Wet Weather Team Project Meeting Materials

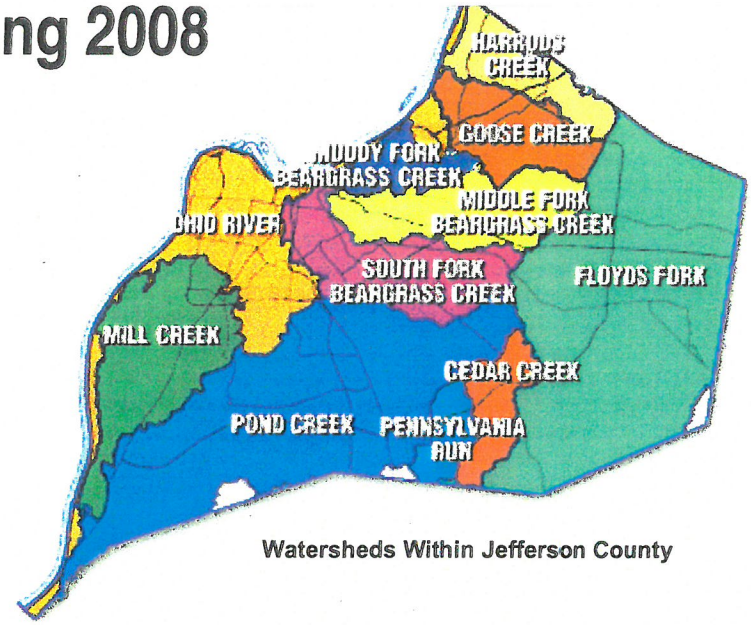
Summer 2007–Spring 2008

01.05.0210.07

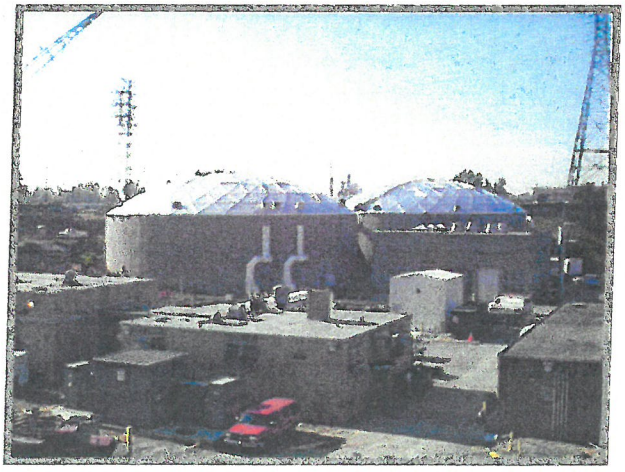
WWT Stakeholders Meeting # 10 6/21/2007

MSD

Louisville and Jefferson County
Metropolitan Sewer District



Watersheds Within Jefferson County



Agenda

Draft Agenda
Louisville and Jefferson County Metropolitan Sewer District (MSD)
Wet Weather Team Meeting #10

Thursday, June 21, 2007, 4:20-8:30PM
MSD Main Office, Board Room
700 West Liberty St., Louisville

Meeting Objectives:

- Review and discuss comments provided by community members at the Project WIN public meetings in April, May, and June 2007.
- Review and discuss approaches for weighting the Wet Weather Team's values.
- Review and discuss high-level combined sewer overflow (CSO) and sanitary sewer overflow (SSO) control strategies, including "green" alternatives.
- Review meeting topics planned for the remainder of 2007 (as time allows).
- 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 (30 minutes)**

- Updates on MSD wet weather activities and follow-up items from the last Wet Weather Team meeting.
- Introduction to the overall technical consulting team that will be preparing the Wet Weather Plan.

5:10 PM **Debrief from Project WIN Public Meetings (20 minutes)**

- Review comments provided by community members at the Project WIN public meetings in April, May, and June 2007.
- Provide feedback on the format, structure, and content of the public meetings.

5:30 PM **Dinner Break (20 minutes)**

Dinner will be provided for Wet Weather Team members.

5: 50 PM **Values Weighting Approaches Discussion (50 minutes)**

- Review and discuss proposed approaches for weighting the Wet Weather Team's values.

6:40 PM **CSO and SSO Control Strategy Discussion (75 minutes)**

- Review capital commitments MSD has made for the Wet Weather Program that are outside of the scope of the Wet Weather Team process (e.g., Big Four SSOs).
- Review and discuss types of CSO control strategies, including "green" alternatives.

7:55 PM **Overview of the Next Phase of the Project (20 minutes)** ***(as time allows)***

- Review meeting topics planned for the remainder of 2007.

8:15 PM **Opportunity for Observer Comments (10 minutes)**

8:25 PM **Wrap Up and Next Steps (5 minutes)**

- Review plans and expectations for the August 2, 2007 Wet Weather Team meeting.

8:30 PM **Adjourn**

Final Meeting Summary
Wet Weather Team Meeting #10
Thursday, June 21, 2007
MSD Main Office, Louisville

The Wet Weather Team (WWT), chartered by the Louisville and Jefferson County Metropolitan Sewer District (MSD), met on June 21, 2007, at MSD's main office in Louisville. The objectives of the meeting were to:

- Review public comments and debrief from the Project WIN (Waterway Improvements Now) public meetings that occurred in April, May, and June 2007.
- Review and discuss a proposed approach for weighting the project-specific community values, and review an example of how the weighting will affect the cost-benefit analysis of alternatives.
- Review and discuss high-level combined sewer overflow (CSO) and sanitary sewer overflow (SSO) control strategies, including "green" alternatives.

Wet Weather Project Updates

Rate Increases: Derek Guthrie of MSD gave an update on MSD's recently proposed rate increase to fund early action items under MSD's wet weather consent decree. He said that the rate proposal is in the process of being reviewed by both the MSD Board of Directors and Metro Council. Action on the increase is expected by late July, and if approved, the increase would go into effect on August 9, 2007.

Green Infrastructure: Mr. Guthrie also mentioned that the U.S. EPA and several national organizations had recently agreed upon a "statement of intent" in support of green infrastructure. (The statement was included as part of the background materials for this meeting.) He noted that MSD believes this to be a positive development; however, he also cautioned that there are still likely to be regulatory hurdles to relying too heavily on green infrastructure to meet regulatory commitments to control CSOs and SSOs.

Technical Team Composition: Gary Swanson of CH2M HILL described the organization of the technical team that will develop the draft Wet Weather Plan. The technical team is organized into three related subgroups focusing on the CSO Long-Term Control Plan (LTCP, led by O'Brien & Gere), the Sanitary Sewer Discharge Plan (SSDP, led by Tetra Tech), and green infrastructure (led by Strand Associates, Inc.). CH2M HILL, MSD's Communications staff, and the Wet Weather Team (facilitated by Ross & Associates) work on all aspects of the Wet Weather Plan.

Future Meeting Topics: Jennifer Tice of Ross & Associates gave a brief overview of the draft schedule of meeting topics planned for WWT meetings through February 2008, which coincides with the period the technical team will be conducting the cost-benefit analysis of project alternatives. Meeting topics will likely include discussions related to:

- Education and outreach;
- Monitoring and evaluation;
- Control strategies and project alternatives; and
- Financing and rate structure.

Debrief from the Project WIN Public Meetings

Angela Akridge of MSD gave a brief summary of the structure, attendance, and outcomes of the six Project WIN public meetings that occurred in April, May, and June 2007. She said that a total of 244 people attended, and that more people attended the later meetings. Most of the comments at the public meetings were supportive of MSD's overall efforts, and many people asked questions related to the planned rate increase. Fifty eight questionnaires were submitted; highlights of the survey responses included the following:

- An equal number of respondents said they regularly use the Ohio River and/or local streams for recreational activities as said they only use the waterways from the shoreline for recreation or scenery.
- When asked about the state of the community's streams and river, the majority of respondents listed non-point source pollution, litter, and sewer overflows as concerns.
- Most respondents said that "clean streams and river water" was a "very important" or "important" issue when compared to other priorities in life.

Several WWT members had attended at least one of the public meetings, and provided feedback on how the meetings went. WWT members also offered other suggestions for future outreach efforts. Their comments included the following:

- The presentations were good and flowed well. The handouts were helpful.
- MSD did a good job explaining the information and responding to questions from the audience.
- To increase attendance, considering latching onto other meetings as well as advertising the meetings at churches.
- Start the presentations with information on rates, to get people's attention.
- Continue to distribute information (such as the newpaper insert about Project WIN) to people.
- Consider that people will need time to digest information from presentations and written materials.
- Add a portal to MSD's website where people could submit comments. Run a public service announcement to inform people about the issues and the website URL for submitting comments.
- Develop and run an information booth at selected festivals in the community (similar to the booth used for Project XL).
- The key to the public meetings and outreach efforts is showing people that there's an open and transparent process within which MSD is making decisions on behalf of the community.

The facilitation team will distribute a summary of public comments prepared by MSD to the Wet Weather Team. The next series of Project WIN public meetings is planned for October–November 2007. The technical team expects to use these meetings as an opportunity to solicit neighborhood input on the preliminary project concepts being considered for the Wet Weather Plan. This early engagement of the public in the decision-making process was one of the suggestions made by WWT stakeholders.

Values Weighting Proposal and Example Discussion

Gary Swanson of CH2M HILL gave a presentation that outlined a proposed approach for weighting the WWT's project-specific values and described an example of how the value weights would be used. Key points about the values weighting approach include the following:

- All of the values are important, although some degree of differentiation based on the relative importance of the project-specific values is possible. The differentiation range should be narrow.

- Public health enhancement appears to have the highest level of importance to most stakeholders on the WWT.
- Regulatory performance is either assumed and not weighted highly, or essential and weighted as "critically important."
- All of the programmatic values are considered "very important" and are built into the decision-making process.

Based on these conclusions, the technical team proposed the following project-specific value weights:

Value	Proposed Weight
Public Health Enhancement	10
Environmental Enhancement	8
Regulatory Performance	8
Eco-friendly Solutions	6
Asset Protection	6

WWT stakeholders approved this values weighting proposal, recognizing that the technical team will have the ability to conduct sensitivity analyses of the value weights using the cost-benefit analytic tool.

During this session, Mr. Swanson described an example of how the performance measure scoring systems and weights for the values would be used to decide between project alternatives. The example included five hypothetical alternatives for controlling overflows from a particular CSO, and illustrated how the alternatives would be scored using the performance measure matrices, and how the value weights would influence the benefit-cost calculations. He noted that the weighting would be important for fine tuning the benefit-cost calculations, but would not make a bad project look good. To ensure that the process is both systematic and transparent, Mr. Swanson said that the technical team would prepare an electronic file for each alternative with the performance measure scores, so that WWT members could review the analysis in detail, if desired.

WWT participants asked a number of clarifying questions about the example and had some suggestions for the technical team's analysis. Highlights of this discussion are as follows.

- A WWT member wondered if an "educational" alternative could be considered that would involve influencing the families in the area to stop the input of water to the combined sewer system by disconnecting downspouts, avoiding running washers during wet weather events, and other behavior changes.
- Participants noted that it could be challenging to implement some of the alternatives in the neighborhood highlighted in the example because of the extent of urban development and the topography of the area. Although this was simply an example, participants advised that it is important to connect the theory with actual circumstances. Mr. Swanson said that the technical team would consider issues such as those when doing engineering analyses of alternatives.
- One WWT member observed that the alternatives in the example only decreased the volume of the CSO by a relatively small amount (e.g., 20,000 out of 240,000 total gallons), and that the unaffected flow volume could represent an opportunity to prevent additional impacts downstream. Alternatives that address this "big picture" should also be considered.
- WWT members requested additional information on the alternatives the technical team will be considering. The technical team will be making that information available to the WWT.
- In response to a question, Mr. Swanson said that alternatives that will not work to address the problem and help achieve compliance will not move forward as selected project alternatives;

however, MSD may still decide to invest in certain solutions if they are good for the program as a whole. For example, green infrastructure will be a component of MSD's compliance strategy, even though proving the effectiveness of some technologies to the regulators is less certain.

- WWT participants commented that WWT was dealing with a mixed message in that the group has signaled a preference for green solutions, yet there is a concern that regulators may be less likely to accept green solutions as a compliance strategy. Rob Greenwood of Ross & Associates noted that newer and more innovative strategies that become part of the Wet Weather Program may require more "selling" to address weaknesses from a traditional compliance perspective.

SSO and CSO Control Strategy Presentations and Discussion

The technical team gave a series of presentations related to SSO and CSO controls, covering the following three topics (which are further described below):

- Big four SSO plan and other early action consent decree commitments;
- Green infrastructure initiative; and
- CSO control strategies.

Big Four SSO Plan and Other Early Action Consent Decree Commitments

Gary Swanson of CH2M HILL and Tom Luking of Tetra Tech provided updates on the "Big Four" SSO plan (the Interim Sanitary Sewer Discharge Plan) and other early action items in the consent decree. Mr. Swanson said that MSD has completed about half of the early action projects committed to in the consent decree, and is in the process of designing or requesting bids for the other half of the projects

Tom Luking's presentation discussed MSD's plans for eliminating the Big Four SSOs, some of which need to be addressed by 2011. Potential solutions planned for the Big Four SSOs are as follows.

- Beechwood Village—Rebuild the sewer system, use the existing system for storm drainage, and possibly increase the sewer pipe size.
- Highgate Springs Pump Station—Construct a new Hikes Lane Interceptor from the Highgate Springs Pump Station to the Southeastern Interceptor. This will eliminate the Highgate Springs Pump Station, and off-load the existing Hikes Point interceptor.
- Hikes Point—Upsize collector sewers in Hikes Point to route all flows to the Hikes Point interceptor, which will have sufficient capacity for these flows after the Hikes Lane Interceptor is completed.
- Southeast Diversion—Route flows from the new Hikes Lane Interceptor to the Northern Ditch and Pond Creek Interceptors, and treat the flows at the West County Wastewater Treatment Plant.

MSD's plans for Beechwood Village incorporate suggestions made by WWT stakeholders, and the plans for Hikes Point reflect suggestions made by residents at public meetings. Comments from WWT participants included the following:

- The potential disruption along Hikes Lane represents an opportunity for broader education of the public about wet weather sewer overflow issues.
- In response to a comment that the treatment plant would be treating wastewater mixed with stormwater (i.e., diluted wastewater), MSD said that there will be other efforts to reduce inflow into the sanitary sewer system, including an effort to reduce illegal sump pump connections.
- Participants commented that the Big Four SSO solutions affect a large area, and that a lot of the community will be sharing the burden of the solution.

Green Infrastructure Initiative

John Lyons of Strand Associates and Chris Manning of Human Nature gave a joint presentation on MSD's Green Infrastructure Initiative. Green infrastructure solutions are designed to augment traditional engineering solutions, assist in achieving regulatory compliance, be cost effective, and achieve multiple benefits. MSD plans to explore a broad approach to green infrastructure for the community that will be multi-scale, provide multiple benefits, and will involve regional collaboration. An effective green infrastructure program must be integrated with the overall Wet Weather Plan. Performance data are available for some best management practices, but for others performance may need to be proven.

Mr. Lyons and Mr. Manning also introduced a "group exercise" that would be conducted at the August 2, 2007 WWT meeting. The exercise will involve identifying specific opportunities and challenges related to green infrastructure at four scales (regional, watershed, neighborhood, and property scales); more information on this exercise will be distributed as a "homework assignment." During this session, Bud Schardein of MSD also gave a brief demonstration of how water filters through pervious pavement.

In general, the WWT was very supportive of the ideas in the green infrastructure presentation. Highlights from the WWT's discussion about green infrastructure included the following:

- Participants suggested conducting demonstration projects, as well as building a monitoring component in projects, to help with demonstrating the overall effectiveness of solutions.
- Small and visible projects ("quick wins") could be helpful as a starting point (e.g., in a particular neighborhood, near a Rubbertown plant, etc.)
- A few WWT members suggested considering preserving existing green areas, rather than exclusively focusing on building new green areas. In addition, participants suggested looking at the big picture, in considering whether there are particular areas that should not be developed.
- WWT members suggested getting the neighborhoods involved in identifying potential solutions. The presenters mentioned that other communities have used a neighborhood competition to get grass roots ideas for potential solutions.
- A WWT member observed that a large part of the solution to wet weather sewer overflow issues will depend on the actions of individuals. Education about non-point source pollution and individual actions to address it will thus be an important part of the Wet Weather Program.
- A WWT participant commented that it is important to engage with people early on to inform them about the activities and projects planned for a particular area.

CSO Control Strategies

Tim Kraus of O'Brien & Gere and Gary Swanson of CH2M HILL reviewed the types of technologies available for controlling CSOs and gave an update on the process the technical team is using to identify preliminary project alternatives for controlling specific CSOs. CSO technology alternatives include:

- Sewer separation (partial or complete);
- Storage (in-line and off-line storage, individual and regional storage);
- Treatment (solids and floatables capture, enhanced primary treatment, secondary treatment); and
- Green infrastructure.

The technical team held a technology workshop in March 2007 to review the full range of available CSO control technologies, and then held a workshop in May 2007 to review the characteristics of each CSO

and identify which strategies should be considered for each CSO. The documents developed in those workshops were included as part of the materials for this meeting.

There will be additional time to discuss CSO control strategies at the WWT meeting on August 2, 2007. Comments made at this meeting included the following:

- WWT participants urged MSD and the technical team to share information on projects being considered with other relevant agencies. It was noted that the green infrastructure team plans to reach out to other agencies on behalf of MSD to solicit ideas for an overall approach to green infrastructure for the community.
- WWT members suggested showing people visible representations of the solutions, since they can be very helpful for explaining project concepts to the public. In general, the technical team will be engaging with the public on potential project concepts very early in the decision-making process, based on the recommendations from WWT stakeholders.

Observer Comments

Patria Fielding of the Clifton Community Council said that she hadn't known about the Wet Weather Team meetings before this meeting, and offered to distribute information about the meetings through an e-news list serving the Clifton neighborhood. She said that people in the community do not know what is going on with MSD's consent decree activities. As an example, Ms. Fielding described how she had seen MSD employees working in the Clifton neighborhood and preparing to throw away the pavers. She talked to an MSD staff person on the site, and explained that the area was a preservation district and that the pavers should be saved. Until she had seen that construction activity and had that conversation, she had not known that MSD was separating the sewer in that area as part of the consent decree.

Wrap Up and Next Steps

- MSD will finish preparing a summary of public comments received at the Project WIN public meetings, and will work with the facilitation team to distribute the comments to the WWT.
- The facilitation team will check in with WWT members who missed the meeting about the values weighting proposal and other discussion topics.
- The facilitation and technical teams will develop a "homework assignment" regarding green infrastructure opportunities and challenges in Jefferson County for WWT members to consider before the August 2, 2007 WWT meeting.
- The next WWT meeting will be on Thursday, August 2, 2007, at MSD's main office. Potential meeting topics include:
    - Guest speaker presentation on green infrastructure strategies;
    - Discussion and group exercise related to green infrastructure opportunities and challenges in Jefferson County;
    - Review and discuss high-level CSO control strategies and preliminary project concepts being considered for the CSO Long-Term Control Plan; and
    - Introductory presentation on long-term monitoring and evaluation efforts.

Meeting Participants

Wet Weather Team Stakeholders

Michael Ballard (alternate for Judy Nielsen), Louisville Metro Health Department

Steve Barger, Labor

Susan Barto, Mayor of Lyndon
Charles Cash, City of Louisville, Planning & Design Services Department
Allan Dittmer, University of Louisville
Laura Douglas, E.ON U.S. LLC
Faye Ellerkamp, City of Windy Hills
Jeff Frank, Vanguard Sales
Arnita Gadson, West Jefferson County Community Task Force
Tom Herman, Zeon Chemicals
Rick Johnstone, Deputy Mayor, Mayor's Office
Bob Marrett, CMB Development Company
Kurt Mason, Jefferson County Soil and Water Conservation District
Lisa Santos, Irish Hill Neighborhood Association
Tina Ward-Pugh, Metro Council, District 9
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 & Chief Engineer
Bud Schardein, MSD Executive Director

Facilitation and Technical Support

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

Meeting Observers

Patria Fielding, Clifton Community Council
Marion Gee, MSD
Tom Luking, Tetra Tech, Inc.
Clay Kelly, Strand Associates
Tim Kraus, O'Brien & Gere
John Lyons, Strand Associates
Chris Manning, Human Nature
Paul Maron, Strand Associates
Teri Pifine, MSD
Wesley Sydnor, O'Brien & Gere

Meeting Materials

- Agenda for the 6/21/07 WWT Meeting
- Summary of the 5/22/07 WWT Meeting
- WWT Solution Ideas (Draft of 6/14/07)
- WWT Education and Outreach Idea List (Draft of 6/14/07)
- WWT Data and Monitoring Requests Tracking Sheet (Draft of 6/14/07)

- Revised Wet Weather Plan Decision Flow Chart (Draft of 6/13/07)
- Green Infrastructure Statement of Intent with Stakeholder Statement of Support for Green Infrastructure
- Wet Weather Plan Technical Team Organizational Diagram
- Wet Weather Team Upcoming Meeting Topics (as of 6/15/07)
- Proposed Weighting Approach for Project-Specific Values Presentation
- Final Draft Performance Measure Matrices for Asset Protection, Eco-Friendly Solutions, Environmental Enhancement, Public Health Enhancement, and Regulatory Performance
- Scores for CSO 144 Example Handout
- Interim Sanitary Sewer Discharge Plan Concepts Presentation
- Green Infrastructure Initiative Presentation
- Combined Sewer Overflow Long-Term Control Plan Mitigation Strategies Presentation
- CSO LTCP Mitigation Technologies Table
- Proposed CSO LTCP Project Listing Table

Wet Weather Team Solution Ideas
Working Draft – June 14, 2007

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 "punch list" 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," 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 and MSD actions that are not related to sewer overflow issues.

What's New (May/June 2007)

1. (I-A-6) – Address greenskeepers about best management practices (BMPs), since non-point source runoff is made worse by golf course chemicals.
2. (I-E-Beargrass) – New section for site-specific solutions for Beargrass Creek.
3. (I-E-Beargrass-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.
4. (I-E-Beargrass-2) – 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.
5. (I-E-Beargrass-3) – 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.

I. Project Alternatives

A. Stormwater Best Management Practices (Non-Structural)

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.
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 drain your bathtub, etc.).
5. 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).
6. Address greenskeepers about best management practices (BMPs), since non-point source runoff is made worse by golf course chemicals.

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)[1]
    g. Wetlands

[1] Adapted from Pennsylvania Department of Environmental Protection, *Pennsylvania Stormwater Best Management Practices Manual*, http://www.dep.state.pa.us/dep/deputate/watermgt/wc/Subjects/StormwaterManagement/BMP%20Manual/14_Glossary_Final_Draft.pdf

5. Consider incorporating aspects of the LEED green building standards into MSD design manuals for structural BMPs.
6. Ensure that urban CSO areas have at least a 30 percent tree canopy.

C. CSO and SSO Point Source Controls

1. Disconnect downspouts and/or sump pumps (e.g., by developing educational initiatives aimed at landowners).
2. Increase enforcement and inspections of downspout and sump pump connections.

D. General/Other Solutions

1. Leverage and coordinate the Wet Weather Program efforts with MSD's MS4 stormwater management permitting responsibilities.

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

Beechwood Village

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

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. 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.
3. 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.

II. Funding Ideas

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
    b. Rates and fees that are linked to the cost to serve (i.e., the level of impact)
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.

B. Financial Incentives

1. Provide incentives for "preferred" behaviors.
2. Offer incentives for developers to use cost-effective, eco-friendly solutions (e.g., low impact development techniques, stormwater best management practices).
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.

C. 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.

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)*

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. 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. 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.

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.

Wet Weather Team Education and Outreach Idea List
Working Draft – June 14, 2007

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 "punch list" 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.

In future versions, 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.

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.

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.

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)
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
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. 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.
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.

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.
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. Address greenskeepers about best management practices (BMPs), since non-point source runoff is made worse by golf course chemicals.

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.

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.

Wet Weather Team Data and Monitoring Requests Tracking Sheet
Working Draft – June 14, 2007

The following is a list of data and monitoring requests made by Wet Weather Team (WWT) members for consideration for the 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 requests to the facilitation team. Requests will be taken off the list when they have been responded to.

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

A. Effectiveness of Potential Solutions / Control Options

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.

B. Asset Protection Information

1. Specific information on the percentage of backups that are the result of MSD's activities as opposed to private property issues.

C. Customer Satisfaction Information

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

D. Water Quality and Environmental Information

1. Data on how fecal coliform levels change with flow volumes.
2. 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. 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.

E. Economic and Financial Information

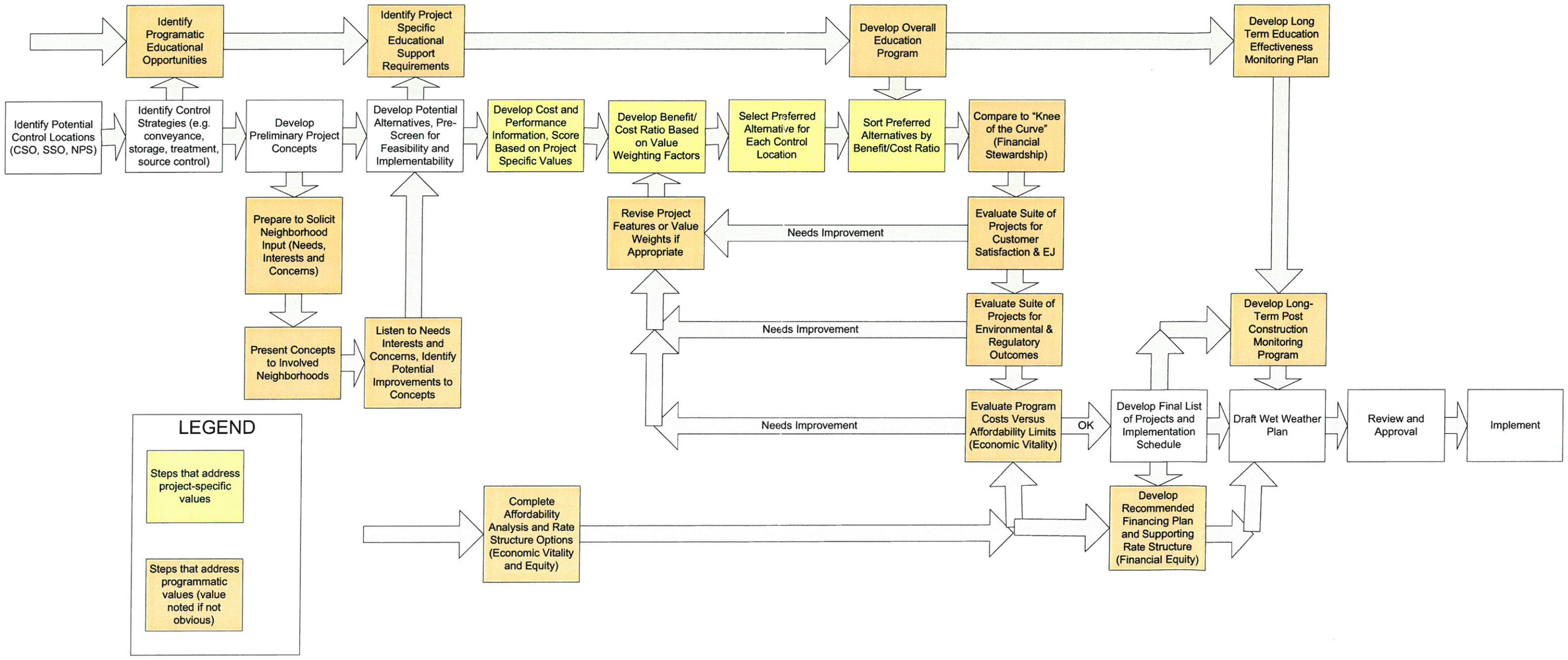
1. How MSD's development fees compare to development fees in other places.
2. Cincinnati's rates before the community started to respond to its consent decree.

F. Research Suggestions

1. 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.
2. Work with the University of Louisville School of Public Health and/or the Metro Louisville Health Department to collect data on the public health impacts of polluted water, and include the information in an annual report.

Wet Weather Plan – Decision Flow Chart

Draft 6/13/2007



Green Infrastructure
Statement of Intent

U.S. Environmental Protection Agency (EPA)
and
National Association of Clean Water Agencies (NACWA)
Natural Resources Defense Council (NRDC)
Low Impact Development Center (LID)
Association of State and Interstate Water Pollution Control Administrators (ASIWPCA)

April 19, 2007

Introduction

This Statement of Intent is entered into and between the U.S. Environmental Protection Agency (EPA) and the following organizations in recognition of the Statement of Support for Green Infrastructure (attached) and the efforts of all supporting organizations thereto: National Association of Clean Water Agencies, Washington, DC; Natural Resources Defense Council, Washington, DC; the Low Impact Development Center, Beltsville, MD; and the Association of State and Interstate Water Pollution Control Administrators, Washington, DC.

Purpose

The purpose of this Statement is to formalize a collaborative effort among the signatory organizations in order to promote the benefits of using green infrastructure in protecting drinking water supplies and public health, mitigating overflows from combined and separate sewers and reducing stormwater pollution, and to encourage the use of green infrastructure by cities and wastewater treatment plants as a prominent component of their Combined and Separate Sewer Overflow (CSO & SSO) and municipal stormwater (MS4) programs. The Statement is intended to describe and facilitate cooperation, collaboration, coordination, and effective communication among the signatory organizations. We encourage other organizations that support green infrastructure to join us in this initiative.

Background

Many communities in the United States are looking for ways to reduce overflows from sewer systems and stormwater discharges. Overflows occur when separate sewage and/or combined sewage and stormwater pipes overflow due to rainfall, other wet

weather events, or system deterioration. In the late 20th century, most cities that attempted to reduce sewer overflows did so by separating combined sewers, expanding treatment capacity or storage within the sewer system, or by replacing broken or decaying pipes. More recently, a number of cities and utilities have recognized that sewer overflows can also be reduced effectively by diverting stormwater from the sewer system and directing it to areas where it can be infiltrated, evapotranspirated or re-used. These approaches are often referred to as "green infrastructure" because soil and vegetation are used instead of, or in addition to, pipes, pumps, storage tunnels, and other "hard infrastructure" that is traditionally used to store and treat the combined sewage and stormwater. Green infrastructure can also be used to reduce stormwater discharges and help to restore the natural hydrology, water quality and habitat of urban and suburban watersheds.

Green infrastructure approaches currently in use include green roofs, trees and tree boxes, rain gardens, vegetated swales, pocket wetlands, infiltration planters, vegetated median strips, reforestation, and protection and enhancement of riparian buffers and floodplains. Green infrastructure can be used almost anywhere where soil and vegetation can be worked into the urban or suburban landscape. Green infrastructure is most effective when supplemented with other decentralized storage and infiltration approaches, such as the use of permeable pavement and rain barrels and cisterns to capture and re-use rainfall for watering plants or flushing toilets. These approaches can be used to keep rainwater out of the sewer system so that it does not contribute to a sewer overflow and also to reduce the amount of untreated stormwater discharging to surface waters. Green infrastructure also allows stormwater to be absorbed and cleansed by soil and vegetation and either re-used or allowed to flow back into groundwater or surface water resources.

Objectives

The objectives of this Statement are to:

- Affirm the belief by the signatory organizations in the value of green infrastructure as both a cost effective and an environmentally preferable approach to reduce stormwater and other excess flows entering combined or separate sewer systems in combination with, or in lieu of, centralized hard infrastructure solutions;
- Establish a framework for working together to advance an understanding of green infrastructure as a tool for reducing overflows from sewer systems and stormwater discharges and to encourage and promote their wider application;
- Identify partnership opportunities between the signatory organizations; and
- Develop strategies to promote the use of green infrastructure by cities and utilities as an effective and feasible means of reducing stormwater pollution and sewer overflows such as:

- Developing models for all components of green infrastructure and make them available nationwide.

- Exploring opportunities and incentives for the use of green infrastructure provisions in MS4 permits and CSO Long Term Control Plans (LTCPs), including as a component of injunctive relief provisions of enforcement actions;

- Developing memoranda and guidance materials, including language for the NPDES permit writer's manual, that would explain how regulatory and enforcement officials should evaluate and provide appropriate credit for the use of green infrastructure in meeting Clean Water Act requirements;

- Recognizing the most effective and innovative uses of green infrastructure to meet Clean Water Act goals through EPA awards or recognition programs;

- Providing technical assistance, training, and outreach to potential users of green infrastructure, including states, cities, counties, utilities, environmental and public health agencies, engineers, architects, landscape architects, planners and nongovernmental organizations;

- Establishing a web-based green infrastructure resource center at EPA to assist communities in complying with requirements for combined sewer overflows and municipal stormwater permits and evaluating the multiple environmental benefits that green infrastructure can provide; and

- Developing tools to assist local green infrastructure programs with outreach, training, model development and application, planning and design, monitoring, and plan review.

Recognition: The signatory organizations intend to develop strategies to identify, encourage, and recognize innovative and effective use of green infrastructure.

Communication: The signatory organizations intend to communicate widely about this Statement with their constituencies and encourage them to focus increased attention to green infrastructure development.

Note: All actions that EPA may take in furtherance of this statement are subject to the availability of appropriated funds and the parties to this agreement will not submit a claim to EPA for compensation solely on the basis of this agreement. In signing this statement, none of the organizations listed above, including EPA, are obligating funds nor making any commitment to provide funding to any organization or individuals in the future. Further, EPA cannot endorse the sale or purchase of products or services developed by the participating organizations. This Statement does not create any right or benefit, substantive or procedural, enforceable by law or in equity against the other Signatory organizations or EPA, their officers or employees, or any other

person. This Statement does not apply to any person outside of the other Signatory Organizations and EPA. Nothing in this Statement of Intent creates an exception to EPA policies on competition for assistance agreements or procurement contracts.

STEPHEN L. JOHNSON — Date
Administrator
U.S. Environmental Protection Agency

DICK CHAMPION — Date
National Association of Clean Water Agencies

NANCY STONER — Date
Natural Resources Defense Council

NEIL WEINSTEIN — Date
Low Impact Development Center

DANA AUNKST — Date
Association of State and Interstate
Water Pollution Control Administrators

Stakeholder Statement of Support for Green Infrastructure
(Signatories as of 5/22/07)

Purpose

To bring together organizations that recognize the benefits of using green infrastructure in mitigating overflows from combined and separate sewers and reducing stormwater pollution and to encourage the use of green infrastructure by cities and wastewater treatment plants as a prominent component of their Combined and Separate Sewer Overflow (CSO & SSO) and municipal stormwater (MS4) programs.

Goals

Green infrastructure can be both a cost effective and an environmentally preferable approach to reduce stormwater and other excess flows entering combined or separate sewer systems in combination with, or in lieu of, centralized hard infrastructure solutions. The undersigned organizations support:

- Use of green infrastructure by cities and utilities where it is an effective and feasible means of reducing stormwater pollution and sewer overflows;
- Development of models to quantify stormwater detention, retention, and filtration potential of green infrastructure to better identify opportunities to successfully use green infrastructure in CSO, SSO, MS4 and nonpoint source programs;
- Monitoring to verify the amount of CSO, SSO, and stormwater discharge reduction that cities obtain through using green infrastructure;
- Measurement of economic and environmental benefits realized from the use of green infrastructure in sewer systems and quantification of its life-cycle costs;
- Increased federal, state, and local funding for green infrastructure initiatives;
- Elimination of barriers to the incorporation of green infrastructure in stormwater and sewer system programs;
- Development and funding of a plan to identify research needs to further green infrastructure;
- Preparation of guidance documents to assist cities and wastewater treatment plants in developing green infrastructure initiatives in their CSO, SSO, and MS4 programs; and
- Development of model provisions to incorporate green infrastructure into CSO and MS4 permits; SSO capacity, management, operations, and maintenance plans; and consent decrees and other enforcement vehicles.

Background

Many communities in the United States are looking for ways to reduce overflows from sewer systems and stormwater discharges. Overflows occur when combined sewage and stormwater pipes overflow due to rainfall or other wet weather events. In the late 20th century, most cities that attempted to reduce sewer overflows did so by separating combined sewers, expanding treatment capacity or storage within the sewer system, or by replacing broken or decaying pipes. More recently, a number of cities and utilities have recognized that sewer overflows can also be reduced effectively by diverting stormwater from the sewer system and directing it to areas where it can be infiltrated, evapotranspirated or re-used. These approaches are often referred to as "green infrastructure" because soil and vegetation are used instead of, or in addition to, pipes, pumps, storage tunnels, and other "hard infrastructure" that is traditionally used to store and treat the combined sewage and stormwater. Green infrastructure can also be used to reduce stormwater discharges and help to restore the natural hydrology, water quality and habitat of urban and suburban watersheds.

Green Infrastructure Benefits

Green infrastructure approaches currently in use include green roofs, trees and tree boxes, rain gardens, vegetated swales, pocket wetlands, infiltration planters, vegetated median strips, reforestation, and protection and enhancement of riparian buffers and floodplains. Green infrastructure can be used almost anywhere where soil and vegetation can be worked into the urban or suburban landscape. Green infrastructure is most effective when supplemented with other decentralized storage and infiltration approaches, such as the use of permeable pavement and rain barrels and cisterns to capture and re-use rainfall for watering plants or flushing toilets. These approaches can be used to keep rainwater out of the sewer system so that it does not contribute to a sewer overflow and also to reduce the amount of untreated stormwater discharging to surface waters. Green infrastructure also allows stormwater to be absorbed and cleansed by soil and vegetation and either re-used or allowed to flow back into groundwater or surface water resources.

Green infrastructure has a number of other environmental and economic benefits in addition to reducing the volume of sewer overflows and stormwater discharges.

- *Cleaner Water* – Vegetation and green space reduce the amount of stormwater runoff and, in combined systems, the volume of combined sewer overflows.

- *Enhanced Water Supplies* – Most green infiltration approaches involve allowing stormwater to percolate through the soil where it recharges the groundwater and the base flow for streams, thus ensuring adequate water supplies for humans and more stable aquatic ecosystems.

- *Cleaner Air* – Trees and vegetation improve air quality by filtering many airborne pollutants and can help reduce the amount of respiratory illness.

- *Reduced Urban Temperatures* – Summer city temperatures can average 10°F higher than nearby suburban temperatures. High temperatures are linked to higher ground

level ozone concentrations. Vegetation creates shade, reduces the amount of heat absorbing materials and emits water vapor – all of which cool hot air.

- *Increased Energy Efficiency* – Green space helps lower ambient temperatures and, when incorporated on and around buildings, helps shade and insulate buildings from wide temperature swings, decreasing the energy needed for heating and cooling.

- *Community Benefits* – Trees and plants improve urban aesthetics and community livability by providing recreational and wildlife areas. Studies show that property values are higher when trees and other vegetation are present.

- *Cost Savings* - Green infrastructure may save capital costs associated with digging big tunnels and centralized stormwater ponds, operations and maintenance expenses for treatment plants, pumping stations, pipes, and other hard infrastructure; energy costs for pumping water around; cost of treatment during wet weather; and costs of repairing the damage caused by stormwater and sewage pollution, such as streambank restoration.

Supporting Organizations

The undersigned organizations hereby endorse this *Statement of Support* and commit to its implementation.

ALLIANCE FOR THE GREAT LAKES (www.greatlakes.org)

AMERICAN INSTITUTE OF ARCHITECTS (www.aia.com)

AMERICAN PUBLIC WORKS ASSOCIATION (www.apwa.net)

AMERICAN RIVERS (www.americanrivers.org)

AMERICAN SOCIETY OF LANDSCAPE ARCHITECTS (www.asla.org)

AMIGOS BRAVOS (www.amigosbravos.org)

ASSOCIATION OF ENVIRONMENTAL AUTHORITIES of NJ (www.aeanj.org)

ASSOCIATION OF STATE AND INTERSTATE WATER POLLUTION CONTROL ADMINISTRATORS (www.asiwpca.org)

BAY AREA CLEAN WATER AGENCIES (www.bacwa.org)

CALIFORNIA ASSOCIATION OF SANITATION AGENCIES (www.casaweb.org)

CENTER FOR NEIGHBORHOOD TECHNOLOGY (www.cnt.org)

CITIZENS CAMPAIGN FOR THE ENVIRONMENT (www.citizenscampaign.org)

CLEAN WATER ACTION (www.cleanwateraction.org)

COALITION FOR ALTERNATIVE WASTEWATER TREATMENT

THE CONSERVATION FUND (www.conservationfund.org)

ENVIRONMENTAL INTEGRITY PROJECT (www.environmentalintegrity.org)

GULF RESTORATION NETWORK (http://healthygulf.org)

HEAL THE BAY (www.healthebay.org)

HEALING OUR WATERS (www.healingourwaters.org)

HUDSON RIVERKEEPER (http://riverkeeper.org)

INTERNATIONAL SOCIETY OF ARBORICULTURE (www.isa-arbor.com)

THE LOW IMPACT DEVELOPMENT CENTER (www.lowimpactdevelopment.org)

NATIONAL ASSOCIATION OF CLEAN WATER AGENCIES (www.nacwa.org)

NATIONAL AUDUBON SOCIETY (www.audubon.org)

NATURAL RESOURCES DEFENSE COUNCIL (www.nrdc.org)

NY/NJ BAYKEEPER (www.nynjbaykeeper.org)

NORTHWEST ENVIRONMENTAL DEFENSE CENTER (http://law.lclark.edu/org/nedc/)

OREGON ASSOCIATION OF CLEAN WATER AGENCIES (www.oracwa.org)

PENNSYLVANIA HORTICULTURAL SOCIETY (www.pennsylvaniahorticulturalsociety.org)

SANTA MONICA BAYKEEPER (www.smbaykeeper.org)

SIERRA CLUB (www.sierraclub.org)

SUSTAINABLE URBAN FORESTS COALITION (www.urbanforestcoalition.com)

TENNESSEE CLEAN WATER NETWORK (www.tcwn.org)

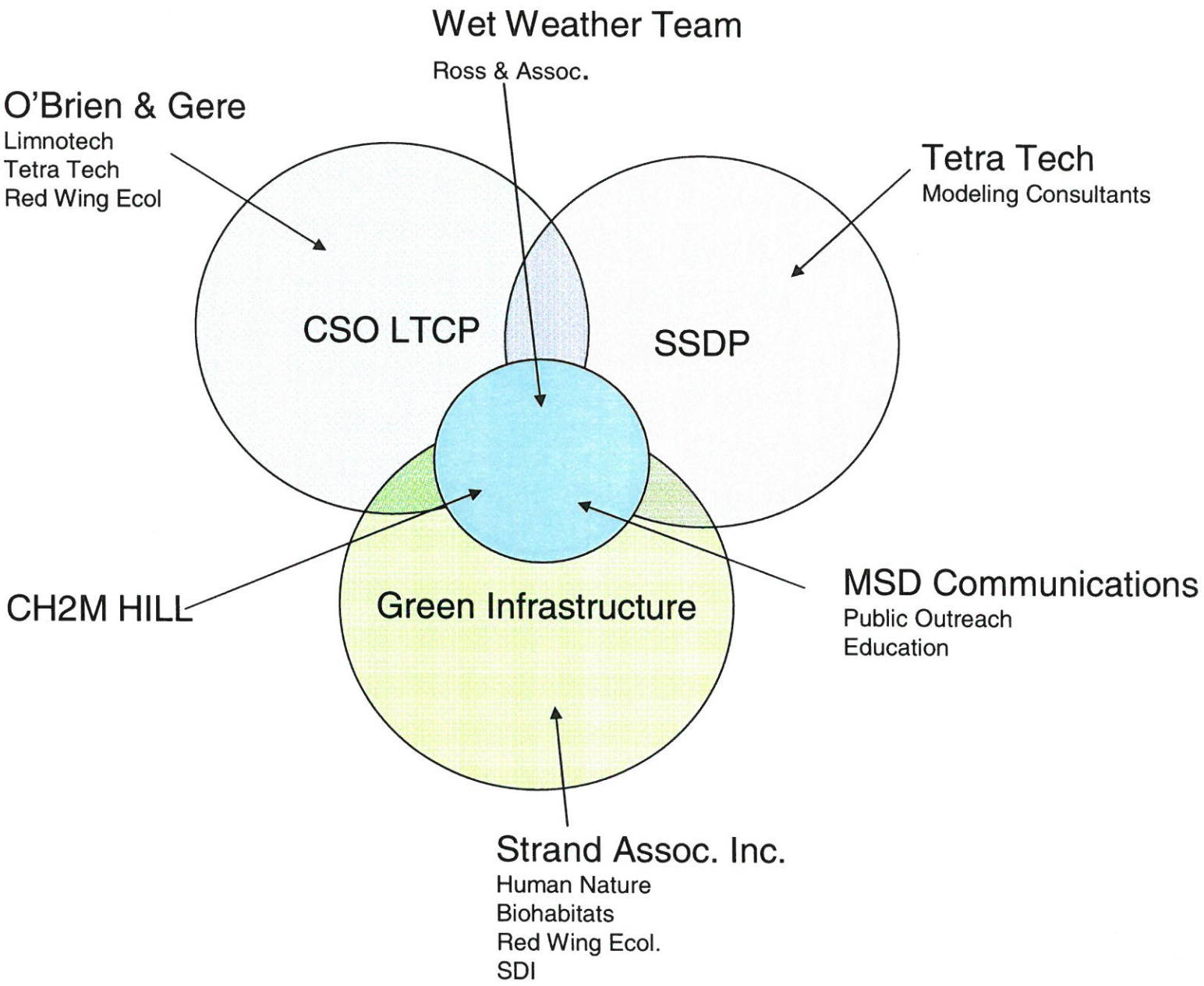
TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION (http://www.state.tn.us/environment/)

U.S. GREEN BUILDING COUNCIL (www.usgbc.org)

WATER ENVIRONMENT FEDERATION (www.wef.org)

WATERKEEPER ALLIANCE (www.waterkeeper.org)

WET WEATHER PARTNERSHIP (www.csop.com)


Wet Weather Team
Ross & Assoc.
O'Brien & Gere
Limnotech
Tetra Tech
Red Wing Ecol
Tetra Tech
Modeling Consultants
CSO LTCP
SSDP
CH2M HILL
Green Infrastructure
MSD Communications
Public Outreach
Education
Strand Assoc. Inc.
Human Nature
Biohabitats
Red Wing Ecol.
SDI

Wet Weather Team Upcoming Meeting Topics (as of 6/15/07)

This document outlines the schedule of Wet Weather Team stakeholder meetings planned from August 2007 through June 2008, along with anticipated topics for meetings through February 2008, which coincides with the period the technical team will conduct the cost-benefit analysis of project alternatives.

(Color key: blue = education and outreach; green = financial topics; red = cost-benefit and programmatic analysis of Wet Weather Program alternatives; and black = monitoring/evaluation and other topics.)

WWT Meeting #11 (August 2, 2007)

- Guest speaker presentations on "green" strategies
- Control strategies presentation/discussion (SSO focus)
- Introductory discussion of post-construction monitoring and evaluation efforts (for water quality improvements and effectiveness of the education/outreach efforts) (monitoring discussion #1)
    - Update on water quality monitoring and modeling efforts
- Detailed walkthrough of anticipated WWT meeting schedule

WWT Meeting #12 (September 20, 2007)

- Introductory discussion of affordability (affordability discussion #1)
- Review and discuss draft proposal for post-construction monitoring and evaluation efforts (for water quality improvements and effectiveness of the education/outreach efforts) (monitoring discussion #2)
- Review preliminary project concepts to be shared with neighborhoods
- Discuss approach for soliciting neighborhood input on preliminary project concepts
- Update on the process for developing the Wet Weather Program public education and outreach plan (Note: The WWT discussed initial ideas for the education and outreach plan in spring 2007.)

October & November 2007: Public Meetings – Series #2 (Soliciting Neighborhood Input)

WWT Meeting #13 (October 18, 2007)

- Review and discuss draft outline of Wet Weather Plan
- Review affordability analysis and discuss preliminary affordability target for the community (affordability discussion #2)
- Introductory discussion of rate structure and financing options (financing discussion #1)
- Update on neighborhood input and changes to project concepts
- Update on the process for identifying project alternatives based on the revised project concepts

WWT Meeting #14 (December 6, 2007)

- Refine draft affordability target for the community (affordability discussion #3)
- Review and discuss proposals for rate structure and financing plan (financing discussion #2)
- Review and discuss draft proposal for Wet Weather Program public education and outreach plan (education discussion #2)
- Review and discuss draft outputs from the values-based cost-benefit analysis of project alternatives for particular site-specific problems (Part 1 of 2)
    - Review how the values weighting influenced the results of the analysis
    - Identify any refinements needed to the cost-benefit approach and the alternatives identified

WWT Meeting #15 (January 15, 2008) ***[Note: Rescheduled from 1/17/08]***

- Refine draft rate structure and financing plan (financing discussion #3)
- Refine draft Wet Weather Program public education and outreach plan (education discussion #3)
- Refine draft proposal for post-construction monitoring and evaluation efforts (for water quality improvements and effectiveness of the education/outreach efforts) (monitoring discussion #3)
- Review and discuss draft outputs from the values-based cost-benefit analysis of project alternatives for particular site-specific problems (Part 2 of 2)
    - Review how the values weighting influenced the results of the analysis
    - Identify any refinements needed to the cost-benefit approach and the alternatives identified

WWT Meeting #16 (February 26, 2008) ***[Note: Rescheduled from 2/19/08]***

- Review and discuss results of the cost-benefit analysis of project alternatives:
    - Review preferred alternatives selected for each control location
    - Review examples of alternatives that were not selected and the reasons why
- Preview public meetings in March

March 2008: Public Meetings – Series #3

Note: Detailed meeting plans for Wet Weather Team meetings occurring after February 2008 have not yet been fully developed, and are contingent upon progress made during the previous set of meetings.

Wet Weather Team Meeting Schedule, August 2007–June 2008

Meeting Number	Proposed Date	Tentative Location
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
15	Tuesday, January 15, 2008 *[Note: Rescheduled from 1/17/08]*	TBD
16	Tuesday, February 26, 2008 *[Note: Rescheduled from 2/19/08]*	TBD
17	Thursday, April 3, 2008	TBD
18	Thursday, May 15, 2008	TBD
19	Thursday, June 19, 2008 *[Note: New Meeting Added]*	TBD

The meetings will likely run from 4:20 PM to 8:30 PM, including dinner for participants.

Alternative #1													
Value:	**Asset Protection**		**Impact**						**Rationale**	**Measurement Method**			
		Flood Damage	**Homes or businesses are subject to severe structural damage**	**Homes or businesses are subject to minor to moderate structural damage**	**Flooding limits access to homes or businesses**	**Flooding limits access to recreational areas**	**Standing water on property, but access not affected and no damage expected**	**No standing water**	Stormwater BMPs can reduce stormwater peaks and reduce extent of flooded areas, while sewer separation may increase localized stormwater peak flows and increase the flooding impacts of storms. Alternatively, purchase of highly impacted properties may be a cheaper way to reduce flood damage and create green space and buffer zones.	Drainage models where available, or historic observations of flood-prone areas combined with the expected relative impacts of sewer system modifications on storm water flows			
Performance Measures		**Basement Back-ups**	**Sewer surcharging within 6 feet of ground surface for more than 20% of manholes**	**Sewer surcharging within 6 feet of ground surface for 10 - 20% of manholes**	**Sewer surcharging within 6 feet of ground surface for 5 - 10% of manholes**	**Sewer surcharging within 6 feet of ground surface for 1 - 5% of manholes**	**Sewer surcharging within 6 feet of ground surface for 0 - 1% of manholes**	**No surcharging within 6 feet of ground surface**	First floor levels are typically 1 - 2 feet above ground surface, and basement floors are typically 8 - 10 feet below the first floor. A sewer surcharge of 6 feet below ground surface is highly likely to cause back-ups in homes with basement service.	Measurement methods will be via hydraulic models to quantify the hydraulic grade lines compared to ground surface elevations at manholes.			
	Event Recurrence Interval	→	**Most Severe Impact**				**Least Impact**	**No Impact**					
		↓	**5**	**4**	**3**	**2**	**1**	**0**	**Assumptions**	**Base Case Score**	**Alternative Score**	**Total Score**	
Frequency	**6-10 per year**	**Most Likely**	**5**	25	20	15	10	5	0				0
	1-6 per year		**4**	20	16	12	8	4	0				0
	1-2 year recurrence interval		**3**	15	12	9	6	3	0				0
	2-5 year recurrence interval		**2**	10	8	6	4	2	0				0
	>5 year recurrence interval	**Least Likely**	**1**	5	4	3	2	1	0				0
	Not Possible	**Not Possible**	**0**	0	0	0	0	0	0	**Average Total Score**			**0**
Note - This value sheet calculates the average benefit over the recurrence intervals. A correction calculation is included in order to obtain a maximum score of 25.										**Corrected Score**			**0**

Acronyms
BMPs - Best management practices

Alternative #1													
Value:	**Environmental Enhancement**												
	Scoring												
Aspect	-5	-4	-3	-2	-1	0	1	2	3	4	5	Assumptions	Score Per Aspect
Aquatic and Terestrial Habitat Protection	Elimination of habitat for rare or endangered species	Elimination of significant amount of common habitat	Elimination of minor amount of common habitat	Significant habitat imparement	Minor imparement to existing habitat	No impact on habitat	Minor enhancement of existing habitat	Significant enhancement of existing habitat	Creation of minor amount of common habitat	Creation of significant amount of common habitat	Creation of critical habitat for rare or endangered species		
Aesthetics - Solids and Floatables	75%+ reduction in volume of flow with no S&F capture	50 - 75% of flow with no S&F removal	25 - 50% of flow with no S&F removal	10 - 25% of flow with no S&F removal	Reduces efficiency of existing S&F control device, 0 - 10% of flow with no S&F removal	No change in S&F removal	0 - 10% of discharged flow treated with positive S&F removal (screens)	10 - 25 % of discharged flow treated with positive S&F removal (screens)	25 - 50% of discharged flow treated with positive S&F removal (screens)	50 - 75% of discharged flow treated with positive S&F removal screens	75% + of discharged flow treated with positive S&F removal (screens)		
Aesthetics - Odor and Air Emissions	Create annoying odor source affecting > 20 customers often	Create annoying odor source affecting <20 customers often, or >20 customers occasionally	Create annoying odor source affecting <20 customers occasionally	Create detectable odor source affecting > 50 customers often	Create detectable odor source affecting < 50 customers occasionally	No impact on odors	Eliminate detectable odor source affecting < 50 customers occasionally	Eliminate detectable odor source affecting > 50 customers often	Eliminate annoying odor source affecting <20 customers occasionally	Eliminate annoying odor source affecting <20 customers often, or >20 customers occasionally	Eliminate annoying odor source affecting >20 customers often		
Dissolved Oxygen Impacts	Reduction of in-stream DO by 2 mg/l + during critical flow periods	Continuous reduction of in-stream DO of 2 mg/l +	Continuous reduction of in-stream DO of 0 - 2 mg/l, possible reduction of in-stream DO 2 - 4 mg/l during critical conditions	Intermittent reduction of in stream DO 2 mg/l + possible during non-critical conditions, reduction of DO 0 - 2 mg/l during critical conditions	Intermittent reduction of in stream DO 0 - 2 mg/l possible during non-critical conditions	No DO impacts	Intermittent improvement of in-stream DO 0 - 2 mg/l	Intermittent improvement of in-stream DO 2 mg/l +, Intermittent critical condition improvments 0 - 2 mg/l	Continuous improvement of in-stream DO 0 - 2 mg/l, Intermittent critical condition improvements 2-4 mg/l	Continuous improvement of in-stream DO 2 mg/l +	Continuous improvement of critical condition in-stream DO 2 mg/l +		
Downstream Impacts	75%+ increase in annual BOD or nutrient loads	50 - 75% increase in annual BOD or nutrient loads	25 - 50% increase in annual BOD or nutrient loads	10 - 25% increase in annual BOD or nutrient loads (CSO + runoff)	Potential 0 - 10 % increase in annual average BOD or nutrient loads (CSO + runoff)	No impact on BOD or nutrient loads (CSO + runoff)	0 - 10% reduction in annual BOD or nutrient loads (CSO + runoff)	10 - 25% reduction in annual BOD or nutrient loads (CSO + runoff)	25 - 50% reduction in annual BOD or nutrient loads (CSO + runoff)	50 - 75% reduction in annual BOD or nutrient loads (CSO + runoff)	75%+ reduction in annual BOD or nutrient loads (CSO + runoff)		
Stream Flow Impacts (Peak flows)	25% + increase in peak flows	10% - 25% increase in peak flows	Up to 10% increase in peak flows	Frequent increase in flow during critical conditions	Possible increase in average flow, or minor increase in high flow peaks	No impact on peak flows	Minor reduction in flows - no significant peak reduction	Minor reduction in peak flows under some conditions	Up to 10% reduction in peak flows	10% - 25% reduction in peak flows	25%+ reduction in peak flows		
Stream Flow Impacts (DWF only)	25%+ decrease in flow during critical conditions.	10% - 25% decrease in flow during critical conditions	0-10% permanent decrease in flow during critical conditions	Frequent decrease in flow during critical conditions	Possible decrease in average flow	No impact on average or base stream flow	Intermittent increase in stream flow - not timed to critical conditions	Intermittent increase in stream flow - often improves critical conditions	0 - 10% permanent increase in stream flow during critical conditions	10 - 25 % permanent increase in stream flow during critical conditions	25%+ permanent increase in stream flow during critical conditions.		

Instructions: (1.) Score each alternative for each of the seven aspects of the value. Scores can be positive or negative, depending on the impact of the alternative on the value. (2.) Total the scores for each aspect to get the total score for this alternative in this value. (3.) Shaded area represents "fatal flaw". Alternatives that score in this area should not be proposed.

Total Raw Score Calculated	0
Total Score (Default)	0

Note: The total score calculated may be more than 25. In the instances where this might occur, a default maximum score of 25 will be calculated.

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

Acronyms

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

Alternative #1	
Value:	**Eco-Friendly Solutions**

	Scoring												
Aspect	-5	-4	-3	-2	-1	0	1	2	3	4	5	Assumptions	Score Per Aspect
Non-Renewable Energy Consumption	Primary energy consumption is greater than secondary treatment	Primary energy consumption equal to 75 - 100% of secondary treatment	Primary energy consumption equal to 30 - 75% of secondary treatment	Primary energy consumption equal to 15 - 30% of secondary treatment	Primary energy consumption equal to 0 - 15% of secondary treatment	No energy consumption except for cleaning and maintenance	Cleaning and maintenance not needed, no primary consumption	NA	NA	NA	NA		
Use of Natural Systems	Constructed facilities permanently displace 5+ acres wetlands or 50% locally available green space	Constructed facilities permanently displace 3 - 5 acres wetlands or 25 - 50% locally available green space	Constructed facilities permanently displace 1 - 3 acres wetlands or 10 - 15% locally available green space	Constructed facilities permanently displace 0 - 1 acre wetlands or up to 10% locally available green space	Constructed facilities temporarily disrupt wetlands or green space	Alternative does not use or affect natural systems, wetlands, or green space	Alternative doesn not use natural systems, but enhances green space or wetland	Natural systems play a minor role in alternative function, up to 1 acre wetland or 10% additional green space created	Natural systems are significant part of alternative function, 1 - 3 acres of wetland created or 10 - 25% additional green space	Alternative fully uses natural systems, 3 - 5 acres of wetland created or 25-50% additional green space	Alternative results in multi-use natural system development, 5+ acres of wetland or 50% additional green space		
Multiple-Use Facilties	Constructed facilities permanently eliminate recreational opportunity	Constructed facilities significantly impare recreational opportunity	Constructed facilities moderately impare recreational opportunity	Constructed facilities have minor impacts on recreational opportunity	Construction temporarily impacts recreational opportunity	No impacts on recreational opportunties	Alternative improves access to existing recreational areas	Alternative has limited positive impact on recreation	Alternative significantly enhances recreational opportunties	Alternative increases recreational opportunties in area	Alternative results in multi-use facility		
Source Control of subwatershed pollutant loads	Pollutant loadings are increased by 50%	Pollutant loadings are increased by 30 - 50%	Pollutant loadings are increased by 10 - 30%	End of pipe pollutant loadings are increased by 0 - 10%	End of pipe pollutant loadings impacts are inconsistent, but likely higher	End of pipe pollutant loadings are unchanged	Pollutant loadings impacts are inconsistent, but likely lower	Source control reduces pollutant loadings by 0 - 10%	Source control reduces pollutant loadings by 10 - 30%	Source control reduces pollutant loadings by 30 - 50%	Source control reduces pollutant loadings by more than 50%		
Non-Obtrusive Construction Techniques	Permanent loss of green space or sensitive area disruption	Main thoroughfare closures, sensitive area temporary disruptions	Widespread dust and noise, blasting, secondary street closures	Localized dust, noise and local street closures	Minor dust and noise, traffic lane closures	No construction impacts	NA	NA	NA	NA	NA		
Consistent Land Use	Intrusive or nuisance facilities inconsistent with neighborhood or land use.	Facilities inconsistent with neighborhood or land use.	Facility characteristics mitigated to reduce impact on neighborhood	Facitlies have significant impact on development density or land use	Facility has minor impact on development density or land use	No impact on land use or no above ground facilities	Alternative mitigates existing compatibility problem	Alternative removes facility inconsistent with neighborhood	Alternative removes nuisance facility from neighborhood	Alternative enhances property values in neighborhood	Alternative provides enhancements that significantly improve neighborhood		
Impermeable Surfaces	5 acres+ of impermeable surfaces are added	3 - 5 acres of impermeable surfaces are added	1 - 3 acres of impermeable surfaces are added	up to 1 acre of impermeable surfaces are added	Minor increase in impermeable surfaces added	No change in impermeable surface	Minor reduction in impermeable surfaces	Up to 1 acre of impermeable surfaces removed	1 - 3 acres of impermeable surfaces removed	3 - 5 acres of impermeable surfaces removed	More than 5 acres of impermeable surfaces removed		
LEEDS Performance	NA	NA	NA	NA	NA	LEEDS not applicable or LEEDS score <10	LEEDS Score 10 - 25	LEEDS Certified	LEEDS Silver	LEEDS Gold	LEEDS Platinum		

Instructions: (1.) Score each alternative for each of the eight aspects of the value. Scores can be positive or negative, depending on the impact of the alternative on the value. (2.) Total the scores for each aspect to get the total score for this alternative in this value. (3.) Shaded area represents "fatal flaw". Alternatives that score in this area should not be proposed.

Total Raw Score Calculated	0
Total Score (Default)	0

Note: The total score calculated may be more than 25. In the instances where this might occur, a default maximum score of 25 will be calculated.

Aspect	Rationale	Measurement Method
Non-Renewable Energy Consumption	Eco-friendly solutions would be expected to be low consumers of non-renewable energy. Benchmarking energy consumption against conventional secondary treatment provides penalty points for high energy consuming alternatives.	Evaluation of primary energy consumed per MG of flow treated, compared to the energy consumed at the WCWTP per MG treated.
Use of Natural Systems	Natural systems replace concrete and steel construction with wet bottom storage lagoons, constructed bioswales, rain gardens etc. that increase green space of various kinds. Options that reduce wetlands and green space get penalty points.	Acres of wetlands and other types of green space created or eliminated. Also includes subjective evaluation of the "basis" of the alternative - "green" or "grey".
Multiple-Use Facilties	Eco-friendly solutions create recreational opportunties for both water-based and riparian recreation. Boating, canoing, kayaking, fishing, wading, swimming etc. would be direct water-based recreation. Bird watching, hiking, biking, picnicing, camping etc. would be considered related riparian recreation.	Subjective evaluation of changes predicted in the aquatic or riparian environment as a result of better water quality, increased base flow or decreased flow peaks, increased tree cover or vegitated riparian areas etc.
Source Control of subwatershed pollutant loads	Controlling pollutant loads at the source through behavior modification, product replacements or stormwater management BMPs that capture pollutants thereby avoiding end of pipe treatment requirements	Modeled land-side pollutant loading reductions as calculated by the BGC Water Quality Tool or by comparision to literature values or pilot program measurements.
Non-Obtrusive Construction Techniques	Probable construction impacts on traffic, noise and dust are all measures of the friendliness of an alternative. Construction impacts get penalty points for creating nuisance conditions.	Subjective evaluation of probable construction impacts based on the type of construction envisioned for the alternative.
Consistent Land Use	Alternative configuration can either enhance or detract from the surrounding property. For example, an extremely unfriendly pump station can be noisy, smelly, and ugly. The same pump station can be "disguised" as a residence that fits right in with the neighborhood. If a larger parcel of land is available, a pump station can be hidden from view by landscaping, and a community garden or other green space added to enhance the neighborhood.	At the planning level, projects can be defined to avoid negative impacts on the surrounding properties. Depending on the availability of land, enhancements are possible. This aspect encourages project definition and budgets to enhance, not detract.
Impermeable Surfaces	Adding impermeable surfaces increases total runoff volume, peak runoff flowrates, and the total transport of any pollutant deposited on the surface from any source. Conversely, permeable surfaces can reduce flow volume and peaks, and provide filtering mechanisms for pollutants.	Acres of permeable surfaces created or eliminated.
LEEDS Performance	LEED standards are applicable to alternatives that include above-ground building structures.	Application of LEED evaluation points.

Acronyms

BGC - Beargrass Creek
LEEDS - Leadership in Energy and Environmental Design
MG - million gallons
WCWTP - West County Wastewater Treatment Plant

Alternative #1

Value:	Public Health Enhancement		Measure		Impact						Rationale	Measurement Method		
Performance Measures	WWTP Peak Flows		WWTP Peak Flows	Peak flow delivered to WWTP versus rated peak hour capacity of disinfection system	Peak flow exceeds rated capacity by more than 100%, wetlands treatment with < 1 day HRT	Peak flow exceeds rated capacity by 50 - 100%, wetlands treatment with < 2 days HRT	Peak flow exceeds rated capacity by 10 - 50%, wetlands treatment with < 3 days HRT	Peak flow exceeds rated capacity by less than 10%, wetlands treatment with 3 - 5 days HRT	Peak flow is within rated capacity, wetlands treatment with > 5 days HRT	Peak flow is less than 80% of rated capacity	WWTP disinfection systems have ability to adjust dose rates to handle small short term peaks without exceeding discharge standards. Significant peaks may result in inadequate disinfection that exceeds discharge permit limits. Peak flows well below system capacity allow performance significantly better than standards require.	Measurement will be from analyzing plant influent flows against pre-determined plant stress-test results and operating criteria.		
	WWTP Peak Flows	CSOs / CSOs and SSOs	Release point		Untreated CSO or SSO discharge (or runoff in CSO area) where volume is > 0.04% of stream's flow	Significant untreated discharge to water or ground in high public use or access area	Minor discharge to high public use area or significant discharge to water in low public use or access area, basement back-up	Minor discharge to water in low public use area, or significant minor discharge to ground in low public use or access area, discharge contained and cleaned up	Minor discharge to ground in low public use area or discharged anywhere, de minimus quantity	No discharge	Not all discharges violate the Clean Water Act. Discharges vary in the impact to public health and the environment. Therefore, EPA developed guidance on how to set priorities based on the risk to the public's health and the environment under their Enforcement Management System in Chapter X, titled "Setting Priorities for Addressing Discharges from Separate Sanitary Sewers." The assigned consequences follow the intent of the principles and priorities presented in the chapter. SSO Event Mean Concentration for Fecal Coliform estimated at 500,000/100ml. Dilution factor 0.04% required to not exceed 200 FC/100 ml Water Quality Standard.	Measurement methods will be via hydraulic models to quantify the SSO discharge and the GIS to establish relative distance from designated locations or objects.		
	Design Event Recurrence Interval	Frequency per location	Event Recurrence Interval	→	Most Severe Impact				Least Impact	No Impact				
				↓	5	4	3	2	1	0	Assumptions	Base Case Score	Alternative Score	Total Score
Frequency	6-10 per year	>10 per year	< 1 year recurrence interval	Most Likely 5	25	20	15	10	5	0				0
	1-6 per year	4-10 per year	1-2 yr recurrence interval	4	20	16	12	8	4	0				0
	1-2 year recurrence interval	1-4 per year	2-5 yr recurrence interval	3	15	12	9	6	3	0				0
	2-5 year recurrence interval	1-2 year recurrence interval	5-10 yr recurrence interval	2	10	8	6	4	2	0				0
	>5 year recurrence interval	>2 year recurrence interval	>10 yr storm return	Least Likely 1	5	4	3	2	1	0				0
	Not Possible	Not Possible	Not Possible	Not Possible 0	0	0	0	0	0	0	Average Total Score			0
											Corrected Score			0

Note - This value sheet calculates the average benefit over the recurrence intervals. A correction calculation is included in order to obtain a maximum score of 25.

Acronyms

CSO - Combined sewer overflow
FC - Fecal coliform
GIS - Geographic information system
HRT - Hydraulic retention time
ml - Milliliter
SSO - Sanitary sewer overflow
WWTP - Wastewater treatment plant

Alternative #1

Value:	Regulatory Performance		Measure	Impact						Rationale	Measurement Method
Performance Measure	WWTP Peak Flows		Peak flow delivered to WWTP versus rated peak hour capacity of plant	Peak flow exceeds rated capacity by more than 50%	Peak flow exceeds rated capacity by 25 - 50%	Peak flow exceeds rated capacity by 10 - 25%	Peak flow exceeds rated capacity by less than 10%	Peak flow is within rated capacity	Peak flow is less than 80% of rated capacity	WWTPs have ability to handle small short term peaks without exceeding discharge standards, but significant peaks may result in process washout and associated failure of discharge permit limits. Peak flows less than 80% of rated capacity allow plant to perform significantly better than discharge standards require.	Measurement will be from analyzing plant influent flows against pre-determined plant stress-test results and operating criteria.
	WWTP Peak Flows	Beargrass Creek CSOs	Untreated CSO or runoff discharge flow rate % of receiving stream flow	Discharge > 5%	Discharge 1 - 5%	Discharge 1 - 0.2%	Discharge 0.1 - 0.2%	Discharge <0.1%	No discharge	CSO Event Mean Concentration for Fecal Coliform in overflows estimated at 250,000/ 100 ml. Dilution factor 0.08% required to not exceed 200 FC/100 ml Water Quality Standard. For partial treatment such as wetland treatment or bioretention, use the comparison to equivalent primary plus disinfection to proportion flow.	Measurement method will be via hydraulic model to quantify the CSO. Spreadsheet calculation to determine mix concentration.
	WWTP Peak Flows	CSOs in Ohio River	Untreated CSO Average Annual Overflow Volume (AAOV)	100 MG+ AAOV	20 - 100 MG AAOV	2 - 20 MG AAOV	1 - 2 MG AAOV	<1.0 MG AAOV	No discharge	100 MG AAOV (10 events) dilution factor in average Ohio River flow is 0.04%. 1.0 MG AAOV (1 event) dilution factor is 0.06%. Cumulative impact of multiple overflow locations may become significant for WQS exceedance.	Measurement methods will be via hydraulic models to quantify the CSO discharge. Spreadsheet calculation to mix concentration.
	WWTP Peak Flows	CSOs / SSOs	Release point	< 1 year recurrence interval	1-2 yr recurrence interval	2-5 yr recurrence interval	5-10 yr recurrence interval	>10 yr storm return	No discharge	Regulations do not distinguish between potential impact of SSOs, therefore frequency and impact are the same for Regulatory Performance value.	Measurement methods will be via hydraulic models to quantify the SSO discharge

Frequency	Event Recurrence Interval	Frequency per location	Event Recurrence Interval			Most Severe Impact				Least Impact	No Impact	Assumptions	Base Case Score	Alternative Score	Total Score
						5	4	3	2	1	0				
Frequency	6-10 per year	>10 per year	< 1 year recurrence interval	Most Likely	5	25	20	15	10	5	0				0
	1-6 per year	4-10 per year	1-2 yr recurrence interval		4	20	16	12	8	4	0				0
	1-2 year recurrence interval	1-4 per year	2-5 yr recurrence interval		3	15	12	9	6	3	0				0
	2-5 year recurrence interval	1-2 year recurrence interval	5-10 yr recurrence interval		2	10	8	6	4	2	0				0
	>5 year recurrence interval	>2 year recurrence interval	>10 yr storm return	Least Likely	1	5	4	3	2	1	0				0
	Not possible	Not possible	Not Possible	Not Possible	0	0	0	0	0	0	0	Average Total Score			0
												Corrected Score			0

Note - This value sheet calculates the average benefit over the recurrence intervals. A correction calculation is included in order to obtain a maximum score of 25.

Acronyms

AAOV - Average annual overflow volume
CSO - Combined sewer overflow
FC - Fecal coliforms
MG - Million gallons
ml - Milliliters
SSO - Sanitary sewer overflow
WQS - Water quality standards
WWTPs - Wastewater treatment plants

Alternative #1

Value:	Public Health		Measure		Impact						Rationale	Measurement Method		
Performance Measures	WWTP Peak Flows		WWTP Peak Flows	Peak flow delivered to WWTP versus rated peak hour capacity of disinfection system	Peak flow exceeds rated capacity by more than 100%, wetlands treatment with < 1 day HRT	Peak flow exceeds rated capacity by 50 - 100%, wetlands treatment with < 2 days HRT	Peak flow exceeds rated capacity by 10 - 50%, wetlands treatment with < 3 days HRT	Peak flow exceeds rated capacity by less than 10%, wetlands treatment with 3 - 5 days HRT	Peak flow is within rated capacity, wetlands treatment with > 5 days HRT	Peak flow is less than 80% of rated capacity	WWTP disinfection systems have ability to adjust dose rates to handle small short term peaks without exceeding discharge standards. Significant peaks may result in inadequate disinfection that exceeds discharge permit limits. Peak flows well below system capacity allow performance significantly better than standards require.	Measurement will be from analyzing plant influent flows against pre-determined plant stress-test results and operating criteria.		
		CSOs and SSOs	Release point	Untreated CSO or SSO discharge (or runoff in CSO area) where volume is > 0.04% of stream's flow	Significant untreated discharge to water or ground in high public use or access area	Minor discharge to high public use area or significant discharge to water in low public use or access area, basement back-up	Minor discharge to water in low public use area, or significant minor discharge to ground in low public use or access area, discharge contained and cleaned up	Minor discharge to ground in low public use area or discharged anywhere, de minimus quantity	No discharge	Not all discharges violate the Clean Water Act. Discharges vary in the impact to public health and the environment. Therefore, EPA developed guidance on how to set priorities based on the risk to the public's health and the environment under their Enforcement Management System in Chapter X, titled "Setting Priorities for Addressing Discharges from Separate Sanitary Sewers." The assigned consequences follow the intent of the principles and priorities presented in the chapter. SSO Event Mean Concentration for Fecal Coliform estimated at 500,000/100ml. Dilution factor 0.04% required to not exceed 200 FC/100 ml Water Quality Standard.	Measurement methods will be via hydraulic models to quantify the SSO discharge and the GIS to establish relative distance from designated locations or objects.		
	Design Event Recurrence Interval	Frequency per location	Event Recurrence Interval	→	Most Severe Impact				Least Impact	No Impact				
				↓	5	4	3	2	1	0	Assumptions	Base Case Score	Alternative Score	Total Score
Frequency	6-10 per year	>10 per year	< 1 year recurrence interval	Most Likely 5	25	20	15	10	5	0				0
	1-6 per year	4-10 per year	1-2 yr recurrence interval	4	20	16	12	8	4	0				0
	1-2 year recurrence interval	1-4 per year	2-5 yr recurrence interval	3	15	12	9	6	3	0				0
	2-5 year recurrence interval	1-2 year recurrence interval	5-10 yr recurrence interval	2	10	8	6	4	2	0				0
	>5 year recurrence interval	>2 year recurrence interval	>10 yr storm return	Least Likely 1	5	4	3	2	1	0				0
	Not Possible	Not Possible	Not Possible	Not Possible 0	0	0	0	0	0	0	Average Total Score			0
											Corrected Score			0

Note - This value sheet calculates the average benefit over the recurrence intervals. A correction calculation is included in order to obtain a maximum score of 25.

Acronyms

CSO - Combined sewer overflow
FC - Fecal coliform
GIS - Geographic information system
HRT - Hydraulic retention time
ml - Milliliter
SSO - Sanitary sewer overflow
WWTP - Wastewater treatment plant

Summary of Scores for CSO 144 example						
		Scores for Alternatives				
Values	**Weights**	Sewer Separation Alternative #1	Separation & Wetlands Alternative #2	Underground Storage Alternative #3	Wetlands CSO Treatment Alternative #4	Optimized Storage & Wetlands Alternative #5
Regulatory Performance	**8**	12.00	12.00	9.67	7.67	11.00
Public Health Enhancement	**10**	-4.33	9.67	11.33	8.67	13.67
Asset Protection	**6**	1.00	0.00	0.00	0.00	0.00
Environmental Enhancement	**8**	-3.00	16.00	10.00	13.00	13.00
Eco-Friendly Solutions	**6**	-3.00	4.00	-7.00	7.00	7.00
Weighted Benefit Score		16.67	344.67	228.67	294.00	370.67
Capital Costs		$1,970,000	$2,280,000	$368,000	$230,000	$305,000
Weighted Benefit Cost Ratio		0.01	0.15	0.62	1.28	1.22

Alternative #1

Value:	Regulatory Performance			Measure		Impact						Measurement Method		
Performance Measure	WWTP Peak Flows			WWTP Peak Flows	Peak flow delivered to WWTP versus rated peak hour capacity of plant	Peak flow exceeds rated capacity by more than 50%	Peak flow exceeds rated capacity by 25 - 50%	Peak flow exceeds rated capacity by 10 25%	Peak flow exceeds rated capacity by less than 10%	Peak flow is within rated capacity	Peak flow is less than 80% of rated capacity	Measurement will be from analyzing plant influent flows against pre-determined plant stress-test results and operating criteria.		
		CSOs		Beargrass Creek CSOs	Untreated CSO or runoff discharge flow rate % of receiving stream flow	Discharge > 5%	Discharge 1 - 5%	Discharge 1 - 0.2%	Discharge 0.1 - 0.2%	Discharge <0.1%	No discharge	Measurement method will be via hydraulic model to quantify the CSO. Spreadsheet calculation to determine mix concentration.		
				CSOs in Ohio River	Untreated CSO Average Annual Overflow Volume (AAOV)	100 MG+ AAOV	20 - 100 MG AAOV	2 - 20 MG AAOV	1 - 2 MG AAOV	<1.0 MG AAOV	No discharge	Measurement methods will be via hydraulic models to quantify the CSO discharge. Spreadsheet calculation to mix concentration.		
			SSOs	Release point		< 1 year recurrence interval	1-2 yr recurrence interval	2-5 yr recurrence interval	5-10 yr recurrence interval	>10 yr storm return	No discharge	Measurement methods will be via hydraulic models to quantify the SSO discharge		
	Event Recurrence Interval	Frequency per location	Event Recurrence Interval			Most Severe Impact				Least Impact	No Impact			
						5	4	3	2	1	0	Base Case Score	Alternative Score	Total Score
Frequency	6-10 per year	>10 per year	< 1 year recurrence interval	Most Likely	5	25	20	15	10	5	0	10	0	10
	1-6 per year	4-10 per year	1-2 yr recurrence interval		4	20	16	12	8	4	0	8	0	8
	1-2 year recurrence interval	1-4 per year	2-5 yr recurrence interval		3	15	12	9	6	3	0	9	0	9
	2-5 year recurrence interval	1-2 year recurrence interval	5-10 yr recurrence interval		2	10	8	6	4	2	0	6	0	6
	>5 year recurrence interval	>2 year recurrence interval	>10 yr storm return	Least Likely	1	5	4	3	2	1	0	3	0	3
	Not possible	Not possible	Not Possible	Not Possible	0	0	0	0	0	0	0	Average Total Score		7.2
												Corrected Score		12

Note - This value sheet calculates the average benefit over the recurrence intervals. A correction calculation is included in order to obtain a maximum score of 25.

Acronyms

AAOV - Average annual overflow volume
CSO - Combined sewer overflow
FC - Fecal coliforms
MG - Million gallons
ml - Milliliters
SSO - Sanitary sewer overflow
WQS - Water quality standards
WWTPs - Wastewater treatment plants

Alternative #2

Value:	Regulatory Performance		Measure		Impact						Measurement Method		
Performance Measure	WWTP Peak Flows		WWTP Peak Flows	Peak flow delivered to WWTP versus rated peak hour capacity of plant	Peak flow exceeds rated capacity by more than 50%	Peak flow exceeds rated capacity by 25 - 50%	Peak flow exceeds rated capacity by 10 25%	Peak flow exceeds rated capacity by less than 10%	Peak flow is within rated capacity	Peak flow is less than 80% of rated capacity	Measurement will be from analyzing plant influent flows against pre-determined plant stress-test results and operating criteria.		
		CSOs	Beargrass Creek CSOs	Untreated CSO or runoff discharge flow rate % of receiving stream flow	Discharge > 5%	Discharge 1 - 5%	Discharge 1 - 0.2%	Discharge 0.1 - 0.2%	Discharge <0.1%	No discharge	Measurement method will be via hydraulic model to quantify the CSO. Spreadsheet calculation to determine mix concentration.		
			CSOs in Ohio River	Untreated CSO Average Annual Overflow Volume (AAOV)	100 MG+ AAOV	20 - 100 MG AAOV	2 - 20 MG AAOV	1 - 2 MG AAOV	<1.0 MG AAOV	No discharge	Measurement methods will be via hydraulic models to quantify the CSO discharge. Spreadsheet calculation to mix concentration.		
		SSOs		Release point	< 1 year recurrence interval	1-2 yr recurrence interval	2-5 yr recurrence interval	5-10 yr recurrence interval	>10 yr storm return	No discharge	Measurement methods will be via hydraulic models to quantify the SSO discharge		
	Event Recurrence Interval	Frequency per location	Event Recurrence Interval		Most Severe Impact				Least Impact	No Impact			
					5	4	3	2	1	0	Base Case Score	Alternative Score	Total Score
Frequency	6-10 per year	>10 per year	< 1 year recurrence interval	Most Likely 5	25	20	15	10	5	0	10	0	10
	1-6 per year	4-10 per year	1-2 yr recurrence interval	4	20	16	12	8	4	0	8	0	8
	1-2 year recurrence interval	1-4 per year	2-5 yr recurrence interval	3	15	12	9	6	3	0	9	0	9
	2-5 year recurrence interval	1-2 year recurrence interval	5-10 yr recurrence interval	2	10	8	6	4	2	0	6	0	6
	>5 year recurrence interval	>2 year recurrence interval	>10 yr storm return	Least Likely 1	5	4	3	2	1	0	3	0	3
	Not possible	Not possible	Not Possible	Not Possible 0	0	0	0	0	0	0	Average Total Score		7.2
											Corrected Score		12

Note - This value sheet calculates the average benefit over the recurrence intervals. A correction calculation is included in order to obtain a maximum score of 25.

Acronyms

AAOV - Average annual overflow volume
CSO - Combined sewer overflow
FC - Fecal coliforms
MG - Million gallons
ml - Milliliters
SSO - Sanitary sewer overflow
WQS - Water quality standards
WWTPs - Wastewater treatment plants

Alternative #3															
Value:	Regulatory Performance		Measure			Impact						Measurement Method			
		WWTP Peak Flows	Peak flow delivered to WWTP versus rated peak hour capacity of plant			Peak flow exceeds rated capacity by more than 50%	Peak flow exceeds rated capacity by 25 - 50%	Peak flow exceeds rated capacity by 10 25%	Peak flow exceeds rated capacity by less than 10%	Peak flow is within rated capacity	Peak flow is less than 80% of rated capacity	Measurement will be from analyzing plant influent flows against pre-determined plant stress-test results and operating criteria.		
		Beargrass Creek CSOs	Untreated CSO or runoff discharge flow rate % of receiving stream flow			Discharge > 5%	Discharge 1 - 5%	Discharge 1 - 0.2%	Discharge 0.1 - 0.2%	Discharge <0.1%	No discharge	Measurement method will be via hydraulic model to quantify the CSO. Spreadsheet calculation to determine mix concentration.		
		CSOs in Ohio River	Untreated CSO Average Annual Overflow Volume (AAOV)			100 MG+ AAOV	20 - 100 MG AAOV	2 - 20 MG AAOV	1 - 2 MG AAOV	<1.0 MG AAOV	No discharge	Measurement methods will be via hydraulic models to quantify the CSO discharge. Spreadsheet calculation to mix concentration.		
Performance Measure	WWTP Peak Flows	CSOs	SSOs	Release point		< 1 year recurrence interval	1-2 yr recurrence interval	2-5 yr recurrence interval	5-10 yr recurrence interval	>10 yr storm return	No discharge	Measurement methods will be via hydraulic models to quantify the SSO discharge		
	Event Recurrence Interval	Frequency per location	Event Recurrence Interval			Most Severe Impact				Least Impact	No Impact			
						5	4	3	2	1	0	Base Case Score	Alternative Score	Total Score
Frequency	6-10 per year	>10 per year	< 1 year recurrence interval	Most Likely	5	25	20	15	10	5	0	10	0	10
	1-6 per year	4-10 per year	1-2 yr recurrence interval		4	20	16	12	8	4	0	8	0	8
	1-2 year recurrence interval	1-4 per year	2-5 yr recurrence interval		3	15	12	9	6	3	0	9	3	6
	2-5 year recurrence interval	1-2 year recurrence interval	5-10 yr recurrence interval		2	10	8	6	4	2	0	6	2	4
	>5 year recurrence interval	>2 year recurrence interval	>10 yr storm return	Least Likely	1	5	4	3	2	1	0	3	2	1
	Not possible	Not possible	Not Possible	Not Possible	0	0	0	0	0	0	0	Average Total Score		5.8
													Corrected Score	9.66666667

Note - This value sheet calculates the average benefit over the recurrence intervals. A correction calculation is included in order to obtain a maximum score of 25.

Acronyms

AAOV - Average annual overflow volume
CSO - Combined sewer overflow
FC - Fecal coliforms
MG - Million gallons
ml - Milliliters
SSO - Sanitary sewer overflow
WQS - Water quality standards
WWTPs - Wastewater treatment plants

Alternative #4

Value:	Regulatory Performance			Measure		Impact						Measurement Method		
			WWTP Peak Flows	Peak flow delivered to WWTP versus rated peak hour capacity of plant		Peak flow exceeds rated capacity by more than 50%	Peak flow exceeds rated capacity by 25 - 50%	Peak flow exceeds rated capacity by 10 25%	Peak flow exceeds rated capacity by less than 10%	Peak flow is within rated capacity	Peak flow is less than 80% of rated capacity	Measurement will be from analyzing plant influent flows against pre-determined plant stress-test results and operating criteria.		
		Beargrass Creek CSOs		Untreated CSO or runoff discharge flow rate % of receiving stream flow		Discharge > 5%	Discharge 1 - 5%	Discharge 1 - 0.2%	Discharge 0.1 - 0.2%	Discharge <0.1%	No discharge	Measurement method will be via hydraulic model to quantify the CSO. Spreadsheet calculation to determine mix concentration.		
		CSOs in Ohio River		Untreated CSO Average Annual Overflow Volume (AAOV)		100 MG+ AAOV	20 - 100 MG AAOV	2 - 20 MG AAOV	1 - 2 MG AAOV	<1.0 MG AAOV	No discharge	Measurement methods will be via hydraulic models to quantify the CSO discharge. Spreadsheet calculation to mix concentration.		
Performance Measure	WWTP Peak Flows	CSOs	SSOs	Release point		< 1 year recurrence interval	1-2 yr recurrence interval	2-5 yr recurrence interval	5-10 yr recurrence interval	>10 yr storm return	No discharge	Measurement methods will be via hydraulic models to quantify the SSO discharge		
	Event Recurrence Interval	Frequency per location	Event Recurrence Interval			Most Severe Impact				Least Impact	No Impact			
						5	4	3	2	1	0	Base Case Score	Alternative Score	Total Score
Frequency	6-10 per year	>10 per year	< 1 year recurrence interval	Most Likely	5	25	20	15	10	5	0	10	0	10
	1-6 per year	4-10 per year	1-2 yr recurrence interval		4	20	16	12	8	4	0	8	4	4
	1-2 year recurrence interval	1-4 per year	2-5 yr recurrence interval		3	15	12	9	6	3	0	9	3	6
	2-5 year recurrence interval	1-2 year recurrence interval	5-10 yr recurrence interval		2	10	8	6	4	2	0	6	4	2
	>5 year recurrence interval	>2 year recurrence interval	>10 yr storm return	Least Likely	1	5	4	3	2	1	0	3	2	1
	Not possible	Not possible	Not Possible	Not Possible	0	0	0	0	0	0	0	Average Total Score		4.6
													Corrected Score	7.66666667

Note - This value sheet calculates the average benefit over the recurrence intervals. A correction calculation is included in order to obtain a maximum score of 25.

Acronyms

AAOV - Average annual overflow volume
CSO - Combined sewer overflow
FC - Fecal coliforms
MG - Million gallons
ml - Milliliters
SSO - Sanitary sewer overflow
WQS - Water quality standards
WWTPs - Wastewater treatment plants

Alternative #5

Value:	Regulatory Performance			Measure		Impact						Measurement Method		
Performance Measure	WWTP Peak Flows		WWTP Peak Flows	Peak flow delivered to WWTP versus rated peak hour capacity of plant		Peak flow exceeds rated capacity by more than 50%	Peak flow exceeds rated capacity by 25 - 50%	Peak flow exceeds rated capacity by 10 25%	Peak flow exceeds rated capacity by less than 10%	Peak flow is within rated capacity	Peak flow is less than 80% of rated capacity	Measurement will be from analyzing plant influent flows against pre-determined plant stress-test results and operating criteria.		
		CSOs	Beargrass Creek CSOs	Untreated CSO or runoff discharge flow rate % of receiving stream flow		Discharge > 5%	Discharge 1 - 5%	Discharge 1 - 0.2%	Discharge 0.1 - 0.2%	Discharge <0.1%	No discharge	Measurement method will be via hydraulic model to quantify the CSO. Spreadsheet calculation to determine mix concentration.		
			CSOs in Ohio River	Untreated CSO Average Annual Overflow Volume (AAOV)		100 MG+ AAOV	20 - 100 MG AAOV	2 - 20 MG AAOV	1 - 2 MG AAOV	<1.0 MG AAOV	No discharge	Measurement methods will be via hydraulic models to quantify the CSO discharge. Spreadsheet calculation to mix concentration.		
			SSOs	Release point		< 1 year recurrence interval	1-2 yr recurrence interval	2-5 yr recurrence interval	5-10 yr recurrence interval	>10 yr storm return	No discharge	Measurement methods will be via hydraulic models to quantify the SSO discharge		
	Event Recurrence Interval	Frequency per location	Event Recurrence Interval			Most Severe Impact				Least Impact	No Impact			
						5	4	3	2	1	0	Base Case Score	Alternative Score	Total Score
Frequency	6-10 per year	>10 per year	< 1 year recurrence interval	Most Likely	5	25	20	15	10	5	0	10	0	10
	1-6 per year	4-10 per year	1-2 yr recurrence interval		4	20	16	12	8	4	0	8	0	8
	1-2 year recurrence interval	1-4 per year	2-5 yr recurrence interval		3	15	12	9	6	3	0	9	0	9
	2-5 year recurrence interval	1-2 year recurrence interval	5-10 yr recurrence interval		2	10	8	6	4	2	0	6	2	4
	>5 year recurrence interval	>2 year recurrence interval	>10 yr storm return	Least Likely	1	5	4	3	2	1	0	3	1	2
	Not possible	Not possible	Not Possible	Not Possible	0	0	0	0	0	0	0	Average Total Score		6.6
													Corrected Score	11

Note - This value sheet calculates the average benefit over the recurrence intervals. A correction calculation is included in order to obtain a maximum score of 25.

Acronyms

AAOV - Average annual overflow volume
CSO - Combined sewer overflow
FC - Fecal coliforms
MG - Million gallons
ml - Milliliters
SSO - Sanitary sewer overflow
WQS - Water quality standards
WWTPs - Wastewater treatment plants

Alternative #1																
Value:	Public Health		Measure			Impact						Measurement Method				
Performance Measures	WWTP Peak Flows		WWTP Peak Flows	Peak flow delivered to WWTP versus rated peak hour capacity of disinfection system		Peak flow exceeds rated capacity by more than 100%, wetlands treatment with < 1 day HRT	Peak flow exceeds rated capacity by 50 - 100%, wetlands treatment with < 2 days HRT	Peak flow exceeds rated capacity by 10 - 50%, wetlands treatment with < 3 days HRT	Peak flow exceeds rated capacity by less than 10%, wetlands treatment with 3 - 5 days HRT	Peak flow is within rated capacity, wetlands treatment with > 5 days HRT	Peak flow is less than 80% of rated capacity	Measurement will be from analyzing plant influent flows against pre-determined plant stress-test results and operating criteria.			
	WWTP Peak Flows	CSOs	CSOs and SSOs	Release point		Untreated CSO or SSO discharge (or runoff in CSO area) where volume is > 0.04% of stream's flow	Significant untreated discharge to water or ground in high public use or access area	Minor discharge to high public use area or significant discharge to water in low public use or access area, basement back-up	Minor discharge to water in low public use area, or significant minor discharge to ground in low public use or access area, discharge contained and cleaned up	Minor discharge to ground in low public use area or discharged anywhere, de minimus quantity	No discharge	Measurement methods will be via hydraulic models to quantify the SSO discharge and the GIS to establish relative distance from designated locations or objects.			
	Design Event Recurrence Interval	Frequency per location	Event Recurrence Interval			Most Severe Impact				Least Impact	No Impact					
						5	4	3	2	1	0	Base Case Score	Alternative Score	Total Score		
Frequency	6-10 per year	>10 per year	< 1 year recurrence interval	Most Likely	5	25	20	15	10	5	0	15	20	-5		
	1-6 per year	4-10 per year	1-2 yr recurrence interval		4	20	16	12	8	4	0	12	16	-4		
	1-2 year recurrence interval	1-4 per year	2-5 yr recurrence interval		3	15	12	9	6	3	0	8	12	-4		
	2-5 year recurrence interval	1-2 year recurrence interval	5-10 yr recurrence interval		2	10	8	6	4	2	0	8	8	0		
	>5 year recurrence interval	>2 year recurrence interval	>10 yr storm return	Least Likely	1	5	4	3	2	1	0	4	4	0		
	Not Possible	Not Possible	Not Possible	Not Possible	0	0	0	0	0	0	0	Average Total Score		-2.60		
														Corrected Score		-4.33

Note - This value sheet calculates the average benefit over the recurrence intervals. A correction calculation is included in order to obtain a maximum score of 25.

Acronyms

CSO - Combined sewer overflow
FC - Fecal coliform
GIS - Geographic information system
HRT - Hydraulic retention time
ml - Milliliter
SSO - Sanitary sewer overflow
WWTP - Wastewater treatment plant

Alternative #2

Value:	Public Health		Measure			Impact						Measurement Method		
Performance Measures	WWTP Peak Flows		WWTP Peak Flows	Peak flow delivered to WWTP versus rated peak hour capacity of disinfection system		Peak flow exceeds rated capacity by more than 100%, wetlands treatment with < 1 day HRT	Peak flow exceeds rated capacity by 50 - 100%, wetlands treatment with < 2 days HRT	Peak flow exceeds rated capacity by 10 - 50%, wetlands treatment with < 3 days HRT	Peak flow exceeds rated capacity by less than 10%, wetlands treatment with 3 - 5 days HRT	Peak flow is within rated capacity, wetlands treatment with > 5 days HRT	Peak flow is less than 80% of rated capacity	Measurement will be from analyzing plant influent flows against pre-determined plant stress-test results and operating criteria.		
	WWTP Peak Flows	CSOs	CSOs and SSOs	Release point		Untreated CSO or SSO discharge (or runoff in CSO area) where volume is > 0.04% of stream's flow	Significant untreated discharge to water or ground in high public use or access area	Minor discharge to high public use area or significant discharge to water in low public use or access area, basement back-up	Minor discharge to water in low public use area, or significant minor discharge to ground in low public use or access area, discharge contained and cleaned up	Minor discharge to ground in low public use area or discharged anywhere, de minimus quantity	No discharge	Measurement methods will be via hydraulic models to quantify the SSO discharge and the GIS to establish relative distance from designated locations or objects.		
	Design Event Recurrence Interval	Frequency per location	Event Recurrence Interval			Most Severe Impact				Least Impact	No Impact			
						5	4	3	2	1	0	Base Case Score	Alternative Score	Total Score
Frequency	6-10 per year	>10 per year	< 1 year recurrence interval	Most Likely	5	25	20	15	10	5	0	15	5	10
	1-6 per year	4-10 per year	1-2 yr recurrence interval		4	20	16	12	8	4	0	12	4	8
	1-2 year recurrence interval	1-4 per year	2-5 yr recurrence interval		3	15	12	9	6	3	0	8	3	5
	2-5 year recurrence interval	1-2 year recurrence interval	5-10 yr recurrence interval		2	10	8	6	4	2	0	8	4	4
	>5 year recurrence interval	>2 year recurrence interval	>10 yr storm return	Least Likely	1	5	4	3	2	1	0	4	2	2
	Not Possible	Not Possible	Not Possible	Not Possible	0	0	0	0	0	0	0	Average Total Score		5.80
												Corrected Score		9.67

Note - This value sheet calculates the average benefit over the recurrence intervals. A correction calculation is included in order to obtain a maximum score of 25.

Acronyms

CSO - Combined sewer overflow
FC - Fecal coliform
GIS - Geographic information system
HRT - Hydraulic retention time
ml - Milliliter
SSO - Sanitary sewer overflow
WWTP - Wastewater treatment plant

Alternative #3															
Value:	Public Health		Measure			Impact						Measurement Method			
Performance Measures	WWTP Peak Flows		WWTP Peak Flows	Peak flow delivered to WWTP versus rated peak hour capacity of disinfection system		Peak flow exceeds rated capacity by more than 100%, wetlands treatment with < 1 day HRT	Peak flow exceeds rated capacity by 50 - 100%, wetlands treatment with < 2 days HRT	Peak flow exceeds rated capacity by 10 - 50%, wetlands treatment with < 3 days HRT	Peak flow exceeds rated capacity by less than 10%, wetlands treatment with 3 - 5 days HRT	Peak flow is within rated capacity, wetlands treatment with > 5 days HRT	Peak flow is less than 80% of rated capacity	Measurement will be from analyzing plant influent flows against pre-determined plant stress-test results and operating criteria.		
	WWTP Peak Flows	CSOs	CSOs and SSOs	Release point		Untreated CSO or SSO discharge (or runoff in CSO area) where volume is > 0.04% of stream's flow	Significant untreated discharge to water or ground in high public use or access area	Minor discharge to high public use area or significant discharge to water in low public use or access area, basement back-up	Minor discharge to water in low public use area, or significant minor discharge to ground in low public use or access area, discharge contained and cleaned up	Minor discharge to ground in low public use area or discharged anywhere, de minimus quantity	No discharge	Measurement methods will be via hydraulic models to quantify the SSO discharge and the GIS to establish relative distance from designated locations or objects.		
	Design Event Recurrence Interval	Frequency per location	Event Recurrence Interval			Most Severe Impact				Least Impact	No Impact			
						5	4	3	2	1	0	Base Case Score	Alternative Score	Total Score
Frequency	6-10 per year	>10 per year	< 1 year recurrence interval	Most Likely	5	25	20	15	10	5	0	15	0	15
	1-6 per year	4-10 per year	1-2 yr recurrence interval		4	20	16	12	8	4	0	12	4	8
	1-2 year recurrence interval	1-4 per year	2-5 yr recurrence interval		3	15	12	9	6	3	0	8	3	5
	2-5 year recurrence interval	1-2 year recurrence interval	5-10 yr recurrence interval		2	10	8	6	4	2	0	8	4	4
	>5 year recurrence interval	>2 year recurrence interval	>10 yr storm return	Least Likely	1	5	4	3	2	1	0	4	2	2
	Not Possible	Not Possible	Not Possible	Not Possible	0	0	0	0	0	0	0	Average Total Score		6.80
													Corrected Score	11.33

Note - This value sheet calculates the average benefit over the recurrence intervals. A correction calculation is included in order to obtain a maximum score of 25.

Acronyms

CSO - Combined sewer overflow
FC - Fecal coliform
GIS - Geographic information system
HRT - Hydraulic retention time
ml - Milliliter
SSO - Sanitary sewer overflow
WWTP - Wastewater treatment plant

Alternative #4

Value:	Public Health		Measure			Impact						Measurement Method		
Performance Measures	WWTP Peak Flows			Peak flow delivered to WWTP versus rated peak hour capacity of disinfection system		Peak flow exceeds rated capacity by more than 100%, wetlands treatment with < 1 day HRT	Peak flow exceeds rated capacity by 50 - 100%, wetlands treatment with < 2 days HRT	Peak flow exceeds rated capacity by 10 - 50%, wetlands treatment with < 3 days HRT	Peak flow exceeds rated capacity by less than 10%, wetlands treatment with 3 - 5 days HRT	Peak flow is within rated capacity, wetlands treatment with > 5 days HRT	Peak flow is less than 80% of rated capacity	Measurement will be from analyzing plant influent flows against pre-determined plant stress-test results and operating criteria.		
	WWTP Peak Flows	CSOs	CSOs and SSOs	Release point		Untreated CSO or SSO discharge (or runoff in CSO area) where volume is > 0.04% of stream's flow	Significant untreated discharge to water or ground in high public use or access area	Minor discharge to high public use area or significant discharge to water in low public use or access area, basement back-up	Minor discharge to water in low public use area, or significant minor discharge to ground in low public use or access area, discharge contained and cleaned up	Minor discharge to ground in low public use area or discharged anywhere, de minimus quantity	No discharge	Measurement methods will be via hydraulic models to quantify the SSO discharge and the GIS to establish relative distance from designated locations or objects.		
	Design Event Recurrence Interval	Frequency per location	Event Recurrence Interval	→ / ↓		Most Severe Impact				Least Impact	No Impact			
						5	4	3	2	1	0	Base Case Score	Alternative Score	Total Score
Frequency	6-10 per year	>10 per year	< 1 year recurrence interval	Most Likely	5	25	20	15	10	5	0	15	5	10
	1-6 per year	4-10 per year	1-2 yr recurrence interval		4	20	16	12	8	4	0	12	4	8
	1-2 year recurrence interval	1-4 per year	2-5 yr recurrence interval		3	15	12	9	6	3	0	8	6	2
	2-5 year recurrence interval	1-2 year recurrence interval	5-10 yr recurrence interval		2	10	8	6	4	2	0	8	4	4
	>5 year recurrence interval	>2 year recurrence interval	>10 yr storm return	Least Likely	1	5	4	3	2	1	0	4	2	2
	Not Possible	Not Possible	Not Possible	Not Possible	0	0	0	0	0	0	0	Average Total Score		5.20
												Corrected Score		8.67

Note - This value sheet calculates the average benefit over the recurrence intervals. A correction calculation is included in order to obtain a maximum score of 25.

Acronyms

CSO - Combined sewer overflow
FC - Fecal coliform
GIS - Geographic information system
HRT - Hydraulic retention time
ml - Milliliter
SSO - Sanitary sewer overflow
WWTP - Wastewater treatment plant

Alternative #5																	
Value:	Public Health		Measure			Impact						Measurement Method					
Performance Measures	WWTP Peak Flows		WWTP Peak Flows	Peak flow delivered to WWTP versus rated peak hour capacity of disinfection system		Peak flow exceeds rated capacity by more than 100%, wetlands treatment with < 1 day HRT	Peak flow exceeds rated capacity by 50 - 100%, wetlands treatment with < 2 days HRT	Peak flow exceeds rated capacity by 10 - 50%, wetlands treatment with < 3 days HRT	Peak flow exceeds rated capacity by less than 10%, wetlands treatment with 3 - 5 days HRT	Peak flow is within rated capacity, wetlands treatment with > 5 days HRT	Peak flow is less than 80% of rated capacity	Measurement will be from analyzing plant influent flows against pre-determined plant stress-test results and operating criteria.				
	WWTP Peak Flows	CSOs	CSOs and SSOs	Release point		Untreated CSO or SSO discharge (or runoff in CSO area) where volume is > 0.04% of stream's flow	Significant untreated discharge to water or ground in high public use or access area	Minor discharge to high public use area or significant discharge to water in low public use or access area, basement back-up	Minor discharge to water in low public use area, or significant minor discharge to ground in low public use or access area, discharge contained and cleaned up	Minor discharge to ground in low public use area or discharged anywhere, de minimus quantity	No discharge	Measurement methods will be via hydraulic models to quantify the SSO discharge and the GIS to establish relative distance from designated locations or objects.				
	Design Event Recurrence Interval	Frequency per location	Event Recurrence Interval			Most Severe Impact				Least Impact	No Impact						
						5	4	3	2	1	0	Base Case Score	Alternative Score	Total Score			
Frequency	6-10 per year	>10 per year	< 1 year recurrence interval	Most Likely	5	25	20	15	10	5	0	15	0	15			
	1-6 per year	4-10 per year	1-2 yr recurrence interval		4	20	16	12	8	4	0	12	0	12			
	1-2 year recurrence interval	1-4 per year	2-5 yr recurrence interval		3	15	12	9	6	3	0	8	3	5			
	2-5 year recurrence interval	1-2 year recurrence interval	5-10 yr recurrence interval		2	10	8	6	4	2	0	8	2	6			
	>5 year recurrence interval	>2 year recurrence interval	>10 yr storm return	Least Likely	1	5	4	3	2	1	0	4	1	3			
	Not Possible	Not Possible	Not Possible	Not Possible	0	0	0	0	0	0	0	Average Total Score		8.20			
												Corrected Score		13.67			

Note - This value sheet calculates the average benefit over the recurrence intervals. A correction calculation is included in order to obtain a maximum score of 25.

Acronyms

CSO - Combined sewer overflow
FC - Fecal coliform
GIS - Geographic information system
HRT - Hydraulic retention time
ml - Milliliter
SSO - Sanitary sewer overflow
WWTP - Wastewater treatment plant

Alternative #1													
Value:	Asset Protection			Impact						Measurement Method			
Performance Measures		Flood Damage		Homes or businesses are subject to severe structural damage	Homes or businesses are subject to minor to moderate structural damage	Flooding limits access to homes or businesses	Flooding limits access to recreational areas	Standing water on property, but access not affected and no damage expected	No standing water	Drainage models where available, or historic observations of flood-prone areas combined with the expected relative impacts of sewer system modifications on storm water flows			
		Basement Back-ups		Sewer surcharging within 6 feet of ground surface for more than 20% of manholes	Sewer surcharging within 6 feet of ground surface for 10 - 20% of manholes	Sewer surcharging within 6 feet of ground surface for 5 - 10% of manholes	Sewer surcharging within 6 feet of ground surface for 1 - 5% of manholes	Sewer surcharging within 6 feet of ground surface for 0 - 1% of manholes	No surcharging within 6 feet of ground surface	Measurement methods will be via hydraulic models to quantify the hydraulic grade lines compared to ground surface elevations at manholes.			
	Event Recurrence Interval	→ / ↓		Most Severe Impact				Least Impact	No Impact				
				5	4	3	2	1	0	Base Case Score	Alternative Score	Total Score	
Frequency	6-10 per year	Most Likely	5	25	20	15	10	5	0	0	0	0	
	1-6 per year		4	20	16	12	8	4	0	0	0	0	
	1-2 year recurrence interval		3	15	12	9	6	3	0	0	0	0	
	2-5 year recurrence interval		2	10	8	6	4	2	0	2	0	2	
	>5 year recurrence interval	Least Likely	1	5	4	3	2	1	0	1	0	1	
	Not Possible	Not Possible	0	0	0	0	0	0	0	Average Total Score		0.60	
Note - This value sheet calculates the average benefit over the recurrence intervals. A correction calculation is included in order to obtain a maximum score of 25.										Corrected Score		1.00	

Acronyms
BMPs - Best management practices

Alternative #2													
Value:	Asset Protection			Impact						Measurement Method			
		Flood Damage		Homes or businesses are subject to severe structural damage	Homes or businesses are subject to minor to moderate structural damage	Flooding limits access to homes or businesses	Flooding limits access to recreational areas	Standing water on property, but access not affected and no damage expected	No standing water	Drainage models where available, or historic observations of flood-prone areas combined with the expected relative impacts of sewer system modifications on storm water flows			
Performance Measures		Basement Back-ups		Sewer surcharging within 6 feet of ground surface for more than 20% of manholes	Sewer surcharging within 6 feet of ground surface for 10 - 20% of manholes	Sewer surcharging within 6 feet of ground surface for 5 - 10% of manholes	Sewer surcharging within 6 feet of ground surface for 1 - 5% of manholes	Sewer surcharging within 6 feet of ground surface for 0 - 1% of manholes	No surcharging within 6 feet of ground surface	Measurement methods will be via hydraulic models to quantify the hydraulic grade lines compared to ground surface elevations at manholes.			
	Event Recurrence Interval	→ / ↓		Most Severe Impact				Least Impact	No Impact				
				5	4	3	2	1	0	Base Case Score	Alternative Score	Total Score	
Frequency	6-10 per year	Most Likely	5	25	20	15	10	5	0	0	0	0	
	1-6 per year		4	20	16	12	8	4	0	0	0	0	
	1-2 year recurrence interval		3	15	12	9	6	3	0	0	0	0	
	2-5 year recurrence interval		2	10	8	6	4	2	0	2	2	0	
	>5 year recurrence interval	Least Likely	1	5	4	3	2	1	0	1	1	0	
	Not Possible	Not Possible	0	0	0	0	0	0	0	Average Total Score		0.00	
Note - This value sheet calculates the average benefit over the recurrence intervals. A correction calculation is included in order to obtain a maximum score of 25.										Corrected Score		0.00	

Acronyms
BMPs - Best management practices

Alternative #3													
Value:	Asset Protection			Impact						Measurement Method			
Performance Measures		Flood Damage		Homes or businesses are subject to severe structural damage	Homes or businesses are subject to minor to moderate structural damage	Flooding limits access to homes or businesses	Flooding limits access to recreational areas	Standing water on property, but access not affected and no damage expected	No standing water	Drainage models where available, or historic observations of flood-prone areas combined with the expected relative impacts of sewer system modifications on storm water flows			
		Basement Back-ups		Sewer surcharging within 6 feet of ground surface for more than 20% of manholes	Sewer surcharging within 6 feet of ground surface for 10 - 20% of manholes	Sewer surcharging within 6 feet of ground surface for 5 - 10% of manholes	Sewer surcharging within 6 feet of ground surface for 1 - 5% of manholes	Sewer surcharging within 6 feet of ground surface for 0 - 1% of manholes	No surcharging within 6 feet of ground surface	Measurement methods will be via hydraulic models to quantify the hydraulic grade lines compared to ground surface elevations at manholes.			
	Event Recurrence Interval	→ / ↓		Most Severe Impact				Least Impact	No Impact				
				5	4	3	2	1	0	Base Case Score	Alternative Score	Total Score	
Frequency	6-10 per year	Most Likely	5	25	20	15	10	5	0	0	0	0	
	1-6 per year		4	20	16	12	8	4	0	0	0	0	
	1-2 year recurrence interval		3	15	12	9	6	3	0	0	0	0	
	2-5 year recurrence interval		2	10	8	6	4	2	0	2	2	0	
	>5 year recurrence interval	Least Likely	1	5	4	3	2	1	0	1	1	0	
	Not Possible	Not Possible	0	0	0	0	0	0	0	Average Total Score		0.00	
Note - This value sheet calculates the average benefit over the recurrence intervals. A correction calculation is included in order to obtain a maximum score of 25.										Corrected Score		0.00	

Acronyms
BMPs - Best management practices

Alternative #4													
Value:	Asset Protection		Impact						Measurement Method				
		Flood Damage	Homes or businesses are subject to severe structural damage	Homes or businesses are subject to minor to moderate structural damage	Flooding limits access to homes or businesses	Flooding limits access to recreational areas	Standing water on property, but access not affected and no damage expected	No standing water	Drainage models where available, or historic observations of flood-prone areas combined with the expected relative impacts of sewer system modifications on storm water flows				
Performance Measures		Basement Back-ups	Sewer surcharging within 6 feet of ground surface for more than 20% of manholes	Sewer surcharging within 6 feet of ground surface for 10 - 20% of manholes	Sewer surcharging within 6 feet of ground surface for 5 - 10% of manholes	Sewer surcharging within 6 feet of ground surface for 1 - 5% of manholes	Sewer surcharging within 6 feet of ground surface for 0 - 1% of manholes	No surcharging within 6 feet of ground surface	Measurement methods will be via hydraulic models to quantify the hydraulic grade lines compared to ground surface elevations at manholes.				
	Event Recurrence Interval	→	Most Severe Impact				Least Impact	No Impact					
		↓	5	4	3	2	1	0	Base Case Score		Alternative Score		Total Score
Frequency	6-10 per year	Most Likely 5	25	20	15	10	5	0	0		0		0
	1-6 per year	4	20	16	12	8	4	0	0		0		0
	1-2 year recurrence interval	3	15	12	9	6	3	0	0		0		0
	2-5 year recurrence interval	2	10	8	6	4	2	0	2		2		0
	>5 year recurrence interval	Least Likely 1	5	4	3	2	1	0	1		1		0
	Not Possible	Not Possible 0	0	0	0	0	0	0	Average Total Score				0.00
Note - This value sheet calculates the average benefit over the recurrence intervals. A correction calculation is included in order to obtain a maximum score of 25.											Corrected Score		0.00
Acronyms BMPs - Best management practices													

Alternative #5													
Value:	Asset Protection			Impact						Measurement Method			
Performance Measures		Flood Damage		Homes or businesses are subject to severe structural damage	Homes or businesses are subject to minor to moderate structural damage	Flooding limits access to homes or businesses	Flooding limits access to recreational areas	Standing water on property, but access not affected and no damage expected	No standing water	Drainage models where available, or historic observations of flood-prone areas combined with the expected relative impacts of sewer system modifications on storm water flows			
		Basement Back-ups		Sewer surcharging within 6 feet of ground surface for more than 20% of manholes	Sewer surcharging within 6 feet of ground surface for 10 - 20% of manholes	Sewer surcharging within 6 feet of ground surface for 5 - 10% of manholes	Sewer surcharging within 6 feet of ground surface for 1 - 5% of manholes	Sewer surcharging within 6 feet of ground surface for 0 - 1% of manholes	No surcharging within 6 feet of ground surface	Measurement methods will be via hydraulic models to quantify the hydraulic grade lines compared to ground surface elevations at manholes.			
	Event Recurrence Interval	→		Most Severe Impact				Least Impact	No Impact				
		↓		5	4	3	2	1	0	Base Case Score	Alternative Score	Total Score	
Frequency	6-10 per year	Most Likely	5	25	20	15	10	5	0	0	0	0	
	1-6 per year		4	20	16	12	8	4	0	0	0	0	
	1-2 year recurrence interval		3	15	12	9	6	3	0	0	0	0	
	2-5 year recurrence interval		2	10	8	6	4	2	0	2	2	0	
	>5 year recurrence interval	Least Likely	1	5	4	3	2	1	0	1	1	0	
	Not Possible	Not Possible	0	0	0	0	0	0	0	Average Total Score		0.00	
										Corrected Score		0.00	

Note - This value sheet calculates the average benefit over the recurrence intervals. A correction calculation is included in order to obtain a maximum score of 25.

Acronyms

BMPs - Best management practices

Alternative #1												
Value:	**Environmental Enhancement**											
	Scoring											
Aspect	-5	-4	-3	-2	-1	0	1	2	3	4	5	Score Per Aspect
Aquatic and Terestrial Habitat Protection	Elimination of habitat for rare or endangered species	Elimination of significant amount of common habitat	Elimination of minor amount of common habitat	Significant habitat imparement	Minor imparement to existing habitat	No impact on habitat	Minor enhancement of existing habitat	Significant enhancement of existing habitat	Creation of minor amount of common habitat	Creation of significant amount of common habitat	Creation of critical habitat for rare or endangered species	0
Aesthetics - Solids and Floatables	75%+ reduction in volume of flow with no S&F capture	50 - 75% of flow with no S&F removal	25 - 50% of flow with no S&F removal	10 - 25% of flow with no S&F removal	Reduces efficiency of existing S&F control device, 0 - 10% of flow with no S&F removal	No change in S&F removal	0 - 10% of discharged flow treated with positive S&F removal (screens)	10 - 25 % of discharged flow treated with positive S&F removal (screens)	25 - 50% of discharged flow treated with positive S&F removal (screens)	50 - 75% of discharged flow treated with positive S&F removal screens	75% + of discharged flow treated with positive S&F removal (screens)	-2
Aesthetics - Odor and Air Emissions	Create annoying odor source affecting > 20 customers often	Create annoying odor source affecting <20 customers often, or >20 customers occasionally	Create annoying odor source affecting <20 customers occasionally	Create detectable odor source affecting > 50 customers often	Create detectable odor source affecting < 50 customers occasionally	No impact on odors	Eliminate detectable odor source affecting < 50 customers occasionally	Eliminate detectable odor source affecting > 50 customers often	Eliminate annoying odor source affecting <20 customers occasionally	Eliminate annoying odor source affecting <20 customers often, or >20 customers occasionally	Eliminate annoying odor source affecting >20 customers often	2
Dissolved Oxygen Impacts	Reduction of in-stream DO by 2 mg/l + during critical flow periods	Continuous reduction of in-stream DO of 2 mg/l +	Continuous reduction of in-stream DO of 0 - 2 mg/l, possible reduction of in-stream DO 2 - 4 mg/l during critical conditions	Intermittent reduction of in stream DO 2 mg/l + possible during non-critical conditions, reduction of DO 0 - 2 mg/l during critical conditions	Intermittent reduction of in stream DO 0 - 2 mg/l possible during non-critical conditions	No DO impacts	Intermittent improvement of in-stream DO 0 - 2 mg/l	Intermittent improvement of in-stream DO 2 mg/l +, intermittant critical condition improvments 0 - 2 mg/l	Continuous improvement of in-stream DO 0 - 2 mg/l, intermittant critical condition improvements 2-4 mg/l	Continuous improvement of in-stream DO 2 mg/l +	Continuous improvement of critical condition in-stream DO 2 mg/l +	-1
Downstream Impacts	75%+ increase in annual BOD or nutrient loads	50 - 75% increase in annual BOD or nutrient loads	25 - 50% increase in annual BOD or nutrient loads	10 - 25% increase in annual BOD or nutrient loads (CSO + runoff)	Potential 0 - 10 % increase in annual average BOD or nutrient loads (CSO + runoff)	No impact on BOD or nutrient loads (CSO + runoff)	0 - 10% reduction in annual BOD or nutrient loads (CSO + runoff)	10 - 25% reduction in annual BOD or nutrient loads (CSO + runoff)	25 - 50% reduction in annual BOD or nutrient loads (CSO + runoff)	50 - 75% reduction in annual BOD or nutrient loads (CSO + runoff)	75%+ reduction in annual BOD or nutrient loads (CSO + runoff)	-2
Stream Flow Impacts (Peak flows)	25% + increase in peak flows	10% - 25% increase in peak flows	Up to 10% increase in peak flows	Frequent increase in flow during critical conditions	Possible increase in average flow, or minor increase in high flow peaks	No impact on peak flows	Minor reduction in flows - no significant peak reduction	Minor reduction in peak flows under some conditions	Up to 10% reduction in peak flows	10% - 25% reduction in peak flows	25%+ reduction in peak flows	-2
Stream Flow Impacts (DWF only)	25%+ decrease in flow during critical conditions.	10% - 25% decrease in flow during critical conditions	0-10% permanent decrease in flow during critical conditions	Frequent decrease in flow during critical conditions	Possible decrease in average flow	No impact on average or base stream flow	Intermittent increase in stream flow - not timed to critical conditions	Intermittent increase in stream flow - often improves critical conditions	0 - 10% permanent increase in stream flow during critical conditions	10 - 25 % permanent increase in stream flow during critical conditions	25%+ permanent increase in stream flow during critical conditions.	2
Instructions: (1.) Score each alternative for each of the seven aspects of the value. Scores can be positive or negative, depending on the impact of the alternative on the value. (2.) Total the scores for each aspect to get the total score for this alternative in this value. (3.) Shaded area represents "fatal flaw". Alternatives that score in this area should not be proposed.										**Total Raw Score Calculated**		-3.00
Aspect	Rationale						Measurement Method			**Total Score (Default)**		-3.00

Acronyms

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

Alternative #2												
Value:	**Environmental Enhancement**											
	Scoring											
Aspect	-5	-4	-3	-2	-1	0	1	2	3	4	5	Score Per Aspect
Aquatic and Terestrial Habitat Protection	Elimination of habitat for rare or endangered species	Elimination of significant amount of common habitat	Elimination of minor amount of common habitat	Significant habitat imparement	Minor imparement to existing habitat	No impact on habitat	Minor enhancement of existing habitat	Significant enhancement of existing habitat	Creation of minor amount of common habitat	Creation of significant amount of common habitat	Creation of critical habitat for rare or endangered species	3
Aesthetics - Solids and Floatables	75%+ reduction in volume of flow with no S&F capture	50 - 75% of flow with no S&F removal	25 - 50% of flow with no S&F removal	10 - 25% of flow with no S&F removal	Reduces efficiency of existing S&F control device, 0 - 10% of flow with no S&F removal	No change in S&F removal	0 - 10% of discharged flow treated with positive S&F removal (screens)	10 - 25 % of discharged flow treated with positive S&F removal (screens)	25 - 50% of discharged flow treated with positive S&F removal (screens)	50 - 75% of discharged flow treated with positive S&F removal screens	75% + of discharged flow treated with positive S&F removal (screens)	4
Aesthetics - Odor and Air Emissions	Create annoying odor source affecting > 20 customers often	Create annoying odor source affecting <20 customers often, or >20 customers occasionally	Create annoying odor source affecting <20 customers occasionally	Create detectable odor source affecting > 50 customers often	Create detectable odor source affecting < 50 customers occasionally	No impact on odors	Eliminate detectable odor source affecting < 50 customers occasionally	Eliminate detectable odor source affecting > 50 customers often	Eliminate annoying odor source affecting <20 customers occasionally	Eliminate annoying odor source affecting <20 customers often, or >20 customers occasionally	Eliminate annoying odor source affecting >20 customers often	0
Dissolved Oxygen Impacts	Reduction of in-stream DO by 2 mg/l + during critical flow periods	Continuous reduction of in-stream DO of 2 mg/l +	Continuous reduction of in-stream DO of 0 - 2 mg/l, possible reduction of in-stream DO 2 - 4 mg/l during critical conditions	Intermittent reduction of in stream DO 2 mg/l + possible during non-critical conditions, reduction of DO 0 - 2 mg/l during critical conditions	Intermittent reduction of in stream DO 0 - 2 mg/l possible during non-critical conditions	No DO impacts	Intermittent improvement of in-stream DO 0 - 2 mg/l	Intermittent improvement of in-stream DO 2 mg/l +, intermittant critical condition improvments 0 - 2 mg/l	Continuous improvement of in-stream DO 0 - 2 mg/l, intermittant critical condition improvements 2-4 mg/l	Continuous improvement of in-stream DO 2 mg/l +	Continuous improvement of critical condition in-stream DO 2 mg/l +	3
Downstream Impacts	75%+ increase in annual BOD or nutrient loads	50 - 75% increase in annual BOD or nutrient loads	25 - 50% increase in annual BOD or nutrient loads	10 - 25% increase in annual BOD or nutrient loads (CSO + runoff)	Potential 0 - 10 % increase in annual average BOD or nutrient loads (CSO + runoff)	No impact on BOD or nutrient loads (CSO + runoff)	0 - 10% reduction in annual BOD or nutrient loads (CSO + runoff)	10 - 25% reduction in annual BOD or nutrient loads (CSO + runoff)	25 - 50% reduction in annual BOD or nutrient loads (CSO + runoff)	50 - 75% reduction in annual BOD or nutrient loads (CSO + runoff)	75%+ reduction in annual BOD or nutrient loads (CSO + runoff)	2
Stream Flow Impacts (Peak flows)	25% + increase in peak flows	10% - 25% increase in peak flows	Up to 10% increase in peak flows	Frequent increase in flow during critical conditions	Possible increase in average flow, or minor increase in high flow peaks	No impact on peak flows	Minor reduction in flows - no significant peak reduction	Minor reduction in peak flows under some conditions	Up to 10% reduction in peak flows	10% - 25% reduction in peak flows	25%+ reduction in peak flows	2
Stream Flow Impacts (DWF only)	25%+ decrease in flow during critical conditions.	10% - 25% decrease in flow during critical conditions	0-10% permanent decrease in flow during critical conditions	Frequent decrease in flow during critical conditions	Possible decrease in average flow	No impact on average or base stream flow	Intermittent increase in stream flow - not timed to critical conditions	Intermittent increase in stream flow - often improves critical conditions	0 - 10% permanent increase in stream flow during critical conditions	10 - 25 % permanent increase in stream flow during critical conditions	25%+ permanent increase in stream flow during critical conditions.	2

Instructions: (1.) Score each alternative for each of the seven aspects of the value. Scores can be positive or negative, depending on the impact of the alternative on the value. (2.) Total the scores for each aspect to get the total score for this alternative in this value. (3.) Shaded area represents "fatal flaw". Alternatives that score in this area should not be proposed.

Total Raw Score Calculated	16.00
Total Score (Default)	16.00

Aspect	Rationale	Measurement Method

Acronyms

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

Alternative #3												
Value:	**Environmental Enhancement**											
	Scoring											
Aspect	-5	-4	-3	-2	-1	0	1	2	3	4	5	Score Per Aspect
Aquatic and Terestrial Habitat Protection	Elimination of habitat for rare or endangered species	Elimination of significant amount of common habitat	Elimination of minor amount of common habitat	Significant habitat imparement	Minor imparement to existing habitat	No impact on habitat	Minor enhancement of existing habitat	Significant enhancement of existing habitat	Creation of minor amount of common habitat	Creation of significant amount of common habitat	Creation of critical habitat for rare or endangered species	-1
Aesthetics - Solids and Floatables	75%+ reduction in volume of flow with no S&F capture	50 - 75% of flow with no S&F removal	25 - 50% of flow with no S&F removal	10 - 25% of flow with no S&F removal	Reduces efficiency of existing S&F control device, 0 - 10% of flow with no S&F removal	No change in S&F removal	0 - 10% of discharged flow treated with positive S&F removal (screens)	10 - 25 % of discharged flow treated with positive S&F removal (screens)	25 - 50% of discharged flow treated with positive S&F removal (screens)	50 - 75% of discharged flow treated with positive S&F removal screens	75% + of discharged flow treated with positive S&F removal (screens)	5
Aesthetics - Odor and Air Emissions	Create annoying odor source affecting > 20 customers often	Create annoying odor source affecting <20 customers often, or >20 customers occasionally	Create annoying odor source affecting <20 customers occasionally	Create detectable odor source affecting > 50 customers often	Create detectable odor source affecting < 50 customers occasionally	No impact on odors	Eliminate detectable odor source affecting < 50 customers occasionally	Eliminate detectable odor source affecting > 50 customers often	Eliminate annoying odor source affecting <20 customers occasionally	Eliminate annoying odor source affecting <20 customers often, or >20 customers occasionally	Eliminate annoying odor source affecting >20 customers often	0
Dissolved Oxygen Impacts	Reduction of in-stream DO by 2 mg/l + during critical flow periods	Continuous reduction of in-stream DO of 2 mg/l +	Continuous reduction of in-stream DO of 0 - 2 mg/l, possible reduction of in-stream DO 2 - 4 mg/l during critical conditions	Intermittent reduction of in stream DO 2 mg/l + possible during non-critical conditions, reduction of DO 0 - 2 mg/l during critical conditions	Intermittent reduction of in stream DO 0 - 2 mg/l possible during non-critical conditions	No DO impacts	Intermittent improvement of in-stream DO 0 - 2 mg/l	Intermittent improvement of in-stream DO 2 mg/l +, intermittant critical condition improvments 0 - 2 mg/l	Continuous improvement of in-stream DO 0 - 2 mg/l, intermittant critical condition improvements 2-4 mg/l	Continuous improvement of in-stream DO 2 mg/l +	Continuous improvement of critical condition in-stream DO 2 mg/l +	1
Downstream Impacts	75%+ increase in annual BOD or nutrient loads	50 - 75% increase in annual BOD or nutrient loads	25 - 50% increase in annual BOD or nutrient loads	10 - 25% increase in annual BOD or nutrient loads (CSO + runoff)	Potential 0 - 10 % increase in annual average BOD or nutrient loads (CSO + runoff)	No impact on BOD or nutrient loads (CSO + runoff)	0 - 10% reduction in annual BOD or nutrient loads (CSO + runoff)	10 - 25% reduction in annual BOD or nutrient loads (CSO + runoff)	25 - 50% reduction in annual BOD or nutrient loads (CSO + runoff)	50 - 75% reduction in annual BOD or nutrient loads (CSO + runoff)	75%+ reduction in annual BOD or nutrient loads (CSO + runoff)	3
Stream Flow Impacts (Peak flows)	25% + increase in peak flows	10% - 25% increase in peak flows	Up to 10% increase in peak flows	Frequent increase in flow during critical conditions	Possible increase in average flow, or minor increase in high flow peaks	No impact on peak flows	Minor reduction in flows - no significant peak reduction	Minor reduction in peak flows under some conditions	Up to 10% reduction in peak flows	10% - 25% reduction in peak flows	25%+ reduction in peak flows	2
Stream Flow Impacts (DWF only)	25%+ decrease in flow during critical conditions.	10% - 25% decrease in flow during critical conditions	0-10% permanent decrease in flow during critical conditions	Frequent decrease in flow during critical conditions	Possible decrease in average flow	No impact on average or base stream flow	Intermittent increase in stream flow - not timed to critical conditions	Intermittent increase in stream flow - often improves critical conditions	0 - 10% permanent increase in stream flow during critical conditions	10 - 25 % permanent increase in stream flow during critical conditions	25%+ permanent increase in stream flow during critical conditions.	0
Instructions: (1.) Score each alternative for each of the seven aspects of the value. Scores can be positive or negative, depending on the impact of the alternative on the value. (2.) Total the scores for each aspect to get the total score for this alternative in this value. (3.) Shaded area represents "fatal flaw". Alternatives that score in this area should not be proposed.										**Total Raw Score Calculated**		10.00
Aspect	Rationale						Measurement Method			**Total Score (Default)**		10.00

Acronyms

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

Alternative #4												
Value:	**Environmental Enhancement**											
						Scoring						
Aspect	-5	-4	-3	-2	-1	0	1	2	3	4	5	Score Per Aspect
Aquatic and Terestrial Habitat Protection	Elimination of habitat for rare or endangered species	Elimination of significant amount of common habitat	Elimination of minor amount of common habitat	Significant habitat imparement	Minor imparement to existing habitat	No impact on habitat	Minor enhancement of existing habitat	Significant enhancement of existing habitat	Creation of minor amount of common habitat	Creation of significant amount of common habitat	Creation of critical habitat for rare or endangered species	3
Aesthetics - Solids and Floatables	75%+ reduction in volume of flow with no S&F capture	50 - 75% of flow with no S&F removal	25 - 50% of flow with no S&F removal	10 - 25% of flow with no S&F removal	Reduces efficiency of existing S&F control device, 0 - 10% of flow with no S&F removal	No change in S&F removal	0 - 10% of discharged flow treated with positive S&F removal (screens)	10 - 25 % of discharged flow treated with positive S&F removal (screens)	25 - 50% of discharged flow treated with positive S&F removal (screens)	50 - 75% of discharged flow treated with positive S&F removal screens	75% + of discharged flow treated with positive S&F removal (screens)	4
Aesthetics - Odor and Air Emissions	Create annoying odor source affecting > 20 customers often	Create anrtoying odor source affecting <20 customers often, or >20 customers occasionally	Create annoying odor source affecting <20 customers occasionally	Create detectable odor source affecting > 50 customers often	Create detectable odor source affecting < 50 customers occasionally	No impact on odors	Eliminate detectable odor source affecting < 50 customers occasionally	Eliminate detectable odor source affecting > 50 customers often	Eliminate annoying odor source affecting <20 customers occasionally	Eliminate annoying odor source affecting <20 customers often, or >20 customers occasionally	Eliminate annoying odor source affecting >20 customers often	0
Dissolved Oxygen Impacts	Reduction of in-stream DO by 2 mg/l + during critical flow periods	Continuous reduction of in-stream DO of 2 mg/l +	Continuous reduction of in-stream DO of 0 - 2 mg/l, possible reduction of in-stream DO 2 - 4 mg/l during critical conditions	Intermittent reduction of in stream DO 2 mg/l + possible during non-critical conditions, reduction of DO 0 - 2 mg/l during critical conditions	Intermittent reduction of in stream DO 0 - 2 mg/l possible during non-critical conditions	No DO impacts	Intermittent improvement of in-stream DO 0 - 2 mg/l	Intermittent improvement of in-stream DO 2 mg/l +, intermittant critical condition improvments 0 - 2 mg/l	Continuous improvement of in-stream DO 0 - 2 mg/l, intermittant critical condition improvements 2-4 mg/l	Continuous improvement of in-stream DO 2 mg/l +	Continuous improvement of critical condition in-stream DO 2 mg/l +	2
Downstream Impacts	75%+ increase in annual BOD or nutrient loads	50 - 75% increase in annual BOD or nutrient loads	25 - 50% increase in annual BOD or nutrient loads	10 - 25% increase in annual BOD or nutrient loads (CSO + runoff)	Potential 0 - 10 % increase in annual average BOD or nutrient loads (CSO + runoff)	No impact on BOD or nutrient loads (CSO + runoff)	0 - 10% reduction in annual BOD or nutrient loads (CSO + runoff)	10 - 25% reduction in annual BOD or nutrient loads (CSO + runoff)	25 - 50% reduction in annual BOD or nutrient loads (CSO + runoff)	50 - 75% reduction in annual BOD or nutrient loads (CSO + runoff)	75%+ reduction in annual BOD or nutrient loads (CSO + runoff)	2
Stream Flow Impacts (Peak flows)	25%+ increase in peak flows	10% - 25% increase in peak flows	Up to 10% increase in peak flows	Frequent increase in flow during critical conditions	Possible increase in average flow, or minor increase in high flow peaks	No impact on peak flows	Minor reduction in flows - no significant peak reduction	Minor reduction in peak flows under some conditions	Up to 10% reduction in peak flows	10% - 25% reduction in peak flows	25%+ reduction in peak flows	2
Stream Flow Impacts (DWF only)	25%+ decrease in flow during critical conditions.	10% - 25% decrease in flow during critical conditions	0-10% permanent decrease in flow during critical conditions	Frequent decrease in flow during critical conditions	Possible decrease in average flow	No impact on average or base stream flow	Intermittent increase in stream flow - not timed to critical conditions	Intermittent increase in stream flow - often improves critical conditions	0 - 10% permanent increase in stream flow during critical conditions	10 - 25 % permanent increase in stream flow during critical conditions	25%+ permanent increase in stream flow during critical conditions.	0
Instructions: (1.) Score each alternative for each of the seven aspects of the value. Scores can be positive or negative, depending on the impact of the alternative on the value. (2.) Total the scores for each aspect to get the total score for this alternative in this value. (3.) Shaded area represents "fatal flaw". Alternatives that score in this area should not be proposed.										**Total Raw Score Calculated**		13.00
Aspect	Rationale						Measurement Method			**Total Score (Default)**		13.00

Acronyms

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

Alternative #5												
Value:	**Environmental Enhancement**											
	Scoring											
Aspect	-5	-4	-3	-2	-1	0	1	2	3	4	5	Score Per Aspect
Aquatic and Terestrial Habitat Protection	Elimination of habitat for rare or endangered species	Elimination of significant amount of common habitat	Elimination of minor amount of common habitat	Significant habitat imparement	Minor imparement to existing habitat	No impact on habitat	Minor enhancement of existing habitat	Significant enhancement of existing habitat	Creation of minor amount of common habitat	Creation of significant amount of common habitat	Creation of critical habitat for rare or endangered species	3
Aesthetics - Solids and Floatables	75%+ reduction in volume of flow with no S&F capture	50 - 75% of flow with no S&F removal	25 - 50% of flow with no S&F removal	10 - 25% of flow with no S&F removal	Reduces efficiency of existing S&F control device, 0 - 10% of flow with no S&F removal	No change in S&F removal	0 - 10% of discharged flow treated with positive S&F removal (screens)	10 - 25 % of discharged flow treated with positive S&F removal (screens)	25 - 50% of discharged flow treated with positive S&F removal (screens)	50 - 75% of discharged flow treated with positive S&F removal screens	75% + of discharged flow treated with positive S&F removal (screens)	4
Aesthetics - Odor and Air Emissions	Create annoying odor source affecting > 20 customers often	Create annoying odor source affecting <20 customers often, or >20 customers occasionally	Create annoying odor source affecting <20 customers occasionally	Create detectable odor source affecting > 50 customers often	Create detectable odor source affecting < 50 customers occasionally	No impact on odors	Eliminate detectable odor source affecting < 50 customers occasionally	Eliminate detectable odor source affecting > 50 customers often	Eliminate annoying odor source affecting <20 customers occasionally	Eliminate annoying odor source affecting <20 customers often, or >20 customers occasionally	Eliminate annoying odor source affecting >20 customers often	0
Dissolved Oxygen Impacts	Reduction of in-stream DO by 2 mg/l + during critical flow periods	Continuous reduction of in-stream DO of 2 mg/l +	Continuous reduction of in-stream DO of 0 - 2 mg/l, possible reduction of in-stream DO 2 - 4 mg/l during critical conditions	Intermittent reduction of in stream DO 2 mg/l + possible during non-critical conditions, reduction of DO 0 - 2 mg/l during critical conditions	Intermittent reduction of in stream DO 0 - 2 mg/l possible during non-critical conditions	No DO impacts	Intermittent improvement of in-stream DO 0 - 2 mg/l	Intermittent improvement of in-stream DO 2 mg/l +, intermittant critical condition improvments 0 - 2 mg/l	Continuous improvement of in-stream DO 0 - 2 mg/l, intermittant critical condition improvements 2-4 mg/l	Continuous improvement of in-stream DO 2 mg/l +	Continuous improvement of critical condition in-stream DO 2 mg/l +	2
Downstream Impacts	75%+ increase in annual BOD or nutrient loads	50 - 75% increase in annual BOD or nutrient loads	25 - 50% increase in anoual BOD or nutrient loads	10 - 25% increase in annual BOD or nutrient loads (CSO + runoff)	Potential 0 - 10 % increase in annual average BOD or nutrient loads (CSO + runoff)	No impact on BOD or nutrient loads (CSO + runoff)	0 - 10% reduction in annual BOD or nutrient loads (CSO + runoff)	10 - 25% reduction in annual BOD or nutrient loads (CSO + runoff)	25 - 50% reduction in annual BOD or nutrient loads (CSO + runoff)	50 - 75% reduction in annual BOD or nutrient loads (CSO + runoff)	75%+ reduction in annual BOD or nutrient loads (CSO + runoff)	2
Stream Flow Impacts (Peak flows)	25%+ increase in peak flows	10% - 25% increase in peak flows	Up to 10% increase in peak flows	Frequent increase in flow during critical conditions	Possible increase in average flow, or minor increase in high flow peaks	No impact on peak flows	Minor reduction in flows - no significant peak reduction	Minor reduction in peak flows under some conditions	Up to 10% reduction in peak flows	10% - 25% reduction in peak flows	25%+ reduction in peak flows	2
Stream Flow Impacts (DWF only)	25%+ decrease in flow during critical conditions.	10% - 25% decrease in flow during critical conditions	0-10% permanent decrease in flow during critical conditions	Frequent decrease in flow during critical conditions	Possible decrease in average flow	No impact on average or base stream flow	Intermittent increase in stream flow - not timed to critical conditions	Intermittent increase in stream flow - often improves critical conditions	0 - 10% permanent increase in stream flow during critical conditions	10 - 25 % permanent increase in stream flow during critical conditions	25%+ permanent increase in stream flow during critical conditions.	0
Instructions: (1.) Score each alternative for each of the seven aspects of the value. Scores can be positive or negative, depending on the impact of the alternative on the value. (2.) Total the scores for each aspect to get the total score for this alternative in this value. (3.) Shaded area represents "fatal flaw". Alternatives that score in this area should not be proposed.										**Total Raw Score Calculated**		13.00
Aspect	Rationale						Measurement Method			**Total Score (Default)**		13.00

Acronyms

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

Alternative #1												
Value:	**Eco-Friendly Solutions**											
						Scoring						
Aspect	-5	-4	-3	-2	-1	0	1	2	3	4	5	Score Per Aspect
Non-Renewable Energy Consumption	Primary energy consumption is greater than secondary treatment	Primary energy consumption equal to 75 - 100% of secondary treatment	Primary energy consumption equal to 30 - 75% of secondary treatment	Primary energy consumption equal to 15 - 30% of secondary treatment	Primary energy consumption equal to 0 - 15% of secondary treatment	No energy consumption except for cleaning and maintenance	Cleaning and maintenance not needed, no primary consumption	NA	NA	NA	NA	1
Use of Natural Systems	Constructed facilities permanently displace 5+ acres wetlands or 50% locally available green space	Constructed facilities permanently displace 3 - 5 acres wetlands or 25 - 50% locally available green space	Constructed facilities permanently displace 1 - 3 acres wetlands or 10 - 15% locally available green space	Constructed facilities permanently displace 0 - 1 acre wetlands or up to 10% locally available green space	Constructed facilities temporarily disrupt wetlands or green space	Alternative does not use or affect natural systems, wetlands, or green space	Alternative doesn not use natural systems, but enhances green space or wetland	Natural systems play a minor role in alternative function, up to 1 acre wetland or 10% additional green space created	Natural systems are significant part of alternative function, 1 - 3 acres of wetland created or 10 - 25% additional green space	Alternative fully uses natural systems, 3 - 5 acres of wetland created or 25-50% additional green space	Alternative results in multi-use natural system development, 5+ acres of wetland or 50% additional green space	0
Multiple-Use Facilties	Constructed facilities permanently eliminate recreational opportunity	Constructed facilities significantly impare recreational opportunity	Constructed facilities moderately impare recreational opportunity	Constructed facilities have minor impacts on recreational opportunity	Construction temporarily impacts recreational opportunity	No impacts on recreational opportunties	Alternative improves access to existing recreational areas	Alternative has limited positive impact on recreation	Alternative significantly enhances recreational opportunties	Alternative increases recreational opportunties in area	Alternative results in multi-use facility	0
Source Control of subwatershed pollutant loads	Pollutant loadings are increased by 50%	Pollutant loadings are increased by 30 - 50%	Pollutant loadings are increased by 10 - 30%	End of pipe pollutant loadings are increased by 0 - 10%	End of pipe pollutant loadings impacts are inconsistent, but likely higher	End of pipe pollutant loadings are unchanged	Pollutant loadings impacts are inconsistent, but likely lower	Source control reduces pollutant loadings by 0 - 10%	Source control reduces pollutant loadings by 10 - 30%	Source control reduces pollutant loadings by 30 - 50%	Source control reduces pollutant loadings by more than 50%	-2
Non-Obtrusive Construction Techniques	Permanent loss of green space or sensitive area disruption	Main thoroughfare closures, sensitive area temporary disruptions	Widespread dust and noise, blasting, secondary street closures	Localized dust, noise and local street closures	Minor dust and noise, traffic lane closures	No construction impacts	NA	NA	NA	NA	NA	-2
Consistent Land Use	Intrusive or nuisance facilities inconsistent with neighborhood or land use	Facilities inconsistent with neighborhood or land use	Facility characteristics mitigated to reduce impact on neighborhood	Facities have significant impact on development density or land use	Facility has minor impact on development density or land use	No impact on land use or no above ground facilities	Alternative mitigates existing compatibility problem	Alternative removes facility inconsistent with neighborhood	Alternative removes nuisance facility from neighborhood	Alternative enhances property values in neighborhood	Alternative provides enhancements that significantly improve neighborhood	0
Impermeable Surfaces	5 acres+ of impermeable surfaces are added	3 - 5 acres of impermeable surfaces are added	1 - 3 acres of impermeable surfaces are added	up to 1 acre of impermeable surfaces are added	Minor increase in impermeable surfaces added	No change in impermeable surface	Minor reduction in impermeable surfaces	Up to 1 acre of impermeable surfaces removed	1 - 3 acres of impermeable surfaces removed	3 - 5 acres of impermeable surfaces removed	More than 5 acres of impermeable surfaces removed	0
LEEDS Performance	NA	NA	NA	NA	NA	LEEDS not applicable or LEEDS score <10	LEEDS Score 10 - 25	LEEDS Certified	LEEDS Silver	LEEDS Gold	LEEDS Platinum	0
Instructions: (1.) Score each alternative for each of the eight aspects of the value. Scores can be positive or negative, depending on the impact of the alternative on the value. (2.) Total the scores for each aspect to get the total score for this alternative in this value. (3.) Shaded area represents "fatal flaw". Alternatives that score in this area should not be proposed.										**Total Raw Score Calculated**		**-3.00**
Aspect	Rationale						Measurement Method			**Total Score (Default)**		**-3.00**

Acronyms

BGC - Beargrass Creek
LEEDS - Leadership in Energy and Environmental Design
MG - million gallons
WCWTP - West County Wastewater Treatment Plant

Alternative #2												
Value:	**Eco-Friendly Solutions**											
						Scoring						
Aspect	-5	-4	-3	-2	-1	0	1	2	3	4	5	Score Per Aspect
Non-Renewable Energy Consumption	Primary energy consumption is greater than secondary treatment	Primary energy consumption equal to 75 - 100% of secondary treatment	Primary energy consumption equal to 30 - 75% of secondary treatment	Primary energy consumption equal to 15 - 30% of secondary treatment	Primary energy consumption equal to 0 - 15% of secondary treatment	No energy consumption except for cleaning and maintenance	Cleaning and maintenance not needed, no primary consumption	NA	NA	NA	NA	0
Use of Natural Systems	Constructed facilities permanently displace 5+ acres wetlands or 50% locally available green space	Constructed facilities permanently displace 3 - 5 acres wetlands or 25 - 50% locally available green space	Constructed facilities permanently displace 1 - 3 acres wetlands or 10 - 15% locally available green space	Constructed facilities permanently displace 0 - 1 acre wetlands or up to 10% locally available green space	Constructed facilities temporarily disrupt wetlands or green space	Alternative does not use or affect natural systems, wetlands, or green space	Alternative doesn not use natural systems, but enhances green space or wetland	Natural systems play a minor role in alternative function, up to 1 acre wetland or 10% additional green space created	Natural systems are significant part of alternative function, 1 - 3 acres of wetland created or 10 - 25% additional green space	Alternative fully uses natural systems, 3 - 5 acres of wetland created or 25-50% additional green space	Alternative results in multi-use natural system development, 5+ acres of wetland or 50% additional green space	3
Multiple-Use Facilties	Constructed facilities permanently eliminate recreational opportunity	Constructed facilities significantly impare recreational opportunity	Constructed facilities moderately impare recreational opportunity	Constructed facilities have minor impacts on recreational opportunity	Construction temporarily impacts recreational opportunity	No impacts on recreational opportunties	Alternative improves access to existing recreational areas	Alternative has limited positive impact on recreation	Alternative significantly enhances recreational opportunties	Alternative increases recreational opportunties in area	Alternative results in multi-use facility	2
Source Control of subwatershed pollutant loads	Pollutant loadings are increased by 50%	Pollutant loadings are increased by 30 - 50%	Pollutant loadings are increased by 10 - 30%	End of pipe pollutant loadings are increased by 0 - 10%	End of pipe pollutant loadings impacts are inconsistent, but likely higher	End of pipe pollutant loadings are unchanged	Pollutant loadings impacts are inconsistent, but likely lower	Source control reduces pollutant loadings by 0 - 10%	Source control reduces pollutant loadings by 10 - 30%	Source control reduces pollutant loadings by 30 - 50%	Source control reduces pollutant loadings by more than 50%	-2
Non-Obtrusive Construction Techniques	Permanent loss of green space or sensitive area disruption	Main thoroughfare closures, sensitive area temporary disruptions	Widespread dust and noise, blasting, secondary street closures	Localized dust, noise and local street closures	Minor dust and noise, traffic lane closures	No construction impacts	NA	NA	NA	NA	NA	-2
Consistent Land Use	Intrusive or nuisance facilities inconsistent with neighborhood or land use	Facilities inconsistent with neighborhood or land use	Facility characteristics mitigated to reduce impact on neighborhood	Facilties have significant impact on development density or land use	Facility has minor impact on development density or land use	No impact on land use or no above ground facilities	Alternative mitigates existing compatibility problem	Alternative removes facility inconsistent with neighborhood	Alternative removes nuisance facility from neighborhood	Alternative enhances property values in neighborhood	Alternative provides enhancements that significantly improve neighborhood	4
Impermeable Surfaces	5 acres+ of impermeable surfaces are added	3 - 5 acres of impermeable surfaces are added	1 - 3 acres of impermeable surfaces are added	up to 1 acre of impermeable surfaces are added	Minor increase in impermeable surfaces added	No change in impermeable surface	Minor reduction in impermeable surfaces	Up to 1 acre of impermeable surfaces removed	1 - 3 acres of impermeable surfaces removed	3 - 5 acres of impermeable surfaces removed	More than 5 acres of impermeable surfaces removed	-1
LEEDS Performance	NA	NA	NA	NA	NA	LEEDS not applicable or LEEDS score <10	LEEDS Score 10 - 25	LEEDS Certified	LEEDS Silver	LEEDS Gold	LEEDS Platinum	0
Instructions: (1.) Score each alternative for each of the eight aspects of the value. Scores can be positive or negative, depending on the impact of the alternative on the value. (2.) Total the scores for each aspect to get the total score for this alternative in this value. (3.) Shaded area represents "fatal flaw". Alternatives that score in this area should not be proposed.										**Total Raw Score Calculated**		4.00
Aspect	Rationale						Measurement Method			**Total Score (Default)**		4.00

Acronyms

BGC - Beargrass Creek
LEEDS - Leadership in Energy and Environmental Design
MG - million gallons
WCWTP - West County Wastewater Treatment Plant

Alternative #3												
Value:	**Eco-Friendly Solutions**											
	Scoring											
Aspect	-5	-4	-3	-2	-1	0	1	2	3	4	5	Score Per Aspect
Non-Renewable Energy Consumption	Primary energy consumption is greater than secondary treatment	Primary energy consumption equal to 75 - 100% of secondary treatment	Primary energy consumption equal to 30 - 75% of secondary treatment	Primary energy consumption equal to 15 - 30% of secondary treatment	Primary energy consumption equal to 0 - 15% of secondary treatment	No energy consumption except for cleaning and maintenance	Cleaning and maintenance not needed, no primary consumption	NA	NA	NA	NA	0
Use of Natural Systems	Constructed facilities permanently displace 5+ acres wetlands or 50% locally available green space	Constructed facilities permanently displace 3 - 5 acres wetlands or 25 - 50% locally available green space	Constructed facilities permanently displace 1 - 3 acres wetlands or 10 - 15% locally available green space	Constructed facilities permanently displace 0 - 1 acre wetlands or up to 10% locally available green space	Constructed facilities temporarily disrupt wetlands or green space	Alternative does not use or affect natural systems, wetlands, or green space	Alternative doesn not use natural systems, but enhances green space or wetland	Natural systems play a minor role in alternative function, up to 1 acre wetland or 10% additional green space created	Natural systems are significant part of alternative function, 1 - 3 acres of wetland created or 10 - 25% additional green space	Alternative fully uses natural systems, 3 - 5 acres of wetland created or 25-50% additional green space	Alternative results in multi-use natural system development, 5+ acres of wetland or 50% additional green space	-2
Multiple-Use Facilties	Constructed facilities permanently eliminate recreational opportunity	Constructed facilities significantly impare recreational opportunity	Coostructed facilities moderately impare recreational opportunity	Constructed facilities have minor impacts on recreational opportunity	Construction temporarily impacts recreational opportunity	No impacts on recreational opportunties	Alternative improves access to existing recreational areas	Alternative has limited positive impact on recreation	Alternative significantly enhances recreational opportunties	Alternative increases recreational opportunties in area	Alternative results in multi-use facility	-1
Source Control of subwatershed pollutant loads	Pollutant loadings are increased by 50%	Pollutant loadings are increased by 30 - 50%	Pollutant loadings are increased by 10 - 30%	End of pipe pollutant loadings are increased by 0 - 10%	End of pipe pollutant loadings impacts are inconsistent, but likely higher	End of pipe pollutant loadings are unchanged	Pollutant loadings impacts are inconsistent, but likely lower	Source control reduces pollutant loadings by 0 - 10%	Source control reduces pollutant loadings by 10 - 30%	Source control reduces pollutant loadings by 30 - 50%	Source control reduces pollutant loadings by more than 50%	0
Non-Obtrusive Construction Techniques	Permanent loss of green space or sensitive area disruption	Main thoroughfare closures, sensitive area temporary disruptions	Widespread dust and noise, blasting, secondary street closures	Localized dust, noise and local street closures	Minor dust and noise, traffic lane closures	No construction impacts	NA	NA	NA	NA	NA	-2
Consistent Land Use	Intrusive or nuisance facilities inconsistent with neighborhood or land use	Facilities inconsistent with neighborbood or land use	Facility characteristics mitigated to reduce impact on neighborhood	Facilties have significant impact on development density or land use	Facility has minor impact on development density or land use	No impact on land use or no above ground facilities	Alternative mitigates existing compatibility problem	Alternative removes facility inconsistent with neighborhood	Alternative removes nuisance facility from neighborhood	Alternative enhances property values in neighborhood	Alternative provides enhancements that significantly improve neighborhood	-1
Impermeable Surfaces	5 acres+ of impermeable surfaces are added	3 - 5 acres of impermeable surfaces are added	1 - 3 acres of impermeable surfaces are added	up to 1 acre of impermeable surfaces are added	Minor increase in impermeable surfaces added	No change in impermeable surface	Minor reduction in impermeable surfaces	Up to 1 acre of impermeable surfaces removed	1 - 3 acres of impermeable surfaces removed	3 - 5 acres of impermeable surfaces removed	More than 5 acres of impermeable surfaces removed	-1
LEEDS Performance	NA	NA	NA	NA	NA	LEEDS not applicable or LEEDS score <10	LEEDS Score 10 - 25	LEEDS Certified	LEEDS Silver	LEEDS Gold	LEEDS Platinum	0
Instructions: (1.) Score each alternative for each of the eight aspects of the value. Scores can be positive or negative, depending on the impact of the alternative on the value. (2.) Total the scores for each aspect to get the total score for this alternative in this value. (3.) Shaded area represents "fatal flaw". Alternatives that score in this area should not be proposed.										**Total Raw Score Calculated**		-7.00
Aspect	Rationale						Measurement Method			**Total Score (Default)**		-7.00

Acronyms

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WCWTP - West County Wastewater Treatment Plant

Alternative #4												
Value:	**Eco-Friendly Solutions**											
	Scoring											
Aspect	-5	-4	-3	-2	-1	0	1	2	3	4	5	Score Per Aspect
Non-Renewable Energy Consumption	Primary energy consumption is greater than secondary treatment	Primary energy consumption equal to 75 - 100% of secondary treatment	Primary energy consumption equal to 30 - 75% of secondary treatment	Primary energy consumption equal to 15 - 30% of secondary treatment	Primary energy consumption equal to 0 - 15% of secondary treatment	No energy consumption except for cleaning and maintenance	Cleaning and maintenance not needed, no primary consumption	NA	NA	NA	NA	-1
Use of Natural Systems	Constructed facilities permanently displace 5+ acres wetlands or 50% locally available green space	Constructed facilities permanently displace 3 - 5 acres wetlands or 25 - 50% locally available green space	Constructed facilities permanently displace 1 - 3 acres wetlands or 10 - 15% locally available green space	Constructed facilities permanently displace 0 - 1 acre wetlands or up to 10% locally available green space	Constructed facilities temporarily disrupt wetlands or green space	Alternative does not use or affect natural systems, wetlands, or green space	Alternative doesn not use natural systems, but enhances green space or wetland	Natural systems play a minor role in alternative function, up to 1 acre wetland or 10% additional green space created	Natural systems are significant part of alternative function, 1 - 3 acres of wetland created or 10 - 25% additional green space	Alternative fully uses natural systems, 3 - 5 acres of wetland created or 25-50% additional green space	Alternative results in multi-use natural system development, 5+ acres of wetland or 50% additional green space	3
Multiple-Use Facilties	Constructed facilities permanently eliminate recreational opportunity	Constructed facilities significantly impare recreational opportunity	Constructed facilities moderately impare recreational opportunity	Constructed facilities have minor impacts on recreational opportunity	Construction temporarily impacts recreational opportunity	No impacts on recreational opportunties	Alternative improves access to existing recreational areas	Alternative has limited positive impact on recreation	Alternative significantly enhances recreational opportunties	Alternative increases recreational opportunties in area	Alternative results in multi-use facility	3
Source Control of subwatershed pollutant loads	Pollutant loadings are increased by 50%	Pollutant loadings are increased by 30 - 50%	Pollutant loadings are increased by 10 - 30%	End of pipe pollutant loadings are increased by 0 - 10%	End of pipe pollutant loadings impacts are inconsistent, but likely higher	End of pipe pollutant loadings are unchanged	Pollutant loadings impacts are inconsistent, but likely lower	Source control reduces pollutant loadings by 0 - 10%	Source control reduces pollutant loadings by 10 - 30%	Source control reduces pollutant loadings by 30 - 50%	Source control reduces pollutant loadings by more than 50%	0
Non-Obtrusive Construction Techniques	Permanent loss of green space or sensitive area disruption	Main thoroughfare closures, sensitive area temporary disruptions	Widespread dust and noise, blasting, secondary street closures	Localized dust, noise and local street closures	Minor dust and noise, traffic lane closures	No construction impacts	NA	NA	NA	NA	NA	-2
Consistent Land Use	Intrusive or nuisance facilities inconsistent with neighborhood or land use	Facilities inconsistent with neighborhood or land use	Facility characteristics mitigated to reduce impact on neighborhood	Facilties have significant impact on development density or land use	Facility has minor impact on development density or land use	No impact on land use or no above ground facilities	Alternative miligates existing compatibility problem	Alternative removes facility inconsistent with neighborhood	Alternative removes nuisance facility from neighborhood	Alternative enhances property values in neighborhood	Alternative provides enhancements that significantly improve neighborhood	4
Impermeable Surfaces	5 acres+ of impermeable surfaces are added	3 - 5 acres of impermeable surfaces are added	1 - 3 acres of impermeable surfaces are added	up to 1 acre of impermeable surfaces are added	Minor increase in impermeable surfaces added	No change in impermeable surface	Minor reduction in impermeable surfaces	Up to 1 acre of impermeable surfaces removed	1 - 3 acres of impermeable surfaces removed	3 - 5 acres of impermeable surfaces removed	More than 5 acres of impermeable surfaces removed	0
LEEDS Performance	NA	NA	NA	NA	NA	LEEDS not applicable or LEEDS score <10	LEEDS Score 10 - 25	LEEDS Certified	LEEDS Silver	LEEDS Gold	LEEDS Platinum	0
Instructions: (1.) Score each alternative for each of the eight aspects of the value. Scores can be positive or negative, depending on the impact of the alternative on the value. (2.) Total the scores for each aspect to get the total score for this alternative in this value. (3.) Shaded area represents "fatal flaw". Alternatives that score in this area should not be proposed.										**Total Raw Score Calculated**		7.00
Aspect	Rationale						Measurement Method			**Total Score (Default)**		7.00

Acronyms

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MG - million gallons
WCWTP - West County Wastewater Treatment Plant

Alternative #5												
Value:	**Eco-Friendly Solutions**											
						Scoring						
Aspect	-5	-4	-3	-2	-1	0	1	2	3	4	5	Score Per Aspect
Non-Renewable Energy Consumption	Primary energy consumption is greater than secondary treatment	Primary energy consumption equal to 75 - 100% of secondary treatment	Primary energy consumption equal to 30 - 75% of secondary treatment	Primary energy consumption equal to 15 - 30% of secondary treatment	Primary energy consumption equal to 0 - 15% of secondary treatment	No energy consumption except for cleaning and maintenance	Cleaning and maintenance not needed, no primary consumption	NA	NA	NA	NA	0
Use of Natural Systems	Constructed facilities permanently displace 5+ acres wetlands or 50% locally available green space	Constructed facilities permanently displace 3 - 5 acres wetlands or 25 - 50% locally available green space	Constructed facilities permanently displace 1 - 3 acres wetlands or 10 - 15% locally available green space	Constructed facilities permanently displace 0 - 1 acre wetlands or up to 10% locally available green space	Constructed facilities temporarily disrupt wetlands or green space	Alternative does not use or affect natural systems, wetlands, or green space	Alternative doesn not use natural systems, but enhances green space or wetland	Natural systems play a minor role in alternative function, up to 1 acre wetland or 10% additional green space created	Natural systems are significant part of alternative function, 1 - 3 acres of wetland created or 10 - 25% additional green space	Alternative fully uses natural systems, 3 - 5 acres of wetland created or 25-50% additional green space	Alternative results in multi-use natural system development, 5+ acres of wetland or 50% additional green space	2
Multiple-Use Facilties	Constructed facilities permanently eliminate recreational opportunity	Constructed facilities significantly impare recreational opportunity	Constructed facilities, moderately impare recreational opportunity	Constructed facilities have minor impacts on recreational opportunity	Construction temporarily impacts recreational opportunity	No impacts on recreational opportunties	Alternative improves access to existing recreational areas	Alternative has limited positive impact on recreation	Alternative significantly enhances recreational opportunties	Alternative increases recreational opportunties in area	Alternative results in multi-use facility	3
Source Control of subwatershed pollutant loads	Pollutant loadings are increased by 50%	Pollutant loadings are increased by 30 - 50%	Pollutant loadings are increased by 10 - 30%	End of pipe pollutant loadings are increased by 0 - 10%	End of pipe pollutant loadings impacts are inconsistent, but likely higher	End of pipe pollutant loadings are unchanged	Pollutant loadings impacts are inconsistent, but likely lower	Source control reduces pollutant loadings by 0 - 10%	Source control reduces pollutant loadings by 10 - 30%	Source control reduces pollutant loadings by 30 - 50%	Source control reduces pollutant loadings by more than 50%	0
Non-Obtrusive Construction Techniques	Permanent loss of green space or sensitive area disruption	Main thoroughfare closures, sensitive area temporary disruptions	Widespread dust and noise, blasting, secondary street closures	Localized dust, noise and local street closures	Minor dust and noise, traffic lane closures	No construction impacts	NA	NA	NA	NA	NA	-2
Consistent Land Use	Intrusive or nuisance facilities inconsistent with neighborhood or land use	Facilities inconsistent with neighborhood or land use	Facility characteristics mitigated to reduce impact on neighborhood	Facilties have significant impact on development density or land use	Facility has minor impact on development density or land use	No impact on land use or no above ground facilities	Alternative mitigates existing compatibility problem	Alternative removes facility inconsistent with neighborhood	Alternative removes nuisance facility from neighborhood	Alternative enhances property values in neighborhood	Alternative provides enhancements that significantly improve neighborhood	4
Impermeable Surfaces	5 acres+ of impermeable surfaces are added	3 - 5 acres of impermeable surfaces are added	1 - 3 acres of impermeable surfaces are added	up to 1 acre of impermeable surfaces are added	Minor increase in impermeable surfaces added	No change in impermeable surface	Minor reduction in impermeable surfaces	Up to 1 acre of impermeable surfaces removed	1 - 3 acres of impermeable surfaces removed	3 - 5 acres of impermeable surfaces removed	More than 5 acres of impermeable surfaces removed	0
LEEDS Performance	NA	NA	NA	NA	NA	LEEDS not applicable or LEEDS score <10	LEEDS Score 10 - 25	LEEDS Certified	LEEDS Silver	LEEDS Gold	LEEDS Platinum	0
Instructions: (1.) Score each alternative for each of the eight aspects of the value. Scores can be positive or negative, depending on the impact of the alternative on the value. (2.) Total the scores for each aspect to get the total score for this alternative in this value. (3.) Shaded area represents "fatal flaw". Alternatives that score in this area should not be proposed.										**Total Raw Score Calculated**		7.00
Aspect	Rationale						Measurement Method			**Total Score (Default)**		7.00

Acronyms

BGC - Beargrass Creek
LEEDS - Leadership in Energy and Environmental Design
MG - million gallons
WCWTP - West County Wastewater Treatment Plant

LOUISVILLE MSD
CSO LTCP MITIGATION TECHNOLOGIES

CSO Control Technology	Improvement Potential				Implementation and Operational Factors
	CSO Volume	Bacteria	Floatables	Suspended Solids	
Source Control					
Public Education	None	Low	Medium	Medium	Part of ongoing Plan
Street Sweeping	None	Low	Medium	Medium	District has mechanical sweepers. Effective at floatables removal, cost-intensive O & M. District would need a new fleet of vacuum sweepers for removal of fine particulates. Ineffective at reducing CSO volume, bacteria and very fine particulate pollution. Bud Schardein working with Louisville PW.
Construction Site Erosion Control	None	Low	Low	Medium	Reduces sewer sediment loading, enforcement required.
Catch Basin Cleaning	None	Low	Medium	Low	Part of ongoing Plan, reduces sewer sediment loading, requires specialized equipment.
Industrial Pretreatment	Low	Low	Low	Low	There is limited industrial activity in and out of combined sewer area.
Garbage Disposal Ban	None	Low	Adverse	High	Requires increased allocation of resources to enforce, alternative-dumping alternatives recommended.
Combined Sewer Flushing	None	Low	Low	Medium	Maximizes existing collection system volume, reduces first flush effect. Subject to resettling problems, labor intensive.
Inflow Control					
"Daylight" orphaned storm sewers	Medium	Medium	Medium	Medium	Reduces CSO volume during storm events. Construction would be disruptive to effected areas, cost intensive.
Offload Ground Water Pumpage	Low	Low	Low	Low	Relatively low volume. Construction would be disruptive to effected areas, not cost effective.
Storm Water Detention	Medium	Medium	Medium	Medium	Requires large area in congested urban environment. Potential siting difficulties and public opposition, construction would be disruptive to affected areas, increased O & M.
~~Street Storage of Storm Water~~	~~Medium~~	~~Medium~~	~~Medium~~	~~Medium~~	~~Low operational cost. Potential flooding and freezing problems, public opposition.~~
~~Water Conservation~~	~~Low~~	~~Low~~	~~Low~~	~~Low~~	~~Potentially reduces dry weather flow making room for CSO, ancillary benefit is reduced water consumption.~~
Inflow/Infiltration Control	Low	Low	Low	Low	Infiltration usually lower volume than inflow. Infiltration can be difficult to control.
Stream Diversion	Low	None	None	None	

LOUISVILLE MSD
CSO LTCP MITIGATION TECHNOLOGIES

CSO Control Technology	Improvement Potential				Implementation and Operational Factors
	CSO Volume	Bacteria	Floatables	Suspended Solids	
Low Impact Development-Retrofit					
Bioretention	Medium	Medium	Medium	Medium	Site specific, requires widespread application across District to be effective. Potential to be cost intensive in some areas.
~~Dry Wells~~	~~Medium~~	~~Medium~~	~~Low~~	~~Medium~~	~~Site specific, low cost, good BMP for residential areas, requires interaction with homeowners and businesses, widespread participation required to be effective.~~
Filter Strips	Medium	Medium	Low	Medium	Site specific, low cost, good BMP for parking lots, requires interaction with private owners in residential areas, requires widespread application across District to be effective.
Vegetated Buffers	Medium	Medium	Medium	Medium	Site specific, low cost, good BMP for parking lots, requires interaction with private owners in residential areas, requires widespread application across District to be effective.
Level Spreader	Low	Low	Low	Medium	Site specific, low cost. Must be used in conjunction with other LID-R techniques.
Grassed Swales	Medium	Medium	Low	Medium	Site specific, requires widespread application across District to be effective. Potential to be cost intensive in some areas.
Rain Barrels	Low	Medium	Low	Medium	Good BMP for residential areas, low cost, requires interaction with home and business owners. Minimal capture of total runoff volume, requires barrel coverage to inhibit mosquitoes.
Cisterns	Medium	Medium	Low	Medium	Site specific, requires widespread application across District to be effective. Potential to be cost intensive in some areas.
Infiltration Trenches/ Catch Basins	Medium	Medium	Medium	Medium	Site specific, low cost, good BMP for residential areas, widespread participation required to be effective.
Rooftop Greening	Medium	Low	Low	Medium	Site specific, non-intrusive construction, other beneficial effects to city, requires widespread application to be effective, requires interaction with all property owners. Cost-intensive.
Increased Tree Cover	Low	Low	None	Low	Site specific, low cost, other beneficial effects to city. Little capture of storm water.
Permeable Pavements	Medium	Medium	Low	Medium	Site specific. Cost-intensive, subject to clogging, increased O & M costs, labor intensive.

LOUISVILLE MSD
CSO LTCP MITIGATION TECHNOLOGIES

CSO Control Technology	Improvement Potential				Implementation and Operational Factors
	CSO Volume	Bacteria	Floatables	Suspended Solids	
Collection System Controls					
Sewer Relining	Medium	None	None	None	Reduction in friction may result in slight improvement in capacity, reduces infiltration and exfiltration. Sealing action may prevent root intrusion. May not require excavation. Requires special equipment and thorough cleaning prior to installation.
In-situ Pipe Replacement (Pipe Bursting)	Medium	None	None	None	Increase in diameter and reduction in friction may provide substantial improvement in capacity, reduces infiltration and exfiltration. Sealing action may prevent root intrusion. Requires special equipment. May not work with certain backfill materials such as flowable fill. Bursting action may damage adjacent utilities. Requires excavation.
Infiltration Reduction	Medium	None	None	None	Reduces CSO Volume. Infiltration must be done on a large scale. Spot repairs simply move clear water to the next crack in the pipe.
Sewer System Optimization					
Optimize Existing System	Medium	Medium	Medium	Medium	Low cost relative to large scale structural BMPs. Limited by existing system volume and dry weather flow dam elevations.
Real Time Control	Medium	Medium	Medium	Medium	Highly automated system. Increased O & M, increased potential for sewer backups.
Sewer Separation					
Full (Sanitary is New)	High	High	High	High	May provide a highly effective long lasting solution. Disruptive to affected areas, cost intensive, potential for increased storm water pollutant loads, requires homeowner participation.
Full (Storm is New)	High	High	High	High	May provide a highly effective long lasting solution. May provide additional capacity for new development. Disruptive to affected areas, cost intensive, potential for increased storm water volumes and pollutant loads.
Partial (Roof Leaders and Sump Pumps remain on Sanitary)	Medium	High	High	High	Reduce volume of CSO. Does not require a great deal of customer appreciation. May provide additional capacity for new development. Potential for CSO still exists. Disruptive construction in separated areas.
Rain Leader Disconnection	Medium	Medium	Low	Low	Low cost, requires home and business owner participation. Potential for increased storm water pollutant loads.

LOUISVILLE MSD
CSO LTCP MITIGATION TECHNOLOGIES

CSO Control Technology	Improvement Potential				Implementation and Operational Factors
	CSO Volume	Bacteria	Floatables	Suspended Solids	
Storage					
In-Line Storage	Medium	Medium	Medium	Medium	Reduces potential for CSO while continuing to provide treatment to storm water component. Aesthetically acceptable, provides storage and conveyance. Disruptive to affected areas, potentially expensive in congested urban areas. May have a significant O & M cost due to sewage pumping and basin cleaning.
Off-line Storage	Medium	Medium	Medium	Medium	Reduces potential for CSO while continuing to provide treatment to storm water component. Aesthetically acceptable, provides storage and conveyance. May be constructed under parking lot or other similar use facility. Disruptive to affected areas. May have a significant O & M cost due to sewage pumping and basin cleaning.
On-site Storage and Flow equalization basins	Medium	Medium	Medium	Medium	Requires available areas at the current treatment location, disruptive to affected area, cost intensive, aesthetically acceptable. Requires available site at current WWTP location, disruptive to affected areas, cost intensive. May have a significant O & M cost due to sewage pumping and basin cleaning.
Earthen Basins	High	High	High	High	Disruptive to affected areas, lack of space in urban environment, potential odor problems.
Open Concrete Tanks	High	High	High	High	Requires large space. Potential odor control problems, disruptive to effected area, public opposition.
Closed Concrete Tanks	High	High	High	High	Requires large space, aesthetically acceptable. Disruptive to affected area, cost intensive.
Storage Pipelines/Conduits	High	High	High	High	Aesthetically acceptable, provides storage and conveyance. Disruptive to affected areas, potentially expensive in congested urban areas.
Tunnels	High	High	High	High	Non-disruptive, requires little area at ground level, capital intensive, provides storage and conveyance, pump station required to lift stored flow out of tunnel.

LOUISVILLE MSD
CSO LTCP MITIGATION TECHNOLOGIES

CSO Control Technology	Improvement Potential				Implementation and Operational Factors
	CSO Volume	Bacteria	Floatables	Suspended Solids	
Treatment					
Screening/Netting Systems	None	None	High	None	Controls only floatables.
Primary Sedimentation	None	Medium	Medium	Medium	Provides reduction in bacteria, solids, and floatables. Disinfection may be added for even better treatment. Expensive to construct, especially in an urban environment. Will generate additional O & M costs. May have to haul sludge from facility.
Swirl Concentrators / Vortex Separators	None	Low	Medium	Medium	Relatively inexpensive, many models, small footprint. Variable pollutant removal. Increased O&M. Ineffective against CSO volume.
High Rate Physical / Chemical Treatment	None	Medium	High	High	Very effective on solids and floatables. Supports certain downstream disinfection technologies. Requires extensive new construction, remote chemical storage, high O&M costs.
Disinfection	None	High	None	None	Controls potentially dangerous pathogenic microorganisms. Increased O & M. Possible remote storage of hazardous chemicals. Possible high power consumption.
Deep Bed Filtration	None	Medium	High	High	Effectively treats sewage of different concentrations. May require dry weather pumping to maintain required minimum flow. Increased O & M. Siting issues in an urban environment.
~~Trickling Filters~~	~~None~~	~~Medium~~	~~High~~	~~High~~	~~Effectively treats sewage of different concentrations. May require dry weather pumping to maintain required minimum flow. Increased O & M. Siting issues in an urban environment.~~
Constructed Wetlands	High	Low	High	High	Large storage volume captures CSOs alleviating peaking problems. Captures floatables and most solids in first basin simplifying cleaning. Works during power failure. Attracts natural flora and fauna. Low O & M costs. Poor nutrient removal below 40o F. Requires at least 1 acre per million gallons. Possible Expensive land cost. Must be constructed outside of floodprone areas. Requires disinfection at outfall to kill bacteria. Requires aeration at outfall. Minimum flow requirements.
Plant Modification	High	High	High	High	Dependable technologies that the operator understands. High Cost, increased O & M. Ineffective unless adequate transportation system upstream.
Expansion of MFWTP	High	High	High	High	Limited by space at Morris Foreman (MFWTP), increased O & M.

LOUISVILLE MSD
CSO LTCP MITIGATION TECHNOLOGIES

CSO Control Technology	Improvement Potential				Implementation and Operational Factors
	CSO Volume	Bacteria	Floatables	Suspended Solids	
Solids and Floatables Control					
Netting Systems	None	None	High	None	Easy to implement. Potential negative aesthetic impact.
~~Containment Booms~~	~~None~~	~~None~~	~~High~~	~~None~~	~~Simple to install. Difficult to clean, negative aesthetic impact.~~
Screens, Manually Cleaned	None	None	High	None	Prone to clogging, requires manual maintenance.
Screens, Mechanically Cleaned	None	None	High	None	Rake mechanisms periodically remove material trapped on the bar screen.
Weir-Mounted Screens, Mechanically Cleaned	None	None	High	None	Relatively low maintenance, requires suitable physical configuration. Must bring power to site.
Fixed Underflow Baffles Mounted in Regulator	None	None	High	None	Low maintenance, easy to install, requires proper hydraulic configuration.
Floating Underflow Baffles Mounted in Regulator	None	None	High	None	Moving parts make them susceptible to failure.
Overflow Screen with Automatic Backwash	None	None	High	None	Limited hydraulic capacity makes these suitable for small outfalls only.
Manually Cleaned Trash & Bar Racks	None	None	High	None	Both screens must be manually raked and the screenings allowed to drain before disposal.
~~Fine Screens~~	~~None~~	~~None~~	~~High~~	~~None~~	~~Screens can be in the shape of a rotary drum or linear horizontal or vertical screens. Propriety screens such as ROMAG have been specifically designed for wet weather applications. Minimizes the need for manual collection of screenings.~~
Catch Basin Modifications	None	None	High	None	Requires suitable catch basin configuration. Potential for street flooding and increased maintenance efforts.
MS4 Program Elements					
Side Stream Aeration	None	None	None	None	Only effective for increasing DO. High O & M, limited effective area.
In-stream Aeration	None	None	None	None	Only effective for increasing DO. High O & M, limited effective area.
Flow Augmentation	None	None	None	None	Lowers concentrations by dilution. Cost-intensive, disruptive to effected areas, limited beneficial effects to water quality, increased O & M.
Bulkheading	None	None	None	None	Extremely effective when used as a shore side containment structure along a waterbody. Requires the use of an additional technology to remove settled solids. Prevents any shore side contaminates from entering waterbody.

LOUISVILLE MSD
PROPOSED CSO LTCP PROJECT LISTING

RECEIVING STREAM	CSO NO.	CSO NAME	RTC Future Phase	Seperation (Elimination)	Individual Storage	Individual Treatment	Sub-Regional Storage	Sub-Regional Treatment	Sub-Regional Storage +Treatment	RTC+Sub-Treatment	Green	Comments
		Central Relief Drain										
OR	026	CRD 6th & BROADWAY	X	X			X	X	X	X	X	RTC control at the end of CRD
OR	027	CRD 7th & BROADWAY	X	X			X	X	X	X	X	
OR	028	CRD 6th & YORK	X	X			X	X	X	X	X	
OR	029	CRD 8th & YORK	X	X			X	X	X	X	X	
OR	030	CRD 9th & YORK "A"	X	X			X	X	X	X	X	
OR	031	CRD 6th & BRECKINRIDGE	X	X			X	X	X	X	X	
OR	032	CRD 4th & BRECKINRIDGE	X	X			X	X	X	X	X	
OR	033	CRD ON YORK E OF 4th	X	X			X	X	X	X	X	
OR	034	CRD 4th & YORK	X	X			X	X	X	X	X	
OR	035	CRD 2nd & BROADWAY NO 1	X	X			X	X	X	X	X	
OR	036	CRD 3rd & BROADWAY	X	X			X	X	X	X	X	
OR	038	CRD 5th & BROADWAY	X	X			X	X	X	X	X	
OR	178	CRD 9th & YORK "B"	X	X			X	X	X	X	X	
OR	181	CRD 2nd & BROADWAY NO 2	X	X			X	X	X	X	X	
OR	192	CRD S 6th & GARLAND	X	X			X	X	X	X	X	
OR	193	CRD S 6th & KENTUCKY	X	X			X	X	X	X	X	
OR	194	CRD S OAK W OF 4th	X	X			X	X	X	X	X	
OR	195	CRD S 4th & OAK	X	X			X	X	X	X	X	
OR	196	CRD S 3rd & OAK	X	X			X		X	X	X	
OR	197	CRD S 3rd S OF OAK	X	X			X		X	X	X	
OR	198	CRD S 3rd & ORMSBY	X	X			X	X	X	X	X	
OR	199	CRD S 3rd N OF MAGNOLIA	X	X				X	X	X	X	
OR	200	CRD S 3rd & MAGNOLIA	X	X				X	X	X	X	
OR	201	CRD S 5th & KENTUCKY	X	X				X	X	X	X	
OR	202	CRD S ORMSBY W OF 3rd	X	X				X	X	X	X	
OR	203	CRD S 4th & ORMSBY	X	X				X	X	X	X	
	SBR	**CSOs 142,174,180,182,183,184,185,186,187,188,205**										
SO	142	SBR LOGAN ST @ ST CATHERINE										Inflatable Dam RTC-Completed
SO	174	SBR GOSS & BOYLE										Inflatable Dam RTC-Completed
SO	180	SBR ORMSBY AVE RELIEF										Inflatable Dam RTC-Completed
SO	182	SBR SHELBY & BURNETT										Inflatable Dam RTC-Completed
SO	183	SBR ALEXANDER & KESWICK										Inflatable Dam RTC-Completed
SO	184	SBR FETTER & ALEXANDER										Inflatable Dam RTC-Completed
SO	185	SBR SHELBY & KESWICK										Inflatable Dam RTC-Completed
SO	186	SBR LOGAN & OAK										Inflatable Dam RTC-Completed
SO	187	SBR SHELBY & CAMP										Inflatable Dam RTC-Completed
SO	188	SBR SHELBY & CLAY										Inflatable Dam RTC-Completed
SO	205	SBR MORGAN STREET RELIEF										Inflatable Dam RTC-Completed
		Improved Channel at SO										
SO	082	BGI AT BGC					X	X			X	Subregional Storage with 120,121,153,141 Subregional Storage with 83,84,118,119,120,1
SO	083	BRENT ST & BROADWAY CONNECT					X	X			X	Subregional Storage with 84,118,119 Subregional Storage with 82,84,118,119,120,121,
SO	084	BRENT ST @ BGC					X	X			X	Subregional Storage with 83,118,119 Subregional Storage with 82,83,118,119,120
SO	091	SCHILLER AVE OVFL					X	X			X	Subregional Storage with 92,113,146,152 Subreg
SO	092	ST CATHERINE @ BGC					X	X			X	Subregional Storage with 113,146,152 Subregional Storage with 91,113,146,152
SO	110	REG NO 3 - GOSS AVE					X	X			X	Subregional Storage and Treatment with 97,106,111,137,148 Subregional Storage and Treatment with 9
SO	111	EMERSON STREET SEWER					X	X			X	Subregional Storage and Treatment with 97,106,110,137,148 Subregional Storage and Trea

LOUISVILLE MSD
PROPOSED CSO LTCP PROJECT LISTING

RECEIVING STREAM	CSO NO.	CSO NAME	RTC Future Phase	Seperation (Elimination)	Individual Storage	Individual Treatment	Sub-Regional Storage	Sub-Regional Treatment	Sub-Regional Storage +Treatment	RTC+Sub-Treatment	Green	Comments
SO	113	ELLISON AVENUE SEWER					X	X			X	Subregional Storage and Treatment with 97,106,110,111,137,148,151 Subregional Storage with 92,146,152
SO	117	REG NO 11 - DRY RUN					X	X			X	Subregional Storage with 149,179 Subregional Tre
SO	118	REG NO 15 - E BRDWY					X	X			X	Subregional Storage with 83,84,119 Subregional Storage with 82,8
SO	119	BRENT STREET SEWER					X	X			X	Subregional storage with 84,84,118 Subregional Storage with
SO	120	PHOENIX HILL SEWER					X	X			X	Subregional Storage with 82,121,153,141 Subregional Storage with 121,141,1
SO	121	REG NO 18 - GREEN ST					X	X			X	Subregional Storage with 82,120,141,153 Subregional Storage with
SO	141	BAXTER AVE @ BGC					X	X			X	Subregional Storage with 82,120,121,153 Subregion
SO	146	SNEADS BRANCH DIVERSION					X	X			X	Subregional Storage with 92,113,152 Subregional
SO	147	SWAN STREET DIVERSION										**Scheduled to be elimintated by 9/2007** Subregional Treatment wit
SO	148	EASTERN PKWY DIVERSION					X	X			X	Subregional Storage and Treatment with 97,106,110,111,137 Subregional Storage and Treatme
SO	149	DRY RUN DIVERSION					X	X			X	Subregional Storage with 117,179 Subr
SO	151	REG NO 5 - CASTLEWOOD					X	X			X	Subregional Storage and Treatment with 97,106,110,111,113,137,148 Subregional Storage and Treatmen
SO	152	REG NO 7 - SOUTHEASTERN					X	X			X	Subregional Storage with 92,113,146 Subregional Storage w
SO	153	COOPER STREET					X	X			X	Subregional Storage with 82,120,121,141 Subregional Stor
SO	179	KENTUCKY ST SEWER OVFL					X	X			X	Subregional Storage with 117,149 Subregion
		South Fork BGC										
SO	018	NIGHTINGALE PS				X	X	X			X	Subregional Storage and Treatment with 108,109 Subregional Storage
SO	088	MELLWOOD AVE INT		X								Sewers Seperated
SO	093	SPRING STREET		X			X				X	130 and 93 are associated as subregional storage
SO	097	CANTONMENT SIPHON NO 2					X	X			X	Subregional Storage with 106,110,111,137,148 Subregional Storage with 106,110,
SO	106	ROYAL - NEFF		X							X	Subregional Storage with 97,110,111,137,148 Subregional Storag
SO	108	REG N0 1 - NEWBURG	X		X	X	X	X			X	Subregional Storage and Treatment with 109,118 Bending weir for in-line storage
SO	109	REG NO 2 - DEER PARK	X		X	X	X	X			X	Subregional Storage and Treatment with 18,109
SO	130	WEBSTER STREET		X		X	X				X	130 and 93 are associated as subregional storage
SO	131	REG NO 33 - MELWD & FRANKFORT		X			X				X	Subregional Storage with 93,130
SO	137	CALVARY CEMETARY					X	X			X	Subregional Storage and Treatment with 97,106,110,111,148 Subregio
		Middle Fork BGC										
MI	086	PAYNE AT SPRING		X			X				X	Subregional Storage with 140
MI	125	REG NO 24 - GRINSTEAD DR					X	X			X	Subregional Storage and Treatment with 126,127,166
MI	126	REG NO 26 - RAYMOND AVE					X	X			X	Subregional Storage and Treatment with 125,127,166
MI	127	ETLEY AVENUE					X	X			X	Subregional Storage and Treatment with 125,126,166
MI	140	LOCUST STREET		X			X				X	Subregional Storage with 86

LOUISVILLE MSD
PROPOSED CSO LTCP PROJECT LISTING

RECEIVING STREAM	CSO NO.	CSO NAME	RTC Future Phase	Seperation (Elimination)	Individual Storage	Individual Treatment	Sub-Regional Storage	Sub-Regional Treatment	Sub-Regional Storage +Treatment	RTC+Sub-Treatment	Green	Comments
MI	144	VANCE ST REGULATOR		X	X	X		X			X	Subregional Treatment and Subregional Storage with 125,126,127, 166
MI	166	BEALS BRANCH SAN DIV					X	X			X	
MI	206	CHEROKEE PARK @ SPRING DR		X		X						
		Muddy Fork BGC										
MU	132	REG NO 35 - BROWNSBORO	X				X	X			X	Common Discharge Point with 154,167;Evaluation Dredging Edward Ponds Branch which is the outfall
MU	154	MELLWOOD @ SCHOEFFEL	X				X	X			X	Common Discharge Point with 132,167;Evaluation Dredging Edward Ponds Branch which is the outfall
MU	167	BROWNSBORO LAT NO 2	X				X	X			X	Common Discharge Point with 132,154;Evaluation Dredging Edward Ponds Branch which is the outfall
		Ohio River North										
OR	019	34th STREET PS			X	X					X	
OR	022	FOURTH ST PS					X				X	Storage with 23,50,51,52,54,55,56,150,155,156,208 (toward 11th street area)
OR	023	ORI @ 4th ST PS					X				X	Storage with 22,50,51,52,54,55,56,150,155,156,208 (toward 11th street area)
OR	050	12th STREET		X			X				X	Storage with 22,23,51,52,54,55,56,150,155,156,208 (toward 11th street area)
OR	051	11th STREET	X	X			X				X	Storage with 22,23,50,52,54,55,56,150,155,156,208 (toward 11th street area)
OR	052	10th STREET		X			X				X	Storage with 22,23,50,51,54,55,56,150,155,156,208 (toward 11th street area)
OR	053	8th STREET		X			X				X	
OR	054	7th STREET		X			X				X	Storage with 22,23,50,51,52,55,56,150,155,156,208 (toward 11th street area)
OR	055	6th STREET		X			X				X	Storage with 22,23,50,51,52,54,56,150,155,156,208 (toward 11th street area)
OR	056	5th STREET		X			X				X	Storage with 22,23,50,51,52,54,55,150,155,156,208 (toward 11th street area)
OR	057	FIRST STREET OVFL WEIR		X			X				X	Storage with 160,161,207
OR	058	PRESTON ST OVFL WEIR		X	X						X	
OR	062	LOGAN COMPANY									X	
OR	150	8th ST @ COMMON PLACE		X			X				X	Storage with 22,23,50,51,52,54,55,56,155,156,208 (toward 11th street area)
OR	155	ROWAN ST @ 12th ST		X			X				X	Storage with 22,23,50,51,52,54,55,56,150,156,208 (toward 11th street area)
OR	156	6th & WASHINGTON SAN DIV		X			X				X	Storage with 22,23,50,51,52,54,55,56,150,155,208
OR	160	SEWER IN ALLEY SAN DIV		X			X				X	Storage with 57,161,207
OR	161	MARKET ST SAN DIV		X			X				X	
OR	172	ADAMS STREET		X							X	Possilbe elimination with Bridges Project
OR	190	SEVENTEENTH ST SAN DIV			X	X					X	
OR	207	2nd & JEFFERSON		X			X				X	Storage with 57,160,161
OR	208	12th & JEFFERSON		X			X				X	Storage with 22,23,50,51,52,54,55,56,150,155,156
		Ohio River West										
OR	015	SOUTHWESTERN PS									X	
OR	016	MILES PARK BYPASS					X	X			X	Storage and Treatment with 210,211
OR	104	SW PKWY SEWER @ BROADWAY					X	X			X	Storage and Treatment with 105,189
OR	105	WESTERN OUTFALL @ BROADWAY					X	X			X	Storage and Treatment with 104,189
OR	189	NORTHWESTERN SAN DIV			X	X	X	X			X	Storage and Treatment with 104,105
OR	191	ALGONQUIN PKWY SAN DIV									X	
OR	210	45th STREET-GREENWOOD					X	X			X	Storage and Treatment with 16,211
OR	211	MAIN DIVERSION STRUCTURE					X	X			X	Storage and Treatment with 16,210 Inflatable Dam in place

6/21/2007

Proposed Weighting Approach for Project-Specific Values

Wet Weather Team
Stakeholder Group Meeting No. 10
June 21, 2007

Louisville & Jefferson County
Metropolitan Sewer District

Presentation Outline

- Review feedback and discussion on value weighting
- Propose an approach to value weighting for project-specific values
- Present an example that uses the proposed approach
- Determine a path forward for using project-specific values in alternative evaluation

Discussion Confirms all Values are Important

	Important	Very Important	Critically Important
Public Health	1	1	1111111111111
Env. Enhancement		11111	1111111111
Reg. Performance	1111		11111111111
Education		11111	11111111
Asset Protection	1	11111111111	11
Financial Stewardship	111	111111111	1111
Eco-Friendly	11	11111111	1111
Env. Justice	11	111111111	111
Financial Equity	11111	11111111	
Cust. Satisfaction	1111	111111111	11
Econ Vitality	111111	1111111	11

Conclusions from last meeting

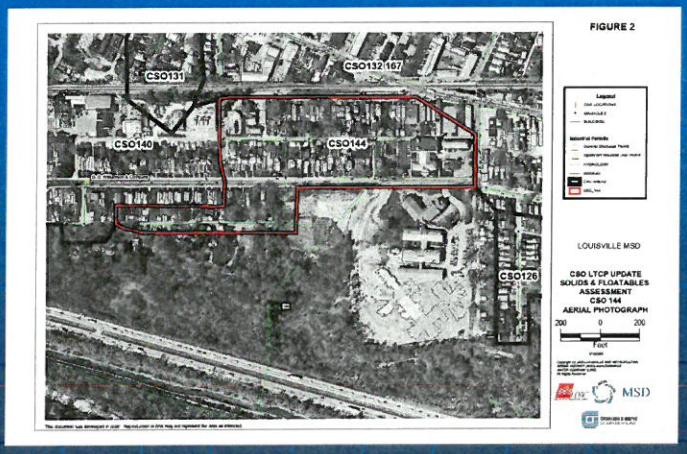
- While all values are important, some differentiation between relative importance is possible
- Differentiation range is relatively narrow, i.e. no value is three times more important than any other
- For project-specific values, protection of public health appears to be the highest importance to most stakeholders
- Regulatory performance is either "assumed" and not weighted highly, or "essential" and weighted as critically important
- Programatic values are all considered "very important" and are built into the decision process

Proposed project-specific weighting approach

- Public Health enhancement - 10
- Environmental enhancement – 8
- Regulatory performance – 8
- Eco-friendly solutions – 6
- Asset protection – 6

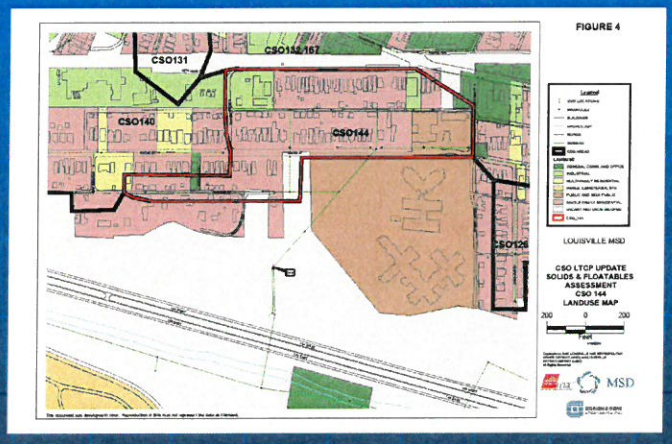
Example of weighting factors "in action"

- Evaluate controls for CSO 144
  - discharge to Middle Fork of Beargrass Creek
  - 27 overflow events in average year
  - average overflow volume 20,000 gallons per overflow event



CSO 144 drainage area characteristics

- 16.4 acres
- approximately 50% impervious
- 70% residential, 24% industrial & commercial, 6% vacant
- tree cover less than 4%
- predicted runoff volume per inch of rain = 240,000 gallons (most caught in combined sewers)



Example alternatives for CSO control at 144

- Alternative 1 – sewer separation
- Alternative 2 – sewer separation with wetlands treatment of runoff (for 1" rainfall event)
- Alternative 3 – concrete storage basing for peak flow storage of average event
- Alternative 4 – wetlands treatment of CSO from average event
- Alternative 5 – optimized combination of storage and wetlands treatment of CSO from average event

Sewer Separation

- Capital Cost =$ 1,970,000
- Scores on Performance Measures
  - Public Health Enhancement - -4.3
    - untreated stormwater runoff increases 10x
  - Regulatory Performance – 12
    - CSO is eliminated
  - Environmental Enhancement - -3
    - pollutant loading to stream goes up
  - Eco-Friendly Solutions - -3
    - nothing particularly eco-friendly
  - Asset Protection - 1
    - reduces minor surface flooding condition

Alternative 2 – Sewer Separation with Stormwater Treatment

- Capital Cost =$ 2, 280,000
- Scores on Performance Measures
  - Public Health Enhancement 9.7
    - wetlands treatment reduces runoff impacts
  - Regulatory Performance – 12
    - CSO eliminated
  - Environmental Enhancement - 16
    - CSO eliminated and stormwater impacts mitigated
  - Eco-Friendly Solutions – 4
    - Wetlands treatment is part of solution
  - Asset Protection – 1
    - minor surface ponding eliminated

Alternative 3 – concrete storage basin for peak flow storage

- Capital Cost =$ 368,000
- Scores on Performance Measures
  - Public Health Enhancement 11.3
    - overflow volumes greatly reduced
  - Regulatory Performance – 9.67
    - overflows reduced, but not eliminated
  - Environmental Enhancement – 10
    - overflow volumes greatly eliminated
  - Eco-Friendly Solutions - -7
    - "concrete and steel" solution
  - Asset Protection 0
    - does not affect sewer system

11

Alternative 4 – Wetlands Treatment of overflow

- Capital Cost =$ 230,000
- Scores on Performance Measures
  - Public Health Enhancement – 8.7
    - good reduction in pathogen discharges
  - Regulatory Performance – 7.7
    - significant reduction in untreated discharges
  - Environmental Enhancement – 13
    - significant reduction in loads
  - Eco-Friendly Solutions – 7
    - wetland-based treatment
  - Asset Protection – 0
    - no impact on sewer system

12

Alternative 5 – Optimized Treatment/Storage

- Capital Cost =$ 305,000
- Scores on Performance Measures
  - Public Health Enhancement – 13.7
    - very little untreated discharge
  - Regulatory Performance – 11
    - very little untreated discharge
  - Environmental Enhancement – 13
    - pollutant loads significantly reduced
  - Eco-Friendly Solutions – 7
    - end-of pipe treatment using wetlands
  - Asset Protection – 0
    - no impact on sewer system

Weighted Scores Favor Wetlands Treatment of CSOs

Summary of Scores for CSO 144 example

Values	Weights	Scores for Alternatives: Sewer Separation Alternative #1	Separation & Wetlands Alternative #2	Concrete Storage Tank Alternative #3	Wetlands CSO Treatment Alternative #4	Optimized Storage & Wetlands Alternative #5
Regulatory Performance	8	12.00	12.00	9.67	7.67	11.00
Public Health Enhancement	10	-4.33	9.67	11.33	8.67	13.67
Asset Protection	6	1.00	1.00	0.00	0.00	0.00
Environmental Enhancement	8	-3.00	16.00	10.00	13.00	13.00
Eco-Friendly Solutions	6	-3.00	4.00	-7.00	7.00	7.00
Weighted Benefit Score		16.67	350.67	228.67	294.00	370.67
Capital Costs		$1,970,000	$2,280,000	$368,000	$230,000	$305,000
Weighted Benefit Cost Ratio		0.01	0.15	0.62	1.28	1.22

Sensitivity Analysis Demo

Summary of Scores for CSO 144 example						
		Scores for Alternatives				
Values	Weights	Sewer Separation Alternative #1	Separation & Wetlands Alternative #2	Concrete Storage Tank Alternative #3	Wetlands CSO Treatment Alternative #4	Optimized Storage & Wetlands Alternative #5
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Asset Protection	6	1.00	1.00	0.00	0.00	0.00
Environmental Enhancement	8	-3.00	16.00	10.00	13.00	13.00
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Discussion
Summary
Wrap-up

Interim Sanitary Sewer Discharge Plan Concepts

Wet Weather Team
Stakeholder Group Meeting No. 10
June 21, 2007

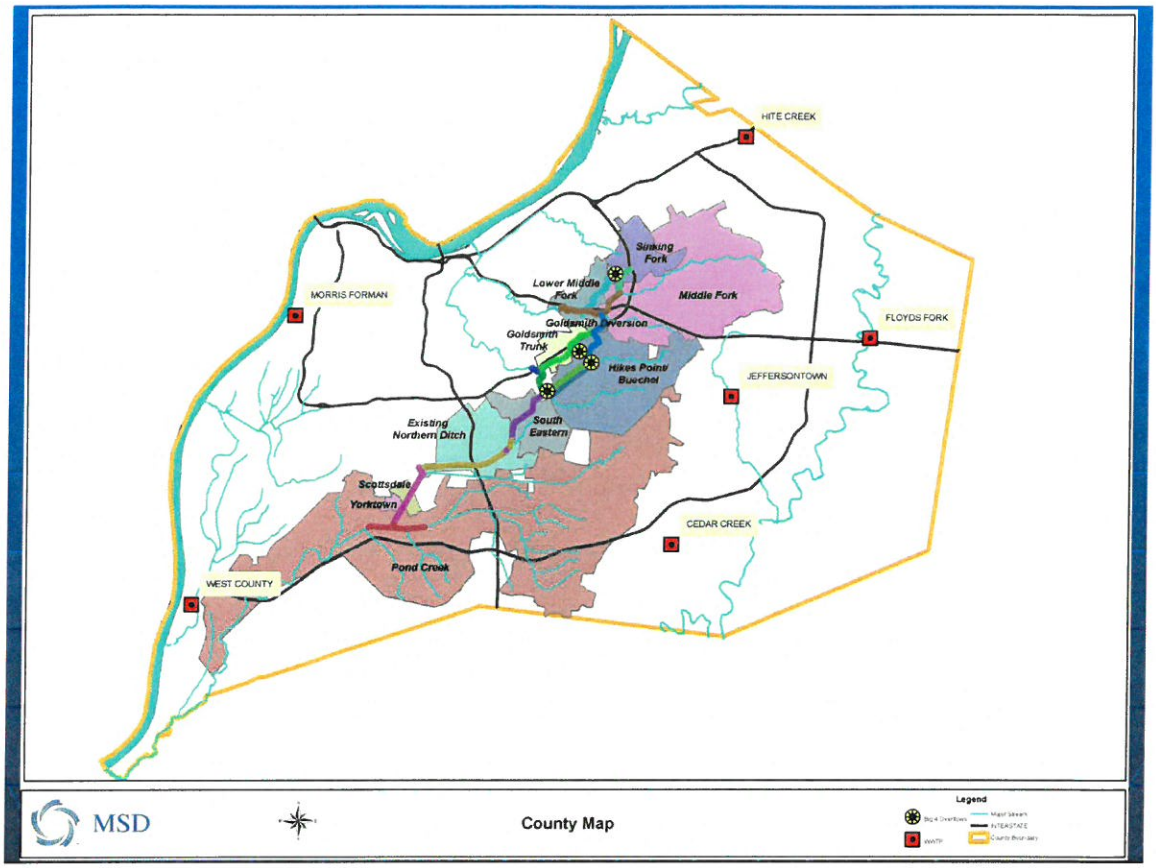
Louisville & Jefferson County
Metropolitan Sewer District

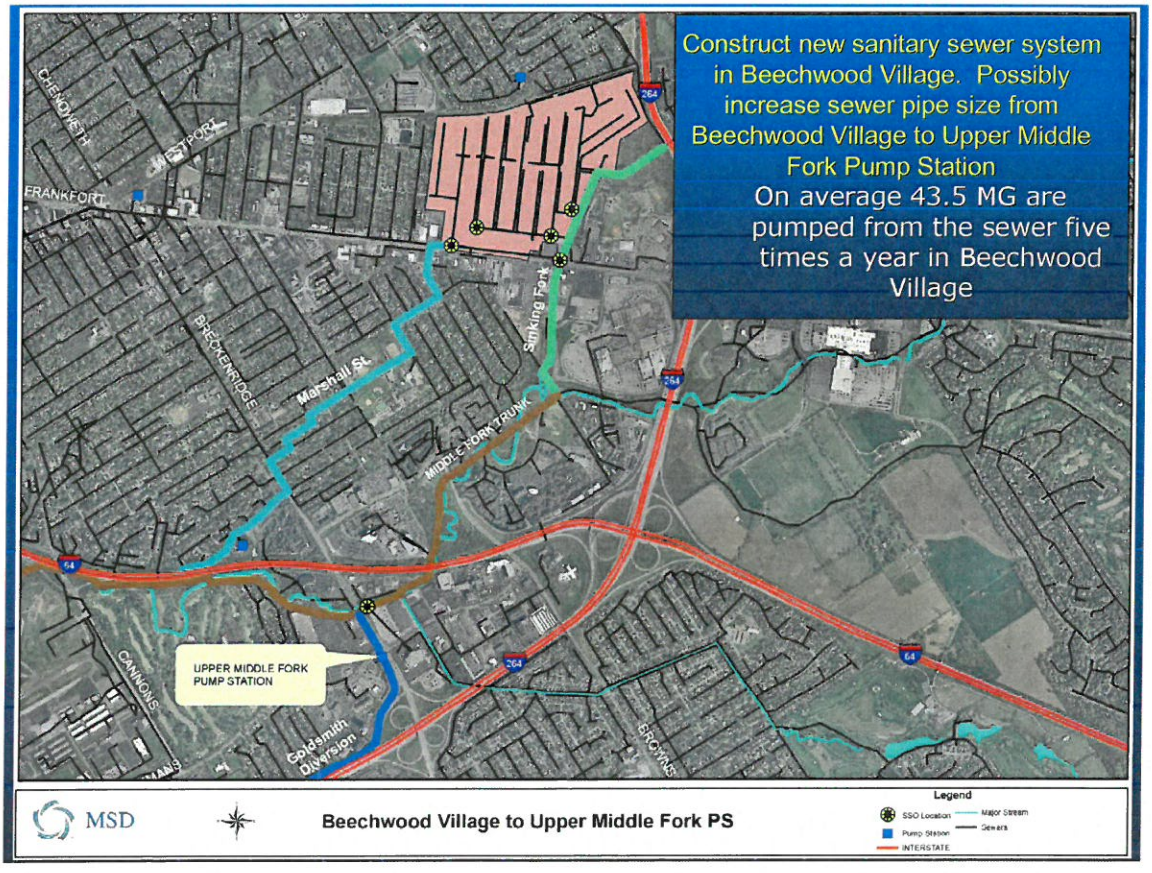
Presentation Outline

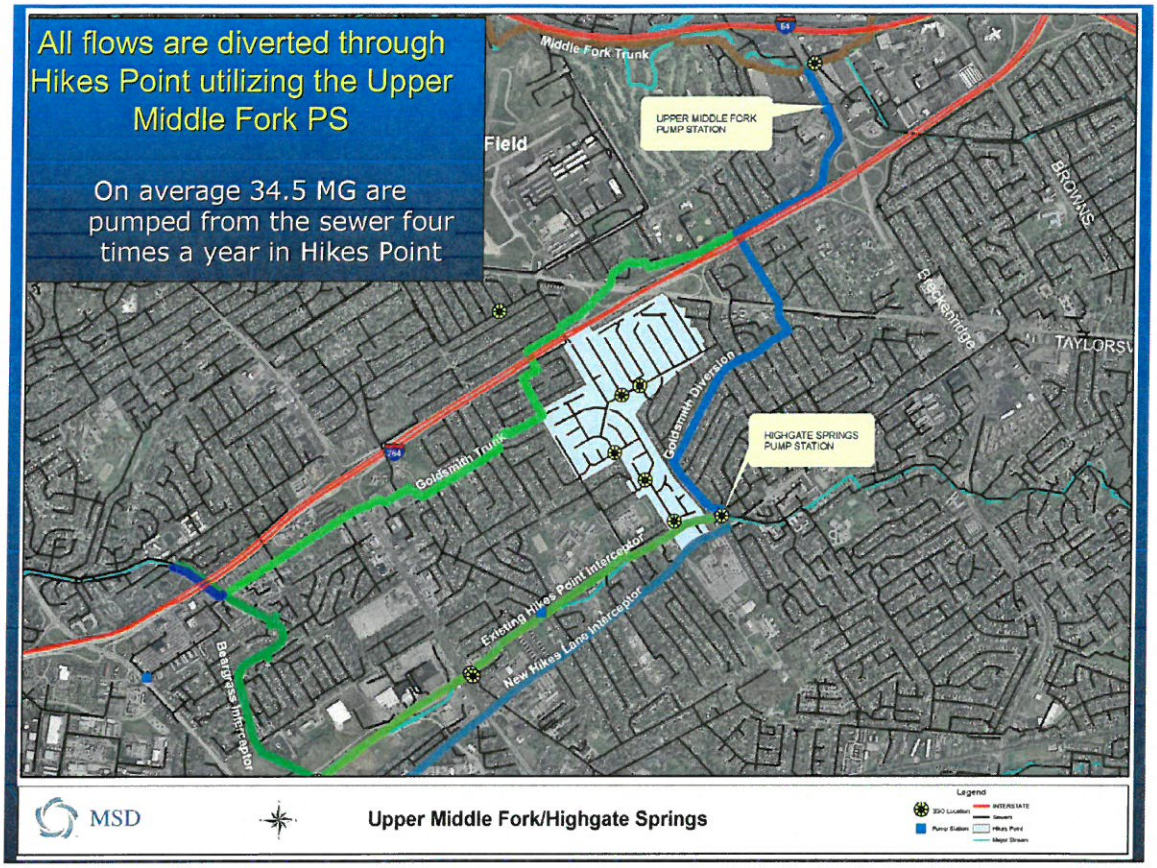
The Interim Sanitary Sewer Plan will address:

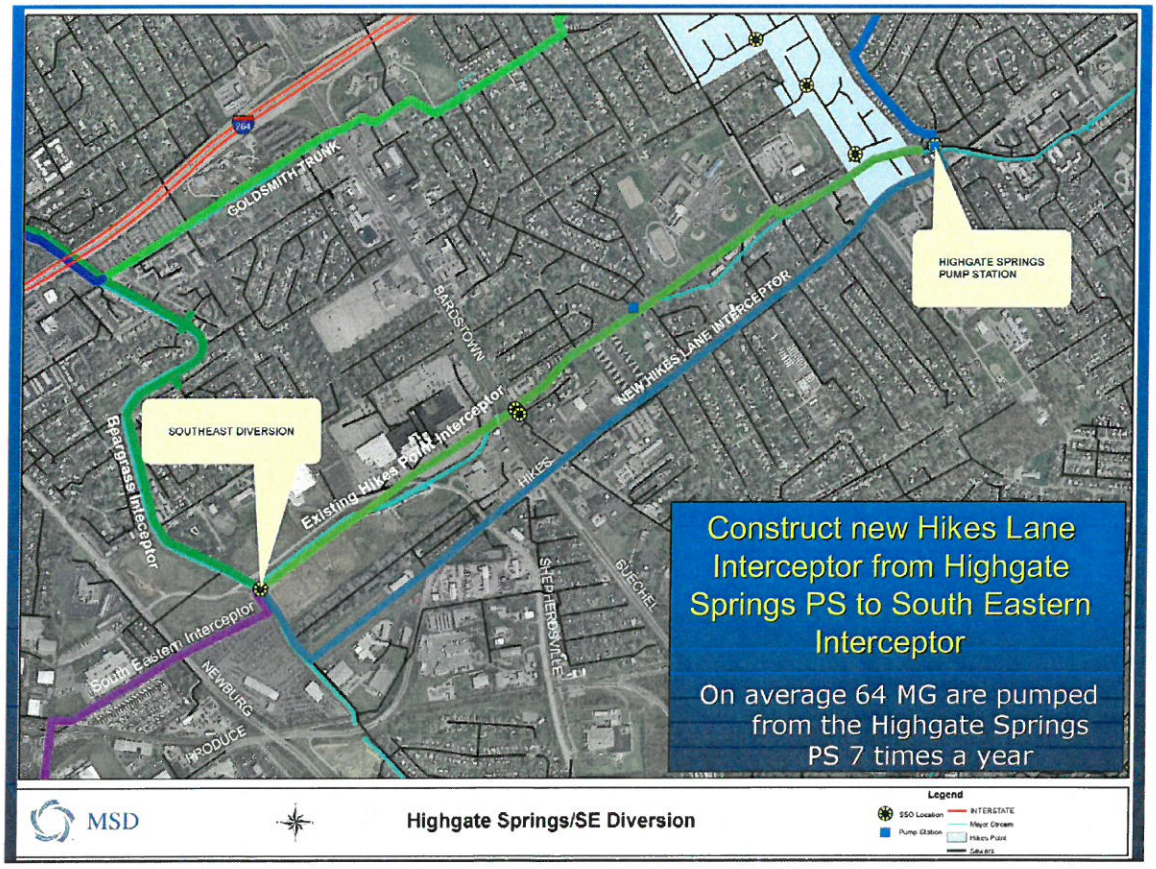
- Problem Definition
- Conveyance Facilities
- Storage Facilities
- Treatment Facilities

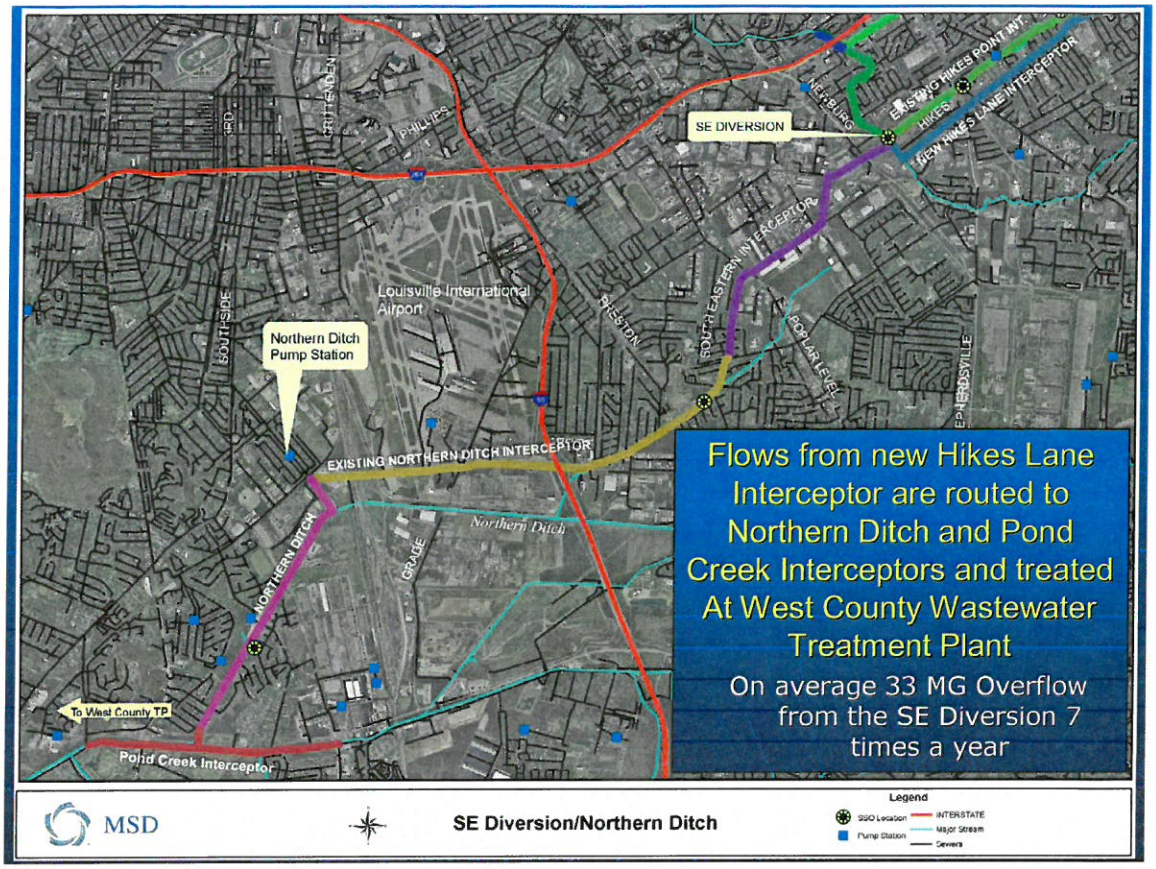
Louisville & Jefferson County
Metropolitan Sewer District

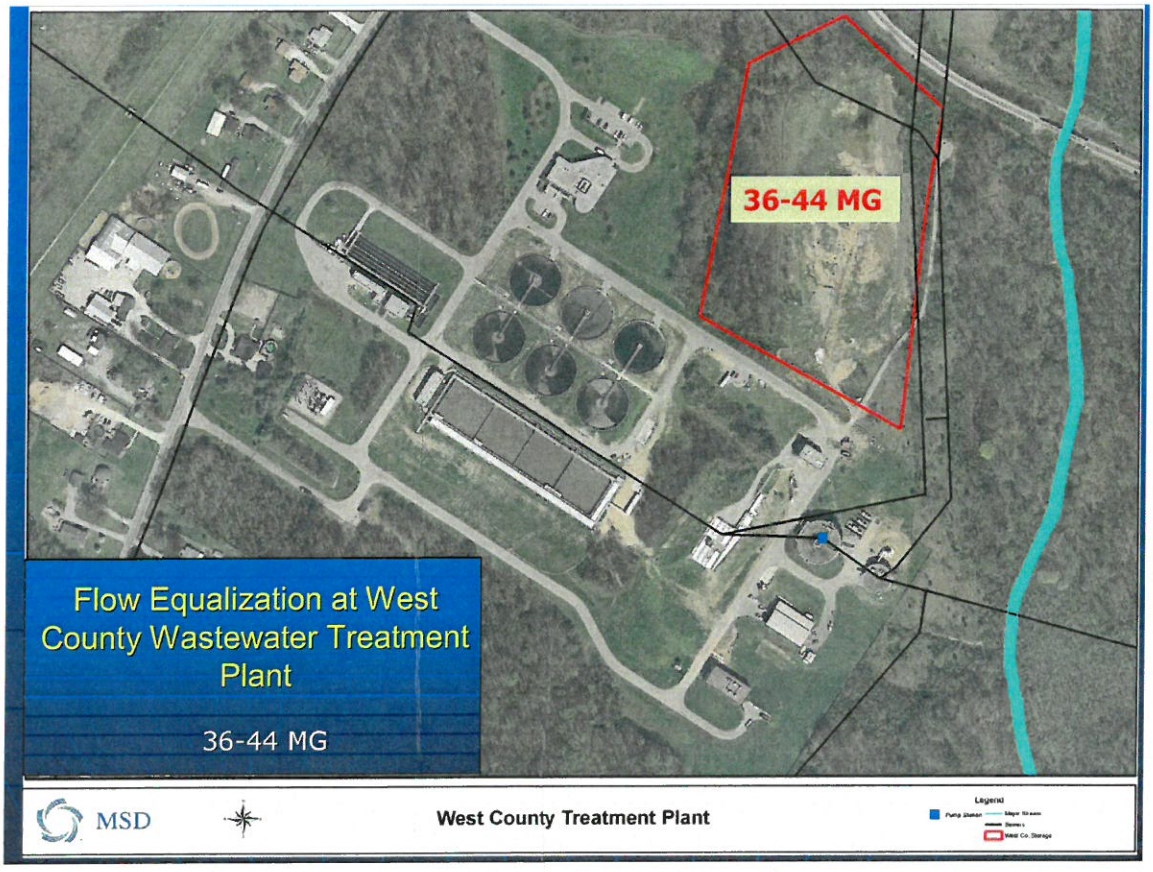

HITE CREEK
Sinking Fork
Lower Middle Fork
Middle Fork
MORRIS FORMAN
FLOYDS FORK
Goldsmith Diversion
Goldsmith Trunk
Hikes Point Buechel
JEFFERSONTOWN
Existing Northern Ditch
South Eastern
Scottsdale
Yorktown
CEDAR CREEK
Pond Creek
WEST COUNTY
MSD
County Map
Legend


Construct new sanitary sewer system in Beechwood Village. Possibly increase sewer pipe size from Beechwood Village to Upper Middle Fork Pump Station
On average 43.5 MG are pumped from the sewer five times a year in Beechwood Village
CHENOWETH
WESTPORT
FRANKFORT
BRECKENRIDGE
Marshall St.
Sinking Fork
MIDDLE FORK TRUNK
UPPER MIDDLE FORK PUMP STATION
GANNONS
Goldsmith Diversion
BROWNS
MSD
Beechwood Village to Upper Middle Fork PS
Legend
SSO Location
Pump Station
INTERSTATE
Major Stream
Sewers

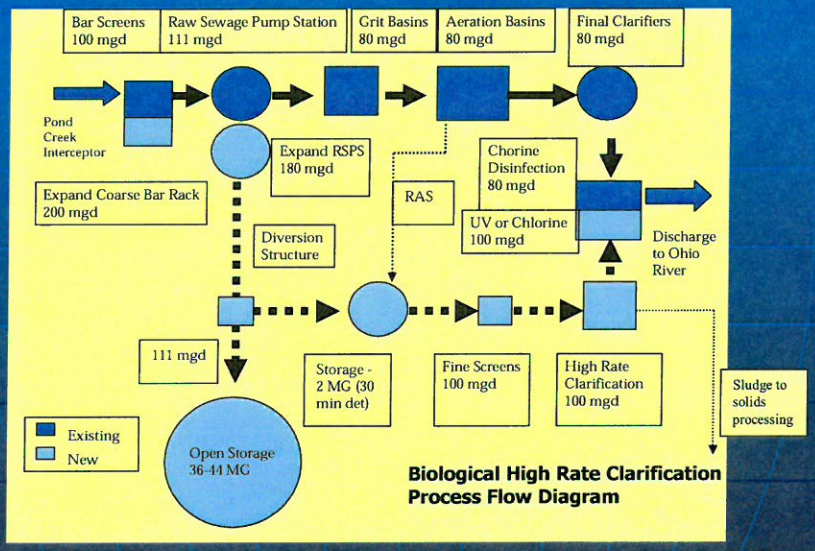

All flows are diverted through Hikes Point utilizing the Upper Middle Fork PS
On average 34.5 MG are pumped from the sewer four times a year in Hikes Point
Middle Fork Trunk
UPPER MIDDLE FORK PUMP STATION
Field
BROWNS
Brookenridge
TAYLORS
Goldsmith Diversion
HIGHGATE SPRINGS PUMP STATION
Goldsmith Trunk
Existing Hikes Point Interceptor
New Hikes Lane Interceptor
Beargrass Interceptor
MSD
Upper Middle Fork/Highgate Springs
Legend


GOLDSMITH TRUNK
BARDSTOWN
HIGHGATE SPRINGS PUMP STATION
NEW HIKES LANE INTERCEPTOR
SOUTHEAST DIVERSION
Beargrass Interceptor
Existing Hikes Point Interceptor
HIKES
SHEPHERDSVILLE
GUECHEL
South Eastern Interceptor
NEWBURG
PRODUCE
Construct new Hikes Lane Interceptor from Highgate Springs PS to South Eastern Interceptor
On average 64 MG are pumped from the Highgate Springs PS 7 times a year
MSD
Highgate Springs/SE Diversion
Legend


SE DIVERSION
EXISTING HIKES POINT INT.
NEW HIKES LANE INTERCEPTOR
HIKES
NEIGLING
SOUTH EASTERN INTERCEPTOR
BOB LAR LEVEL
PRESTON
Louisville International Airport
Northern Ditch Pump Station
SOUTHSIDE
3RD
CRITTENDEN
PHILLIPS
EXISTING NORTHERN DITCH INTERCEPTOR
Northern Ditch
NORTHERN DITCH
GRADE
To West County TP
Pond Creek Interceptor
Flows from new Hikes Lane Interceptor are routed to Northern Ditch and Pond Creek Interceptors and treated At West County Wastewater Treatment Plant
On average 33 MG Overflow from the SE Diversion 7 times a year
MSD
SE Diversion/Northern Ditch
Legend
SSO Location
Pump Station
INTERSTATE
Major Stream
Sewers


36-44 MG
Flow Equalization at West County Wastewater Treatment Plant
36-44 MG
MSD
West County Treatment Plant
Legend

Wet Weather Treatment at West County Wastewater Treatment Plant



Louisville & Jefferson County
Metropolitan Sewer District

Discussion
Summary
Wrap-up

Louisville & Jefferson County
Metropolitan Sewer District

Green Infrastructure Initiative

Wet Weather Team
Stakeholder Group Meeting No. 10
June 21, 2007

Louisville & Jefferson County
Metropolitan Sewer District

Green Team Initiative

I. Introduction
- Program Objectives
- Project Team

II. Project Approach
- Awareness
- Exploration
- Vision

III. Group Exercise

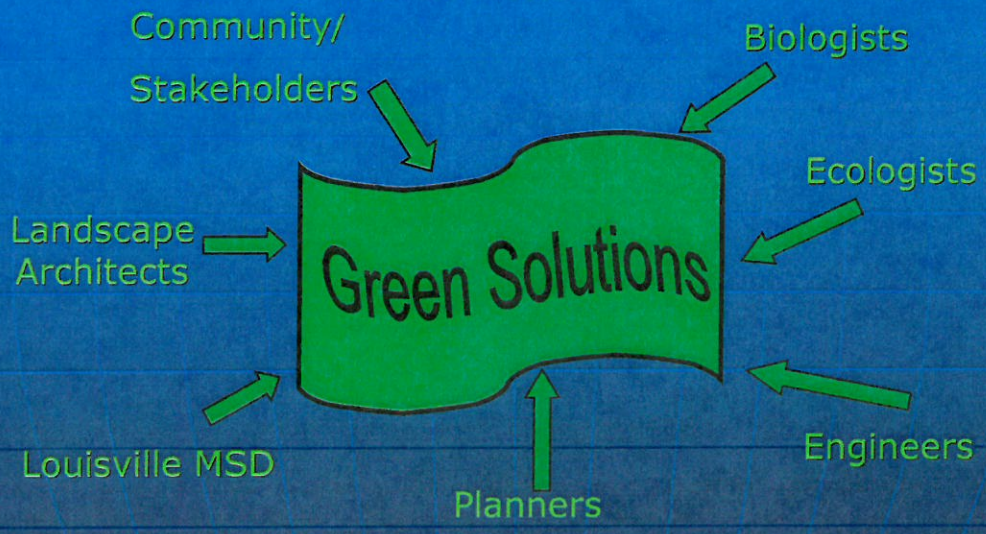
I. Introduction

- Green infrastructure programs are site specific and must consider:
  - Physical and Technical Components
  - Financial Aspects
  - Regulatory Requirements
  - Political and Social Perspectives
  - Community Values

I. Objectives

- **Augment traditional engineering solutions**
  - site specific
  - throughout the watershed
  - quantity or quality
- **Assist in achieving regulatory compliance**
- **Cost effective**
  - cost sharing and grant opportunities
- **Provide supplemental benefits**
  - habitat
  - community connectivity
  - public amenities

I. Project Team – Multi-Disciplinary



Strand Associates, Inc. **Human Nature, Inc.** **Biohabitats Incorporated**

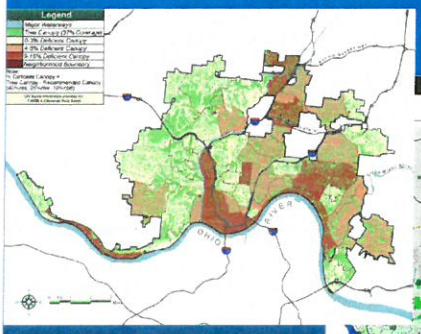
Redwing Ecological Services, Inc. **Spatial Data Integrations, Inc.**

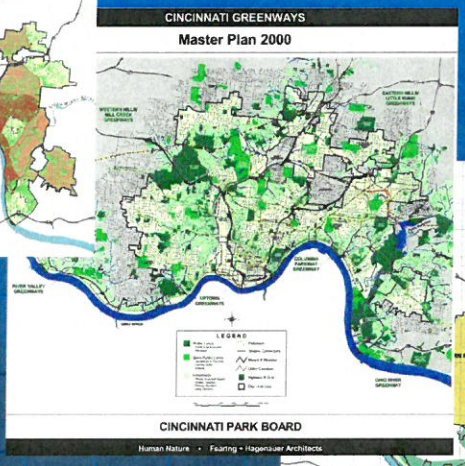
II. Project Approach

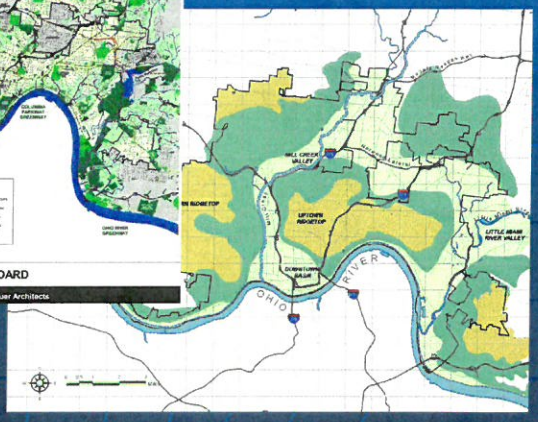
- **Awareness**
  - Compilation of relevant information
  - Understanding Louisville MSD & Community Needs
  - Identify existing programs and potential partners
    - **Rainbarrel Program**
    - **Rain Garden Initiative**
    - **Project WIN**
    - **Educational programs**
    - **Living Lands and Water**
- **Exploration**
  - Investigating a range of green infrastructure strategies and building community/stakeholder support
- **Vision**
  - Articulating a powerful vision that inspires the community, integrates with the Wet Weather Plan and provides a roadmap for implementation

II. Project Approach

- Awareness - Inventory and Analysis

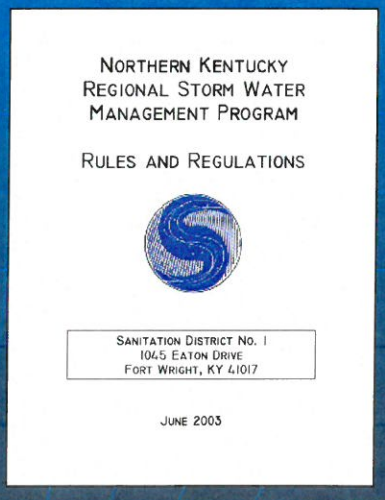






II. Project Approach

- Awareness - Regional Collaboration

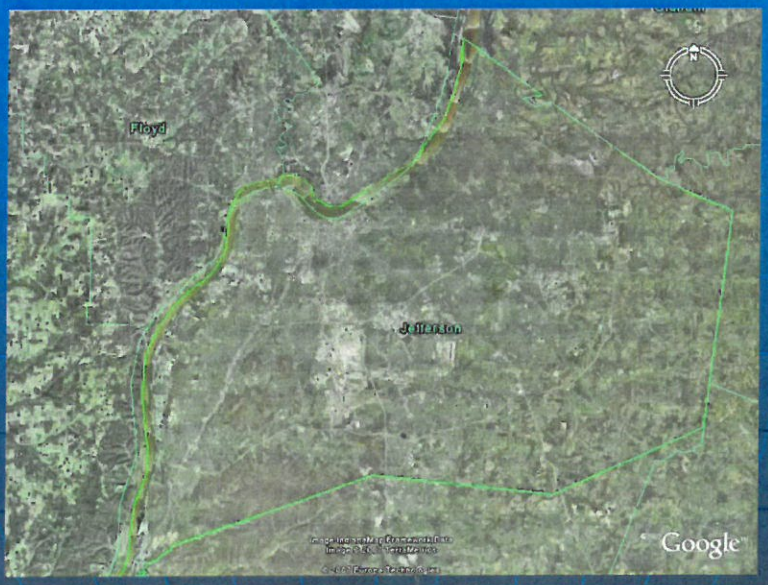


II. Project Approach

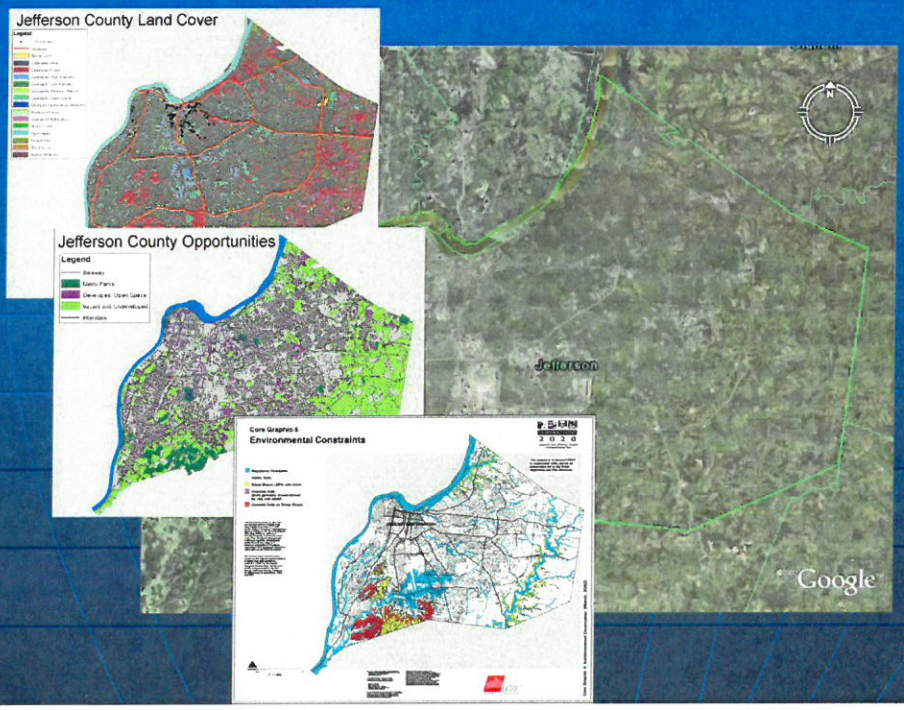
❑ Exploration – Program Perspective

- **Multi-Scale**
  - From site specific BMP's to regional regulations
- **Multi-Objective**
  - Consent Decree compliance to Quality of Life
- **Multi-Benefit**
  - Water quality, urban beautification, air quality, habitat, greenway connectivity

Regional Scale



Regional Scale



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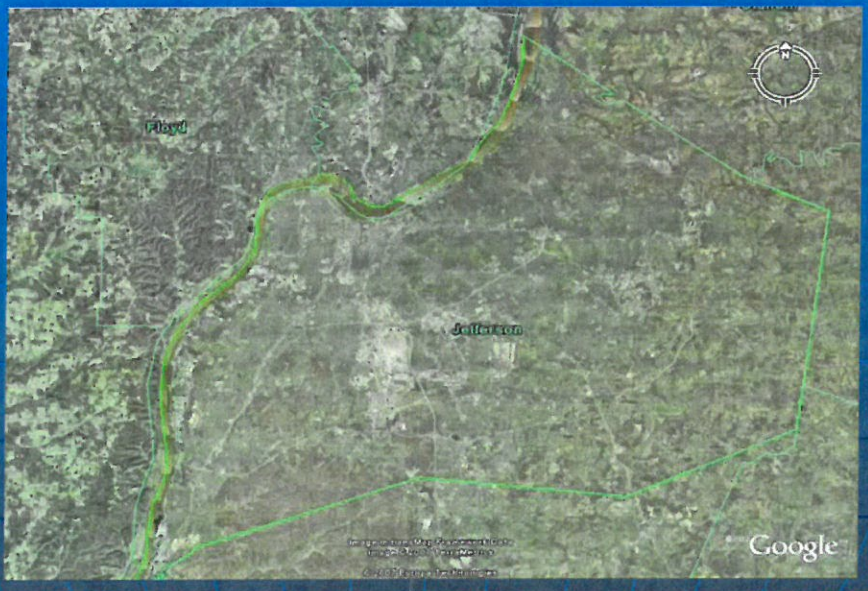
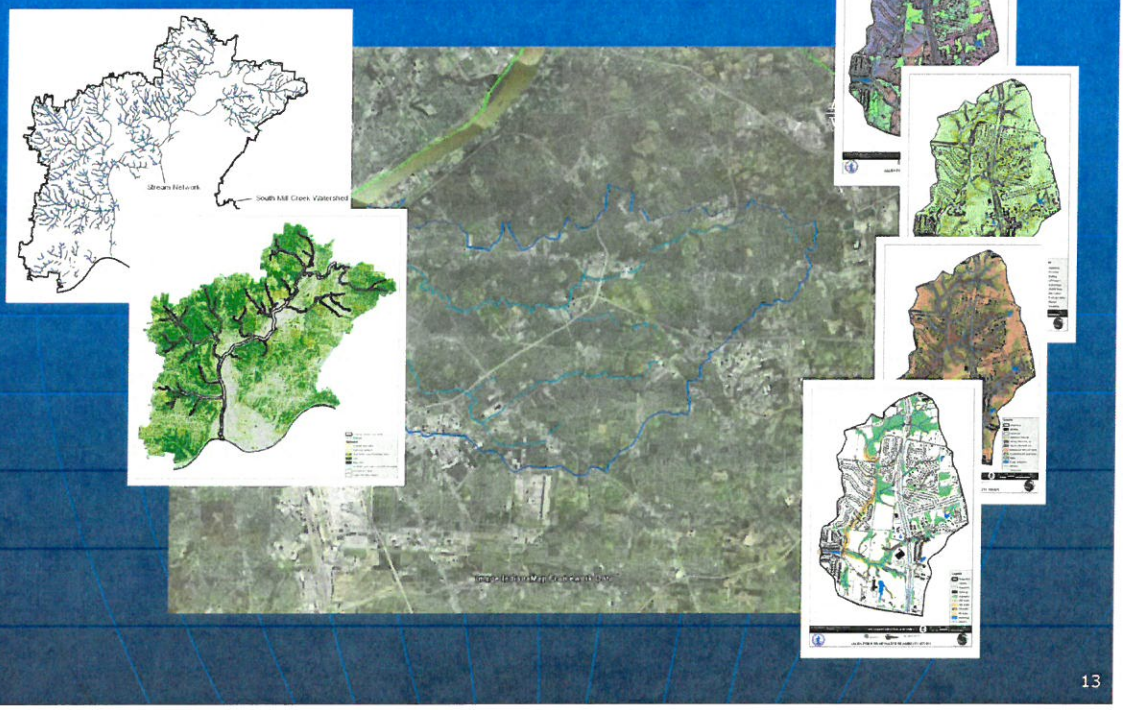
Watershed Scale



zoom

12

Watershed Scale



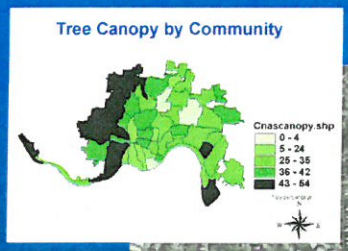
13

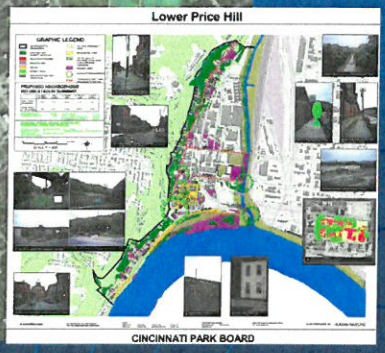
Neighborhood Scale

zoom

14

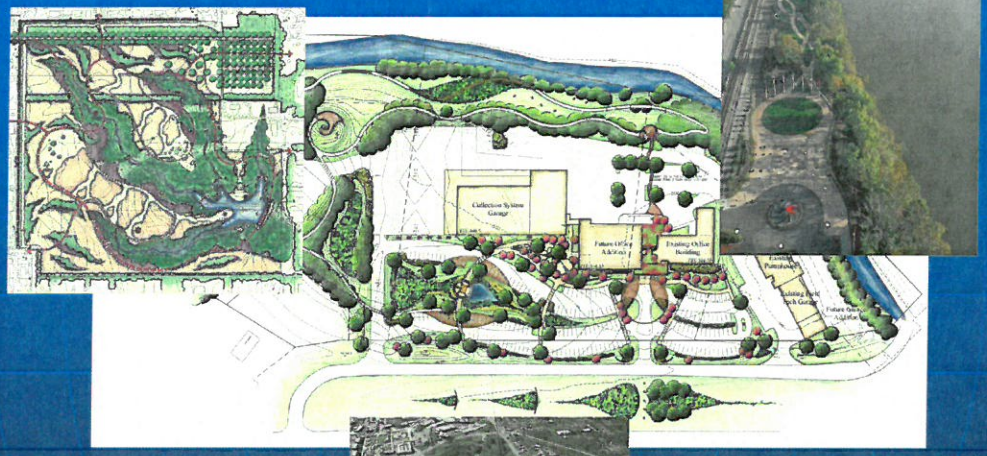
Neighborhood Scale





15

Site Scale



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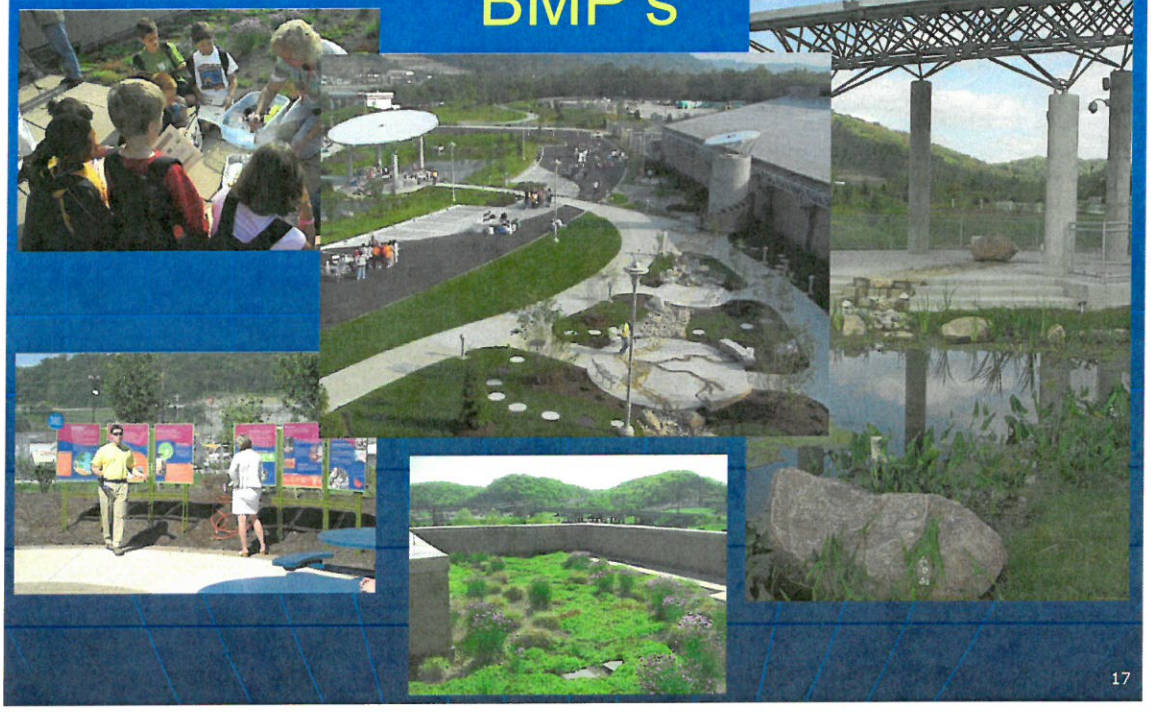
Components/ BMP's



17

II. Exploration

- Components - BMP Technologies
  - Some well-established and accepted by regulators
  - Some may require time and monitoring to prove effectiveness.

Porous Pavements

Wetlands Design/Restoration

Trillium Lane Wetland Mitigation
Marathon County, WI

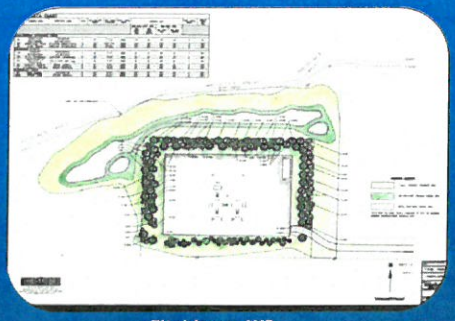
WalCoMet Creek Wetland

Fort Wright, KY

Jefferson County, KY

Jefferson County, KY

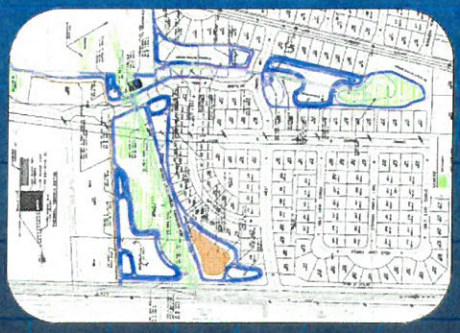
Infiltration Techniques



Fitchburg, WI

Fort Wright, KY

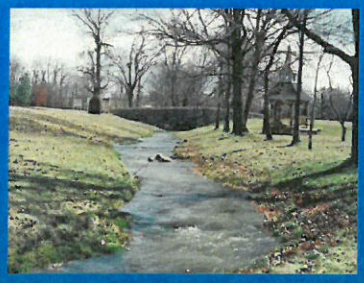
Fort Wright, KY



Sun Prairie, WI

Stream Restoration

9 Springs Creek – Fitchburg, WI



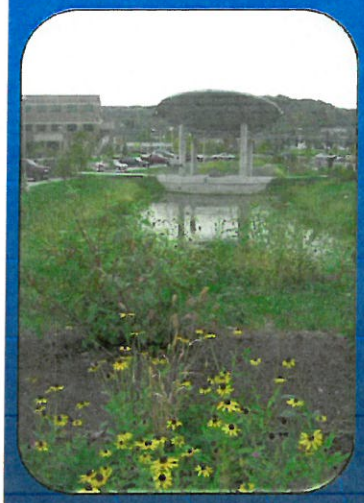
Willow Oak – Lexington, KY

Jefferson County, KY

Mill Creek – Cleveland, OH

9 Springs Creek – Fitchburg, WI

Detention / Retention



Retention Basin – Fort Wright, KY

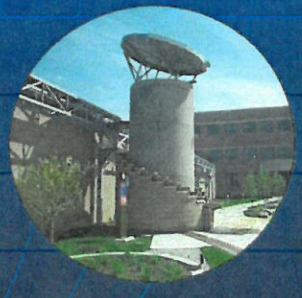
Brooklyn F.S. Pond

H Pond – Marathon County, WI

Autumn Lake - Madison, WI

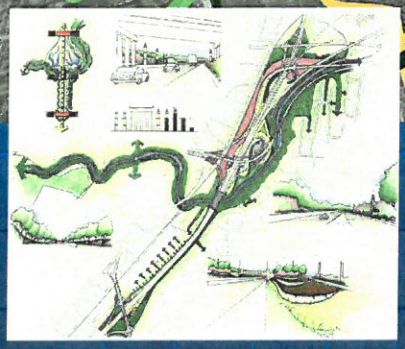
Other BMP'S

University of Madison – Madison, WI



III. Vision

Cohesive Systems

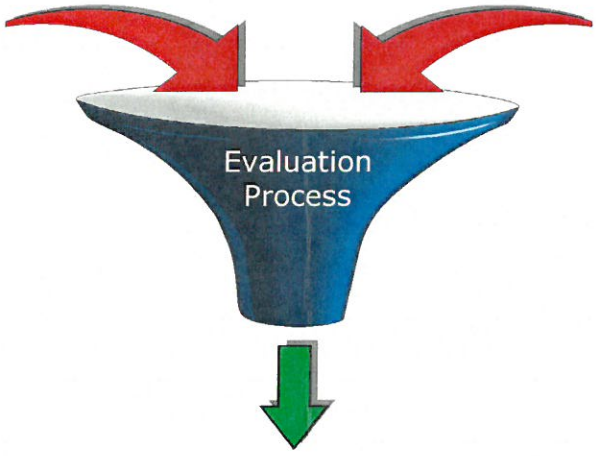


Master Planning

Compelling Design

III. Vision

Incentives	**Wetlands**	**Regulations**
Green Roofs	**Rain Barrels**	**Greenways**
Regional Collaboration	**Porous Pavement**	**Stream Restoration**



Plan of Action Integrated into the Wet Weather Plan

Summary

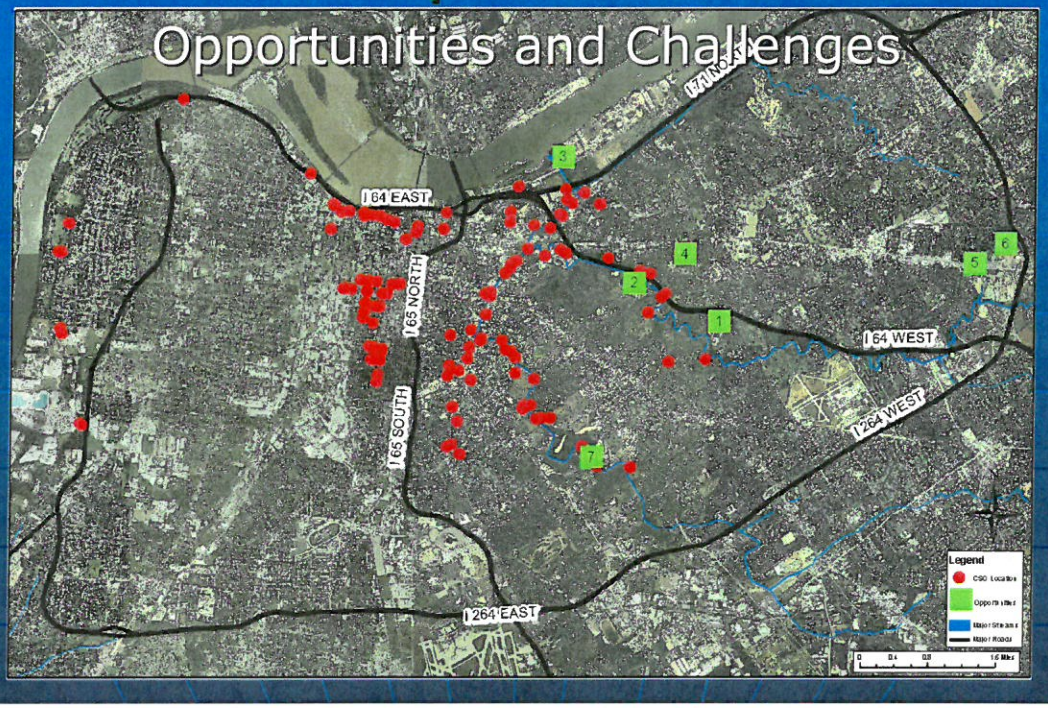
- Green infrastructure program will be multi-scale, multi-objective, multi-benefit.
- Performance data is available for some BMPs, but others may need to be proven.
- Effective green infrastructure program must be integrated into overall wet weather plan.

Opportunities and Challenges

- Opportunities
  - Connect Cherokee and Seneca Park with the waterfront
  - Restore CSO 127 meander
  - Convert Eva Bandman Park into restored wetlands
  - Restore wetlands at quarry areas between Grinstead and Payne
  - Detention pond at Beechwood Village entrance
  - Park-like wet detention area at St. Matthew's Park
  - Restore South Fork between I-264 and Eastern Parkway
- Challenges
  - Public Awareness
  - Cost
  - Regulatory Compliance
  - Schedule

Group Exercise

Opportunities and Challenges



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Discussion

Combined Sewer Overflow Long-Term Control Plan Mitigation Strategies

Wet Weather Team
Stakeholder Group Meeting No. 10
June 21, 2007

Louisville & Jefferson County
Metropolitan Sewer District

Topics

- Review Available Technology
- Review Work to Date Flushing Out Viable Projects
- Review Characteristics of CSO Areas that Impact Selection
- Review Examples

Combined Sewage Overflow Long-Term Control Plan Technology Alternatives

- Sewer Separation
- Storage
  - In-line Storage
  - Off-line Storage
  - Individual vs. Regional Storage
- Treatment
  - Solids and Floatable Capture
  - Enhanced Primary Treatment
  - Secondary Treatment
- Green Infrastructure

Combined Sewer System Separation

Sewer Separation

- Defined as the conversion of a combined sewer system (CSS) into separate sanitary and storm water systems
- Sewer system separations can consist of the following:
  - Complete separation
  - Partial separation
  - Private Property Work
    - Reconnect House Sewer
    - Downspout/Sump Pump disconnection

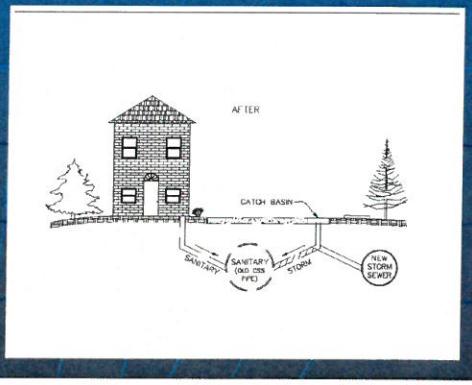
Sewer Separation (continued)

- Separation is typically dependent on the following conditions:
  - Small sewersheds
  - Small pipe diameters
  - Right-of-Way (ROW) availability and usage
  - Conflicting utilities (ex.: water mains, power, telephone, cable, etc.)
- Separation is an option but cost is typically very high due to the magnitude of construction required

Sewage Separation

Before:

After:



Combined Sewer Overflow Storage

Combined Sewage Storage

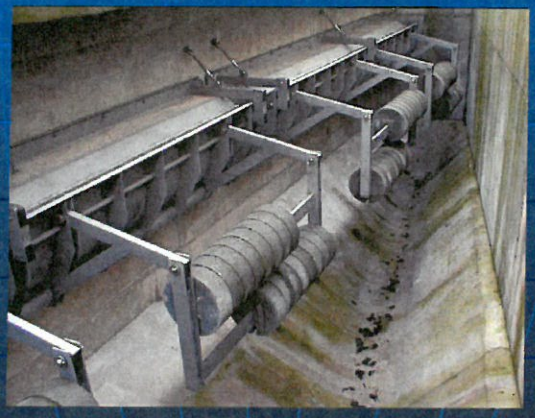
- In-line Storage Technologies:
  - Sluice Gates
  - Bending Weirs
  - Inflatable Dams
- Off-line Storage Technologies:
  - Open Basins - earthen or concrete
  - Closed (below-grade) Basins / Tanks
- Large Diameter Pipe

Combined Sewage Storage (continued)

- Storage Configurations
  - Individual CSO
  - Multiple CSO's, typically referred to as regional or sub-regional storage (more common)

Combined Sewage Storage In-line Technologies-Bending Weirs

- Installed in sewers to reduce the occurrence of overflow
- Used to increase water level in sewers, assuring maximum use of storage and conveyance capacities
- Can also be fitted to capture solids and floatables pollutants



Combined Sewage Storage In-line Technologies-Inflatable Dam

- Large inflatable rubber bladder
- Typically applied in large diameter pipes where the diameter, slope, and CSS Model indicates the full capacity of a pipe is not utilized
- Technology provides multiple benefits such as maximizing existing infrastructure investment while providing treatment for the overflow volume, reducing pollutant discharge
- Reasonable cost for benefit received
- Requires control appurtenances

Combined Sewage Storage In-Line Technologies

- Advantages/Disadvantages - In Line Storage
  - Storage offers the opportunity to retain CSS overflow for eventual treatment at MFWTP - available capacity
  - Cost effective making use of existing infrastructure
  - Storage may require pumping facilities to transfer the retained overflow to system.
  - Cleaning of accumulated solids needs to be considered
  - Existing system size defines benefits

Combined Sewage Storage Off-line Technologies-Open Basins

- Retention basins, constructed of earth or concrete, placed strategically within the CSS to retain CSS overflow
- Land availability and use are major issues. Many CSO's are located in the high-density urban region and CBD of Louisville
- Adjacent-land use consideration. Characteristics of CSO water quality can create public opposition

Combined Sewage Storage Off-line Technologies-Closed Tanks

- Closed basins / tanks function as open basins, but would likely require pumping facilities for conveyance to the CSS for eventual treatment at MFWTP
- Land availability and use are also issues but may be mitigated by utilizing the tank cover for a secondary use such as parking, recreational facilities, etc.
- Cost significantly more than open basins

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Combined Sewage Storage Off-line Technologies-Large Diameter Pipe

- Large diameter pipes function similar to a closed tank in storing overflow from the CSS
- Also require pumping facilities for conveyance to the CSS for eventual treatment at MFWTP
- Land area is reduced however construction easements and construction costs may offset these issues
- Large diameter pipes may create the opportunity to provide new conveyance routes to MFWTP plus provide increased In-line storage

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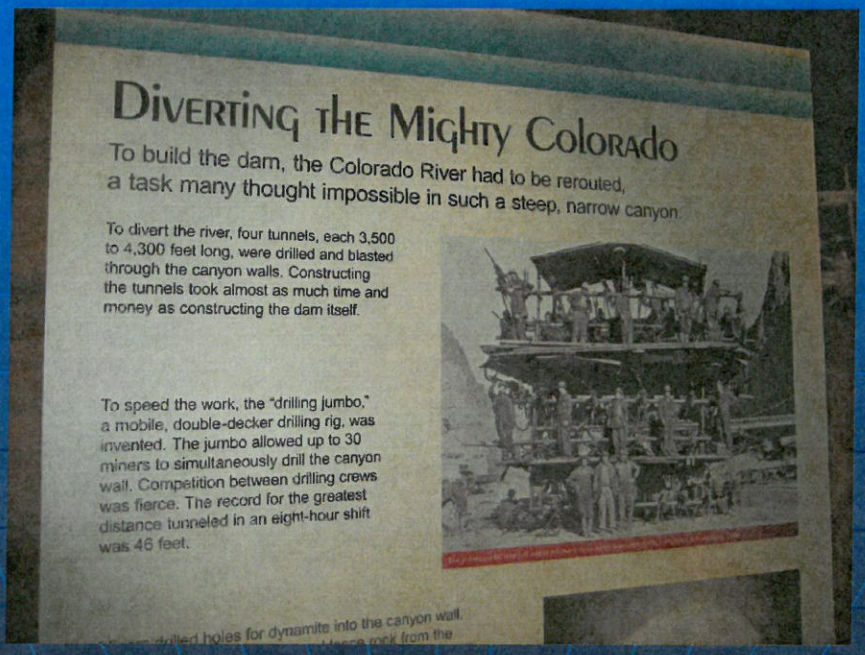
Combined Sewage Storage
Off-line Technologies-Large Diameter Pipe



DIVERTING THE MIGHTY COLORADO

To build the dam, the Colorado River had to be rerouted, a task many thought impossible in such a steep, narrow canyon.

To divert the river, four tunnels, each 3,500 to 4,300 feet long, were drilled and blasted through the canyon walls. Constructing the tunnels took almost as much time and money as constructing the dam itself.

To speed the work, the "drilling jumbo," a mobile, double-decker drilling rig, was invented. The jumbo allowed up to 30 miners to simultaneously drill the canyon wall. Competition between drilling crews was fierce. The record for the greatest distance tunneled in an eight-hour shift was 46 feet.

...drilled holes for dynamite into the canyon wall. ...rock from the

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Combined Sewage Storage
Off-Line Technologies

- Advantages/Disadvantages of Storage
  - Storage offers the opportunity to retain CSS overflow for eventual treatment at MFWTP - available capacity
  - Land needs
  - Storage may require pumping facilities to transfer the retained overflow to system.
  - Cleaning of accumulated solids is typically required
  - Odor has not been found to be a significant issue
  - Adjacent-land use consideration. Characteristics of CSO water quality can create public opposition

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Combined Sewer Overflow Treatment

Combined Sewer Overflow Treatment

- Solids and Floatables Capture
- Enhanced Primary Treatment
- Secondary Treatment

Combined Sewage Treatment Solids and Floatables Capture

- Screening technology, currently utilized on existing MSD CSO's to provide solids capture for Nine Minimal Controls (NMC) regulatory performance, will continue to be utilized in the future for small-volume CSO's not eliminated under the CSO-LTCP
- Several screening technology alternatives are available on the market:
  - Screens
  - Netting Systems
  - Separators

Combined Sewage Treatment Solids and Floatables Capture

- Screens consist of a grid of parallel bars that retain any solid larger than the opening. These typically require manual cleaning following an overflow event

Combined Sewage Treatment Solids and Floatables Capture

- Netting Systems can be installed in-pipe, end-of-pipe, or floating within the receiving stream. Solids are captured in the netting during an overflow event, with the net and debris discarded and replaced for future events.

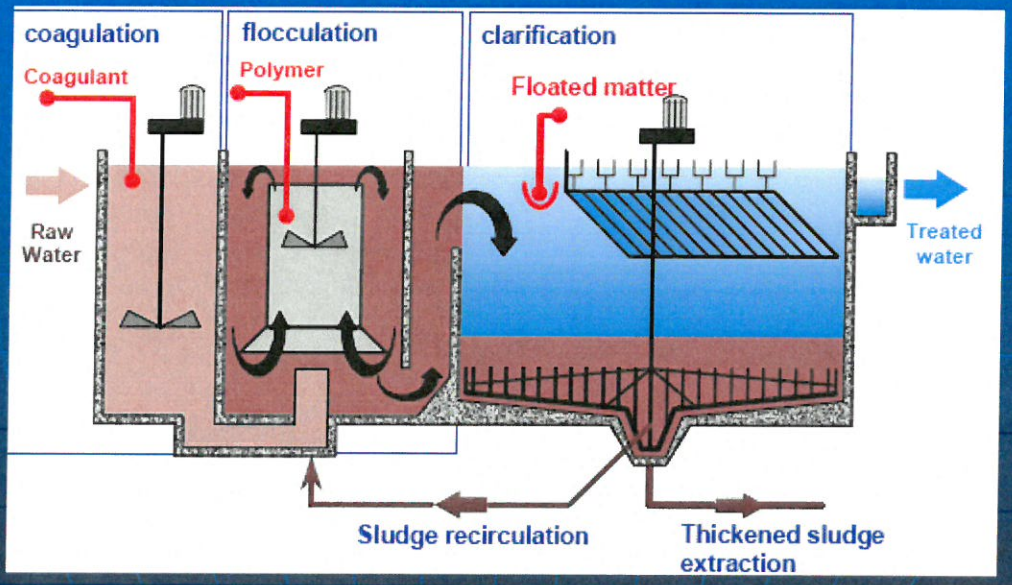
Combined Sewage Treatment Solids and Floatables Capture

- Separators are typically an in-pipe device using centrifugal force from a vortex flow path to capture solids. The captured solids are retained.

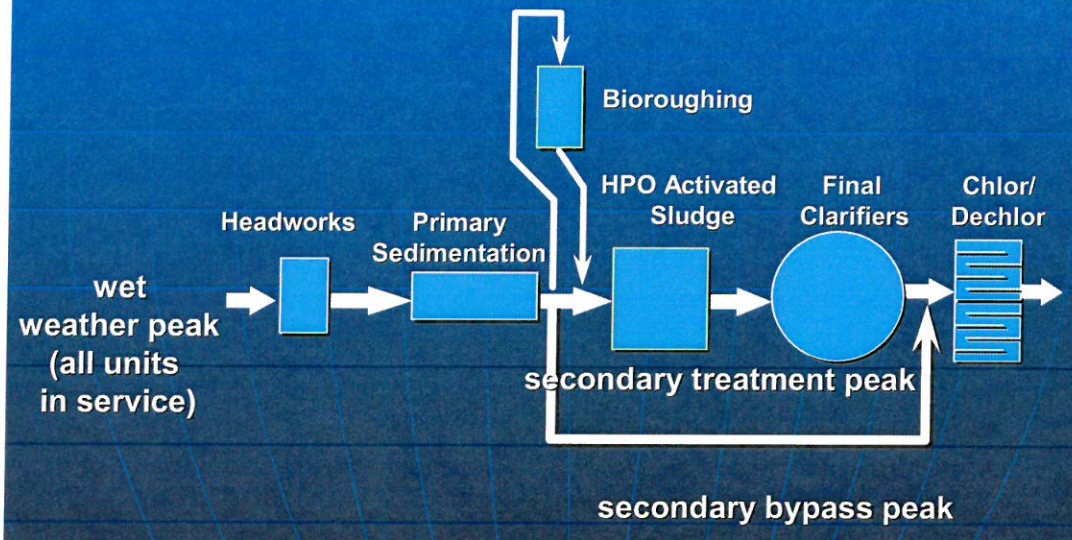
Combined Sewage Treatment Enhanced Primary Treatment

- Enhanced Primary Treatment can consist of the following:
  - A process that combines screening, gravity settling, and chemical addition to treat combined sewage overflow prior to discharge to receiving stream
  - A packaged system that are provides rapid startup and operation, high treatment capacities, and acceptable BOD and solids removal rates
  - Land footprint minimal in relation to the level of CSO mitigation benefit

Combined Sewage Treatment Enhanced Primary Treatment



Combined Sewage Treatment Secondary Treatment

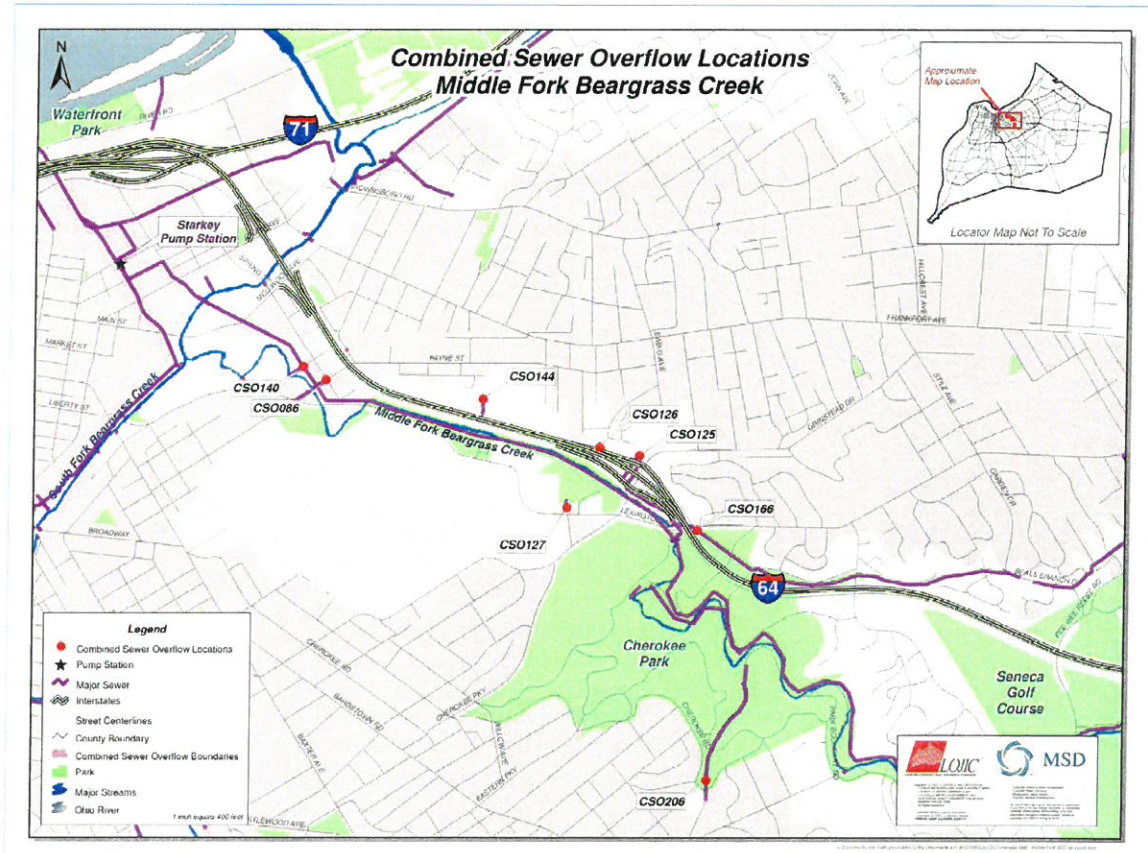


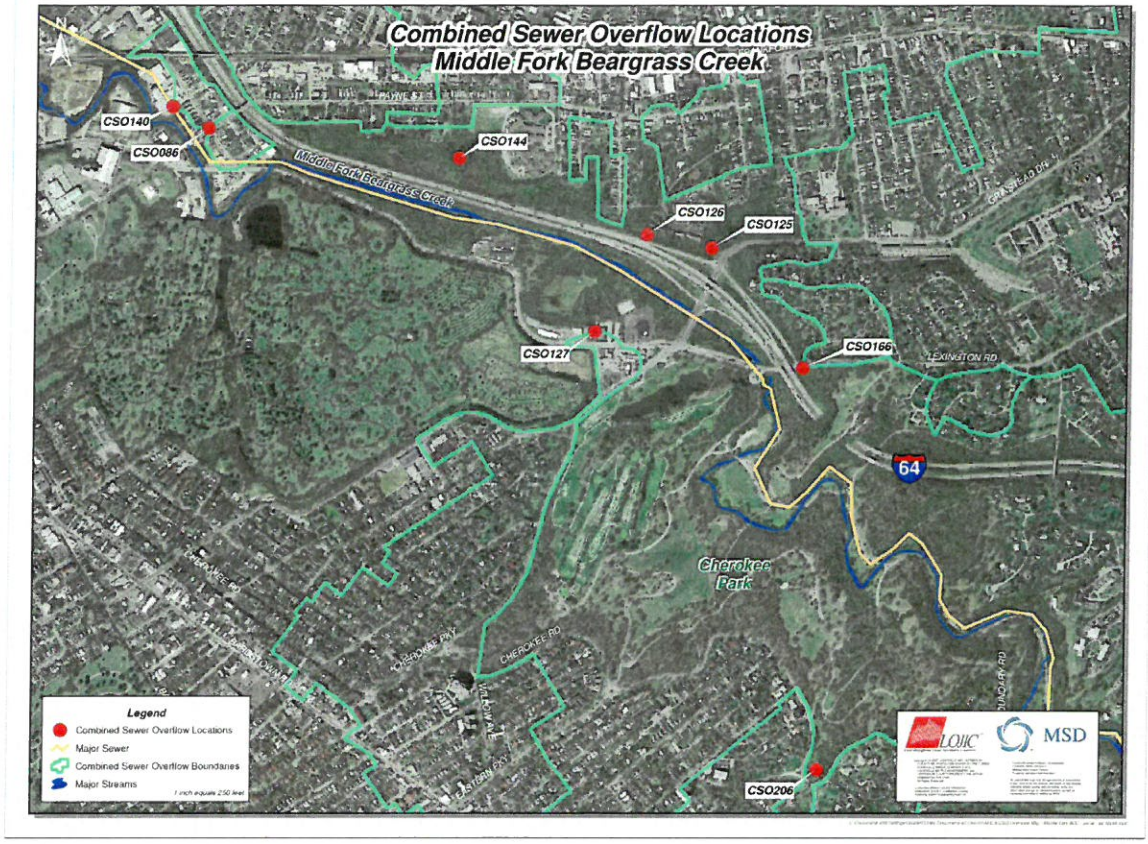
Initial Project Identification

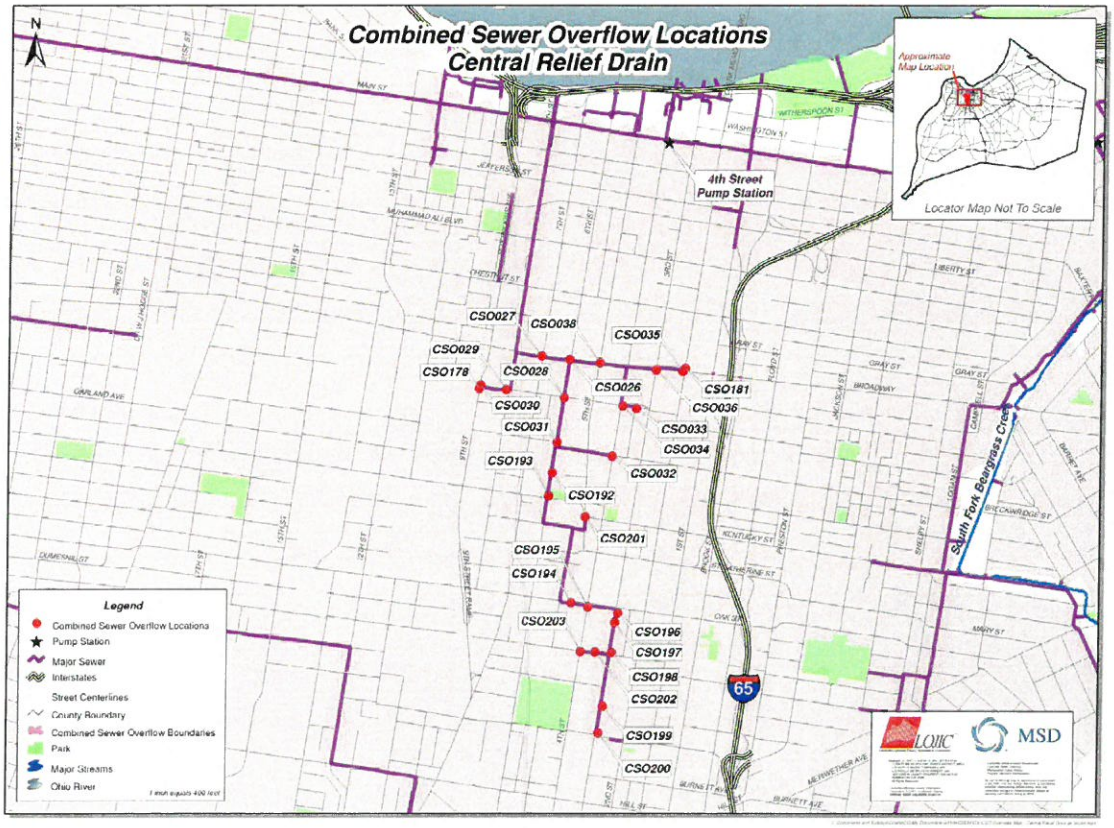
- March 23, 2007 technology workshop
  - Reviewed the full range of available technologies
  - Only 5 of 58 were eliminated
- May 10, 2007 workshop
  - Reviewed each CSO utilizing LOJIC maps; aerial photography; applying technology table, CSO characteristics (IE, frequency, flow rate)
  - Spreadsheet and database being developed

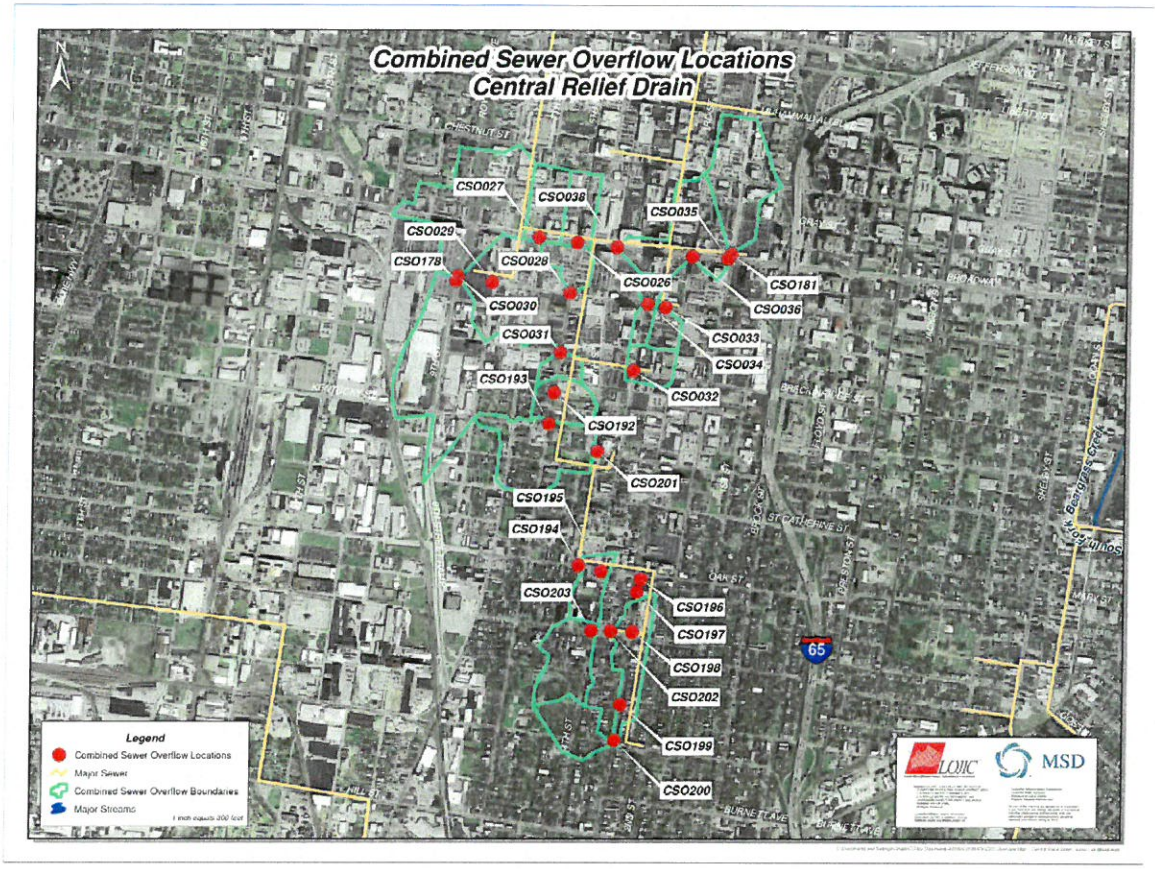
Example
Combined Sewer Overflow Mitigation Options

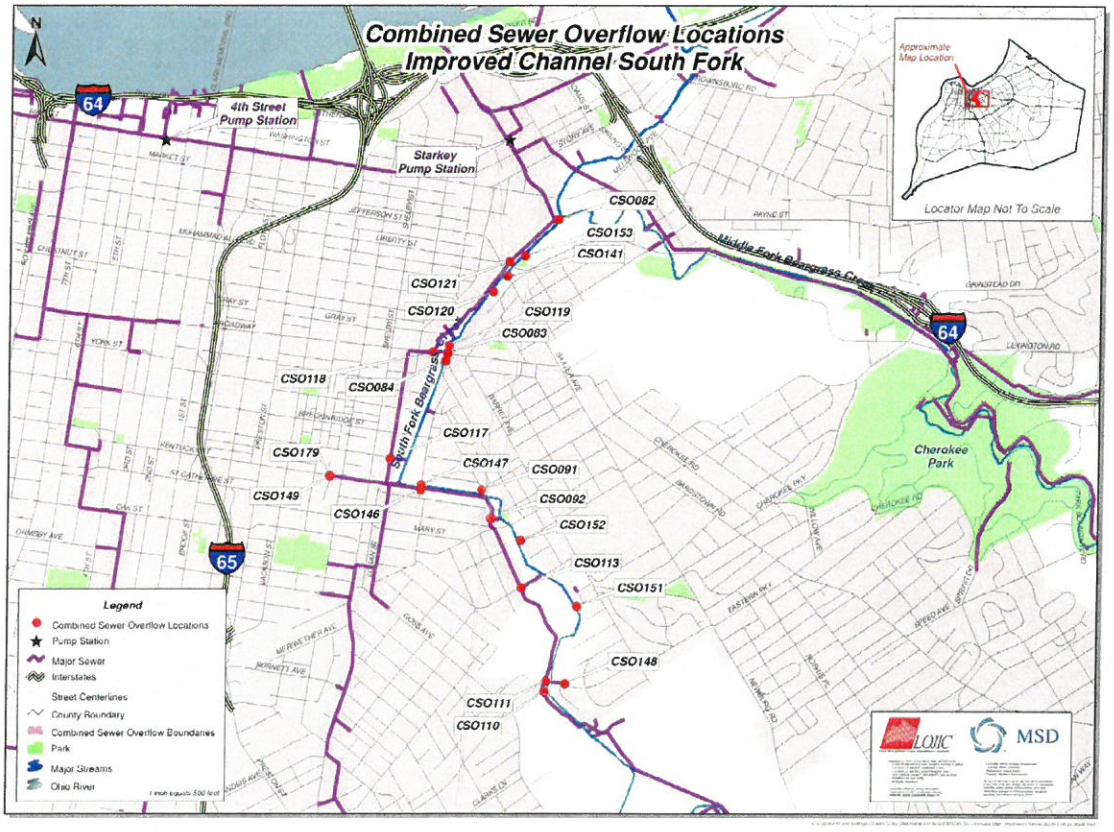
- Middle Fork of Beargrass Creek
- Central Relief Drain
- South Fork of Beargrass Creek Regional Option

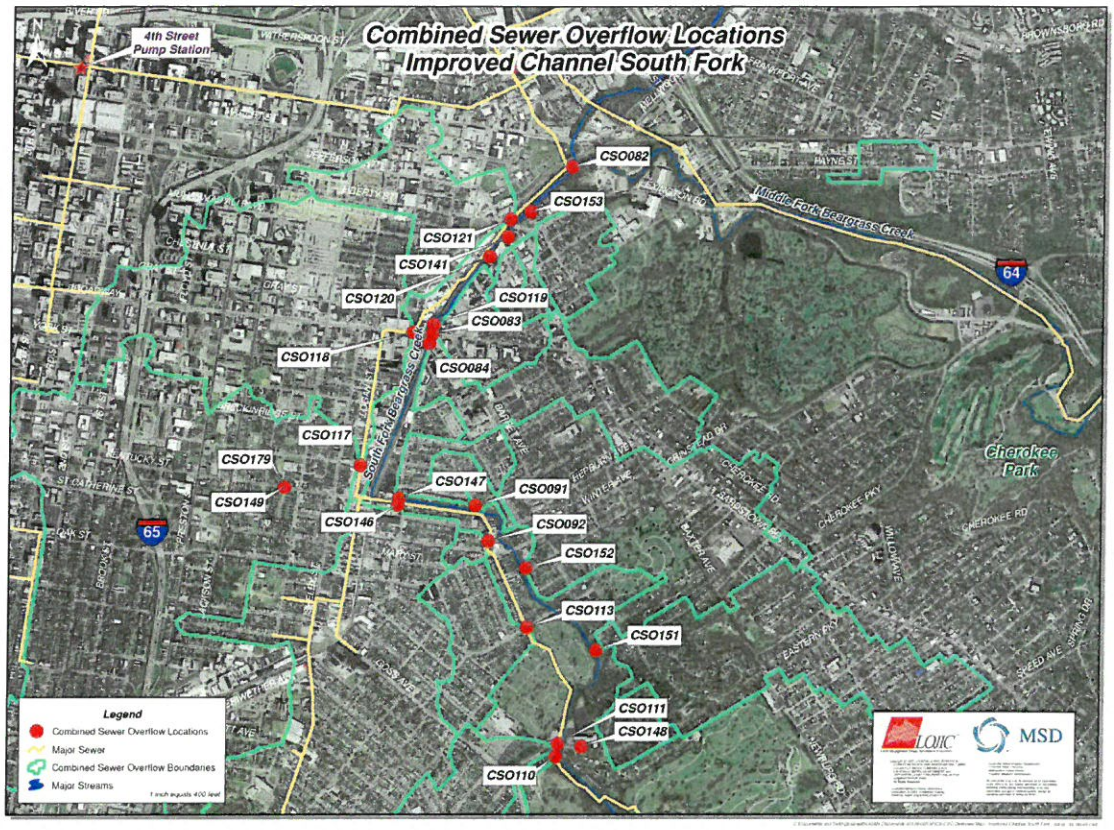



Combined Sewer Overflow Locations
Middle Fork Beargrass Creek
CSO140
CSO086
CSO144
CSO126
CSO125
CSO127
CSO166
CSO206
Middle Fork Beargrass Creek
LEXINGTON RD
64
Cherokee Park
Legend
Combined Sewer Overflow Locations
Major Sewer
Combined Sewer Overflow Boundaries
Major Streams
MSD


Combined Sewer Overflow Locations
Central Relief Drain
Approximate Map Location
Locator Map Not To Scale
4th Street Pump Station
CSO027
CSO038
CSO035
CSO029
CSO178
CSO028
CSO026
CSO181
CSO030
CSO036
CSO031
CSO033
CSO034
CSO193
CSO032
CSO192
CSO201
CSO195
CSO194
CSO203
CSO196
CSO197
CSO198
CSO202
CSO199
CSO200
65
South Fork Beargrass Creek
Legend
Combined Sewer Overflow Locations
Pump Station
Major Sewer
Interstates
Street Centerlines
County Boundary
Combined Sewer Overflow Boundaries
Park
Major Streams
Ohio River
MSD

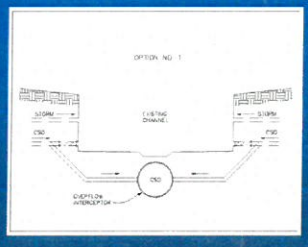

Combined Sewer Overflow Locations
Central Relief Drain
CSO027
CSO038
CSO035
CSO029
CSO178
CSO028
CSO026
CSO181
CSO030
CSO036
CSO031
CSO033
CSO034
CSO193
CSO032
CSO192
CSO201
CSO195
CSO194
CSO203
CSO196
CSO197
CSO198
CSO202
CSO199
CSO200
65
Legend
Combined Sewer Overflow Locations
Major Sewer
Combined Sewer Overflow Boundaries
Major Streams
LOJIC
MSD


Combined Sewer Overflow Locations
Improved Channel South Fork
4th Street
Pump Station
Starkey
Pump Station
64
65
CSO082
CSO153
CSO141
CSO121
CSO120
CSO119
CSO083
CSO118
CSO084
CSO117
CSO179
CSO147
CSO091
CSO149
CSO146
CSO092
CSO152
CSO113
CSO151
CSO148
CSO111
CSO110
South Fork Beargrass Creek
Middle Fork Beargrass Creek
Cherokee
Park
Approximate
Map Location
Locator Map Not To Scale
Legend
Combined Sewer Overflow Locations
Pump Station
Major Sewer
Interstates
Street Centerlines
County Boundary
Combined Sewer Overflow Boundaries
Park
Major Streams
Ohio River
LOJIC
MSD

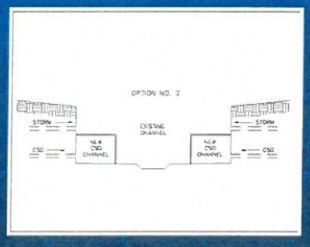


South Fork of Beargrass Creek Regional Option

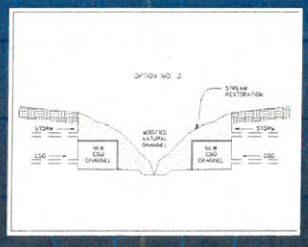
Option 1:



Option 2:



Option 3:



Combined Sewer Overflow Long-Term Control Plan Mitigation Strategies Key Points

- Process to determine project list is underway. Input on strategy and specific projects is requested
- Consider a broad range of technologies including augmentation with Green Infrastructure