



Milwaukee's Green View



Milwaukee Metropolitan Sewerage District

Everything is coming up Green in Milwaukee





But you have to start with a grey backbone...

- Treatment Plants
- Sewers
- Storage Vessels...

To go Green ...

- Rain Barrels
- Rain Gardens
- Bioretention...

Jones Island

Wastewater Treatment Facilities




South Shore

How does the water get to the Treatment Plants?

- 300 miles / MMSD sewers
- 3,000 miles / Community sewers
- 3,000 miles / Private property sewers



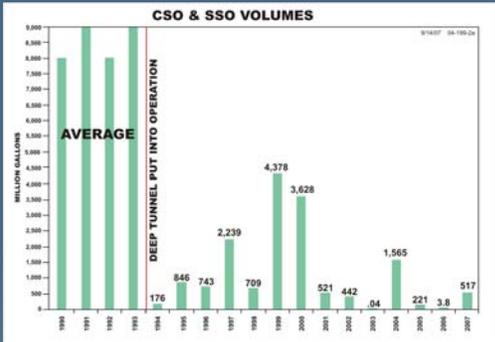
Deep Tunnel System in ~~1994~~ 2006

100 feet below ground

- 485 million gallons
- 19.4 miles long
- 17- to 32-foot diameter
- Designed to minimize basement backup and for 1-2 overflows a year



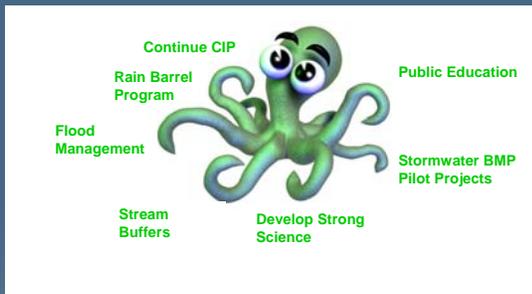

Results of our Grey Backbone



Beaches will still close
even with
ZERO overflows.



We addressed this in many ways





Lincoln Creek

Before

After

- Concrete Removal
- Minimized Floodplain
- Habitat Enhancement



Green Seams

- 454 acres in 2006
- Over 1,300 acres since 2001
- \$8.9 million since 2001
- \$891,000 grants since 2001

Stormwater Ordinances

- In 2002, MMSD implemented a "Stormwater Rule"
 - Requiring 28 communities to implement a stormwater runoff ordinance for all new impervious areas greater than 1/2 acre.
 - 100 year runoff release rate - 0.5 cfs/acre of new impervious area
 - 2 year runoff release rate - 0.15 cfs/acre of new impervious area

Every DROP COUNTS

WE STARTED BECAUSE IT MADE SENSE...

- Stormwater Trees
- Rain Gardens
- Downspout Disconnection
- Green Roofs

Rain Barrels

7,064
Since 2003

Green Roof

MMSD Headquarters

- Installed Summer 2003
- 435 containers in "green grid" container system
- Covers 4,000 square feet



Stormwater BMPs

MMSD has sponsored
23 projects since
2003



Neighborhood Partnerships

➤ Walnut Way Neighborhood




Multiple Benefits

- Urban Gardens
- Neighborhood Revitalization
- Cistern for CSO reduction

Community Partnerships

➤ Shorewood - 50 rain gardens

➤ Urban Ecology Center





11,246
Plants sold since 2005



Stormwater Management Education



Milwaukee River Flushing Station

Getting it done in the Region: Whole Demonstration Sites

Alterra Coffee Shop

- Porous pavement
- Downspout Disconnection
- Rain Barrels
- Rain Garden
- Water Quality Inlet Filter
- Estimate 30% reduction in runoff



Hart Park Flood Management



Stormwater Reduction BMP Volume Reduction

- 1. Downspout Disconnection (dd) 12%
- 2. Rain Barrel (w/ dd) 14%
- 3. Rain Garden (w/ dd) 36%
- 4. Rain barrel and Rain Garden (w/ dd) 38%
- 5. Green Roof 22%
- 6. Bioretention 70%
- 7. Green Parking Lot 76%
- 8. Stormwater Trees 10%

Source: CDM

Pollutant Removal Estimates for Stormwater BMPs

Pollutant	Infiltration Practices	Bioretention	Porous Pavement	Constructed Wetland
Total phosphorus	70	34	85	49
Soluble phosphorous	85	38		35
Total nitrogen	51	84		30
Nitrate	82	31	30	67
Copper		51		40
Zinc	99	71		44
TSS	95	81	85	76

Sources: National Pollutant Removal Performance Database for Stormwater Treatment Practices, Center for Watershed Protection, June 2000
 Pennsylvania Stormwater Manual (draft, 2004)