Welcome!
We will begin shortly…

Virtual Meeting Schedule	
6:00 – 6:10	Welcome
6:10 – 7:00	Presentation
7:00 – 7:20	Presentation Q & A
7:20 – 7:30	Wrap-Up

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Warner Park & Cherokee Marsh Watershed Study Public Information Meeting #1

Brown and Caldwell with
City of Madison Engineering Division
July 20, 2023

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Meeting Technical Housekeeping

- This meeting will be **recorded** and posted to the project page.
- All attendees should be **muted** to keep background noise to a minimum.
- Use the **“chat”** button for technical issues with meeting to troubleshoot with staff to assist.
- Use the **“Q and A”** button to type questions about presentation. Questions will be answered live after the presentation.
- Inappropriate questions may be dismissed.
- Use the **“raise your hand”** button to verbally ask your question. You will be prompted to unmute when it is your turn.

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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.

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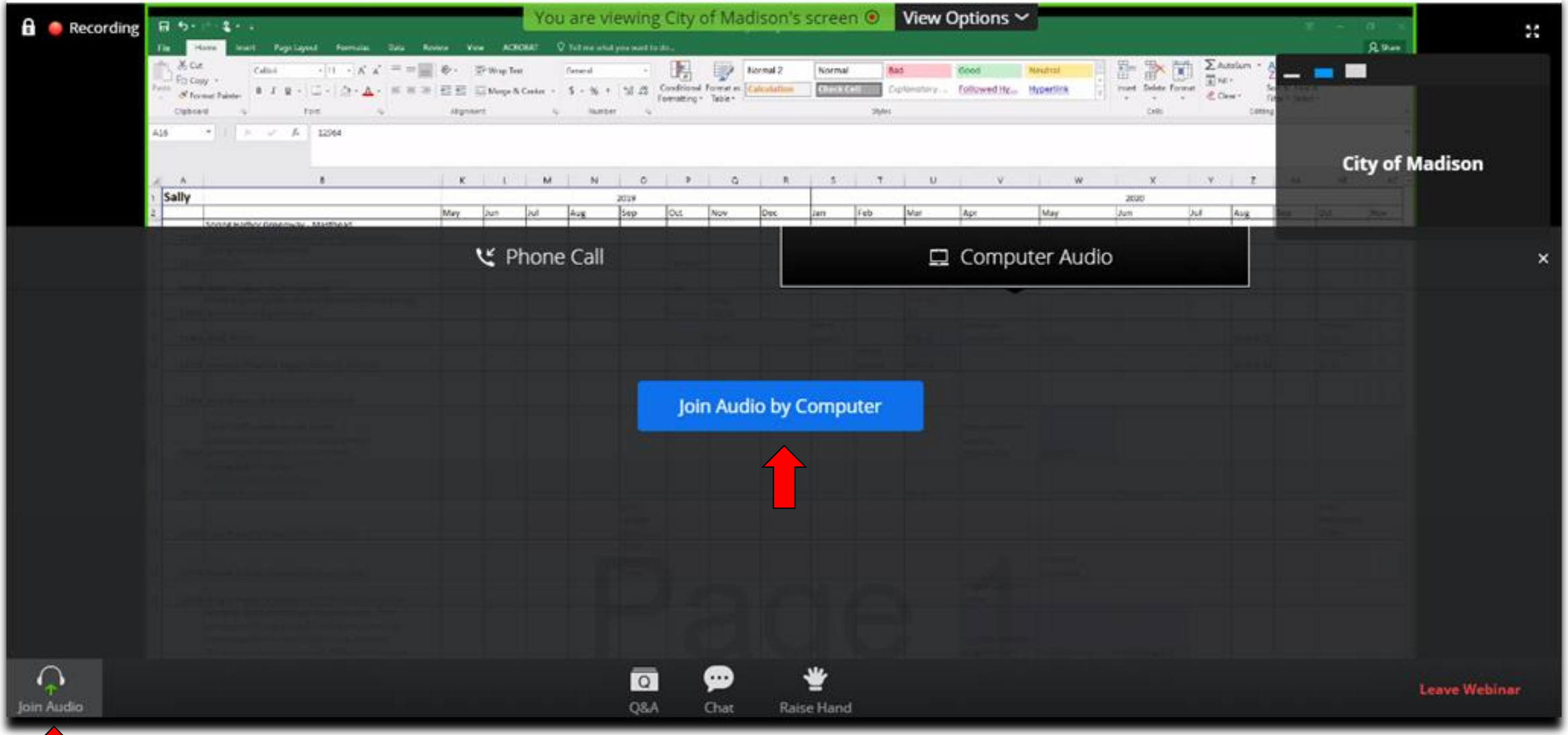
How to Participate



Make sure to join audio

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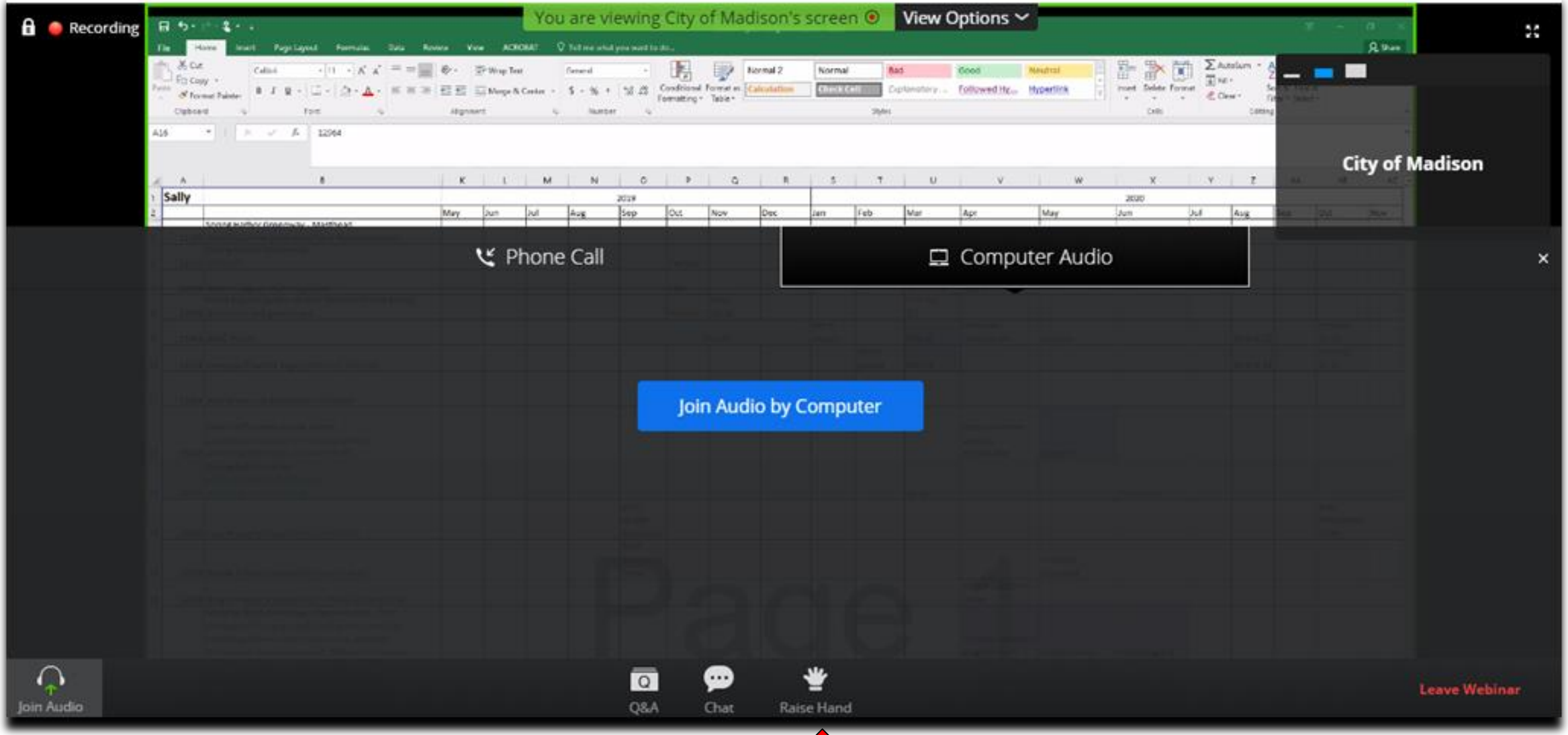
How to Participate



Raise your hand to be unmuted
For comments or ask additional questions.

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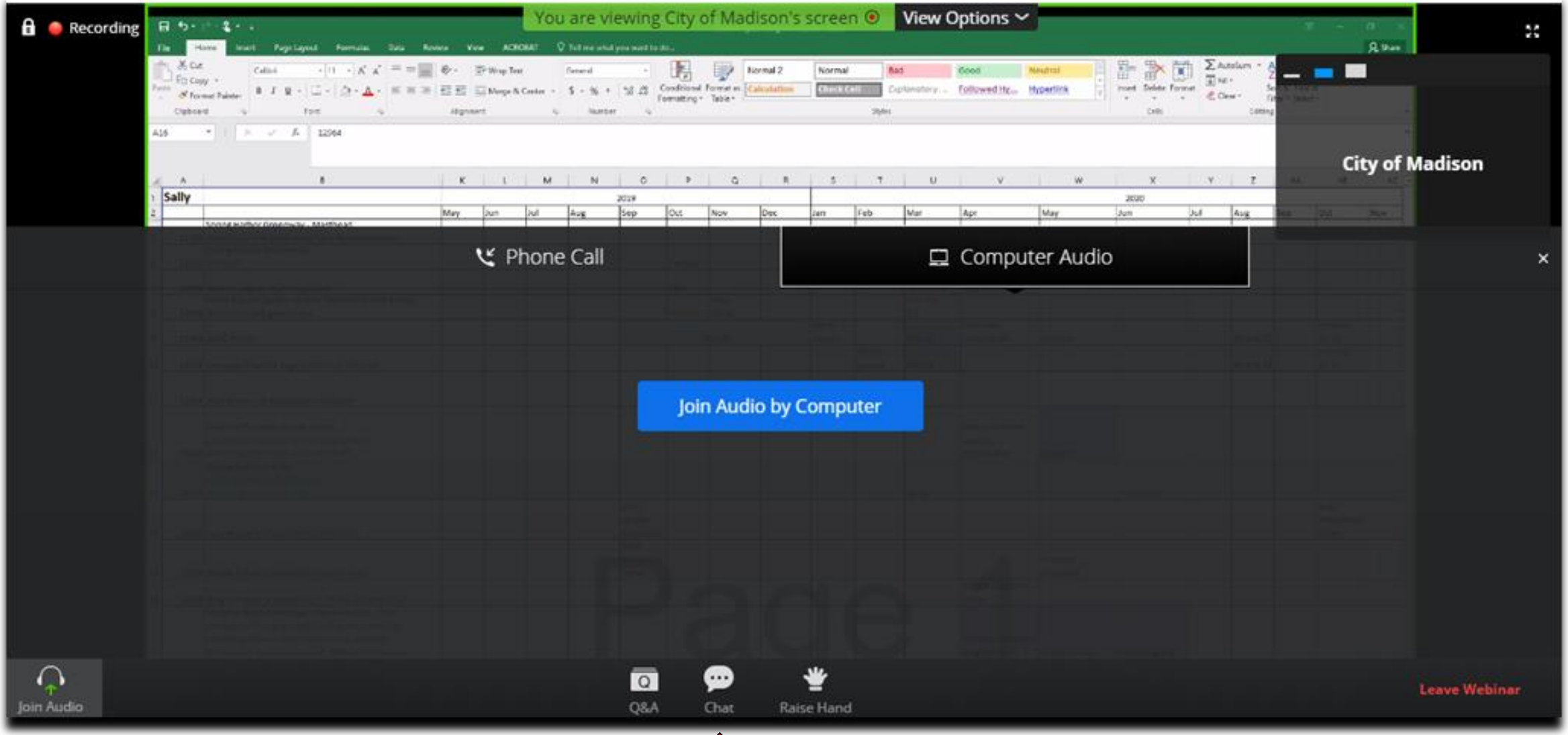
How to Participate



Use chat if you have technical issues or a question for the panelists

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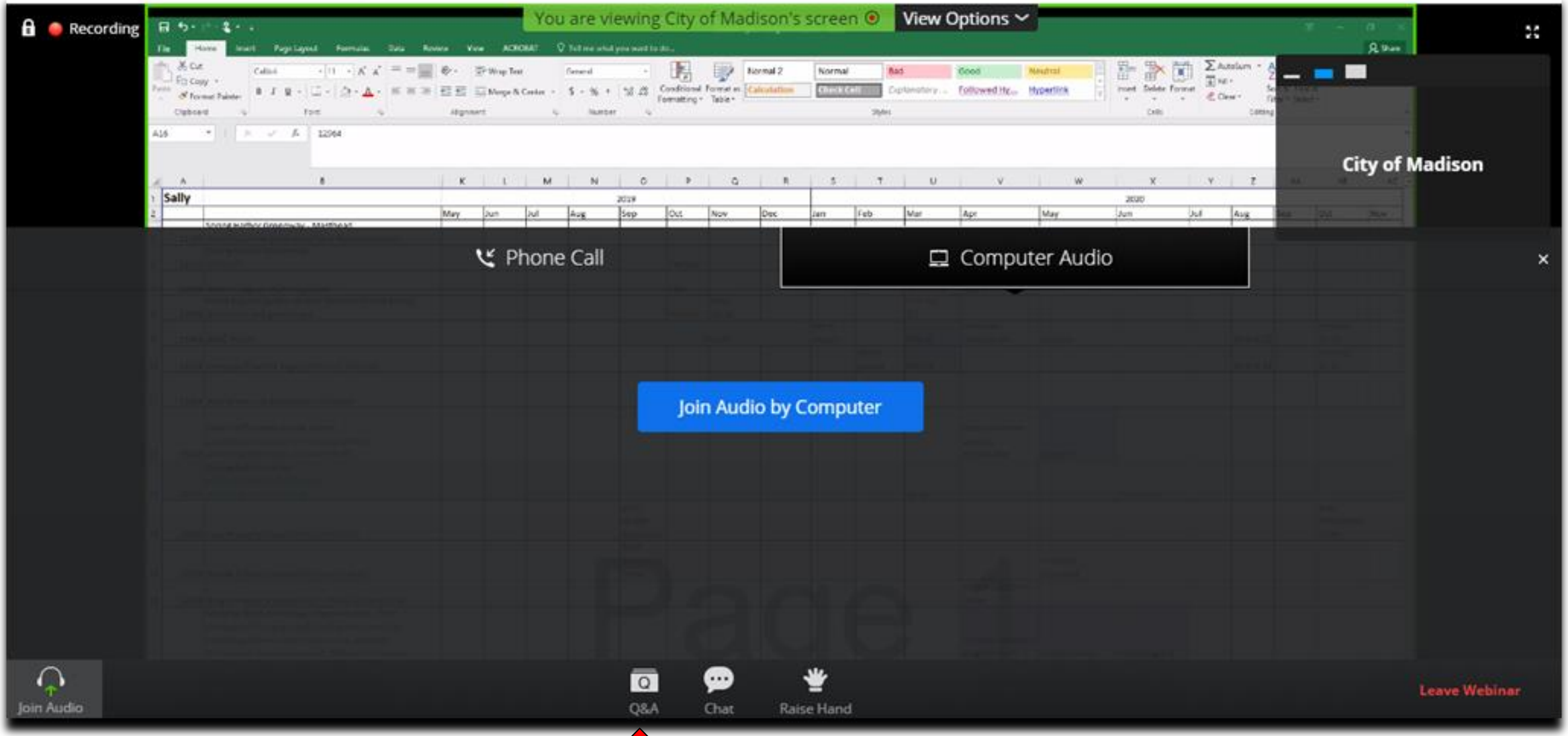
How to Participate



Use Q/A if you have questions.
We will answer after the presentation

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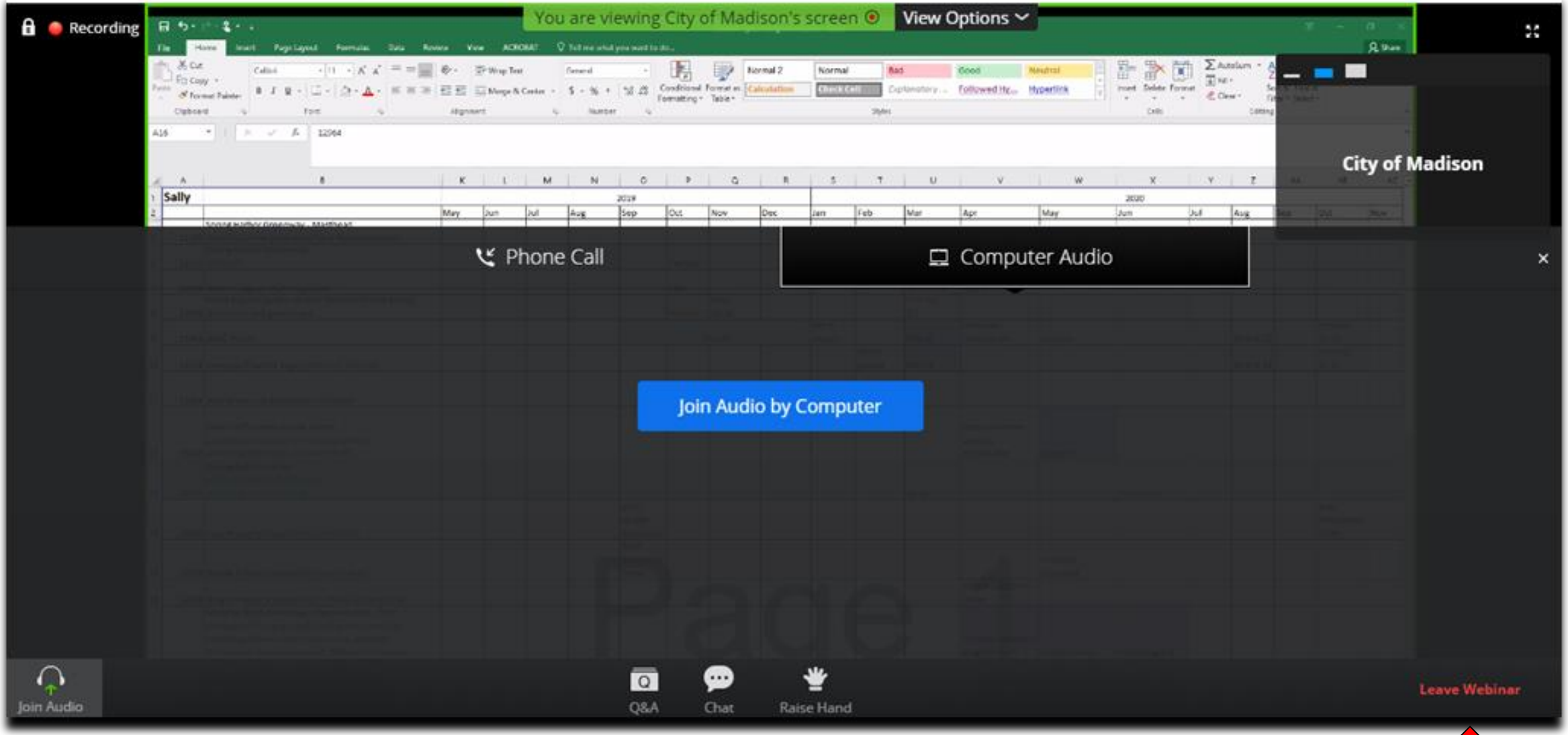
How to Participate



To leave the meeting click here

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Evening Overview

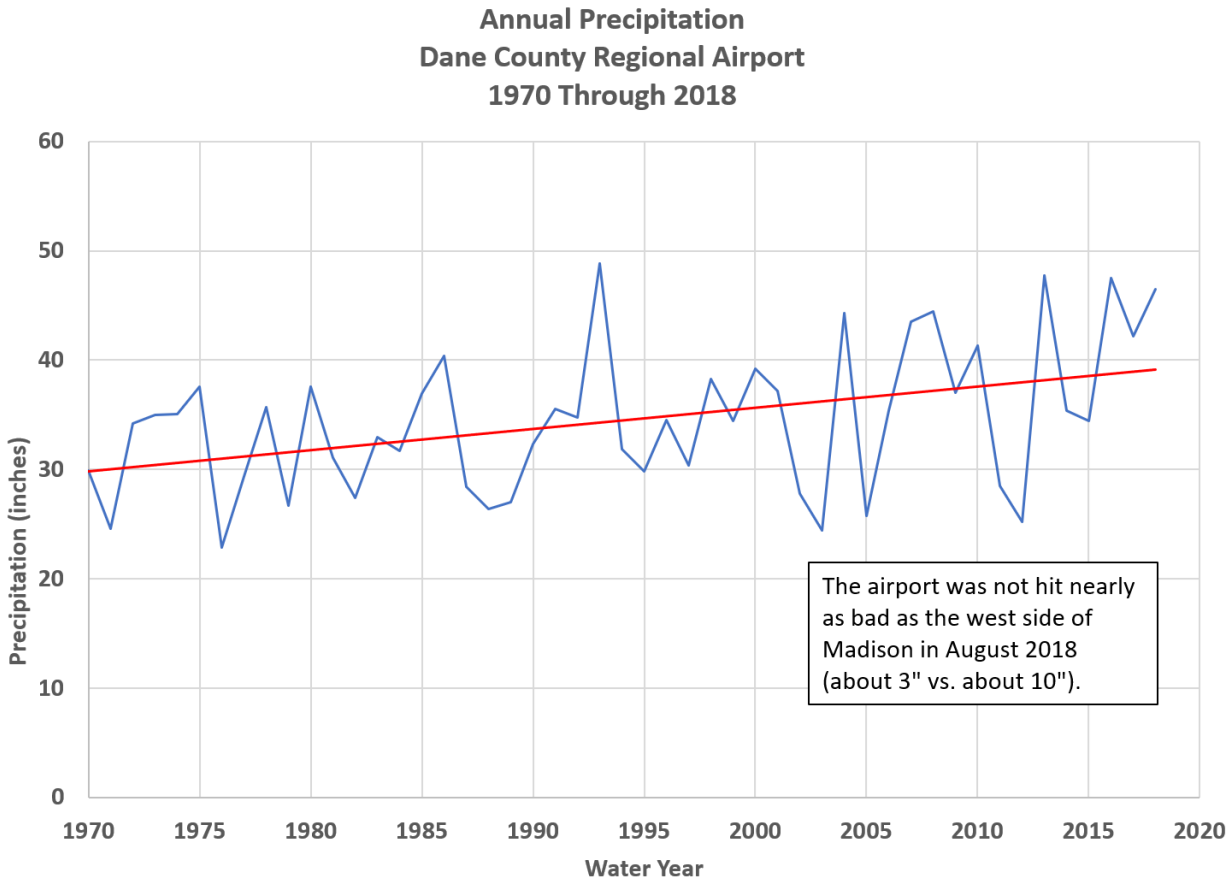
- Welcome (Hannah Mohelnitzky, City of Madison)
- Presentation (Mike Wegner, Brown and Caldwell)
- Q&A (facilitated by Hannah Mohelnitzky, City of Madison)
- Wrap Up (Hannah Mohelnitzky, City of Madison)

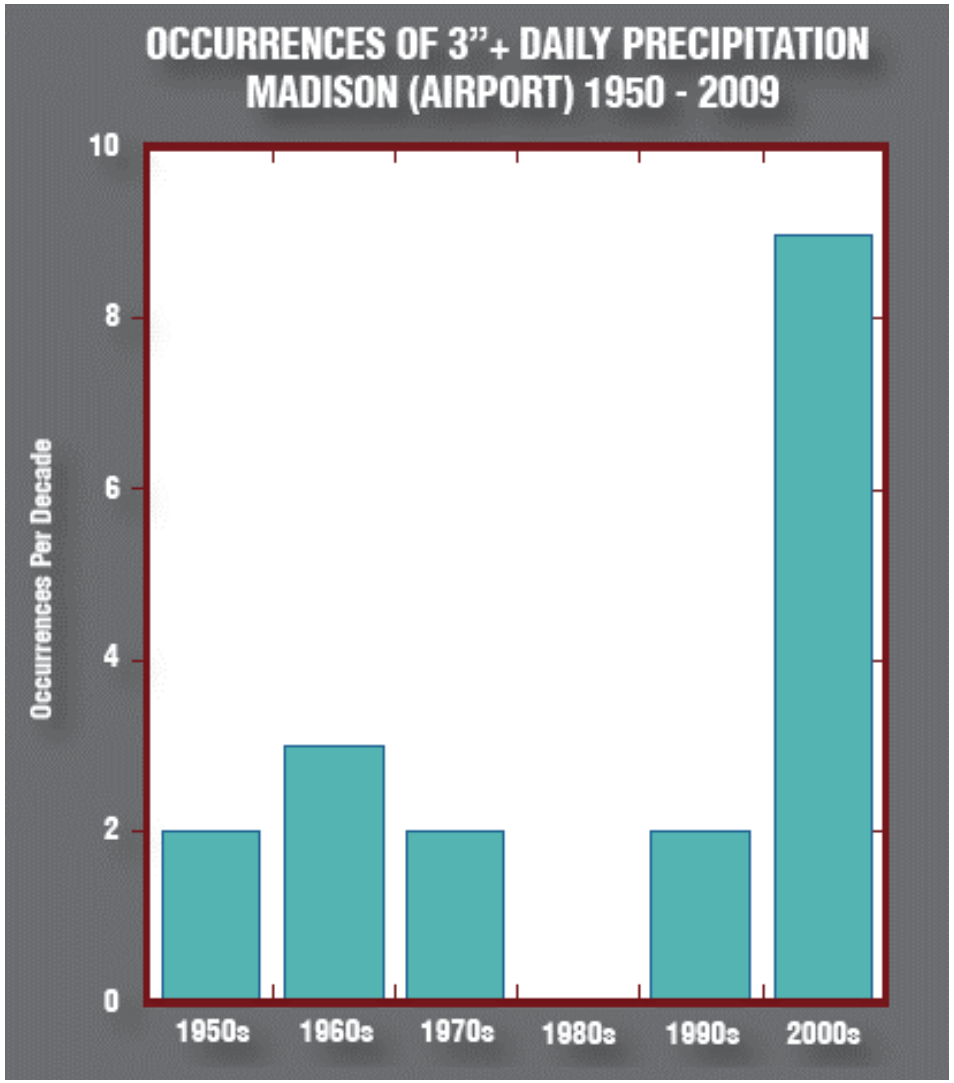
Presentation Outline

1. Why We Are Here
2. 1% Chance 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

- September 9-12, 2019: 5.65” in 3 days
- September 22, 2019: 3.38” in ~12 hours
- October 1 , 2019: 3.21” in ~12 hours
- September 11, 2022: 3.20” in ~24 hours

*These recent, large rain events have hit the west side harder

E Johnson Street, Madison, WI

Rainfall totals taken from the Weather Underground Badger Park station (KWIMADIS238) in Madison, WI.

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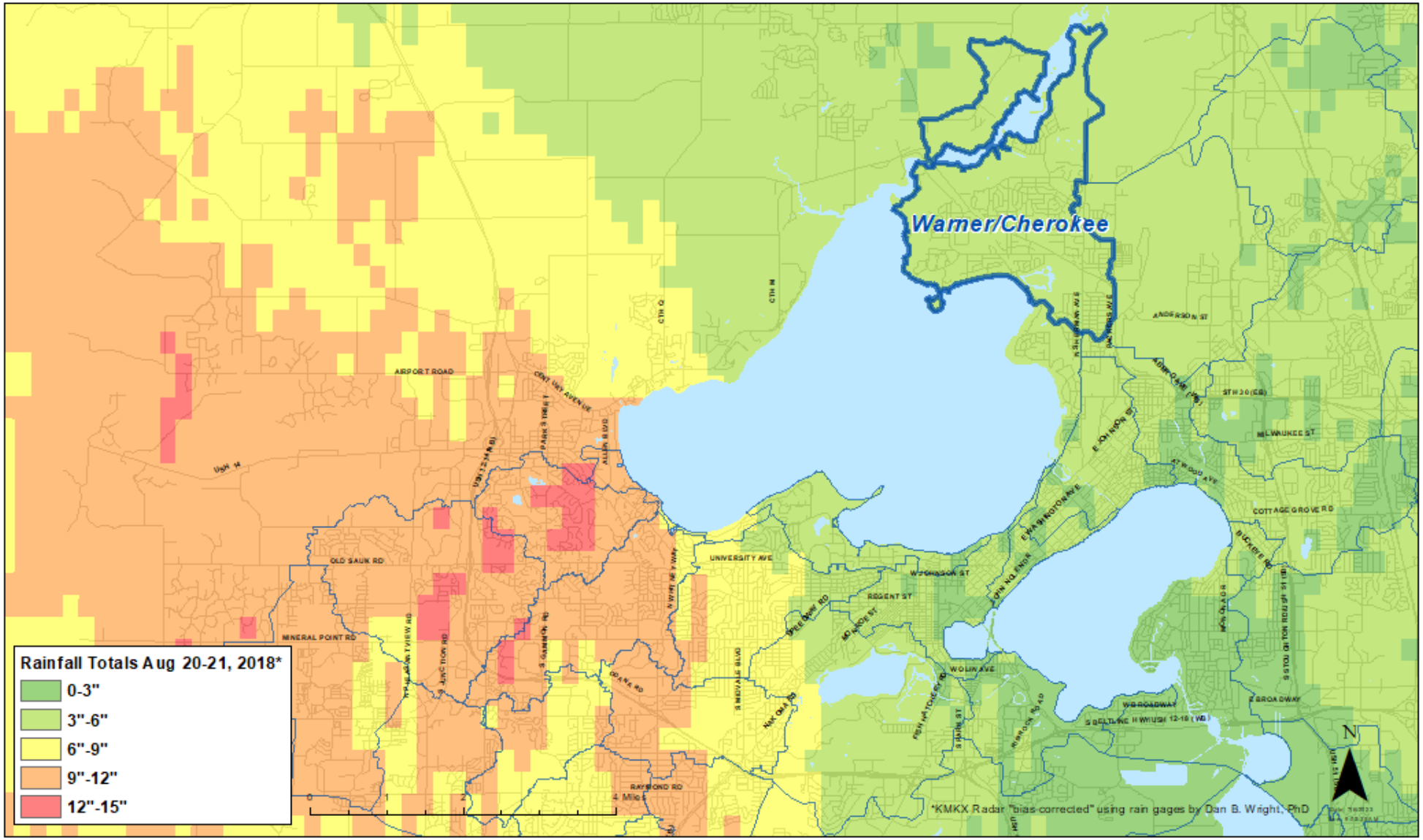
Rainfall Totals August 20-21, 2018



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

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Why We Are Here: Historic Rain Events

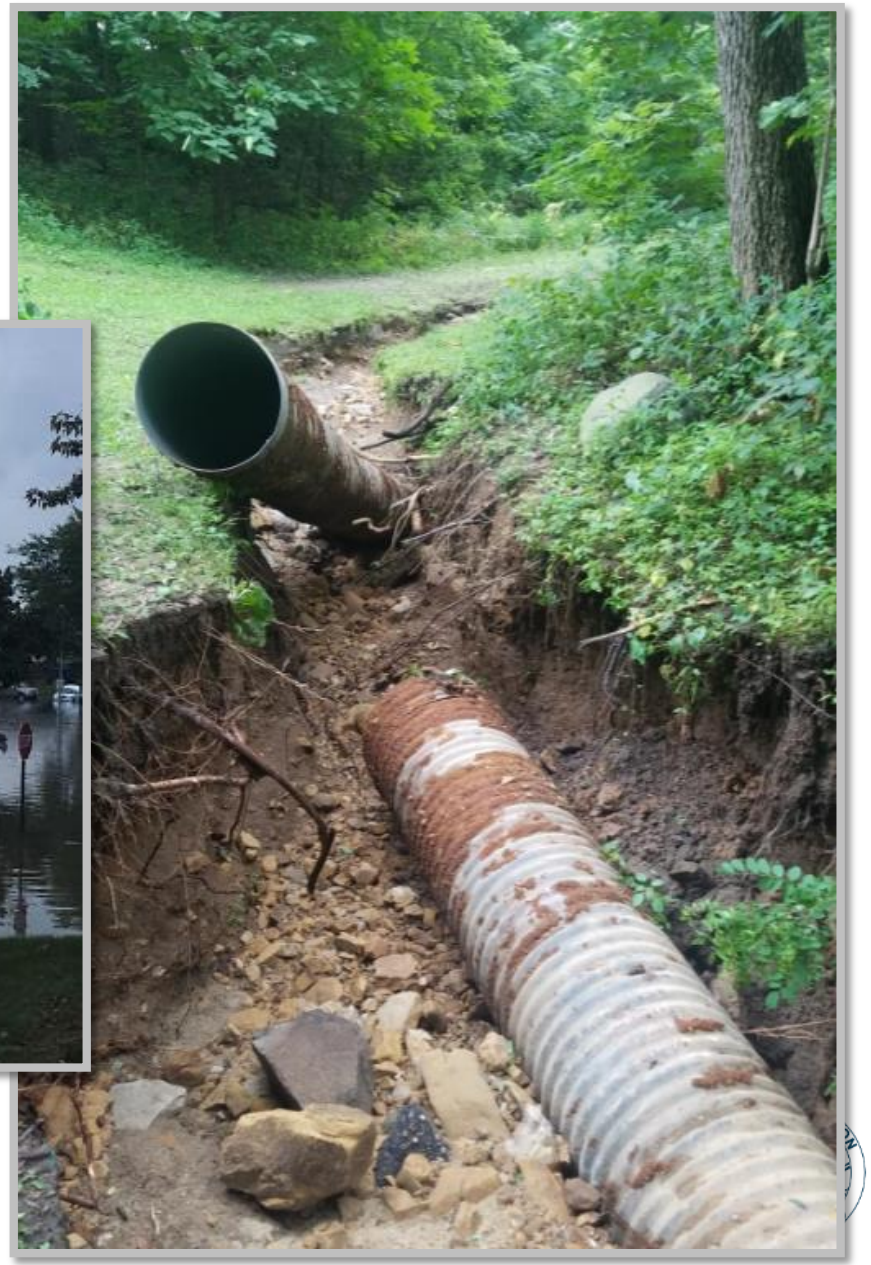
- Recent storms have amplified known inadequacies
- Recent storms have revealed new storm sewer deficiencies

⇨ Result: flood damage

Deming Way, Madison, WI

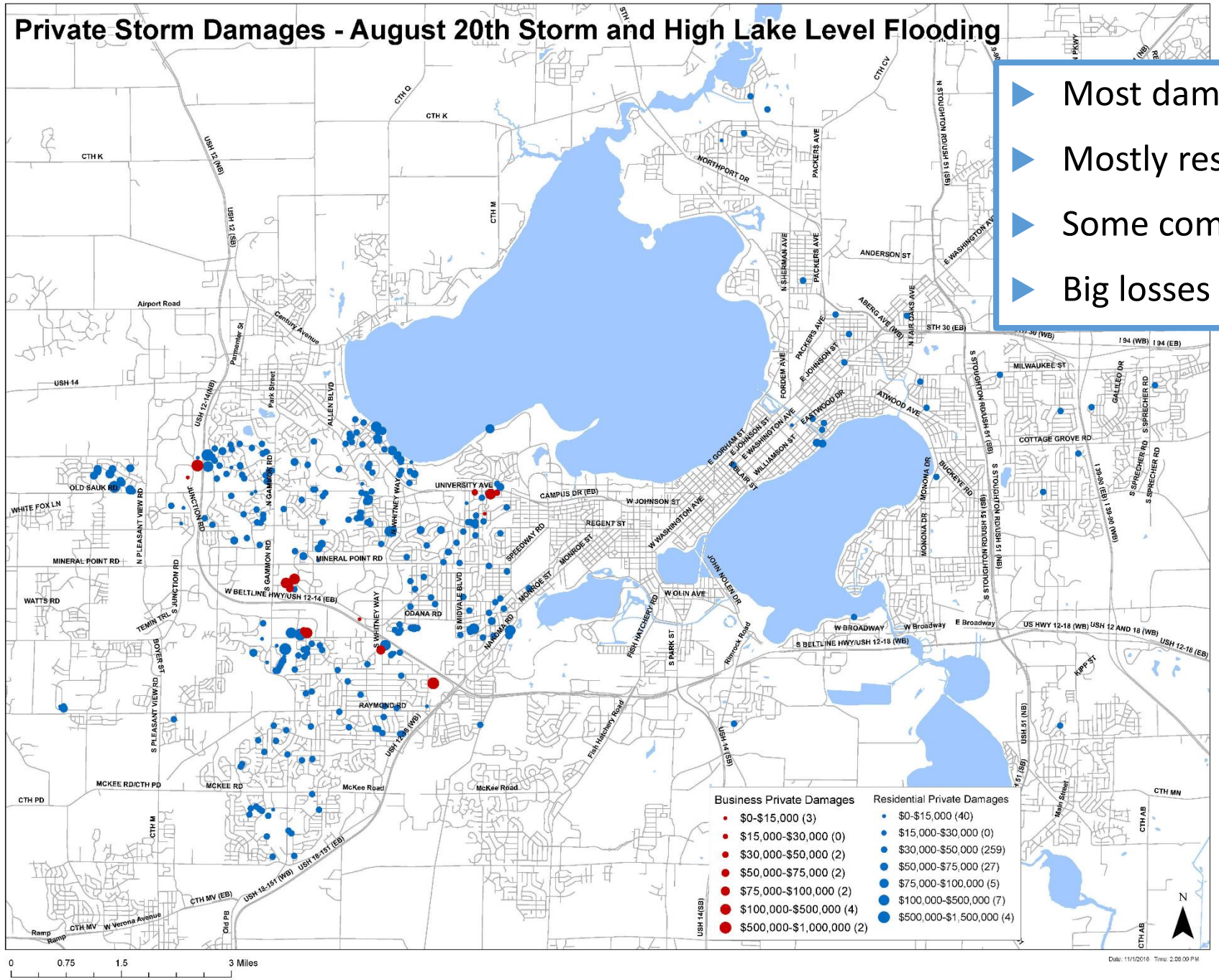
Why We Are Here: Historic Rain Events

- August 20th event: substantial damage
  - Public infrastructure: $4M
  - Private property:
    - *Reported $17.5M*
    - *Estimated $30M*



Odana Road (above), Glenwood Children's Park (right), Madison, WI

Private Storm Damages - August 20th Storm and High Lake Level Flooding



- Most damage on the West Side
- Mostly residential damage
- Some commercial damages
- Big losses

MADISON

Why We Are Here: Historic Rain Events

- Recent storms have amplified known inadequacies
- Recent storms have revealed new storm sewer deficiencies

⇨ Result: flood damage

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

Deming Way, Madison, WI

1% Chance Storm Definition

- % Chance Storm Definition: chance that a rainfall event will occur each year
- 1% chance storm is also known as the 100-year storm
  - 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 1% chance event
- Also referred to as the "Annual Exceedance Probability" (AEP)

% Chance Storm	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

- September 9-12, 2019: 5.65” in 3 days
  - *4-10% chance*
- September 22, 2019: 3.38” in ~12 hours
  - *10-20% chance*
- October 1 , 2019: 3.21” in ~12 hours
  - *10-20% chance*
- September 11, 2022: 3.20” in ~24 hours
  - *20-50% chance*

E Johnson Street, Madison, WI

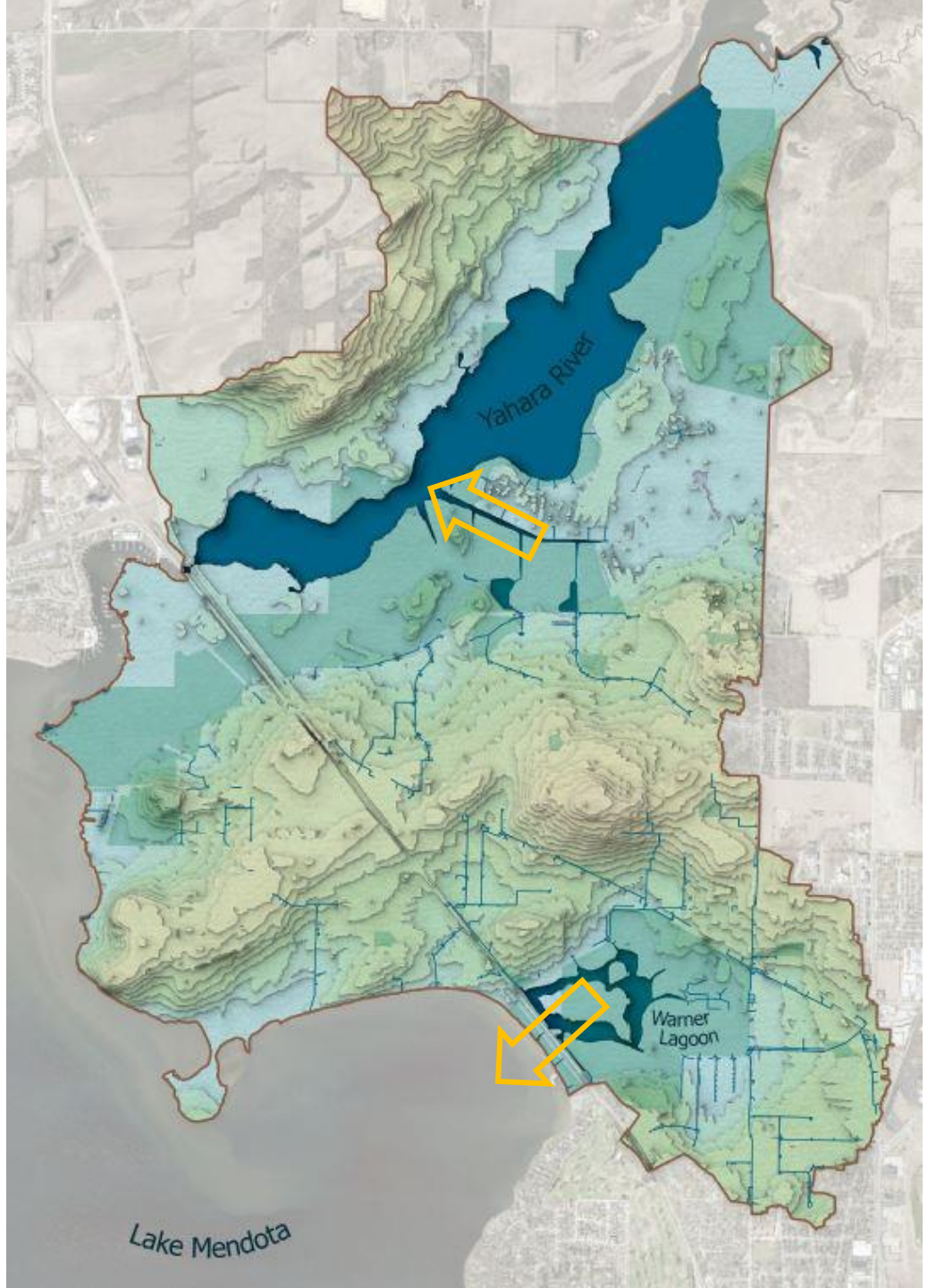
Rainfall totals taken from the Weather Underground Sunset Village station (KWIMADIS33) in Madison, WI.

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.



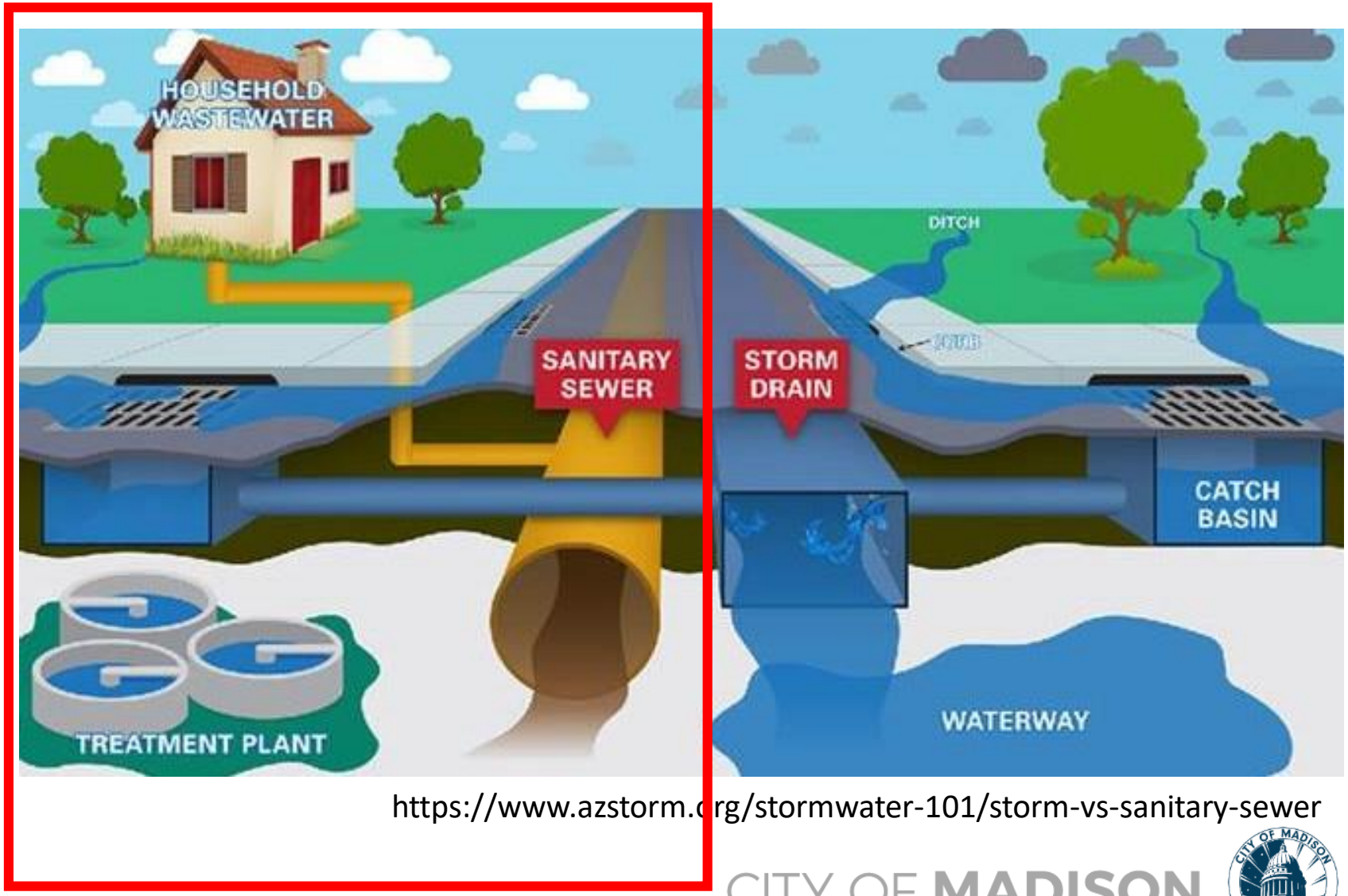
Where the Water Goes: Sewer Systems

- 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

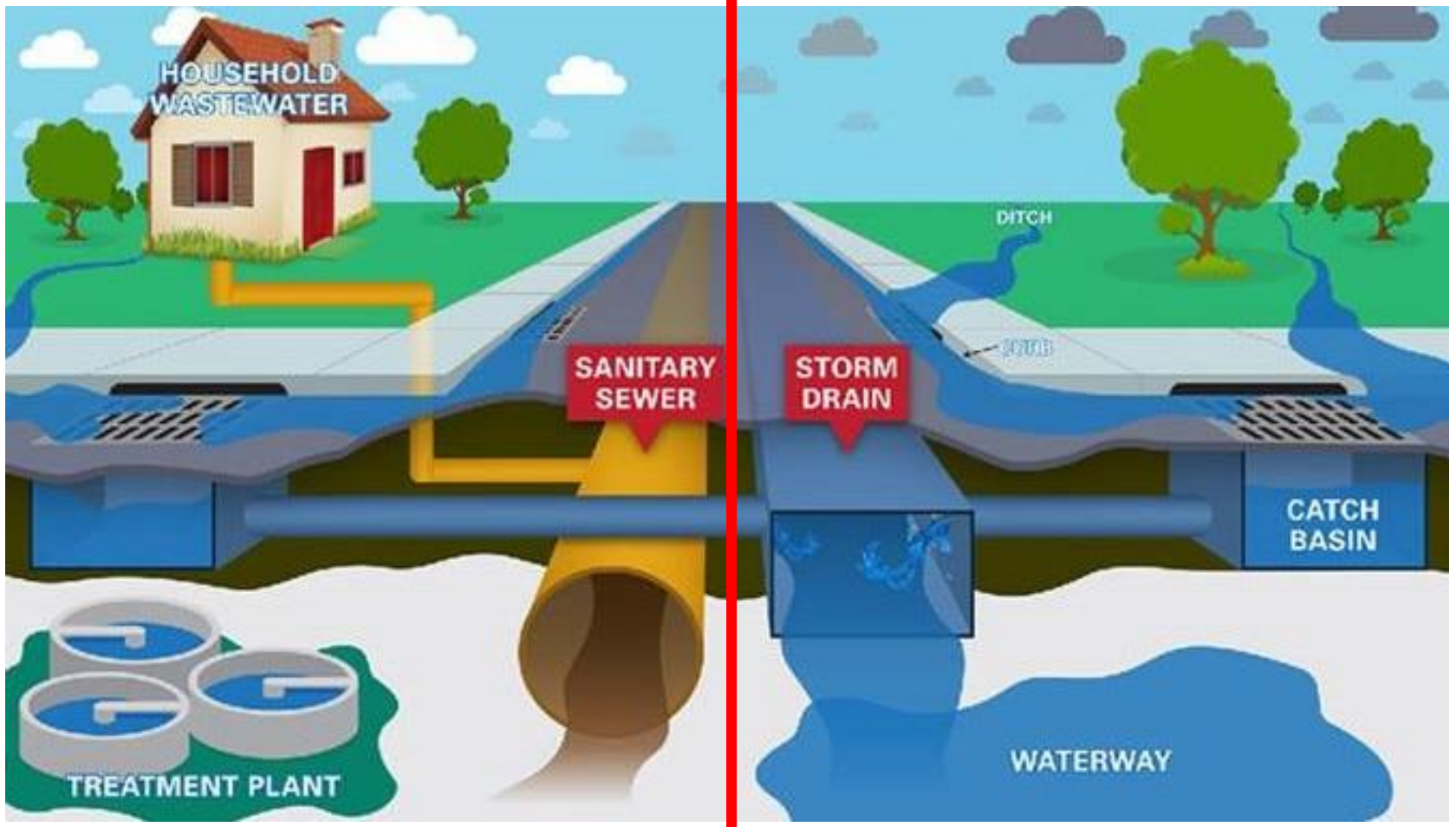
- Sanitary sewer drains residential (toilets, showers, kitchen sinks, etc.), commercial and industrial wastewater streams
- Sanitary sewer transports wastewater to Madison Metropolitan Sewerage District (MMSD) treatment plant
- Sanitary infrastructure includes:
  - Manholes
  - Household lateral pipes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

Where the Water Goes: Storm System in Madison

Greenway at Owen Conservation Park

Above: 96” pipe on University Ave (2013)
Below: storm sewer inlet on W Doty St

Reasons for Flooding Issues

- In many watersheds, flooding is not driven by Lake Mendota level
- Lake Mendota level: controlled by Dane County
  - Tenney Lock
- Yahara Lakes function as a system
  - Solution to problems is increased conveyance through lake chain
- Website:

https://lwrd.countyofdane.com/Yahara-Chain-of-Lakes-Lake-Levels-Task-Force

https://www.wiscontext.org/yahara-watershed

Reasons for Flooding Issues

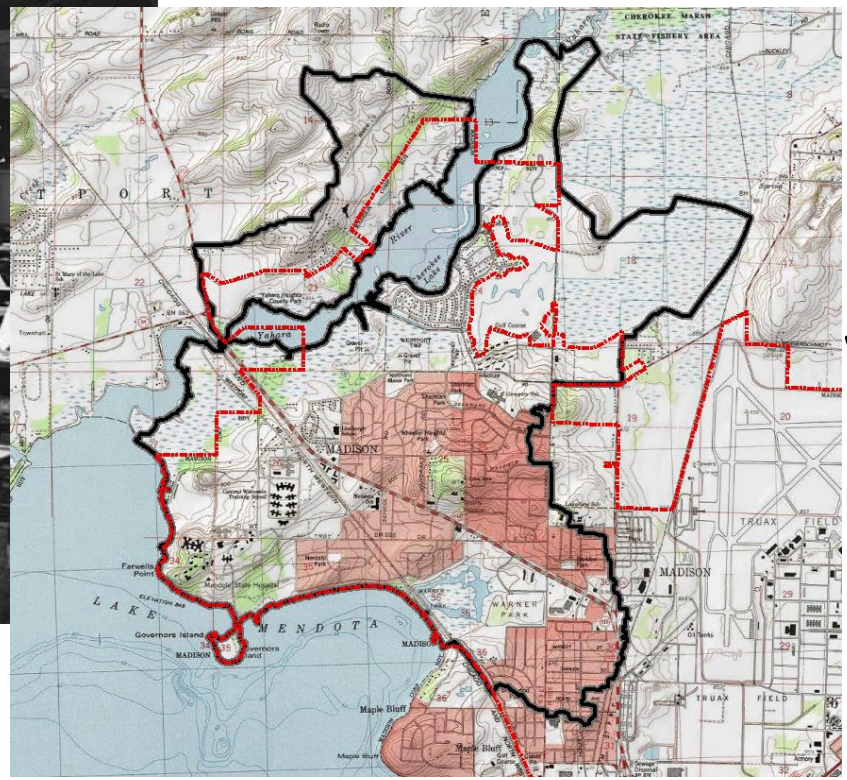
- Flash flooding: when storm sewer system cannot handle high amounts of rain
- Comparative example: a traffic jam
  - Too many cars of the Beltline during rush hour → backups happen
- During a storm, more water tries to move through the storm sewer system → backups happen

Beltline, looking west from Park Street, WisDOT

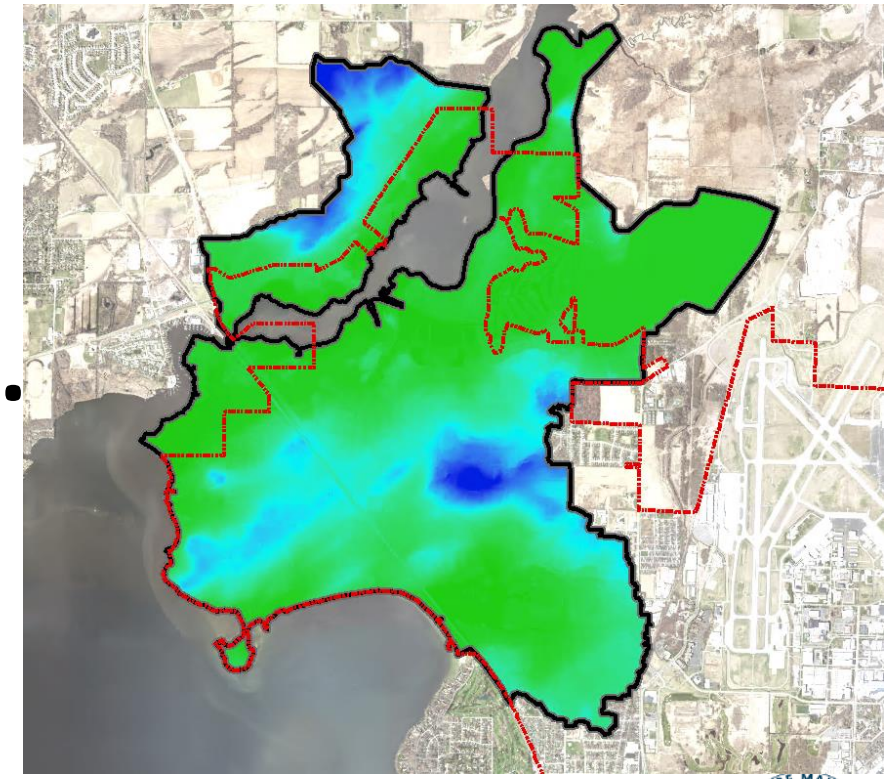
Reasons for Flooding Issues

- 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.



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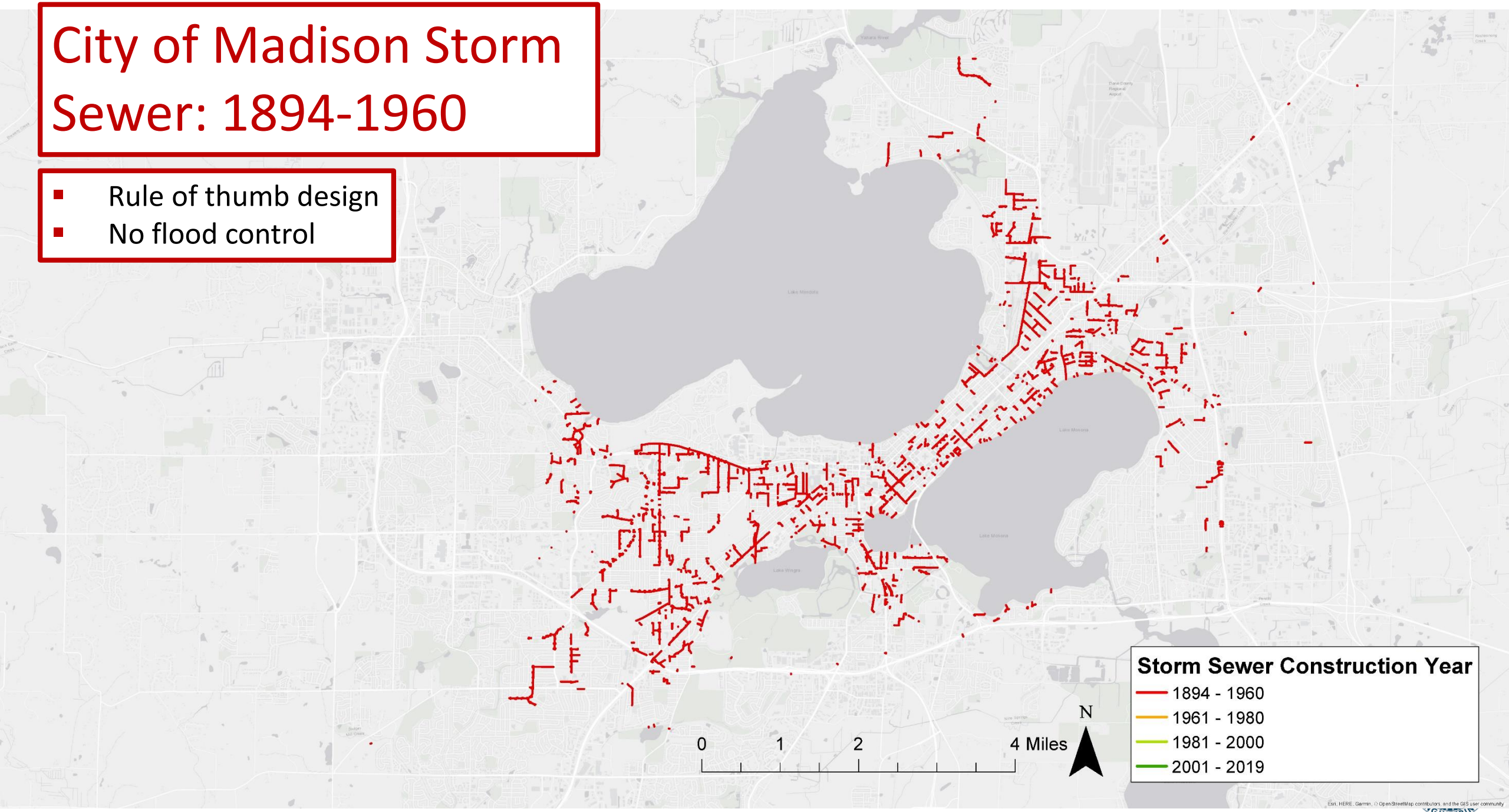
Reasons for Flooding Issues: Changing Design Standards

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

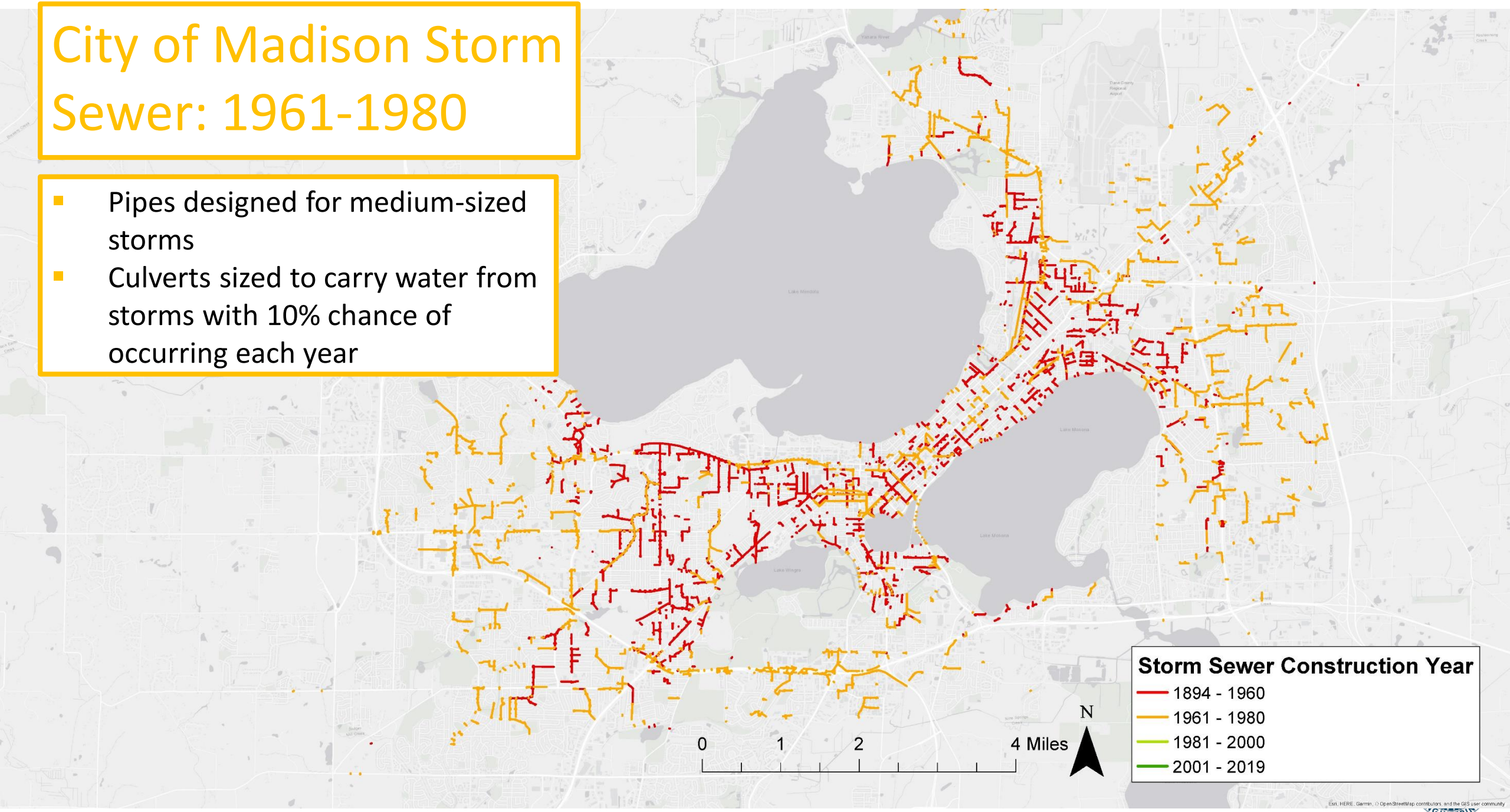
City of Madison Storm Sewer: 1894-1960

- Rule of thumb design
- No flood control



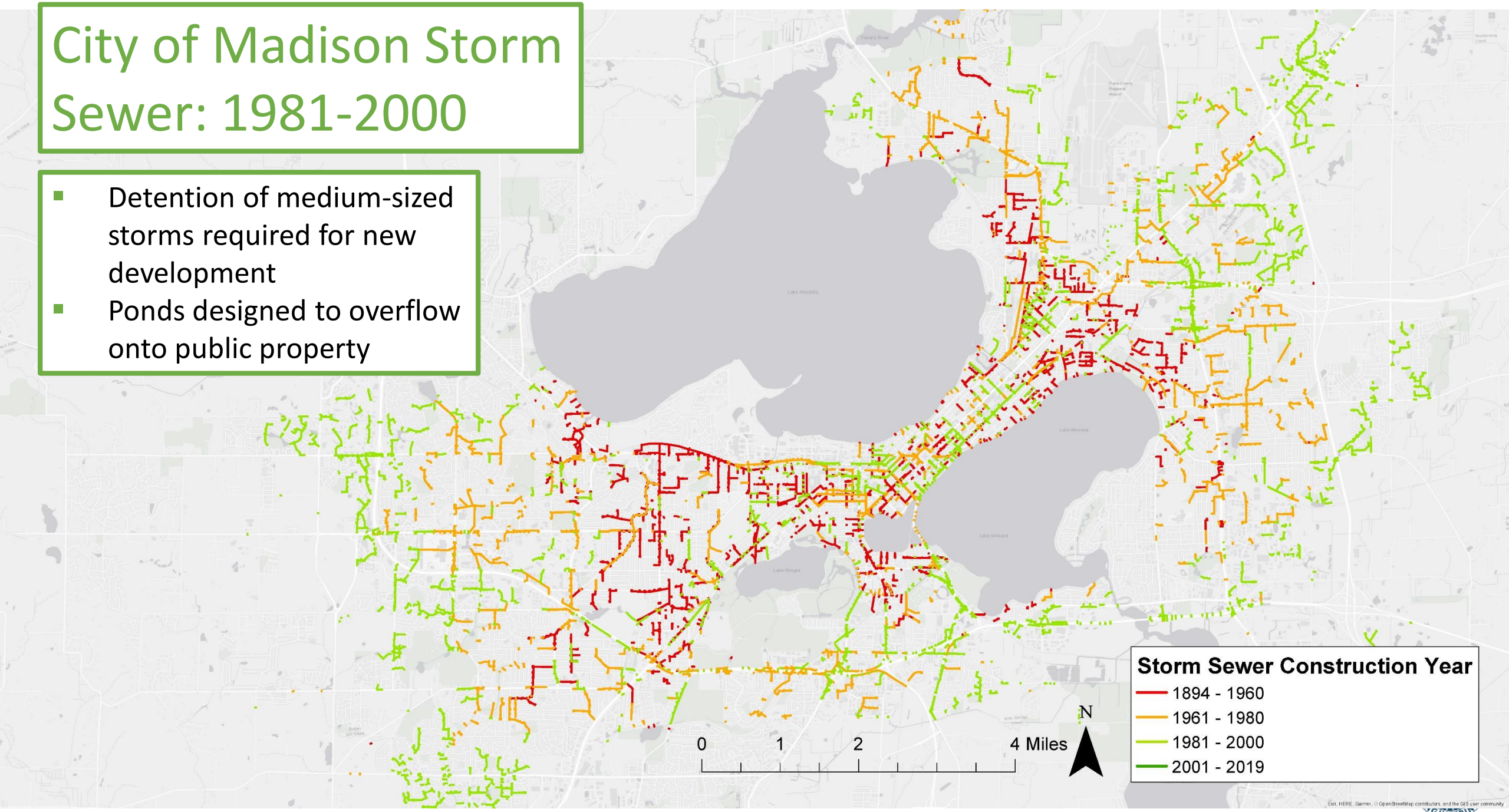
City of Madison Storm Sewer: 1961-1980

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



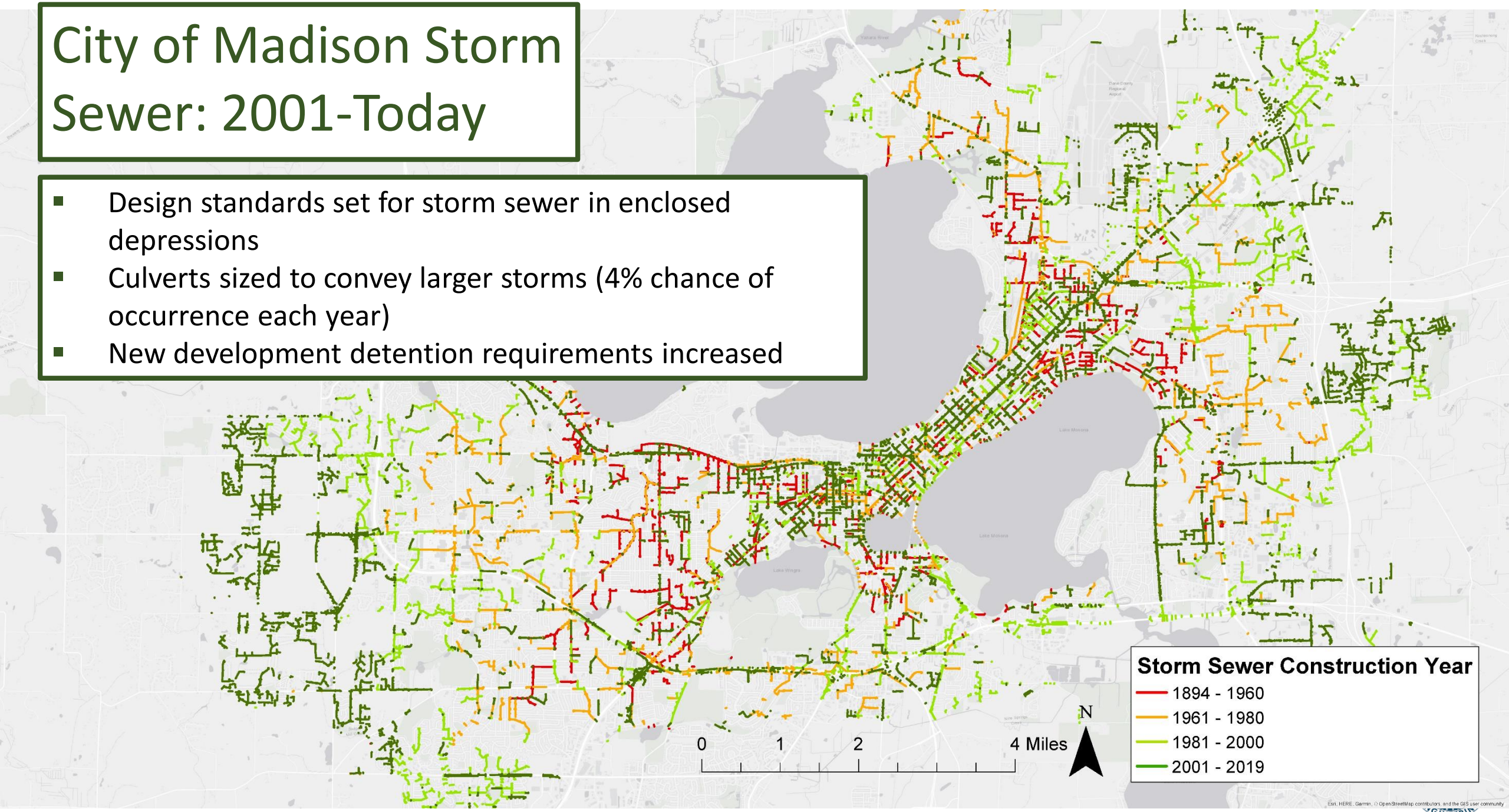
City of Madison Storm Sewer: 1981-2000

- 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



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)

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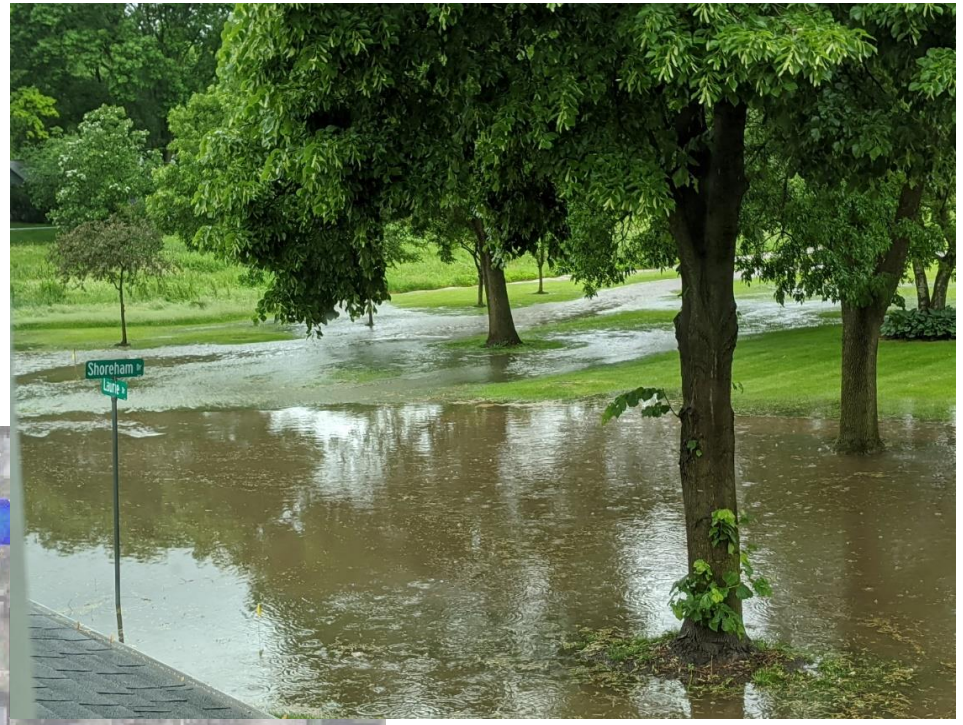
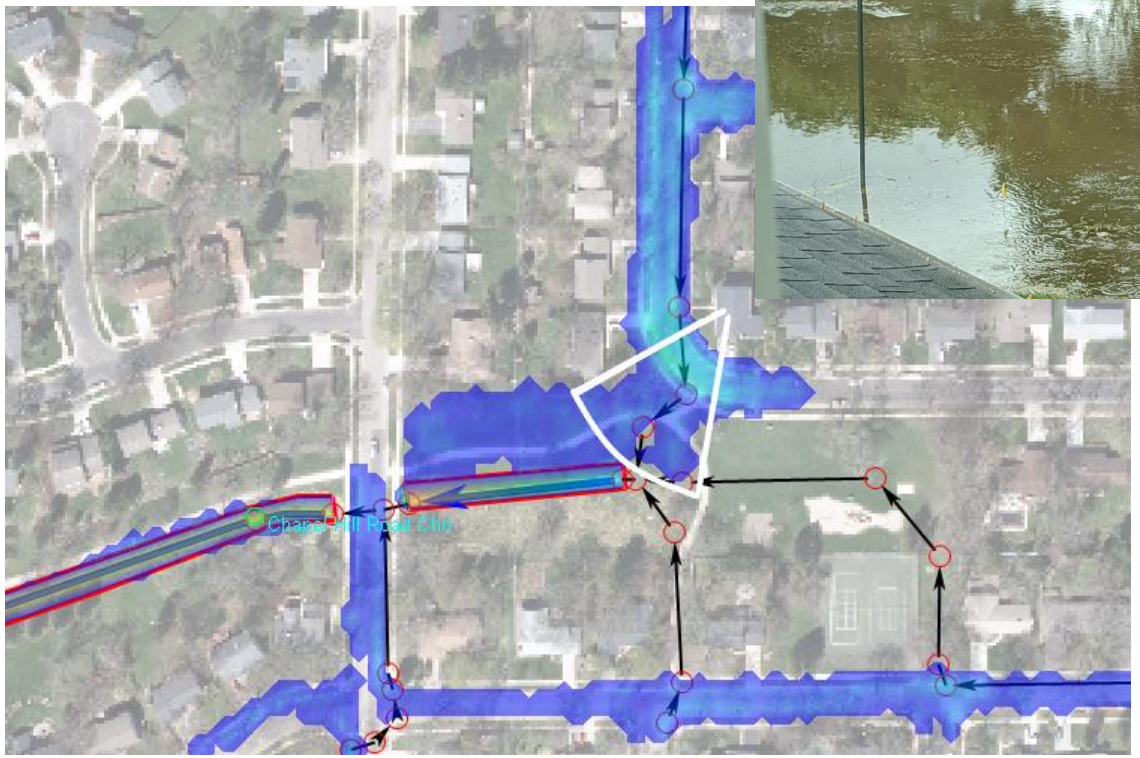
Watershed Study Goals

- Find out why flooding happens in certain locations





Above – Photograph of Actual Flooding Witnessed (June 9, 2020)

Left – Example Watershed Model Output Map (June 9, 2020)

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Watershed Study Goals

- Find out why flooding happens in certain locations
- System goals
  - 10% Chance Event (4.09” rain/24 hours).
    - No surcharging of storm sewer onto roadway (storm sewer pipes are sized to carry storm)

N. High Point Road at Old Sauk Road, Madison, WI

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Watershed Study Goals

- Find out why flooding happens in certain locations
- System goals
  - 10% Chance Event (4.09” rain/24 hours).
    - No surcharging of storm sewer onto roadway (storm sewer pipes are sized to carry storm)
  - 4% Chance Event (5.01” rain/24 hours)
    - 0.5’ at Centerline of Road (roads passable for emergency vehicles)

Winding Way, Madison, WI

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Watershed Study Goals

- Find out why flooding happens in certain locations
- System goals
  - 10% Chance Event (4.09” rain/24 hours).
    - No surcharging of storm sewer onto roadway (storm sewer pipes are sized to carry storm)
  - 4% Chance Event (5.01” rain/24 hours)
    - 0.5’ at Centerline of Road (roads passable for emergency vehicles)
  - 1% Chance Event (6.66” rain/24 hours)
    - No structure (home/building) flooding
    - No greenway crossing overflow
    - Safe overflow from enclosed depressions

Regent St at Kenosha Ave, Madison, WI

Watershed Study Goals

- Find out why flooding happens in certain locations
- System goals
  - 10% Chance Event (4.09” rain/24 hours).
    - No surcharging of storm sewer onto roadway (storm sewer pipes are sized to carry storm)
  - 4% Chance Event (5.01” rain/24 hours)
    - 0.5’ at Centerline of Road (roads passable for emergency vehicles)
  - 1% Chance Event (6.66” rain/24 hours)
    - No structure (home/building) flooding
    - No greenway crossing overflow
    - Safe overflow from enclosed depressions
  - 0.2% Chance Event (8.81” rain/24 hours)
    - Safe conveyance of overflow

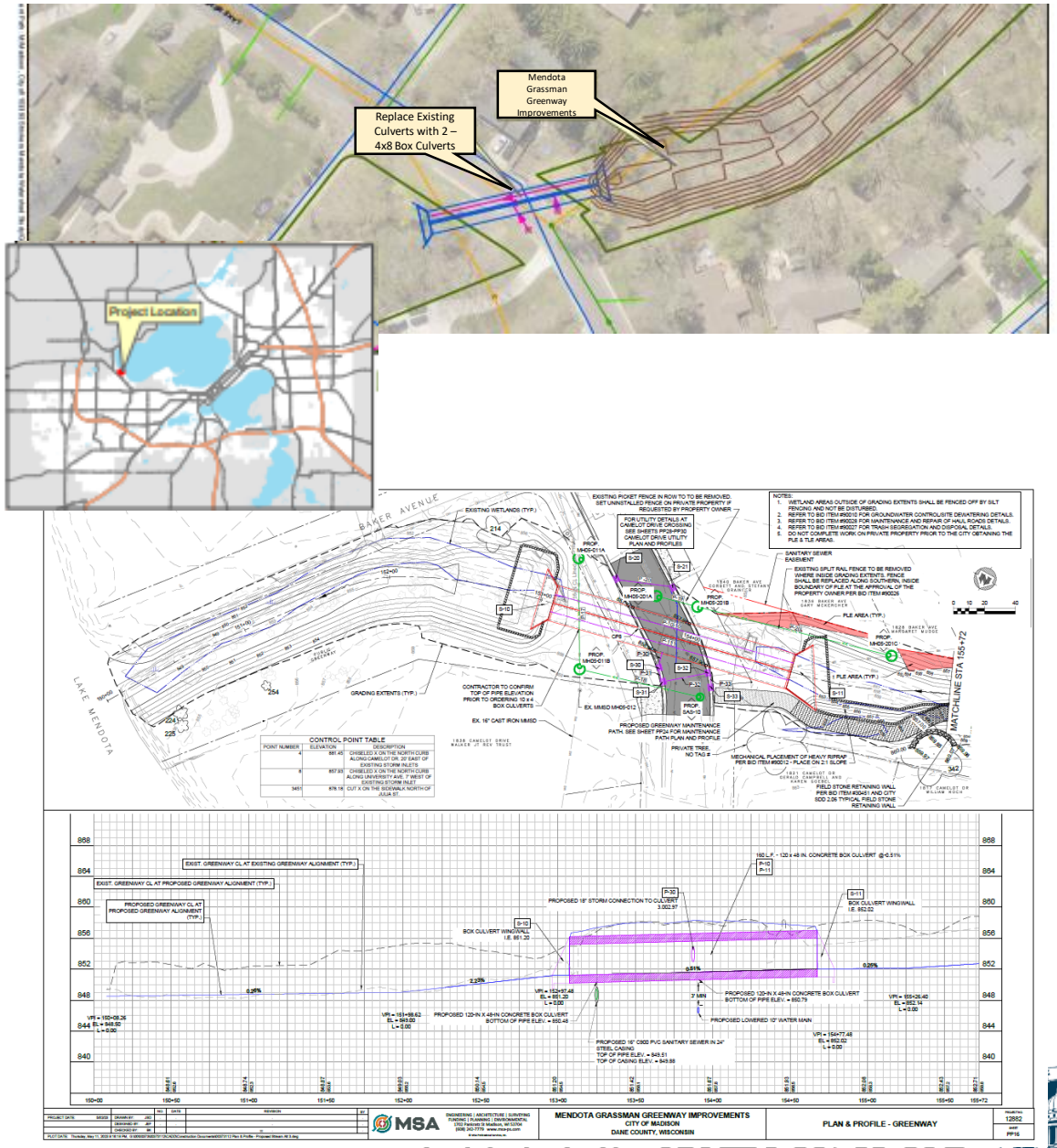
Tenney Park, Madison, WI

Watershed Study Goals

- Find out why flooding happens in certain locations

Test Solutions

- Lots more detail gets added in final design
- Will help prioritize and budget future projects



Example: Mendota Grassman Greenway at Camelot Dr
Top left: photo of existing culvert under Camelot
Top right: Model-Level Solution Evaluation (1 of 4 pages)
Bottom right: Design Level Detail (1 of 117 pages)

Watershed Study Goals

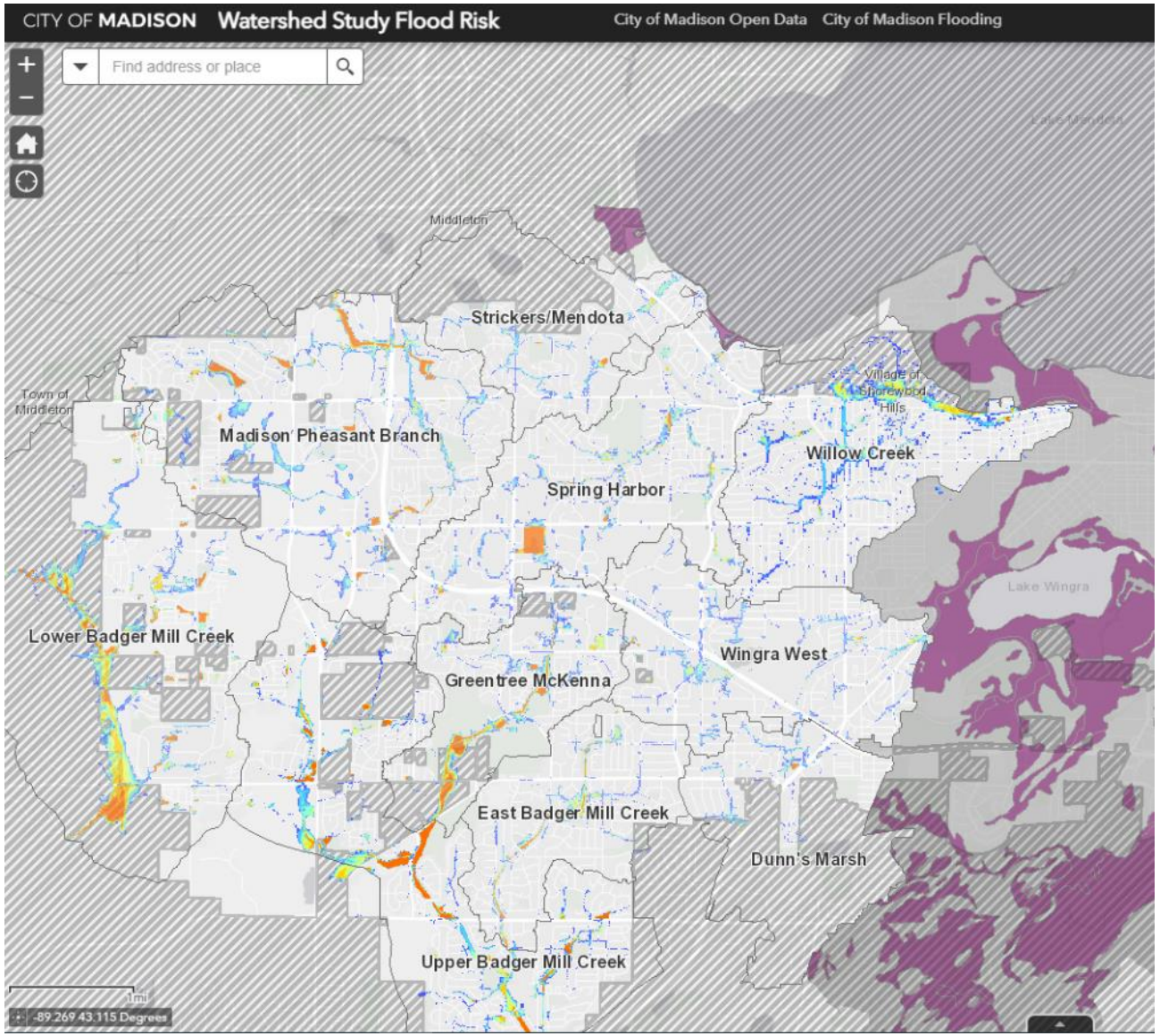
- Find out why flooding happens in certain locations

Test Solutions

- Lots more detail gets added in final design
- Will help prioritize and budget future projects

Education

- Understand potential flood risk
- Educate public on what they can do to reduce their risk



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Watershed Study Limitations

- Retrofitting infrastructure takes time and money
- Repairs are not always easy, popular, or cheap
- There is 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

Warner Park Lagoon Water Quality Plan

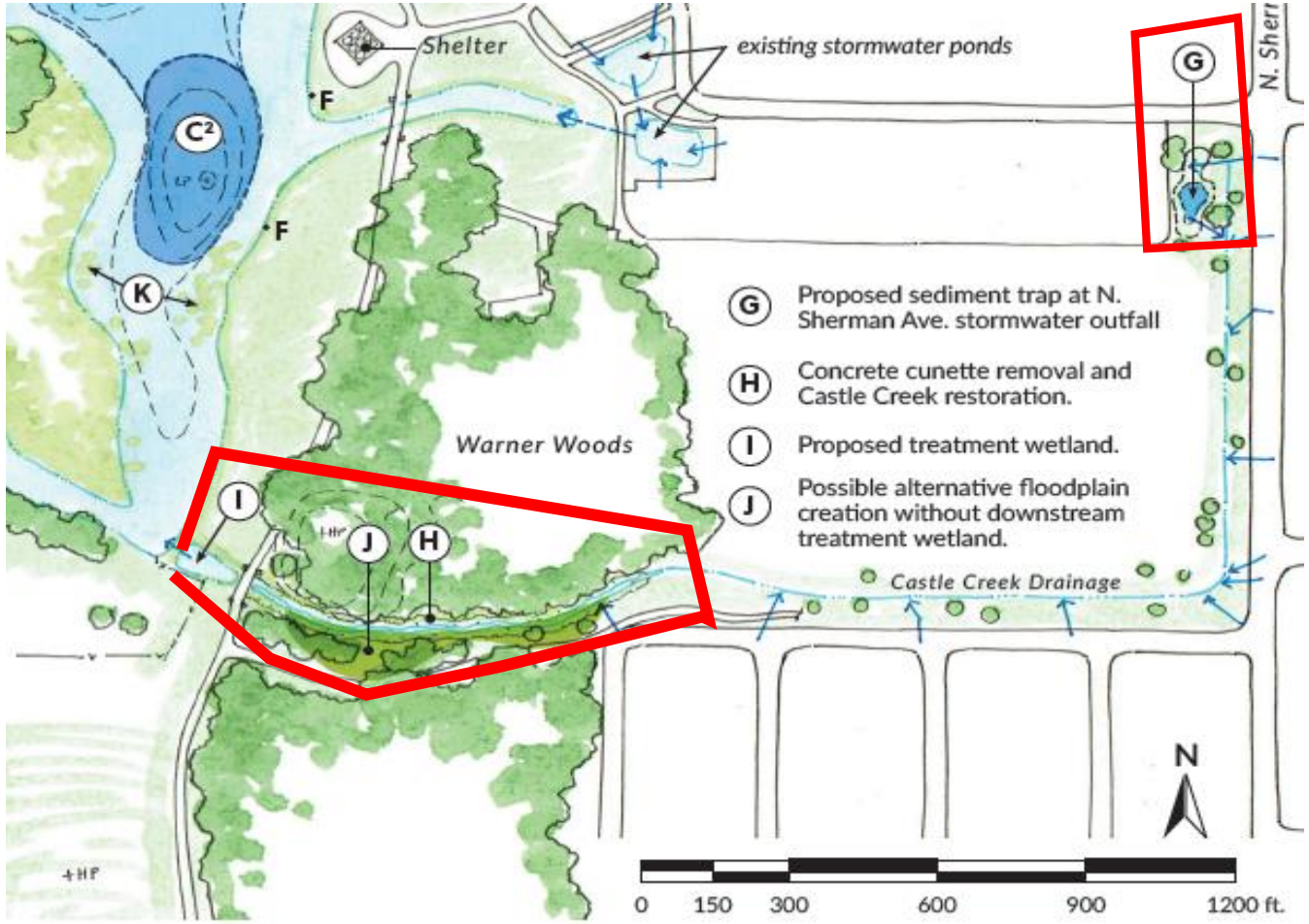
- Separate study/plan
- Developed 2018-2021 based on community input
- Recommends a series of water quality improvement concepts

Warner Park Lagoon Water Quality Plan

- City does <u>not currently</u> have enough $ in budget for dredging
- $330k budgeted for improvements in Castle Creek
  - <u>Which</u> projects TBD (G, H, I, J)

Warner Park Lagoon Water Quality Plan

- Watershed Study will figure out existing and proposed flows through Castle Creek greenway
  - Will inform project design and cost estimates
  - Potential to reduce flooding on Trailsway
- Once scope is better defined, City will host separate public meeting on the Castle Creek improvements
  - G, H, I, J → Likely H & J
  - ~2024



More info: www.cityofmadison.com/engineering/projects/warner-lagoon-water-quality-plan

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Next Steps

Model Existing Conditions & Predict Future Flood Risk

Analyze Solutions on Watershed Scale, Rank & Budget

Create Watershed Model

Identify Flooding Impacts

Develop Engineering Solutions

Prioritize & Budget

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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 Watershed Model

- What does modeling the Warner Park and Cherokee Marsh watershed involve?
  - Watershed area: 4,617 acres (~7.2 square miles)
  - 21.3 miles of City-owned storm sewer
  - ~9,300 feet of City-owned greenways
  - About 6,500 parcels of mixed land uses (mostly open spaces, residential & commercial)
  - ~900 publicly owned inlets

Next Steps

Create Watershed Model

- What you might see in the watershed

Above: Warner Lagoon Water Level Meter
Left: Rain Gauge

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

Next Steps

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

- See how well existing storm sewer system meets goals

Commerce Drive near
Plaza Drive, Madison, WI

Next Steps

- Must be holistic
- Not “move the problem elsewhere”
- Account for climate change
  - Look at **trending increases** in storm frequency and intensity
- Consider long term maintenance needs
- Provide benefits relative to cost

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Next Steps

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

What are some general options?

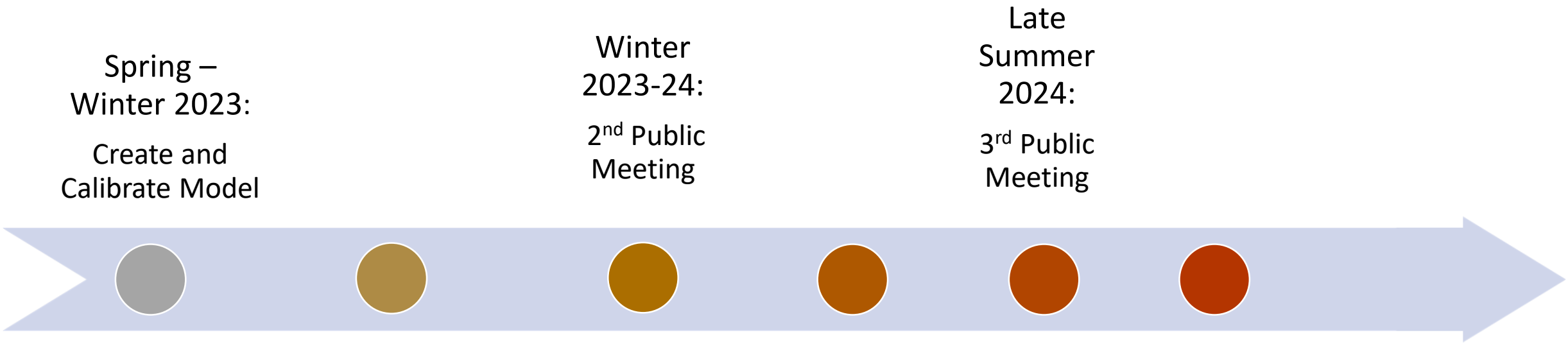
- Improve pipe and/or inlet capacity
- Safe overflow paths
- Reroute flow
- Increase storage / detention
- Flood-proof buildings
- Local landscaping / grading
- Solutions on private property to structures or land

Above: Bioretention
Top Right: Stormwater Pond
Bottom Right: Box Culverts

Next Steps

- Improvements require time and money
  - Some solutions are long-term, sustained community efforts (green infrastructure)
  - Some solutions are discrete, high capital-cost projects (box culverts, pond, etc.)
- Solutions prioritized based on:
  - Frequency, severity and damage (cost-benefit)
  - Emergency response routes
  - Areas with other projects scheduled (road repair, etc.)
  - Within a Neighborhood Resource Team area

Next Steps



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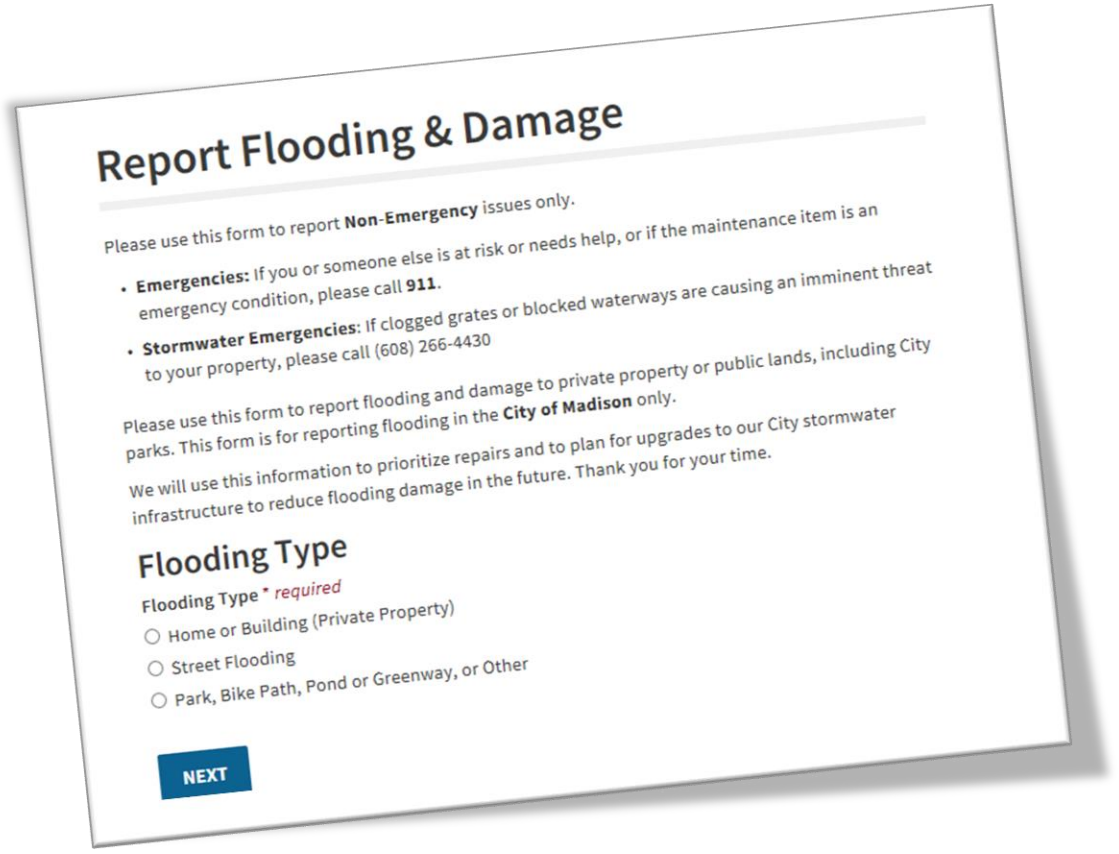
Property Owner Responsibilities

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

  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 & Damage

Please use this form to report **Non-Emergency** issues only.

- **Emergencies:** If you or someone else is at risk or needs help, or if the maintenance item is an emergency condition, please call **911**.
- **Stormwater Emergencies**: If clogged grates or blocked waterways are causing an imminent threat to your property, please call (608) 266-4430

Please use this form to report flooding and damage to private property or public lands, including City parks. This form is for reporting flooding in the **City of Madison** only.

We will use this information to prioritize repairs and to plan for upgrades to our City stormwater infrastructure to reduce flooding damage in the future. Thank you for your time.

Flooding Type

Flooding Type * *required*

- ○ Home or Building (Private Property)
- ○ Street Flooding
- ○ Park, Bike Path, Pond or Greenway, or Other

NEXT

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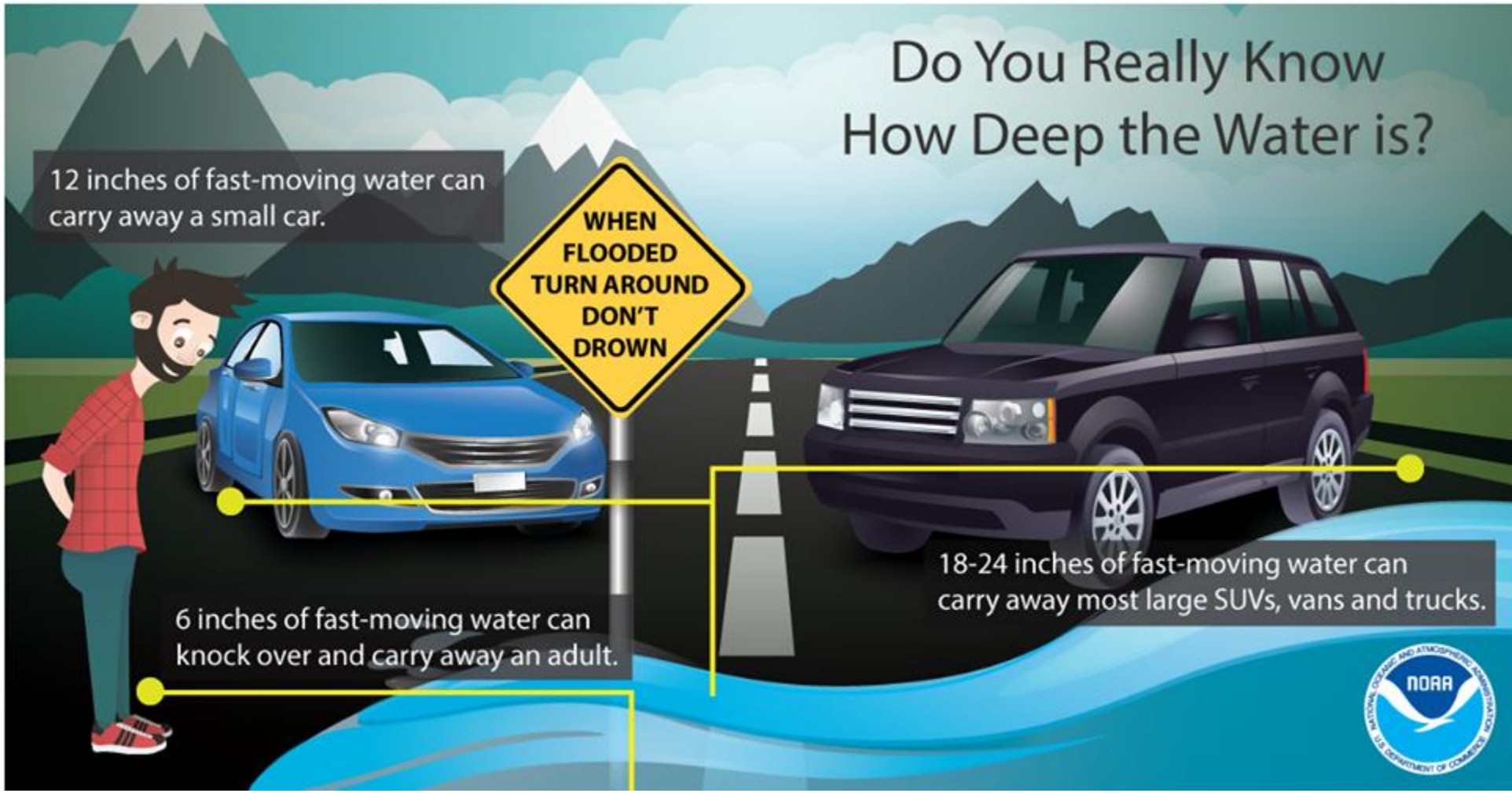
Property Owner Responsibilities

- Be Safe!
- Don’t drive or walk through flooded areas



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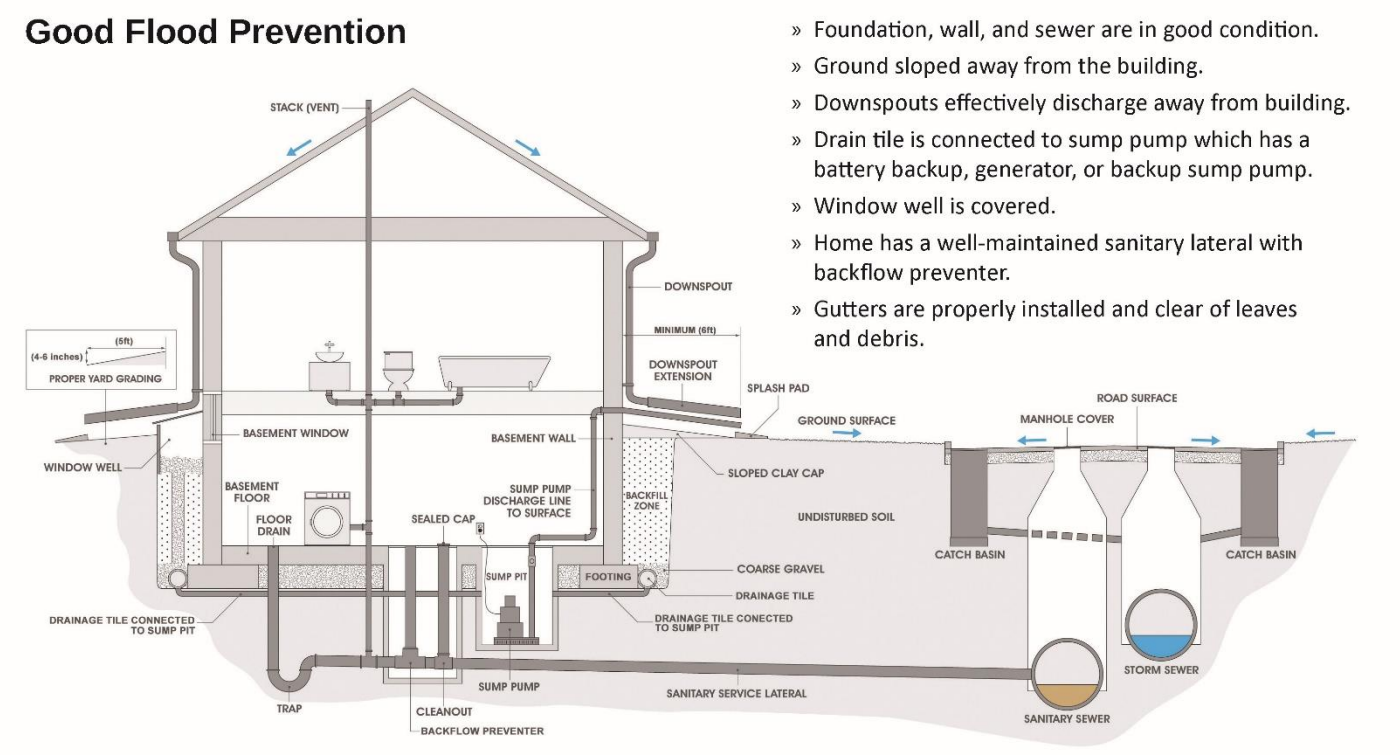
Property Owner Responsibilities

- 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



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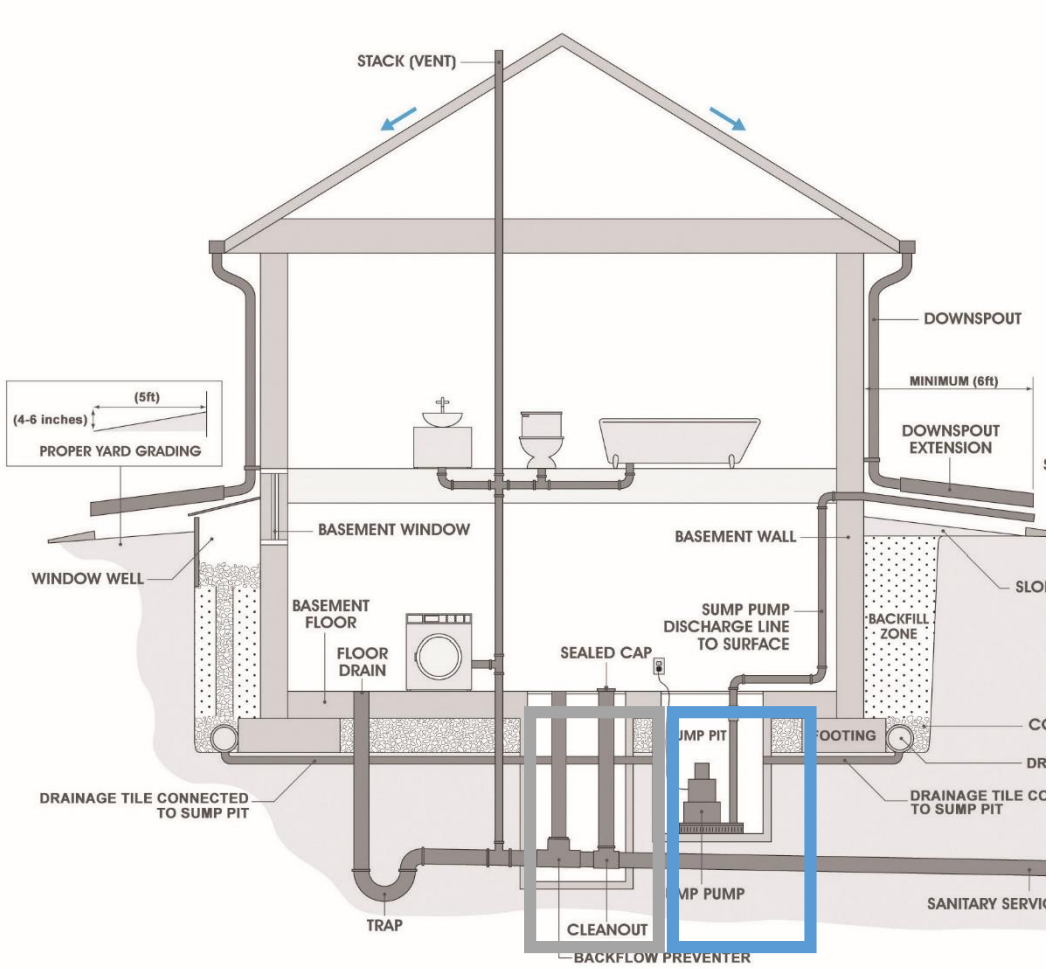

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Property Owner Responsibilities

- 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**
- Focus group participation

Property Owner Responsibilities

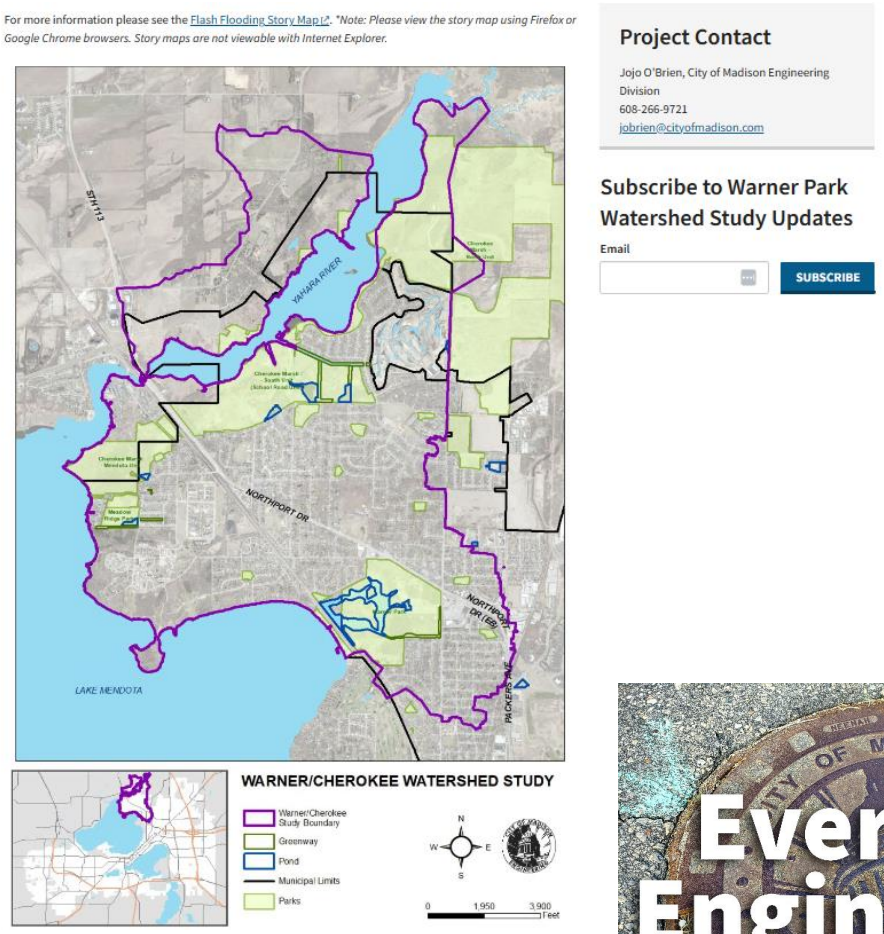
- Self-report Online Survey
- Understand local drainage and how to protect your property
- Install backflow preventers and sump pumps
- Consider supplemental insurance
- Focus group participation: for regional issues that affect more than one person

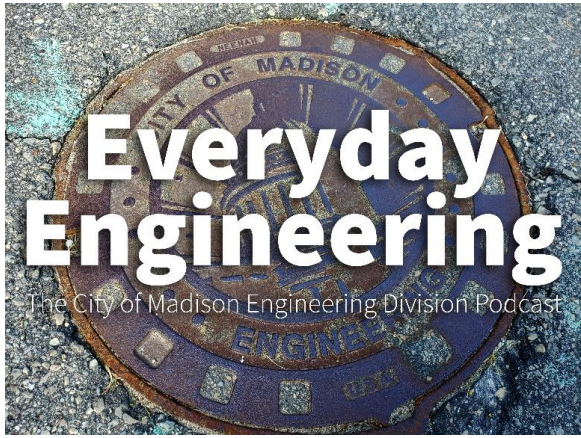
Property Owner Responsibilities

- **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/

How to Stay Involved

- www.cityofmadison.com/flooding
  - Report Flooding Survey
  - Individual Watershed Studies Pages
    - Sign up for updates!
  - How you can prevent flooding at your home
  - Everyday Engineering Podcast
    - Historic Flooding and Basement Drainage episodes
  - Focus Groups





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Next PIM

- Winter 2023/2024
  - Present watershed model findings
  - Findings will be specific to the Warner Park and Cherokee Marsh watershed
  - Obtain input to refine data and model
  - Use as a ‘fact check’ with residents

Contact Information & Resources

- Engineering
  - Project Manager, Jojo O'Brien, jobrien@cityofmadison.com
  - Public Information Officer, Hannah Mohelnitzky, hmohelnitzky@cityofmadison.com

- Project Website: www.cityofmadison.com/WarnerCherokeeWatershed
  - Sign-up for project email updates on the website
  - Updates on closures & work progress will be posted to the project website
  - Recording for this meeting will be posted on project webpage

- Facebook – City of Madison Engineering
- Twitter – @MadisonEngr
- Engineering Podcast: Everyday Engineering on iTunes, GooglePlay

Questions and Answers

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