants to accept the additional worst-case wet weather flows projected due to SSO elimination. If conveyance with no in-system storage would be the selected solution for all the SSOs in a

WQTC service area, the plants will require significant facilities expansion to deal with the increased flows (Type 3 modification). Note that total conveyance was never selected as the only selected solution in a watershed, so this worst-case evaluation is hypothetical, for the purpose of WQTC capacity expansion alternative development and evaluation.

4.4.2 Alternatives to Expand Treatment Plant Wet Weather Capacity

WQTC unit processes that contributed to wet weather flow capacity limitations included influent pumping capacity, clarification (with associated return activated sludge equipment) and disinfection systems. Treatment options were developed to expand the rate-limiting unit process only as required to address wet weather flows and not to increase current annual average capacity at each plant, as modifications of that type are required to be considered as part of a wastewater facilities plan and not within the scope of an overflow abatement program.

Given that the modeled wet weather flow peaks were generally very short duration, flow equalization was evaluated as an alternative to unit process expansion. Flow equalization included the following facilities: storage tank, submersible pump, wash-down pump, additional influent pumping capacity, and influent diversion structure and piping modifications, as appropriate.

The unit costs for the treatment unit process expansion options ranged from $1.00 per gallon per day (gpd) for flow rates greater than 1 mgd to $1.30 per gpd for flow rates less than 1 mgd. The cost for the wet weather flow equalization alternatives ranged from $2.75 per gallon for volumes less than 100,000 gallons to $1.88 per gallon for volumes greater than 100,000 gallons. Note that the costs for treatment are expressed in gpd, while the storage volumes are expressed in gallons. The units of measure are not equivalent and the costs are therefore not directly comparable. Determining the optimal solution requires consideration of modeled wet weather hydrographs developed for the plant influent flows to identify the required peak flow rates for treatment and the storage volumes required to eliminate the need for increased treatment capacity.

Tables 4.4.2 and 4.4.3 provide examples of this trade-off analysis. The costs do not include non-engineering and contingency mark-ups and common modifications to each option such as increased influent pumping requirements.

TABLE 4.4.2

EXAMPLE OF LOW VOLUME / LOW FLOW RATE COST COMPARISON

Chenoweth Hills WQTC 2.60-inch Storm	Treatment Cost	Storage Cost
Excess Flow – 0.46 mgd	$598,000	
Excess Volume – 0.03 MG		$82,5000

TABLE 4.4.3

EXAMPLE OF HIGH VOLUME / HIGH FLOW RATE COST COMPARISON

Hite Creek WQTC 2.60-inch Storm	Treatment Cost	Storage Cost
Excess Flow – 2.73 mgd	$2,730,000	
Excess Volume – 0.38 MG		$714,000

These examples illustrate the evaluation for all the plants and all the design conditions. The modeled influent worst-case hydrographs for the small WQTCs all showed a very high flow peak at the plant, but for a relatively short duration. The wet weather peaks were often several times greater than would be predicted using 10-States Standards. As a result, the wet weather treatment capacity often required a doubling or tripling of clarification and disinfection facilities. Storage volumes, however, were relatively modest due to the short duration of the flow peak. Based on this analysis, in every case it was determined that wet weather flow equalization was the most cost effective Type 3 option for expanding the wet weather capacity of the WQTCs being evaluated under worst-case conditions.

Table 4.4.4 summarizes the wet weather storage required for flow peaks generated by overflow elimination projects in the collections system that are worst-case (conveyance only) design conditions at each of the plants, and presents a comparative cost estimate to use in evaluating the impacts of the various SSO reduction strategies in the collection systems.

TABLE 4.4.4

WQTC ALTERNATIVES – SUMMARY

Plant	Storm Event	Average Design Daily Flow Capacity (mgd)	Extended Peak Flow Capacity (mgd)	Modeled Excess Extended Peak Flow (mgd)	Modeled Excess Volume (MG)	Estimated Capital Construction Cost (1)
Berrytown WQTC		0.137	0.46			
	1.82-inch			0.36	0.12	$1,700,000
	2.25-inch			0.61	0.22	$2,400,000
	2.6-inch			0.82	0.31	$2,900,000
Chenoweth Hills WQTC		0.2	0.46			
	1.82-inch			0.09	0.00 (2)	0
	2.25-inch			0.29	0.00 (2)	0
	2.60-inch			0.46 (3)	0.03	$156,000
Lake Forest WQTC		0.47	1.047			
	1.82-inch			1.55	0.36	$3,400,000
	2.25-inch			2.34	0.57	$4,200,000
	2.6-inch			2.95	0.76	$4,900,000
Hunting Creek South WQTC		0.25	0.63			
	1.82-inch			1.20	0.07	$2,100,000
	2.25-inch			1.23	0.08	$2,200,000
	2.60-inch			1.24	0.09	$2,200,000
North Hunting Creek WQTC		0.396	1.127			

TABLE 4.4.4

WQTC ALTERNATIVES – SUMMARY

Plant	Storm Event	Average Design Daily Flow Capacity (mgd)	Extended Peak Flow Capacity (mgd)	Modeled Excess Extended Peak Flow (mgd)	Modeled Excess Volume (MG)	Estimated Capital Construction Cost (1)
	1.82-inch			0.17	0.05	$1,200,000
	2.25-inch			0.41	0.15	$2,100,000
	2.60-inch			0.63	0.24	$2,700,000
Cedar Creek WQTC		7.5	31.5			
	1.82-inch			0	0	0
	2.25-inch			3.35	0.1	$4,000,000
	2.60-inch			14.24	1.22	$9,600,000
Hite Creek WQTC		6.0	16			
	1.82-inch			0	0	0
	2.25-inch			0.18 (4)	0	0
	2.60-inch			2.73	0.38(5)	$817,000

NOTES:
1. Estimated Capital Costs are in 2010 dollars
2. Chenoweth Hills existing 70,000 gallon wet weather storage tank can accommodate up to the 2.25-inch storm event.
3. Chenoweth Hills effluent pump station has adequate capacity.
4. Hite Creek excess peak flow is close to the design capacity of the plant and, therefore, no storage is required.
5. Hite Creek existing facilities can accommodate the additional excess peak flow. Storage is not necessary.

The Ken Carla, Starview, and Timberlake WQTCs are not included in Table 4.4.4 because they do not have capacity-related SSOs in their service areas, and therefore are not projected to receive any additional flows as a result of IOAP projects. The Jeffersontown WQTC is not included in the evaluations documented in Table 4.4.4 because it has been evaluated in much greater detail, for a wider range of expansion alternatives. The Jeffersontown detailed evaluations are described in the Comprehensive Performance Evaluation in Appendix 4.4.3.

4.4.3 Collection System Alternatives

MSD's modeling team identified a number of alternatives to the worst-case conveyance solution set assumed for Comprehensive Performance Evaluation evaluations. A description of the projects evaluated in the collection system that would minimize SSOs at the treatment center is described below:

4.4.3.1 Berrytown WQTC

An in-line storage solution was selected to address SSO MSD0199-LS in the Berrytown WQTC service area. This included constructing two large parallel storage pipes to store peak flows until the pump station can catch up with the inflow and avoid overflows. As a result of this storage solution, no increase in peak flows is expected at the Berrytown WQTC. See the Berrytown Comprehensive Performance Evaluations in Appendix 4.4.3 for a hydrograph illustrating modeled peak flows before and after the IOAP project implementation. MSD is not approving any new connections to the WQTC unless there is an equivalent offset that results in no net increase in flow to the plant. The Berrytown WQTC is scheduled to be eliminated as discussed in Section 4.4.1 above. No Type 3 modifications to the Berrytown WQTC will be required.

4.4.3.2 Chenoweth Hills WQTC

SSOs associated with the Chenoweth Run and Chippewa Pump Stations will be eliminated by pump station upgrades and force main improvements. These IOAP projects are not expected to increase current peak flows at the WQTC. See the Chenoweth Hills Comprehensive Performance Evaluations in Appendix 4.4.3 for a hydrograph illustrating modeled peak flows before and after the IOAP project implementation. The Chenoweth Hills WQTC will be eliminated by the end of the year 2015 by the Chenoweth Hills WQTC Elimination, Chenoweth Run, and Chippewa Pump Station Improvements project. No Type 3 modifications will be required.

4.4.3.3 Lake Forest WQTC

The SSO associated with the Lake Forest WQTC was attributed to capacity of the influent pump station, which MSD upgraded in 2008 to eliminate this issue. There are no IOAP projects planned that would increase current peak flows. See the Lake Forest Comprehensive Performance Evaluations in Appendix 4.4.3 for a hydrograph illustrating modeled peak flows before and after the IOAP project implementation. The Lake Forest WQTC is scheduled to be eliminated as discussed in Section 4.4.1 above. No Type 3 modifications will be required.

4.4.3.4 Hunting Creek South WQTC

SSOs in the Hunting Creek South WQTC service area will be eliminated by a combination of pump station upgrades and out-of-basin flow diversion. The net result of these IOAP projects will not increase current peak flows. See the Hunting Creek South Comprehensive Performance Evaluations in Appendix 4.4.3 for a hydrograph illustrating modeled peak flows before and after the IOAP project implementation. The Hunting Creek South WQTC is scheduled to be eliminated by the end of the year 2015 as specified in the Consent Decree. No Type 3 modifications will be required.

4.4.3.5 North Hunting Creek WQTC

SSOs in the North Hunting Creek WQTC service area will be eliminated through a combination of pump station upgrades and inline storage at two locations. IOAP projects are not expected to increase current peak flows. See the North Hunting Creek Comprehensive Performance Evaluations in Appendix 4.4.3 for a hydrograph illustrating modeled peak flows before and after the IOAP project implementation. MSD will not approve any new connections to the WQTC unless there is an equivalent offset that results in no net increase in flow. The North Hunting Creek WQTC is scheduled to be eliminated by the end of 2015 as specified in the Consent Decree. No Type 3 modifications will be required. Note, however, that MSD was granted approval to remove the "polishing pond" from the flowstream, thereby eliminating the primary cause of effluent violations at this plant (TSS violations due to algae growth in the pond).

4.4.3.6 Cedar Creek WQTC

A conveyance solution was designed to address SSOs 86423, 89197, 89195, 67999, and 67997 for the 1.82-inch storm event. This included upsizing lines in the region downstream to a larger interceptor. An in-line storage solution was designed to address SSOs at 28984, 28998, 63094, 63095, and 70158 for the 1.82-inch storm event. This project was designed to create large in-line storage lines to store peak flows. A pump station upgrade was designed to address SSOs at 81316 and 97362 for the 2.60-inch storm event. This project is a design to create large in-line storage lines to store peak flows until the downstream pump station can catch up with the inflow and avoid overflows. Pumping capacities will be expanded to address SSO MSD1080-PS and SSO 88545 during the 1.82-inch and 2.25-inch storm events, respectively. IOAP projects are not expected to increase current peak flows. See the Cedar Creek Comprehensive Performance Evaluations in Appendix 4.4.3 for a hydrograph illustrating modeled peak flows before and after the IOAP project implementation. No Type 3 modifications are required.

4.4.3.7 Hite Creek WQTC

An in-line storage solution was designed to address SSOs 91087, 91088, and MSD1082-PS for the 1.82-inch storm event. This project is designed to create large in-line storage lines to absorb peak flow rates until the downstream pump station can catch up with the inflow and avoid overflows. Pumping capacity of the pump station was increased to address SSOs 90781 and MSD1085-PS during the 2.60-inch storm event. I/I reduction is proposed to get the sewershed back down to levels of I/I that were consistent with other nearby basins which address SSOs 90776, 108956, 108957, and MSD1086-PS for the 2.60-inch storm event. With the elimination of the five Prospect WQTCs, the Hite Creek WQTC will see an increase in base flow projected to approach 5.3 mgd. The plant has both the dry weather and wet weather capacity to accept these additional flows, but these flows will bring the WQTC to almost 90 percent of rated capacity. MSD will monitor the loading to this plant with the future elimination of the Prospect WQTCs in mind, and begin facilities planning for an overall Type 3 plant expansion when conditions indicate this is warranted.

4.4.4 Other WQTC Evaluations

As noted previously, the Consent Decree required Comprehensive Performance Evaluations of specific plants that may not receive any additional flow as a result of SSO elimination projects. In addition, MSD chose to conduct Comprehensive Performance Evaluations for two other plants with performance or potential capacity issues that indicated a Comprehensive Performance Evaluation would be of value. The following describes the outcomes of Comprehensive Performance Evaluations conducted on plants that do not have IOAP projects associated with them. The Comprehensive Performance Evaluation conducted for the Jeffersontown WQTC is also a special case, described below.

4.4.4.1 Timberlake WQTC

The Timberlake WQTC does not have any documented, suspected, or modeled SSOs in its service area, and therefore has no IOAP projects associated with it. A Comprehensive Performance Evaluations for the Timberlake WQTC was required by the Consent Decree, however, to address KPDES discharge permit violations. The Comprehensive Performance Evaluations review of the past three years of effluent violations revealed that most of the violations were directly or indirectly associated with the “polishing pond”. During the three years of record evaluated, the polishing pond problems were primarily related to algae blooms during warm weather and septic sediments releasing organics and solids during periods of water temperature instability (typically the spring and fall “turnover”). In addition to these typical polishing ponds operating problems, the Timberlake polishing pond can also be inundated by high water, resulting in effluent samples that include muddy flood waters. Since the Timberlake WQTC will be eliminated by the end of 2015, no Type 3 actions are recommended. MSD has eliminated the polishing pond from the flowstream, thereby eliminating the primary cause of violations at the plant (high TSS caused by pond flooding from the creek, or algae growth in the pond).

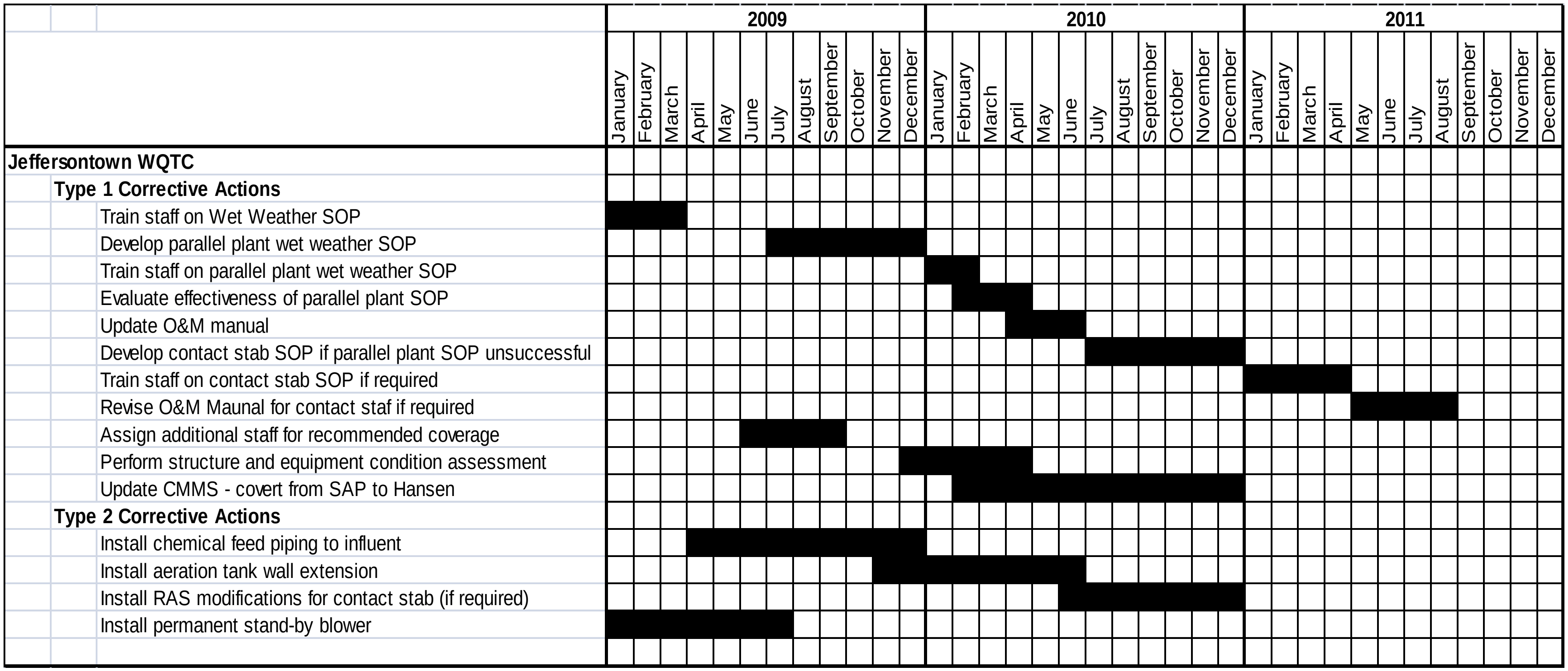
4.4.4.2 Jeffersontown WQTC

The Jeffersontown WQTC is the only facility in MSD’s system (other than the Morris Forman WQTC, which treats combined sewage) that is equipped to “blend” primary effluent with treated secondary effluent prior to discharge. The practice of blending in a facility that does not treat combined sewage is currently viewed as a bypass under the regulations, and is therefore not allowed by the KPDES permit. The Consent Decree requires MSD to either eliminate or upgrade the Jeffersontown WQTC to stop the practice of blending by December 31, 2015. A Type 3 modification is required to either eliminate or expand the Jeffersontown WQTC.

The Jeffersontown WQTC Comprehensive Performance Evaluation was required by the Consent Decree, primarily to identify Type 1 and Type 2 corrective measures that could improve treatment efficiency and reduce the need for blending prior to the elimination or upgrade of the plant.

Figure 4.4.1 illustrates the schedule of recommended Type 1 and Type 2 modifications for the Jeffersontown WQTC. All modifications have been completed as scheduled.

FIGURE 4.4.1 TYPE 1 AND TYPE 2 MODIFICATIONS FOR THE JEFFERSONTOWN WQTC



4.4.4.3 Ken Carla and Starview WQTCs

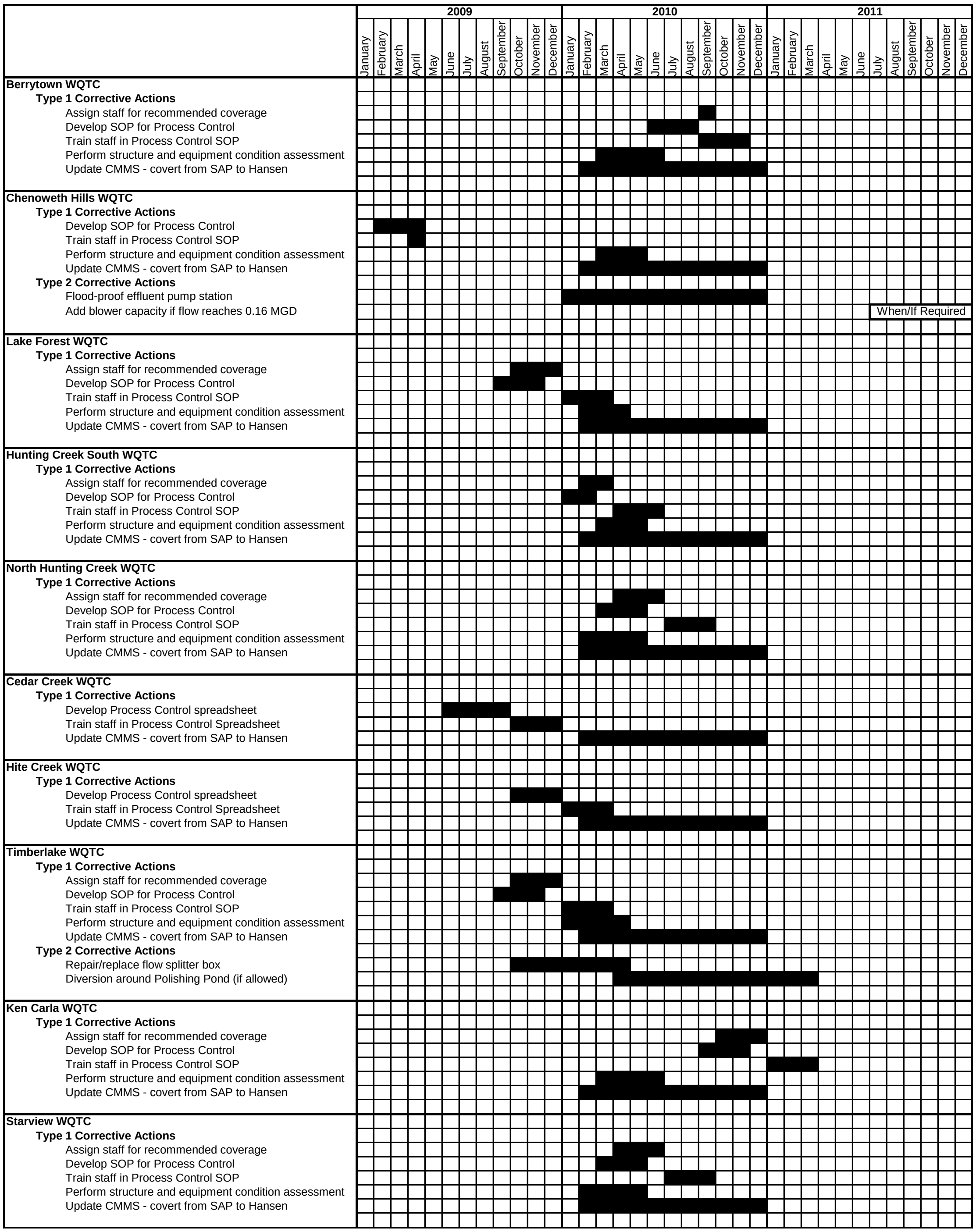
The Ken Carla WQTC is one of the plants that is required by the Consent Decree to be eliminated by the end of 2015. The Starview WQTC is scheduled to be eliminated by the end of the year 2014 (pending resolution of legal issues surrounding a recapture agreement in default as discussed in Section 4.4.1 above. Comprehensive Performance Evaluations were conducted at these treatment centers to determine if there were any Type 1 or Type 2 corrective actions that could improve plant performance prior to elimination. Type 1 actions were identified for both plants. No Type 2 recommendations were developed.

4.4.4.4 Summary

While no Type 3 solutions are currently recommended for any of the treatment centers (with the exception of the regional WQTCs already planned for expansion), the Comprehensive Performance Evaluations identified Type 1 operational modifications and Type 2 minor facility modifications for several of the centers. These modifications will be made in accordance with the schedules in the individual plant Composite Correction Program, see Appendix 4.4.3 with the Comprehensive Performance Evaluation in an individual Comprehensive Performance Evaluation/Composite Correction Program report for each plant.

A summary of the schedule for completing Type 1 and Type 2 modifications is included in Figure 4.4.2. All the Type 1 and Type 2 modifications were completed on schedule as documented in the Quarterly and Annual Reports that can be found in the Library section of the Project WIN website at www.msdprojectWIN.org.

FIGURE 4.4.2 TYPE 1 AND TYPE 2 MODIFICATIONS SUMMARY



4.5 SOURCE CONTROL AND CAPACITY SUSTAINABILITY

Source control measures related to removing illicit connections from MSD's sewer system, both in the combined and separate systems, can play a vital role in reducing sewer overflows and protecting, lowering the risk of basement backups and reducing treatment costs. MSD currently offers a voluntary program for plumbing modification on private property to protect against backups and remove illicit connections such as downspouts and sump pumps. MSD's Wastewater/Stormwater Discharge Regulations (WDRs) provide a framework around which a more extensive policy regarding the removal of these connections from MSD's system will be developed for consideration by MSD's Board.

Single-family rooftops account for 18 percent of the impervious area within the CSS area. By disconnecting roof downspouts, a significant portion of this impervious area can be removed from the combined system. Removal of these storm water connections can result in reduced wet weather flows and ultimately overflows. Illicit connections in the separate sanitary sewer system, which typically have much smaller sewer lines than in the combined, can have a dramatic effect on sewer flows and can result in basement backups and surface overflows. MSD will propose a revised policy to MSD Board consideration to target the stormwater entering the sewer system from residential landuse.

Within the combined system, MSD utilized LOJIC data to calculate the total square footage of single-family rooftops for each drainage basin. Field surveys of approximately 30 basins were conducted in an effort to determine the percentage of single-family homes with downspouts that are directly connected to the CSS. The results of this effort indicate that, on average, approximately 65 percent of parcels have downspouts that are directly connected to the combined sewer system. For those sewersheds where field surveys were conducted the actual percent of downspouts connected was utilized in the evaluation.

To remove these connections, MSD will develop a policy to address illicit connections for MSD Board consideration to accomplish objectives similar to the following:

- Identify clean water discharges from private property into MSD's sewer system as possibly illicit and subject to MSD inspection and possible disconnection. Waiver of disconnection may be granted under certain circumstances, such as disconnected discharges that might put structures at risk for flooding or cause other damage or risk to property.
- Allow MSD to request access from a property owner to confirm connection, when an illicit connection is suspected.
- For a certain grace period from the initiation of this program, allow MSD or its contractor to remove, at MSD's expense, clean water connections safely and direct them to the ground.

- Following this grace period, require property owners to removed illicit connections at their expense including a follow-up inspection by MSD.
- Allow MSD to expand its financial assistance programs to support removal of these connections by property owners by spreading the cost over a longer period.
- Should access to the property be denied or the illicit connect not be removed, allow MSD to apply a monthly penalty to the property's bill until compliance is reached.

New or revised policies are subject to Executive Director and MSD Board approval; therefore, details of the illicit discharge removal program will be further refined as discussions with the Board move forward. Should MSD not successfully adopt a mandatory program as generally described above, the voluntary disconnection program, MSD's current Plumbing Modification Program, will be continued with increased outreach. Two pilot projects have been performed to provide incentives to property owners for downspout disconnection and rain barrel installation. The data collected from these projects will help MSD to implement and refine a successful program in its service area that cost effectively reduces overflows.

MSD has documented the sewer expansion, rehabilitation and replacement actions taken to provide adequate sewer system capacity in the SCAP report. MSD's recognizes the importance of ongoing operations and maintenance (O&M) activities that also contribute to sustaining that capacity. The ongoing O&M program is documented under the Continual Sewer System Assessment program that resulted from the approved CMOM Self-Assessment Report. These inspection, maintenance and rehabilitation activities enable the sewer system to operate at its maximum capacity and to convey successfully the current and future demands placed upon that system. Green stormwater source control measures are discussed at length in Volume 2, Chapter 3 with a green program update provided in Volume 2, Chapter 5.

4.6 COMMUNITY-WIDE GREEN INFRASTRUCTURE INITIATIVE

MSD is committed to fully incorporating a comprehensive green infrastructure initiative into the Final CSO LTCP. MSD's green initiative will utilize both specific green project and program elements. Integrated with traditional gray solutions various green technique, will be used to capture, treat, and/or infiltrate stormwater runoff from existing impervious areas.

After an extensive evaluation of impervious surface types and local physical conditions such as soils and geology, MSD has proposed a Green Infrastructure Program that includes the following diverse elements:

- Vegetated roofs
- Downspout disconnection
- Rain barrels
- Green streets

- Dry wells
- Urban reforestation
- Green alleys
- Biofiltration
- Rain gardens

Additionally, MSD identified 19 locations for green infrastructure demonstration. The proposed projects originally included:

Green Alleys (see example in Figure 4.6.1.)

- Seventeenth Street and West Hill
- Campbell Street and Main Street
- Seventh Street and Market Street

Dry Wells

- Interstate (I)-264 On-Ramp
- I-264 Off-Ramp
- I-264 and Gibson Lane
- JFK Montessori School Area
- Russell Lee Drive

Green Parking Lots

- Sixth Street and Muhammad Ali Boulevard
- Seventh Street and Cedar Street
- Second Street and Broadway
- MSD Main Office Parking Lot, 700 West Liberty Street
- Third Street and Ormsby Avenue

Green Street (see example in Figure 4.6.2.)

- Twelfth Street and Jefferson Street

FIGURE 4.6.1 GREEN ALLEY

FIGURE 4.6.2 GREEN STREET

Rain Gardens (see example in Figure 4.6.3.)

- Sixth Street and Broadway
- Four additional locations yet to be determined

FIGURE 4.6.3 RESIDENTIAL RAIN GARDEN

Combined, these 19 demonstration projects represent approximately $1.5 million in construction costs, and are projected to remove approximately 12 MG of stormwater from the CSS resulting in an average cost to MSD of $0.13 per gallon.

While MSD is committed to implementing each of the demonstration projects, issues such as easements, land acquisition, permitting and other site specific constraints that have not been identified at this level of evaluation may require adjustments to the list of proposed projects during later phases. However, MSD is committed to aggressively pursuing these projects and has budgeted $2 million for their implementation that includes an allowance for design, permitting, land acquisition, and other contingencies.

MSD completed implementation of 19 demonstration projects and is evaluating performance and maintenance issues. For a complete discussion of the actual list of demonstration projects completed see Volume 2, Chapter 5.

As discussed in Volume 2, Chapter 3, Section 3.2.5, MSD utilized a spreadsheet-based tool to assist in the development of the Green Infrastructure Program. The recommended plan targets major categories of impervious surfaces and applies various green techniques to reduce the runoff associated with each impervious surface type. Conservative estimates of anticipated implementation rates for each green element dictate the cumulative impact of stormwater reduction from a particular category of impervious surface. Based on this evaluation, MSD is able to determine overall programmatic costs for varying degrees of green control.

Table 4.6.1 summarizes the components of MSD's proposed annual budget for the regional Green Infrastructure program initiative and presents potential stormwater runoff elimination assuming implementation over a 15-year program.

Implementing the program defined by the Green Cost Tool, MSD plans to spend approximately $6 million per year over the first six years to initiate a regional Green Infrastructure program. Additionally, MSD will develop and implement a post-construction monitoring program to evaluate the performance of various green infrastructure elements. Based on the results of the monitoring effort, MSD will make appropriate adjustments to the green initiative to achieve maximum community benefit for the dollars spent.

The green infrastructure incentives program has been very successful, with numerous projects completed or under development. For a complete discussion of the incentives program results through October 2012, see Volume 2, Chapter 5.Table 4.6.1

GREEN PROGRAM INITIATIVE COSTS

Impervious Surface and Best Management Practice (BMP) Type	Implementation Level[1]	Gallons Removed from CSS[2]	Annual Cost
Extensive Vegetated Roofs – Public	7%	21,327,000	$427,000
Tray System Vegetated Roofs – Public	3%	5,625,000	$112,000
Extensive Vegetated Roofs – Commercial	1%	4,376,000	$88,000
Tray System Vegetated Roofs – Commercial	1%	2,693,000	$54,000
Extensive Vegetated Roofs – Industrial	1%	6,532,000	$131,000
Tray System Vegetated Roofs - Industrial	1%	4,020,000	$80,000
Downspout Disconnection – Residential	10%	123,792,000	$386,000
Rain Barrel Program – Residential	N/A	0	$165,000
Green Street – Local Roads	1%	245,901,000	$3,070,000
Urban Reforestation - Local Roads	14,000 trees	11,200,000	$224,000
Biofiltration – Urban Highways	0.5%	10,691,000	$7,000
Type A Alley (porous strip)	5%	11,885,000	$238,000
Type B Alley (porous entire width)	5%	11,885,000	$238,000
Biofiltration – Public Parking	5%	305,541,000	$191,000
Biofiltration – Commercial Parking	1%	84,098,000	$52,000
Biofiltration – Industrial Parking	0.5%	44,716,000	$28,000
Biofiltration - - Residential	0.5%	52,035,000	$32,000
	Subtotal	**946,316,000**	**$5,523,000**
		Program Administration	**$276,000**
		Total	**$5,799,000**

[1]Implemenation level defines the proposed percentage of that impervious surface type to be retrofitted with a green control as part of the Green Infrastructure Program.

[2]Represents the potential reduction in stormwater if the listed implementation rates are successfully carried out over 15 years as part of the Green Infrastructure Program.

Refer to Volume 2, Chapter 5, and Volume 3 Chapter 5 for detailed overflow volume, frequency and project information

CHAPTER 5: REGULATORY COMPLIANCE

Special Note: This chapter was developed in 2008. The statistical data for the CSO's reported, specifically related to individual CSO overflow volumes and frequency in a typical rainfall year, were derived from the CSS model calibrated in 2007. Since then, a more detailed calibration and validation effort has adjusted the average annual overflow volumes and frequencies in the typical year. This information is provided in Volume 2, Chapter 5. The vast majority of the physical system characterization in this chapter is still accurate.

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CHAPTER 5: REGULATORY COMPLIANCE

This Chapter illustrates the approaches that the Louisville and Jefferson County Metropolitan Sewer District (MSD) has taken through the Integrated Overflow Abatement Plan (IOAP) to comply with the regulatory requirements of the Consent Decree, the Clean Water Act (CWA), and the Combined Sewer Overflow (CSO) Control Policy.

5.1 MEETING THE REQUIREMENTS OF THE CONSENT DECREE

On August 12, 2005, MSD entered into a Consent Decree with the U.S. Environmental Protection Agency (EPA) and the Kentucky Environmental and Public Protection Cabinet to address wet weather overflows within the separate and combined sewer systems (CSS). The stated objective of the Consent Decree is to further the objectives of the CWA; eliminate unauthorized discharges from MSD's separate sewer system (SSS), CSS, and water quality treatment centers (WQTCs); and to address discharges from MSD's CSO locations identified in the Kentucky Pollutant Discharge Elimination System (KPDES) permit for the Morris Forman WQTC. The Consent Decree outlines the compliance program and schedules for achieving specific objectives, including the development of discharge abatement plans.

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 WQTC performance, record-keeping, and reporting. Public comment closed on the draft ACD on December 31, 2008. The ACD was filed in Federal Court on April 15, 2009. For the purpose of the IOAP, the term "Consent Decree" will be understood to mean the ACD, unless specifically noted otherwise.

The discharge abatement plans required by the Consent Decree include both interim and final plans. The abatement plans required include:

- An Updated Sanitary Sewer Overflow Plan (SSOP), submitted February 10, 2006, in accordance with Consent Decree Requirements;
- An Interim Sanitary Sewer Discharge Plan (SSDP) submitted in accordance with the Consent Decree, and approved on July 28, 2008. The Interim SSDP addresses unauthorized discharges in the Beechwood Village and Hikes Point areas, at the Highgate Springs Pump Station, and at the Southeastern Diversion Structure;
- An Interim Long-Term Control Plan (LTCP) submitted in accordance with the Consent Decree and approved on February 27, 2007;
- A Final CSO LTCP to address discharges from permitted CSOs, being submitted as Volume 2 of this IOAP; and

- A Final SSDP intended to eliminate unauthorized discharges from MSD's SSS, CSS, and WQTCs, being submitted as Volume 3 of this IOAP.

Chapter 5 describes how the IOAP complies with the Consent Decree and its underlying laws, regulations, policies, and guidance documents. The purpose of this chapter is not to address compliance with the Nine Minimum Controls (NMCs); the Sewer Overflow Response Protocol (SORP), the Capacity Management Operations and Maintenance (CMOM) Self-Assessment Report, or the Early Action projects required by the Consent Decree. These plans have been submitted separately and approved by EPA and KDEP. It should be recognized, however, that compliance with the Consent Decree, CWA, and the CSO Control Policy all require plan elements in combination with the NMCs, the CMOM program, the SORP program, and the Final CSO LTCP. Similarly, elimination of unauthorized discharges in MSD's sewerage system requires coordinated implementation of the SORP, CMOM, and Final SSDP.

This chapter does not repeat all information that is found in other volumes, chapters, and/or sections of this report, rather it provides a cross reference or roadmap for where to find the specific information to show compliance with each aspect of the Consent Decree, the Final CSO LTCP, and the requirements and guidance for the Final SSDP.

5.1.1 Key Findings

A. The Final CSO LTCP includes a complementary combination of gray and green infrastructure as well as continued pollution prevention, and behavior modification outreach programs that when combined jointly results in full compliance with the CSO Control Policy and the Consent Decree. (Volume 1, Chapter 3, Section 3.3.3, Volume 2, Chapter 4, Section 4.1.2. and Volume 2, Chapter 5.)

B. The CSO Control Policy requires provisions to make use of the maximum storage available in the system. MSD's evaluation of in-line storage opportunities and use of Real Time Control (RTC) systems to maximize the effective use of storage opportunities demonstrates compliance with this requirement. (Volume 2, Chapter 4, Section 4.1.2.)

C. The CSO Control Policy also requires provisions to maximize the use of existing WQTC capacity. MSD's previous evaluations of the wet weather capacity of the Morris Forman WQTC resulted in facility modifications that have maximized wet weather treatment on that site. A further evaluation of the current facility and site constraints at the Morris Forman WQTC concluded that no additional treatment capacity could be added to the existing site, and as a result, any expansion of treatment capacity would have to be done off-site. (Volume 2, Chapter 3, Sections 3.2.4 and 3.2.7.)

D. The IOAP considers the entire watershed in its approach to control both CSOs and SSOs. Consistent with the CSO Control Policy and guidance, the IOAP incorporates a Final CSO LTCP that includes extensive analysis of current water quality conditions, including the impacts of CSOs and other pollutant sources and pathways on water quality standards attainment. The Final CSO LTCP evaluates the cost, performance and likely water quality improvements associated with a wide range of CSO control alternatives. The Final CSO LTCP also evaluates control measures based on cost, performance and cost-benefit criteria as established by the Wet Weather Team (WWT) Stakeholder Group and consistent with EPA memos and guidance.[1] (Volume 2, Chapter 2, Section 2.9, and Chapter 4, Sections 4.1.3 and 4.4.)

E. Implementing the Final CSO LTCP will result in 98 percent capture and treatment of the combined sewage that is collected during wet weather. This wet weather capture performance exceeds the minimum requirements of the CSO Policy Presumption Approach, that requires at least 85 percent capture and treatment. (Volume 2, Chapter 4, Section 4.1.1.)

F. Implementing the Final CSO LTCP will improve the water quality in the Ohio River and all three forks of Beargrass Creek. Water quality modeling predicts that the remaining CSO wet weather loads (after removing background) will no longer cause fecal coliform water quality standards violations on the Ohio River. Similar modeling for Beargrass Creek also predicts that remaining CSO wet weather loads will no longer cause fecal coliform water quality standards violations. (Volume 2, Chapter 4, Section 4.4.)

G. Water quality modeling on both the Ohio River and Beargrass Creek predict continued water quality challenges and water quality standard violations, primarily due to pollution sources not attributable to CSOs. Water quality models run at higher than 96 percent combined sewage capture predicted no measurable improvement in fecal coliform counts on the Ohio River, and only minimal improvement in the fecal coliform counts predicted for Beargrass Creek. The total Final CSO LTCP program costs and the selection of project alternatives are based on the "knee of the curve" analysis which indicates clearly where the increment of pollution reduction achieved in the receiving water diminishes compared to the increased costs of control. This approach is entirely consistent with the CSO Policy and LTCP guidance documents.[2] (Volume 2, Chapter 4, Section 4.1.3.)

H. Consistent with the CSO Policy, it appears that in Beargrass Creek water quality standards violations are primarily due to natural background conditions or pollution sources other than CSO, and therefore the upcoming Total Maximum Daily Load (TMDL) for Beargrass Creek is the appropriate approach to apportion loads.[3] (Volume 2, Chapter 4, Section 4.1.3.)

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[1] US EPA Memorandum from Michael B. Cook, Director of the Office of Wastewater Management and Eric Shaffer, Director of the Office of Regulatory Enforcement to the Water Division Director Regions I-X; , July 7, 1999 , Subject: Water Quality Attainment and Technology –Based CSO Requirements; page 2.

US EPA Memorandum from Robert Perciasepe, Assistant Administrator, Office of Water and Steven A. Herman, Assistant Administrator Office of Enforcement and Compliance Assurance to Water Management Division Directors Regions 1-10; Regional Counsels, Regions 1-10 and State Directors, May 19, 1998; Subject: Implementation of the CSO Policy; pages 3 and 4.

[2] US EPA, National CSO Control Policy, EPA 830-B-94-001, April 1994; Section II.C.5; and US EPA, Office of Water (4204) EPA 832-B-95-002, September 1995, Combined Sewer Overflows Guidance for Long-term Control Plan; Chapter 3, Section 3.4.3.

[3] US EPA, National CSO Control Policy, EPA 830-B-94-001, April 1994; Section II.C.4.b.A.ii.

I. The implementation schedule for the gray and green infrastructure programs is consistent with the values, goals and objectives of the IOAP. The schedule shows early implementation of the green infrastructure program, incorporating a post construction monitoring program to ensure that gray infrastructure projects in later phases are properly sized and designed. The phased implementation of the IOAP schedule is affordable, and consistent with the CSO Policy and guidance on phased implementation and affordability. (Volume 1, Chapter 6, Sections 6.3 and 6.4.)

J. The development of the IOAP relied on an analytical framework using a values-based performance evaluation framework established by the WWT. This framework is recommended in the "Guide to Managing Peak Wet Weather Flows in Municipal Wastewater Systems" (WEF 2006), a guidance manual jointly sponsored by the Water Environment Federation (WEF) and the EPA. The framework included a robust benefit-cost scoring methodology for evaluating and selecting project alternatives and a systematic process for evaluating the IOAP programmatically. (Volume 1, Chapter 2, Section 2.5.)

K. The suite of projects selected for the Final SSDP will result in the elimination of capacity related SSOs and will eliminate SSOs at an estimated 145 locations in the "average year". (Volume 3, Chapter 4, Section 4.2.)

L. The WWT agreed that a three-hour "cloudburst" storm with a statistically anticipated rainfall of 1.82 inches as the minimum design storm considered is consistent with the values-based evaluation framework for determining elimination of SSOs. The cloudburst storm approach at a similar recurrence interval has previously been approved for this application in Atlanta, Georgia, and elsewhere. Consistent with the site specific nature of wet weather flows however, the WWT determined that in some specific locations, more protection could be provided at a reasonable cost. Consequently, protection against larger storms is planned at 166 site-specific locations. (Volume 3, Chapter 4, Section 4.1.)

M. With the full implementation of the Final CSO LTCP and the Final SSDP, sewer overflows will not be the cause of fecal coliform water quality standards exceedances in the Ohio River. Fecal coliform exceedances will be reduced from current conditions, but are expected to continue in the Ohio River, primarily due to upstream pollution sources, stormwater runoff and sources other than sewer overflows. (Volume 2, Chapter 4, Section 4.2.)

N. With full implementation of the Final CSO LTCP and Final SSDP, sewer overflows will not be the cause of fecal coliform water quality standards exceedances in Beargrass Creek. Fecal coliform exceedances in Beargrass Creek will be reduced from current conditions, but fecal coliform exceedances are expected to continue primarily due to upstream loads, stormwater runoff and sources other than sewer overflows. (Volume 2, Chapter 4, Section 4.2.)

5.2 MEETING WATER QUALITY CRITERIA AND CSO POLICY REQUIREMENTS

The Consent Decree requires that the Final CSO LTCP be developed to comply with the CSO Control Policy. The CSO Control Policy provides a comprehensive approach to developing a reasonable and affordable way of achieving water quality standards and public health objectives. Following the approach outlined in the CSO Control Policy, MSD worked with regulators and the interested stakeholders to develop a site-specific plan that is both affordable and compliant with applicable regulations. The CSO Control Policy recognizes that control of CSOs is site-specific based on rainfall patterns, the receiving waters, and the existing sewer system.

Consequently, the required Final CSO LTCP should consider not only the site-specific nature of the CSOs in Louisville Metro, but the range of cost-effective control options and strategies that could be implemented to control CSOs and provide water quality and public health protection. The result of this analysis should be a Final CSO LTCP that:

- Chooses either the Presumption Approach or the Demonstration Approach;
- Takes into account the cost and performance of the selected alternatives to identify where the increment of pollution reduction achieved in the receiving water diminishes compared to the increased costs (commonly known as the knee of the curve);
- Describes how the plan maximizes the delivery of the wet weather flows to the existing WQTC for treatment and disinfection;
- Provides a construction and financing schedule which may be phased based on the relative importance of the specific projects in the plan and is consistent with the financial capability of the rate payers in the MSD service area; and
- Includes a post-construction compliance and monitoring program adequate to verify compliance with water quality and to ascertain the effectiveness of the CSO control. This is essentially how the adaptive management approach can be achieved as recommended in the Policy.

As required, all these elements of a Final CSO LTCP should be developed by working with the permitting and regulatory agencies and while engaging the public fully in the stakeholder process of selecting the alternatives and making decisions.

The CSO Control Policy itself has many components and should be considered and applied jointly and holistically in a coordinated fashion to provide the most comprehensive and cost-effective approaches to CSO control. Additionally, the CSO Control Policy encourages innovation and alternative approaches and technologies to be applied in a site-specific manner (consistent with the characteristics of the wet weather flows and sewer systems and the public acceptance and affordability of the program) to achieve the agreed upon control of CSO.

MSD recognizes the uniqueness of the CSO Control Policy and the flexibility of the policy to allow for a watershed approach to water quality allowing for the development of an innovative and cost-effective plan. MSD's Final CSO LTCP takes into account the requirements to:

- Control CSOs,
- Eliminate unauthorized discharges,
- Implement the NMCs,
- Educate and engage the public to reduce the discharges to the collection systems in peak wet periods,
- Apply cost-benefit analysis to ensure that public funds will produce water quality and other public results and benefits, and
- Incorporate the most reasonable and practical development of green infrastructure to reduce the runoff of stormwater into the collection system.

5.2.1 Presumption and Demonstration Approaches to Long Term Control of CSOs

The CSO Policy identifies two approaches, the "demonstration" and the "presumption" approaches to establish targets for CSO controls that will protect water quality and designated uses (59 Code of Federal Regulations {CFR} 18688). The CSO Policy provides the flexibility to choose either approach, or a combination of these approaches, as long as the LTCP shows reasonable attainment of water quality.

The Presumption Approach was conceived as a high level of control with explicit performance criteria. This presumed adequate control approach would be considered reasonable in light of the available characterization, monitoring, modeling and water quality information. The Presumption Approach requires either a capture and treatment of 85 percent of the combined sewer flow generated during a wet weather event, with an average of no more than four overflows per year; or a reduction of not less than 85 percent of the mass of pollutants that were identified as causing water quality impairments.

The Demonstration Approach allows a municipal agency to apply site-specific parameters to choose a control program that is different from what is required by the Presumption Approach (typically lower levels of capture than required by the Presumption Approach) as long as it can be shown to meet water quality standards and protect designated uses. In addition, the continued overflows should not preclude the attainment of standards or impairment of the uses. If natural background or other sources of pollution or conditions do cause impairments, then a TMDL should be developed. The CSO Policy considers the Demonstration Approach to be an adaptive approach which allows for cost effective expansion or retrofitting should planned water quality improvements not be realized.

When MSD established the WWT and embarked upon the development of the values-based risk approach to all overflow abatement (for both CSOs and SSOs), the process produced a Final CSO LTCP consistent with the Demonstration Approach of the CSO Control Policy.

As described in Chapter 3 of the Final CSO LTCP, the Presumption Approach criteria (four overflows per year maximum) was used to initially size control alternatives for all CSOs. To establish the best technical solution for each of the CSOs, site-specific technology approaches were identified by applying a cost-benefit tool with an initial control level of four overflows per year. Alternative solutions were then established using other levels of control, namely zero, two, and eight overflows per year.

Simulations with the water quality models of Beargrass Creek and Ohio River showed that even with a high level of control (including elimination of CSOs), water quality standards cannot be met at all times because of other pollution sources. Using this information, MSD selected a system-wide solution that achieved 96 percent capture of wet weather combined sewage (the 2012 IOAP Modification increased this capture to 98 percent but does not change the conclusions reached). This level of control also results in a 92 percent overall reduction in CSO volume. Water quality results and the knee of the curve analysis demonstrate that this level of control results in an appropriate, cost-effective level of CSO control that would result in full compliance with water quality standards in a typical year, if background loads were not present.

The Consent Decree also requires that the Final CSO LTCP shall meet the following conditions:

- If CSOs occur, they will only be the result of wet weather including activities to address those discharges resulting from MSD's compliance with the requirements of the United States Army Corp of Engineers (USACE) Ohio River Flood Protection System Pumping Operations Manual, dated 1954 and revised 1988.
  - The Final CSO LTCP contains a detailed analysis of the flood pump station operating protocols that currently result in dry-weather CSOs. An approach has been developed to eliminate the need for the operating conditions that causes these dry weather overflows.
  - Projects identified in the Final CSO LTCP include modifications to gate and actuators where that is necessary to implement the revised operating strategies. MSD has opened discussions with the USACE to obtain their agreement that the operating protocols can be changed.
  - The flood pump station evaluation is discussed in Volume 2, Chapter 2, and the full report is appended to that chapter. Capital projects required to implement the proposed revisions to the operating strategies are described in Volume 2, Chapter 4.

- All wet weather overflow points must comply with the technology and water quality requirements of the CWA and minimize the impacts on water quality, biota and human health. The technology requirements for the CSO overflows are the NMCs.
  - MSD showed compliance with the NMC in the September 15, 2006, report. Compliance with the water quality based requirements are achieved with wet weather capture levels that are consistent with the Demonstration Approach, in that they will not cause water quality standards violations in the absence of background, natural, and other sources not related to sewer overflows.

This is further discussed in Section 5.2.1 below.

According to the Consent Decree, CSO Policy, and LTCP guidance, the Final CSO LTCP must have the following elements:

- Characterization, monitoring and modeling and design parameters as the basis for selection and design of effective CSO controls, (including control to address those discharges resulting from MSD's compliance with the requirements of the USACE' "Ohio River Flood Protection System Pumping Operations Manual," dated 1954 and revised 1988). This is addressed in Volume 2, Chapter 2.
- Results of the evaluation of WQTC peak flow treatment capacity for any WQTC, other than the Morris Forman WQTC, that will receive additional flow based on the MSD Final CSO LTCP project. Such evaluation shall be consistent with the EPA publications "Improving POTW Performance Using the Composite Correction Approach," EPA CERI, October 1984, and "Retrofitting POTWs," EPA CERI, July 1989. The Morris Forman WQTC is the only treatment facility in MSD's system that receives combined sewage; therefore none of MSD's WQTCs require this evaluation as part of the Final CSO LTCP. The capacity of the Morris Forman WQTC is addressed in Volume 2, Chapter 3.
- A report on the public participation process. The public participation process is discussed in detail in Volume 1, Chapter 3, and the specific role of public participation on the Final CSO LTCP is contained in Volume 2, Chapter 4.
- Identification of how the Final CSO LTCP addresses sensitive areas as the highest priority for controlling overflows. Sensitive areas are addressed in Volume 2, Chapters 2 and 4.
- A report on the cost analysis of the alternatives considered. The cost analysis for alternative selection is addressed in Volume 2 Chapter 3. The development of budget costs for the selected alternatives is discussed in Volume 2 Chapter 4. The analysis of the impact of capital and operating costs on projected rates is addressed in Volume 1 Chapter 6, as is an analysis of the affordability of the projected rates.
- Operational plan revisions to include agreed-upon long-term CSO controls. The operational plan for all the projects in the IOAP is contained in Volume 1, Chapter 6.
- Maximization of treatment at MSD's WQTCs for wet weather flows to ensure that these flows receive at least the equivalent of primary clarification, removal of solids and

floatables (S&F) and disinfection before being discharged to the receiving waters. Maximization of treatment at the Morris Forman WQTC was addressed in Section 3 of the updated NMC Compliance Report of September 15, 2006, and is addressed in the IOAP in Volume 2, Chapter 3.

- Schedule for implementation of the CSO controls that are selected by the plan including a phasing plan which considers protection first of sensitive uses and financial capability and viable funding of the program, including users fees. Prioritizing and scheduling are addressed in Volume 1, Chapter 6, and Volume 2, Chapter 4.
- A post-construction compliance monitoring program adequate to verify compliance with water quality based CWA requirements and ascertain the effectiveness of the CSO controls. The post-construction compliance monitoring plan for the entire IOAP is presented in Volume 1, Chapter 6, Section 6.5.

As defined in the IOAP, the 22 gray infrastructure projects to control wet weather CSOs include:

- Three sewer separation projects;
- Two conveyance expansion projects;
- 14 storage basin projects that includes in-line and off-line storage. (Most in-line storage projects have a RTC component.);
- One project with a totally green infrastructure solution (with a second project currently listed as storage being evaluated for implementation at a green-only solution);
- Replacement and expansion of the Nightingale Sanitary Pump Station; and
- One high-rate wet weather treatment system (screening, settling, and disinfection) that also incorporates in-line and off-line storage.

In addition, five projects have been identified at flood pump stations to allow MSD to make operational changes that address dry weather overflows resulting from USACE operating rules for the flood protection system.

The IOAP also identifies a number of complementary green infrastructure wet weather and water quality programs managed by MSD and/or by other community partners. These complementary efforts have included partners such as the Mayor's Green City Initiative, the Partnership for a Green City, the Louisville Metro Office of Sustainability, Louisville Metro's Municipal Separate Storm Sewer System (MS4) stormwater permit, and initiatives of Jefferson County Public Schools (JCPS), University of Louisville, private developers, and other partnering entities. The Final CSO LTCP outlines proposed budgets to provide subsidies and incentives to potential partners and to encourage them to implement green infrastructure that can reduce the amount of stormwater runoff that reaches the CSS.

Nineteen green infrastructure demonstration projects are included the IOAP. These proposed green infrastructure demonstration projects originally included:

- Five green parking lots
- One green street
- Five rain gardens
- Three pervious concrete green alleys
- Five infiltration dry wells

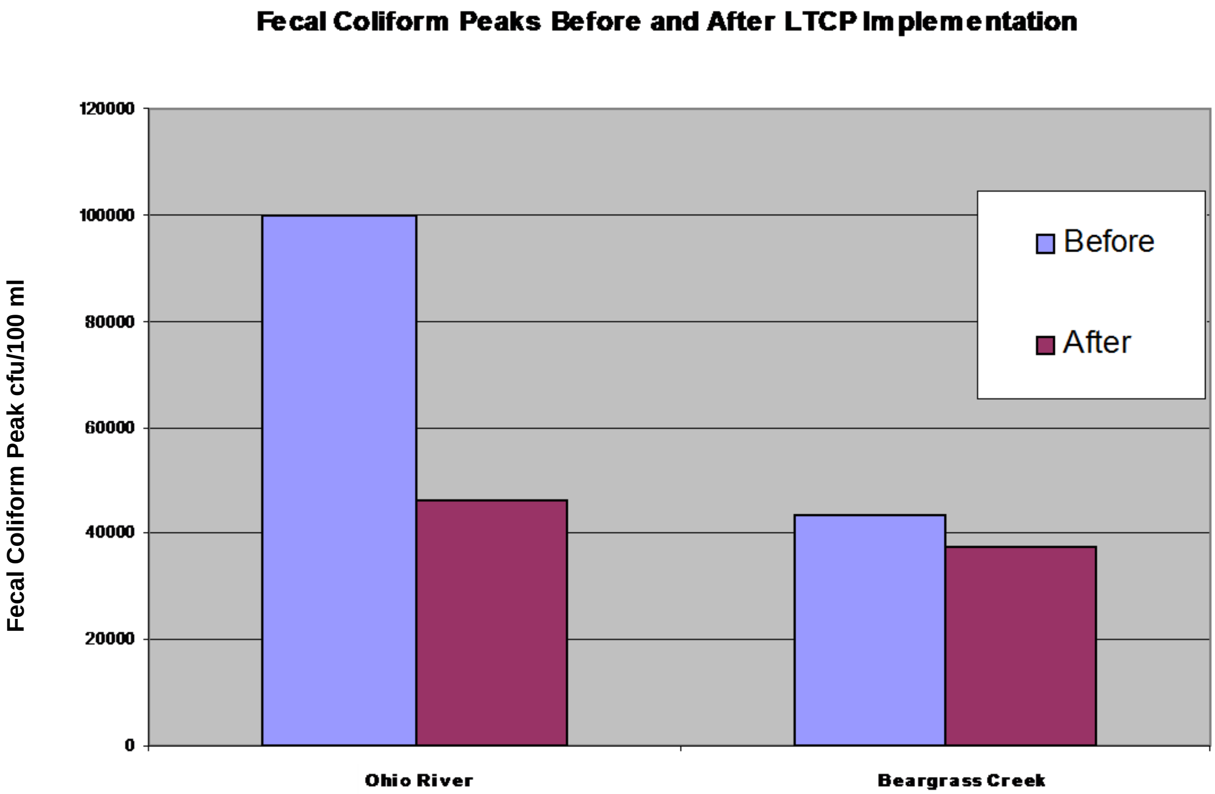
Due to permitting issues, the five dry well demonstration projects could not be implemented within the schedule constraints of the IOAP. These five projects were replaced with projects using alternate technologies. A complete list of the 19 demonstration projects actually implemented can be found in Volume 2, Chapter 5.

These demonstration projects are intended to be the first of many green infrastructure projects funded totally by MSD, or by community partners who may receive subsidies or incentives from MSD. The incentive program developed by MSD has been very successful, with numerous projects completed and in-progress throughout the CSS. A list of the incentive projects approved by the MSD Board through October, 2012, can be found in Volume 2, Chapter 5.

5.2.2 Water Quality Standards Review

Implementing the IOAP is expected to improve water quality in both Louisville Metro streams and the Ohio River. The expected water quality benefits of the IOAP include reductions in the peak levels of fecal coliform bacteria in the Ohio River and Beargrass Creek and a reduction in the number of days that fecal coliform levels exceed water quality standards during periods of wet weather. See Figure 5.2.1.

FIGURE 5.2.1



Both the Consent Decree and the CSO Control Policy require that if control of CSOs alone will not consistently achieve established water quality standards, then the regulatory agency and the CSO community should review together the causes of the exceedances of the standards and develop a full understanding as to whether the standards are achievable. The CSO Policy has supplemental guidance on compliance approaches available to deal with water quality issues in LTCPs (Michael B. Cook, Director of Wastewater Management, Office of Water, EPA Headquarters, *Water Quality-Based, Technology-Based CSO Requirements;* Memo to Water Division Director Regions I-X; dated July 17, 1999). This memo recognizes the potential that CSO control may not provide for full compliance with water quality standards.

All EPA Policy guidance and memorandum recommend that during the development of the LTCP:

- Use a watershed approach, including extensive analysis of the current water quality conditions, the impacts of the CSO and other sources on water quality attainment;
- Evaluate the cost, performance and likely water quality improvements associated with a wide range of CSO control alternatives and evaluate control measures on a cost/performance criteria;
- Involve State and Federal authorities during the development of information and the decisions about the controls and attainment of water quality; and
- Include stakeholder participation, including consideration of the cost/performance criteria and the potential for water quality attainment or non-attainment.

As stated in a memorandum signed by Assistant Administrator Robert Perciasepe on May 19, 1998,

> *"Site specific data collected as part of the development of the long-term control plan and data from watershed analyses should assist States in evaluating the adequacy of the long-term control plan to contribute to the attainment of water quality standards. Such data will also provide important information necessary for determining whether a use is attainable and, where the designated use is not attainable, the appropriateness of a variance or other revision to the applicable water quality standards."* [4]

Water quality monitoring and modeling clearly demonstrate that overflow control alone is not enough to improve water quality enough to consistently meet water quality standards. The specific water quality exceedences that are anticipated for Louisville Metro are summarized in Volume 2, Chapter 2 (current conditions) and Chapter 4 (expected conditions after implementation of the Final CSO LTCP). In summary, this report states that due to background and upstream sources of pollution which are either not fully controlled or not permitted, the Ohio River downstream from the Morris Forman WQTC is projected to exceed the recreational season fecal coliform monthly maximum standards 83 percent of the time in an average year. This compares to the current condition that is predicted to exceed recreational season maximum monthly standards every month in an average per year (assuming at least one rainfall per month during the recreation season). Peak fecal coliform levels at this location are projected to drop from 100,000 colony-forming units (cfu)/100 milliliters (ml) to 46,000 cfu/100 ml.

[4] USEPA, Robert Perciasepe, Assistant Administrator Office of Water and Steven A. Herman, Assistant Administrator Office of Enforcement and Compliance Assurance; Memorandum Subject: Implementation of the CSO Control Policy; To: Water Management Division Director, Regions, Regional Counsels Region 1-10, State Directors; May 19, 1999

Similarly, water quality models predict that Beargrass Creek, at its mouth, will exceed the recreational season fecal coliform monthly maximum standards over 80 percent of the time in an average year, versus the current condition that exceeds recreational season fecal coliform water quality standards almost 95 percent of the time. Peak fecal coliform levels at the Beargrass Creek mouth are projected to drop from 44,300 cfu/100 ml to 38,000 cfu/100 ml.

In light of this challenge, MSD's implementation of the IOAP is key to broader contributions to water quality improvement efforts in the community. Review and revision of the water quality standards may be appropriate as MSD implements CSO controls and conducts the appropriate monitoring and model recalibration called for in the post-construction compliance monitoring plan. Ohio River Sanitation Commission (ORSANCO) adopted a provision in its water quality standards for the Ohio River allowing for development and application of alternative criteria if CSO communities have submitted a long-term CSO control plan and a Use Attainability Analysis (UAA) (ORSANCO, 2006).

MSD intends to implement the controls recommended in the Final CSO LTCP and then evaluate progress towards meeting water quality standards. MSD will continue to coordinate closely with KDEP and EPA on the achievability of the current water quality standards during wet weather events. KDEP and EPA may determine that development of a UAA is needed to establish if other pollutant source controls is warranted.

The IOAP was developed in response to a Consent Decree negotiated with EPA and the KDEP. As such, the IOAP will be a federally enforceable action plan for sewer overflow abatement. The IOAP must, therefore, limit its scope to commitments that directly relate to MSD programs and activities to address CSO and unauthorized discharge issues. Other Louisville Metro community water quality programs, which may be partly or completely out of MSD's control, can provide synergistic benefits with the IOAP, but they do not fall under the same level of federal enforcement. These programs may, however, have different mechanisms for ensuring accountability.

5.2.3 Evaluation of Approaches to Water Quality Standards Compliance

MSD developed the IOAP using a values-based performance evaluation framework established by the WWT. The WWT identified five project-specific community values to underpin the analysis and selection of alternatives for the IOAP. Three of these five are fully driven by and consistent with the requirements of the Consent Decree:

- Public health enhancement
- Environmental enhancement
- Regulatory performance

The remaining two project-specific values are Asset Protection and Eco-Friendly Solutions. These project-specific values are not directly related to Consent Decree issues, but reflect additional community values that the WWT Stakeholder Group wanted to factor into IOAP decision-making.

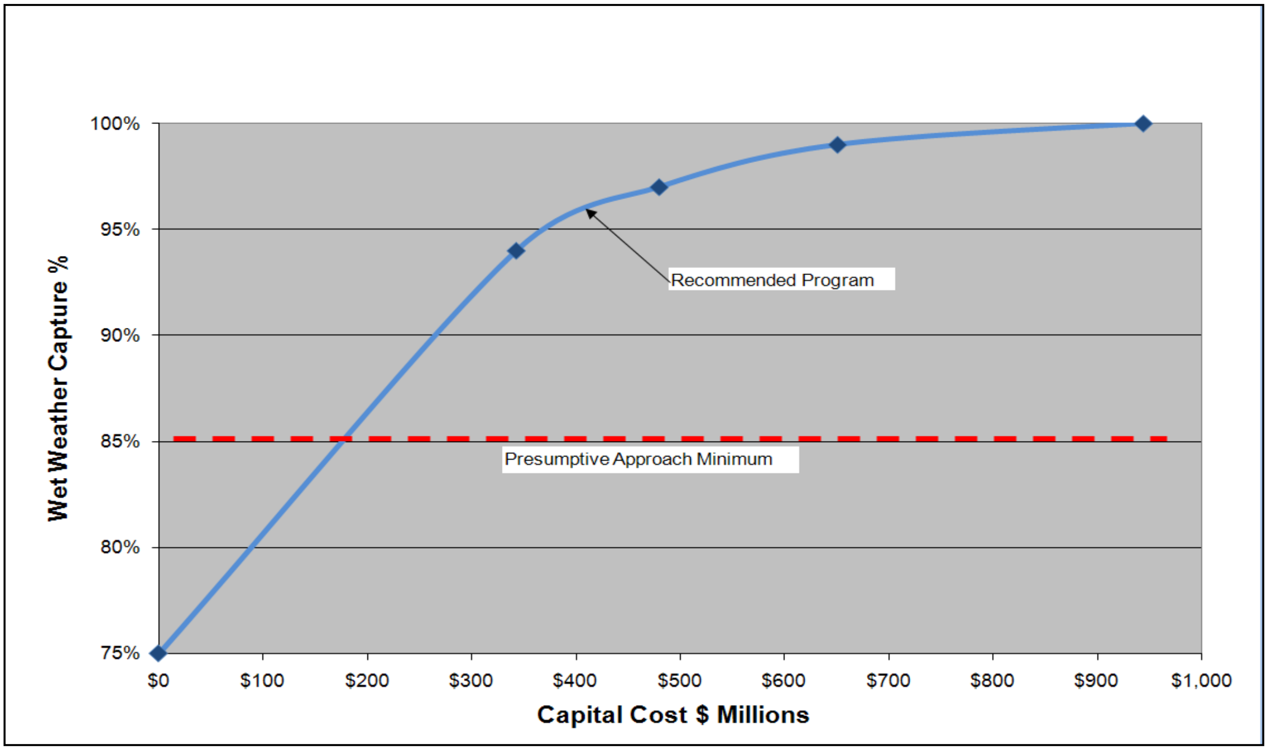
At the same time as these project specific community values were being applied to alternatives, the six programmatic values were also applied including:

1. Customer satisfaction
2. Economic vitality
3. Education
4. Environmental justice and equity
5. Financial equity
6. Financial stewardship

Using a structured decision-making process as framed by the WWT, MSD developed and evaluated overflow abatement control options for the IOAP based on managing risks to these community values. In particular, MSD analyzed each project alternative considered for the IOAP in terms of potential benefits and costs, where "benefits" are quantified based on the anticipated reduction in risks to the community values and "costs" reflect the total capital and operational costs of the alternative. The benefit-cost analysis (same as cost/performance) influences the selection of site-specific abatement approaches or technologies, site-specific levels of protection (within the boundary conditions for CSOs and unauthorized discharges), and the relative priority of projects for implementation. The suite of Final CSO LTCP projects that resulted from this evaluation was then compared with a knee of the curve evaluation and found to be in complete agreement.

Figure 5.2.2 illustrates that the recommended program achieves 96 percent capture of wet weather flows at a cost of approximately $320 million (2008 dollars) (the 2012 IOAP Modification increased this to 98 percent capture at approximately the same cost). The cost to achieve 100 percent capture would cost an additional $600 million. The recommended program is considered to be at the knee of the curve, and further reductions would be beyond the point of diminishing returns. Note that the data points on the curve represent system-wide costs and capture calculated at eight, four, two, and zero overflows per year.

FIGURE 5.2.2 EXAMPLE KNEE-OF-THE CURVE GRAPH



The WWT's discussions about total program costs and the selection of projects for the IOAP, as directed in EPA's CSO Control Policy, considered a "knee of the curve" analysis to determine where the increment of pollution reduction achieved in the receiving water diminishes compared to the increased costs. In addition to this analysis, the community's level of investment in the IOAP has been considered in the context of anticipated future requirements and other needs for MSD services. These services may include stormwater compliance needs associated with Louisville Metro's MS4 stormwater permit and requirements to meet the forthcoming total TMDL allocations for Beargrass Creek. This consideration of other water quality investment needs is important since sewer overflow control alone will not be sufficient to meet water quality standards.

The following two Figures illustrate how the knee of the curve analysis for both the Ohio River and Beargrass Creek are related to the values-based choices to implement a Final CSO LTCP which captures 96 percent of the combined sewage during wet weather events (the 2012 IOAP Modification increases this to 98 percent capture, but does not change the conclusions reached).

Figure 5.2.3 graphs the peak fecal coliform levels in the Ohio River predicted at various levels of CSO reduction investment. Under current conditions, CSO loads are predicted to cause peak fecal coliform levels to be approximately 100,000 cfu per 100 ml of water. The recommended level of CSO control reduces this value to approximately 45,000 cfu/100 ml, at a cost of approximately $320 million. Spending an additional $600 million is predicted to reduce the fecal coliform levels so slightly that it is indistinguishable at this scale, and represents an insignificant further reduction in public health risk. This graph shows that almost all the fecal coliform reduction benefits come in the first $320 million of CSO reduction projects, and virtually no fecal coliform reduction benefits come from additional expenditures beyond $320 million. The data points on the curve represent system-wide costs and capture calculated at eight, four, two, and zero overflows per year. Note that this curve was generated for the suite of projects submitted as part of the September 30, 2009, version of the IOAP. Water quality models were not re-run with the suite of projects submitted as the 2012 IOAP Modification since the changes in loadings were very small relative to the overall loadings originally modeled. Since the overall CSO AAOV is less than the AAOV originally modeled the results would be expected to be similar, and the same conclusions drawn.

Figure 5.2.4 graphs the peak fecal coliform levels in Beargrass Creek, predicted at various level of CSO reduction investment. Under current conditions, CSO loads are predicted to cause peak fecal coliform levels to be approximately 43,500 cfu per 100 ml of water. The recommended level of system-wide CSO control reduces this value to just over 37,500 cfu/100 ml, at a cost of approximately $320 million. Similar to the Ohio River results, spending an additional $600 million is predicted to reduce the fecal coliform levels so slightly it is indistinguishable at this scale, and represents an insignificant further reduction in public health risk. The data points on the curve represent system-wide costs and capture calculated at eight, four, two, and zero overflows per year. Note that this curve was generated for the suite of projects submitted as part of the September 30, 2009, version of the IOAP. Water quality models were not re-run with the suite of projects submitted as the 2012 IOAP Modification since the changes in loadings were very small relative to the overall loadings originally modeled. Since the overall CSO AAOV is less than the AAOV originally modeled the results would be expected to be similar, and the same conclusions drawn.

FIGURE 5.2.3 PEAK FECAL COLIFORM REDUCTIONS – OHIO RIVER

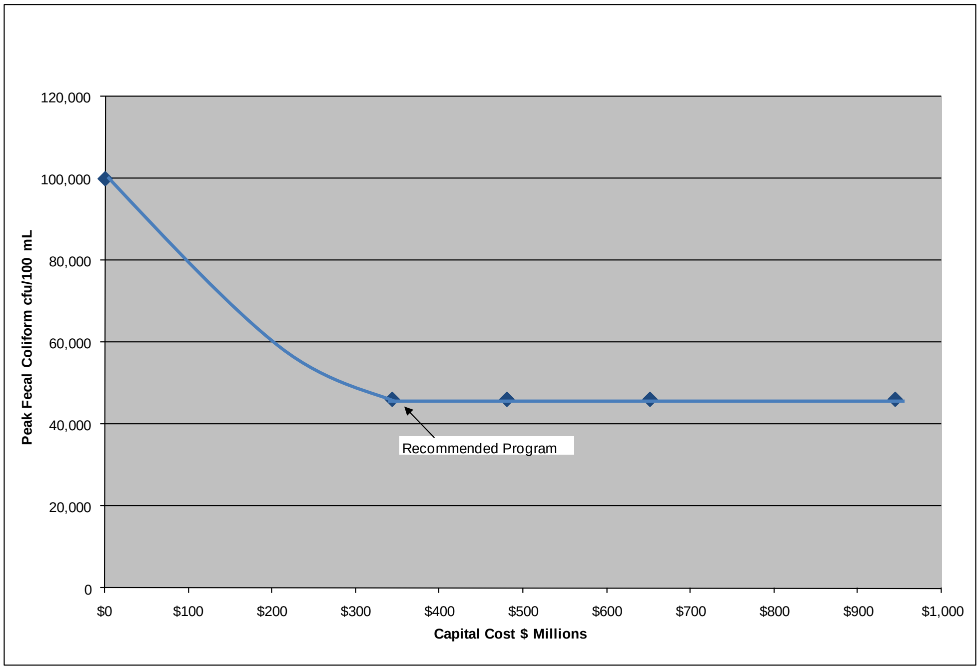
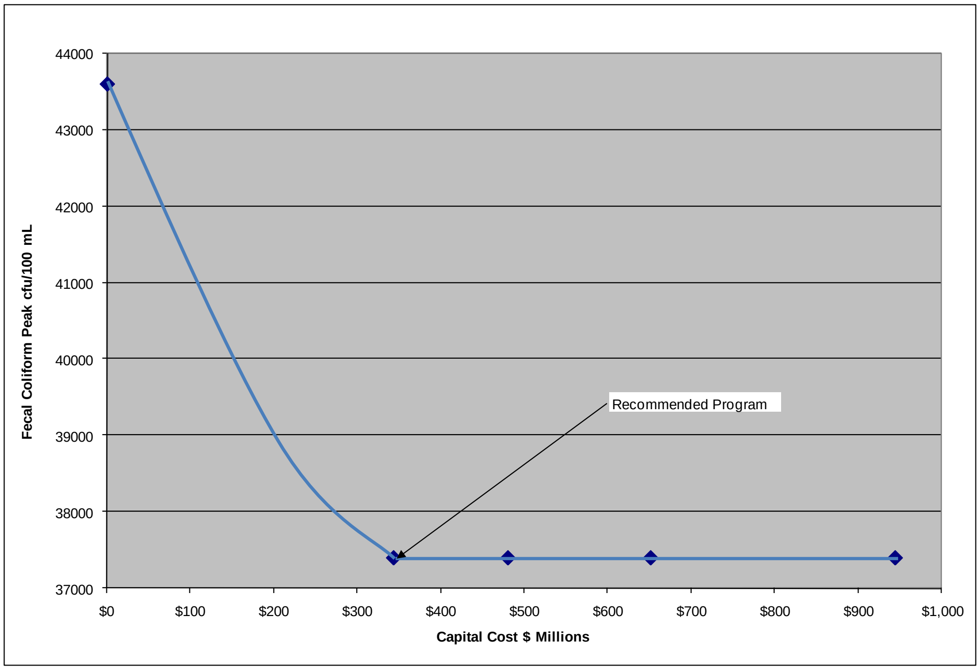


FIGURE 5.2.4 PEAK FECAL COLIFORM REDUCTIONS – BEARGRASS CREEK



5.3 ELIMINATING UNAUTHORIZED DISCHARGES FROM THE SEWER SYSTEM

The Consent Decree requires MSD to develop a Final SSDP designed to eliminate unauthorized discharges from the SSS, CSS, and WQTCs. When MSD established the WWT and embarked upon the development of the values-based risk approach to all overflow abatement, the process produced an SSDP, including the following Consent Decree elements. (Note: locations of specific requirements are cited from the 3-volume IOAP):

- A map that shows the location of all known unauthorized discharges, including areas and sewers lines that serve as tributary to each unauthorized discharge. This is addressed in Volume 3, Chapter 2, Section 2.2.2.
- A description of each unauthorized discharge location that includes:
    i. frequency of discharge
    ii. annual volume of discharge
    iii. type of discharge (i.e. manhole, pump station; constructed discharge, etc)
    iv. the receiving stream
    v. land use for the immediate and downstream area where discharge occurs, and potential for public health impact
    vi. any previous SSOs in the last five years
    vii. any previous, current or proposed rehabilitation, or construction work to remediate or eliminate the discharge

This information is presented in Volume 3, Chapter 2, Sections 2.4.3 and 2.5, and on the project fact sheets included in Volume 3, Chapter 4.

- Prioritization of the unauthorized discharges and remedial measures, schedules for design, initiation and completion of construction of these measures. This is presented in Volume 3, Chapter 4, Section 4.2.
- A plan to involve stakeholders in the planning, prioritization and selection of project alternatives. This is addressed in Volume 1 Chapter 2, Sections 2.5 and 2.6, and in Chapter 3, Section 3.2.
- The results of an evaluation of WQTC peak flow treatment capacity for any WQTC that will receive additional flow based on any Interim or Final SSDP project. The results of this evaluation are presented in Volume 1, Chapter 4. The actual Comprehensive Performance Evaluations and Composite Correction Programs are appended to Volume 1, in Appendix 4.4.3.

Specifically the results from the implementation of the Final SSDP will:

- Eliminate SSOs at an estimated 145 locations in an average year, (average of 2005–2007 data, normalized for rainfall) from a total of 214 potential overflow locations that are controlled to at least the 1.82-inch 3-hour cloudburst storm.(includes SSOs addressed by both the Interim SSDP and the Final SSDP);
- Eliminate an average of 290 million gallons (MG) of overflow volume per year (average of 2005–2007 normalized for rainfall), eliminating 100 tons of five-day biochemical oxygen demand (BOD5) and almost 200 tons of solids annually;
- Eliminate “blending” at the Jeffersontown WQTC;
- Provide full secondary treatment of sanitary sewage from the SSS area; and
- Eliminate five small WQTCs in the Prospect area that discharge to Harrod’s Creek, a watershed that has been severely impacted by suburban runoff.

5.3.1 Elimination of Unauthorized Discharges Based on Site-Specific Design Storms and the WWT Values Based Framework

In the IOAP, the values evaluation framework has been used to evaluate a range of site-specific design storms to establish the appropriate level of control of SSOs. MSD’s technical team analyzed each project alternative considered for the IOAP in terms of potential benefits and costs, where benefits are quantified based on the anticipated reduction in risks to the community values and costs reflect the total capital and operational costs of the alternative. The benefit-cost analysis influences the selection of site-specific abatement approaches or technologies, site-specific levels of protection, and the relative priority of projects for implementation.

The IOAP used the values-based benefit/cost evaluation framework to determine design events that reflect an appropriate level of control of sewer overflows for the Louisville Metro community. The decision to develop site-specific levels of control based on benefit/cost evaluations was made by MSD in consultation with the Stakeholder Group that is a part of the WWT. While site-specific levels of control were determined to best meet the objectives of the community, the WWT Stakeholder Group strongly supported the identification of boundary conditions representing the minimum level of protection acceptable to the community, and the maximum level of protection determined to be reasonable, given competing demands on environmental protection community resources.

A storm event with a 50 percent probability of occurring in any given year (commonly referred to as a two-year storm) was identified as the minimum level of protection acceptable to the community. The cities of Atlanta and Knoxville set the precedent for selecting a design storm with a 50 percent probability of being exceeded in any given year as the minimum protection level for unauthorized discharges. Using the values evaluation framework approach to determine the design storm control level means that solutions to address an individual unauthorized discharge location would be designed to protect against larger storms (for example, a 2.25-inch cloudburst storm instead of a 1.82-inch cloudburst storm) if that would yield a higher benefit-cost ratio in the analysis of project alternatives.

Similarly, a storm event with a ten percent probability of occurring in any given year (commonly referred to as a 10-year storm) was selected as the maximum level of protection considered reasonable. A storm of this severity happens infrequently, and often causes high levels of non-point source pollution that overwhelm the potential impacts of SSOs. The WWT Stakeholder Group understood the need to focus community resources available for environmental protection on the pollution sources that give the greatest return on invested dollars. Protecting against SSOs in a storm with a ten percent probability of occurring in any year was identified as the upper limit of protection that the community believes is reasonable, given the potential for other, more cost-effective controls on other sources of pollution.

Relying on an analysis of sixty years of historical weather patterns for Jefferson County, the IOAP uses a three-hour "cloudburst" storm, with a statistically anticipated rainfall of 1.82 inches, as the minimum design storm considered. The Cities of Atlanta and Knoxville used similar design storms as the minimum protection level for SSO control. Additionally, the approach of using the values evaluation framework to determine the SSO control level means that solutions to address certain SSOs have been designed to protect against larger storms (for example, a 2.25-inch cloudburst storm instead of a 1.82 cloudburst storm) because they yield a higher benefit-cost ratio in the analysis of project alternatives.

In the Final CSO LTCP, the level of control was similarly selected using the benefit-cost ratios at several levels of control (eight, four, two, and no overflows in the average year). This level of control was then assessed by the analysis referred to as the "knee-of-the-curve" analysis. This analysis typically involves estimating costs for a range of control levels, then comparing performance (benefits) versus cost and identifying the point of diminishing returns. For the Final SSDP, the knee-of-the-curve analysis focused on a comparison of total benefits versus total capital costs at various levels of protection.

The Final SSDP optimization process did not require that total capital cost and benefits be calculated for each preferred technology at all levels of protection. Total capital costs and benefits were calculated for the preferred technologies at a level of protection corresponding to the 1.82-inch and 2.25-inch cloudburst storms. Cost and benefits were calculated for 12 of these preferred technologies for the 1.52-inch and 2.60-inch levels of protection. Costs and benefits for the other preferred technologies were estimated by correlation to the 1.82-inch or 2.25-inch level-of-protection values. All costs reflect the more detailed budget-level cost estimates prepared for the preferred alternatives.

Figure 5.3.1 shows a curve of total benefits as a function of total capital cost for each level of protection. This Figure also shows a single point above the curve denoting the total benefits (28,100) and total capital cost ($142 million, 2008 dollars) for the recommended projects (not including Interim SSDP projects). The Figure illustrates a typical knee of the curve response, with the point of inflection representing the point of diminishing returns. The Figure shows that beyond the 1.82-inch level of protection, additional capital expenditures result in a much slower increase in total benefits. The single point corresponding to the recommended projects lies just at the knee of the curve, demonstrating that the program maximizes benefits to the community with a controlled cost.

Figure 5.3.2 shows a curve of average project benefit-cost ratio versus total capital cost. There is a single point representing the average benefit-cost ratio (67) and total capital cost ($142 million) for the recommended projects. This curve is plotted in a format to show optimization of the benefit-cost ratio. This Figure clearly shows that the maximum average benefit cost ratio occurs around the 1.82-inch cloudburst storm. Benefit-cost ratios decline significantly beyond a 1.82-inch level of protection. The single point shows that the recommended projects are at the highest benefit-cost ratio, again demonstrating that the program maximizes benefits to the community.

Note that Figure 5.3.2 this curve was generated for the suite of projects submitted as part of the September 30, 2009, version of the IOAP. A complete re-analysis of this data was not performed on the suite of projects submitted as the 2012 IOAP Modification since the project changes were so minor relative to the overall SSDP program. Only two SSDP projects changed in level-of protection, with both of them going to higher levels of control than proposed in the September 30, 2009, IOAP.

Refer to Volume 2, Chapter 5, and Volume 3 Chapter 5 for detailed overflow volume, frequency and project information

FIGURE 5.3.1 FINAL SSDP PROJECT OPTIMIZATION: TOTAL BENEFITS VERSUS TOTAL CAPITAL COST (2008 DOLLARS)

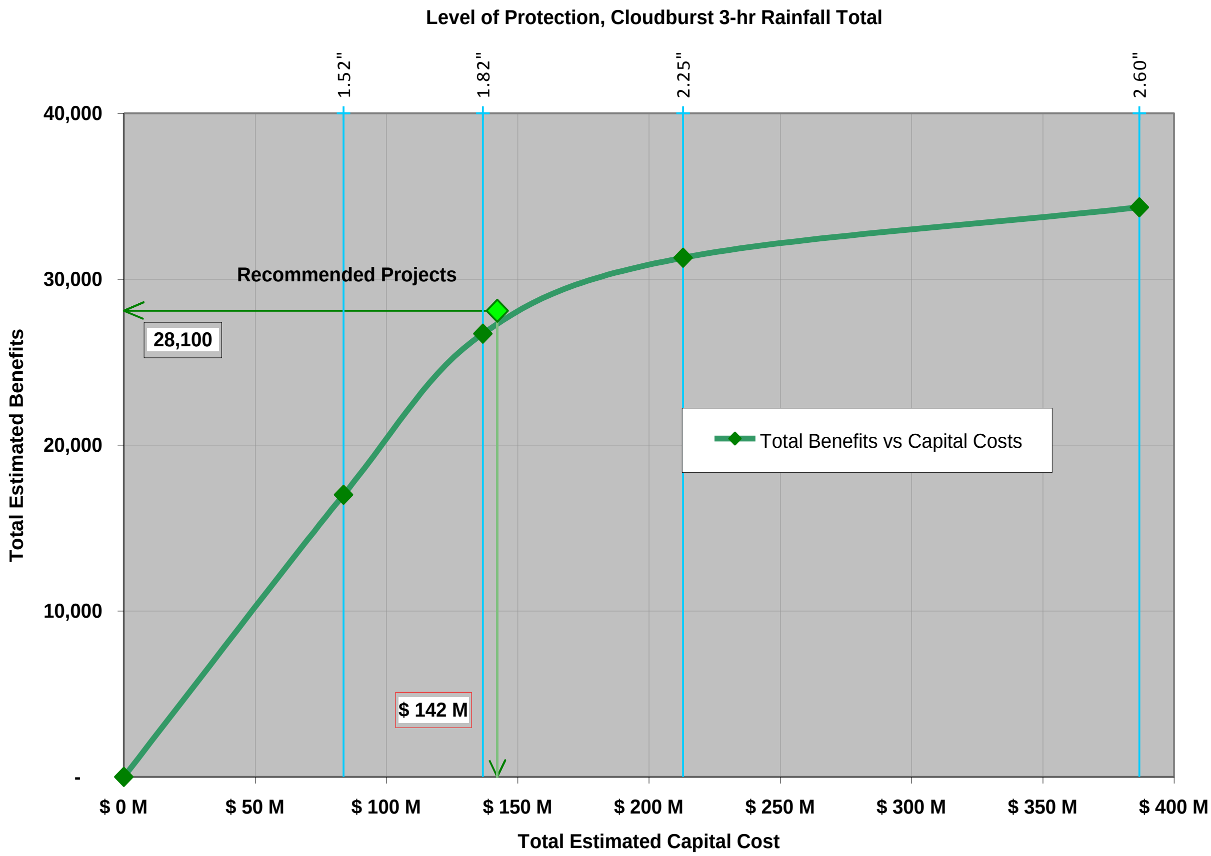
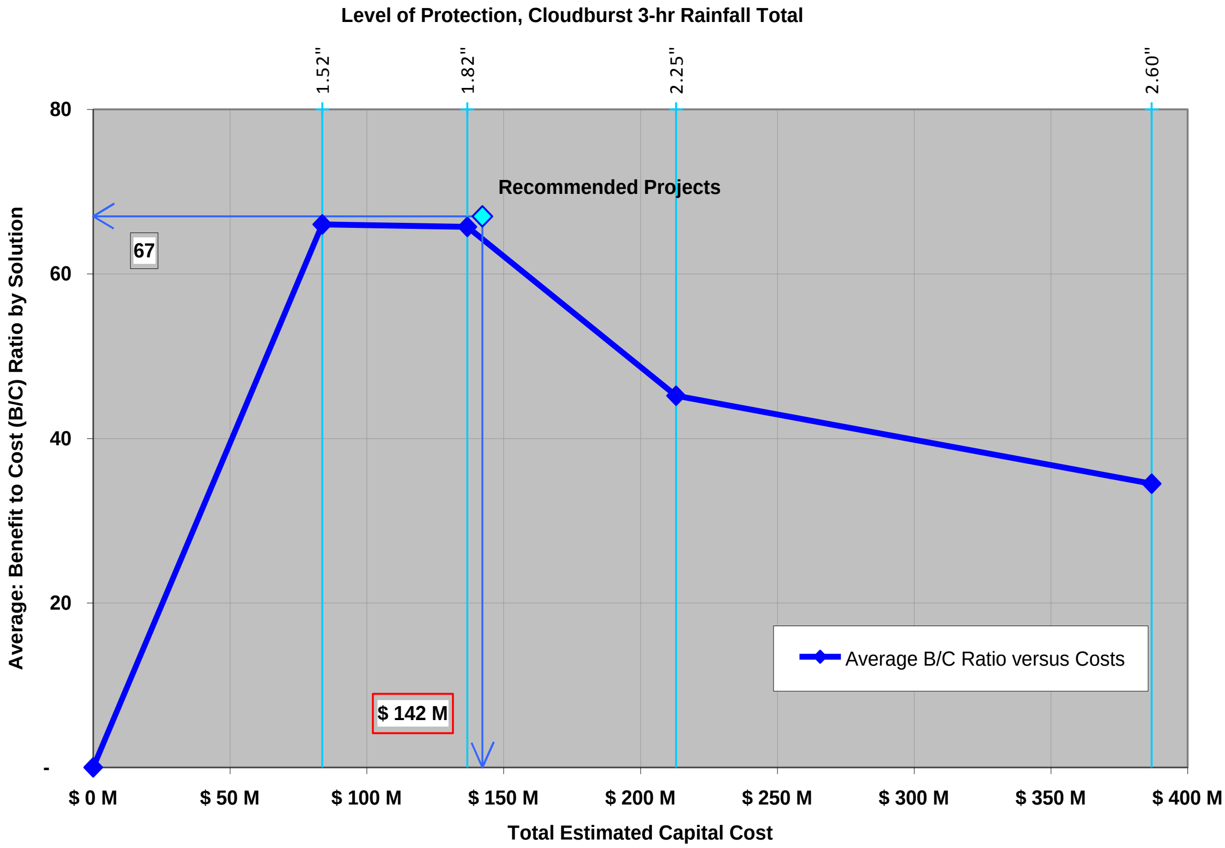


FIGURE 5.3.2 FINAL SSDP PROJECT OPTIMIZATION: AVERAGE BENEFIT-COST RATIO VERSUS TOTAL CAPITAL COST (2008 DOLLARS)



As a result of this analysis, Final SSDP projects have been selected to provide the following levels of control:

- 31 projects eliminate overflows up to a 1.82-inch cloudburst storm.
- 5 projects eliminate overflows up to a 2.25 cloudburst storm.
- 11 projects eliminate overflows up to a 2.60-inch cloudburst storm.

The specific mix of control options for individual SSO locations in the IOAP is driven by the benefit-cost analysis of how the project alternatives affect the WWT's community values and site-specific considerations. Project alternatives are built around MSD's existing infrastructure, such as large diameter pipes and WQTCs. In addition, the project alternatives draw on synergistic benefits from other MSD projects, such as the Interim SSDP projects.

The Final SSDP was developed based on front-end consideration of source control. This means that more traditional gray infrastructure in the IOAP has been sized after the anticipated effectiveness of source control. Source control includes public outreach and education; however, the primary component is an aggressive Inflow and Infiltration (I/I) program including control reduction of private sewer sources of I/I. The sizing of the gray solutions is based on actual source control investments justified by performance information applied in models.

The 41 gray infrastructure Final SSDP projects and six Interim SSDP projects to control SSOs include (note that projects may contain more than one of these components and may therefore be counted more than once):

- 19 projects that include conveyance capacity upgrades, sewer rehabilitation, and interceptor relief;
- 9 projects with in-line or off-line storage;
- Upgrades or replacements to 13 pump stations;
- 12 pump station eliminations;
- Expansion of one WQTC; and
- Elimination of seven small WQTCs including five in the Prospect area.

The I/I control program has a program budget of $51 million over 15 years to replace and rehabilitate sewer pipes and to implement a private property sewer rehabilitation program that will require property owners to disconnect illicit connections and to inspect and maintain sewers to prevent blockages and leaks. Other source control will include public education pertaining to:

- Private sewer ownership, inspection and maintenance requirements;
- Illicit connections to the storm sewers, use of rain barrels and other options for drainage concerns; and
- Fats, oils and grease (FOG) campaign for businesses and homeowners.

5.4 AN APPROVABLE FINAL CSO LTCP

The MSD Final CSO LTCP as submitted on June 19, 2009, is fully compliant with the Consent Decree and the requirements of the CSO Control Policy. This 2012 IOAP Modification provides a higher level of CSO control and a lower final residual AAOV, confirming that it is also fully compliant with the Consent Decree and the CSO Control Policy. MSD's water quality compliance approach is based on EPA's Demonstration Approach in that water quality modeling demonstrates that in the typical year, CSOs remaining after implementation of the IOAP will not, in the absence of background loads, cause water quality standard violations in Beargrass Creek or the Ohio River. The innovative and site-specific approach includes implementation of green infrastructure and public education. As stated above in Section 5.2.1, the Final CSO LTCP is also fully compliant with the three goals required in the Consent Decree [paragraph 25. (b) (2)].

Both the Consent Decree and the CSO Policy require specific elements of the LTCP as noted in the Table 5.4.1 below. MSD has fully complied with both the Consent Decree and the CSO Policy through the full inclusion of each of these elements in the Final CSO LTCP.

TABLE 5.4.1

FINAL CSO LTCP ELEMENTS AS REQUIRED BY THE CONSENT DECREE

Requirement Per Consent Decree Paragraph 25 (b) (2)	IOAP and Final CSO LTCP Chapters and Sections	Compliance with CSO Policy and Consent Decree
(i) Results of 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 MSD's compliance with the requirements of the USACE Ohio River Flood Protection System Pumping Operations Manual, dated 1954 and revised 1988.	Volume 2 - Final CSO LTCP: Chapter 2 for an evaluation of the controls to address flood pumping issues, Chapter 3 for the alternative analysis Chapters 4 and 5 for the selection of effective CSO Controls including modifications to the flood pumping system, where required, to implement revised operating procedures at the flood pump stations.	**Yes** – the proposed plan is based on an extensive process in which every alternative accounted for data and was reviewed by WWT.
(ii) Results of an evaluation of WQTC peak flow treatment capacity for any WQTC other than the Morris Forman WQTC that will receive additional flow based on any LTCP. Such evaluation shall be consistent with the EPA publications "Improving POTW Performance Using the Composite Correction Approach and "Retrofitting POTWs"	No existing treatment plants other than the Morris Forman WQTC will receive any additional flow as a result of the Final CSO LTCP. Volume 2, Chapter 3.3 Evaluation of CSO Control Alternatives; Table 3.1.1 shows treatment alternatives; Chapter 3.2.7.5 Utilization of Morris Forman WQTC; Chapter 3.2.7.5 Satellite treatment alternatives; Table 3.3.1.	**Yes** – peak flow treatment capacity will be available with use of storage, real time control (RTC), and treatment.
(iii) Report on the Public Participation Process	Volume 1 - IOAP, Chapter 3	**Yes** – the WWT and the general public were actively involved in the decision making to select the long-term CSO controls.
(iv) Identification of how the LTCP addresses sensitive area as the highest priority for controlling overflows	Volume 2, Chapter 1.6.6.7; Chapter 2.8; and Chapter 3.2.7.6	**Yes** – while all receiving waters considered in the Final CSO LTCP are categorized sensitive under CSO Policy criteria, MSD performed further prioritization of stream reaches based on ecological characteristics.
(v) Report on the cost analyses of the alternatives considered	Volume 1, Chapter 2 Volume 1, Chapter 6 presents rate and affordability impacts Volume 2, Chapter 3.3.2, and Chapters 4 and 5.	**Yes** – application of cost to community value framework for a cost-benefit and a knee of the curve analysis were part of the development of project alternatives and choices. Affordability and phases were also accounted in the development of the schedule.

TABLE 5.4.1

FINAL CSO LTCP ELEMENTS AS REQUIRED BY THE CONSENT DECREE

Requirement Per Consent Decree Paragraph 25 (b) (2)	IOAP and Final CSO LTCP Chapters and Sections	Compliance with CSO Policy and Consent Decree
(vi) Operational plan revisions to include agreed upon long term controls	Volume 1, Chapter 6	**Yes** – operational plan budgets adequate resources to operate and maintain the Final CSO LTCP projects.
(vii) maximization of treatment and evaluation of treatment capacity at Morris Forman WQTC	Volume 2, Chapter 3.2.7.5 Utilization of Morris Forman WQTC Chapter 3.3 Evaluation of CSO Control Alternatives Appendix 3.2.20 Morris Forman WQTC Wet Weather SOP Procedures Appendix 3.2.21 Morris Forman WQTC Expansion Tech Memo	**Yes** – Wet Weather flow capacity has been maximized and verified through extensive testing. Additional peak flow treatment capacity will be available with use of storage, RTC and a new retention treatment basin.
(viii) Identification of an implementation schedule for the selected CSO control	Volume 2, Chapters 4 and 5, Final CSO LTCP and selected Project Final Recommended Project List	**Yes** – All projects completed by Consent Decree deadline of December 31, 2020.
(ix) A post-construction compliance monitoring program adequate to verify compliance with water quality-based CWA requirement and ascertain the effectiveness of CSO controls	Volume 1 Chapter 6.5	**Yes** – a full suite of monitoring will be implemented in order to determine efficacy and adapt plan as appropriate.

5.5 AN APPROVABLE FINAL SSDP

The MSD Final SSDP as submitted on June 19, 2009, is fully compliant with the Consent Decree. The 2012 IOAP Modification provides a higher level of control (as indicated by the design events used for project sizing) and therefore is also fully compliant with the Consent Decree. The combined, sustained and phased implementation includes both a gray infrastructure plan and a source control program including a private sewer program intended to reduce I/I. This Final SSDP, in conjunction with the SORP and public education aimed at individual responsibility and behavior modification (as it relates to FOG, private sewer maintenance and rehabilitation, illicit cross connections and drainage) will eliminate unauthorized discharges from the SSS, CSS and WQTCs by December 31, 2024.

As outlined in Section 5.3, the Final SSDP complies with all the requirements of the Consent Decree under paragraph 25 (a) (3), as shown in Table 5.5.1.

In addition, the Consent Decree requires that the results of an evaluation of the WQTC peak flow treatment capacity for any WQTC that will receive additional flow based on any interim or Final SSDP project. These analyses were fully developed and can be found in Volume 1, Chapter 4.

TABLE 5.5.1

FINAL SSDP ELEMENTS AS REQUIRED BY THE CONSENT DECREE

Requirement Per Consent Decree Paragraph 25(A)(3)	IOAP and Final SSDP Chapters and Sections	Compliance With Consent Decree
(3) The long-term SSDP projects, including schedules, milestones, and deadlines	Volume 1, Chapter 4.3, Chapter 6.3 Volume 3, Chapter 4.1 and Chapter 5	**Yes –** The Final SSDP describes 41 gray infrastructure projects, I/I reductions studies, and a source control program to eliminate 208 SSOs. The project schedule shows milestones and completion dates for each of these projects.
(3) Results of an evaluation of WWTP peak flow treatment capacity for any WWTP that will receive additional flow based on any Interim or Final SSDP project. Such evaluation shall be consistent with the EPA publications "Improving POTW Performance Using the Composite Correction Approach and "Retrofitting POTWs"	Volume 1, Chapter 4.4	**Yes -** All the plants that could receive additional flow as a result of SSO elimination have been evaluated.
(A) A map that shows the location of all known Unauthorized Discharges. The map shall include the areas and sewer lines that ser as a tributary to each Unauthorized Discharge. Smaller maps of individual tributary areas also may be included to show the lines involved in more detail.	Volume 3, Chapter 2.5, Figures 2.5.3 through 2.5.15	**Yes –** The network branch maps show all 208 documented and suspected SSOs, with sufficient detail to see tributary sewers.
(B.i) A description of each Unauthorized Discharge locations that includes the frequency of the Unauthorized Discharge	Volume 3, Chapter 2.4, Table 2.4.2, with additional information in the Fact Sheets.	**Yes –** Table 2.4.2 contains this information and in the Fact Sheets.
(B.ii) The annual volume released of the Unauthorized Discharge	Volume 3, Chapter 2.4, Table 2.4.2 in the Fact Sheets at the end of the chapter.	**Yes –** Table 2.4.2 contains this information in the Fact Sheets.
(B.iii) A description of the type of Unauthorized Discharge location	Volume 3, Chapter 2.4, Table 2.4.2 in the Fact Sheets	**Yes –** Table 2.4.2 contains this information in the Fact Sheets.
(B.iv) The receiving stream	Volume 3, Chapter 2.4, Table 2.4.2 in the Fact Sheets.	**Yes –** Table 2.4.2 contains this information in the Fact Sheets.
(B.v.) The immediate and downstream land use, including the potential for public health concerns	Volume 3, Chapter 2.2.1	**Yes –** Descriptions of the WQTC service areas describe landuse and the history of sewer system development in the area.

TABLE 5.5.1

FINAL SSDP ELEMENTS AS REQUIRED BY THE CONSENT DECREE

Requirement Per Consent Decree Paragraph 25(A)(3)	IOAP and Final SSDP Chapters and Sections	Compliance With Consent Decree
(B.vi) A description of any previous (within the last 5 years) current, or proposed studies to investigate the Unauthorized Discharge	Volume 3, Chapter 1.3	**Yes –** Chapter 1 summarizes MSD's previous and current SSO elimination efforts.
(B.vii) A description of any previous (within the last 5 years current of proposed rehabilitation or construction work to remediate or eliminate the Unauthorized Discharge	Volume 3, Chapter 2.2 and 2.3	**Yes –** The descriptions of the WQTC service areas include summary descriptions of previous construction work, and the descriptions of the model development describes those on-going or currently planned projects that contribute to SSO elimination.
(C) A prioritization of Unauthorized Discharge locations based on the frequency, volume, and impact on the receiving stream and upon public health, in coordination with CMOM programs	Volume 1, Chapter 6.3 Volume 3, Chapter 4.2.1	**Yes –** The referenced chapters describe the schedule prioritization process, based in part on the benefit-cost ratio that includes the required parameters in the benefit calculation.
(C) Schedules for design and construction, phased based on sound engineering judgment, and in no case extending beyond December 31, 2024	Volume 1, Chapter 6.3 Volume 3, Chapter 4.2 and Chapter 5	**Yes** – Schedules are included that show the required phases, and this schedule shows completion by December 31, 2024.
(D) A plan to involve stakeholders in the planning prioritization and selection of projects.	Volume 1, Chapter 3.2 Volume 3, Chapter 4.3	**Yes** – The IOAP included a robust and stakeholder involvement process that included participation in decisions on selection and prioritization of projects.

5.6 "NO SURPRISES" FOR APPROVING AGENCIES

Throughout the development of the IOAP, meetings were scheduled with those regulatory agencies having jurisdiction over the program to facilitate open communication between MSD and the regulators regarding progress and compliance with Consent Decree requirements. Electronic reporting updates requested by KDEP and EPA have been developed and implemented to provide current information. The Initial Discharge Report for any overflow that reaches the Waters of the US is sent to EPA and KDEP via email. If the overflow report has not been closed when initially sent because data is not yet available, a second email is sent with updated information when the report is closed. This Initial Discharge Report system polls the Hansen database twice a day and sends emails on qualifying overflows. Emails are automatically sent to subscribers (including regulators, if they subscribe) to inform them when a rain event has occurred that may trigger overflows or when a large volume dry weather overflow has occurred. A second email is sent 48 hours after the end of the event to notify subscribers that conditions have returned to normal.

Additionally, reports are prepared for each of the four quarters of the calendar year: and are submitted to EPA and KDEP within 30 days of the end of each quarter and are posted on MSD's Project WIN website in the Library section for public review. These reports include specific information about activities consistent with the requirements of the Consent Decree and the progress toward the development of the IOAP. In addition to these reports, MSD initiated periodic face-to-face meetings with technical team members from the KDEP and EPA to discuss the progress of the Project WIN overflow abatement program. The intent of these meetings was to ensure that there no surprises when the IOAP was submitted, and that the IOAP met all the parameters to allow approval.

Chapter 6

CHAPTER 6: INTEGRATED OVERFLOW ABATEMENT PLAN IMPLEMENTATION

Special Note: This chapter was developed in 2008. The statistical data for the CSO's reported, specifically related to individual CSO overflow volumes and frequency in a typical rainfall year, were derived from the CSS model calibrated in 2007. Since then, a more detailed calibration and validation effort has adjusted the average annual overflow volumes and frequencies in the typical year. This information is provided in Volume 2, Chapter 5. The vast majority of the physical system characterization in this chapter is still accurate.

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Appendix 6.5.1 2011 Water Quality Synthesis Report
Appendix 6.5.2 Burnsville MN Case Study

The Technical Memorandum “Sewer Maintenance Cost”, found in Appendix 6.2.1, describes in detail, the cost rate calculation for sewer line O&M. This Technical Memorandum was updated for the 2012 IOAP Modification, and the updated Technical Memorandum can be found in Appendix 6.2.2.

CHAPTER 6: INTEGRATED OVERFLOW ABATEMENT PLAN IMPLEMENTATION

Other chapters and volumes of the Integrated Overflow Abatement Plan (IOAP) describe Louisville and Jefferson County Metropolitan Sewer District's (MSD) approach to characterizing overflows, identifying potential solutions, evaluating alternatives, and selecting technology approaches and site-specific levels of control. This chapter presents an operational plan that provides the staff, equipment, and other facilities necessary to implement and sustain the recommendations of the IOAP. This chapter also addresses the impact of the IOAP capital and operating costs on MSD's rates, and the community's ability to pay those rates. The project schedule is described, along with the Post-construction Compliance Monitoring Program that will support an adaptive management approach to assuring that MSD meets its obligations under the Consent Decree.

6.1 PUBLIC PARTICIPATION AND AGENCY INTERACTION

Volume 1, Chapter 3 describes in detail the overall public participation and agency interaction program. A key component of the public participation process was the Wet Weather Team (WWT) that included an active and engaged Stakeholder Group. The WWT developed a highly structured decision support process using benefit-cost evaluations based on a set of community values identified by the Stakeholder Group. MSD engaged the public through a series of public meetings presenting Project WIN topics for information and discussion at different phases of the plan development.

In addition to forming the basis for project selection, the benefit-cost evaluation was a key factor in project prioritization and scheduling. The process for developing the schedule is discussed later in Section 6.3. Projects were prioritized by considering the specific requirements of the Consent Decree, the logical sequencing of construction to allow beneficial use of completed facilities immediately after construction, and the relative benefit-cost scoring.

Input from the public meetings also contributed to project prioritization and scheduling. For example, wet weather capacity-related overflows in the Camp Taylor area are a small part of a much larger customer service issue. A group of Camp Taylor residents attended one of the public meetings to voice their concerns with the reliability of service in their area. While the projects required to eliminate wet weather capacity related overflows in Camp Taylor actually score relatively low on the project-specific benefit-cost evaluation, the work order history of sewer collapses, pipe breakage, and blockages indicate that the programmatic customer service value justifies a higher priority for that project. Since the work order history supported the resident's reports, MSD revised the proposed Camp Taylor work by dividing it into four phases. As a result, the first phase includes a complete and comprehensive condition assessment of the sewers in the area, to prioritize and plan the repair and/or replacement of these sewers. The assessment will first focus on portions of sewer system that work order history suggests are in the worst condition. This phase will begin almost immediately upon review and approval of the IOAP. The second phase will include repair or replacement of the most critical areas identified by the condition assessment. The third and fourth phases include rehabilitating or replacing the sewers that analysis shows to be in poor condition, on a prioritized basis as determined by the condition assessment.

Volume 1, Chapter 3 also documents the meetings with regulatory agencies. These meetings involved both regularly scheduled conference calls with technical staff from Kentucky Department of Environmental Protection (KDEP) and U.S. Environmental Protection Agency (EPA), and face-to-face meetings that included other representatives from these agencies and sometimes from the U.S. Department of Justice. These meetings affected both operating approaches and project prioritization and scheduling. For example, as a result of these meetings, the Jeffersontown Water Quality Treatment Center (WQTC) Comprehensive Performance Evaluation was developed in greater detail than EPA guidance recommends and that was originally specified in the original Consent Decree of August 2005. MSD also prepared a comprehensive Process Control Program to improve both wet weather and dry weather operating procedures at this WQTC.

In preparing the 2012 IOAP Modification, MSD continued the practice of open communication with the public and with regulators. Volume 1 Chapter 3 details the ongoing meetings with the WWT Stakeholder Group, the Project WIN Project Review and Public Input meetings, and the on-going communications meetings with EPA and KDEP. Prior to developing the draft 2012 IOAP Modification, MSD met with regulators to describe the adaptive management changes indicated by the model recalibration, and the impacts on project sizing, budgets, and schedules. Discussions focused on the justification for the changes and the environmental impacts of the changes. A process was agreed to for gaining approval of minor modifications for time-sensitive modifications, and the form and format of the 2012 IOAP Modification was agreed upon. The open communication between MSD and its customers and regulators is intended to ensure “no surprises” for any parties as these 2012 IOAP Modifications are submitted for review and approval.

6.2 OPERATIONAL PLAN

This section reviews the MSD operating budget to anticipate the increased annual operations and maintenance (O&M) cost of facilities constructed as part of the IOAP. The intent is to develop operating budget projections that accounts for additional staff, equipment, and other facilities needed to implement and sustain the IOAP recommendations. The proposed facilities that will impact operating costs include sewers and force mains, storage basins, pump stations and remote wet weather treatment facilities. In addition, recommendations of the Capacity Management Operations and Maintenance (CMOM) program impact MSD’s standard operating procedures (SOPs) and preventive maintenance programs for plants, pump stations, sewers and force mains. Future costs and staffing levels are presented in this section for the purpose of estimating future financial resources needed. Actual staffing levels and operating budgets are based on operating experiences and depend on a variety of unknown factors such as future utility rates, material costs, labor agreements, etc. Staffing levels and budgets are determined through the annual budgeting process reviewed and approved by the MSD Board, and can be expected to vary from the estimates presented herein due to the many factors that affect them.

6.2.1 Current Operating Budgets

Table 6.2.1 shows the MSD Fiscal Year 2012 (July 1, 2011 – June 30, 2012) operating budget. Using this budget and data as a reference point, MSD can project additional funds required for construction projects and proper operation and maintenance of sewage lines, storage basins, and pump stations.

TABLE 6.2.1

FY 2012 OPERATING BUDGET

Category	Amount ($)
Labor	29,415,000
Utilities	$14,337,000
Contracted Services (Professional, Maintenance & Repairs, Biosolids and Grit)	$16,805,000
Billing & Collection	$4,470,000
Materials & Supplies	$8,180,000
Chemicals and Fuel	$5,697,000
Other	$2,701,000
Total	**$81,605,000**

6.2.2 Additional IOAP Resources

To implement and sustain the recommendations of the IOAP, additional resources will be required. The following sections review the method used to estimate additional operational costs for new sewers, storage basins, pump stations, and remote treatment. These methods account for labor and equipment required in sewer inspections and cleaning; labor and other costs related to routine preventive maintenance and post-event storage basin cleaning; labor and energy related to pump station operation; and labor, chemicals, and energy cost for remote treatment facilities. The estimated values serve as an initial point for developing the additional operation and maintenance costs of the IOAP projects.

Offsetting the cost of the new facilities is the savings that will be realized by the elimination of pump stations and small WQTCs. The labor savings will be reflected in reduced staffing. The savings in all other operating categories will be estimated based on the overall operating budget allocated to the 15 small WQTCs in operation during FY 2012.

For the purposes of this report, it is assumed that costs will essentially be the same whether MSD or a contractor performs the proposed IOAP activities. Benchmarking MSD costs for Closed-circuit television (CCTV) inspection of sewers and sewer cleaning confirms that MSD's self-delivery costs are competitive with services procured from outside service providers through a competitive bid process. The following section describes the approach to estimating annual operating and maintenance costs for each type of project.

6.2.2.1 Sewer Preventive Maintenance

The Technical Memorandum "Sewer Maintenance Cost", found in Appendix 6.2.1, describes in detail, the cost rate calculation for sewer line O&M. This Technical Memorandum was updated for the 2012 IOAP Modification, and the updated Technical Memorandum can be found in Appendix 6.2.2. Cleaning and inspection costs were obtained from outside contractors and compared to MSD's historical work order records. Inspection costs were distributed assuming a

10-year cycle, while cleaning costs were distributed assuming a five-year period. Note that these preventive maintenance cycles were overall averages, selected for resource determination only. These cycles may not represent the preventive maintenance cycles actually implemented under MSD's CMOM program. For example, the preventive maintenance cleaning cycle currently defined in the CMOM program schedules cleaning on cycles that vary from once per month (for areas of known blockage problems) to every 10-years for areas with no unusual history of blockages.

An additional 30 percent was added to the initial estimates to account for overhead functions such as reporting, mapping, hiring contractors, managing work crews, utility locating, and minor repairs. Table 6.2.2 provides a list of the resulting estimated sewer pipe O&M rates.

TABLE 6.2.2

APPROX. IOAP SEWER MAINTENANCE COST IN 2008 DOLLARS

Sewer Pipe Diameter (Inch)	Approximate Maintenance Cost ($/LF·YR)
4 – 12	0.45
15 – 16	0.54
18	0.54
21 – 30	0.81
33	0.82
36	0.93
38 – 42	1.26
48	1.26
54 – 60	1.33
63 – 84	1.46
90 – 120	2.07

These rates were used to generate initial annual O&M costs for the selected IOAP projects that include new sewers as part of the solution. Approximately 54 miles of new sewers are added by the IOAP (as compared to over 3,200 miles currently in the system). The anticipated additional O&M costs due to new sewers is approximately $174,000 per year (2012 dollars) representing one new staff position plus associated support and equipment in Infrastructure and Flood Protection (I&FP) Division.

6.2.2.2 Storage Basins

Technical Memorandum "Detention Basin Operation & Maintenance Cost", found in Appendix 6.2.3, discusses the method of estimating the O&M cost of off-line detention basins. This Technical Memorandum was updated for this 2012 IOAP Modification, and the updated Technical Memorandum can be found in Appendix 6.2.4. To estimate the annual O&M cost for a detention basin, the basin's fixed cost and variable cost are combined. The model's fixed cost is a flat rate based on 208 work-hours of O&M per year for each basin. This is based on an average of four hours per week per basin for inspection and routine clean up. The variable cost is a function of the number of uses or frequency of events per year and the volume of the basin.

The hydraulic models described in Volume 2 and Volume 3 predicts the frequency of basin use. Each event is assumed to generate an additional labor demand required for post-event maintenance and cleaning of the basin. The post-event time has been initially set at a minimum of 16 hours for the smallest basins and increases proportionally to a maximum of 40 hours for the largest basins. The time is multiplied by the labor wage rate. A standard rate of $36.35 per hour has been assumed. An additional fixed cost amount for miscellaneous monthly administrative and operational cost, such as telemetry, power, and fuel are added for each basin. To account for renewal and replacement costs, an amount equal to four percent of the equipment cost is included in the annual operating costs. Note that modeled parameters such as required work-hours, wage rates, and miscellaneous cost must be monitored and adjusted as necessary to maintain validity of the model.

The IOAP includes 17 new off-line storage facilities (and several in-line storage facilities that have lower O&M costs) of various sizes. The estimated O&M cost for off-line storage basins is $2,100,000 per year (2012 costs) includes 15 new staff positions in Metro Operations.

6.2.2.3 Pump Stations

The Technical Memorandum "Pump Station O&M Cost", found in Appendix 6.2.5 discusses the method of estimating the annual O&M cost of a pump station. This Technical Memorandum was updated for this 2012 IOAP Modification, and the updated Technical Memorandum can be found in Appendix 6.2.6. The method calculates the energy cost based on the average annual volume pumped and the estimated discharge pressure. For pump stations associated with storage basins that may not get used often, a demand charge based on the pump station capacity was also included. Labor cost calculations assume a fixed cost for inspection and preventive maintenance based on a range of one to seven hours per week per pump station., based on pump station size. An additional maintenance cost based on the pump station capital cost is included as well. This additional amount represents the increased O&M requirements associated with larger, more complex pump stations. By applying this method to the selected IOAP projects, an initial estimate of the annual O&M cost for a pump station can be calculated.

The IOAP adds 18 new pump stations (many associated with storage projects) with an estimated operating cost of $381,000 per year. Several other IOAP projects upgrade and expand the capacity of existing pump stations, also adding operating cost (primarily energy).

Other projects remove 10 pump stations from service, thus reducing staff needs. While the net gain is only eight pump stations, the new pump stations are typically much larger than the small pump stations that will be eliminated. The net long-term effect of pump station changes is an increase of three new positions in Metro Operations and an increase in utility costs.

6.2.2.4 Treatment

A Technical Memorandum was prepared to evaluate the added cost of treatment of additional wet weather capture at the Morris Forman WQTC and the Derek R. Guthrie WQTC. In addition, the Technical Memorandum addresses the O&M costs expected for the remote treatment facility. This Technical Memorandum can be found in Appendix 6.2.7.

The Morris Forman WQTC is expected to treat an additional two billion gallons per year as a result of increased wet weather capture. This will not require any staff additions, but will add $353,000 per year in chemicals, solids hauling, and electrical costs. The Derek R. Guthrie WQTC is being expanded to handle a peak wet weather flow of 200 MGD, doubling the existing wet weather capacity by essentially doubling the number of treatment units available. It is expected that this increase in plant equipment, and the increase in operating complexity resulting from the wet weather treatment facilities will require two additional operating positions. Almost doubling the equipment requiring maintenance is expected to require the addition of three maintenance positions as well. In total, operating costs at the Derek R. Guthrie WQTC are expected to increase by $1,205,000 per year (2012 dollars).

The IOAP includes only one remote treatment facility, the 50 million gallons per day (mgd) wet weather treatment basin with a 25 million gallon off-line storage basin located near the Southwestern Pump Station. This facility had previously been planned to be located near the Paddys Run Flood Pump Station, but access issues resulted in the project being relocated. Operating costs are based on an average of 16 work-hours per week in routine inspection and preventive maintenance, and an average of 24 work-hours per event for clean-up (typically 11 events per year if the use of in-line storage is optimized to avoid using the treatment system for small storms). Operating labor during the event, if operator supervision is required, is expected to add 40 work-hours per event. The flow control, solids pumping and chemical feed systems are estimated to add an additional staff position. The sum of these labor requirements indicate the need for two additional operator positions added to the Morris Forman WQTC. In addition, two additional maintenance positions are recommended based on the needs of the added facilities. This should be monitored during the early years of operation, and staffing levels adjusted after actual operating experience is gained. Overall operating costs, including staffing are estimated to be $458,000 per year (2012 dollars).

The IOAP also includes the elimination of the Jeffersontown WQTC and most of MSD's small "package plant" WQTCs by the end of 2015. MSD has decided to eliminate the remainder of the package plants on approximately the same schedule as a voluntary measure to improve operational reliability and treatment efficiency. A Technical Memorandum was prepared to document the O&M savings expected from these plant eliminations. This Technical Memorandum can be found in Appendix 6.2.8. Eliminating the Jeffersontown WQTC and all the small WQTCs, will eliminate 10 positions in Metro Operations, and result in a total cost savings of $1,782,000 per year (2012 dollars).

6.2.3 Additional CMOM Resources

In accordance with Consent Decree requirements, MSD completed a CMOM Self Assessment in May 2006 to determine if there are programs or activities that could improve MSD's level of service or compliance performance. The development of the CMOM program included the revised SOPs for pump station preventive maintenance and treatment plant operation. Implementing these new procedures over all the facilities under Metro Operations results in an estimated preliminary staffing level that adds 6 new positions as compared to 2012 staffing levels.

A revised gravity sewer preventive maintenance program also modified the preventive maintenance program to clean all sewers (except property service connections) on a variable cycle depending on historical blockage records. Alternatively, if a condition assessment confirms that at least 95 percent of the pipe area is available, the sewer is defined as "clean" and no further action is required. In addition, the program includes regularly scheduled comprehensive condition assessments using closed-circuit television (CCTV) or other inspection methods. The cleaning cycle for a particular segment of sewer could vary between several times per year to once every 10 - 15 years depending on the maintenance history, age, and the results of previous condition assessments.

It is anticipated that the initial inspection and cleaning will be done as part of a comprehensive base-line assessment for MSD Advanced Asset Management program. The base-line assessment will likely be funded as a capital expense; therefore, operating costs are not expected to increase for several years. Over time, the cleaning and inspection program is anticipated to be brought in-house, adding an estimated 22 positions to the I&FP Division. At the same time, a more effective preventive maintenance program is anticipated to reduce the level of corrective maintenance performed, reducing that part of the division by 11 positions. The net result is 11 additional positions in the division, reflecting the higher level of service that this program will provide. Any new positions will be phased in over several years to allow for the systematic orientation and training of new staff, and validation of the actual required staffing levels to accomplish the objectives of the CMOM program.

6.2.4 Summary of Future Resource Needs

Table 6.2.3 summarizes the future staffing changes estimated in response to the IOAP and related programs. Future advances in technology or O&M approaches may indicate that these levels may need to be adjusted (up or down). In addition, MSD reorganization may assign activities to divisions other than those discussed above. MSD will monitor staffing levels and operating effectiveness against established metric developed under the CMOM program. These metrics will be used as one of the factors that will guide future staffing and budgeting decisions.

TABLE 6.2.3

SUMMARY OF ESTIMATED STAFFING REQUIREMENTS

Projected Staffing Levels - Operations, Infrastructure and Flood Protection					
Asset Group	**2007 Staffing**	**2012 Staffing**	**2016 Staffing**	**2020 Staffing**	**2025 Staffing**
Morris Forman WQTC	93	92	94	96	96
Metro Operations					
Administration and Planning	4	4	4	4	4
Regional WQTC Operations (reorganized)	57	24	26	26	26
Small WQTC		10	2	0	0
WQTC and Pump Stations Maint. (reorganized)		28	35	36	38
Storage Basins		1	2	8	15
Flood Pump Stations	0	8	8	8	8
SCADA and Controls	4	6	7	8	10
Infrastructure and Flood Protection					
Admin, Preventive Maintenance and Support	60	70	70	76	82
Sewer Maintenance	73	70	71	75	71
Stormwater Maintenance	70	70	70	70	70
Flood Protection Levee and Floodwall System	13	9	9	9	9
TOTAL	**374**	**392**	**398**	**416**	**429**

Note: Program and operating priorities will dictate actual numbers of employees and their work assignments.
SCADA - Supervisory Control and Data Acquisition

6.3 IMPLEMENTATION SCHEDULE

The implementation schedule was developed to achieve the following three objectives:

1. Comply with all schedule requirements of the Consent Decree, including:
    - Elimination of pumped overflows in the Beechwood Village area by December 31, 2011;
    - Elimination of overflows at the Southeast Diversion Structure by December 31, 2011;
    - Elimination of pumped overflows in the Hikes Point area by December 31, 2013;
    - Elimination of pumped overflows at the Highgate Springs Pump Station by December 31, 2013;

   - Elimination of five small WQTCs by December 31, 2015: North Hunting Creek WQTC, Hunting Creek South WQTC, Timberlake WQTC, Shadow Wood WQTC, and Ken Carla WQTC;
   - Elimination of the practice of "blending" at the Jeffersontown WQTC by December 31, 2015;
   - Completion of all Final CSO Long-Term Control Plan (LTCP) projects, including those required to eliminate dry weather overflows caused by current U. S. Army Corps of Engineers (USACE) operating rules at MSD's flood pump stations, by December 31, 2020;
   - Completion of all Final SSDP projects by December 31, 2024.
2. Sequence projects to allow beneficial use upon completion or shortly thereafter
3. Provide a level cash flow that matches MSD's projected ability to raise rates and borrow money.

These primary factors drove the development of the implementation schedule. Additional considerations that impacted the schedule include the following:

- Status of existing projects already under design or construction that could be modified to include the IOAP facilities to provide rapid delivery;
- Protection of sensitive areas or areas considered to have a higher public health or environmental priority;
- Anticipated ease or difficulty of implementation (land acquisition, regulatory, or permitting issues);
- Opportunity for green infrastructure or I/I elimination to allow future "right-sizing' of facilities; and
- Benefit-cost score ranking.

Figure ES.1, at the end of the Executive Summary, contains the summary schedule for the entire IOAP, as adjusted by this IOAP 2012 Modification. Schedules for the Final CSO LTCP projects and the Final SSDP projects are included in Volumes 2 and Volume 3, respectively.

The projects shown in Figure ES.1 in the Executive Summary correspond to the selected alternatives described in the Final CSO LTCP and the Final SSDP. Since many of these alternatives address several overflow points with one solution, the projects often have several different components (for example, gravity interceptor sewers, wet weather storage basins, pump stations, and force main discharge). As projects move from planning to design, MSD may elect to break the overall project into multiple packages. This allows contract sizes to better match local contracting capabilities and typically results in better construction prices for MSD. If the project is implemented in multiple packages, the completion date shown in Figure ES.1

represents the date that the final package is put into beneficial use. For example, the Jeffersontown WQTC elimination is shown as one project on Figure ES.1 (at the end of the Executive Summary). To make this project easier to manage and to allow early action on portions of the project that could have beneficial use in advance of the actual plant elimination, MSD has broken this effort into six separate projects in the 5-Year Capital Improvements Plan. While each project has its own construction schedule, Figure ES.1 illustrates that the final decommissioning of the WQTC will be accomplished by the December 31, 2015 date required by the Consent Decree.

6.4 FINANCIAL PLAN

This section presents a proposed financial plan for MSD's continuing operations and capital improvement program, including the proposed IOAP.

6.4.1 Introduction

The primary anticipated sources of funding and financing for MSD's activities and capital improvements are described herein. The projected cash flows, and financial results from operations are presented, and the required adjustments to the MSD's wastewater and stormwater rates to cover the projected system costs, given the study assumptions, are provided. In addition, an evaluation of the affordability of the resulting projected charges to the MSD's customers is presented.

6.4.2 Capital Funding Options

MSD relies upon a number of sources of funding and financing to support its planned capital improvements and on-going operations. The following describes the primary mechanisms that MSD currently relies upon and/or is considering to fund planned wastewater and stormwater improvements, as well as its operations.

6.4.2.1 Bonds

Local governments may issue bonds to finance major capital improvements. As a special district, many of the most common bonds used by municipalities (general obligation or tax increment financing) are not available to fund the IOAP. MSD has historically issued revenue bonds, which rely upon a pledge of the net revenues of the utility as security for the bonds, to fund the bulk of its capital improvements to its wastewater and stormwater systems. The debt service on these bonds has been repaid from revenues generated through the utility's rates and charges.

Special Assessment Bonds are used to finance improvements that will provide a special benefit to the properties served by the improvements. These types of bonds are typically used to finance the construction of sewer lines or stormwater improvements to serve a specific area. Special assessments are then placed on the properties that will be served by the improvements, to recover the cost of the improvements or pay the debt service on the bonds issued to finance the improvements.

The financial plan presented herein relies primarily on the issuance of revenue bonds to finance the major planned improvements to the wastewater and stormwater system. Special Assessment Bonds may also be used to fund relatively small wastewater collection and stormwater improvements to serve isolated areas, but do not represent a significant component of the overall financial plan for the system.

6.4.2.2 Loans

Loans from banks and other financial institutions may be used in place of bonds to finance wastewater and stormwater system improvements. In addition, subsidized loans, often known as "state revolving funds" (SRF) have become a common way for the federal and state governments to assist local governments finance improvements to water, wastewater, and stormwater systems. The Kentucky Infrastructure Authority administers the revolving loan fund in Kentucky, providing low-interest loans to communities for projects that improve wastewater, drinking water, and stormwater infrastructure. These loans, while typically issued at favorable interest rates, have a 20-year repayment term. Demands for funding from SRF loan programs may exceed the funds available, thus the availability of funding from this source may be a concern.

While the financial plan presented in the IOAP does not assume the use of loans. MSD will continually evaluate the availability of loan funds and impact of lower interest rates but quicker repayment terms. The rates and terms that would be assumed for a loan are not significantly different from the issuance of bonds, and would only be used if the overall impact reduces MSD’s overall costs and rates. Loans are therefore considered interchangeable with the issuance of revenue bonds for the purposes of this analysis.

6.4.2.3 Federal and State Grants

The Federal Government and State of Kentucky may issue grants to local government’s to help fund improvements to their wastewater and stormwater systems. The availability of grant funds for wastewater and stormwater improvements declined significantly with the implementation of the state revolving loan program, but some grant funding is still available. MSD has applied for grants under the Federal economic stimulus program that provides grants for infrastructure projects similar to those proposed under the IOAP. Typically, grants require the local government to provide a portion of the funds to construct the projects for which the grant is being provided. Availability of grants is subject to the level of funding provided by the Federal government and State of Kentucky. As such, while MSD intends to pursue economic stimulus and other grant funding for some of the planned improvements to its wastewater and stormwater system, the financial plan does not rely on grant funding for any of the planned improvements.

6.4.2.4 Wastewater and Stormwater Rates

MSD collects rates from customers for the wastewater and stormwater services provided. These rates are designed to recover the utility's annual costs including operating expenses, debt service requirements, normal capital outlays, and other financial commitments.

6.4.2.5 Impact Fees

Impact fees are collected by many utilities to recover the cost of providing capacity in the utility to serve new growth. Impact fees are one-time charges collected from new connections to the utility system. Revenues received from impact fees can only be used for improvements to serve new growth or to repay debt that has been issued to fund improvements to serve new growth. The IOAP program is primarily focused on implementing improvements to serve existing customers, and thus impact fees are not anticipated to be a major source of funding for this program.

6.4.2.6 Public-Private Partnerships and Privatization

Utilities in many areas have chosen to contract out specific services, including operation of their facilities. Others choose to contract with private companies to own and operate specific facilities in service to the utility. MSD has considered arrangements like this in the past, but has no plans to pursue this approach in implementing the IOAP.

One form of public-private partnership that MSD is using successfully is the green infrastructure incentives program. In this program, MSD has used a business case analysis to determine the value of disconnecting impervious area from the combined sewer system through green infrastructure practices. Based on this business case analysis MSD offers partial subsidies for construction of green infrastructure practices by private parties or other government agencies. Under some conditions a partial credit towards drainage fees is also available. Details of the program can be found on MSD's website as part of the "Rates, Rentals and Charges" document that is updated annually. MSD's website can be found at www.msdlouky.org.

6.4.3 Projected Cash Flows and Revenue Requirements

Projects implemented under the IOAP will require funds to construct and operate new facilities. In addition, operating, reporting, and record-keeping requirements of the Consent Decree are expected to add costs to the operation of existing facilities. The following section describes the estimated capital, debt service, and operating costs associated with implementing the IOAP and complying with requirements of the Consent Decree.

6.4.3.1 Projected Expenditures

System operating expenses (net after capitalized operating costs) were $75.1 million (compared to a budget of $81.6 million) in FY 2012. Between FY 2013 and FY 2015, net operating expenses are anticipated to increase at an annual rate of 3.5 percent. Net operating expenses are projected to be $110 million in 2025.

Additional O&M expenses associated with the IOAP program and other capital improvements to the system began impacting MSD's operating in 2010 when additional O&M expenses estimated at $1.1 million were incurred. Additional operating expenses of approximately $0.9 million are expected to occur in 2014. Annual operating expenses are expected to increase on an annual basis from 2017 to the end of the IOAP implementation. Between 2019 and 2021, an increase of $3.0 million is expected, reflecting an anticipated transfer of responsibilities for system-wide sewer cleaning and inspection from a capitalized expense to an operating expense. After this step-change in costs, annual increases of approximately $250 thousand to $600 thousand continue until all IOAP projects are complete. In 2025, the additional operating expenses due to the proposed IOAP capital program are projected to amount to a total of $6.2 million per year.

At the end of FY 2012 MSD's total debt was approximately $1.56 billion. This debt included bonds from Series 2001 through Series 2011. This includes a significant restructure and refinance of debt that MSD did during FY 2010 and FY 2011. Current projections call for additional issues of $125 million in 2014, $100 million in 2015, $125 million in 2017, and $100 million in 2019. Note that these projections are based on assumptions regarding actual bid prices of projects and bond rates that are stable at 4.0 percent for the duration of the IOAP implementation. In reality, final project costs will vary from estimates and the size and timing of issuing bonds will be determined after consultation with financial advisors and bond counsel when trends in working capital reserves indicate additional borrowing is required.

Debt service on MSD's outstanding debt was approximately $88 million in 2008. Annual debt service is projected to increase on an annual basis through 2013 by varying annual amounts, driven by pre-existing and ongoing capital borrowing, at which point it is projected to be $114 million. Between 2013 and 2024, annual debt service is projected to increase to as high as $136 million, eventually dropping back to $127 million by FY 2025.

MSD capitalizes internal costs required to manage and support the capital program through a fund known as the "force account". The force account charges include the costs of directly managing the capital program (for example, Engineering Division staff) and indirect costs that also support the management of the program. Annual force account expenditures were $29.9 million in FY 2012. These annual expenditures are currently projected to increase on an annual basis by approximately 3.5 percent. In 2025, this annual expense is projected to be $43.8 million.

Other non-force account annual capital expenditures associated with ongoing capital improvements to the MSD system are projected to be $ 70 million in FY 2013, $49 million in FY 2014, and average $ 24 million per year for the balance of the planning period. MSD's budgeting process for capital improvements typically considers a five-year window that shows a high level of variability from year to year, but the overall average is relatively consistent. For the purpose of long-term financial projections, the detailed year-to-year totals are not necessary.

Total expenditures are projected to increase on an annual basis from $229 million in 2008 to $320 million by 2025. Expenditures will average approximately $350 million per year between FY 2013 and FY 2025.

6.4.3.2 Projected System Revenues

To support these projected expenditures, wastewater service charge revenues are projected to increase from $126 million in 2008, to $302million in 2025. These projections assume annual percentage increases in wastewater service charges or rates in accordance with the projections shown in Table 6.4.1. Note that these projected rate increases have remained valid since the initial submittal of the IOAP in December 2008. The MSD Board has approved the annual rate increases recommended in Table 6.4.1 for FY 2010, 2011, 2012, and 2013. Future projections indicate that the schedule of rate increases originally proposed should be adequate for the remainder of the Consent Decree implementation program, provided unforeseen regulatory or other factors don't impose new requirements on MSD.

Note that these rate projections are based on assumptions of future costs and staffing levels. Actual budgets, staffing, and rates are determined through an annual budgeting process that is approved by the MSD Board. Future rates can be expected to vary from these projections to the extent that the assumptions underlying them are found to be imprecise.

TABLE 6.4.1

PROJECTED WASTEWATER AND CONSENT DECREE SURCHARGE RATES

Fiscal Year	Total Annual Rate	Monthly Base Rate	Base Rate Increase	CD Increase	CD Surcharge	Total Monthly Rate
2008	$ 354.98	$ 22.63	6.50%	0.0%	$ 6.95	$ 29.58
2009	$ 378.05	$ 24.10	6.50%	6.5%	$ 7.40	$ 31.50
2010	$ 402.62	$ 25.67	6.50%	6.5%	$ 7.88	$ 33.55
2011	$ 428.79	$ 27.34	6.50%	6.5%	$ 8.40	$ 35.73
2012	$ 456.66	$ 29.11	6.50%	6.5%	$ 8.94	$ 38.06
2013	$ 486.35	$ 31.01	6.50%	6.5%	$ 9.52	$ 40.53
2014	$ 515.53	$ 32.87	6.00%	6.0%	$ 10.09	$ 42.96
2015	$ 543.88	$ 34.67	5.50%	5.5%	$ 10.65	$ 45.32
2016	$ 573.79	$ 36.58	5.50%	5.5%	$ 11.23	$ 47.82
2017	$ 605.35	$ 38.59	5.50%	5.5%	$ 11.85	$ 50.45
2018	$ 638.65	$ 40.42	5.50%	5.5%	$ 12.50	$ 53.22
2019	$ 673.77	$ 42.96	5.50%	5.5%	$ 13.19	$ 56.15
2020	$ 710.83	$ 45.32	5.50%	5.5%	$ 13.92	$ 59.24
2021	$ 749.93	$ 47.81	5.50%	5.5%	$ 14.68	$ 62.49
2022	$ 791.17	$ 50.44	5.50%	5.5%	$ 15.49	$ 65.93
2023	$ 834.69	$ 53.22	5.50%	5.5%	$ 16.34	$ 69.56
2024	$ 880.60	$ 56.14	5.50%	5.5%	$ 17.24	$ 73.38
2025	$ 929.03	$ 59.23	5.50%	5.5%	$ 18.19	$ 77.42

Stormwater service charge revenues were approximately $31 million in 2008 and are projected to increase to $85 million by 2025. The pattern of annual stormwater service rate revenue increases is expected to follow a similar pattern of projected percentage increases forecast for wastewater service rate revenues, with a 6.5 percent increase in 2009 through 2013, 6.0 percent in FY 2014, and by 5.50 percent annually in 2015 through 2021.

Aggregate miscellaneous revenues were approximately $12.7 million in 2008 and are projected to oscillate between $11 million and $44.5 million until 2013, when they are projected at $21.5 million. After 2013, they are projected to increase annually at a rate of 3.0 percent through 2025, at which point they are projected to amount to $27 million.

Total funds available for expenses, capital improvements, and debt service are projected to follow an oscillating pattern in which the infusion of capital bond proceeds spikes the total available funds on a rotation consistent with the schedule of issuing bonds. The annual net of revenues less expenses is projected to exhibit a pattern of one-year of positive annual net returns followed by one year of negative annual net returns over much of the projection period. This reflects the infusion of funds in the years in which bonds are issued, with capital expenditures, which make use of these funds drawing down the balance. The cumulative net funds available always show a positive balance, indicating that the projected borrowing pattern is adequate to fund the current capital plan projections.

6.4.3.3 Summary

Table 6.4.2, at the end of the chapter, provides a summary of revenues and expenditures for the years FY 2008 through FY 2025.

6.4.4 Projected Rates and Fees

The combined wastewater and stormwater monthly service fee is composed of three components that can be adjusted in unison or independently. The components of the combined fee are the base service charge, the stormwater service charge, and the Consent Decree surcharge.

The average residential customer base wastewater service charge in 2008 is $22.63 on a monthly basis. It is projected to increase by 6.5 percent per annum through FY 2013 at which time it will be $31.01 per month. In FY 2014, rates are projected to increase 6.0 percent. Between FY 2015 and FY 2025, the average base service charge is projected to increase at 5.50 percent on an annual basis. In FY 2025, the annual base service charge for the average residential customer is projected to be $929.03 per year or $59.23 per month.

The average residential customer base stormwater service charge in 2008 is $5.35 on a monthly basis. It is projected to increase by 6.5 percent per year through 2013 at which time it will be $7.30 per month. In 2014 the rate is projected to increase by 6.0 percent and between 2015 and 2025, the average stormwater service charge is projected to increase by 5.5 percent on an annual basis. In 2025, the annual stormwater service charge for the average residential customer is projected to be $14.00 per month.

The residential customer Consent Decree surcharge in 2008 is $6.95 on a monthly basis. It is projected to increase by 6.5 percent per annum through 2013 at which time it will be $9.52 per month. In 2014, the surcharge is projected to increase by 6.0 percent. Between 2015 and 2025, the average residential customer Consent Decree surcharge is projected to increase by 5.5 percent on an annual basis. In 2025, the annual Consent Decree surcharge for the average residential customer is projected to be $18.19 per month.

The combination of the annual adjustments of these three charge components results in the current combined annual charge of $398.68 or $33.22 per month increasing at a rate near 6.5 percent per year through 2013 after which the projected annual increases will diminish to an annual rate of between 6.0 and 5.5 percent on an annual basis. In 2025, the combined base, stormwater, and Consent Decree surcharge average annual rate for a residential customer will be $91.42 on a monthly basis.

Note that these are projections based on assumptions about future costs and staffing levels. Actual rates are determined annually by the MSD Board and may vary from the projections presented herein.

6.4.5 Description of Local Economic Conditions

Economic measures such as employment, natural resource dependency, and industry diversity are commonly used to explain local economic conditions for social assessments. It is also significant to note that there is a national and regional perspective to these local conditions. Their contexts are relevant because they may classify broad tendencies and characteristics that may have local manifestations or otherwise affect local economic circumstances. In addition, conditions described as “current” herein are based on statistics generated over the several years prior to 2008.

At the time this section was first written it was observed that the nation appeared to be entering a period of economic recession. The impacts of this recession on the economic parameters discussed herein will not be quantifiable for several years to come. The discussion of local economic conditions must be understood in this context, recognizing that conditions today will not necessarily be true in years to come.

6.4.5.1 Industry

Louisville Metro is home to a dynamic and diversified economy, which has outperformed the U.S. in job and income growth in the last decade. The Louisville Metro region has embraced an economic vision to benefit from emerging opportunities in fast-growth niches that take advantage of the area’s advantages such as in logistics, health/biomedicines, as well as financial services and manufacturing, principally automotive. The occupations with the largest increasing trend rates in 2007 consisted of: Business and Financial Operations; Arts, Design, Entertainment, Sports, and Media; and Life, Physical, and Social Science. Similarly, the occupations with the largest magnitude of job gains were Production; Office and Administrative Support; and Food Preparation and Serving Related.

6.4.5.2 Employment

The Louisville Metro area is headquarters to some of the nation's top companies, including Fortune 500 companies: Yum! Brands Inc., Kindred Healthcare, and Humana Inc. One of the better-known industries based in Louisville Metro is Hillerich & Bradsby, which makes the "Louisville Slugger" baseball bat. The headquarters for the Presbyterian Church (USA) and the American Printing House for the Blind, the official source of texts for the visually impaired, are also in the city. Ford Motor Co. has two plants in the area. Manufacturing plants for GE Consumer Products and Swift & Co. are also located in Louisville Metro. Companies new to the area since 2000 are Charter Communications (cable TV), Gordon Foods, and Reynolds/Alcoa.

Employers of 1,000 employees or more include; United Parcel Service (UPS), Jefferson County, KY Public Schools, Ford Motor Company, Jewish Hospital & St. Mary’s Healthcare Inc., University of Louisville, General Electric Company, Kroger Company, US Federal Government and the US Postal Service among others.

6.4.5.3 Income

The median income for a household (MHI) in 2008 adjusted dollars is $47,073 compared to the National median income of $52,606. The per capita income (total personal income divided by the total population) for the city is $ 26,817 in 2008 adjusted dollars. See Table 6.4.3 for Louisville Metro/Jefferson County median incomes.

TABLE 6.4.3

U.S. AND JEFFERSON COUNTY MEDIAN INCOMES	
National MHI 2006	$48,451
Interim Inflation Adjustment Factor	1.085
Adjusted 2008 National MHI[A]	$52,606
Jefferson County MHI 2006	$43,355
Interim Inflation Adjustment Factor	1.085
Adjusted 2008 Jefferson County MHI	$47,073
Adjusted Jefferson County MHI Relative To Adjusted National MHI	-10.5%
[A]*source: Census 2000, 2006 American Community Survey Data Profile Highlights*	

6.4.5.4 Natural Resource Dependency

The geography of Louisville Metro, particularly its river access, central location, and generally, placid climate has contributed to its significance as a center for industry and commerce. Kentucky has traditionally been a mining and agricultural state, but Louisville Metro has significantly diversified its economic base in recent years. The city has traditionally been a manufacturing center for durable goods as well as appliances, cars, and trucks. In addition, over the last decade, the area's economy brought a different variety of high-tech employment opportunities.

6.4.6 Household Burden

Traditional affordability guidelines have measured wastewater billings relative to MHI. When billed charges are less than 1.0 percent, between 1.0 and 2.0 percent, and greater than 2.0 percent, EPA has characterized the financial impacts on users as “low”, “mid-range,” and “high” costs, respectively. Rate projections indicate that the annual residential sewer bill (including the Consent Decree Surcharge) for MSD residential customers in 2008 is $355, or 0.7 percent of the projected 2008 Jefferson County annual median household income of $47,073. A combined sewer and stormwater bill in 2008 is $419.18, which represents 0.9 percent of MHI in Jefferson County. The majority of the MSD customer households in Louisville Metro fall within the “low” household financial burden designation.

With the projected increases in wastewater and stormwater rates, the projected annual combined wastewater and stormwater bills would increase to 2.0 percent of the current median household income, and thus would still fall within on the border between the mid-range and high range of financial burden. Since the rate projections include escalation for inflation, it is likely that the MHI will rise over this time, and the burden would remain in the mid-range.

6.4.7 Local Impacts

EPA guidance documents require consideration of a more comprehensive range of cost factors in assessing the affordability of wastewater and stormwater charges. Under these criteria, current costs are considered to be in the "Mid-Range" category for the Residential Indicator and in the "Mid-Range" category for Permittee Financial Capability Indicator, as shown in Table 6.4.4 and discussed in more detail below. The combined Financial Capability Indicator results in a burden that is considered to be a "Medium Burden".

TABLE 6.4.4

MSD FINANCIAL CAPABILITY ASSESSMENT: A "MEDIUM" FINANCIAL BURDEN

Permittee Financial Capability Indicators Score	Residential indicator (cost per household as a % of MHI)		
	Low (Below 1.0%)	Mid-Range (Between 1.0 And 2.0%)	High (Above 2.0%)
Weak (Below 1.5)	Medium Burden	High Burden	High Burden
Mid-Range (Between 1.5 and 2.5)	Low Burden	Medium Burden	High Burden
Strong (Above 2.5)	Low Burden	Low Burden	Medium Burden

Note: MSD has a residential indicator score of 1.5 and a financial capability indicators average score of 1.0. The intersection of these two determines the financial burden category.

The second part of the affordability assessment involves calculation of a "Financial Capability Indicator", which assesses the overall financial health of the community. This indicator examines bond rating, debt burden, unemployment rate, property tax collection rates, MHI, and other factors to develop a numerical score. The financial capability is considered by EPA to be low if the score is less than 1.5, medium if the score is between 1.5 and 2.5, and strong if the score is greater than 2.5. The MSD service area falls into the Mid-Range of the Financial Capability Indicators Score. The resulting evaluation, which considers both the residential indicator, which has a score of Mid-Range and a financial capability indicator score, which is also Mid-Range is a medium burden.

Another factor addressed, but not specifically included in the EPA guidance documents is the impact of utility bills on low-income populations. For almost 10 percent of Jefferson County households, the current residential wastewater and stormwater service costs are over two percent of the MHI. Under the example scenario of capital improvements, almost 20 percent of Jefferson County households would see their wastewater service costs make up more than two percent of their MHI. While mitigation strategies are not addressed in EPA policy, MSD has recently implemented a discount program for low-income senior citizens that may lower the wastewater and stormwater bills for many of these users.

6.5 POST CONSTRUCTION COMPLIANCE MONITORING

MSD currently monitors a wide array of assets for performance including sewer lines, actuated gates, pump stations, and treatment plant components. A large amount of ambient, environmental data is also collected including stream flow, water quality, rainfall, biological, and habitat information. Collectively MSD uses this data to support many internal MSD activities such as:

- Operations & Maintenance event support
- Real Time Control (RTC) global and local operations
- Municipal Separate Storm Sewer System (MS4) permit activities and reporting
- Systematic and site-specific cause and effect evaluations
- Validation and recalibration of hydrologic, hydraulic, and water quality models
- The collection, identification, and prioritization of CSO and SSO control needs
- Informing the public about health concerns, customer behavior, and programmatic progress

MSD has the ability to review each data set parallel to one another to establish cause and effect relationships that assist in deciding the best course of action to address immediate operational, specific project and programmatic needs.

Under the IOAP, the primary compliance assessment objectives will be to certify project completion to the selected overflow control level, both for CSOs and SSOs, as well as to determine if predicted levels of overflow control and anticipated water quality benefits are realized. As such, post construction compliance monitoring will support impact analysis and the validation of various objectives of IOAP projects initiatives, and the overall abatement plan.

To further develop and implement effective monitoring, MSD will continue to use methods that have proven effective with historical and current monitoring efforts. This experience is critical in determining the most accurate methods for characterizing capital project impacts and programmatic effectiveness. Compliance monitoring will capture both pre- and post-construction conditions. MSD will use this data to assess baseline conditions, existing sewer and stream conditions, and re-assess conditions periodically once IOAP projects and programs are in place.

Compliance monitoring will encompass project-specific monitoring, systematic sewer, pump station, and stream monitoring. Periodically, the collected data will be used to analyze and report upon environmental benefits through data trending and modeling. Much of this effort, as described below, is already underway and will be adjusted accordingly to enable assessment of the IOAP implementation. The objectives of compliance monitoring address new challenges, including small-scale overflow control projects such as green infrastructure, monitoring public behavior changes and implementing adaptive management.

This section discusses MSD's historical and current monitoring efforts, new IOAP compliance monitoring objectives, and the general monitoring approach for each major overflow abatement technology outlined within this plan. Gray and green infrastructure monitoring, sewer rehabilitation for inflow and infiltration (I/I) reduction, behavior change, data quality, modeling, and adaptive management are key elements of that equation. A flow chart outlining this Post Construction Compliance Monitoring process is shown in Figure 6.5.1 at the end of the Chapter.

The Post Construction Compliance Monitoring (PCCM) program will implement a series of performance evaluations, post-construction, using monitoring and modeling in order to accurately report on the individual and collective performance of the various overflow control measures identified by the IOAP. In accordance with guidance provided by the EPA, the following components are integral to an effective PCCM program:

1. Assessment and Documentation of Baseline Conditions
2. Execution of Post Construction Monitoring & Analyses
3. Reporting Results to Regulatory Agencies and the Public

6.5.1 Historical and Current Monitoring

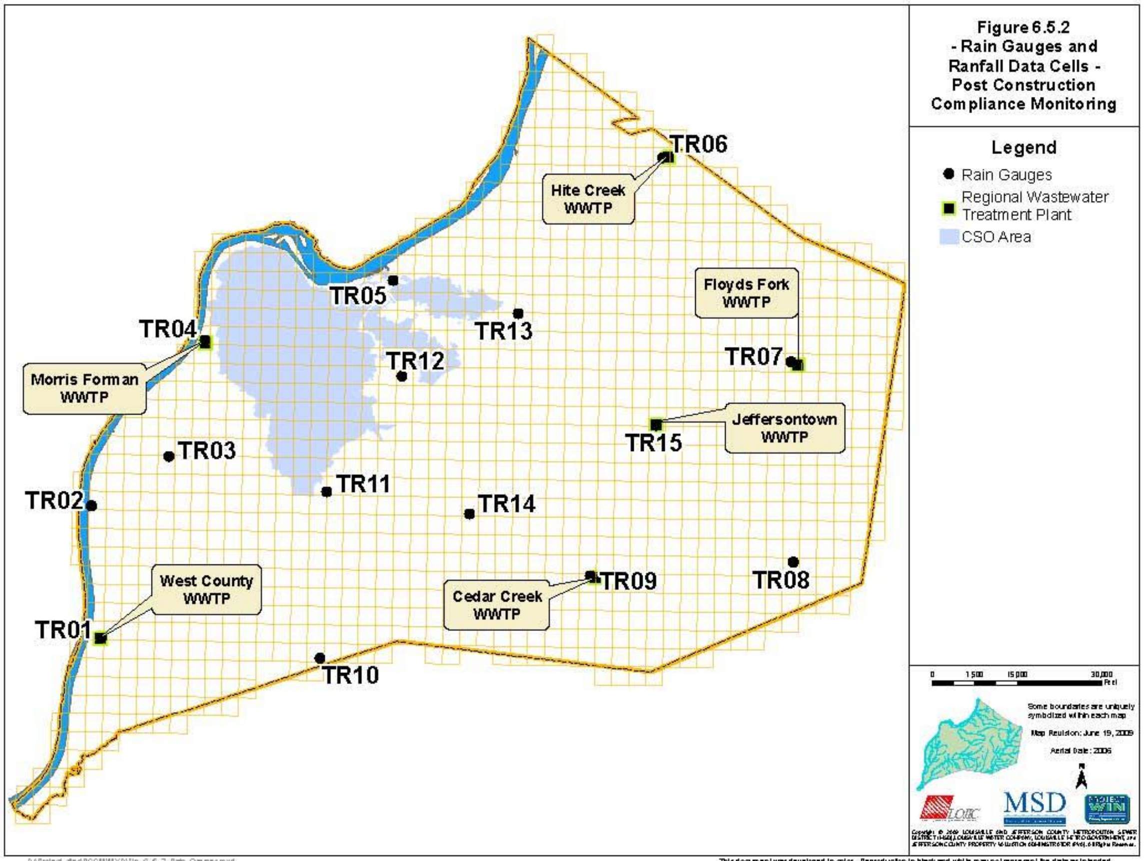
MSD has been monitoring various environmental data sets for over 20 years. Comprehensive data have been collected for baseline conditions and event based evaluations for precipitation, sewer and stream samples, infrastructure, automated physiochemical analyses, and wet chemistry analyses on sewer and stream data, and in-depth biological indicator species and habitat analyses. Customer request and sewer overflow tracking has also been developed and implemented to identify problem areas and track system performance on an event basis.

6.5.1.1 Rain Data

Rain data has been collected by MSD continuously on a network of rain gauges across Louisville Metro since the early 1990s. In 2003, a network of radar rainfall data was added to fill in the gaps in physical distance between the rain gauges. Rain data are simultaneously evaluated with many of the other data sets to help determine the timing and impact of wet weather. A map of the rain gauges and radar grid is located in Figure 6.5.2.

Refer to Volume 2, Chapter 5, and Volume 3 Chapter 5 for detailed overflow volume, frequency and project information

FIGURE 6.5.2 RAIN GAUGES AND RADAR RAINFALL GRID



6.5.1.2 Flow Monitoring

Flow monitoring is an important tool in determining the success of both gray and green solutions. MSD uses flow monitoring data to verify and recalibrate flow projections, calculated using hydraulic models, for new and rehabilitated sewer lines, manholes, and pump stations. Current and future monitoring efforts encompass combined sewer flow, storage facilities, separate sanitary flow, I/I, pump stations, WQTCs, CSOs and other system characteristics critical to assessing performance.

MSD currently has long-term sewer flow meters in place throughout the county and is installing additional long-term meters on many combined and sanitary sewer overflows. These meters are being placed in critical locations to provide data for model recalibration, overflow behavioral analyses and overflow abatement project performance. Temporary monitors are being placed in areas affected by capital construction, green infrastructure, and sewer rehabilitation. Temporary flow monitor data will supplement permanent flow meter data to express a more accurate portrayal of the effectiveness of the projects.

Sewer flow meters have been in place in various locations in the MSD collection system since the early 1990s as well to assess baseline conditions, locate I/I, determine sewer overflow volumes, and assist sewer modeling efforts. The majority of the historical meters were temporary flow meters used for evaluation studies. MSD is installing additional long-term collection system flow monitors to assist future sewer model updates and calibrations. MSD has installed approximately 24 flow monitors in CSO overflow locations by December 2008, and will install additional meters by December 31, 2009. By December 2012, MSD will have monitoring equipment on all CSOs where valid data can be gathered and staff safety allows. In 2013, MSD will focus on expanding SSO remote monitoring.

All of the data from these new collection system and CSO meters are available on telemetry and the data is being used to support the long-term trending and model calibration of the sewer system. A map of current and historical MSD flow monitoring sites (including pump stations and WQTCs) is displayed in Figure 6.5.3, and an example of how that data can be used with rain data is displayed in Figure 6.5.4.

In addition to the sewer flow meters, MSD has telemetered monitoring on over 2,000 assets in the collection system, the majority of which are at sewage pump stations – this number excludes internal monitoring for treatment center components. From pump run times, known pump capacities, and wet well levels, MSD can infer and model flow rates at many more locations than the ones that have actual flow meters. A map of the locations MSD has installed telemetered equipment is illustrated in Figure 6.5.5. Each point on the map represents an asset that has telemetered equipment installed and many assets have monitoring points stacked together. An example of how pump run time data and rain data can be used is displayed in Figure 6.5.6.

Refer to Volume 2, Chapter 5, and Volume 3 Chapter 5 for detailed overflow volume, frequency and project information

FIGURE 6.5.3 HISTORICAL FLOW METERS

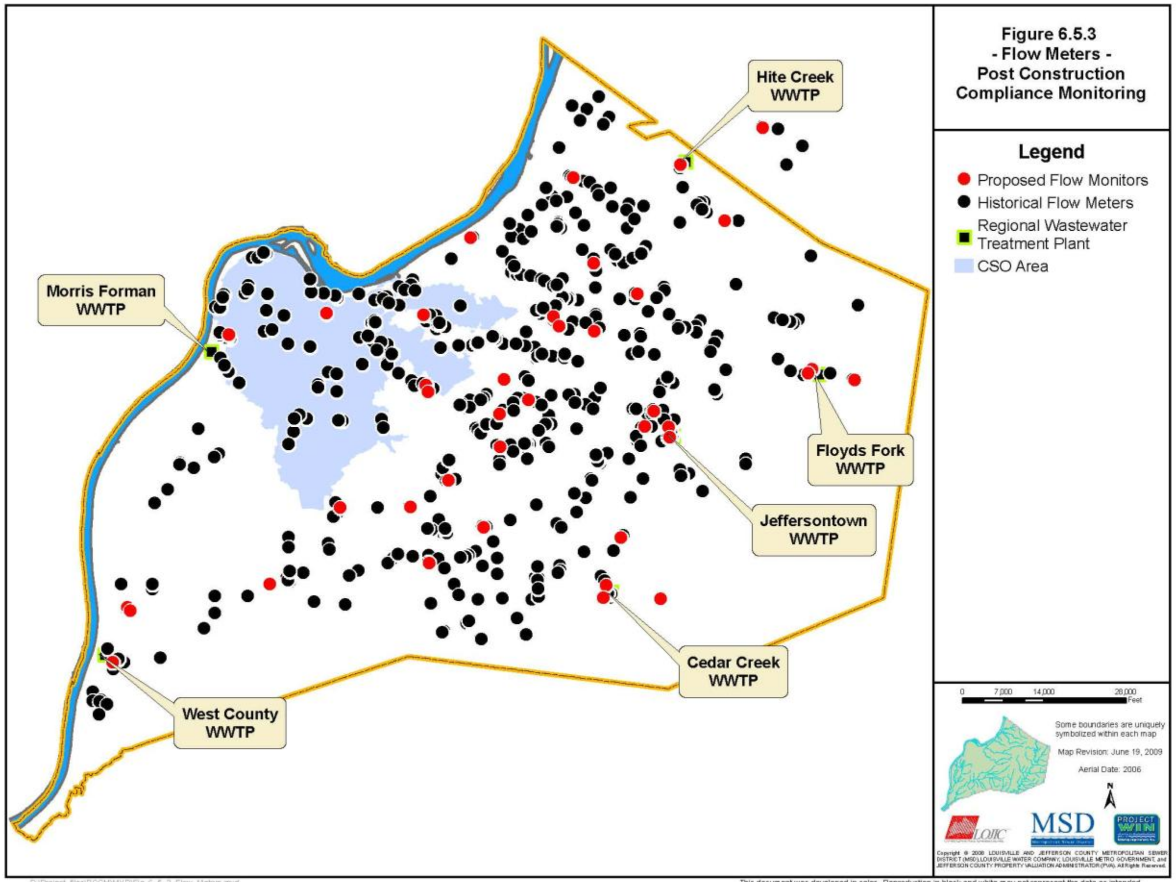


FIGURE 6.5.4 SEWER FLOW METER DATA WITH RAIN

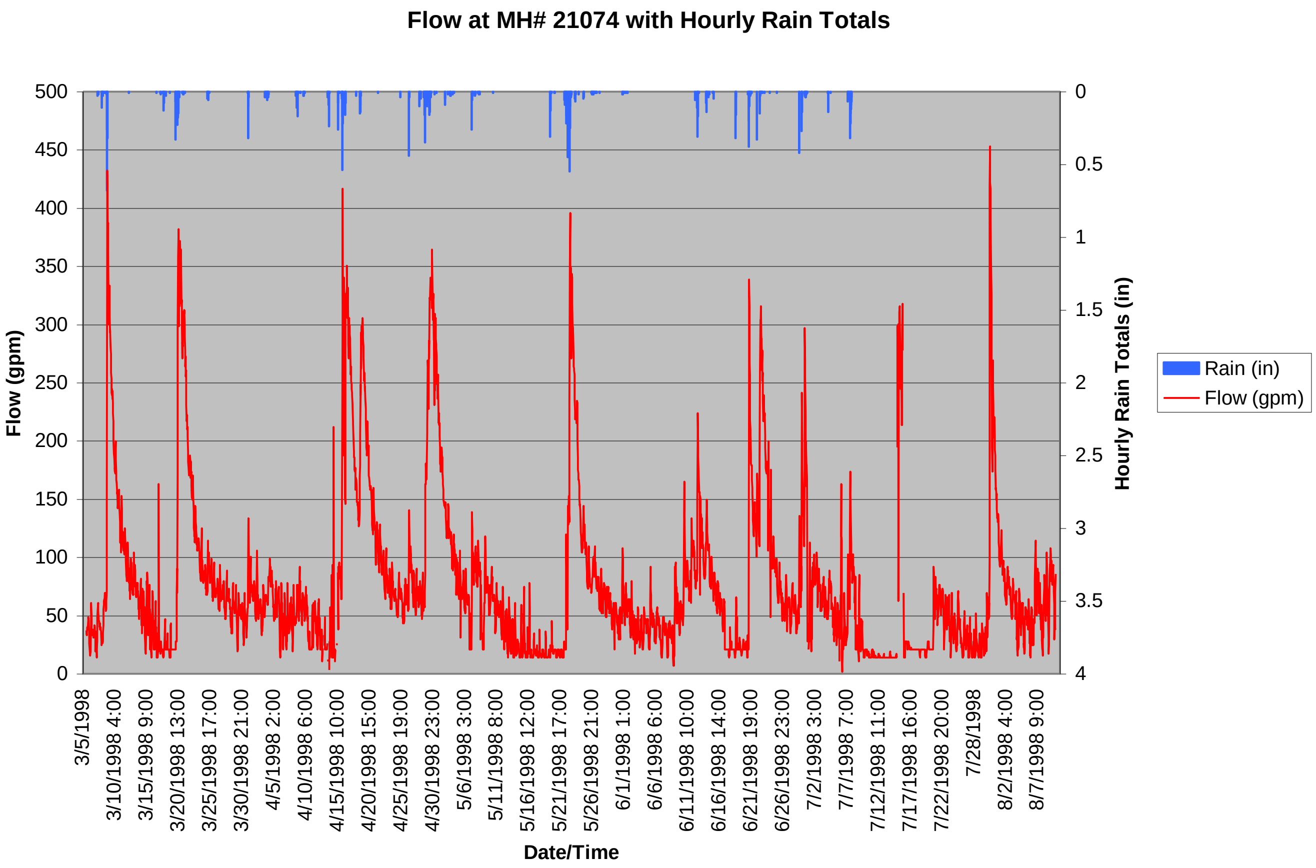
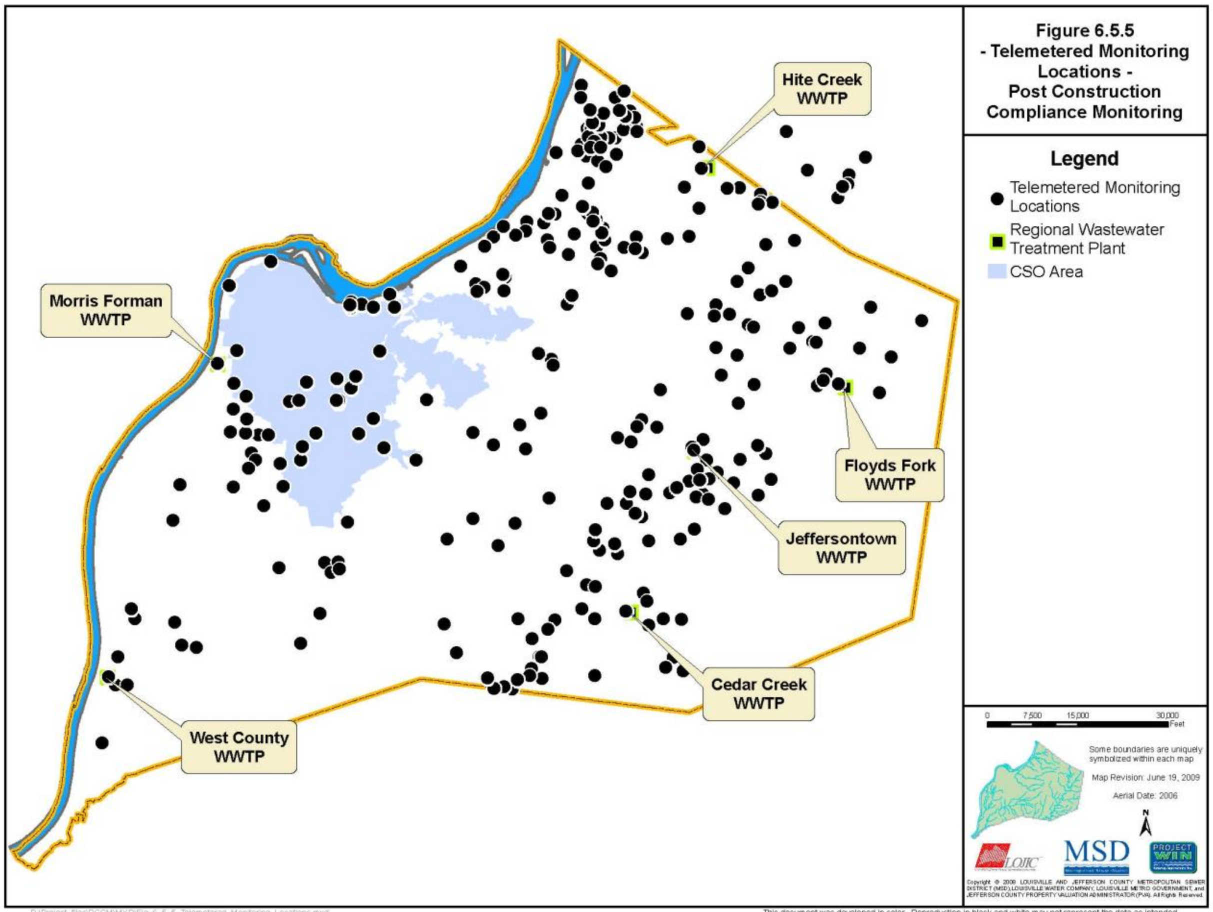


FIGURE 6.5.5 TELEMETERED MONITORING LOCATIONS



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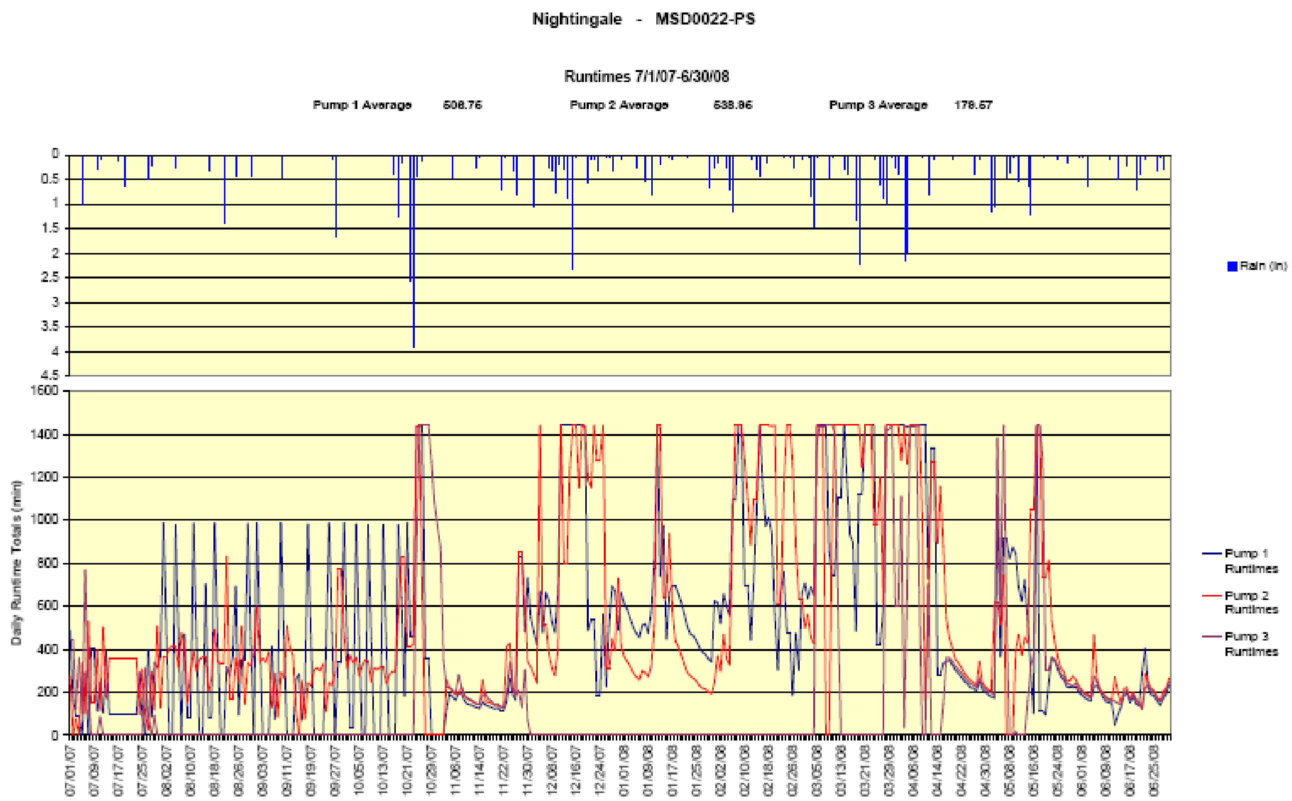
This document was developed in color. Reproduction in black and white may not represent the data as intended.

FIGURE 6.5.6 PUMP STATION RUN TIMES AND RAIN AT NIGHTINGALE PUMP STATION



6.5.1.3 Stream Flow and Water Quality Monitoring

MSD currently maintains a system of automated and manual stream monitoring to track stream flow and water quality trends throughout Louisville Metro. Automated water quality measurements are recorded in 15-minute intervals at the 28 Long Term Monitoring Network (LTMN) sites in Jefferson County. MSD collects bacteria samples at each LTMN location five times per month during the recreational contact season. The data is used to determine compliance with water quality standards such as daily averages, maximums, minimums, and 30-day geometric means. Quarterly samples are also taken at these sites to gather more in depth readings of conventional pollutants, nutrients, and metals.

United States Geological Survey (USGS) stream flow gauges have been in place for many years at MSD's LTMN shown in Figure 6.5.7 and these data are an important part of tracking wet weather flow and calculating pollutant loadings. The data are transmitted remotely and available in real-time on the USGS web site (http://waterdata.usgs.gov/ky/nwis/rt) and on MSD's intranet.

The equipment housing and communications ports for the stream flow meters are shared with MSD's automated stream water quality meters called sondes. The sondes collect dissolved oxygen, pH, temperature, and conductivity readings every 15-minutes, which enables MSD to see diurnal patterns in those data series as well as longer-term trends. Since the year 2000, MSD has maintained 28 sonde sites, in and around Louisville Metro. Data from these sondes is also available at the site referenced above and on MSD's intranet. Twenty-six of those sonde sites also contain stream flow gauges. The graph in Figure 6.5.8 gives an example of healthy dissolved oxygen, pH, conductivity, and temperature readings in a local stream. The downward spikes in the conductivity directly correlate to small rain events that occurred during that time period.

Surface water and wastewater samples are collected on stream and sewer locations respectively and delivered to the laboratory for analysis on a routine basis and for special projects. The laboratory analyzes the samples for a variety of pollutants including bacteria, conventional pollutants, nutrients, and metals. A graph displaying fecal coliform samples taken during a wet weather event at one location is presented in Figure 6.5.9.

MSD conducts wet weather water quality sampling at the LTMN sites approximately three times every five years. Rain events chosen for sampling generally have a predicted depth of 0.5 inches or more. CSOs are normally active in a rainfall of this size and the data enables a water quality analysis of impacts on local streams to be performed. Samples for fecal coliform, suspended solids, BOD, nitrogen, phosphorus, and typical sonde readings are taken over a 48-hour period or longer, capturing the readings before, during, and after the rain event to demonstrate pollutant loading in the stream during wet weather.

For WQTCs, results for the water quality testing currently taking place at treatment centers are reported monthly in the Discharge Monitoring Reports (DMR) in accordance with the respective KPDES permits. With the addition of new wet weather treatment facilities and treatment processes, MSD will monitor the quality of effluent from these new facilities, especially at the Bells Lane Wet Weather Treatment Facility (formerly referred to as the Paddys Run Wet Weather Treatment Facility) and the expanded secondary treatment process at the Derek R. Guthrie WQTC (formerly known as the West County Wastewater Treatment Plant).

Testing at the Derek R. Guthrie WQTC will follow guidelines as laid out further in this document. Testing of effluent at the wet weather treatment facilities proposed for the Bells Lane Wet Weather Treatment Facility (formerly known as the Paddys Run Wet Weather Treatment Facility) will follow similar protocols, adjusted to account for the intermittent nature of the discharge, and differing treatment objectives. These tests will help to verify effectiveness in reducing pollutant loads being discharged to streams and the Ohio River. Water quality data trended over several years will support more accurately calibrated water quality models.

Continuing long-term monitoring at the LTMN sites, wet weather sampling, recreational contact site sampling, and treatment plant sampling will be required for specific reporting as well as long-term ambient monitoring. Ambient monitoring is necessary for assessing compliance with water quality standards over time in Louisville Metro. In addition, long-term monitoring provides MSD with a broad look at the effects of new construction, completed projects and programs and public participation.

Biological samples are also collected at the LTMN to assess long-term stream health. Samples are collected for fish, macroinvertebrates, and algae because the number and species of each is an important indicator of stream health, and the sets are interrelated. Habitat data is also collected at each site to indicate what type of environment is available to the different organisms. Figure 6.5.10 depicts how the fish data is gathered.

The number and species of each organism are important indicators of stream health. The raw data have been compiled into an objective metric called the Index of Biotic Integrity. That system provides a consistent framework for converting detailed species lists and counts into simplified numeric evaluations against standards that rate a stream as “Excellent”, “Good”, “Fair”, etc. The standard is based on knowing the tolerance of each species of organism to different types of environmental pollution. Finding sensitive and more diverse species may be an indication of better water quality, and finding less diverse and highly tolerant species may indicate poor water quality.

Figure 6.5.11 shows an example of Fish Index of Biotic Integrity scores trended over time at two locations. In this graph, Cedar Creek in Bullitt County shows a similar score in three different evaluation years with each score falling in the “Fair” range. Chenoweth Run at Ruckriegel Parkway showed a similar score in three different evaluation years with each score falling in the “Poor” range.

The 2011 Water Quality Synthesis Report has been attached in Appendix 6.5.1 to serve as an example of the analyses performed every two years to ascertain the trending stream health throughout MSD’s LTMN.

Refer to Volume 2, Chapter 5, and Volume 3 Chapter 5 for detailed overflow volume, frequency and project information

FIGURE 6.5.7 STREAM LONG TERM MONITORING NETWORK

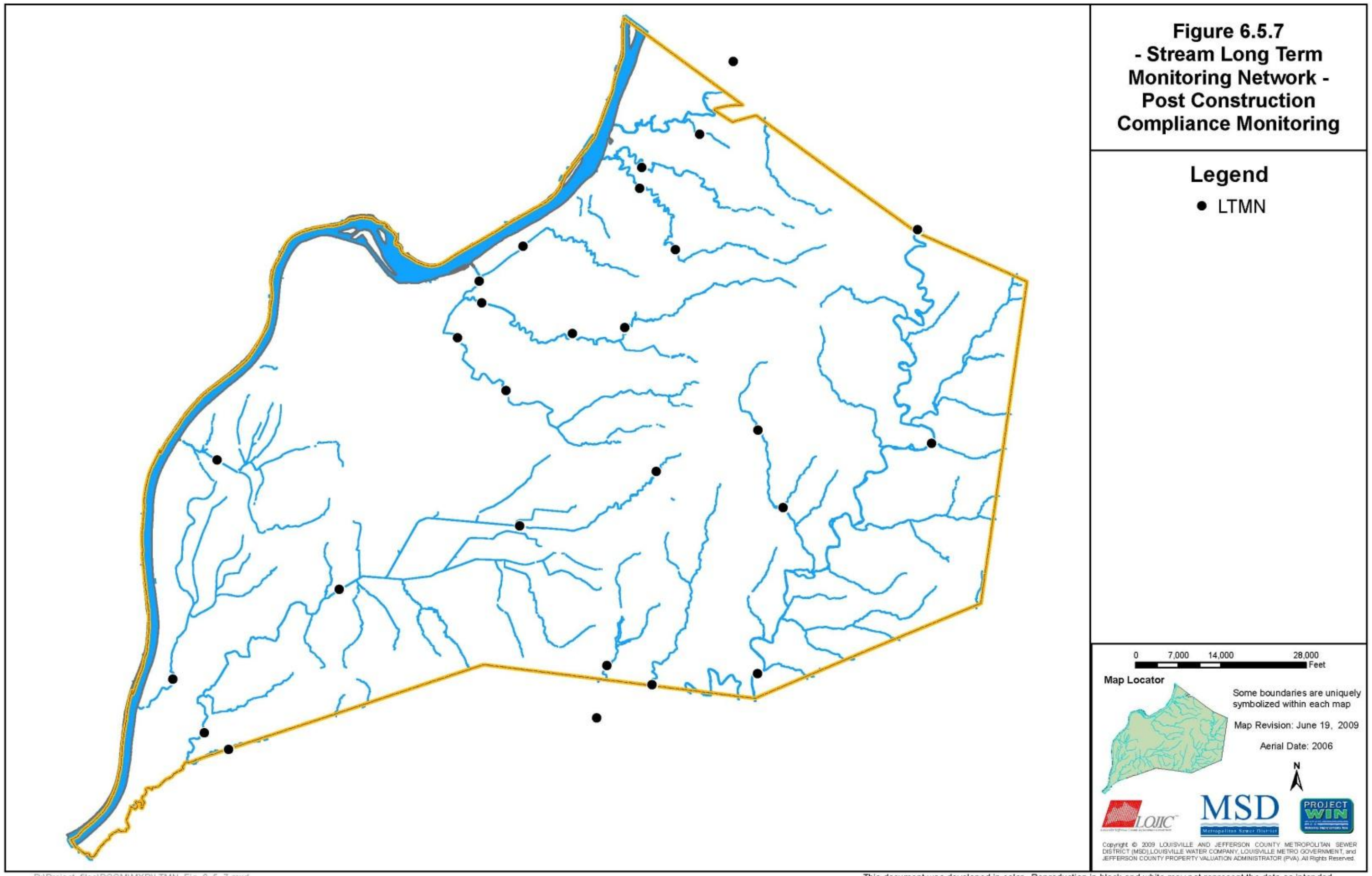
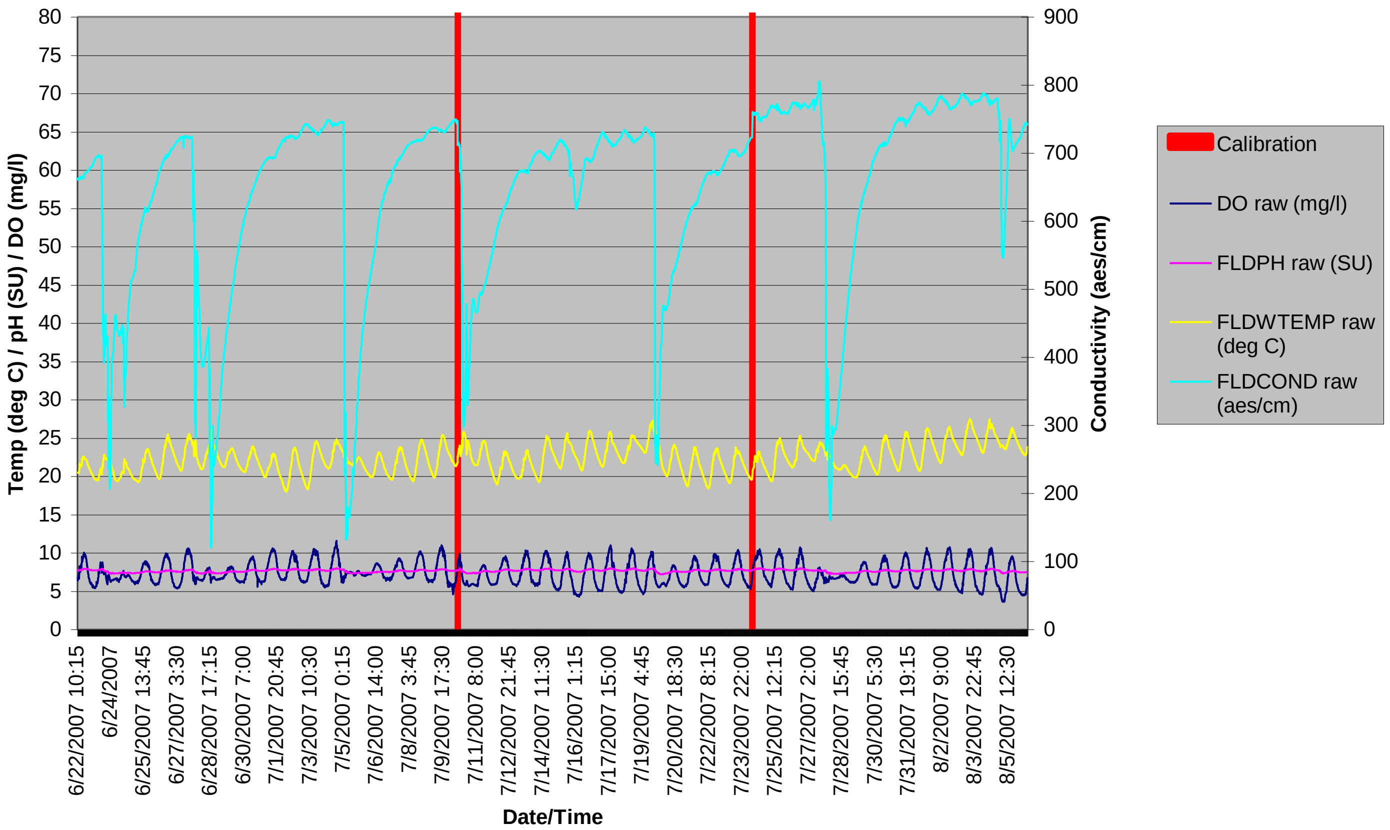


FIGURE 6.5.8 SONDE DATA FROM SAMPLING LOCATION EMIMI009



Refer to Volume 2, Chapter 5, and Volume 3 Chapter 5 for detailed overflow volume, frequency and project information

FIGURE 6.5.9 FECAL COLIFORM SAMPLES AT SAMPLING LOCATION EMUMU007 WITH RAIN

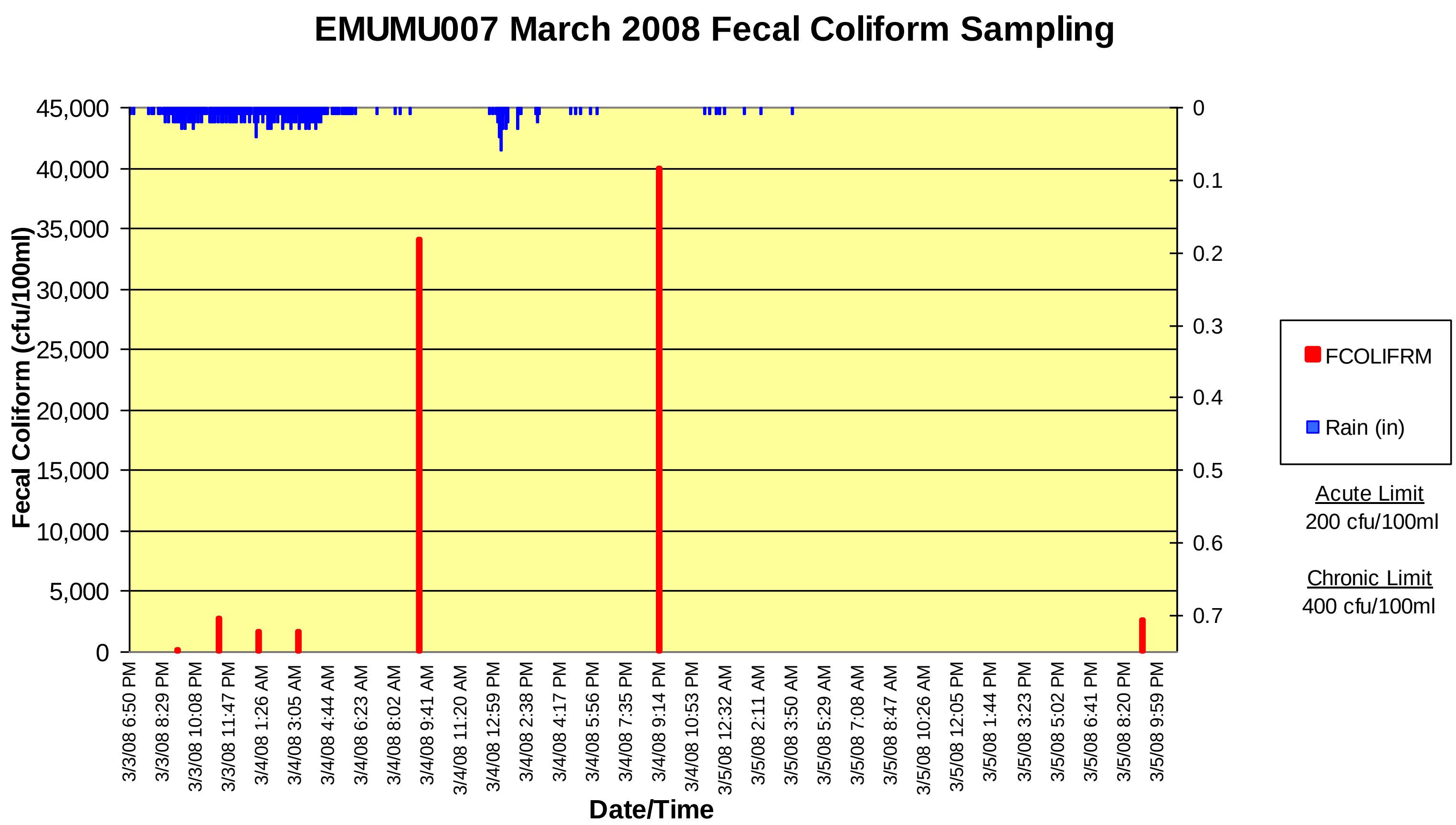


FIGURE 6.5.10 FISH SAMPLING

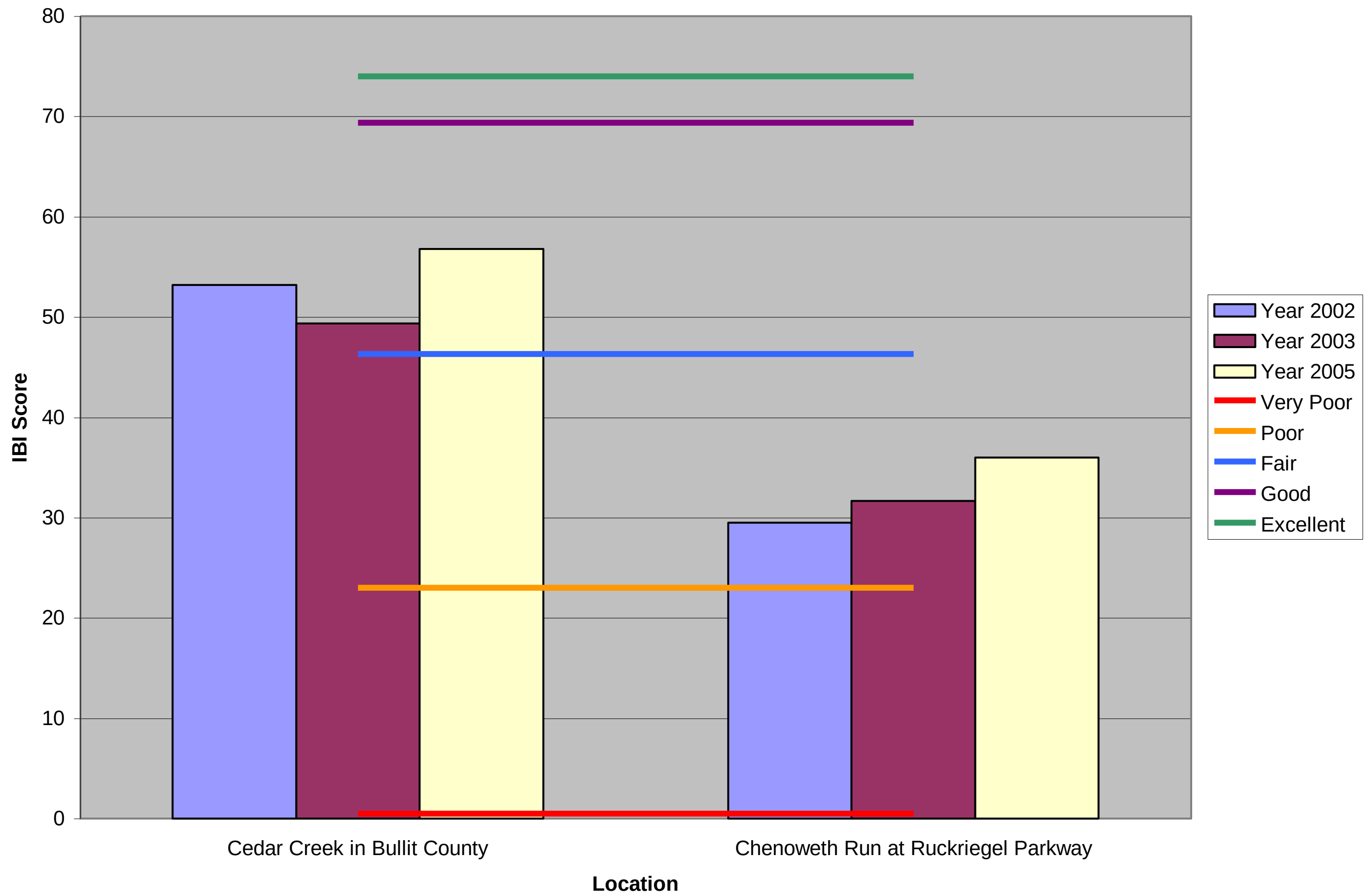
Top Left – Stream Technicians use Electrofishing techniques to collect fish over a designated stream reach.

Top Right – They transfer all fish to a cooler for temporary holding.

Bottom Left – Species are identified for each individual fish

Bottom Right – Results are documented for number of each individual species caught. These data are turned into a measure of stream quality.

FIGURE 6.5.11 FISH INDEX OF BIOTIC INTEGRITY (IBI) 2002 - 2005 AT 2 LOCATIONS



6.5.2 IOAP Compliance Monitoring Objectives

1. To meet local, state, and federal objectives that have been set forth through the overflow abatement planning process, MSD will continue the existing activities described above and implement new monitoring and modeling activities for various components of the plan. A Gantt chart displaying the current and future monitoring and modeling efforts is outlined in Figure 6.5.12 Water Quality Monitoring Schedule at the end of the chapter. IOAP compliance monitoring and reporting will focus on the three primary objectives, as follows. Assessment and Documentation of Facility Operation Boundary Conditions – MSD will collect baseline data through the use of pre-construction monitoring data. In the event that pre-construction monitoring is not feasible, sewer modeling and historic operational data will be used to assess boundary conditions.
2. Execution of Post Construction Monitoring – MSD will compare boundary condition data to post-construction data to evaluate project performance as it relates to the overflow level of control committed within the IOAP.
3. Reporting Results to Regulatory Agencies and the Public – Beginning with the FY14 Annual Report through request for Amended Consent Decree termination, MSD will provide annual reports on performance findings for completed, self-identifying where the performance falls below the committed level of control and defining remedial measures and schedule to improve performance to the appropriate level.

Monitoring objectives are to assess the individual performance of projects as they are completed, as well as the collective, improved system performance and subsequent water quality impacts of the IOAP. Monitoring will determine the efficacy of the system, compliance with water quality standards, and help evaluate if there is a need for additional projects or programs to meet water quality compliance.

Finally, area-wide programmatic elements (green infrastructure, I/I reduction) and collective project impacts of the overflow abatement plan must demonstrate their effectiveness through hydraulic and water quality modeling. These models will be recalibrated a minimum of every five years, possibly more frequently, with collected rain data, flow monitoring, stream sampling and other assessment data. The modeled elements will include flow monitoring results reflecting the benefits of green infrastructure projects such as downspout disconnection, green roofs, and pervious pavements focused on the combined sewer area along with I/I reduction, sump pump disconnection and illicit connection removal in the separate sanitary area. Monitoring efforts specific for assessing IOAP compliance are discussed in the following subsections.

6.5.3 IOAP Compliance Monitoring Components

The primary IOAP components to be assessed through monitoring and modeling are:

- Gray Infrastructure – wet weather conveyance, storage, and treatment
- Green Infrastructure – impervious area disconnection through infiltration trenches, rain gardens, pervious pavers, downspout redirection& green roof projects
- I/I reduction and Private Property Program – targeted sewer rehabilitation areas to reduce flows from inflow and infiltration and illicit property connections
- Behavior Change – effects of the public information and outreach program

To assess these components, several activities, beyond the collection of data, will be crucial throughout the process.

- Data Quality Assurance – assessing data to be used in hydraulic and water quality model calibration to be sure that it is representative and accurate
- Systematic Performance Assessment - Utilizing environmental and flow meter data sets to update the sewer and water quality models to assess system overflow reduction and overall plan effectiveness
- Adaptive Management – managing, scheduling, and adjusting the programs and projects which are required to fulfill the requirements set forth in this document

Consistent application of these activities will allow MSD to effectively assess compliance with IOAP objectives. Monitoring programs to assess gray infrastructure performance, such as storage basins and pipes, are well documented and understood. Green infrastructure, along with I/I reduction and a private property program for removing illicit connections, presents new ways of thinking about wet weather management; however, in concept, monitoring compliance and effectiveness are relatively similar to gray solutions. Due to the smaller and dispersed nature of these overflow controls, demonstration or case study sites will be used to establish their effectiveness. Once established, these effects will support the expanded use of similar controls, implemented on a larger area. Ultimately, the hydraulic model recalibrations resulting from flow monitoring will demonstrate the benefits of the source control efforts, and demonstrate overall compliance with the IOAP objectives.

Community-wide behavior change is another important aspect that needs to be monitored. Cooperation and understanding from the community and other partners are key to long-term IOAP success. As with practices such as recycling and conservation, dramatic long-term impacts can be obtained by raising public awareness of an issue, such as water quality, and how adjusting individual behavior can have an effect.

Finally, reporting on system performance concerning overflow mitigation will be accomplished utilizing sewer and water quality models that are frequently updated and improved utilizing the environmental data sets that MSD collects. Statistical analysis using this data to study individual overflow behavior can result in a much improved understanding of each overflow and a verification of model simulation results. As the IOAP projects and programs are implemented over time, the models will be adjusted, and the typical year rainfall and design storms will be simulated to demonstrate compliance with plan targets. Any significant project modifications needed as a result of these continual efforts will be reported to EPA and KDEP for concurrence, similar to this 2012 IOAP Modification.

6.5.3.1 Gray Infrastructure – Wet Weather Treatment

In addition to using gray infrastructure for wet weather storage and conveyance, MSD also proposes to expand the current wet weather treatment capacity. The IOAP proposes the construction of a wet weather expansion of the Derek R. Guthrie WQTC and a retention treatment basin system near the Southwestern Pump Station.

Derek R Guthrie WQTC Flow Equalization and Treatment Project

MSD is increasing its conveyance capacity and wet weather storage in targeted areas to eliminate SSOs. Part of the additional wet weather flow captured will be conveyed to the Derek R. Guthrie WQTC that currently has a current peak hydraulic design capacity of 96 mgd. In order for the Derek R. Guthrie WQTC to handle the additional wet weather flow, it is necessary to expand the wet weather treatment capacity of the plant by an additional 100 mgd. Process changes are expected to increase the capacity of the existing facilities to 100 mgd also, for a total wet weather peak flow capacity of 200 mgd with all units in service. The Post Construction Compliance Monitoring Plan will incorporate the following four elements: equipment testing, field verification of the hydraulic model, field verification of the process model, and report on one-year operations including a certification of expansion. These elements are described in detail below.

<u>Equipment Testing</u>

Field testing of the critical equipment at the Derek R. Guthrie WQTC will be conducted to ensure that actual equipment and system performance meets or exceeds design requirements. The critical components to be tested as part of the Derek R. Guthrie WQTC expansion include influent pumps, aeration blowers, bar screens, grit collectors, and clarifiers.

Each influent pump will undergo the following field tests:

- Alignment - Test complete assemblies for correct rotation, proper alignment and connection, and quiet operation.
- Vibration Test - Test with units installed under normal and peak operational loads to ensure minimal vibration.
- Flow Output - Measured by plant instrumentation and storage volumes.
- Operating Temperatures - Monitor bearings on pump and motor for abnormally high temperatures.

Each blower will undergo the following field tests:

- Alignment - Test complete assemblies for correct rotation, proper alignment and connection, and quiet operation.
- Vibration Test - Test with units installed under normal and peak operational loads to ensure minimal vibration.
- Performance - Measured by plant instrumentation and manufacturer's equipment curves.
- Operating Temperatures - Monitor bearings on blower and motor for abnormally high temperatures.
- Voltage and Amperage - Measured for minimum, average, and maximum design conditions.

Each bar screen will undergo the following field tests:

- Alignment - Check complete assemblies for operational alignment to ensure moving parts do not rub stationary parts and equipment tracks straight through full cycle.
- Performance - Verify raking capacity and smooth operation.

Each grit collector will undergo the following field tests:

- Alignment - Test complete assemblies for proper rotation and operational alignment to ensure moving parts do not rub stationary parts and equipment tracks straight through rotation.
- Performance - Verify raking capacity and smooth operation.

Each clarifier will undergo the following field tests:

- Alignment - Test complete assemblies for proper rotation and operational alignment to ensure moving parts do not rub stationary parts and equipment tracks straight through rotation.
- Performance - Verify raking capacity and smooth operation.

Manufacturer representation will accompany all equipment testing.

Hydraulic Model Field Verification

The Derek R. Guthrie WQTC expansion is designed to provide a total peak hydraulic flow of 200 mgd. This design peak hydraulic flow capacity will be verified at the completion of the expansion project. Verification of an actual 200 mgd flow is difficult due to the infrequent nature of heavy rain events and the inherent challenges of surveying during these times. Therefore, this flow will be simulated by removing from service a specific number of processing tanks while adjusting flow to a predetermined amount. This simulation procedure is detailed in Table 6.5.1, which shows the specific number of units in service at each flow rate (highlighted cells show which process is being tested).

Currently, the average daily flow (ADF) at Derek R. Guthrie WQTC is approximately 25 mgd. The higher flow rates required for testing will be achieved by temporarily storing influent in the onsite retention basin (approximately 17 MG active storage) and then releasing it into the WQTC head works.

TABLE 6.5.1

DEREK R. GUTHRIE WQTC 200 MGD SIMULATION

(UNITS IN SERVICE DURING SELECTED FLOWS)

Processing Unit	Total # of Units	Wastewater Flow Per Unit at 200 mgd[1]	50 mgd	67 mgd	100 mgd
Grit Basins	4	50	1	2	2
Stabilization Basins	2	43[2]	2	2	2
Contact Basins	3	67	1	1	2
Secondary Clarifiers	12	16.7	3	4	6
Disinfection Basins	4	50	1	2	2

[1] Assumes all units in service
[2] RAS flow rate at 200 mgd influent rate
Note: highlighted cells show which process is being tested

Additionally, the hydraulic model developed during the treatment plant design will be calibrated based on the results of the surveyed water surface elevations taken at various flow rates. Once calibrated, the modeled hydraulic capacity at 200 mgd will be confirmed.

Process Model Field Verification

The Derek R. Guthrie WQTC will be field tested to verify that each of the unit processes are functioning as designed. This will be accomplished by analyzing samples taken at key locations throughout the plant and comparing the measured data with process design data. The wastewater sampling parameters are shown in Table 6.5.2 and the sampling locations shown on Figure 6.5.13.

Simulating biological treatment design conditions for biochemical oxygen demand$_5$ (BOD), total suspended solids (TSS), and flow rate will be extremely difficult. Treatment performance will be plotted against influent conditions to trend performance to the design conditions.

TABLE 6.5.2

DEREK R. GUTHRIE WQTC SAMPLING PARAMETERS

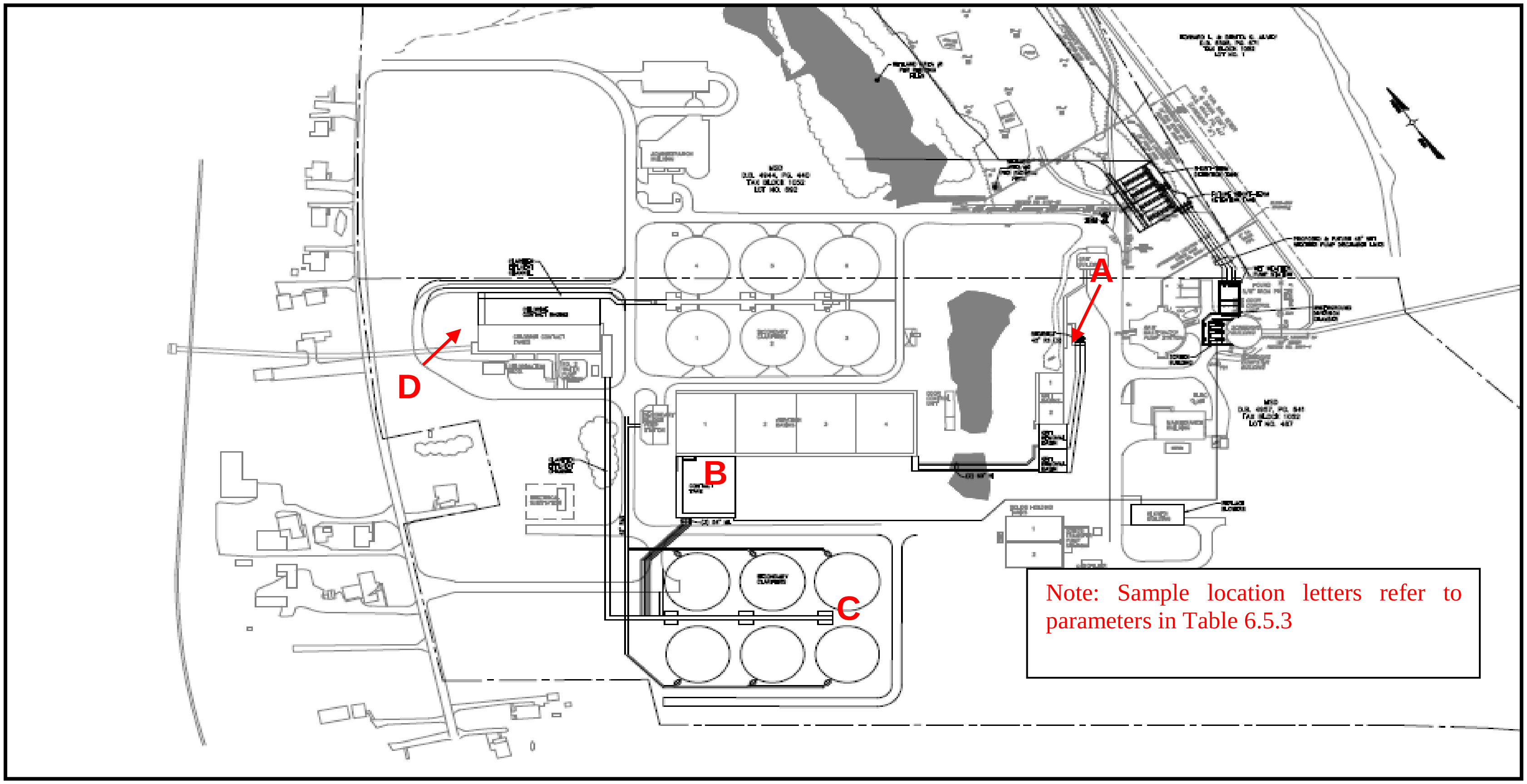
Sample Point	TSS	BOD_5	pH	NH_3	DO	Fecal Coli	Chlorine Residual	SVI	MLSS	MLVSS	Blanket Depth
A – Influent Line	X	X	X	X							
B – Contact Basin					X			X	X	X	
C – Secondary Clarifier											X
D – Effluent Line	X	X	X	X	X	X	X				

BOD - biochemical oxygen demand; DO – dissolved oxygen, NH_3 – ammonia ; SVI- Sludge Volume Index, MLSS – Mixed Liquor Suspended Solids; MLVSS – Mixed Liquor Volatile Suspended Solids

One-Year Operations Report

Twelve months of final effluent sampling data (beginning one month after startup) will be analyzed to verify that the secondary treatment system meets or exceeds the design intent, and that both dry weather and wet weather performance is in accordance with current 7-day and monthly permitted effluent secondary standards. Sampling data reported in the month DMRs will be used. If the plant is functioning as intended, then verification of the operational performance will be documented in a report. If actual performance does not meet the design intent, remedial actions will be recommended in the report to bring the process into compliance.

FIGURE 6.5.13 DEREK R. GUTHRIE WQTC SAMPLING LOCATIONS



6.5.3.2 Retention Treatment Basin

In a continuing effort to reduce CSOs, it is necessary to construct a basin to provide short-term storage and "equivalent primary treatment". During wet weather events, the basin will provide retention until its maximum storage capacity has been reached. If the maximum capacity is not reached during the event, the wastewater will be pumped from the basin to the Morris Forman WQTC for treatment. If the maximum capacity of the basin is exceeded during the event, it will serve as an equivalent primary treatment system, providing sediment removal, disinfection, and removal of disinfection residuals as per discharge permit requirements. The Post Construction Compliance Monitoring Plan for the Retention Treatment Basin will incorporate the following three elements: equipment testing, field verification of the process model, report on one-year operations including a certification of expansion. These elements are described in detail below. Note that field verification of a hydraulic model (planned for the Derek R. Guthrie WQTC compliance monitoring plan) is not required for the retention treatment basin due to the simplicity of the hydraulics through this basin.

<u>Equipment Testing</u>

Field testing of the critical equipment will be conducted to ensure that design performance is being realized. The critical component of the retention treatment basin is the chemical feed system. This system will be tested to verify that its capacity meets or exceeds design requirements. Manufacturer representation will accompany all equipment testing.

<u>Process Model Field Verification</u>

In accordance with EPA requirements outlined in its CSO Control Policy, any "combined sewer flows remaining after implementation of the nine minimum controls and within the criteria specified at II.C.4.a.i or ii, should receive a minimum of:

- Primary clarification (Removal of floatables and settleable solids may be achieved by any combination of treatment technologies or methods that are shown to be equivalent to primary clarification.)
- Solids and floatables disposal
- Disinfection of effluent, if necessary, to meet water quality standard, protect designated uses and protect human health, including removal of harmful disinfection chemical residuals, where necessary."

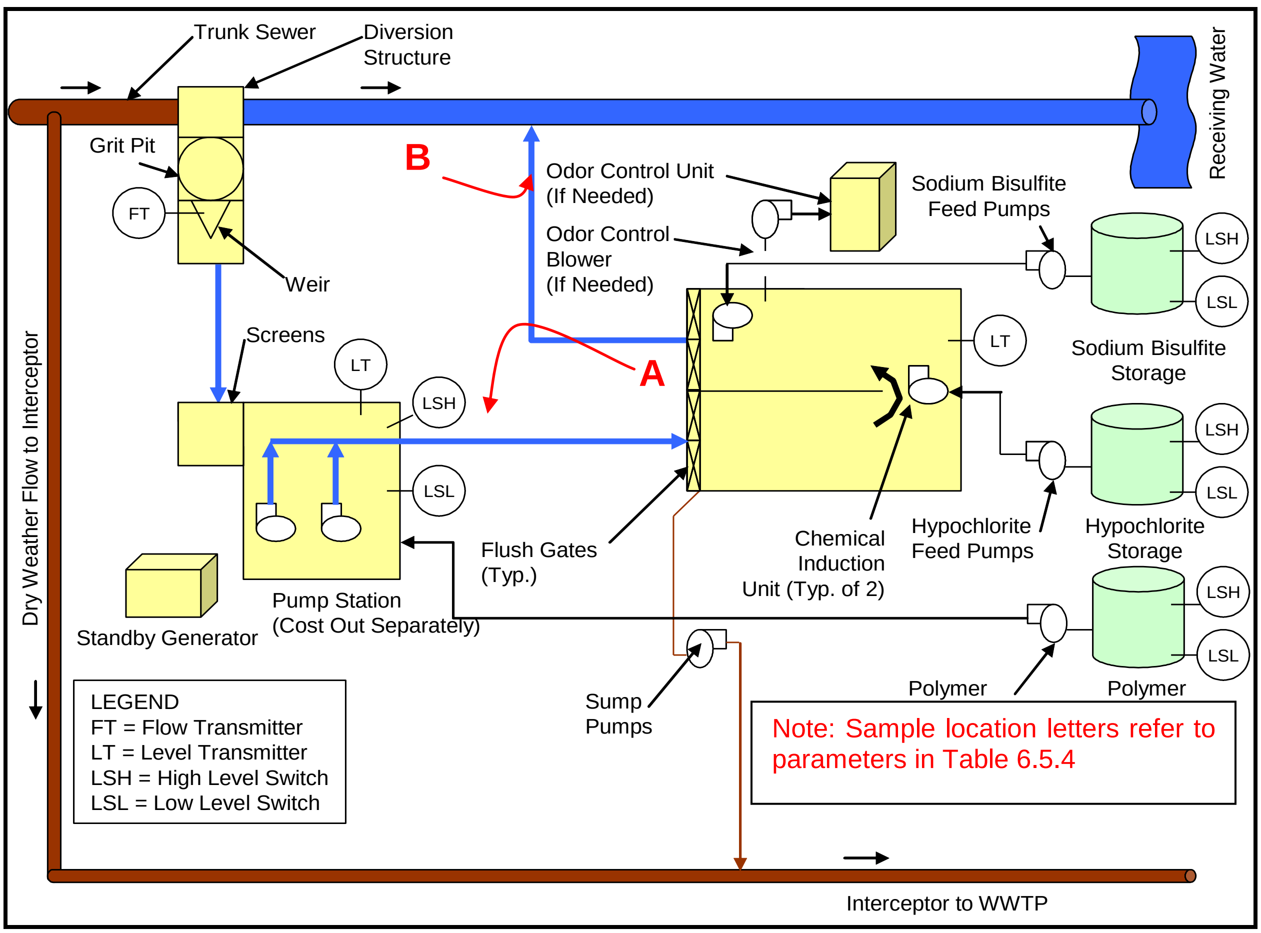
The retention treatment basin is designed to perform as an equivalent to primary treatment. As a result, field testing will consist of sampling to verify adequate TSS removal, disinfection by chlorine, and dechlorination. The wastewater sampling parameters are shown in Table 6.5.3and the sampling locations in Figure 6.5.14 Retention Treatment Basin Sampling Locations.

TABLE 6.5.3

RETENTION TREATMENT BASIN SAMPLING PARAMETERS

Sample Point	TSS	BOD	pH	Fecal Coli.	Chlorine Residual
A	X	X	X		
B	X	X	X	X	X

FIGURE 6.5.14 RETENTION TREATMENT BASIN SAMPLING LOCATIONS

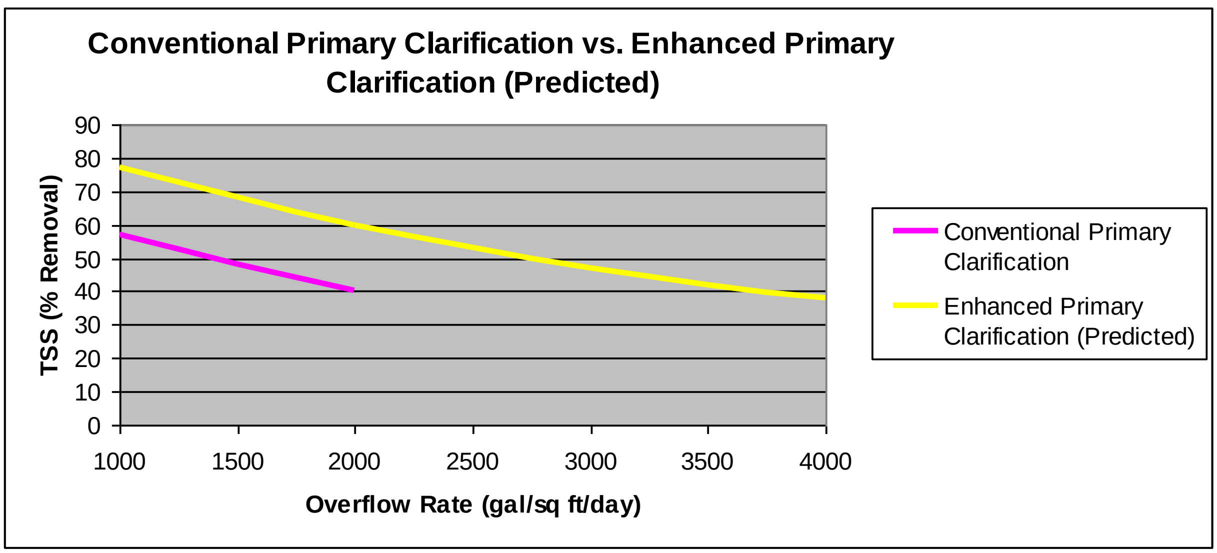


Conventional primary clarification has been shown to remove about 40 percent TSS at an overflow rate of 2,000 gpd/square foot (sq. ft.[1]). An enhanced primary treatment system (addition of chemical coagulation and flocculation using a polymer) was chosen to allow a higher overflow rate and maintain this same 40 percent TSS removal. Enhanced treatment has been shown to increase TSS removal by about 20 percent when compared to conventional primary treatment systems[2]. Using data from conventional primary clarification, a curve was developed to predict TSS removal by the Retention Treatment Basin at higher flow rates. Figure 6.5.15 Predicted TSS Removal illustrates this curve.

[1] Conventional primary clarification curve source- Vesilind, Aarne. Water Quality Treatment Center Design. London: IWA Publishing, 2003, Figure 5.5.

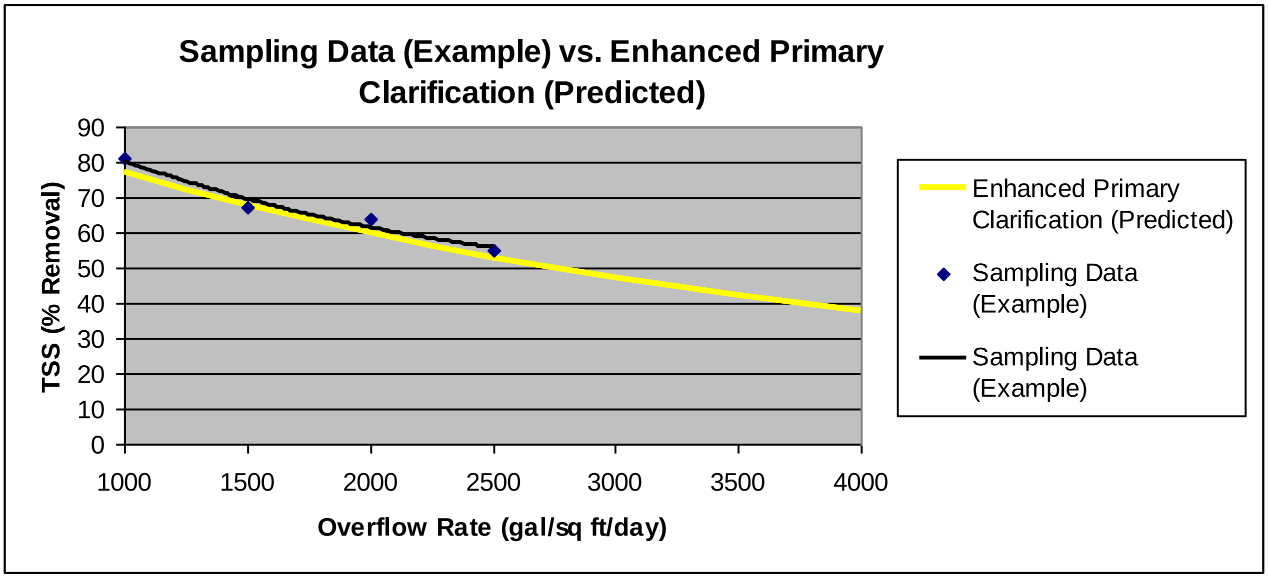
[2] Enhanced primary clarification curve approximated by adding 20 percent TSS removal to conventional primary treatment curve. Source- Vesilind, Aarne. Waste Treatment Plant Design. London: IWA Publishing, 2003, p 5-15.

FIGURE 6.5.15 PREDICTED TSS REMOVAL



Due to the infrequent nature of heavy rain events and the inherent challenges of sampling during these events, the TSS removal at high flow rates will be extrapolated from lower flow rate sampling data. This will be done by plotting TSS removal data on the same graph as the predicted curve and analyzing its trend. The actual sample data points should follow the same path as the predicted TSS removal curve that will be used to demonstrate the TSS removal ability at higher flows. Figure 6.5.16 Example of Sampling Data illustrates this method.

FIGURE 6.5.16 EXAMPLE OF SAMPLING DATA



Although the retention treatment basin was sized based on TSS removal design parameters, particulate BOD will also be removed with the TSS. The anticipated BOD percent removal is uncertain, as the influent wastewater has not yet been characterized. In typical primary treatment, the BOD removal is approximately one-half the TSS removal.

<u>One-Year Operations Report</u>

Twelve months of sampling data (beginning one month after startup) will be analyzed to verify that the secondary treatment system meets or exceeds the design intent, and that both dry weather and wet weather performance is in accordance with current permitted effluent secondary standards. If the plant is functioning as intended, then verification of the operational performance will be documented in a report. If actual performance does not meet the design intent, remedial actions will be recommended in the report to bring the process into compliance.

6.5.3.3 Green Infrastructure, I/I Reduction, and Private Property Program

Monitoring green infrastructure, I/I reduction projects and the effects of a private property program does not diverge far from the methods of monitoring gray infrastructure. Flow monitoring, rain gauges, and water quality sampling are still important in determining the success of “green” initiatives. Gauging the support of the community and their willingness to participate is crucial to success; however, the success of green infrastructure, I/I reduction, and the private property programs will ultimately be gauged by the reduction of sewer overflows.

MSD will gauge the success or failure of these programs in each overflow area when deciding to implement further expansion.

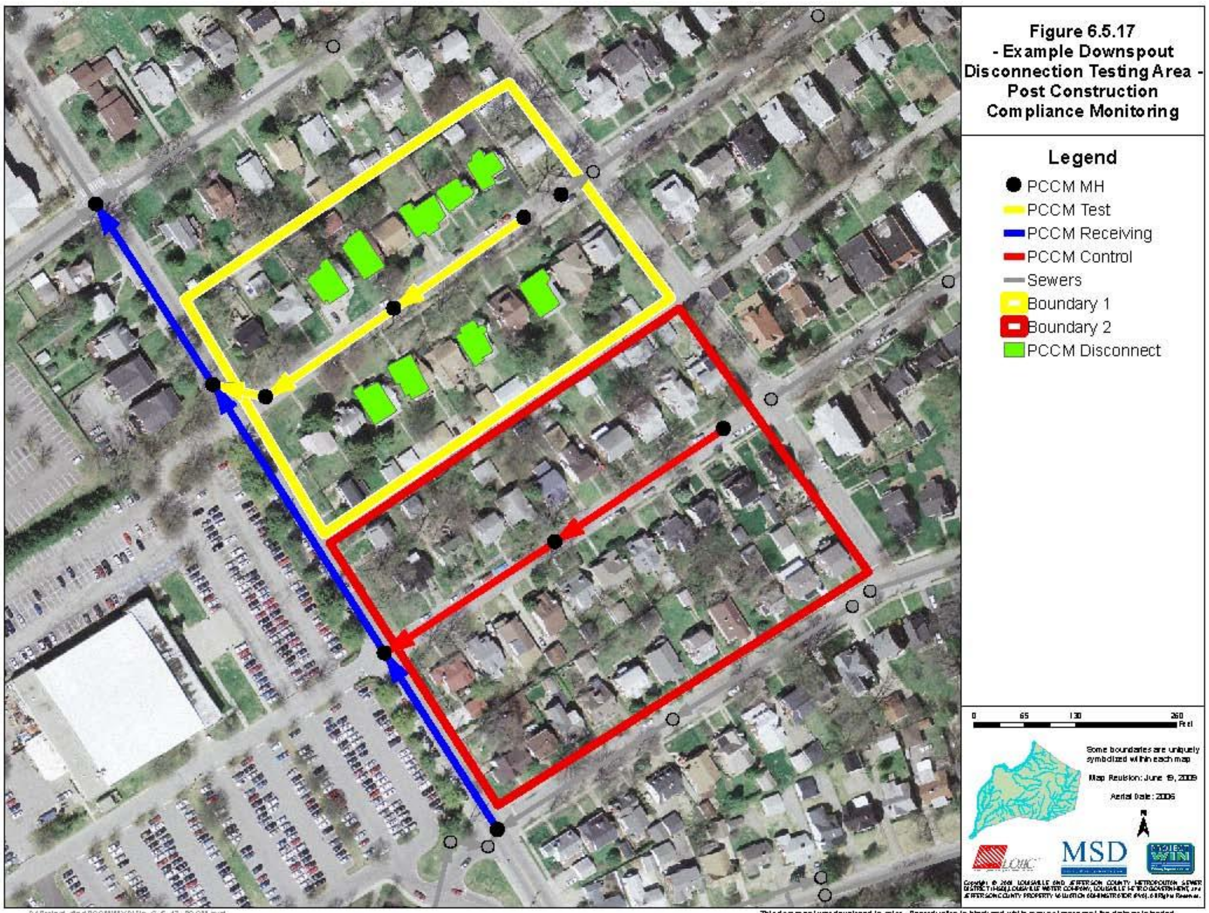
The types of "green" options that will be vital components of MSD's strategy are green roofs, downspout disconnection, rain gardens, bioswales, and pervious pavement. The combination of these components, in small test areas, will allow MSD to monitor its success at reducing stormwater runoff. Similarly, sewer rehabilitation, such as manhole repair and sewer lining, can reduce I/I and, in conjunction with a program to remove illicit sewer connections from private property, can greatly reduce overflow volumes in a collection system.

Case Study Flow Monitoring

Changes in sanitary sewer levels caused by downspout disconnection, dry wells, and pervious pavement will be monitored by utilizing flow meters and rain data. MSD will evaluate the green infrastructure demonstration projects (Volume 2, Section 3.2.1.4) and three I/I case study projects (to be determined by July 1, 2009). A second site near the case study area(s) may be used as a control site – one that has a similar size, ratio of impervious surface to pervious surface, and land use.

Pre-construction testing will be performed on both sites by placing a flow meter downstream of each location to measure flow in the sanitary sewer during wet weather events. A rain gauge will be placed at each location to accurately measure rainfall. After construction and installation of either green infrastructure or I/I reduction measures at a study location, testing will resume at both this and the control sites. Post construction data will be compared to preconstruction data to determine the effectiveness of the green or rehabilitation solutions, utilizing the control site response for comparison. For each case, a brief summary will be generated to report the findings. A case study performed in Burnsville, Minnesota, by Barr Engineering Company (www.landandwater.com Volume 48, No. 5) utilized a similar style of testing. Refer to Appendix 6.5.2. A sample test location setup with the ideal layout for case study flow monitoring is displayed in Figure 6.5.17 Example Downspout Disconnection Test Area.

FIGURE 6.5.17 EXAMPLE DOWNSPOUT DISCONNECTION TEST AREA



Site Specific Monitoring

Site specific monitoring will be performed for a variety of green technologies to assess long-term performance and maintenance needs. Beginning with the FY14 Annual Report through request for Amended Consent Decree termination, MSD will provide annual reports on performance findings for those green projects with monitoring instrumentation.

6.5.3.4 Data Quality Assurance

Monitoring "gray" and "green" infrastructure produces a wide variety of data, collected from several internal and external sources. Assuring that procedures associated with the life of a data point or data set, are carried out with the highest quality is a top priority for MSD. MSD intends to implement several quality assurance practices to ensure data accuracy.

Data Collection and Instrument Calibration

Proper data collection practices are crucial to achieving accuracy. Training is provided annually for staff collecting water quality samples at the LTMN and non-LTMN. This training outlines standards for collecting and delivering water quality samples and calibrating sondes. In addition, MSD will continue to contract with USGS to administer an additional training program providing more in-depth training on sonde calibration and maintenance. Training will ensure more accurate data for water quality analysis. Further adjustments to training procedures and collection and calibration methods will be made as necessary.

Data Quality Procedures

Rain data is collected by MSD through a network of rain gauges, and Onerain provides a network of radar driven rainfall data. Both data sets provide the data in a live feed to databases at MSD, so there is little opportunity for the data to be corrupted; however, there are opportunities for the data sets to have gaps or become misaligned. Data sets found to have missing or misaligned data are either corrected or tagged as incorrect.

Flow meter data is currently collected by MSD using telemetry and direct data downloads. The telemetry systems are utilized for the long-term flow meters. Pertinent information about the flow meter is added to Hansen as a sewer flow meter asset, and the high-resolution data is stored in databases. In the migration process, a Quality Assurance application will identify records outside of acceptable parameters. Corrections and verification will be made as necessary.

MSD has established quality assurance procedures for environmental data and is working on implementation through the environmental data integration site. The procedures encompass data aspects such as collection, delivery, formatting, storage, and analysis. Ensuring the integrity of environmental data is of utmost importance in determining the success of MSD projects and programs.

6.5.3.5 Community Behavior Changes

The public information, outreach, and education program (referred to as the public program) is defined in Volume 1, Chapter 3, Section 3.1. The public program has a variety of objectives, but one primary objective is to build and sustain behavior changes in the community that support green infrastructure participation, and personal responsibility for I/I reduction and other source control measures.

Ultimately, the success of the behavior change program is indicated through the reduction in sewer flows measured as part of the Post-Construction Compliance Monitoring program. Since the outcomes of this monitoring effort will take years to identify, additional “course correction” monitoring is needed. Many monitoring techniques are identified in the public program description. These are all intended to measure if the public program is reaching the target audiences with the appropriate messages and if behavior changes are taking place. These measures will be used to make improvements to the public program approach in a continuous improvement approach to public behavior change.

The monitoring approaches described in the public program are all surrogates for the “bottom line” measurement of overflow reduction effectiveness. Overflow reduction effectiveness can only be measured in the pipes, as part of a comprehensive flow monitoring and model calibration approach. In addition to the primary objective of overflow reduction, the public program also has other objectives, such as sustaining support for rate increases needed to finance the IOAP investment, and achieving more general customer relations objectives of MSD. Public outreach, involvement, and education are critical to MSD’s overall success; therefore, MSD has decided to integrate customer surveys into the overall IOAP response program.

Customer Surveys

A bi-annual customer survey will be developed both to monitor the effectiveness of the Project WIN public outreach efforts, and to reinforce key messages crucial to successful implementation of Project WIN. MSD’s use of customer surveys is adapting in response to results from the first two customer surveys issued. For a discussion of the results of the first two surveys and future plans for use of customer surveys, see Volume 1, Chapter 3.6.2. .

Systematic Performance

Monitoring systematic performance involves the use of environmental data collected from monitoring overflow abatement technologies along with rainfall and stream parameters, to further enhance hydraulic and water quality models and to accurately report overflow reductions and associated stream water quality improvements. As the IOAP projects and programs are implemented over time and compliance monitoring data is collected, the existing conditions for the models will be adjusted and the typical year rainfall and design storms will be simulated to demonstrate compliance with plan targets and assess the state of the streams in relation to the water quality standards. If this periodic assessment proves the plan to be less effective than predicted, in overflow abatement and water quality improvements, adjustments will be made within the plan to adapt and refocus efforts toward the original targets.

6.5.3.6 Adaptive Management

MSD is dedicated to cost-effectively achieving all of the goals and requirements of the IOAP. MSD is focused on effectively implementing adaptive management practices to achieve its goals. The basic principle of adaptive management is to learn from successes and failures, and modify future actions to be more effective in achieving long-term performance objectives. Adaptive management makes use of a constantly improving system understanding through sewer flow and overflow monitoring, system modeling advancements and operational clarity to review the proposed approaches for overflow abatement and adjusts to achieve the intended objectives. Adaptive management also includes improvement of practices and procedures included in the IOAP appendices. As these approaches change, MSD will revise and publish pieces as necessary.

MSD reports on project progress through quarterly and annual reports, in accordance with the terms of the Consent Decree. MSD will notify the EPA and KDEP of the substantial completion of each capital project, in accordance with the project certification requirements of the Consent Decree. As projects are certified to be complete, MSD will institute monitoring for a period of 12 to 24 months. Once adequate performance data has been gathered, MSD will report on project performance in the next annual report. If the project is performing at or above the expected level of control, MSD will maintain this operational level and continue to monitor and report performance.

If a project is deemed to be performing below the appropriate level of protection, MSD will identify remedial measures along with a schedule to bring the project into compliance. Note that many projects are inter-related; therefore, final performance evaluations may not be possible until the completion of the Final LTCP and Final SSDP in 2020 and 2024, respectively. This inter-relationship may be cited as the reason for under-performance during the interim, annual performance reporting for completed projects.

Within three years of the completion of the projects identified in the Final LTCP (currently required to be completed not later than December 31, 2020), MSD will prepare a system-wide performance report focused on overflow assessment against the site-specific level of control and the systematic residual overflow volume outlined in the LTCP. A similar report will be prepared upon completion of the projects identified in the Final SSDP (currently required to be completed not later than December 31, 2024) focused on the elimination of SSO's to the site-specific level of control design event, recognizing that an extended evaluation of project performance will not be available for some of the projects completed near the end of the implementation schedule. If necessary, MSD will propose remedial measures with a schedule where performance falls short of the intended level stated in the Final LTCP and the Final SSDP. These performance reports will be prepared for MSD's use in supporting the submittal of the final compliance report required by the Amended Consent Decree.

In accordance with paragraph 72 of the Amended Consent Decree, on or before the agreed upon termination date of December 31, 2024, MSD will submit a compliance report certifying that MSD has:

- Completed all Support Environmental Projects (SEPs),
- Paid all penalties and stipulated penalties due,
- Submitted and received approval of the Early Action Plan; the Interim SSDP; the Final SSDP; the Interim LTCP; the Final LTCP; the Process Control Program for the Jeffersontown WQTC; the CPE and CCP for the Jeffersontown WQTC; and the CPEs CCPs and Elimination Plan for the WQTCs pursuant to paragraph 27 of the Amended Consent Decree, and,
- Completed all work and implemented all the requirements of the Early Action Plan; the Interim SSDP; the Final SSDP; the Interim LTCP; the Final LTCP; the Process Control Program for the Jeffersontown WQTC; the CPE and CCP for the Jeffersontown WQTC; and the CPEs CCPs and Elimination Plan for the WQTCs pursuant to paragraph 27 of the Amended Consent Decree, as required under the Amended Consent Decree or any additional amendments to the Amended Consent Decree.

In conjunction with tracking schedules and progress, MSD is taking major steps towards interactive and transparent access to data. Using web-based dashboards, alert systems, and data query interfaces, MSD is able to present reliable data to inquiring organizations and individuals in a more effective manner.

Adaptive management is critical to the success of reducing volume and eliminating overflows in the Louisville Metro sewer system. Successful management will define the success of capital project certification and effectiveness, and ultimately determine the outcome of the IOAP.

6.5.3.7 2012 Adaptive IOAP Modifications

As part of the adaptive management approach outlined in the approved 2009 IOAP, the Louisville and Jefferson County MSD has been expanding the monitoring network throughout its sewer system. MSD has been utilizing data from this network to recalibrate the hydrologic and hydraulic models used to size overflow abatement projects and refine individual project approaches and sizes based on an improved understanding of the sewer system operation and the relationship of certain overflows to one another.

MSD developed this programmatic justification for a proposed 2012 IOAP Modification, utilizing the same benefit/cost methodology defined by the WWT for the 2009 approved plan, as outlined in previous chapters. This justification demonstrates the proposed modifications achieve a higher overall benefit to the community through earlier overflow reduction, increased use of green infrastructure and acknowledgement of pertinent public input.

MSD submitted individual project modification letters to state and federal regulatory agencies on August 17, 2012, along with this programmatic justification to provide additional detail for each project requiring significant adjustments. Revisions to several of these letters and associated project fact sheets were developed in response to telephone discussions on September 5, 2012.

These letters were submitted as advanced notification, documenting the modifications that will be addressed in this proposed 2012 IOAP Modification. On October 4th, 2012, the EPA approved 13 of the 28 project modifications that were requested. Those projects approved were critical as the modifications were requesting schedule changes or significant project modifications that effected MSD's short-term activities. Revised LTCP and SSDP project suites are outlined within Chapter 5 of Volumes 2 and 3, respectively.

One of the basic principles of IOAP implementation approach is the use of adaptive management, refining past decisions through continuous improvement of the physical and hydraulic information available for use as analytical tools. The intent of adaptive management is to "right-size" projects as additional information is collected and analyzed through expanded flow monitoring and improved system operational understanding. MSD's challenge in implementing the IOAP is adjusting the project sizes and technical approach to successfully achieve overflow reduction and regulatory objectives while maintaining community affordability. Continuous measurement and improved understanding of the large, complex sewer system functionality under various wet weather conditions is enabling the District to achieve these desired outcomes.

Project identification and sizing for the preparation of the approved 2009 IOAP was based on a set of sewer system models developed and calibrated to rain events, flow data and field reconnaissance in 2006 and 2007. This mathematically modeled representation of the physical sewer system was based on sewer maps and construction drawings that date back as far as the early 1900s, supplemented and verified to some extent by survey data related to critical elements of the system. While surveyors field-verified some of the information from the maps, plans, as-builts and drawings, the size, accessibility and complexity of the system precludes resurveying every pipe and manhole during the planning process.

After building the mathematical models of the combined and separate sewer systems, the hydraulic calculations for both dry and wet weather were calibrated using flow measurements taken from 29 locations in the combined system over the course of 3 - 4 months in the spring of 2007. This time period included several significant rain events. The purpose of the initial hydraulic modeling was to provide estimates of flows at various locations in the sewer system to allow identification, evaluation, and prioritization of projects to reduce sewer overflows. However, MSD understood that this initial modeling effort would require increased system monitoring and model refinement to ensure that regulatory compliance and water quality objectives are achieved, as documented in the 2009 IOAP adaptive management approach.

Parallel to the development of the IOAP for the 2009 submittal to the regulatory agencies, MSD began implementation of an aggressive program involving installation of long-term flow monitoring equipment at numerous locations to continue improving the quality of the sewer flow predictions from the models and subsequent overflow abatement project sizing. Over 200 new sewer monitoring sites have been installed since 2009.

Approach

The most recent calibration of the sewer models resulted in a few project modifications detailed below.

MSD is proposing various project modifications including approach, size, level of control and schedule (see attached) due to the model calibration, constructability, green infrastructure implementation, projected rate increases and recent public input. The projects were analyzed through the same technology assessment and benefit/cost methods used in the 2009 plan, as defined by the WWT Stakeholder Group.

Environmental Benefits

MSD has evaluated the impacts of the proposed modifications on the overflow reduction timing and overall overflow reduction performance as compared to the 2009 IOAP.

Note that Figure 6.5.18 CSO AAOV Reduction thru 2020 shows three different overflow reduction curves. MSD has evaluated the impacts of the proposed modifications on the overflow reduction timing and overall overflow reduction performance as compared to the 2009 IOAP. In the Executive Summary, Figure ES.2 illustrates the effect of the proposed modifications on the timing of CSO elimination. The curve labeled “2009 Approved IOAP” shows the timing of AAOV reductions for the approved plan. The curve labeled “2012 Modified IOAP” shows that the proposed modifications achieve AAOV reductions earlier than was projected in the 2009 approved IOAP. In addition, residual AAOV is significantly lower in the 2012 Modified IOAP, reflecting a higher overall level of CSO control. Note that the apparent delay in achieving significant AAOV reductions is due to the need to focus initially on major SSO reductions required by the ACD and described in the Interim SSDP. Significant AAOV reductions were achieved prior to 2009 through the implementation of the first two phases of the RTC project, early action sewer separations, etc.

Figure 6.5.19 SSO Location Reduction thru 2024 shows that the overall level of control for SSOs remains essentially the same as in the approved IOAP, but the SSO eliminations occur quicker than originally proposed for SSOs at all levels of control.

FIGURE 6.5.18 - CSO AAOV REDUCTION THRU 2020

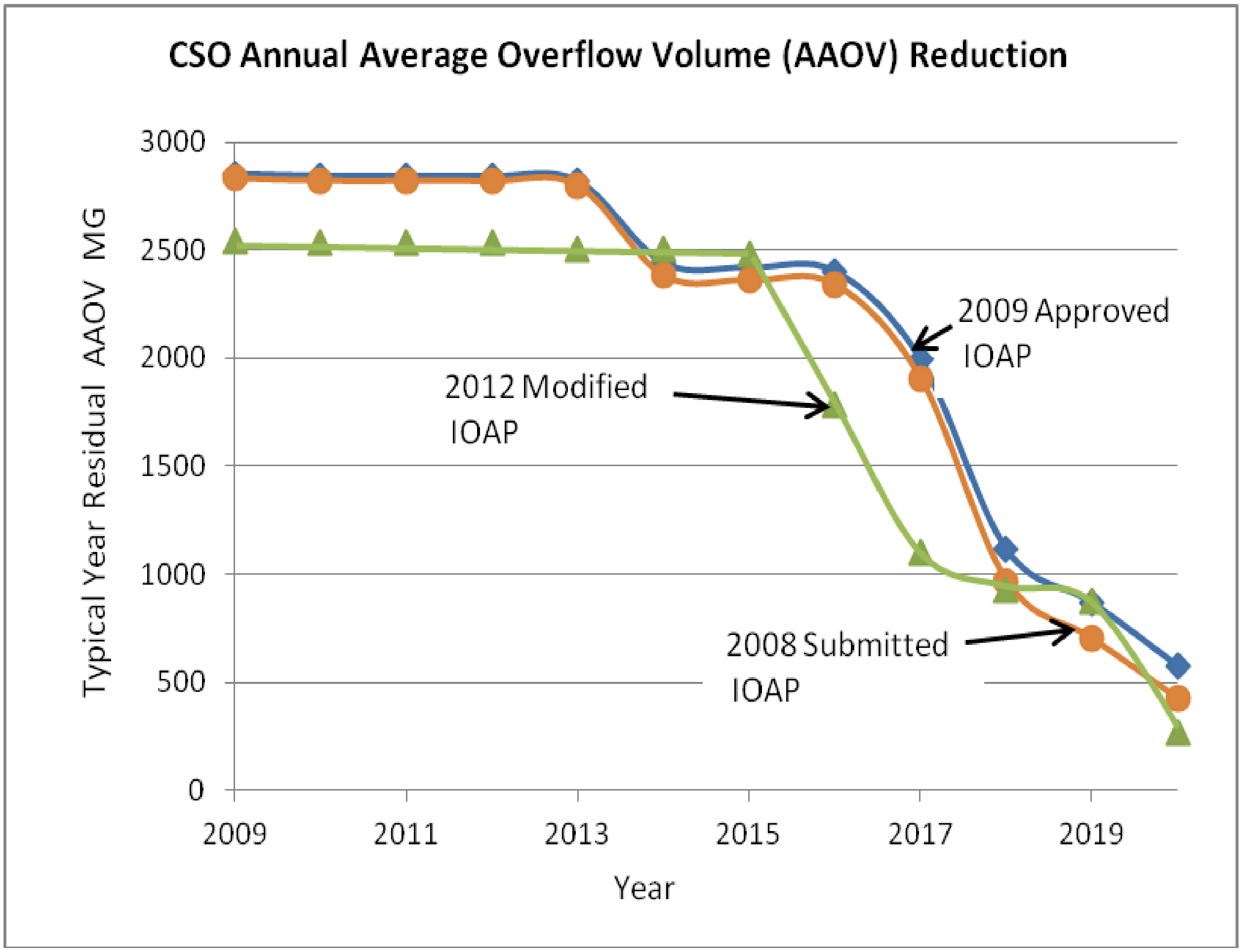
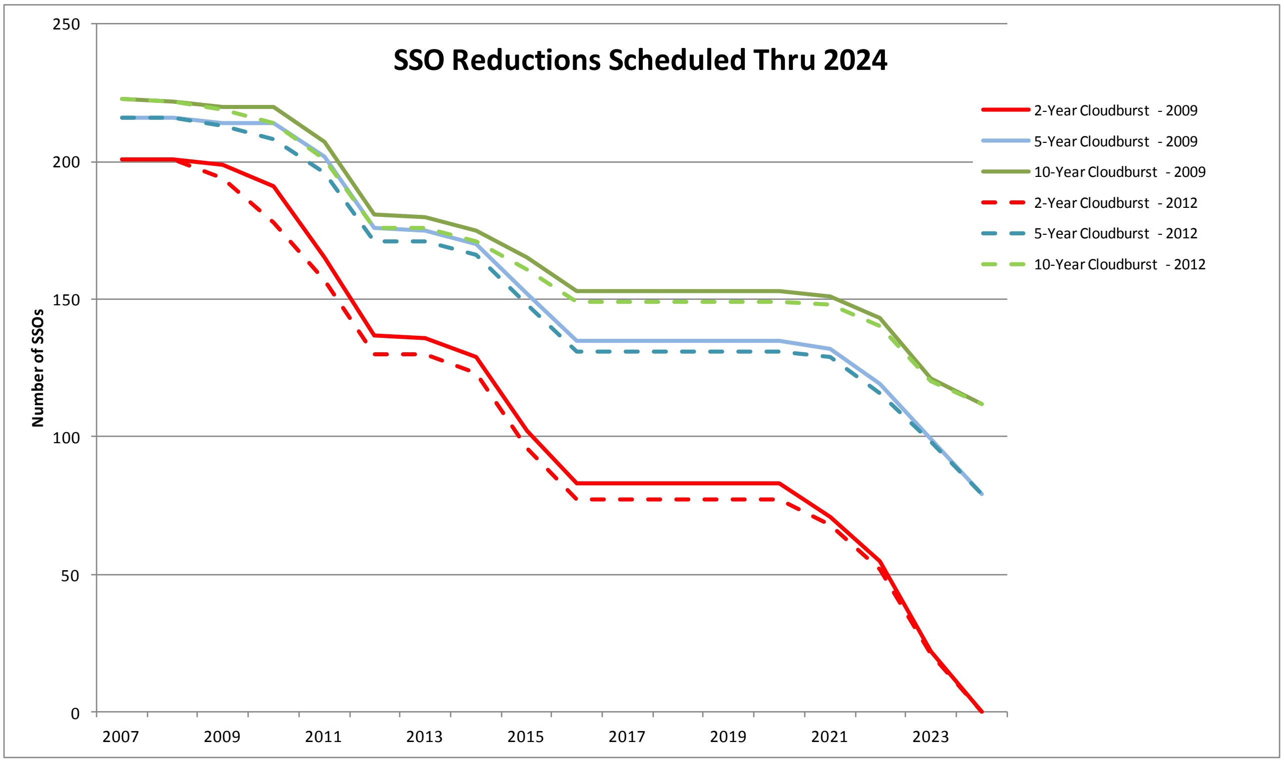


FIGURE 6.5.19 – SSO LOCATION REDUCTION THRU LOCATION REDUCTION THRU 2024



6.5.3.9 Path Forward

MSD deems that the recent recalibration has identified the major project modifications needed to successfully comply with overflow reduction targets. However, the monitoring system expansion is continuing and the additional data will be used for further model calibration, statistical and behavioral verification. Coupled with overflow statistical analyses, green infrastructure impact assessments and upgrades to modeling technologies, MSD's understanding of system operation and interaction will continue to improve and may result in additional project adjustments as IOAP implementation continues.

MSD is moving forward with accelerated schedules in some areas, and deferring activities on other projects that are proposed to be completed later than proposed in the 2009 IOAP.

TABLE 6.4.2 - SUMMARY OF REVENUES AND EXPENDITURES FY 2008 THROUGH FY 2025 (ALL COSTS IN $1,000'S)

	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
Available Revenues*	Actual through FY 2012																	
Wastewater service charges	125,782	130,661	133,853	145,880	148,390	158,035	167,517	176,731	186,451	196,706	207,525	218,939	230,980	243,684	257,087	271,227	286,144	301,882
Stormwater service charges	31,107	32,343	34,757	37,417	39,999	42,759	45,709	48,863	52,235	55,835	58,906	62,146	65,564	69,170	72,974	76,988	81,222	85,689
Misc. revenues	12,730	34,507	46,118	38,819	44,538	21,517	21,742	21,692	21,606	21,606	22,254	22,922	23,609	24,318	25,047	25,799	26,573	27,370
Bond Proceeds	104,225	9,143	418,832	90,635	(30,915)	-	125,000	100,000	-	125,000	-	100,000	-	-	-	-	-	-
Total Available Funds	273,844	206,654	633,560	312,751	202,012	222,311	359,968	347,286	260,292	399,147	288,685	404,006	320,153	337,172	355,108	374,013	393,939	414,941
Expenditures																		
Operating (net)**	70,335	69,534	72,939	76,999	75,126	77,380	79,701	82,092	84,555	87,092	89,704	92,396	95,167	98,022	100,963	103,992	107,112	110,325
Additional O&M Projections			-	-	-		935	933	902	1,202	1,797	2,804	3,574	4,209	5,051	5,314	5,649	6,224
Debt Service***	92,898	103,450	142,741	137,143	115,971	114,531	116,210	122,122	122,321	129,687	129,895	135,849	136,078	136,327	136,587	136,860	126,797	126,823
Consent Decree (Escalated, no FA)	7,152	10,458	35,308	92,399	52,048	62,155	71,347	45,504	42,203	47,200	80,640	80,092	51,342	46,040	40,764	35,542	26,050	8,779
Other Capital (No FA)	32,220	36,932	34,748	41,643	27,080	69,985	49,429	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000
Force Account****	26,510	24,401	28,129	30,472	29,859	30,755	31,677	32,628	33,607	34,615	35,653	36,723	37,824	38,959	40,128	41,332	42,572	43,849
Total Capital	65,882	71,791	98,185	164,514	108,987	162,895	152,453	90,008	87,702	99,234	140,293	140,815	113,166	108,999	104,892	100,874	92,622	76,628
Total Expenditures	229,115	244,775	313,865	378,656	300,084	354,806	349,299	307,279	307,588	323,796	361,690	371,863	347,986	347,558	347,493	347,040	332,180	320,000
Annual Change in Working Capital	44,729	(38,121)	319,695	(65,905)	(98,072)	(132,494)	10,669	40,007	(47,296)	75,351	(73,005)	32,143	(27,832)	(10,386)	7,615	26,973	61,759	94,941
Year-end Working Capital	88,564	50,443	370,138	304,233	206,161	73,667	84,336	124,343	77,047	152,398	79,394	111,536	83,704	73,318	80,933	107,906	169,666	264,607

*Assumes wastewater and stormwater rate adjustments as listed on project rate increase schedule, stormwater grows customers due to revenue enhancement through 2017

**Assumes 3.0% annual increase in operating expenses from 2013 - 2025

***Debt Service assumes all new bond issues with uniform payment series for 30 years at 4.0 %

****Force account was calculated by taking the FY 2012 figure and using an escalation factor of 3.0 %

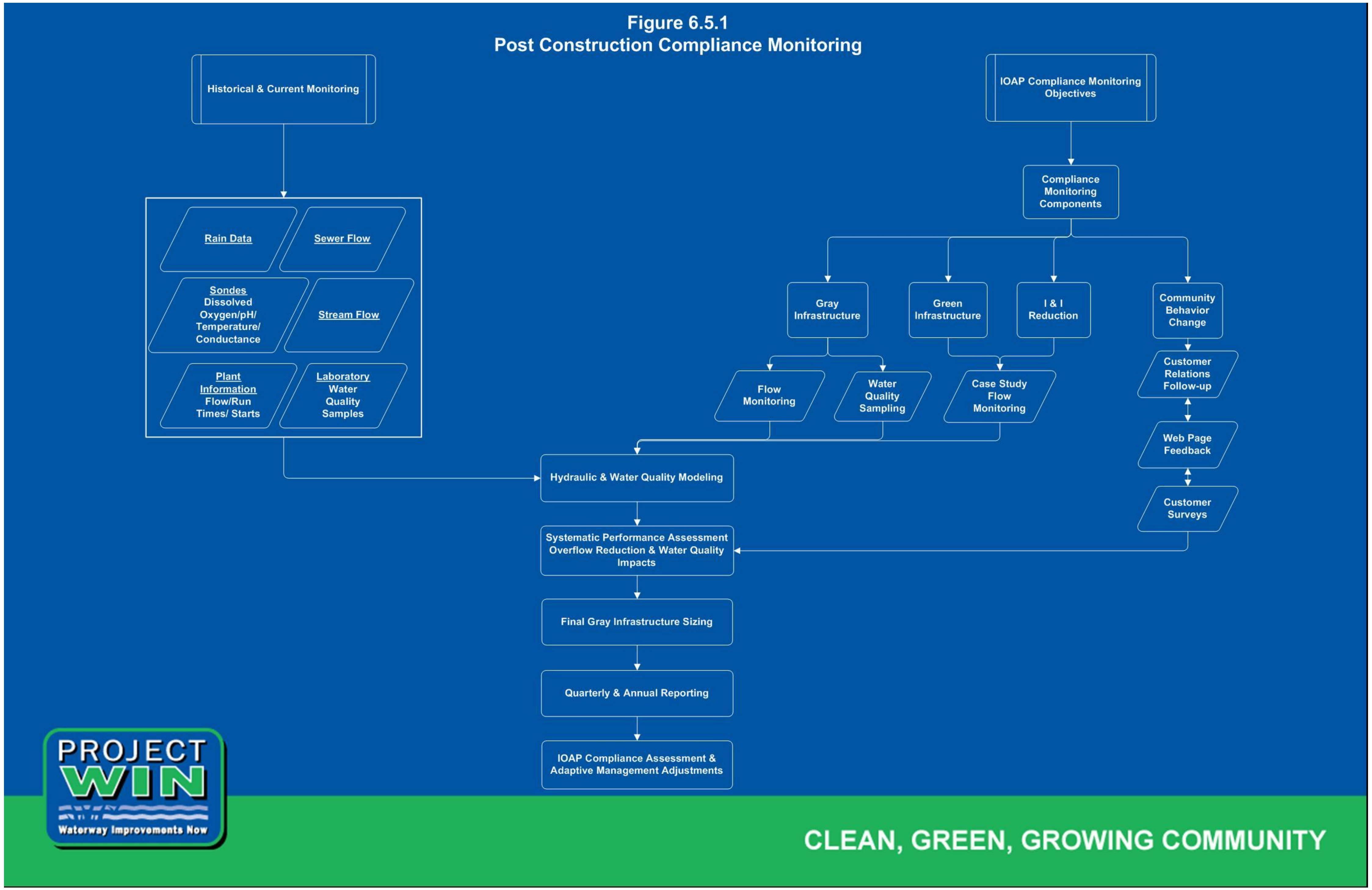


Figure 6.5.1
Post Construction Compliance Monitoring
Historical & Current Monitoring
Rain Data
Sewer Flow
Sondes Dissolved Oxygen/pH/ Temperature/ Conductance
Stream Flow
Plant Information Flow/Run Times/ Starts
Laboratory Water Quality Samples
IOAP Compliance Monitoring Objectives
Compliance Monitoring Components
Gray Infrastructure
Green Infrastructure
I & I Reduction
Community Behavior Change
Flow Monitoring
Water Quality Sampling
Case Study Flow Monitoring
Customer Relations Follow-up
Web Page Feedback
Customer Surveys
Hydraulic & Water Quality Modeling
Systematic Performance Assessment Overflow Reduction & Water Quality Impacts
Final Gray Infrastructure Sizing
Quarterly & Annual Reporting
IOAP Compliance Assessment & Adaptive Management Adjustments
PROJECT WIN
Waterway Improvements Now
CLEAN, GREEN, GROWING COMMUNITY

FIGURE 6.5.12 WATER QUALITY MONITORING SCHEDULE