Wet Weather Team Project Meeting Materials

Summer 2007–Spring 2008

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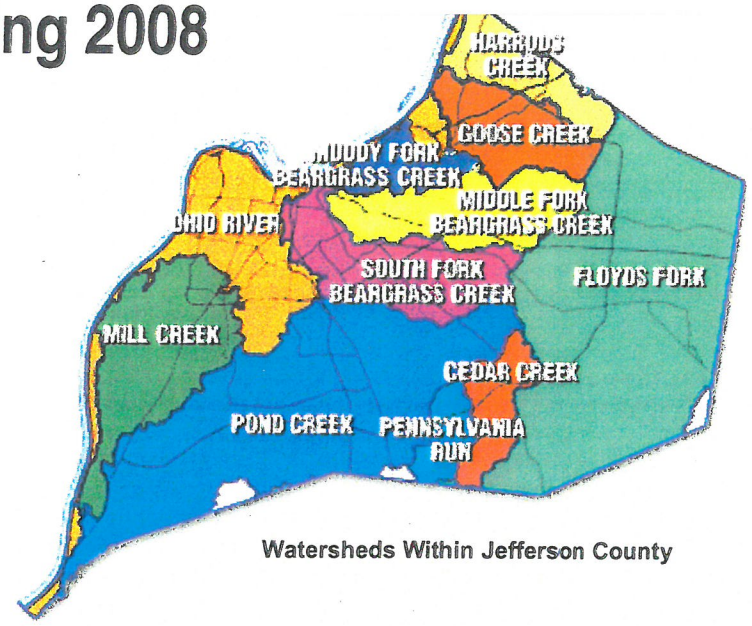
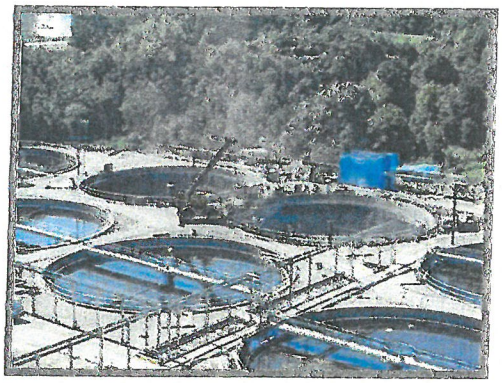
WWT Stakeholders Meeting # 18 5/15/2008

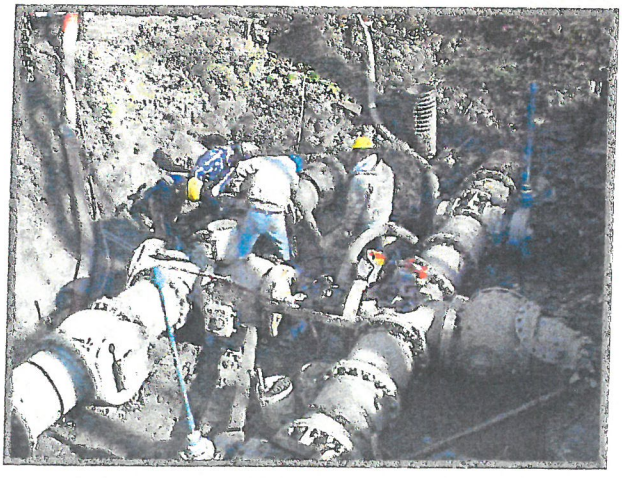
MSD

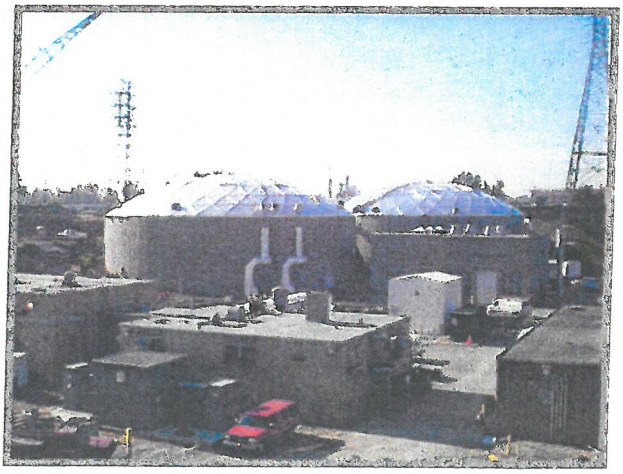
Louisville and Jefferson County
Metropolitan Sewer District



Watersheds Within Jefferson County







Agenda

Revised Draft Agenda
Louisville and Jefferson County Metropolitan Sewer District (MSD)
Wet Weather Team Meeting #18

Thursday, May 15, 2008, 4:20-8:30 PM
MSD Main Office, Board Room
700 West Liberty St., Louisville

Meeting Objectives:

- Learn about the status of MSD's draft Education and Outreach Plan and the May 2008 Project WIN public meetings.
- Review and discuss a draft Post-Construction Compliance Monitoring Plan.
- Review the status and process for collecting Wet Weather Team stakeholder feedback on the emergent vision for MSD's Integrated Overflow Abatement Plan that was presented at the April 3, 2008 WWT meeting.
- Review and discuss examples from the technical team's analysis of green infrastructure solutions.
- Identify next steps and expectations for the next meeting of the Wet Weather Team.

4:20 PM **Participants Arrive and Get Settled**

4:30 PM **Introductions, Review Agenda and Ground Rules (10 minutes)**

- Review meeting objectives and ground rules.

4:40 PM **Wet Weather Project Updates and Observations (25 minutes)**

- Updates on issues related to the Wet Weather Team Project and follow-up items from the last Wet Weather Team meeting.
  - Update on the draft Education and Outreach Plan.
  - Update on Project WIN public meetings (ongoing in May 2008).
- WWT stakeholder updates and announcements.

5:05 PM **Monitoring Plan Discussion (60 minutes)**

- Review and discuss a draft Post-Construction Compliance Monitoring Plan.

6:05 PM **Opportunity for Observer Comments (10 minutes)**

6:15 PM **Dinner Break (25 minutes)**

Dinner will be provided for Wet Weather Team members.

6:40 PM **Integrated Overflow Abatement Plan Vision Update (30 minutes)**

- Update on the WWT stakeholder feedback on the emergent vision for MSD's Integrated Overflow Abatement Plan following the April 3, 2008 WWT meeting.
- Discuss the process for refining the vision based on comments.

7:10 PM **Green Solutions Analysis Presentation (1 hour)**

- Review the approach for identifying and analyzing green solutions for MSD's Integrated Overflow Abatement Plan, including the integration of gray and green infrastructure solutions.
- Review and discuss examples from the benefit/cost analysis of green infrastructure alternatives.

8:10 PM **Opportunity for Observer Comments (10 minutes)**

8:20 PM **Wrap Up and Next Steps (10 minutes)**

- Review plans for the next Wet Weather Team meeting on Thursday, June 19, 2008.

8:30 PM **Adjourn**

Final Meeting Summary
Wet Weather Team Meeting #18
Thursday, May 15, 2008
MSD Main Office, Louisville

The Wet Weather Team (WWT), chartered by the Louisville and Jefferson County Metropolitan Sewer District (MSD), met on May 15, 2008, at MSD's main office. The objectives of the meeting were to:

- Learn about the status of MSD's draft education and outreach plan and the May 2008 Project WIN public meetings.
- Review and discuss a draft post-construction compliance monitoring plan.
- Review the status and process for collecting Wet Weather Team stakeholder feedback on the emergent vision for MSD's Integrated Overflow Abatement Plan (IOAP) that was presented at the April 3, 2008 WWT meeting.
- Review and discuss examples from the technical team's analysis of green infrastructure solutions.

Wet Weather Project Updates and Announcements

The following Wet Weather Project updates and announcements were noted at the meeting.

- Executive Session Idea: Regarding a WWT stakeholder suggestion discussed at the last WWT meeting, Jennifer Tice of Ross & Associates said that MSD had considered the possibility of the WWT meeting in an executive session (without observers), but decided, for a variety of reasons, not to go forward with an executive session at this point. The facilitation team followed up with the stakeholder who had made the suggestion, and the stakeholder was comfortable with MSD's decision.
- Education and Outreach Plan: Angela Akridge of MSD noted that MSD is working on the education and outreach plan for the IOAP; a draft of the plan will be presented at the next WWT meeting. Ms. Akridge also distributed some "how to" manuals on rain gardens to interested participants.
- Project WIN Public Meetings: MSD has hosted a series of Project WIN public meetings in May 2008, and made a number of changes to how these meeting were scheduled, advertised, and conducted (e.g., notice was provided a month in advance, some meetings were held mid-day, and refreshments rather than full meals were provided to save costs). Despite these changes, public attendance has been even lower than it was for previous Project WIN public meeting series. MSD has started taping the public meetings, and plans to show the taped meetings on Metro TV. For the fall public meeting series, MSD may show the presentation on Metro TV before the public meetings.
- MSD Rate Increases: Ms. Akridge said that MSD would soon be submitting a proposal for a rate increase to the MSD Board and to Metro Council. These are MSD's normal operational rate increases for wastewater and drainage services; there will be no change to the Project WIN charges.
- Editorial on Indianapolis Consent Decree: A WWT stakeholder mentioned that there had been a recent newspaper editorial that mentioned the City of Indianapolis' $1.8 billion consent decree. The editorial mentioned that the community's average wastewater rates were expected to reach $60 per month by 2025.

Monitoring Plan Discussion

Justin Gray of MSD described the draft post-construction compliance monitoring plan for MSD's IOAP. His presentation included a summary of historical and current monitoring efforts, the objectives of the compliance monitoring plan for the IOAP, and the elements of the monitoring plan. The plan includes:

- "Gray" solution monitoring;

- "Green" solution monitoring;
- Sewer rehabilitation monitoring;
- Behavior change effectiveness surveys; and
- Adaptive management and reporting.

WWT members asked a few clarifying questions and offered some comments, as follows.

- A few WWT stakeholders asked about the time frame for monitoring (e.g., for green infrastructure projects). Gary Swanson of CH2M Hill said that green infrastructure solutions would need several years of monitoring to allow time to increase participation, monitor how well the solutions are being maintained, and evaluate their effectiveness.
- Some WWT participants suggested that monitoring data could be displayed as part of an interpretive center. A display could be interactive and provide real-time data on the temperature of the water, pH, and other water quality and stream flow conditions that MSD monitors.
- A few WWT members commented that MSD may need more than incentives to ensure that some solutions are maintained; some requirements (a hammer) may also be needed. Bud Schardein of MSD responded by noting that when MSD provides stormwater credits for porous pavement, MSD also establishes a system for inspecting the pavement periodically.
- In response to questions about quality assurance protocols, MSD and the technical team said that quality assurance plans will be developed for individual sampling projects, data will be publicly available on a website (so errors may be found more quickly), and sampling results will be compared to the expected ranges for data, as outlined by EPA and the State.
- A few WWT stakeholders observed that habitat monitoring and bioassessment did not appear to be included in the draft IOAP monitoring plan. MSD said that habitat monitoring and bioassessment would continue to be done every two years; this is part of MSD's requirements under the municipal separate storm sewer system (MS4) permit.
- Some WWT stakeholders suggested that MSD consider supporting a volunteer monitoring program across the county. Participants noted that there could be some concerns about the validity of data collected by volunteers; however, they indicated that it nevertheless could be useful as a way to get people involved and could help with verifying other data MSD collects.
- Several WWT members suggested that MSD consider strategies for conducting targeted outreach and providing feedback about monitoring results to specific neighborhoods. For example, a display about a green infrastructure project (porous pavement, a green roof, etc.) could describe the project, its expected benefits, and what the results have been.
    - Another suggestion was to establish a recognition program for neighborhood efforts (e.g., something equivalent to a "gold star" recognition).

Update on the Emergent Vision of MSD's Integrated Overflow Abatement Plan

Rob Greenwood of Ross & Associates gave an update on WWT responses to a survey about the emergent vision for the IOAP. Following the April 3, 2008 WWT meeting, stakeholders on the WWT were asked to complete a worksheet that asked for feedback on several particular items mentioned in the IOAP vision presentation from the April WWT meeting. Mr. Greenwood said that seven WWT members had not yet responded to the survey, so the facilitation team decided not to share the comments that had been received at this meeting.

Overall, based on the initial responses, Mr. Greenwood noted that there was a solid base of general comfort with the twelve items in the survey. This indicates that the draft vision is fairly stable, although it remains "emergent" since it is still being developed and refined. With regard to items WWT members

rated as "uncomfortable," "very uncomfortable," or "unsure," these included requests for additional explanation or clarification of elements in the vision and comments that the current wording did not accurately reflect the reality (e.g., there were possible overstatements).

Rob Greenwood proposed a process for moving forward with the emergent vision; steps included (a) getting responses from the seven WWT members who had not yet responded, (b) conducting one-on-one follow up with WWT members who had comments or were uncomfortable about items in the vision, (c) discussing the comments with MSD and the technical team, (d) writing a draft narrative version of the emergent vision, and (e) distributing the draft vision text to WWT members for review before the June WWT meeting. All participants present were comfortable with this proposed approach.

Green Infrastructure Status Report Presentation

At the start of this session, Gary Swanson of CH2M Hill described a diagram outlining the sequence of steps in technical team's process for evaluating and selecting projects to address a particular combined sewer overflow (CSO) or sanitary sewer overflow (SSO) problem, including showing how programmatic and site-specific green alternatives are compared with and/or integrated into "gray" solutions. This flow chart was developed in response to a WWT request for a relatively simple visual representation of the technical team's analytic process.

John Lyons of Strand Associates and Gary Wolnitzek of Human Nature gave a presentation on the status of the green infrastructure team's work to identify and evaluate programmatic and site-specific green alternatives for the IOAP. The presentation reviewed examples of the sewershed analysis and a site concept plan presented at a previous meeting, walked through the steps in the regional analysis of green infrastructure opportunities, and showed examples of several particular study areas, each consisting of multiple sewersheds and neighborhoods. The regional analysis included examining geology, soils, historical maps, hydrology, green space, rights of way, and land cover. The technical team has also analyzed the tree canopy coverage in certain neighborhoods. Mr. Strand said that other communities have implemented site-specific green infrastructure solutions; however, few, if any, others have taken a regional approach to identify green opportunities as MSD and the technical team are doing.

Mr. Lyons noted that MSD will be searching for green opportunities that will provide early successes in the IOAP. Green projects being evaluated include rain gardens, dry wells, sinkhole projects, green alleys/streets, green parking lots, and offloading flows to natural systems. In addition to specific projects, the technical team is evaluating green infrastructure programs to encourage downspout disconnection, rain barrels, rain gardens, and vegetated roofs.

WWT members asked a number of clarifying questions in response to the presentation and also provided the following comments.

- Several WWT stakeholders asked for more information about the effectiveness of green infrastructure solutions (e.g., websites or other resources with that information) and asked whether other communities had experienced any issues with their green infrastructure efforts. Chicago's Green Alley Program was specifically mentioned. John Lyons said that the City of Chicago hasn't had complaints about the green alleys; however, the City does not inspect building foundations.
- A few WWT members suggested the following two specific green opportunities (both would involve collaboration with other entities):
    - At the intersection of Grinstead and Lexington Road, MSD could potentially work with the Kentucky Department of Transportation to redirect flows from the interchange into a wetland.
    - MSD could work with Metro Parks to collect stormwater into a cistern at Beringer Spring.

- Several WWT members commented on relationship of green infrastructure programs and projects in the IOAP and other community environmental initiatives that MSD does not control. Participants noted that the MS4 stormwater permit could provide some leverage, but suggested that MSD also explore partnerships with other entities.
    - In particular, a few WWT stakeholders suggested that MSD should convene a group of local authority figures (e.g., the mayor, the president of the University of Louisville, and others) to coordinate and work collaboratively on community environmental improvement initiatives. A good time for a meeting like this might be in the summer, when more of the details of MSD's draft IOAP are known.
- A few WWT participants asked whether MSD's monitoring program would be broad and flexible enough to evaluate the effects of other water-quality improvement efforts and use that information for right-sizing future projects. The technical team replied that monitoring program would track those changes in water quality and flows.
- A few WWT participants suggested that the technical team consider where in the county there were problems with seepage and backups during the 1997 storm. It may be useful to avoid known problem areas. A MSD participant observed that soils are currently very saturated from recent rainfall events.
- Some WWT members noted that they appreciated the regional perspective of the analysis and were encouraged by the number of opportunities being identified.

Observer Comments

An MSD contractor described the educational displays that were posted in the hallway outside the WWT meeting room. The displays were some of the products produced as part of an MSD-sponsored educational challenge involving seventeen local high schools. (Two videos shown during the dinner break at the WWT meeting were also produced for the challenge.) The participating high schools were informed of the objectives of Project WIN and the types of behavior changes that Project WIN promoted, and then the high schools developed advertising and marketing campaigns to address youths of their age. In addition to posters, the student groups submitted t-shirts, rap songs, and radio and TV commercials.

A few WWT members expressed positive comments about the Project WIN educational challenge and suggested that this type of activity should be done again in the future. One opportunity mentioned was Public Health Week, which focuses on a different topic each year (climate change was a recent focus).

Wrap Up and Next Steps

- WWT members who have not yet submitted comments on the emergent vision for the IOAP should send their survey responses to the facilitation team at Ross & Associates as soon as possible.
- The facilitation team will follow up with WWT members individually regarding the IOAP emergent vision to learn more about participants' responses to the vision survey and how to address any areas of discomfort or confusion.
- Working with MSD and the technical team, the facilitation team will use the WWT's feedback on the emergent vision to develop a draft vision statement that will be shared by the June WWT meeting.
- Potential topics for the WWT's next meeting on June 19, 2008 include:
    - Update on the emergent vision for MSD's Integrated Overflow Abatement Plan;
    - Draft education and outreach plan; and
    - Introduction to the programmatic evaluation of alternatives for the IOAP, including the "knee of the curve" (financial stewardship) analysis of a preliminary ranked list of projects.

Meeting Participants

Wet Weather Team Stakeholders

Mike Ballard (alternate for Judy Nielsen), Louisville Metro Health Department
Steve Barger, Labor
Susan Barto, Mayor of Lyndon
Samantha Davis (alternate for Tina Ward-Pugh), Louisville Metro Council, District 9
Allan Dittmer, University of Louisville
Faye Ellerkamp, City of Windy Hills
Arnita Gadson, West Jefferson County Community Task Force and Kentucky Environmental Quality Commission
Tom Herman, Zeon Chemicals
Rick Johnstone, Deputy Mayor, Louisville Metro Mayor's Office
Bob Marrett, CMB Development Company
Lisa Santos, Irish Hill Neighborhood Association
Bruce Scott, Kentucky Waterways Alliance
David Tollerud, University of Louisville, School of Public Health and Information Sciences
David Wicks, Jefferson County Public Schools

MSD Personnel

Angela Akridge, MSD Regulatory Policy Manager
Brian Bingham, MSD Regulatory Management Services Director
Derek Guthrie, MSD Director of Engineering/Operations and Chief Engineer
Bud Schardein, MSD Executive Director

Facilitation and Technical Support

Gary Swanson, CH2M HILL
Rob Greenwood, Ross & Associates Environmental Consulting
Jennifer Tice, Ross & Associates Environmental Consulting

Meeting Observers

Tony Bischoff, Hydromax USA
Jim Bruggers, Louisville Courier-Journal
Henry Cubero, The Cubero Group
Justin Gray, MSD
David Hackworth, CH2M Hill
Greg Hendricks, The Cubero Group
Christine Horn, The Cubero Group
Clay Kelly, Strand Associates
Tim Kraus, O'Brien & Gere
John Lyons, Strand Associates
Paul Maron, Strand Associates
William Marshall, Tetra Tech
Julia Muller, MSD
Sarah Provancher, Pro Communications
Gary Wolnitzek, Human Nature

Meeting Materials

- Agenda for the 5/15/08 WWT Meeting
- Summary of the 4/3/08 WWT Meeting
- Compliance Monitoring Plan Presentation
- Project Evaluation and Selection Process Diagram
- Green Infrastructure Status Report Presentation

Reference Materials (Updated May 2008)

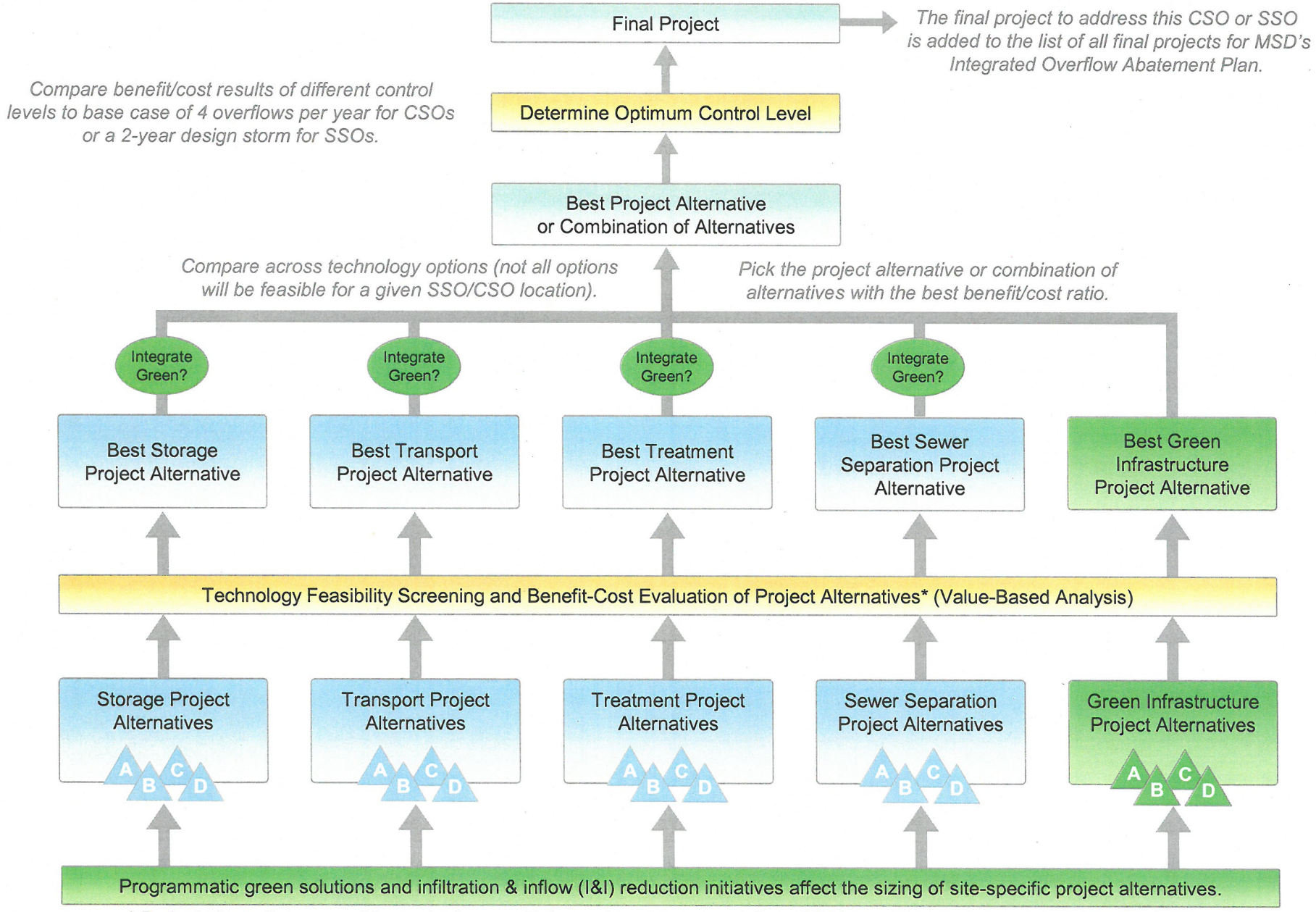
- WWT Meeting Schedule
- WWT Contact List
- Acronym List
- Definitions of Key Terms
- WWT Charter
- WWT Ground Rules

Idea Lists (Updated May 2008)

- Consensus Items List
- Solution Ideas List
- Education and Outreach Ideas List
- Data Requests and Monitoring Suggestions List

Project Evaluation and Selection Process

(Draft of 5/8/08)



** Project alternatives can address single or multiple combined sewer overflow (CSO) or sanitary sewer overflow (SSO) locations.*

Wet Weather Team Meeting Schedule
(as of May 2008)

Meeting Number	Date	Location
2006 Wet Weather Team Meetings		
1	Thursday, July 20, 2006	MSD Central Maintenance Facility
2	Tuesday, August 15, 2006	Morris Forman Wastewater Treatment Plant
3	Tuesday, September 12, 2006	MSD Central Maintenance Facility
4	Tuesday, December 5, 2006	MSD Central Maintenance Facility
2007 Wet Weather Team Meetings		
5	Thursday, January 18, 2007	MSD Central Maintenance Facility
6	Tuesday, February 13, 2007	MSD Main Office, Downtown Louisville
7	Thursday, March 15, 2007	MSD Main Office, Downtown Louisville
8	Thursday, April 19, 2007	MSD Main Office, Downtown Louisville
9	Tuesday, May 22, 2007	Floyds Fork Wastewater Treatment Plant
10	Thursday, June 21, 2007	MSD Main Office, Downtown Louisville
11	Thursday, August 2, 2007	MSD Main Office, Downtown Louisville
12	Thursday, September 20, 2007	MSD Main Office, Downtown Louisville
13	Thursday, October 18, 2007	MSD Main Office, Downtown Louisville
14	Thursday, December 6, 2007	MSD Main Office, Downtown Louisville
2008 Wet Weather Team Meetings		
15	Tuesday, January 15, 2008	MSD Main Office, Downtown Louisville
16	Tuesday, February 26, 2008	MSD Main Office, Downtown Louisville
17	Thursday, April 3, 2008	MSD Main Office, Downtown Louisville
18	Thursday, May 15, 2008	MSD Main Office, Downtown Louisville
19	Thursday, June 19, 2008	MSD Main Office, Downtown Louisville
20	Tuesday, July 15, 2008	MSD Main Office, Downtown Louisville
21	Tuesday, September 16, 2008	MSD Main Office, Downtown Louisville
22	Thursday, November 20, 2008	MSD Main Office, Downtown Louisville

Wet Weather Team Membership and Contact Information
May 2008

Name	Organization	Phone	E-mail Address
Stakeholder Representatives			
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Tina Ward-Pugh	Louisville Metro Council, District 9	(502) 574-1109	Tina.Ward-Pugh@louisvilleky.gov, maryrose.beyerle@louisvilleky.gov
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Louisville & Jefferson County Metropolitan Sewer District Personnel			
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Derek Guthrie	MSD Director of Engineering/ Operations & Chief Engineer	(502) 540-6370	guthrie@msdlouky.org
Bud Schardein	MSD Executive Director	(502) 540-6000 x6346	schardei@msdlouky.org

Wet Weather Team Membership and Contact Information (Continued)

Name	Organization	Phone	E-mail Address
Facilitation Support			
Rob Greenwood	Ross & Associates Environmental Consulting, Ltd.	(206) 447-1805	rob.greenwood@ross-assoc.com
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Technical Support			
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Reggie Rowe	CH2M HILL	(205) 366-9592	Reggie.Rowe@CH2M.com

Acronyms
Wet Weather Team Project, May 2008

AAOV	Average annual overflow volume
AUC	Annual user charge
BAT	Best available technology economically achievable
B/C	Benefit/cost
BCT	Best conventional pollutant control technology
BG	Billion gallons
BGC	Beargrass Creek
BOD	Biochemical oxygen demand
BEHI	Bank erosion hazard index
BMP	Best management practice
BPJ	Best professional judgment
BWV	Beechwood Village
CAFO	Concentrated animal feeding operation
CCWTP	Cedar Creek Wastewater Treatment Plant
CD	Consent Decree
CFR	Code of Federal Regulations
cfu	Colony forming unit
CIP	Capital Improvement Program
CMOM	Capacity, management, operation, and maintenance
CSO	Combined sewer overflow
CSOP	Combined Sewer Operational Plan
CSS	Combined sewer system
CWA	Clean Water Act
DBI	Diatom Bioassessment Index
DIP	Drainage improvement project
DO	Dissolved oxygen
DOJ	Department of Justice
DOW	Kentucky Division of Water
DRI	Drainage Response Initiative
EMC	Event mean concentration
EMS	Environmental management system
EPA	U.S. Environmental Protection Agency
EPPC	Kentucky Environmental and Public Protection Cabinet
EPSC	Erosion Prevention and Sediment Control
FC	Fecal coliform
FFWTP	Floyds Fork Wastewater Treatment Plant
FOG	Fats, oils, and grease
FR	*Federal Register*
FWQA	Federal Water Quality Association
FY	Fiscal year
GI	Gastrointestinal
GIS	Geographic information system
HCWTP	Hite Creek Wastewater Treatment Plant
HDD	Horizontal directional drilling
Hg	Mercury

HMGP	Hazard Mitigation Grant Program
HPO	High purity oxygen
IBI	Index of Biotic Integrity
I&I	Infiltration and inflow
IOAP	Integrated Overflow Abatement Plan
ISSDP	Interim Sanitary Sewer Discharge Plan
JRC	Justice Resource Center
JTown	Jeffersontown
JTWTP	J-Town Wastewater Treatment Plant
KDOW	Kentucky Division of Water
KIA	Kentucky Infrastructure Authority
KPDES	Kentucky Pollutant Discharge Elimination System
KRS	Kentucky Revised Statute
KYTC	Kentucky Transportation Cabinet
lf	Linear feet
LG&E	Louisville Gas & Electric
LID	Low impact development
LOJIC	Louisville and Jefferson County Information Consortium
LTCP	Long Term Control Plan
LTMN	Long Term Monitoring Network
LWC	Louisville Water Company
MC	Mill Creek
MEP	Maximum extent practicable
MFWTP	Morris Forman Wastewater Treatment Plant
MG	Million gallons
MGD	Million gallons per day
MHI	Median household income
MM	Million
mo	Month
MSD	Louisville and Jefferson County Metropolitan Sewer District
MS4	Municipal separate storm sewer system
NIMBY	Not in my backyard
NMC	Nine Minimum Controls
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and maintenance
ORFM	Ohio River Force Main
ORSANCO	Ohio River Sanitation Commission
PCBs	Polychlorinated biphenyls
PF	Peaking factor
P.L.	Public law
PMP	Plumbing Modification Program
POTW	Publicly owned treatment works
PS	Pump station
RBP	Rapid bioassessment protocol
RM	River mile
ROW	Right-of-way
RTC	Real time control
S&F	Solids and floatables
SEP	Supplemental environmental project
SORP	Sewer Overflow Response Protocol
SS	Suspended solids

SSDP	Sanitary Sewer Discharge Plan
SSES	Sewer System Evaluation Survey
SSO	Sanitary sewer overflow
SSOP	Sanitary Sewer Overflow Plan
SSS	Sanitary sewer system
STP	Sewage treatment plant
SWPS	Southwestern Pump Station
TARC	Transit Authority of River City
T/E	Threatened / endangered species
TKN	Total Kjeldahl Nitrogen
TMDL	Total maximum daily load
TSS	Total suspended solids
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
WATERS	Watershed approach to environmentally responsible stewardship
WCWTP	West County Wastewater Treatment Plant
WDR	Waste discharge requirements
WET	Whole effluent toxicity
WIN	Waterway Improvements Now
WQ	Water quality
WQS	Water quality standards
WTP	Wastewater treatment plant
WWP	Wet Weather Plan
WWT	Wet Weather Team
yr	Year

Definitions of Key Terms
Wet Weather Team Project, October 2007

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.*
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.†
Best Available Technology Economically Achievable (BAT)	A technology-based standard established by the Clean Water Act as the most appropriate means available on a national basis for controlling the direct discharge of toxic and non-conventional pollutants to navigable waters. BAT effluent limitations guidelines, in general, represent the best existing performance of treatment technologies that are economically achievable within an industrial point source category or subcategory.*
Best Conventional Pollutant Control Technology (BCT)	A technology-based standard for discharge from existing industrial point sources of conventional pollutants including BOD, TSS, fecal coliform, pH, oil, and grease. The BCT is established in light of a two-part "cost reasonableness" test.*
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.*
Combined Sewer Overflow (CSO)	A discharge of untreated wastewater from a combined sewer system at a point prior to the headworks of a publicly owned treatment works. CSOs generally occur during wet weather (rainfall or snowmelt). During periods of wet weather, these systems become overloaded, bypass the treatment works, and discharge directly to receiving waters.*
Combined Sewer System (CSS)	A wastewater collection system that conveys sanitary wastewater and stormwater through a single pipe to a publicly owned treatment works for treatment prior to discharge to surface waters.*
Dissolved Oxygen (DO)	A measurement of the amount of oxygen dissolved in water.
Fecal Coliform	Rod-shaped bacteria present in the feces of warm-blooded animals.†

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* Adapted from Water Environment Federation, *Guide to Managing Peak Wet Weather Flows in Municipal Wastewater Systems,* Draft – February 2006.

† Adapted from EPA, "National Pollutant Discharge Elimination System Glossary," http://cfpub.epa.gov/npdes/glossary.cfm?program_id=0.

Green Infrastructure	An adaptable term used to describe an array of products, 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	Water other than wastewater that enters a wastewater system and building sewers from the ground through such means as defective pipes, pipe joints, connections, or manholes. Infiltration does not include inflow.[‡]
Inflow	Water other than wastewater that enters a wastewater system and building sewer from sources such as stormwaters, surface runoff and drainage. Inflow does not include infiltration.[‡]
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.[*]
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).[‡]
Primary Treatment	The practice of removing some portion of the suspended solids and organic matter in wastewater through sedimentation. Common usage of this term also includes preliminary treatment to remove wastewater constituents that may cause maintenance or operational problems in the system (i.e., grit removal, screening for rags and debris, oil, and grease removal, etc.).[*]
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)	Untreated or partially treated sewage overflow from a sanitary sewer collection system.[*]
Secondary Treatment	Technology-based requirements for direct discharging from municipal sewage treatment facilities. The standard is based on a combination of physical and biological processes typical for the treatment of pollutants in municipal sewage. Standards are expressed as a minimum level of effluent quality in terms of: 5-day BOD, suspended solids, and pH.[*]
Sensitive Areas	Areas of particular environmental significance or sensitivity that could be adversely affected by a combined sewer overflow.[‡]
Total Suspended Solids (TSS)	A measure of the filterable solids present in a sample.[*]

[‡] Adapted from EPA, *Report to Congress on Implementation and Enforcement of the CSO Control Policy,* http://cfpub.epa.gov/npdes/cso/cpolicy_report.cfm?program_id=5.

Louisville and Jefferson County Metropolitan Sewer District
Wet Weather Team Charter
Final Version, 8/15/06

Summary

The Louisville and Jefferson County Metropolitan Sewer District (MSD) has chartered a Wet Weather Team (WWT) to assist with the development of an integrated Wet Weather Program that complies with Clean Water Act requirements and addresses the community's problems with combined sewer overflows and sanitary sewer overflows that occur during wet weather conditions. The Wet Weather Team consists of community representatives, elected officials, and MSD personnel. Stakeholders in the WWT will advise MSD on its investment, policy, and performance choices in the design of the Wet Weather Program, so that these choices can be made wisely and in ways that best meet the needs of the local community.

Background and Problem Statement

Like many municipalities nationwide, a portion of the Louisville sewer system is designed and permitted to collect wet weather runoff along with residential, commercial, and industrial wastewater. During some wet weather events, the volume of wastewater in the system exceeds the capacity of collection pipes and wastewater treatment plants, resulting in releases (discharges) of untreated wastewater diluted with stormwater—called combined sewer overflows (CSOs). Louisville also has had wet weather problems with sanitary sewer overflows (SSOs), which are unintentional discharges of diluted sewage from separate sanitary sewers. SSOs can occur as a result of groundwater or surface water entering the sanitary sewer system through improper connections to the sewer system, or damaged or deteriorated infrastructure. SSOs can also occur as a result of various other sewer operation and maintenance conditions. CSOs and SSOs can cause or contribute to water quality problems in receiving streams and watersheds. CSOs and SSOs can threaten public health and can cause property damage through, for example, basement back-ups.

In 2005, MSD entered into a Consent Decree with the U.S. Environmental Protection Agency and the Kentucky Environmental and Public Protection Cabinet (EPPC) regarding discharges from MSD's sewer system and alleged violations of the Clean Water Act. Under the Consent Decree, MSD must develop a Long Term Control Plan for CSOs and a Sanitary Sewer Discharge Plan for SSOs by December 31, 2008. The Consent Decree requires that MSD engage stakeholders in the development of public participation and funding plans, through a "Wet Weather Team." In addition to these areas, MSD has decided that it would also be valuable to involve stakeholders in discussions about the overall development and implementation of a new Wet Weather Program.

MSD, on behalf of the Louisville and Jefferson County community, will need to invest substantial amounts of money in wet weather controls and management efforts to meet our compliance obligations under the Consent Decree and the Clean Water Act. The Wet Weather Team will guide MSD in making wise investment decisions for a Wet Weather Program that will improve water quality, protect public health, prevent sewer back-ups, comply with applicable regulatory requirements, and address the community's needs for wastewater and stormwater management.

Wet Weather Team Objectives

MSD charters 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 the Consent Decree, the WWT is charged with two primary tasks: (1) preparing a plan for funding MSD's Wet Weather Program and (2) developing a program for public information, education, and involvement.

In addition to these tasks, the WWT will advise MSD on its overall investment, policy, and performance choices in the development and implementation of the Wet Weather Program. These choices may include increasing system storage or conveyance and treatment capacity, modifying the frequency of specific operations or maintenance activities, developing design parameters and standards such as design storms, and additional compliance inspection and enforcement activities.

Strategies to address sewer overflow issues will likely employ a combination of specific technologies and operational practices. For example, to increase the storage and treatment capacity of its systems, MSD could add parallel or relief sewers, increase the size of existing assets and facilities, separate combined sewers, use remote or side-stream treatment, take actions to prevent excess inflow and infiltration, and/or use diversions during certain wet weather events. Different approaches may be appropriate for different parts of MSD's systems, depending on the specific threats to those systems, the likelihood that disruptions could occur, and the type and severity of the impacts disruptions would have on the community's values.

During the WWT stakeholder process, MSD will also be conducting other activities related to planning and implementation of the Clean Water Act and the Consent Decree, including developing discharge abatement plans, asset management activities, water quality monitoring, and related wet weather control efforts. MSD may ask WWT stakeholders for input regarding these activities. In addition, it is possible that shifts in regulatory requirements may occur over the project duration that could affect the framework of the WWT process. If this occurs, MSD will inform the WWT about the regulatory changes and their relevance to the project, and the WWT will discuss appropriate changes to the framework of the WWT process.

Expectations for Wet Weather Team Members and Process

Stakeholders on the Wet Weather Team include individuals recognized as community opinion leaders associated with environmental advocacy, business and industry, elected official, local government, community neighborhood, recreation, public health, environmental justice, and organized labor interests. WWT stakeholders do not formally represent their specific affiliated organization, but rather seek to provide input reflective of the broad interest area in which they lead. In addition to stakeholders, the WWT will include MSD personnel, as specified in the Consent Decree. MSD personnel on the WWT will participate in discussions with WWT stakeholders; however, decisions regarding stakeholder guidance to MSD will be based only on the input from the stakeholder subgroup of the WWT.

WWT members who are not able to attend a particular meeting may send an alternate, provided that the suggested alternate is discussed with MSD and the WWT member can assure that the alternate will be well briefed on past and current WWT discussions and decisions. WWT members are expected to participate for the entire process; however, participants may withdraw at any time without prejudice and may be replaced by MSD with a representative with similar expertise and experience.

WWT meetings will be designed as working sessions, not as public education meetings. Observers are welcome at meetings, but are not participants in WWT deliberations. A segment at the end of each meeting (approximately 15 minutes) will be dedicated to receiving observer comments. Each observer's oral comments must not exceed two minutes in duration, although written comments to the WWT and/or MSD will be welcome throughout the process. Separate public meetings will also be held to educate the public about the WWT process and to solicit comments on plans for MSD's Wet Weather Program.

MSD will use a values-based risk management process, supported by a third-party facilitation team, to obtain input from WWT stakeholders on MSD's investment decisions and priorities regarding wet weather controls and management efforts to achieve compliance and provide a level of service that meets community needs. This structured process will allow WWT stakeholders to systematically consider the importance of potentially competing values and the technical and management options available to address community needs. Prior to submittal of the final plans to EPA and Kentucky EPPC by December 31, 2008, MSD will need to provide final draft plans to the MSD Board for consideration and adoption.

Although the facilitation team will be under contract to MSD, its "clients" will be the individual members of the WWT and the wet weather planning process as a whole. The stakeholder subgroup of the WWT will be a "consensus seeking" body, although progress and ultimate MSD decision-making will not be strictly tied to consensus. The facilitation team will ensure that perspectives of WWT stakeholders—particularly in cases where consensus is lacking—are gathered throughout the plan development process and made available to MSD to ensure a balanced and well-informed final decision process. If the WWT stakeholder subgroup does not reach consensus on a particular item, the range of views will be recorded for consideration by the MSD Board. Differences of opinion reflected in WWT and MSD documents will not be attributed to particular individuals or interests; however, WWT stakeholders can submit attributed comments directly to MSD and/or the MSD Board for their consideration. All written comments received by MSD, consistent with public disclosure requirements, will be made available publicly.

Recognizing that the way in which WWT deliberations are publicly characterized will affect the group's ability to reach consensus, WWT members are encouraged to refrain from characterizing the views of other WWT members or of the full WWT to the press. MSD will consider requests from WWT members for outside experts to speak at meetings, but MSD reserves the right to include additional or alternative speakers to ensure that a full range of perspectives is provided. Any written comments and news articles about the WWT project that appear in the media will be provided to WWT members for their information.

The WWT stakeholder process is the backbone of MSD's efforts to develop an integrated Wet Weather Program for addressing improvements needed to MSD's stormwater, combined sewer, and sanitary sewer systems. All WWT stakeholders are expected to:

- 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 project; and
- Participate in the identification, review, and analysis of options.

Expectations for Wet Weather Team members are further defined in the Wet Weather Team ground rules.

Schedule

Under the Consent Decree, MSD faces strict deadlines for producing deliverables and significant penalties for noncompliance. The WWT stakeholder process must, as a result, move forward at a regular, steady pace for it to be successful. WWT meetings will occur approximately every four to six weeks as needed from June 2006 through May 2008.

Louisville and Jefferson County Metropolitan Sewer District
Wet Weather Team Ground Rules
Final Version, 8/15/06 (updated 5/9/08)

A. Participants and Participation

1. Wet Weather Team (WWT) members are "participants." The Wet Weather Team consists of MSD personnel and a subgroup of stakeholders that will provide guidance to MSD. MSD personnel may participate in WWT discussions, but will not be included in decisions regarding stakeholder guidance to MSD. All participants in the stakeholder subgroup have equal representation.

2. The facilitation team is a neutral third party with no stake in the outcome of the discussions. The facilitation team, although under contract to MSD, works for the process and treats all Wet Weather Team participants as equal "clients."

3. To ensure an effective process, participants agree to make every effort to attend all meetings. If an alternate is needed, the suggested alternate will be recommended to and discussed with MSD in advance to ensure there will be appropriate balance and representation on the Wet Weather Team.

4. Observers are welcome at meetings, but are not participants in the Wet Weather Team's deliberations. A portion or portions of each meeting (not to exceed 15 minutes each) will be dedicated to receiving observer comments. Each observer's oral comments must not exceed two minutes, although written comments to the WWT and/or MSD will be welcome throughout the process.

5. MSD will consider requests from participants to invite outside experts to speak at Wet Weather Team meetings on relevant topics; however, MSD reserves the option of providing additional or alternative perspectives at meetings to ensure that the full range of perspectives and factual evidence is provided.

6. Wet Weather Team members are expected to participate through the entire process; however, any participant may withdraw from the process at any time without prejudice. In the event a participant chooses to withdraw, he or she should communicate the reasons for withdrawal and may be replaced by MSD with another representative with similar expertise and experience.

B. Meeting Discussions and Procedures

1. Each participant agrees to honest and direct communications.

2. Participants are encouraged to frame observations in terms of needs and interests, not in terms of positions; opportunities for finding solutions increase dramatically when discussion focuses on needs and interests.

3. Decisions will be made during meetings; if an alternate attends a meeting, he or she must be fully briefed on Wet Weather Team deliberations and able to participate in decision making.

4. The facilitator will manage the discussions, using more or less structure depending on the nature and tenor of the discussions.

5. Participants and/or the facilitator may request a caucus break at any time during the meeting. Individual caucus breaks are not to exceed 15 minutes.

6. A general summary of meeting discussions will be prepared; observations contained in the summary will not be individually attributed. Participants can, however, submit attributed comments directly to MSD and/or the MSD Board for consideration; all written comments will be made available publicly.

7. All meetings will start and finish on time.

C. Desired Outcomes

1. The stakeholder subgroup of the Wet Weather Team is a "consensus seeking" body. The desired outcome is one in which all stakeholder subgroup members support the products and are willing to say so publicly. Full consensus, however, is not necessary to enable the MSD Board to have a balanced and well-informed final decision process.

2. The perspectives of all WWT stakeholders—particularly in cases where consensus is lacking—will be gathered throughout the plan development process and made available to the MSD Board for consideration during their final decision making.

3. To help the process stay on track, agreed-upon, non-mainstream issues may be recorded and dealt with at a later date or referred to other, more appropriate forums.

D. Communications Outside of Wet Weather Team Meetings

1. Individual observations are not for attribution outside the meeting.

2. Participants are encouraged to refer inquiries from the press to the facilitation team or to final meeting summaries or other final Wet Weather Team materials. Individuals who choose to speak with the press agree to limit remarks to personal views and to refrain from characterizing the views of, or attributing comments to, other participants or the full Wet Weather Team.

3. Wet Weather Team participants may share information about the project's process and activities with peers outside the Team, as long as the communications make clear that the information is not an official product of the Team.

4. Wet Weather Team participants may share draft documents and communicate about the project's progress with managers and co-workers within their own organizations. Wet Weather Team participants agree to consult with the Team before sharing draft documents outside of the Team or their immediate co-workers and managers.
    - Certain types of draft materials that contain pre-decisional information that is highly sensitive (e.g., potential sites for constructed facilities) will be labeled "draft: working documents not for release."
    - Documents labeled "not for release" will not be shared during Wet Weather Team stakeholder meetings. Information from "not for release" documents may, however, be generalized or presented at a higher level of detail at WWT meetings if necessary to support WWT deliberations.
    - If Wet Weather Team participants would like to review "not for release" documents individually outside of WWT meetings, MSD will make the documents available for WWT members to review at MSD's office in MSD's presence. WWT members will be asked to sign a confidentiality agreement before reviewing "not for release" documents at MSD.

Wet Weather Team Consensus Items
Working Draft – May 9, 2008

The following is a list of items on which the Wet Weather Team (WWT) has come to consensus, organized by the date of the WWT meeting at which consensus was reached. The facilitation team will maintain and update this list throughout the remainder of the WWT effort.

Consensus Item	Wet Weather Team Meeting	Reference Document
1. Wet Weather Team Charter	Wet Weather Team Meeting #2 (August 15, 2006)	Wet Weather Team Charter (August 15, 2006)
2. Wet Weather Team Ground Rules	Wet Weather Team Meeting #2 (August 15, 2006)	Wet Weather Team Ground Rules (August 15, 2006)
3. Wet Weather Team Community Values	Wet Weather Team Meeting #6 (February 13, 2007)	Wet Weather Team Community Values
4. Performance Evaluation Framework for Project-Specific Values	Wet Weather Team Meeting #9 (May 22, 2007)	Final Draft Performance Measurement Matrices
5. Approach for Incorporating Programmatic and Project-Specific Values into Decision Making	Wet Weather Team Meeting #9 (May 22, 2007)	Values-Based Decision-Making Flowchart
6. Weights for Project-Specific Values	Wet Weather Team Meeting #10 (June 21, 2007)	See: Summary of the June 21, 2007 WWT Meeting (WWT Meeting #10)
7. Understanding of Sanitary Sewer Overflow Strategies and the Role of Source Control	Wet Weather Team Meeting #14 (December 6, 2007)	Wet Weather Team Stakeholder Group Understanding of Sanitary Sewer Overflow Strategies and the Role of Source Control (December 2007)
8. Understanding of Community's Anticipated Tolerance for Annual Rate Increases	Wet Weather Team Meeting #15 (January 15, 2008)	See: Summary of the January 15, 2008 WWT Meeting (WWT Meeting #15)
9. Understanding of Combined Sewer Overflow Control Strategies in MSD's Integrated Overflow Abatement Plan	Wet Weather Team Meeting #17 (April 3, 2008)	Wet Weather Team Stakeholder Group Understanding of Combined Sewer Overflow Control Strategies (April 2008)

Wet Weather Team Solution Ideas
Working Draft – May 9, 2008

The following is a list of potential "solution ideas" identified by Wet Weather Team (WWT) members that will be considered in the design of the Wet Weather Program. The list will act as a resource for the technical team as they consider project and program alternatives. These ideas were identified both at WWT meetings and through individual communications with WWT members (e.g., via e-mail). This list will remain "live" throughout the remainder of the WWT effort to capture ideas as they are shared. WWT members are encouraged to send additional ideas to the facilitation team for inclusion in this list.

New ideas will be listed under a "What's New" section at the beginning of the document for easy reference, as well as under the appropriate section later in the document. After the "What's New" list, this document is organized into three sections:

- Section I, "Project Alternatives," is organized into five sub-categories: Stormwater Best Management Practices (Non-Structural), Stormwater Best Management Practices (Structural), CSO and SSO Point Source Controls, General/Other Solutions, and Site-Specific Solutions.
- Section II, "Funding Ideas and Incentives," is organized into three sub-categories: Cost Allocation Strategies, Financial Incentives, and Funding Sources/Options.
- Section III, "Ideas Partly or Completely Outside the Scope of MSD's Wet Weather Consent Decree," includes municipal government actions that are only partly within MSD's control, MSD actions that are not related to sewer overflow issues, and green infrastructure ideas that are not directly related to sewer overflow issues.

What's New (April / May 2008)

1. (II-A-6) – Extend MSD's senior citizen's discount program to ensure that it helps people who face financial hardship. Ideas include:
    a. Consider people's ability to pay, not simply their age, and provide assistance and/or discounts to low-income populations.
    b. Evaluate whether the square footage of people's homes could be used as an indicator of the need for financial assistance.
    c. Examine the verification and process and criteria that LG&E uses for its Winterhelp program.
2. (II-A-8) – Charge higher rates for people with the ability to pay in order to provide resources to offer incentives to people who "do the right thing" and discounts to people who need financial assistance.
3. (11-A-9) – Consider charging residences that have septic tanks more on their drainage bills than other residences.
4. (II-C-1-a through d) – Provide incentives for "preferred" behaviors, such as:
    a. Installing/using green roofs and permeable pavement.
    b. Increasing tree canopy, changing plantings, and other activities to reduce runoff from people's yards.
    c. Reducing use of lawn chemicals.
    d. Controlling the spread of invasive species.
5. (II-C-2-a-i) – Offer drainage credits to companies that put money into water education for the community. For example, give companies a one dollar discount for every five dollars spent on community education.

6. (II-C-9) – Consider incentives for development in areas where there is less impact on the sewer system (i.e., encouraging lower impact development).
    a. There could be a role for impact fees in encouraging development in areas where there is less impact on the sewer system.
7. (III-A-Other Entities-12) – Work with the Green City Partnership to develop potential incentives.
8. (III-A-Other Entities-13) – Develop a collaborative agreement on green infrastructure with other entities (e.g., schools, city and county government), such as the Memorandum of Understanding between Cincinnati Public Schools, the City of Cincinnati, and the County of Hamilton, Ohio regarding sustainable design "green" guidelines.

I. Project Alternatives

A. Stormwater Best Management Practices (Non-Structural)

1. Influence behavior of residential and commercial landowners through education. [Note: See the Education and Outreach Idea List for more ideas about educational efforts to influence behaviors.]
    a. Promote water conservation practices: rain gardens, rain barrels, and responsible alternatives for sump pumps and downspout connections.
    b. Encourage stewardship: removing invasive vegetation from riparian zones, planting wetlands, litter cleanups, etc.
    c. Conduct education on environmentally sustainable ways of using fertilizer and weed killer, and other stormwater best management practices to neighborhood groups.
    d. Discourage chemical treatment of and mowing near waterways to help keep debris from waterways.
2. Regularly distribute billing inserts (like LG&E's) to MSD customers with facts and tips to encourage certain behaviors (e.g., lawn chemical management, pet waste management, landscaping practices).
3. Conduct a baseline survey and follow-up surveys of residents to determine whether education and outreach efforts are effective in changing behavior and perceptions on issues related to the Wet Weather Program.
4. Hold "CSO Action Days" during or right after a hard rain to promote behavior change (e.g., don't use your dishwasher, wait to do your laundry, etc.).
5. Encourage the use of best management practices for chemical use in lawn management practices.
    a. Inform greens keepers about best management practices (BMPs), since non-point source runoff is made worse by golf course chemicals.
6. Develop a pledge for customers that clearly lays out behaviors that will help MSD meet Consent Decree requirements. For an example, see http://www.watershedpledge.org (see also II-B-4).
7. Invite people to "join" Project WIN by installing rain gardens, rain barrels, reducing their use of lawn chemicals, etc.
    a. Add a page to MSD's website where people can submit notes or pictures of their efforts.
    b. Give out plaques or other awards to those who "join."

B. Stormwater Best Management Practices (Structural, including Green Infrastructure Solutions)

1. Use landscaped areas to control stormwater runoff.
2. Encourage homeowners to construct rain gardens and use rain barrels.
3. Install French drains along roads to accept stormwater runoff (see also detailed suggestions listed for Beechwood Village below).

4. Develop specific design parameters or standards for stormwater best management practices and low impact development techniques and include these in an MSD Design Manual. The Design Manual should provide guidance for approaches including, but not limited to, the following:
    a. Pervious pavement
    b. Level spreaders
    c. Riparian buffers
    d. Vegetated swales
    e. Wet ponds
    f. Wet ponds with forebays (small basins that settle out incoming sediment before it is delivered to a stormwater BMP)
    g. Wetlands
5. Consider incorporating aspects of the LEED green building standards into MSD design manuals for structural BMPs.
6. Increase tree canopy.
    a. Ensure that urban CSO areas have at least a 30 percent tree canopy.
    b. Initiate a tree-planting program with a goal to increase tree canopy in neighborhoods.
7. Work with the community group "Women of Vision" to create a meditation garden in the West End that could also act as a rain garden or roof runoff demonstration.
8. Conduct demonstration projects. [Note: Overlaps with demonstration projects in Education and Outreach Ideas List.] Specific ideas for projects include:
    a. Create a demonstration area in each Jefferson County watershed to demonstrate and interpret healthy stream habitats and what MSD is doing to study and protect them.
    b. Create some sustainable lawns as pilot projects
    c. Develop a green infrastructure best management practice site similar to SD1 (Sanitation District Number 1 of Northern Kentucky).
    d. Add green demonstration/education facilities to old urban schools.
    e. Use the Butchertown Greenway Pump Station that is offline for an education and demonstration facility.
9. Plant native plants with deep root systems.
10. Maintain existing detention/retention basins – many may not function properly due to lack of maintenance.
11. Design structural stormwater best management practices to be multiple use and eco-friendly.
    a. Design detention ponds and stream buffers for recreational use.
    b. Make use of detention facilities as sports fields
    c. Incorporate trails along streams to provide recreational opportunities.
12. Convert alley stormwater systems into infiltration systems using pervious pavement.
    a. Potential areas could include the central business district and the west end.

C. CSO and SSO Point Source Controls

1. Disconnect downspouts and/or sump pumps (e.g., by developing educational initiatives aimed at landowners).
    a. One potential target for a downspout disconnection program could be school buildings.
    b. Yard signs similar to those used in Portland's residential Downspout Disconnection Program could be useful for education and outreach about MSD's Wet Weather Program. [Note: This idea overlaps with the Education Ideas List.] Specific ideas for signs include:

i. Messages such as "I disconnected my downspout" and/or "I have a rain barrel."
ii. The bottom of the sign could invite readers to "ask me" for more information.

2. Increase enforcement and inspections of downspout and sump pump connections.
    a. Incorporate inspections into the property-transfer process (e.g., as another inspection with the sale of existing homes). For example, MSD could deputize the state plumbing inspector, which has the authority to go into private property, to conduct inspections of downspouts. MSD could pay on a per building basis for those inspections.
3. Look at large parking lots as potential sites for wastewater storage facilities. Organizations might be willing to have a covered storage facility built below a ground-level parking lot. In addition, there could be opportunities to add value for the property owner, by building a parking garage as a replacement and/or by providing credit for any non-point source pollution reduction associated with the project.
4. Repair and seal all building laterals.
5. Act on any sump pump or other illegal connection issues uncovered during the course of MSD's regular operations and maintenance work on the sanitary and combined sewer systems.

D. General/Other Solutions

1. Leverage and coordinate the Wet Weather Program efforts with MSD's MS4 stormwater management permitting responsibilities.
2. Conduct green infrastructure demonstration projects with monitoring components built in, to help demonstrate the overall effectiveness of green infrastructure solutions.
    a. Start with small, visible projects ("quick wins" – e.g., in a particular neighborhood, near a Rubbertown plant).
3. Preserve rural character where possible.
4. Create a localized resource database to support green infrastructure development efforts (e.g., provide information on contractors that install pervious pavements). Specific ideas include:
    a. Develop a list of environmentally approved chemicals for use in lawn/landscape management.
    b. Landscape architects could provide green options for projects and developments.
5. Do not rule out flow-reduction techniques to address SSOs for any watershed.
6. Look at combining different types of control options, including opportunities to reduce flows of water into the sewer system (e.g., from housing units) in tandem with other types of solutions. For example, combining storage and flow-reduction approaches could make it possible to use a smaller-sized storage facility.
7. Involve community members in addressing the root causes of SSOs (e.g., by working with the Metro Council, community organizers, and neighborhood groups).
8. Challenge preconceived notions of what U.S. EPA will accept in terms of the role of source control in an SSO elimination plan.
    a. Use technical feasibility and cost effectiveness as the primary basis for deciding the level of source control to meet regulatory compliance obligations, and work with relevant regulatory bodies to justify the basis for this approach.
9. Consider wet weather sewer overflow control strategies that reduce future maintenance issues.

E. Site-Specific Solutions (Considered in Addition to the Solutions Listed Above)

<u>Beechwood Village</u>

1. Construct a park-like wet detention area in the wooded area of St. Matthews Park.
2. Install new sanitary lines and laterals to homes, and pumps for basement facilities when requested by the homeowner.
3. Install French drains on either side of roadways to accept stormwater runoff. The drains would be continuous trenches filled with gravel and covered by turf. The drains could also accept discharges from sump pumps and downspouts.
4. Install perforated pipe in the French drains so they can discharge more freely when they flood. The piped drain system would need to be a combination of gravity and pump depending on the topography and discharge point(s).
5. If a solid pipe system is used, the system could discharge to constructed wetlands designed to treat stormwater. Possible sites for constructed wetlands are the forest north of the Community Park and the detention pond for the bank on Shelbyville Road at the Beechwood Village entrance.
6. Restore natural stream banks for the Sinking Fork north of Shelbyville Road where the big pump now sits.

Beargrass Creek – Middle Fork

1. Restore the Middle Fork between Grinstead crossing and confluence.
    a. Restore wetlands and improve aquatic health in the following areas:
        i. The isolated quarry areas to the north of the interstate between Grinstead and Payne (which receives a small CSO discharge). One specific idea is to remove sediments from these areas.
        ii. The old meander into which CSO 127 discharges and the wet meadow in its bend.
    b. Work with the City of Louisville, the Parks, and the private sector to turn this area into a greenway that connects the waterfront with Cherokee and Seneca Parks, and eventually with parks in Saint Matthews, with a bikeway from Saint Matthews to downtown.
    c. Close CSOs in this area using projects that reduce flooding and improve water quality.
2. CSOs 125, 126, 127, 144, and 166; and CSOs 86 and 140 could potentially be treated at one facility (some pumping would be required). This could be a visible project that could help link areas in the community.
3. Potentially develop the River Metals property (a brownfield near the Girl Scouts Building) as a storage or wetlands treatment area.
4. Establish wetlands at Seneca Park and Old Cannons Lane.
5. Consider locations/sites for storage solutions that are closer to the SSOs in the Anchor Estates Pump Station watershed than the potential location presented at the 9/20/07 WWT meeting.
6. Utilize parks property orphaned by I-64 as a detention basin for the Beals Branch sewershed CSO. Restore the sediment-filled wetland at the confluence of Beals Branch and the Middle Fork as a treatment wetland for the basin's discharge.

Beargrass Creek – South Fork

1. Restore the South Fork between I-264 and Eastern Parkway.
    a. Restore the stream channel, along with the wet meadows and woods in the floodplain.
    b. Coordinate with landowners (e.g., the City of Louisville and Bellarmine College) on the restoration of the stream segment, which is part of a "nature education" corridor and is subject to MSD conservation easements.
    c. Potentially make this area into a bikeway as part of the solution.

Beargrass Creek – Muddy Fork

1. Restore Eva Bandman Park.
    a. Convert the park into restored wetlands with a boardwalk for visitors.
    b. Include the park as part of the solution for the CSOs that discharge at the confluence by having it receive their stormwater.
2. Tie the impaired section of Beargrass Creek to newly created wetlands, near Eva Bandman Park.
3. Incorporate green infrastructure into the Arts Center.
4. Turn the MSD pump station into an interpretive center.
5. For CSOs 132, 154, and 167:
    a. Conduct a concentrated effort to disconnect downspouts in this area.
    b. Use incentives to get people to help solve the problem in this area. In particular, educate people about ways to reduce non-point source pollution.
    c. Acquire properties in flood-prone areas by paying more than fair market value for the homes (as compensation to homeowners for having to move). These areas could then be used to create detention or retention basins, or other facilities/structures to reduce wet-weather sewer overflows. [Note: Purchasing properties in flood-prone areas is also listed in Section III.]

Floyds Fork Watershed

1. Look for opportunities for green infrastructure in the Floyds Fork watershed, as it is the last undeveloped area in Jefferson County.
2. Protect Floyds Fork with riparian buffers and other preservation efforts.

Other Watershed and Site-Specific Solutions

1. Create an 800-acre lake in the southwest portion of Jefferson County. Use a dam/flood wall to build it and include marshes around it.
2. Examine other sites for green infrastructure opportunities, such as:
    a. Pond Creek Lake and the southwest pump stations (this area has been studied already by the Corp of Engineers)
    b. The Bradley Property

II. Funding Ideas and Incentives

A. Cost Allocation Strategies

1. Equitably assign costs (focus areas for the financial equity value):
    a. Consider the burden on fixed income and low-income populations.
        i. Spread payments over a longer time period if this would reduce the burden on lower income residents.
    b. Rates and fees that are linked to the cost to serve (i.e., the level of impact).
    c. Consider how the community develops to make sure that everyone pays into the solution.
2. Charge residences differently depending on the area of impervious surfaces on properties (and therefore the amount of stormwater runoff that would be generated).
3. Require lower development fees for areas that already have sewer capacity (e.g., urban areas in need of re-investment).
4. Bill based on increased water usage—the more you use, the higher the rate.

5. Develop an equitable plan for joint funding for permeable pavement efforts.
6. Extend MSD's senior citizen's discount program to ensure that it helps people who face financial hardship. Ideas include:
    a. Consider people's ability to pay, not simply their age, and provide assistance and/or discounts to low-income populations.
    b. Evaluate whether the square footage of people's homes could be used as an indicator of the need for financial assistance.
    c. Examine the verification and process and criteria that LG&E uses for its Winterhelp program.
7. General principles for funding and cost allocation:
    a. Have higher rates in the near term to avoid future balloon payments.
    b. Create balance between what the community pays now and what the community will pay later.
    c. Do not increase rates so much that they drive companies or residents to move elsewhere.
    d. Use the community's resources wisely. This will involved dealing with issues such as the Big 4 SSOs, but also working on long-term strategies to improve water quality such as promoting behavior change through education.
8. Charge higher rates for people with the ability to pay in order to provide resources to offer incentives to people who "do the right thing" and discounts to people who need financial assistance.
9. Consider charging residences that have septic tanks more on their drainage bills than other residences.

B. Funding Sources/Options

1. Consider using volunteers to reduce costs.
2. Consider solutions that could meet the objectives of multiple agencies (e.g., water quality and flood control improvements) and therefore could potentially receive funding from multiple sources.
3. Consider additional user charges that could be used as a result of adopting a different rate schedule.
4. Maintaining a certain level of bond rating could be a way of setting limits on how much money MSD borrows versus how much it generates in internal revenues.
5. Consider not borrowing any money.
6. Balance the impact of potential financial packages on MSD's bond rating, rates, and cash flow/liquidity.

C. Incentives *[Note: Incentives related to a potential ordinance to address private sources of infiltration and inflow are located in Section III-A-Regulatory Requirements/Policies]*

1. Provide incentives for "preferred" behaviors, such as:
    a. Installing/using green roofs and permeable pavement.
    b. Increasing tree canopy, changing plantings, and other activities to reduce runoff from people's yards.
    c. Reducing use of lawn chemicals.
    d. Controlling the spread of invasive species.
2. Offer incentives for developers to use cost-effective, eco-friendly solutions (e.g., low impact development techniques, stormwater best management practices).
    a. One idea for an incentive is to offer drainage credits.

i. Offer drainage credits to companies that put money into water education for the community. For example, give companies a one dollar discount for every five dollars spent on community education.

b. Develop incentives for developers to use the greenest and simplest solutions for new development (e.g., moving permit applications to the front of the review line).

3. Charge reduced wastewater rates to property owners that use eco-friendly techniques to reduce stormwater runoff.
4. Reduce fees for families or businesses who sign a pledge that clearly lays out behaviors that will help MSD meet Consent Decree requirements (see also I-A-5).
    a. In critical CSO neighborhoods, provide free rain barrels to people who sign the pledge.
5. Develop compensation credits to help alleviate financial burden to developers and property owners.
6. Reduce rates for houses that are certified (i.e., through inspections) as eliminating inflow from their properties into the sewer systems.
7. Develop and administer a "forgivable loan" program that would cover the replacement of a private lateral line when an inspection reveals that it contributes to an SSO.
    a. The loan would be up to a maximum amount set by MSD for the private contracting work and would be forgiven at the end of, for example, 20 years, if the homeowner made no illicit connections. If illicit connections were made, the loan would be due in its full amount, civil penalties would apply, and water would be disconnected after a grace period if the illicit connections weren't removed.
    b. The loan program would require regular inspections.
    c. The loan would come due via lien if the homeowner sold the property, but the new homeowner could negotiate with MSD for a new loan but with a new twenty year term.
8. Consider not charging based on winter water usage, as this could potentially remove an incentive to conserve water, since water usage varies more in the summer.
9. Consider incentives for development in areas where there is less impact on the sewer system (i.e., encouraging lower impact development).
    a. There could be a role for impact fees in encouraging development in areas where there is less impact on the sewer system.

III. Ideas Partly or Completely Outside the Scope of MSD's Wet Weather Consent Decree

A. Municipal Government Actions (Only Partly within MSD's Control)

Regulatory Requirements/Policies

1. Improve the development review process for new subdivisions. Deny permits for subdivisions or any new homes if the plant in the area is above capacity.
2. Require that regional detention ponds in post-developed areas provide filtration for storms that occur every two years or less.
3. Require post-development runoff to be equal to pre-development runoff.
4. Develop mandatory or alternative green solutions for development projects (e.g., by changing development codes).
5. Determine impervious surface limits for individual watersheds.
6. Deny permits for sites within CSO or SSO sewersheds that have any incidents of illegal connections to the sewer system to limit impacts on already overloaded systems.
7. Use wet weather capacity (instead of dry weather capacity) of the sewer system as the baseline for approving new development.

8. Develop an ordinance to address private sources of infiltration and inflow. Ideas related to a potential ordinance include:

Authority and Responsibility for Inspections and Enforcement

a. Develop an ordinance that would allow MSD or a plumbing inspector to enter homes to identify sources of infiltration and inflow (e.g., broken foundation drains). MSD could subsidize or help pay for the costs of the inspections.

b. Require contractors and plumbers working on private property to check for sources infiltration and inflow.

c. Adopt a requirement for inspections of private properties for sources of infiltration and inflow any time a building permit is issued (e.g., for an addition to an existing home).

d. The ordinance should have the flexibility to allow people other than plumbing inspectors to conduct inspections of private properties.

   i. Allow other types of inspectors to do the inspections.

   ii. Allow property owners to make repairs themselves and then have certified inspectors inspect the repairs.

   iii. It may be better from an accountability perspective to not have MSD do the inspections, repair work, and enforcement.

Trigger for Inspections

e. Use a proactive approach to inspecting properties (such as the approach used in Johnson County, KS) that would allow MSD to target high-priority areas.

f. Use two approaches for triggering property inspections: require inspections during the property transfer process, and also proactively target certain neighborhoods/areas for inspections.

Scope

g. Have the ordinance address issues with the combined sewer system as well as the sanitary sewer system (e.g., look at ways to reduce runoff and limit impervious cover in the CSO area).

h. Expand the scope of the ordinance to include:

   i. An outright ban on downspouts, sump pumps, and basement drains.

   ii. A requirement that new parking lots and parking lots that are going to be repaved have more stormwater controls.

Financial Assistance

i. MSD should provide financial assistance to the community related to the ordinance.

j. The ordinance should include a cost-sharing component.

Other

k. Develop legislation related to private sources of infiltration and inflow that would:

   i. Prohibit clear water connections to the sanitary system.

   ii. Require homeowners to maintain the lateral line.

   iii. Provide for civil penalties for homeowners and plumbers for illicit connections or failure to repair the lateral line.

   iv. Disconnect water supply after a brief grace period if the problems aren't corrected.

   v. Give MSD the authority to inspect when an SSO occurs downstream of any sanitary connection.

   vi. Describe a process MSD would use when it must inspect sanitary connections upstream from an SSO, including notice and information about the program.

vii. This new inspection process should begin immediately with the "Big 4" SSOs, but could be implemented when MSD detects others.

l. A draft ordinance should be reviewed by a county/city attorney.

Opportunities to Encourage/Use Green Infrastructure in Development Projects

1. Utilize very large basins or lakes in new development areas and in rural areas. For new developments, create larger detention/retention basins.
2. Preserve existing natural systems, vegetation, and trees during development, rather than removing and rebuilding them. Take advantage of existing assets in development opportunities.
3. Look at green parking opportunities along business corridors.
4. Look at opportunities to develop more upward and infill already developed areas (i.e., increase density).
5. Develop a "complete streets" program policy to encourage "parkway-like" streets and reduce stormwater run-off.
6. Form partnerships with housing developers to minimize impervious surfaces.
7. The parking lot on Frankfort Avenue could utilize porous pavement for public parking.
8. Develop a recognition program for those who use green infrastructure.
9. Opportunities in schools:
    a. Incorporate green elements into the three new research facilities being planned at the University of Louisville.
    b. Turn school grounds into "ecological playgrounds" for neighborhoods.
10. Look at opportunities to incorporate green infrastructure into brownfield development (e.g., in Park Hill Corridor).
11. Prepare a draft best management practice for developers on using green infrastructure.

Opportunities to Link MSD Efforts to Existing Partnerships and Programs

1. Develop a "comprehensive solution" for local environmental improvement and education efforts.
    a. Fund and staff a collaborative planning effort to link the environmental education programs of multiple local agencies (MSD, Louisville Water Company, Metro government departments, Mayor's Office, TARC, etc.) together, develop specific goals and assessment systems, and then hold agencies accountable to those goals.'
2. Encourage local government agencies (e.g., Jefferson County Public Schools, Metro Parks) to adopt preventative practices to decrease stormwater runoff and wastewater volumes (e.g., low-flow toilets, pervious pavement, additional tree coverage, etc.).
3. Integrate green projects into planning efforts underway.
4. Work with the Green City Partnership (an initiative involving the Louisville Metro Government, Jefferson County Public Schools, and the University of Louisville) on green infrastructure efforts. The Metro Green Initiative should be a leader for the community's Green City Partnership.
5. Consider green infrastructure in the context of healthy activity improvement projects and projects that promote greater walk-ability in neighborhoods.
6. Make use of neighborhood plans. There could be opportunities to incorporate green infrastructure into the 14 neighborhood plans and 6 neighborhood assessments that are being developed, as well as in neighborhood plans that well be developed in the future.

Opportunities for MSD to Collaborate with Other Entities

1. Coordinate with planning and zoning departments and other governmental entities around the value of green infrastructure.
2. Partner with schools to relate students' community service efforts with green projects.
3. Coordinate with other regional entities to build a major treatment plant near the Salt River.
4. Consider linking Wet Weather Program construction projects to road construction efforts.
    a. One potential place for such a linkage is the road construction occurring in the Goose Creek Pump Station area.
5. Work with governmental entities to "lead by example" by eliminating infiltration and inflow entering the sewer systems from government-owned properties.
6. Consider where development will occur in the future, in order to avoid having similar wet weather problems related to private sources of infiltration and inflow in the future.
7. Partner with other cities and states that have wet weather consent decrees to collectively ask federal representatives to seek additional government funds for wastewater and stormwater management improvement efforts.
8. Coordinate with other agencies to examine the total impacts of all utility costs (water, wastewater, energy, gas) on customers.
9. Help the community implement a watershed approach to improving water quality that includes addressing stormwater and non-point source pollution in addition to CSOs and SSOs.
10. Form partnerships with people and agencies who work on climate change issues (e.g., the new committee in the Green City Partnership).
11. Network with partners on education activities.
12. Work with the Green City Partnership to develop potential incentives.
13. Develop a collaborative agreement on green infrastructure with other entities (e.g., schools, city and county government) such as the Memorandum of Understanding between Cincinnati Public Schools, the City of Cincinnati, and the County of Hamilton, Ohio regarding sustainable design "green" guidelines.

B. MSD Actions Not Related to Sewer Overflow Issues

1. Purchase properties within the floodplain.
    a. Buy land that is flooded on a regular basis and turn it into parks.
    b. When building a detention basin, buy properties in the floodplain that are most impacted.
2. Improve implementation and enforcement of the Sediment Control Act.
3. Partner with local lawn care companies to promote Louisville Green (MSD's organic fertilizer).
4. Do not give rebates during droughts and do not give special rates for irrigation meters for residential or commercial entities for lawn care, as this could be seen as encouraging lawns, which can contribute to water quality problems (e.g., runoff containing fertilizers and pesticides).

C. Green Infrastructure Ideas Not Related to Wet Weather Issues

1. Heine Brothers Coffee is looking for five acres for an urban farm to grow produce and sell to local restaurants.
2. The "86-64" community effort to remove portions of I-64 could be an opportunity to reclaim the waterfront and promote public transportation such as light rail.
3. Utilitize the open space in parks for green infrastructure.
4. Develop and educate residents about urban farming opportunities.
5. Teach and promote sensible/responsible development.

6. Require parking lots to provide shaded areas.
7. Establish a tree ordinance to protect specific trees (identified based on species, age, etc.) and require mitigation if the protect trees are damaged or removed.
8. Protect or improve water quality and flood control for developments.

Wet Weather Team Education and Outreach Idea List
Working Draft – May 9, 2008

The following is a list of education and outreach ideas identified by Wet Weather Team (WWT) members for consideration for the Wet Weather Program. The list will act as a resource for MSD and the technical team as they develop and refine the draft education and outreach plan for MSD's Wet Weather Program. (The focus of this list is on long-term education, outreach, and public engagement efforts, rather than near-term activities such as public meetings occurring during the WWT process.) These ideas were identified both at WWT meetings and through individual communications with WWT members (e.g., via e-mail). This list will remain "live" throughout the remainder of the WWT effort, and WWT members are encouraged to send additional ideas for this list to the facilitation team.

New ideas will be listed under a "What's New" section at the beginning of the document for easy reference, as well as under the appropriate section later in the document. The remainder of the document is organized into two main sections, Section I, which focuses on MSD Wet Weather Program education and outreach efforts, and Section 2, which covers efforts that are only partly within MSD's control.

What's New (April / May 2008)

1. (1-B-13) – Share the messages from MSD's IOAP Vision at Project WIN public meetings and with builders and other contractors.
2. (II-A-4) – Create a centralized water education center, such as the Gwinnett Environmental & Heritage Center in Gwinnett County, Georgia.

I. MSD Wet Weather Program Education and Outreach Efforts

A. Education/Outreach Program Characteristics

1. MSD should expand upon its existing education and outreach efforts, including Project WIN and other MSD programs such as Living Lands and Waters.
2. Education efforts should be comprehensive, adequately resourced, and human scale to encourage behavior changes (e.g., stewardship practices).
3. To be successful, public involvement efforts should include:
    a. A corporate or programmatic identity: logo, leader, advisory board, budget, mission, goals, website, etc.
    b. Communications: announcements, fliers, newsletters, radio/TV appearances, etc.
    c. Stewardship: removing invasive vegetation from riparian zones, planting wetlands, [and yes] litter cleanups
    d. Education: stream science, water quality monitoring
    e. Conservation: promoting rain gardens, rain barrels, and responsible alternatives for sump pumps and downspout connections.
    f. Coordination: linking the public involvement activity with MSD and the wet weather team
    g. Celebration: festivals, canoe floats, and other events that call positive attention to the area's waterways.
4. Outreach efforts should show people that there is an open and transparent process within which MSD is making decisions on behalf of the community.

B. Audiences, Objectives, and Messages

1. Target education efforts in "critical CSO neighborhoods" and schools in those areas.
    a. Use a targeted direct-mail approach to help address local, site-specific problems.
2. Involve commercial and industrial customers and solutions through PR and planning, not just residential customers.
3. Make a presentation to the full Metro Council.
4. Work with schools (in conjunction with Earth Day and river/creek cleanups) to involve both students and parents.
5. Message ideas:
    a. Develop positive educational messages about the value of clean water to supplement other education and outreach messages. (CSO warning signs, river sweeps, and other elements of MSD's outreach activities send a negative message about the community's water resources.)
    b. Can the "water is dirty, stay away from it" signs that EPA designated include a promise that the public can change the situation?
    c. Translate Consent Decree activities into dollar impacts for residents.
    d. Communicate that we have no choice but must comply with the requirements of the consent decree in a timely manner.
    e. Help people understand how they are connected to the problem.
    f. Help change the perception people have of streams to a positive one (people think that streams are "dead").
    g. Help people understand that green infrastructure can be incorporated into urban areas, since urban areas can be redeveloped.
    h. Craft messages explaining the importance of addressing private sources of infiltration and inflow, and people's personal responsibility for addressing it.
    i. Create community ownership of the solutions.
    j. Stress that there are two sides to EPA compliance, and note that programs will affect some people more directly than others because of the way the sewer system has developed over time:
        i. What MSD is going to do with its infrastructure that will affect the whole community.
        ii. What citizens and businesses will be asked to do.
    k. Inform the community that EPA is targeting three parts of the sewer system: CSO sewersheds, the "Big 4" SSO sewersheds, and the other SSO sewersheds.
    l. Help people understand that, even though MSD is paying the EPA Consent Decree rate surcharge, the community as a whole must help solve the problem.
    m. Help people understand the differences between the combined sewer system and the sanitary sewer system.
    n. Explain funding concepts and choices to the public. Showing side-by-side cost comparisons could be a particularly useful way of doing this.
    o. Thoroughly explain the financial assistance component of any private infiltration and inflow reduction program.
    p. Some information from MSD's Sewer Overflow Response Protocol training (such as how MSD prepares for wet weather events) could be useful to share with the public, potentially during weather forecasts.

q. Educate people about the benefits of green projects that are the result of partnerships between MSD and other agencies.

6. Involve neighborhoods in identifying potential green infrastructure solutions (e.g., by having a neighborhood competition to get grassroots ideas for potential solutions).
7. Develop education programs for schools that allow children to take information home.
8. Educate local leaders on the need for source reduction. One way to do this would be to show them the cost of specific solutions to SSO and CSO problems.
9. Explain problems and programs related to SSOs directly to homeowners (individually if necessary), and enlist neighborhood associations and other neighborhood institutions to help when appropriate.
10. Conduct an aggressive education effort before instituting any new requirement that would address private-side infiltration and inflow sources.
11. Develop and implement a public information and involvement strategy for each of the three parts of the sewer system that EPA is targeting: the "Big 4" SSO sewersheds, the other SSO sewersheds, and the CSO sewersheds.
    a. Each area should be mapped and made publicly available on MSD's website.
    b. Public information should roll out in consecutive waves so the different programs can be explained to the larger community and the direct effects can be explained to the parts of the community that may need to do more to make them work.
    c. The first wave of public information should address the "Big 4" SSO sewersheds, followed by the other SSO sewersheds, and then the CSO sewersheds.
12. Communicate effectively with the community regarding rate increases.
    a. Keep the message positive.
    b. Include as part of the message that the alternative to the Wet Weather Program is having the federal courts impose requirements on the community.
    c. Tell residents what they are getting for their money and how these efforts are improving public health.
    d. Help people feel involved in the process and understand that they have some responsibility for helping solve the problem (e.g., through communications that ask, "can you help us?" instead of "we're going to do this").
    e. Help residents understand what they are paying for and what the community has to do to improve water quality and comply with the Consent Decree.
13. Share the messages from MSD's IOAP Vision at Project WIN public meetings and with builders and other contractors.

C. General Outreach and Education Strategies and Techniques

1. Use a variety of communication media to inform Louisville residents about issues, opportunities, and activities related to the Wet Weather Program and the Consent Decree. Examples include:
    a. feature articles and/or advertisements in the Courier Journal
    b. direct mail
    c. public service announcements on television
    d. radio (WLOU/WLLV 1350 and 101.3 FM for the west)
    e. e-mail lists ("UofL announcements" to University of Louisville employees, e-mail lists for Metro Council members)
    f. website(s) (provide information, as well as solicit input and questions)

g. community meetings ("piggy back" on other events/meetings such as the Mayor's Night Out, community association meetings, Metro Council meetings, etc.)
h. media "groundbreaking" events
i. 5-minute DVD video (highlight the central issues and indicate the short and long-term consequences)
j. hold a "creek concert" to raise awareness of stream issues to young people
k. develop/use a Kentucky State Fair Exhibit (permanent or traveling)
l. hold a speaker's forum and/or have a group of people available that could speak at community meetings and events
m. work with the Mayor's press staff and the Louisville Metro Neighborhoods Department to get the word out
n. hold a press conference

2. Develop/use posters and visual displays to illustrate concepts to the public and provide context to Wet Weather Program activities. Specific suggestions include:
   a. Schematic of a combined sewer overflow
   b. Schematic of sump pumps and downspouts connected to sanitary sewers
   c. Map of the combined sewer area and outfalls against blue line streams and landmarks (road system would do)
   d. Map of SSO outfalls including the sewersheds of the "big four," as above
   e. Water Quality maps from the Beargrass Creek report card, also water quality info about Ohio River related to CSO outfalls
   f. Comparison of city sewer rates indicating which cities have consent decrees
   g. Time frames for the major deliverables in the Consent Decree
   h. Create visible representations of the solution, since they can be helpful for explaining project concepts to the public. Use these visual representations when soliciting community input.
3. Initiate a dialog with neighborhoods, potentially including door-to-door outreach, to better understand local water quality problems and to solicit local input on potential solutions.
4. Develop a speakers bureau to attend chamber/business association meetings and other groups that use speakers.
5. Conduct demonstration projects (Note: Overlaps with demonstration projects in Solution Ideas List). Specific ideas include:
   a. Create a demonstration area in each Jefferson County watershed to demonstrate and interpret healthy stream habitats and what MSD is doing to study and protect them.
   b. Strategically place demonstration projects (e.g., porous pavement) near neighborhoods.
   c. Create some sustainable lawns as pilot projects
   d. Develop a green infrastructure best management practice site similar to SD1 (Sanitation District Number 1 of Northern Kentucky).
   e. Add green demonstration/education facilities to old urban schools.
   f. The Clifton neighborhood is motivated, so would be a good demonstration area to show the effects of behavior change.
   g. Use the Butchertown Greenway Pump Station that is offline for an education and demonstration facility.

6. Present "Where is your CSO or SSO?" information on-line: On the MSD or LOGIC website, have the ability to type in your address and have it call up the location of the CSO or SSO that the property owner's waste goes to. The website could describe the watershed that contributes water and runoff to that individual CSO or SSO.
7. Support the identification of public watershed advocates for each Jefferson County watershed. Each watershed needs a public advocate. It could be connected with a nature center, or be an independent citizen advocacy group.
8. Make MSD facilities visitor friendly. For example, add educational exhibits around the flood wall, the history of flooding, etc. to the Beargrass Creek Pump Station and near the flood detention basins at the Fairgrounds.
9. Have MSD employees be educational ambassadors, as a way of making Louisville environmentally literate.
10. Public meeting ideas:
    a. To increase attendance, consider latching onto other meetings.
    b. Ideas for places/ways to advertise the public meetings:
        i. Churches
        ii. PTA meetings.
        iii. Metro Council and neighborhood newsletters
        iv. Channel 25 (Metro Louisville programming)
        v. Short recorded messages on phones
        vi. Send announcements about the public meetings through the Department of Neighborhoods distribution list to get word out to neighborhood groups.
        vii. Listservs
        viii. Get the word out at local schools so kids can take information home to their parents.
        ix. Local TV or NPR piece
        x. Homeowners Association newsletters
        xi. Suburban city newsletters
    c. Start public meeting presentations with information on rates to get people's attention.
    d. At public meetings, consider the fact that people need time to digest information from presentations and written materials.
    e. Avoid using acronyms in presentations and discussions with community members.
    f. Conduct direct outreach to block watch groups, neighborhood associations, and business associations to identify neighborhood leaders.
    g. Give people at least two weeks advance notice of the public meetings.
    h. Have the Metro Council representative for the local area host the public meetings.
    i. Hold public meetings at local schools, maybe in conjunction with other meetings that are already taking place.
    j. Give information that is as specific in terms of location as possible at the public meetings.
    k. Advertise some of the potential solutions being considered, and hold the meetings near some of the likely places of disruption, as a way to get people to attend public meetings.
    l. Bring up the green aspects of the Wet Weather Program at public meetings in order to find more partners for MSD to collaborate with on green projects.

11. Add a portal to MSD's website where people can submit comments on Project WIN; run a public service announcement to inform people about the issues and the website address for submitting comments.
12. Develop and run an information booth at selected festivals in the community (similar to the booth used for Project XL).
13. Use the potential disruption along Hikes Lane (part of the Big Four SSO plan) as an opportunity for broader education of the public about wet weather sewer overflow issues.
14. Yard signs similar to those used in Portland's residential Downspout Disconnection Program could be useful for education and outreach about MSD's Wet Weather Program. [Note: Overlaps with CSO and SSO Point Source Controls in Solution Ideas List.] Specific ideas for signs include:
    a. Messages such as "I disconnected my downspout" and/or "I have a rain barrel."
    b. The bottom of the sign could invite readers to "ask me" for more information.
15. Invite people to "join" Project WIN by installing rain gardens, rain barrels, reducing their use of lawn chemicals, etc.
    a. Add a page to MSD's website where people can submit notes or pictures of their efforts.
    b. Give out plaques or other awards to those who "join."

D. Education to Change Behavior [Overlaps with Behavior Change Strategies in Solution Ideas List]

1. Influence behavior of residential and commercial landowners through education.
    a. Promote water conservation practices: rain gardens, rain barrels, and responsible alternatives for sump pumps and downspout connections.
    b. Encourage stewardship: removing invasive vegetation from riparian zones, planting wetlands, litter cleanups, etc.
    c. Conduct education regarding fertilizer, weed killer, and other stormwater best management practices to neighborhood groups.
    d. Develop and educate residents about urban farming opportunities
    e. Teach and promote sensible/responsible development.
    f. Discourage chemical treatment and mowing near waterways to help keep debris from waterways.
2. Regularly distribute billing inserts (like LG&E's) to MSD customers with facts and tips to encourage certain behaviors (e.g., lawn chemical management, pet waste management, landscaping practices).
3. Hold "CSO Action Days" (like Ozone Action Days) during or right after a hard rain to raise awareness and promote behavior change (e.g., don't use your dishwasher or clothes washer, wait to drain your bathtub, etc.).
4. Develop a pledge for customers that clearly lays out behaviors that will help MSD meet Consent Decree requirements. For an example, see http://www.watershedpledge.org
5. Encourage the use of best management practices for chemical use in lawn management practices.
    a. Inform greens keepers about best management practices (BMPs), since non-point source runoff is made worse by golf course chemicals.
6. Provide technical assistance to support behavior-change efforts.
    a. Develop a program in which residents could pay a small fee for MSD or another agency to conduct a water/wastewater audit on a house similar to the energy audits offered by LG&E.

E. Monitoring, Evaluation, and Accountability

1. Conduct a baseline survey and follow-up surveys of residents to determine whether education and outreach efforts are effective in raising awareness and in changing behavior and perceptions on issues related to the Wet Weather Program. [Note: This is also included in the Solution Ideas List.]
    a. Develop a survey instrument (potentially with a coalition of cities) and use it every year.
2. Collect baseline data, monitor performance, and ensure "high stakes accountability" for all of the education and outreach objectives of the Wet Weather Program.
    a. Evaluate the extent to which citizens value clean water, support MSD, understand best management practices for homes and businesses, and have a basic understanding of ecological conditions and processes.
3. Consider creating/supporting an evaluation center to evaluate and document the effectiveness of education and outreach programs.
4. Develop a "report card" for MSD's Wet Weather Program to post on MSD's Project WIN website and publish it in print format regularly (e.g., annually). This report card would report on performance measures related to the goals of MSD's Wet Weather Program and implementation of the consent decree.
5. Support volunteer monitoring efforts, such as those practiced by the Salt River Watershed Watch program (http://kywater.org/watch/salt/).

II. Ideas Partly or Completely Outside the Scope of MSD's Wet Weather Consent Decree

A. *Municipal Government Actions (Only Partly within MSD's Control)*

1. Develop a "comprehensive solution" for local environmental improvement and education efforts.
    a. Fund and staff a collaborative planning effort to link the environmental education programs of multiple local agencies (MSD, Louisville Water Company, Metro government departments, Mayor's Office, TARC, etc.) together, develop specific goals and assessment systems, and then hold agencies accountable to those goals.

    [Note: This is also included in the Solution Ideas List.]
2. Transform governmental facilities to be role models and learning laboratories—demonstrate how to do the right thing.
    a. Encourage local government agencies (e.g., Jefferson County Public Schools, Metro Parks) to adopt preventative practices to decrease stormwater runoff and wastewater volumes (e.g., low-flow toilets, pervious pavement, additional tree coverage, etc.).

    [Note: This is also included in the Solution Ideas List.]
3. Work with other building inspectors to raise awareness of wet weather issues during inspections.
4. Create a centralized water education center, such as the Gwinnett Environmental & Heritage Center in Gwinnett County, Georgia.

Wet Weather Team Data Request and Monitoring Suggestions List
Working Draft – May 9, 2008

The following is a list of data requests and monitoring suggestions made by Wet Weather Team (WWT) members for consideration for the Wet Weather Program. This includes requests for information to support the WWT's deliberations and suggestions for the research, monitoring, and evaluation efforts associated with MSD's Wet Weather Program. These ideas were identified both at WWT meetings and through individual communications with WWT members (e.g., via e-mail). This list will remain "live" throughout the remainder of the WWT effort, and WWT members are encouraged to send additional suggestions to the facilitation team. Requests that have been responded to will be kept on this list, but marked as "Addressed." New ideas will be listed under a "What's New" section at the beginning of the document for easy reference, as well as under the appropriate section later in the document.

Note: For monitoring and evaluation suggestions related to the Wet Weather Program public education and outreach plan, please see the Wet Weather Team Education and Outreach Idea List.

What's New (April / May 2008)

1. (1-C-8) – Develop a flow diagram or decision tree showing the process for identifying and selecting projects.

I. Requests for Information to Support WWT Deliberations

A. Requests for Information on Current Conditions

1. Data on how fecal coliform levels change with flow volumes.
2. Data on where water quality sampling is currently done in relation to recreational areas.
3. Current data MSD has on water quality in stream reaches (as aquatic health is an issue in some, but not all, stream reaches).
4. How MSD's development fees compare to development fees in other places.
5. Specific information on the percentage of backups that are the result of MSD's activities as opposed to private property issues.
6. Cincinnati's rates before the community started to respond to its consent decree.
7. Information on the "root causes" of wet weather CSO and SSO problems (e.g., the CSO volume attributable to residential downspouts) to assist with Wet Weather Program decision making. *[Note: This is an ongoing request.]*
8. Information on the differences between what is legal and required in the sanitary sewer system and the combined sewer system (e.g., whether or not it is legal to connect a sump pump to the combined sewer system).
9. Data on community use of rain barrels over time in communities that have rain barrel programs.

B. Requests for Information of the Effectiveness and Costs of Potential Solutions

1. Information on the long-term effectiveness of strategies that rely on source prevention (e.g., rain gardens).
2. Quantitative information on the benefits and/or effectiveness of eco-friendly solutions currently used by MSD.

3. Additional information on the benefits and challenges of different control approaches (e.g., why a storage solution might be preferable to a transport solution for a particular area). *[Note: This is an ongoing request.]*
4. Information on the costs and benefits of a regulatory approach to address private I&I as compared to other control strategies.
    a. Include information showing how the marginal costs of this approach compare to costs of other approaches and overall program costs, as there could be a lot of opposition to a new private I&I reduction program because of costs.
    b. One potential cost comparison could be comparing the costs of a private I&I reduction program using an ordinance to the costs of building a large underground storage facility to recover a similar amount of I&I.

C. Process Suggestions

1. Conduct assessments of different watersheds to find the best opportunities for green infrastructure.
2. Conduct additional analysis of the potential effects of behavior change and green infrastructure strategies at reducing flows into MSD's sewer systems.
3. Examine how choices about funding sources affect the total wastewater and stormwater rates that residents pay.
4. Provide examples illustrating the implications of different combinations of funding sources (e.g., loans, bonds, pay-as-you-go) for funding the Wet Weather Program, in order to better understand the tradeoffs. *[Addressed at the January 15, 2008 Wet Weather Team Meeting]*
5. Ask someone from the Kentucky Resources Council or one of the MSD consultants to look at the current Kentucky Plumbing Code to see if it is as strong as it needs to be as it relates to CSOs and SSOs.
6. Involve experts in making financial decisions, given the relationships among the timing of projects, cash flows, bond rating, and other factors.
7. Include information on the amount of debt remaining to be paid after the Consent Decree implementation period in future funding presentations.
8. Develop a flow diagram or decision tree showing the process for identifying and selecting projects.

II. Suggestions Related to the Wet Weather Program Monitoring, Evaluation, and Research Plan

A. Suggestions Related to Water Quality and Public Health Monitoring

1. Consider monitoring water quality and flow at additional locations, based upon the Wet Weather Program's objectives and the performance measures developed for the program. Potential new monitoring locations to consider include:
    a. Intensely used public access sites within Beargrass Creek
    b. Stream segments MSD does not monitor currently, such as Buechel Branch and upper South Fork of Beargrass Creek
    c. Additional locations within the Floyds Fork watershed
2. Environmental performance data such as biological indexes of aquatic health (fish counts, macro-invertebrate sampling, etc.), nutrient sampling, downstream pollutant load, and tree cover or other measures of habitat restoration efforts.

3. Data on the public health impacts of polluted water (collected by the School of Public Health or the Health Department and included in an annual report).
4. Involve the research community (e.g., students at the University of Louisville's School of Public Health) in water quality monitoring and data analysis.
5. Consider whether to use EPA's quality control protocols for water quality monitoring efforts.

B. Suggestions Related to the Effectiveness of Green Infrastructure Projects

1. Build monitoring components into green infrastructure projects to help demonstrate the overall effectiveness of green infrastructure solutions.
2. Pick a CSO catchment area and study the effects of rain barrels and rain gardens.
3. In order to gain information on the long-term effectiveness of strategies that rely on source prevention, conduct a demonstration project in a small area, and compare the changes in pollutant loading and stormwater flows to those of other areas.

C. Suggestions Related to the Effectiveness of Behavior Change Efforts

1. Conduct separate research and data analysis to supplement any data collected through surveys about people's behavior.

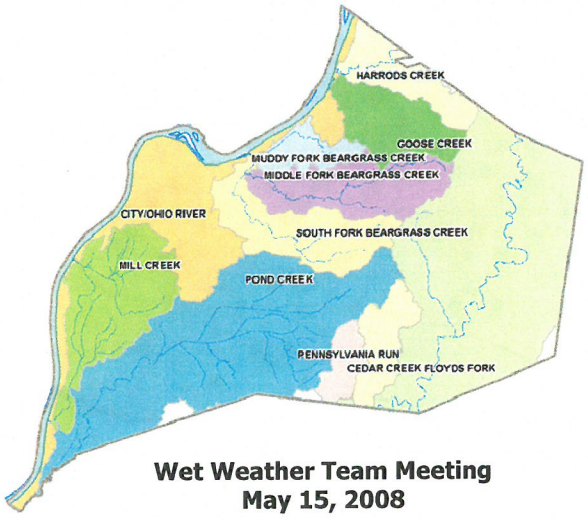
D. Suggestions Related to the Presentation of Information in the Wet Weather Plan

1. Model the water quality benefits of stormwater reduction efforts and present this information to EPA along with the benefits of overflow abatement efforts.
2. Present the results of water quality monitoring so they show the benefits of overflow abatement (e.g., don't focus on bacteria levels only during rain events, as this obscures the fact that streams usually meet the bacteria criteria at other times).

E. Other Suggestions

1. Monitor customer satisfaction data (e.g., number of hits on MSD's website, number of requests for information, customer satisfaction surveys).

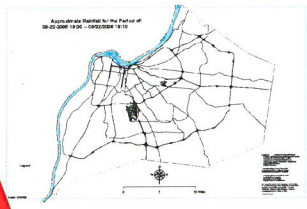
Integrated Overflow Abatement Plan Compliance Monitoring



Wet Weather Team Meeting
May 15, 2008

Rain

Rain Gauge

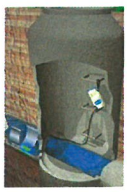


Laboratory

Sewer

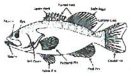
Sampling

Data Download



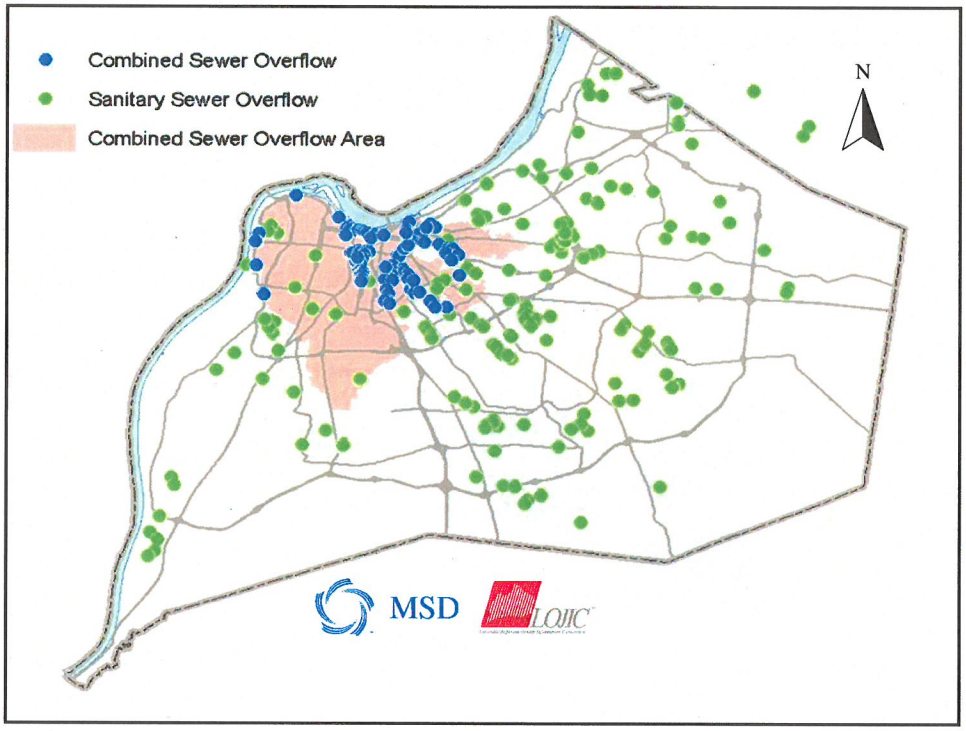
Flow Meter

Stream



Biological

Sonde



Outline

- Compliance Monitoring Objectives & Requirements
- Historical and Ongoing Monitoring
- Compliance Monitoring Components
  - Construction projects
  - Green Infrastructure Effectiveness
  - Behavior Change Effectiveness
    - Sustainability of changes
    - Effectiveness of changes
  - Systematic Performance
    - Hydraulic and Water Quality Modeling
    - Reporting

Monitoring Objectives (1 of 3)

- CSO Objectives
  - Reduction in Overflow Frequency (e.g. 4/year)
  - Reduction in Overflow Volume (e.g. 85% AAOV)
  - Maximize Positive Impact to Water Quality
- SSO Objectives
  - Elimination to Level of Protection
- System Performance & Performance Enhancement
- Behavior Changes
- Adaptive Management Adjustments

AAOV = Average Annual Overflow Volume

Monitoring Objectives (2 of 3)

- Gray Solutions
  - Storage Basin Performance
  - Conveyance Performance
  - Treatment Performance (Quality & Volume)
  - Overflow Reduction
  - Real Time Control Opportunities
- Green Infrastructure
  - Presumptive Impact Planning (Gray/Green Integration)
  - Impact Measurement
  - Long Term Performance & Outreach Effectiveness

Monitoring Objectives (3 of 3)

- System Long Term Monitoring & Sampling
- Performance Needs & Water Quality Impact
  - Quarterly, Annual, and Synthesis Reporting
  - Water Quality and Quantity Modeling Extrapolation
  - Need for Additional Controls or Adjustments

Project Types for Monitoring

- Treatment Plant Expansion
- Site Treatment
- Storage
- Green Infrastructure (Impervious Disconnection)
- Sewer Separation
- Transport
- Plumbing Modification & Potential Private Property Ordinance
- Sewer Rehabilitation
- Overall System Monitoring

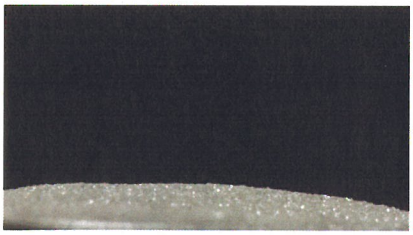
Monitoring Plan Focus

- Monitoring sites selected to best measure performance
- Frequency of monitoring and monitored parameters will be reviewed
  - Regulatory requirements and guidance
  - Stakeholder values
- Quality Assurance Planning
  - Data Review & Access
  - Equipment Maintenance Frequency
  - Telemetry

Ongoing Monitoring Efforts

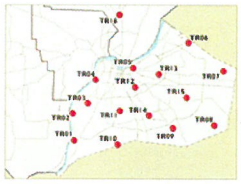
- Rainfall Data – Gage and Radar Rainfall
- Event Data – Calls, Field Routes, & Alarms
- Flow Monitoring – Stream, In Sewer, Overflow, Pump Station, Treatment Plant
- Water Quality Monitoring Sampling – Dry/Wet Weather, Continuous
- Habitat & Biological Studies (Recreational Use & Sensitivity Studies)
- KPDES Permit Sampling (dictated by permit)

Rain Data



Rain Gauge Network

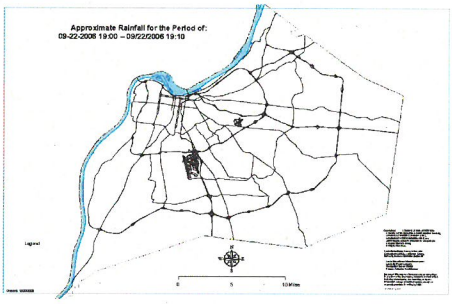
MSD RAINFALL CONDITIONS
FOR JEFFERSON COUNTY, KENTUCKY
(page updates automatically)

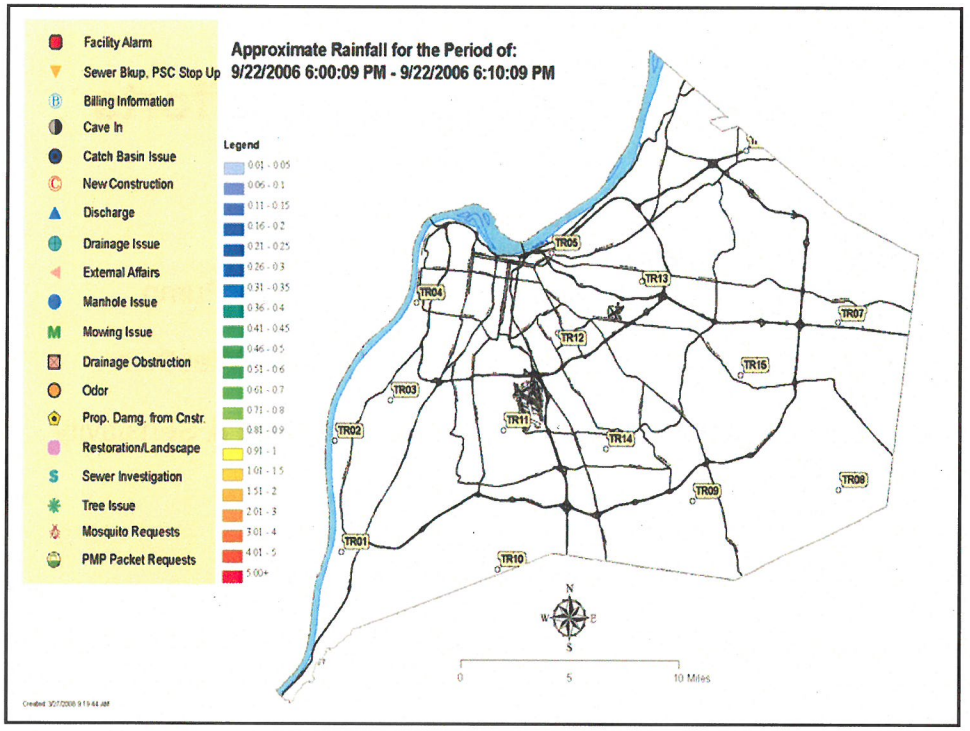


Current Rainfall Conditions as of Feb 28, 2008 1:05 PM

ID	Site	Rainfall Rate (in./hr.)	Daily Total (inches)
TR01	West County WWTP	0.00	0.00
TR02	FRP Fire Station Training Facility	0.00	0.00
TR03	Shively PS	0.00	0.00
TR04	Morris Forman WWTP	0.00	0.00
TR05	Beargrass Creek PS	0.00	0.00
TR06	Hite Creek WWTP	0.00	0.00
TR07	Floyds Fork WWTP	0.00	0.00
TR08	Fern Creek Fire Station #3	0.00	0.00
TR09	Cedar Creek WWTP	0.00	0.00
TR10	Camp Horne (Jefferson Co. Forest)	0.00	0.00

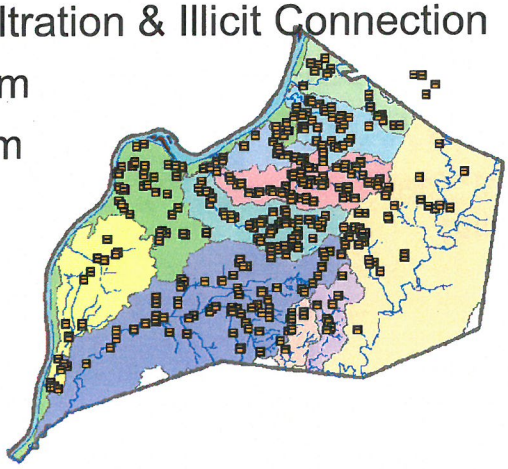
Radar Rainfall Data





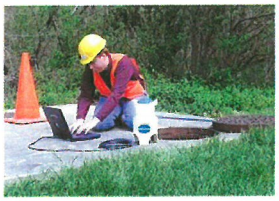
Historical Flow Monitoring Locations

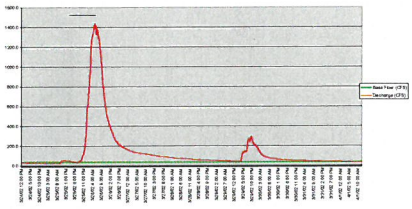
- Inflow/Infiltration & Illicit Connection
- Short Term
- Long Term



13

Sewer Flows and Overflows

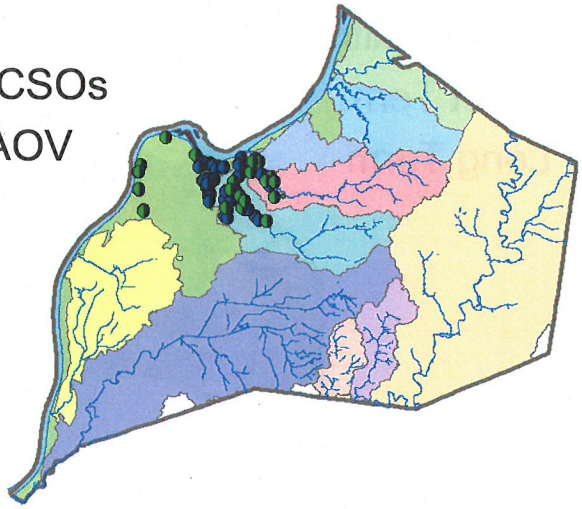




14

CSO Flow Monitors

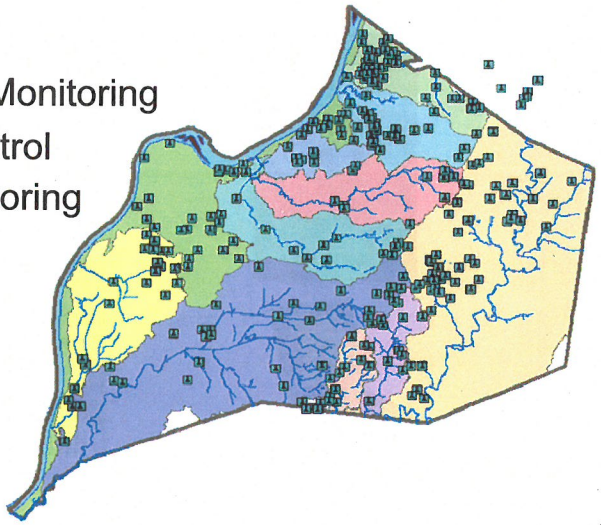
- ~ 25 Large CSOs
- > 10 MG AAOV
- Typical Year Modeling



15

Operations Monitoring Sites

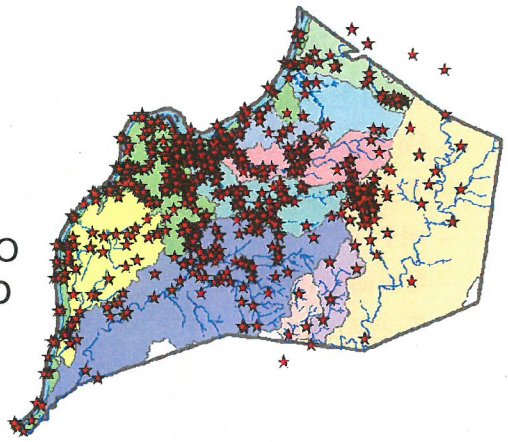
- Pump Station Monitoring
- Real Time Control
- Overflow Monitoring



16

Sampling Locations

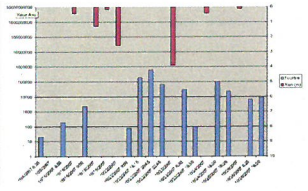
- Dry Weather
- Wet Weather
  - October 2007
  - March 2008
- Ohio River – ORSANCO
- Jefferson County - MSD



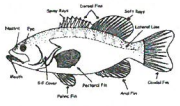
Water Quality Monitoring

Sonde

Sampling



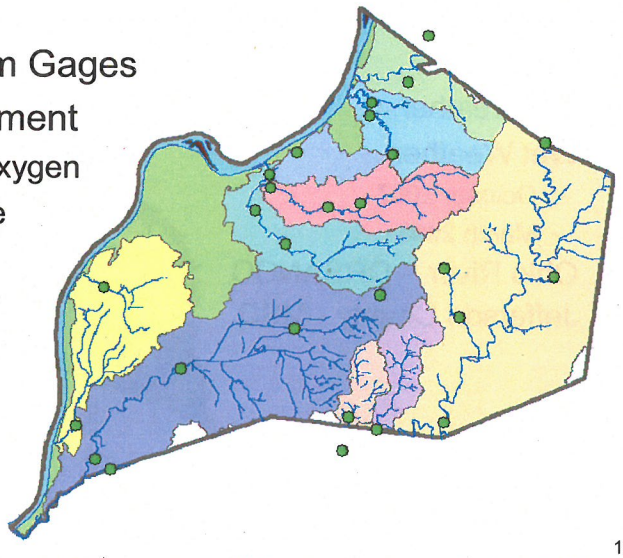
Laboratory



Biological

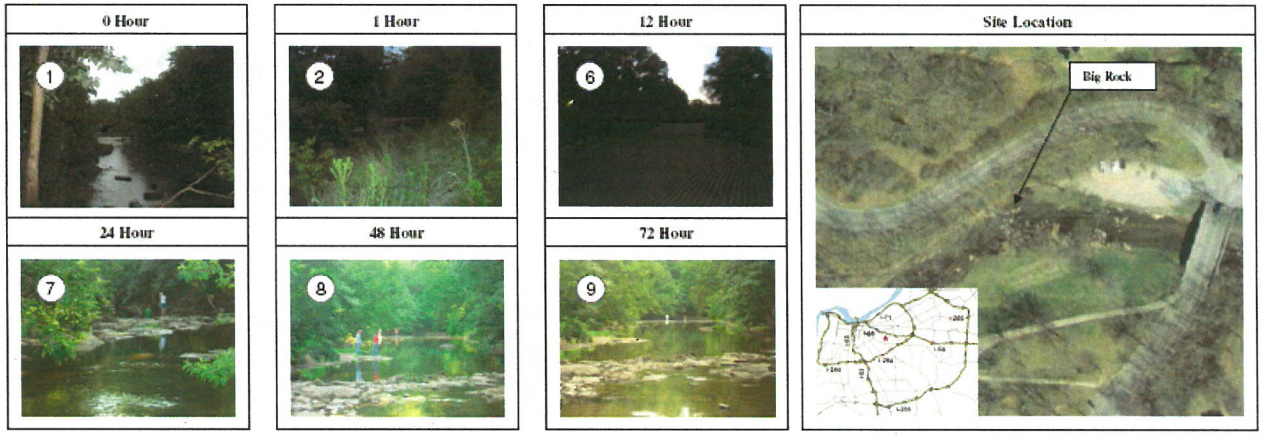
Long Term Monitoring Network

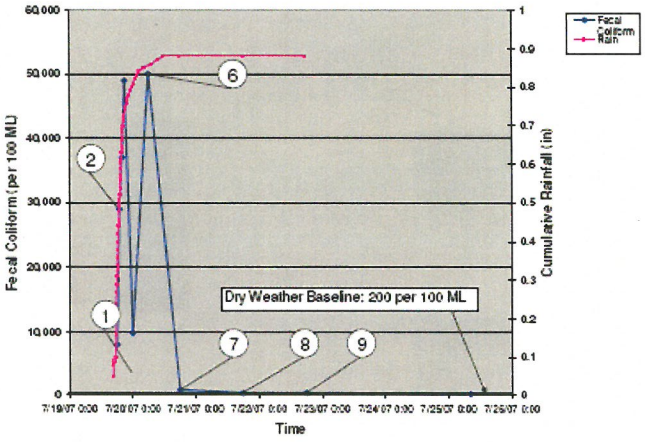
- USGS Stream Gages
- Sonde Equipment
  - Dissolved Oxygen
  - Temperature
  - pH
  - Conductivity
  - Telemetry



Sampling Information

Seneca Park Recreation Sampling – July 19, 2007 Rain Event

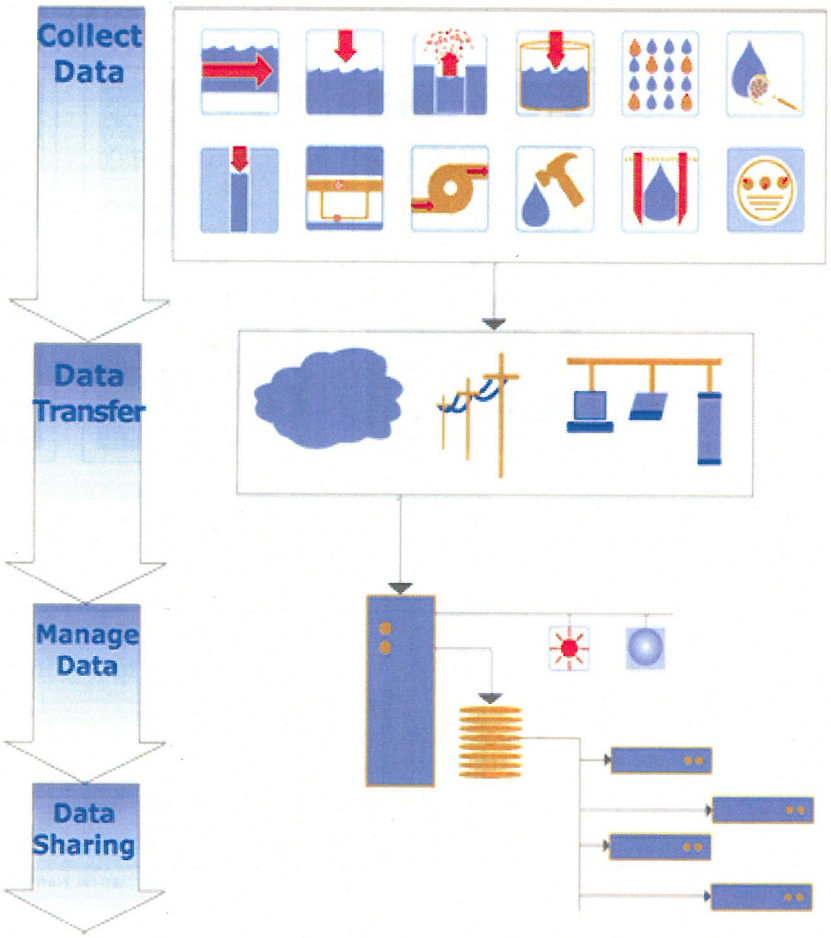




MSD Recreational Sampling – Fecal Coliform				
Sample	Sample Time	Actual Time	FC (per 100 ML)	Cumulative Rainfall (in)
1	0 hour	7/19/07 18:15	8,000	0.19
2	1 hour	7/19/07 19:10	29,000	0.44
3	2 hour	7/19/07 20:10	37,000	0.57
4	3 hour	7/19/07 21:10	49,000	0.71
5	6 hour	7/19/07 0:05	9,800	0.79
6	12 hour	7/20/07 6:15	50,000	0.85
7	24 hour	7/20/07 18:00	880	0.88
8	48 hour	7/21/07 18:00	340	0.88
9	72 hour	7/22/07 18:00	390	0.88
Baseline		7/25/07 8:14	200	

Planned Efforts (Short Term)

- Expanded long term flow monitoring (in-sewer)
- Expanded telemetry
- Data Integration
- "Big Four" Baseline Sampling



The Life Cycle of an Environmental Data Point

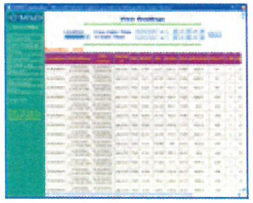
Sonde

Technician installs Sonde in stream.

Tech calibrates and downloads sonde every 2 - 3 weeks.

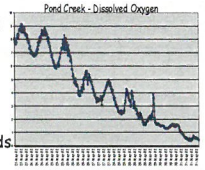
Tim Brock copies files up to network

Peggy Burgin converts them to database format



SONDE application created by IT stores the data

Patrick Fitzgerald creates data reports that analyze data trends



Data goes to help demonstrate compliance status with regulatory limits or prioritize environmental projects.

Rain Gauge

Telemetered Rain Gauges:

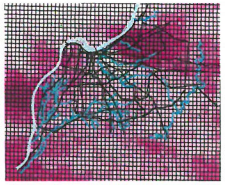
PLC sends data to MSD database and ONERAIN every 5 minutes

Data is accessible real time via MSD Web Site

Non-Telemetered Rain Gauges:

Data is logged on a data card.

Mike Griffith's staff downloads data via a laptop and places files on the network.



ONERAIN Data available for analysis real time

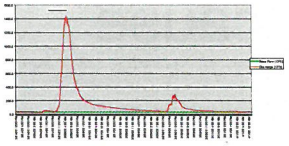
Flow Meter

Permanent (Telemetered) Collection System Flow Meters:

PLC sends data to MSD database and RTC systems every 5 minutes

Temporary (Non-Telemetered) Collection System Flow Meters:

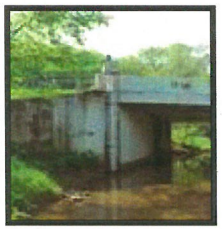
Mike Griffith's staff downloads data via a laptop and places files on the network.



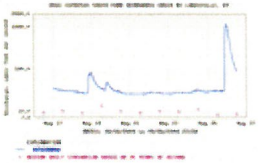
Collection System Flow Data used to generate hydrographs that help identify wet weather problems, reduce I & I, and prioritize elimination of overflows.

Stream Flow

USGS Stream Flow Gauges (Telemetered):



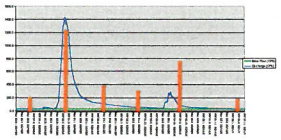
USGS maintains network of stream flow gauges in conjunction with MSD



Provisional data for USGS stream flow meters available on line real time:

Final data gets transferred to MSD quarterly

MSD Data like fecal coliform can be plotted on the same graphs with stream flow data to indicate when water quality problems are the worst

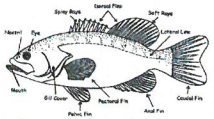


Biological

Macroinvertibrate and Fish Sampling:

Samples are collected from Streams of various macro-invertebrate and fish species

Taxonomy and condition data generated on samples



Algae Sampling:

Samples are collected from Streams using ceramic tiles and analyzed under a microscope

Taxonomy and enumeration data generated on samples. Demonstrates condition of the stream

Laboratory

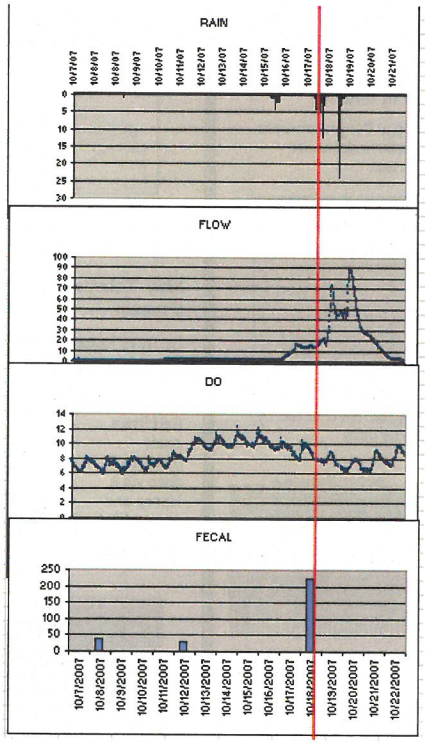
Surface Water Monitoring:

Water quality technician collects discrete surface water samples and delivers them to the laboratory

Laboratory analyzes samples and publishes data in the LIMS

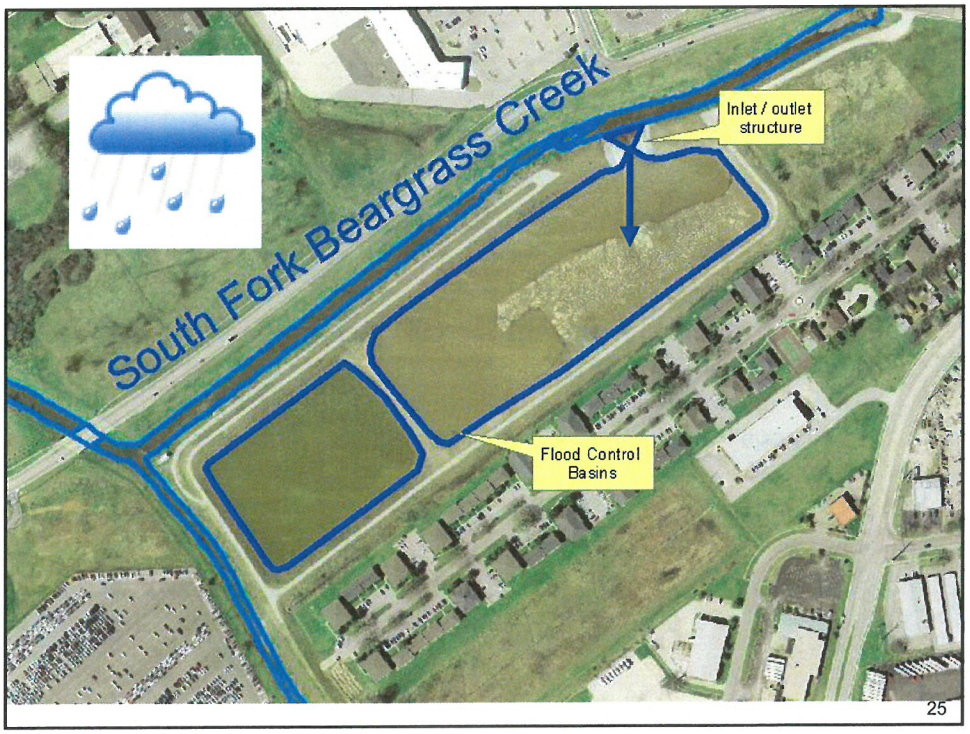
Environmental Data Interrelated

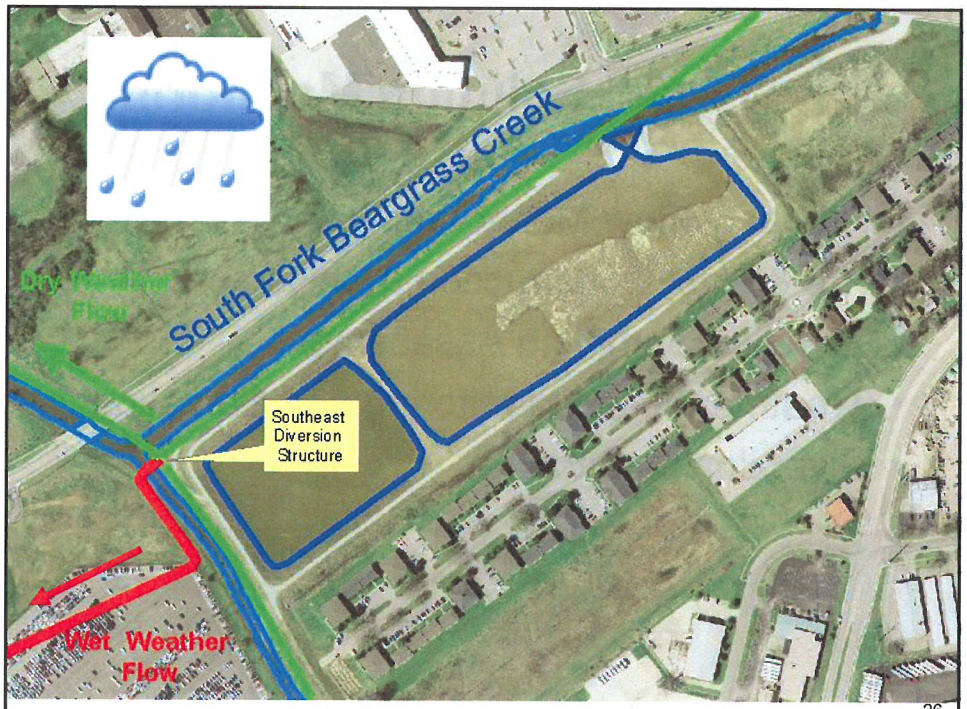
- Long dry spell affects oxygen, metals, and temperature in the stream
- Changes in oxygen and temperature affect biological life in stream (algae, bugs, fish)
- Rainfall causes increase in stream and sewer flows
- Runoff and sewer overflows cause increase in bacterial counts
- Sewer overflows may affect oxygen in the stream



"Gray" Solution Monitoring

- Primarily Flow Monitoring
- Pre & Post Construction Assessment
- Baseline Sampling Assessment
- Treatment Flow Monitoring and Sampling
- Diversion Monitoring



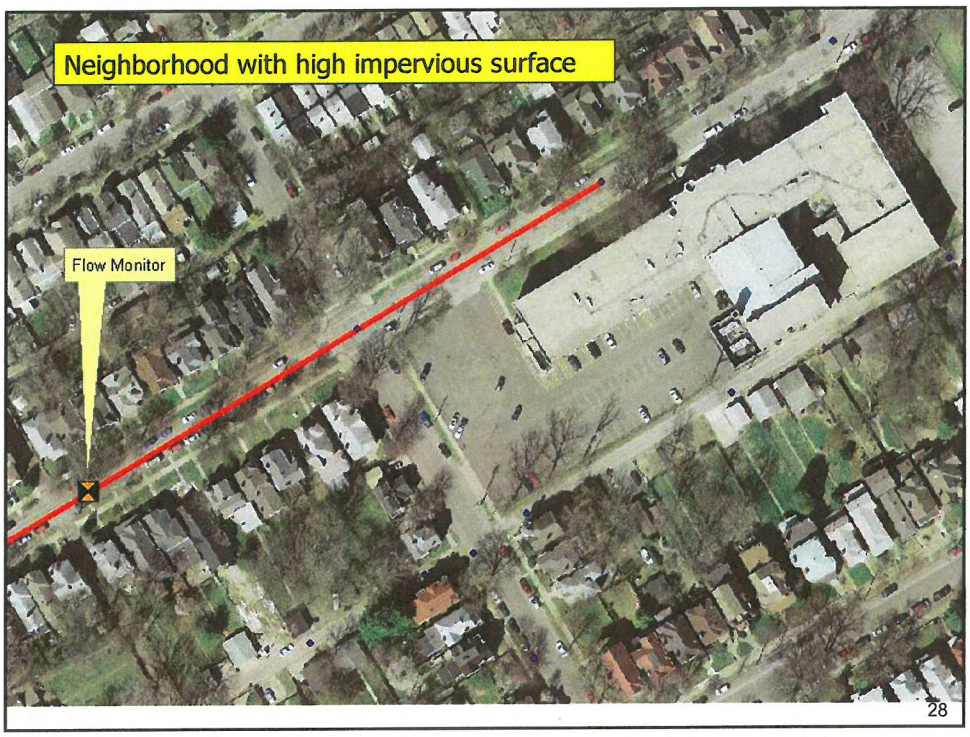


26

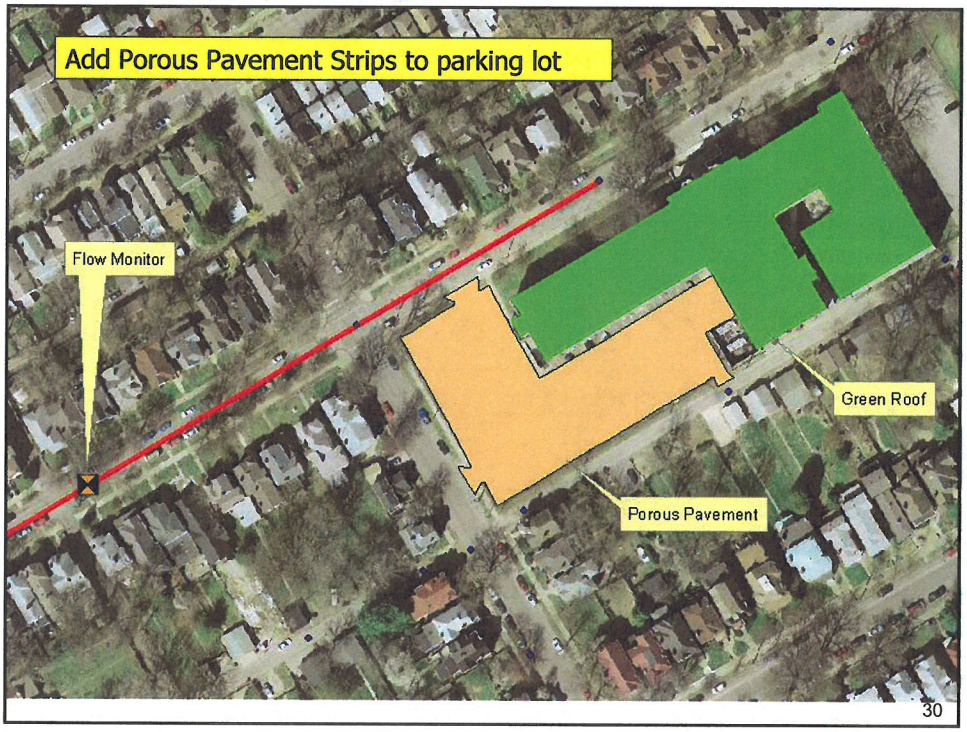
"Green" Solution Monitoring

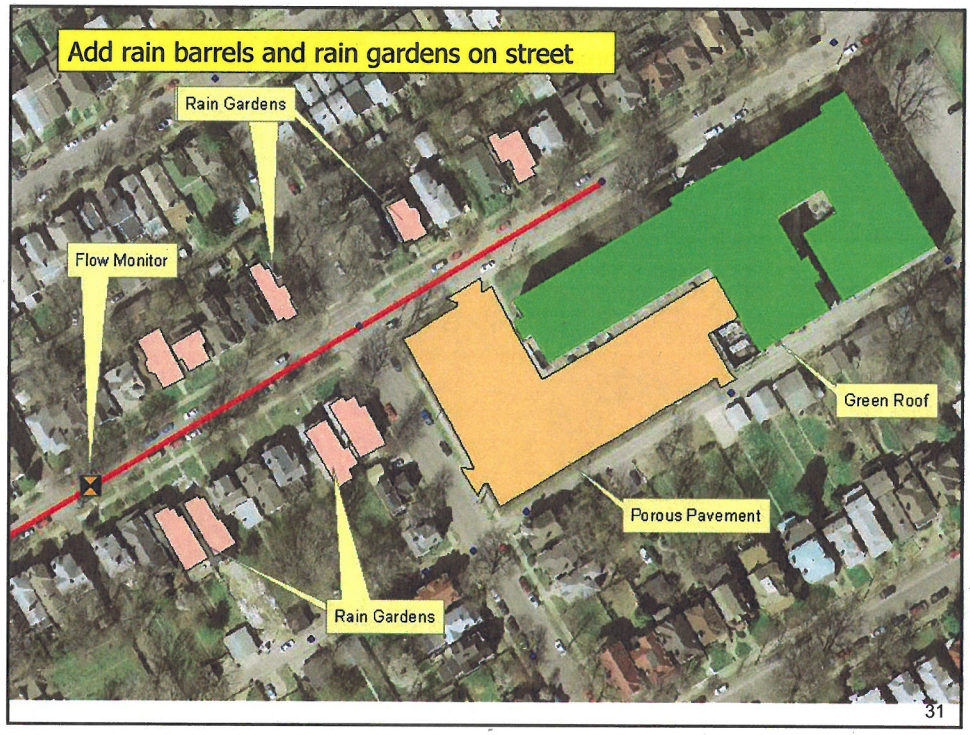
- "Presumptive" Volume Reduction per Green Infrastructure Type for Planning (Impervious Area Disconnected/Gallons Removed)
- Green Monitoring Program (Small Sewershed or Neighborhood Focus)
  - Downspout Disconnection (Rain Barrel, Gardens)
  - Pervious Pavement
  - Dry Well
  - Green Roof
  - Collective Impact Monitoring

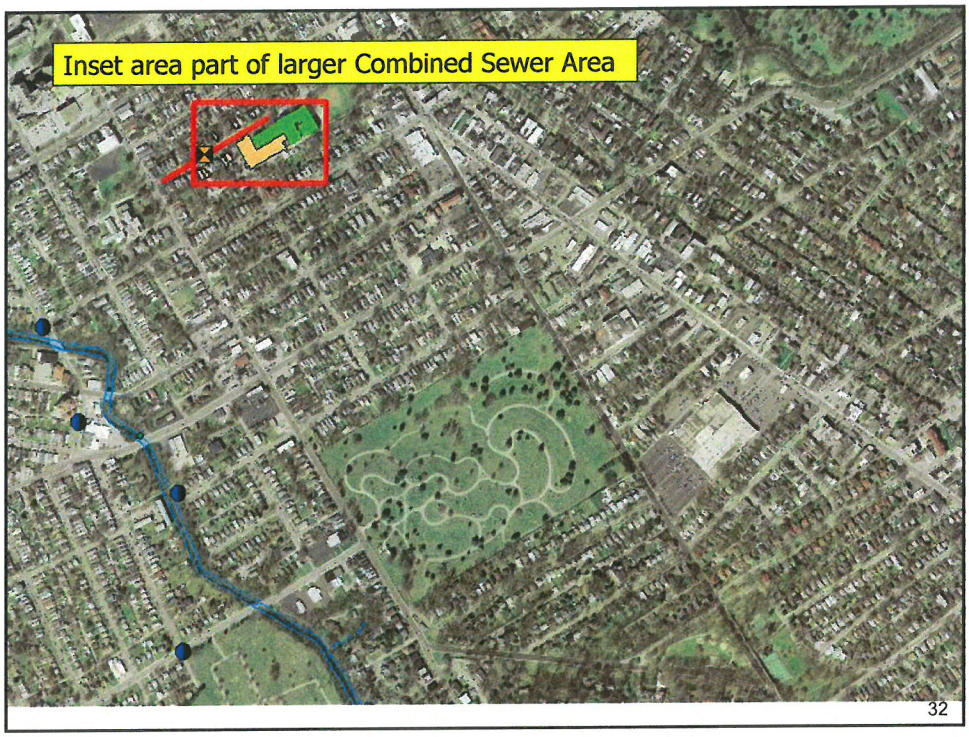
27

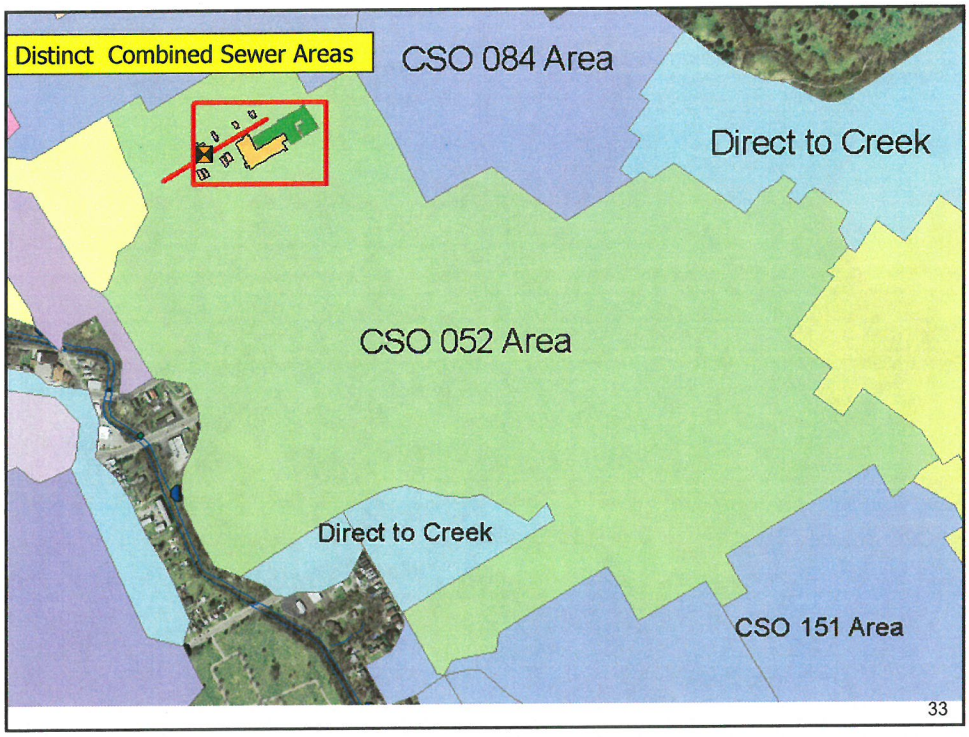

Neighborhood with high impervious surface
Flow Monitor
28

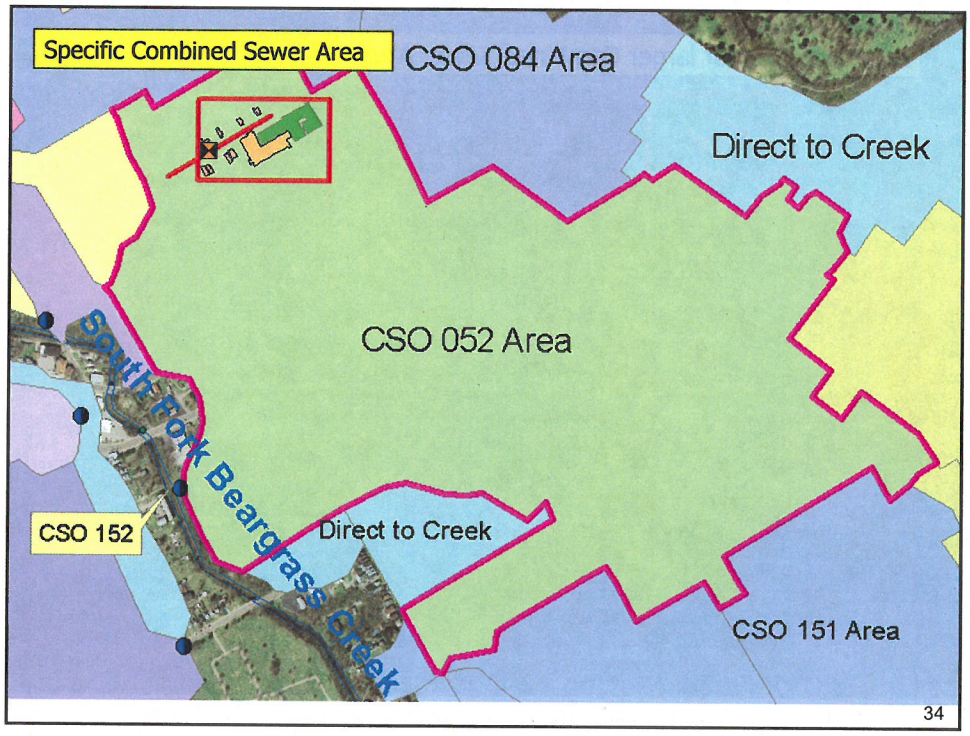

Add a green roof to a commercial building
Flow Monitor
Green Roof
29

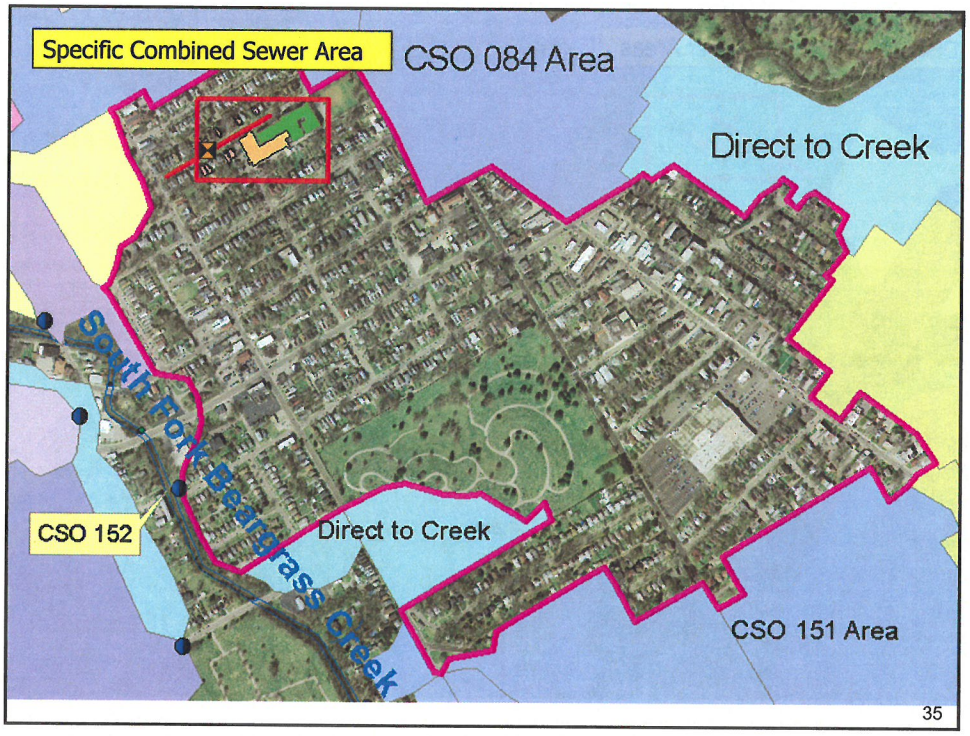

Add Porous Pavement Strips to parking lot
Flow Monitor
Green Roof
Porous Pavement
30

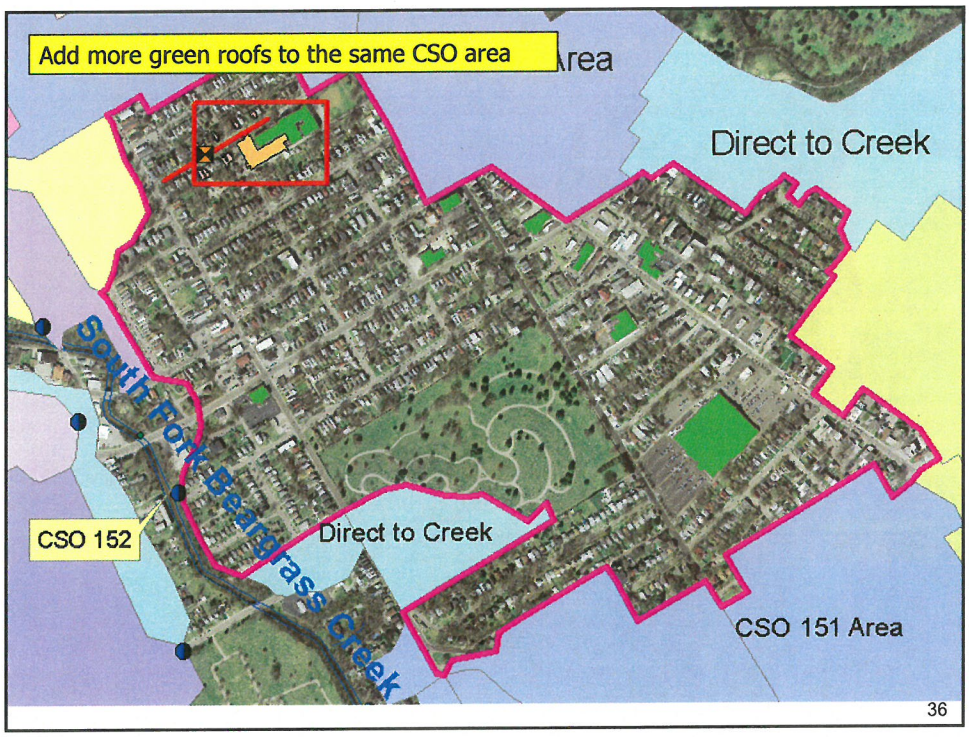

Add rain barrels and rain gardens on street
Rain Gardens
Flow Monitor
Green Roof
Porous Pavement
Rain Gardens
31

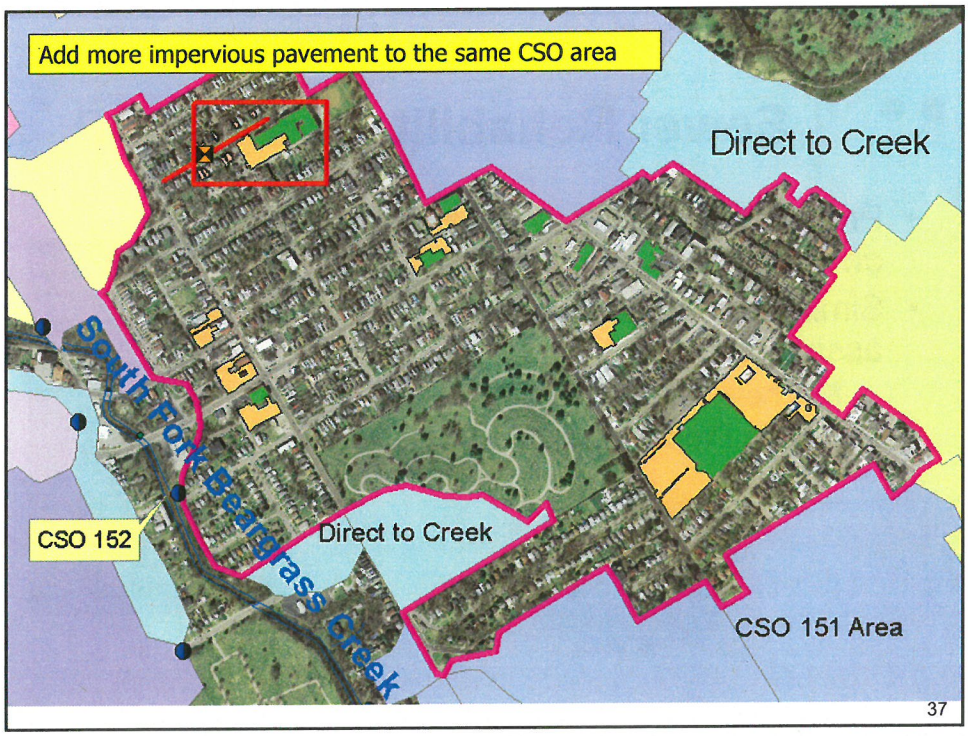

Inset area part of larger Combined Sewer Area
32

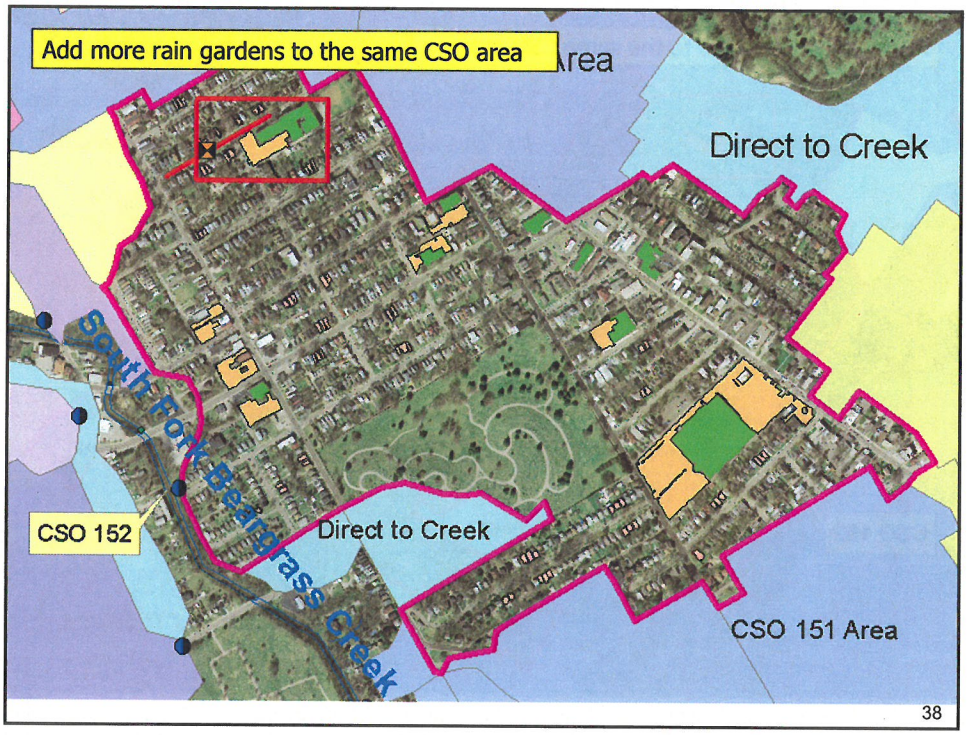

Distinct Combined Sewer Areas
CSO 084 Area
Direct to Creek
CSO 052 Area
Direct to Creek
CSO 151 Area
33


Specific Combined Sewer Area
CSO 084 Area
Direct to Creek
CSO 052 Area
South Fork Beargrass Creek
CSO 152
Direct to Creek
CSO 151 Area
34


Specific Combined Sewer Area
CSO 084 Area
Direct to Creek
South Fork Beargrass Creek
CSO 152
Direct to Creek
CSO 151 Area
35


Add more green roofs to the same CSO area
Direct to Creek
South Fork Beargrass Creek
CSO 152
Direct to Creek
CSO 151 Area
36


Add more impervious pavement to the same CSO area
Direct to Creek
South Fork Beargrass Creek
CSO 152
Direct to Creek
CSO 151 Area
37



38

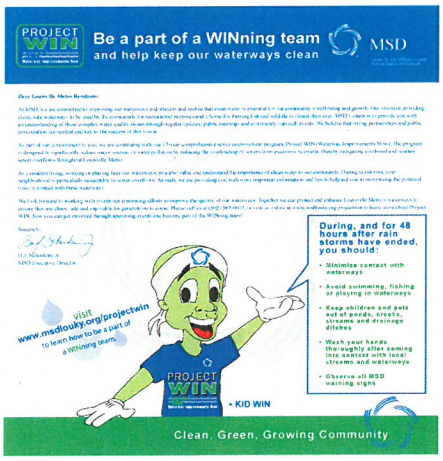
Sewer Rehabilitation - SSDP

- Practical approach to assess impact on infiltration and inflow (I&I)
- Similar approach to green assessment
  - Manhole Rehabilitation & Pipe Lining
  - Private Property Program

39

Behavior Change Effectiveness

- How well are we getting our message across?
- Outreach Efforts
- Ratepayer Surveys



Programmatic Reporting

- Hydraulic Modeling (Project Interaction)
- Water Quality Modeling (Impact to Streams and the Ohio)
- Volume Reduction & Overflow Elimination
- Estimated Pollutant Load Reduction
- Project Certification
- Performance Assessment
- Reporting
  - Quarterly
  - Annual
  - Biannual (Synthesis)

Questions

- Does this approach paint a clear picture of performance?
- Are there additional components that should be included?
- How can we make the approach more transparent to the general public?

Green Infrastructure Status Report

Wet Weather Team
Stakeholder Group Meeting No. 19
May 15, 2008

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Waterway Improvements Now

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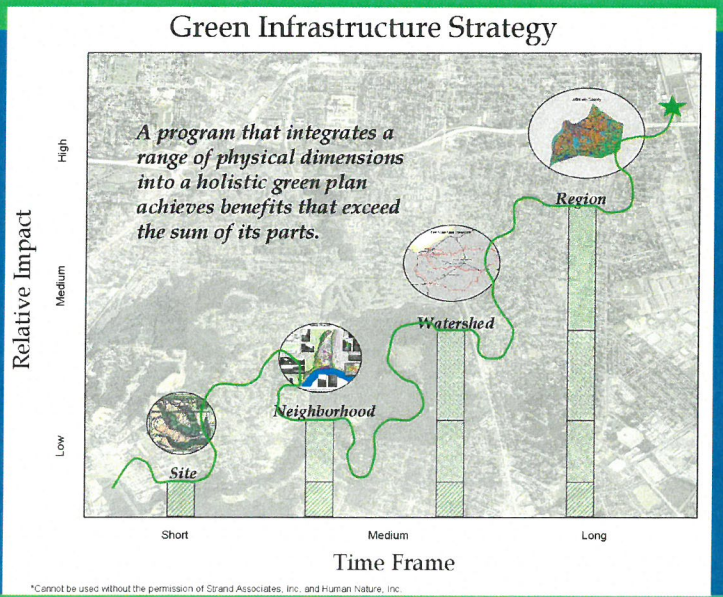
Multi Scale Approach



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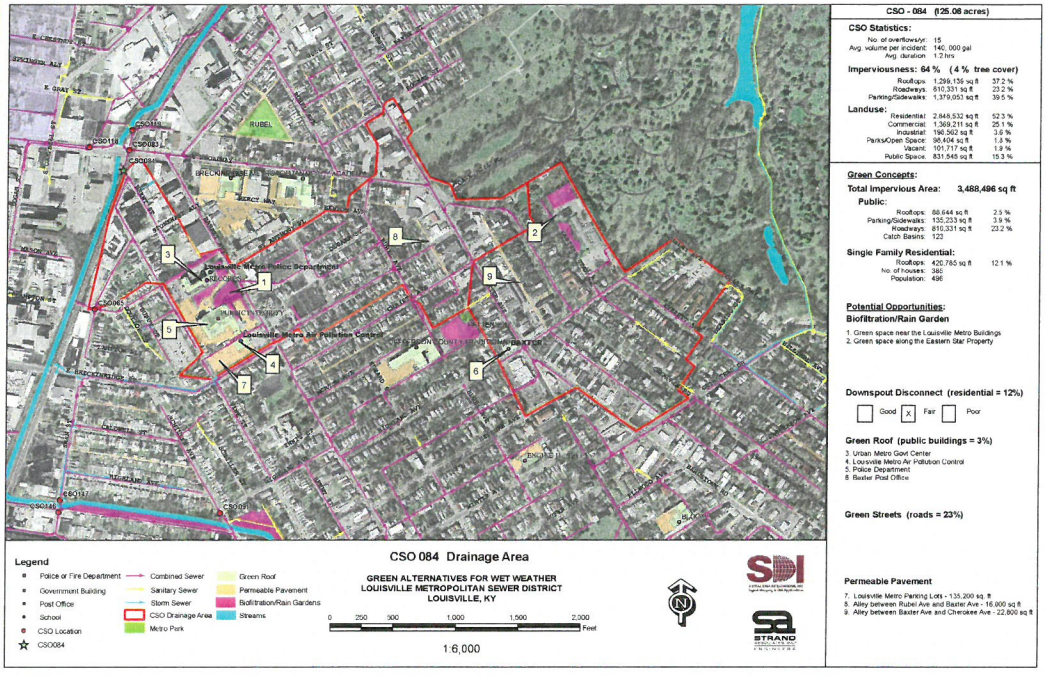
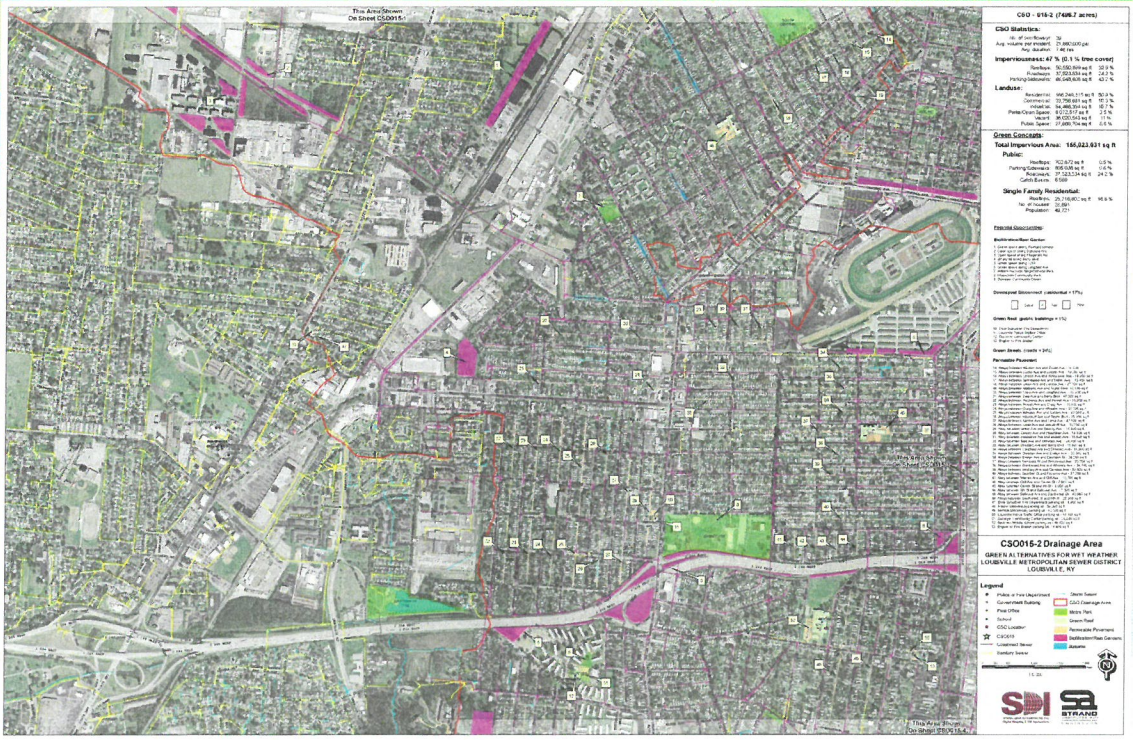
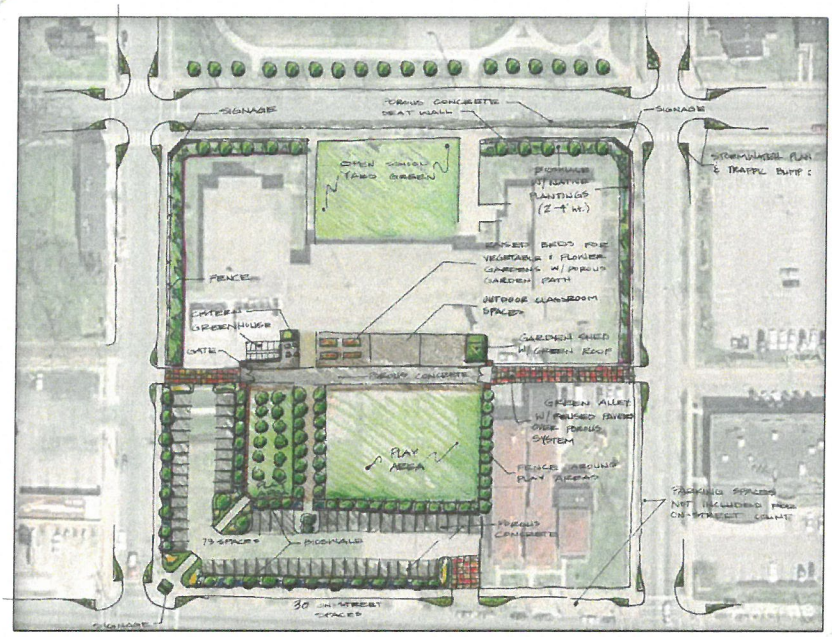
Sewershed Analysis



Sewershed Analysis



Roosevelt Perry School - Louisville MSD



MSD
Louisville and Jefferson County Metropolitan Sewer District

Human Nature • Strand Associates, Inc.

Regional Evaluation

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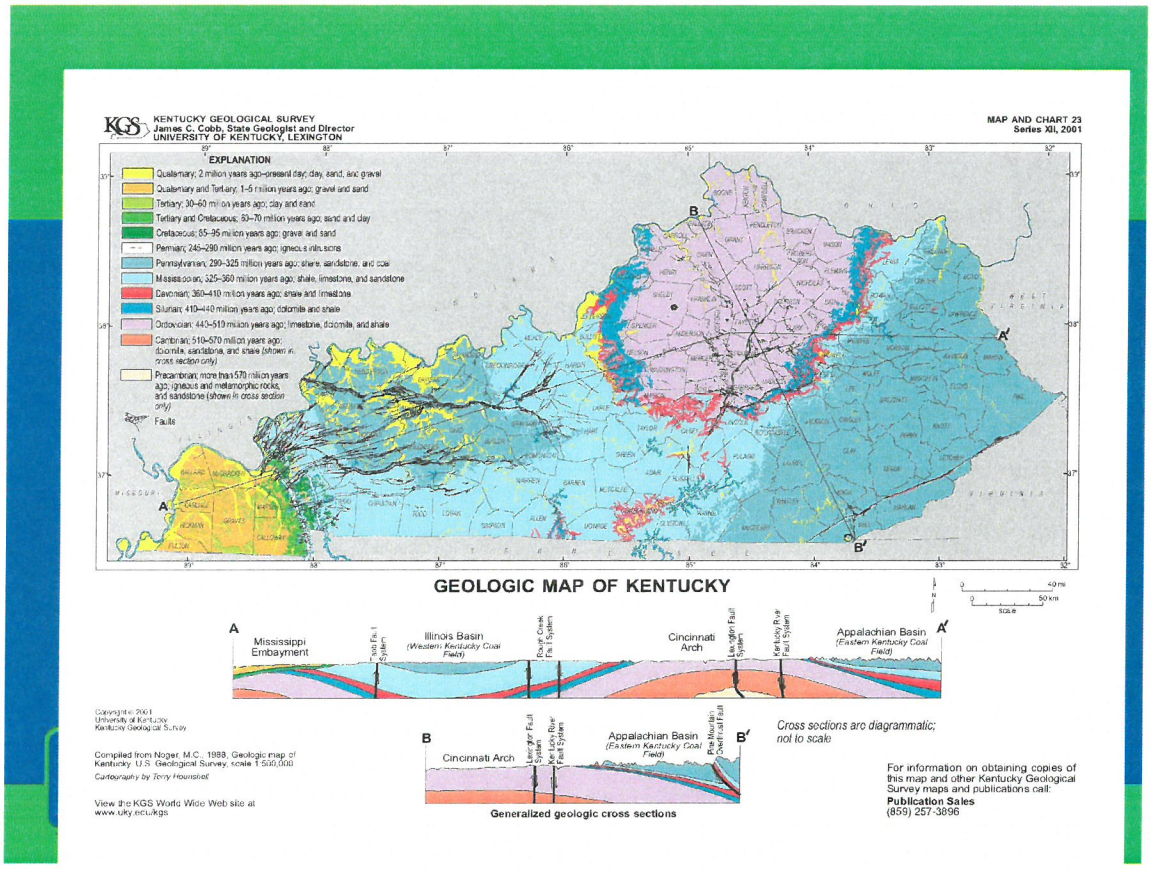
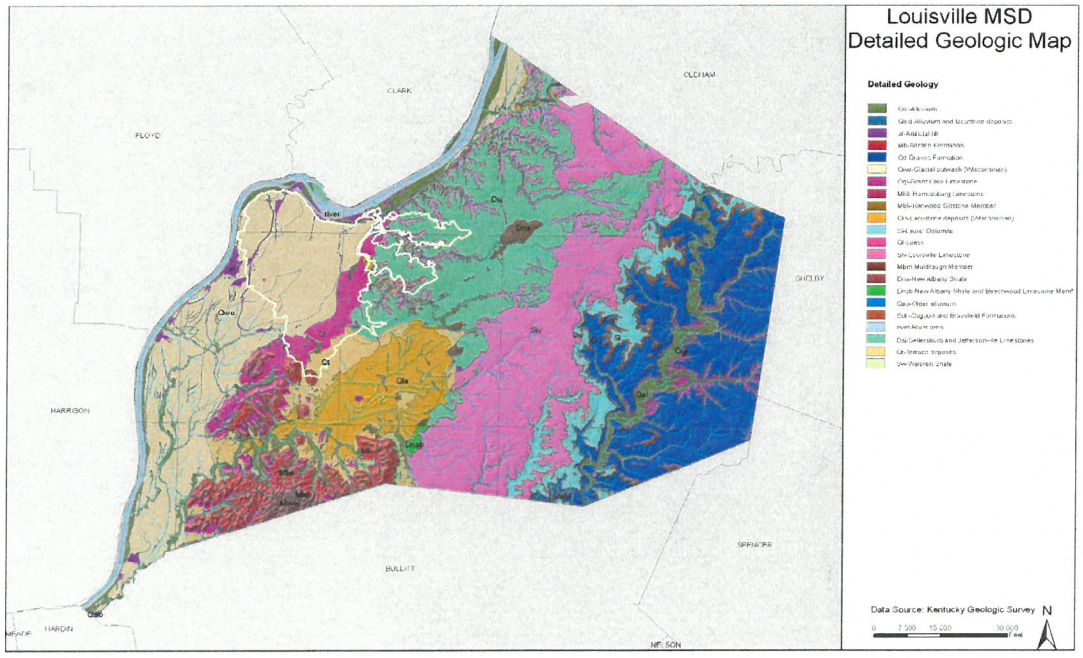
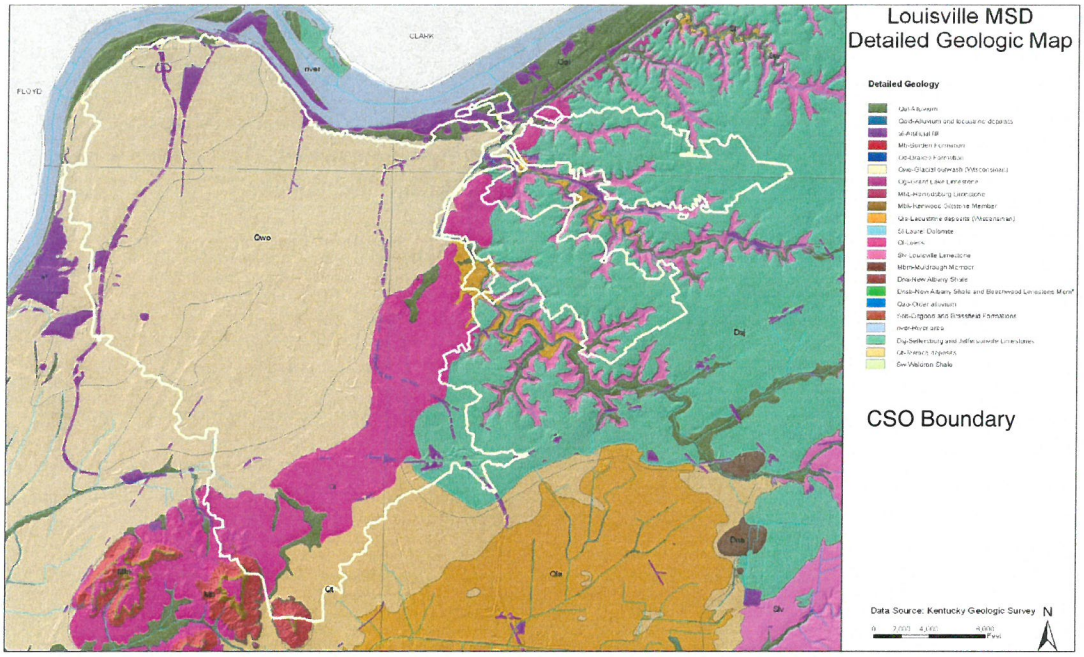

KENTUCKY GEOLOGICAL SURVEY
James C. Cobb, State Geologist and Director
UNIVERSITY OF KENTUCKY, LEXINGTON
MAP AND CHART 23
Series XII, 2001
EXPLANATION
Quaternary; 2 million years ago–present day; clay, sand, and gravel
Quaternary and Tertiary; 1–5 million years ago; gravel and sand
Tertiary; 30–60 million years ago; clay and marl
Tertiary and Cretaceous; 63–70 million years ago; sand and clay
Cretaceous; 65–95 million years ago; gravel and sand
Permian; 245–290 million years ago; igneous intrusions
Pennsylvanian; 290–325 million years ago; shale, sandstone, and coal
Mississippian; 325–360 million years ago; shale, limestone, and sandstone
Devonian; 360–410 million years ago; shale and limestone
Silurian; 410–440 million years ago; dolomite and shale
Ordovician; 440–510 million years ago; limestone, dolomite, and shale
Cambrian; 510–570 million years ago; dolomite, sandstone, and shale (shown in cross section only)
Precambrian; more than 570 million years ago; igneous and metamorphic rocks, and sandstone (shown in cross section only)
Faults
GEOLOGIC MAP OF KENTUCKY
Mississippi Embayment
Illinois Basin
(Western Kentucky Coal Field)
Rough Creek Fault System
Cincinnati Arch
Lexington Fault System
Kentucky River Fault System
Appalachian Basin
(Eastern Kentucky Coal Field)
Pine Mountain Overthrust Fault
Generalized geologic cross sections
Cross sections are diagrammatic; not to scale
Copyright © 2001
University of Kentucky
Kentucky Geological Survey
Compiled from Noger, M.C., 1988, Geologic map of Kentucky: U.S. Geological Survey, scale 1:500,000
Cartography by Terry Hounshell
View the KGS World Wide Web site at www.uky.edu/kgs
For information on obtaining copies of this map and other Kentucky Geological Survey maps and publications call:
Publication Sales
(859) 257-3896

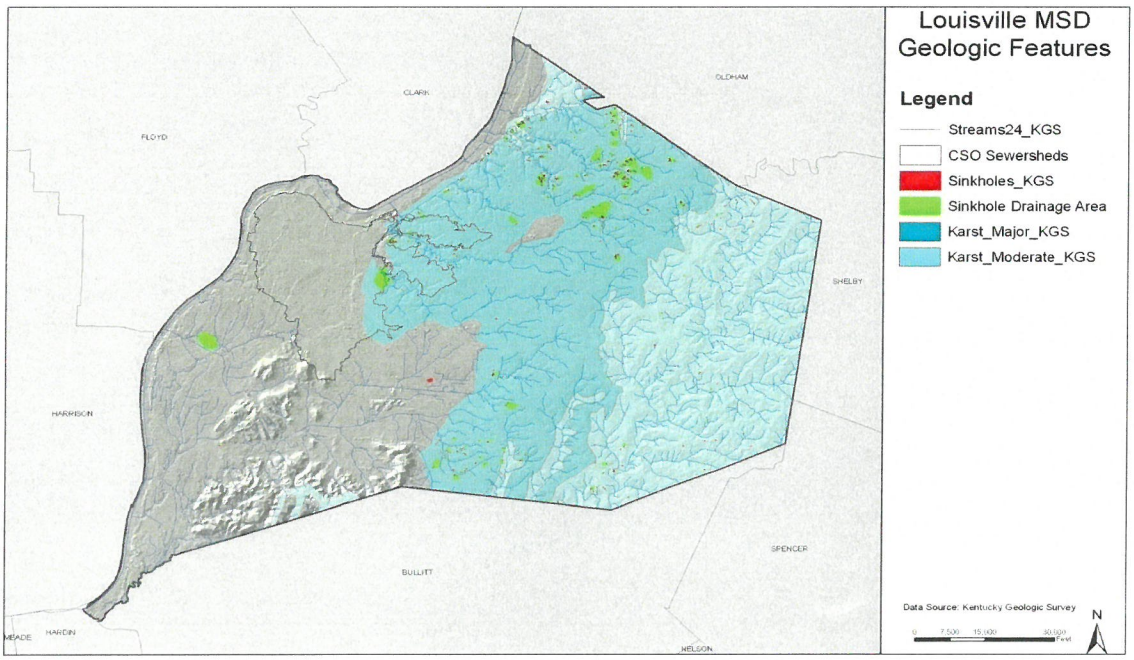
Geology


Louisville MSD
Detailed Geologic Map
Detailed Geology
CLARK
FLOYD
OLDHAM
SHELBY
HARRISON
BULLITT
SPENCER
MEADE
HARDIN
NELSON
Data Source: Kentucky Geologic Survey
N

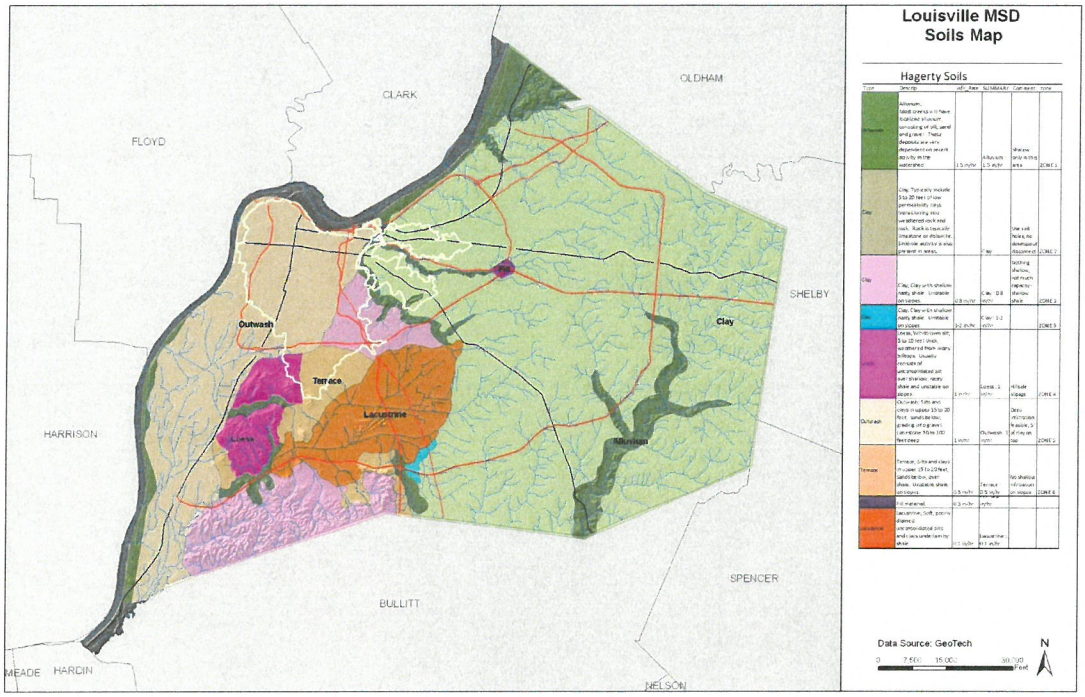
Geology



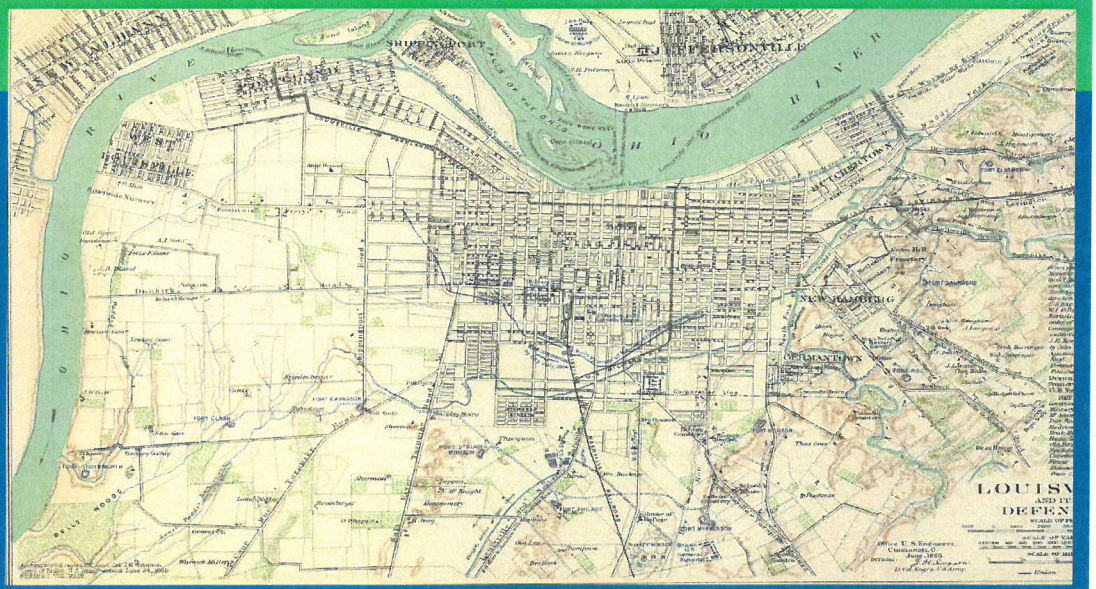
Geology



Soils Map



Historic



PROJECT WIN
Waterway Improvements Now

1865

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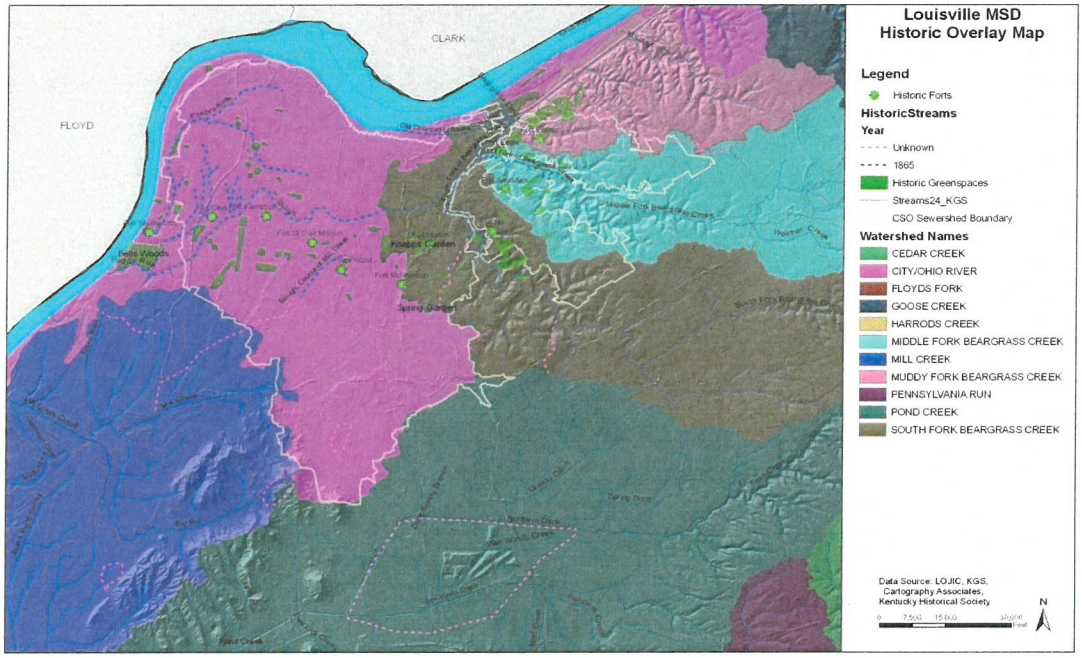
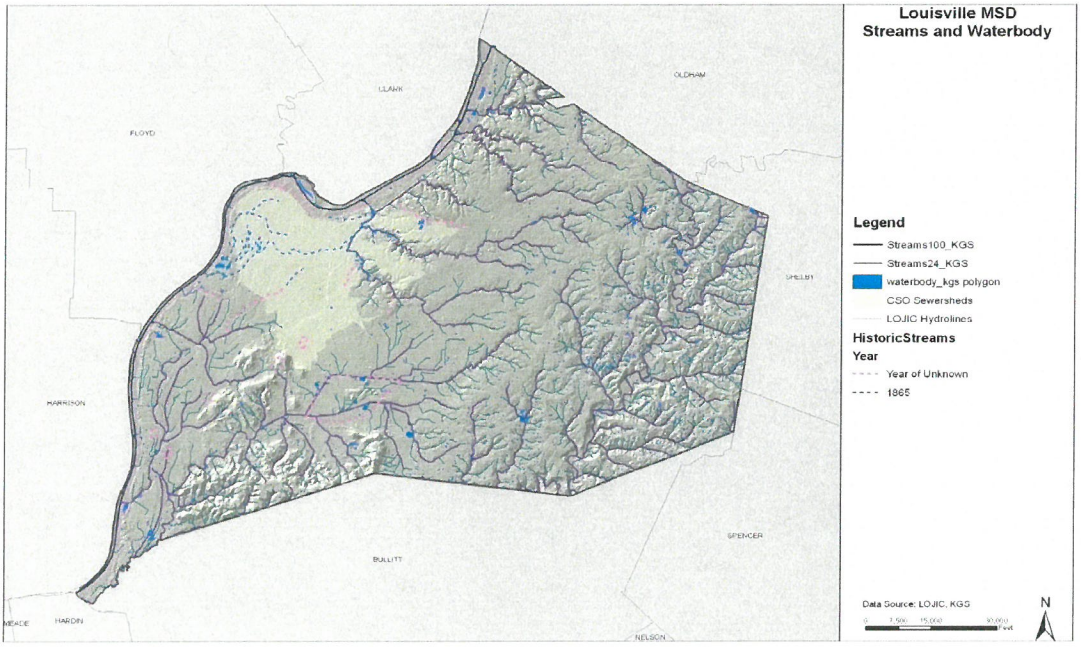
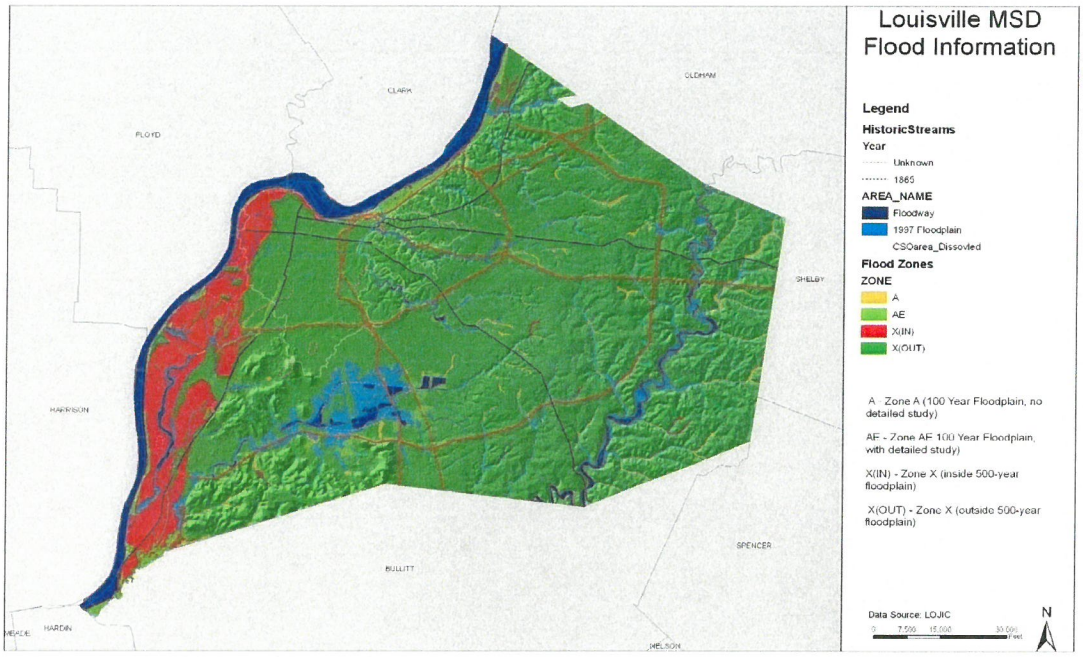
Historic



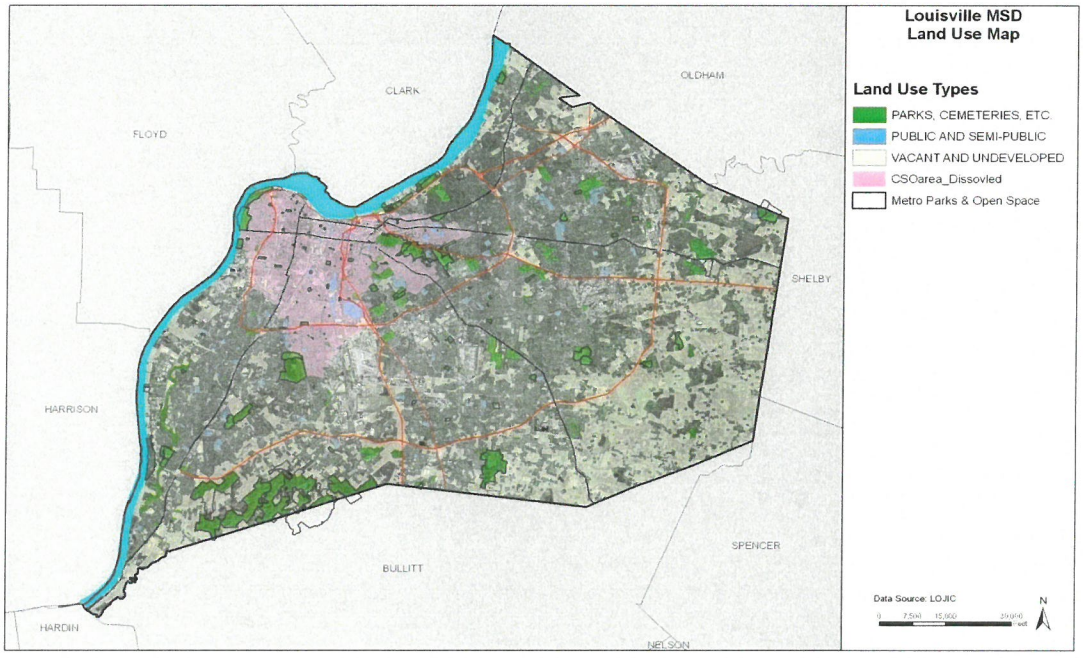
Hydrology
Streams and Waterbody
(includes historical information)



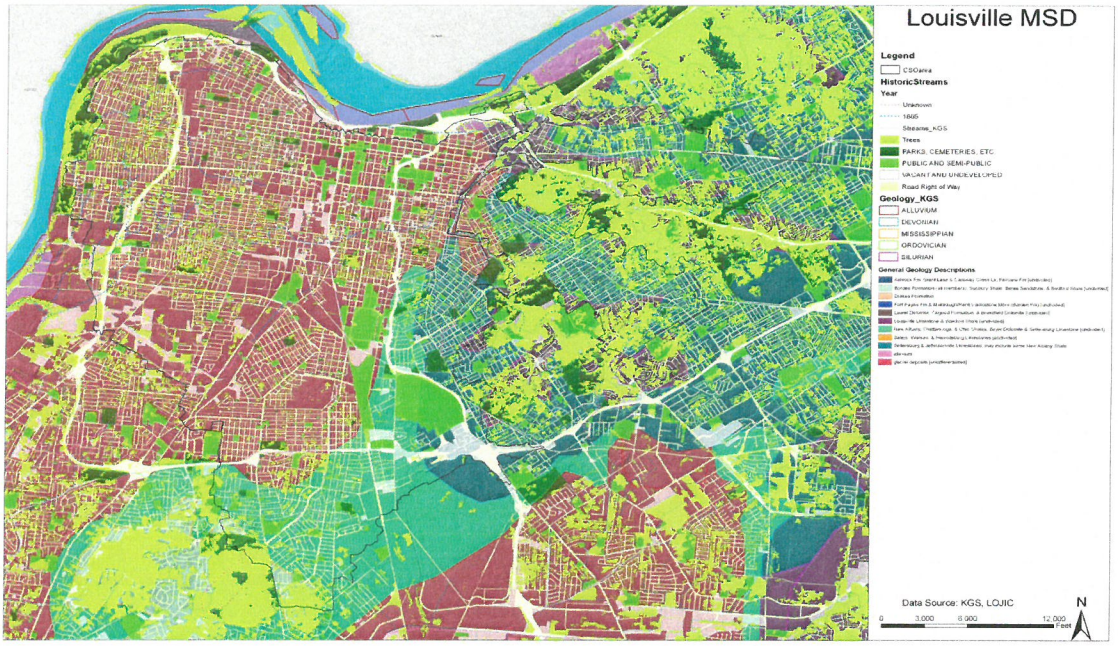
Hydrology
Flood Information



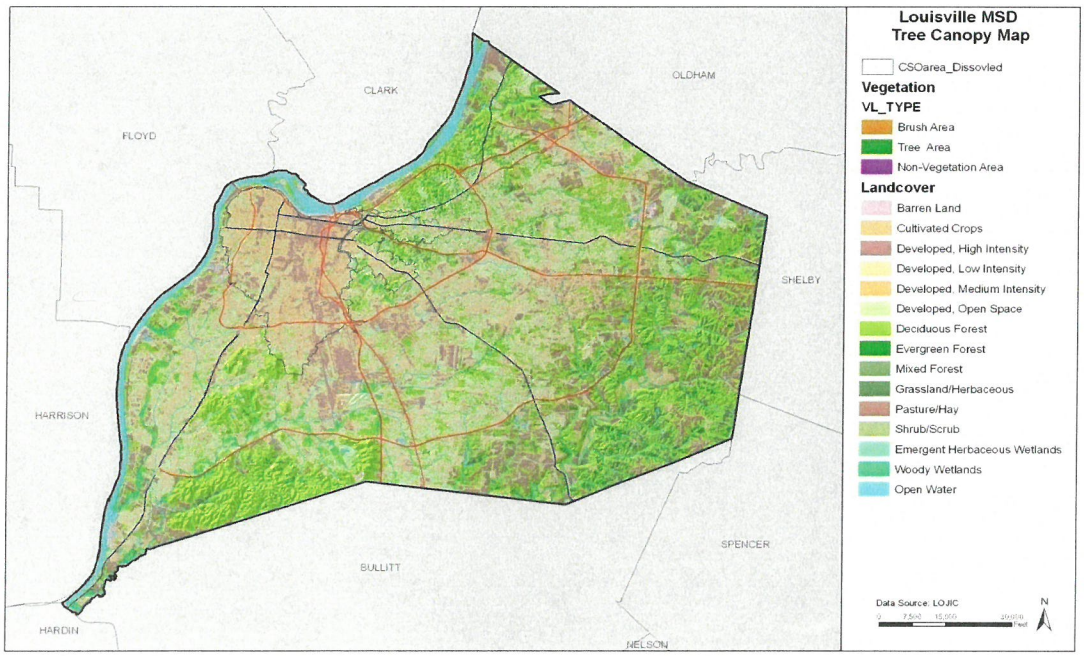
Green Space



Right of Way



Land Cover



Canopy Coverage Analysis

- Clifton canopy
- LOJIC & Digitized. (Clifton Only)

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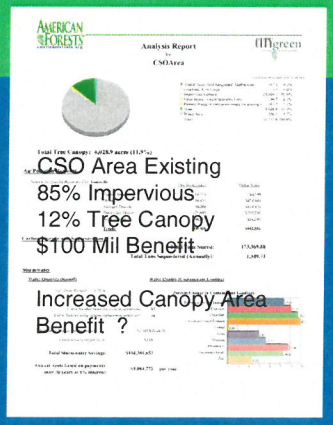
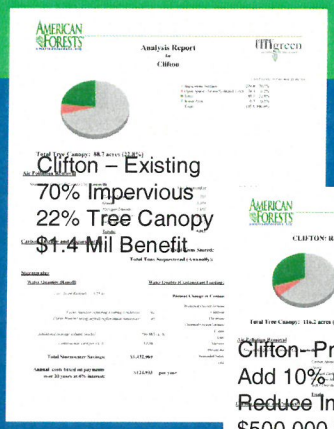
Canopy Coverage Analysis

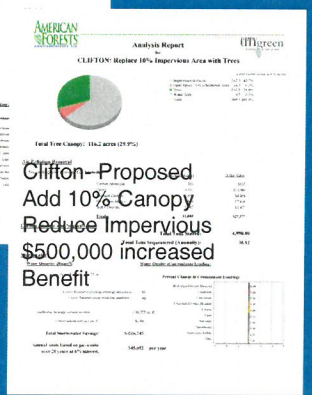


CSO Area Existing
85% Impervious
12% Tree Canopy
$100 Mil Benefit

Increased Canopy Area Benefit ?



Clifton – Existing
70% Impervious
22% Tree Canopy
$1.4 Mil Benefit



Clifton– Proposed
Add 10% Canopy
Reduce Impervious
$500,000 increased Benefit

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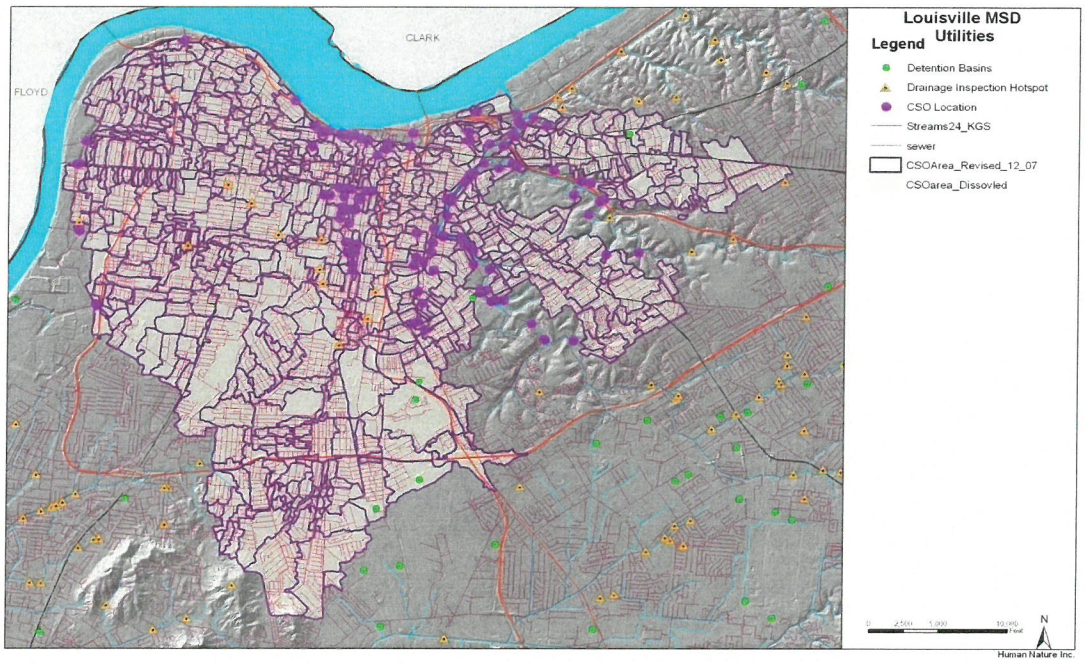
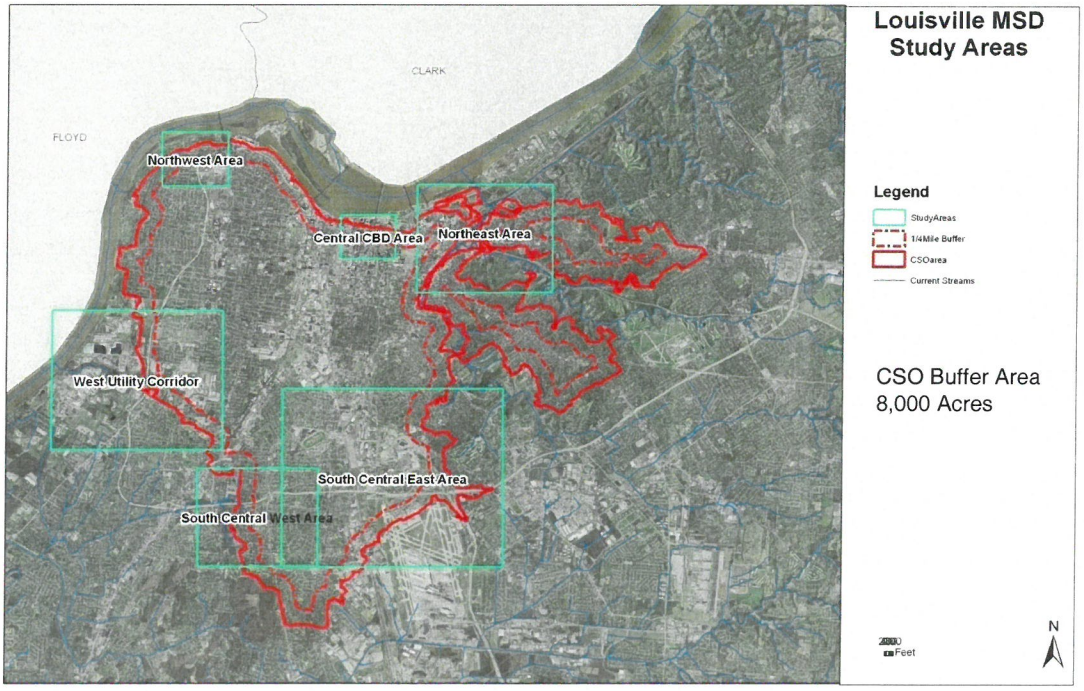
Utilities

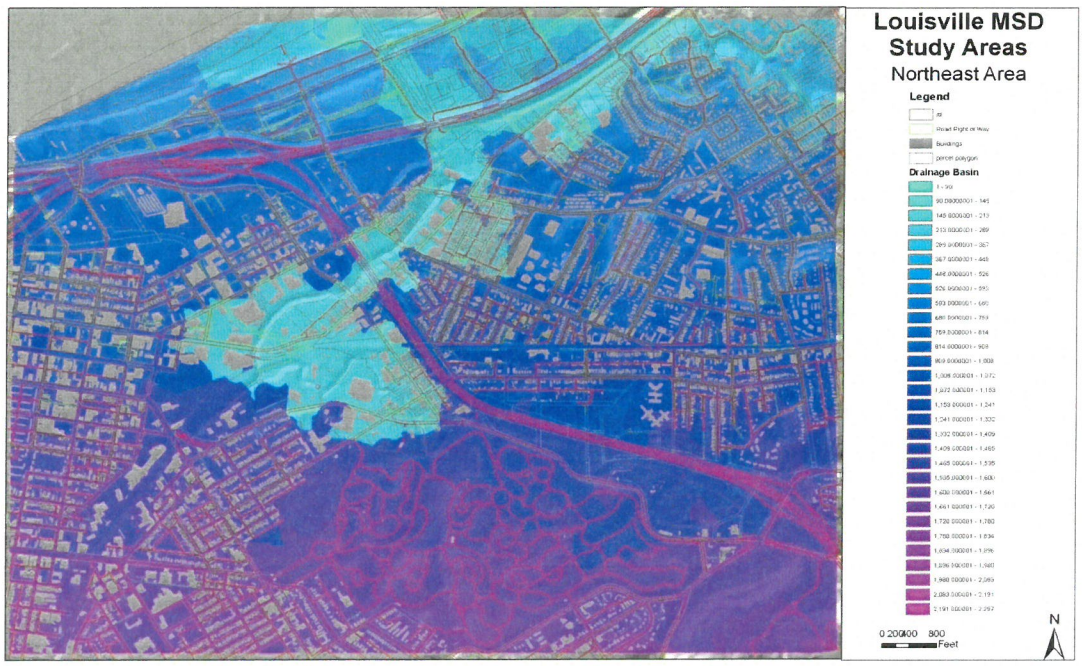


Study Areas



Study Areas
Northeast Area

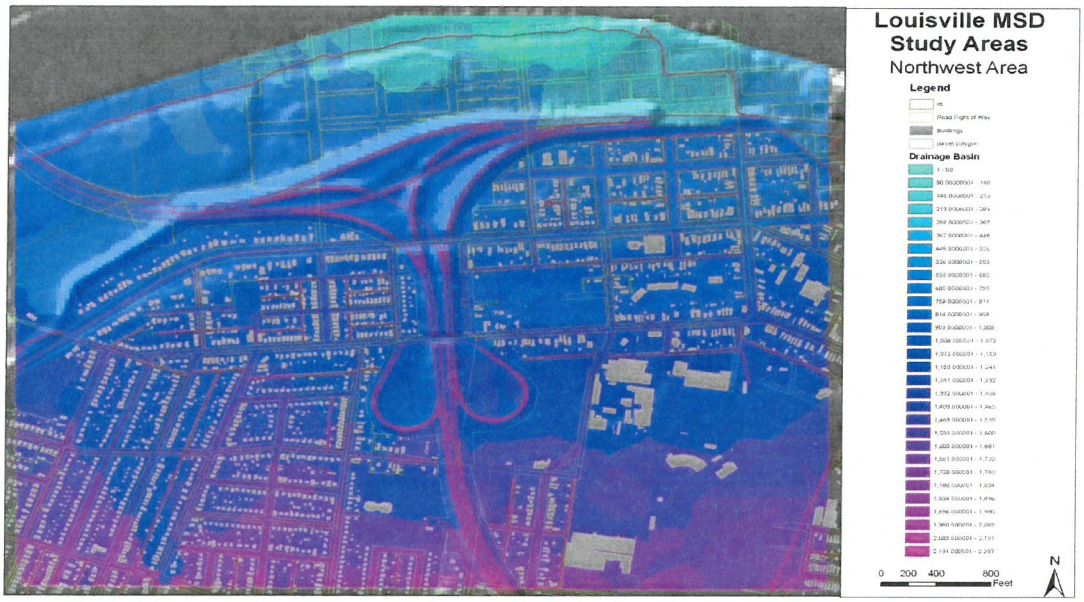
Study Areas
Northeast Area



Study Areas
Northeast Area

Study Areas
Northwest Area

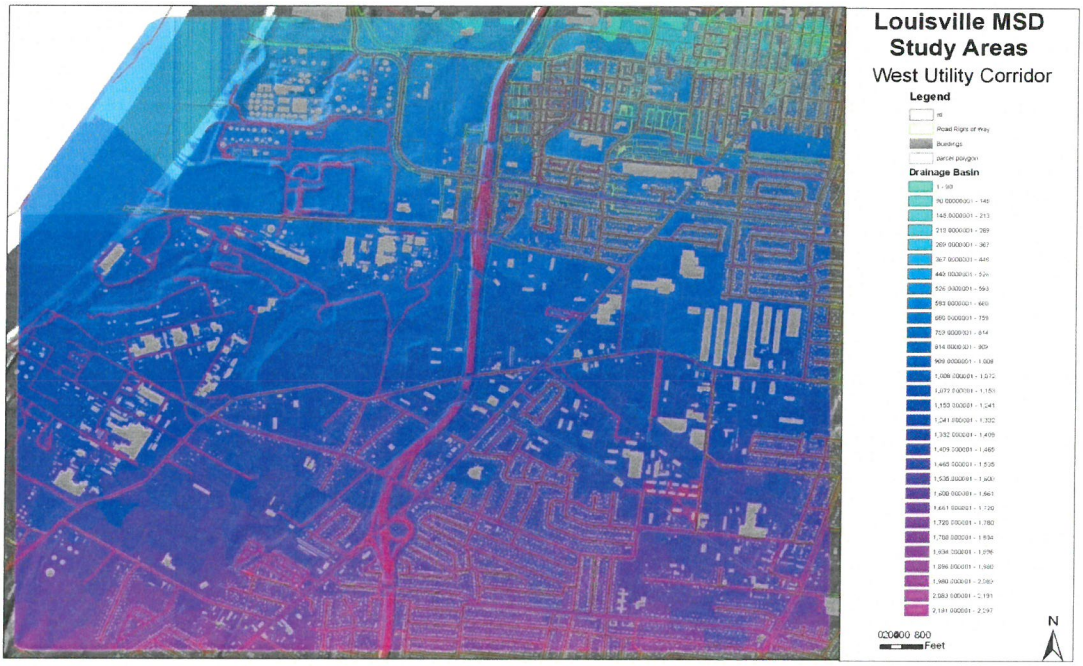
Study Areas
Northwest Area



Study Areas
Northwest Area

Study Areas
West Utility Corridor

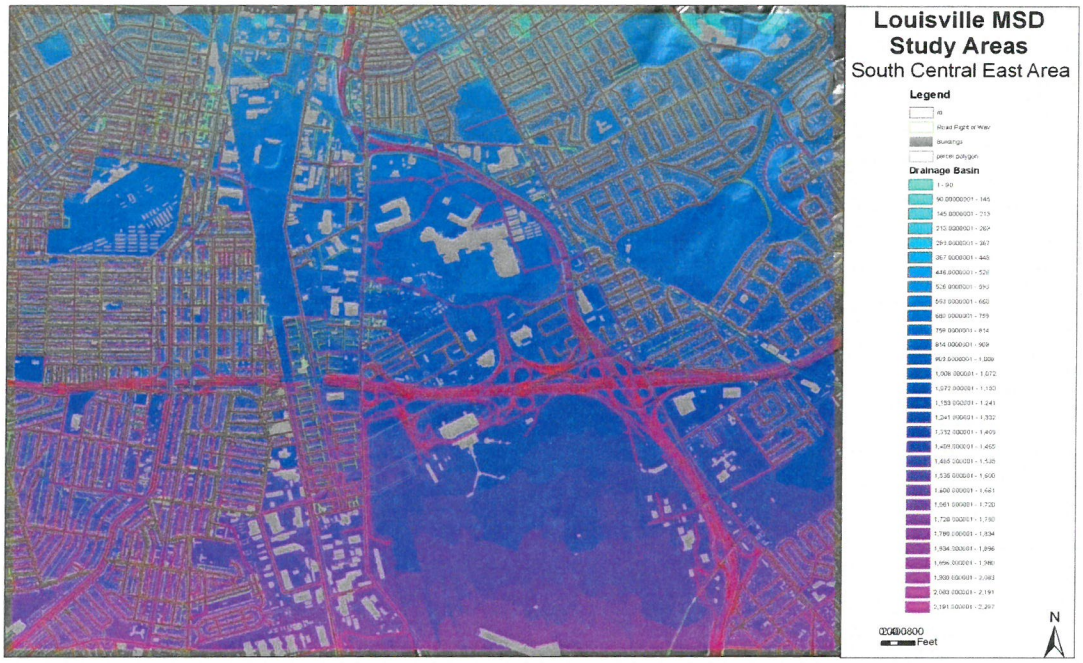
Study Areas
West Utility Corridor



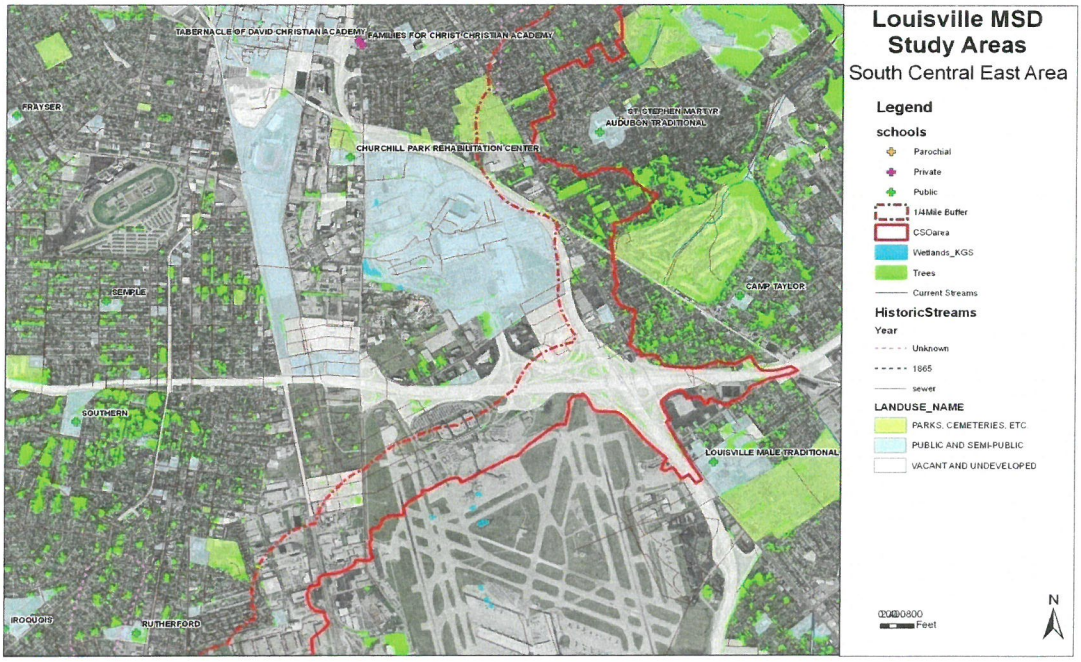
Study Areas
West Utility Corridor

Study Areas
South Central East Area

Study Areas
South Central East Area

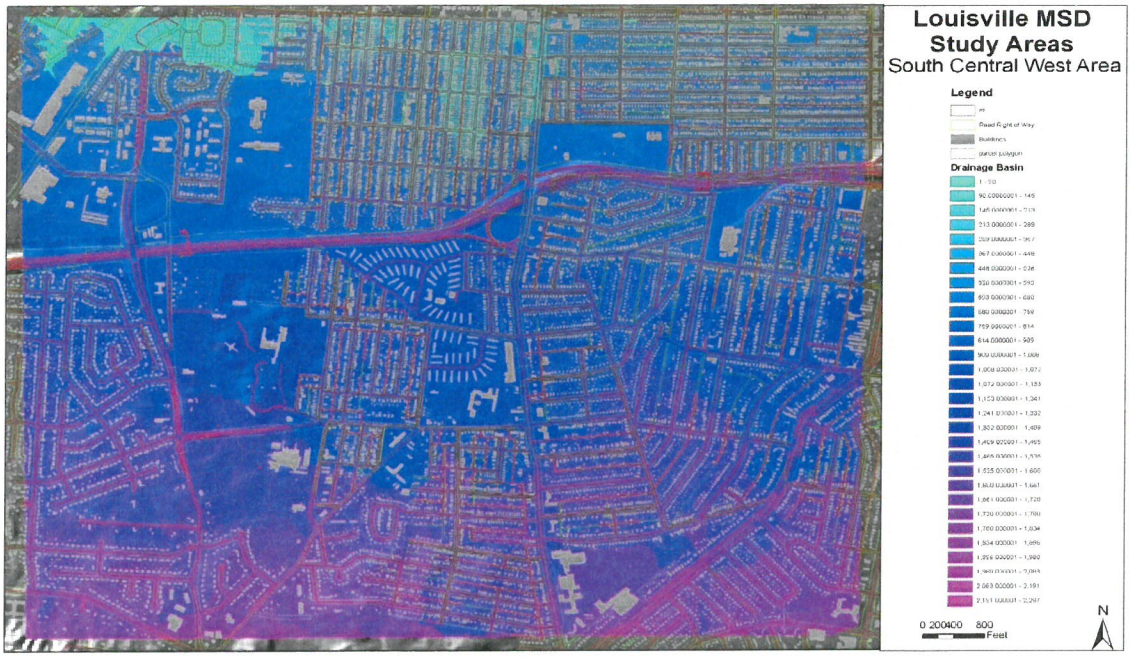


Study Areas
South Central East Area



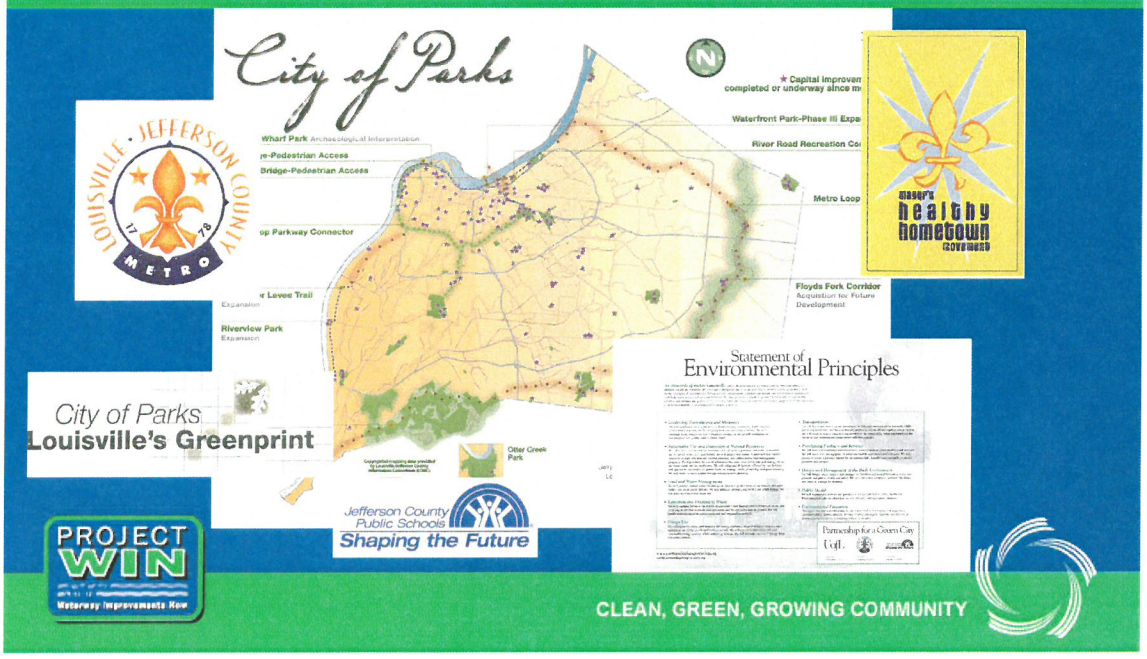
Study Areas
South Central West Area

Study Areas
South Central West Area



Study Areas
South Central West Area

Shared Vision of a Green City



Green Strategy for LTCP

- Identify green opportunities.
- Coordinate with the "gray" solutions
- Develop a green plan that includes:
  - Green programs
  - Green projects
  - Strive for early success with green.

Sewershed

- Based on a review of the regional information, general strategies are being developed for each sewershed.

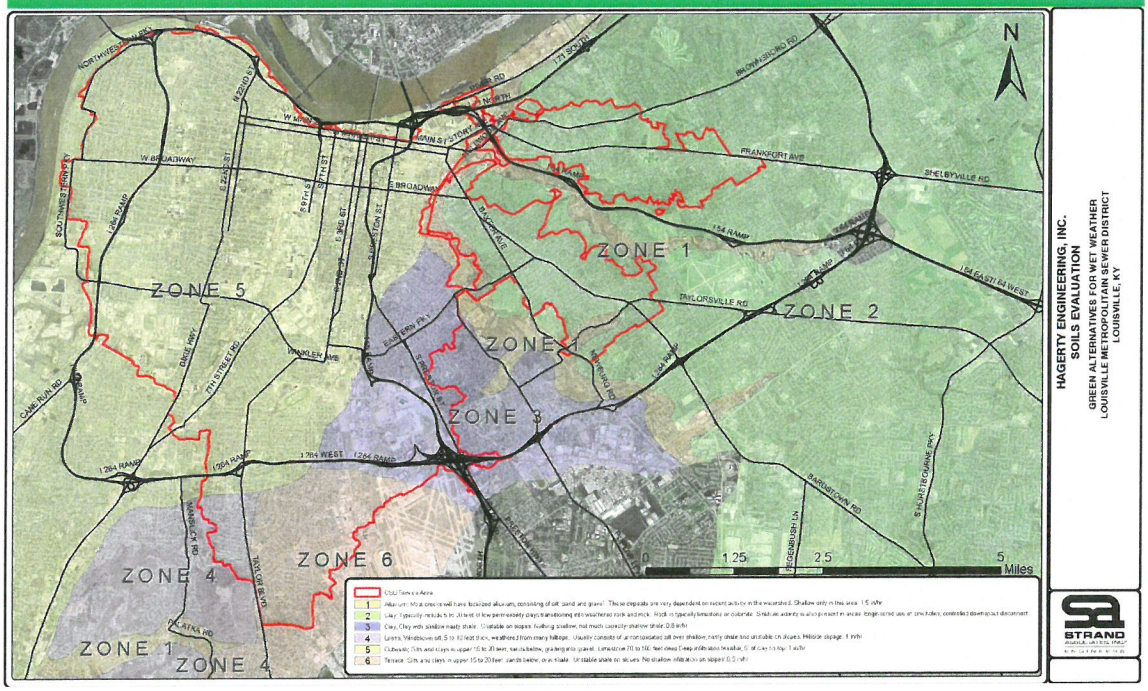
Neighborhood

- Specific neighborhoods – within the sewersheds are being identified for targeted programs and projects

Site

- A short list of specific sites is being developed for development of demonstration projects for inclusion in the LTCP.

Regional Soils Evaluation



Proposed Approach

- Program Components
  - Downspout Disconnection Program
  - Vegetated Roof Program
  - Rain Garden Program
  - Rain Barrel Program

PROJECT WIN
Waterway Improvements Now

CLEAN, GREEN, GROWING COMMUNITY

Proposed Approach

Project Components

- Rain Garden Projects
- Dry Well Projects
- Sinkhole Projects
- Green Alley/Green Street/Green Parking Lot Projects
- Off-loading to natural systems

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Downspout Disconnect

- Will be limited to target areas as soils permit.
- Will utilize scoring matrix based on participation/ effectiveness factors.

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Downspout Disconnect Matrix

LOUISVILLE MSD GREEN EVALUATION				
		Residential Downspout Disconnection Program Matrix		
Participation	High	15%	30%	40%
	Medium	10%	20%	30%
	Low	5%	10%	15%
		Low	Medium	High
		Effectiveness		

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Vegetated Roof

- **Determine effectiveness of green roofs at reducing runoff ($/gallon).**
- **Evaluate the feasibility of establishing a green roof incentive program**


Pittsburgh, PA


Fort Wright, KY

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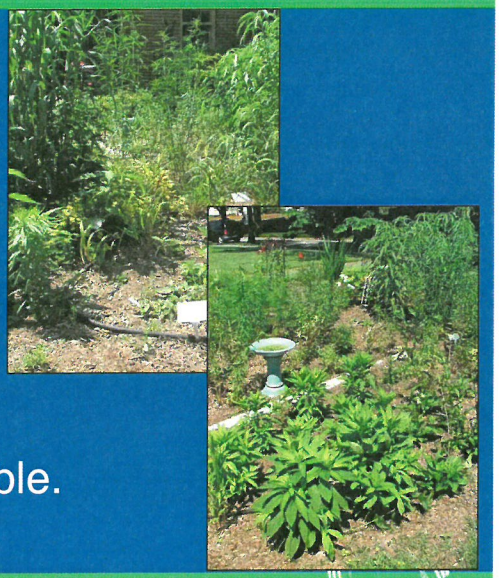
Rain Garden

- Service area wide.
- 2 designs based on soils:
  - 1 ET
  - 1 infiltration.
- Augment effectiveness of downspout disconnect.
- Address street runoff where public green space is available.



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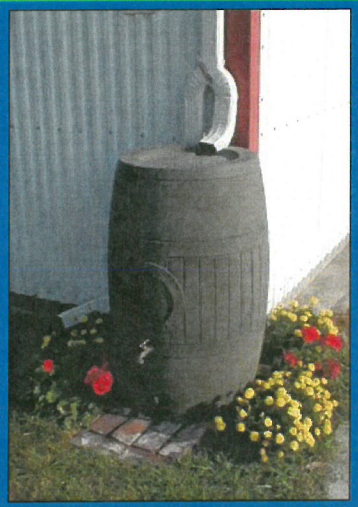
Rain Barrel Program

- Service area wide.
- Augment effectiveness of downspout disconnect where appropriate.
- Used to promote awareness and personal responsibility.
- Develop two standard details:
  - One that overflows to surface;
  - One that overflows to CSS.



PROJECT WIN Waterway Improvements Now

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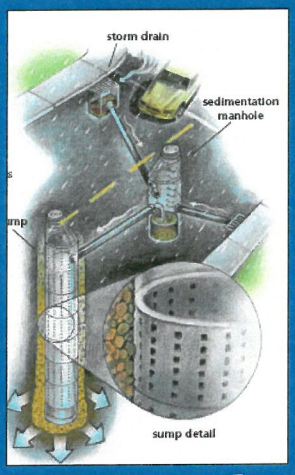
Dry Wells

- ID demo projects.
- Develop three (3) standard details:
  - Residential, single inlet, multi-inlet
- Establish a cost/gallon relationship.



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Waterway Improvements Now

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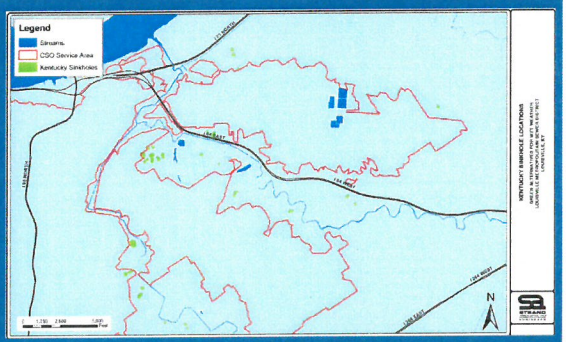
Sinkholes

- East side represents great opportunity.
- ID demo projects.
- May involve coordination with sewer separation project.



PROJECT WIN
Waterway Improvements Now

CLEAN, GREEN, GROWING COMMUNITY

Green Alleys

- ID demonstration sites
- Develop 2 standard designs
- Coordinate with Public Works

Chicago, IL

PROJECT WIN Waterway Improvements Now

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Green Streets

- Identify 2 demonstration sites
- Coordinate with Public Works
- Develop standard detail for Louisville

Portland, OR

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Urban Reforestation

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Discussion

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