Wet Weather Team Project Meeting Materials

Summer 2007–Spring 2008

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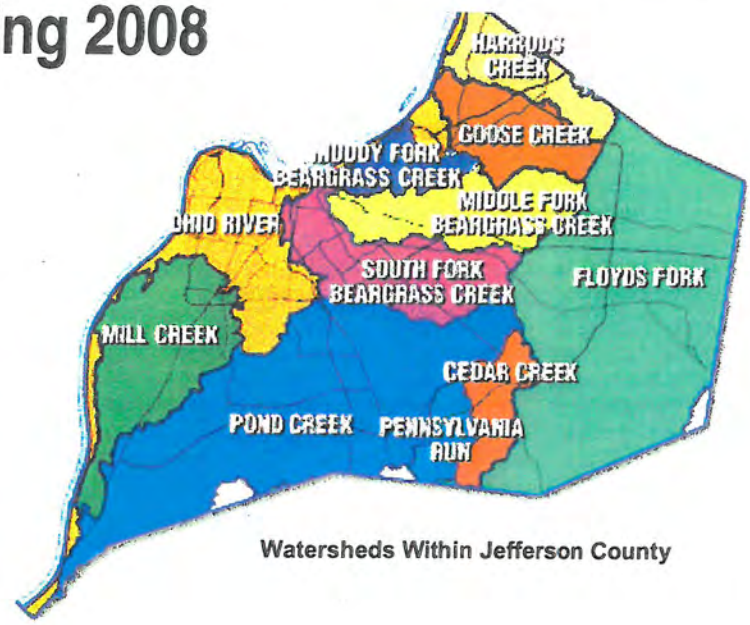
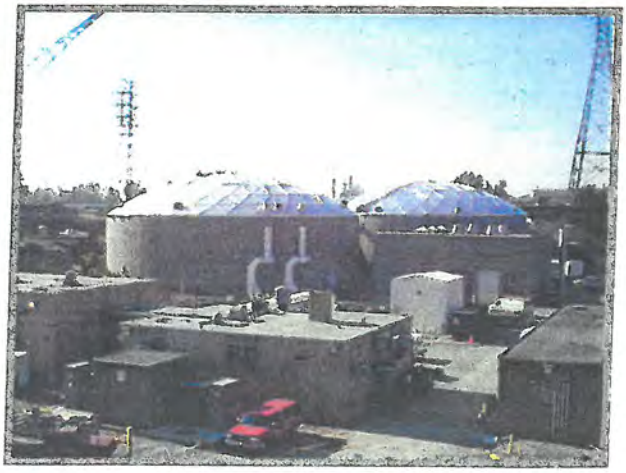
WWT Stakeholders Meeting # 11 8/2/2007

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 #11
Thursday, August 2, 2007, 4:20-8:30PM
MSD Main Office, Board Room
700 West Liberty St., Louisville

Meeting Objectives:

- Learn about green infrastructure strategies and techniques used in the Portland, OR metropolitan area for addressing water quality issues associated with sewer overflows and stormwater runoff.
- Identify potential green infrastructure opportunities and challenges in Jefferson County.
- Review and discuss high-level combined sewer overflow (CSO) control strategies and preliminary project concepts being considered for the CSO Long-Term Control Plan.
- Participate in an initial discussion of the potential components of long-term monitoring and evaluation efforts for MSD's Wet Weather Program.
- 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 (15 minutes)**

- Updates on MSD wet weather activities and follow-up items from the last Wet Weather Team meeting.

4:55 PM **Presentation on Green Infrastructure Strategies (50 minutes)**

- Presentation and Q&A session on green infrastructure strategies led by Clean Water Services of Portland, Oregon.

5:45 PM **Dinner Break (25 minutes)**

Dinner will be provided for Wet Weather Team members.

6:10 PM **Green Infrastructure Opportunities and Challenges Discussion (45 minutes)**

- Review the scope of the green infrastructure initiative and its relation to MSD's wet weather consent decree obligations.
- Discussion and group exercise to identify potential opportunities and challenges for green infrastructure in Jefferson County.

6:55 PM **CSO Control Strategy Discussion (60 minutes)**

- Review and discuss high-level CSO control strategies and preliminary project concepts being considered for the CSO Long-Term Control Plan.

7:55 PM **Introductory Presentation on Long-Term Monitoring and Evaluation Efforts (20 minutes)** *(as time allows)*

- Review and discuss potential components of a post-construction monitoring and evaluation plan for the Wet Weather Program, including plans to track changes in water quality and the effectiveness of the education/outreach efforts.
- Update on water quality monitoring and modeling efforts.

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 September 20, 2007 Wet Weather Team meeting.

8:30 PM **Adjourn**

Final Meeting Summary
Wet Weather Team Meeting #11
Thursday, August 2, 2007
MSD Main Office, Louisville

The Wet Weather Team (WWT), chartered by the Louisville and Jefferson County Metropolitan Sewer District (MSD), met on August 2, 2007, at MSD's main office in Louisville. The objectives of the meeting were to:

- Learn about efforts to address wet-weather sewer overflows and other water quality issues in the Portland, Oregon metropolitan area.
- Identify potential green infrastructure opportunities and challenges in Jefferson County.
- Review and discuss preliminary project concepts being considered for the Long-Term Control Plan (LTCP) for addressing combined sewer overflows (CSOs).

Wet Weather Project Updates

MSD Executive Director Bud Schardein provided several updates related to MSD's wet weather activities, including the following:

- Rate Increase: The MSD Board of Directors unanimously approved the proposed rate increase in mid July. The Louisville Metro Council had a Budget Committee hearing on August 1, and there was a unanimous vote in favor of the rate change. Mr. Schardein thanked WWT members Stuart Benson and Tina Ward-Pugh for their support in co-sponsoring the bill.
- Mayor's Environmental Advisory Group: The Mayor of Louisville has requested that Louisville Metro Government Departments, MSD, and other local agencies participate in an advisory group to discuss and coordinate environmental initiatives for the Louisville metropolitan area. Diane Secor will serve as MSD's representative to this group.
- State Fair Exhibit: MSD has sponsored an exhibit on biodiversity at the Kentucky State Fair this year. MSD management and union employees will staff the exhibit.
- Rain Barrels: MSD has distributed over 300 free rain barrels to community members requesting them. The demand for rain barrels exceeds the supply. MSD has been retrofitting old food waste barrels to make the rain barrels. Rain barrels have an opening that connects to residential downspouts to collect rain water and a hose bib that can be used for watering plants.

Gary Swanson of CH2M HILL gave an update on the U.S. Environmental Protection Agency's response to the Long Term Control Plan for CSOs submitted by the City of Cincinnati. Cincinnati's proposed controls for CSOs included screening and disinfection of overflows into the Ohio River, but not primary treatment, as called for in EPA's CSO Policy. The rationale was that the problems in the Ohio River related to pathogens and aesthetics, not biological oxygen demand (BOD) and dissolved oxygen (DO). EPA Region 5 rejected Cincinnati's LTCP on the basis that primary treatment for BOD and DO is required under the CSO Policy. In addition, EPA Region 5 noted that the Cincinnati plan did not include green infrastructure solutions, and these solutions are expected to be included in a LTCP. Cincinnati is now negotiating with EPA Region 5 on an approach to dealing with these comments.

During this session, WWT stakeholders also asked about maintenance and durability issues associated with pervious pavement. MSD said that there were some limitations with pervious pavement in that it is not appropriate for use in areas where heavy vehicles turn around. For that reason, pervious pavement is

used in the stalls of parking lots, but not in the turning area in some developments. Maintenance needs for pervious pavement include using a vacuum-based street cleaner to remove debris once or twice a year.

Video Presentation and Discussion of Water Quality Improvements in Portland, Oregon

Brian Bingham of MSD explained that MSD had invited a representative from Clean Water Services—the wastewater utility serving the Portland, Oregon, metropolitan area—to speak at this Wet Weather Team stakeholder group meeting; however, this visit had been postponed. MSD and other agencies plan to meet with Clean Water Services over a week in late summer or fall 2007. MSD will invite WWT stakeholders to an optional discussion session with Clean Water Services during that time.

In lieu of the guest speaker, participants watched a video called "River Renewed" about water quality issues and improvement efforts in Portland. The video described the history of water pollution in the Willamette River, the components of Portland's 20-year plan (launched in 1991) to address water quality issues associated with CSOs, and the results of these efforts to date.

- Four key efforts ("Cornerstone Projects") in Portland's plan include: (1) separating sewers, (2) installing sumps to collect stormwater, (3) removing underground streams in the combined sewer system, and (4) convincing residents to disconnect downspouts.
- New large pipes and interceptors are planned in the system to increase wastewater storage and treatment capacity.
- The program incorporates green infrastructure solutions to reduce stormwater runoff and flows into the combined sewer system. (Examples include a school that converted an abandoned tennis court into a wetland and demonstration garden, and commercial developments that incorporated bioswales, cisterns to irrigate with rain water, and permeable pavers.)
- The cost of the 20-year program is over a billion dollars, funded by local rate payers. By the 2011 completion, a 94 percent reduction in CSO volume is expected, and CSOs are anticipated to occur only four times a year, instead of with every rainfall.

In response to the video, WWT participants made the following comments and suggestions:

- Several WWT members commented that the video was an effective educational and motivational tool. People feel better about supporting projects when they can see how their money is spent.
- Although Portland is ahead of Louisville in the design and implementation of long-term plans to address sewer overflow issues, the community is similar in size to Louisville, and Portland's efforts could potentially be as a useful model. The results of Portland's efforts are impressive.
- Yard signs similar to those used in Portland's residential Downspout Disconnect Program could be useful for education and outreach about MSD's Wet Weather Program. Signs could convey messages such as "I disconnected my downspout" and/or "I have a rain barrel." The bottom of the sign could also invite readers to "ask me" for more information.
- A WWT member suggested developing a program in which residents could pay a small fee for MSD or another agency to conduct a water/wastewater audit on a house, similar to the energy audits offered by LG&E.

MSD is working on an educational video related to wet-weather wastewater and stormwater management. MSD suggested sharing a draft version of the video to the Wet Weather Team later to get feedback on it.

Green Infrastructure Group Exercise

John Lyons of Strand Associates and Chris Manning of Human Nature reminded participants about the scope of MSD's green infrastructure initiative, and reviewed parts of the green infrastructure presentation from the June 21, 2007 WWT meeting, as an introduction to a group exercise about green infrastructure opportunities and challenges in Jefferson County. MSD charged the green infrastructure team with looking broadly to identify green infrastructure opportunities for Louisville and Jefferson County, including: (1) ideas that could help MSD meet its wet weather consent decree obligations, and (2) ideas that are partly or completely outside the scope of MSD's responsibilities and the consent decree, but may be useful long-term community investments to improve water quality and provide other benefits.

The group exercise was designed to solicit ideas about specific opportunities and challenges related to green infrastructure in Jefferson County. This included suggestions at five different scales: regional (county-wide), watershed, neighborhood, site/parcel, and component (portion of a site). WWT ideas mentioned at the meeting included the following.

I. Green Infrastructure Opportunities

A. Regional-Scale Opportunities

Education and Outreach Ideas (Note: Education is also listed in the challenges section below.)

- Create a regional education program.
- Develop education programs for schools that allow children to bring the information home.
- Conduct education regarding fertilizer, weed killer, and other stormwater best management practices to neighborhood groups.
- Develop and educate residents about urban farming opportunities.
- Teach and promote sensible/responsible development.
- MSD could partner with local lawn care companies to promote MSD's organic fertilizer (Louisville Green).

Policies and Requirements

- Develop a "complete streets" policy to encourage "parkway-like" streets.
- Regional detention ponds in post-developed areas should be required to provide filtration for storms that occur every two years or less.
- Require post-development runoff to be equal to pre-development runoff.
- Require parking lots to provide shaded areas.
- Establish a tree ordinance to protect specific trees (identified based on species, age, etc.); require mitigation if the protected trees are damaged or removed.
- Develop mandatory or alternative green solutions for development projects (e.g., by changing development codes).

Coordination with Planning Efforts

- Coordinate with planning and zoning departments and other governmental entities around the value of green infrastructure.
- Integrate green projects into other planning efforts underway.
- Make use of neighborhood plans. The Louisville Mayor wants each neighborhood to have a neighborhood plan. There could be good opportunities to incorporate green infrastructure into the 14 neighborhood plans and 6 neighborhood assessments that are being developed, as well as in neighborhood plans that will be developed in the future.

- Work with the Green City Partnership (an initiative involving the Louisville Metro Government, Jefferson County Public Schools, and the University of Louisville) on green infrastructure efforts. The Metro Green Initiative should be a leader for community's Green City Partnership.

Incentives (Note: Incentives are also listed as challenges below.)

- Create incentives for developers to use green infrastructure.
- Develop a recognition program for those who use green infrastructure.

Other Regional Green Solutions/Strategies

- Partner with schools to relate students' community service efforts with green projects. For example, students could clean, produce, and install rain barrels for community service hours.
- Develop a downspout disconnection program, and focus on school buildings.
- Develop effective rain garden and rain barrel programs.
- Initiate a tree-planting program with a goal to increase tree canopy in neighborhoods.
- Create a localized resource database to support green infrastructure development efforts (e.g., provide information on contractors that install pervious pavement).
- Develop a list of environmentally approved chemicals for use in lawn/landscape management.
- Build a major treatment plant near the Salt River.
- Promote alternative transit with large employers (use transit passes, limit construction of new roads, etc).

General Considerations and Comments

- Preserve rural character where you can ("some things don't need to be changed").
- A number of small projects will add up to make a collective difference.

B. Watershed-Scale Opportunities

- Conduct assessments of different watersheds to find the best opportunities and determine impervious surface limits for watersheds.
- Purchase land in flood-prone areas.
- The "86-64" community effort to remove portions of I-64 could be an opportunity to reclaim the waterfront and promote public transportation such as light rail.
- Create an 800-acre lake in southwest portion of Jefferson County; use a dam/flood wall to build it and include marshes around it.
- In the Harrods Creek watershed, some mitigation funds are being used for natural area restoration where a new bridge is being installed.
- Floyds Fork watershed suggestions included:
  - Floyds Fork is the last undeveloped area in Jefferson County, so there may be good opportunities for green infrastructure there.
  - Protect existing natural streams like Floyds Fork with riparian buffers and other preservation efforts.
- Beargrass Creek watershed suggestions included:
  - Take advantage of a natural meander that is a remnant of Beargrass Creek.
  - There are green opportunities within Beargrass Creek, near and upstream from Seneca and Cherokee Parks.
  - Connect Cherokee and Seneca Parks with waterfront projects.

C. Neighborhood-Scale Opportunities

Green Infrastructure in Development/Redevelopment Projects

- Form partnerships with housing developers to minimize impervious surfaces.
- Landscape architects could provide green options for projects and developments.

- Steps should be taken to protect or improve water quality and flood control for developments.
- Limit impervious cover close to streams and establish riparian buffers to reduce runoff into the streams.
- Utilize very large basins or lakes in new development areas and in rural areas. For new developments, create larger detention/retention basins.
- Preserve existing natural systems, vegetation, and trees during development, rather than removing and rebuilding them. Take advantage of existing assets in development opportunities.
- Look at green parking opportunities along business corridors.
- Look at opportunities to develop more upward and infill already developed areas (i.e., increase density).
- Consider green infrastructure in the context of healthy activity improvement projects and projects that promote greater walk-ability in neighborhoods.

Demonstration Projects

- Strategically place demonstration projects (e.g., porous pavement) near neighborhoods.
- Pick a CSO catchment area and really study the effect of rain barrels and rain gardens.
- Create some sustainable lawns as pilot projects.
- Develop a best management practice demonstration site similar to SD1 (Sanitation District Number 1 of Northern Kentucky).
- Promote Heine Brothers Coffee's "breaking new grounds" effort, which is using compost made from coffee grounds. Heine Brothers is looking for five acres for an urban farm to grow produce and sell to local restaurants.

Suggestions for Specific Neighborhoods

- The Clifton neighborhood is motivated; this is a good demonstration area to show the effects of behavior change.
- In Clifton Heights consider acquiring land to create a nature preserve along the rear of properties that border the river trail (in Mellwood) and the waterfront.

D. Site- and Component-Scale Opportunities

General Suggestions for Sites/Properties

- Begin planting native plants with deep root systems.
- Use best management practices for chemical use in lawn management practices.
- Discourage chemical treatment and mowing near waterways to help keep debris from waterways.
- Monitor, control, and maintain wetland areas around creeks and retention basins.
- Maintain existing detention/retention basins—many may not function properly due to lack of maintenance.
- Suggestions for parks and recreational areas included:
  - Utilize the open space in parks for green opportunities.
  - Make use of detention facilities as sports fields.
  - Design detention ponds and steam buffers for recreational use.
  - Incorporate trails along streams to provide recreational opportunities.
- Suggestions for schools included:
  - Add green demonstration/education facilities to old urban schools.
  - Every school ground should be an ecological playground for the neighborhood.

Suggestions for Specific Sites

- River Metals site suggestions included:
  - There could be green opportunities along the Middle Fork of Beargrass Creek when the River Metals property is re-developed.

- A proposed development at the Klempner Brothers (River Metals) site along Lexington Road is pushing for green roofs.

- University of Louisville property suggestions included:
  - Incorporate green elements into the three new research facilities being planned at University of Louisville.
  - The University of Louisville has a proposed solution for the Third Street underpass near the Speed School of Engineering.
- Use the Butchertown Greenway Pump Station that is offline for an education and demonstration facility.
- The pocket parking lot on Frankfort Ave. could utilize porous pavement for public parking.
- Convert Eva Bandman Park into a wetland.
- Look for opportunities at Pond Creek Lake and the southwest pump station. (This area has been studied already by the Corp of Engineers.)
- Look at the geomorphology of Beargrass Creek from Old Cannons Lane to the Ohio River. Wetlands could be established at Seneca Park and Old Cannons Lane.
- There may be potential opportunities at the Bradley Property.

II. Green Infrastructure Challenges

A. Regional-Scale Challenges

Education and Outreach Challenges

- It will be challenging to change the mindsets of the public, educate people to accept the need for green infrastructure, and get residents to "buy in" to green projects and opportunities. (What is the best "formula" to convince people to use green infrastructure?) Specific challenges include:
  - Helping people understand how they are connected to the problem;
  - Changing the perception people have of streams to a positive one (People think streams are "dead."); and
  - Developing effective public relations/education programs for "urban solutions" (The public might not think of green infrastructure as an "urban solution.").
- We need visible success to capture the public's imagination.

Challenges Associated with Policies and Requirements

- It could be challenging to add requirements to the Development Code to allow MSD to have more enforcement authority.
- Passing all of the ordinances (e.g., changing municipal development codes to mandate green development practices and/or allow them as alternatives) will be challenging.
- Another challenge will be to have developers accept the new green development requirements.

Compensation, Incentives, and Funding Challenges

- Finding funding to implement all of the green initiatives is likely to be a common challenge.
- There is a need to develop financial incentives that inspire people to build green. Good incentives should be available for both public and private entities.
- Developing effective credits, money incentives, or other compensation will be important on the site and neighborhood levels. Specific ideas include:
  - Develop compensation credits to help alleviate financial burden of developers and property owners.
  - Possibly reduce permitting fees for those who participate in green development.
  - Develop an equitable plan for joint funding, especially for the permeable pavement program.

Maintenance and Operational Challenges (Note: This is also relevant at neighborhood and site scales.)

- Developing effective maintenance programs for green infrastructure will be a challenge, as will finding the time to implement and maintain the green infrastructure.
  - Think long term for maintenance and upkeep when implementing green projects.
  - Water should not stand in small areas more than four days to ensure that mosquito issues do not arise.
- It could be useful to create a recycling/reuse program for broken and unused rain barrels.

B. Watershed-Scale Challenges

- Finding available land to use for green projects will likely be challenging, as will finding neighborhoods that will accept and implement the green programs.
- For large land-acquisition projects (e.g., buying properties in flood-prone areas to develop large retention/detention basins), it could be challenging to secure funding, respect the property rights of homeowners, and find alternate housing locations.

C. Neighborhood- and Site-Scale Challenges

- Operation and maintenance of individual best management practices (e.g., on a particular site or in a particular development or neighborhood) could be challenging.
- It can be difficult to deal with competing interests and priorities when multiple partners are involved. In particular, mediating between communities and developers could be challenging.
- Property rights issues may pose a challenge; Kentucky has strict requirements. For example, it could be difficult to build large basins while at the same time respecting property rights.

Long-Term Control Plan CSO Projects Presentation and Discussion

Tim Kraus of O'Brien & Gere gave a presentation that reviewed water quality conditions in the Ohio River and Beargrass Creek, the types of available CSO control strategies and technologies, characteristics of MSD's combined sewer system, and project concepts the technical team is considering for different clusters of CSOs. Most of the CSOs are located in the eastern side of the combined sewer system; however, most of the volume of CSOs occurs in the west side. This suggests that fewer, larger facilities are appropriate for the west side, while the east side may require multiple, smaller facilities and controls. Characteristics of the CSOs in an area (volume, number, locations) and the land uses (e.g., the extent of undeveloped land) affect which control technologies are appropriate to consider for specific sites.

The review and discussion of preliminary project concepts for consideration in MSD's CSO Long-Term Control Plan was divided according to geographic "clusters" of CSOs within the combined sewer system. The technical team has identified some potential CSO control strategies for each cluster of CSOs (including storage, treatment, real-time control of flows, and sewer separation [CSO elimination]), but seeks WWT input on any gaps in the alternatives being considered, including green infrastructure ideas. The technical team will be developing specific project alternatives based on the project concepts, and then evaluating these project alternatives using the values-based performance evaluation framework the WWT helped develop. Highlights from the WWT discussion of CSO project concepts are as follows.

General Comments

- WWT members asked for information on the "root causes" (e.g., the CSO volume attributable to residential downspouts) of CSO problems, since this information can be useful for identifying potential solutions, determining the limitations of potential solutions, and developing rationales for the selected alternatives.

- For example, a WWT member asked about the area of roofs in a particular region; this would indicate the maximum area of green roofs in that region and thus the potential flow reduction that could be achieved from green roofs.

- A few WWT members noted that it would be important to think about projects in the context of the community and the entire sewer system, not simply in the context of individual neighborhoods. For example, everyone in the community will be paying for the Wet Weather Program.
- Participants commented that the aerial photos and maps in this presentation are good reference slides.

Muddy Fork of Beargrass Creek – CSOs 132, 154, and 167

- Local Conditions/Characteristics: The only flows to this stream reach are CSOs (i.e., it is a dry stream); these flows enter the stream through a single pipe. It is a highly residential area with some undeveloped land. A local community changed an ordinance related to downspouts in this area.
- Solution/Project Ideas Identified During the Meeting:
  - Conduct a concentrated effort to disconnect downspouts in this area.
  - Make the Arts Center there more "green."
  - Tie the impaired section of Beargrass Creek to newly created wetlands, near Eva Bandman Park.
  - Make the MSD pump station into an interpretive center.
  - Use incentives to get people to help solve the problem (in particular, educate people about ways to reduce non-point source pollution).
  - Acquire properties in flood-prone areas by paying more than fair market value for the homes (as compensation to homeowners for having to move). These areas could then be used to create detention or retention basins, or other facilities/structures to reduce wet-weather sewer overflows.

Middle Fork of Beargrass Creek – CSOs 125, 126, 127, 144, and 166; and CSOs 86 and 140

- Local Conditions/Characteristics: Mr. Kraus noted that this large watershed has a number of potential green infrastructure opportunities along with clustered storage/treatment options. CSO 140 could potentially be considered within this cluster of CSOs. Land ownership is mostly residential.
- Solution/Project Ideas Identified During the Meeting:
  - There are upstream opportunities within Cherokee Park that could improve water quality. (Note: These ideas were not discussed in detail since this session focused specifically on CSO controls.)
  - The seven CSOs in the region could potentially be treated at one facility (some pumping would be required). This could be a visible project that could also help link areas in the community.
  - A few WWT members asked whether the 30-acre River Metals Property, a brownfield near the Girls Scouts Building, could be used to help address CSOs in the area. The technical team indicated that the site could potentially be developed as a storage or wetlands treatment area.

South Fork of Beargrass Creek –CSOs 18, 108, and 109; and CSOs in the South Fork Improved Channel

- Local Conditions/Characteristics: There is a lot of open space, and the public is engaged in this area.
- Solution/Project Ideas: No specific ideas were identified for this region during the meeting.

Central Relief Drain (Ohio River North Region) CSOs

- Local Conditions/Characteristics: This region is densely populated, and it has multiple CSOs with small contributing areas. It is largely a commercial/industrial area (it includes part of downtown Louisville), with some residential land use. The sewer system in this area contains a mix of old and new components. The combined wastewater/stormwater flows go through one outfall to the river.
- Solution/Project Ideas: No specific ideas were identified for this region during the meeting.

Ohio River West Region – CSOs 104, 105, and 189

- Local Conditions/Characteristics: This is a large watershed without many CSOs. CSO flow volumes are high (in part because of the size of the pipes). It includes the biggest CSO in the system.
- Solution/Project Ideas: No specific ideas were identified for this region during the meeting.

Observer Comments

Diane Secor of MSD made an announcement about the MSD-sponsored biodiversity exhibit at the Kentucky State Fair. WWT members are invited to attend the opening ceremony on August 15, 2007.

Wrap Up and Next Steps

- MSD will invite WWT stakeholders to attend an optional meeting with representatives of Clean Water Services—the wastewater utility serving the Portland, Oregon, metropolitan area—when they are in Louisville to meet with MSD and other agencies.
- The green infrastructure team (part of the technical team) will continue to solicit and collect ideas about green infrastructure opportunities in Jefferson County, including alternatives to consider for MSD's Wet Weather Program, along with potential broader community investment opportunities.
- The technical team will continue to identify and further define project alternatives for addressing clusters of CSOs, as well as project alternatives related to SSOs and watershed strategies.
    - By October 2007 the technical team anticipates having identified preliminary project concepts to share during fall public meetings to solicit neighborhood input and feedback.
    - These preliminary project concepts will become project alternatives that the technical team will evaluate based on performance relative to the WWT's community values.
- The next WWT meeting will be on Thursday, September 20, 2007, at MSD's main office. Potential meeting topics include:
    - Presentation and discussion about long-term monitoring and evaluation efforts (originally planned for the August 2, 2007 WWT Meeting);
    - Review and discuss high-level SSO control strategies and preliminary project concepts being considered for MSD's Wet Weather Program;
    - Preview and discuss the approach to solicit neighborhood input on preliminary project concepts during public meetings planned for October–November 2007; and
    - Introductory presentation on affordability and financing considerations related to MSD's Wet Weather Program.

Meeting Participants

Wet Weather Team Stakeholders

Steve Barger, Labor
Susan Barto, Mayor of Lyndon
Stuart Benson, Louisville Metro Council, District 20
Charles Cash, Louisville Metro Planning & Design Services Department
Allan Dittmer, University of Louisville
Laura Douglas, E.ON U.S. LLC
Faye Ellerkamp, City of Windy Hills
Arnita Gadson, University of Louisville/West Jefferson County Community Task Force
Mike Heitz, Louisville Metro Parks Department
Rick Johnstone, Deputy Mayor, Louisville Metro Mayor's Office

Bob Marrett, CMB Development Company
Kurt Mason, Jefferson County Soil and Water Conservation District
Judy Nielsen, Louisville Metro Health Department
Lisa Santos, Irish Hill Neighborhood Association
David Tollerud, University of Louisville, School of Public Health & Information Sciences
Tina Ward-Pugh, Louisville Metro Council, District 9
David Wicks, Jefferson County Public Schools

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

Phyllis Croce, MSD
Henry Cubero, The Cubero Group
Tom Luking, Tetra Tech, Inc.
Clay Kelly, Strand Associates
Tim Kraus, O'Brien & Gere
Wendy Larson, Limno Tech
John Lyons, Strand Associates
Chris Manning, Human Nature
Paul Maron, Strand Associates
Adrienne Nemura, Limno Tech
Brian O'Neill, Redwing Ecological
Teri Pifine, MSD
Diane Secor, MSD
Ron Thomas, Redwing Ecological

Meeting Materials

- Agenda for the 8/2/07 WWT Meeting
- Summary of the 6/21/07 WWT Meeting
- Solution Ideas List (July 2007 Update)
- Education and Outreach Ideas List (July 2007 Update)
- Data and Monitoring Requests Tracking List (July 2007 Update)
- Green Infrastructure Homework Assignment Instructions
- Green Infrastructure Worksheet
- Combined Sewer Overflow Long Term Control Plan Project Identification Presentation
- Post-Construction Compliance Monitoring Presentation (Note: This presentation was not given at this meeting.)
- WWT Contact Information (Updated July 2007)
- WWT Meeting Schedule
- Outline of Upcoming WWT Meeting Topics
- Acronym List (Updated July 2007)
- Definitions of Key Terms

Wet Weather Team Solution Ideas
Working Draft – July 18, 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 (June/July 2007)

1. (I-B-7) – Work with the community group "Women of Vision" to create a meditation garden in the West End that could also act as a rain garden or roof runoff demonstration.
2. (I-D-2) – Conduct green infrastructure demonstration projects with monitoring components built in, to help demonstrate the overall effectiveness of green infrastructure solutions.
    a. Start with small, visible projects ("quick wins" – e.g., in a particular neighborhood, near a Rubbertown plant).

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
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.
7. Work with the community group "Women of Vision" to create a meditation garden in the West End that could also act as a rain garden or roof runoff demonstration.

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.
2. Conduct green infrastructure demonstration projects with monitoring components built in, to help demonstrate the overall effectiveness of green infrastructure solutions.

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[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

a. Start with small, visible projects ("quick wins" – e.g., in a particular neighborhood, near a Rubbertown plant).

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 – July 26, 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.

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

What's New (June/July 2007)

1. (I-A-4) – Outreach efforts should show people that there is an open and transparent process within which MSD is making decisions on behalf of the community.
2. (I-B-6) – Involve neighborhoods in identifying potential green infrastructure solutions (e.g., by having a neighborhood competition to get grassroots ideas for potential solutions).
3. (I-C-10) – To increase attendance at public meetings, consider latching onto other meetings.
4. (I-C-11) – Advertise public meetings at churches.
5. (I-C-12) – Start public meeting presentations with information on rates to get people's attention.
6. (I-C-13) – At public meetings, consider the fact that people need time to digest information from presentations and written materials.
7. (I-C-14) – Add a portal to MSD's website where people can submit comments on Project WIN; run a public service announcement to inform people about the issues and the website address for submitting comments.
8. (I-C-15) – Develop and run an information booth at selected festivals in the community (similar to the booth used for Project XL).
9. (I-C-16) – Use the potential disruption along Hikes Lane (part of the Big Four SSO plan) as an opportunity for broader education of the public about wet weather sewer overflow issues.
10. (I-C-17) – Create visible representations of the solutions, since they can be helpful for explaining project concepts to the public. Use these visual representations when soliciting community input.
11. (I-E-4) – Develop a "report card" for MSD's Wet Weather Program to post on MSD's Project WIN website and publish it in print format regularly (e.g., annually). This report card would report on performance measures related to the goals of MSD's Wet Weather Program and implementation of the consent decree.

I. MSD Wet Weather Program Education and Outreach Efforts

A. Education/Outreach Program Characteristics

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

B. Audiences, Objectives, and Messages

1. Target education efforts in "critical CSO neighborhoods" and schools in those areas.
    a. Use a targeted direct-mail approach to help address local, site-specific problems.
2. Involve commercial and industrial customers and solutions through PR and planning, not just residential customers.
3. Make a presentation to the full Metro Council.
4. Work with schools (in conjunction with Earth Day and river/creek cleanups) to involve both students and parents.
5. Message Ideas:
    a. Develop positive educational messages about the value of clean water to supplement other education and outreach messages. (CSO warning signs, river sweeps, and other elements of MSD's outreach activities send a negative message about the community's water resources.)
    b. Can the "water is dirty, stay away from it" signs that EPA designated include a promise that the public can change the situation?
    c. Translate Consent Decree activities into dollar impacts for residents.
    d. Communicate that we have no choice but must comply with the requirements of the consent decree in a timely manner.
6. Involve neighborhoods in identifying potential green infrastructure solutions (e.g., by having a neighborhood competition to get grassroots ideas for potential solutions).

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
    a. Schematic of sump pumps and downspouts connected to sanitary sewers
    b. Map of the combined sewer area and outfalls against blue line streams and landmarks (road system would do)
    c. Map of SSO outfalls including the sewersheds of the "big four," as above
    d. Water Quality maps from the Beargrass Creek report card, also water quality info about Ohio River related to CSO outfalls
    e. Comparison of city sewer rates indicating which cities have consent decrees
    f. 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.
10. To increase attendance at public meetings, consider latching onto other meetings.
11. Advertise public meetings at churches.
12. Start public meeting presentations with information on rates to get people's attention.
13. At public meetings, consider the fact that people need time to digest information from presentations and written materials.
14. Add a portal to MSD's website where people can submit comments on Project WIN; run a public service announcement to inform people about the issues and the website address for submitting comments.
15. Develop and run an information booth at selected festivals in the community (similar to the booth used for Project XL).
16. Use the potential disruption along Hikes Lane (part of the Big Four SSO plan) as an opportunity for broader education of the public about wet weather sewer overflow issues.
17. Create visible representations of the solutions, since they can be helpful for explaining project concepts to the public. Use these visual representations when soliciting community input.

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.
4. Develop a "report card" for MSD's Wet Weather Program to post on MSD's Project WIN website and publish it in print format regularly (e.g., annually). This report card would report on performance measures related to the goals of MSD's Wet Weather Program and implementation of the consent decree.

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 Request Tracking List
Working Draft – July 26, 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.

New ideas will be listed under a "What's New" section at the beginning of the document for easy reference, as well as under the appropriate section later in the document.

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

What's New (June/July 2007)

1. (A-3) Build monitoring components into green infrastructure projects to help demonstrate the overall effectiveness of green infrastructure solutions.
2. (D-5) Consider monitoring water quality and flow at additional locations, based upon the Wet Weather Program's objectives and the performance measures developed for the program. Potential new monitoring locations to consider include:
    a. Intensely used public access sites within Beargrass Creek
    b. Stream segments MSD does not monitor currently, such as Buechel Branch and upper South Fork of Beargrass Creek
    c. Additional locations within the Floyds Fork watershed

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.
3. Build monitoring components into green infrastructure projects to help demonstrate the overall effectiveness of green infrastructure solutions.

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.
5. Consider monitoring water quality and flow at additional locations, based upon the Wet Weather Program's objectives and the performance measures developed for the program. Potential new monitoring locations to consider include:
    a. Intensely used public access sites within Beargrass Creek
    b. Stream segments MSD does not monitor currently, such as Buechel Branch and upper South Fork of Beargrass Creek
    c. Additional locations within the Floyds Fork watershed

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 Requests

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. Data on the public health impacts of polluted water (collected by the School of Public Health or the Health Department and included in an annual report).

Wet Weather Team
Group Exercise
For the Wet Weather Team Meeting on August 2, 2007

Opportunities and Challenges Associated with Green Infrastructure

This document describes a "homework assignment" to prepare for a group exercise at the August 2nd Wet Weather Team meeting on the topic of green infrastructure in Louisville/Jefferson County. The document begins with background information on the work the Green Infrastructure Team is doing and its relation to MSD's Wet Weather Consent Decree obligations, describes the purpose of the assignment and exercise, provides examples of green infrastructure opportunities and challenges, and ends with the worksheet for the assignment. Please complete the enclosed worksheet and bring it with you to the Wet Weather Team meeting on August 2, 2007.

Background

The Green Infrastructure Team has been asked by MSD to initiate a broad study of potential green infrastructure opportunities that would benefit the Louisville/Jefferson County community at large in more effectively managing its precipitation and water resources. This green infrastructure effort would reach beyond the scope of MSD's Consent Decree, in that it may involve actions that are not completely within MSD's responsibilities for controlling sewer overflows and/or activities that may extend beyond the time frames indicated in the Consent Decree. Nevertheless, MSD anticipates that green infrastructure will serve an important role in augmenting the Wet Weather Plan and ensuring that the community's resources are used cost effectively to improve water quality.

In response to new directives from the highest levels of USEPA, MSD is exploring the potential of incorporating green infrastructure elements into its Wet Weather Plan for control of water quality issues associated with combined sewer overflows (CSOs), sanitary sewer overflows (SSOs), and storm water runoff.. Although it is recognized that conventional engineering solutions such as high rate treatment, sewer separation, tunnels, and remote storage facilities represent the core elements of the long term control plan, the trend nationally is to supplement these "conventional" engineering solutions with green infrastructure. Green techniques such as vegetated roofs, porous pavements, wetlands, rain gardens, infiltration chambers, and increased greenspace present an opportunity to provide the community with multiple benefits. In addition to reducing storm water runoff which minimizes the frequency, duration and volume of CSOs, green infrastructure can also:

- reduce the pollutant loading to the sewer system;
- provide wildlife habitat;
- connect greenspaces throughout the community;
- improve community beautification efforts;
- reduce heat island effects;
- restore or improve the health of natural systems such as riparian corridors; and
- improve air and water quality.

When considering the role of green infrastructure in the long term control planning process, it is important to consider the costs and benefits of green alternatives in determining the relative magnitude of the community's commitment to these practices.

Homework Assignment

As discussed at the June 21st Wet Weather Team meeting, we will be conducting a facilitated discussion at the August 2nd Wet Weather Team meeting regarding the opportunities and challenges associated with implementing a green infrastructure program in Louisville/Jefferson County. This program is expected to reach beyond the scope of, but at the same time, augment MSD's Wet Weather Plan.

Purpose

The purpose of this exercise is to share your local insight and perspective with the Consultant Team regarding green infrastructure. Our primary goal is to explore techniques that minimize the entry of stormwater runoff into the sewer systems. This will be accomplished in a variety of ways ranging from the construction of green components such as a biofiltration chambers and rain gardens on individual lots, to broader and more long range solutions such as urban reforestation. Additionally, we expect the green infrastructure plan to identify projects and programs that directly relate to compliance with the terms of the Consent Decree as well as initiatives that go beyond the jurisdiction of MSD, but would be good for the community as a whole. The secondary goal of the green infrastructure initiative is to establish a well connected system of green infrastructure that maximizes the benefits received by the community. The value in this exercise is that each member of the Wet Weather Team will view these issues from a different perspective.

When considering opportunities and challenges associated with developing a green infrastructure plan, some of you may choose to focus strictly on a neighborhood scale, while others may choose to focus on more regional issues. Although we welcome as much input as possible, we do not expect any individual to generate responses to all the categories that we have identified. In fact, one or two well thought out comments from each member of the Wet Weather Team will be considered success.

Examples

The following are some examples of opportunities and challenges, some of which were presented at the last meeting.

- 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
  - Rain barrel program

- Challenges
  - Land/Easement acquisition
  - Ownership and maintenance
  - Public Awareness
  - Cost
  - Regulatory Compliance
  - Schedule
  - Local soils for infiltration

In preparation for the discussion at the Wet Weather Team meeting, we would like you to focus your identified opportunities and challenges in terms of the physical scale of the proposed projects and/or initiatives using the following categories of scale:

a) Component (an example would be a pocket wetland)
b) Site/parcel (a site can include multiple components)
c) Neighborhood
d) Watershed
e) Regional

As you go through this exercise, we also ask that you consider the following issues:

- Long term ownership and maintenance.
  - MSD owns and operates
  - MSD partners with other entities
  - Incentivized activities (stormwater credits, tax incentives)
  - Private facilities – detention/retention
  - Homeowner techniques – rain gardens, rain barrels

- Quantification/Measurement of Performance.
  - Well established techniques with predictable short-term results
  - Well established techniques, but unproven voluntary participation
  - Projects that require many years to realize benefits (e.g. urban reforestation)
  - Unproven technologies
  - Regional policies with anticipated, but not quantifiable committed results
  - Behavior modification resulting from sustained education programs

Structure of the Exercise at the August WWT Meeting

The exercise will begin with a presentation on opportunities identified at previous Wet Weather Team meetings, and a discussion of the challenges anticipated by the Green Infrastructure Team. Wet Weather Team members will then be asked to share some of the opportunities and challenges they identified in the homework assignment with the group. The exercise will conclude with an opportunity to bring up any additional opportunities and challenges.

Wet Weather Team
Green Infrastructure Opportunities and Challenges Worksheet
For the Wet Weather Team Meeting on August 2, 2007

Please use this worksheet to help organize your thoughts as they relate to opportunities and challenges associated with implementing a green infrastructure program in Louisville/Jefferson County that is expected to augment MSD's Wet Weather Plan. We do not expect individuals to identify opportunities and challenges for every category listed below; rather, we ask that you focus on the area(s) that are most important to you, or that you are most familiar with (e.g., your own neighborhood).

If possible, try to arrange your comments into the following structure:

Component

Opportunities	Challenges

Site/parcel – (if you have a specific location in mind, please identify)

Opportunities	Challenges

Neighborhood

Opportunities	Challenges

Watershed

Opportunities	Challenges

Regional

Opportunities	Challenges

Wet Weather Team Meeting Schedule
(as of June 2007)

2006-2007 Wet Weather Team Meetings

Meeting Number	Date and Time	Location
1	Thursday, July 20, 2006 5:45 – 8:00 PM	MSD Central Maintenance Facility
2	Tuesday, August 15, 2006 5:45 – 8:00 PM	Morris Forman Wastewater Treatment Plant
3	Tuesday, September 12, 2006 4:30 – 9:00 PM	MSD Central Maintenance Facility
4	Tuesday, December 5, 2006 4:30 – 9:00 PM	MSD Central Maintenance Facility
5	Thursday, January 18, 2007 4:20 – 8:30 PM	MSD Central Maintenance Facility
6	Tuesday, February 13, 2007 4:20 – 8:00 PM	MSD Main Office, Downtown Louisville
7	Thursday, March 15, 2007 4:20 – 8:00 PM	MSD Main Office, Downtown Louisville
8	Thursday, April 19, 2007 4:20 – 8:00 PM	MSD Main Office, Downtown Louisville
9	Tuesday, May 22, 2007 4:00 – 8:30 PM	Floyds Fork Wastewater Treatment Plant
10	Thursday, June 21, 2007 4:20 – 8:30 PM	MSD Main Office, Downtown Louisville

Proposed Wet Weather Team Meeting Dates for 2007–08

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	TBD
16	Tuesday, February 26, 2008	TBD
17	Thursday, April 3, 2008	TBD

Meeting Number	Proposed Date	Tentative Location
18	Thursday, May 15, 2008	TBD
19	Thursday, June 19, 2008	TBD

The meetings will likely run from 4:30 PM to 8:00 or 8:30 PM, including dinner for participants.

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.

Acronyms
Wet Weather Team Project, July 2007

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

JTWTP	J-Town Wastewater Treatment Plant
KDOW	Kentucky Division of Water
KPDES	Kentucky Pollutant Discharge Elimination System
KRS	Kentucky Revised Statute
KYTC	Kentucky Transportation Cabinet
lf	Linear feet
LG&E	Louisville Gas & Electric
LID	Low impact development
LOJIC	Louisville and Jefferson County Information Consortium
LTCP	Long Term Control Plan
LTMN	Long Term Monitoring Network
LWC	Louisville Water Company
MC	Mill Creek
MEP	Maximum extent practicable
MFWTP	Morris Forman Wastewater Treatment Plant
MG	Million gallons
MGD	Million gallons per day
MHI	Median household income
MSD	Louisville and Jefferson County Metropolitan Sewer District
MS4	Municipal separate storm sewer system
NMC	Nine Minimum Controls
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and maintenance
ORSANCO	Ohio River Sanitation Commission
PCBs	Polychlorinated biphenyls
P.L.	Public law
PMP	Plumbing modification program
POTW	Publicly owned treatment works
PS	Pump station
RM	River mile
ROW	Right-of-way
RTC	Real time control
S&F	Solids and floatables
SEP	Supplemental environmental project
SORP	Sewer Overflow Response Protocol
SS	Suspended solids
SSDP	Sanitary Sewer Discharge Plan
SSES	Sewer System Evaluation Study
SSO	Sanitary sewer overflow
SSS	Sanitary sewer system
STP	Sewage treatment plant
SWPS	Southwestern Pump Station
TARC	Transit Authority of River City
TKN	Total Kjeldahl Nitrogen
TMDL	Total maximum daily loads
TSS	Total suspended solids
USACE	United States Army Corps of Engineers
WATERS	Watershed approach to environmentally responsible stewardship
WCWTP	West County Wastewater Treatment Plant
WDR	Waste discharge requirements
WET	Whole effluent toxicity

WQ	Water quality
WQS	Water quality standards
WTP	Wastewater treatment plant
WWT	Wet Weather Team

Definitions of Key Terms
Wet Weather Team Project, February 2007

Avoidable	A legal term of art meaning that a consequence could have been prevented with the exercise of reasonable engineering judgment in facilities planning and implementation, and/or adequate management, operations, and maintenance practices.*
Biochemical Oxygen Demand (BOD)	A measurement of the amount of oxygen used by the decomposition of organic material over a specified time period (usually 5 days) in a wastewater sample. Used as a measurement of the readily decomposable organic content of water.†
Best Available Technology Economically Achievable (BAT)	A technology-based standard established by the Clean Water Act as the most appropriate means available on a national basis for controlling the direct discharge of toxic and non-conventional pollutants to navigable waters. BAT effluent limitations guidelines, in general, represent the best existing performance of treatment technologies that are economically achievable within an industrial point source category or subcategory.*
Best Conventional Pollutant Control Technology (BCT)	A technology-based standard for discharge from existing industrial point sources of conventional pollutants including BOD, TSS, fecal coliform, pH, oil, and grease. The BCT is established in light of a two-part "cost reasonableness" test.*
Best Management Practices (BMPs)	Schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants to waters of the United States. BMPs also include treatment requirements, operating procedures, and practice to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.*
Combined Sewer Overflow (CSO)	A discharge of untreated wastewater from a combined sewer system at a point prior to the headworks of a publicly owned treatment works. CSOs generally occur during wet weather (rainfall or snowmelt). During periods of wet weather, these systems become overloaded, bypass the treatment works, and discharge directly to receiving waters.*
Combined Sewer System (CSS)	A wastewater collection system that conveys sanitary wastewater and stormwater through a single pipe to a publicly owned treatment works for treatment prior to discharge to surface waters.*
Dissolved Oxygen (DO)	A measurement of the amount of oxygen dissolved in water.
Fecal Coliform	Rod-shaped bacteria present in the feces of warm-blooded animals.†

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

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

Infiltration	Water other than wastewater that enters a wastewater system and building sewers from the ground through such means as defective pipes, pipe joints, connections, or manholes. Infiltration does not include inflow.‡
Inflow	Water other than wastewater that enters a wastewater system and building sewer from sources such as stormwaters, surface runoff and drainage. Inflow does not include infiltration.‡
National Pollutant Discharge Elimination System (NPDES)	A national program under the Clean Water Act that regulates discharges of pollutants from point sources to waters of the United States. Discharges are illegal unless authorized by an NPDES permit.*
Pathogen	An organism capable of causing disease, including disease-causing bacteria, protozoa, and viruses.†
Peak Flow	The maximum flow that occurs over a specific length of time (e.g., daily, hourly, instantaneous).‡
Primary Treatment	The practice of removing some portion of the suspended solids and organic matter in wastewater through sedimentation. Common usage of this term also includes preliminary treatment to remove wastewater constituents that may cause maintenance or operational problems in the system (i.e., grit removal, screening for rags and debris, oil, and grease removal, etc.).*
Sanitary Sewer	A pipe or conduit (sewer) intended to carry wastewater or water-borne wastes from homes, businesses, and industries to the publicly owned treatment works.*
Sanitary Sewer Overflows (SSO)	Untreated or partially treated sewage overflows from a sanitary sewer collection system.*
Secondary Treatment	Technology-based requirements for direct discharging from municipal sewage treatment facilities. The standard is based on a combination of physical and biological processes typical for the treatment of pollutants in municipal sewage. Standards are expressed as a minimum level of effluent quality in terms of: 5-day BOD, suspended solids, and pH.*
Sensitive Areas	Areas of particular environmental significance or sensitivity that could be adversely affected by a combined sewer overflow.‡
Total Suspended Solids (TSS)	A measure of the filterable solids present in a sample.*

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

Combined Sewer Overflow Long Term Control Plan Project Identification

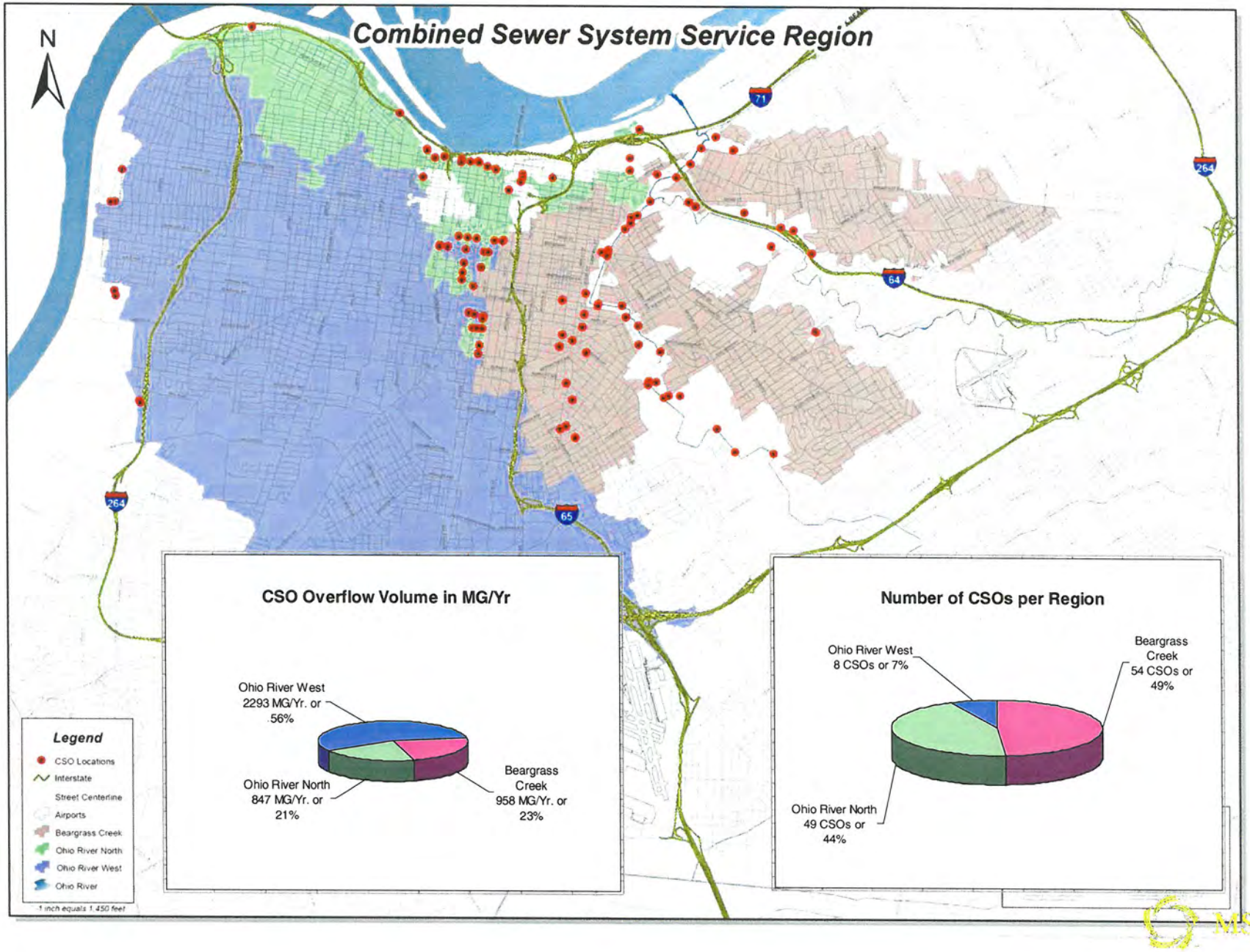
Wet Weather Team

Stakeholder Group Meeting No. 11

August 2, 2007

Presentation Outline

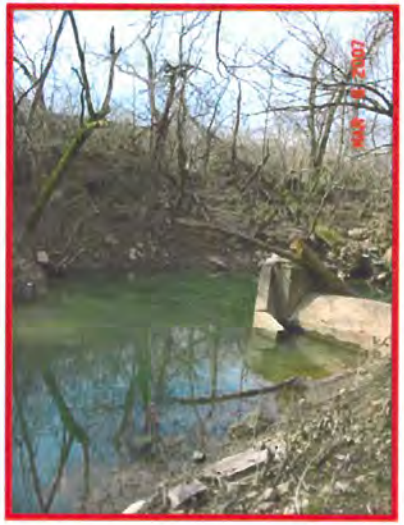
- Review the problem
- Review the process for developing CSO LTCP project list
- Briefly state range of available technologies for CSO control
- Present draft project concepts for CSOs


Combined Sewer System Service Region
N
71
264
64
65
264
CSO Overflow Volume in MG/Yr
Ohio River West
2293 MG/Yr. or
56%
Ohio River North
847 MG/Yr. or
21%
Beargrass
Creek
958 MG/Yr. or
23%
Number of CSOs per Region
Ohio River West
8 CSOs or 7%
Beargrass
Creek
54 CSOs or
49%
Ohio River North
49 CSOs or
44%
Legend
CSO Locations
Interstate
Street Centerline
Airports
Beargrass Creek
Ohio River North
Ohio River West
Ohio River
1 inch equals 1,450 feet
MSD

Problem Definition

CSO and SSO Point Sources Contribute Much of the Beargrass Creek Watershed Load

Stream Segment	BOD Load		TSS Load		Fecal Coliform Load	
	Point Source	Non-point Source	Point Source	Non-point Source	Point Source	Non-point Source
Muddy Fork	<1%	99%	<1%	99%	<1%	99%
Middle Fork	30%	70%	13%	87%	56%	44%
South Fork	55%	45%	27%	73%	77%	23%
Total Loads	42%	58%	20%	80%	68%	32%



MSD

Problem Definition

The Beargrass Creek Watershed has significant water quality problems

Sub-watershed Name	Percent exceedances 200 fcu/100 ml geo mean	Percent exceedances 400 cfu/100 ml max sample
Muddy Fork	63%	36%
Middle Fork	79%	53%
South Fork	69%	49%

Low levels of Dissolved Oxygen (DO) are also a problem

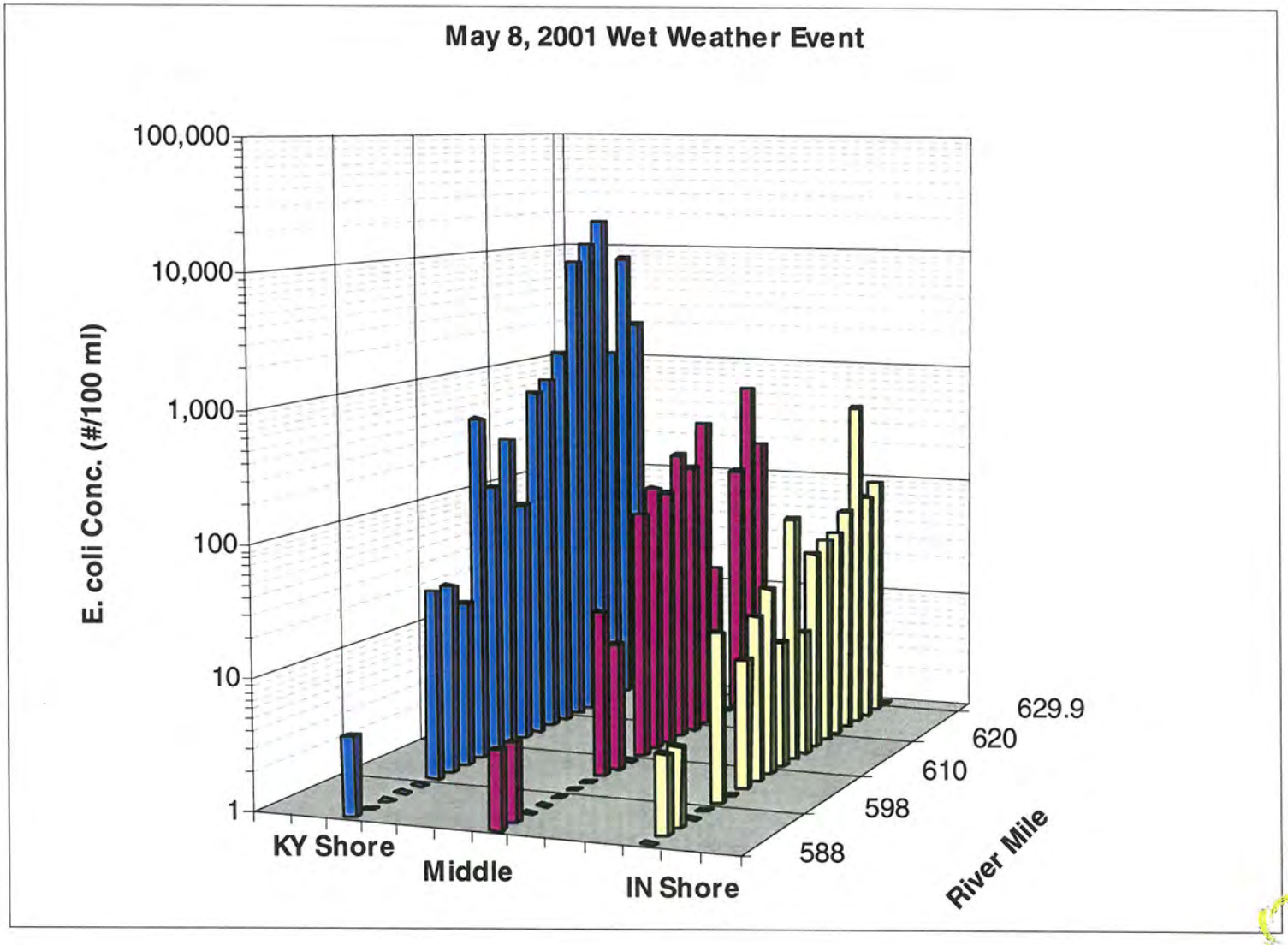
Problem Definition

Number of exceedances of Fecal Coliform 30-day Geometric Mean of 200/100mL

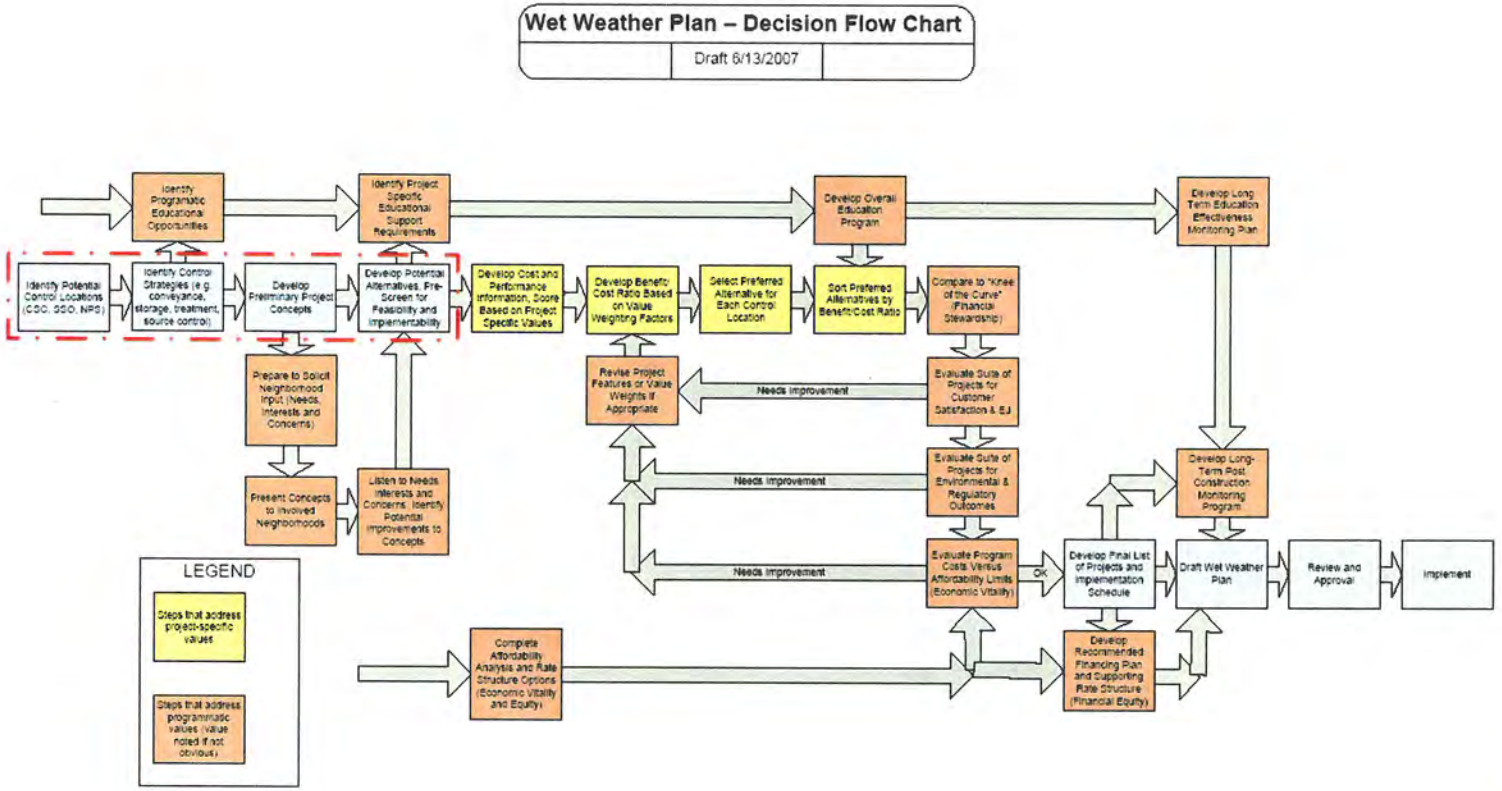
	Sample Location River Mile 594			Sample Location River Mile 608.7			Sample Location River Mile 619.3		
Year	Exceed	Total	%	Exceed	Total	%	Exceed	Total	%
2000							6	6	100%
2001	1	6	17%	0	6	0%	6	6	100%
2002	2	6	33%	1	6	17%	6	6	100%
2003	3	6	50%	4	6	67%	6	6	100%
2004	2	6	33%	2	6	33%	5	6	83%
2005	0	6	0%	1	6	17%	2	2	100%
2006	0	6	0%	1	6	17%	6	6	100%
Total	8	36	22%	9	36	25%	37	38	98%

Problem Definition

Ohio River Spatial Resolution of Bacterial Concentrations



CSO LTCP Project Identification Process



Overview of Project Identification

- Range of technologies
- Characteristics of CSOs
- Project limits: individual as well as clusters of CSOs considered
- Data assembled
- Draft project list developed

Steps Completed to Date

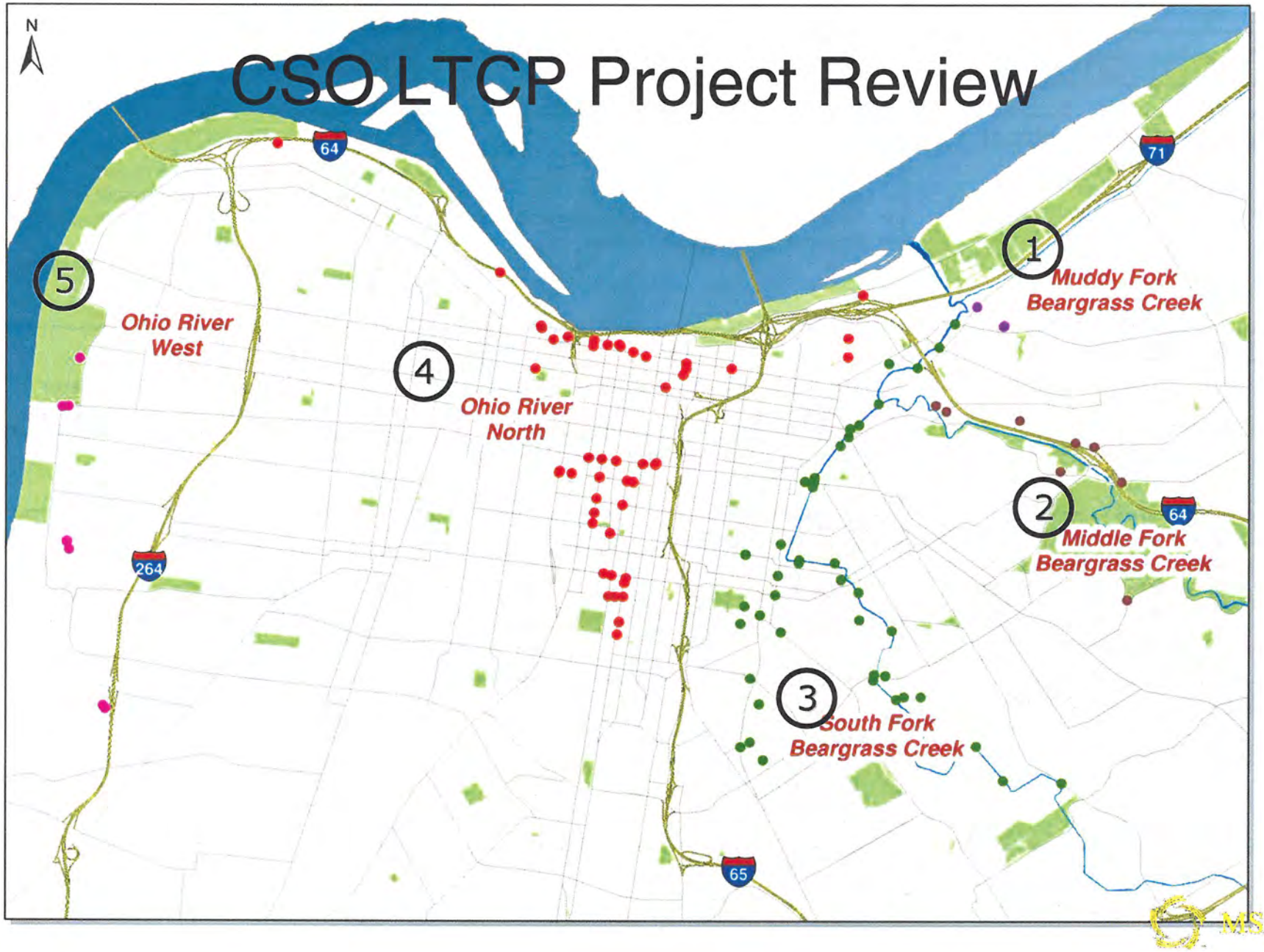
- March 23, 2007 technology workshop
  - Reviewed the full range of available technologies
- May 10, 2007 workshop
  - Reviewed each CSO utilizing LOJIC maps; aerial photography; applying technology table, CSO characteristics (i.e. frequency, flow rate)
- Project database being developed
- Projects details being developed for evaluation

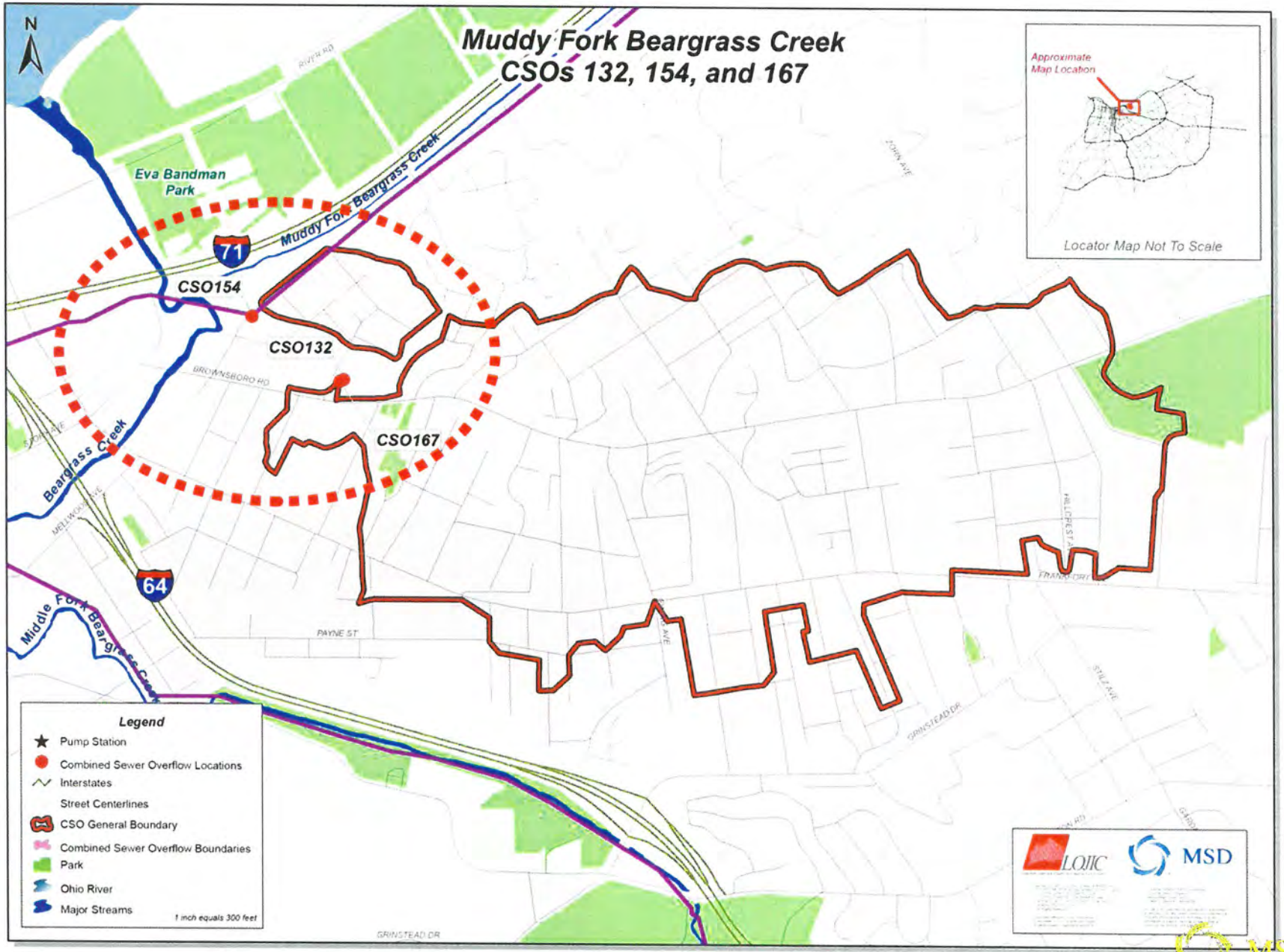
CSO LTCP Technologies

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

Technology	Applications	Remarks
Sewer Separation ▪ Complete Separation ▪ Partial Separation ▪ Private Property Work	▪ Small Sewersheds ▪ Small Diameter Pipes ▪ Right-of-Way (ROW) Availability and Usage ▪ Minimal Underground Utilities	▪ Possible Decline in Water Quality ▪ Separation is an option but cost is typically very high due to the magnitude of construction required ▪ Private Property Work: Reconnect House Sewer & Downspout/Sump Pump Disconnection
CSO Storage ▪ In-line Storage ▪ Off-line Storage ▪ Large Diameter Pipe ▪ Individual & Multiple Storage Configurations	▪ Storing Overflow from the Combined Sewer System ▪ Large Diameter Pipes not Utilizing Full Capacity (In-line Storage Application)	▪ Closed Basins/Tanks, Large Diameter Pipes, and Storage Configurations May Require Pumping Facilities for Conveyance
CSO Treatment ▪ Solids & Floatables Capture ▪ Enhanced Primary Treatment with/without Secondary Treatment	▪ Capture and Retain Solids and Floatables During an Overflow Event ▪ Treat Combined Sewage Overflow Prior to Discharge to Receiving Stream	▪ Screening Technologies Available: Screens, Netting Systems, & Separators ▪ Land footprint from Treatment Minimal in Relation to the Level of CSO Mitigation Benefit
Green Infrastructure ▪ Infiltration ▪ Vegetation ▪ Regulation	▪ Component ▪ Site ▪ Neighborhood ▪ Watershed ▪ Region	▪ Multi-scale ▪ Multi-objective ▪ Multi-benefit ▪ Site specific considerations ▪ Performance data limited


CSO LTCP Project Review
N
64
71
264
65
1
Muddy Fork
Beargrass Creek
2
Middle Fork
Beargrass Creek
3
South Fork
Beargrass Creek
4
Ohio River
North
5
Ohio River
West
MSD


Muddy Fork Beargrass Creek
CSOs 132, 154, and 167
N
Approximate Map Location
Locator Map Not To Scale
Eva Bandman Park
Muddy Fork Beargrass Creek
71
CSO154
CSO132
CSO167
BROWNSBORO RD
Beargrass Creek
64
Middle Fork Beargrass Creek
PAYNE ST
GRINSTEAD DR
Legend
Pump Station
Combined Sewer Overflow Locations
Interstates
Street Centerlines
CSO General Boundary
Combined Sewer Overflow Boundaries
Park
Ohio River
Major Streams
1 inch equals 300 feet
LOUIC
MSD
MSD

Muddy Fork Beargrass Creek CSOs 132,154,167

CSO NO.	Drainage Area (AC)	2003 AAOV (MG/YR)	Overflow Frequency (NO/YR)	Avg. Overflow Duration (HRS)	Percentage of Entire System (AAOV)
132	674.0	117.7	64	6.6	3.36%
154	31.0	1.5	12	1.3	0.04%
167	11.0	0.0	0	0.0	0.00%

MSD

Projects for Individual CSOs

MSD

CSO Number: CSO 132

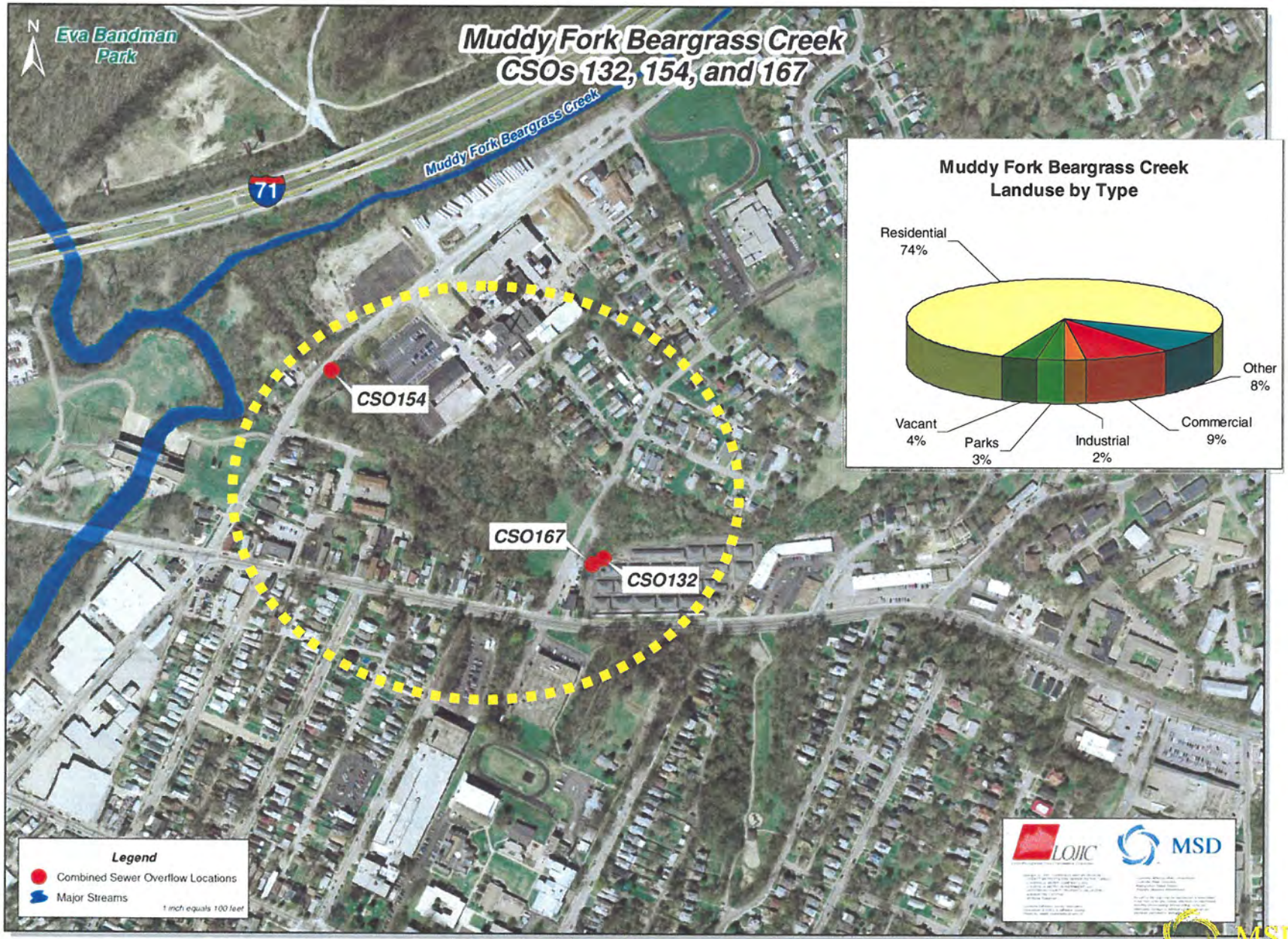
Project ID	Project Type	Project Description
L-MU-154-M-08	Sub-Regional Storage +Treatment	
L-MU-154-M-02	RTC Future Phase	

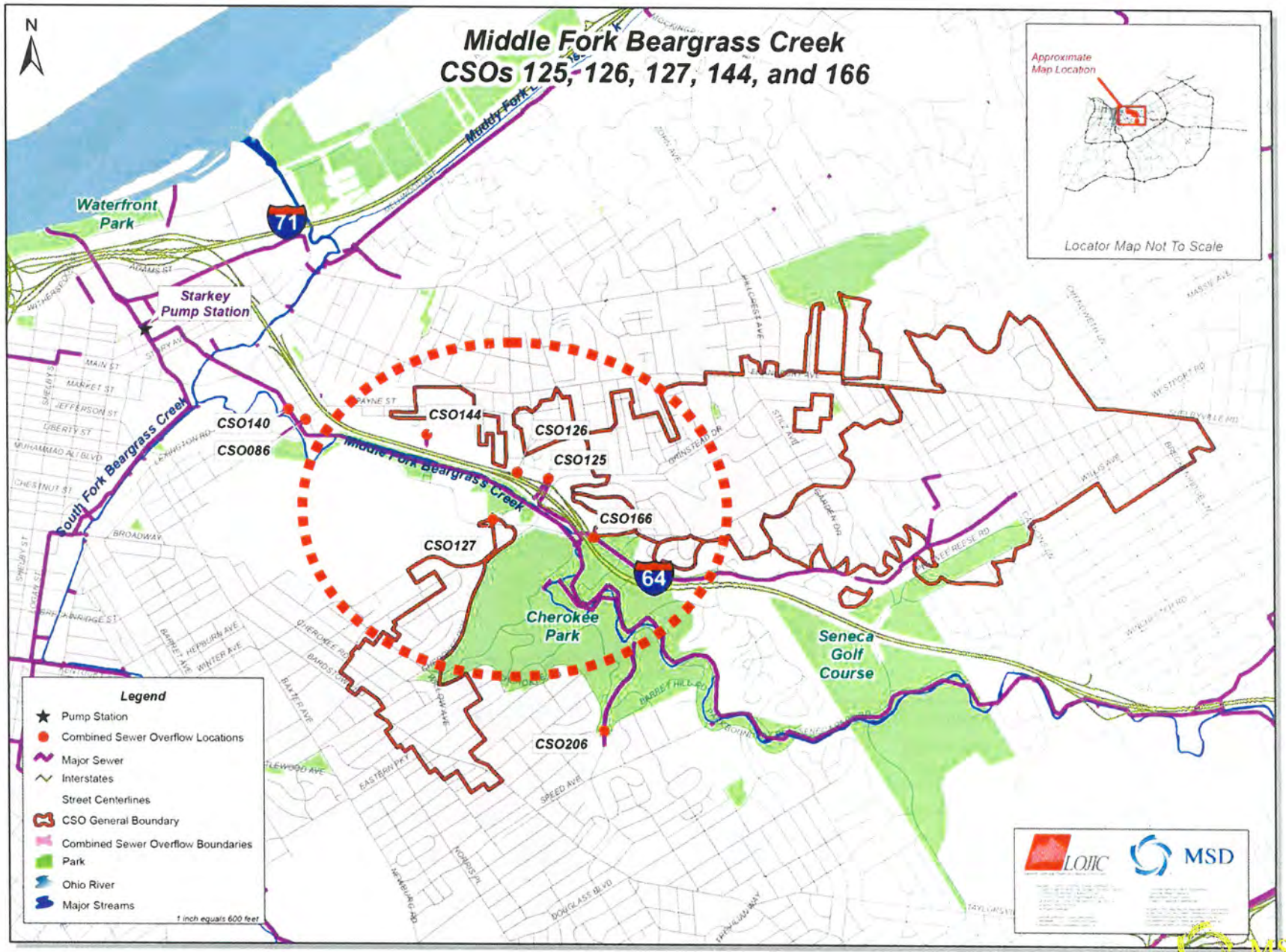
CSO Number: CSO 154

Project ID	Project Type	Project Description
L-MU-154-M-08	Sub-Regional Storage +Treatment	
L-MU-154-M-02	RTC Future Phase	

CSO Number: CSO 167

Project ID	Project Type	Project Description
L-MU-154-M-08	Sub-Regional Storage +Treatment	
L-MU-154-M-02	RTC Future Phase	


Muddy Fork Beargrass Creek
CSOs 132, 154, and 167
Eva Bandman Park
Muddy Fork Beargrass Creek
71
CSO154
CSO167
CSO132
Muddy Fork Beargrass Creek
Landuse by Type
Residential 74%
Other 8%
Vacant 4%
Parks 3%
Industrial 2%
Commercial 9%
Legend
Combined Sewer Overflow Locations
Major Streams
1 inch equals 100 feet
LOJIC
MSD
MSD


Middle Fork Beargrass Creek
CSOs 125, 126, 127, 144, and 166
N
Approximate Map Location
Locator Map Not To Scale
Waterfront Park
Starkey Pump Station
Muddy Fork
South Fork Beargrass Creek
Middle Fork Beargrass Creek
CSO140
CSO086
CSO144
CSO126
CSO125
CSO166
CSO127
CSO206
Cherokee Park
Seneca Golf Course
71
64
Legend
Pump Station
Combined Sewer Overflow Locations
Major Sewer
Interstates
Street Centerlines
CSO General Boundary
Combined Sewer Overflow Boundaries
Park
Ohio River
Major Streams
1 inch equals 600 feet
LOJIC
MSD

Middle Fork Beargrass Creek CSOs 144,126, 125, 127, 166

CSO NO.	Drainage Area (AC)	2003 AAOV (MG/YR)	Overflow Frequency (NO/YR)	Avg. Overflow Duration (HRS)	Percentage of Entire System (AAOV)
144	16.4	0.6	27	3.7	0.02%
126	35.3	0.3	6	1.2	0.01%
125	391.0	18.4	30	7.2	0.53%
127	192.3	13.3	29	1.9	0.38%
166	681.1	16.3	31	1.8	0.47%

MSD

Projects for Individual CSOs

MSD

CSO Number: **CSO 125**

Project ID	Project Type	Project Description
L-MI-144-M-08	Sub-Regional Storage +Treatment	
L-MI-126-M-08	Sub-Regional Storage +Treatment	

CSO Number: **CSO 126**

Project ID	Project Type	Project Description
L-MI-144-M-08	Sub-Regional Storage +Treatment	
L-MI-126-M-08	Sub-Regional Storage +Treatment	

CSO Number: **CSO 127**

Project ID	Project Type	Project Description
L-MI-144-M-08	Sub-Regional Storage +Treatment	
L-MI-126-M-08	Sub-Regional Storage +Treatment	

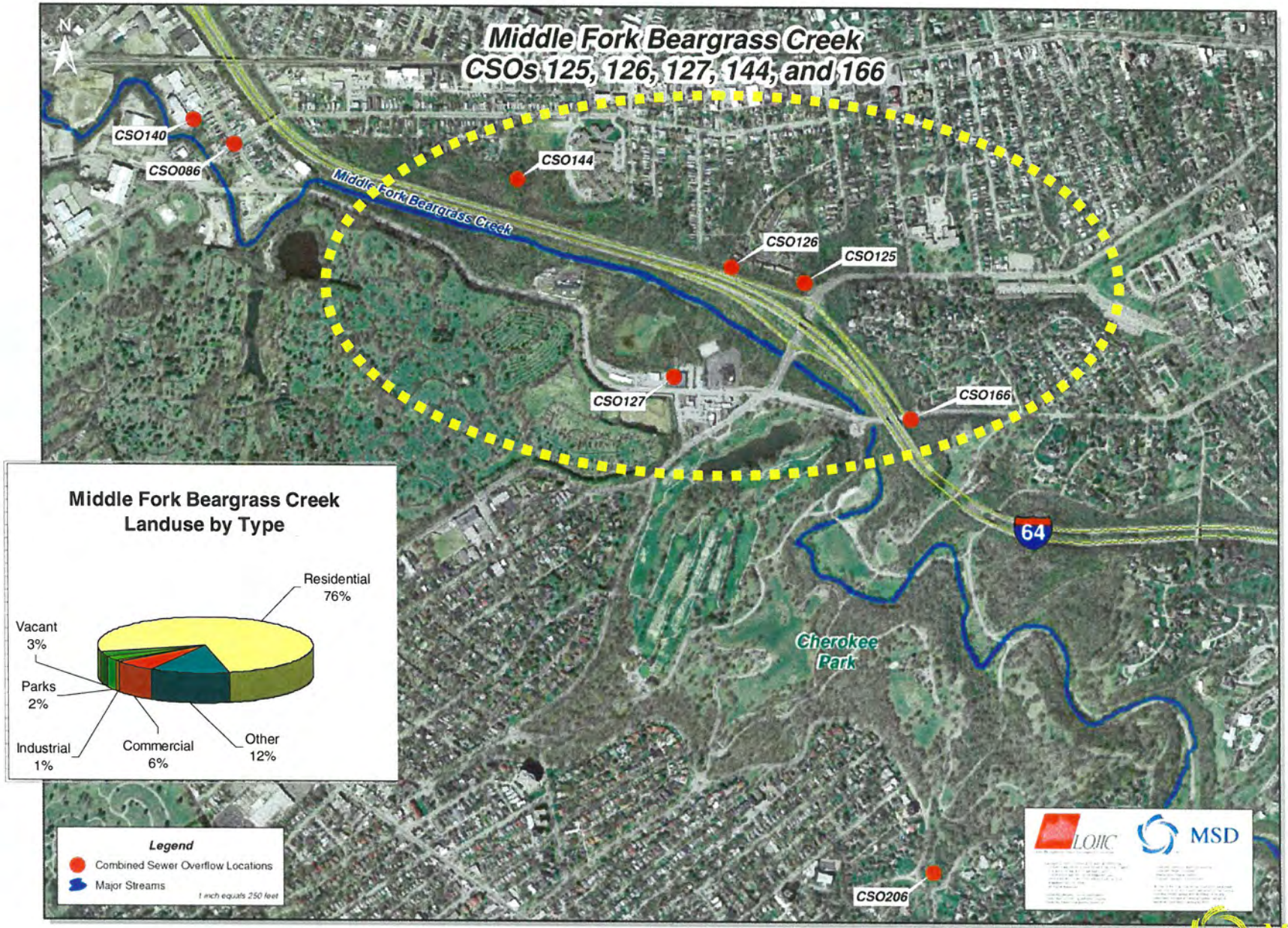
Projects for Individual CSOs

CSO Number: **CSO 144**

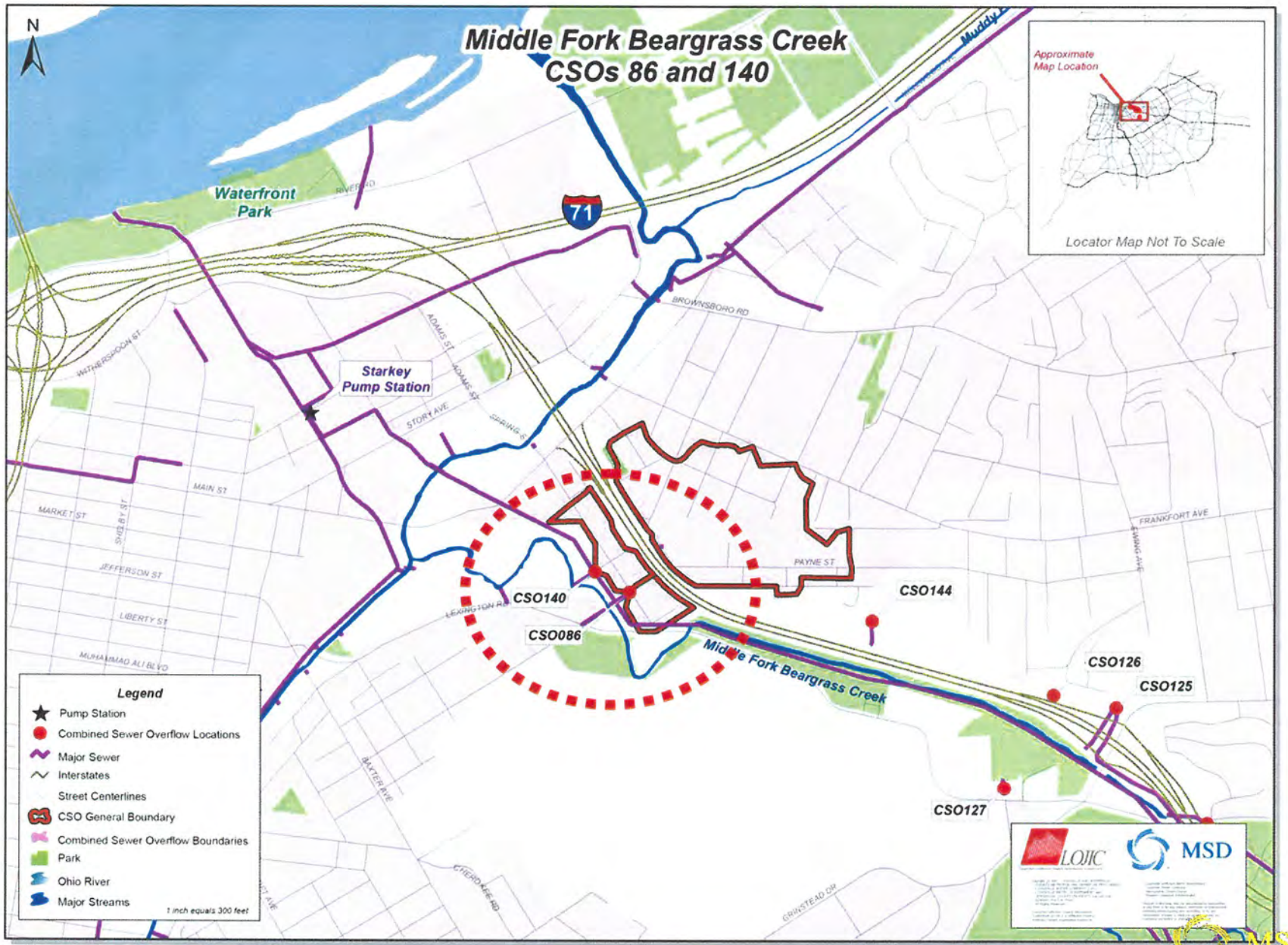
Project ID	Project Type	Project Description
L-MI-144-S-05	Individual Treatment	
L-MI-144-S-04	Individual Storage	
L-MI-144-S-03	Separation (Elimination)	
L-MI-144-M-08	Sub-Regional Storage +Treatment	
L-MI-126-M-08	Sub-Regional Storage +Treatment	

CSO Number: **CSO 166**

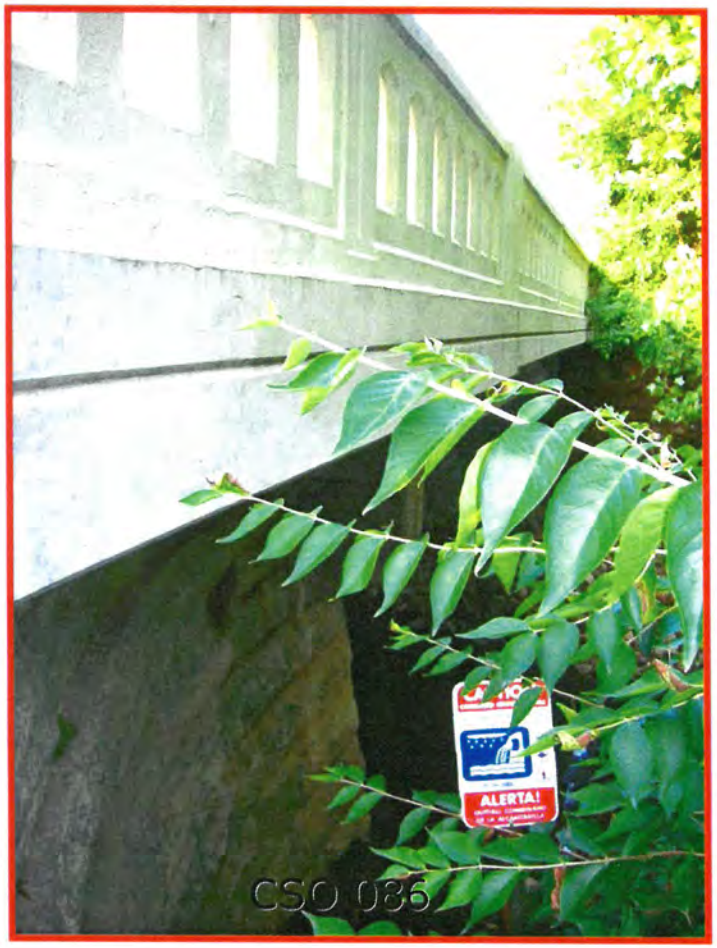
Project ID	Project Type	Project Description
L-MI-144-M-08	Sub-Regional Storage +Treatment	
L-MI-126-M-08	Sub-Regional Storage +Treatment	


Middle Fork Beargrass Creek
CSOs 125, 126, 127, 144, and 166
N
CSO140
CSO086
CSO144
Middle Fork Beargrass Creek
CSO126
CSO125
CSO127
CSO166
64
Cherokee Park
CSO206
Middle Fork Beargrass Creek
Landuse by Type
Residential 76%
Vacant 3%
Parks 2%
Industrial 1%
Commercial 6%
Other 12%
Legend
Combined Sewer Overflow Locations
Major Streams
1 inch equals 250 feet
LOJIC
MSD

MSD


Middle Fork Beargrass Creek
CSOs 86 and 140
N
Approximate Map Location
Locator Map Not To Scale
Waterfront Park
71
Starkey Pump Station
BROWNSBORO RD
ADAMS ST
STORY AVE
MAIN ST
MARKET ST
JEFFERSON ST
LIBERTY ST
MUHAMMAD ALI BLVD
PAYNE ST
FRANKFORT AVE
CSO140
CSO086
CSO144
CSO126
CSO125
CSO127
Middle Fork Beargrass Creek
Legend
Pump Station
Combined Sewer Overflow Locations
Major Sewer
Interstates
Street Centerlines
CSO General Boundary
Combined Sewer Overflow Boundaries
Park
Ohio River
Major Streams
1 inch equals 300 feet
LOJIC
MSD

Middle Fork Beargrass Creek CSOs 086, 140



CSO NO.	Drainage Area (AC)	2003 AAOV (MG/YR)	Overflow Frequency (NO/YR)	Avg. Overflow Duration (HRS)	Percentage of Entire System (AAOV)
86	6.1	0.0	0	0.0	0.00%
140	75.5	5.1	28	1.9	0.14%

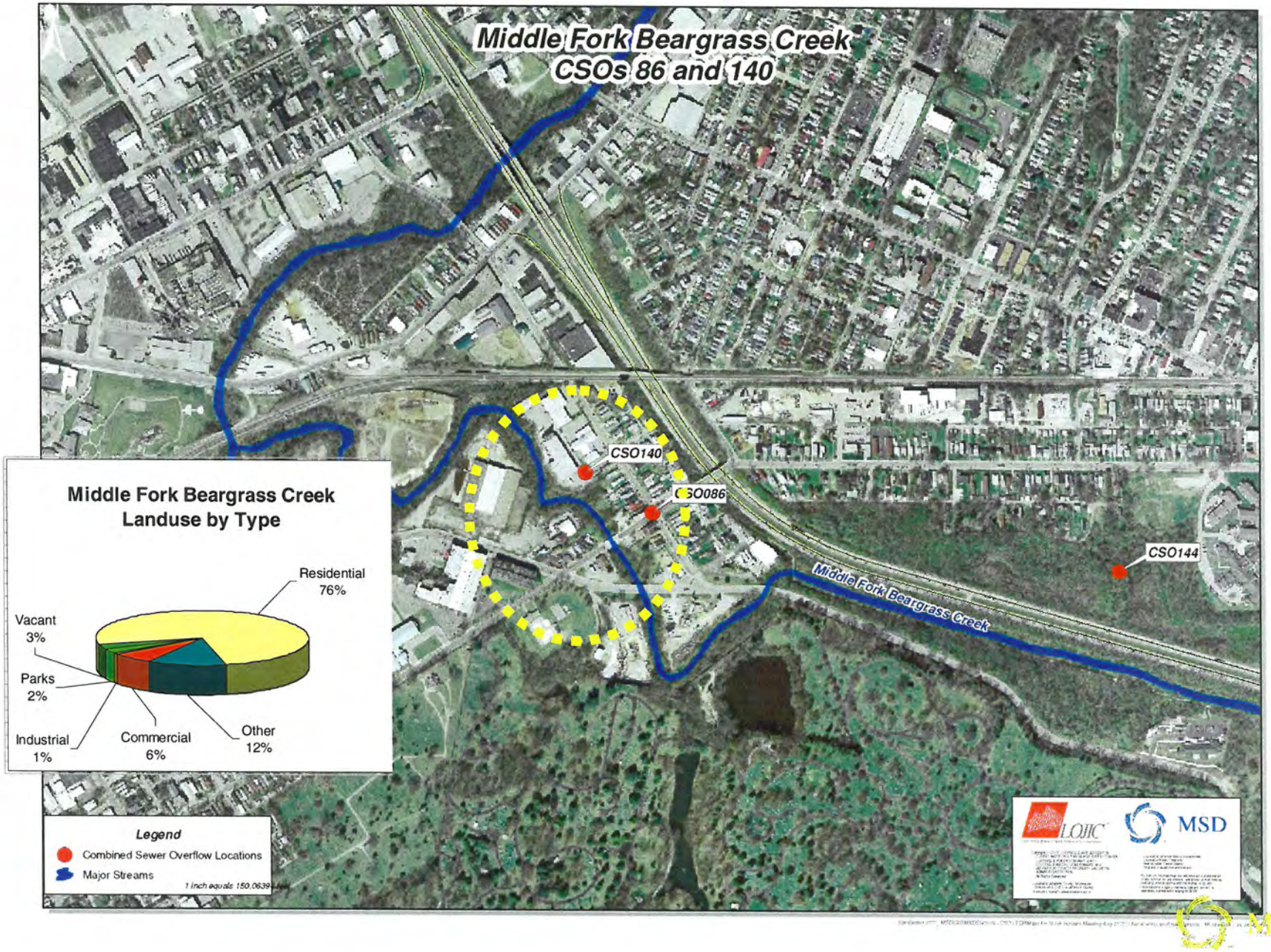
Projects for Individual CSOs

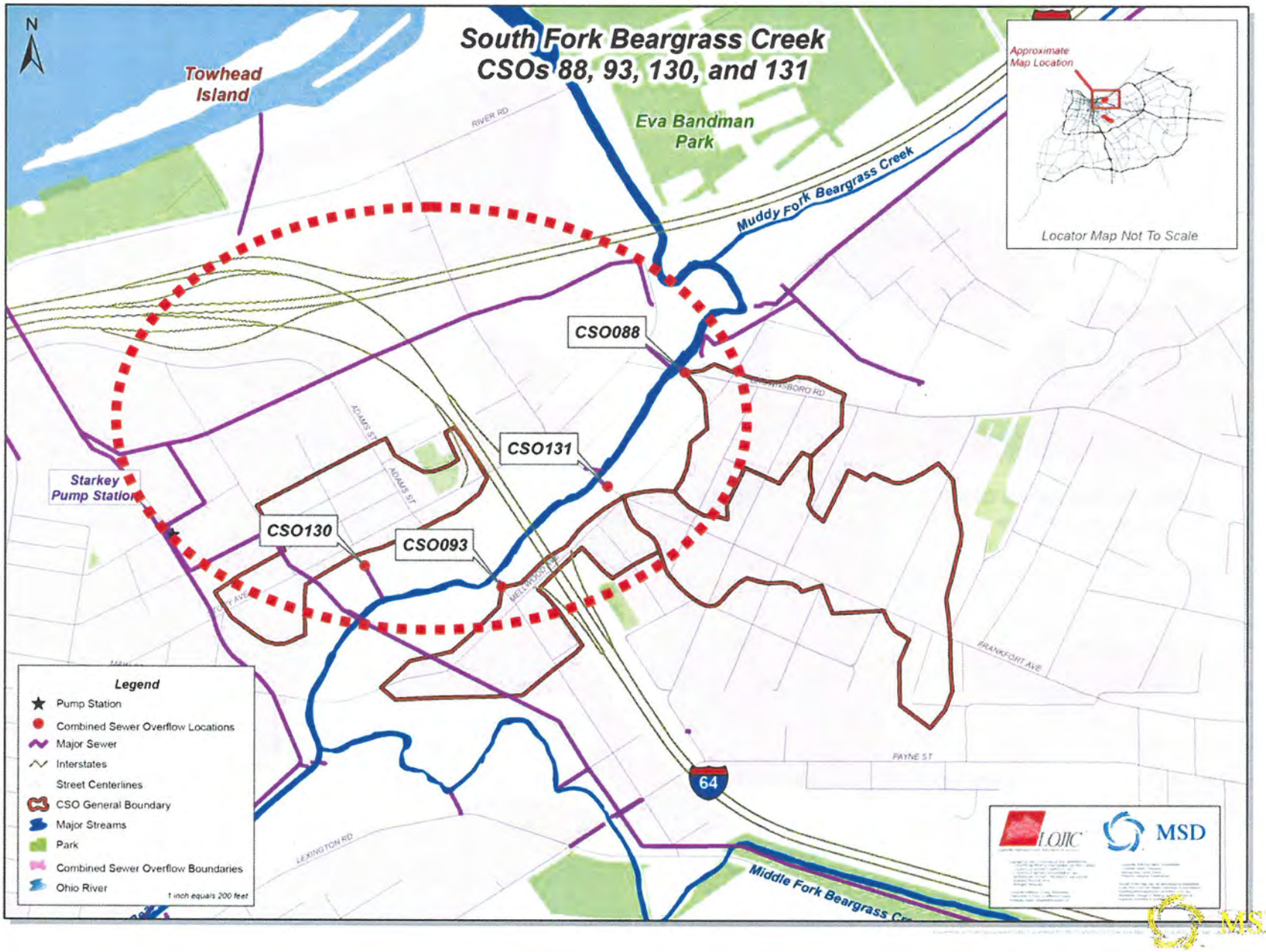
CSO Number: **CSO 086**

Project ID	Project Type	Project Description
L-MI-140-M-06	Sub-Regional Storage	
L-MI-140-M-06	Separation (Elimination)	

CSO Number: **CSO 140**

Project ID	Project Type	Project Description
L-MI-140-S-03	Separation (Elimination)	
L-MI-140-M-06	Sub-Regional Storage	


Middle Fork Beargrass Creek
CSOs 86 and 140
CSO140
CSO086
CSO144
Middle Fork Beargrass Creek
Middle Fork Beargrass Creek
Landuse by Type
Residential
76%
Vacant
3%
Parks
2%
Industrial
1%
Commercial
6%
Other
12%
Legend
Combined Sewer Overflow Locations
Major Streams
1 inch equals 150.0639
LOJIC
MSD
MSD


South Fork Beargrass Creek
CSOs 88, 93, 130, and 131
Towhead Island
Eva Bandman Park
Muddy Fork Beargrass Creek
Approximate Map Location
Locator Map Not To Scale
CSO088
CSO131
CSO130
CSO093
Starkey Pump Station
RIVER RD
ADAMS ST
FRANKFORT AVE
FAYNE ST
LEXINGTON RD
64
Middle Fork Beargrass Cr
Legend
Pump Station
Combined Sewer Overflow Locations
Major Sewer
Interstates
Street Centerlines
CSO General Boundary
Major Streams
Park
Combined Sewer Overflow Boundaries
Ohio River
1 inch equals 200 feet
LOJIC
MSD

South Fork Beargrass Creek CSOs 093, 130, 131, 088

CSO NO.	Drainage Area (AC)	2003 AAOV (MG/YR)	Overflow Frequency (NO/YR)	Avg. Overflow Duration (HRS)	Percentage of Entire System (AAOV)
93	20.8	0.0	0	0.0	0.00%
130	28.4	6.5	26	3.5	0.19%
131	50.3	0.2	3	1.3	0.01%
88	Separated	0.0	0	0.0	0.00%

Projects for Individual CSOs

MSD

CSO Number: CSO 088

Project ID	Project Type	Project Description
L-SO-088-S-03	Seperation (Elimination)	

CSO Number: CSO 093

Project ID	Project Type	Project Description
L-SO-130-M-06	Sub-Regional Storage	
L-SO-093-S-03	Seperation (Elimination)	

CSO Number: CSO 130

Project ID	Project Type	Project Description
L-SO-130-S-05	Individual Treatment	
L-SO-130-S-03	Seperation (Elimination)	
L-SO-130-M-06	Sub-Regional Storage	

MSD

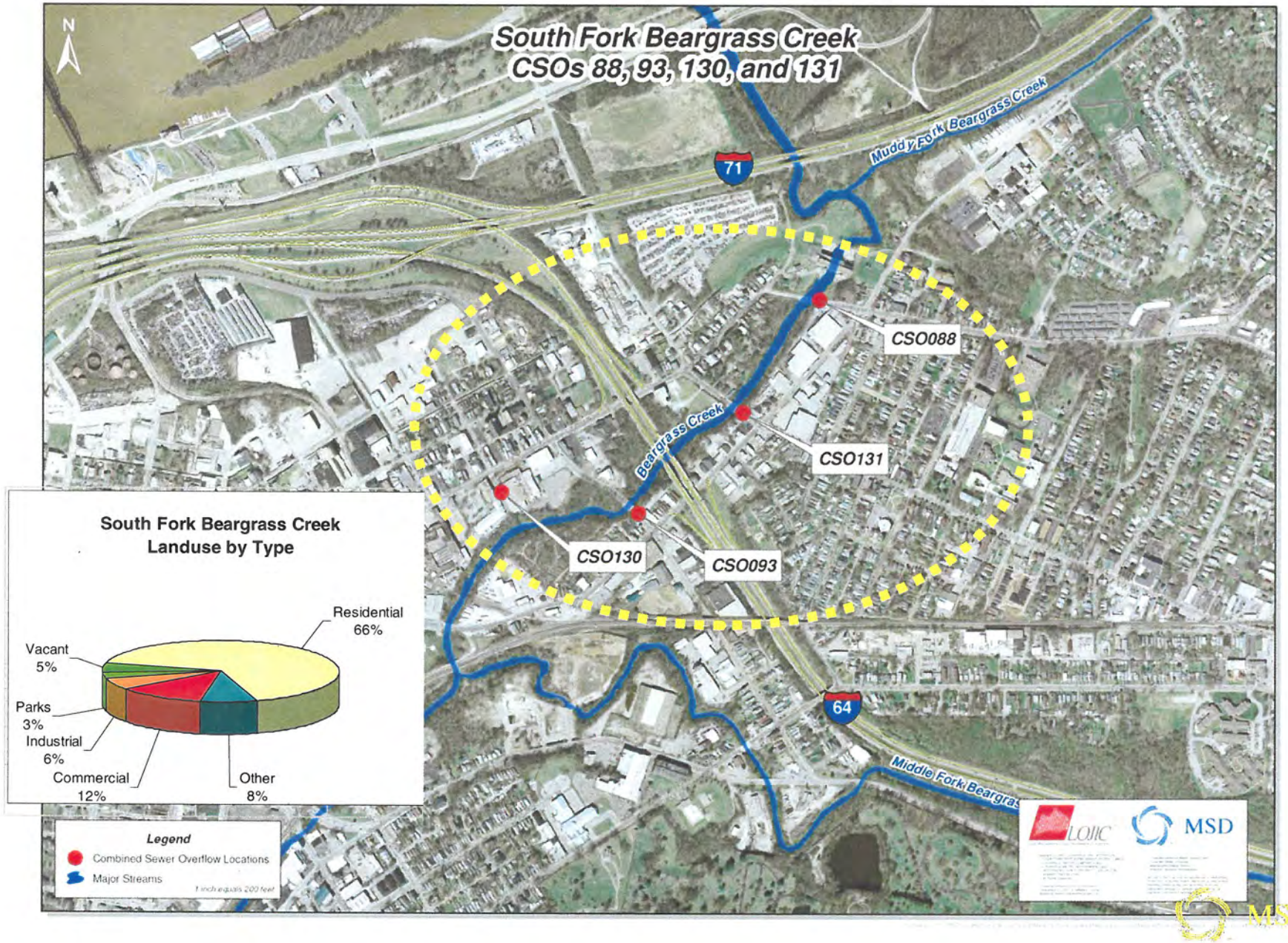
Projects for Individual CSOs

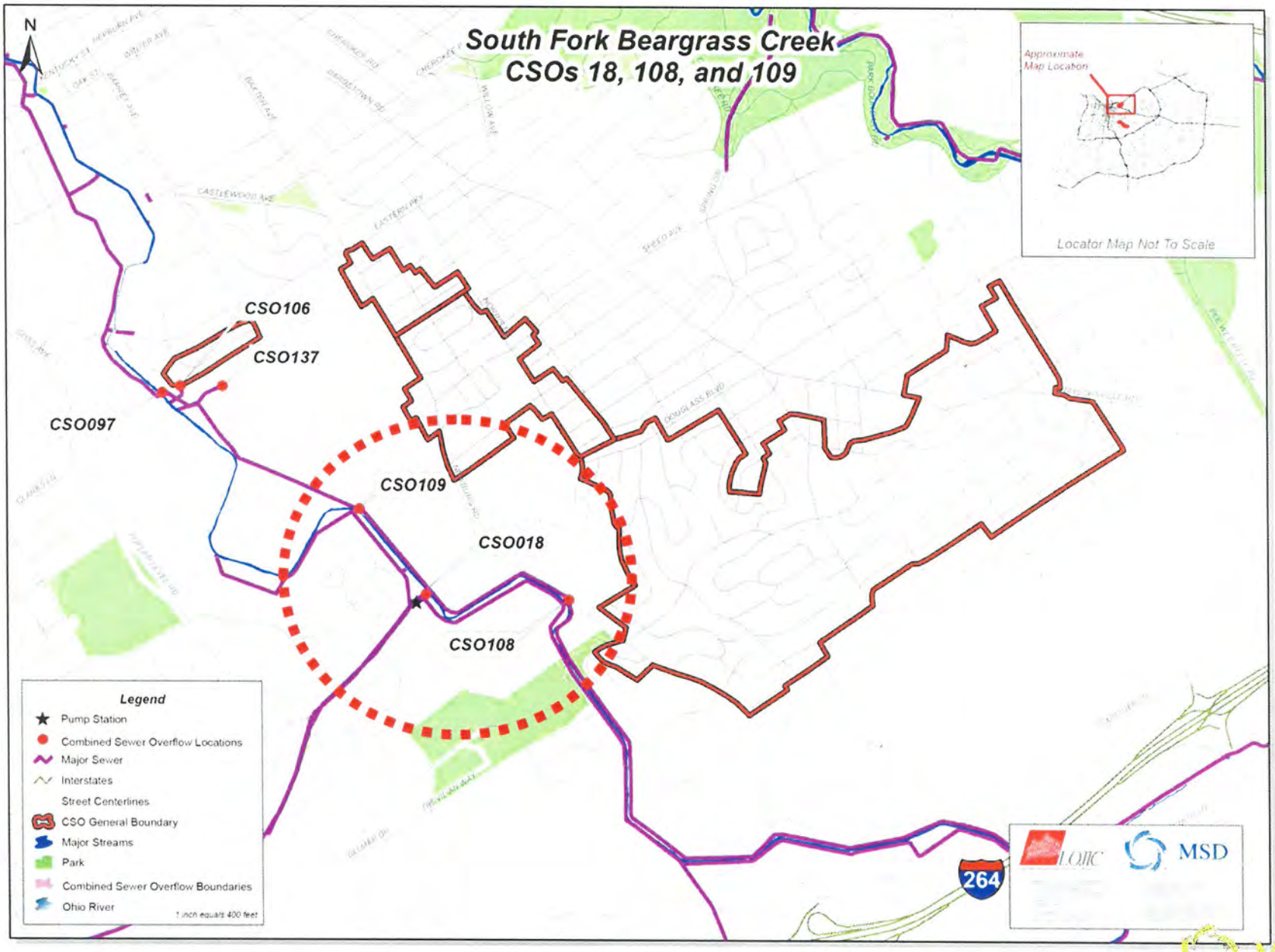
MSD

CSO Number: **CSO 131**

Project ID	Project Type	Project Description
L-SO-131-S-03	Seperation (Elimination)	
L-SO-130-M-06	Sub-Regional Storage	

MSD


South Fork Beargrass Creek
CSOs 88, 93, 130, and 131
N
71
64
Muddy Fork Beargrass Creek
Beargrass Creek
Middle Fork Beargrass
CSO088
CSO131
CSO130
CSO093
South Fork Beargrass Creek
Landuse by Type
Residential
66%
Vacant
5%
Parks
3%
Industrial
6%
Commercial
12%
Other
8%
Legend
Combined Sewer Overflow Locations
Major Streams
1 inch equals 200 feet
LOJIC
MSD
MSD


South Fork Beargrass Creek
CSOs 18, 108, and 109
N
Approximate Map Location
Locator Map Not To Scale
CSO106
CSO137
CSO097
CSO109
CSO018
CSO108
Legend
Pump Station
Combined Sewer Overflow Locations
Major Sewer
Interstates
Street Centerlines
CSO General Boundary
Major Streams
Park
Combined Sewer Overflow Boundaries
Ohio River
1 inch equals 400 feet
264
LOJIC
MSD
MSD

South Fork Beargrass Creek CSOs 108, 109, 018

CSO NO.	Drainage Area (AC)	2003 AAOV (MG/YR)	Overflow Frequency (NO/YR)	Avg. Overflow Duration (HRS)	Percentage of Entire System (AAOV)
108	485.2	39.6	34	2.2	1.13%
18	0.0	0.6	1	29.0	0.02%
109	95.4	3.0	19	1.2	0.08%

MSD

Projects for Individual CSOs

MSD

CSO Number: CSO 018

Project ID	Project Type	Project Description
L-SO-109-M-08	Sub-Regional Storage +Treatment	
L-SO-018-S-05	Individual Treatment	
L-SO-018-S-04	Individual Storage	
L-SO-018-S-01	RTC Phase I	
L-SO-018-M-08	Sub-Regional Storage +Treatment	

CSO Number: CSO 108

Project ID	Project Type	Project Description
L-SO-109-M-08	Sub-Regional Storage +Treatment	
L-SO-108-S-05	Individual Treatment	
L-SO-108-S-04	Individual Storage	
L-SO-108-S-02	RTC Future Phase	

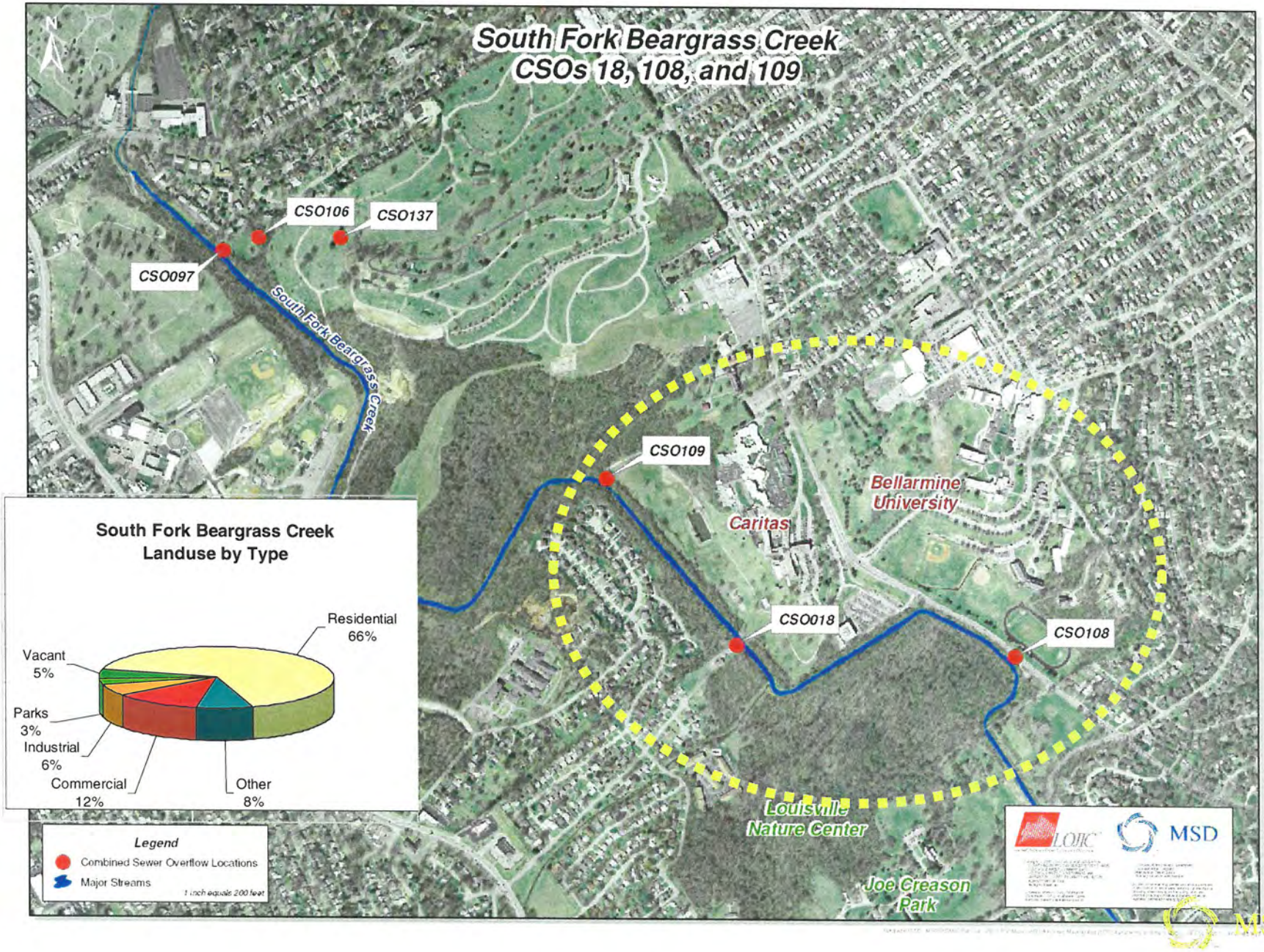
Projects for Individual CSOs

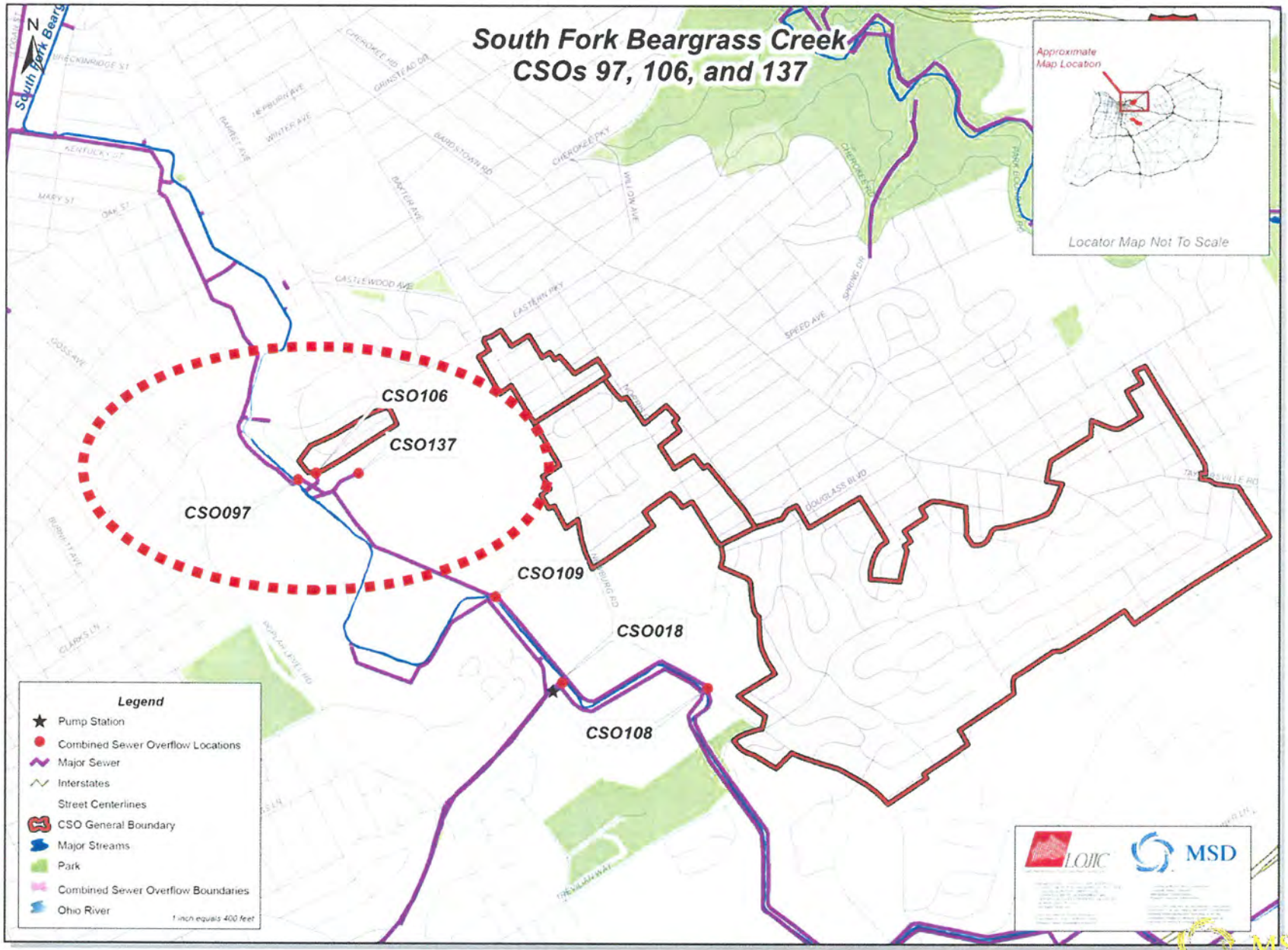
MSD

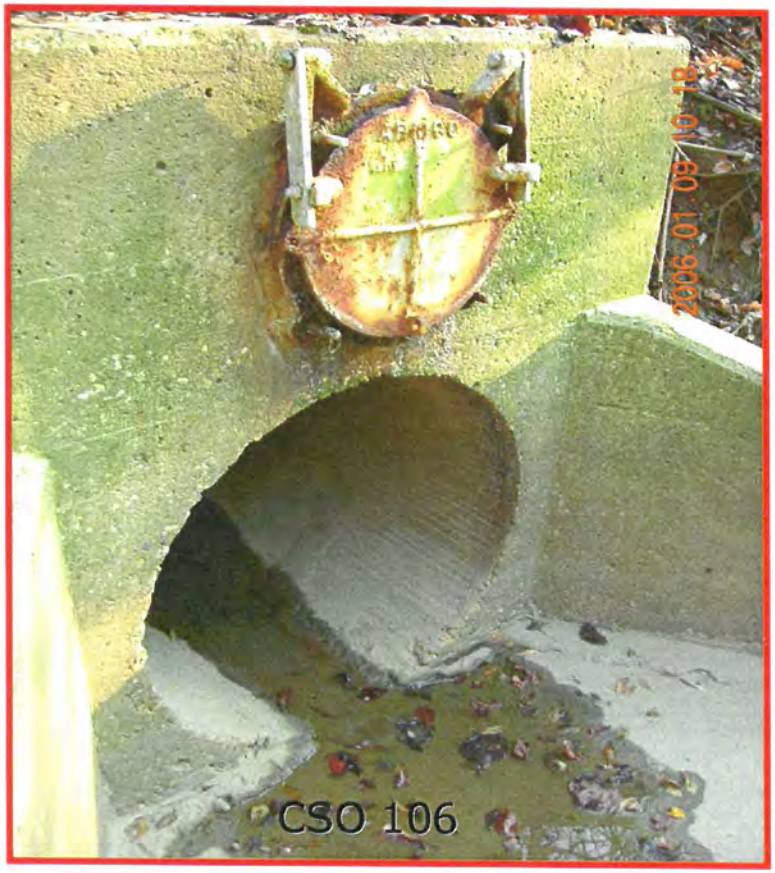
CSO Number: **CSO 109**

Project ID	Project Type	Project Description
L-SO-109-S-05	Individual Treatment	
L-SO-109-S-04	Individual Storage	
L-SO-109-M-08	Sub-Regional Storage +Treatment	
L-SO-018-M-08	Sub-Regional Storage +Treatment	

MSD


South Fork Beargrass Creek
CSOs 18, 108, and 109
CSO106
CSO137
CSO097
South Fork Beargrass Creek
CSO109
Bellarmine University
Caritas
CSO018
CSO108
Louisville Nature Center
Joe Creason Park
South Fork Beargrass Creek
Landuse by Type
Residential 66%
Vacant 5%
Parks 3%
Industrial 6%
Commercial 12%
Other 8%
Legend
Combined Sewer Overflow Locations
Major Streams
1 inch equals 200 feet
LOJIC
MSD
MSD


South Fork Beargrass Creek
CSOs 97, 106, and 137
Approximate Map Location
Locator Map Not To Scale
CSO106
CSO137
CSO097
CSO109
CSO018
CSO108
Legend
Pump Station
Combined Sewer Overflow Locations
Major Sewer
Interstates
Street Centerlines
CSO General Boundary
Major Streams
Park
Combined Sewer Overflow Boundaries
Ohio River
1 inch equals 400 feet
LOJIC
MSD
MSD



South Fork Beargrass Creek CSOs 137, 097, 106

CSO NO.	Drainage Area (AC)	2003 AAOV (MG/YR)	Overflow Frequency (NO/YR)	Avg. Overflow Duration (HRS)	Percentage of Entire System (AAOV)
137	26.7	1.1	19	1.6	0.03%
97	--	49.8	56	6.9	1.42%
106	11.8	0.1	11	1.1	0.00%

Projects for Individual CSOs

MSD

CSO Number: CSO 097

Project ID	Project Type	Project Description
L-SO-151-M-08	Sub-Regional Storage +Treatment	
L-SO-113-M-08	Sub-Regional Storage +Treatment	
L-SO-111-M-08	Sub-Regional Storage +Treatment	

CSO Number: CSO 106

Project ID	Project Type	Project Description
L-SO-151-M-08	Sub-Regional Storage +Treatment	
L-SO-113-M-08	Sub-Regional Storage +Treatment	
L-SO-111-M-08	Sub-Regional Storage +Treatment	
L-SO-106-S-03	Separation (Elimination)	

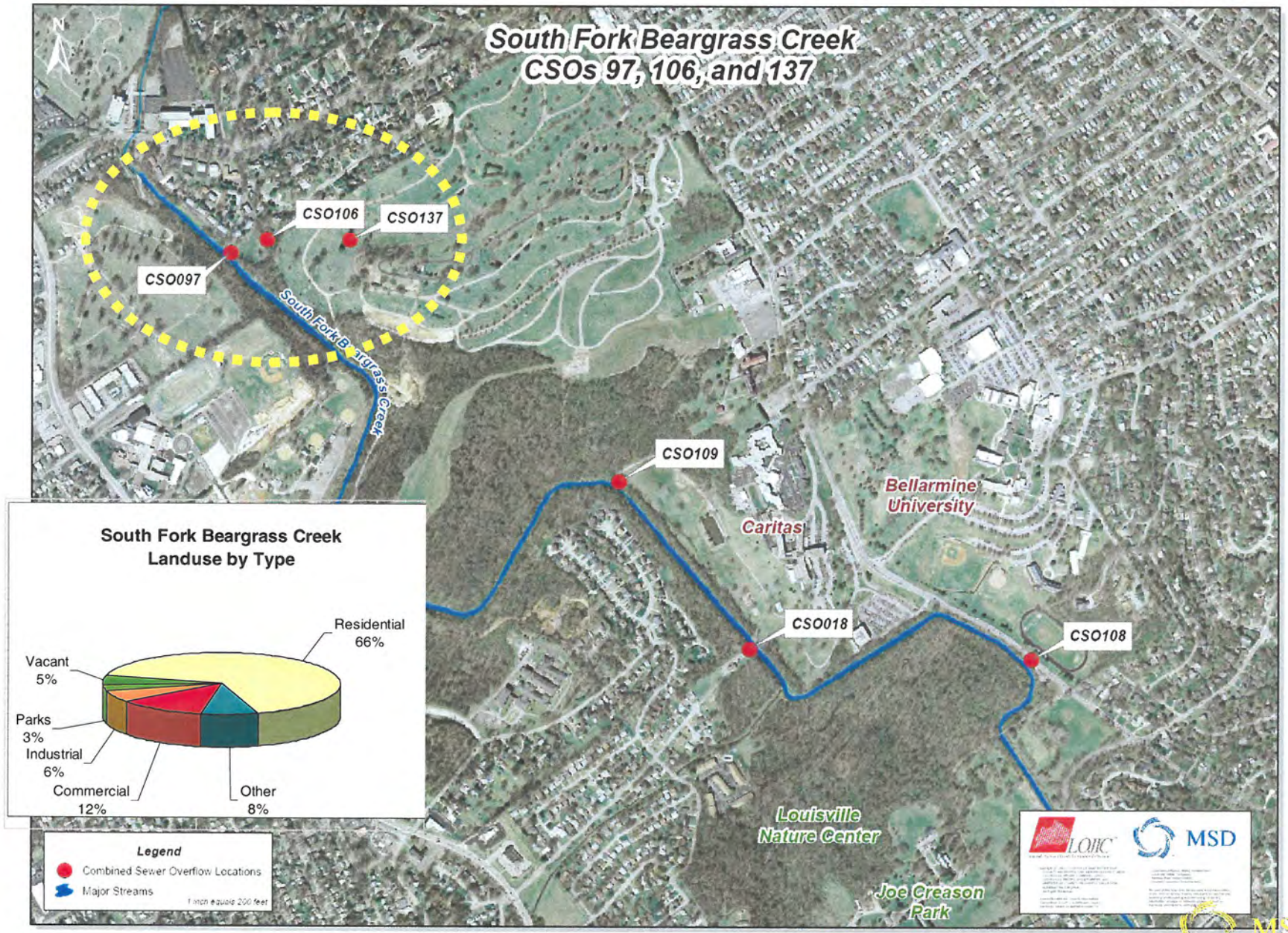
MSD

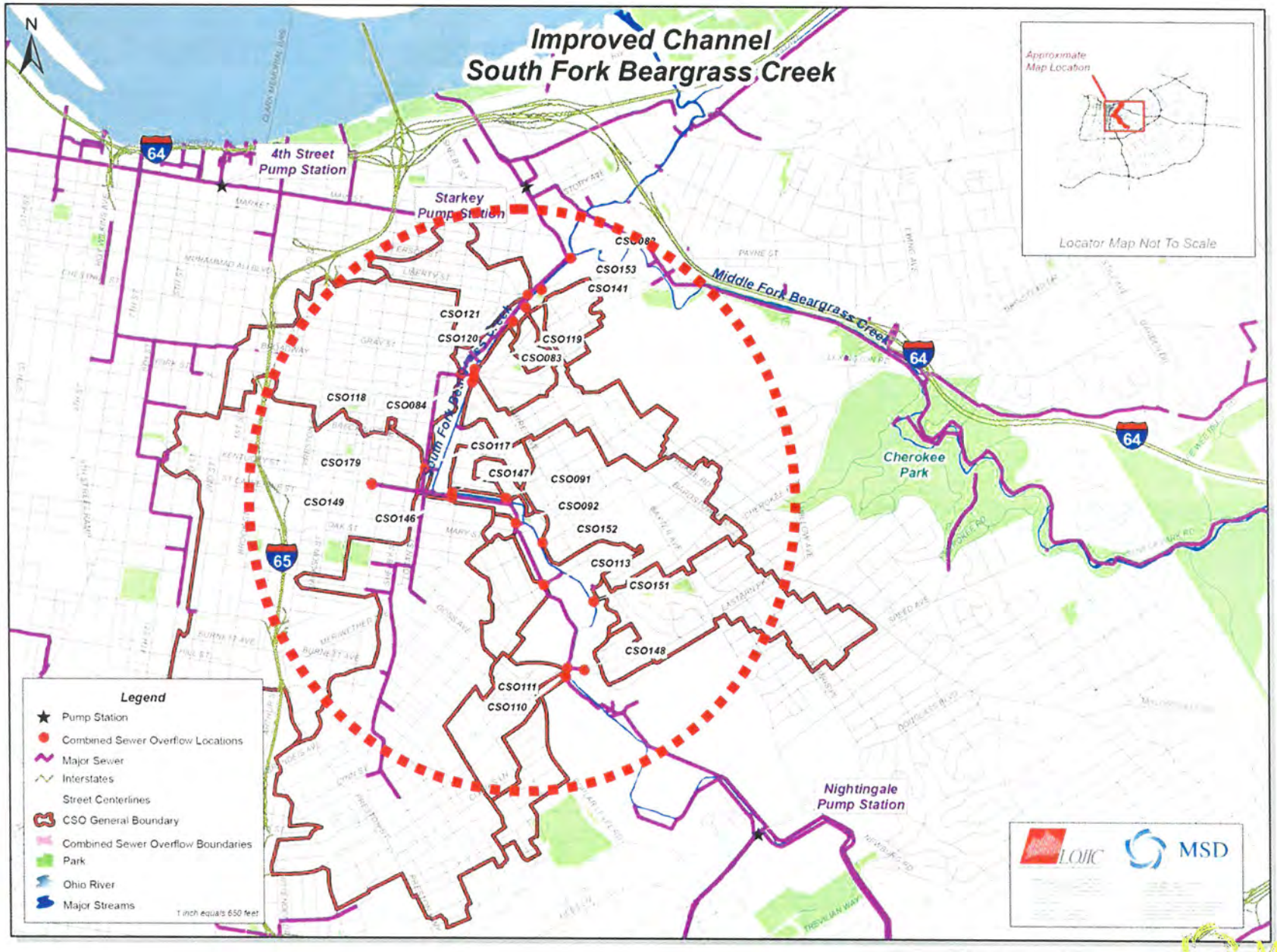
Projects for Individual CSOs

MSD

CSO Number: **CSO 137**

Project ID	Project Type	Project Description
L-SO-151-M-08	Sub-Regional Storage +Treatment	
L-SO-113-M-08	Sub-Regional Storage +Treatment	
L-SO-111-M-08	Sub-Regional Storage +Treatment	


South Fork Beargrass Creek
CSOs 97, 106, and 137
N
CSO106
CSO137
CSO097
South Fork Beargrass Creek
CSO109
Bellarmine University
Caritas
CSO018
CSO108
Louisville Nature Center
Joe Creason Park
South Fork Beargrass Creek
Landuse by Type
Residential 66%
Vacant 5%
Parks 3%
Industrial 6%
Commercial 12%
Other 8%
Legend
Combined Sewer Overflow Locations
Major Streams
1 inch equals 200 feet
LOJIC
MSD


Improved Channel
South Fork Beargrass Creek
N
4th Street
Pump Station
Starkey
Pump Station
Middle Fork Beargrass Creek
South Fork Beargrass Creek
Cherokee
Park
Nightingale
Pump Station
CSO082
CSO153
CSO141
CSO121
CSO120
CSO119
CSO083
CSO118
CSO084
CSO117
CSO179
CSO147
CSO091
CSO149
CSO092
CSO146
CSO152
CSO113
CSO151
CSO148
CSO111
CSO110
64
65
Approximate
Map Location
Locator Map Not To Scale
Legend
Pump Station
Combined Sewer Overflow Locations
Major Sewer
Interstates
Street Centerlines
CSO General Boundary
Combined Sewer Overflow Boundaries
Park
Ohio River
Major Streams
1 inch equals 650 feet
LOUIC
MSD
MSD

Improved Channel CSOs

CSO No.	Drainage Area (AC)	2003 AAOV (MG/YR)	Overflow Frequency (NO/YR)	Avg. Overflow Duration (HRS)	Percentage of Entire System (AAOV)
082	16.0	0.59	12	1.25	0.02%
083	45.7	2.67	36	1.86	0.08%
084	125.1	2.21	15	1.2	0.06%
091	14.99	0.06	3	1.33	0.00%
092	7.65	0.003	2	1	0.00%
110	73	3.9	32	1.9	0.11%
111	99.4	9.55	39	2.74	0.27%
113	67.6	7.83	46	5.13	0.22%
117	74.2	82.53	37	3.02	2.36%
118	354.1	169.76	64	7.29	4.85%
119	-	2.35	27	1.62	0.07%
120	7.7	4.35	24	1.5	0.12%
121	107.2	3.2	23	1.39	0.09%
141	16.5	0	0	0	0.00%
146	724.6	91.68	51	6.72	2.62%
147	Separated	1.3	65	3.1	0.04%
148	24.9	0.27	12	1.16	0.01%
149	225.8	6.9	19	8.26	0.20%
151	232.5	143.91	64	7.4	4.11%
152	260.6	34.4	42	2.88	0.98%
153	41.7	7.15	53	3.37	0.20%
179	Included w/149	0.08	14	1.21	0.00%

Projects for Individual CSOs

General Location: ***Improved Channel South Fork***

CSO	Project ID	Project Type	Project Description
CSO 082	L-SO-082-M-07	Sub-Regional Treatment	
	L-SO-082-M-06	Sub-Regional Storage	
	L-SO-083-M-06	Sub-Regional Storage	
CSO 083	L-SO-083-M-06	Sub-Regional Storage	
	L-SO-082-M-07	Sub-Regional Treatment	
	L-SO-119-M-06	Sub-Regional Storage	
CSO 084	L-SO-082-M-07	Sub-Regional Treatment	
	L-SO-119-M-06	Sub-Regional Storage	
	L-SO-083-M-06	Sub-Regional Storage	
CSO 091	L-SO-146-M-06	Sub-Regional Storage	
	L-SO-082-M-07	Sub-Regional Treatment	
CSO 092	L-SO-082-M-07	Sub-Regional Treatment	
	L-SO-146-M-06	Sub-Regional Storage	
	L-SO-092-M-06	Sub-Regional Storage	

General Location: ***Improved Channel South Fork***

CSO	Project ID	Project Type	Project Description
CSO 110	L-SO-082-M-07	Sub-Regional Treatment	
	L-SO-111-M-08	Sub-Regional Storage +Treatment	
	L-SO-113-M-08	Sub-Regional Storage +Treatment	
	L-SO-151-M-08	Sub-Regional Storage +Treatment	
CSO 111	L-SO-151-M-08	Sub-Regional Storage +Treatment	
	L-SO-082-M-07	Sub-Regional Treatment	
	L-SO-113-M-08	Sub-Regional Storage +Treatment	
	L-SO-111-M-08	Sub-Regional Storage +Treatment	
CSO 113	L-SO-082-M-07	Sub-Regional Treatment	
	L-SO-092-M-06	Sub-Regional Storage	
	L-SO-146-M-06	Sub-Regional Storage	
	L-SO-113-M-08	Sub-Regional Storage +Treatment	
CSO 117	L-SO-082-M-07	Sub-Regional Treatment	
	L-SO-117-M-06	Sub-Regional Storage	
CSO 118	L-SO-119-M-06	Sub-Regional Storage	
	L-SO-082-M-07	Sub-Regional Treatment	
	L-SO-083-M-06	Sub-Regional Storage	
CSO 119	L-SO-083-M-06	Sub-Regional Storage	

MSD

General Location: ***Improved Channel South Fork***

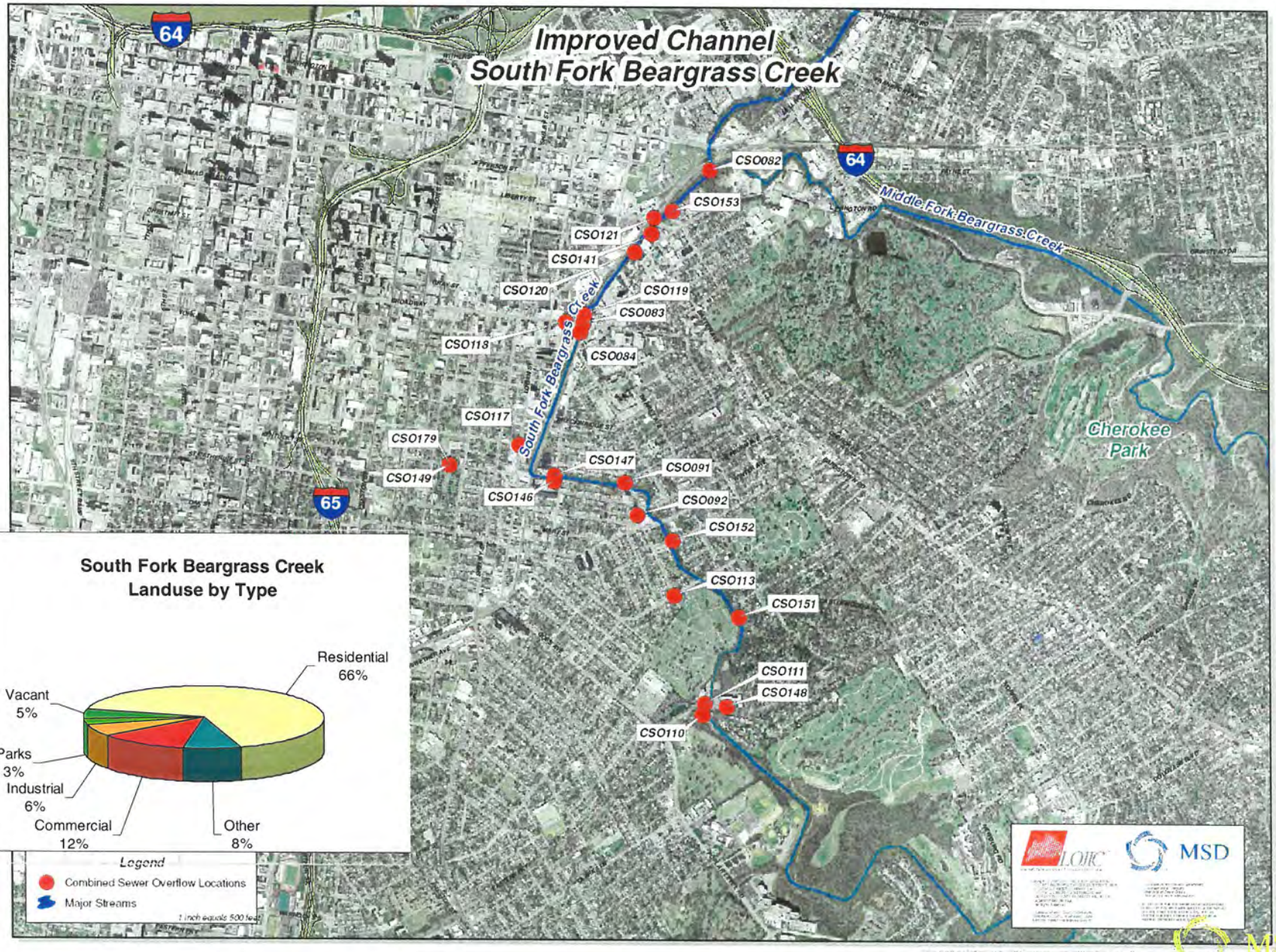
CSO	Project ID	Project Type	Project Description
CSO 119	L-SO-119-M-06	Sub-Regional Storage	
	L-SO-082-M-07	Sub-Regional Treatment	
CSO 120	L-SO-153-M-06	Sub-Regional Storage	
	L-SO-082-M-07	Sub-Regional Treatment	
	L-SO-082-M-06	Sub-Regional Storage	
	L-SO-083-M-06	Sub-Regional Storage	
CSO 121	L-SO-083-M-06	Sub-Regional Storage	
	L-SO-082-M-06	Sub-Regional Storage	
	L-SO-153-M-06	Sub-Regional Storage	
	L-SO-082-M-07	Sub-Regional Treatment	
CSO 141	L-SO-153-M-06	Sub-Regional Storage	
	L-SO-082-M-06	Sub-Regional Storage	
	L-SO-082-M-07	Sub-Regional Treatment	
CSO 146	L-SO-092-M-06	Sub-Regional Storage	
	L-SO-146-M-06	Sub-Regional Storage	
	L-SO-082-M-07	Sub-Regional Treatment	
CSO 148	L-SO-113-M-08	Sub-Regional Storage +Treatment	
	L-SO-082-M-07	Sub-Regional Treatment	

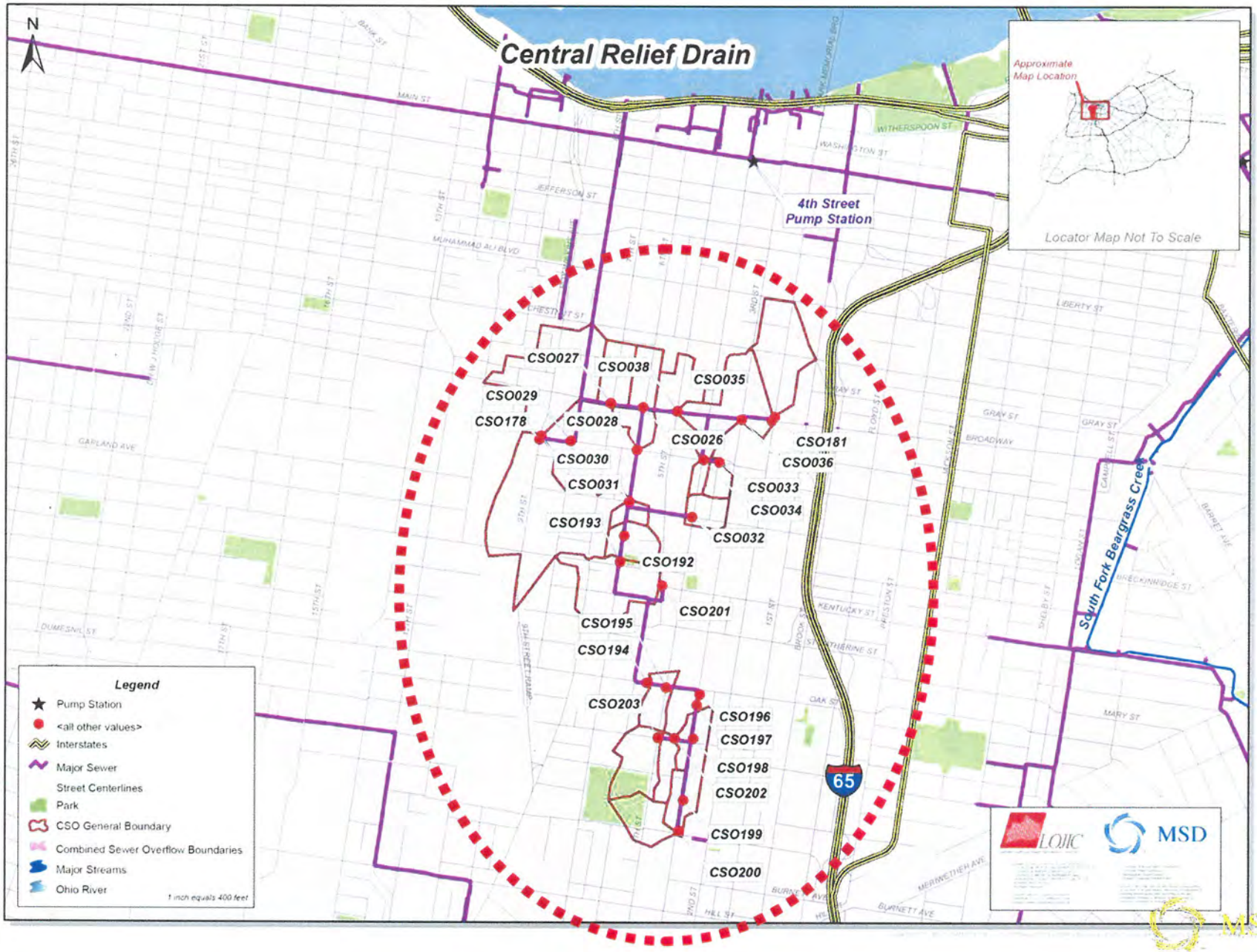
MSD

General Location: ***Improved Channel South Fork***

CSO	Project ID	Project Type	Project Description
CSO 148	L-SO-111-M-08	Sub-Regional Storage +Treatment	
	L-SO-151-M-08	Sub-Regional Storage +Treatment	
CSO 149	L-SO-082-M-07	Sub-Regional Treatment	
	L-SO-117-M-06	Sub-Regional Storage	
CSO 151	L-SO-151-M-08	Sub-Regional Storage +Treatment	
	L-SO-113-M-08	Sub-Regional Storage +Treatment	
	L-SO-082-M-07	Sub-Regional Treatment	
CSO 152	L-SO-146-M-06	Sub-Regional Storage	
	L-SO-092-M-06	Sub-Regional Storage	
	L-SO-082-M-07	Sub-Regional Treatment	
CSO 153	L-SO-083-M-06	Sub-Regional Storage	
	L-SO-082-M-07	Sub-Regional Treatment	
	L-SO-082-M-06	Sub-Regional Storage	
	L-SO-153-M-06	Sub-Regional Storage	
CSO 179	L-SO-082-M-07	Sub-Regional Treatment	
	L-SO-117-M-06	Sub-Regional Storage	

MSD


Improved Channel
South Fork Beargrass Creek
64
65
CSO082
CSO153
CSO121
CSO141
CSO120
CSO119
CSO083
CSO118
CSO084
CSO117
CSO179
CSO149
CSO147
CSO146
CSO091
CSO092
CSO152
CSO113
CSO151
CSO111
CSO148
CSO110
South Fork Beargrass Creek
Middle Fork Beargrass Creek
Cherokee Park
South Fork Beargrass Creek
Landuse by Type
Residential 66%
Vacant 5%
Parks 3%
Industrial 6%
Commercial 12%
Other 8%
Legend
Combined Sewer Overflow Locations
Major Streams
1 inch equals 500 feet
LOJIC
MSD
MSD


N
Central Relief Drain
4th Street
Pump Station
Approximate
Map Location
Locator Map Not To Scale
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
South Fork Beargrass Creek
65
Legend
Pump Station
<all other values>
Interstates
Major Sewer
Street Centerlines
Park
CSO General Boundary
Combined Sewer Overflow Boundaries
Major Streams
Ohio River
1 inch equals 400 feet
LOJIC
MSD
MSD

Ohio River North Central Relief Drain CSOs

CSO NO.	Drainage Area (AC)	2003 AAOV (MG/YR)	Overflow Frequency (NO/YR)	Avg. Overflow Duration (HRS)	Percentage of Entire System (AAOV)
026	8.4	0.0	0	0.0	0.00%
027	10.1	0.0	0	0.0	0.00%
028	6.1	0.1	4	1.0	0.00%
029	0.0	2.9	24	1.5	0.08%
030	32.6	1.5	17	1.2	0.04%
031	3.8	0.0	0	0.0	0.00%
032	6.4	0.0	0	0.0	0.00%
033	4.3	0.0	2	1.0	0.00%
034	5.1	1.4	35	1.8	0.04%
035	0.0	0.0	0	0.0	0.00%
036	20.0	0.3	12	1.1	0.01%
038	9.5	0.0	2	1.0	0.00%
053	34.1	5.6	32	1.8	0.16%
150	1.8	4.3	49	2.4	0.12%

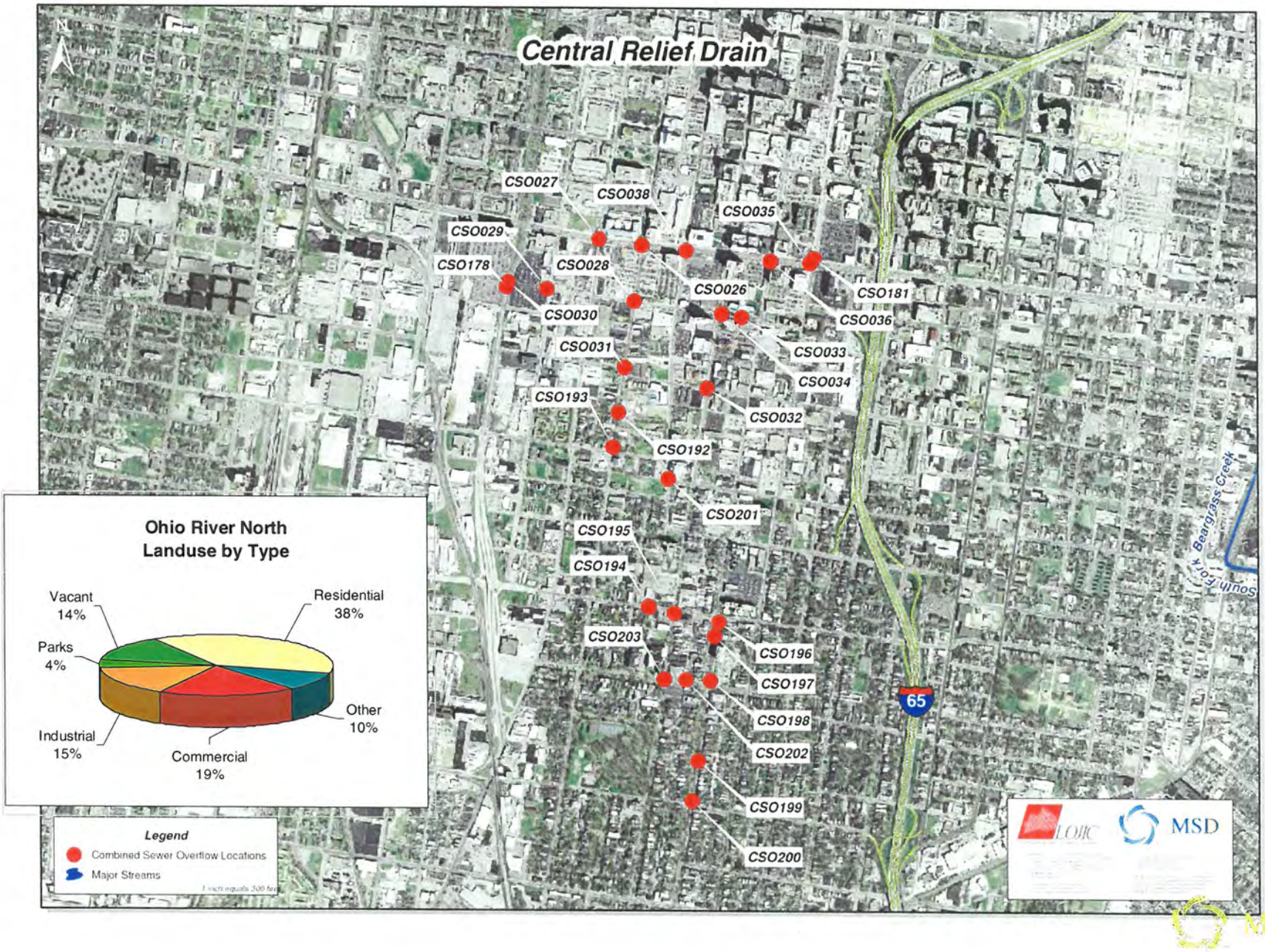
CSO NO.	Drainage Area (AC)	2003 AAOV (MG/YR)	Overflow Frequency (NO/YR)	Avg. Overflow Duration (HRS)	Percentage of Entire System (AAOV)
178	29.7	0.1	5	1.0	0.00%
181	22.6	0.4	14	1.2	0.01%
192	9.0	0.2	14	1.2	0.01%
193	22.7	0.2	14	1.2	0.00%
194	--	0.0	0	0.0	0.00%
195	7.3	0.0	0	0.0	0.00%
196	--	1.6	58	3.2	0.05%
197	--	0.6	33	1.8	0.02%
198	13.0	1.8	57	2.7	0.05%
199	--	0.0	11	1.2	0.00%
200	10.3	0.3	31	1.5	0.01%
201	--	0.4	27	2.7	0.01%
202	5.3	0.1	19	1.2	0.00%
203	14.2	0.0	0	0.0	0.00%

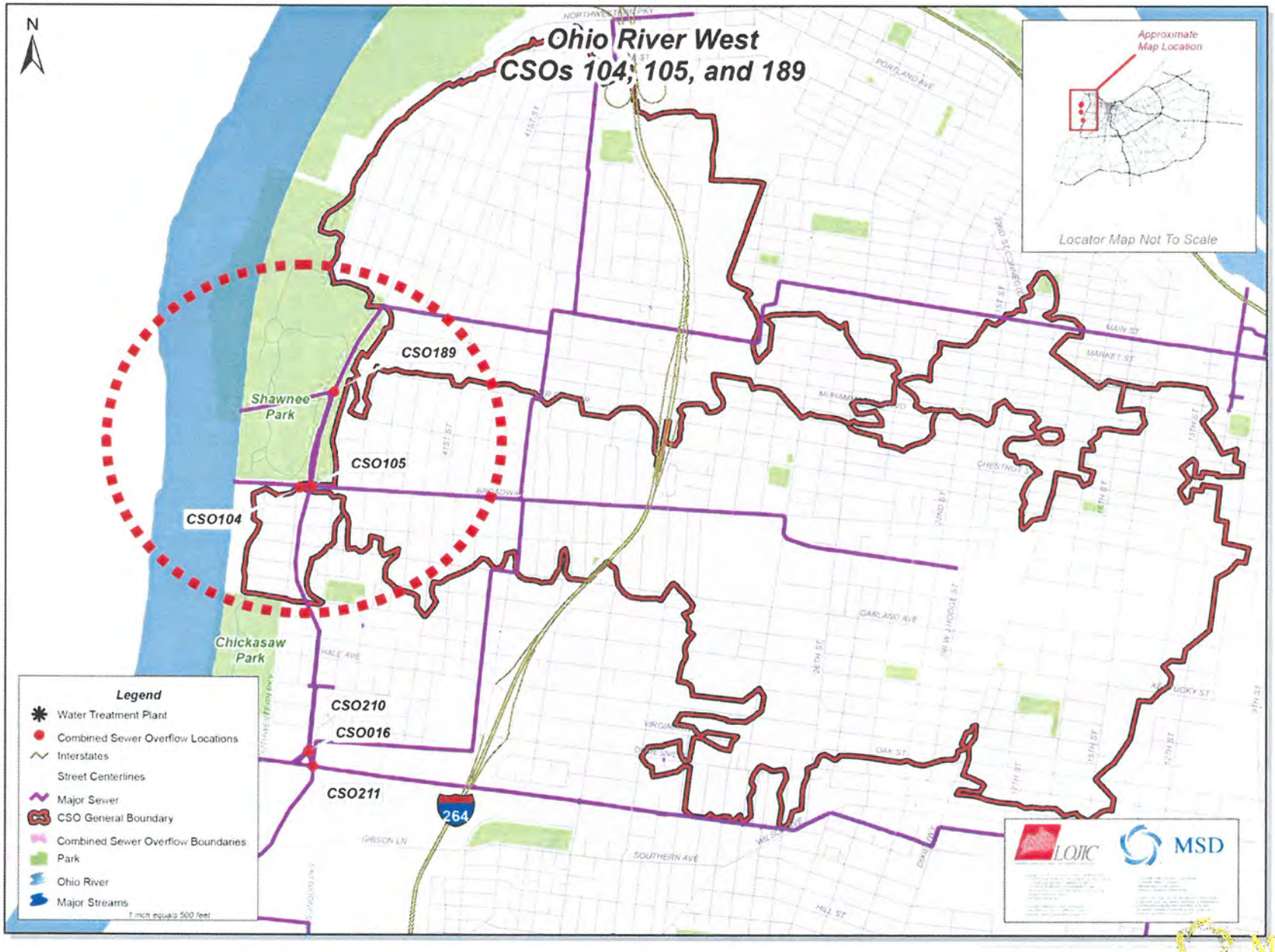
Projects for Individual CSOs

Central Relief Drain CSOs

CSO Number: CSO 026

Project ID	Project Type	Project Description
L-OR-027-M-09	RTC+Sub-Treatment	
L-OR-027-M-08	Sub-Regional Storage +Treatment	
L-OR-027-M-07	Sub-Regional Treatment	
L-OR-027-M-06	Sub-Regional Storage	
L-OR-027-M-02	RTC Future Phase	
L-OR-026-S-03	Separation (Elimination)	


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
South Fork Beargrass Creek
Ohio River North
Landuse by Type
Vacant
14%
Residential
38%
Parks
4%
Other
10%
Industrial
15%
Commercial
19%
Legend
Combined Sewer Overflow Locations
Major Streams
LOUIC
MSD
MSD


Ohio River West
CSOs 104, 105, and 189
N
Approximate Map Location
Locator Map Not To Scale
CSO189
CSO105
CSO104
CSO210
CSO016
CSO211
Shawnee Park
Chickasaw Park
264
Legend
Water Treatment Plant
Combined Sewer Overflow Locations
Interstates
Street Centerlines
Major Sewer
CSO General Boundary
Combined Sewer Overflow Boundaries
Park
Ohio River
Major Streams
1 inch equals 500 feet
LOJIC
MSD
MSD

Ohio River West
CSOs 189, 104, 105

CSO NO.	Drainage Area (AC)	2003 AAOV (MG/YR)	Overflow Frequency (NO/YR)	Avg. Overflow Duration (HRS)	Percentage of Entire System (AAOV)
189	1148.7	553.1	54	8.6	15.81%
104	62.0	6.0	21	1.9	0.17%
105	1893.0	351.4	82	6.3	10.05%

Projects for Individual CSOs

MSD

CSO Number: CSO 104

Project ID	Project Type	Project Description
L-OR-104-M-08	Sub-Regional Storage +Treatment	

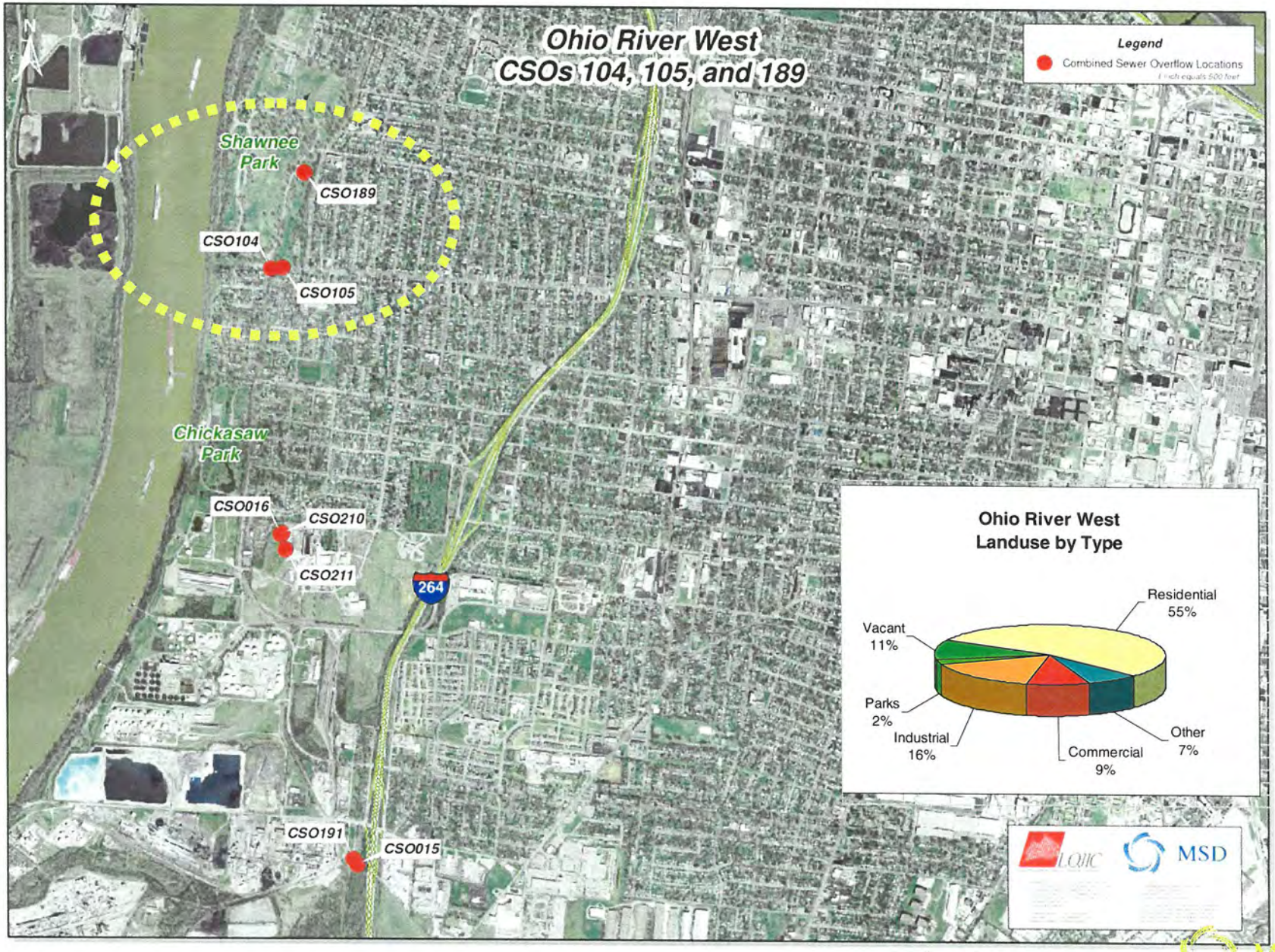
CSO Number: CSO 105

Project ID	Project Type	Project Description
L-OR-104-M-08	Sub-Regional Storage +Treatment	

CSO Number: CSO 189

Project ID	Project Type	Project Description
L-OR-189-S-05	Individual Treatment	
L-OR-189-S-04	Individual Storage	
L-OR-104-M-08	Sub-Regional Storage +Treatment	

MSD


Ohio River West
CSOs 104, 105, and 189
Legend
Combined Sewer Overflow Locations
1 inch equals 500 feet
N
Shawnee Park
CSO189
CSO104
CSO105
Chickasaw Park
CSO016
CSO210
CSO211
264
CSO191
CSO015
Ohio River West
Landuse by Type
Residential 55%
Vacant 11%
Parks 2%
Industrial 16%
Commercial 9%
Other 7%
LOUIC
MSD

Q&As

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Review CSO Information

What is the CSO Number that you want to review?

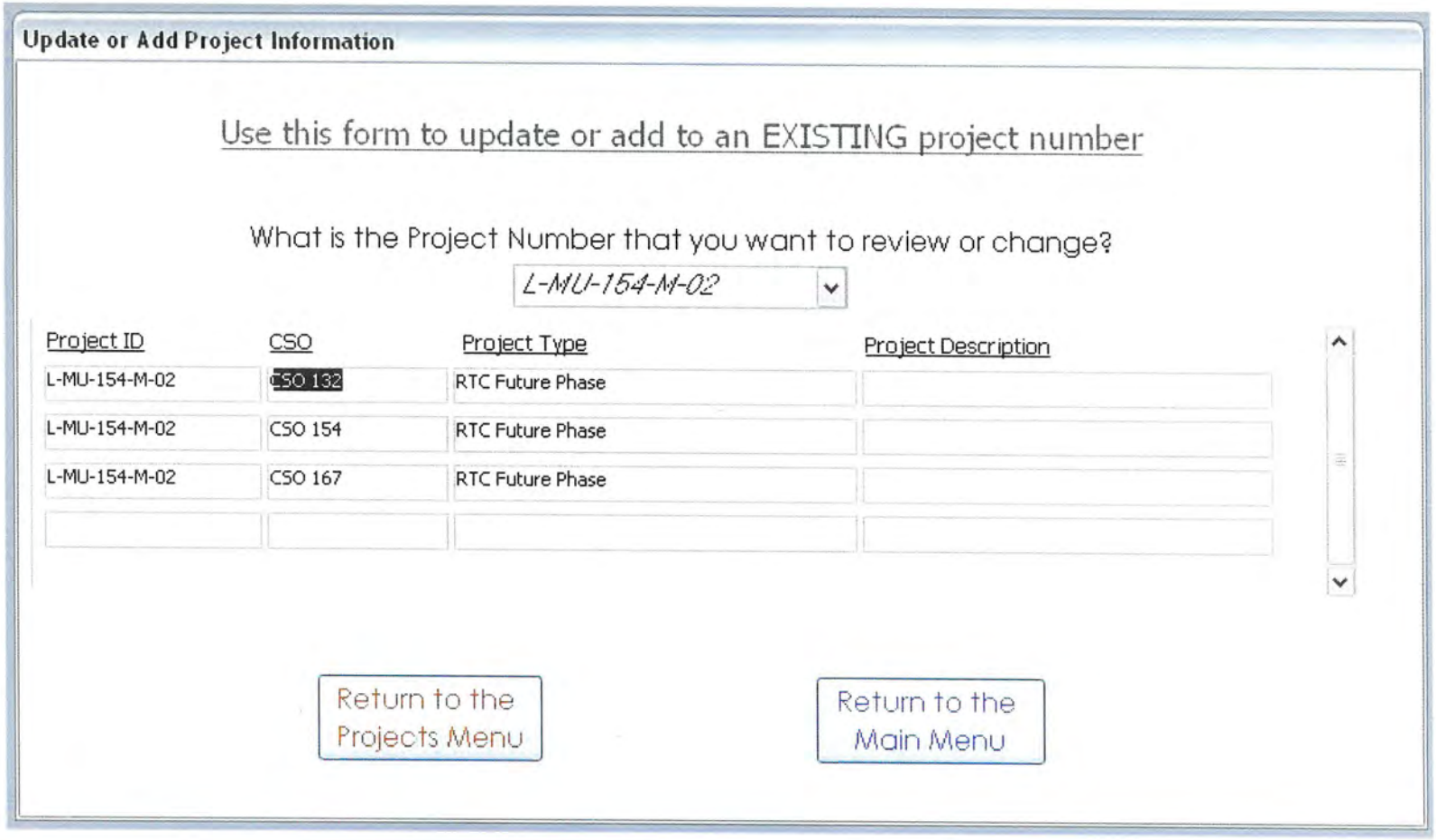
CSO019

CSO Number	CSO019	CSO Location	OHIO RIVER NORTH
CSO Name	34th STREET PS	Receiving Stream	OR

S_F Device		# of Overflow Incidents Per Year	49
% Impervious	46.01%	# of Overflow Incidents Per Year	5.02
% Tree Cover	0.00%	AVG Volume per Incident (1000G/Incident)	1940
2003 AAOV (MG/Yr)	95.45	Drainage Area (Acres)	1,192.4
Residential Landuse	55.5%	Population	8,976
Commercial Landuse	12.3%		
Industrial Landuse	10.9%	Comments	
Parks	5.4%		
Vacant Parcels	15.9%		

Generate Report for Printing | Return to the CSO Menu | Return to the Reports Menu | Return to the Main Menu

MSD


Update or Add Project Information
Use this form to update or add to an EXISTING project number
What is the Project Number that you want to review or change?
L-MU-154-M-02
Project ID
CSO
Project Type
Project Description
L-MU-154-M-02
CSO 132
RTC Future Phase
L-MU-154-M-02
CSO 154
RTC Future Phase
L-MU-154-M-02
CSO 167
RTC Future Phase
Return to the Projects Menu
Return to the Main Menu

Individual Project Form

MSD

For Project ID: **L-OR-027-M-08**

CSO	Project Type	Project Description
CSO 026	Sub-Regional Storage +Treatment	
CSO 027	Sub-Regional Storage +Treatment	
CSO 028	Sub-Regional Storage +Treatment	
CSO 029	Sub-Regional Storage +Treatment	
CSO 030	Sub-Regional Storage +Treatment	
CSO 031	Sub-Regional Storage +Treatment	

Post-Construction Compliance Monitoring

Wet Weather Team
Stakeholder Group Meeting No. 11
August 2, 2007

Louisville & Jefferson County
Metropolitan Sewer District

Presentation Outline

- Preliminary Discussion of Compliance Monitoring Framework
- Regulatory Guidance and Requirements
- Opportunities for Enhanced System Performance
- Compliance Monitoring Components
  - Construction projects
  - Water Quality Improvements
  - Green Infrastructure Effectiveness
  - Behavior Change Effectiveness
    - Sustainability of changes
    - Effectiveness of changes

Final Compliance Monitoring Program Shaped by the Wet Weather Plan

- Monitoring sites may be adjusted to better measure performance
- Frequency of monitoring and monitored parameters will be reviewed
  - Regulatory requirements and guidance
  - Stakeholder values
- Specific quality assurance measures will guard against historical data quality issues (drift due to probe fouling, etc.)
- Measurement of behavior modification effectiveness will involve specialists engaged as part of the education activities

Intent of Post-Construction Compliance Monitoring

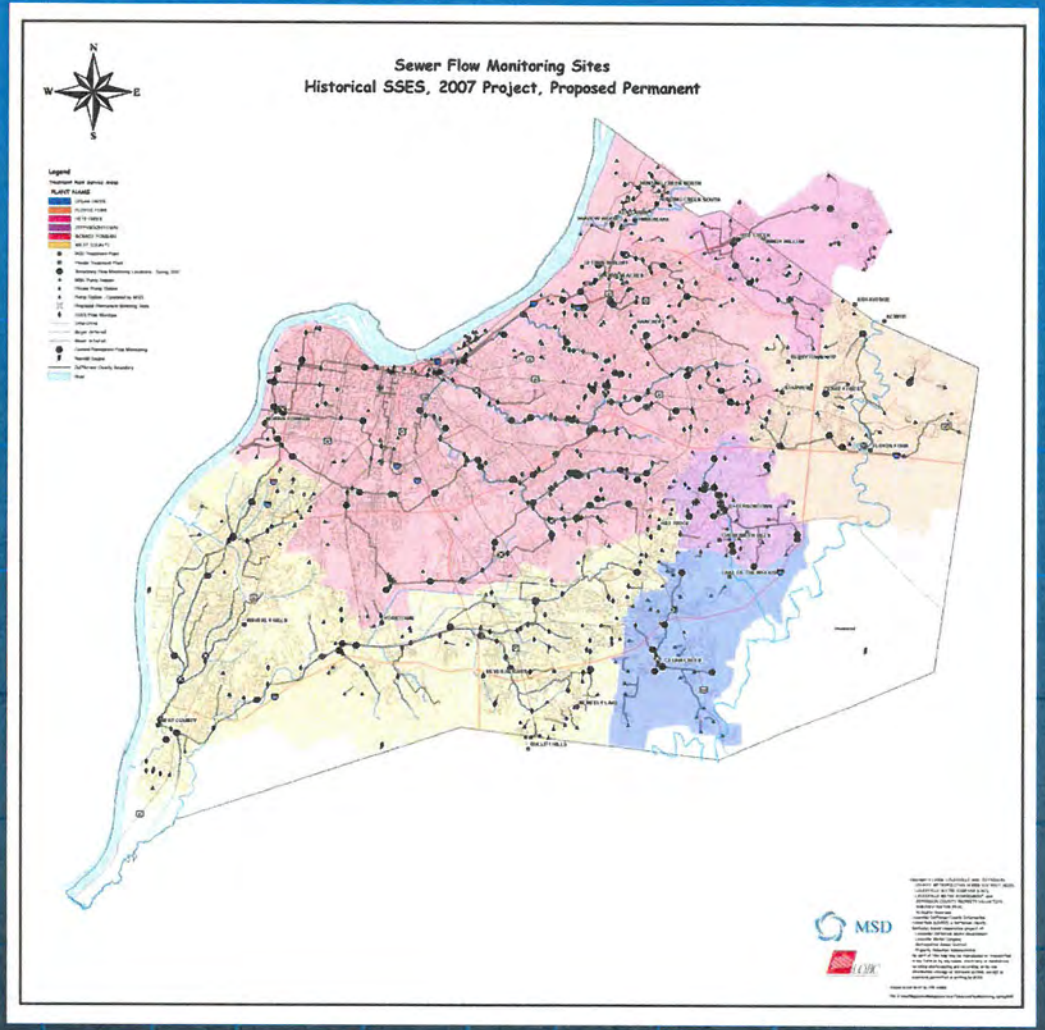
- Principles outlined in CSO Policy
  - Verify compliance with Water Quality Standards, protection of beneficial uses, and effectiveness of CSO controls
  - Evaluate if additional controls are required to achieve objectives
- LTCP Guidance Manual provides suggested approaches
- Consent Decree requires documentation of compliance with all components of the Wet Weather Plan, including CMOM and SSDP

Long-term Monitoring Offers MSD Opportunities for Plan Enhancement

- Confirm the effectiveness of MSD-owned and operated green infrastructure
- Document the extent of inter-agency cooperative projects and resulting water quality benefits
- Measure the extent, effectiveness, and sustainability of incentives, outreach, education, advertising, etc. on behavior changes that improve water quality
- Early successes can allow modifications in program direction in later years
  - "Adaptive management" is encouraged
  - Periodic re-evaluation is required (KPDES permit cycle is 5 years)
  - Proof of non-traditional approaches can eliminate or redirect projects of marginal value

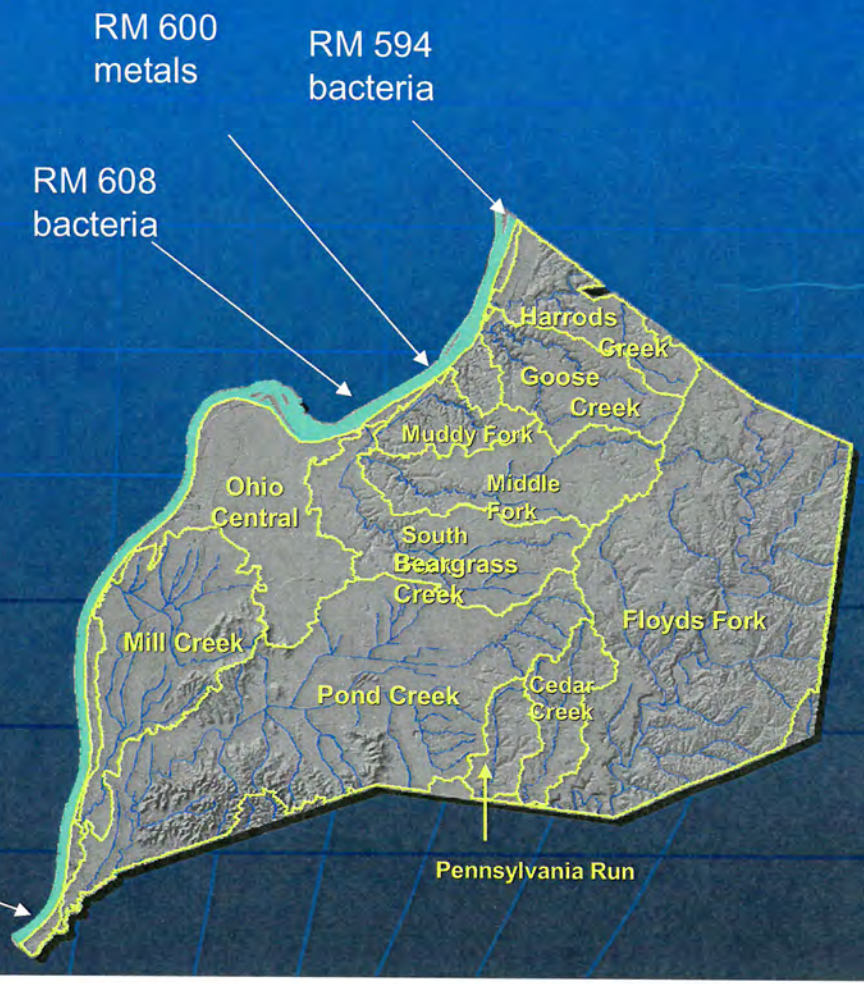
Multi-Faceted Compliance Monitoring Approach Maximizes Value to MSD

- Construction Project Monitoring
  - Schedule Milestones
  - Performance Testing
  - Project Effectiveness
    - Flow monitoring
    - Discharge sampling
    - Event recording
- Project effectiveness tied back to "average year" or target recurrence intervals
- Project monitoring short-term, only to demonstrate individual project performance



Water Quality Improvements Are Key Measures of Long-Term Effectiveness

- ORSANCO sampling represents long-term data base of Ohio River Conditions
  - Metals, nutrients & other specific chemicals bi-monthly
  - Bacteria 5/mo during contact recreation season
  - Fish populations annually
  - Fish tissue annually
  - Dioxon 3x annually
  - Future parameters and frequency to be discussed with ORSANCO as monitoring plan developed
- River flows available from USGS

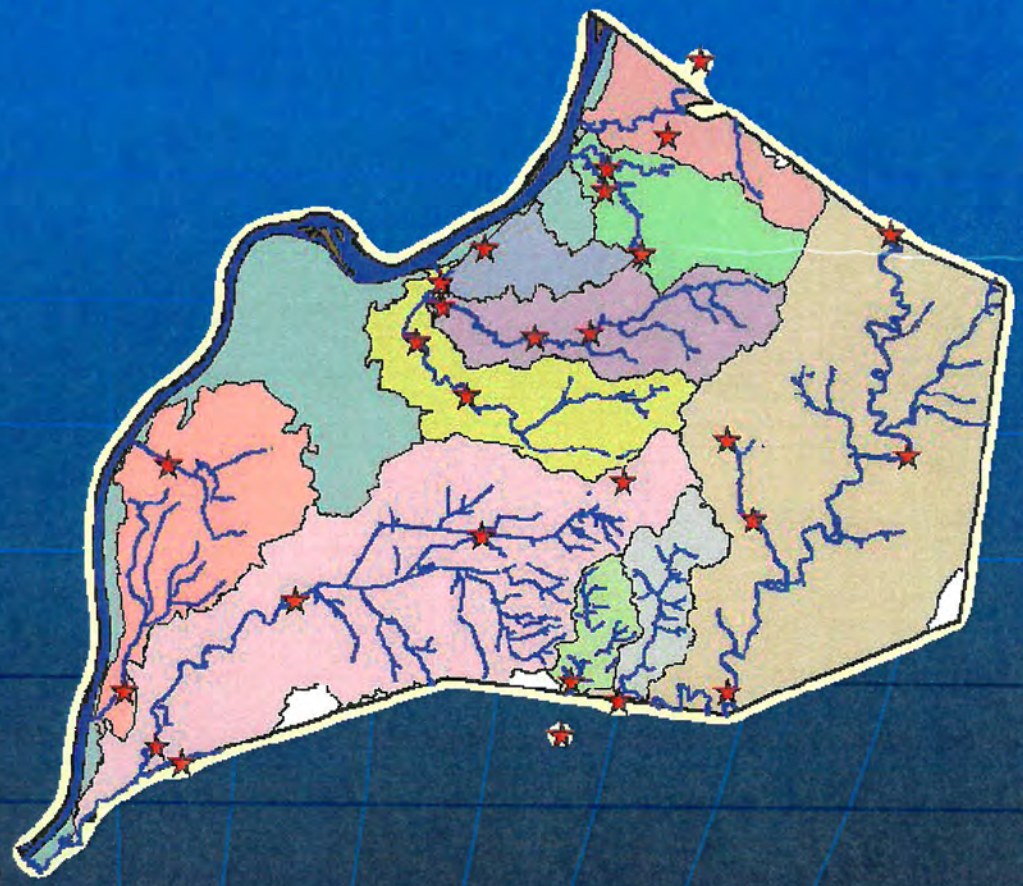


MSD's Water Quality Monitoring Program Provides Continuous Measurement of Key Parameters

- Long Term Monitoring Network (LTMN)
- 28 Sites in and around Jefferson County
- Permanently installed monitors (sondes) measure DO, pH, temp, conductivity every 15 minutes year round
- Permanently installed USGS stream flow gauges
- Data available live on USGS web site

Regular Sampling Provides Baseline Conditions for Bacterial and Chemical Pollutants

- 28 LTMN Sites
- Laboratory Data
  - Recreational Contact sampling: 5 Fecal Coliform samples per month May through October
  - Quarterly samples for conventional pollutants, nutrients, and metals
- Future sites and analyses reviewed during Wet Weather Plan development



Biological and Habitat Monitoring Address Key Stakeholder Value

- 28 LTMN Sites
- Biological Data
  - Fish surveys produce Index of Biotic Integrity (IBI)
  - Macroinvertebrate surveys produce similar Index of Biotic Integrity (IBI)
  - Habitat Assessment performed as part of the macroinvertebrate surveys
  - Algae surveys produce Diatom Bioassessment Index (DBI)
  - Improvement of data accessibility a current MSD initiative
- Site location and analyses subject to review during plan development

HABITAT ASSESSMENT FIELD DATA SHEET – HIGH GRADIENT STREAMS (FRONT)

STREAM NAME		LOCATION	
STATION #	RIVERMILE	COUNTY	STATE
LAT	LONG	RIVER BASIN	
CLIENT		PROJECT NO.	
INVESTIGATORS/CREW			
FORM COMPLETED BY	DATE____ TIME ____ AM PM	REASON FOR SURVEY	

	Habitat Parameter	Condition Category			
		Optimal	Suboptimal	Marginal	Poor
	1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient.	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	SCORE	20 19 18 17 16			
ch	2. Embeddedness	Gravel, cobble, and boulder particles are 0-			

Green Infrastructure Requires Tailored Monitoring Approach

- Approach will differ by scale
  - Regional
  - Watershed
  - Neighborhood
  - Parcel
- Approach will differ by type
  - Constructed facility (MSD owned or not)
  - Incentivized cooperation
  - Education, advertising, etc.
- Approach may require different skills and approaches
  - Horticulture
  - Marketing
- Monitoring must show effectiveness and sustainability to justify impact on later phases of Consent Decree implementation
- Monitoring will be integral to development of each Green Infrastructure project

Behavior Change Monitoring For Effectiveness and Sustainability

- Measures of activity will not justify future modifications to plan implementation – results relative to value protection is what really counts
- Effectiveness measures may be derived from advertising industry
  - How many people did we reach?
  - How many people remember the message?
  - How many people changed their behavior?
  - What measurable benefits can we attribute to this behavior change?
- Effectiveness measures may be highly specific (number of rain barrels in service) or more general (understanding of water quality issues, support for MSD's actions, etc.)
- Sustainability measures drive future education programs and support consideration of behavior change benefits in reducing future program construction of marginal projects

Stakeholder Input Desired

- What did we forget? What are the gaps in our monitoring concepts?
- What additional information would be useful to you in the future?
- Who are the local experts we should consult with, especially related to measuring effectiveness and sustainability of education and behavior-change efforts?

Discussion
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