WET WEATHER STAKEHOLDER TEAM

Agenda

Wet Weather Team
Stakeholder Group Agenda
May 25, 2016
5:30 p.m. – 8:00 p.m.

5:00 – 5:45	Dinner served
5:30 – 5:40	Welcome & Intro *Clay Kelly, Strand Associates*
5:40 – 6:40	Sustaining Vital Infrastructure - Funding Community Needs *Tony Parrott, MSD Executive Director*
6:40 – 7:30	Facility Plan Update - Risk Reduction Factor *Gary Swanson, CH2M*
7:30 – 7:40	Introduction of CIP Memo *Gary Swanson*
7:40 – 7:50	IOAP Update *John Loechle, MSD Engineering Director*
7:50 – 8:00	Observer Comments, Wrap-up and Adjourn *Clay*

Meeting Summary

Meeting Summary
Wet Weather Team Stakeholder Group Meeting
May 25, 2016
MSD Main Office, Louisville

The Wet Weather Team (WWT), chartered by the Louisville and Jefferson County Metropolitan Sewer District (MSD), met on May 25, 2016, at MSD's main office. The objectives of the meeting were to:

- Provide feedback on presentations prepared by MSD and the Facility Plan team to document needs within MSD's system and to present recommended spending projections to bring the community's wastewater, stormwater, and flood protection systems up to current design standards.
- Provide an update on the project prioritization approach being used by the Facility Plan team.
- Provide a Consent Decree Integrated Overflow Abatement Plan (IOAP) update.

Welcome

Clay Kelly of Strand Associates, opened the meeting by welcoming the members and reviewing the meeting objectives, agenda, and basic ground rules. Clay noted that this meeting will replace the June meeting.

Sustaining Vital Infrastructure

Clay introduced Tony Parrott, MSD Executive Director, to present an updated version of the "Sustaining Vital Infrastructure - Funding the Community Needs" presentation. The WWT Stakeholders saw a draft version of this at the March 22, 2016 meeting. Highlights of new information from Tony's presentation include:

- The Facility Plan team identified just over $1 billion in capital improvement projects over the next 5 years. These investments are spread across all of MSD's service areas (flood protection, wastewater and stormwater), with projects located across the entire geographic area.
- MSD staff have reviewed the Facility Plan critical project needs and formed their 5-year Capital Improvement Program (CIP) recommendations based on the greatest risks to the community. The plans defers approximately $100 million in projects to FY 2022 or later.
- Funding the recommended CIP will require increasing the average residential bill by about $9.82 per month. This equates to a 20% rate increase and would require Metro Council approval.
- Bonding capacity is limited and MSD is not able to borrow to fund the CIP.
- To be sensitive to the impact this will have on ratepayers, MSD staff has made recommendations to improve customer affordability, including a total of $2 million for low-income customer assistance, in-home water use audits to identify opportunities for customers to reduce consumption and lower monthly bills, and a "neighbor-to-neighbor" fund that customers may contribute to.
- MSD's Board unanimously approved the recommended CIP. Changes in rates of this size must be approved by Metro Council as an ordinance. The ordinance's first reading could be June 9, after which it would go to the Metro Council Budget and Finance Committee on June 15, and then finally would be voted on at the June 23 Council meeting. If approved, the rate would be adopted by MSD's Board on July 25 and the new rates would take effect August 1, 2016.

A stakeholder asked if there would be any increase in financial bonding capacity as the IOAP projects are built and completed. Tony responded that because the IOAP is funded completely by bonds whose debt service would live on longer than the construction of the projects, there will be no change in the financial capacity of MSD after the projects are built. Tony added that the proposed rate increase would allow MSD to increase its capital spending from 5 cents of every dollar of revenue to 15 cents. A portion of this rate increase will also go to offset the fact that per capita consumption of water is down, so even though customer counts are up significantly, the amount of water sold by LWC is lower than was sold in 1970. This requires higher unit costs to provide the increased revenue needed to provide service to the increased customer base.

A stakeholder wanted clarification on whether any IOAP requirements would not be met if the rate increase did not get approved. Tony said that all requirements and deadlines would most likely be met but that opportunities

to get a little more value out of projects would be eliminated. Also, the schedule would be much tighter as IOAP projects are pushed back to the latest possible time to spread out cash flow.

One stakeholder suggested adding information describing MSD's current costs (operations, debt, capital, e.g.) and how those would be impacted after the rate increase. Tony noted very little will change significantly except the debt service. Brian Bingham, MSD Chief of Operations, and Tony added that the Facility Plan recommendations do not include the costs to significantly update or replace the Morris Forman WQTC, which is MSD's largest single asset. The recommendations include about $30 million to keep it running while a separate facility plan is developed to determine the long-term future and options for the Morris Forman WQTC. The working plan is that a significant upgrade or replacement will be necessary when regulations change and that will be the trigger to move forward with that work.

A stakeholder asked whether there were actions individuals could take to lower their own bills. Tony answered that there are: in-home water audits to identify ways to lower consumption, and the use of green infrastructure to reduce the burden on the stormwater system.

One stakeholder asked whether there was any outreach to the business community planned. Tony said that there are meetings scheduled with Greater Louisville, Inc. and the Jefferson County League of Cities as well as other business groups.

Several stakeholders took the opportunity to applaud MSD for taking pro-active steps to protect our community, especially in the face of almost certain push-back. It was noted that no one in the room wanted a catastrophe to have to happen to bring attention these needs. Several also voiced their opinion that these actions should have been taken years ago but they are happy steps are being taken now.

An individual observed that the power-loss and subsequent flooding at Morris Forman was surprising and asked if there are redundancies in place now. Brian responded by saying that there were redundant systems in place but the power of the lightning strike was such that they disabled the backup systems as well. Ironically, MSD had two projects in the works at the time of the flooding that would have likely prevented the event had they been constructed already. Those improvements are now under construction.

A stakeholder noted that there are opportunities for the community to take actions that would shrink the size of rate increases. Installing stormwater controls, like green infrastructure, would reduce the need for such large pumps and pipes to carry it away.

Several stakeholders encouraged Tony to take his message to the community and individual residents. It presents a compelling case that is not coming through in the short time frames allotted this story in the media. Suggestions of other interest groups that could be contacted to support this were offered including construction contractors, home builders, developers, and business groups.

One stakeholder suggested highlighting the number of jobs created through implementation of the recommended improvements, instead of solely focusing on the cost of the recommendations.

A stakeholder praised Tony's presentation for highlighting flooding and stormwater control. Most infrastructure is hidden but people can relate to the idea of trying to prevent the next Great Flood.

Clay asked all the stakeholders to speak to the community about the Facility Plan, the rate increase, and what it means for our city. He reminded the stakeholders of their charge to not only represent the community to MSD but to also represent MSD to the community. If they have any questions or hesitation about supporting these efforts, he asked them to please contact him so MSD can better understand the community's perspective.

Tony offered his praise to the group as the best, most supportive, most engaged stakeholder group and the best prepared facility plan he's ever seen. He asked everyone to voice their support within the community and to please contact him or Clay with any questions.

Introduction of Capital Improvement Plan Memo

Gary Swanson of CH2M-Hill introduced this topic by reminding those stakeholders who were part of the IOAP development that near the end of the Plan's creation, they were asked to endorse the IOAP. Their support was based on what they had seen and learned in the stakeholder meetings and a memo that summarized the Plan. The MSD and the Facility Plan team are asking the Stakeholder group to provide this same sign of support for the Facility Plan. Gary provided a memo that is essentially the draft Executive Summary for the Facility Plan. He asked everyone to read it and to provide feedback to him and Clay.

MSD and IOAP Update

John Loechle, MSD Engineering Director, gave an update on the IOAP implementation progress. Overall progress is steady and on-schedule. Some project specific updates include:

- The "leave-behind" for the Logan Street Basin has not been determined yet. MSD is discussing it with the public and taking their input.
- Five proposals for the design-build construction team for the Southwestern Parkway Basin were received and MSD is in the process of evaluating them and conducting interviews.
- MSD is exploring the possibility of a tunnel that would be along River Road and possibly under the Ohio River as an alternative to the 13th and Rowan basin that would require interceptor construction along Main Street. John stressed this was a very preliminary evaluation.

20-Year Comprehensive Facility Plan – Risk Reduction Factor and Project Prioritization

Gary delivered a presentation on the integration of risk and other factors into the project prioritization process. Highlights of the presentation include:

- Stakeholders identified the values, the aspects that comprise those values, and the relative weighting of the values across service areas. This allowed the Facility Plan team to score projects based on their benefits.
- Dividing a project's benefits by its costs creates a benefit-cost score that could be used to prioritized projects. This approach can over simplify the process though. As shown by the example from the Ohio River Flood Protection service area, because of the cost to upgrade the largest flood pumping stations, some of the highest benefit projects filter towards the bottom of the list while smaller, lower-cost projects that do not protect as many people or properties tend to rise.
- Elected officials and the MSD Board directed that "risk" be a consideration in evaluating projects.
- To incorporate risk, the Facility Plan team scored the risk (defined by the probability of occurrence times the consequence of occurrence) before and after a project was completed and converted the difference into a Risk Reduction Factor (RRF) of 1 to 2.
- Using the Ohio River Flood Protection service area as an example again shows that sorting projects by RRF moves the larger pump stations to the top of the list. Using the benefit-cost ratio or the RRF is not sufficient enough to truly prioritize though. They can be used to help inform decisions, but the decisions are made by exercising judgement.
- As part of the evaluation of results during project prioritization, other factors were identified that need to be considered such as asset management, impact on neighborhoods/residents, project sequencing (i.e., some projects must be done before others can be constructed) and changing regulations.

- Across all factors, the Facility Plan team must apply its best professional judgement and adjust as necessary.
- To summarize, the Facility Plan team will use a variety of factors, both quantifiable and quantitative, to recommend the order that projects are implemented.

Clay ask the Stakeholders whether they understood this process, if they could endorse a plan that used this approach, and if they had any suggestions on how better to explain it in the document. There was general consensus that the group understood the process, would endorse it and that it was well presented. One stakeholder complimented the flow charts as useful for explaining the process as well and noted that the level of detail in this presentation is probably more than the general public needs or wants.

Another stakeholder asked for clarification on whether the process is the same for all service areas as the example used in the presentation. Gary confirmed that the same approach applied to all areas.

Observer Comments, Wrap-Up, and Adjourn

Clay reminded everyone to review Gary's memo in the next couple of weeks. He also shared that the September meeting will most likely be moved to August.

There were no comments from the observers.

Meeting Materials

- Agenda for the May 25, 2016 WWT Stakeholder Group Meeting
- Copy of the presentation slides

Meeting Summary
Wet Weather Team Stakeholder Group Meeting
May 25, 2016
MSD Main Office, Louisville

Meeting Participants

Wet Weather Team Stakeholders (Present)

Steve Barger, Labor (Retired)
Stuart Benson, Louisville Metro Council, District 20
Allan Dittmer, University of Louisville Provost Office
Billy Doelker, Key Homes
Mark French, University of Louisville Speed School of Engineering
Arnita Gadson, retired Executive Director, Kentucky Environmental Quality Commission
Tom Herman, retired from Zeon Chemicals
David James, Louisville Metro Council, District 6
Rick Johnstone, Deputy Mayor, Louisville Metro Mayor's Office (Retired)
Kurt Mason, District Conservationist, Jefferson County Soil Conservation District
Gina O'Brien, Brightside Executive Director
Rocky Pusateri, Elite Built Homes
Bruce Scott, Kentucky Waterways Alliance (retired)
Marty Storch, Louisville Metro Parks
David Tollerud, University of Louisville, School of Public Health and Information Sciences
David Wicks, Kentucky Conservation Committee, Jefferson County Public Schools Center for Environmental Education (retired)

Wet Weather Team Stakeholders (Not Present)

Susan Barto, Mayor of Lyndon
Maria Koetter, Louisville Metro Government, Director of Sustainability
Jim Mims, former Louisville Metro Planning & Design Services Department
Lisa Santos, Irish Hill Neighborhood Association
Tina Ward-Pugh, WaterStep, citizen representative, former Metro Council member

Wet Weather Team MSD Personnel (Present)

Tony Parrott, MSD Executive Director
Angela Akridge, MSD Chief Engineer
Brian Bingham, MSD Chief of Operations
John Loechle, MSD Engineering Director

Technical Support

Gary Swanson, CH2M-Hill
Clay Kelly, Strand Associates
Paul Maron, Strand Associates

Meeting Observers

Chuck Anderson, Strand Associates
Mike Harris, JTL
Stephanie Laughlin, MSD
Marvin Malone, MSD
Matt Newman, HDR
Alex Novak, MSD
Mark Sneve, Strand Associates

Handouts

Preliminary 20-year Capital Improvement Plan Recommendations

PREPARED FOR:	Louisville & Jefferson County MSD
COPY TO:	Stephanie Laughlin, John Loechle, & Julie Buckler
PREPARED BY:	Gary Swanson/CH2M
	Mark Sneve/Strand
	Matt Newman/HDR
	Chuck Anderson/Strand
	Mike Harris/JTL
	Paul Maron/Strand
DATE:	May 17, 2016
PROJECT NUMBER:	651427
REVISION NO.:	Final

This Technical Memorandum (TM) transmits the preliminary projection of the 20-year Comprehensive Facility Plan capital improvement program (CIP) recommendations. The entire CIP program consists of more than 700 unique projects. The complete preliminary CIP is included as Attachment A. The complete preliminary CIP is also contained in a spreadsheet that has been transmitted to MSD electronically for detailed review. This TM presents roll-up numbers for the purpose of communicating the overall magnitude and technical justification of the recommended program. Based on the preliminary Comprehensive Facility Plan, meeting the critical needs identified is estimated at $4.3 billion over the next two decades.

Executive Summary

From 1985 to 2003, the Louisville & Jefferson County Metropolitan Sewer District (MSD) spent close to $1 billion on improvements to the wastewater collection and treatment system to address high priority public health and safety issues. During this same period, a $134 million program for managing intermittent wet weather sewer overflows was also underway as a part of the larger $1 billion investment to study the system behavior and subsequently design and construct several important sewer overflow abatement facilities. However, the investment made to tackle sewer overflows was not deemed sufficient to meet water quality goals within timeframes established by federal and state regulators and in 2003 MSD received a notice of alleged Clean Water Act violations from the US Environmental Protection Agency (EPA) and the Kentucky Department for Environmental Protection (KDEP). This resulted in a negotiated settlement between these parties most commonly referred to as the Consent Decree. One of the requirements of the Consent Decree was for MSD to develop overflow abatement plans for CSOs, SSOs and unauthorized discharges. In response to this requirement MSD consolidated the required overflow abatement plans into the Integrated Overflow Abatement Plan (IOAP), a long-term plan to control combined sewer overflows (CSOs) and eliminate sanitary sewer overflows (SSOs) and other unauthorized discharges in MSD's sewer system. Submitted in December, 2008, and approved by EPA and KDEP in August, 2009, the plan identified $850 million in capital improvements, associated incremental operating costs, and a high level financial plan that included cash flow projections, projected borrowing schedules, and projected rate increases through the year 2024.

With the filing of the enforcement action, sewer overflows became the critical priority, and MSD shifted resources and investments agency-wide to tackle this massive federally-mandated undertaking. Spending in areas other than sewer overflow control was focused on the day-to-day operation and upkeep of wastewater, stormwater, and flood protection infrastructure. Major investments in infrastructure rehabilitation, renewal and replacement were limited as capital and operating spending ramped up to meet the Consent Decree requirements. This shift was especially significant given that portions of the stormwater and flood protection system were already in decline due to inadequate investment prior to MSD assuming responsibility for these facilities in 1987; and the funding source that had been established to address this lack of attention was insufficient to address all the improvement needs identified.

The result of this deferred investment over the past 10 to 15 years is that Louisville's aging system of pipes, pumps, treatment plants, and flood gates is now in urgent need of rehabilitation if they are to continue providing reliable protection of public health and safety for the community. While iconic landmarks and prominent structures garner more attention, Louisville is also home to a less visible system of facilities that serve a higher calling behind the scenes every day - facilities that keep Ohio River floodwaters at bay, that prevent harmful bacteria from entering homes and local waterways through sewer overflows, and that reduce the likelihood of disease outbreaks such as Zika virus spawned by poor drainage. When pipes fail and structures in the system collapse into sinkholes, and when inland flooding blocks roadways, access to emergency services and critical care is denied. A properly functioning sanitary sewer, stormwater, and drainage system is needed to support the community's economic engine, protect jobs and sustain the local tax base.

Neglecting this essential system is no longer an option - serious failures are imminent. The ability to successfully apply band-aid repairs rather than permanent fixes diminishes significantly with each passing day. Rainfall totals that once could be managed by the system now overwhelm it. This risk is heightened by the increased frequency of extreme storm events. The back-to-back storm events experienced in 2015 flooded homes left families without shelter. Cars were washed away, streets were impassable, schools and businesses shut down, and public safety was threatened in proportions not seen in decades. Citizens demanded that measures be taken to prevent similar occurrences from happening again.

Given the magnitude of the required spending to complete the Consent Decree IOAP, adding investment in existing facilities is a daunting task. To help identify appropriate levels of investment and priorities, MSD is developing a 20-year Comprehensive Facility Plan that consolidates MSD's planning for facility rehabilitation, renewal, replacement, upgrade, and expansion across all its service areas. Projects listed in the preliminary 20-year CIP were determined by the Facility Plan team to address critical needs requiring correction over the next 20 years to protect the health and safety of the community, to provide environmental protection, to effectively meet customer expectations for level of service, and to move closer to the goal of our local waterways achieving federal and state water quality standards. The Facility Plan will also consider the increased staffing needs to accommodate maintenance and operation of new facilities coming on-line under the IOAP and other critical infrastructure investments.

The Facility Plan is vital to ensuring Louisville continues to demonstrate compliance with the Consent Decree after the IOAP is completed. As stipulated in the federal order, MSD must report that CSOs are managed and SSOs and unauthorized discharges are eliminated to their specified level of control once

all projects under the IOAP are finalized. Demonstrating ongoing compliance with water quality standards by meeting this stringent threshold will require proper operation and maintenance of facilities into perpetuity. Without a commitment to the capital investment outlined in the Facility Plan, ratepayers will be at risk of having spent more than $900 million on improvements to the system that fail to satisfy federal regulations and court-ordered mandates.

Consistency of service for ratepayers across the entire Louisville community is also a key objective of the Facility Plan. The aim is to provide a consistent level of drainage and flood protection services for all customers within the MSD service area by the end of the 20-year planning period. Currently the most recently constructed areas in the community are designed to provide basic drainage and flood protection to a 4.5-inch rainstorm occurring in 24 hours (this is commonly referred to as the 10 percent probability storm or the 10-year storm). However, many of the older neighborhoods constructed prior to FEMA guidelines and MSD's acquisition and regulation of drainage in the service area begin to experience localized flooding and drainage problems in a 3-inch rainstorm occurring in 24 hours. This implication is that MSD's current level of protection is not consistent across all customers, even though all customers pay drainage fees based on "equivalent service units" (ESUs).

Based on the preliminary Comprehensive Facility Plan, meeting the critical needs identified is estimated at $4.3 billion over the next two decades. The reality is that the original Consent Decree resulted in large part from a similar pattern of deferred maintenance and investment in critical wastewater infrastructure. The community cannot risk burdening our children and grandchildren with future federal mandates because of an unwillingness to dedicate adequate resources to the challenges of today.

Purpose and Scope

The intent of this preliminary Plan is to facilitate discussion about overall financial needs for future facility rehabilitation, renewal, replacement, upgrade, and expansion. The projects listed in the preliminary 20-year CIP are those identified by the Facility Plan team as being needed over the next 20 years to protect the health and safety of the community, to provide environmental protection, to effectively meet customer expectations for level of service, and to achieve federal and state water quality standards. All projects have been assigned schedule dates and durations based on preliminary assessment of their relative priority and needs. Further refinement of the project schedules and documentation of the formal risk-based benefit/cost analysis will be prepared as part of completing the entire Facility Plan. The projects are not expected to change, but the order could be modified based on the final project prioritization evaluation.

In addition to serving as the basis for the capital project component, the project list will also identify new facilities that will need to be staffed for operation and maintenance. It is assumed that operation and maintenance staffing is adequate for the existing facilities, so staffing requirements will be presented as incremental needs for new facilities only. Note that current Operations and Maintenance (O&M) staffing levels are being validated under a separate contract.

Assumptions

The basis for project development and pricing includes a number of assumptions. While many of these assumptions are specific to the project service type, some of the assumptions are common to all projects and all service types. These common assumptions are as follows:

- Cost estimates for projects were developed using standardized cost estimating guides based on 2016 dollars.
- Project costs in the current CIP are assumed to have already been escalated to account for project timing, and are not adjusted further for inflation.
- New project costs developed by the Facility Plan team have been escalated at three percent compounded annually, which closely matches the long-term inflation rate reflected in both the Consumer Price Index and the Engineering New Record magazine's Construction Cost Index. It should be noted that both indices are strongly affected by regional, national, and global economic trends so the actual inflation at any given time may be different than a uniform three percent, but will be consistent over the entire 20-year period with the trends in price increases experienced over the past 60 years.
- For projects affected by national or state regulatory programs, no significant change in current regulations are anticipated in the first 10 years. Projected changes in the Municipal Separate Storm Sewer System (MS4) regulations are anticipated in the 10 – 15 year time frame. Changes in the Kentucky Pollution Discharge Elimination System (KPDES) program are anticipated in the 15 – 20 year time frame, with some preparatory work being started in advance of the new regulatory requirements.
- For drainage and flood protection services, the Facility Plan objective is to provide a consistent level of protection to all customer within the service area by the end of the planning period. Currently the most recently constructed areas have been designed to provide basic drainage and flood protection to a 4.5-inch rain in 24 hours (the 10% probability storm, also known as the 10-year storm). Many of the older areas of the service area begin to experience localized flooding and drainage problems in a 3-inch storm over 24 hours. This implies that MSD's current level of protection is not consistent across all customers, even though all customers pay drainage fees based on "equivalent service units" (ESUs). Bringing the entire service area to the same level of protection provides for consistency across MSD's drainage customer base, matching the way drainage fees are charged.
- For projects directly affected by precipitation events, the Facility Plan team has projected rainfall intensity, duration, and frequency (IDF) curves for the year 2035. This projection considers both statistical trends going back 60 years along with state-of-the art global circulation models that project future IDF conditions. This reflects the observed increased frequency of extreme storm events.
- MSD's current design criteria for facilities (based on published storm recurrence intervals) will apply to new facilities planned as appropriate, with revised IDF curves applied to the recurrence intervals in the criteria. For example, stormwater culverts under secondary roadways will continue to be designed to the 10 percent probability storm (commonly known as the 10-year storm), but the 24-hour rainfall value used in the calculations reflects precipitation projections for the end of the 20-year planning period (2035). The Facility Plan recommends that MSD's design standards be modified to incorporate the projected 2035 IDF curves in the requirements for new construction.

Preliminary 20-year CIP

Table 1 below presents a summary of the preliminary 20-year CIP, broken down by service area and major program. Note that the values in the body of the table represent 2016 dollars, while the values in the row "Total Escalated Costs" have been escalated at three percent per year compounded to the projected mid-point of construction.

Table 1 – Preliminary 20 Year CIP Summary

	Capital Cost*				Total
Service Area and Program	FY17-FY21	FY22-FY26	FY27-FY31	FY32-FY37	FY17-FY36
Wastewater	**$743.4-M**	**$282.0-M**	**$211.5-M**	**$225.6-M**	**$1462.4-M**
Consent Decree (IOAP)	$472.2-M	$12.0-M	$0.0-M	$0.0-M	$484.1-M
NMC	$86.1-M	$16.8-M	$15.5-M	$15.0-M	$133.4-M
CMOM	$169.2-M	$218.6-M	$136.8-M	$190.9-M	$715.4-M
Development	$16.0-M	$34.6-M	$59.2-M	$19.7-M	$129.5-M
Stormwater	**$260.7-M**	**$491.9-M**	**$465.6-M**	**$498.3-M**	**$1716.4-M**
Drainage	$132.4-M	$312.5-M	$312.0-M	$314.4-M	$1071.4-M
Floodplain Management	$20.1-M	$20.0-M	$20.0-M	$20.0-M	$80.1-M
Stormwater Quality (MS4)	$12.4-M	$15.3-M	$23.8-M	$33.8-M	$85.3-M
Ohio River Flood Protection	$95.8-M	$144.1-M	$109.7-M	$130.1-M	$479.7-M
Support Systems	**$51.9-M**	**$33.8-M**	**$32.9-M**	**$32.9-M**	**$151.4-M**
Capital Equipment	$23.1-M	$27.0-M	$27.0-M	$27.0-M	$104.1-M
Facilities	$24.2-M	$2.5-M	$2.5-M	$2.5-M	$31.7-M
IT	$3.1-M	$3.0-M	$2.1-M	$2.1-M	$10.3-M
LOJIC	$1.6-M	$1.3-M	$1.3-M	$1.3-M	$5.3-M
Total Escalated Costs	**$1087.6-M**	**$993.2-M**	**$1012.1-M**	**$1250.6-M**	**$4343.6-M**

*Table costs are in 2016 Dollars except for Total Escalated Costs which are escalated at 3% per year

Table 2 presents a summary of the first five years of the preliminary 20-year CIP, broken down by year, service area and major program. Note that the values in the body of the table represent 2016 dollars, while the values in the row "Total Escalated Costs" have been escalated at three percent per year compounded to the projected mid-point of construction.

Table 2 – Preliminary 5-Year CIP Summary

	Capital Costs*					Total
Service Area and Program	FY17	FY18	FY19	FY20	FY21	FY17-FY21
Wastewater	**$183.5-M**	**$236.3-M**	**$158.7-M**	**$79.3-M**	**$85.6-M**	**$743.4-M**
Consent Decree (IOAP)	$137.5-M	$191.2-M	$108.4-M	$21.7-M	$13.4-M	$472.2-M
NMC	$14.2-M	$10.4-M	$12.9-M	$15.3-M	$33.3-M	$86.1-M
CMOM	$28.3-M	$33.6-M	$33.3-M	$37.2-M	$36.8-M	$169.2-M
Development	$3.6-M	$1.1-M	$4.1-M	$5.1-M	$2.1-M	$16.0-M
Stormwater	**$26.5-M**	**$43.1-M**	**$58.6-M**	**$60.9-M**	**$71.7-M**	**$260.7-M**
Drainage	$7.0-M	$10.1-M	$24.1-M	$47.4-M	$43.8-M	$132.4-M
Floodplain Management	$4.1-M	$4.0-M	$4.0-M	$4.0-M	$4.0-M	$20.1-M
Stormwater Quality (MS4)	$1.4-M	$2.3-M	$1.3-M	$1.8-M	$5.7-M	$12.4-M
Ohio River Flood Protection	$14.0-M	$26.8-M	$29.3-M	$7.7-M	$18.1-M	$95.8-M
Support Systems	**$12.2-M**	**$11.2-M**	**$7.4-M**	**$12.2-M**	**$9.1-M**	**$51.9-M**
Capital Equipment	$4.0-M	$3.9-M	$3.9-M	$3.9-M	$7.4-M	$23.1-M
Facilities	$6.3-M	$6.2-M	$2.8-M	$7.5-M	$1.5-M	$24.2-M
IT	$1.6-M	$0.7-M	$0.3-M	$0.3-M	$0.3-M	$3.1-M
LOJIC	$0.4-M	$0.4-M	$0.4-M	$0.5-M	$0.0-M	$1.6-M
Total Escalated Costs	**$222.2-M**	**$291.3-M**	**$228.7-M**	**$161.7-M**	**$183.7-M**	**$1087.6-M**
*Table costs are in 2016 Dollars except for Total Escalated Costs which are escalated at 3% per year						

Significant Service Area Projects and Programs

The following sections will address each of the MSD service areas, along with support services, describing specific assumptions that drove project development.

Wastewater

Consent Decree (IOAP)

On August 12, 2005, MSD entered into a Consent Decree in Federal Court with the United States Environmental Protection Agency (EPA) and the Kentucky Environmental and Public Protection Cabinet (KDEP). The Consent Decree was developed in response to an enforcement action taken by EPA and KDEP alleging violations of the Clean Water Act (CWA) primarily related to sewer overflows. The stated objective of the Consent Decree is to further the objectives of the CWA; eliminate unauthorized discharges from MSD's separate sewer system (SSS), combined sewer system (CSS), and water quality treatment centers (WQTCs); and to address discharges from MSD's combined sewer overflow (CSO) locations identified in the Kentucky Pollutant Discharge Elimination System (KPDES) permit for the Morris Forman WQTC. The Consent Decree outlines the compliance program and schedules for achieving specific objectives, including the development of discharge abatement plans.

On December 1, 2008, a draft Amended Consent Decree (ACD) was released for public comment. The draft ACD addressed alleged violations of the CWA primarily related to WQTC performance, record-keeping, and reporting. The public comment period closed on the draft ACD December 31, 2008. The ACD was entered into Federal Court on April 15, 2009. For the purposes of the 20-year Comprehensive Facility Plan, the term "Consent Decree" will be understood to mean the ACD as it was entered into Federal Court on April, 15, 2009.

The IOAP is a major part of MSD's response to the Consent Decree. The IOAP is a long-term plan to control CSOs and eliminate sanitary sewer overflows (SSOs) and other unauthorized discharges from MSD's sewerage system. The IOAP is expected to improve water quality in both Beargrass Creek and the Ohio River through and below Jefferson County. The expected water quality benefits of the IOAP include: (a) reductions in the peak levels of bacteria in the Ohio River and Beargrass Creek; and (b) a reduction in the amount of time that average bacteria levels to exceed water quality standards. In addition the IOAP program will enhance public health and safety by reducing the potential for the public to come in contact with untreated sewer overflows, whether in the basements of their homes or in the streets and ground surfaces where sewer overflows currently discharge.

CSO Benefits

The suite of projects selected for the Final CSO Long-Term Control Plan (LTCP) will result in approximately 98 percent capture and treatment of wet weather combined sewage during an average year. This benefit represents an 89 percent reduction in CSO volume compared to conditions in 2008. As a point of reference, the presumptive approach for compliance with water quality standards in EPA's CSO Control Policy is based on a minimum of 85 percent capture and treatment of wet weather combined sewage.

SSO Benefits

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

Sustainable Performance

MSD's IOAP is based on a "demonstration approach" to achieving compliance with the Consent Decree and the Clean Water Act requirements. While MSD is required to certify compliance with the CSO management requirements after completing the full suite of CSO projects in 2020, MSD's CSO management performance will continue to be monitored through the Morris Forman WQTC KPDES permit to performance standards consistent with the commitments of the IOAP. Similarly, the SSO elimination projects are required to be completed by the end of 2024. MSD's certification that the performance objectives have been met will mean that MSD's obligations under the Consent Decree have been discharged, but the requirements for continued operation of the system to avoid further SSOs will continue through the KPDES permits for the WQTCs that govern operation of all the facilities. It is important to note that the Consent Decree requirements do not go away with the completion of the IOAP projects – the enforcement mechanism changes from the Consent Decree to the KPDES permits.

IOAP Impacts on the preliminary CIP

Over the first five to nine years of the planning period, the wastewater service area CIP is dominated by completing the major projects of the IOAP. The major CSO storage basins are all scheduled to be

completed by the end of FY 21, with the remainder of the SSO elimination projects scheduled to be completed by the end of FY 25. Completing the entire suite of CSO and SSO projects in accordance with the IOAP schedule is required by the Consent Decree. Any failure to complete a project on schedule could be considered a violation of the Consent Decree with consequences including stipulated penalties that could total over a million dollars for a one-year delay in completion.

The next section of the TM addresses the balance of the CIP. These projects address needs in wastewater, stormwater, and flood protection infrastructure that have been deferred for the past 10 to 15 years as spending ramped up to meet the Consent Decree requirements.

Nine Minimum Controls (NMC)

The NMC program was initially developed as part of the Clean Water Act CSO Policy to address combined sewer system best management practices that do not require significant construction. With the completion of the CSO portion of the IOAP in FY 2021, the reporting requirements for the NMC program are reduced. However in a continued focus on protection of public health and safety, the majority of the best practices required by the NMCs are integrated into MSD's long-term approach to managing CSOs in order to ensure protection of public health, safety and the environment. Maximizing storage in the conveyance system, maintaining WQTC capacity, and ensuring effective public notification of sewer overflows are examples of the best management practices that will remain in place in perpetuity as conditions of the Morris Forman WQTC KPDES permit.

The preliminary 20-year CIP recommendation includes funding for the formal NMC Program that is reported quarterly as part of the Consent Decree requirements. This program reporting is assumed to phase out following FY 21. Capital projects that help sustain the intent of the NMC requirements are included in the preliminary CIP through the end of the planning period.

The most significant long-term NMC activities are the Real Time Control (RTC) system in the combined sewer collection system and the Morris Forman WQTC improvements, which are also a major component of the IOAP. The preliminary 20-year CIP recommendation provides annual funding for ongoing RTC rehabilitation and renewal to ensure proper operation of the RTC system which is necessary for long-term sustained compliance with the Clean Water Act CSO Policy, CSO Long-Term Control Plan, and NMC requirements.

Sustaining reliable treatment capability and capacity at the Morris Forman WQTC is critical to ensure proper wastewater treatment for Ohio River water quality protection. This is a significant endeavor that has been underfunded since the most recent overall plant rehabilitation was completed in the early 2000's. A detailed condition assessment has been prepared for the Morris Forman WQTC liquid process treatment facilities. Periodic equipment replacements and major plant renovations are scheduled in five year intervals for the purpose of financial planning. Overall, the preliminary 20-year CIP recommendations include approximately $35 million in rehabilitation and renewal projects over the first five years of the planning period, and over $85 million (escalated for inflation) in scheduled renewal projects over the subsequent 15 years. In order to protect public health, these rehabilitation and renewal projects are essential to maintaining reliable operation of the largest WQTC in MSD's system and in the state of Kentucky. Unfortunately the 2014 failure of the Morris Forman WQTC high-yard electrical distribution center provided a catastrophic view of the consequences of deferring facility renewal and replacement. As power was lost to the main electrical system for the treatment plant, inadequate backup power resulted in flooding and extensive damage to the plant. Wastewater was discharged that had not been treated to the State of Kentucky's KPDES discharge standards creating a

potential public health risk to the community. Ironically, the backup power supply for the plant had been deferred and therefore was not in place to avoid the costly damage to the plant.

The Facility Plan assumes there will be no major changes in the Morris Forman WQTC discharge requirements during the planning period, and therefore the existing plant will continue to operate as is for the duration of the planning period, except for initial construction of facilities required for nutrient removal late in the planning period as noted below.

For many years MSD has produced a high quality soil conditioner called Louisville Green from the biosolids generated by the treatment plant. The condition of the Louisville Green production equipment (primarily the biosolids dryers and pellet processing equipment) is rapidly degrading due to the severe duty conditions experienced in processing the highly-abrasive dried biosolids product. MSD has, in the past, been able to sell all of the Louisville Green it could produce, thereby offsetting operating costs for the system. The current degraded condition of the equipment requires MSD to landfill dewatered biosolids when the capacity of the drying system is overwhelmed. MSD, under a separate initiative, is investigating short-term biosolids management solutions that may include increasing the amount of dewatered biosolids disposed of by landfill (by negotiating better prices in return for the commitment of guaranteed minimum amounts of dewatered biosolids being sent to the landfill), turning over management of the dewatered biosolids to a third-party vendor, and/or replacing the drying system with an alternate technology approach. The preliminary 20-year CIP recommendation includes short-term band-aid fixes for the dryer system, and expansion of the dewatered cake handling system to allow increased landfilling as continued operation of the dryers becomes impractical. Other approaches to biosolids handling that are currently under consideration for a short-term solution may include design and construction of a handler by a third-party vendor, similar to how the high-purity oxygen generation system is currently being procured. If this procurement model is followed, MSD will not directly incur capital cost, and the project will have more impact on the annual operating budget than the CIP.

A 50-year look at continued operations of the Morris Forman WQTC at the current site has concluded that major changes in discharge standards (addition of nutrient or micro-constituent removal) will likely require changes to both the liquid treatment and biosolids handling approaches. Given the severe constraints of the existing site, it will be necessary to locate new facilities on property not part of the current Morris Forman WQTC site. The long-term plan is being developed, and a phasing roadmap for systematic facilities expansion will be included. It is assumed that some level of nutrient removal may be required toward the end of the 20-year planning period. The preliminary 20-year CIP recommendation includes funds for land purchase and the start of facility construction to address nutrient removal during years 15 to 20 of the planning period. Treatment for micro-constituents is not envisioned in the preliminary 20-year CIP, but will represent a significant capital expense when required by new regulations.

Capacity, Management, Operations and Maintenance (CMOM)

The next largest program within the wastewater service area is the Capacity, Management, Operations and Maintenance (CMOM) program. This includes managing the MSD wastewater assets outside the combined sewer service area. EPA Region 4 developed the initial program that became CMOM, and MSD's Consent Decree specifically requires the development and implementation of a CMOM program. The intent of the CMOM program is to ensure that best management practices are implemented across all aspects of the utility, thereby increasing the ability of the utility to meet its obligations under the

Clean Water Act. CMOM activities represent best management practices for wastewater utilities and will be sustained for the entire 20-year planning period.

Major components of the CMOM program include projects for major renewal and replacement projects at the Hite Creek, Floyds Fork, Cedar Creek, and Derek R. Guthrie WQTCs. These renewal and replacement projects are scheduled at 5-year intervals for each of the centers to ensure that MSD can maintain efficient and effective wastewater treatment, a critical aspect of public health protection. The budget established for each center is the result of an asset inventory and condition assessment of each WQTC. The actual scope of each project will be established during detailed design.

The CMOM program provides proactive asset management of the pipes and pump stations that make up most of MSD's collection system. Clear water intrusion of surface and ground water during rain events overloads the conveyance and treatment systems. This clear water intrusion, referred to as infiltration and inflow (I/I), is one of the main causes of sewer overflows. Budgets are established to provide inventory of critical parts for pump stations, rehabilitate and replace sewers that are leaking or in danger of structural failure, and provide stand-by generators in more locations to improve reliability during power outages. Studies show that approximately 50 percent of the I/I entering MSD's sewer system during a rain event comes from private property sources outside of MSD's direct control. To achieve and sustain the required overflow abatement levels, a substantial portion of this I/I must be removed from the system. A project with "seed money" to initiate a private property Infiltration/Inflow reduction program is also included in the CMOM budget. The private property I/I program is expected to become self-sustaining through new fees after initial start-up.

A significant addition to the CMOM program is the expansion of the sewer rehabilitation and replacement activities to encompass major interceptors. In the past MSD deferred major rehab of these major interceptors due to the cost and difficulty in completing construction on these pipes. An increasing frequency of major interceptor failures indicates a critical need to proactively inspect and rehabilitate or replace these high-risk very old assets. When a major interceptor fails, a ripple effect is created across a much broader area due to road closures, traffic impacts, and other factors that directly impact the community. Since major interceptor rehabilitation projects have not been specifically identified at this time, an allowance has been created to begin the process of inspection, project development and early-action remediation of high-risk defects over the next five years. By the end of five years, the allowance is increased to $10 million per year, totally focused on major interceptor rehabilitation and replacement. At this sustained funding level, MSD will be able to renew these critical assets on a prioritized basis. Preemptive rehabilitation is much less expensive than making emergency repairs such as those MSD had to complete in response to a collapsed section of the Broadway Interceptor in 2015. This one repair interrupted businesses, severely impacted traffic flow on a main arterial roadway, and impeded access to nearby hospitals and community support organizations such as United Way.

Development

The preliminary 20-year CIP budget also includes capacity expansions for the Hite Creek, Floyds Fork, and Cedar Creek WQTCs. The timing of these expansion projects has been based on population projections for each service area. Ensuring that capacity is available in advance of development supports growth and development for the community by avoiding moratoriums due to the rated capacity of the WQTCs being exceeded. This expansion is in accordance with KDEP regulations. The Derek R. Guthrie and Morris Forman WQTCs are not anticipated to need a growth-related capacity

expansion within the 20-year planning period; however, they will require investment to continue operating properly.

In addition to WQTC capacity, the preliminary 20-year CIP program also addresses conveyance system capacity needs. Projects are included to address areas anticipated to have significant growth in the Floyds Fork and Cedar Creek service areas due in part to the development of the Parklands of Floyds Fork. Growth is also provided for in the Hite Creek and Derek R. Guthrie service areas. The Morris Forman WQTC service area is essentially built-out meaning growth will result from customers coming online through infill of existing developed areas. In addition to expansion of the sewer system, capacity issues with pump stations have also been identified and addressed. Several pump stations have been identified that do not have adequate capacity to meet projected peak flows due to future growth. To avoid the creation of new SSOs, these pump stations must be expanded in advance of the upstream collection system expansions that will bring them additional flow. The intent is to provide the needed reliable capacity in both the gravity and pumped portions of the collection system so that building moratoriums can be avoided.

Regulations

The CIP budget also includes future projects in anticipation of regulatory changes. Increased levels of treatment for nutrients (nitrogen and phosphorous) could be imposed prior to the end of the planning period which would seriously impact MSD's WQTCs. Projects to begin addressing nutrient removal requirements at all the WQTCs are included in the latter years of the planning period. Note that the timing of nutrient removal regulations will govern when these projects are actually implemented.

The removal of micro-constituents has also been identified as a potential future regulatory requirement. While the imposition of standards requiring removal of micro-constituents is not anticipated with the 20-year planning window, preliminary concepts have been developed and placeholder budgets established to address this potential future need. These placeholder budgets are not in the recommended 20-year CIP. Note that the timing of micro-constituent removal regulations will govern when these projects are actually implemented.

Stormwater Management

Stormwater management is a vital component of MSD's system as it directly impacts the health and safety of all Louisville residents. The 20-year CIP includes a number of programs related to drainage and internal floodplain management. MSD took over stormwater management and Ohio River flood protection for most of Jefferson County in 1987. In 1988 MSD completed a Stormwater Drainage Master Plan that addressed the backlog of known drainage and flooding problems and planned for improvements in overall drainage and flood protection for the service area. MSD implemented the recommendations of the Stormwater Master Drainage Plan on a prioritized basis, within the budget limitations imposed by revenue generated through drainage fees.

Drainage

Project DRI

Drainage problems create health and safety impacts for citizens directly at their homes, schools, businesses, and transportation routes. Beginning in 2003, MSD initiated an aggressive program to address a wide variety of drainage issues that were pointed out by customers. This program, dubbed

Project DRI (Drainage Response Initiative), assigned experienced project managers, contractors, and inspectors to address drainage problems on a "grade-to-drain" basis. Efforts under this program address problems ranging from structural flooding to alleviating minor standing water problems. Since 2003 most of the funds available through drainage fees have been allocated to Project DRI, with more than $125 million in capital drainage improvements completed through this program. While MSD originally thought that Project DRI would be phased out as the backlog of customer drainage issues were resolved, customer drainage requests continue to be among the most common communication received by MSD's Customer Relations Department. This is likely due to drainage impacts of land use changes, the increased frequency of extreme storm events, and the degradation of drainage facilities due to aging. MSD's experience has proven that having the ability to respond quickly to individual property owner's drainage concerns is a vital part of providing quality service and building customer satisfaction. This has proven to be a very valuable program for MSD's customers, and the preliminary 20-year CIP includes an annual allocation of $2.8 to $5 million per year to sustain Project DRI.

Stormwater Master Plan

Given the public concern over the effects of the increased frequency of extreme storm events, the small scale drainage solutions offered by Project DRI are not sufficient to address issues of drainage and flood protection on a county-wide or watershed basis. To increase the public health and safety protection for citizens across the entire service area by improving the drainage and flood level of protection, a significant increase in spending for drainage and flood protection is required. This will also provide a consistent level of protection for the entire service area.

In reviewing stormwater planning documentation it became obvious that the only county-wide stormwater planning done in the past 30 years has related to internal (i.e. not related to the Ohio River) floodplain management. MSD has completed studies in several watersheds to update the definition of the FEMA and Local Regulatory Floodplains. These studies rely on outdated rainfall IDF information, and do not reflect conditions projected for 2035. Since the conditions projected for 2035 are not based on observed data, the updated floodplain information should not be used for regulatory purposes, but can be used to inform potential property owners of the risks associated with future extreme storm events. This is a significant benefit to the community.

While MSD requires plans for new development to document no adverse impacts on downstream flooding, the cumulative effects of land use changes within the existing developed areas have not been subject to the same level of scrutiny. The hydrologic and hydraulic models used for drainage planning have not been updated to reflect land use changes that have occurred since the late 1990s, and are not available in a county-wide integrated data base to allow identification of potential downstream impacts of new projects.

A comprehensive, county-wide stormwater master plan is recommended to be initiated as one of the first recommendations from the stormwater portion of the Facility Plan. This plan will address floodplain management definition and non-floodplain related drainage problems in an integrated approach to deal with this highly visible MSD service. It protects downstream homes and businesses from flooding caused by the impacts of upstream development.

Early Action Projects

While the stormwater master plan is being developed it is obvious that MSD's customers expect immediate action to begin addressing stormwater issues. MSD and the Facility Plan team have

identified 10 areas across the county with a history of drainage problems not directly related to floodplain management issues. Project concepts have been developed to protect these 10 areas to the MSD design standards for new development, using storms projected for 2035 conditions.

Viaduct Flooding

MSD is responsible for 34 viaducts that are subject to flooding during storm events. Some viaducts become completely impassable in relatively minor storms. Viaduct flooding disrupts transportation routes, and has the potential for serious safety concerns if flooded roads are not barricaded in a timely manner, or drivers ignore the barricades and drive under the viaducts anyway. There are many instances of this happening in Louisville every year. Fortunately there have not been any deaths due to this in Louisville, as far as the Facility Plan team could determine. Recent serious flooding events in Houston, Texas did result in five deaths when cars were washed off the road due to flooded roads and viaducts. The Facility Plan team has identified conceptual solutions for each of the viaducts for which MSD is responsible. The projects were prioritized based on the team's understanding of traffic load and perceived risk to public health and safety. The project schedule will be further refined as part of review and revision of the preliminary 20-year CIP in response to MSD's comments. The preliminary CIP includes funding to address all 34 of the viaducts over the next 20 years.

Stormwater Master Plan Implementation

Allowances have been established in the preliminary 20-year CIP to provide for implementation of the Stormwater Master Plan. The budgeted amounts were identified through extrapolation of the Early Action Plan projects described previously to the entire county. The intent is to provide the entire county with updated and expanded stormwater management facilities to consistently meet the intent of MSD drainage design criteria for new development, using stormwater IDF targets projected for the end of the planning period. The funding required to do this is anticipated to exceed $600 million over the 20-year planning period, so the Facility Plan team deemed it critical to establish reasonable placeholder numbers in the long-range financial plan to be developed as part of the Facility Plan. This level of funding would allow MSD to provide a uniform level of stormwater drainage protection to the entire service area over the next 20 years.

Stormwater Quality (MS4) Green Infrastructure

MSD's green infrastructure incentive program has been recognized as one of the country's most cost-effective approaches to sustainable water quality and drainage solutions. Green infrastructure offers community benefits that extend beyond stormwater management. Beautification, enhanced green space, reduced stormwater runoff, reduced heat island effects, and other both aesthetic and functional benefits are derived. This program is a shared responsibility of the IOAP program and the MS4 program. Funding for green infrastructure under the IOAP is scheduled to phase out in FY 2021. Green infrastructure initiatives under the MS4 program are anticipated to continue throughout the planning period.

The Facility Plan identified a number of large stormwater retention basins with the potential for conversion of all or part of the basin to provide infiltration of stormwater. These projects are identified to be completed within the first five years of the CIP, providing very cost-effective green infrastructure solutions on a large scale.

Floodplain Management - Flood Response Fund

Following a number of extreme storm events in 2015, Mayor Greg Fisher formed a multi-agency Flood Mitigation Workgroup to address impacted residents who were unable, for a variety of reasons, to get back in their homes after the flood waters receded. The Flood Mitigation Workgroup recommended a number of mitigation approaches including establishment of a "quick-buy" program to allow property owners to be bought out of flood impacted property in a much shorter time than would typically be possible. The MSD Board approved allocation of $1 million from the FY 16 budget to fund this program. The Flood Mitigation Workgroup recommended an annual fund be established to provide timely relief to property owners impacted by future extreme storm events.

The Flood Response Fund proved to be a vital part of the community's recovery after the 2015 floods. The preliminary 20-year CIP includes an annual allocation of $4 million per year to the Flood Response Fund for various flood mitigation and response activities including continuing the quick-buy program where appropriate, implementing small-scale flood protection projects, and applying for, administering, and providing local-share funding for FEMA and other flood relief grant programs.

Ohio River Flood Protection

MSD took over responsibility for the Ohio River flood protection system in 1988, at the same time the stormwater drainage system became part of MSD's responsibilities.

The Ohio River flood protection system is critical to protecting Louisville and Jefferson County from the type of devastating flooding experienced in New Orleans following Hurricane Katrina, and all along the Mississippi River when flood levee and pump station systems failed during the extreme high water conditions experienced in the past decade. Louisville's Ohio River flood protection system was evaluated in a Levee Safety Evaluation (LSE) by the US Army Corps of Engineers (USACE) in 2015 and found to be compliant with the level of protection required by FEMA. It should be noted that New Orleans' flood protection system was deemed to be compliant prior to the catastrophic failure that resulted during Hurricane Katrina. The level of Ohio River flood protection required by FEMA incorporates a "coincident frequency analysis" that statistically determines the probability of a rain event happening at the same time as high Ohio River levels. The coincident frequency analysis found the MSD Ohio River flood protection systems is adequately sized to handle a 1% probability (100 year storm) event. The FEMA criteria is not related to MSD's local design criteria which calls for conveyance (pumps and pipes) to be sized for at least the 10% event. While meeting the 1% criteria in a coincident frequency analysis, several of the flood pump stations require significant expansion to comply with drainage-related design criteria. The LSE contained a wealth of information about minor deficiencies that need to be corrected. These items have been included in the preliminary 20-year CIP.

Flood Pump Stations

Much of the Ohio River flood protection system was constructed in the 1950s. Design criteria that could be located from records of this era usually indicated the flood pump stations were intended to pump the 10% probability storm (a.k.a. 10-year storm), as defined by 1950 land use patterns and pre-1950 rainfall statistics. Some of the design documents recommended the capacity requirements be updated at 10-year intervals to account for land use changes, among other things. To our knowledge, the capacity of these flood pump stations has never been reassessed through comprehensive hydraulic and hydrologic modeling. As noted previously, capacity assessment completed as part of the LSE study identified several flood pump stations that no longer meet the 10% storm.

In addition to capacity concerns, many of the flood pump stations have original 1950's vintage electrical and mechanical equipment. For the most part the stations are manually operated using control systems that cannot be repaired with off-the-shelf components. To assure the reliability and adequacy of the flood pump station system, all pump stations were subject to a condition assessment (in addition to the one the USACE did) and detailed hydraulic and hydrologic modeling using storm IDFs projected for 2035. The preliminary 20-year CIP includes rehabilitation and/or expansion of all 16 flood pump stations in MSD's system. Given the size of these facilities, the costs are substantial but the risks being addressed are vital to Louisville's protection against catastrophic flooding.

Levee and Floodwall System

MSD maintains a proactive maintenance program to assure the integrity of the levee and floodwall system. In addition, the USACE does a bi-annual inspection of the levee and floodwall, resulting in a report on any deficiencies noted. The preliminary 20-year CIP includes continuation of a proactive preventive maintenance program, in addition to the corrective actions recommended by the LSE study. These efforts are critical to protect the Louisville community from flooding.

Support Systems

MSD owns a large inventory of rolling stock, IT systems, and above-ground facilities that support MSD's operation of wastewater, stormwater drainage and Ohio River flood protection services.

Capital Equipment

MSD owns more than 600 vehicles and portable equipment, ranging from passenger vehicles and pick-up trucks to large excavators and sewer cleaning trucks. MSD is investigating the potential for leasing the commonly available passenger cars and pickup trucks, which would move these costs from capital to operating budgets. The specialty equipment used in MSD's operation and maintenance activities are not available for lease, and MSD must continue to own them to be certain they are available any time they are required. This equipment is critical to MSD's ability to complete the preventive and corrective maintenance activities required to provide sustainable and reliable wastewater, stormwater, and flood protection services. For example, a comprehensive sewer inspection activity requires a sewer flush truck to clean the sewer, a vactor truck to capture the material flushed from the line to prevent it from moving downstream to cause problems elsewhere, and a CCTV truck to take a close look at the condition of the pipe. After the condition is established, either heavy construction equipment like excavators and loaders or specialty equipment to install cured-in-place sewer lining is used to correct deficiencies. The specialized equipment is very expensive to purchase and maintain, given the severe service conditions that this equipment is operated under. The preliminary 20-year CIP includes an annual allowance for repair and replacement of this equipment.

Facilities

The Facility Plan team completed a condition assessment of over 200 buildings and recommended corrective actions where deficiencies were noted. The main areas of deficiency were in roofs. MSD has above-ground buildings with roofs all over the county, ranging from the massive roof system at the Central Maintenance Facility to the little roof over a 10'x10' pump station building. Roofs appear to be one area that MSD allows to "run to failure". Roofs are seldom replaced until a leak is detected inside the building. The Facility Plan recommends an extensive program of roof replacement in the first five years, using standardized roofing systems for different applications. After that, regular inspection and

replacement before failure occurs is recommended to provide the minimum cost of ownership for the buildings protected by these roofs.

The Facility Condition Assessments also identified a number of deficiencies in areas related to HVAC, building egress, signage and safety equipment, and indications of conditions that could eventually cause structural issues, and even structural failure. The preliminary 20-year CIP includes projects to address the specific recommendations identified by the Facility Plan Team, with future budgets to complete periodic condition assessments following deficiency correction.

IT Systems and LOJIC Support

MSD maintains an extensive inventory of IT hardware and software that is essential to the overall operations of the agency. This includes the MSD internet system that is the backbone of MSD electronic communication and digital data generation, communication and storage. It also includes the MSD supervisory control and data acquisition (SCADA) system that controls over 300 pump stations and control gates. It is also the platform for implementation of the RTC system used to optimize use of MSD's conveyance facilities to cost-effectively maximize the use of existing facilities to reduce sewer overflows. Without adequate and updated IT systems, public health and safety could be at risk. This inventory is subject to periodic upgrade and replacement like all MSD's other assets. In addition, MSD hosts the Louisville & Jefferson County Information Consortium (LOJIC) systems which similarly require periodic upgrades and replacements to hardware and software. The preliminary 20-year CIP includes annual allowances to account for these anticipated future costs.

Next Steps

MSD staff will review the preliminary 20-year CIP, and review the project lists with the Facility Plan Team. MSD and the Facility Plan Team will also review and refine the project prioritization approach, to include a significant risk factor to recognize the serious implications of many of these projects. It is anticipated that a draft Facility Plan, including final draft project budgets, schedules and an associated long-term financial overview will be available by the end of August, 2016.

Attachment A – Preliminary 20-Year Capital Improvement Plan

MEMORANDUM

TO: Louisville and Jefferson County Metropolitan Sewer District Board

FROM: Stakeholder Members of the Wet Weather Team

DATE: December 10, 2008

SUBJECT: Draft Integrated Overflow Abatement Plan

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

Wet Weather Team Composition and Charge

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

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

Results of the Wet Weather Team's Deliberations

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

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

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

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

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

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

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

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

Stakeholder Members of the Wet Weather Team

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

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

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

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

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

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

The specific benefits anticipated from the IOAP include the following:

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

Along with delivering water quality improvements from sewer overflow control, MSD participates in other community water quality improvement efforts. Sewer overflow control is essential to improving water quality, but overflow control alone is not enough to meet water quality standards. In light of this challenge, MSD will continue to leverage its role in supporting broader water quality improvement efforts in the community. The IOAP will be one of the key elements of MSD's participation in those water quality improvement efforts. In particular, the IOAP will be complementary to other wet weather and water quality programs managed by MSD and/or by other community partners. These complementary

efforts include, but are not limited to, the Mayor's "Go Green Louisville" Initiative, the Partnership for a Green City, Metro Louisville's Municipal Separate Storm Sewer System (MS4) discharge permit, and initiatives of Jefferson County Public Schools (JCPS), private developers, and other entities.[1]

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

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

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

Values-Based Performance Evaluation Framework Used to Develop the IOAP

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

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

Project-Specific Values

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

Programmatic Values

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

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

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

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

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

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

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

Control Levels for Combined Sewer Overflows and Sanitary Sewer Overflows

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

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

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

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

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

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

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

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

Components of MSD's Integrated Overflow Abatement Plan

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

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

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

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

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

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

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

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

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

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

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

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

Public Information, Education, and Involvement Program

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

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

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

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

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

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

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

Post-Construction Compliance Monitoring

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

Future Development Considerations

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

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

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

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

Funding Plan

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

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

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

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

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

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

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

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

Presentations

Sustaining Vital Infrastructure - Funding Community Needs

May 25, 2018

msd
Safe, clean waterways

Nationally, sewer and drainage infrastructure is a critical issue

American Society of Civil Engineers

2013 REPORT CARD for America's INFRASTRUCTURE

Levees	Wastewater
D-	D

$2.2 trillion

estimated 5-Year investment need

$202 billion

in wastewater upgrade needs

U.S. DEPARTMENT OF HOMELAND SECURITY

Considered a **national safety** issue

msd
Safe, clean waterways

Catastrophic impacts are part of the national dialogue on infrastructure

Hurricane Katrina

Flint, Michigan

msd
Safe, clean waterways

Citizens are recognizing the value of water both nationally and locally

Value of Water COALITION

83% of Americans willing to pay more to modernize and improve systems

Source: 2015 Value of Water Coalition national survey

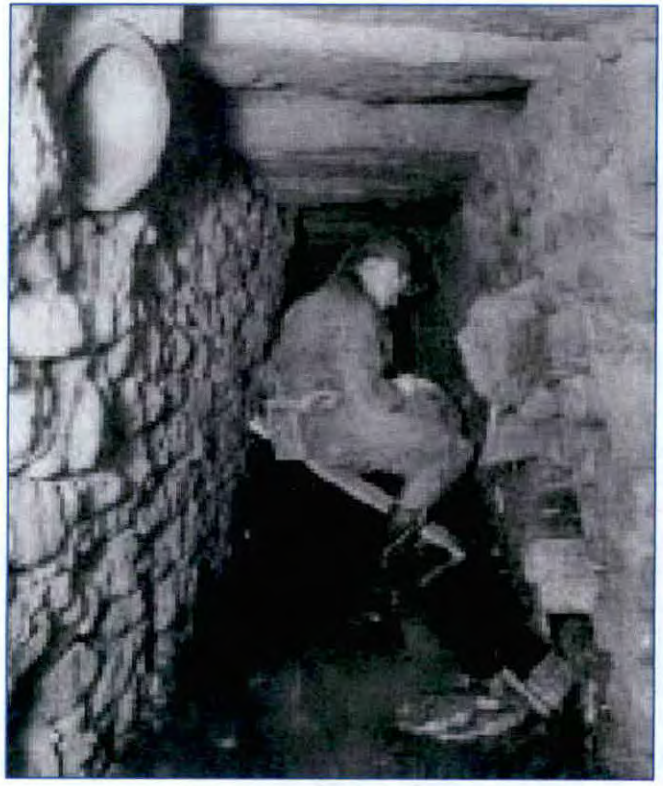
MSD 2015 Project WIN Survey

Louisville residents believe that protecting our waterways from pollution is one of the most important environmental issues the community faces today.

Source: 2015 DataMax survey

msd
Safe, clean waterways

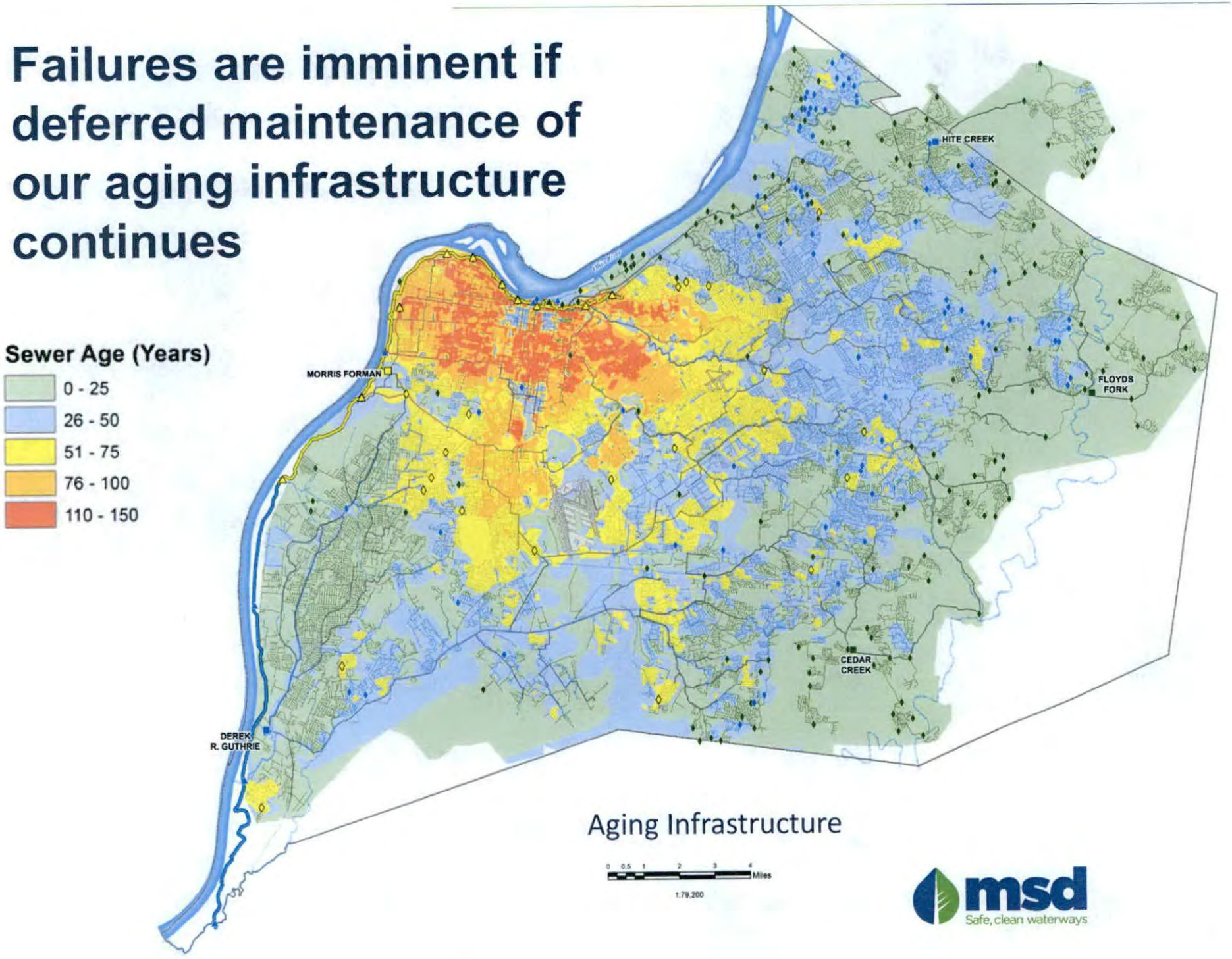
Investment is critical locally as MSD's system pre-dates the Civil War in some areas



The Second Street sewer - an example of Louisville's earliest underground sewers - was a stone-lined ditch capped by slabs of stone

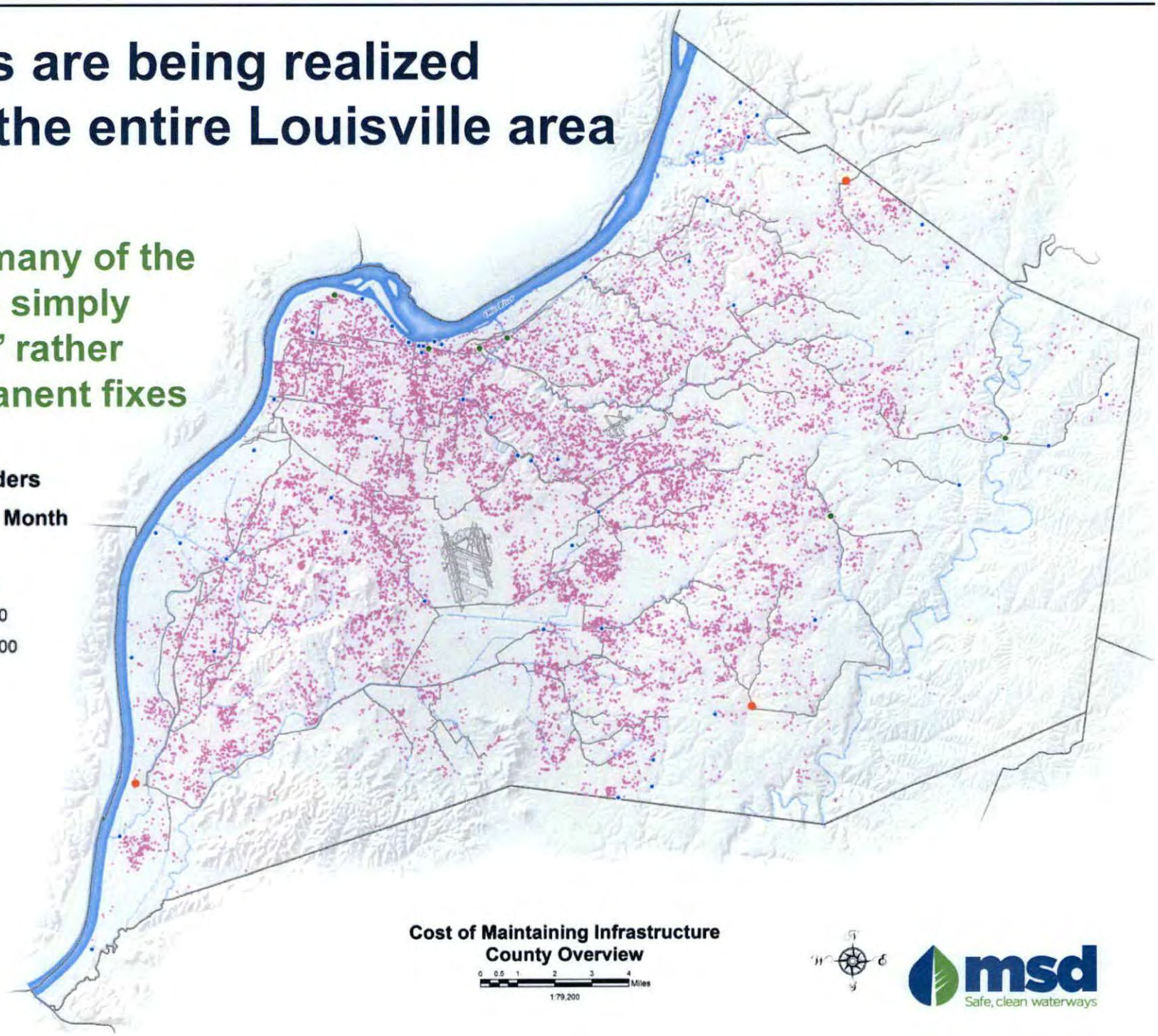
msd
Safe. clean waterways

Failures are imminent if deferred maintenance of our aging infrastructure continues



Benefits are being realized across the entire Louisville area

However, many of the repairs are simply 'band-aids' rather than permanent fixes



Louisville's prosperity depends on what our community's sewer and drainage systems can sustain

GE

UPS

NORTON HEALTHCARE

Kroger

Humana.

Ford

Jewish Hospital

msd
Safe, clean waterways

Bottom line - We cannot meet the goal of transforming Louisville while this is our reality

Torrential rain triggers flash flooding across metro Louisville

Posted: Jul 12, 2015 8:41 AM EDT Updated: Jul 19, 2015 8:52 AM EDT

By Julian Glover

LOUISVILLE, KY (WAVE) - Cars were stranded, homes flooded, and streets impassable thanks to flash flooding triggered by a round of torrential rain Sunday morning.

Wastewater system, treatment plants reach maximum capacity

LOUISVILLE, Ky. (Jan. 14, 2013) – Since Saturday evening, Louisville has experienced more than three inches of rain, causing many streams and drains to over flow. The wastewater system and the treatment plants reached maximum capacity in many areas of Jefferson County.

Sewer leak dumps up to 50,000 gallons of sewage into Beargrass Creek

UPDATED 8:09 PM EST Jan 01, 2016

LOUISVILLE, Ky. —A sewer leak dumped up to 50,000 gallons of sewage into Beargrass Creek. The Metropolitan Sewer District said it had to shut down the Nightingale pump station to work on a sewer main collapse off Phillips Lane.

msd
Safe, clean waterways

95 cents of every revenue dollar is committed to operating and debt service obligations, leaving only 5 cents for capital improvements

45 cents - Operating Expenses

50 cents – Debt Service

5 cents – Capital Improvements

msd
Safe, clean waterways

MSD has made deep cuts to minimize costs

Operating cost reductions primarily driven through staffing reductions

- Staffing levels were over 865 positions in the late 90's
- Staffing has averaged 590 for three years; 65 positions below approved level

Completion of new capital projects are requiring increased staffing

msd
Safe, clean waterways

Operating budgets flat for 5 years

Operating costs controlled even with significant increases in areas out of our control *	
Electricity	Up $8 million
Louisville Water Company billing	Up $2.8 million
Pension contribution	Up $1.8 million

* FY16 costs compared to FY09 costs

The incidence and magnitude of emergency repairs have been increasing	
2014 and 2015	$2 million each
2016 Forecast	> $6 million

msd
Safe, clean waterways

MSD has shown skillful financial management

Debt Service payments are $4M lower than 2013, even with $275M of new bonds issued, due to refinancing activity.

- Three bonds refunded saving $126 million over 23 years.
- Seven derivative contracts terminated saving $14 million over 9 years.
- One bond retired early saving $7 million over 11 years.

Future refunding opportunities will be limited as interest rates rise.

msd
Safe, clean waterways

Capital project spending has been funded through borrowing

Total bonds outstanding now equal $2B with maturities extending to 2045.

- Since 2008 over $880M of capital budget was funded entirely with new bond issues.
- Capital project needs are projected to average $196 million per year for the next 5 years.

New Bonding Capacity is limited to $325M over the next 4 years.

msd
Safe, clean waterways

Aging infrastructure below ground can have dramatic impacts above ground

msd
Safe, clean waterways

When infrastructure fails, jobs and economic development are at risk

Broadway & Floyd 90-inch brick sewer repair, July 2015

*Originally built in **1937***

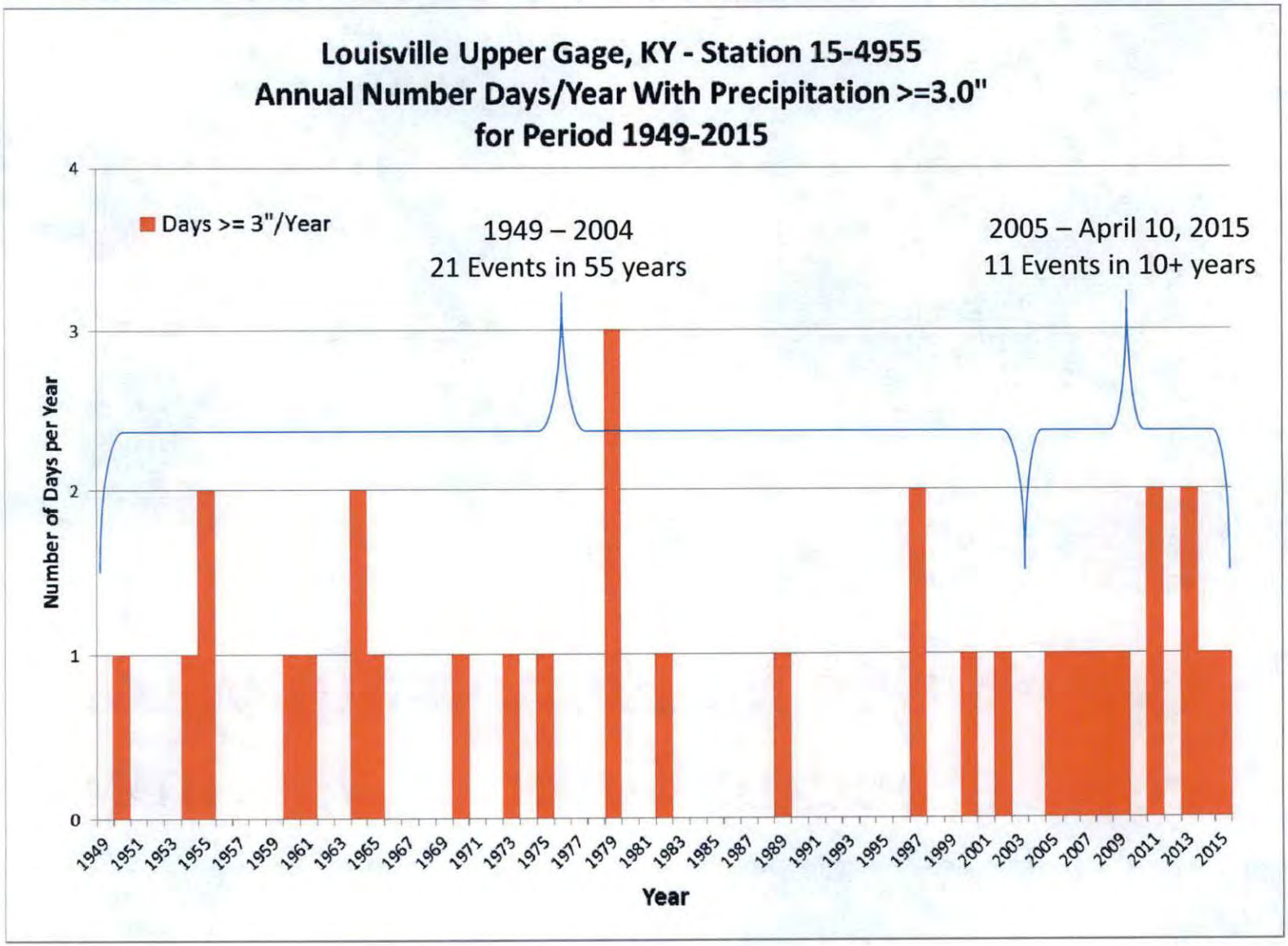
msd
Safe, clean waterways

Community flooding impacts property, the economy, and public health

msd
Safe, clean waterways

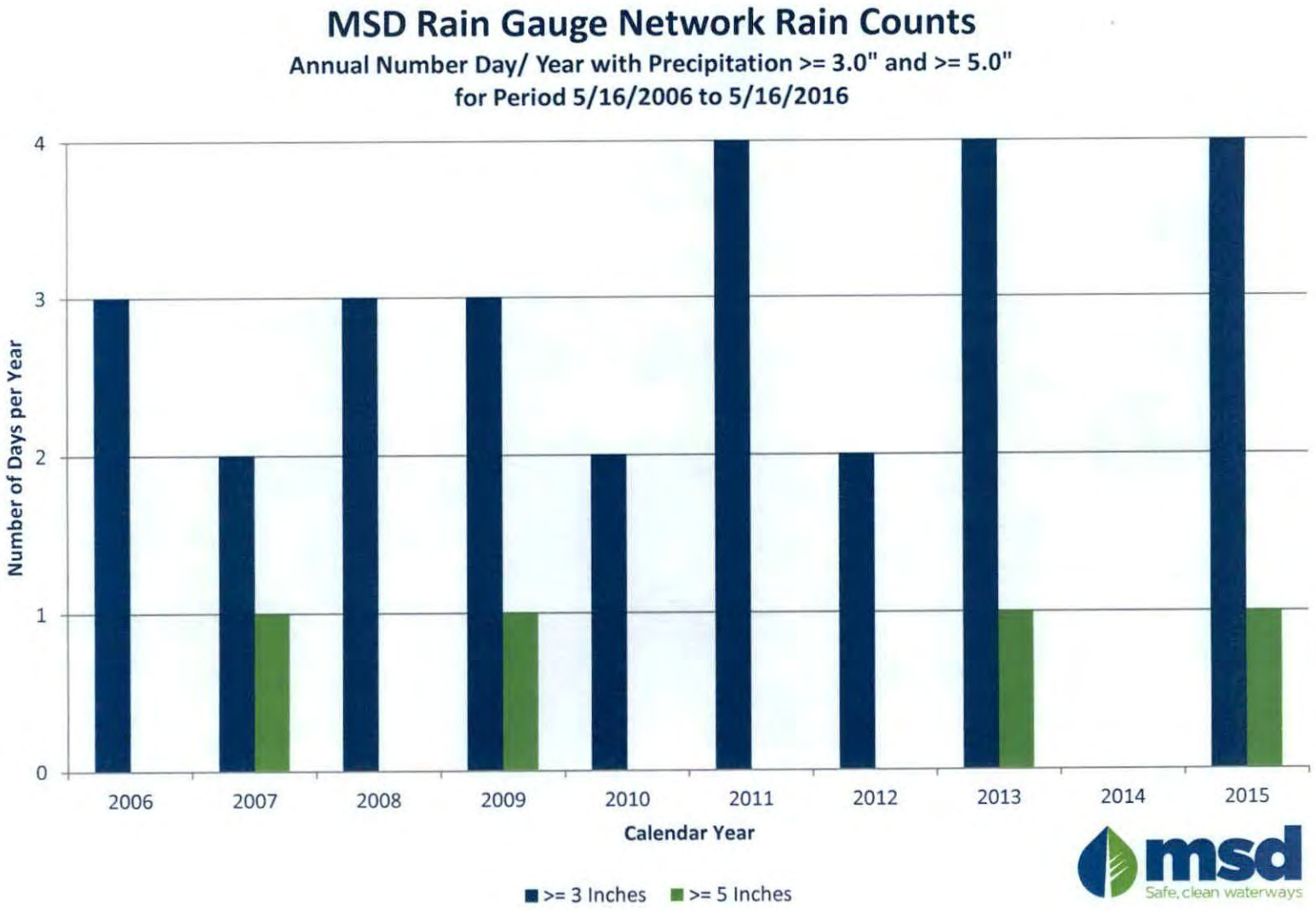
Increased Frequency of Extreme Storms

Highlights Drainage and Floodplain Management Needs

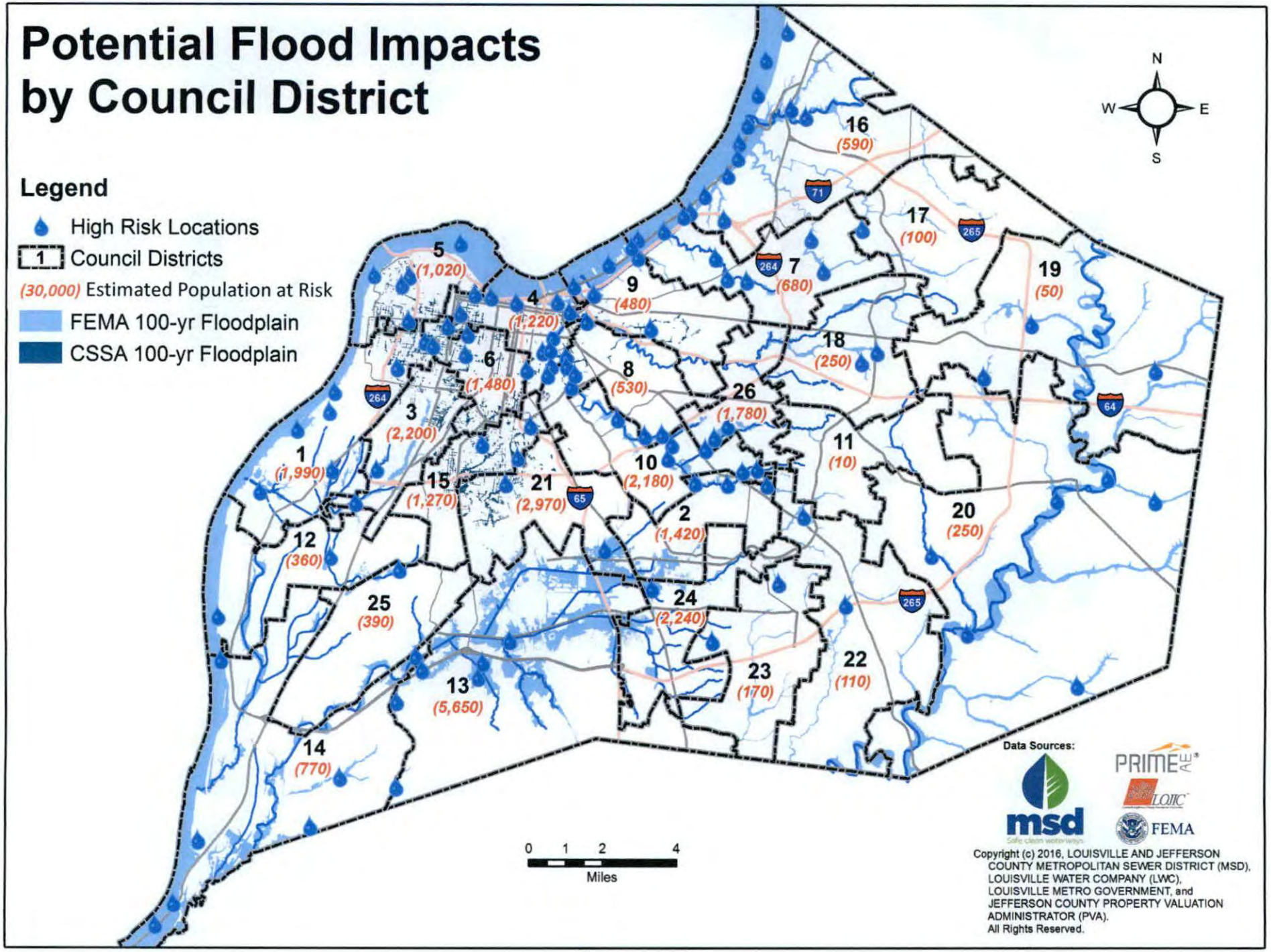


Increased Frequency of Extreme Storms

Highlights Drainage and Floodplain Management Needs



Potential Flood Impacts by Council District



The community's need is well beyond the Consent Decree response

msd
Safe, clean waterways

The comprehensive Facility Plan has identified actual needs

WASTEWATER

- Continued Consent Decree compliance
- Accommodate economic growth and development
- Rehabilitate, repair and replace aging and failing infrastructure

FLOOD PROTECTION

- Area with greatest potential risk
- Failure of this system could have serious consequences
- Address impacts of increased frequency of extreme storms

STORMWATER

- Address community concerns over increased frequency of extreme storms
- Integrate neighborhood drainage program (DRI) into overall stormwater improvements
- Stormwater quality improvements

msd
Safe, clean waterways

20-Year Comprehensive Facilities Plan
Identifies Long-Term Project Delivery Needs

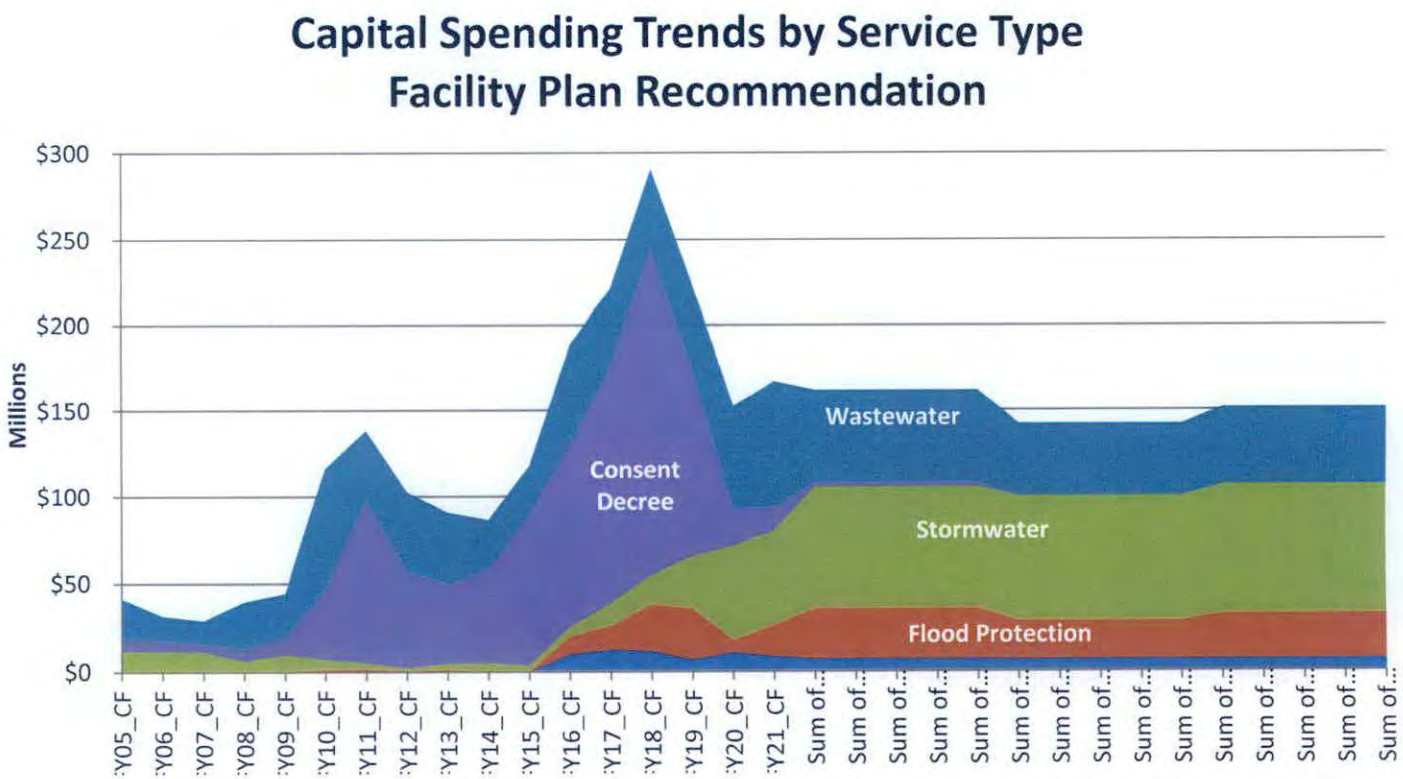
Service Area and Program	Capital Costs*				Total
	FY 17 - FY 21	FY 22 - FY 26	FY 27 - FY 31	FY 32 - FY 36	FY 17 - FY 36
Stormwater	**$260,746,279**	**$491,875,276**	**$465,552,430**	**$498,250,447**	**$1,716,424,432**
Drainage	$132,438,516	$312,543,776	$312,019,930	$314,362,947	$1,071,365,169
Floodplain Management	$20,100,000	$20,000,000	$20,000,000	$20,000,000	$80,100,000
Ohio River Flood Protection	$95,835,263	$144,050,000	$109,720,000	$130,075,000	$479,680,263
Stormwater Quality (MS4)	$12,372,500	$15,281,500	$23,812,500	$33,812,500	$85,279,000
Support Systems	**$47,935,000**	**$33,750,000**	**$32,850,000**	**$32,850,000**	**$147,385,000**
Capital Equipment	$23,050,000	$27,000,000	$27,000,000	$27,000,000	$104,050,000
Facilities	$20,210,000	$2,500,000	$2,500,000	$2,500,000	$27,710,000
IT	$3,100,000	$3,000,000	$2,100,000	$2,100,000	$10,300,000
LOJIC	$1,575,000	$1,250,000	$1,250,000	$1,250,000	$5,325,000
Wastewater	**$747,408,423**	**$281,960,500**	**$211,468,500**	**$225,555,500**	**$1,466,392,923**
CMOM	$169,153,599	$218,604,500	$136,770,500	$190,852,500	$715,381,099
Consent Decree (IOAP)	$472,169,371	$11,950,000	$0	$0	$484,119,371
Development	$16,010,000	$34,626,000	$59,198,000	$19,703,000	$129,537,000
Facilities	$4,000,000	$0	$0	$0	$4,000,000
NMC	$86,075,453	$16,780,000	$15,500,000	$15,000,000	$133,355,453
Grand Total (Escalated Dollars)	**$1,087,000,000**	**$993,000,000**	**$1,012,000,000**	**$1,250,000,000**	**$4,342,000,000**

* Table costs are in 2016 Dollars except for Grand Total which is escalated at 3% per year

msd
Safe. clean waterways

20-Year Comprehensive Facilities Plan

Drainage and Flood Protection Budgets Increase



msd
Safe, clean waterways

First 5 years of infrastructure investments to address concerns expressed by our community (FY 17 – FY 21)

Facility Plan Recommendation	FY17-FY21
Wastewater	$271,239,052
Consent Decree (IOAP)	$472,169,371
Stormwater	$164,911,016
Ohio River Flood Protection	$95,835,263
Support Systems	$51,935,000
Grand Total	**$1,056,089,702**

msd
Safe, clean waterways

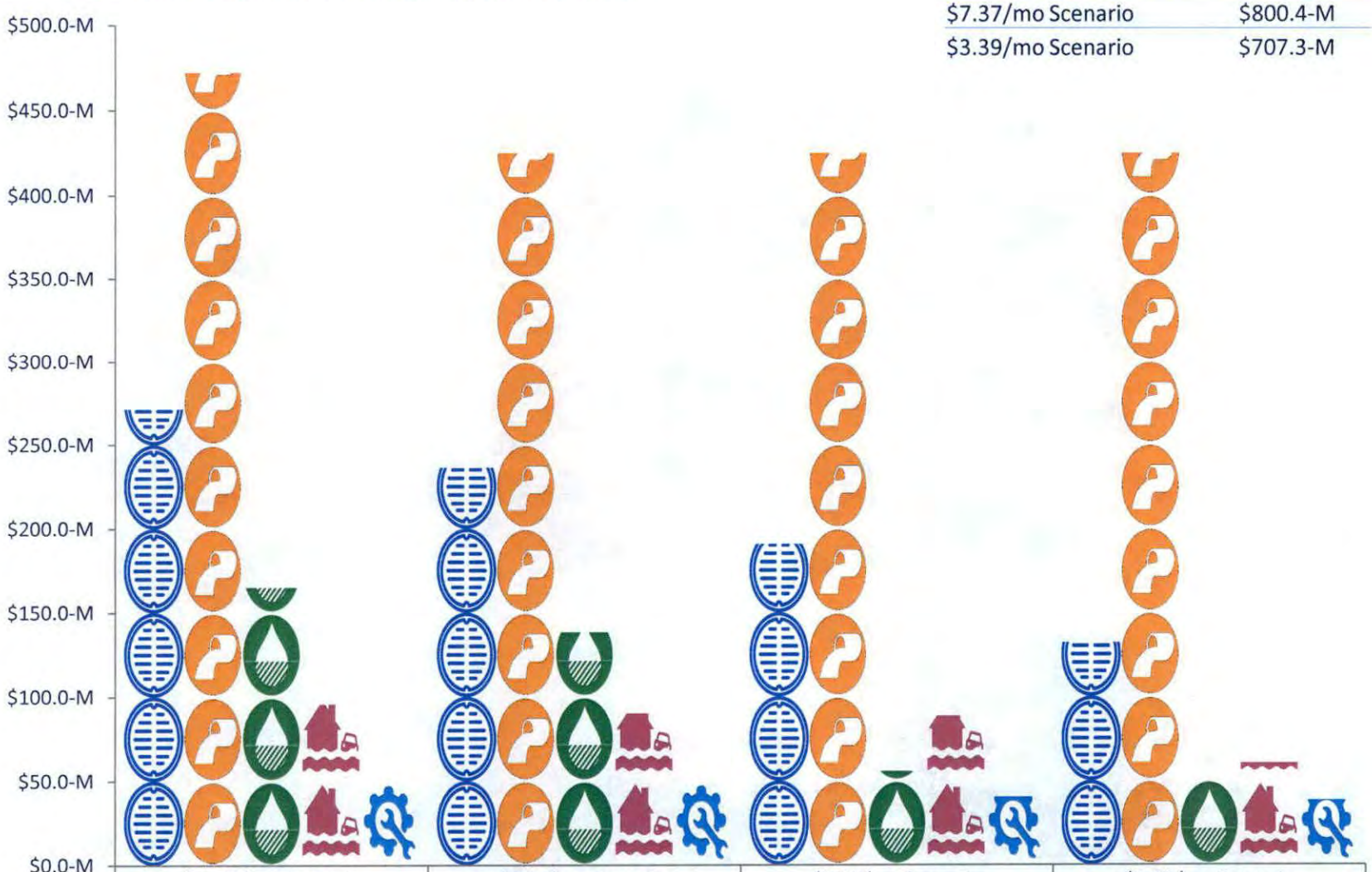
The Facility Plan recommends these initial infrastructure investments to address concerns expressed by our community

Facility Plan Recommendation	FY17-FY21
Wastewater	**$743,408,423**
CMOM	$169,153,599
Consent Decree (IOAP)	$472,169,371
Development	$16,010,000
NMC	$86,075,453
Stormwater	**$260,746,279**
Drainage	$132,438,516
Floodplain Management	$20,100,000
Ohio River Flood Protection	$95,835,263
Stormwater Quality (MS4)	$12,372,500
Support Systems	**$51,935,000**
Capital Equipment	$23,050,000
Facilities	$24,210,000
IT	$3,100,000
LOJIC	$1,575,000
Grand Total	**$1,056,089,702**

msd
Safe, clean waterways

MSD staff developed alternative
5-Year capital spending scenarios

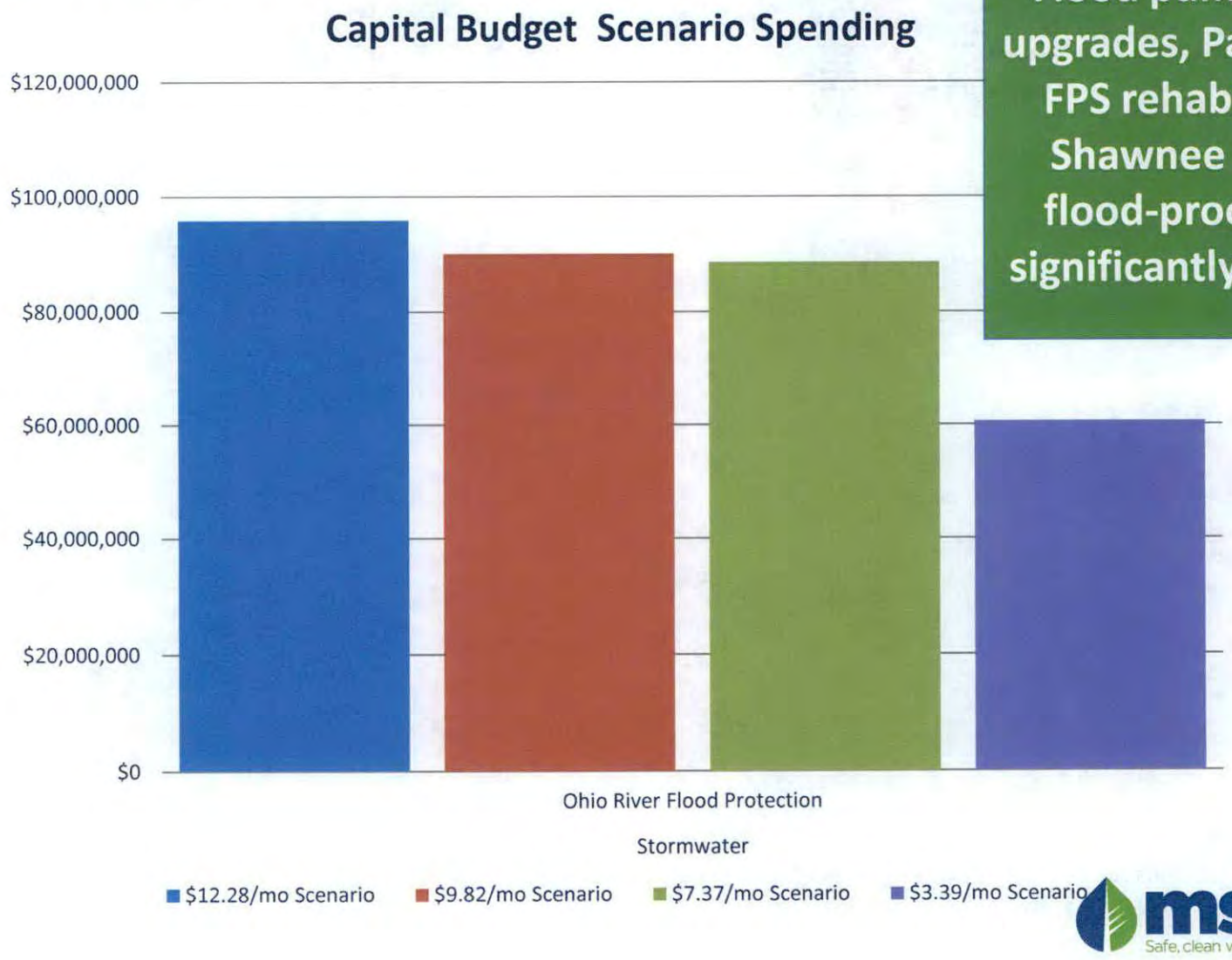
Scenario	Total
$12.28/mo Scenario	$1.06-B
$9.82/mo Scenario	$938.6-M
$7.37/mo Scenario	$800.4-M
$3.39/mo Scenario	$707.3-M



	$12.28/mo Scenario	$9.82/mo Scenario	$7.37/mo Scenario	$3.39/mo Scenario
Wastewater	$271.2-M	$236.3-M	$190.7-M	$132.2-M
Consent Decree (IOAP)	$472.2-M	$425.1-M	$425.1-M	$425.1-M
Stormwater	$164.9-M	$138.3-M	$55.7-M	$51.2-M
Ohio River Flood Protection	$95.8-M	$90.1-M	$88.6-M	$60.5-M
Support Systems	$51.9-M	$48.8-M	$40.3-M	$38.3-M

Flood Protection is the area with greatest potential risk to our community.

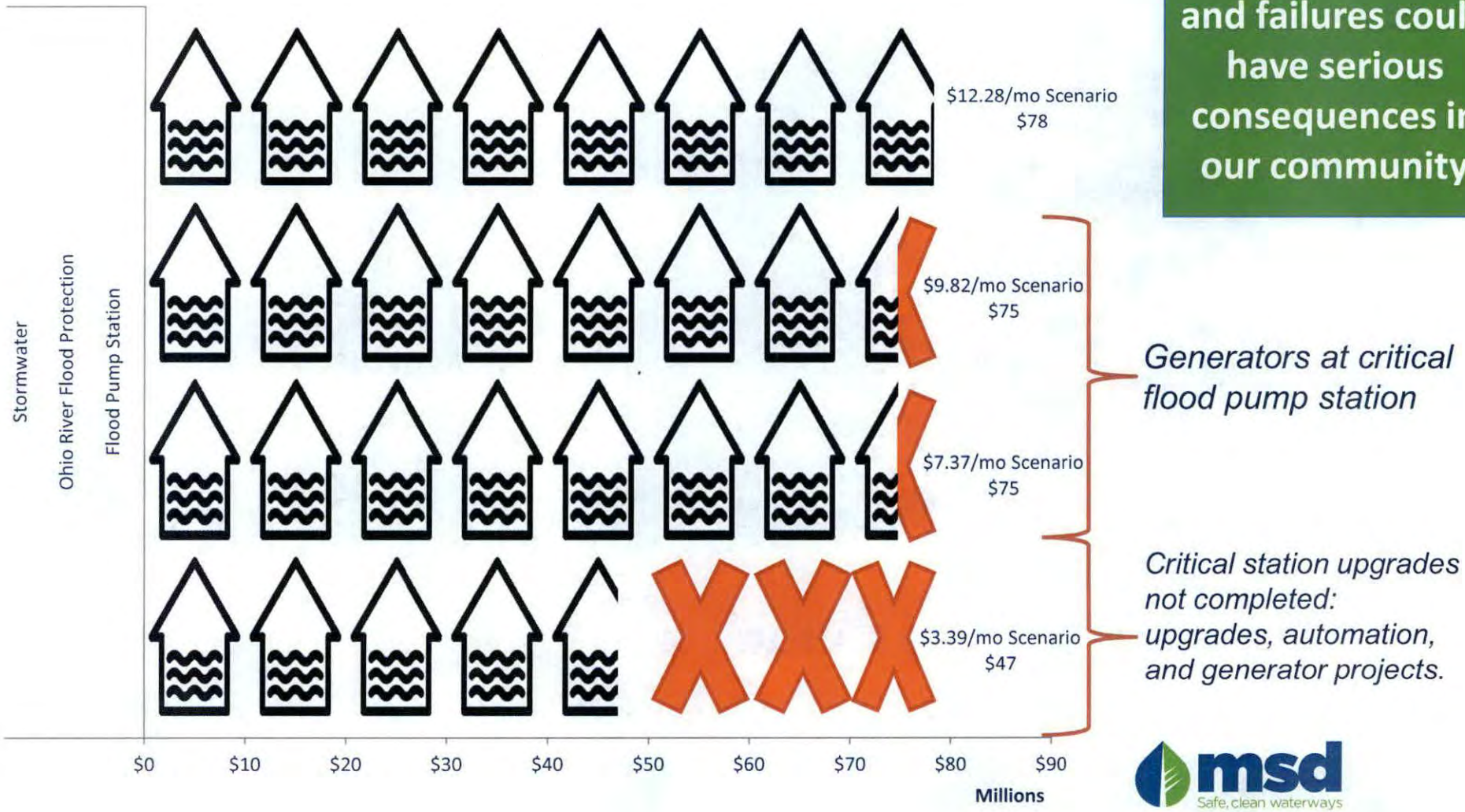
Flood pump station upgrades, Paddy's Run FPS rehabilitation, Shawnee FPS and flood-proofing are significantly impacted



msd
Safe, clean waterways

Flood Protection is the area with greatest potential risk to our community.

Pumping stations are 60+ years old and failures could have serious consequences in our community

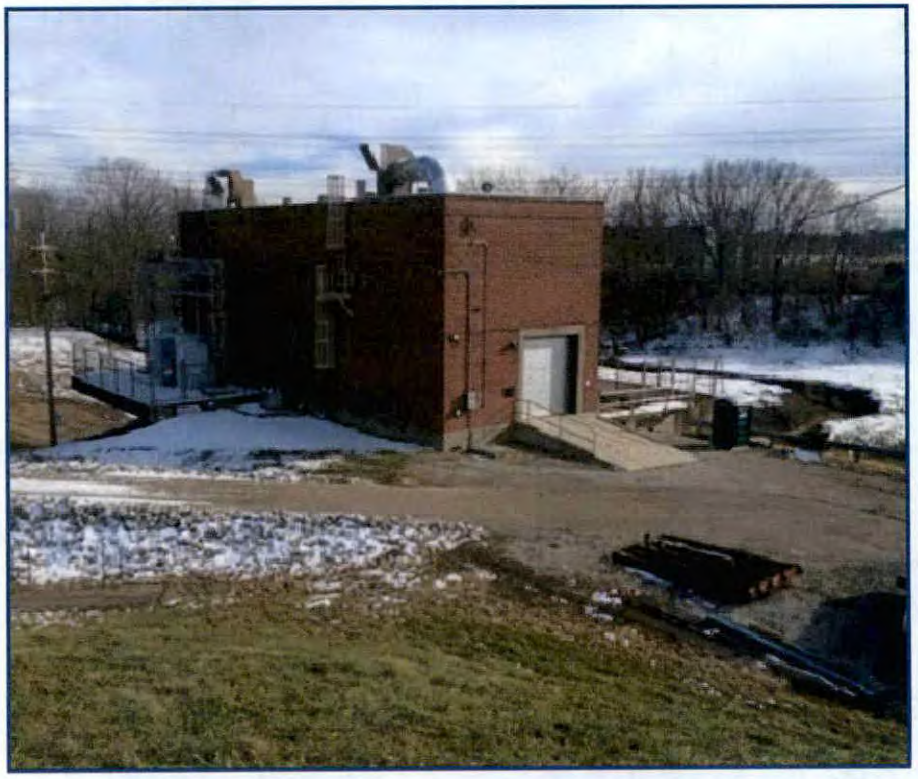


msd
Safe, clean waterways

Increased frequency of extreme storms places hundreds of thousands of customers at risk

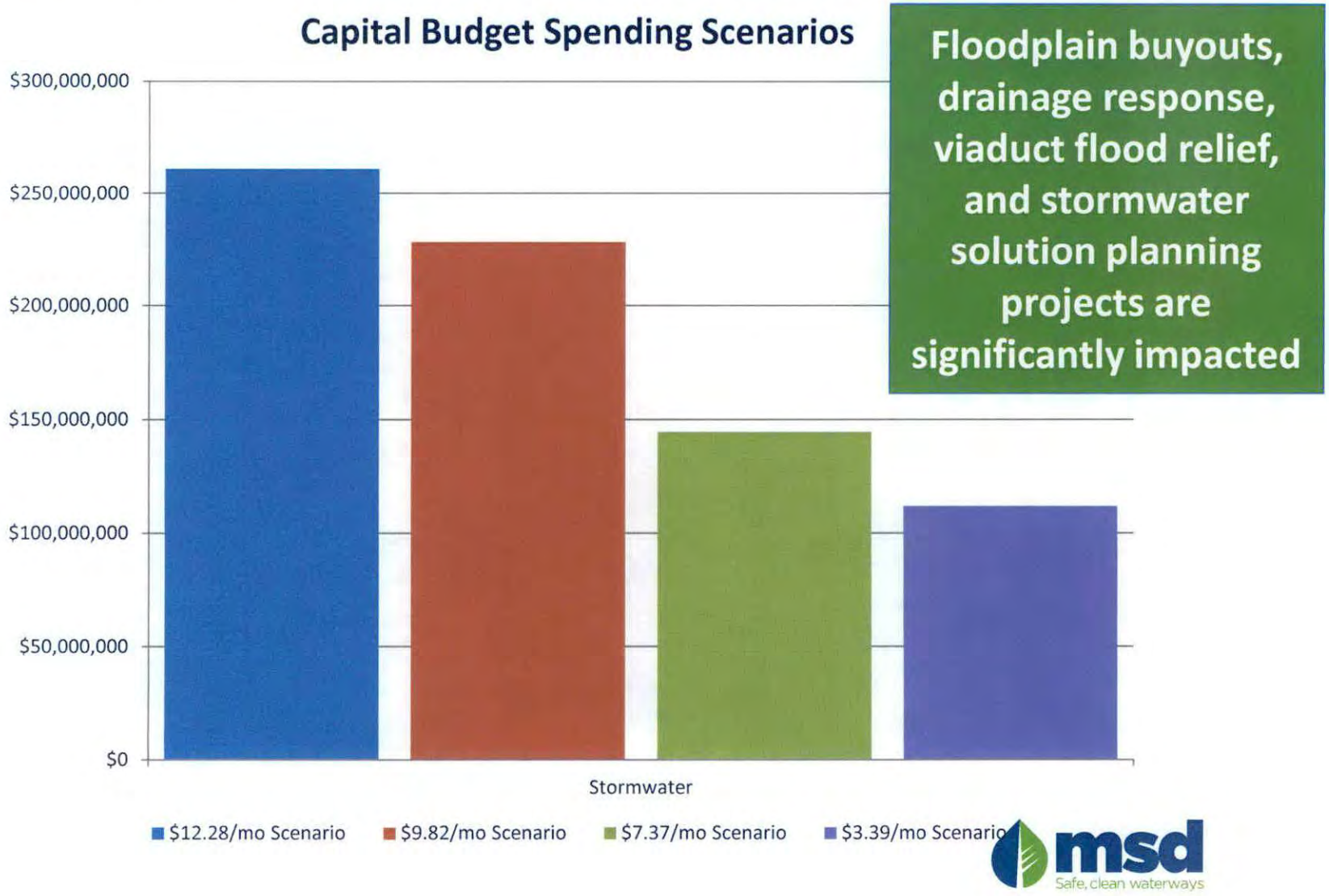
Paddy's Run Flood Pumping Station

- Constructed in 1953
- When the river is up, the pump station protects low-lying areas of the watershed during rain events. This area includes a total of ***214,500*** customers
- Rain in excess of 3 inches over 24 hours could exceed existing capacity and cause ***basement flooding***



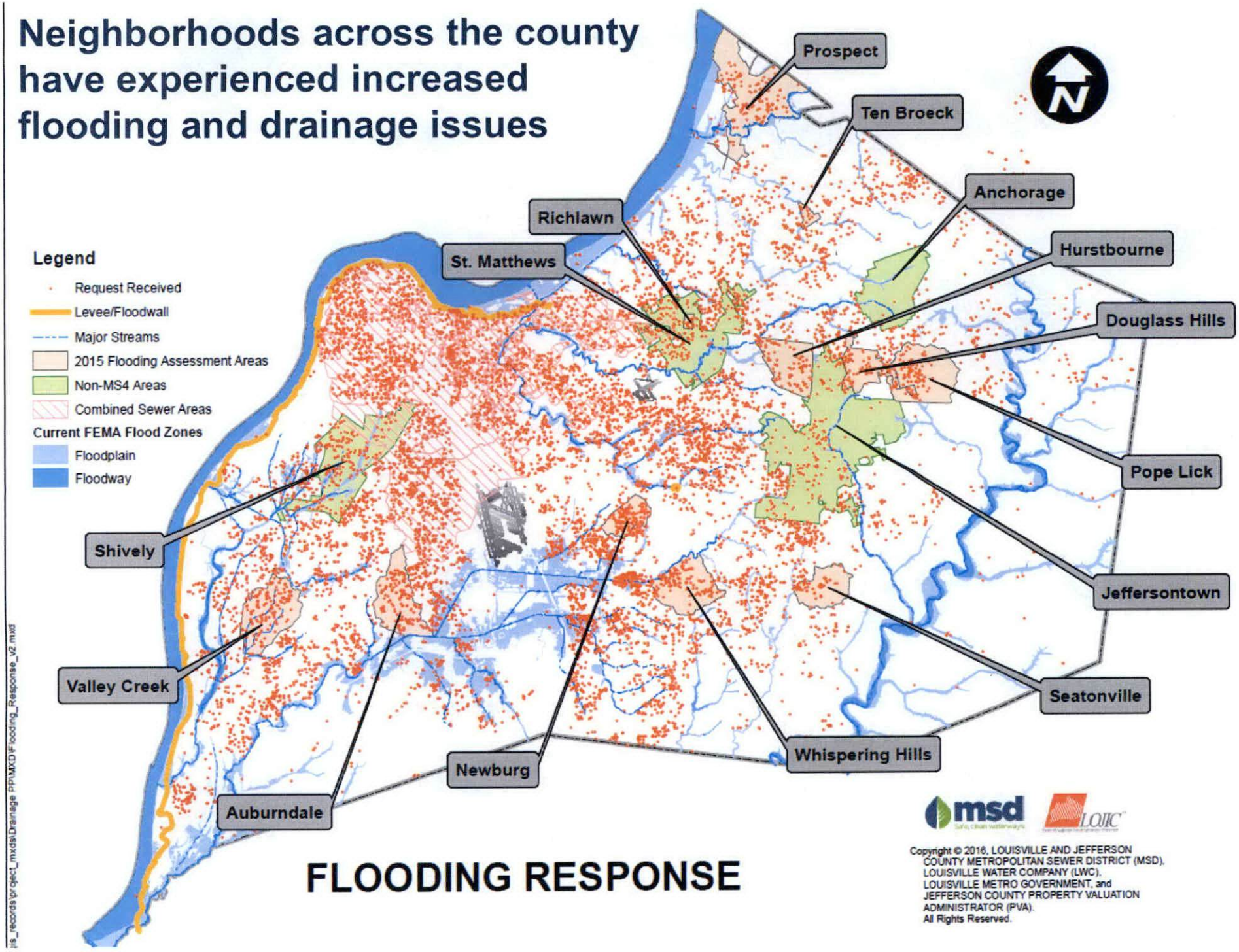
msd
Safe, clean waterways

Community concerns over increased frequency of extreme storms need to be addressed



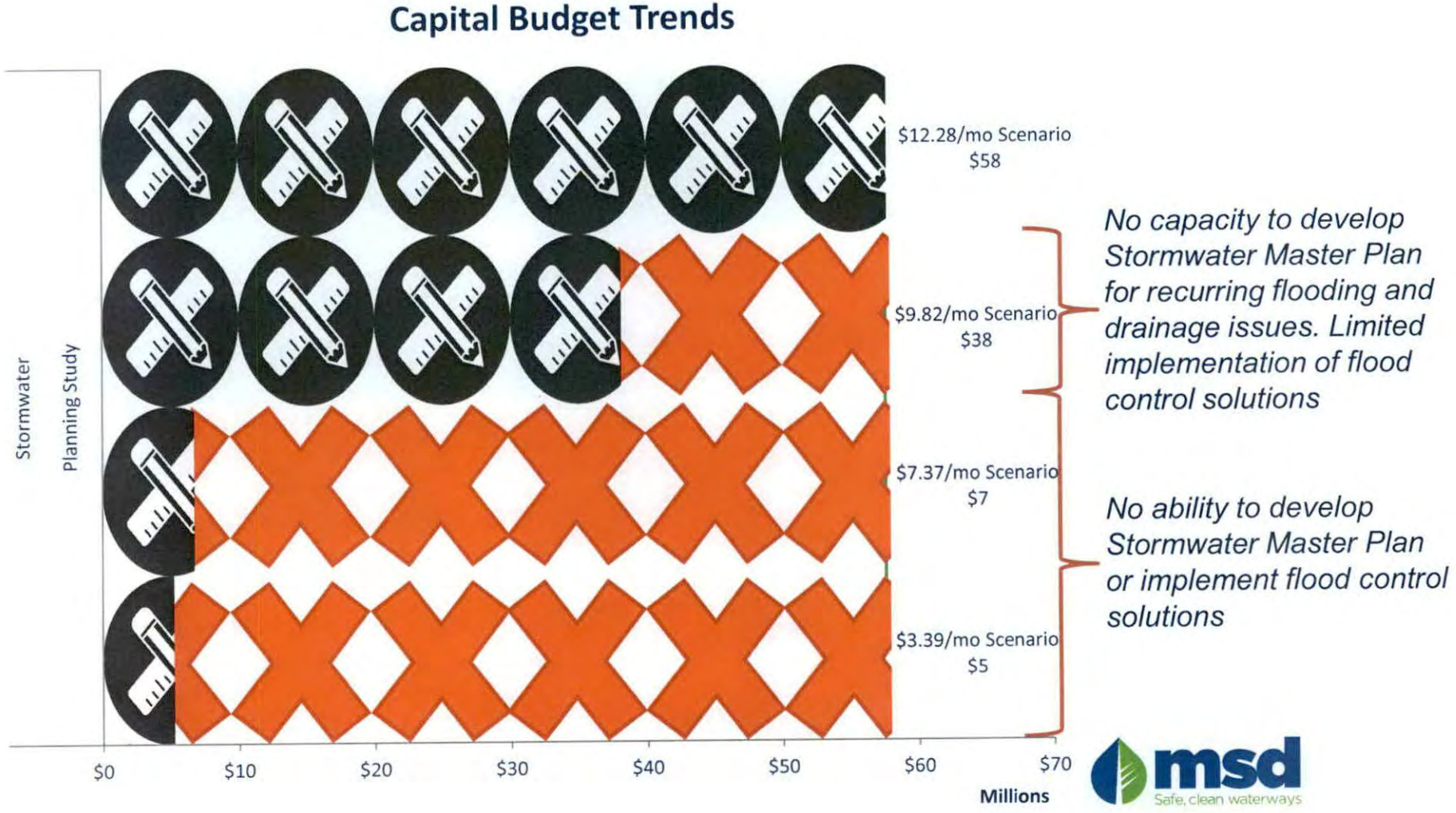
msd
Safe, clean waterways

Neighborhoods across the county have experienced increased flooding and drainage issues



FLOODING RESPONSE

Community concerns over increased frequency of extreme storms need to be addressed



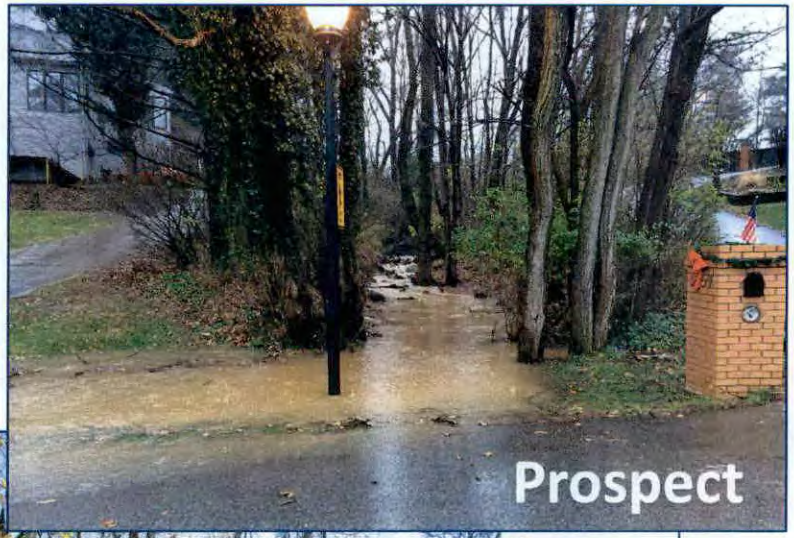
Neighborhoods across the county have experienced increased flooding and drainage issues

1. Estimated 100-year damages calculated using FEMA benefit-cost models
2. Flood insurance claims represent all claims from January 1, 1997 – May 31, 2015

Council District	Council Person	Potential 100-yr Damages (1)	Total Claims Paid (2)
1	Jessica Green	$9,924,377	$685,552
2	Barbara Shanklin	$5,792,637	$1,494,824
3	Mary Woolridge	$5,378,038	$1,419,584
4	David Tandy	$8,630,762	$1,261,729
5	Cheri Hamilton	$1,360,721	$40,436
6	David James	$640,691	$54,047
7	Angela Leet	$28,746,869	$8,772,241
8	Tom Owen	$4,504,463	$1,781,689
9	Bill Hollander	$9,740,523	$1,238,207
10	Pat Mulvihill	$11,903,390	$3,341,375
11	Kevin Kramer	$182,924	$45,000
12	Rick Blackwell	$589,087	$409,398
13	Vicki Welch	$12,195,207	$10,241,128
14	Cindi Fowler	$8,545,755	$905,229
15	Marianne Butler	$568,453	$26,385
16	Kelly Downard	$40,378,049	$11,115,759
17	Glen Stuckel	$438,084	$13,115
18	Marilyn Parker	$2,629,346	$322,335
19	Julie Denton	$317,219	$191,686
20	Stuart Benson	$4,236,236	$877,833
21	Dan Johnson	$9,188,355	$7,010,382
22	Robin Engel	$621,248	$208,201
23	James Peden	$605,688	$9,481
24	Madonna Flood	$5,354,832	$2,890,110
25	David Yates	$2,612,367	$503,856
26	Brent T. Ackerson	$8,970,151	$1,552,593
	Total	**$184,055,472**	**$56,412,175**

Community concerns over increased frequency of extreme storms need to be addressed

- More than ***432*** requests received from July 12-15, 2015
- ***Increased risk*** from frequent extreme storms
- Drainage issues in areas that are ***outside the floodplain***



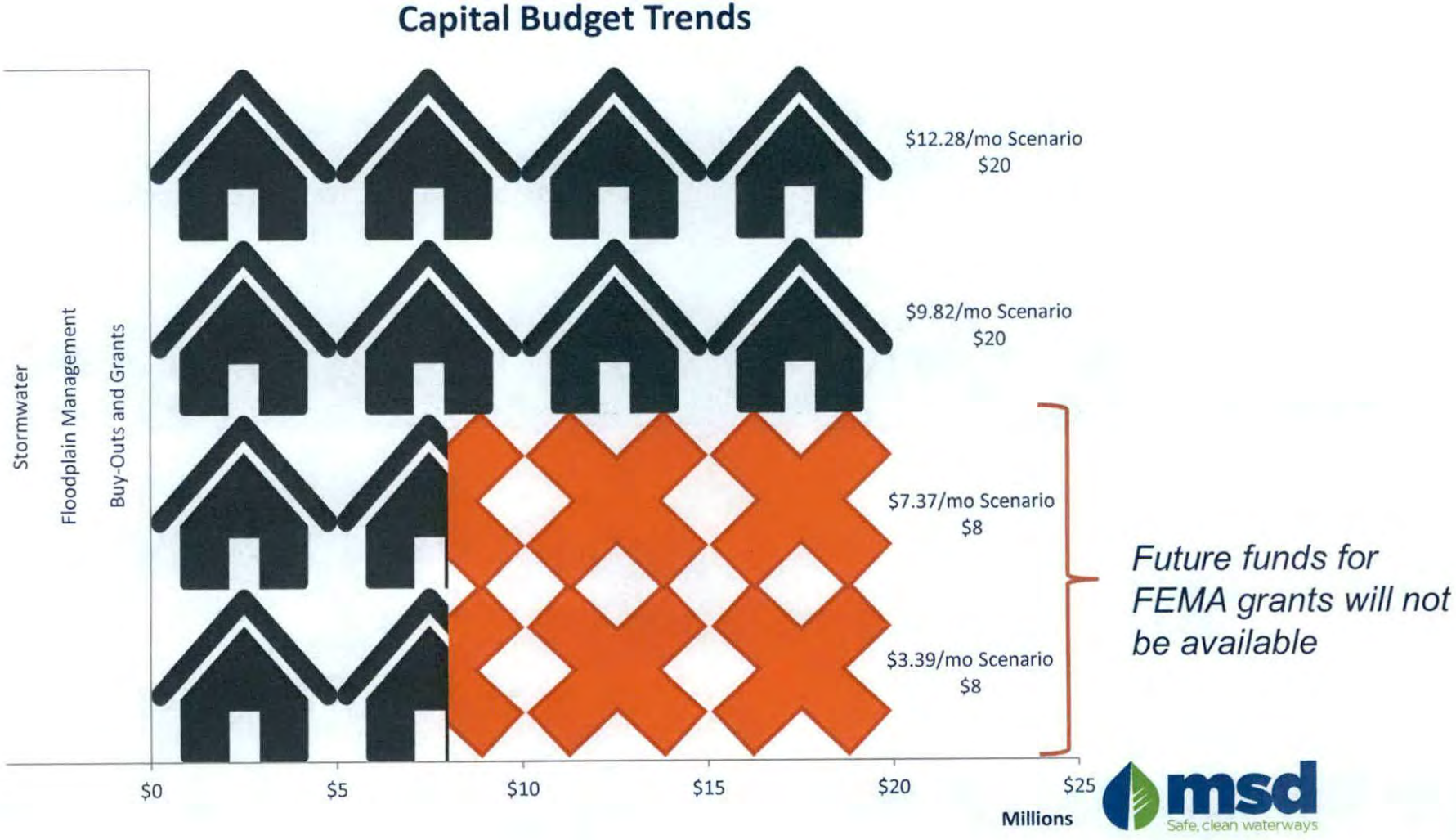
Increased frequency of extreme storms places hundreds of thousands of customers at risk

Flood Mitigation Buyouts

- Approximately ***12,000*** primary structures are in the 100-year floodplain
- ***$14.9 Million*** in FEMA grants are approved
- ***Local match*** must be committed for grants to move forward
- ***15*** homes purchased via 2015 Quick Buy assistance

msd
Safe, clean waterways

2015 Flood Mitigation Workgroup recommended annual funding to purchase properties most severely damaged by flooding

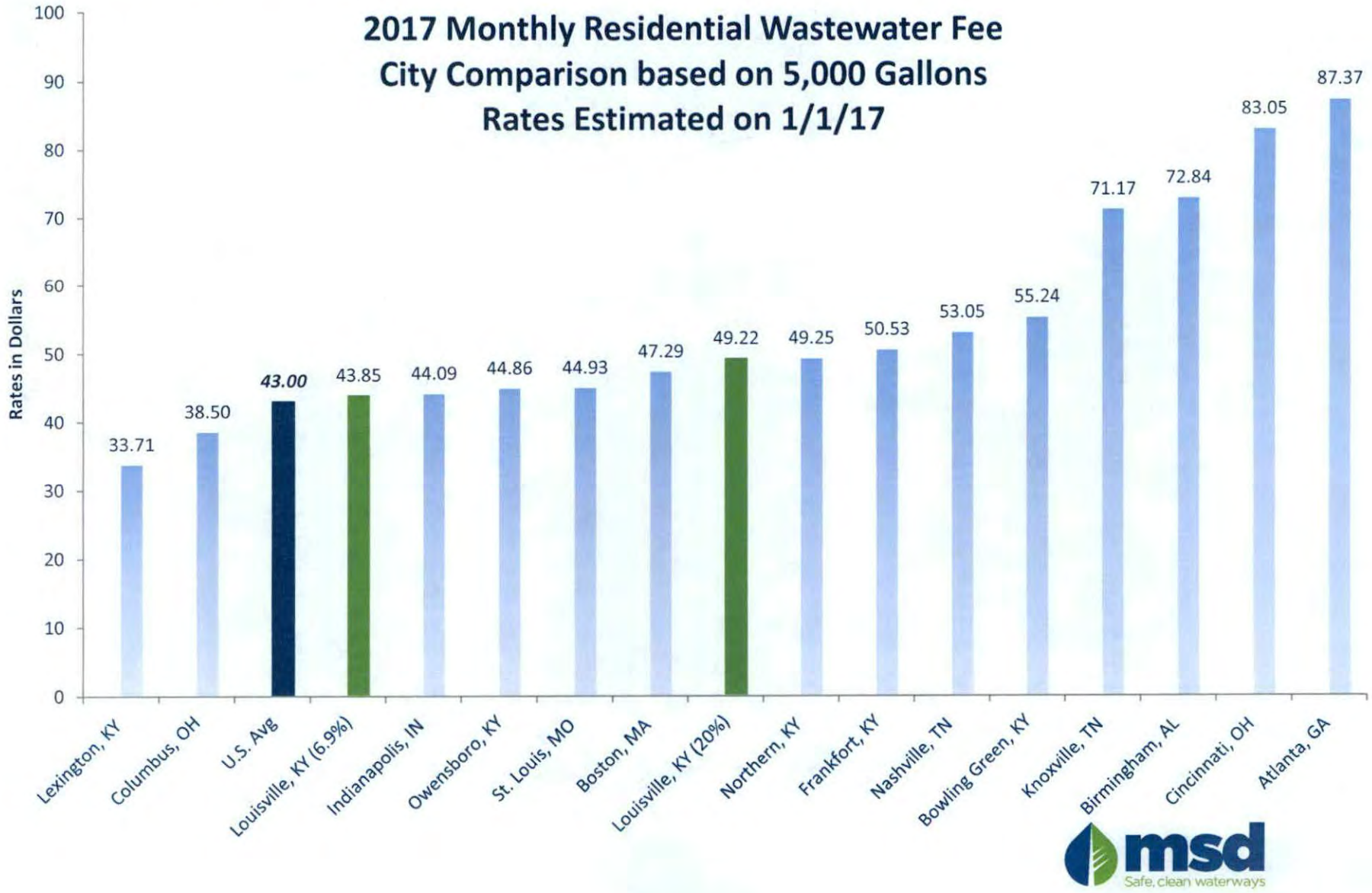


MSD Board approves 20% rate increase on May 23 ($9.82/mo increase in average monthly residential bill)

Service Type	FY17-FY21 Facility Plan Recommendation	$9.82/mo Scenario	Difference
Wastewater	$271,239,052	$236,286,052	($34,953,000)
Consent Decree (IOAP)	$472,169,371	$425,097,888	($47,071,483)
Stormwater	$164,911,016	$138,299,016	($26,612,000)
Ohio River Flood Protection	$95,835,263	$90,085,263	($5,750,000)
Support Systems	$51,935,000	$48,835,000	($3,100,000)
Grand Total	**$1,056,089,702**	**$938,603,219**	**($117,486,483)**

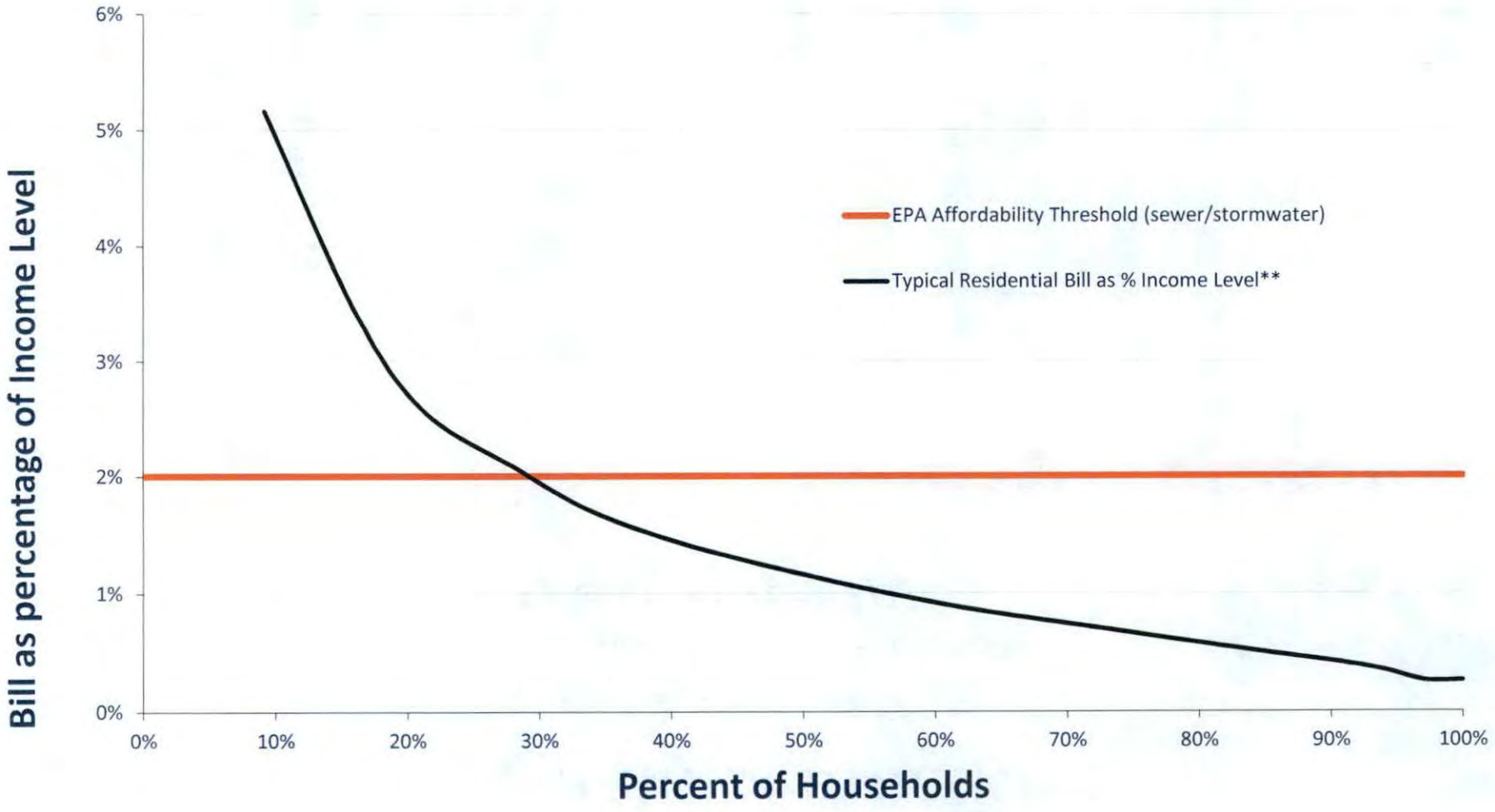
msd
Safe, clean waterways

Louisville will remain competitive



msd
Safe, clean waterways

MSD is sensitive to the impact on ratepayers



** 2015 Cost of Service Study, assumes bimonthly billing, 10,000 gallons water, 8,500 gallons adjusted sewer flow, 5/8 inch connection.

MSD is sensitive to the impact on ratepayers

- Staff Recommendations:
  - Additional $1 million for low-income customer assistance ($2 million total)
  - In-home water use audits to reduce consumption and lower monthly bills
  - Opportunities for customers to voluntarily contribute to a Neighbor-to-Neighbor fund

Commitment to continued affordability assistance

msd
Safe, clean waterways

Summary

- Nationally, sewer and drainage infrastructure is a critical issue
- Locally, Louisville's prosperity depends on what our community's sewer and drainage systems can sustain
- The Facility Plan demonstrates that the community's need is well beyond the Consent Decree response
- MSD is committed to meeting demands while bringing economic value to our community

msd
Safe, clean waterways

Next steps

- June 9 - Ordinance approving 20% rate increase introduced at Metro Council
- June 15 – Budget & Finance Committee presentation
- June 23 – second reading and vote by Metro Council
- July 25 – rate hearing and adoption by MSD Board
- August 1 – new rates take effect

msd
Safe, clean waterways

MSD has a plan to make the needed investments, but this must be a community partnership

msd
Safe, clean waterways

Thank you!

Questions?

msd
Safe, clean waterways

What is "Plan B"?

- New MSD Board actions adopting 6.9% rate increase for FY 17 (Metro Council approval not required)
- Revise Capital Improvement Program to fit available funds for FY 17
  - Reduced stormwater program
  - Reduced flood protection program
  - Reduced infrastructure renewal and replacement
- Try again next year – the needs will not have gone away

msd
Safe, clean waterways

MSD has also considered the impact of other scenarios

- 20% in 2017
- 15% in 2017
- 6.9% in 2017

msd
Safe, clean waterways

MSD Recommendation

20% Scenario

- 20.0% increase in 2017
- Includes $635 million in capital bonds issued

msd
Safe, clean waterways

What does this mean to household cost?

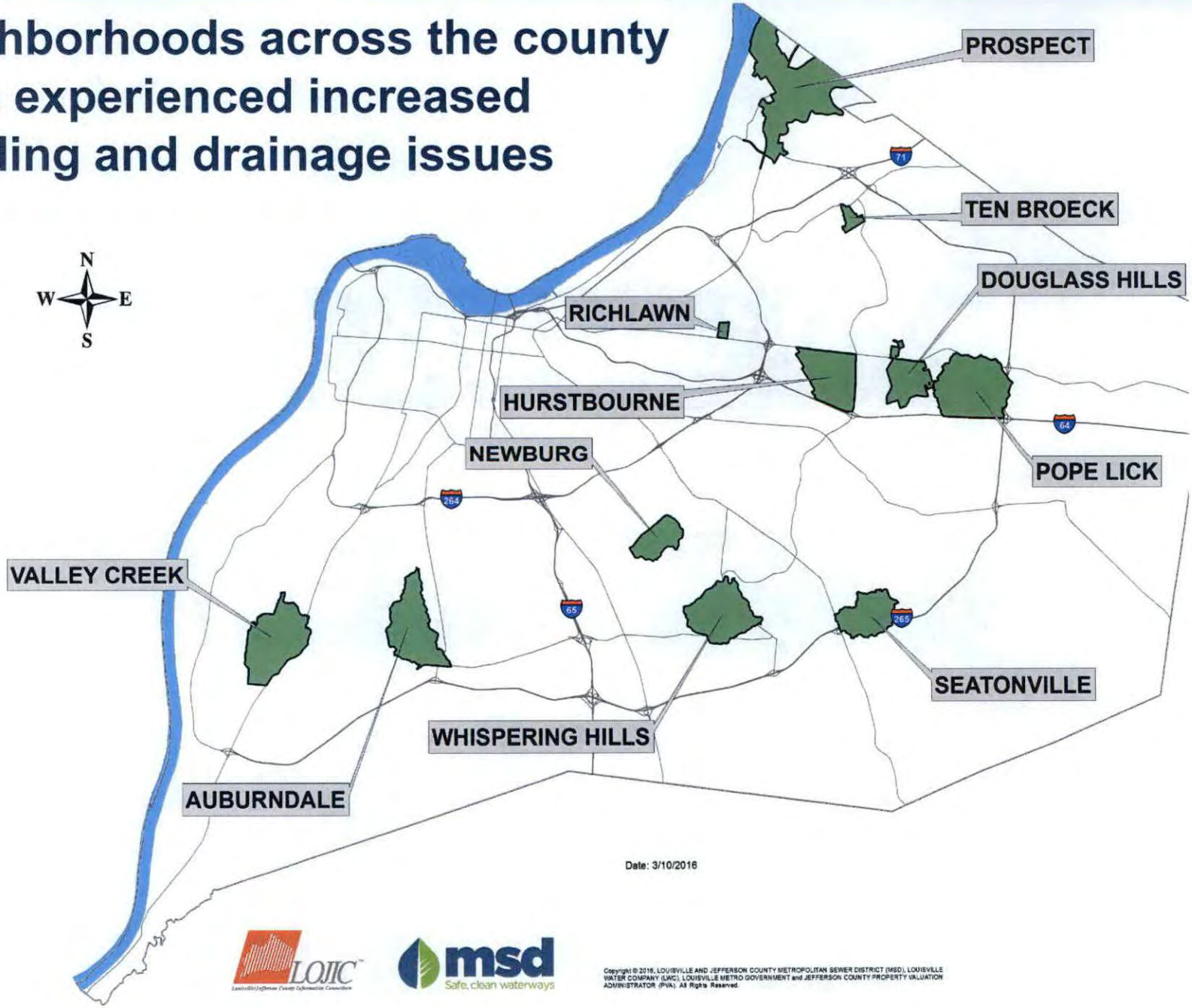
33 cents per day

$9.82 per month

* increase for the average household based on 5,000 gallons of consumption

msd
Safe, clean waterways

Neighborhoods across the county have experienced increased flooding and drainage issues



LOJIC

msd
Safe, clean waterways

$12.28/mo Scenario comparison to Facility Plan Recommendation

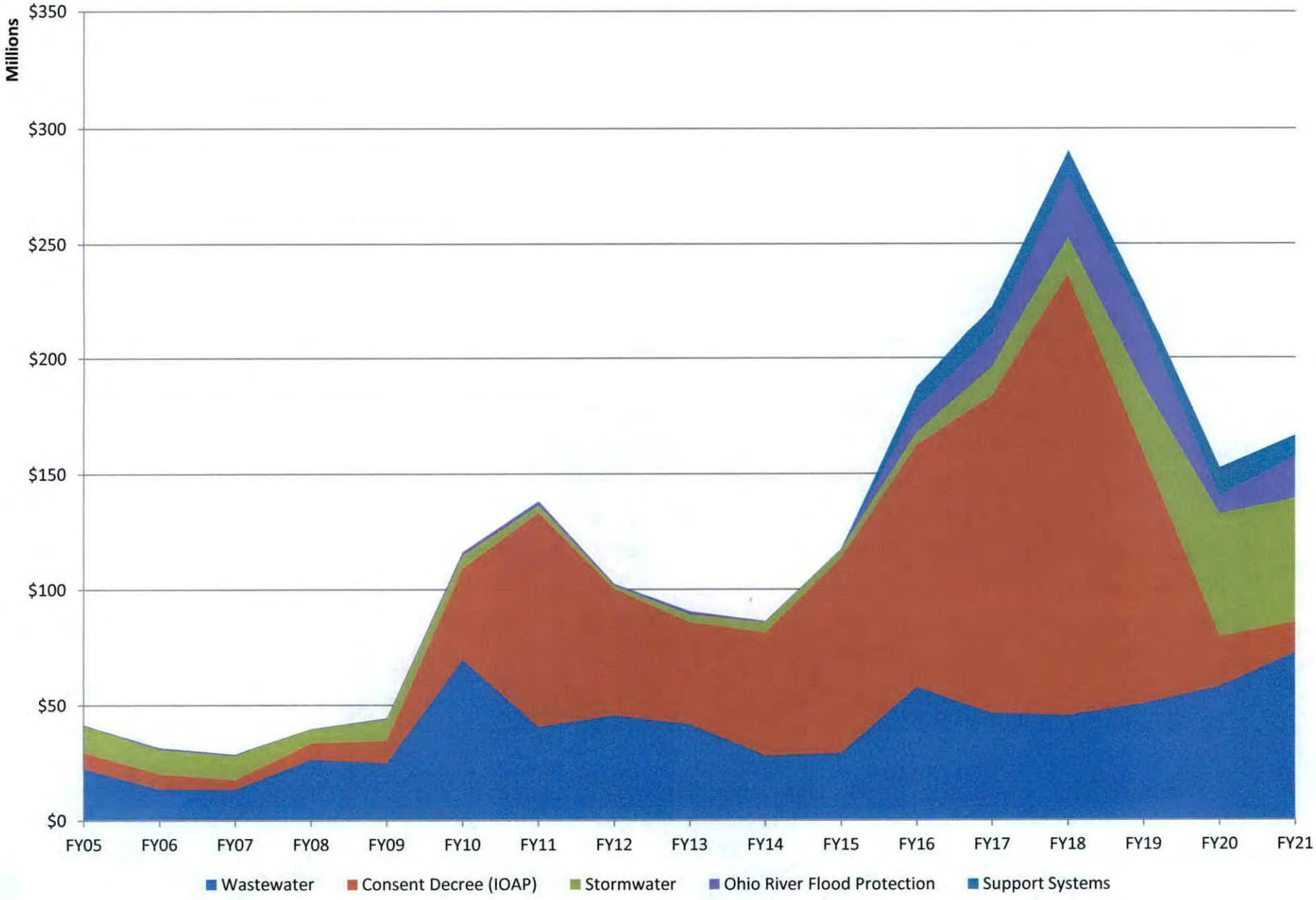
Service Type	FY17-FY21 Facility Plan Recommendation	$12.28/mo Scenario	Difference
Wastewater	$271,239,052	$271,239,052	$0
Consent Decree (IOAP)	$472,169,371	$472,169,371	$0
Stormwater	$164,911,016	$164,911,016	$0
Ohio River Flood Protection	$95,835,263	$95,835,263	$0
Support Systems	$51,935,000	$51,935,000	$0
Grand Total	**$1,056,089,702**	**$1,056,089,702**	**$0**

msd
Safe, clean waterways

Service Type	FY17-FY21 Facility Plan Recommendation	$12.28/mo Scenario	Difference
Wastewater	**$743,408,423**	**$743,408,423**	**$0**
CMOM	$169,153,599	$169,153,599	$0
Consent Decree (IOAP)	$472,169,371	$472,169,371	$0
Development	$16,010,000	$16,010,000	$0
NMC	$86,075,453	$86,075,453	$0
Stormwater	**$260,746,279**	**$260,746,279**	**$0**
Drainage	$132,438,516	$132,438,516	$0
Floodplain Management	$20,100,000	$20,100,000	$0
Ohio River Flood Protection	$95,835,263	$95,835,263	$0
Stormwater Quality (MS4)	$12,372,500	$12,372,500	$0
Support Systems	**$51,935,000**	**$51,935,000**	**$0**
Capital Equipment	$23,050,000	$23,050,000	$0
Facilities	$24,210,000	$24,210,000	$0
IT	$3,100,000	$3,100,000	$0
LOJIC	$1,575,000	$1,575,000	$0
Grand Total	**$1,056,089,702**	**$1,056,089,702**	**$0**

msd
Safe, clean waterways

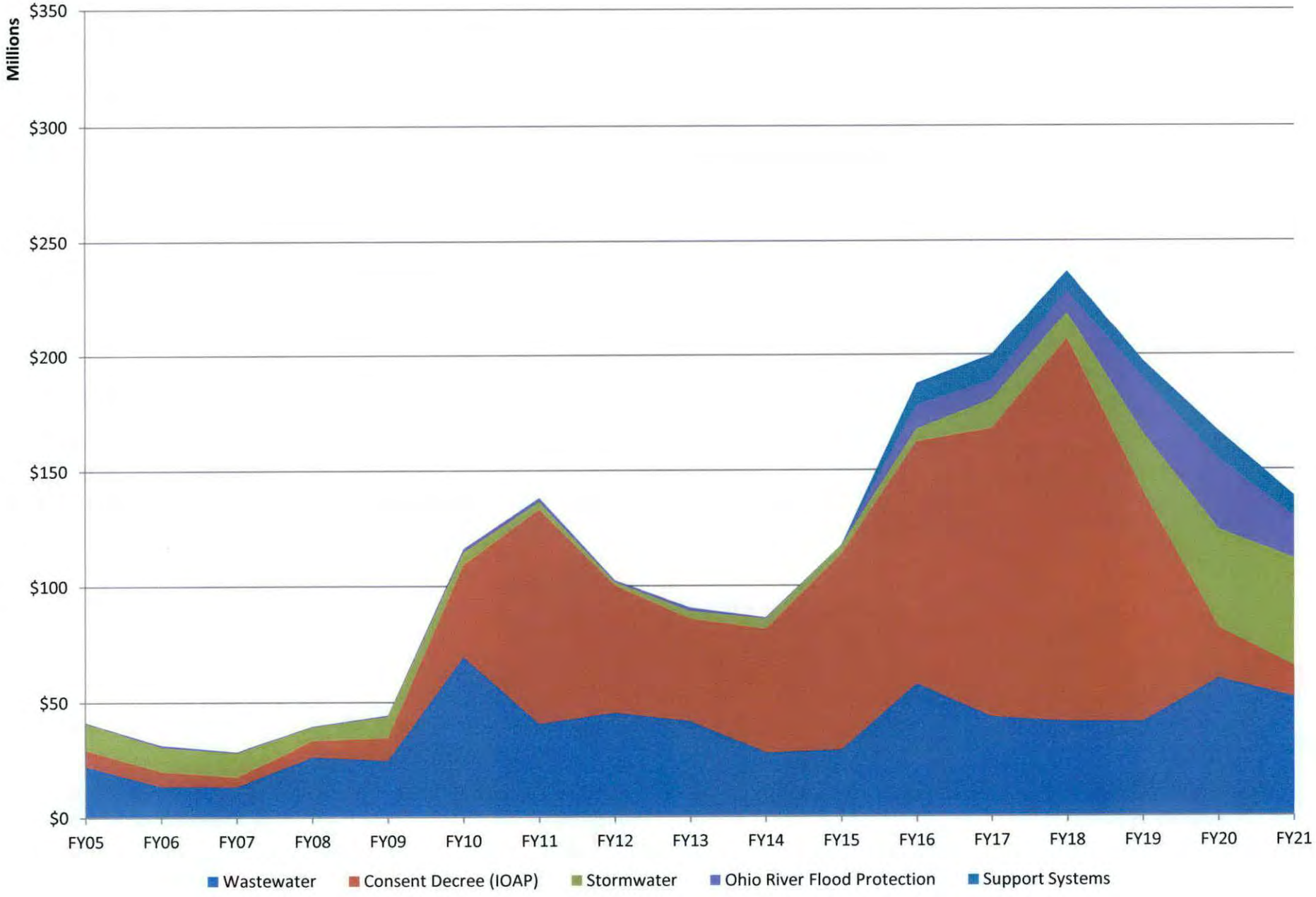
Capital Budget Trends
$12.28/mo Scenario



Service Type	FY17-FY21 Facility Plan Recommendation	$9.82/mo Scenario	Difference
Wastewater	**$743,408,423**	**$661,383,940**	**($82,024,483)**
CMOM	$169,153,599	$156,700,599	($12,453,000)
Consent Decree (IOAP)	$472,169,371	$425,097,888	($47,071,483)
Development	$16,010,000	$16,010,000	$0
NMC	$86,075,453	$63,575,453	($22,500,000)
Stormwater	**$260,746,279**	**$228,384,279**	**($32,362,000)**
Drainage	$132,438,516	$105,826,516	($26,612,000)
Floodplain Management	$20,100,000	$20,100,000	$0
Ohio River Flood Protection	$95,835,263	$90,085,263	($5,750,000)
Stormwater Quality (MS4)	$12,372,500	$12,372,500	$0
Support Systems	**$51,935,000**	**$48,835,000**	**($3,100,000)**
Capital Equipment	$23,050,000	$20,550,000	($2,500,000)
Facilities	$24,210,000	$23,610,000	($600,000)
IT	$3,100,000	$3,100,000	$0
LOJIC	$1,575,000	$1,575,000	$0
Grand Total	**$1,056,089,702**	**$938,603,219**	**($117,486,483)**

msd
Safe, clean waterways

Capital Budget Trends
$9.82/mo Scenario



$7.37/mo comparison to Facility Plan Recommendation

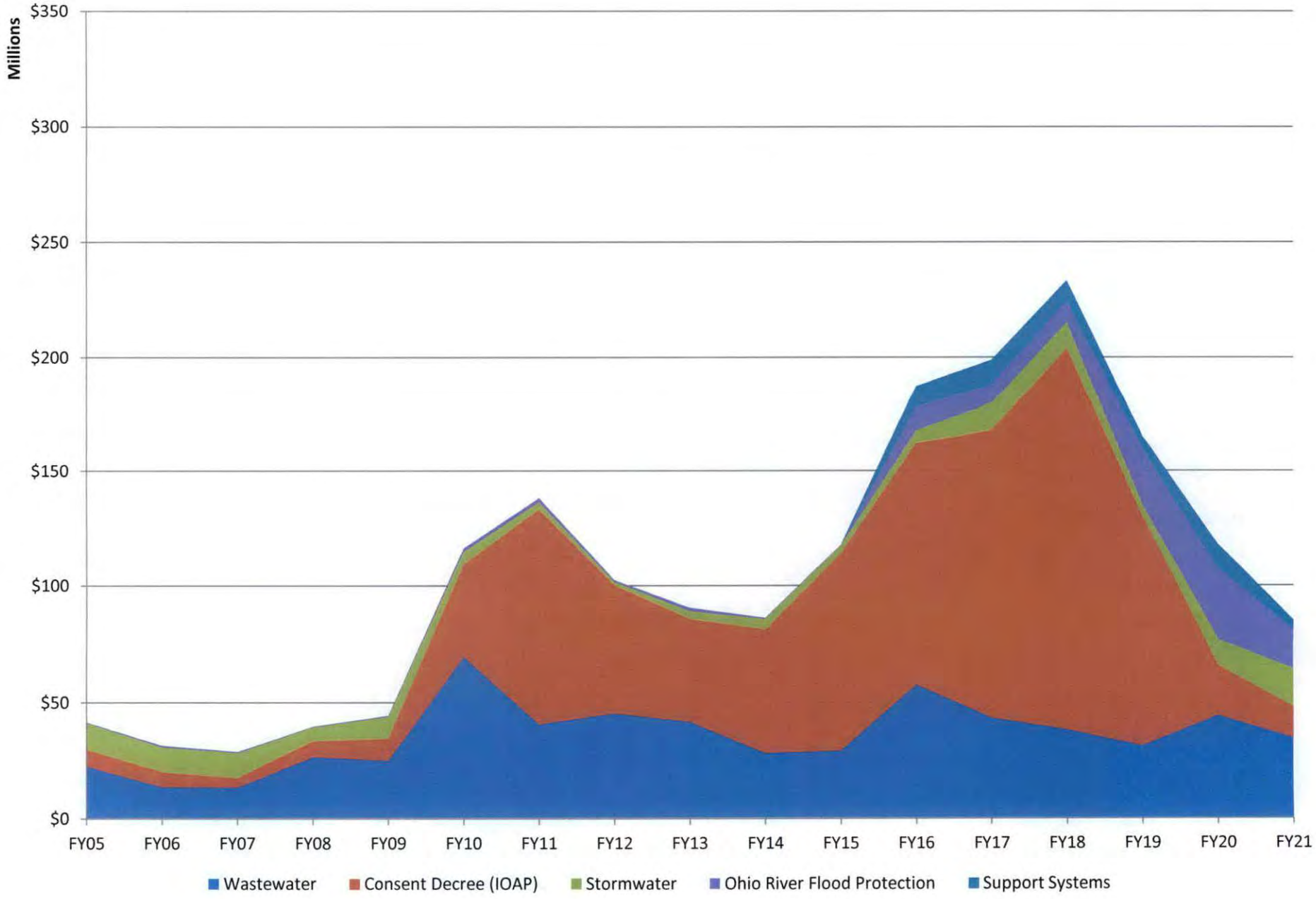
Service Type	FY17-FY21 Facility Plan Recommendation	$7.37/mo Scenario	Difference
Wastewater	$271,239,052	$190,697,052	($80,542,000)
Consent Decree (IOAP)	$472,169,371	$425,097,888	($47,071,483)
Stormwater	$164,911,016	$55,707,016	($109,204,000)
Ohio River Flood Protection	$95,835,263	$88,585,263	($7,250,000)
Support Systems	$51,935,000	$40,335,000	($11,600,000)
Grand Total	**$1,056,089,702**	**$800,422,219**	**($255,667,483)**

msd
Safe, clean waterways

Service Type	FY17-FY21 Facility Plan Recommendation	$7.37/mo Scenario	Difference
Wastewater	**$743,408,423**	**$615,794,940**	**($127,613,483)**
CMOM	$169,153,599	$123,111,599	($46,042,000)
Consent Decree (IOAP)	$472,169,371	$425,097,888	($47,071,483)
Development	$16,010,000	$4,010,000	($12,000,000)
NMC	$86,075,453	$63,575,453	($22,500,000)
Stormwater	**$260,746,279**	**$144,292,279**	**($116,454,000)**
Drainage	$132,438,516	$35,234,516	($97,204,000)
Floodplain Management	$20,100,000	$8,100,000	($12,000,000)
Ohio River Flood Protection	$95,835,263	$88,585,263	($7,250,000)
Stormwater Quality (MS4)	$12,372,500	$12,372,500	$0
Support Systems	**$51,935,000**	**$40,335,000**	**($11,600,000)**
Capital Equipment	$23,050,000	$12,050,000	($11,000,000)
Facilities	$24,210,000	$23,610,000	($600,000)
IT	$3,100,000	$3,100,000	$0
LOJIC	$1,575,000	$1,575,000	$0
Grand Total	**$1,056,089,702**	**$800,422,219**	**($255,667,483)**

msd
Safe, clean waterways

Capital Budget Trends
$7.37/mo Scenario



$3.39/mo comparison to Facility Plan Recommendation

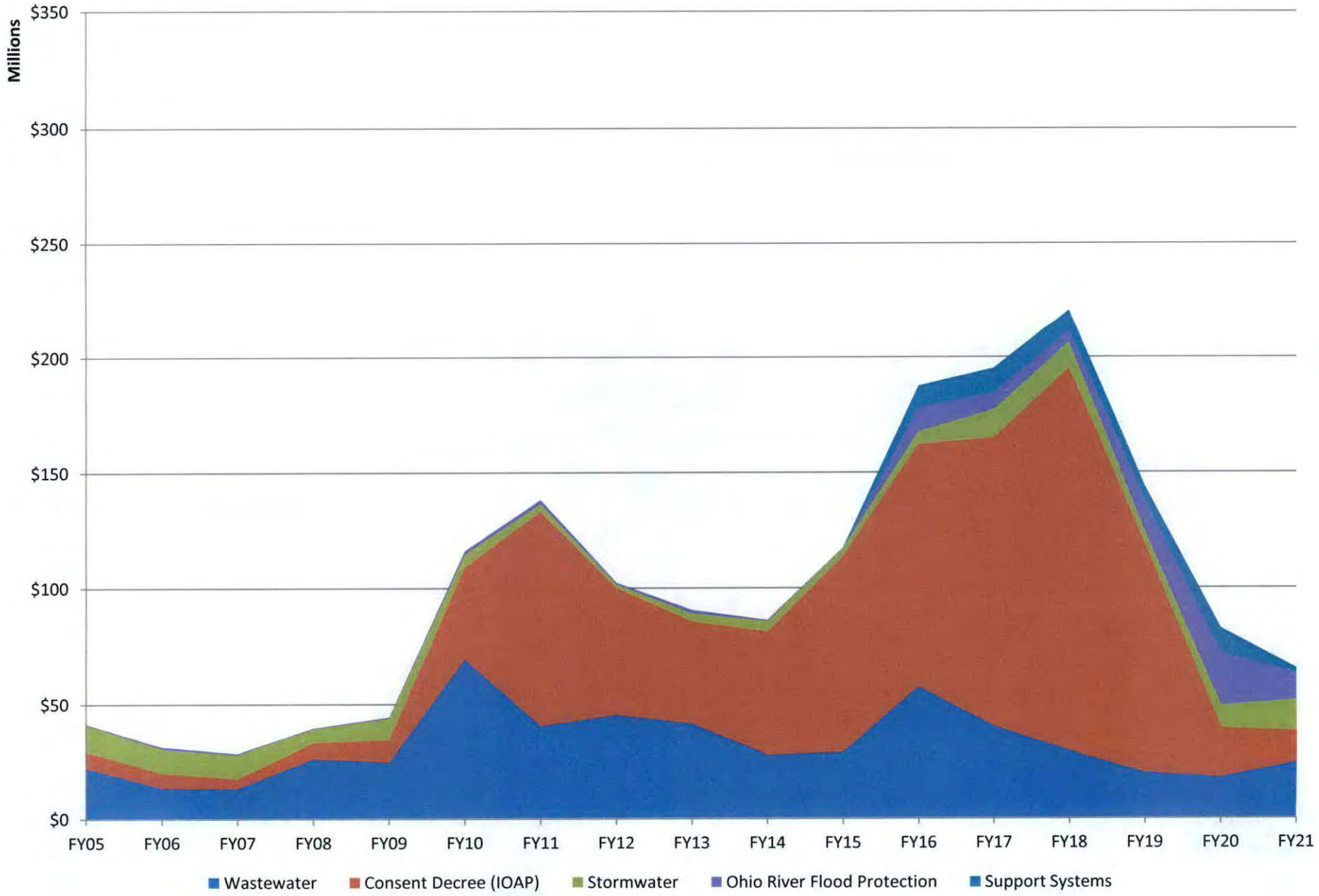
Service Type	FY17-FY21 Facility Plan Recommendation	$3.39/mo Scenario	Difference
Wastewater	$271,239,052	$132,150,052	($139,089,000)
Consent Decree (IOAP)	$472,169,371	$425,097,888	($47,071,483)
Stormwater	$164,911,016	$51,207,016	($113,704,000)
Ohio River Flood Protection	$95,835,263	$60,540,263	($35,295,000)
Support Systems	$51,935,000	$38,335,000	($13,600,000)
Grand Total	**$1,056,089,702**	**$707,330,219**	**($348,759,483)**

msd
Safe, clean waterways

Service Type	FY17-FY21 Facility Plan Recommendation	$3.39/mo Scenario	Difference
Wastewater	**$743,408,423**	**$557,247,940**	**($186,160,483)**
CMOM	$169,153,599	$94,537,599	($74,616,000)
Consent Decree (IOAP)	$472,169,371	$425,097,888	($47,071,483)
Development	$16,010,000	$4,010,000	($12,000,000)
NMC	$86,075,453	$33,602,453	($52,473,000)
Stormwater	**$260,746,279**	**$111,747,279**	**($148,999,000)**
Drainage	$132,438,516	$30,734,516	($101,704,000)
Floodplain Management	$20,100,000	$8,100,000	($12,000,000)
Ohio River Flood Protection	$95,835,263	$60,540,263	($35,295,000)
Stormwater Quality (MS4)	$12,372,500	$12,372,500	$0
Support Systems	**$51,935,000**	**$38,335,000**	**($13,600,000)**
Capital Equipment	$23,050,000	$10,050,000	($13,000,000)
Facilities	$24,210,000	$23,610,000	($600,000)
IT	$3,100,000	$3,100,000	$0
LOJIC	$1,575,000	$1,575,000	$0
Grand Total	**$1,056,089,702**	**$707,330,219**	**($348,759,483)**

msd
Safe, clean waterways

Capital Budget Trends
$3.39/mo Scenario



Deed Restricted Floodplain Acquisitions

JEFFERSON COUNTY, KENTUCKY

msd
Safe, clean waterways

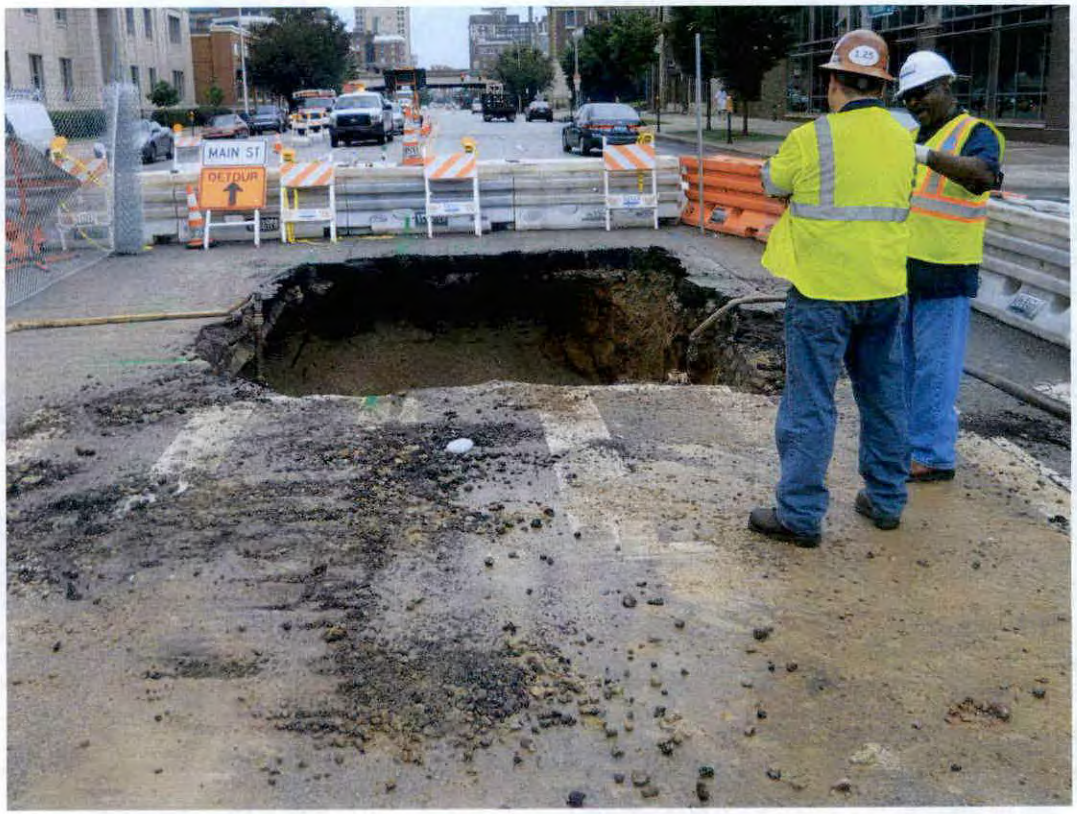
The system includes the most vital components of the community's backbone

Wastewater collection and treatment

Stormwater and drainage management

Reliable flood protection

msd
Safe, clean waterways



msd
Safe, clean waterways

Aging infrastructure below ground can have dramatic impacts above ground

Schiller Ave sewer collapse, January 2016
*Originally built in **1912***

msd
Safe, clean waterways

Aging infrastructure below ground can have dramatic impacts above ground

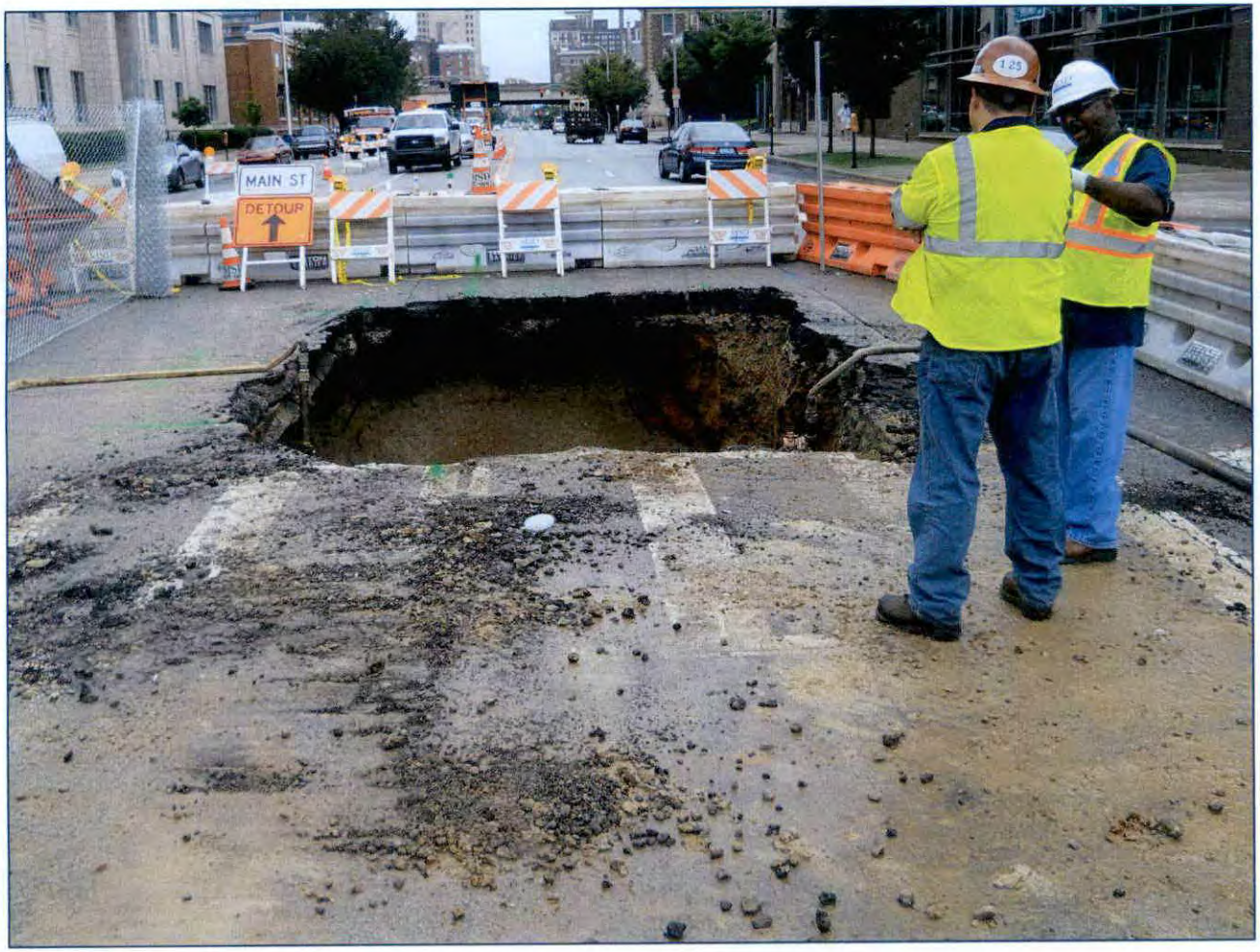
Trolley gets stuck in sinkhole downtown

Friday, November 7th 2014, 9:58 pm EST

LOUISVILLE, KY (WAVE) – Several passengers were on board a trolley as it drove over a sewer grate that gave way, creating a small sink hole in downtown Louisville, according to MetroSafe.

msd
Safe, clean waterways

When infrastructure fails, jobs and economic development are at risk

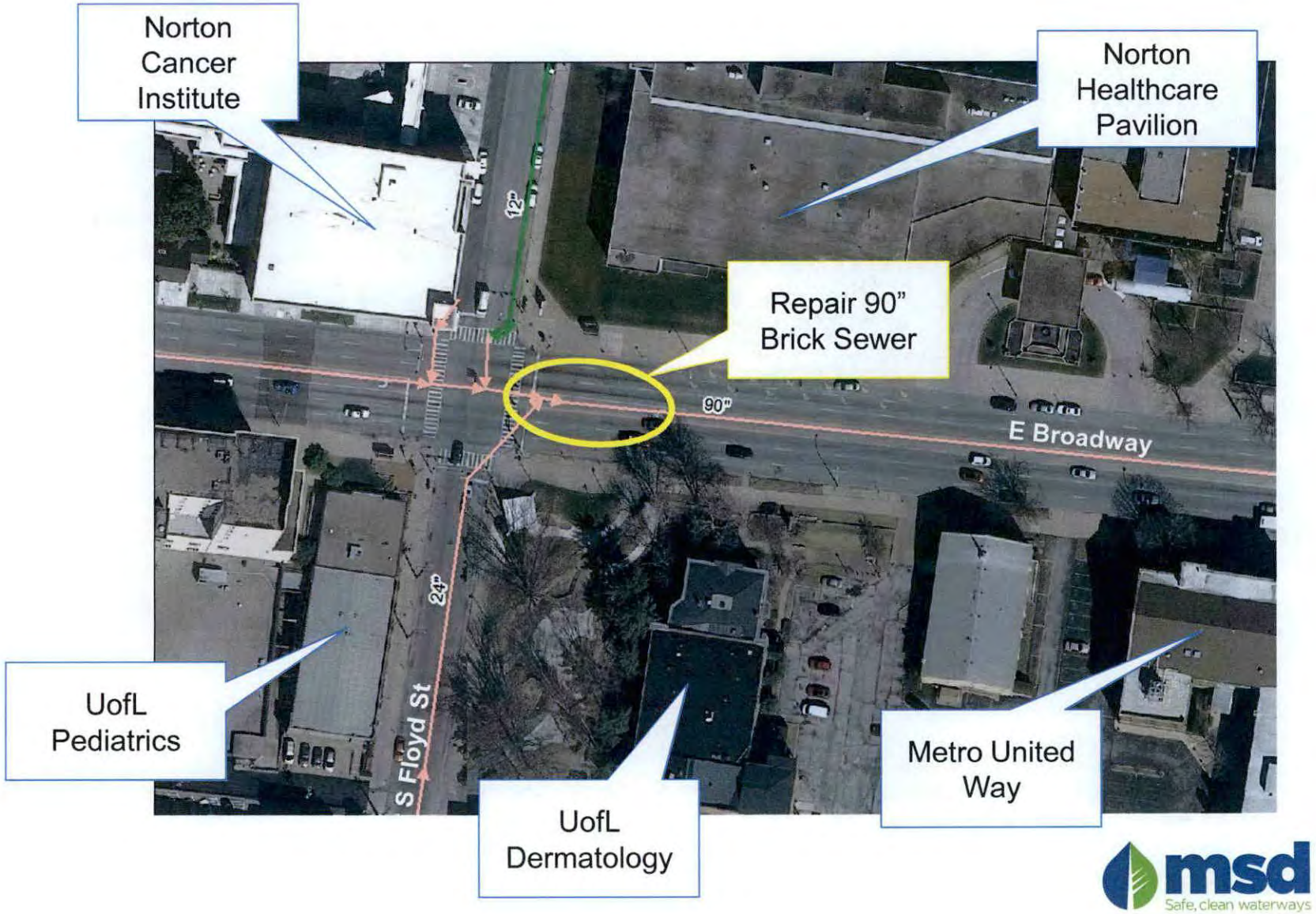


Broadway & Floyd 90-inch brick sewer repair, July 2015

*Originally built in **1937***

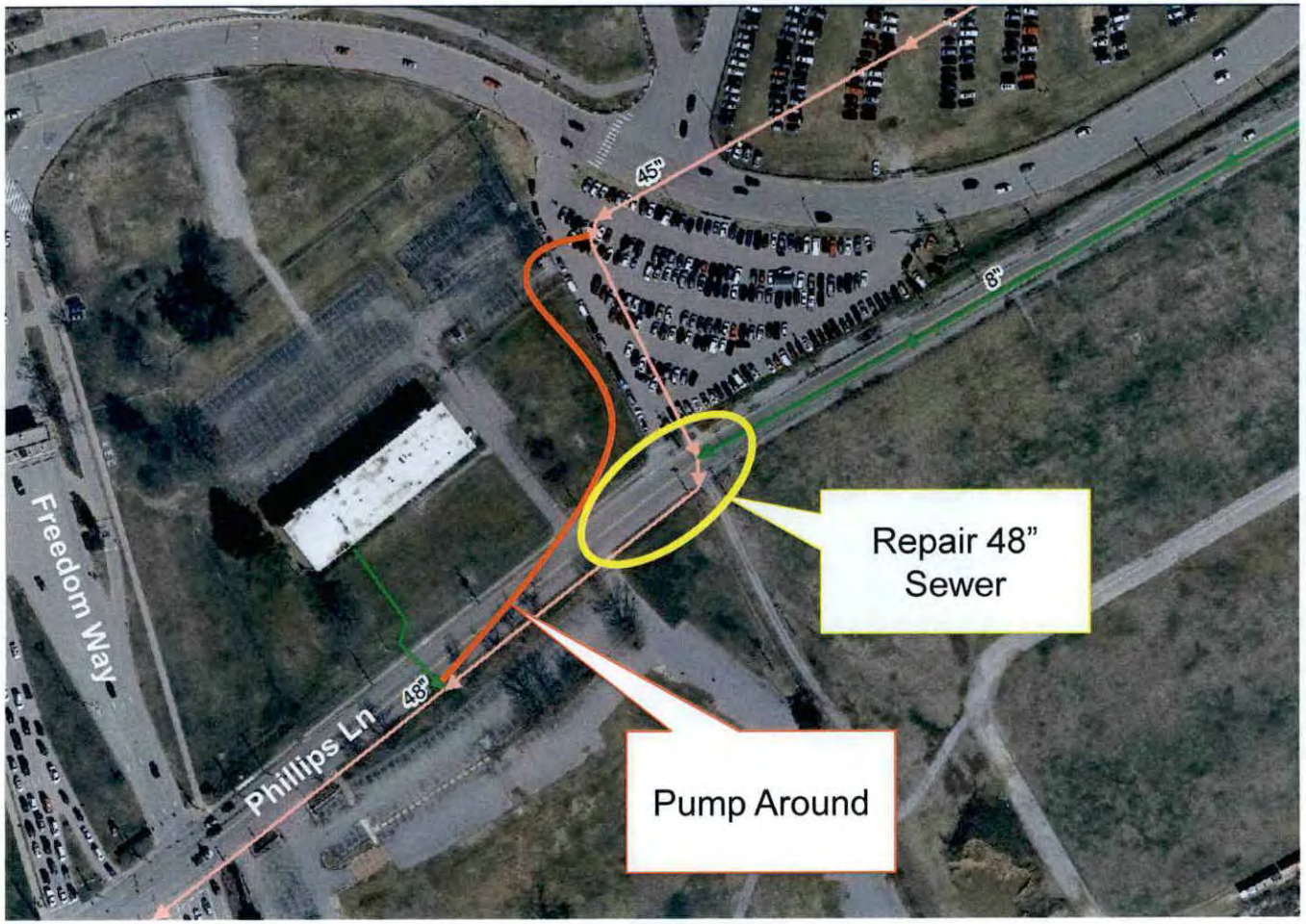
msd
Safe, clean waterways

Major employers and vital services were impacted



msd
Safe, clean waterways

Failing infrastructure also impacts tourism and the City's image



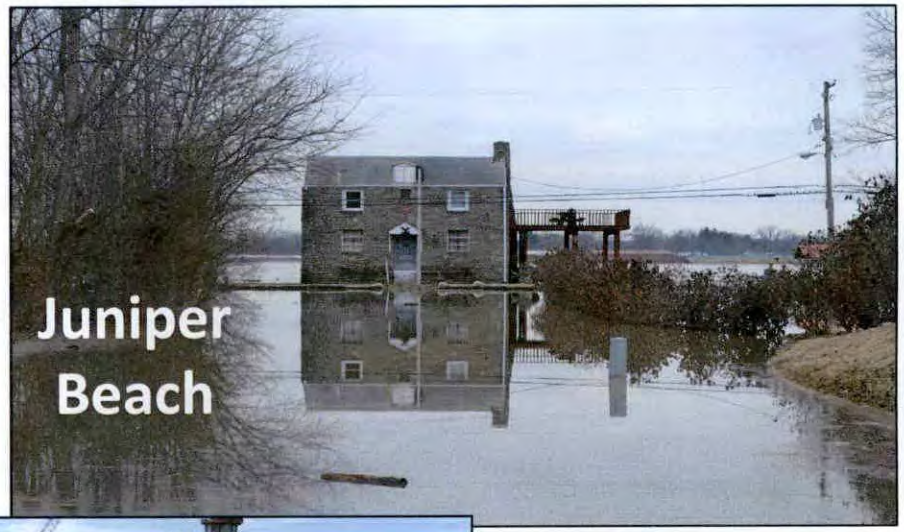
Phillips Lane repair impacted access to Kentucky Fair & Exposition Center during:

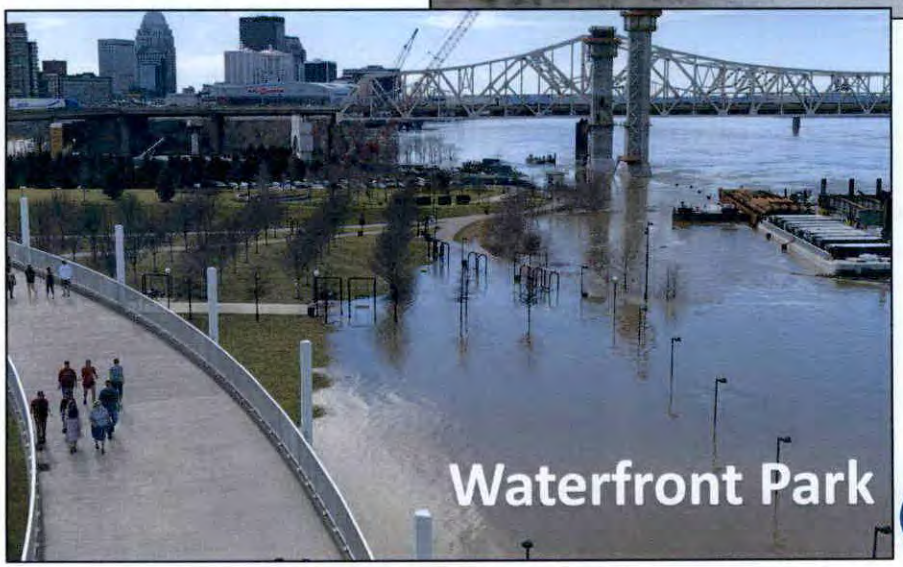
- largest Flea Market in KY
- largest Gun Show in KY
- annual Cat Show

msd
Safe, clean waterways

This was evident during the 2015 Ohio River flooding

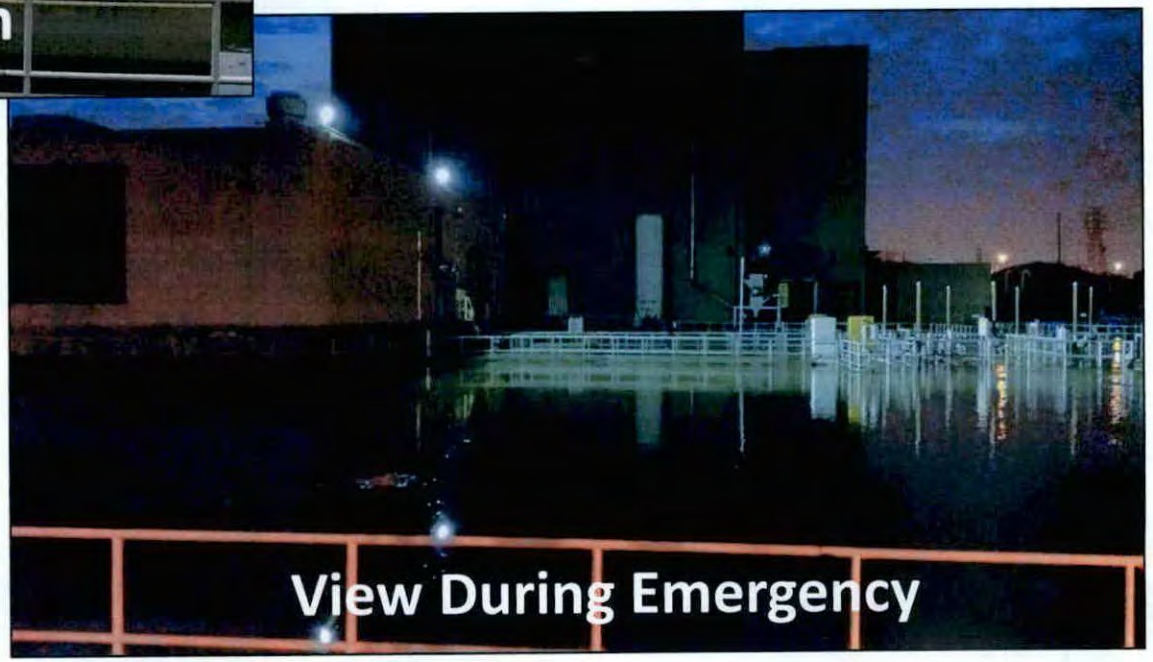
- Extreme weather events converged
- Flows were 4.5 times the normal rate





msd
Safe, clean waterways

2015 Morris Forman Power Outage could have had catastrophic community impacts



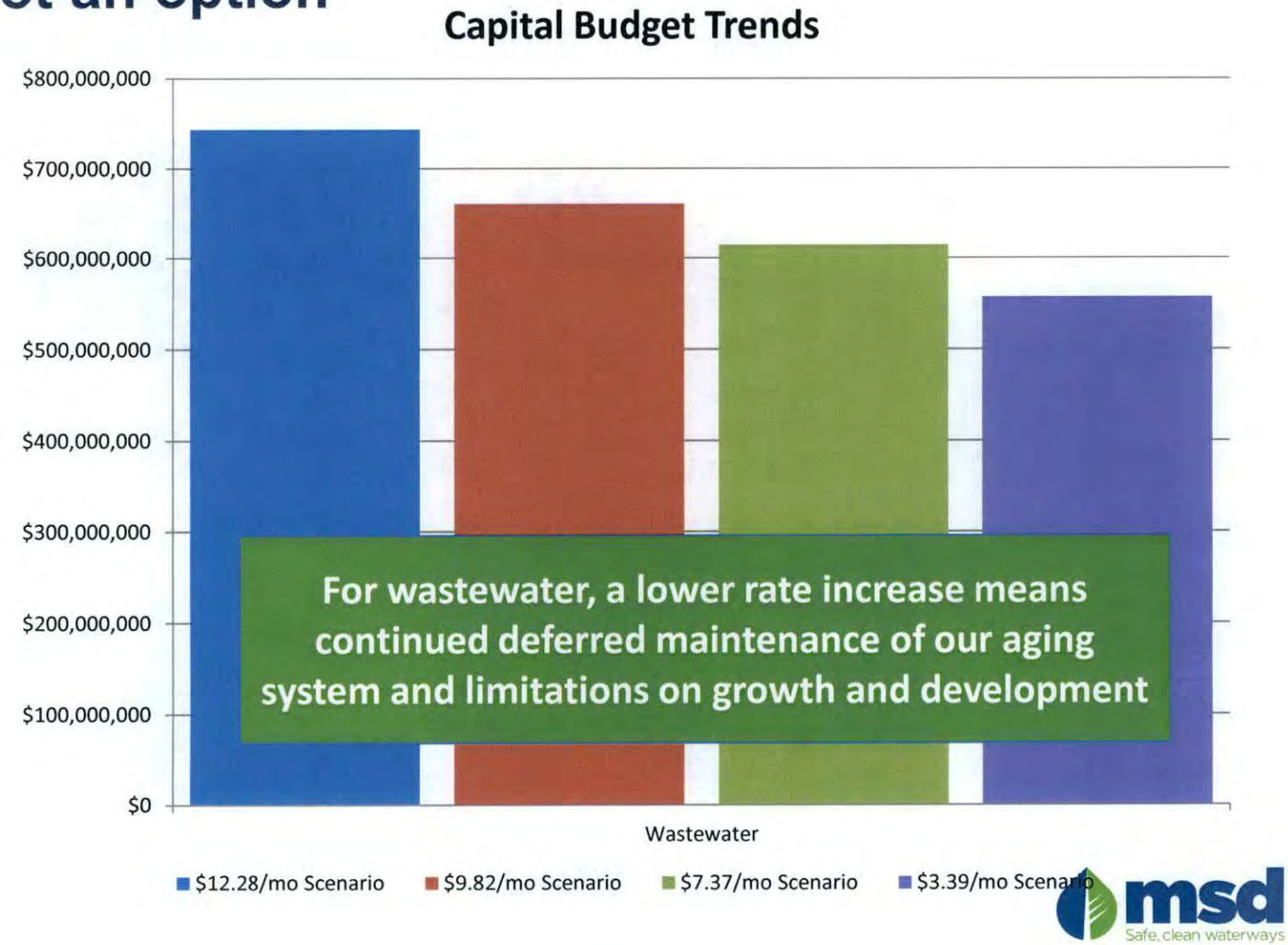
Partnerships with University of Louisville to improve safety

Viaduct Flood Relief

- Four viaducts in the UofL area flood during ***small*** storms
- Viaduct pump stations are ***drastically undersized*** and were likely designed to empty rather than prevent ponding

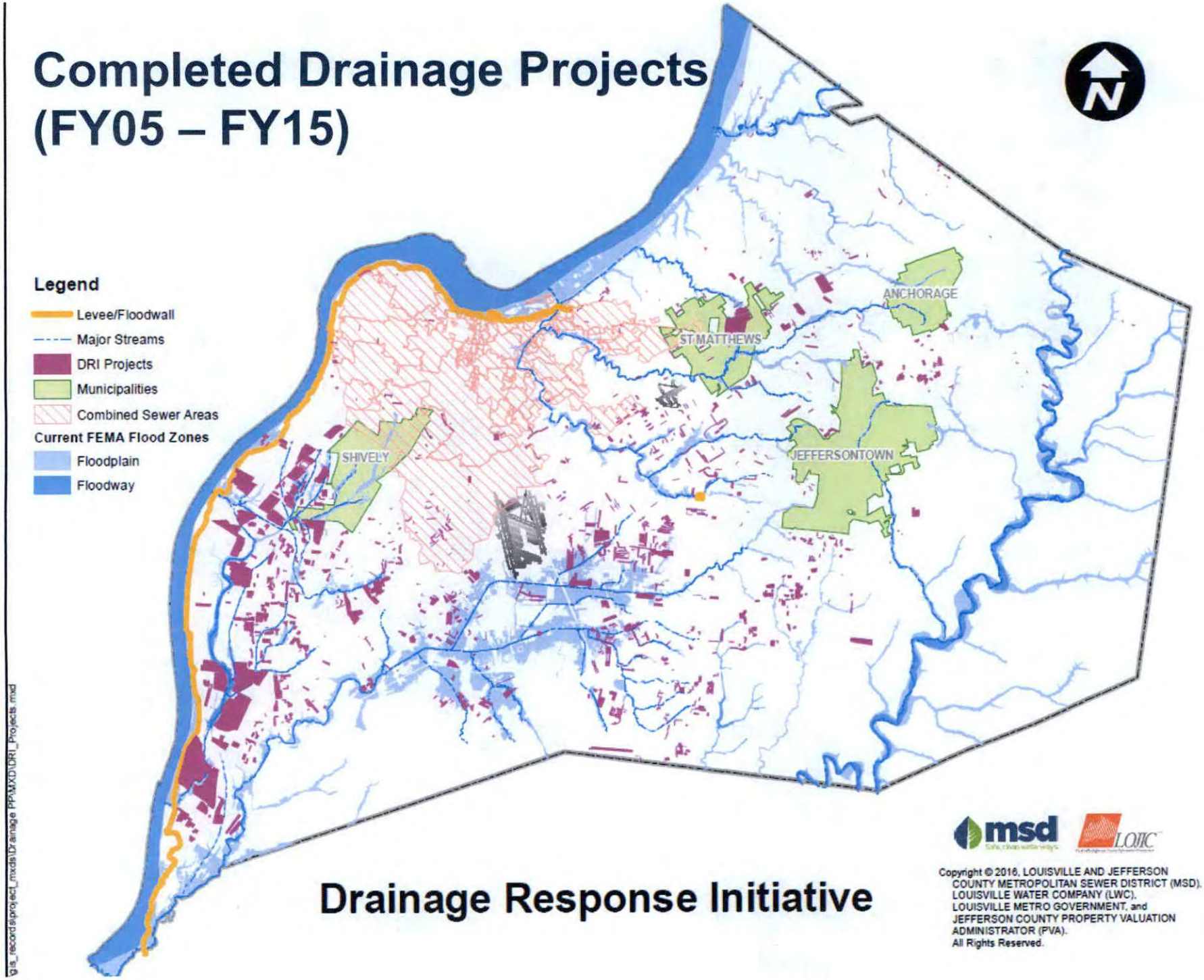
msd
Safe, clean waterways

Overflow abatement must continue on schedule, therefore decreased funding for the Consent Decree is not an option



msd
Safe. clean waterways

Completed Drainage Projects (FY05 – FY15)

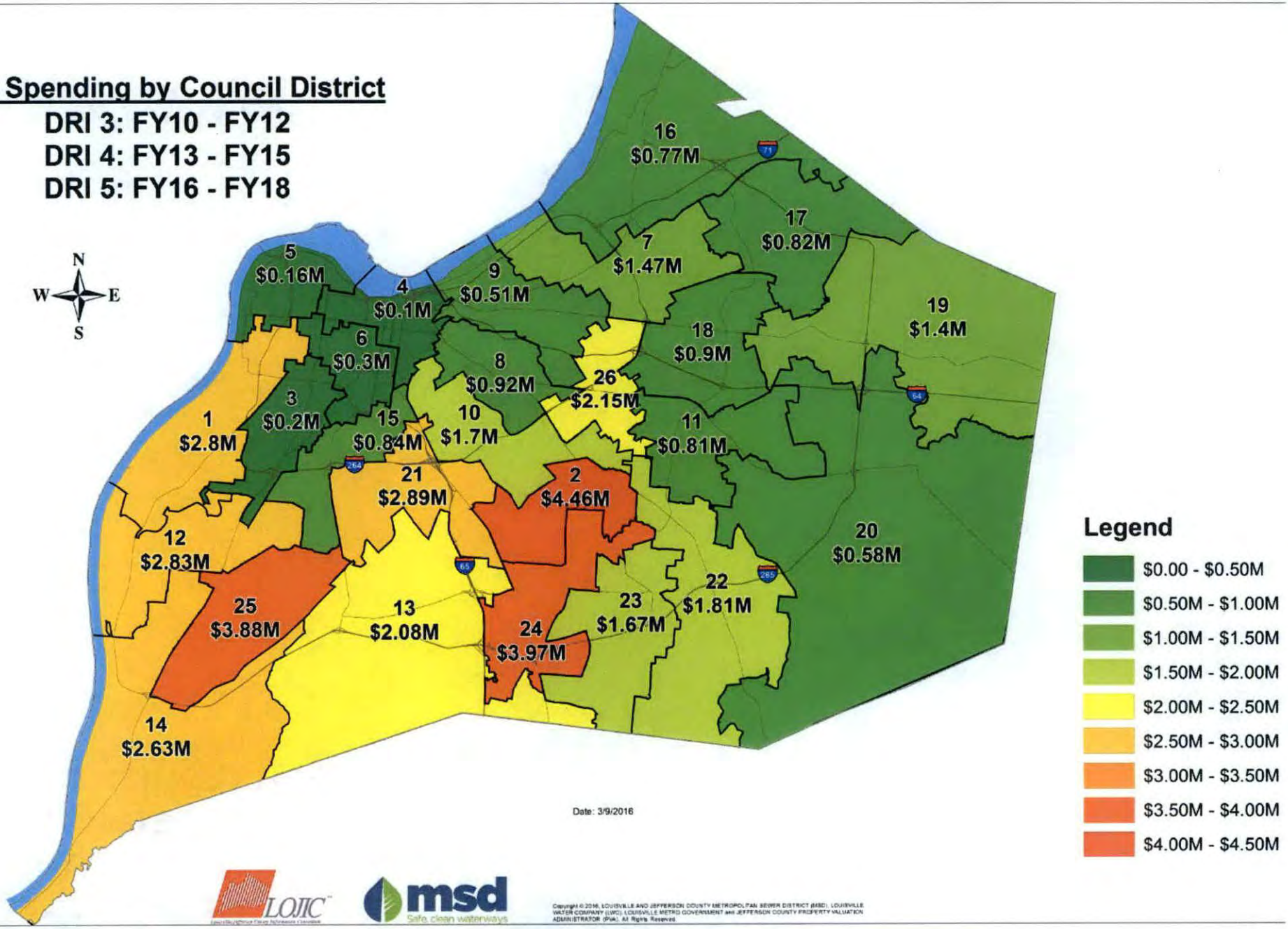


Drainage Response Initiative

g:\s_records\project_mxds\Drainage PFA\MXD\DRI_Projects.mxd

DRI Spending by Council District

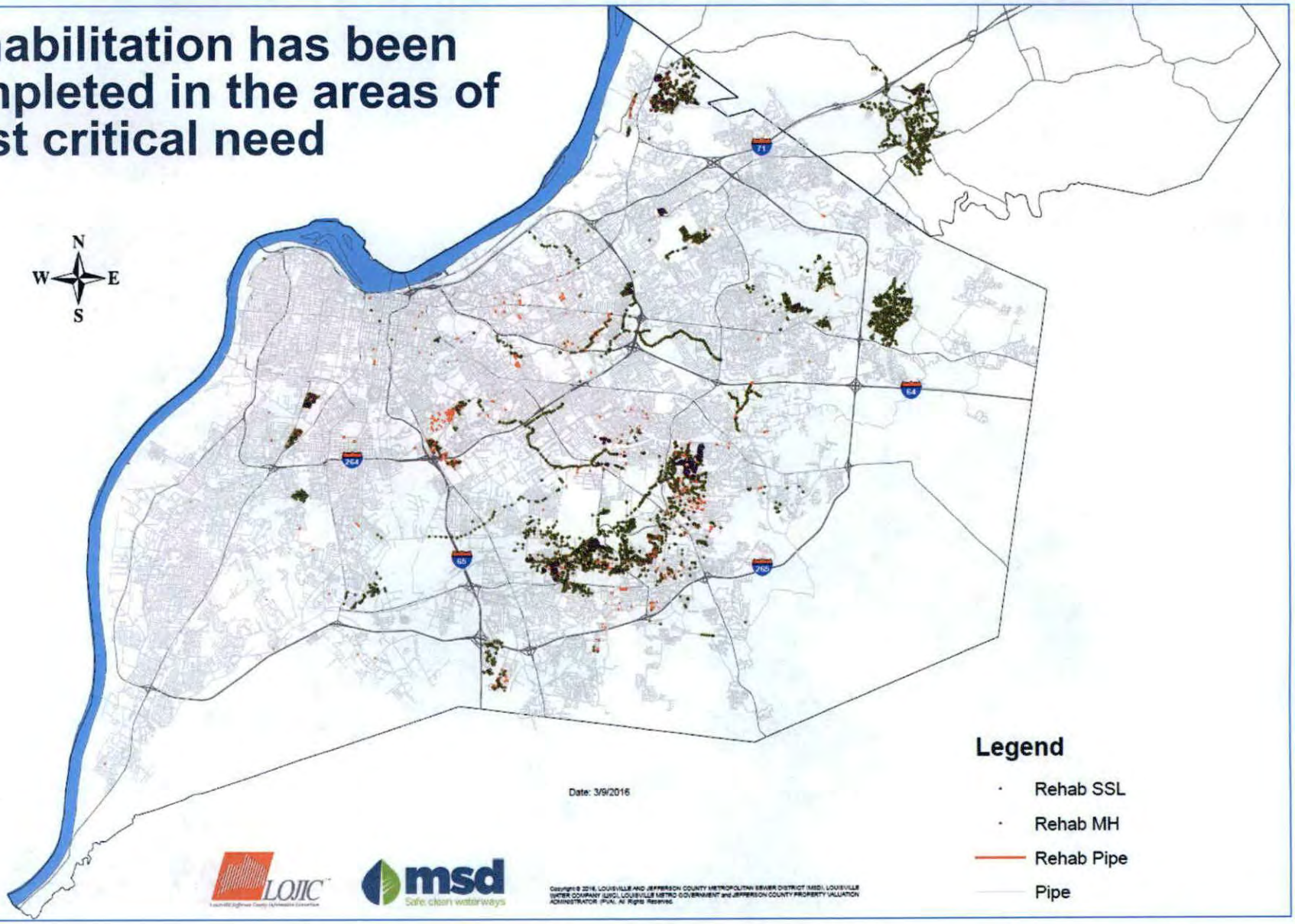
DRI 3: FY10 - FY12
DRI 4: FY13 - FY15
DRI 5: FY16 - FY18



LOJIC

msd
Safe, clean waterways

Rehabilitation has been completed in the areas of most critical need



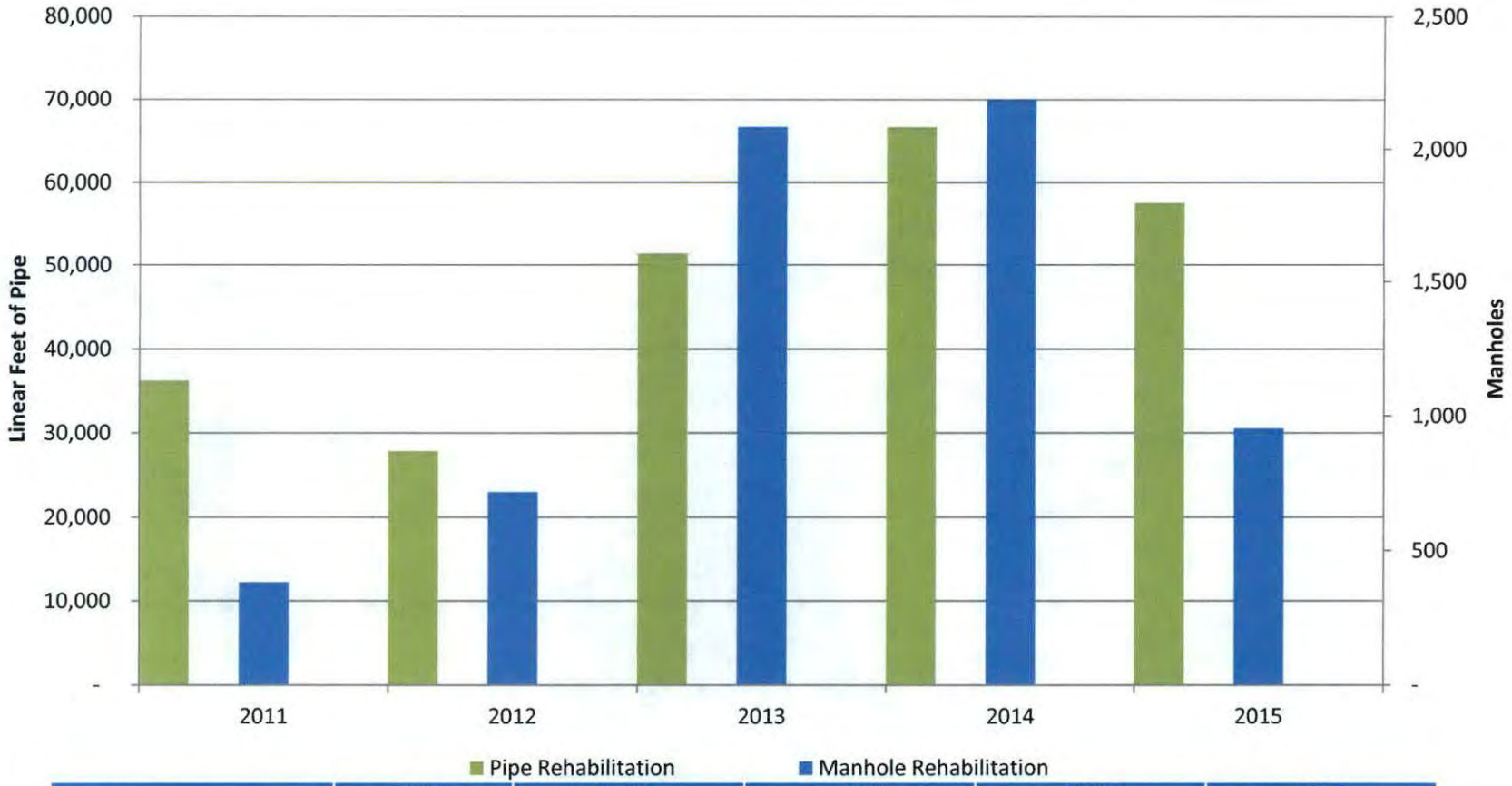
LOJIC

msd
Safe, clean waterways

msd
Safe, clean waterways

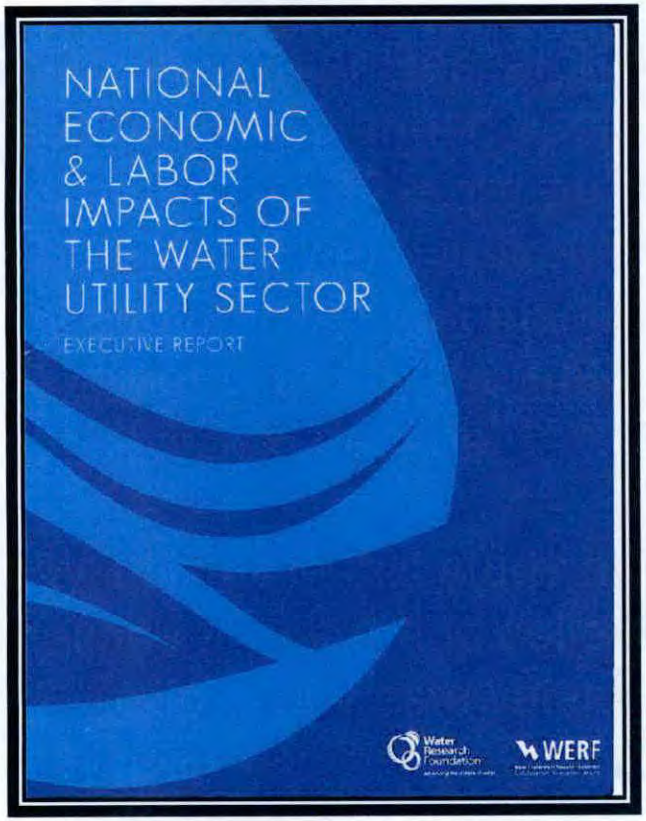
I/I Remediation Program Summary 2011-2015

(Includes Completed Projects & Projects Under Contract)



	2011	2012	2013	2014	2015
Contracted Amount	$ 3,875,750.65	$ 2,854,324.00	$ 6,390,390.96	$ 6,165,329.79	$5,175,304.73
Manhole Rehabilitation	381	716	2,084	2,186	954
Pipe Rehabilitation	36,233	27,798	51,283	66,674	57,551

Studies have shown that value includes the positive impact on the national economy



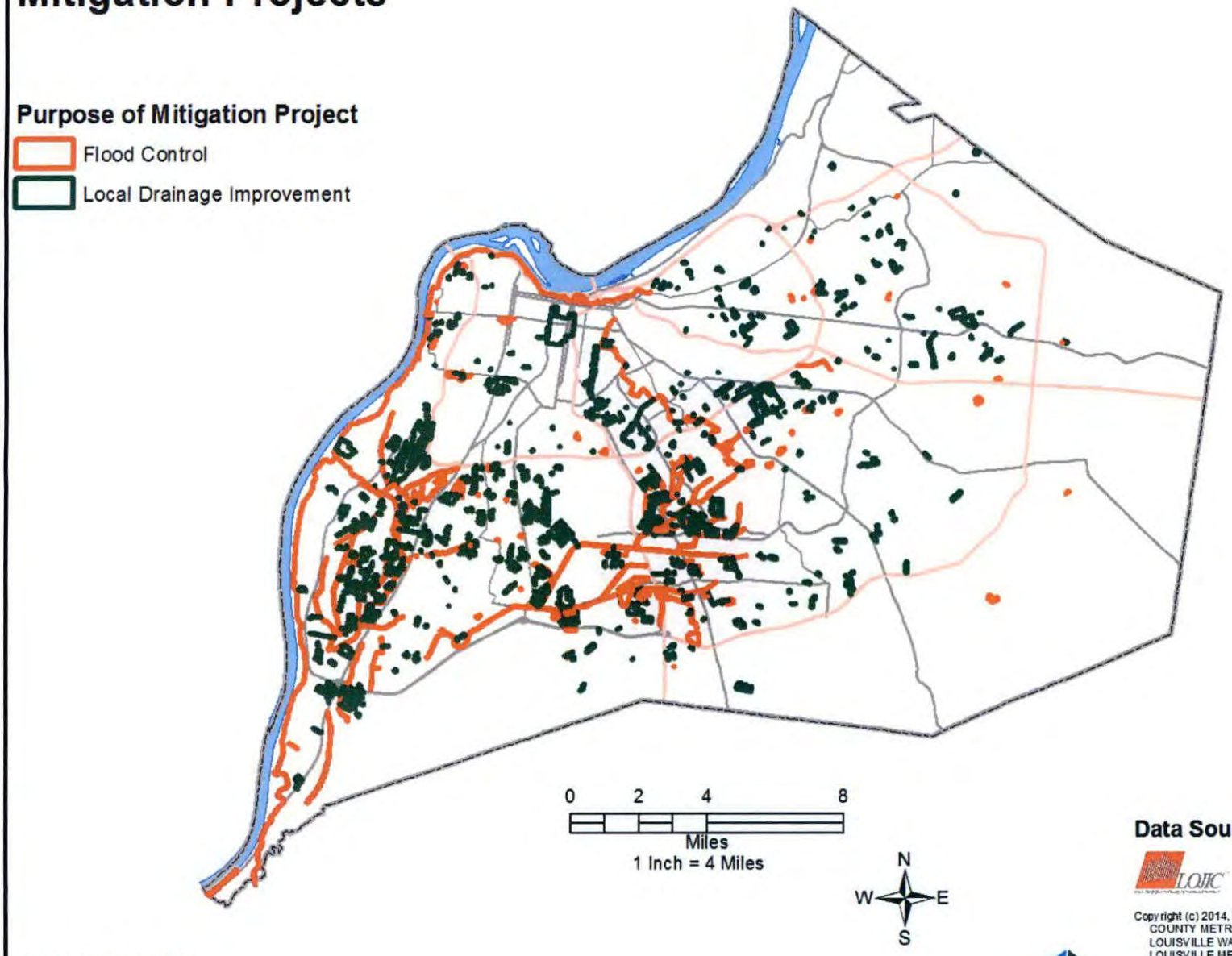
This study by the Water Research Foundation estimated how the planned operating and capital investments of **30 large public utilities** contribute directly and indirectly to the economy and employment markets in their respective regions **and to the nation** over the next decade.

Each day, utilities in this study distribute 7 billion gallons of water and collect 6 billion gallons of wastewater.

For full text of the complete study, visit www.waterrf.org

msd
Safe, clean waterways

Louisville and Jefferson County Mitigation Projects

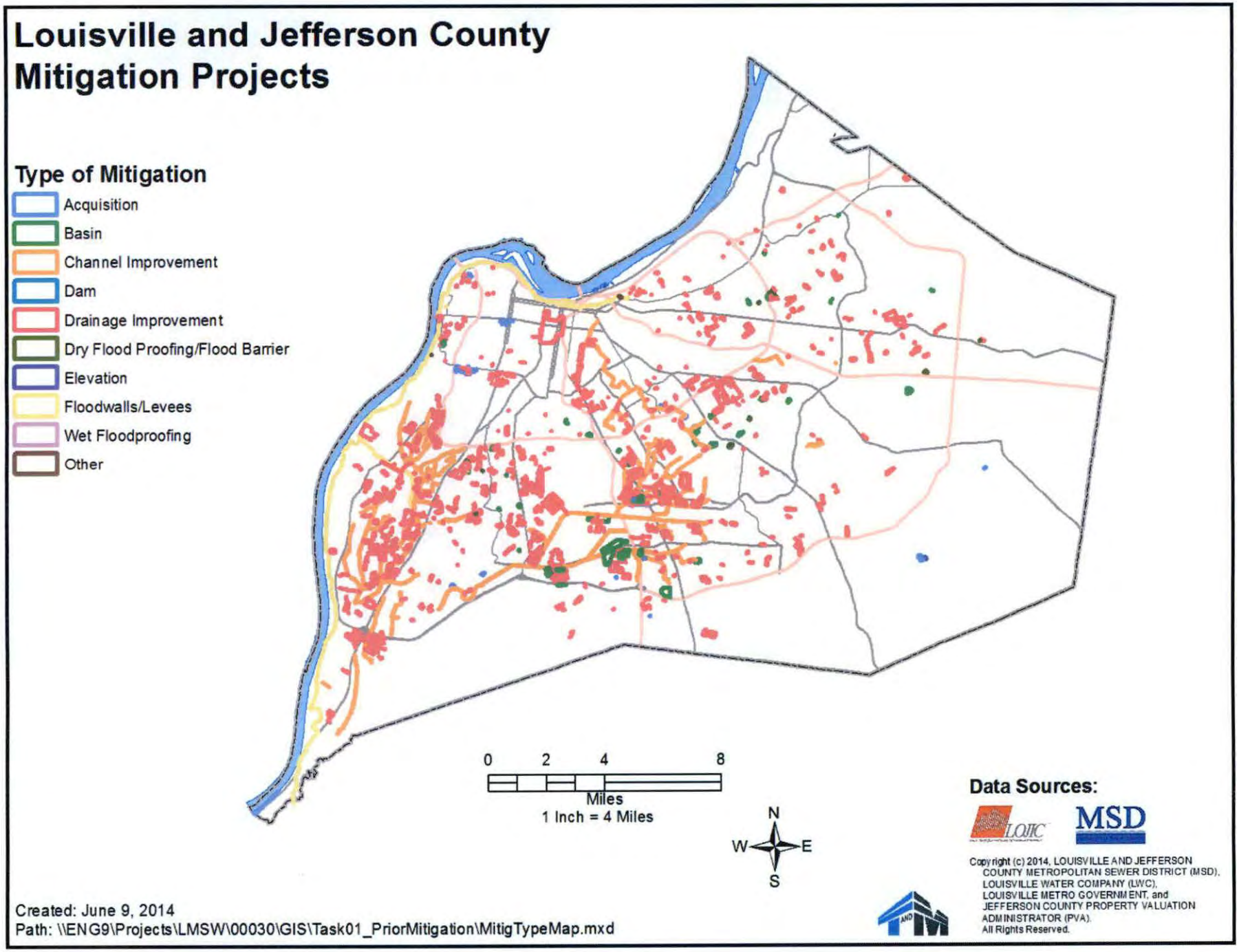


Data Sources:

LOJIC MSD

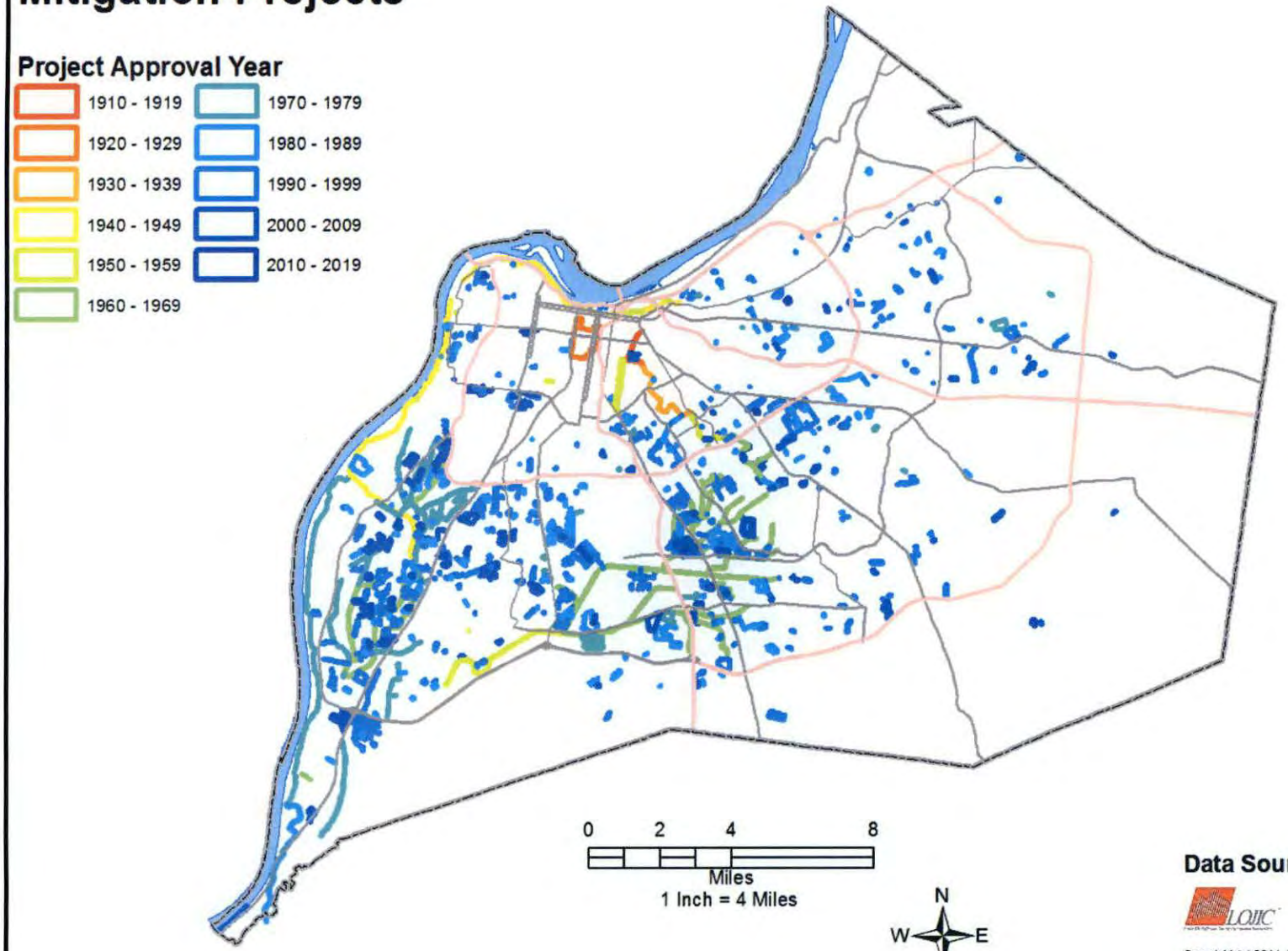
Created: June 9, 2014
Path: \\ENG9\Projects\LMSW\00030\GIS\Task01_PriorMitigation\MitigPurposeMap.mxd

Louisville and Jefferson County Mitigation Projects



Created: June 9, 2014
Path: \\ENG9\Projects\LMSW\00030\GIS\Task01_PriorMitigation\MitigTypeMap.mxd

Louisville and Jefferson County Mitigation Projects



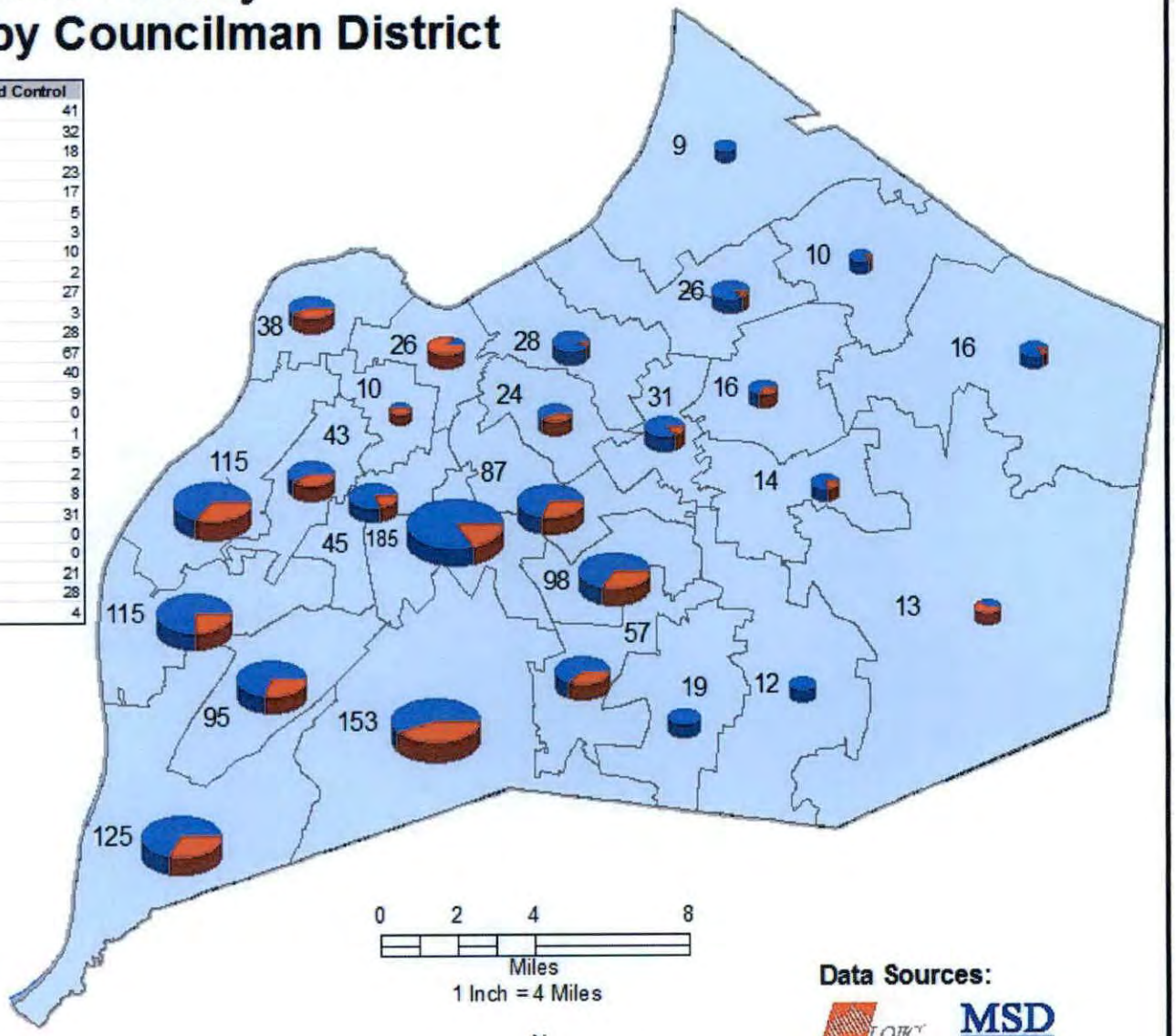
Data Sources:

LOJIC MSD

Created: June 9, 2014
Path: \\ENG9\Projects\LMSW\00030\GIS\Task01_PriorMitigation\MitigYearMap.mxd

Louisville and Jefferson County
Mitigation Projects by Councilman District

Council District	Total Projects	Drainage	Flood Control
1	115	74	41
2	98	66	32
3	43	25	18
4	26	3	23
5	38	21	17
6	10	5	5
7	26	23	3
8	24	14	10
9	28	26	2
10	87	60	27
11	14	11	3
12	115	87	28
13	153	86	67
14	125	85	40
15	45	36	9
16	9	9	0
17	10	9	1
18	16	11	5
19	16	14	2
20	13	5	8
21	185	154	31
22	12	12	0
23	19	19	0
24	57	36	21
25	95	67	28
26	31	27	4



Legend

- Total Projects
- Drainage Improvement
- Flood Control

Data Sources:

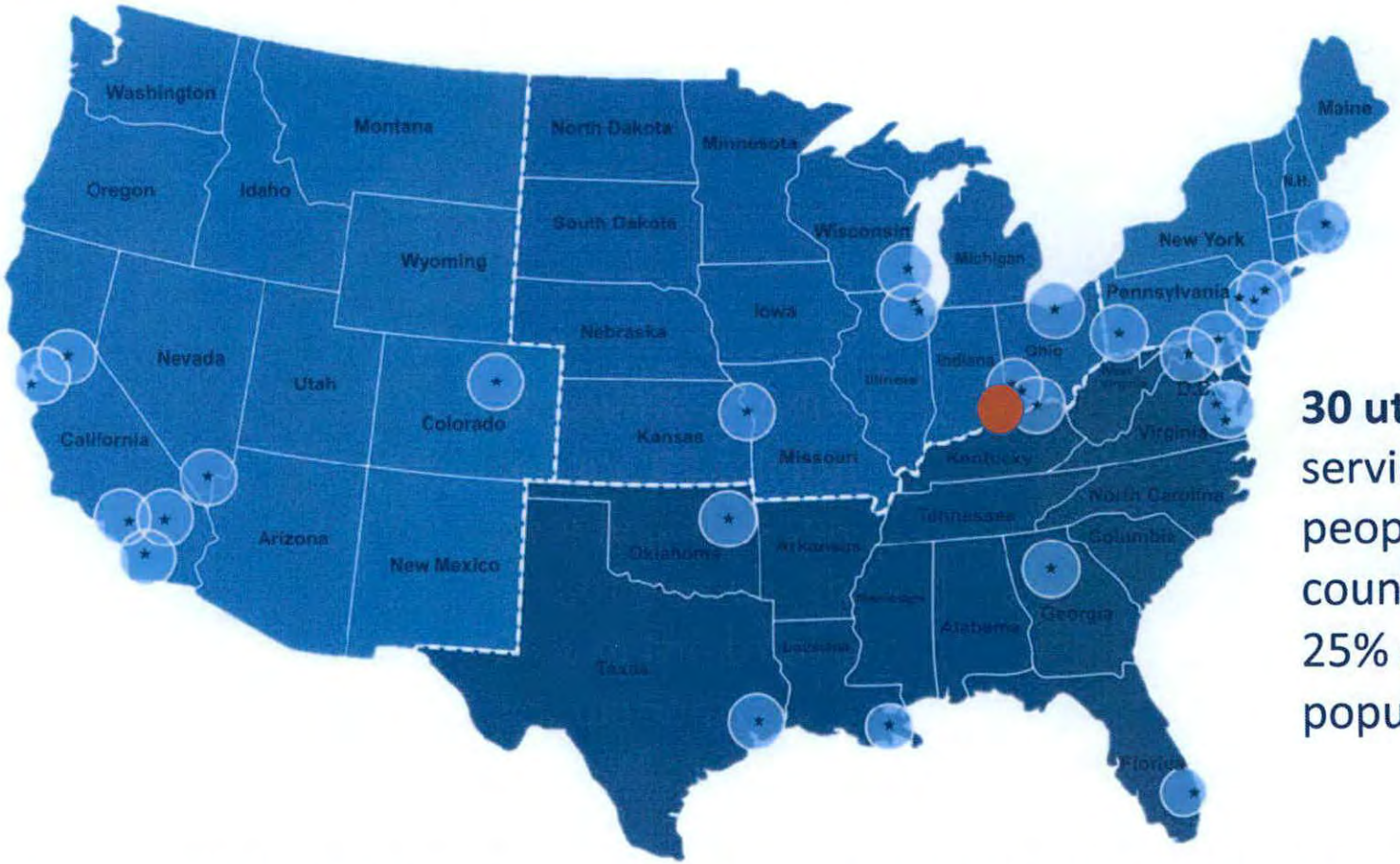
LOJIC MSD

Date: 7/25/2014

I:\LMSW\00030\GIS\Task01_PriorMitigation\CouncilDis.mxd

msd
Safe. clean waterways

Studies have shown 'value' includes the positive impact on the national economy



30 utilities studied, serving **83 million** people across the country - more than 25% of the total US population

National Economic and Labor Impacts of the Water Utility Sector | Water Research Foundation and Water Environment Research Foundation

msd
Safe, clean waterways

Impact of 30 utilities = $524 billion and 289,000 jobs over 10 years

According to Dept of Commerce every $1 we invest = $2.62 for local economy

Economic Output

$179B
Direct

+

$345B
Indirect & Induced

=

$524B
Total Economic Output

$299 billion from Operating Budgets
$225 billion from Capital Plans
289,000 permanent jobs

National Economic and Labor Impacts of the Water Utility Sector | Water Research Foundation and Water Environment Research Foundation

msd
Safe, clean waterways

The economic impact in Louisville is $3.4 billion and 2,310 jobs over 10 years

$1M = 5 Jobs + 11 Jobs = 16 Jobs
Investment | Direct Impact | Indirect & Induced Impact | Total

Economic Output

$1.8B
Direct

+

$1.7B
Indirect and Induced

=

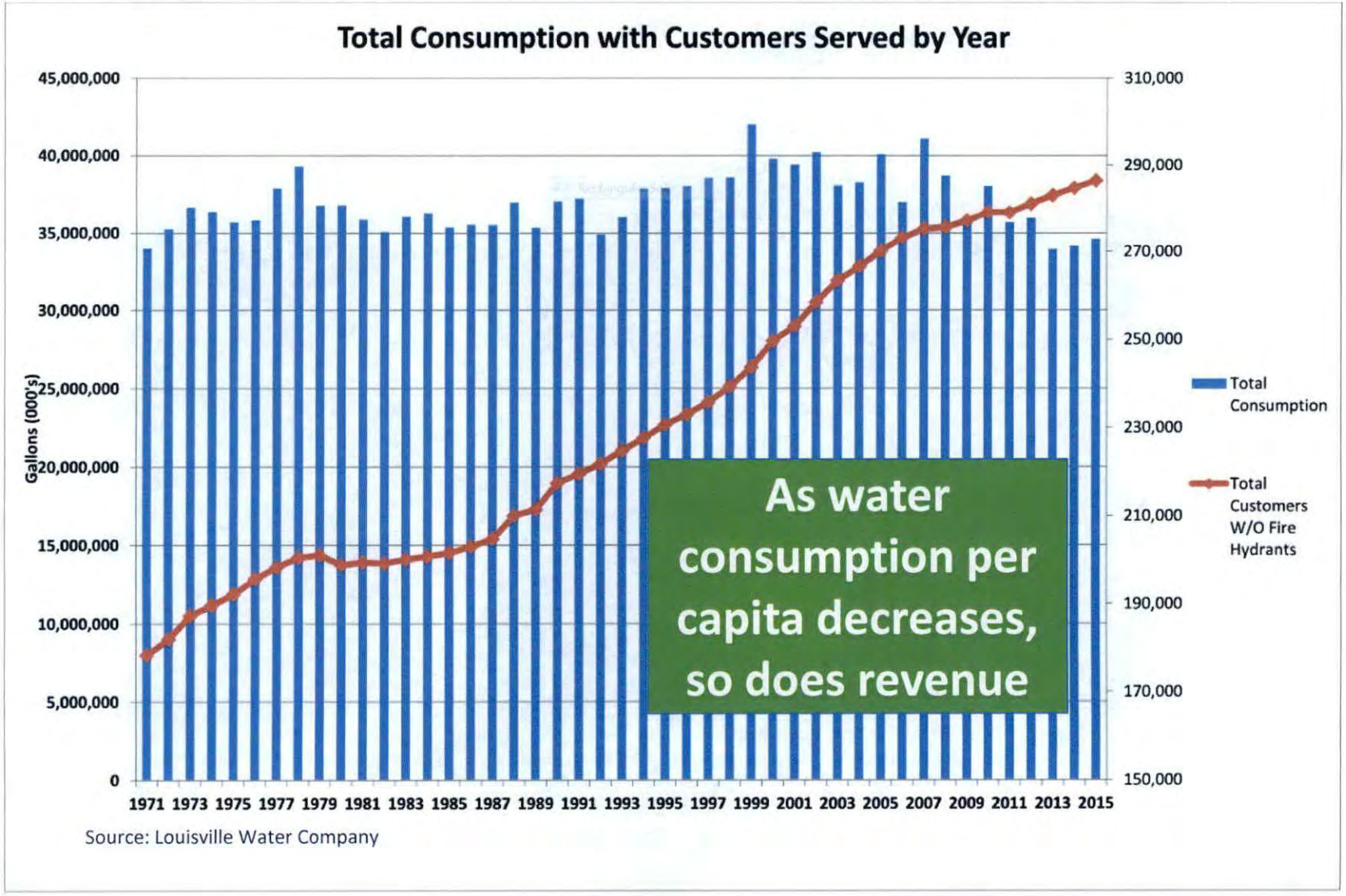
$3.4B
Total Economic Output

Jobs Created
1,030 direct
1,270 indirect
2,310 total

National Economic and Labor Impacts of the Water Utility Sector | Water Research Foundation and Water Environment Research Foundation

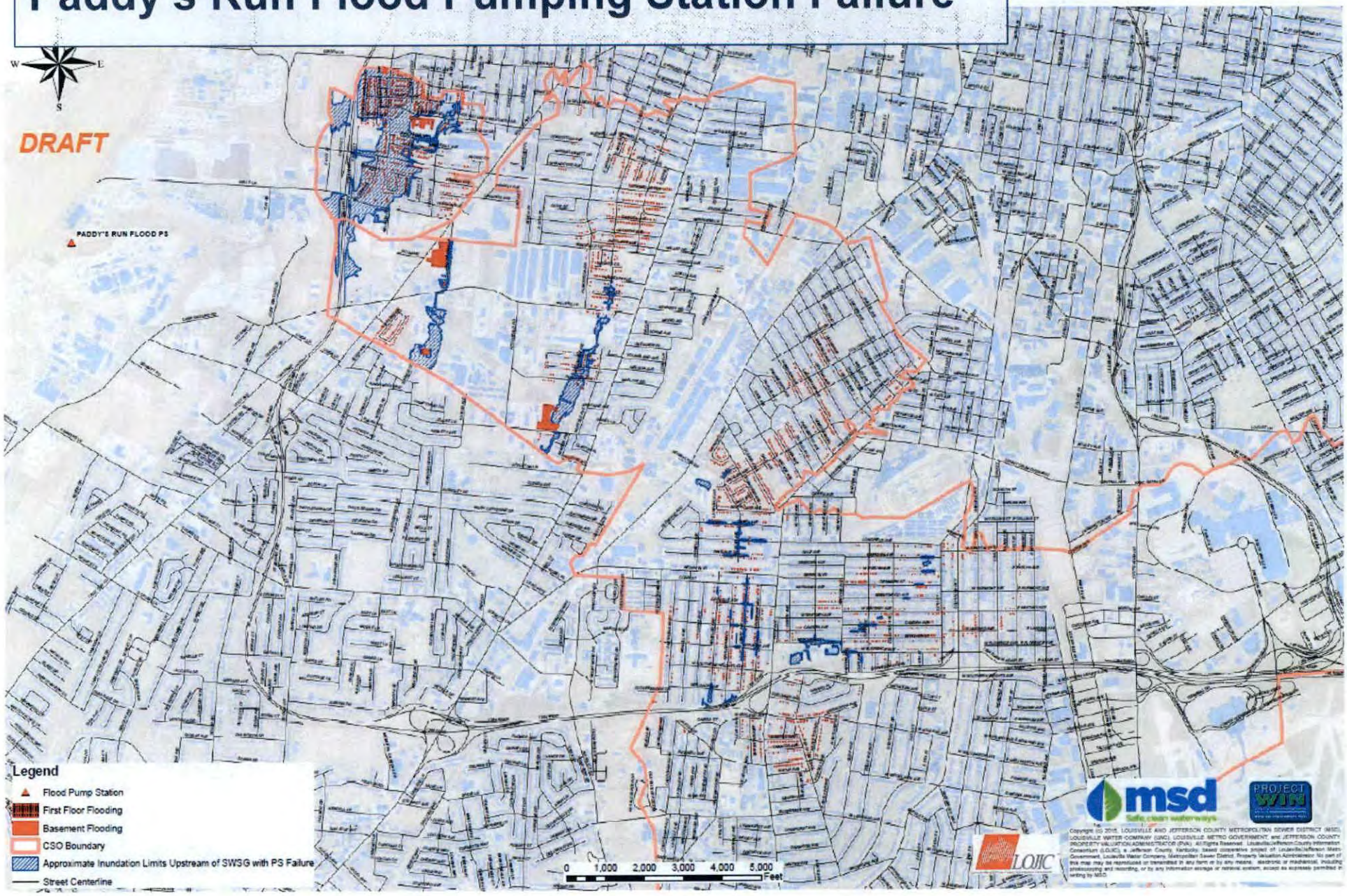
msd
Safe, clean waterways

Despite system expansion to meet population growth, water consumption has declined

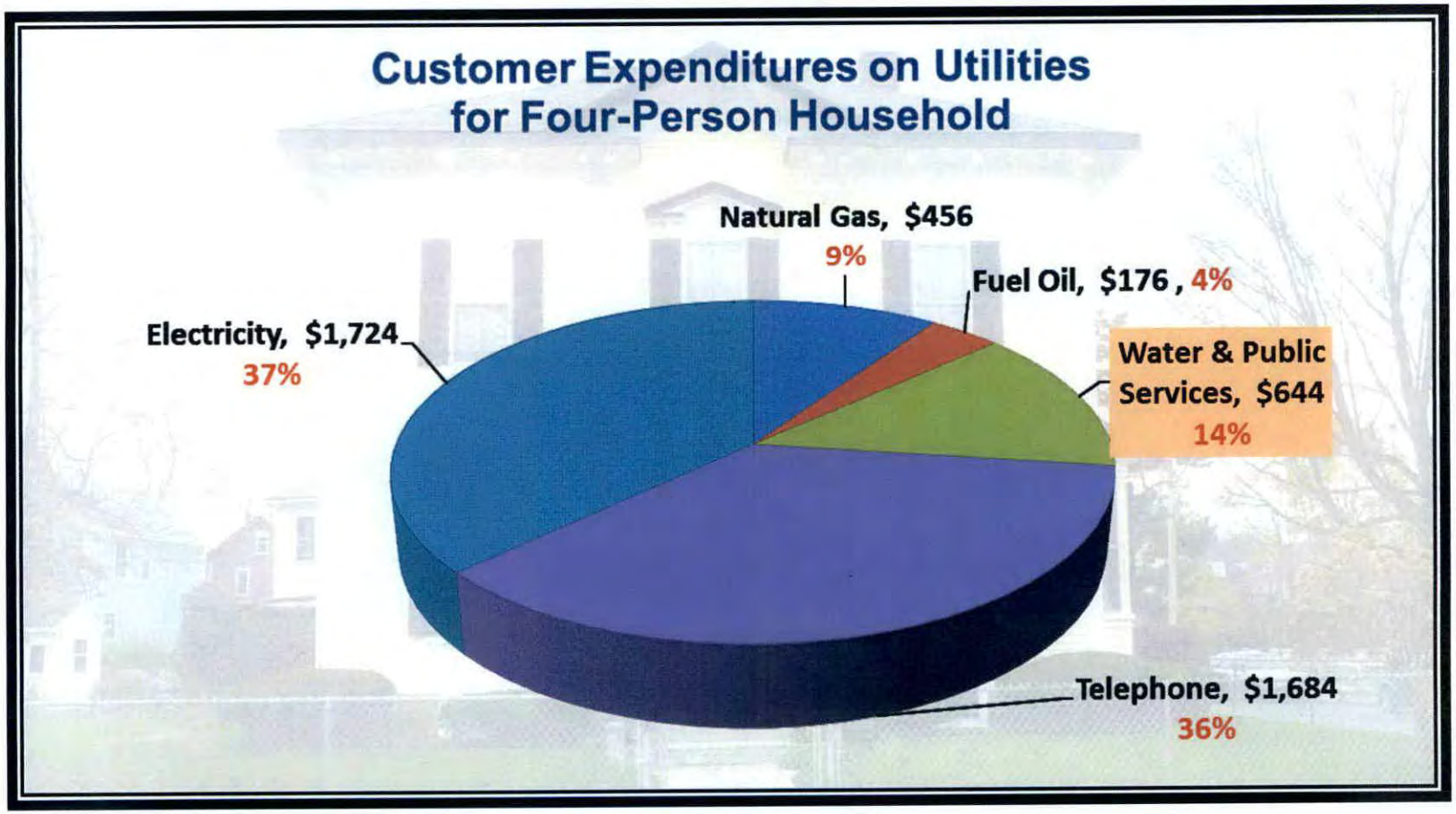


Source: Louisville Water Company

Paddy's Run Flood Pumping Station Failure



Water and sewer is *less than 1%* of total household expenditures



Utility Expenditures $4,683/year; ≈7% Total Household Expenditures
Source: Michigan State University Institute of Public Utilities, 2012

msd
Safe, clean waterways

20-Year Comprehensive Facility Plan

Wet Weather Team Stakeholder Group

Project Prioritization Update

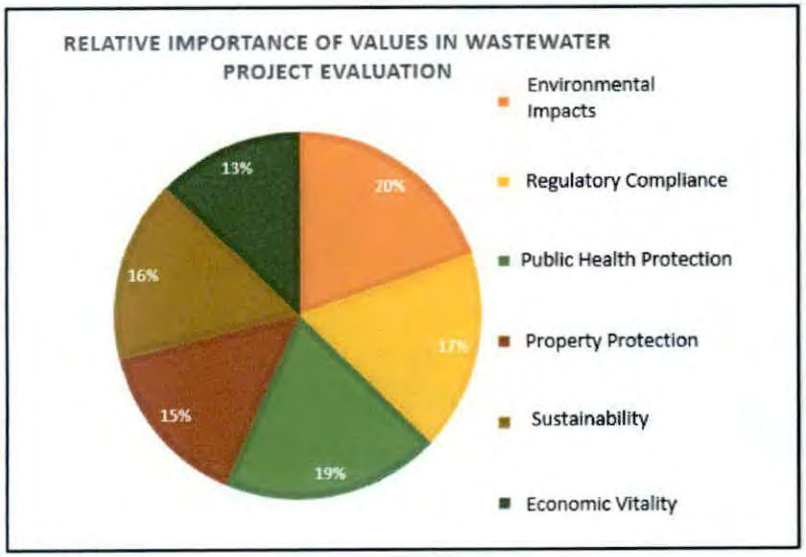
May 25, 2016

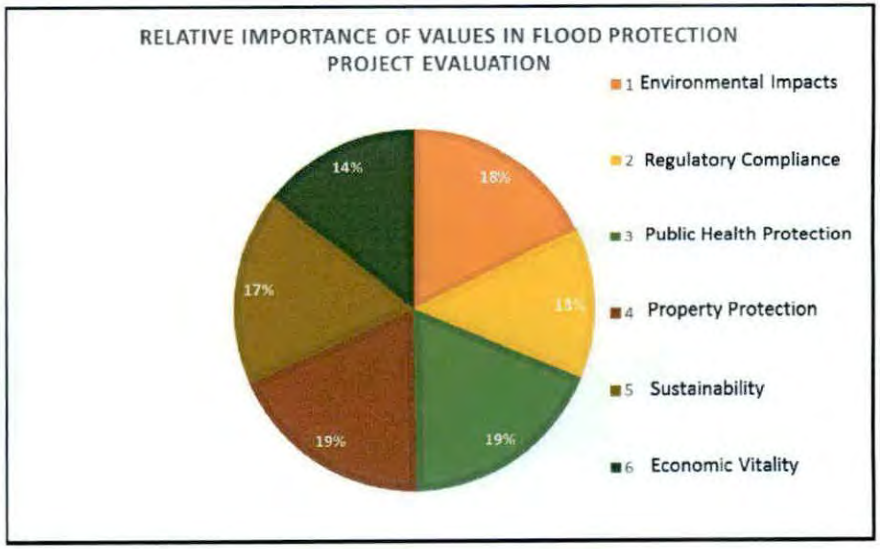
msd
Safe, clean waterways

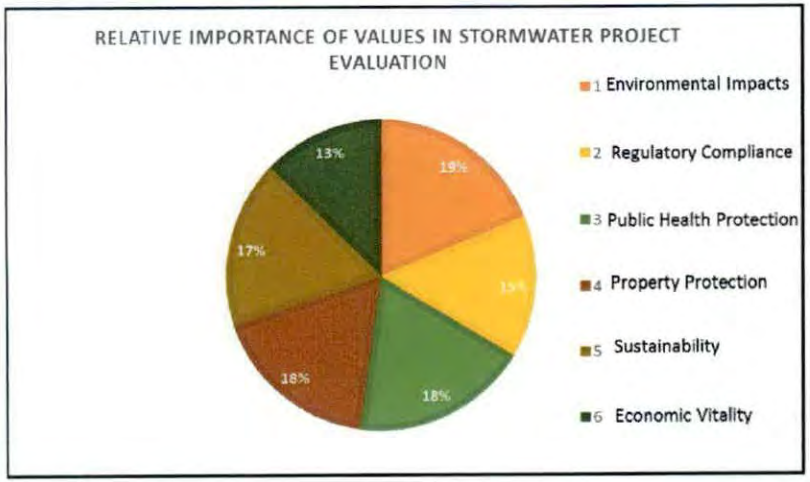
Project Prioritization Approach Built on Community Values

Value:	Environmental Impacts								
			Scoring						Flood Protection
Aspect	Rationale	Measurement Meth	-5	-2	0	2	5	Assumptions	Score Per Aspect
Terrestrial Habitat	Projects can affect habitat positively or negatively	Acres of habitat disrupted or eliminated; enhanced or created	Substantial decrease (>5) in acreage	Slight decease in acreage	No acres of habit affected, neither positively or negatively	Slight increase in acreage created	Substantial increase (>5) in acreage created		0
Aquatic Habitat	Projects can affect habitat positively or negatively	Feet of stream habitat disrupted or eliminated; enhanced or created	Substantial amount of stream impacted >500LF	Minimal amount of stream impacted	No feet of stream habitat affected, neither positively or negatively	Minimal amount of stream enhanced	Substantial amount of stream enhanced >500LF		0
Tree Canopy	Projects can reduce or increase tree cover, temporarily or permanently	A healthy forest has approximately 50 trees per acre, measure acres cleared or net increase in number of trees	Substantial Amount (>1 acre) of Canopy Removed	Minimal amount of canopy removed	No square feet of tree canopy affected, neither positively or negatively	Minimal amount of canopy added	Substantial Amount (>50 trees) of canopy added		0
Visual Aesthetics	Trash and visual appearance	People affected by aesthetic impairment	Create substantial visual disturbance affecting large number of customers	Create slight visual disturbance affecting large number of customers or create substantial visual disturbance to small number of customers	No impact on visual aesthetics	Eliminate slight visual disturbance affecting large number of customers or eliminate substantial visual disturbance to small number of customers	Eliminate substantial visual disturbance affecting large number of customers		0
Odor Aesthetics	Odor can affect quality of life	Customers or businesses affected by odors	Create frequent annoying odor for 20 or more homes or businesses	Create frequent detectable odor or occasional identifiable odor	No impact on odors	Eliminate frequent detectable odor or occasional identifiable	Eliminate frequent annoying odor for 20 or more homes or businesses		0
Stream Peak Flow	Changes in peak flow (up or down) can be positive or negative	Amount of flow changed, can increase or decrease	Substantial increase (>25%) in peak flow	Slight increase in flows - no significant peak increases	No impacts on scouring and erosion due to peak flow events, neither positive or negative	Slight reduction in flows - no significant peak reduction	Substantial reduction (>25%) in peak flows		0
Instructions: (1.) Score each alternative for each of the nine aspects of the value. Scores can be positive or negative, depending on the impact of the alternative on the value. (2.) Total the scores for each aspect to get the total score for this alternative in this value. (3.) Shaded area represents "fatal flaw". Alternatives that score in this area should not be proposed.								Total Raw Score Calculated	0.00

Project Benefits Scored and Weighted to Compare Against Different Service Areas

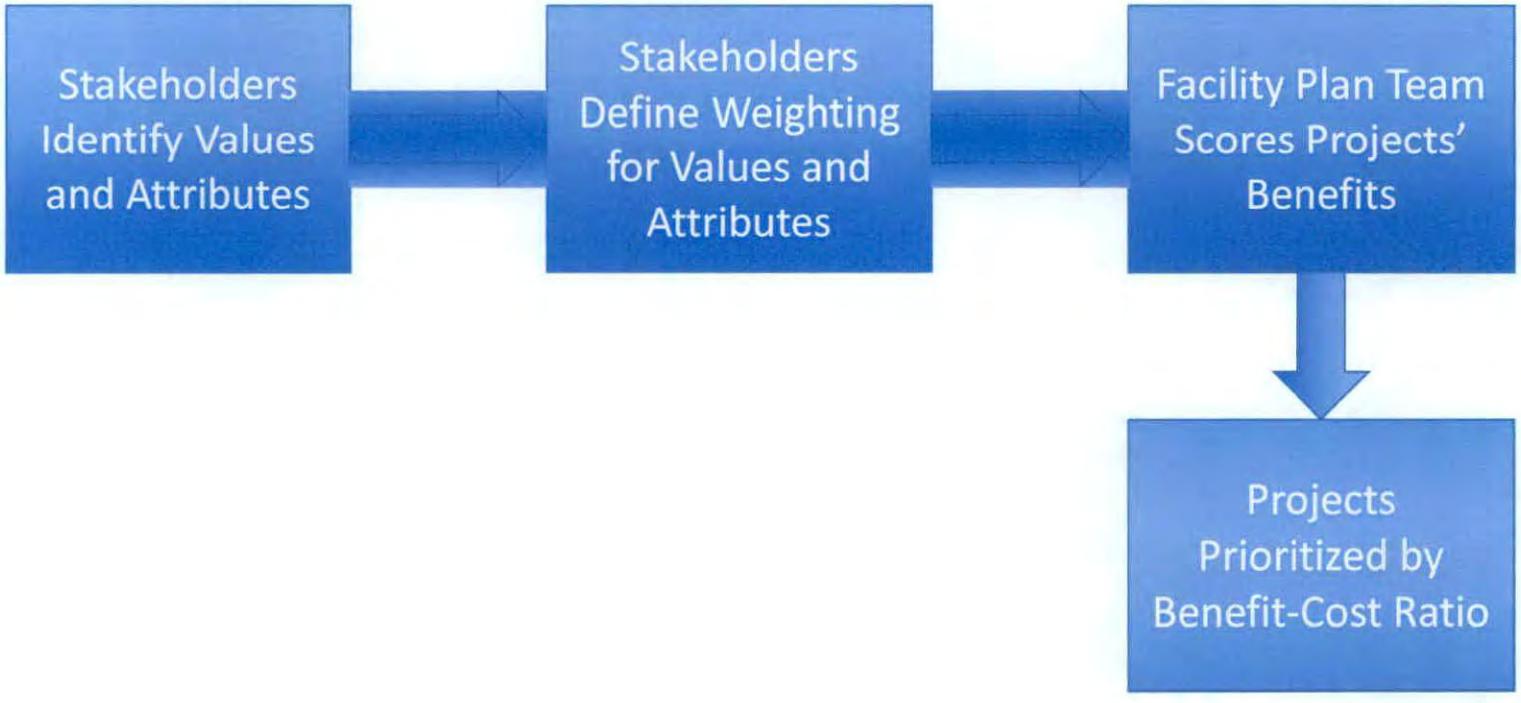






msd
Safe, clean waterways

Original Approach Only Accounted for Benefits and Costs



msd
Safe, clean waterways

Projects Prioritized On Their Benefit-Cost Ratio to Maximize Value

Project Name	Benefit Score	Cost 2016 dollars	Prioritization Score
5th Street Flood Pumping Station	7,380	$1,640,000	4,500
34th Street Flood Pumping Station	7,841	$2,000,000	3,921
10th Street Flood Pumping Station	7,841	$2,070,000	3,788
17th Street Flood Pumping Station	19,106	$5,050,000	3,783
Bingham Way Flood Pumping Station	18,821	$6,590,000	2,856
4th Street Flood Pumping Station	21,055	$12,920,000	1,630
Robert J. Starkey Flood Pumping Station	6,894	$4,360,000	1,581
27th Street Flood Pumping Station	18,913	$12,020,000	1,573
Riverport Flood Pumping Station	8,260	$6,110,000	1,352
Western Parkway Flood Pumping Station	19,106	$17,470,000	1,094
Lower Mill Creek Flood Pumping Station	7,841	$13,450,000	583
Shawnee Park Flood Pumping Station	19,298	$42,730,000	452
Upper Mill Creek Flood Pumping Station	18,686	$49,040,000	381
Paddy's Run Flood Pumping Station	19,566	$60,180,000	325
Beargrass Creek Flood Pumping Station	19,862	$96,880,000	205
Pond Creek Flood Pumping Station	8,721	$79,410,000	110

msd
Safe, clean waterways

MSD Board and Elected Officials Direct that Risk be Included as an Evaluation Factor

- IOAP incorporated risk as part of the level of service (i.e. how many overflows per year was acceptable)

Consequence						
	5	Critical	Critical	Critical	High	Medium
	4	Critical	Critical	High	Medium	Low
	3	Critical	High	Medium	Low	Low
	2	High	Medium	Low	Low	Very Low
	1	Medium	Low	Low	Very Low	Very Low
		5	4	3	2	1
		Probability				

msd
Safe, clean waterways

Risk Reduction Factor Clarifies Prioritizes

- Process "scores" risk before and after a project is complete for key consequences unique to each service area
- Consequence of failure may not changes, but projects will decrease the probability
- Difference between risk scores for the largest decrease in risk equates to a risk reduction factor (RRF) between 1 and 2
- Factor is applied to prioritization score and projects are resorted

msd
Safe. clean waterways

RRF Considered Numerous Consequences and Probabilities

Service Area	Consequences	Probabilities
Wastewater	Population Affected	Impact to Level of Service
		Asset Age
		Schedule of Need
	Impact to MSD Operations	Impact to Level of Service
		Asset Age
		Schedule of Need
	Impact to Environment	Impact to Level of Service
		Asset Age
		Schedule of Need
Stormwater	Buildings Affected	Frequency of Storm
		Asset Age
	Impact to Transportation	Frequency of Storm
		Asset Age
	Impact on Pollution	Frequency of Storm
		Asset Age
Flood Protection	Population Affected	Pumping Capacity
		Asset Age
	Buildings Affected	Pumping Capacity
		Asset Age

msd
Safe, clean waterways

Paddy's Run Flood Pumping Station RRF Calculation Example

			Before Project				After Project
	Population						
Consequence	>20,000	5	Critical	Critical	Critical	High	Medium
	20,000 – 15,000	4	Critical	Critical	High	Medium	Low
	15,000 – 10,000	3	Critical	High	Medium	Low	Low
	10,000 – 5,000	2	High	Medium	Low	Low	Very Low
	<5,000	1	Medium	Low	Low	Very Low	Very Low
			5	4	3	2	1
		Age (yrs)	50+	25 - 50	10 - 25	5 - 10	<5
			Probability				

msd Safe, clean waterways

Applying RRF to Prioritization Scores Adjusts Project Order

Project Order	Project Name	**Benefit/Cost Score**
1	5th Street	4,500
2	34th Street	3,921
3	10th Street	3,788
4	17th Street	3,783
5	Bingham Way	2,856
6	4th Street	1,630
7	Robert J. Starkey	1,581
8	27th Street	1,573
9	Riverport	1,352
10	Western Parkway	1,094
11	Lower Mill Creek	583
12	Shawnee Park	452
13	Upper Mill Creek	381
14	Paddy's Run	325
15	Beargrass Creek	205
16	Pond Creek	110

Project Order	Project Name	**Risk Reduction**
1	Paddy's Run	2.00
2	Shawnee Park	2.00
3	Upper Mill Creek	1.75
4	Lower Mill Creek	1.75
5	Pond Creek	1.75
6	34th Street	1.60
7	Beargrass Creek	1.60
8	27th Street	1.60
9	Western Parkway	1.50
10	5th Street	1.40
11	10th Street	1.40
12	17th Street	1.40
13	Riverport	1.30
14	4th Street	1.20
15	Bingham Way	1.10
16	Robert J. Starkey	1.00

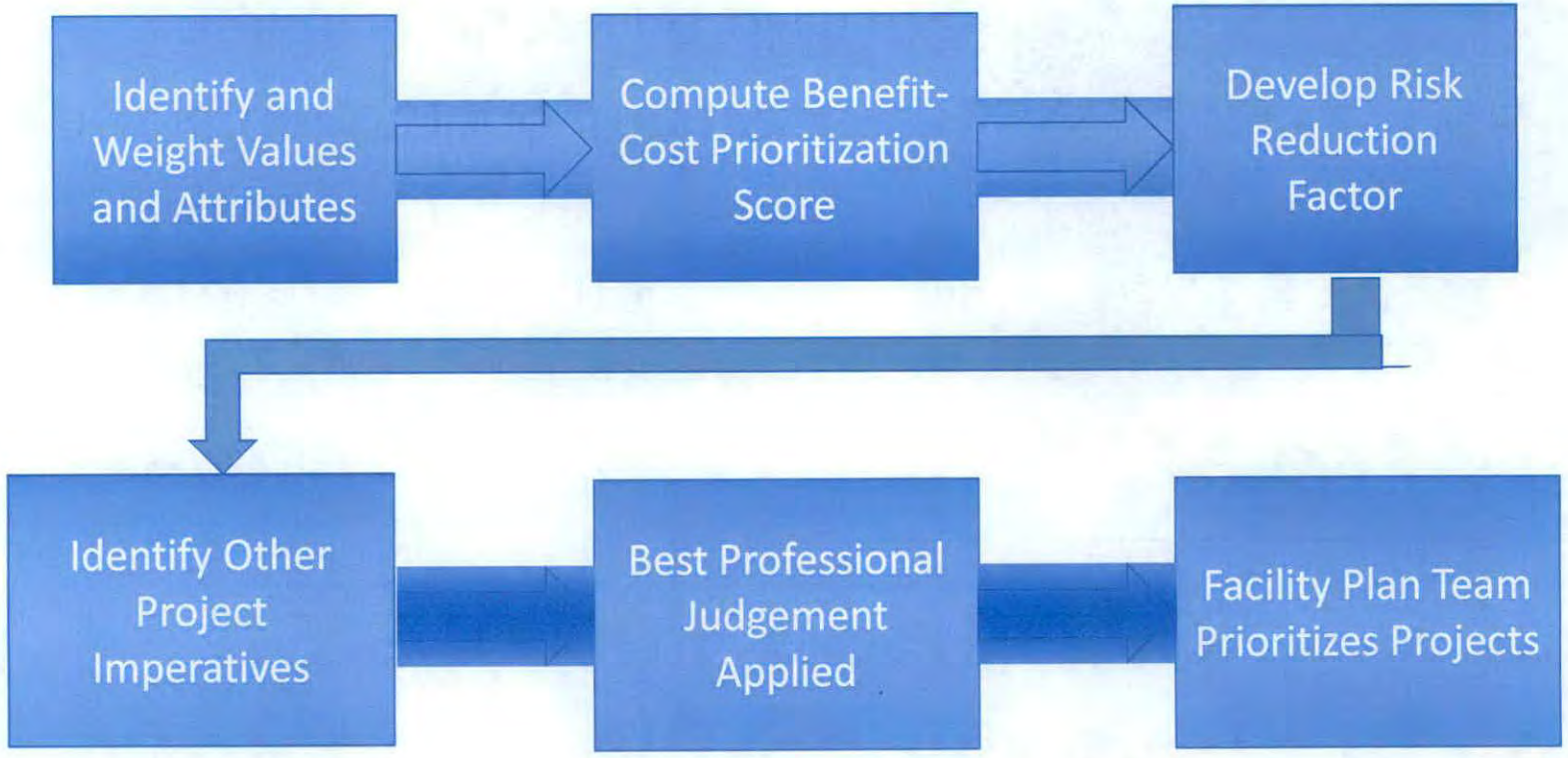
Evaluation of Results Identified Other Factors to be Considered

- Responsible asset management (some projects are simply "must do")
- Neighborhood impact
- Logical sequencing of projects
- Regulations

Best professional judgement applied to all prioritization criteria

msd Safe, clean waterways

Updated Approach Accounts for More Factors to Deliver Community Centered Priorities



msd
Safe, clean waterways

Application of Best Professional Judgement Verifies Results

- The prioritization system does not choose projects. People choose projects
- Facility Plan Team has a responsibility to assess the results of the prioritization and determine if there are adjustments that should be made
- Changes will be documented and justified
- Consistent with IOAP approach where projects were informed by benefit scoring

msd
Safe, clean waterways

Updated Recommendations Include More Holistic Considerations

Project Order	Best Professional Judgement Recommendation	Benefit Score	Risk Reduction Factor	Benefit/Cost Score
1	Paddy's Run FPS	19,566	2.00	325
2	Shawnee Park FPS	19,298	2.00	452
3	5th Street FPS	7,380	1.40	4,500
4	34th Street FPS	7,841	1.60	3,921
5	10th Street FPS	7,841	1.40	3,788
6	17th Street FPS	19,106	1.40	3,783
7	Beargrass Creek FPS	19,862	1.60	205
8	Upper Mill Creek FPS	18,686	1.75	381
9	27th Street FPS	18,913	1.60	1,573
10	Western Parkway FPS	19,106	1.50	1,094
11	4th Street FPS	21,055	1.20	1,630
12	Riverport FPS	8,260	1.30	1,352
13	Robert J. Starkey FPS	6,894	1.00	1,581
14	Lower Mill Creek FPS	7,841	1.75	583
15	Pond Creek FPS	8,721	1.75	110
16	Bingham Way FPS	18,821	1.10	2,856

Feedback

- Do you understand the process the Facility Plan Team is using to prioritize projects?
- Would you endorse a Plan that uses this approach to project prioritization?
- How can we explain it better in the document?

msd
Safe, clean waterways

Responsible Asset Management Minimizes Long-term Costs

- Floodwall, Levee, and Properties projects are focused to deliver the lowest total life-cycle costs that provide dependable operation
- Equipment replacement for Wastewater facilities necessary to meet permits and minimize long-term maintenance costs
- WQTC and sewer expansions to meet population projections and avoid strain on facilities
- Annual allocations to sustain programs as projects are identified

msd
Safe, clean waterways

Risk Reduction Consideration Can be Diluted by Large Capital Costs

Project Order	Benefit-Cost Score Only	RRF Only	Benefit-Cost Score with RRF
1	5th Street FPS	Paddy's Run FPS	5th Street FPS
2	34th Street FPS	Shawnee Park FPS	34th Street FPS
3	10th Street FPS	Upper Mill Creek FPS	10th Street FPS
4	17th Street FPS	Lower Mill Creek FPS	17th Street FPS
5	Bingham Way FPS	Pond Creek FPS	Bingham Way FPS
6	4th Street FPS	34th Street FPS	27th Street FPS
7	Robert J. Starkey FPS	Beargrass Creek FPS	4th Street FPS
8	27th Street FPS	27th Street FPS	Riverport FPS
9	Riverport FPS	Western Parkway FPS	Western Parkway FPS
10	Western Parkway FPS	5th Street FPS	Robert J. Starkey FPS
11	Lower Mill Creek FPS	10th Street FPS	Lower Mill Creek FPS
12	Shawnee Park FPS	17th Street FPS	Shawnee Park FPS
13	Upper Mill Creek FPS	Riverport FPS	Upper Mill Creek FPS
14	Paddy's Run FPS	4th Street FPS	Paddy's Run FPS
15	Beargrass Creek FPS	Bingham Way FPS	Beargrass Creek FPS
16	Pond Creek FPS	Robert J. Starkey FPS	Pond Creek FPS

PROJECT SPOTLIGHT

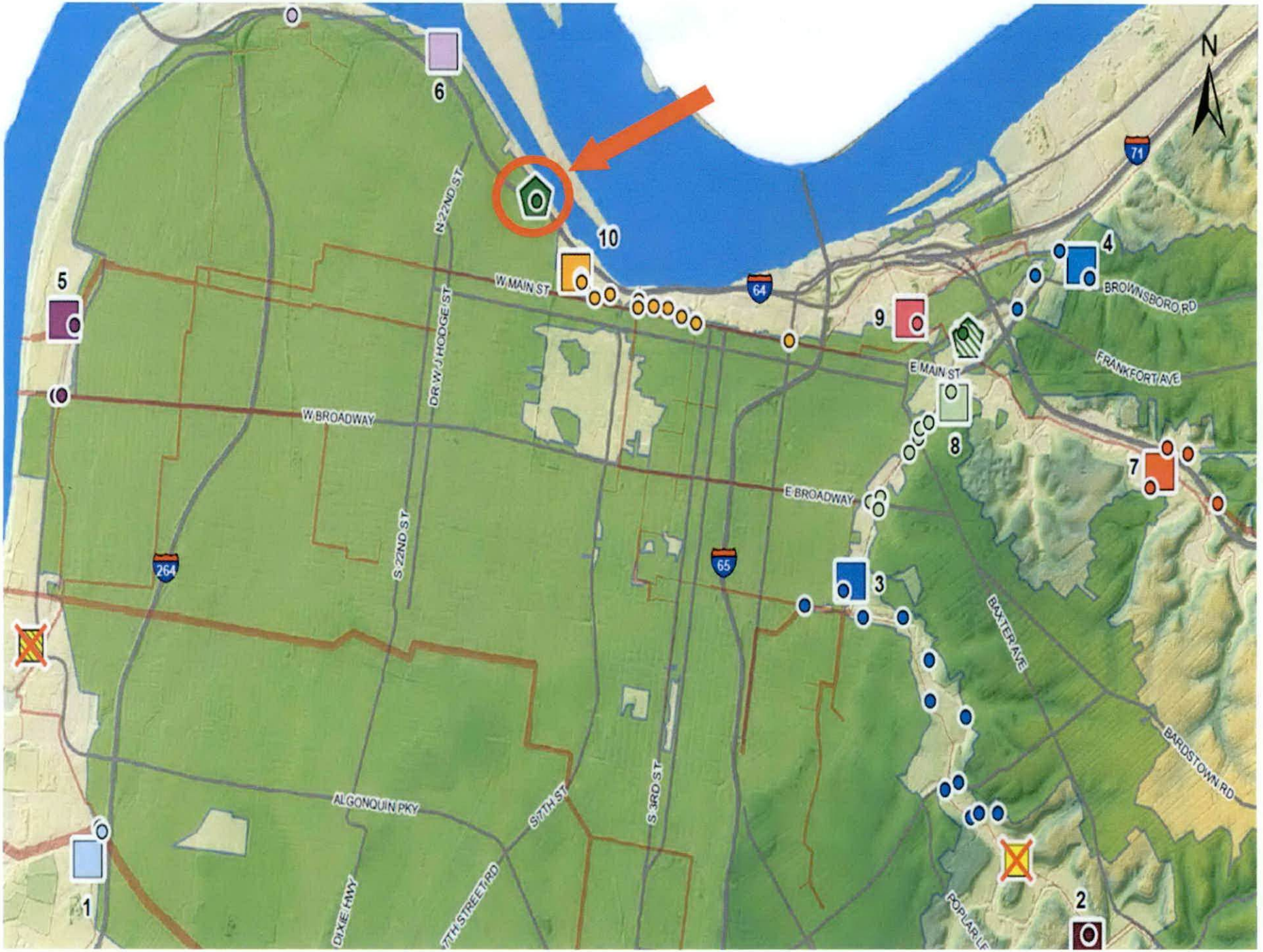
Significant Capital Project Overview

PROJECTS IN CONSTRUCTION

Significant Capital Project Overview

Significant Capital Project Overview | Project Spotlight

CSO 190 GREEN INFRASTRUCTURE PROJECT

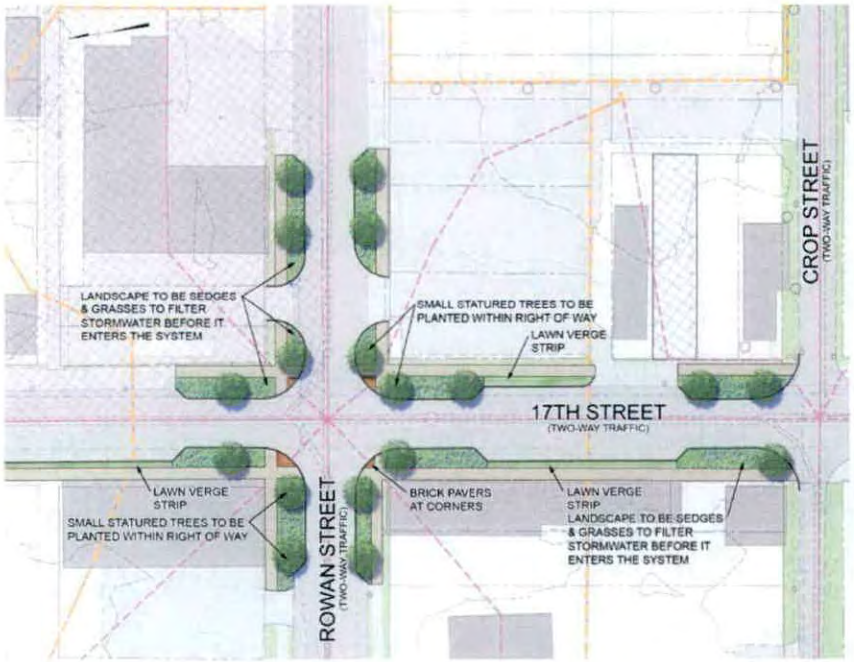

N
6
10
5
9
4
8
7
3
2
1
W MAIN ST
E MAIN ST
W BROADWAY
E BROADWAY
N 22ND ST
DR W J HODGE ST
S 22ND ST
S 7TH ST
S 3RD ST
BROWNSBORO RD
FRANKFORT AVE
BAXTER AVE
BARDSTOWN RD
ALGONQUIN PKY
DIXIE HWY
71
64
65
264

CSO 190 Green Infrastructure Project

Project Background

- 142 Acres
- 96 Acres Impervious
- Capture 63 Impervious Acres with Green Infrastructure
- 32 Million Gallons of Overflow Reduction in a typical year
- Streetscape Improvements, Bioswales, Treewells, and Infiltration Galleries
- Construction will be completed in 3 phases starting November 2015

CSO 190 Green Infrastructure Project



CSO 190 Green Infrastructure Project

Project & Public Meeting Schedule

- **January 26, 2015** - Met with District 5 Neighborhood Advisory Committee
- **February 9, 2015** – Planning Public Information Meeting
- **April 9, 2015** – Stakeholder Meeting
- **April 13, 2015** – Meeting with Metro Councilmen
- **April 14, 2015** – Conceptual Design Public Information Meeting
- **May 12, 2015** – Advanced Design Public Information Meeting
- **September 2015** - Advertising and Bidding
- **November 9, 2015** – Pardon Our Dust Public Information Meeting
- **November 2015 – June 2016** – Phase 1 Construction
- **2016** – Phase 2 Construction
- **2017** – Phase 3 Construction

Phase 1
66,843 C.F. Captured

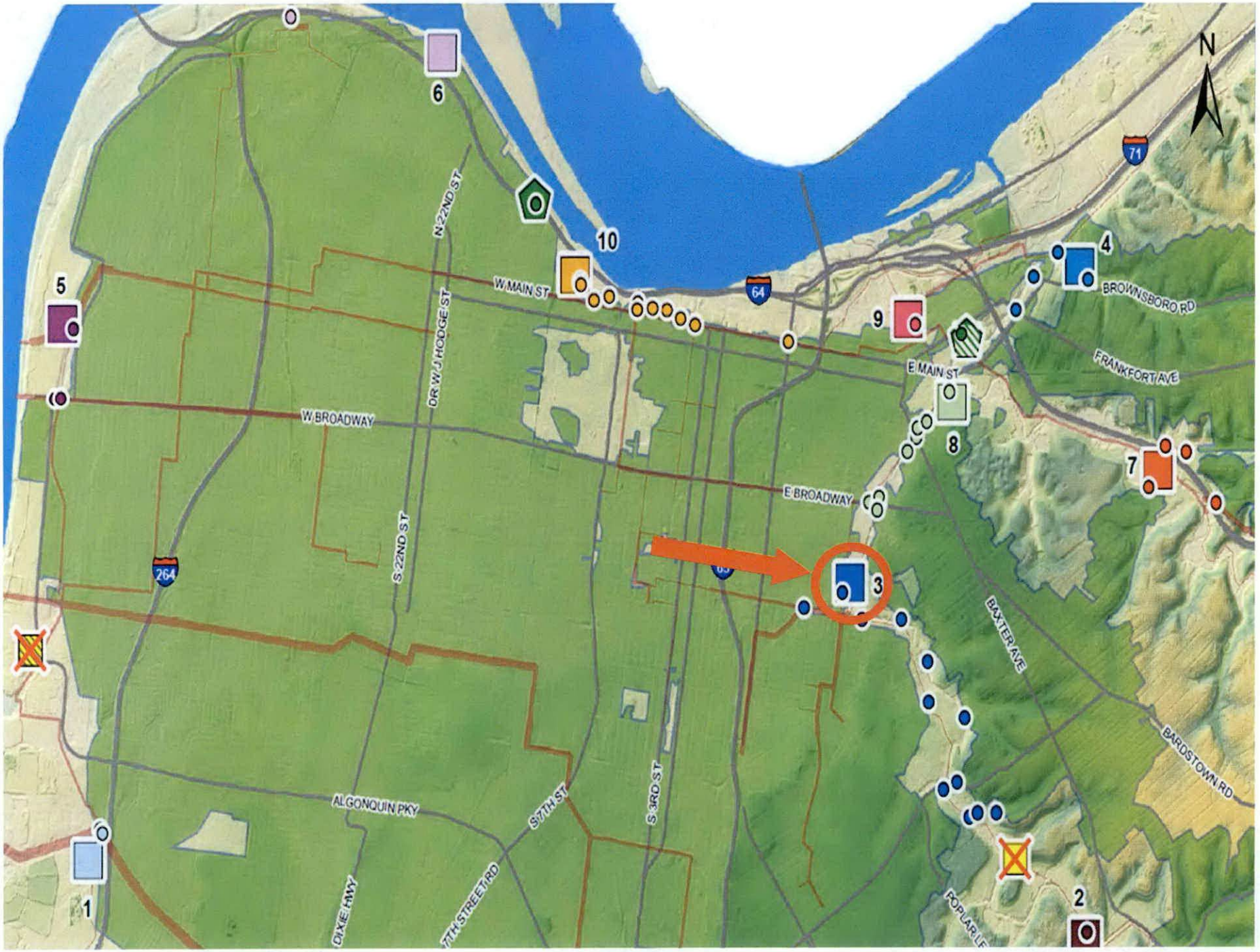
Phase 2
106,230 C.F. Captured

Phase 3
82,477 C.F. Captured

Stipend Partners
18,517 C.F. Captured

Significant Capital Project Overview | Project Spotlight

LOGAN STREET CSO BASIN & INTERCEPTOR


N
6
10
5
W MAIN ST
N 22ND ST
DR W J HODGE ST
64
71
4
BROWNSBORO RD
9
E MAIN ST
FRANKFORT AVE
W BROADWAY
8
7
E BROADWAY
264
S 22ND ST
3
BAXTER AVE
BARDSTOWN RD
ALGONQUIN PKY
S 7TH ST
S 3RD ST
DIXIE HWY
7TH STREET RD
POPLAR LE
1
2

Logan Street CSO Basin & Interceptor

Project Background

- The original IOAP recommended an 12 MG Basin
- Revised project consists of 17 MG Basin
- Eight overflows per year in combined system
- The IOAP project completion deadline is December 31, 2017

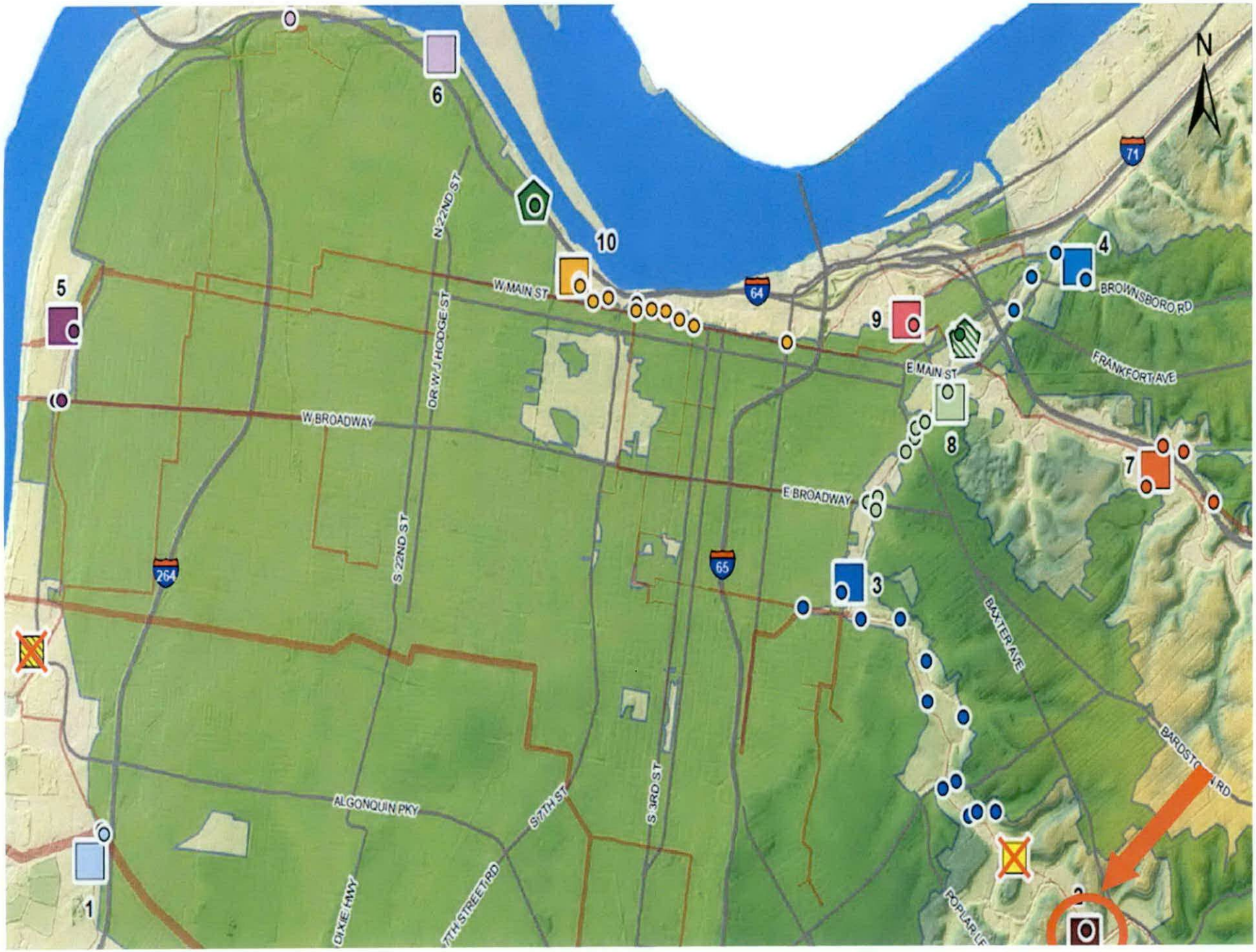
Logan Street CSO Basin & Interceptor

Project Schedule

- Interceptor Construction began February 2014
- Interceptor Final Completion expected December 2016
- Basin Construction began April 2015
- Basin Final Completion expected December 2017
- Modified for below grade structure

Significant Capital Project Overview | Projects In Construction

NIGHTINGALE PUMP STATION & BASIN


N
1
2
3
4
5
6
7
8
9
10
W MAIN ST
W BROADWAY
E BROADWAY
E MAIN ST
N 22ND ST
DR W J HODGE ST
S 22ND ST
S 7TH ST
S 3RD ST
ALGONQUIN PKY
DIXIE HWY
BAXTER AVE
BROWNSBORO RD
FRANKFORT AVE
64
65
71
264

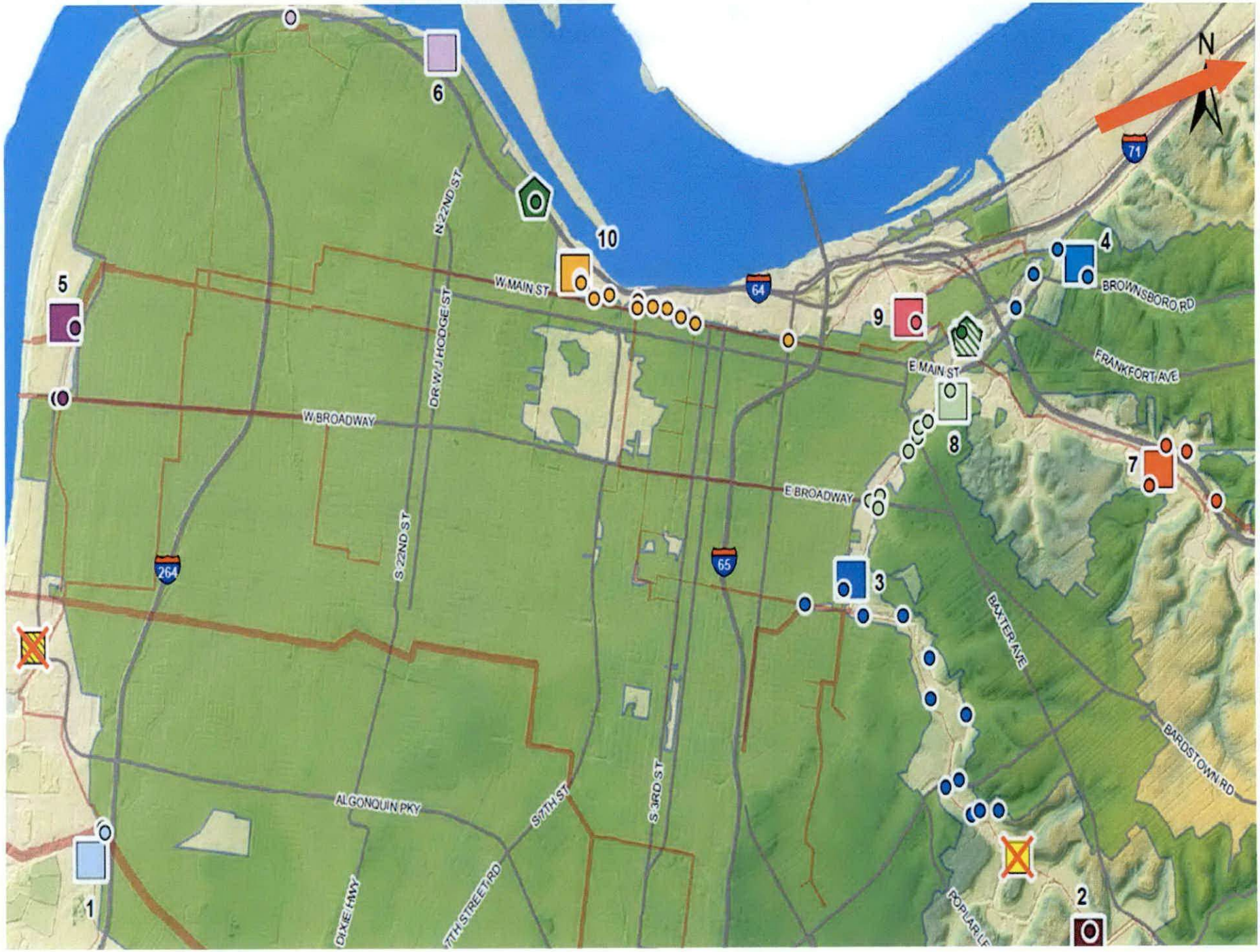
Nightingale Pump Station & Basin

Project Background

- Addresses one (1) CSO:
  - overflow an average of 28 times per year, combined, approx. 155 MG per year
- Revised project consists of 8 MG Basin
- Zero overflows per year
- The IOAP project completion deadline is December 31, 2016
- Project approximately 40% complete

Significant Capital Project Overview | Projects In Construction

MUDDY FORK INTERCEPTOR SSO STORAGE BASIN


N
6
10
5
4
9
8
7
3
1
2
W MAIN ST
E MAIN ST
W BROADWAY
E BROADWAY
N 22ND ST
DR W J HODGE ST
S 22ND ST
S 7TH ST
S 3RD ST
7TH STREET RD
DIXIE HWY
ALGONQUIN PKY
BROWNSBORO RD
FRANKFORT AVE
BAXTER AVE
BARDSTOWN RD
POPLAR LE
64
65
71
264

Muddy Fork Interceptor SSO Storage Basin

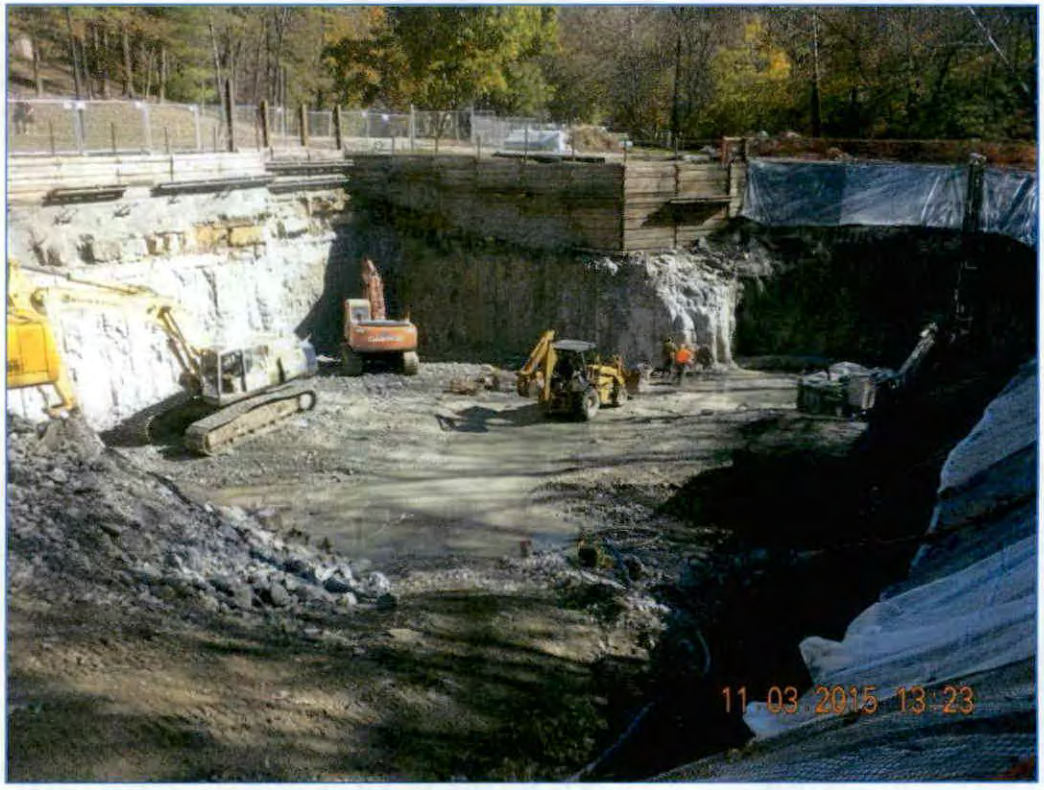
Project Background

- 6 SSO's:
  - overflow an average of 21 times per year, combined, approx. 5 MG per year
- Revised project consists of 1.5 MG Basin
- Zero overflows per year in separate system
- The IOAP project completion deadline is December 31, 2016

Muddy Fork Interceptor SSO Storage Basin

Project Schedule

- Construction began May 2015
- Anticipated duration of construction is 18 months
- Final completion expected November 2016



Significant Capital Project Overview | Projects In Design

CLIFTON HEIGHTS CSO BASIN


N
6
10
5
W MAIN ST
N 22ND ST
DR W J HODGE ST
64
9
E MAIN ST
FRANKFORT AVE
W BROADWAY
8
7
E BROADWAY
264
S 22ND ST
65
3
BAXTER AVE
BARDSTOWN RD
ALGONQUIN PKY
S 7TH ST
S 3RD ST
DIXIE HWY
1
2

Clifton Heights CSO Basin

Project Background

- 5 CSO's overflow an average of 195 times per year, combined, producing approximately 120 MG per year.
- Updated flow monitoring increased the size to a 7.00 Million Gallon Storage Basin providing a level of control of four (4) overflows during the typical year.
- Currently, MSD is advertising the project for construction.
- Construction anticipated start June 2016.
- The IOAP project completion deadline is December 31, 2018.

Clifton Heights CSO Basin

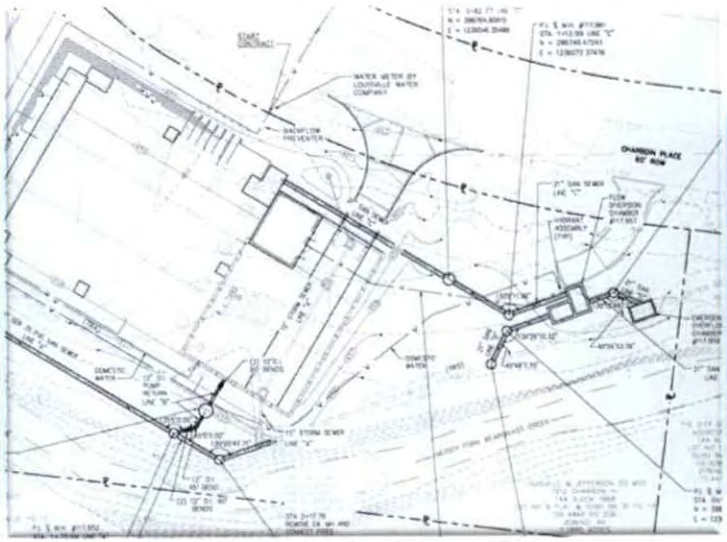
Project & Public Meeting Schedule

September 15, 2015-IOAP Public Input Meeting

April 20, 2015 – Met with Councilman Bill Hollander

May 19, 2015 – Conceptual Design Public Meeting

May 26, 2016- Pardon Our Dust Meeting*(tentatively scheduled for this date)*



PROJECTS IN DESIGN

Significant Capital Project Overview

Significant Capital Project Overview | Projects In Design

SOUTHWESTERN PARKWAY CSO BASIN


N
6
10
4
9
8
7
3
2
1
W MAIN ST
E MAIN ST
W BROADWAY
E BROADWAY
N 22ND ST
DR W J HODGE ST
S 22ND ST
S 7TH ST
S 3RD ST
ALGONQUIN PKY
DIXIE HWY
7TH STREET RD
BROWNSBORO RD
FRANKFORT AVE
BAXTER AVE
BARDSTOWN RD
POPLAR LE
64
65
71
264

Southwestern Parkway CSO Basin

Project Background

- Updated flow monitoring increased the size to a 20 Million Gallon Storage Basin providing a level of control of eight (8) overflows during the typical year.
  - Revised basin size and Level of Control approved by EPA.
- Progressive Design-Build procurement selected.
- The Advanced Design Meeting for this project has not been scheduled, but is planned for Q3 2016.
- Easement acquisition in negotiations
- Construction start estimated Q3 2016 or sooner.
- The IOAP project completion deadline is December 31, 2018.

Southwestern Parkway CSO Basin

Project & Public Meeting Schedule

September 24, 2013 – IOAP Public Input Meeting

March 10, 2015 – Neighborhood Orientation Meeting

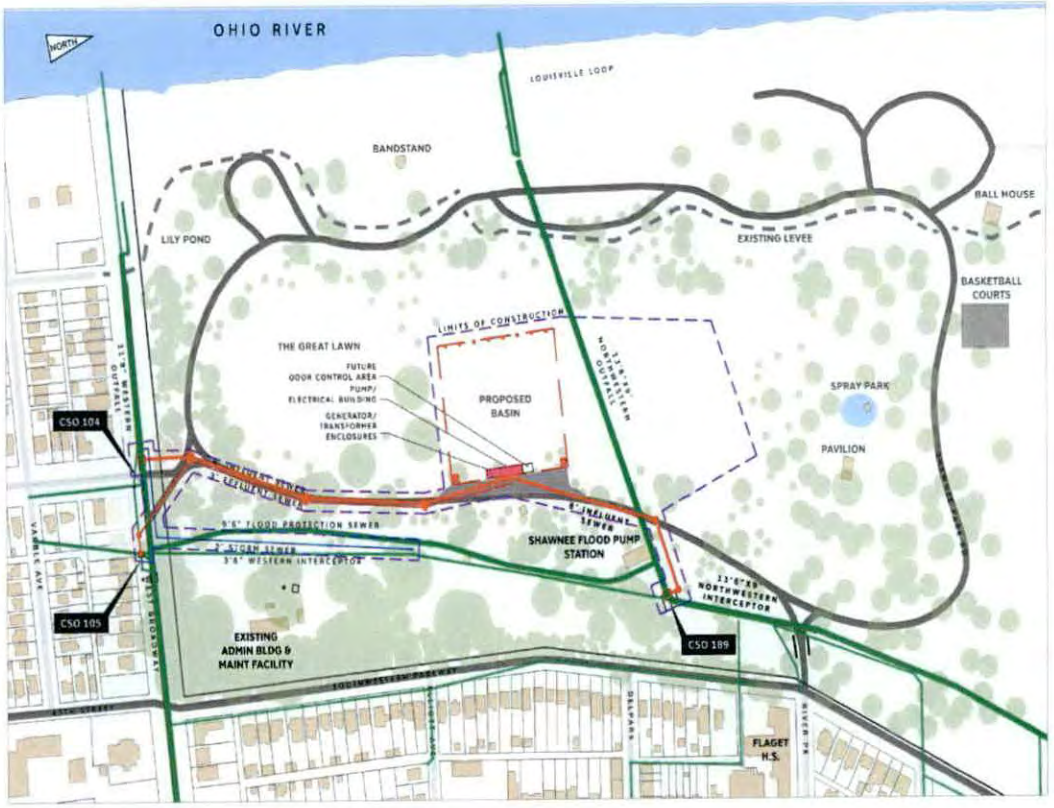
March 23, 2015 – Conceptual Design Public Information Meeting #1

October 19, 2015 – Met with Councilwoman Bryant Hamilton and Residents

November 12, 2015 – Conceptual Design Public Information Meeting #2

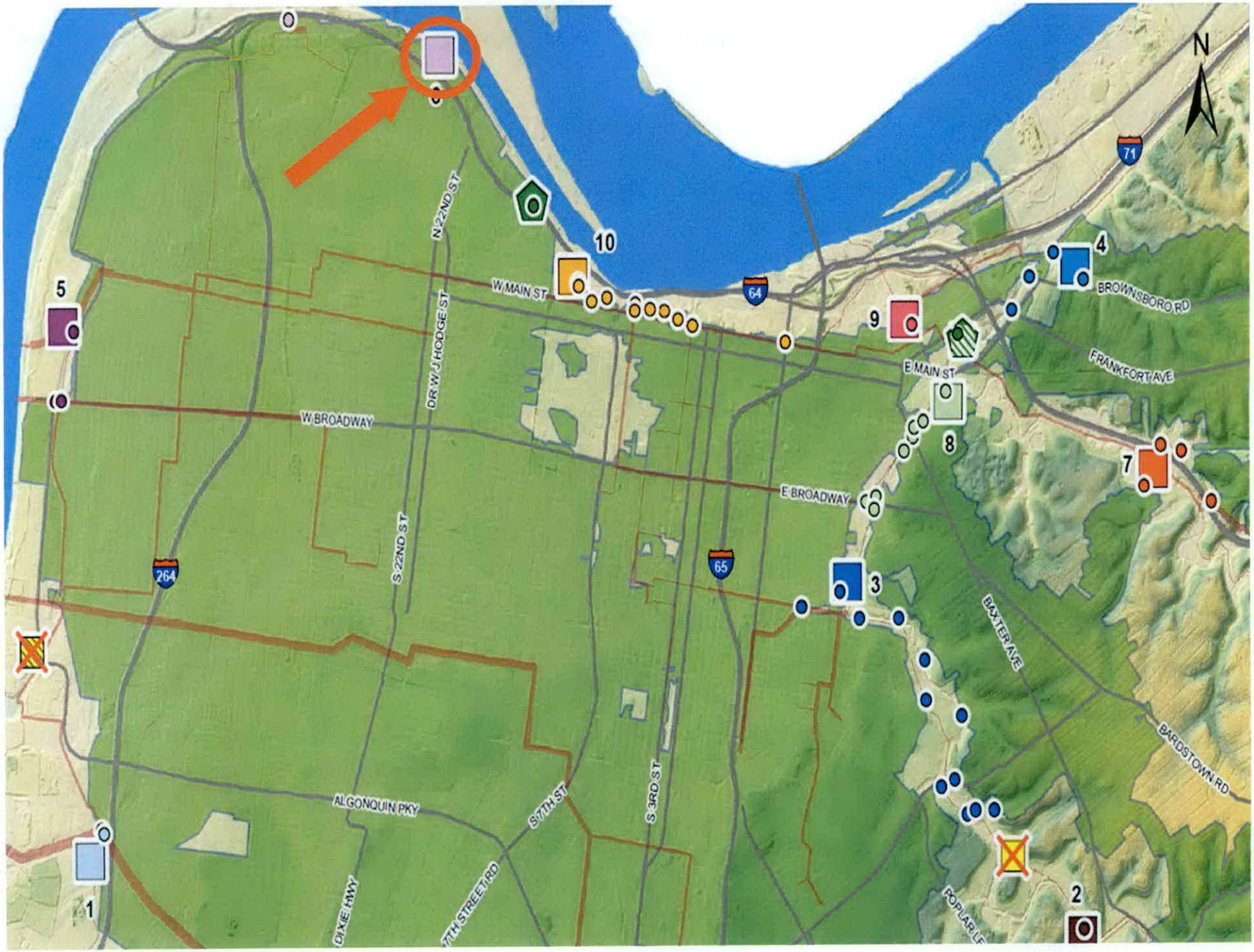
December 14, 2015 – Conceptual Design Public Information Meeting #3

February 11, 2016 – Met with Shawnee Neighborhood Association



Significant Capital Project Overview | Projects In Design

PORTLAND CSO STORAGE BASIN


N
W MAIN ST
W BROADWAY
E BROADWAY
E MAIN ST
N 22ND ST
DR W J HODGE ST
S 22ND ST
S 7TH ST
S 3RD ST
ALGONQUIN PKY
DIXIE HWY
7TH STREET RD
BAXTER AVE
BARDSTOWN RD
BROWNSBORO RD
FRANKFORT AVE
POPLAR LE
64
65
71
264
1
2
3
4
5
7
8
9
10

Portland CSO Basin

Project Background

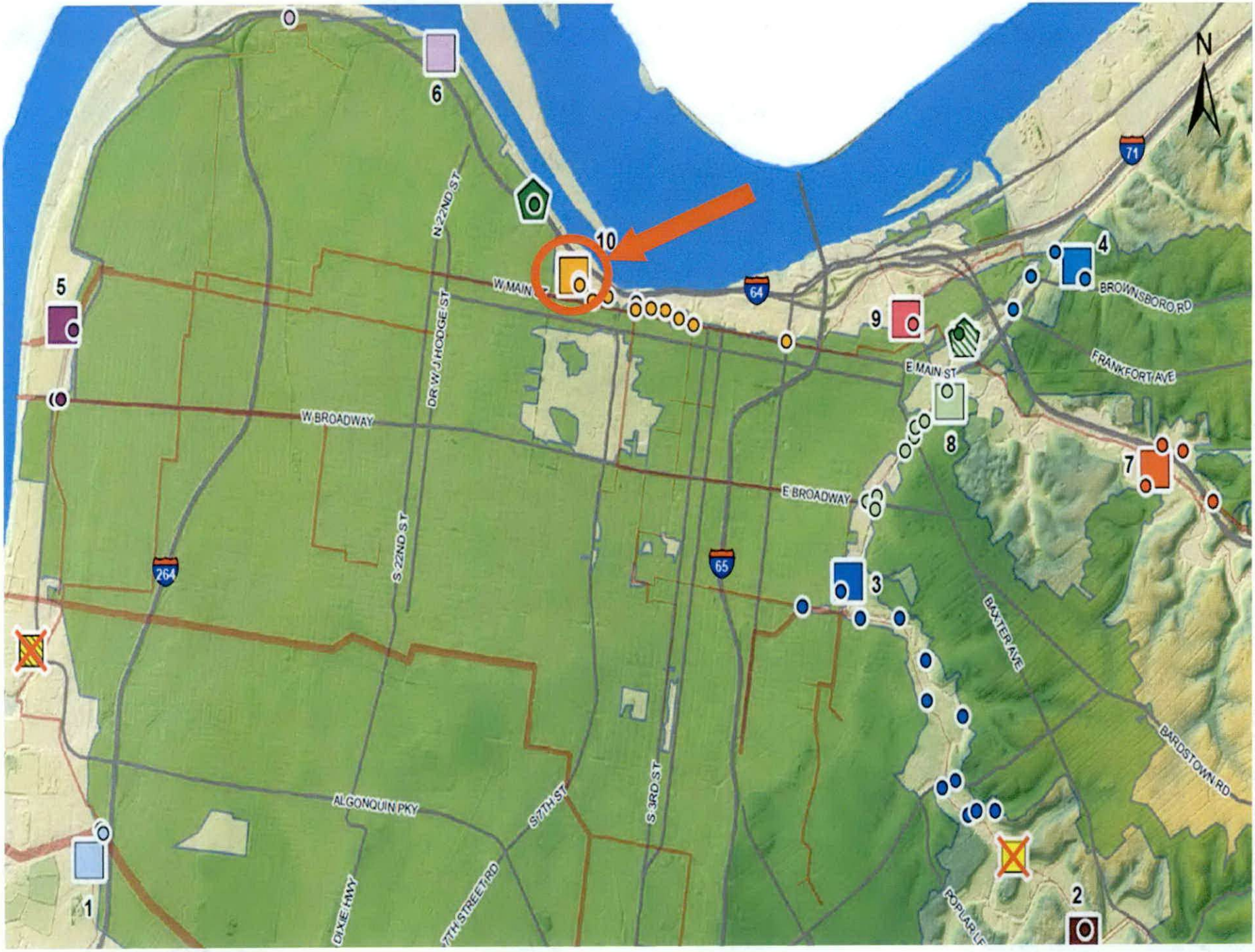
- CSO 019 currently overflows an average of 43 times per year, combined, producing approximately 58 MG per year.
- Update flow monitoring information obtained in Feb 2015 increased the size to 7 Million Gallons. .
- MSD is in the 10% Design Phase of this project with Heritage.
- The Advanced (IOAP) Meeting for this project has not been scheduled, but is planned for June 2016.
- Easement acquisition in negotiations
- The IOAP project completion deadline is December 31, 2019.

Portland CSO Basin

December 19, 2014 – Meeting with Metro Public Works
January 13, 2015 - Meeting with Metro Parks & Recreation
January 26, 2015 - Meeting Councilwomen Hamilton's District 5
February 9, 2015 - Orientation Public Information Meeting
February 12, 2015 - Meeting with Metro Parks & Recreation
March 3, 2015 - Meeting with Portland NOW
April 16, 2015 - Meeting with Metro Parks & Recreation
May 5, 2015 - Meeting with Portland NOW
June 3, 2015 - Meeting with Metro Parks & Recreation
November 11, 2015 - Meeting with Councilwomen Hamilton
December 1, 2015 - Meeting with Portland NOW
December 22, 2015 - Meeting with Metro Parks & Recreation
January 18, 2016 - Meeting with Metro Parks & Recreation
January 26, 2016 - Conceptual Design Public Information Meeting

Significant Capital Project Overview | Projects In Design

13TH & ROWAN CSO BASIN


N
6
10
5
W MAIN ST
N 22ND ST
DR W J HODGE ST
64
71
4
BROWNSBORO RD
9
E MAIN ST
FRANKFORT AVE
W BROADWAY
8
7
E BROADWAY
264
S 22ND ST
65
3
BAXTER AVE
BARDSTOWN RD
ALGONQUIN PKY
S 7TH ST
S 3RD ST
DIXIE HWY
7TH STREET RD
POPLAR LE
1
2

13th & Rowan CSO Basin

Project Background

- 12 CSO's addressed overflow an average of 294 times per year, combined, producing approximately 129 MG per year.
- Updated flow monitoring increased the size to a 10 Million Gallon Storage Basin providing a level of control of eight (8) overflows during the typical year.
- MSD is in the 10% Design Phase of this project with Black & Veatch.
- The Orientation (IOAP) Meeting for this project has not been scheduled, but is planned for Q3 2016.
- Property acquisition in negotiations
- The IOAP project completion deadline is December 31, 2020.

13th & Rowan CSO Basin

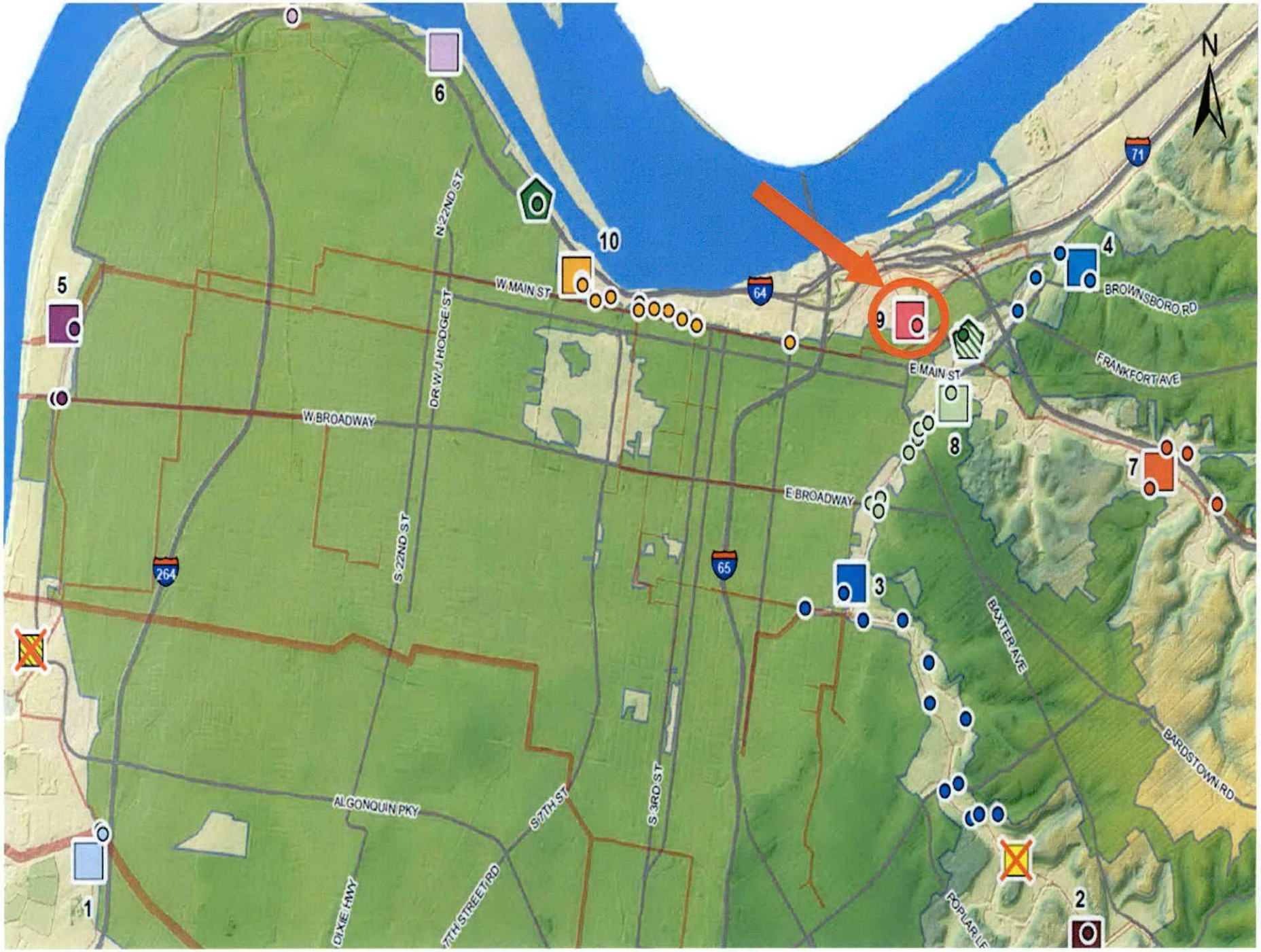
Project & Public Meeting Schedule

January 5, 2016 - Meeting with Councilman Tandy

June 2016 – IOAP Public Input Meeting

Significant Capital Project Overview | Projects In Design

STORY AND MAIN CSO BASIN


N
6
10
5
9
4
71
64
W MAIN ST
N 22ND ST
DR W J HODGE ST
BROWNSBORO RD
E MAIN ST
FRANKFORT AVE
W BROADWAY
8
7
E BROADWAY
264
65
3
S 22ND ST
BAXTER AVE
S 3RD ST
BARDSTOWN RD
ALGONQUIN PKY
S 7TH ST
DIXIE HWY
7TH STREET RD
1
2

Story and Main CSO Basin

Project Background

- 2 CSO's addressed with this project overflow an average of 51 times per year, combined, - approximately 436 MG per year.
- Updated flow monitoring increased the size to a 8 Million Gallon Storage Basin providing a level of control of eight (8) overflows during the typical year.
- Currently, MSD is in the 10% Design Phase of this project with HDR Engineering.
- Property acquired, awaiting closing.
- The Advanced Design (IOAP) Meeting planned for Q3 2016.
- The IOAP project completion deadline is December 31, 2020.

Story and Main CSO Basin

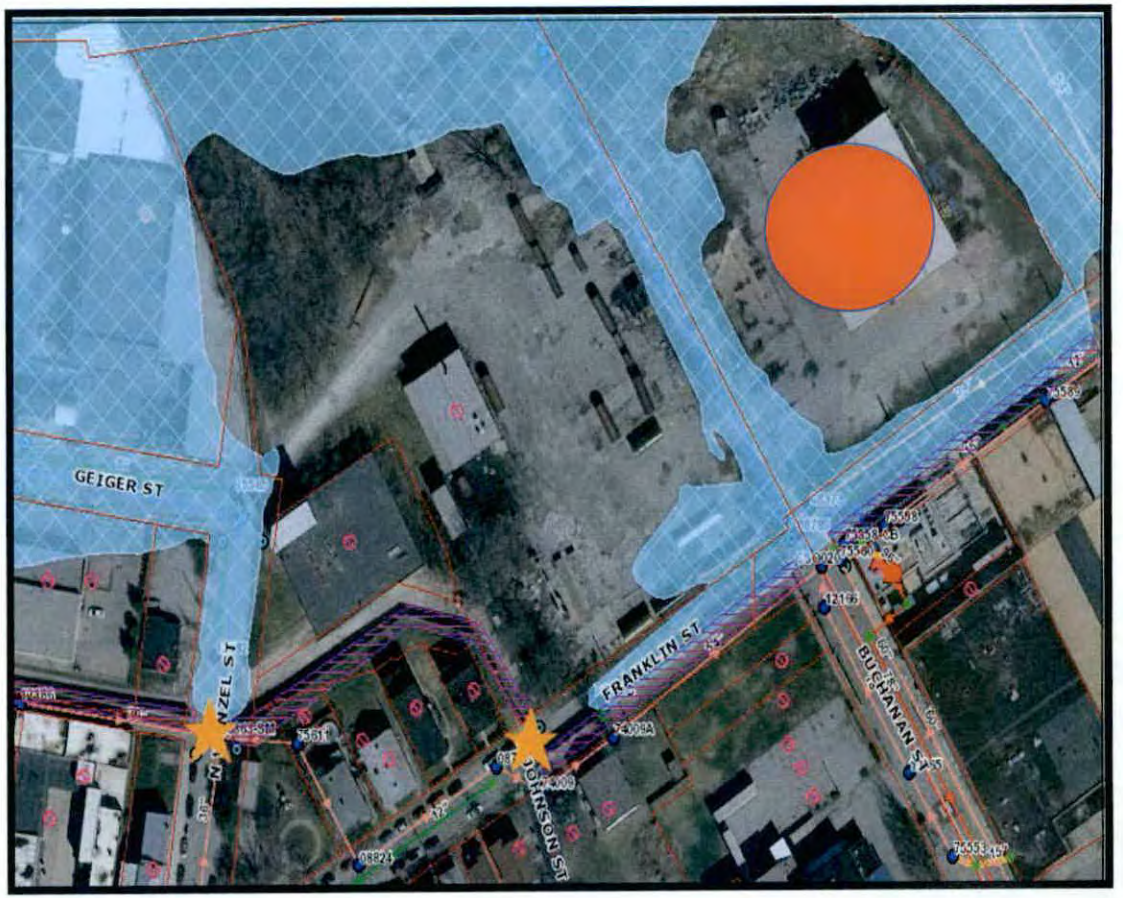
Project & Public Meeting Schedule

June 16, 2015 – IOAP Public Input Meeting

February 10, 2016 – Conceptual Design Meeting

March 8, 2016 – Meet with area business stakeholder (More meetings to follow)

July 25, 2016 – Advanced Design (*tentatively scheduled for this date)*



Significant Capital Project Overview | Projects In Design

LEXINGTON & PAYNE CSO BASIN


N
6
10
5
W MAIN ST
N 22ND ST
DR W J HODGE ST
64
71
4
BROWNSBORO RD
9
FRANKFORT AVE
W BROADWAY
8
7
E BROADWAY
264
S 22ND ST
65
3
BAXTER AVE
S 3RD ST
BARDSTOWN RD
ALGONQUIN PKY
S 7TH ST
DIXIE HWY
7TH STREET RD
POPLAR LE
1
2

Lexington & Payne CSO Basin

Project Background

- 9 CSO's overflow an average of 380 times per year, combined, producing approximately 211 MG per year.
- Updated flow monitoring increased the size to a 14 Million Gallon Storage Basin providing a level of control of zero (0) overflows during the typical year.
- MSD is in the 30% Design Phase of this project with Hazen and Sawyer.
- The Conceptual Design Meeting for this project has not been scheduled, but is planned for Q2 2016.
- Property acquisition in negotiations
- The IOAP project completion deadline is December 31, 2020.

Lexington & Payne CSO Basin

Project & Public Meeting Schedule

November 16, 2015 – Met with Councilman Hollander

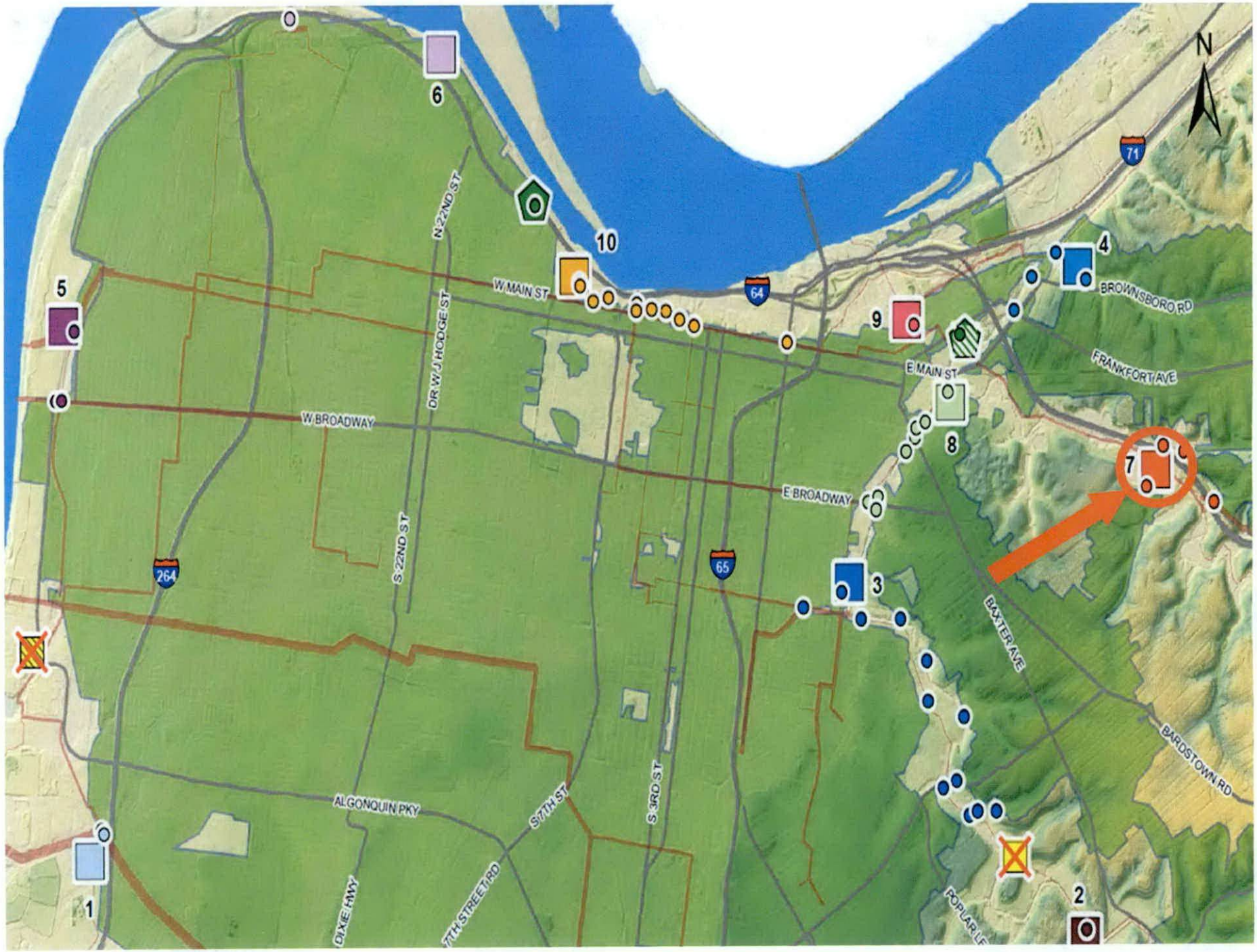
January 5, 2016 – Met with Council President Tandy

January 19, 2016 – Orientation Public Information Meeting

April 26, 2016 – *Conceptual Design Public Information Meeting (tentatively scheduled for this date)*

Significant Capital Project Overview | Projects In Design

I-64 & GRINSTEAD DRIVE CSO BASIN


N
6
10
5
9
4
1
2
3
7
8
W MAIN ST
E MAIN ST
W BROADWAY
E BROADWAY
N 22ND ST
DR W J HODGE ST
S 22ND ST
S 3RD ST
S 7TH ST
7TH STREET RD
DIXIE HWY
ALGONQUIN PKY
BAXTER AVE
BARDSTOWN RD
BROWNSBORO RD
FRANKFORT AVE
POPLAR LE
64
65
71
264

I-64 & Grinstead Drive CSO Basin

Project Background

- 4 CSO's addressed with this project currently overflow an average of 149 times per year, combined, producing approximately 93 MG per year.
- Updated flow monitoring increased the size to a 15 Million Gallon Storage Basin providing a level of control of four (4) overflows during the typical year.
- MSD is in the 30% Design Phase with QK4 Engineers.
- The Advanced Design Meeting for this project completed March 2016.
- Easement acquisition in negotiations
- The IOAP project completion deadline is December 31, 2020.

I-64 & Grinstead Drive CSO Basin

Project & Public Meeting Schedule

September 24, 2013 – IOAP Public Input Meeting

March 10, 2015 – Neighborhood Orientation Meeting

March 23, 2015 – Conceptual Design Public Information Meeting #1

October 19, 2015 – Met with Councilwoman Bryant Hamilton and Residents

November 12, 2015 – Conceptual Design Public Information Meeting #2

December 14, 2015 – Conceptual Design Public Information Meeting #3

February 11, 2016 – Met with Shawnee Neighborhood Association

QUESTIONS/COMMENTS????