

Municipal Climate Adaptation in the Great Lakes Region:

Adaptation and Water, Wastewater and Stormwater:

Milwaukee and the Milwaukee Metropolitan Sewerage District

Karen L. Sands, AICP

Manager of Sustainability

Milwaukee Metropolitan Sewerage District

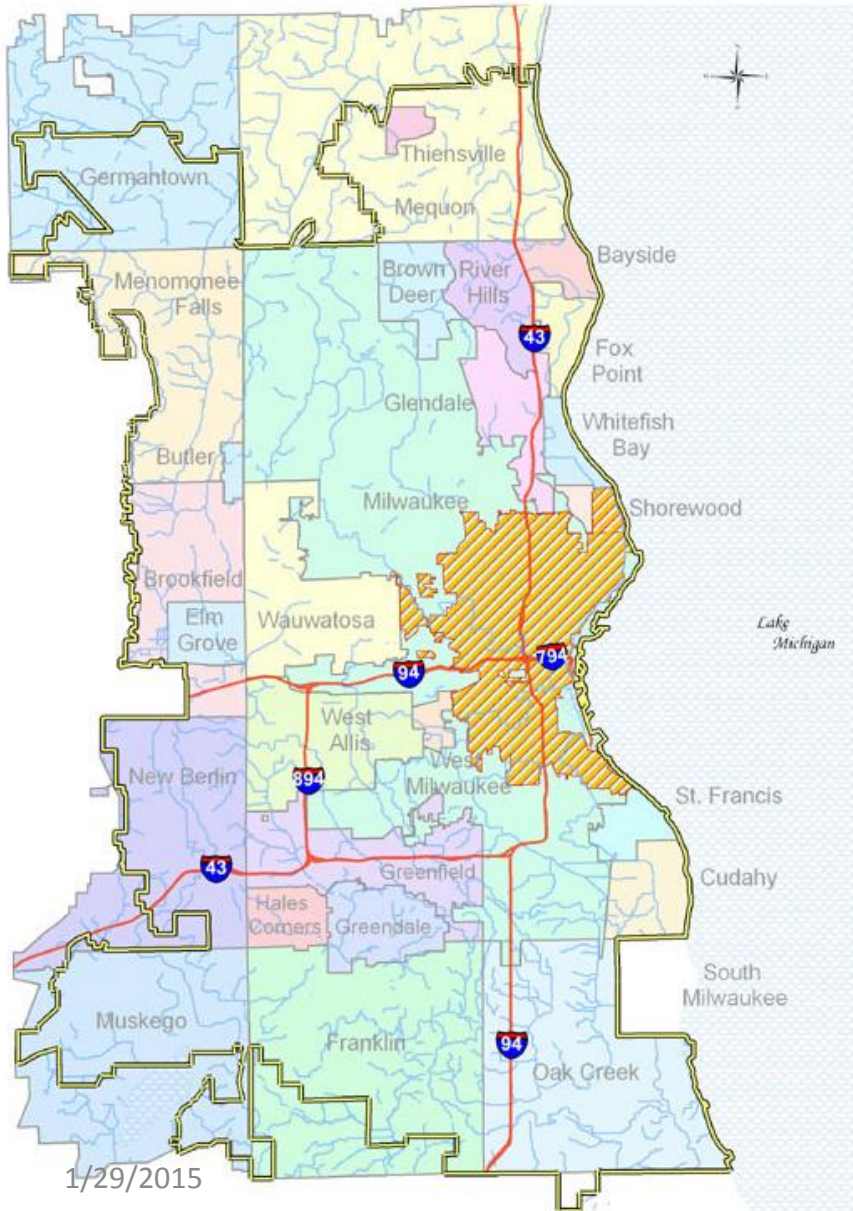


Today's Talk...

- Brief MMSD Background
- Climate Change Context
- Adaptation



Milwaukee Metropolitan Sewerage District



We Serve:

- 1.1 Million Customers
- 28 Municipalities
- 411 Square Miles

Using Grey Infrastructure:

- Collector Sewers
- 2 Water Reclamation Facilities
- 521 MG Tunnel Storage

To Protect the Environment:

- Convey/Store/Reclaim Wastewater
- Manage Flooding
- Much More...

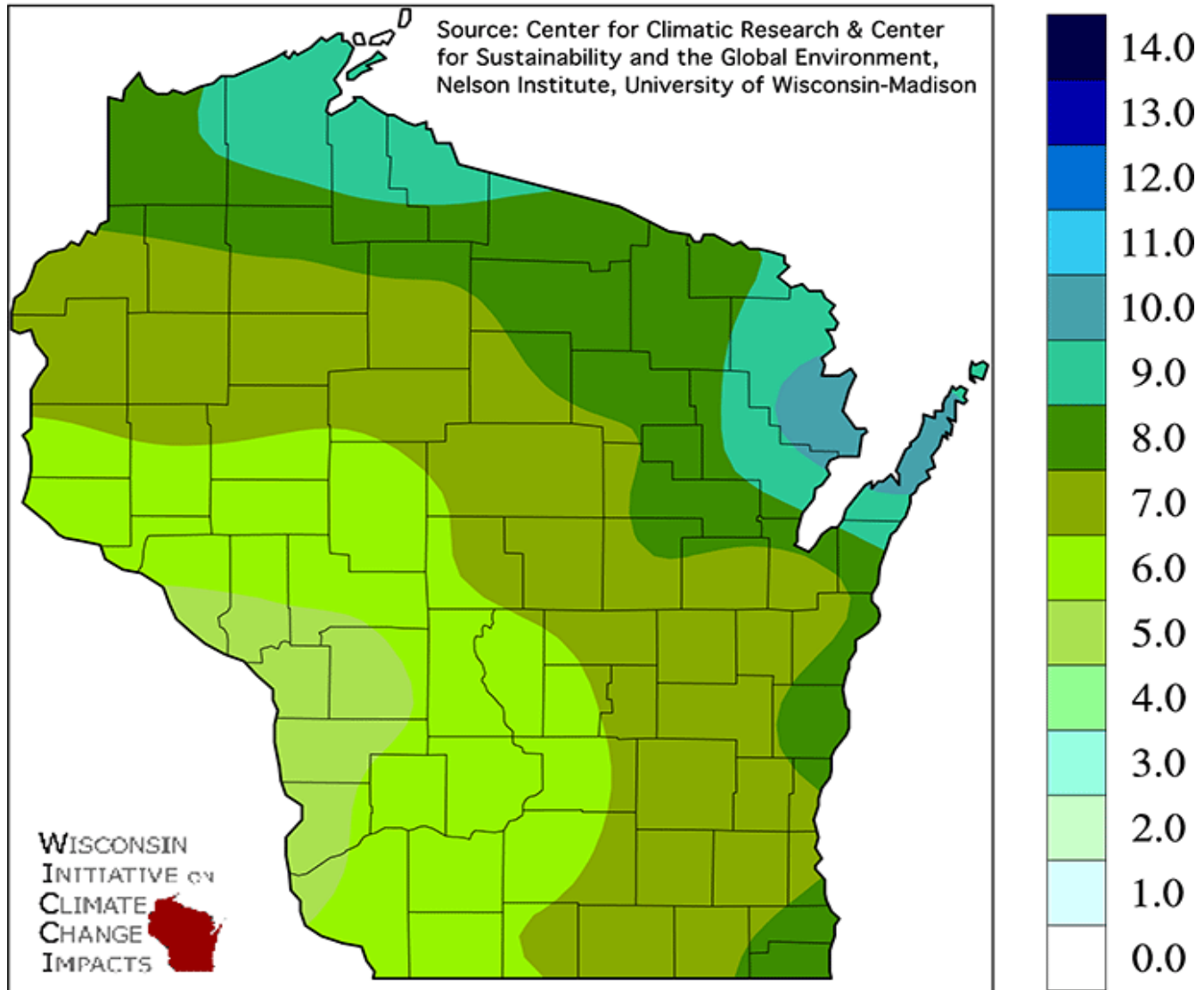
End Result!



1/29/2015

Regional Climate Change Context: WICCI

Projected Change in the Frequency of 1" Precipitation Events
(days/decade) from 1980 to 2055 (A1B)



Climate Change: Data Speaks for Itself

Kinnickinnic River top 5 crests:

- (1) 16.01 ft on 08/06/1986
- (2) 13.29 ft on 06/08/**2008**
- (3) 13.22 ft on 07/10/**2006**
- (4) 13.20 ft on 07/15/**2010**
- (5) 13.17 ft on 07/23/**2010**



MMSD's 2035 Vision and Strategic Objectives

Broad Strategic Objectives For:

1. Integrated Watershed Management
2. Climate Change Mitigation/Adaptation with an Emphasis on Energy Efficiency



MMSD's Overall Climate Change Strategy

MITIGATION Reduce carbon emissions & provide carbon "sinks"

PAST

Renewable Energy
anaerobic digestion, solar

Green Infrastructure
demonstrations

Carbon Footprint
(2000-2007)

PRESENT

Renewable Energy
landfill gas

Green Infrastructure
widespread green roofs

Carbon Footprint
targets, modeling,
tracking, reporting
Greenseams*

FUTURE

Renewable Energy
anaerobic digestion, solar, wind

Green Infrastructure
widespread across the region

Carbon Footprint
significant reduction
Greenseams* expansion

ADAPTATION Anticipate changes to come & moderate effects

PAST

Climate Change
participate in WI Initiative
on Climate Change Impacts

Green Infrastructure
demonstrations

Infrastructure Design
design based on history

PRESENT

Climate Change
participate in WI Initiative
on Climate Change Impacts

Green Infrastructure
widespread green roofs

Infrastructure Design
design based on history

FUTURE

Climate Change
expand modeling to look
beyond CSO impacts

Green Infrastructure
widespread across the region

Infrastructure Design
design based on history &
future modeling

Climate Change Issues for MMSD

- More frequent large storms
- Longer drought periods in between storms
- More precipitation falling on frozen ground
- Others...



MMSD Adaptation Solutions

- Flood management
- Green infrastructure to infiltrate, hold, evapotranspire
- Vulnerability analysis



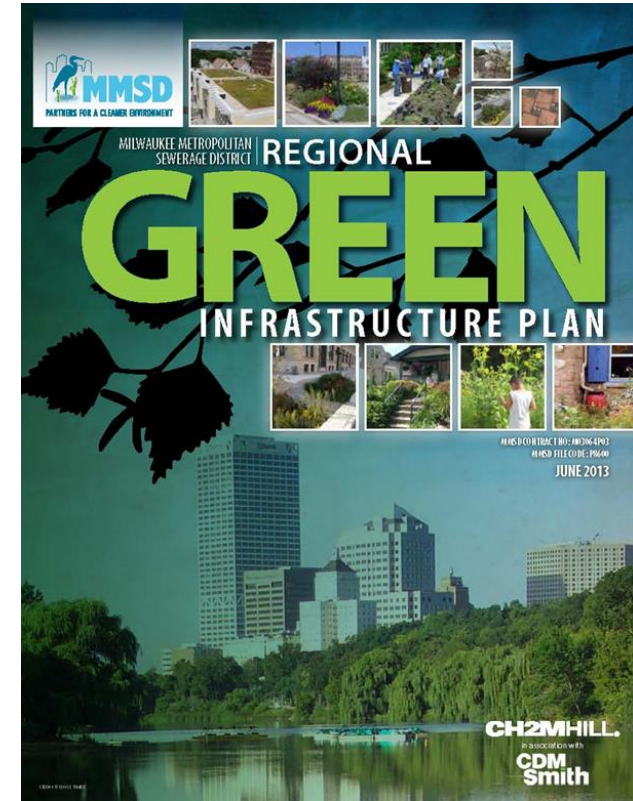
Flood Management: Lincoln Creek



- Concrete removal to naturalize channel
- Minimized floodplain
- Habitat enhancement

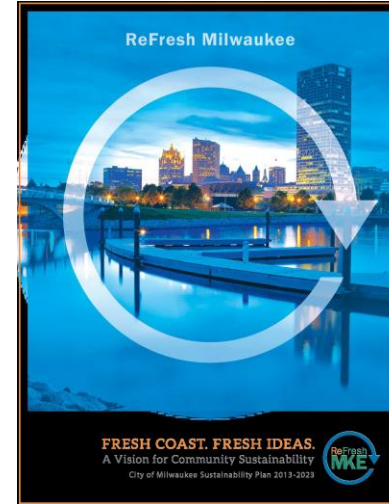
MMSD's Plan: What's So Groundbreaking?

- 0.5" of rainfall on imperviousness = 740 MG!
- Emphasizes combined & separate sewer service areas
- Supports private property inflow & infiltration
- Promotes turf grass with soil amendments
- Assumes we support but don't directly build



Milwaukee's Refresh and GI Baseline Inventory (GIBI) Reports

- Recommends an annual 10% volume increase
- Current implementation: 8 MG
- Additional designed/funded: 19.5 MG
- Report is an inventory only, does not establish GI targets



MMSD's On-Going Programs



Climate Change Vulnerability Analysis



Identify High, Medium and Low Risks, Then...

Adapt:

- Take no-regrets actions, like:
 - Maximize onsite-generated power for ISS pumps
 - Consider sewer lining materials resistant to H₂S
 - Maximize implementation of GI practices
- Take actions to address climate change

For Instance...

- Falling lake levels dry foundation piles



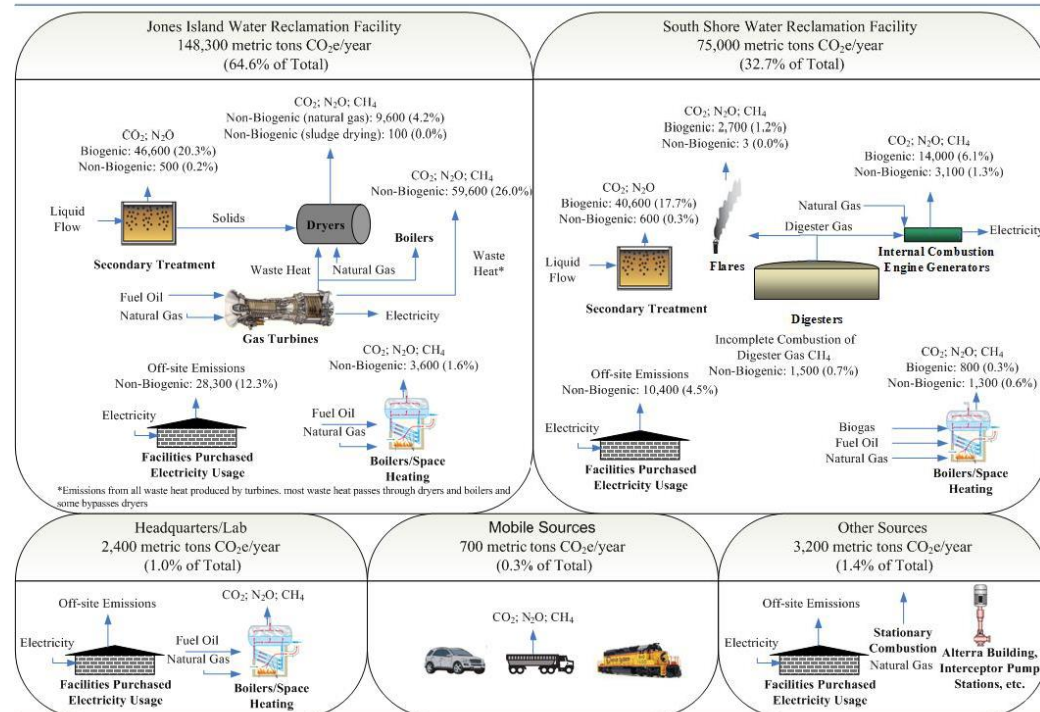
Next Steps (besides GI)

- Monitor floodplains
- Evaluate feasibility of modifications
 - MIS pump stations, change to gravity sewers
 - Retrofit electronic equipment with ventilation
 - Replace WRF equipment to reduce costs
- Develop vector management plan
- Review rain data for changes in volumes and frequency

MMSD Mitigation (besides adaptation)

- Renewable energy/energy conservation
- GI to sequester carbon
- Carbon footprint

MMSD 2007 Greenhouse Gas Emissions
229,600 metric tons CO₂eq/year



Note: Emissions listed for each source are in metric tons CO₂e/year. The percentage for each source is a percentage of the total for all facilities.

Karen Sands, AICP
Milwaukee Metropolitan Sewerage District

ksands@mmsd.com

414-225-2123

www.mmsd.com

www.h2ocapture.com

