

Metropolitan St. Louis Sewer District CSO Volume Reduction Green Infrastructure Pilot Program

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Outline

- Definitions:
 - MSD
 - Combined Sewer Overflow
 - Green Infrastructure
- MSD's CSO Volume Reduction Green Infrastructure Pilot Program
 - Background
 - MSD/LRA Partnership
 - Project Types



Outline

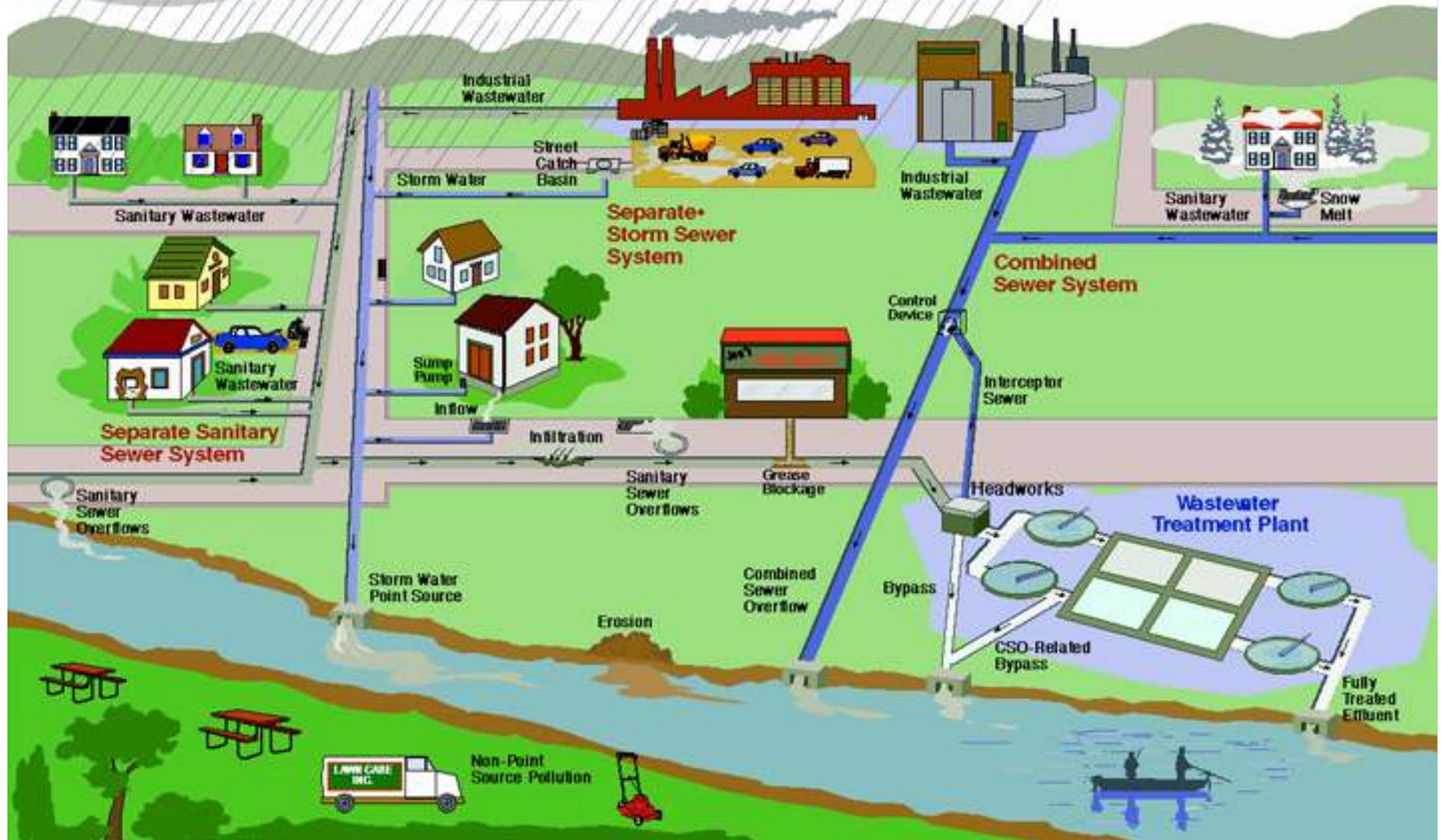
- MSD's CSO Volume Reduction Green Infrastructure Pilot Program (cont.)
 - Development/Maintenance Agreements
 - How's it Going So Far?
 - Anticipated Schedule
 - The \$97 Million Question

MSD Fun Facts

- Sanitary and Storm services for 1.4 million people in the St. Louis metro area
- Processes more than 330 million gallons of wastewater every day
- 4,741 Miles of Sanitary Sewer
- 1,928 Miles of Combined Sewer
- 2,961 Miles of Storm Sewer
- Fourth largest sewer system in US



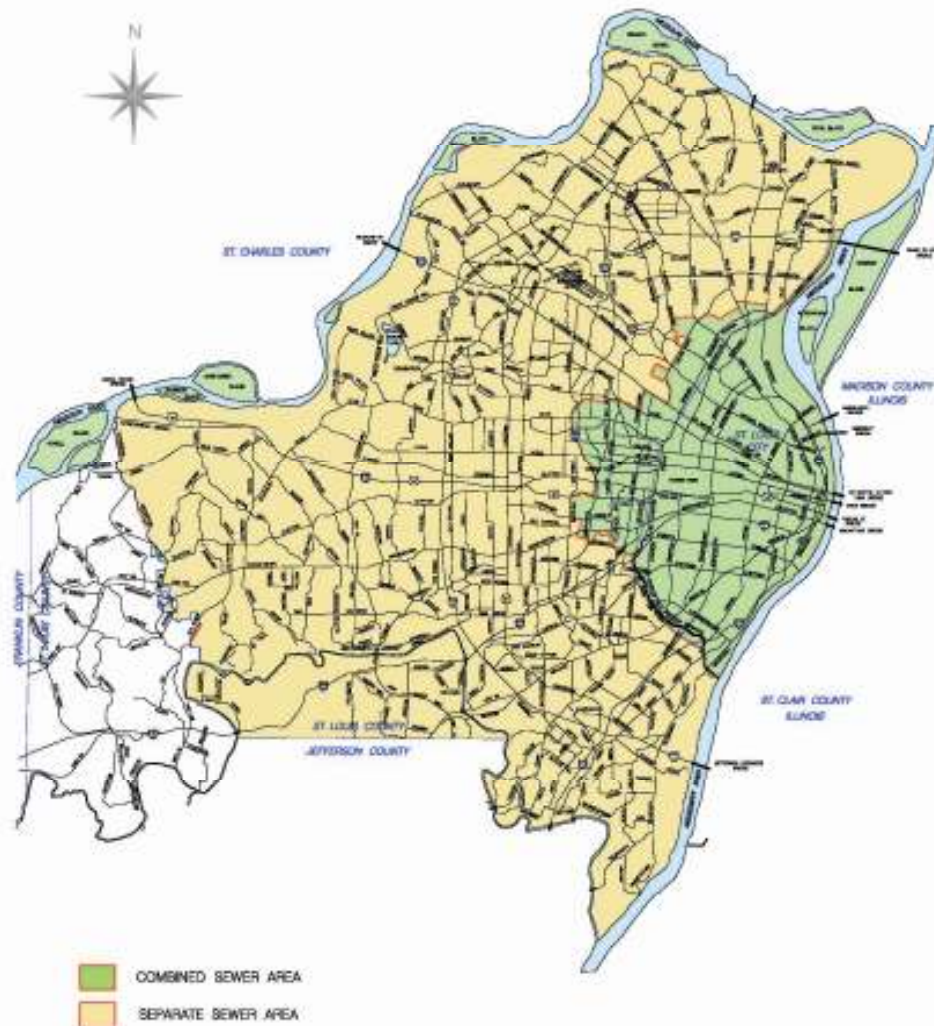
Urban Wet Weather Flows





The Metropolitan St. Louis Sewer District

COMBINED AND SEPARATE SEWER AREAS



MSD Separated/ Combined Sewer Areas



What is Green Infrastructure?

- Green infrastructure (GI) refers to **stormwater management practices** or facilities that reduce the volume, rate or pollutant load of runoff leaving a property
- Usually, detain runoff so that it may be slowed down, filtered, infiltrated into the ground, evaporated, taken up by plants, and/or reused
- Many are literally green with vegetated areas on the surface
- Some are figuratively “green” because of the environmental benefits, such as pervious pavement
- Other common terms are stormwater best management practices (BMPs) and Low Impact Development (LID)

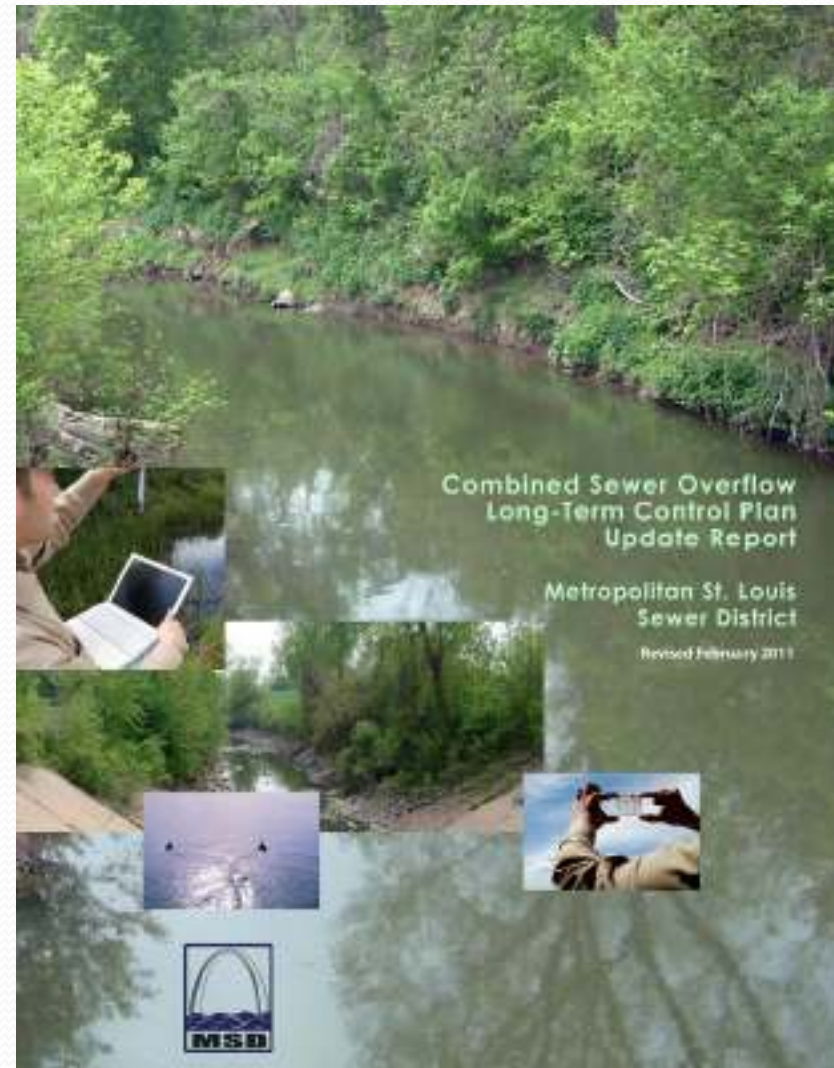
What is Green Infrastructure?

- There are MANY types of green infrastructure best management practices (GI BMPs) including:
 - Bioretention cells and raingardens
 - Amended soil
 - Pervious pavements
 - Wet ponds and constructed wetlands
 - Tree trenches and native plantings
 - Planter boxes and rain barrels
 - Green or blue roofs
 - Rainwater harvesting



Background

- **MSD's Long Term Control Plan (LTCP)** is a document that outlines how MSD is reducing combined sewer overflows (CSOs). It can be found on MSD's website at: www.stlmsd.com/educationoutreach/bestpractices/combinedseweroverflow





Background

- The LTCP includes a Green Infrastructure program aimed at reducing CSO volumes for the CSOs along the Mississippi River (mainly Bissell Point wastewater treatment plant service area)
- Total commitment of \$100 Million for Green Infrastructure over a 23-year period in the area that drains to these CSOs (Bissell Point Treatment Plant service area)
- **GOAL – Use Green Infrastructure practices to reduce the volume of CSOs by reducing the volume of stormwater that goes into the combined sewer system**



Background

- The Green Infrastructure program includes a \$3 million, 5-year pilot program to work through logistical and technical challenges. The knowledge we gain will help us be more successful in the full implementation of the Green Infrastructure Program
- The pilot program will result in a report to EPA outlining what was done, what we learned, and how we propose to conduct the full Green Infrastructure Program
- Detailed information on the Green Infrastructure components of the LTCP can be found in **Chapter 12 and Appendix Q** of the document



Pilot Program Focus Area

Generally “North City”

- North of I-64
- City of St. Louis
- Bissell Point Waste Water Treatment Plant Service Area (area contributes to CSOs along the Mississippi River)

Background

- A major constraint to any green infrastructure program is to find willing property owners for locating GI BMPs
- The Land Reutilization Authority (LRA) is one of the City of St. Louis' economic development authorities and owns approximately 10,000 vacant and abandoned properties, most of which are within the area targeted for the Green Infrastructure Program
- MSD and the LRA felt they have a great opportunity for partnership!





MSD/LRA Partnership

- MSD provided \$1.5 Million in funding for the LRA's demolition program
 - Immediate reduction in directly connected impervious area
- In demolition locations, and other agreed upon LRA locations, MSD is building GI BMPs, or holding areas for future GI BMP construction
- Some properties will be conveyed to MSD for larger neighborhood scale facilities servicing multiple lots, which will be owned and maintained by MSD



MSD/LRA Partnership

- Facilities on lots retained by LRA will be maintained by LRA or current owner
- Some lots are not feasible locations for construction of green infrastructure right now, but MSD can reserve an area for a facility to be built later, in coordination with future owners
- Maintenance or Development Agreements are being recorded for all LRA lots involved in the program, in order to provide lasting control for stormwater volume reduction

Green Infrastructure Concept Schematic

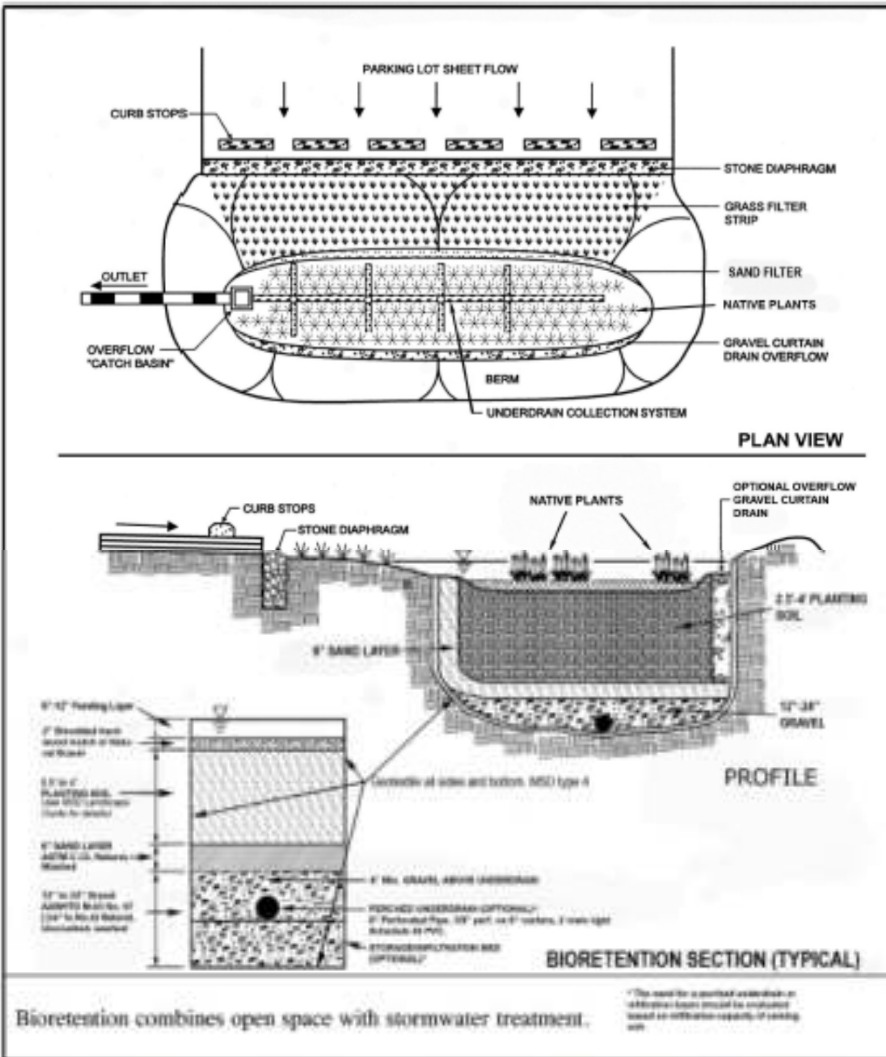


Neighborhood Scale Facilities



- Multi-lot GI BMPs designed to handle the runoff from most or all of the block
- Sized for an assumed percent of impervious surface when the block is re-developed
- MSD owns and maintains the facility
- Good opportunities to capture adjacent streets and alley drainage

Bioretention “Rain Gardens”



Ranken Jordan– photos courtesy of SWT Design

Street “Bump-out”

By SWT Design



Pervious Alley

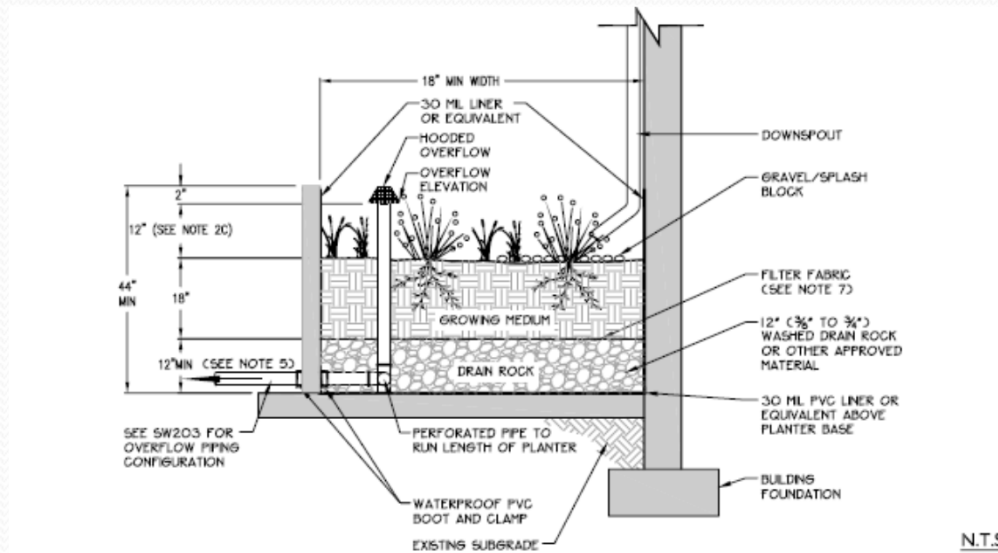


Lot Scale Facilities: Existing House with Planter Box/Rain Garden & Amended Soil



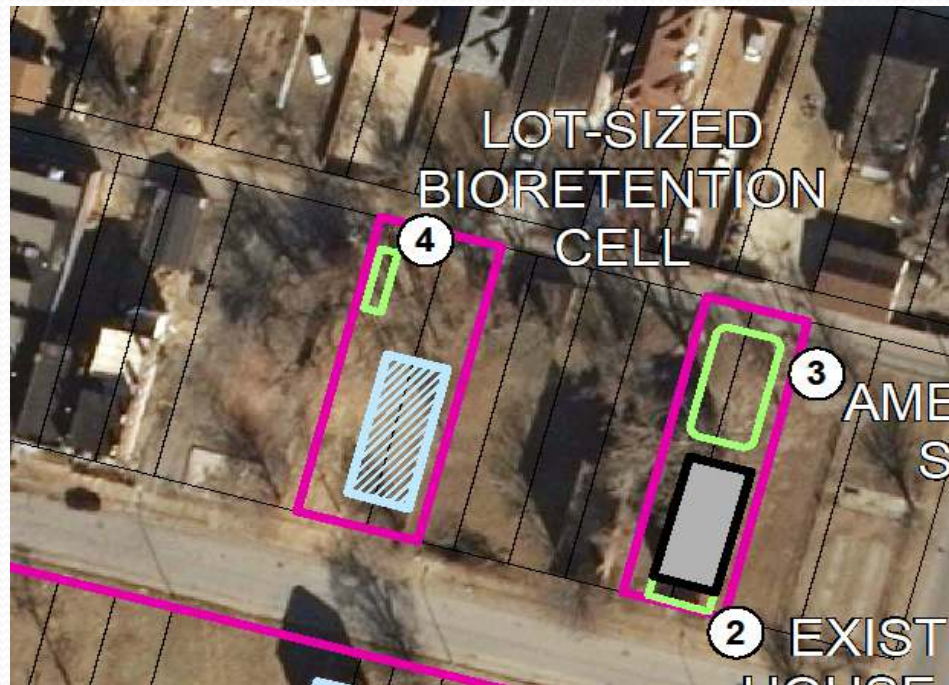
- New or rehab home. Downspouts disconnected to a planter box or other GI BMP
- Owned and maintained by the LRA or current property owner
- MSD has educational material with plant suggestions and maintenance tips and has a recorded Maintenance Agreement that is transferred to new owners

Planter Box and Soil Amendment



- Planter box is lined. Rock layer below the soil stores water while it weeps through holes to lawn or through pipe to lawn popup or sewer
- The soil in the yard can be amended to provide additional runoff control, such as by tilling in compost, and replanting the grass

Demolition with area for Future Lot Sized Facility



- For demolition locations where a facility built now is not feasible
- Record a Development Agreement with future Reserve Area
- Does NOT specify where the facility must go, just a required square footage
- MSD will work with future property owner to incorporate a GI BMP at that time
- On one site, the neighbor approached LRA to purchase the recently cleared lots next door, so we worked to divert the downspouts from their house to raingardens on the adjoining lots

Lot-sized Bioretention “Rain Garden”

- MSD has educational material for the raingarden with plant suggestions and maintenance information
- Plantings can be low maintenance
- Plantings could also have more of a garden appearance



Raingarden After Construction



Habitat for Humanity Lot-sized Bioretention



Development/Maintenance Agreements

- All private parcels involved in the program have a recorded Agreement.
- There are three types, all require:
 - MSD review of development plans
 - Future downspouts for roof drainage will not be re-connected to the combined sewer system
 - Sets a maximum area of impervious surface, which the facility is designed to handle



Development/Maintenance Agreements

- In addition to the general requirements:
 - Maintenance Agreement
 - On properties that receive a Lot Scale facility
 - Includes a “Reserve Area” exhibit showing the GI BMP location
 - Development Agreement with Future Reserve Area
 - On properties with MSD funded demolition but construction of a GI BMP now is not feasible
 - Specifies a minimum reserve area needed for future MSD funded GI BMP to be built when the lot is re-developed
 - Tributary Lot Development Agreement
 - Used for lots that drain to a Neighborhood Scale facility

How's it going so far?

- Demolitions completed by LRA
 - 220 parcels
 - 222 buildings
 - Average demolition cost approximately \$7,000/building

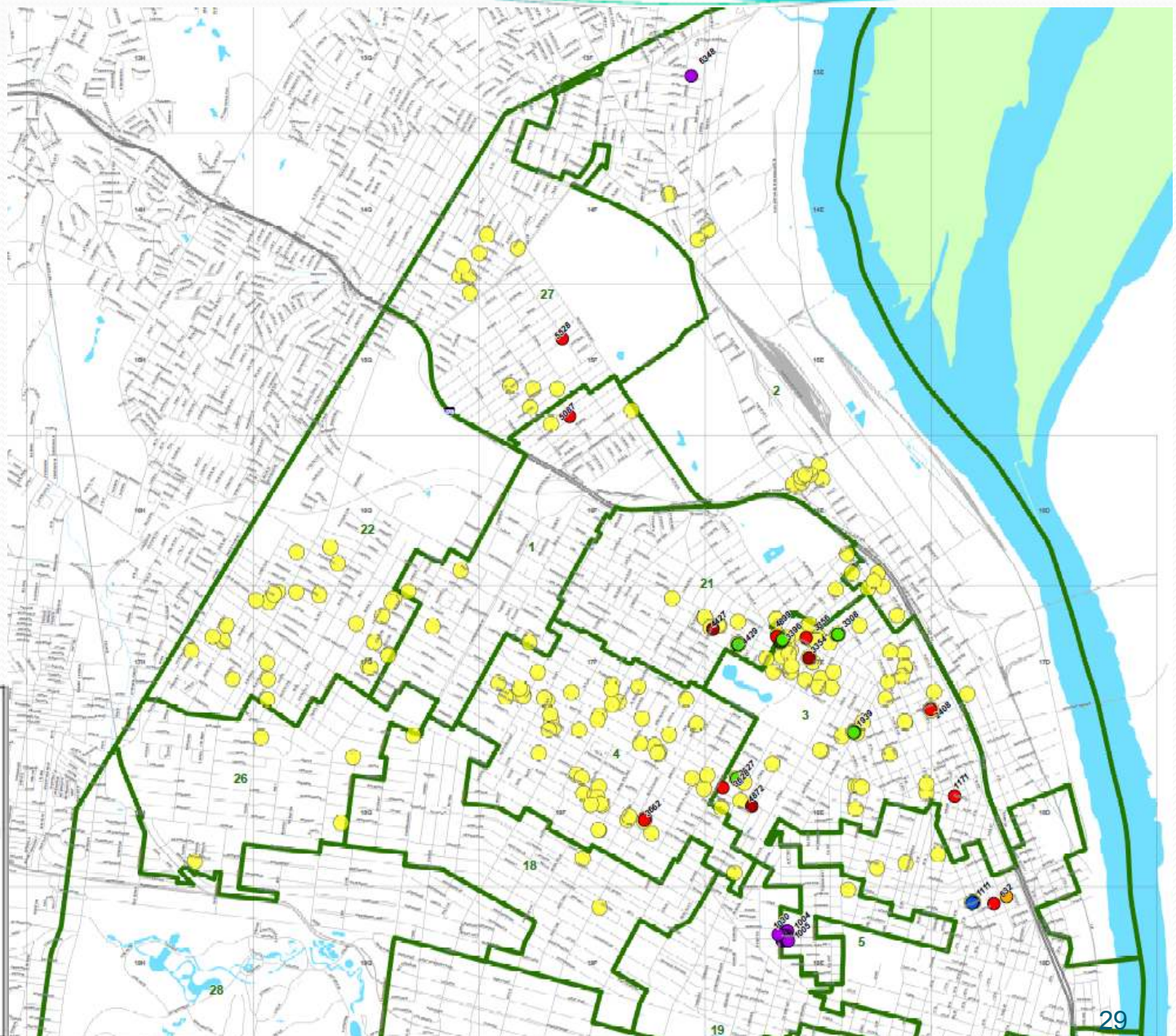




How's it going so far?

- We have located all Pilot facilities. Locations include:
 - 9 Neighborhood-Scale facilities:
 - 7 large bioretention facilities
 - 1 street-side bioretention facility
 - 1 pervious alley
 - Site-Scale facilities:
 - 13 planter boxes installed by Habitat for Humanity
 - 2 rain garden facilities installed by homeowner
 - 1 planter box/rain garden with a Community Development Agency home being rehabilitated
 - 13 parcels with amended soil test sites

Demolition and Planned Project Locations



Planned Locations/Schedule

Lot Scale Projects:			
PROJECT NAME	Ward	Planting Scheduled	City Block(s)
C.B. 1003, 1004, 1005, 1030 (Habitat for Humanity Redevelopment - mult addresses)	3/19	Fall, 2011	1004, 1005, 1030
40' E OF NE CORNER OF N. FLORISSANT & MONROE (1451 & 1455 MONROE)	5	Spring, 2012	1111
Amended Soil Package #1 (4228-4240 Warne Avenue, 4133-4135 Lea Place)	3/21	Fall, 2011	3396, 4429
Amended Soil Package #2 (4021-4023 Glasgow, 3139-3143 N Sarah, 3832-3834 Labadie)	3/4	Spring, 2012	1939, 3624, 3627
Harlan #835 (CDA Rehab)	2	Spring, 2012	6348

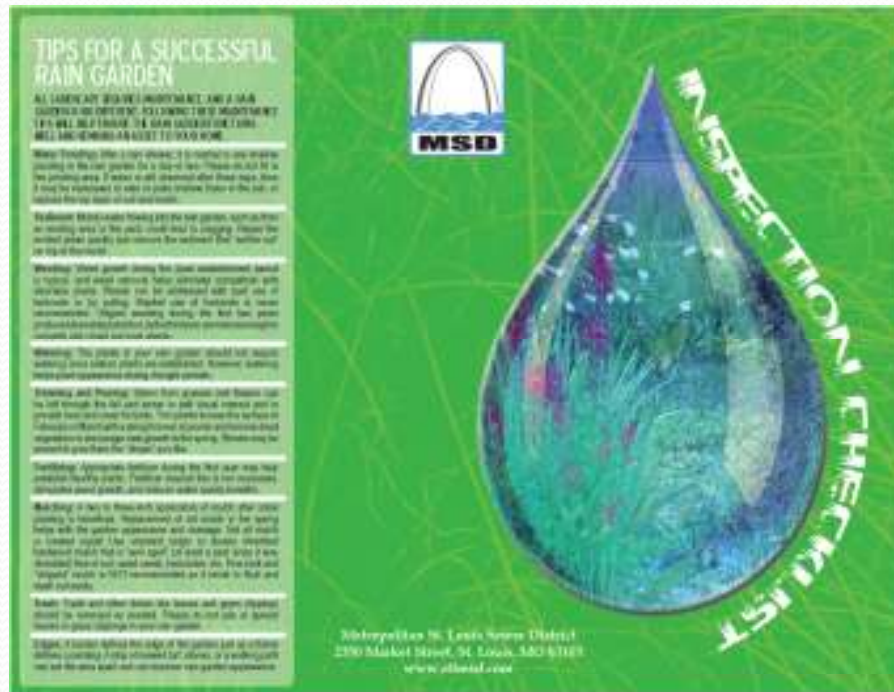
Neighborhood Scale Projects:			
PROJECT NAME	Ward	Planting Scheduled	City Block(s)
CLINTON ST. #1323 BIORETENTION (CB632) - CSO VR GIPLT	5	Fall, 2012	632
CLINTON ST. - N. 13TH ST. PERVIOUS PAVEMENT ALLEY (CB 640) - CSO VR GIPLT	5	Spring, 2013	640
NORTH VANDEVENTER #2818 BIORETENTION CELL (CB 3628) CSO VR GIPLT	3	Spring, 2013	3628
NORTH SARAH #1801-1803 BIORETENTION (CB 3662) CSO VR GIPLT	4	Spring, 2013	3662
GERALDINE #5099 BIORETENTION (CB5087) CSO VR GIPLT	1	Spring, 2013	5087
BEACON #5479 BIORETENTION (CB5528) CSO VR GIPLT	27	Spring, 2013	5528
WARNE #4241 ROW BIORETENTION (CB4899) CSO VR GIPLT	21	Fall, 2013	4899
BLAIR #3961 BIORETENTION (CB2408) CSO VR GIPLT	3	Fall, 2013	2408
19TH ST #3301 BIORETENTION (CB1171) CSO VR GIPLT	3	Fall, 2013	1171



How's it going so far?

- Public Participation/Education:
 - Developed a “Homeowner’s Toolkit” for raingardens including tips, maintenance information and schedule, common weeds, stormwater pollution information, etc. This template will be revised for bioretention and planter boxes.
 - Occasional updates on the pilot program can be found on MSD’s blog at www.yourmsd.wordpress.com
 - Public information meetings will be conducted in the areas around Neighborhood-Scale projects
 - The final report will be featured on the MSD website

Homeowner's Toolkit



RAIN GARDEN SELF INSPECTION AND MAINTENANCE RECORD		
FEBRUARY TO MARCH	MAINTENANCE ACTION PERFORMED	
Remove trash and debris.	Yes	No
Prune bushes and trim other plants to raise the surface.	Yes	No
Remove old, compacted soil and replace with new soil.	Yes	No
APRIL TO MAY		
Replace or remove any damaged or dead plants.	Yes	No
Plant weeds.	Yes	No
SUMMER MONTHS		
Water plants during extremely dry periods.	Yes	No
SEPTEMBER TO OCTOBER		
Remove trash and debris.	Yes	No
Replace or remove any damaged, without tiller or dead plant.	Yes	No
Plant weeds (or new grasses and flowers over water).	Yes	No
Check for adequate water cover.	Yes	No
Repair any eroded areas within the garden or surrounding area.	Yes	No
AFTER IT RAINS		
Check for muddy water or standing water flowing into the garden.	Yes	No
Check for standing water (longer than three days).	Yes	No

Homeowner's Toolkit

WHAT IS A RAIN GARDEN?

Simply put, a rain garden is a planted area where rainwater collects. By allowing stormwater runoff from roofs, driveways, and other impervious areas to be absorbed into the ground, a rain garden reduces erosion, water pollution and flooding.

A rain garden provides an efficient way to use the rain that falls, reducing or avoiding the need for irrigation. They also allow a homeowner or business owner to deal with rainwater runoff on their property, so there is less that flows onto neighboring property and into the public sewer system. In this way, your rain garden is your personal contribution to cleaner water!

Native plants are recommended for rain gardens because they generally don't require fertilizer and are more tolerant of the local climate, soil, and water conditions. The plants take up water flowing into the rain garden, and the deep roots improve the soil's ability to infiltrate the water into the groundwater system.

Please place your complimentary rain garden sign in your rain garden. Thank you for making a difference, garden by garden and drop by drop!

MSD is a proud partner of Show Me Rain Gardens, a regional water quality effort to promote rain gardens.

BENEFITS OF A RAIN GARDEN...

- Reduces stormwater runoff which helps...
 - improve water quality
 - Reduce erosion
 - Reduce flooding
- Landscaping improves property values
- Provides food and habitat for beneficial wildlife
- Provides interesting planting opportunities

WHAT ABOUT MOSQUITOES?

After a rain, it is normal to see shallow ponded water in the rain garden, but only for a day or two. Mosquitoes need 7 to 10 days to lay and hatch eggs. Mosquitoes are more likely to lay eggs in bird baths and clogged gutters. Also, rain gardens attract frogs, dragonflies and birds that eat mosquitoes!





This garden is designed to catch and filter rainwater runoff with plants that are adapted to occasional temporary ponding. Rain gardens provide wildlife habitat, slow storm water runoff, and remove pollutants.

CONTACT MSD FOR MORE INFORMATION AT WWW.STLMSD.COM




COMMON WEEDS THAT YOU SHOULD REMOVE FROM YOUR RAINGARDEN

INTEGRABLE WEEDS



MISSOURI BOTANICAL GARDEN
P.O. Box 1199 • Saint Louis, Missouri 63119-1199 • www.mobot.org

PLANT NAMES PROVIDED BY THE MISSOURI BOTANICAL GARDEN. FOR MORE INFORMATION ABOUT THE WEEDS AND WEEDING PRACTICES, VISIT THE MISSOURI BOTANICAL GARDEN AT WWW.MISSOURIBOTANICALGARDEN.ORG

GET TO KNOW SOME OF THE NATIVE PLANTS IN YOUR RAIN GARDEN

INTEGRABLE NATIVE PLANTS



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How's it going so far?

- Evaluation and Post Construction:
 - Monitoring plan/protocol is nearly complete
 - Tracking of private facilities and Agreements using GIS mapping to ensure parcels affected by the program are handled according to the recorded agreements
 - Discussing maintenance with the City in order to clearly define maintenance roles for facilities located in City right-of-way



Anticipated Schedule

- Demolitions complete
- Habitat planter boxes, 2 amended soil packages and 2 site-scale facilities complete
- First neighborhood scale facility and final site-scale facility this fall, 2012
- All pilot program construction to be complete by the end of 2013
- 2013 to 2015 – Monitoring and evaluation of effectiveness and develop recommendations for the full Green Infrastructure program (the rest of the \$100 million)
- Pilot Program report due to EPA at the end of 2015, including recommendations for full program



The \$97 Million Question

- EPA will receive the pilot report at the end of 2015
- Once EPA and MSD are in agreement on the plan for the full GI program, we can move forward
- “Early Action” projects:
 - The GI Program in the LTCP allows us to consider early opportunities prior to pilot program completion
 - Currently developing an application and prioritization process for potential projects, to be considered on an annual basis
 - Early action projects selected will be submitted to EPA for approval, which is required prior to proceeding on the projects



Thank You!

Questions?

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