Welcome!
We will begin shortly…

Virtual Meeting Schedule	
6:00 – 7:00	Introduction and Presentation
7:00 – 7:30	Presentation Q & A (General)
7:30 – 8:00	Focus Group Discussions/Zoom Breakout Rooms
8:00	Come Back Together/Wrap-Up

East Isthmus and Yahara River Watershed Study Public Information Meeting No. 1

by City of Madison Engineering Division

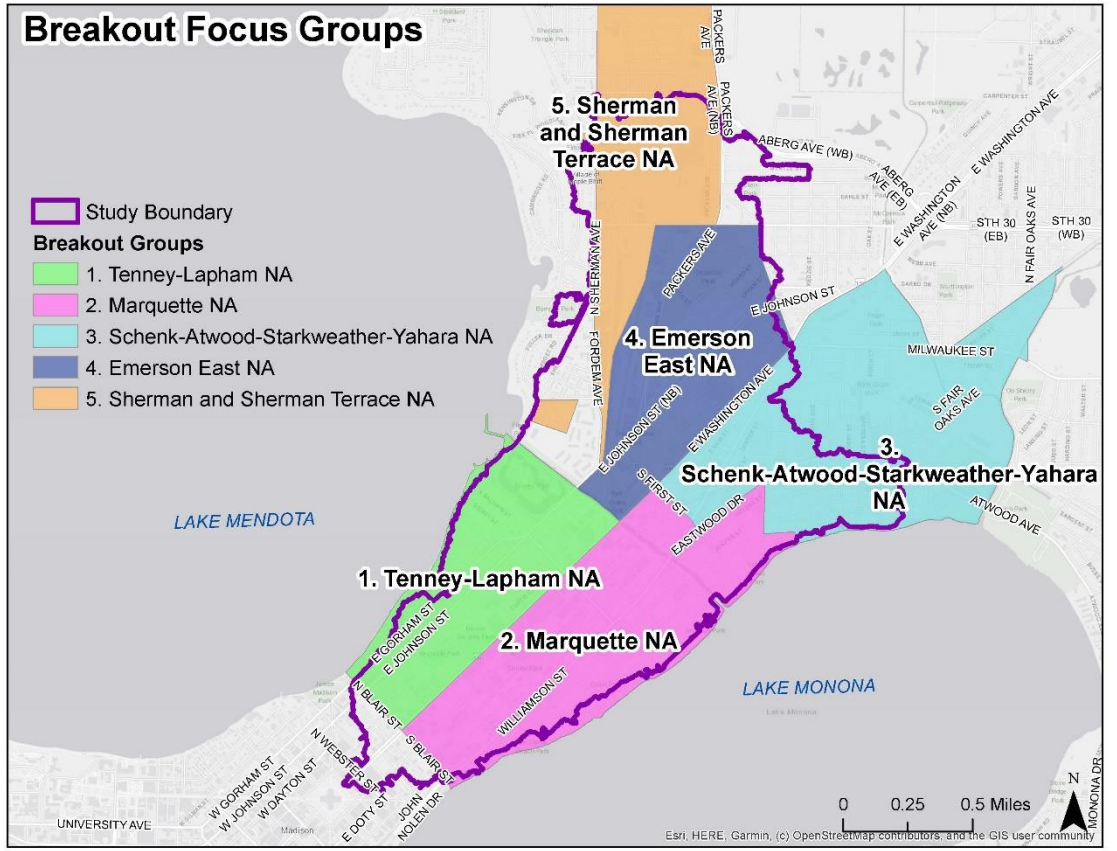
August 26, 2020

Please Note: This meeting is being recorded. It is a public record subject to disclosure.

By continuing to be in the meeting, you are consenting to being recorded and consenting to this record being released to public record requestors.

Evening Overview

- Welcome (Jojo O'Brien, City of Madison)
- Presentation (Dan Christian, Tetra Tech Inc.)
- Q&A (facilitated by Jojo O'Brien, City of Madison)
  - Submit questions through Zoom Q&A
    - *To find the Zoom Q&A Box, hover over the edge of your screen. A toolbar will appear and you can click on "Q&A"*
  - Questions answered at the end of the Presentation
- Breakout to Focus Groups (Tetra Tech & City of Madison staff)
  - A link for the Focus Groups will be posted in the Zoom Group Chat box.
- Come back together/Wrap Up (Jojo O'Brien, City of Madison)

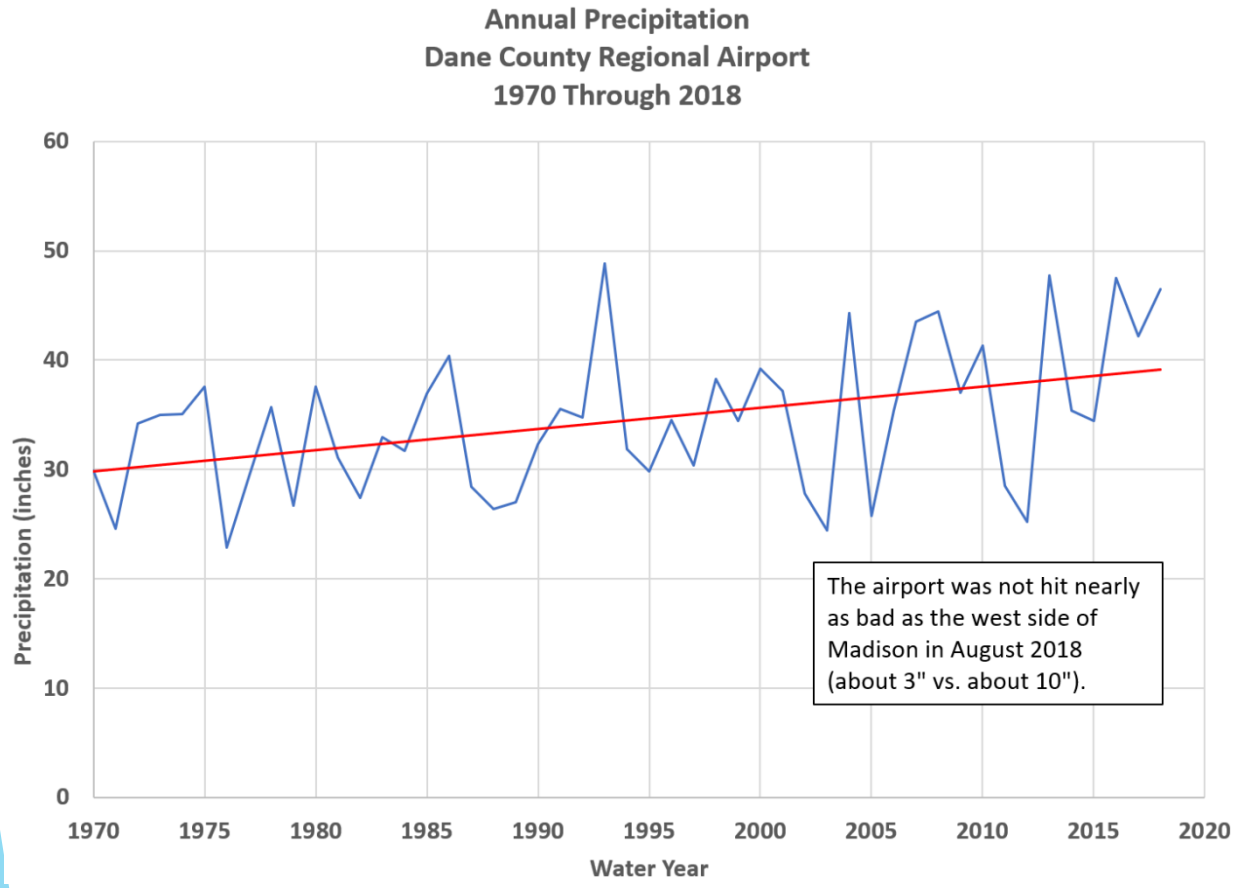


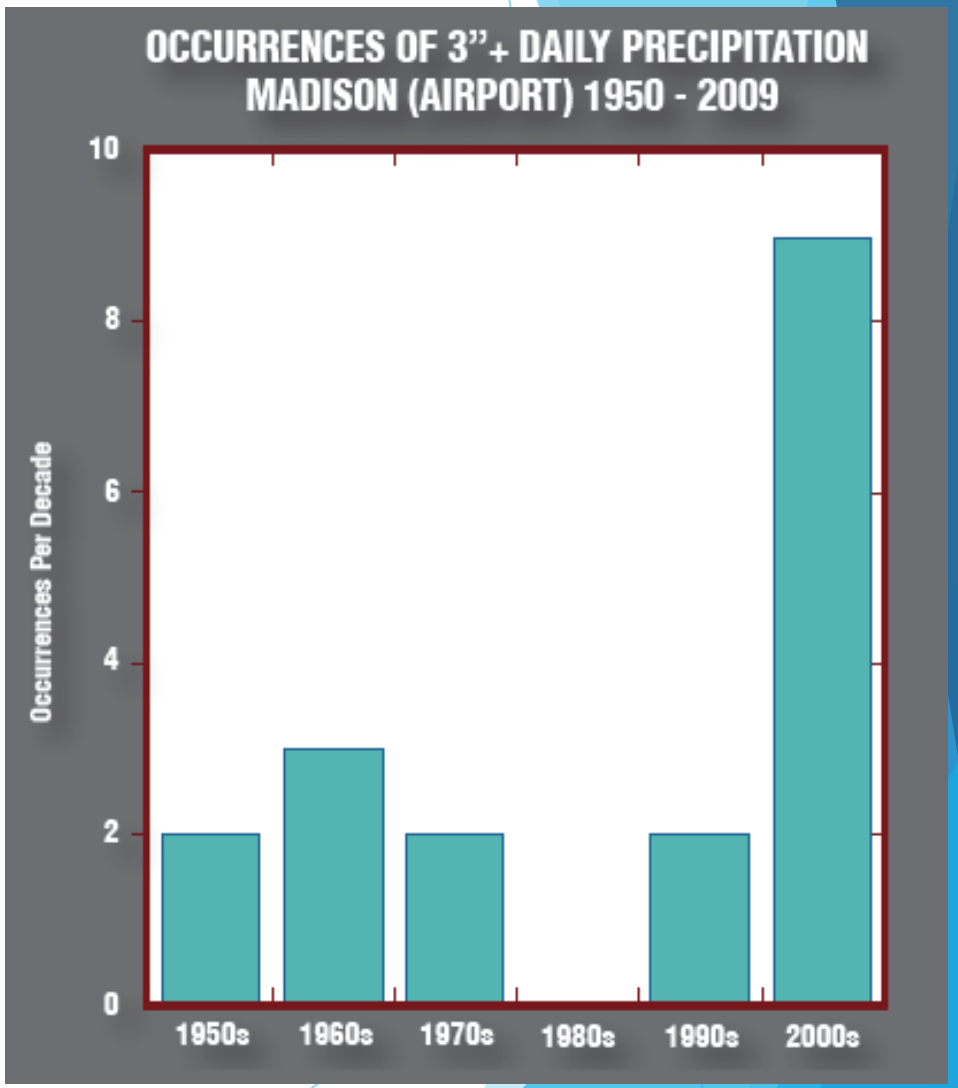
Presentation Overview

1. Why We Are Here
2. 100-Yr Storm Definition
3. Where the Water Goes
4. Reasons for Flooding Issues
5. Watershed Study Goals
6. Next Steps
7. Property Owner Responsibilities
8. How to Stay Involved

Why We Are Here: Historic Events

- More rain
- More rain events greater than 3”





Wisconsin's Changing Climate: Impacts and Adaptation. 2011. Wisconsin Initiative on Climate Change Impacts. Nelson Institute for Environmental Studies, University of Wisconsin-Madison and the Wisconsin Department of Natural Resources, Madison, Wisconsin.

Why We Are Here: Historic Rain Events

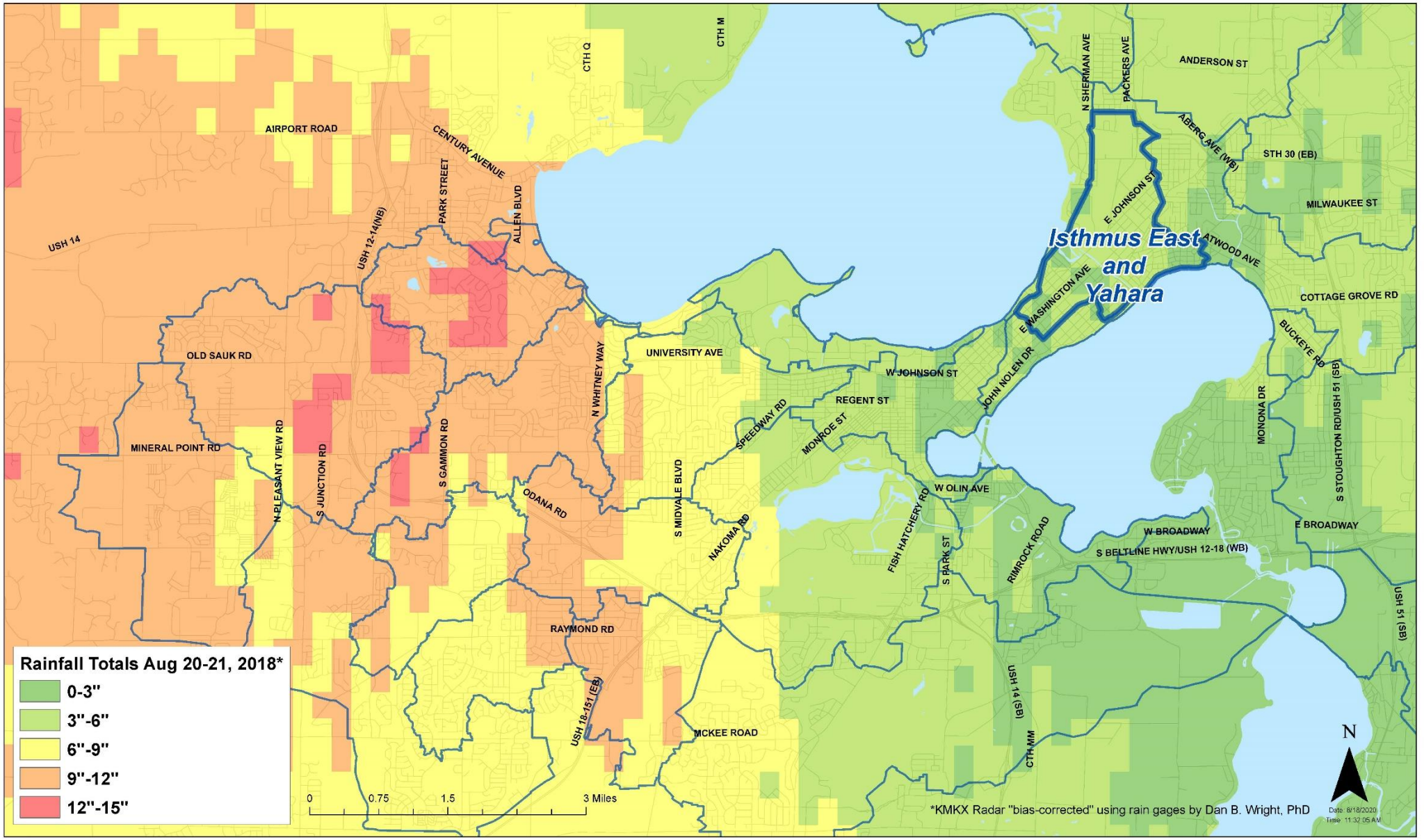
Recent Rain Events

- July 21, 2016: 2.46” in 3 hours
- July 10, 2017: 3.87” in 4 hours
- June 16, 2018: 2.34” in 2.5 hours
- August 20, 2018: 6.78” in 8 hours

E Johnson Street, Madison, WI

All rainfall totals taken from the Weather Underground Meadowwood station (KWIMADIS1) in Madison, WI.

Rainfall Totals August 20-21, 2018



KMKX Radar that was "bias corrected" using rain gauges by UW Professor Dan Wright

Why We Are Here: Historic Rain Events

- Recent storms have
  - amplified known inadequacies
  - revealed new storm sewer deficiencies
- ⇨ Result: flood damage

August 20, 2018 event: substantial damage
- Public infrastructure: $4 million
- Private property: reported $17.5 million, estimated $30 million

- City's plan
  - Complete watershed studies of impacted areas
  - Develop solutions from watershed studies

Deming Way, Madison, WI

100-Year Storm Definition

The “100-Year” Storm

- Annual exceedance probability (AEP): chance that a rainfall event will occur in one year.
- 100-yr storm = 1/100 (1%) AEP
  - Does **NOT** mean that a storm will only occur once in 100 years.
  - During a 30-year mortgage, there’s a 26% chance of experiencing a 100-year (1%) event.

Annual Exceedance Probability (AEP)	Chance of occurring in 1 Year	Return Period or Average Recurrence Interval (ARI)
100%	1 in 1	1-year
50%	1 in 2	2-year
10%	1 in 10	10-year
4%	1 in 25	25-year
1%	1 in 100	100-year
0.10%	1 in 1000	1000-year

Historic Rain Events: In Context

Recent Rain Events

- July 21, 2016: 2.46” in 3 hours
  - 10-20% chance of occurring each year
- July 10, 2017: 3.87” in 4 hours
  - 2% chance of occurring each year
- June 16, 2018: 2.34” in 2.5 hours
  - 10-20% chance of occurring each year
- August 20, 2018: 6.78” in 10 hours
  - 0.5% chance of occurring each year

All rainfall totals taken from the Weather Underground Camelot Dr station (KWIMADIS87) in Madison, WI.

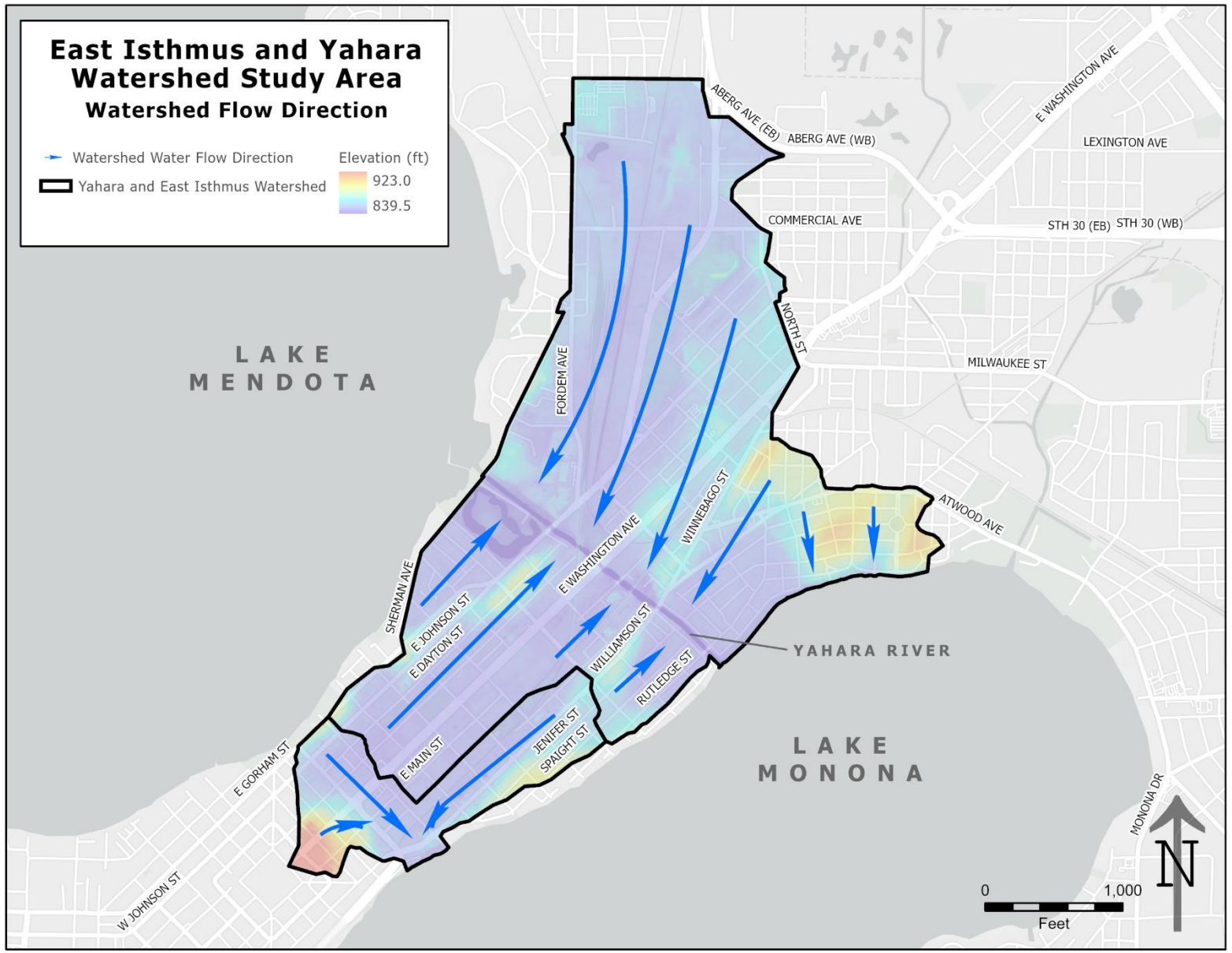
E Mifflin St at N Livingston St, Madison, WI

Where the Water Goes

What's a watershed?

- A watershed is the area of land that drains precipitation (rain, snow, etc.) to a common low point, such as an inlet, stream, or lake.

- Determined by surface terrain and underground pipe system.



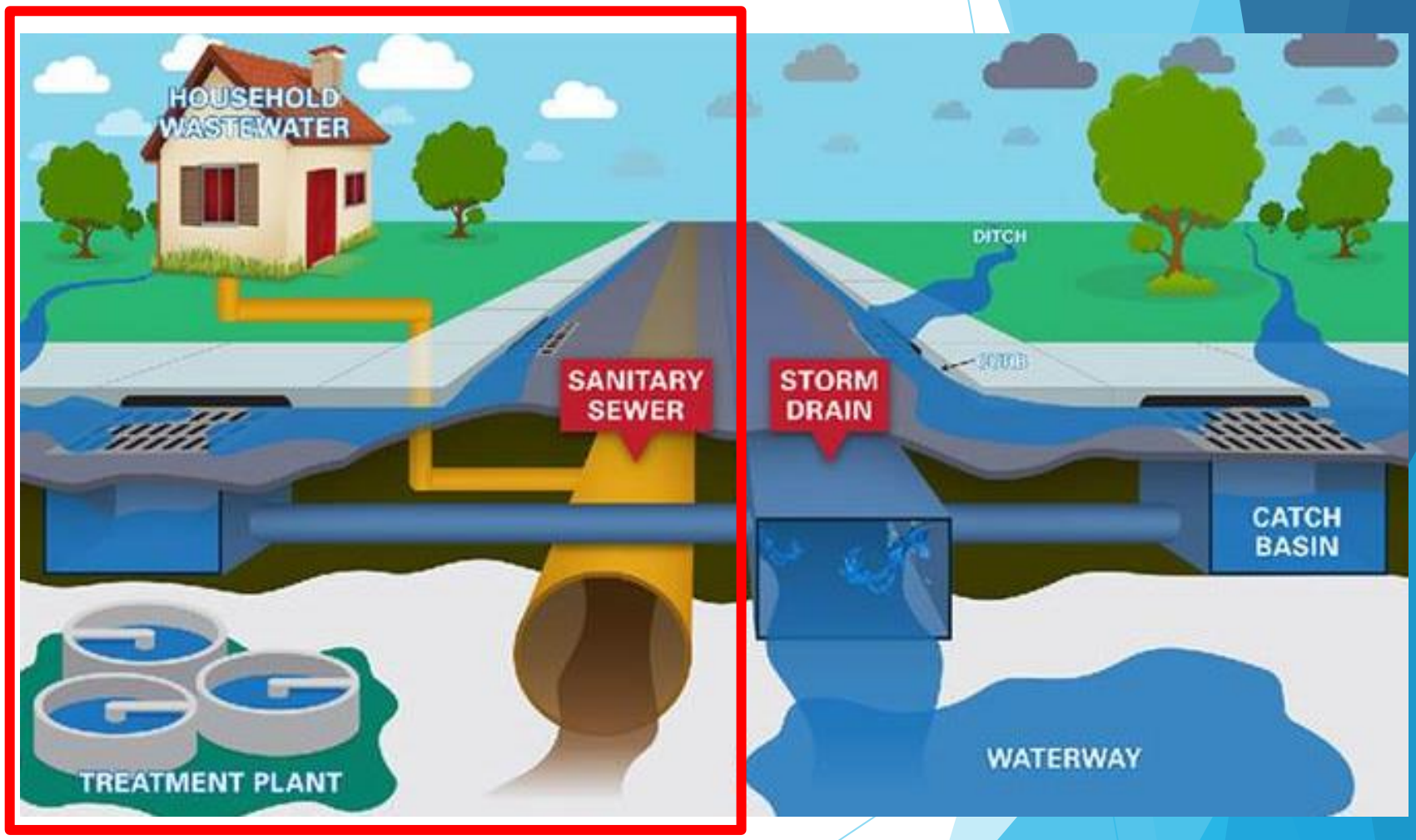
Where the Water Goes: Sewer Systems

- Madison has separate storm and sanitary sewers
- Storm sewer system is NOT the same as the sanitary sewer system

https://www.azstorm.org/stormwater-101/storm-vs-sanitary-sewer

Where the Water Goes: Sanitary Sewer

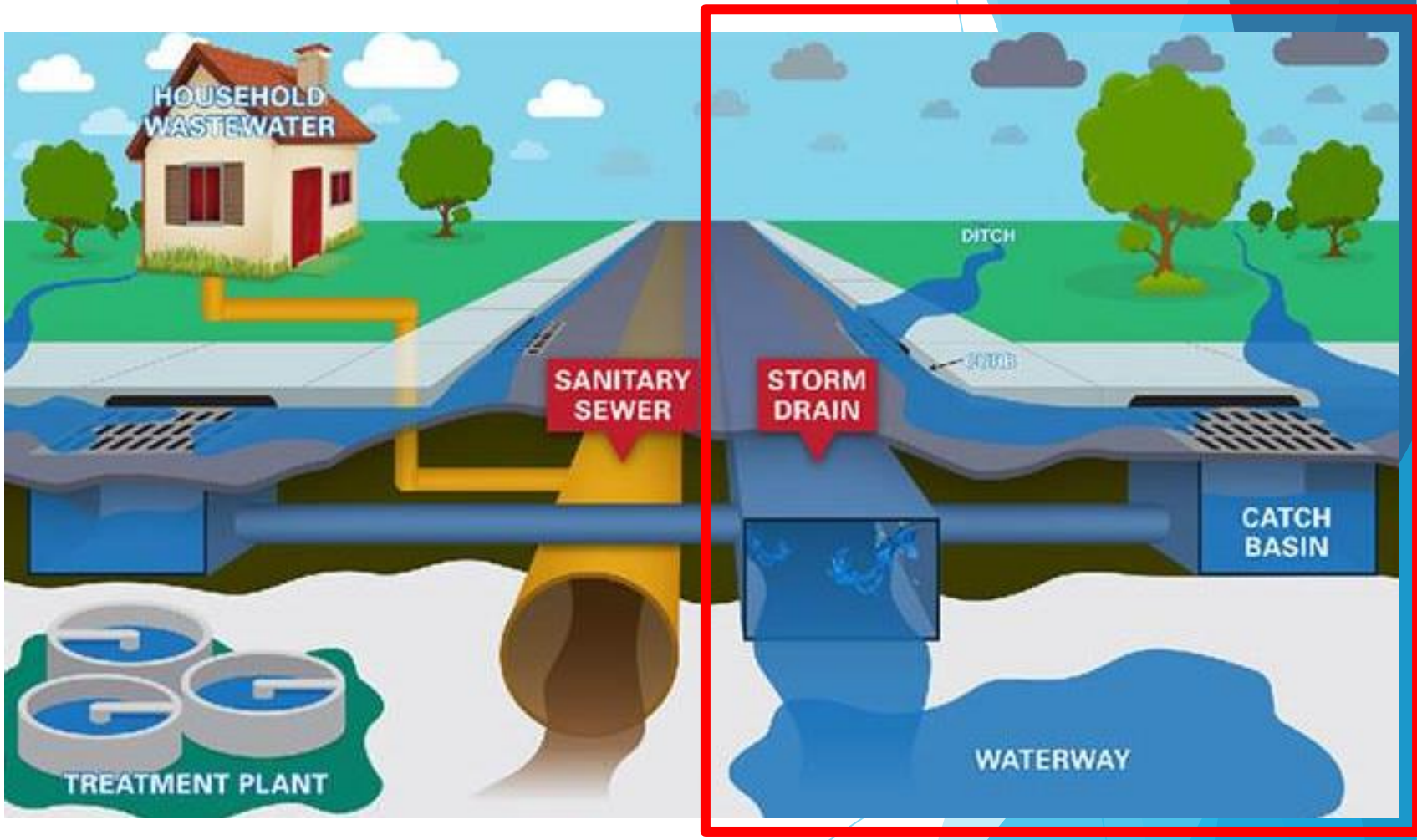
- Sanitary sewer drains residential (toilets, showers, kitchen sinks, etc.), commercial and industrial wastewater streams
- Sanitary sewer transports wastewater to Madison Metropolitan Sewerage District (MMSD) treatment plant
- Sanitary infrastructure includes:
  - Manholes
  - Household lateral pipes
  - Main collector pipes



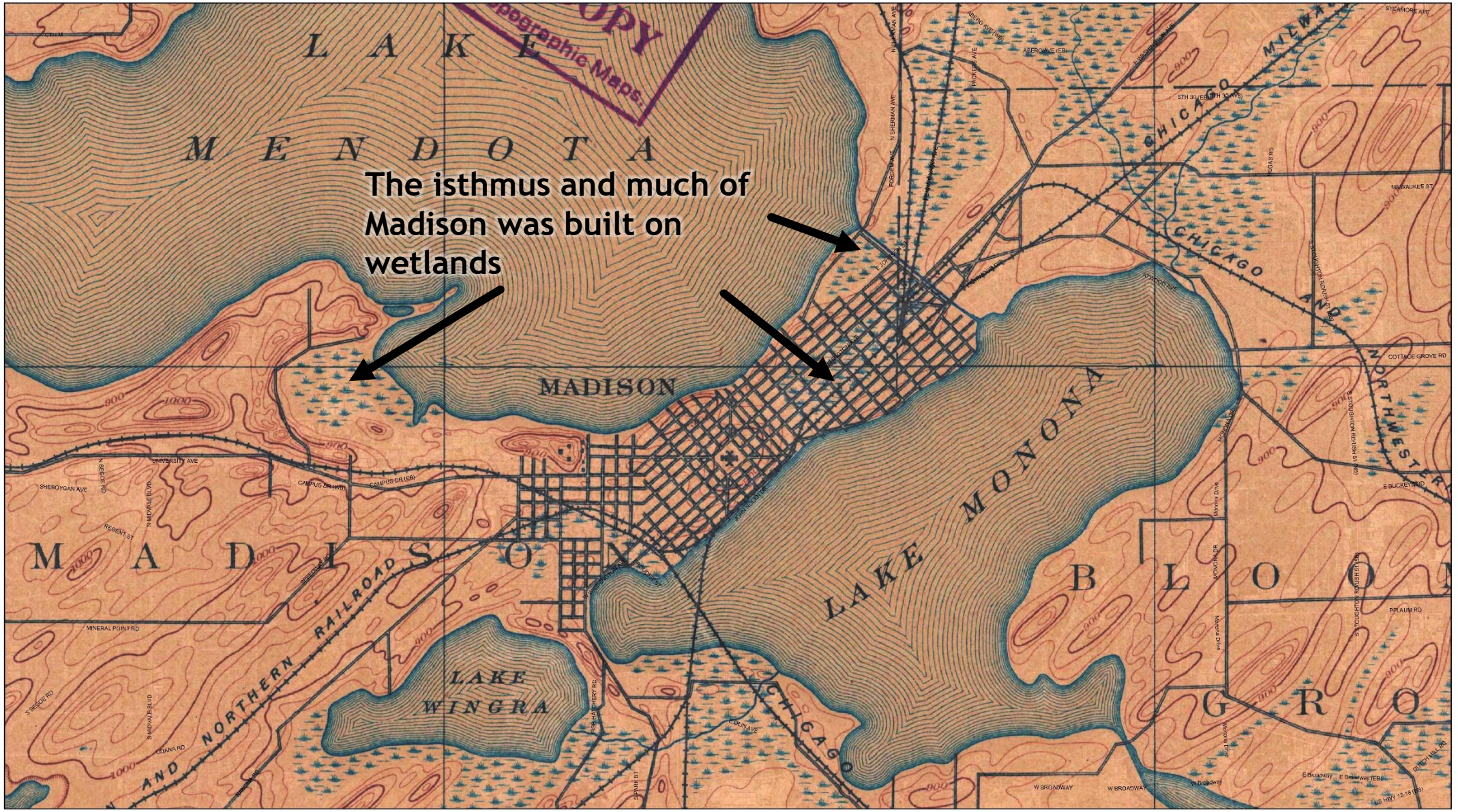
https://www.azstorm.org/stormwater-101/storm-vs-sanitary-sewer

Where the Water Goes: Storm System

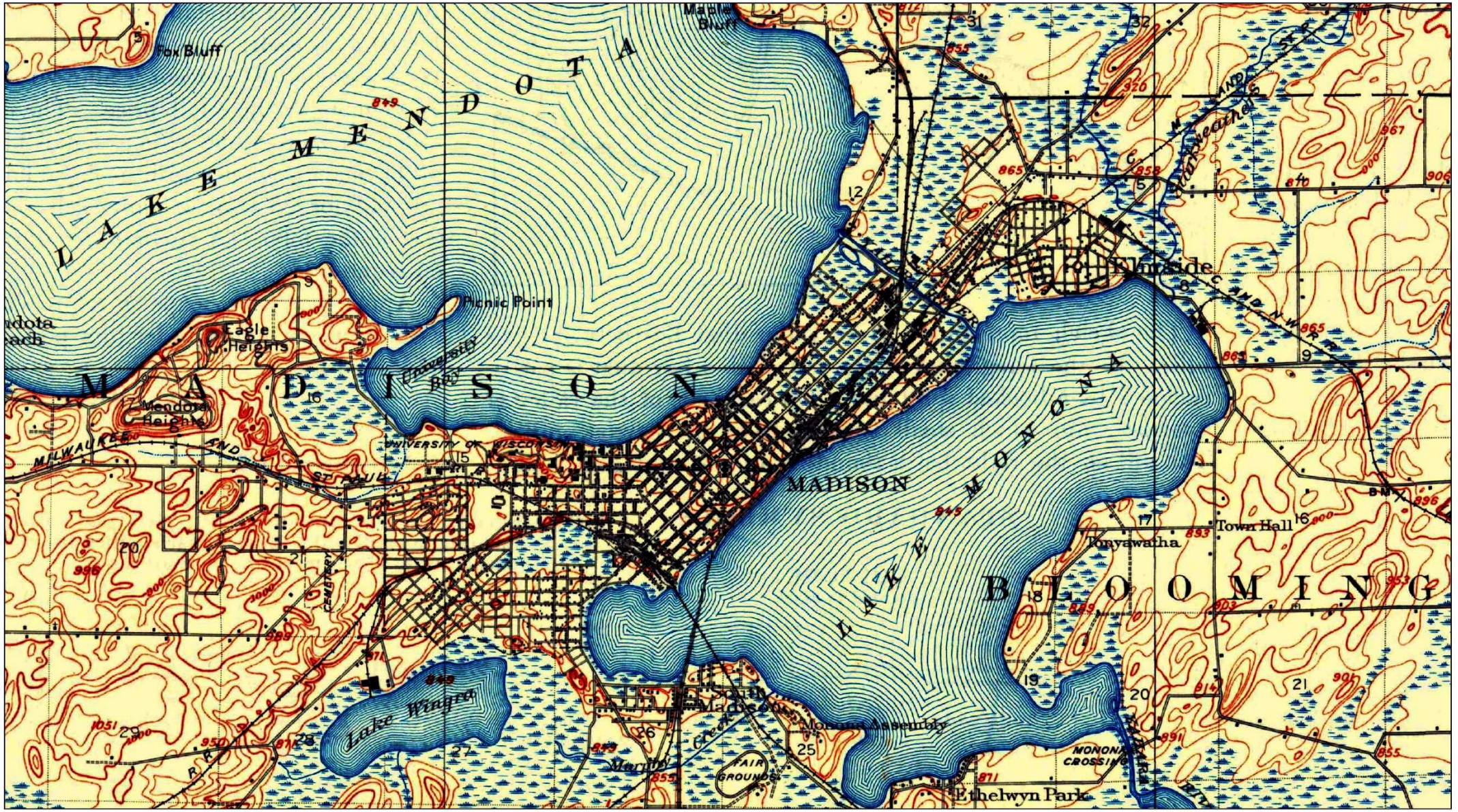
- Our stormwater drains to local surface waters
- We try to treat for nutrients and sediment
- Storm infrastructure includes:
  - Curbs and gutters
  - Inlets
  - Pipes
  - Channels (greenways)
  - Ponds



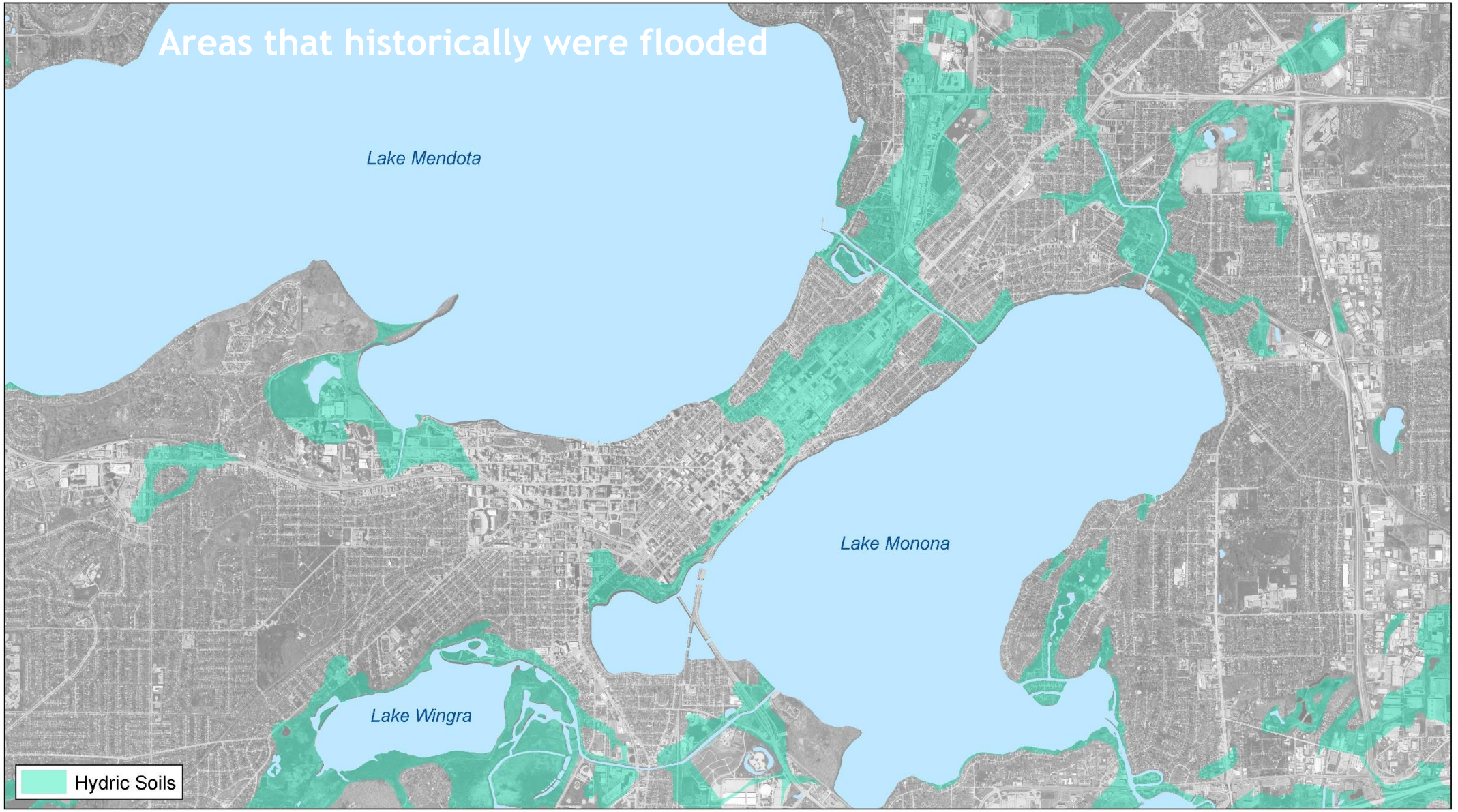
https://www.azstorm.org/stormwater-101/storm-vs-sanitary-sewer



City of Madison 1892



City of Madison 1906



City of Madison - Current Hydric Soils

0 0.25 0.5 1 Miles

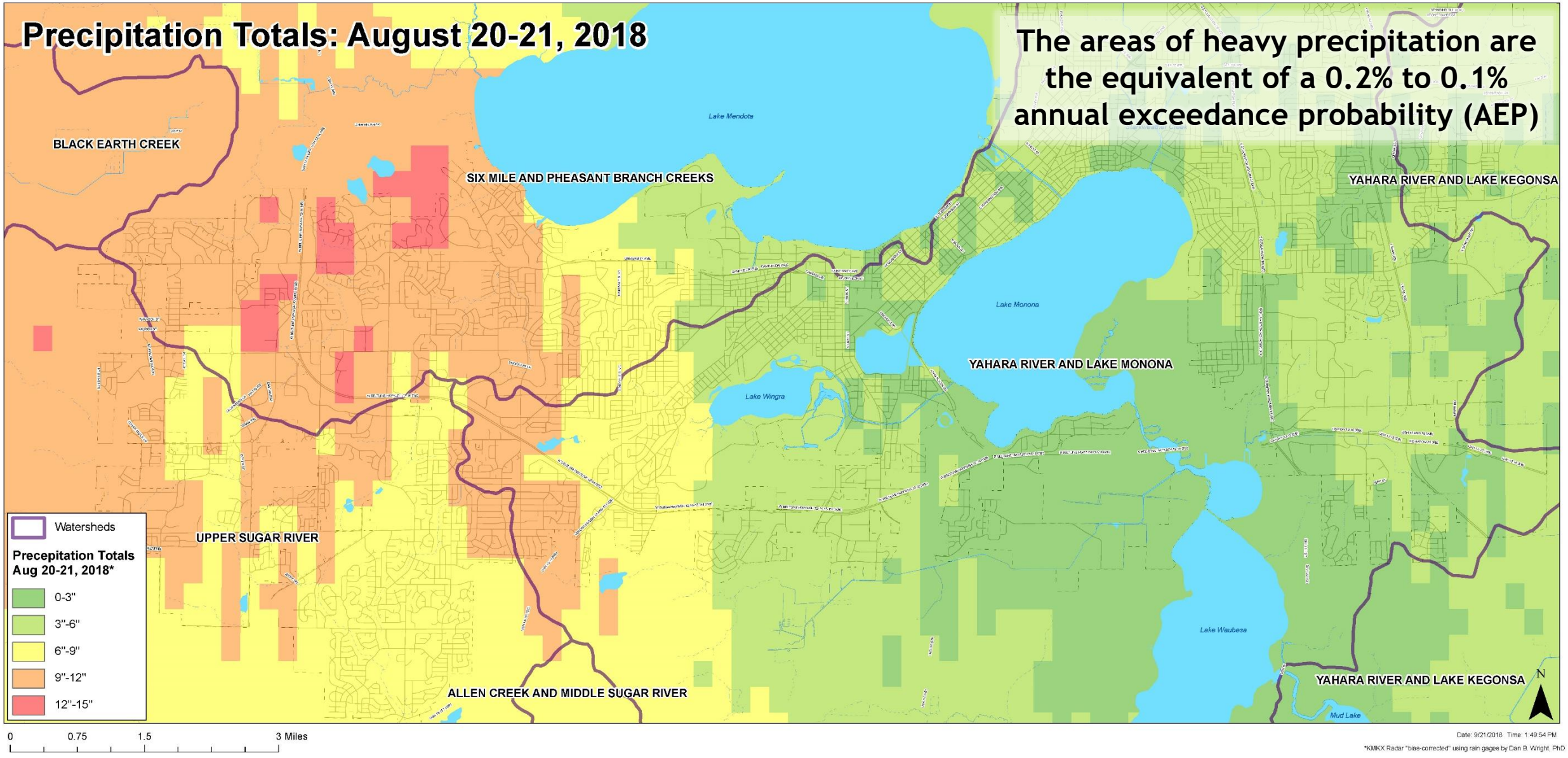
N

City of Madison - Current Hydric Soils + Low Lying Areas

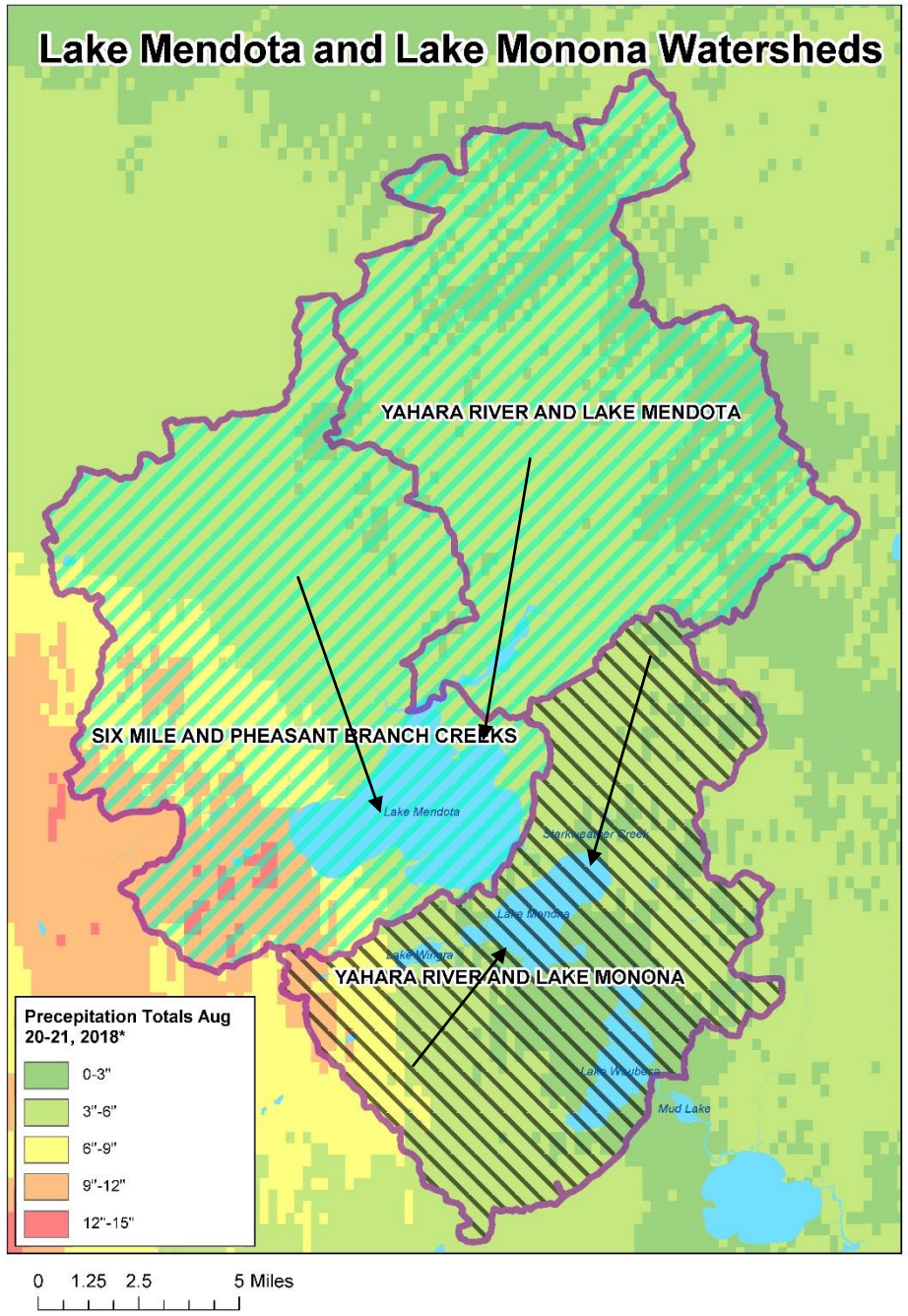
0 0.25 0.5 1 Miles

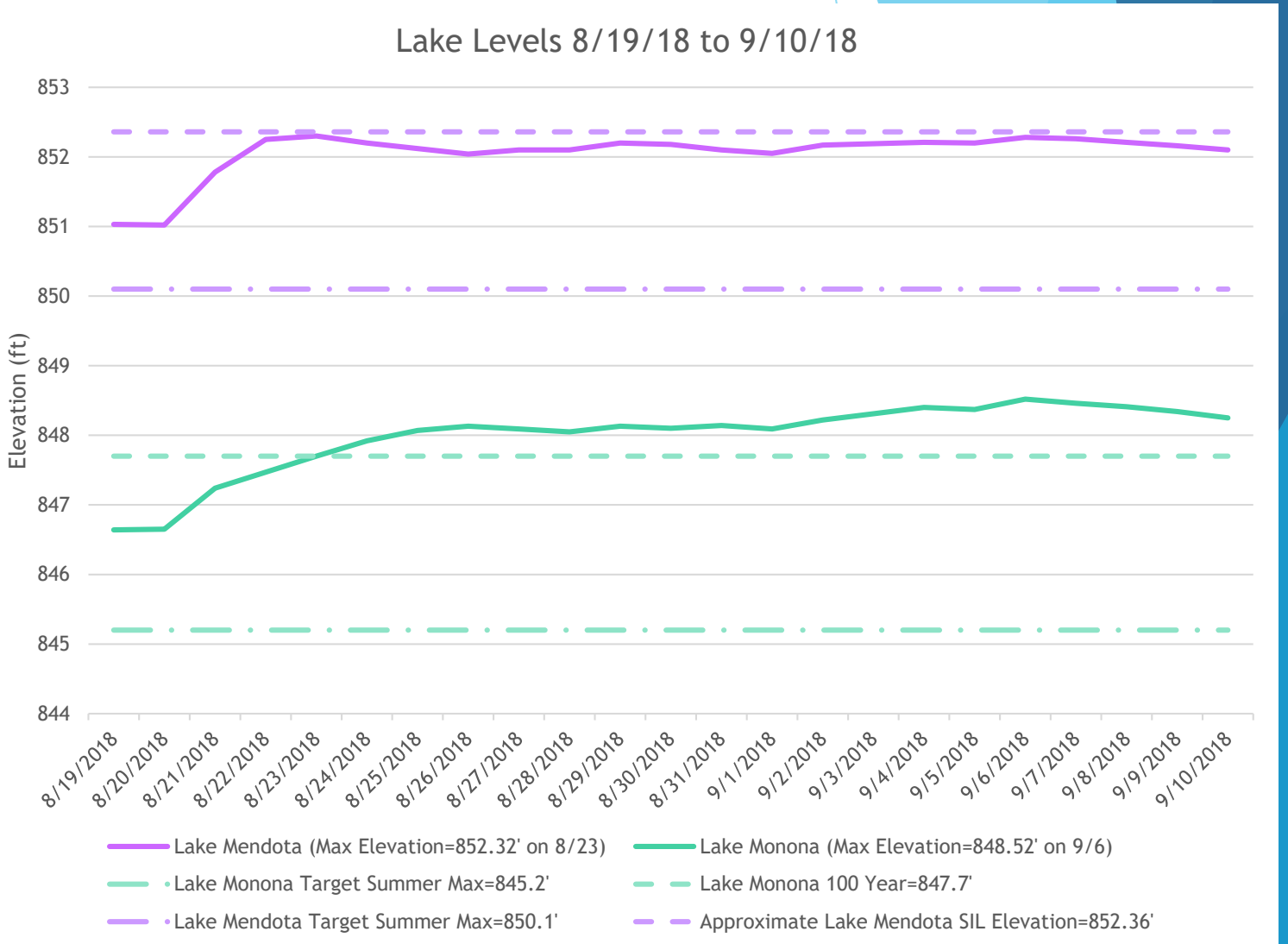
N

2 events: Flash Flooding + Flooding from High Lake Levels

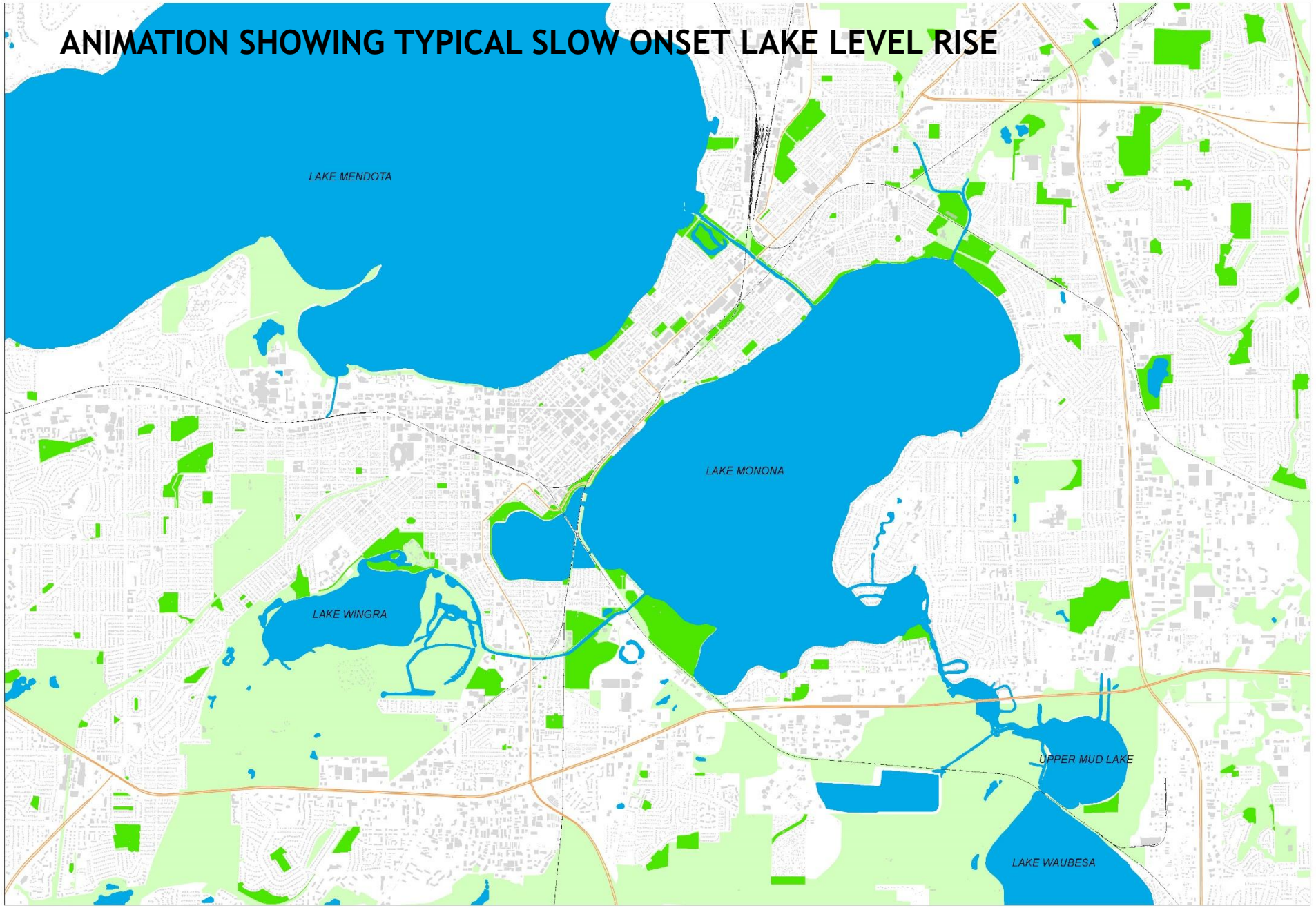


2nd Event: High Lake Level Flooding

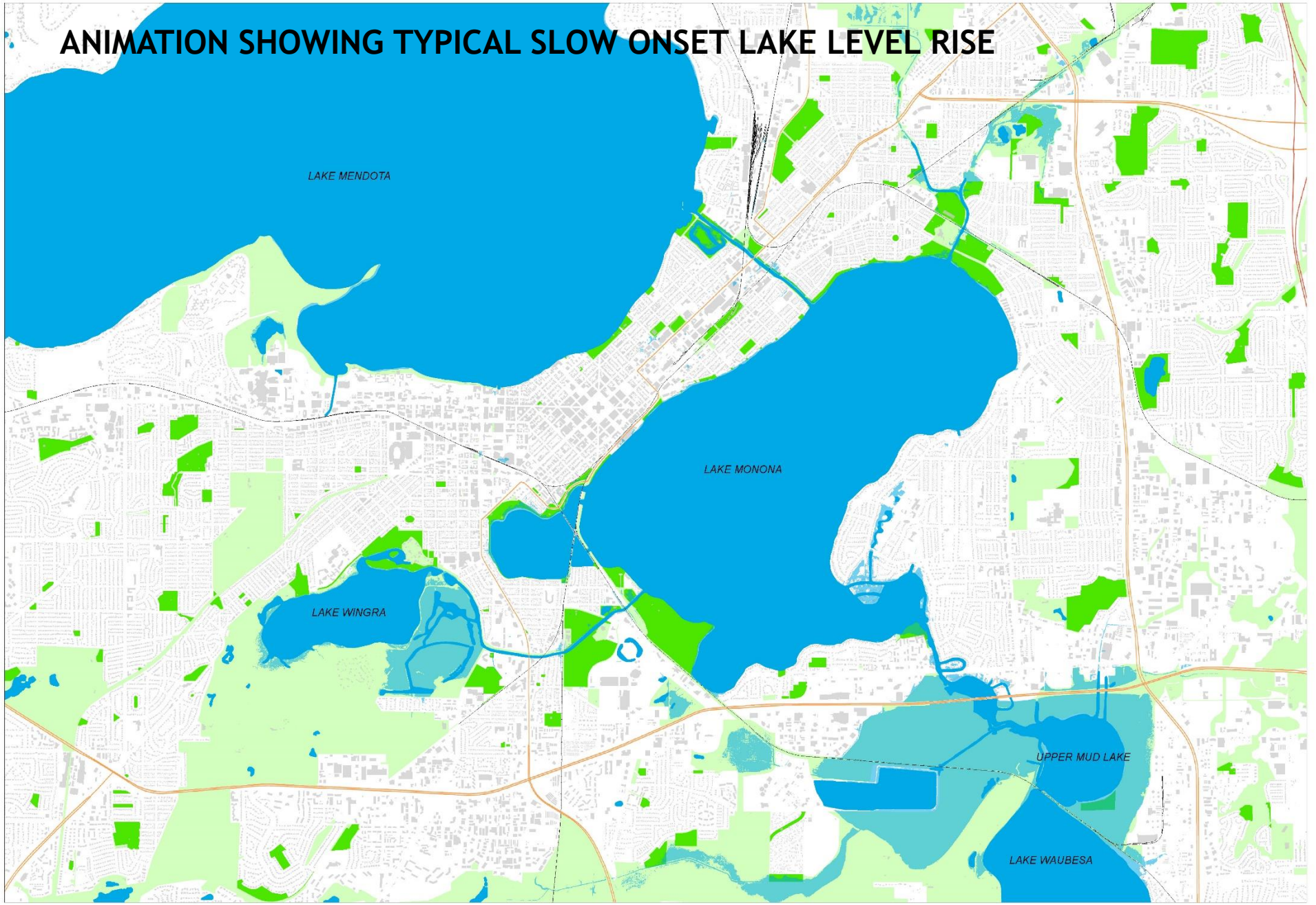




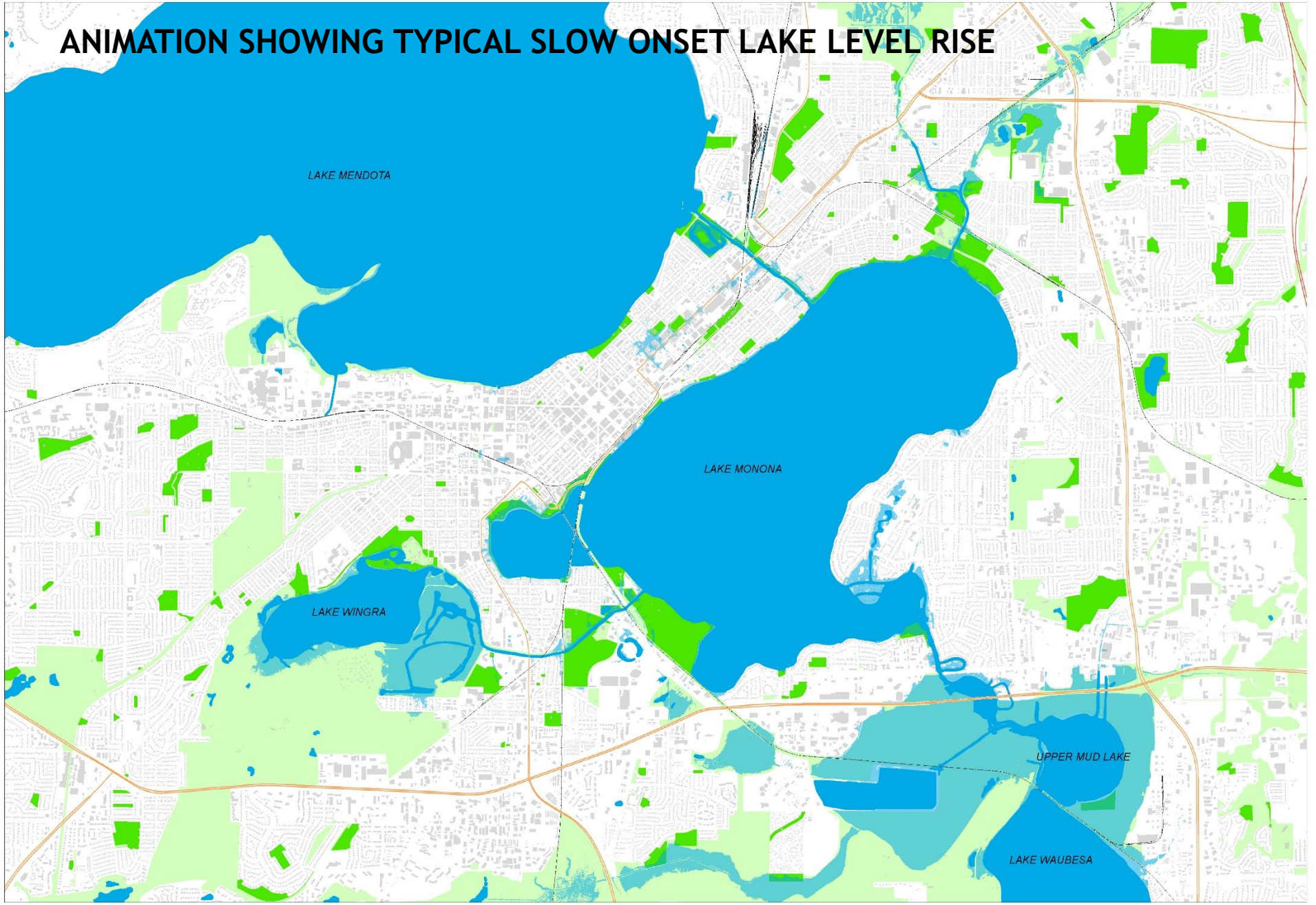
ANIMATION SHOWING TYPICAL SLOW ONSET LAKE LEVEL RISE



ANIMATION SHOWING TYPICAL SLOW ONSET LAKE LEVEL RISE

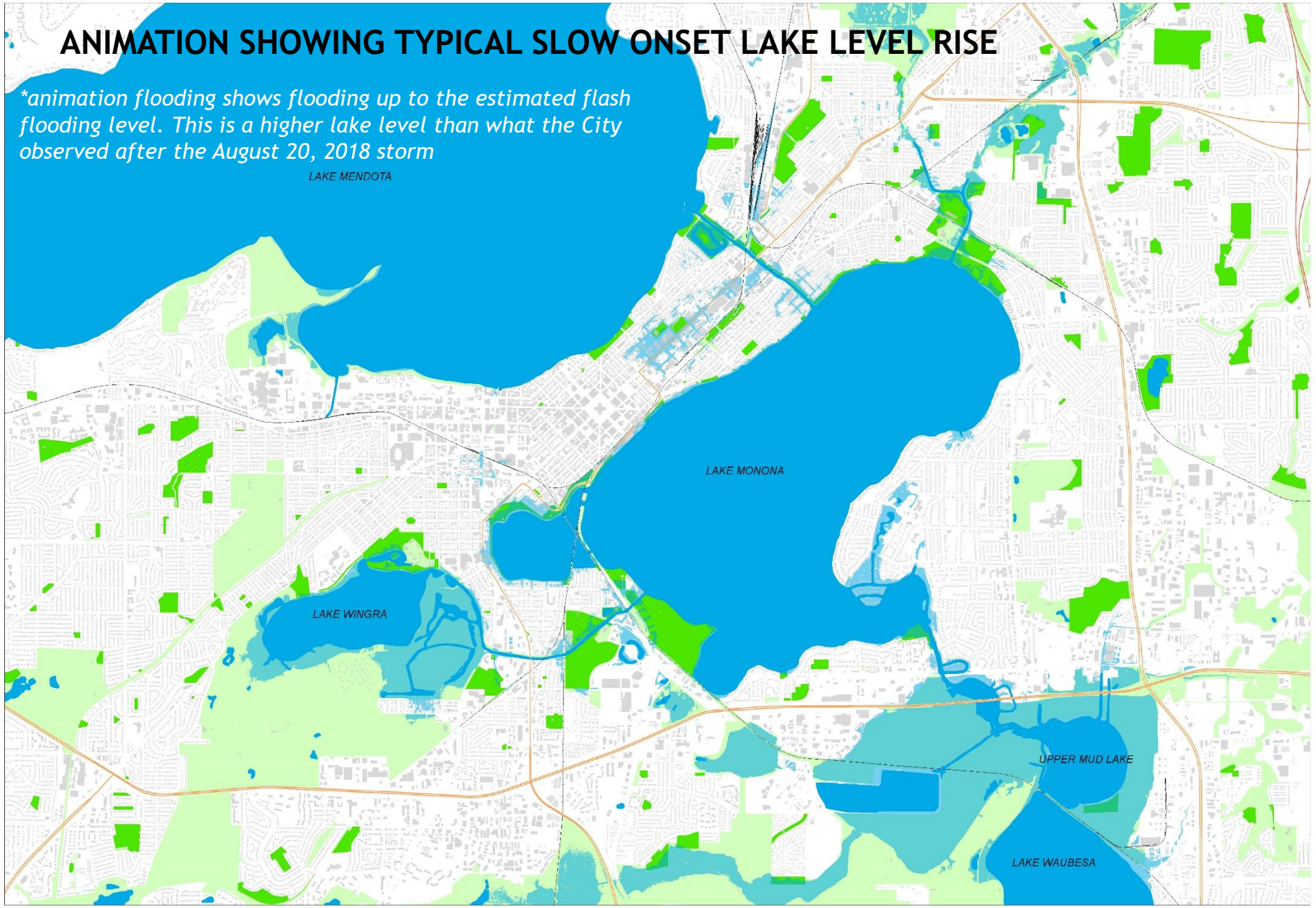


ANIMATION SHOWING TYPICAL SLOW ONSET LAKE LEVEL RISE



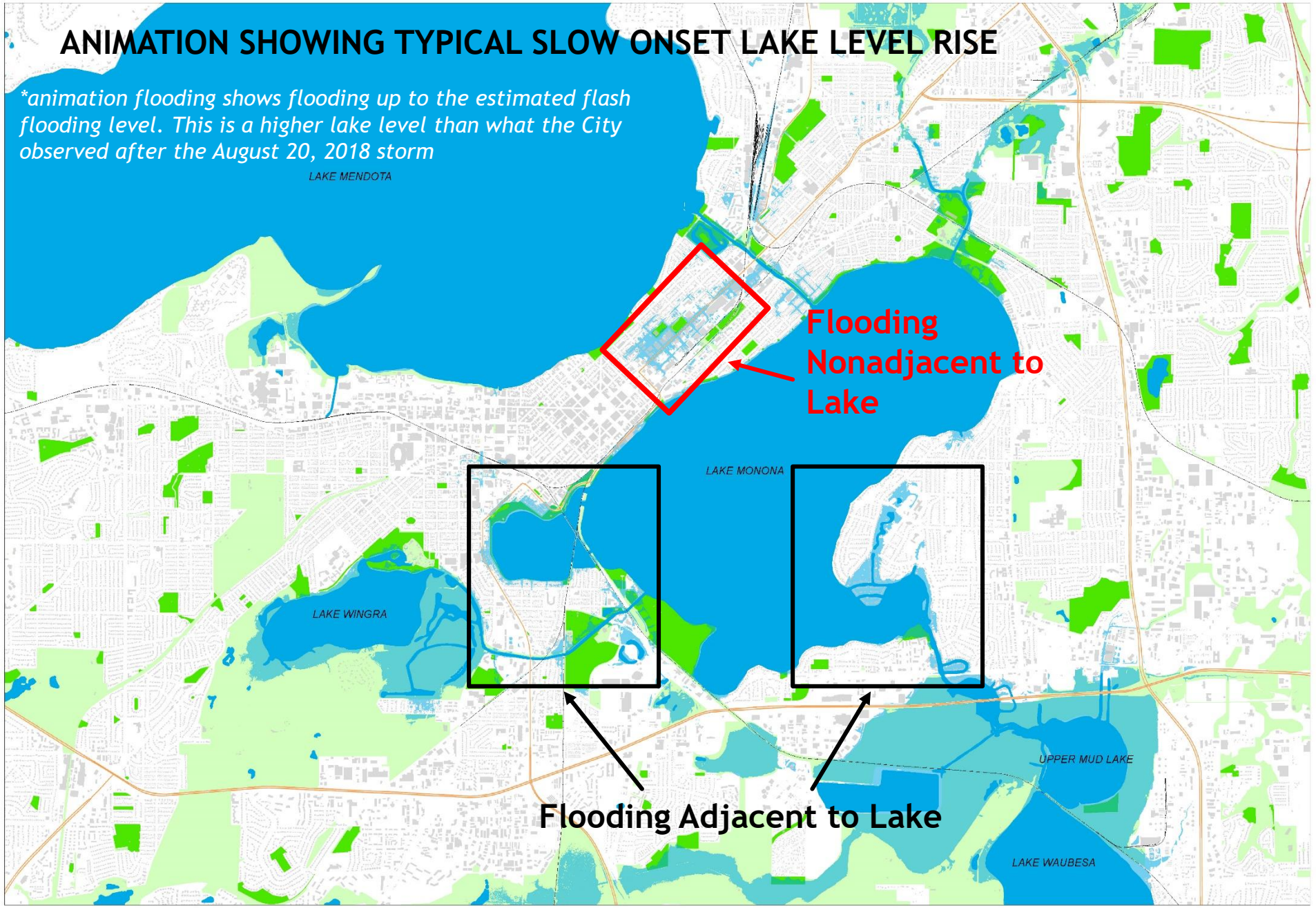
ANIMATION SHOWING TYPICAL SLOW ONSET LAKE LEVEL RISE

**animation flooding shows flooding up to the estimated flash flooding level. This is a higher lake level than what the City observed after the August 20, 2018 storm*

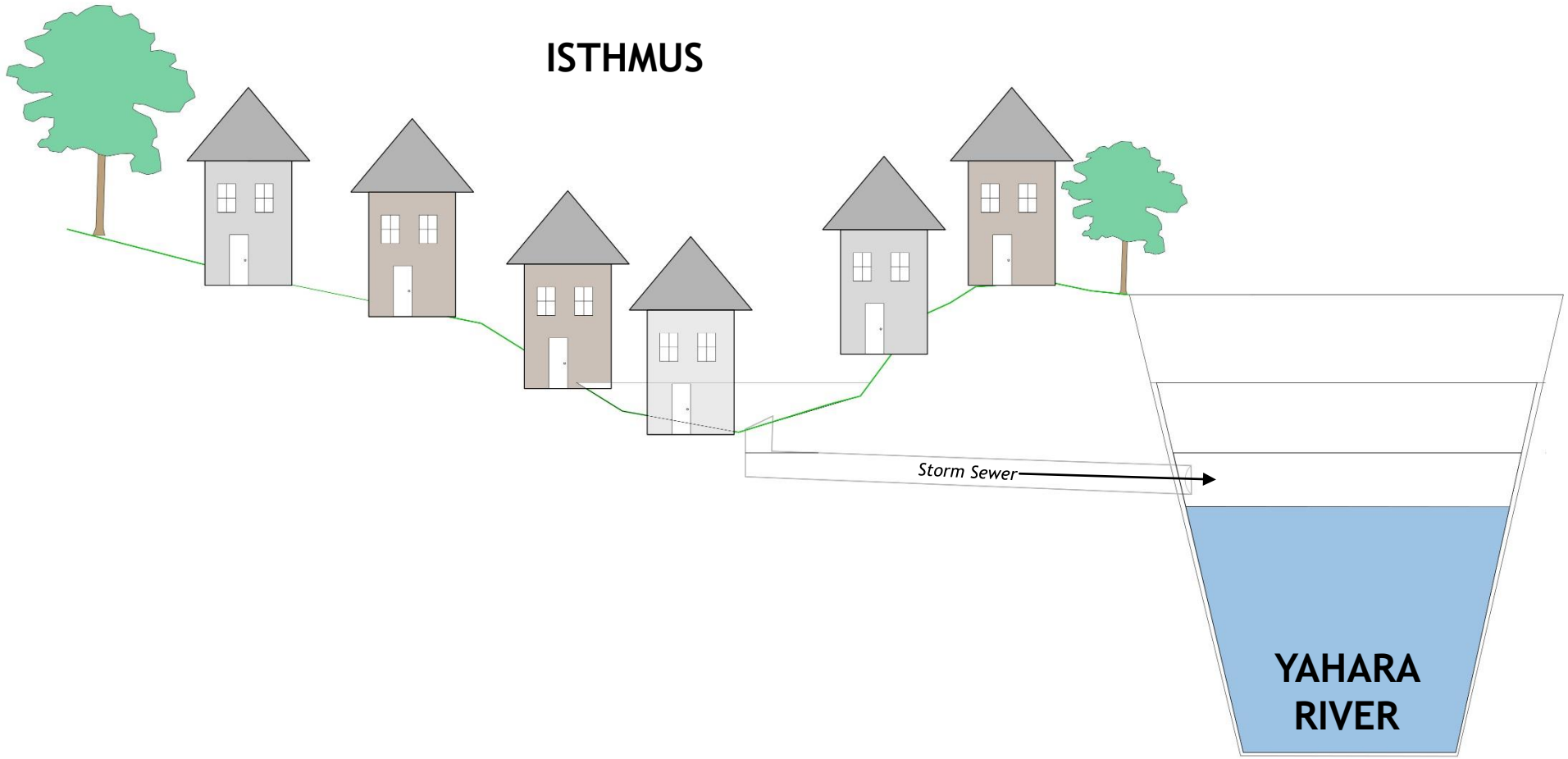


ANIMATION SHOWING TYPICAL SLOW ONSET LAKE LEVEL RISE

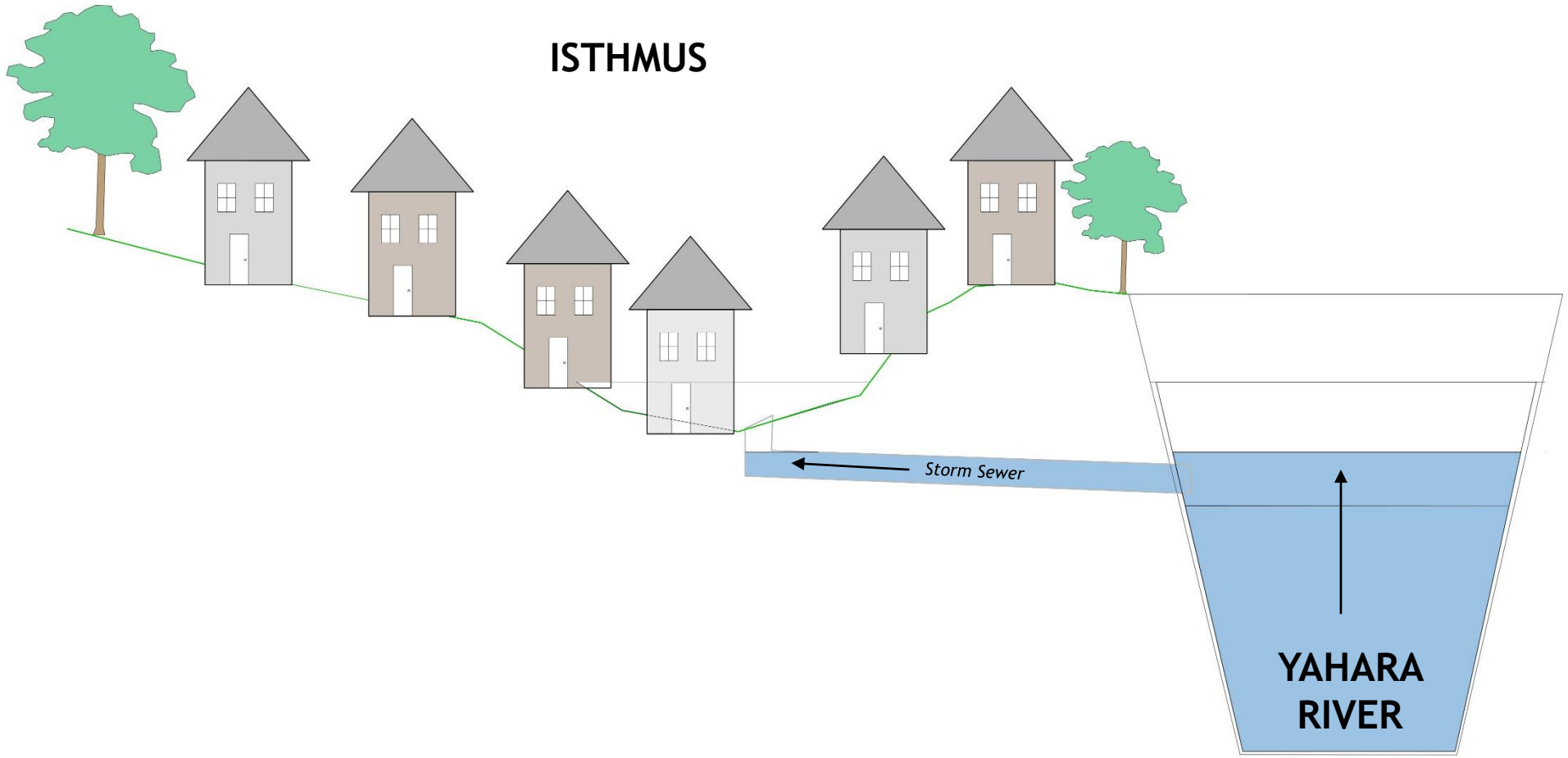
**animation flooding shows flooding up to the estimated flash flooding level. This is a higher lake level than what the City observed after the August 20, 2018 storm*



Isthmus Flooding via Storm Sewers

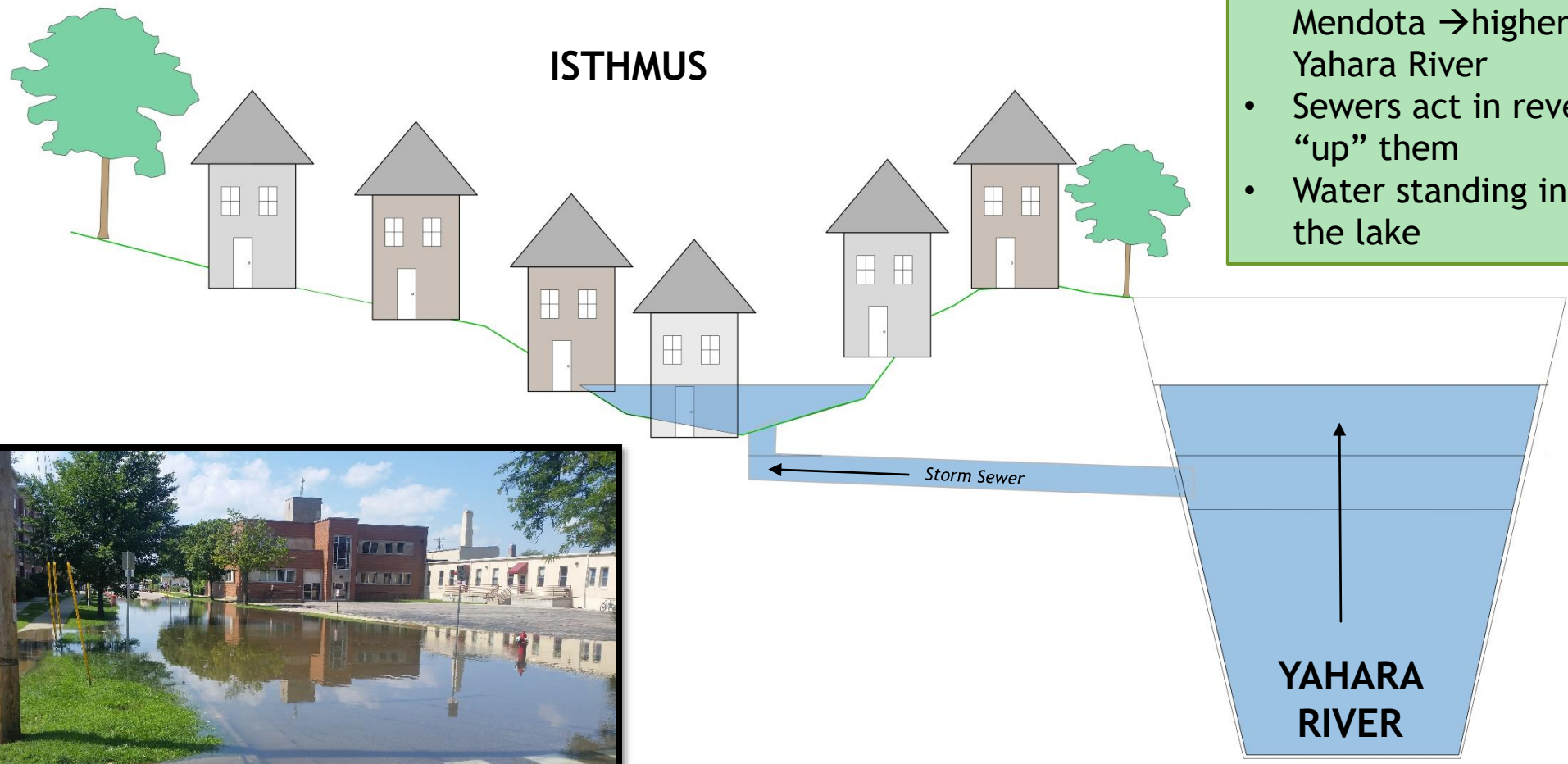


Isthmus Flooding via Storm Sewers

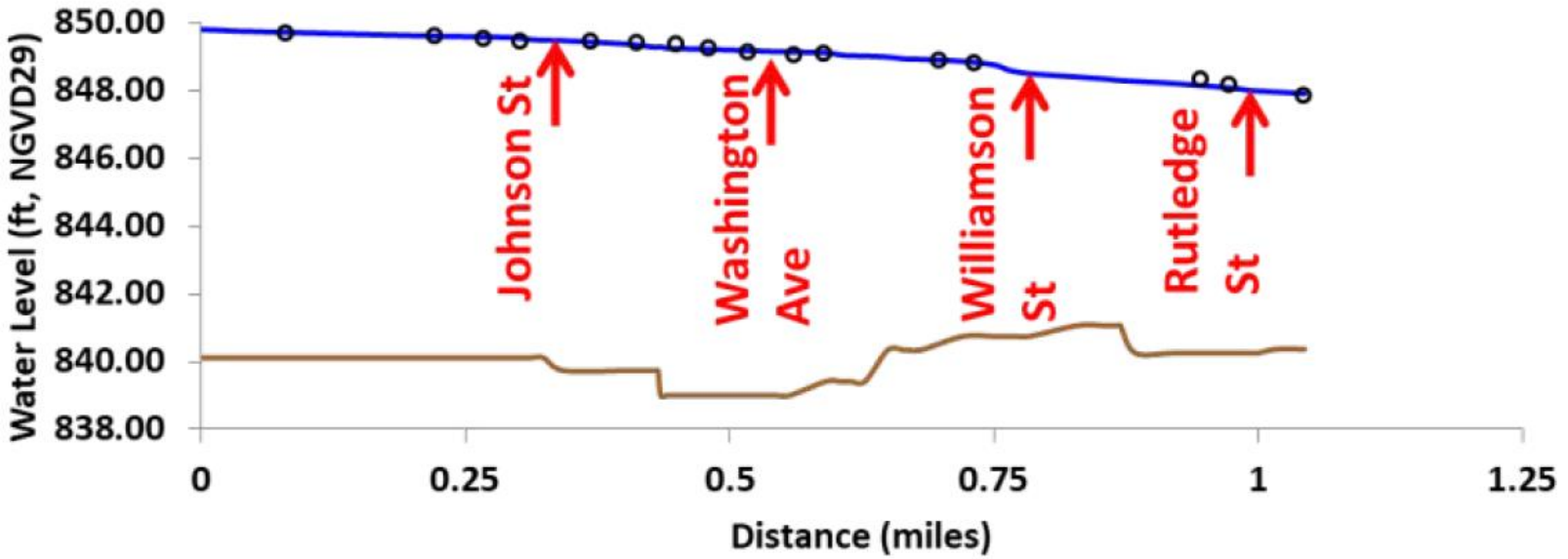


Isthmus Flooding via Storm Sewers

- Storm sewers drain Isthmus during rain events
- Large amounts of water released from Mendota →higher water levels in Yahara River
- Sewers act in reverse, water travels “up” them
- Water standing in isthmus is part of the lake

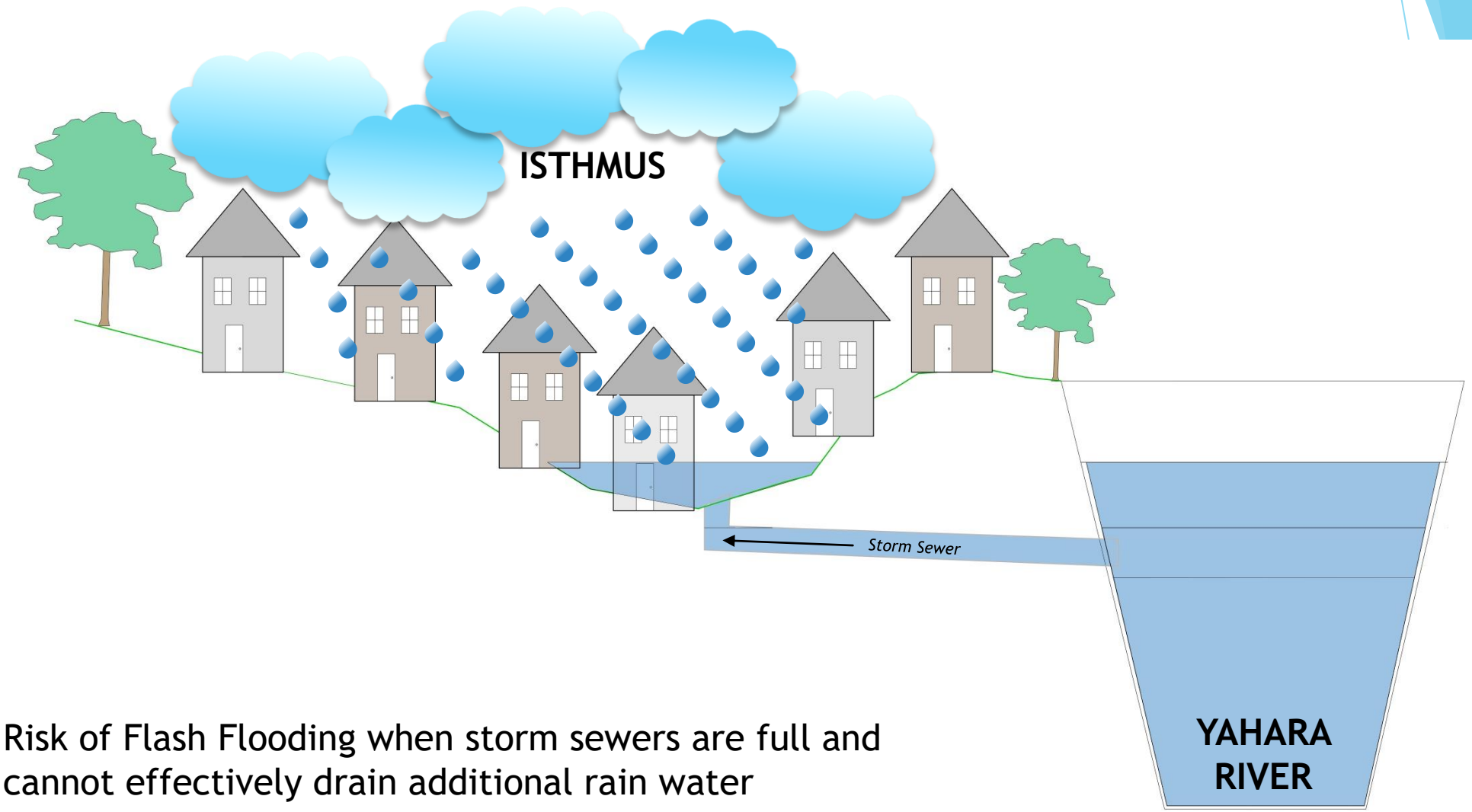


Yahara River Profile



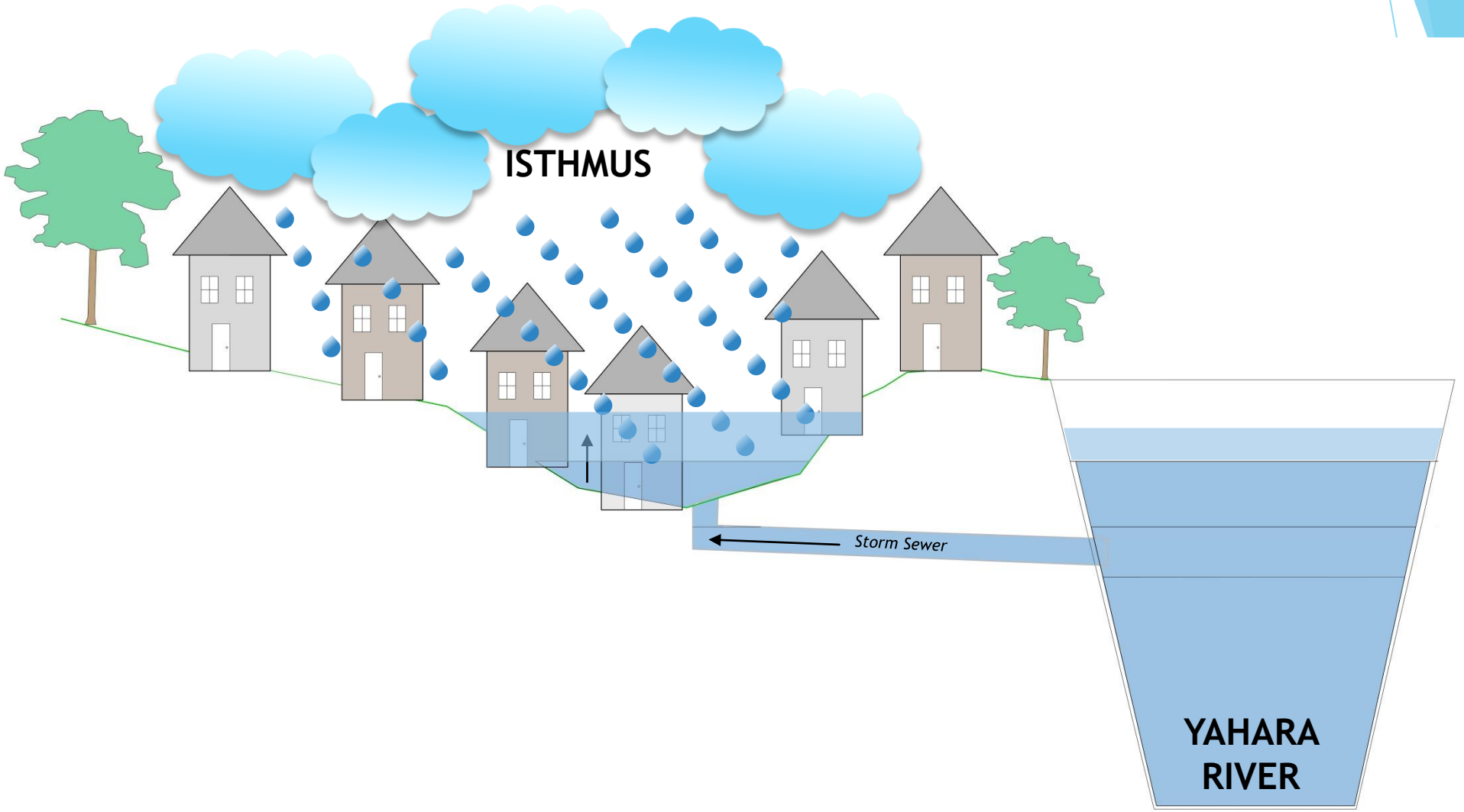
2018 Yahara Chain of Lakes Flooding, Technical Work Group Report, February 1, 2019

Isthmus Flash Flooding Threat

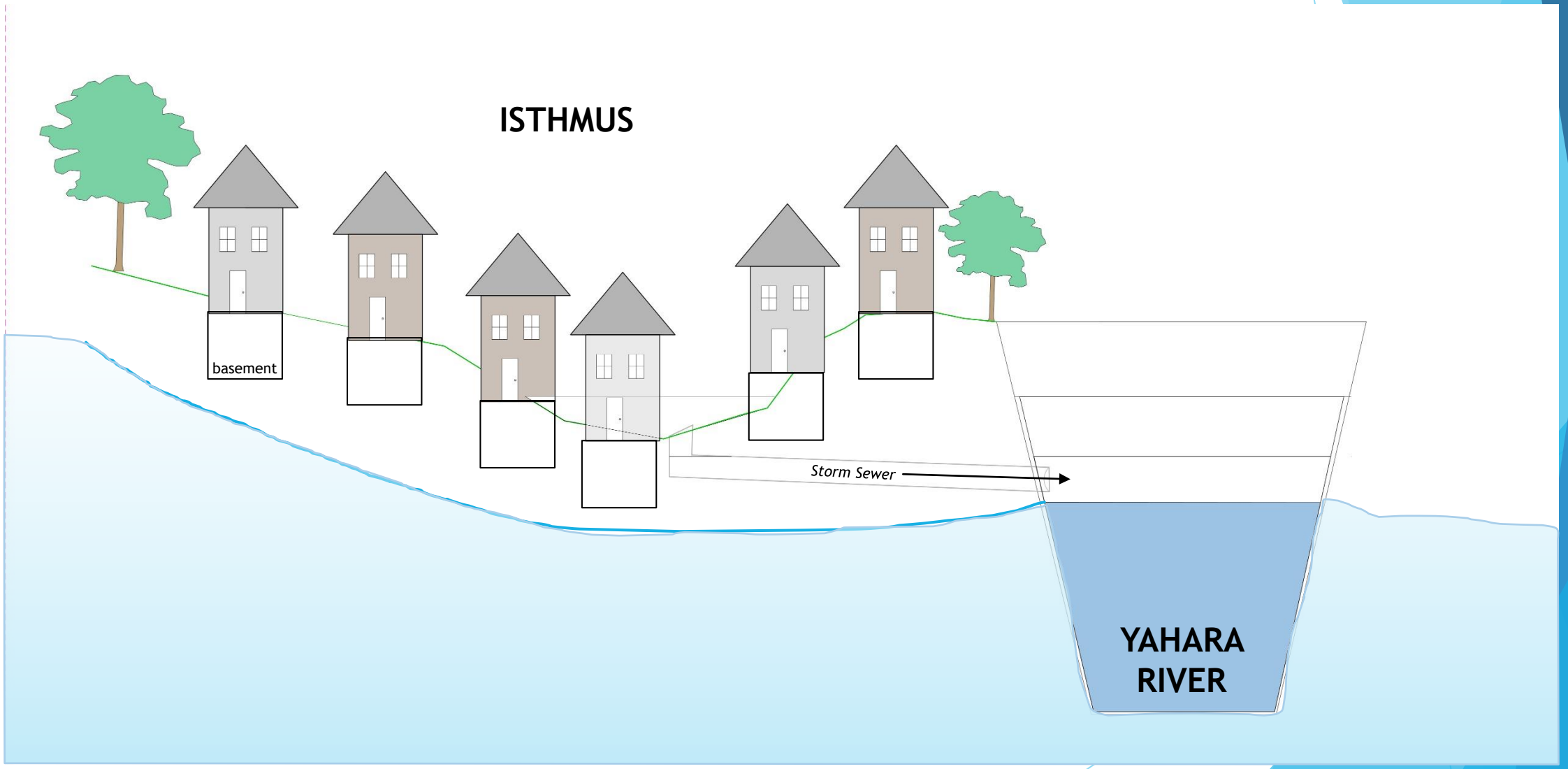


Risk of Flash Flooding when storm sewers are full and cannot effectively drain additional rain water

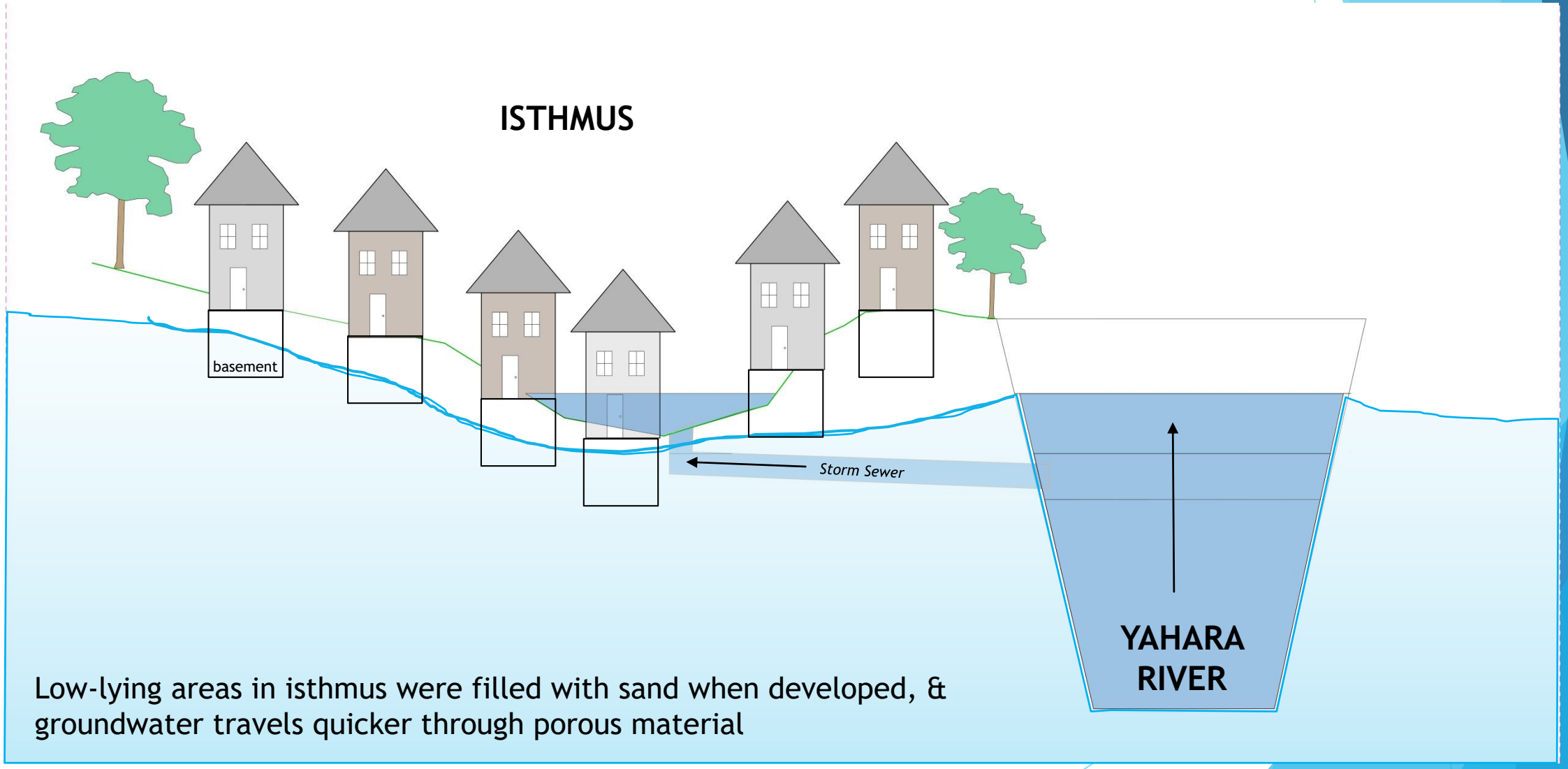
Isthmus Flash Flooding Threat



Isthmus Basement Flooding via Ground Water



Isthmus Basement Flooding via Ground Water



Low-lying areas in isthmus were filled with sand when developed, & groundwater travels quicker through porous material

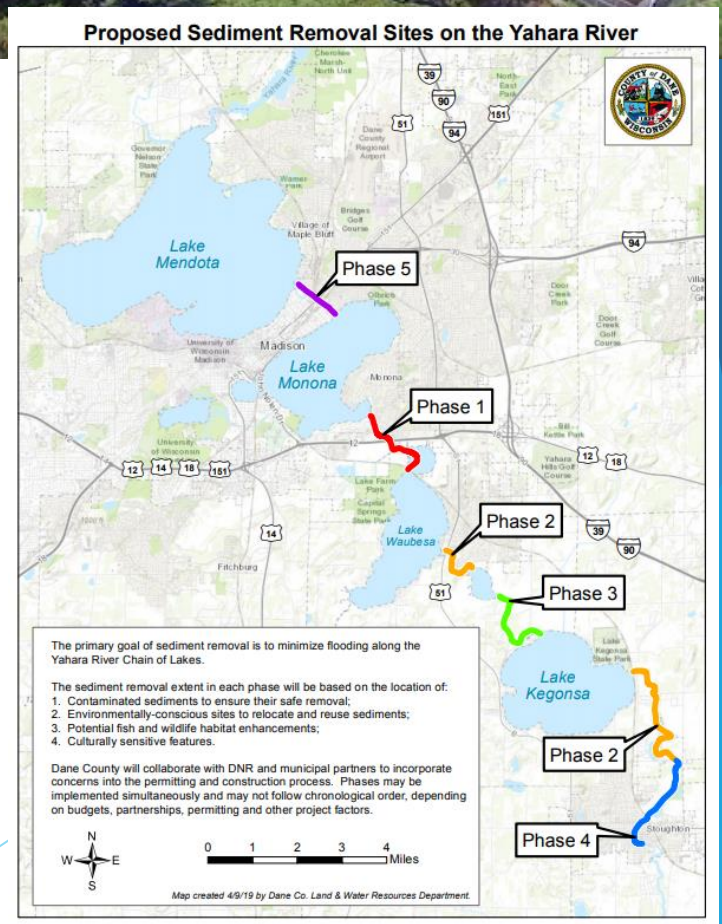
Reasons for Flooding Issues
Flash Flooding

- Flash flooding: when storm sewer system cannot handle high amounts of rain
- Comparative example: a traffic jam
  - Too many cars of the Beltline during rush hour → backups happen
- During a storm, more water tries to move through the storm sewer system → backups happen

Beltline, looking west from Park Street, WisDOT

Reasons for Flooding Issues
Lake Levels

- On the isthmus, flooding is largely controlled by lake levels
- Lake Mendota level: controlled by Dane County at Tenney Lock
- Yahara Lakes function as a system
  - Solution to problems is increased conveyance through lake chain
  - Dane County began dredging project in 2019 to remove sediment from large sections of the Yahara river move more water through the system (project ongoing)
  - https://lwrd.countyofdane.com/yahara-river-sediment-removal



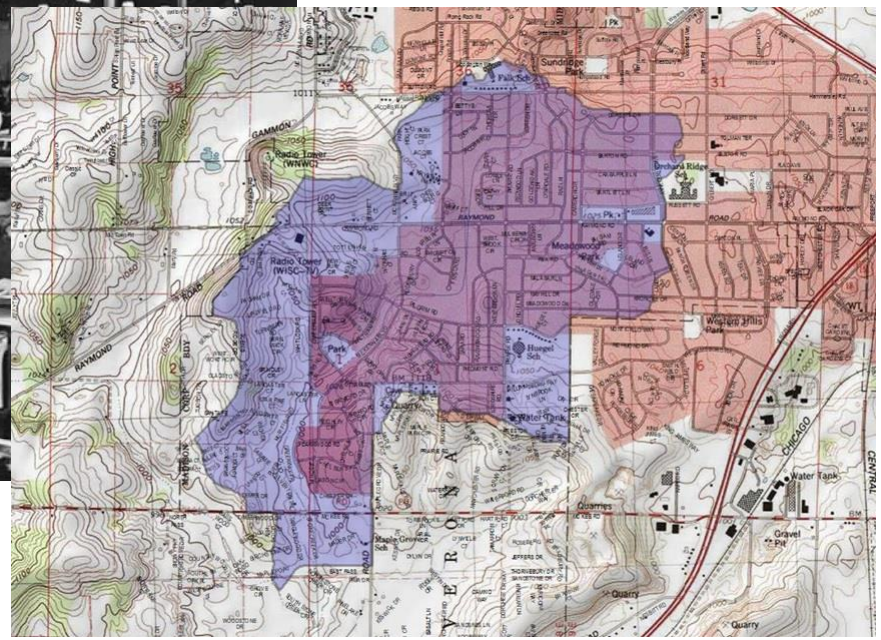
Reasons for Flooding Issues
Changing Design Standards

- Changing public design standards and past limited private design standards have made properties more susceptible to flash flooding.
- Lax historical building requirements created hard-to-solve flooding problems on private property which cannot be easily corrected.

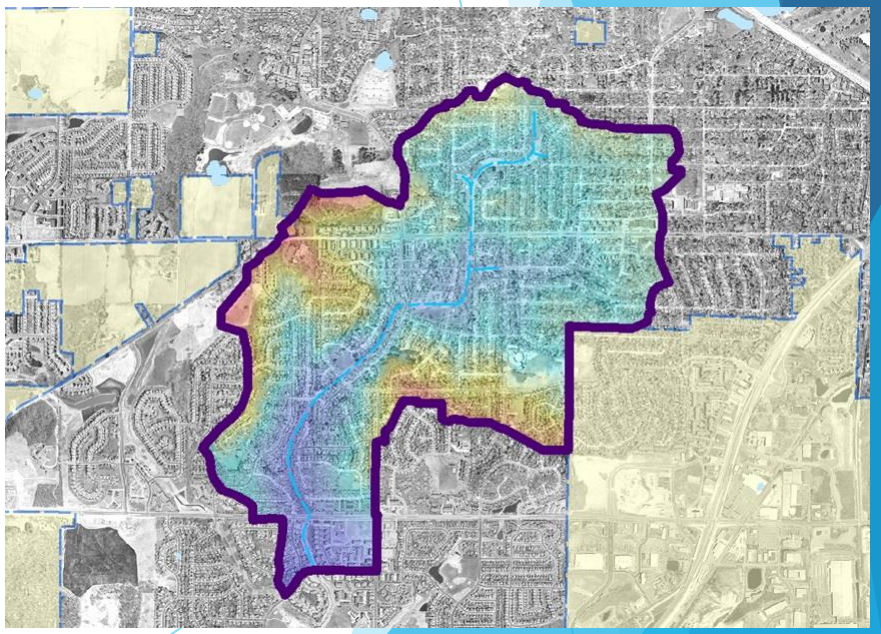
Reasons for Flooding Issues

- Tools have changed in the last five decades.
- Old tools made data gathering and stormwater modeling difficult.

Photo above:
https://www.vintag.es/2018/08/life-before-autocad.html

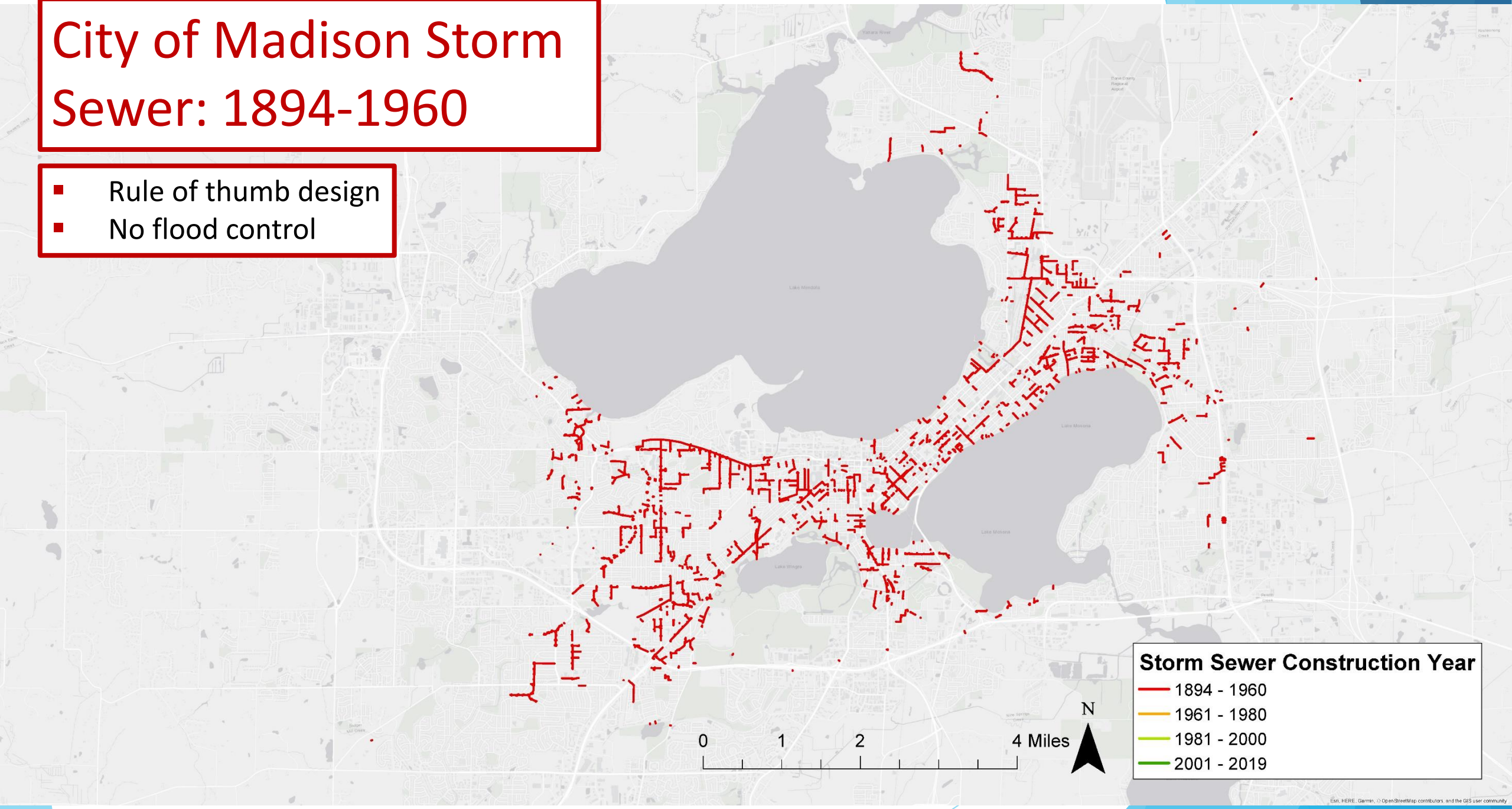


VS.



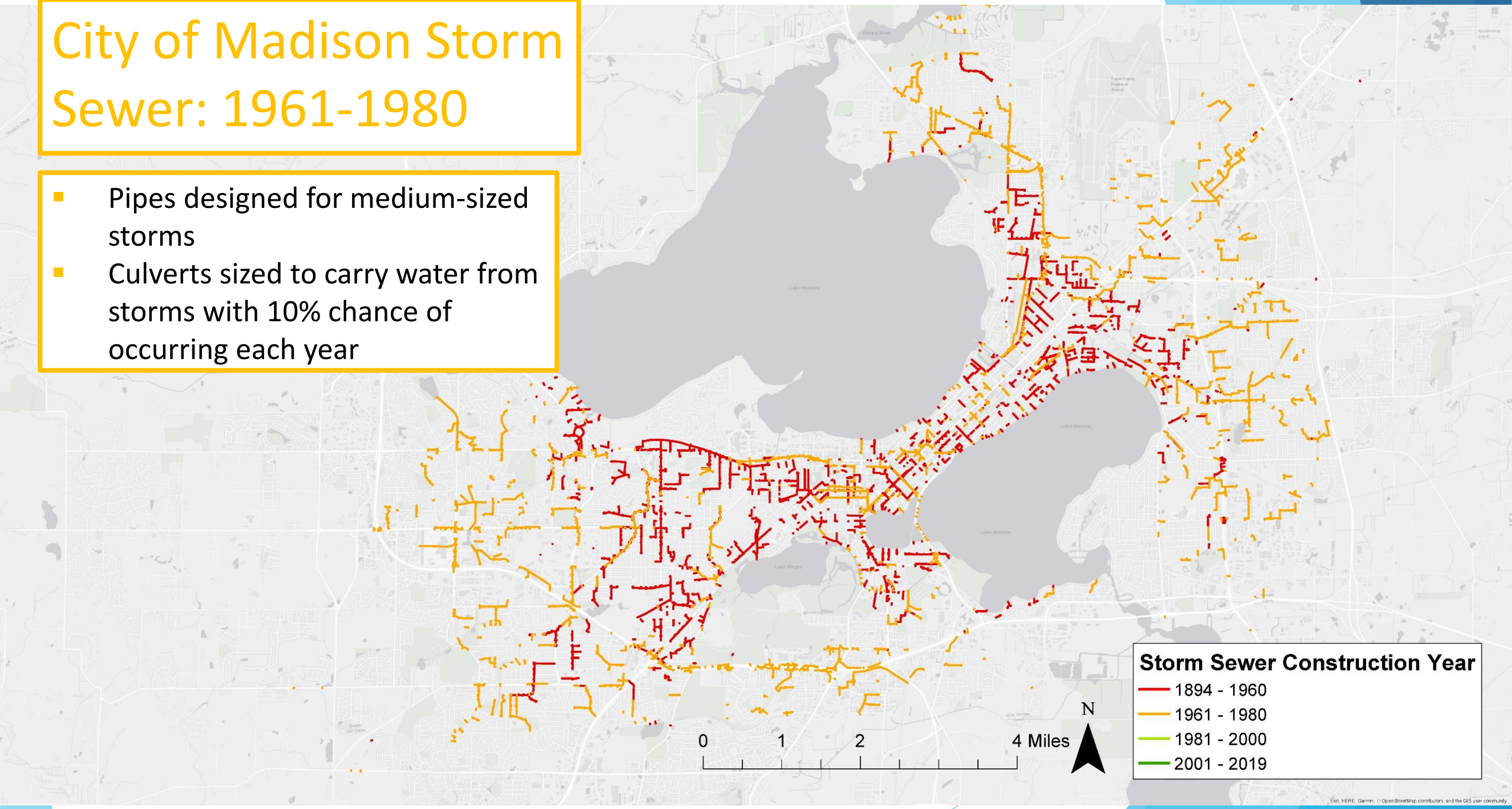
City of Madison Storm Sewer: 1894-1960

- Rule of thumb design
- No flood control



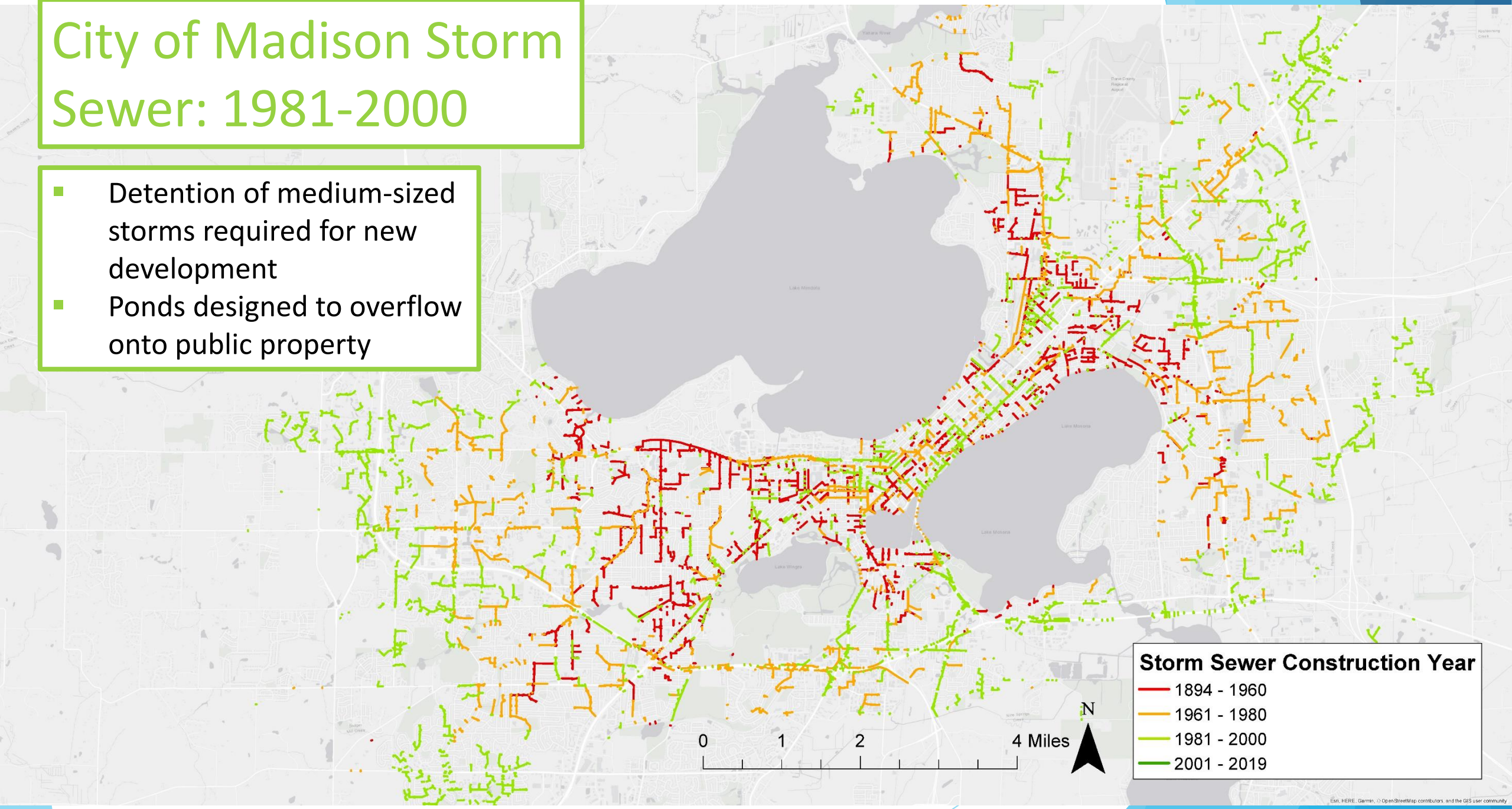
City of Madison Storm Sewer: 1961-1980

- Pipes designed for medium-sized storms
- Culverts sized to carry water from storms with 10% chance of occurring each year



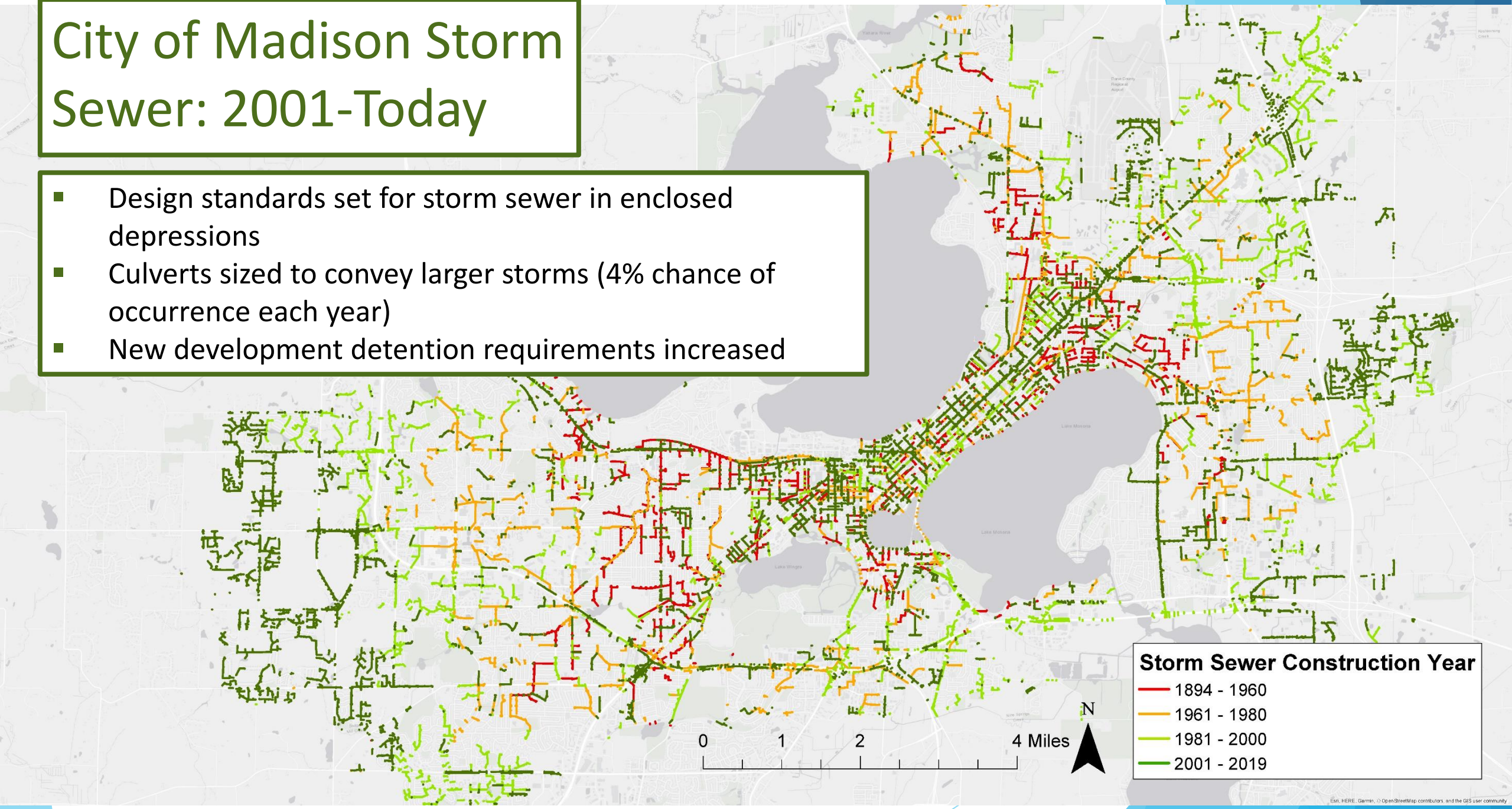
City of Madison Storm Sewer: 1981-2000

- Detention of medium-sized storms required for new development
- Ponds designed to overflow onto public property



City of Madison Storm Sewer: 2001-Today

- Design standards set for storm sewer in enclosed depressions
- Culverts sized to convey larger storms (4% chance of occurrence each year)
- New development detention requirements increased



Watershed Study Goals

- Phase 1: Find out why flooding happens in certain locations
  - For this, we need your help identifying flooding locations
  - Official flood reports help ground-truth the model especially when you document the peak flood extents with pictures and/or measured depths
- Phase 2: Decide on isthmus-specific goals for flood reduction
  - Design solutions to meet goals


S Livingston St, Madison, WI


Tenney Park, Madison, WI

Watershed Study Limitations

- Retrofitting infrastructure takes time and money
- Repairs are not always easy, popular, or cheap
- Not always a good solution
- Property owners will need to create solutions too
- Solutions will need broad community cooperation
- Groundwater problems not easily addressed by watershed modeling and surface infrastructure

Why Replacement Takes Time

- Road reconstruction, storm sewer is expensive but long-lasting
  - Road reconstruction cost = approximately $500-$2,000/ft
  - 2% City infrastructure is upgraded annually
  - Average life:
    - Street=30-50 years
    - Pipes=50-100 years
- Storm Water Utility bill
  - 2018 increased 2.3% (avg. residential increase of $2.15/year)
  - 2019 increased 10.1% (avg. residential increase of $9.60/year)

96” pipe tunneling on University Ave, Madison, WI (2013)

Next Steps

Phase 1: Model Existing Conditions & Predict Future Flood Risk

Phase 2: Analyze Solutions on Watershed Scale, Rank & Budget

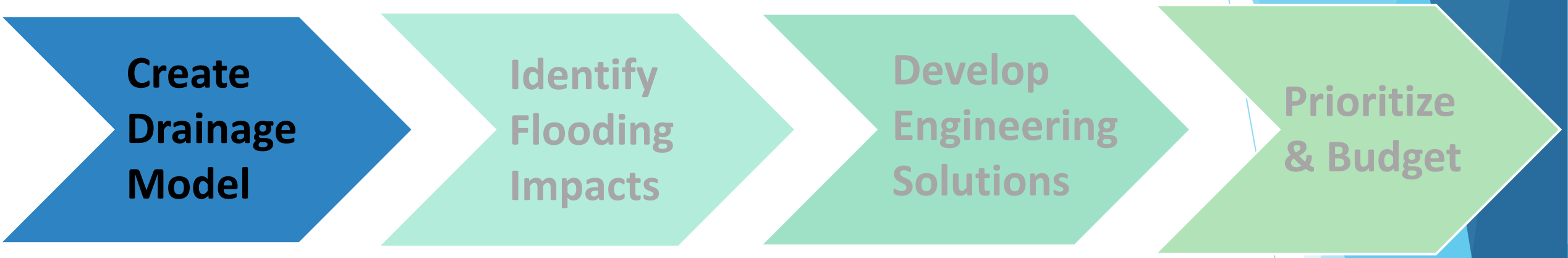
Create Drainage Model

Identify Flooding Impacts

Develop Engineering Solutions

Prioritize & Budget

Next Steps

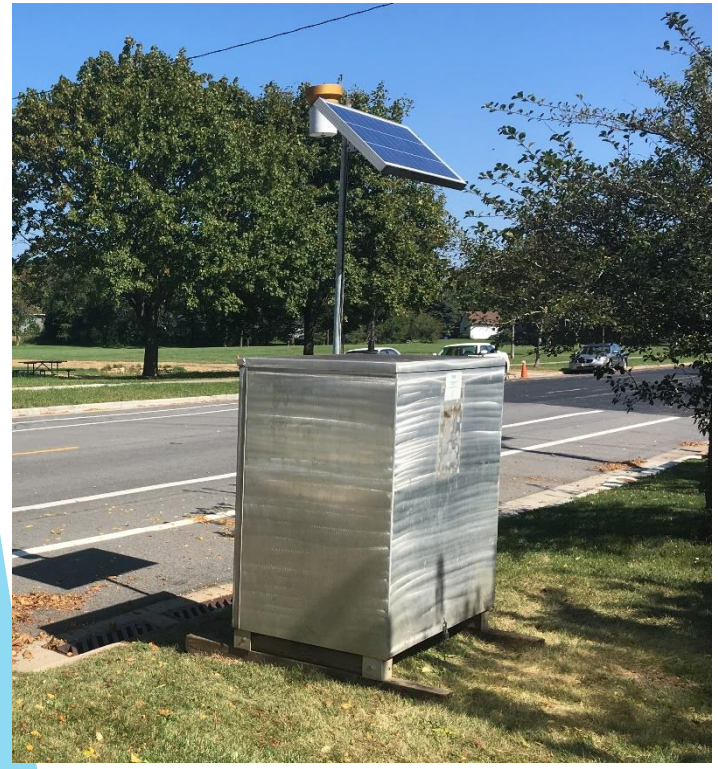


- Gather model input data
- Install equipment and measure rainfall and channel flow
- Build computer models to represent rainfall-runoff-routing
- Compare model to data
- Determine extent of past flooding

Next Steps

Create Drainage Model

- What you might see in the watershed



USGS station (left) and stage gauge (above). Photos courtesy of Bill Selbig (USGS).

Above: surveyor in the field. Photo courtesy of Amber Lefers (AE2S).

Next Steps

Create Drainage Model → **Identify Flooding Impacts** → Develop Engineering Solutions → Prioritize & Budget

- Evaluate flood risk in the isthmus

E Johnson Street, Madison, WI

Next Steps-Phase 2

Phase 1: Model Existing Conditions & Predict Future Flood Risk

Phase 2: Analyze Solutions on Watershed Scale, Rank & Budget

Create Drainage Model

Identify Flooding Impacts

Develop Engineering Solutions

Prioritize & Budget

- Phase 2 has not yet been contracted
- Flood mitigation goals and potential engineering solutions will be discussed at future public meetings once the City has contracted that work

Next Steps

Phase 1: Model Existing Conditions & Predict Future Flood Risk

Phase 2: Analyze Solutions on Watershed Scale, Rank & Budget

Winter – Spring 2020:

Create and Calibrate Model

Spring 2021:

Identify Flood Impacts

Spring – Summer 2021:

2nd Public Meeting

Evaluate Solutions

TBD

3rd Public Meeting

TBD

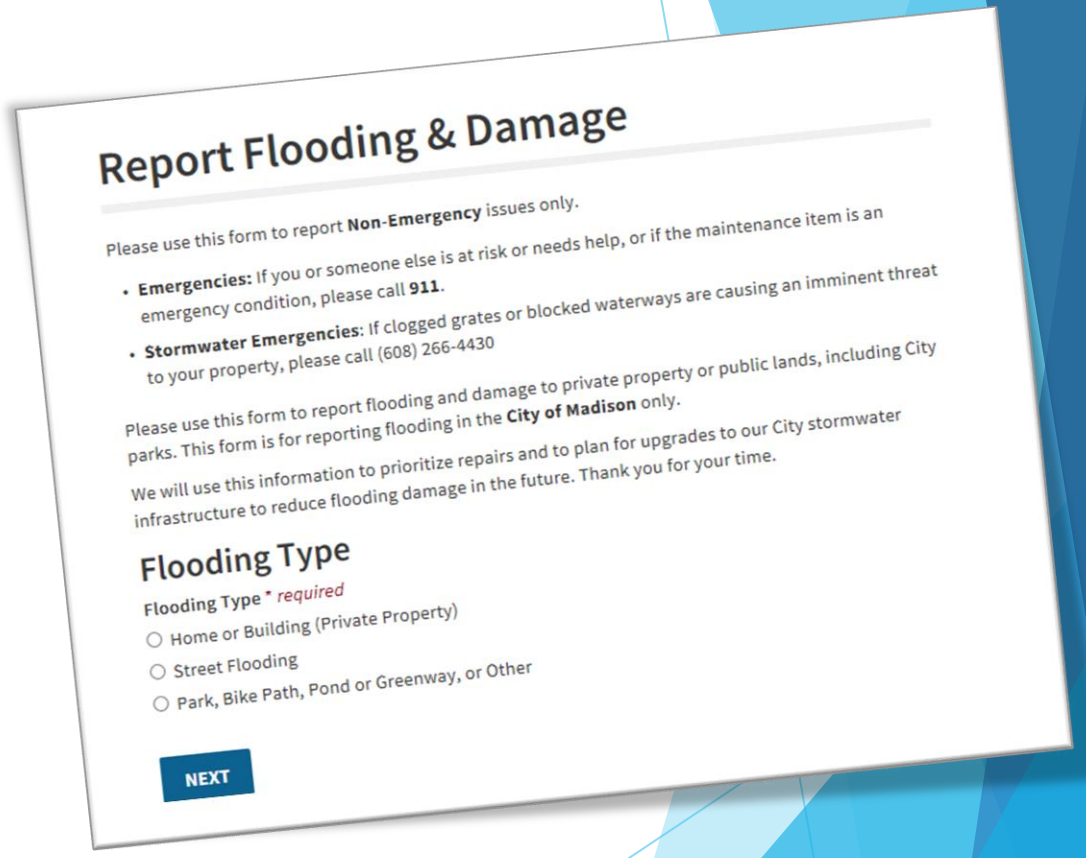
Complete Watershed Study

TBD

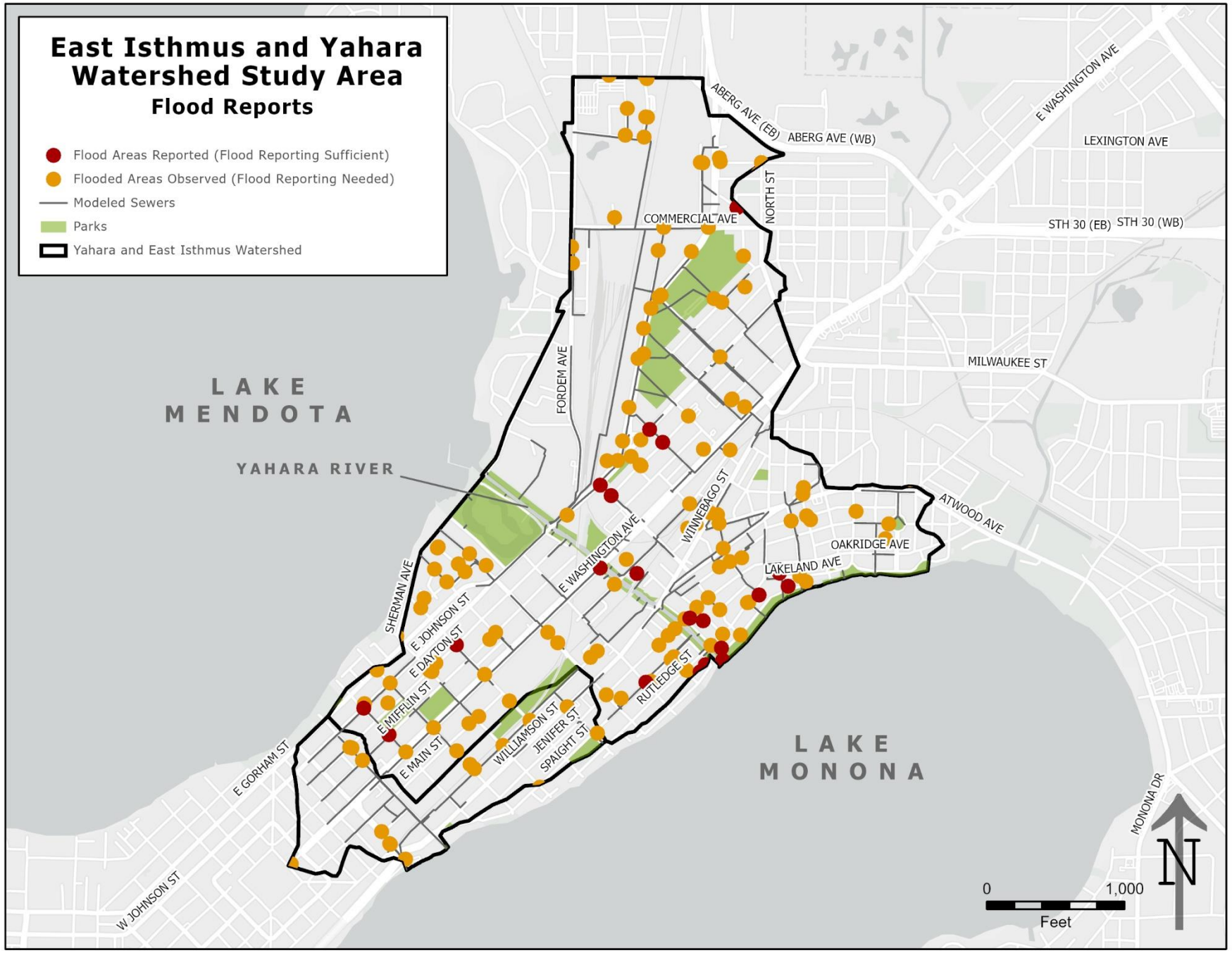
Property Owner Responsibilities

- Self-report Online Survey: document and share data during rain events
  - www.cityofmadison.com/flooding

  WE NEED YOU TO REPORT ON-LINE TO INFORM OUR STUDY!
- Understand local drainage and how to protect your property
- Install backflow preventers and sump pumps
- Consider supplemental insurance
- Focus group participation

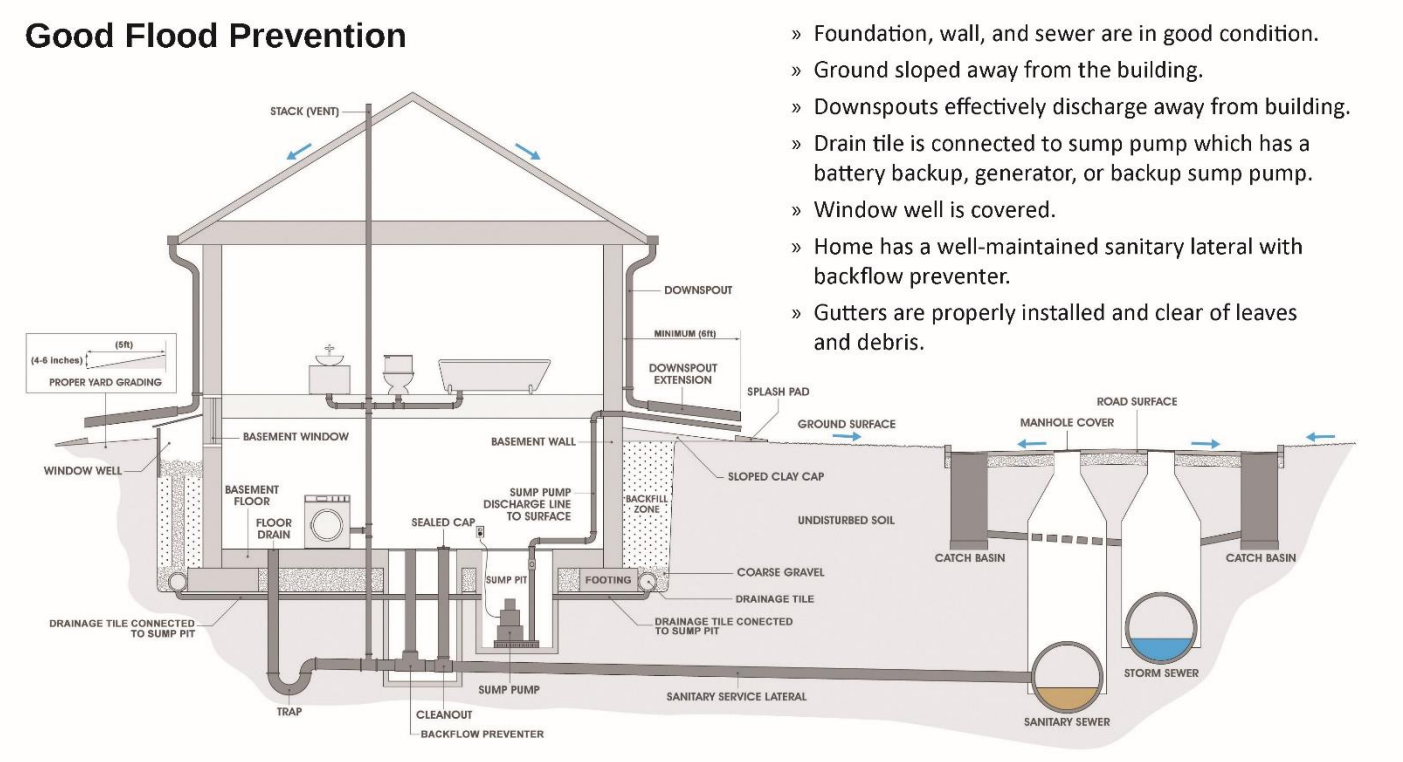


Report Flooding and Damage



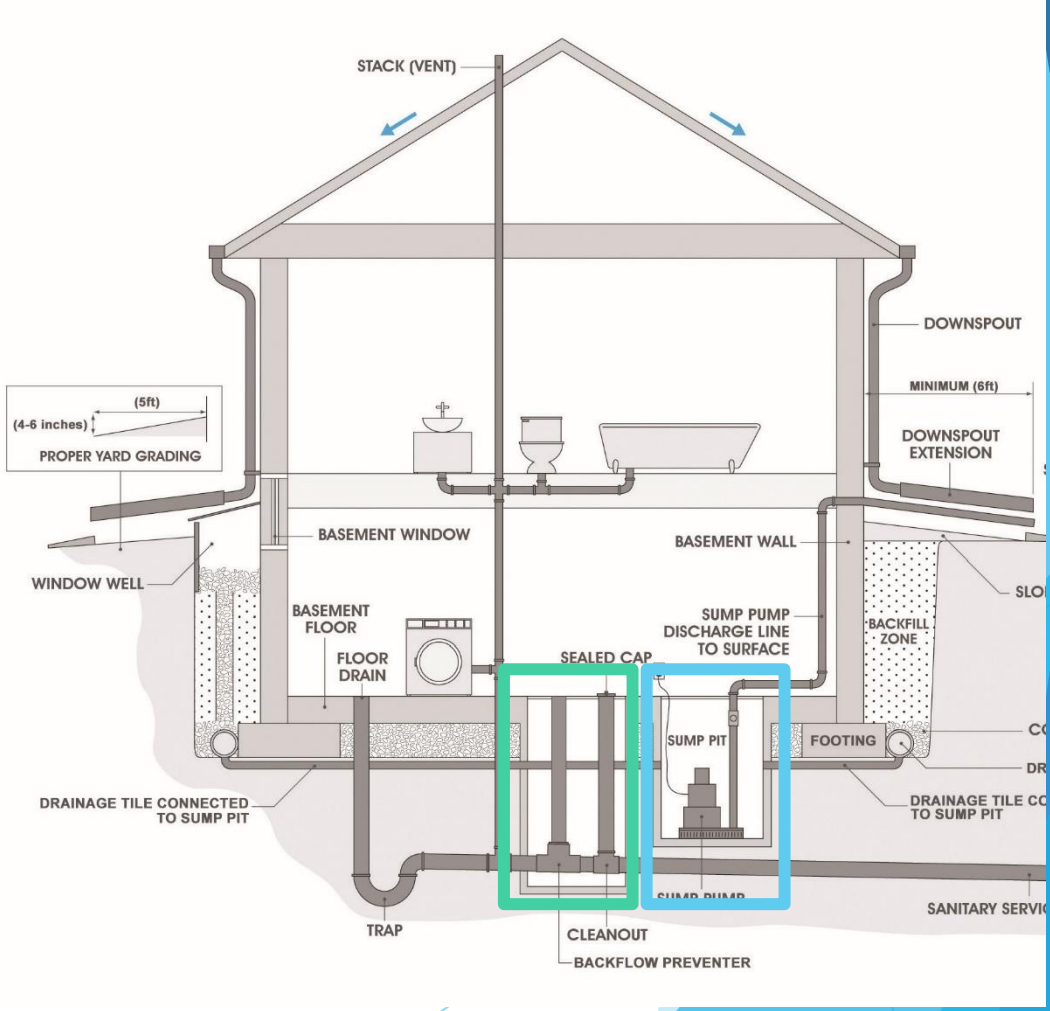
Property Owner Responsibilities

- Self-report Online Survey
- Understand local drainage and how to protect your property
  - www.cityofmadison.com/floodprotection
- Install backflow preventers and sump pumps
- Consider supplemental insurance
- Focus group participation



Property Owner Responsibilities

- Self-report Online Survey
- Understand local drainage and how to protect your property
- Install backflow preventers and sump pumps
- Consider supplemental insurance
- Focus group participation



Property Owner Responsibilities

- Self-report Online Survey
- Understand local drainage and how to protect your property
- Install backflow preventers and sump pumps
- Consider supplemental insurance – **contact your private insurance agent for more information. You CAN obtain FEMA flood insurance even if you are not in a FEMA floodplain.**
- Focus group participation

Property Owner Responsibilities

- Self-report Online Survey
- Understand local drainage and how to protect your property
- Install backflow preventers and sump pumps
- Consider supplemental insurance
- Focus group participation: discuss issues within your neighborhood

Property Owner Responsibilities

- **Be a good neighbor!** Understand how your water could have negative impacts on your neighbor's property.
- Install rain gardens and/or rain barrels etc.
- **Have a plan** to protect yourself during a flash flood warning.
- Become a better steward of your watershed.
  - Adopt an Inlet
  - Remove leaves from the street
  - http://www.ripple-effects.com/

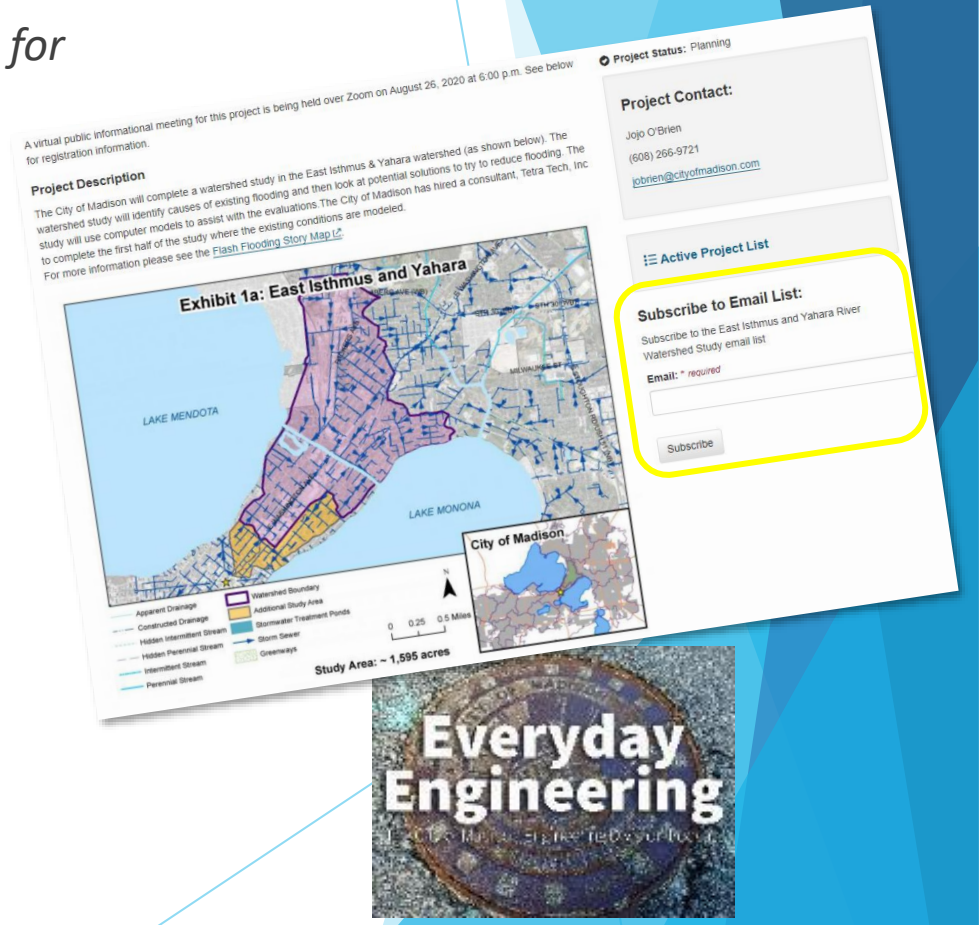
Next Public Information Meeting

- Spring – Summer of 2021
  - Present stormwater and flood model findings
  - Specific to the watershed
  - Refine data and model
  - Use as a ‘fact check’ with residents

Questions and Answers

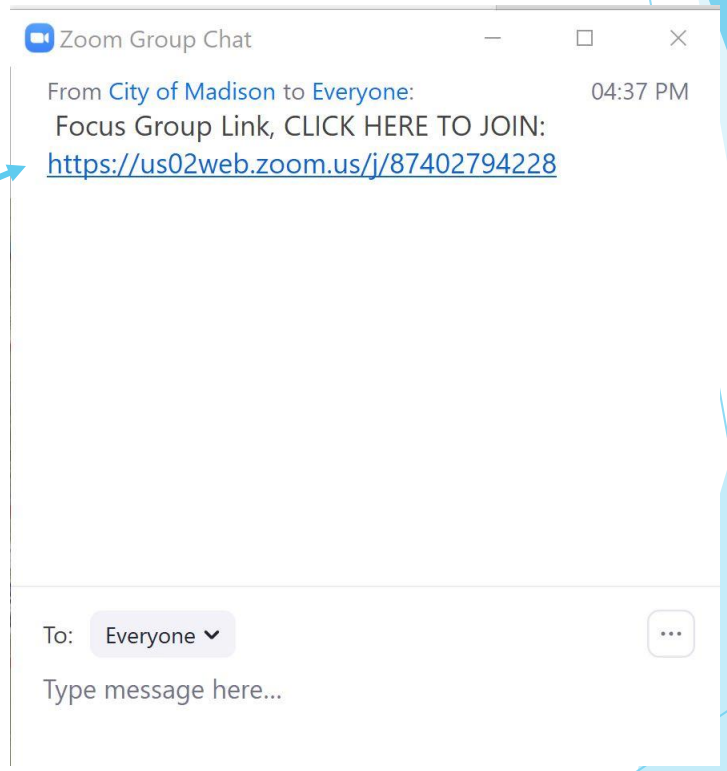
Contact Information & Resources

- Project Manager: Jojo O'Brien, jobrien@cityofmadison.com
- Project Webpage: www.cityofmadison.com/IsthmusYaharaWatershed
  - StoryMap can be found on the Webpage – *Must use Google or Firefox for browser, Explorer not supported*
  - Sign-up for project email updates on the website
  - Report flooding, past or current on the Report Flooding form
- New Flooding Website: www.cityofmadison.com/flooding
- Sandbag information: https://www.cityofmadison.com/flooding/after-a-flood/sandbag-collection-disposal
- Everyday Engineering Podcast
  - Historic Flooding and Basement Drainage episodes
- Facebook – City of Madison Engineering
- Twitter – @MadisonEngr



Focus Groups – Zoom Breakout Rooms

- Join the Zoom Breakout Room Session
  - Open the Zoom Chat box (if not already open)
  - Click on Link provided in the Zoom Group Chat box
  - A message will pop-up that says “Do you want to leave this meeting?”
  - Click “Yes”
  - Join Meeting
  - City staff will meet you in the new virtual meeting room



Small Groups/Focus Groups