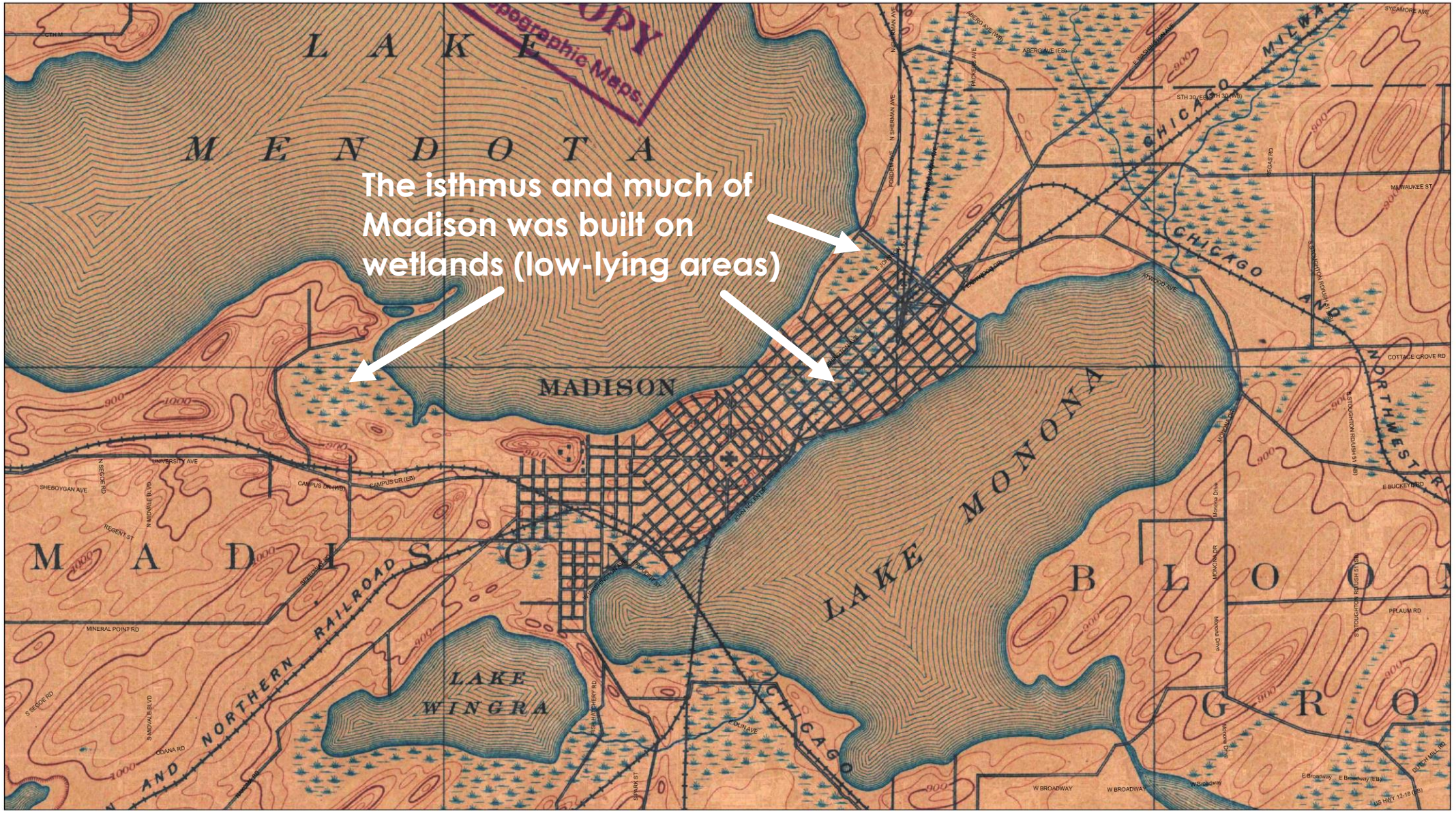
City of Madison Flooding Event

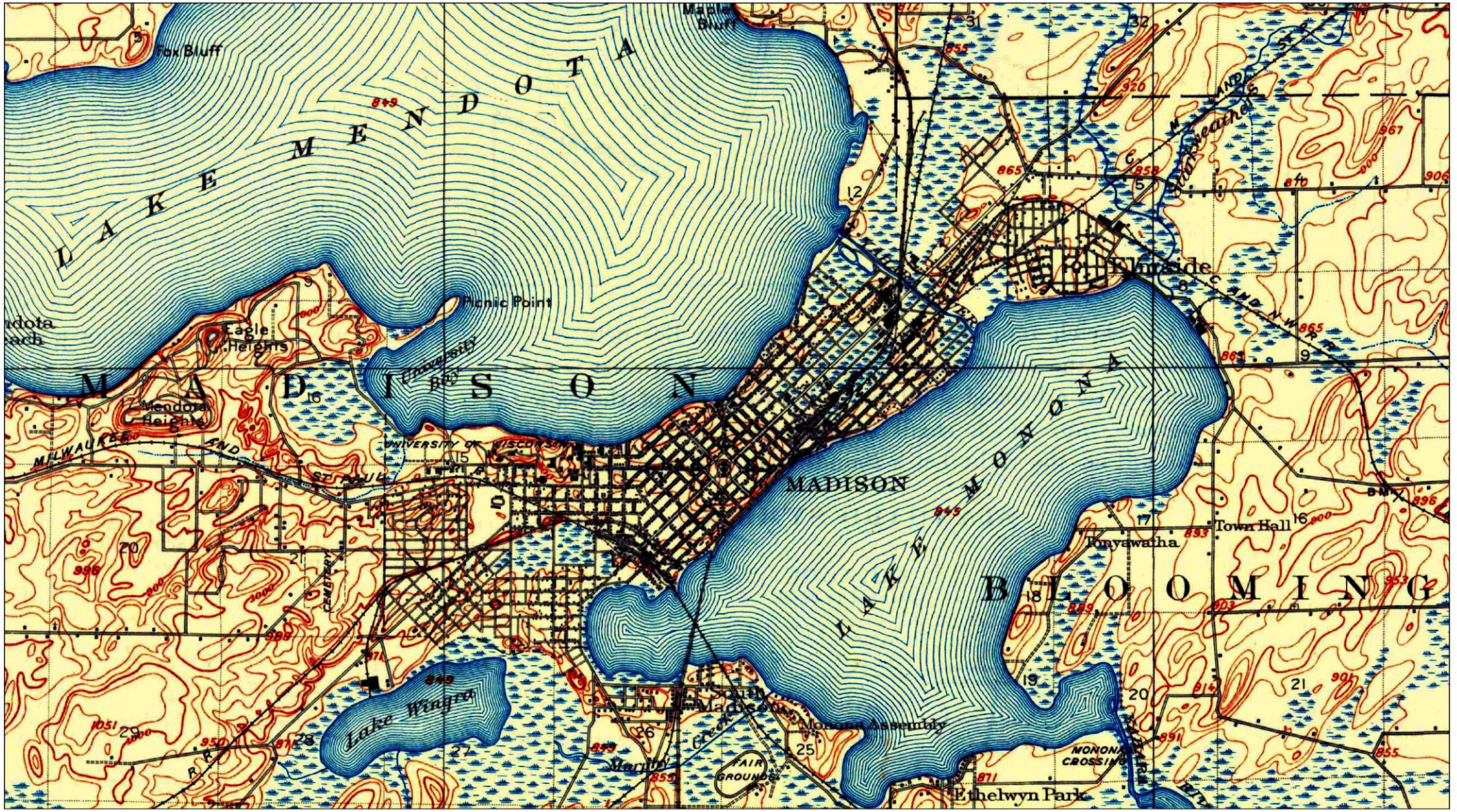
AUGUST 20TH, 2018-PRESENT

Presentation Overview

- Why the isthmus area is at risk
- What happened
  - August 20th flash flooding
  - Flooding from high lake levels
- How the City mapped flood risk
- City Protocols for flood response

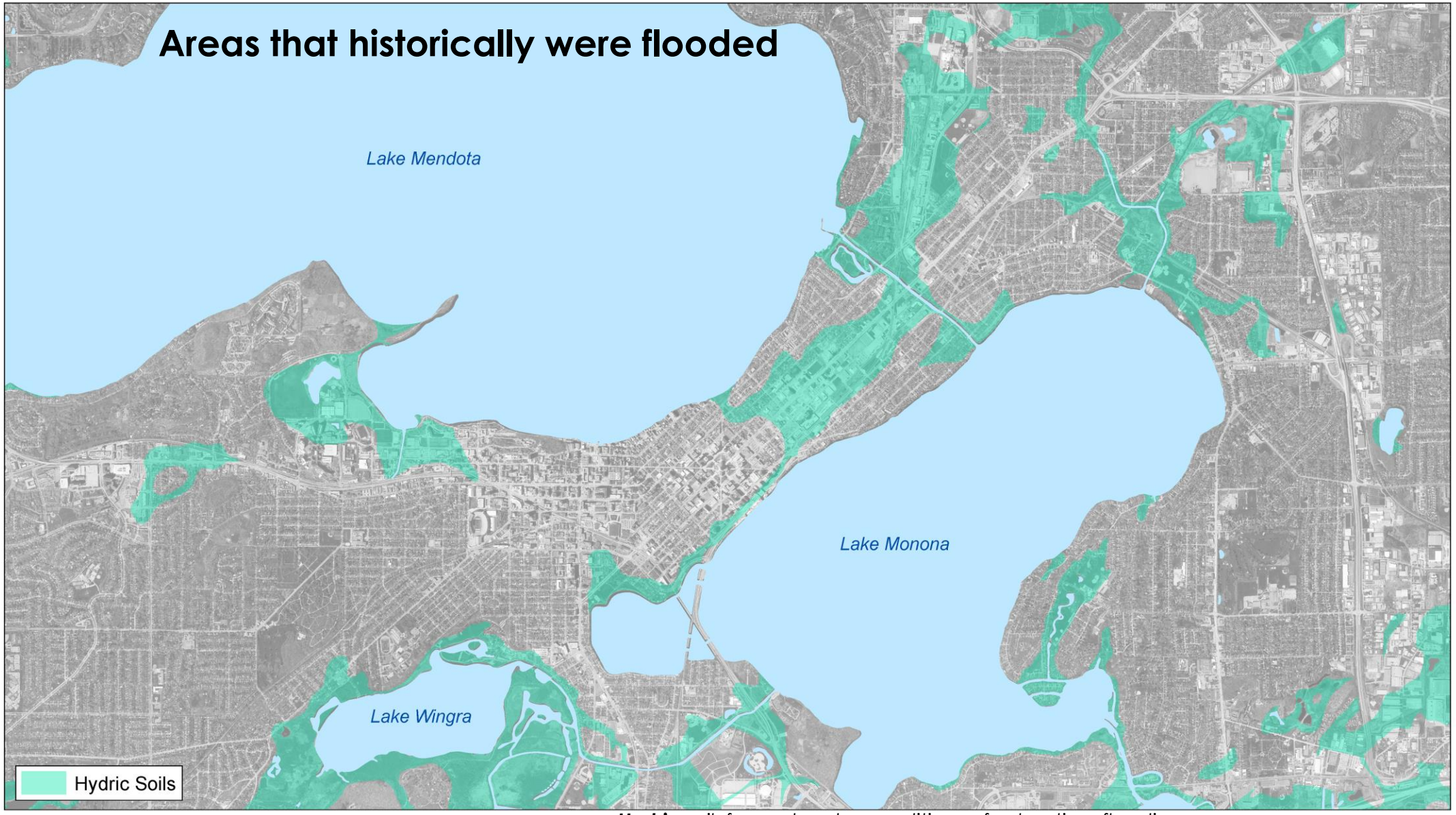


City of Madison 1892



City of Madison 1906

Areas that historically were flooded



City of Madison - Current Hydric Soils

Hydric *soil: formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part.*

0 0.25 0.5 1 Miles

N

City of Madison - Current Hydric Soils + Low Lying Areas

0 0.25 0.5 1 Miles

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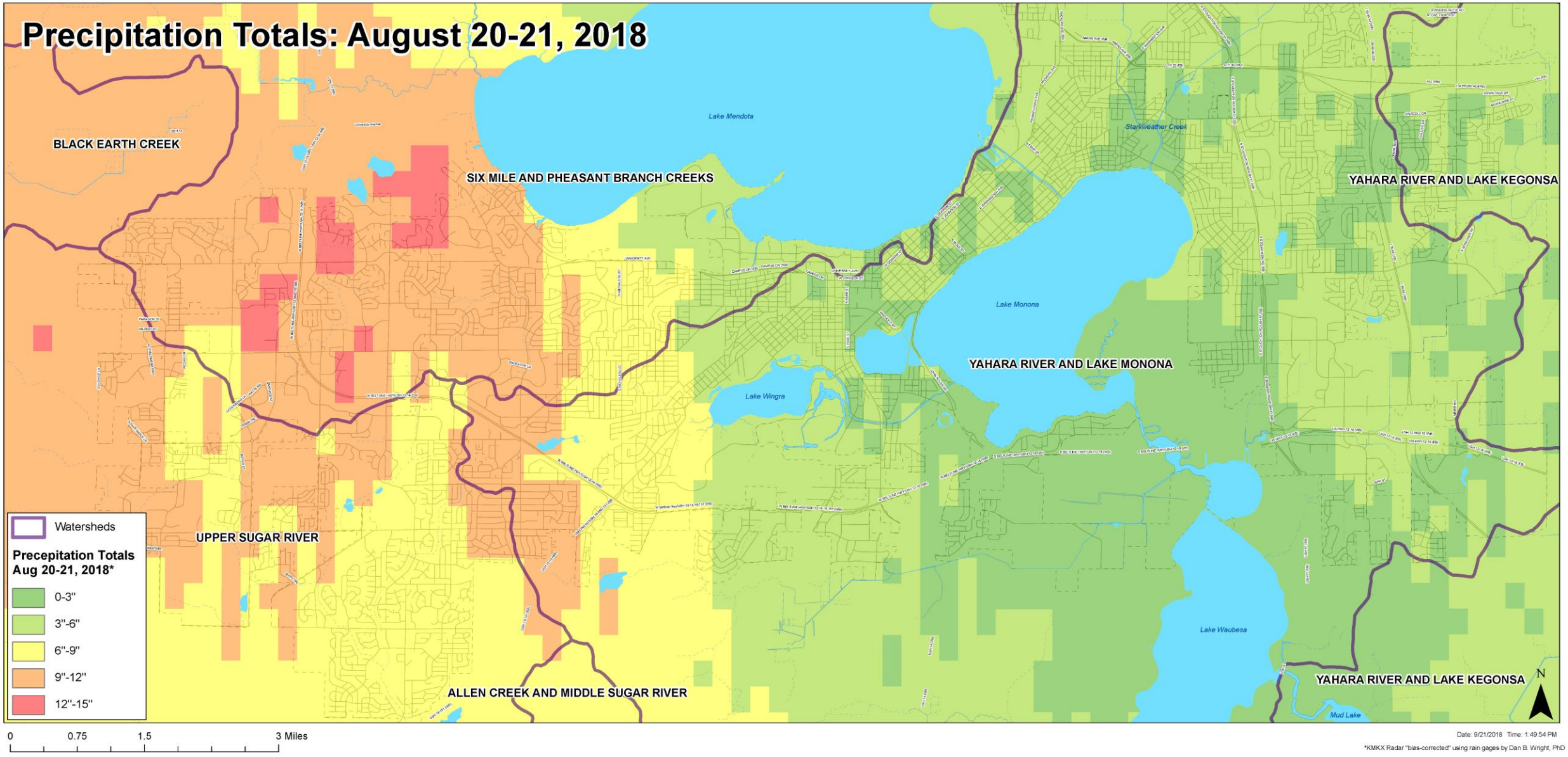
2 Events: 1st Event = Flash Flooding



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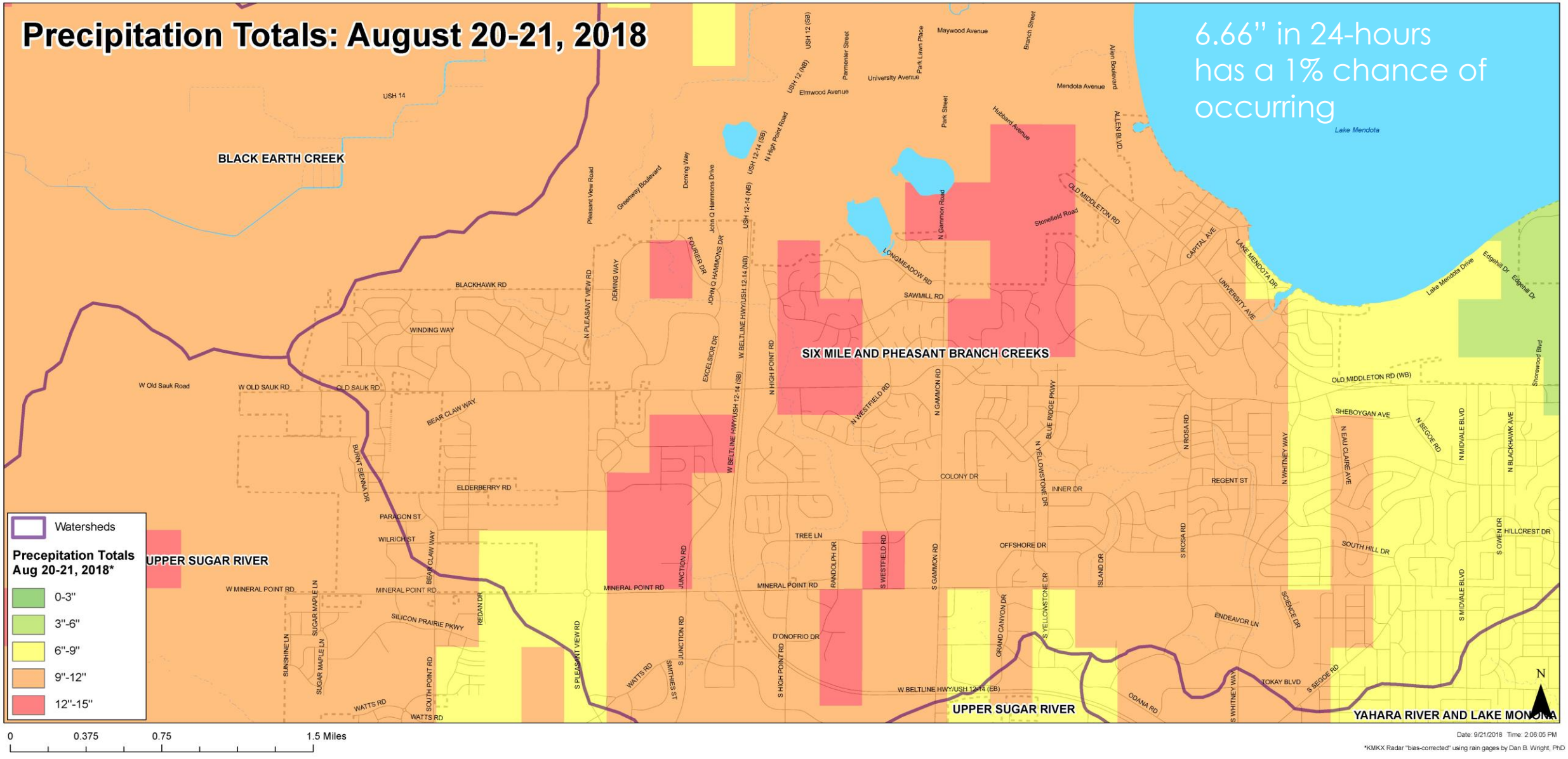
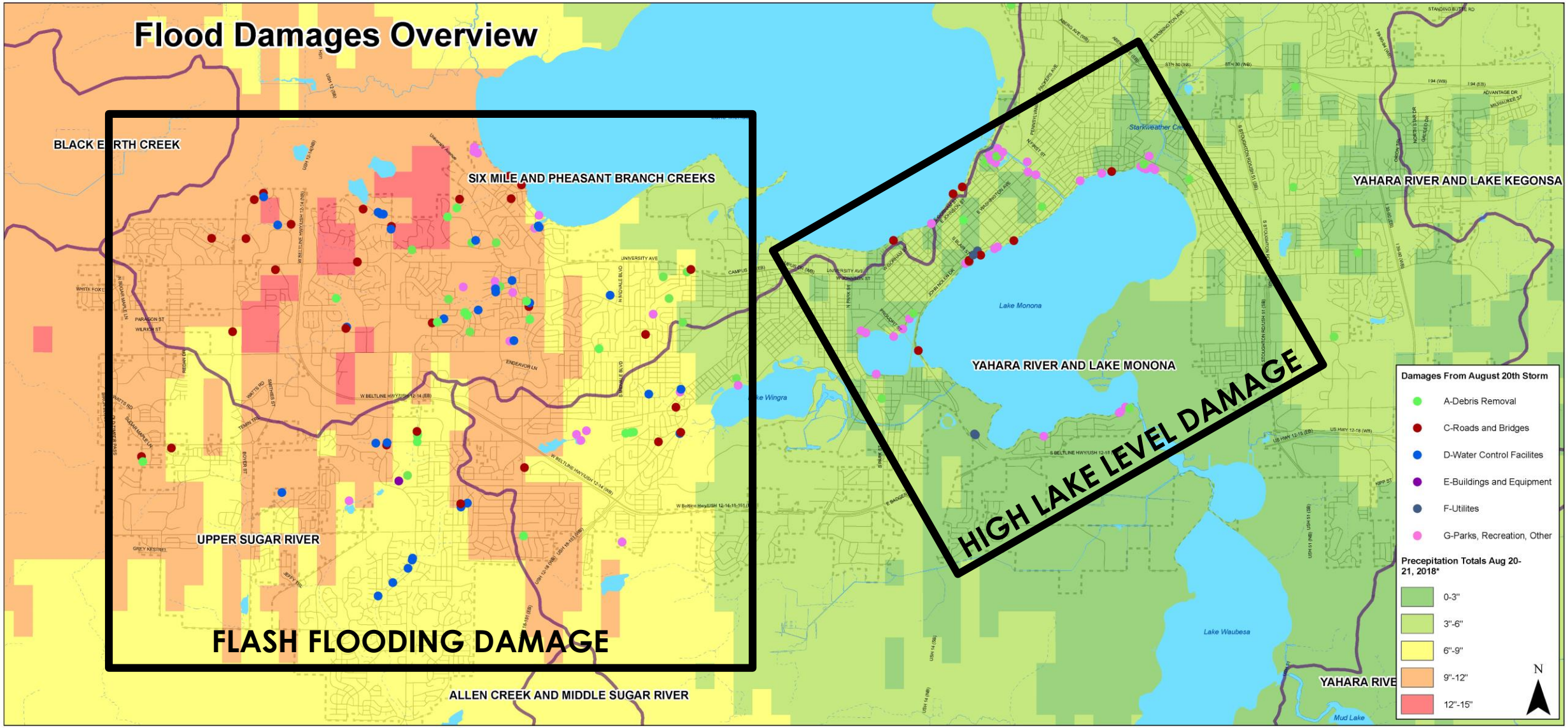


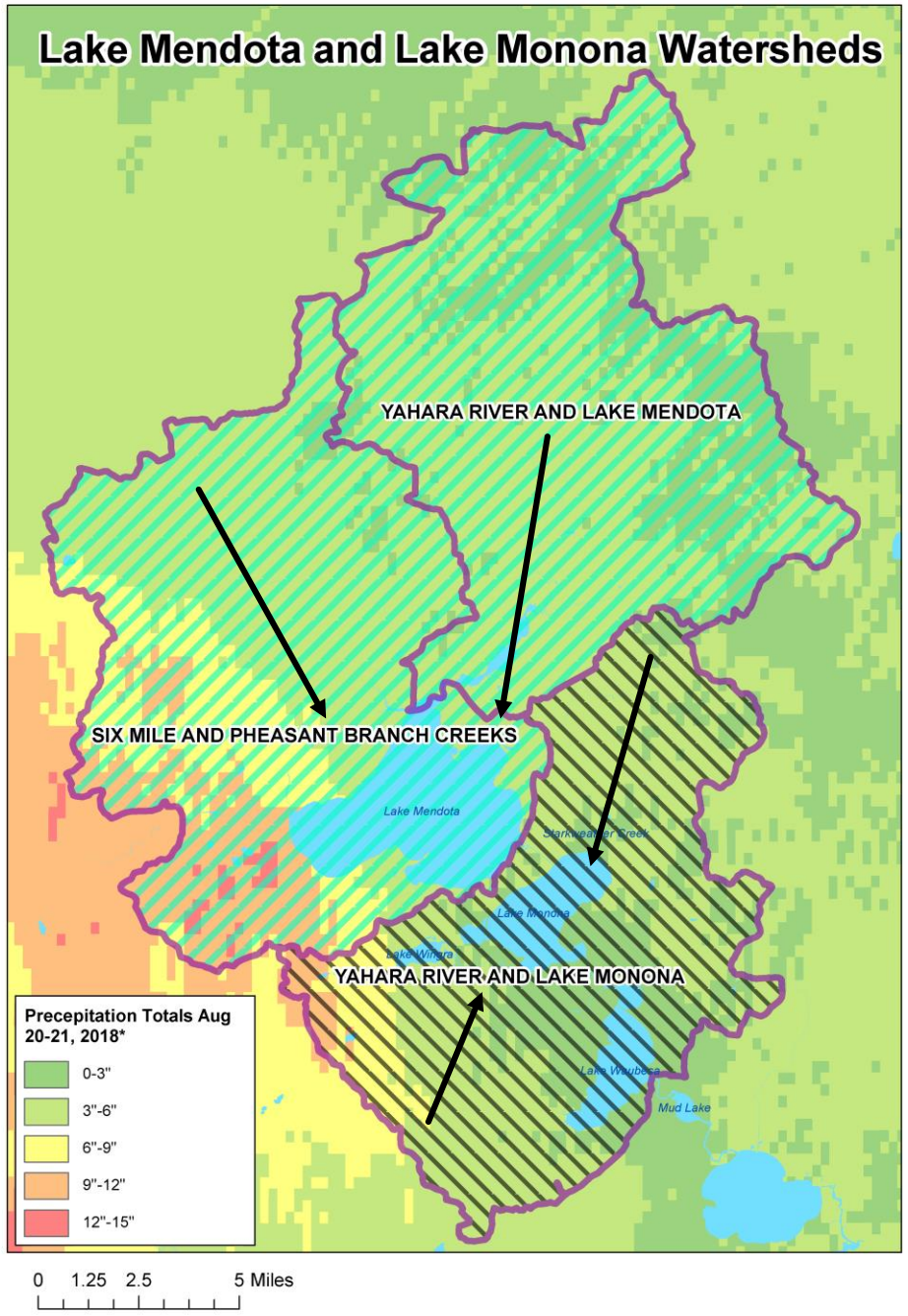
City Response

- Quick Response to flash flooding
  - Emergency Operations Center opened
  - Damages surveyed
  - Emergency repairs
  - Begin understanding quantity of rain → Lake level issues
- Begin preparing for high lake level flooding

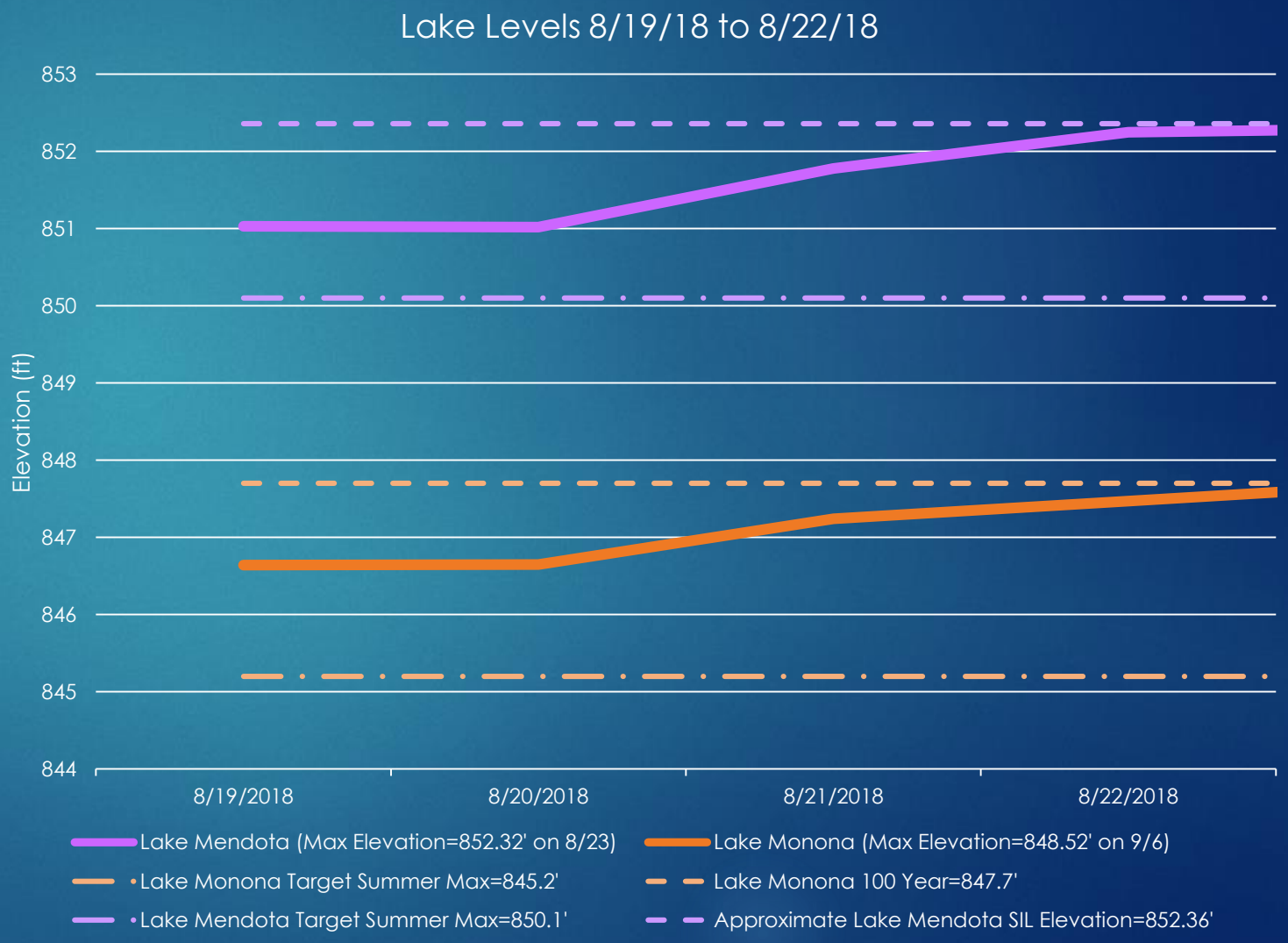
Deming Way Damage

Damages from 2 Events: Flash Flooding + Flooding from High Lake Levels

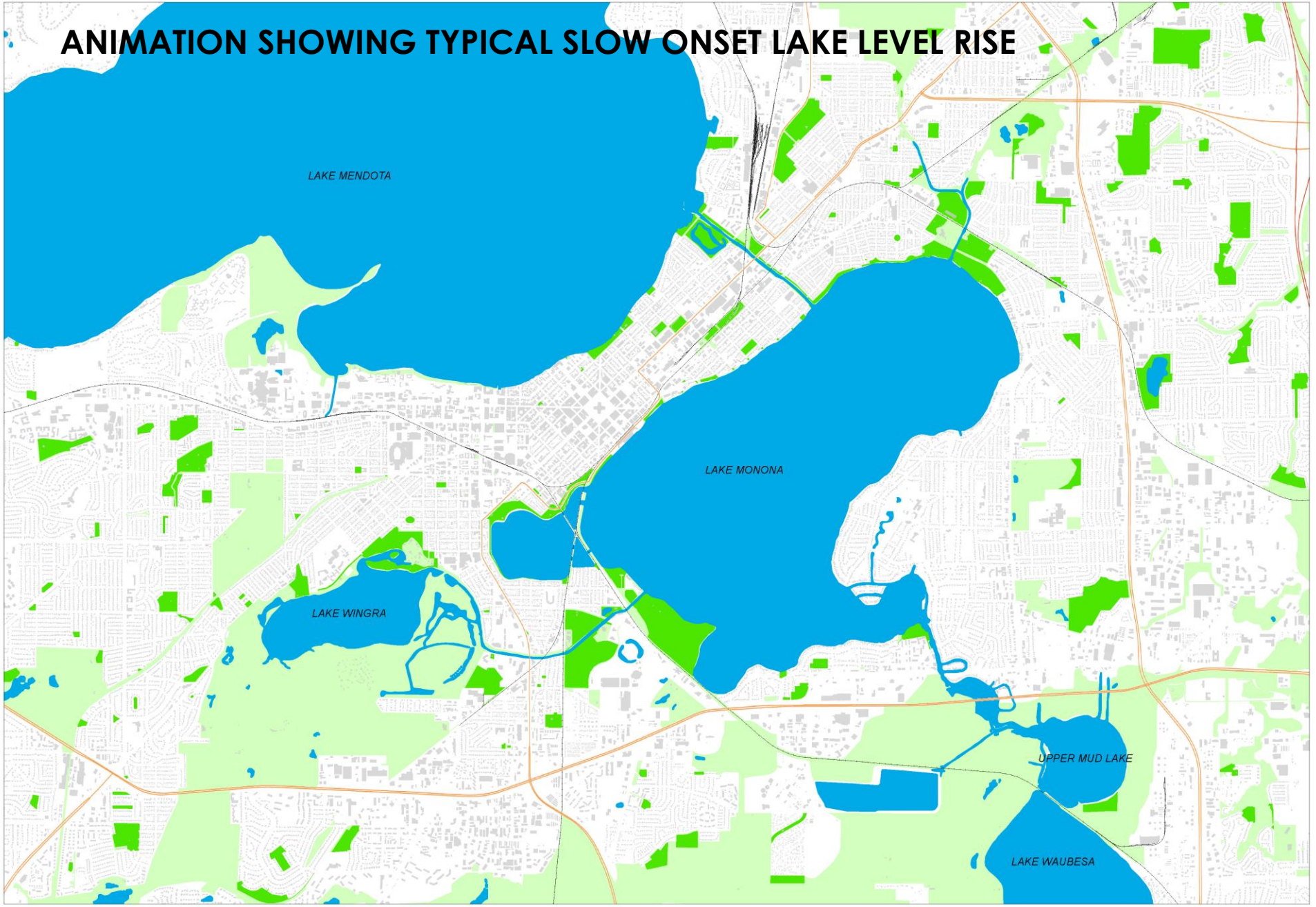




2nd Event: High Lake Level Flooding



ANIMATION SHOWING TYPICAL SLOW ONSET LAKE LEVEL RISE



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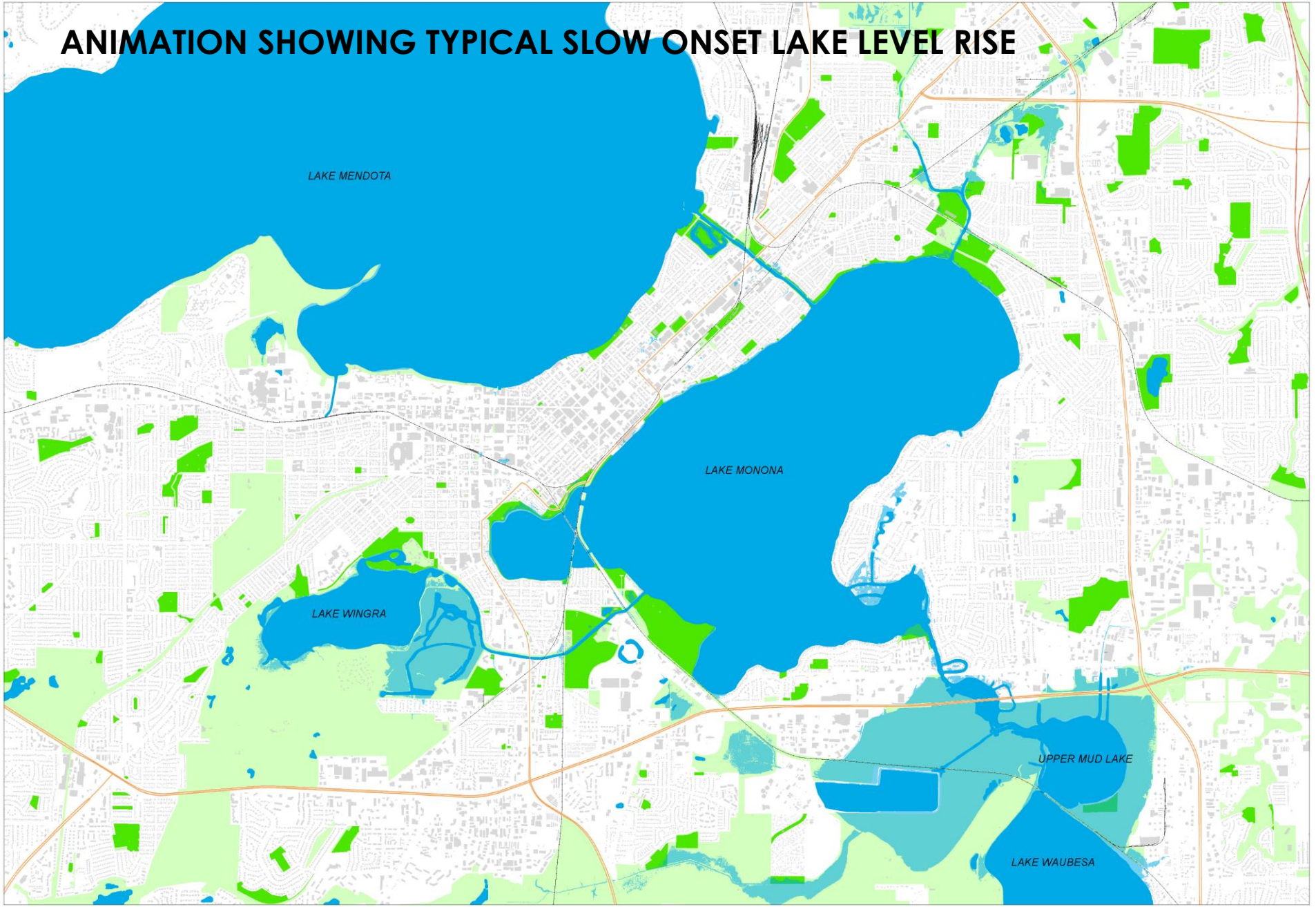

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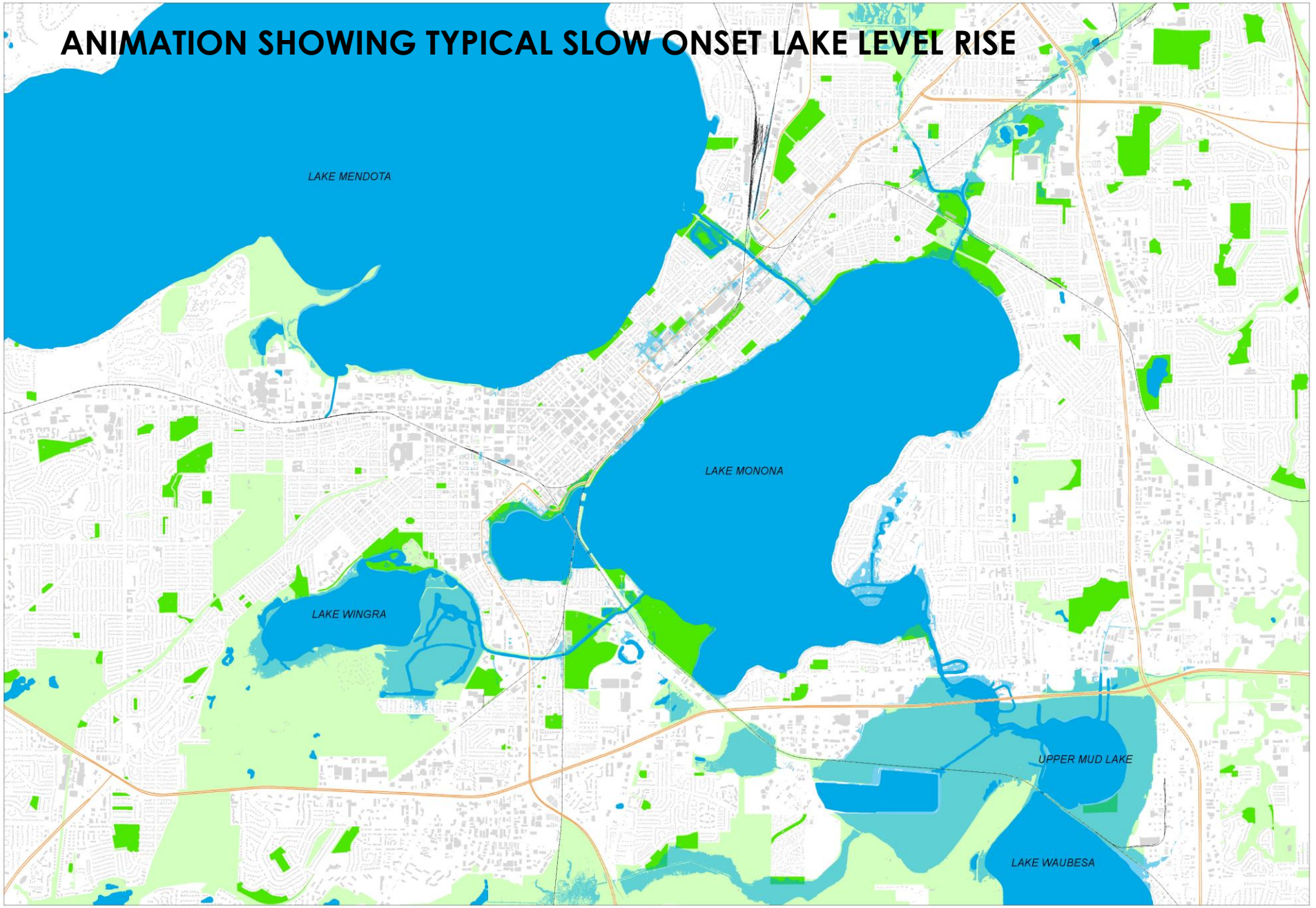
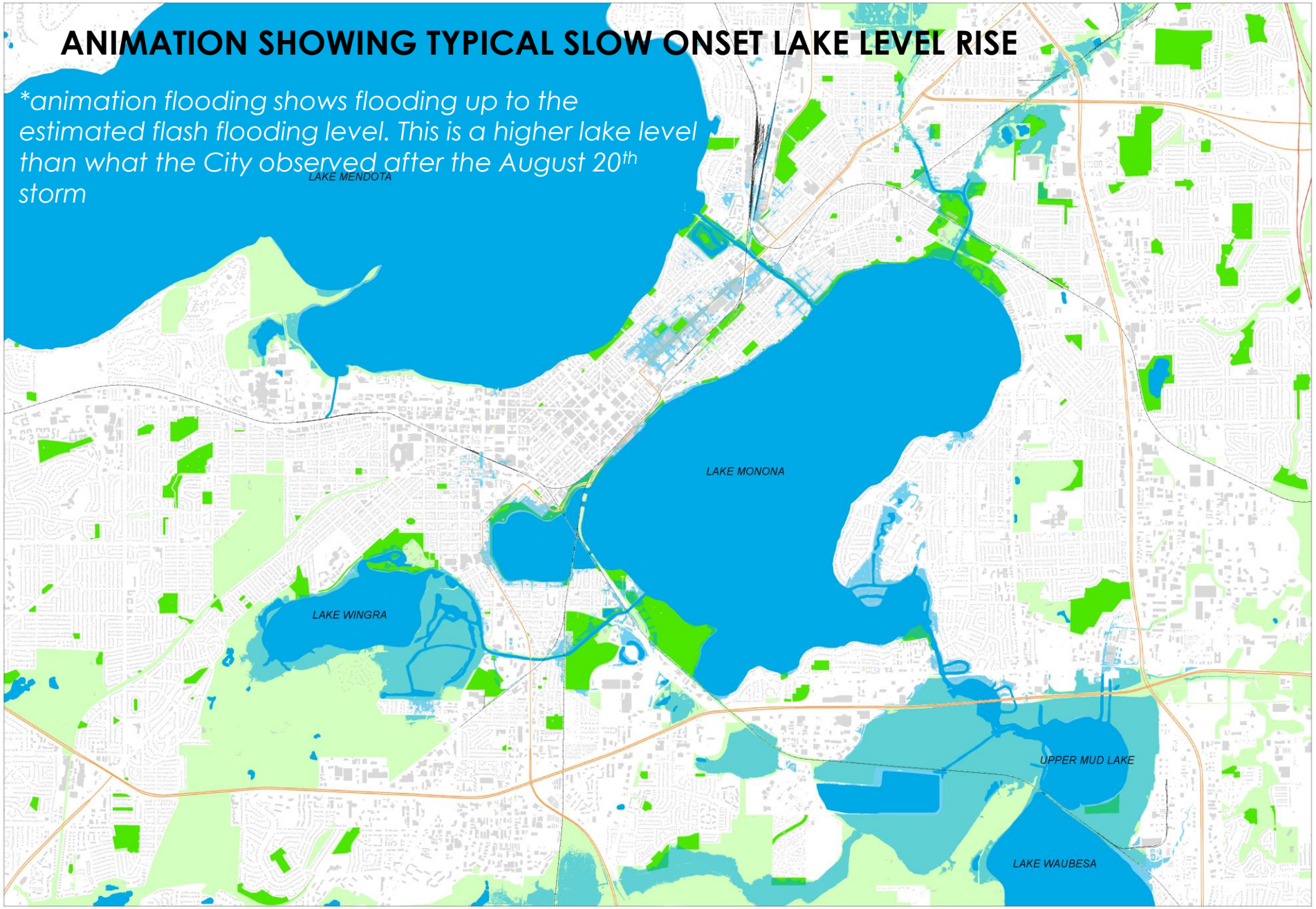


ANIMATION SHOWING TYPICAL SLOW ONSET LAKE LEVEL RISE

**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 20th storm*



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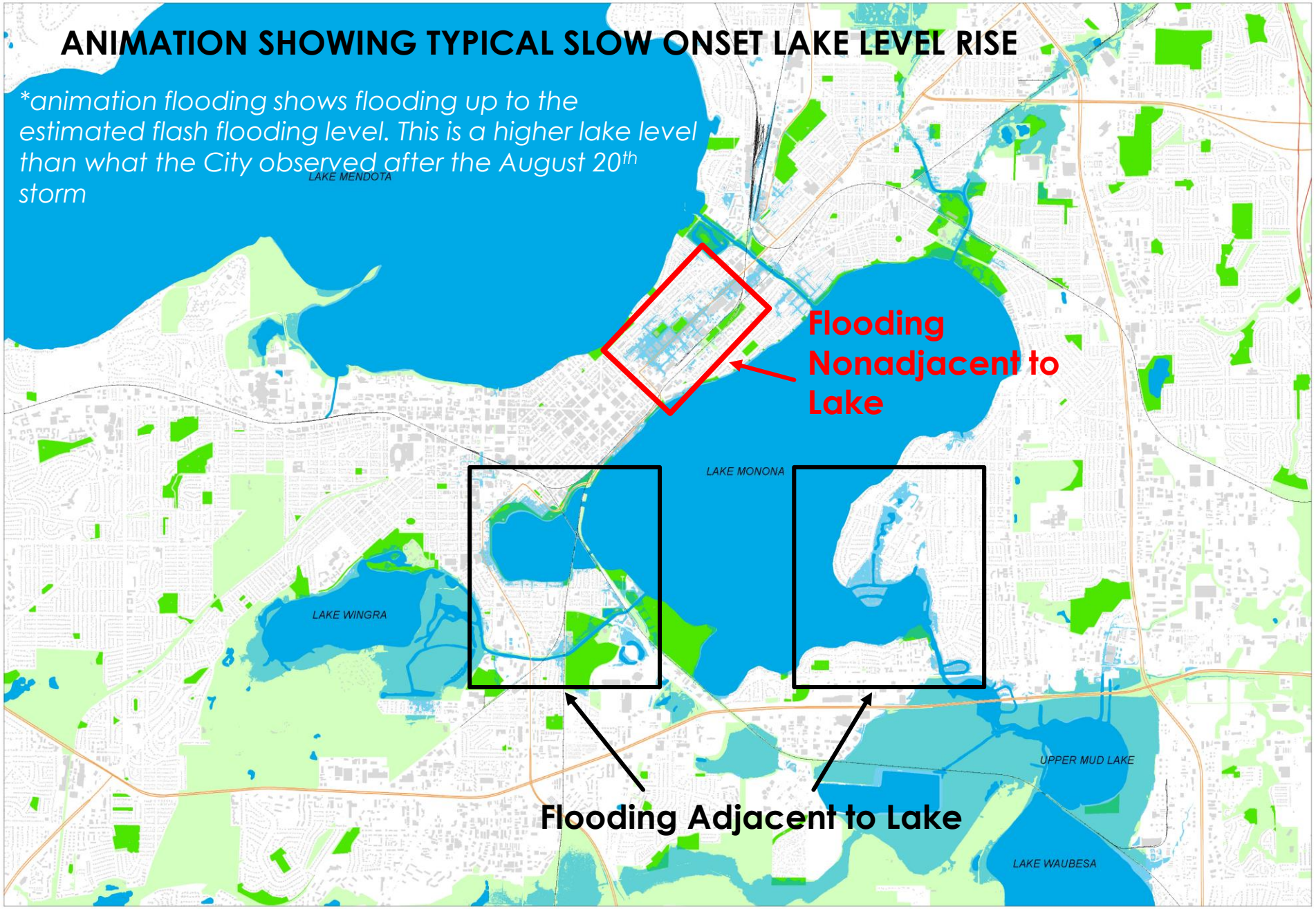
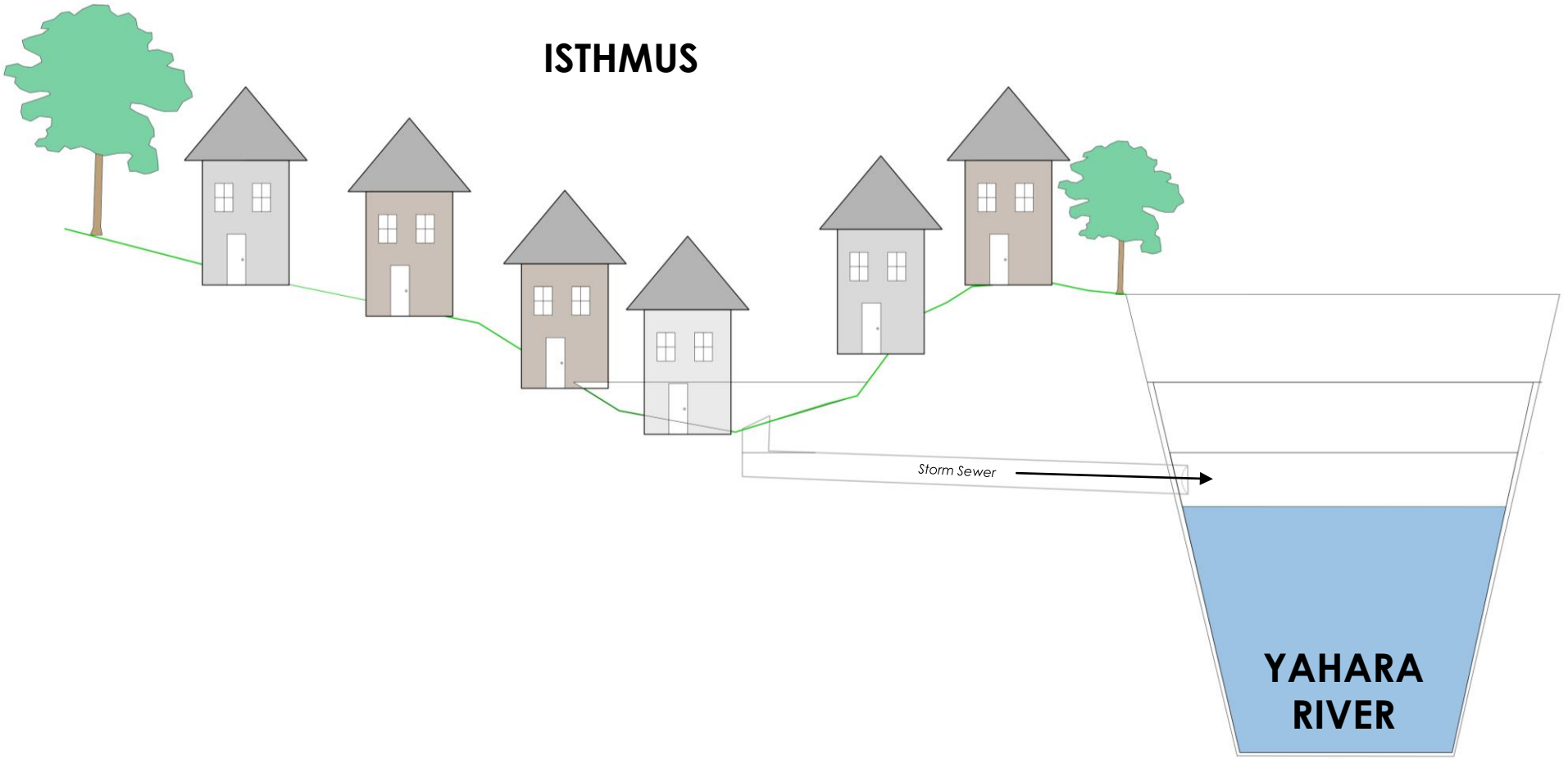


Isthmus Sewer Animation Example



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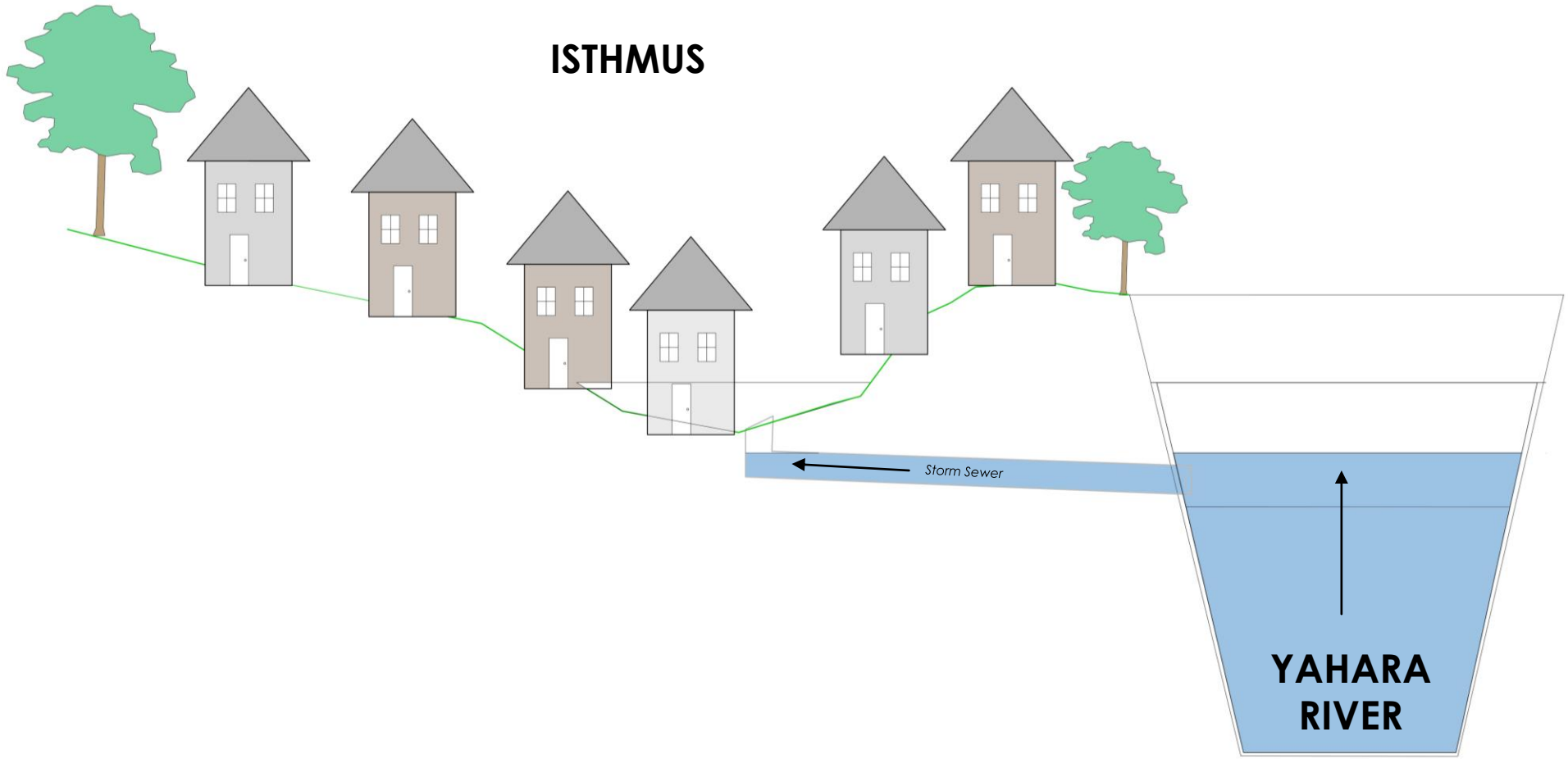
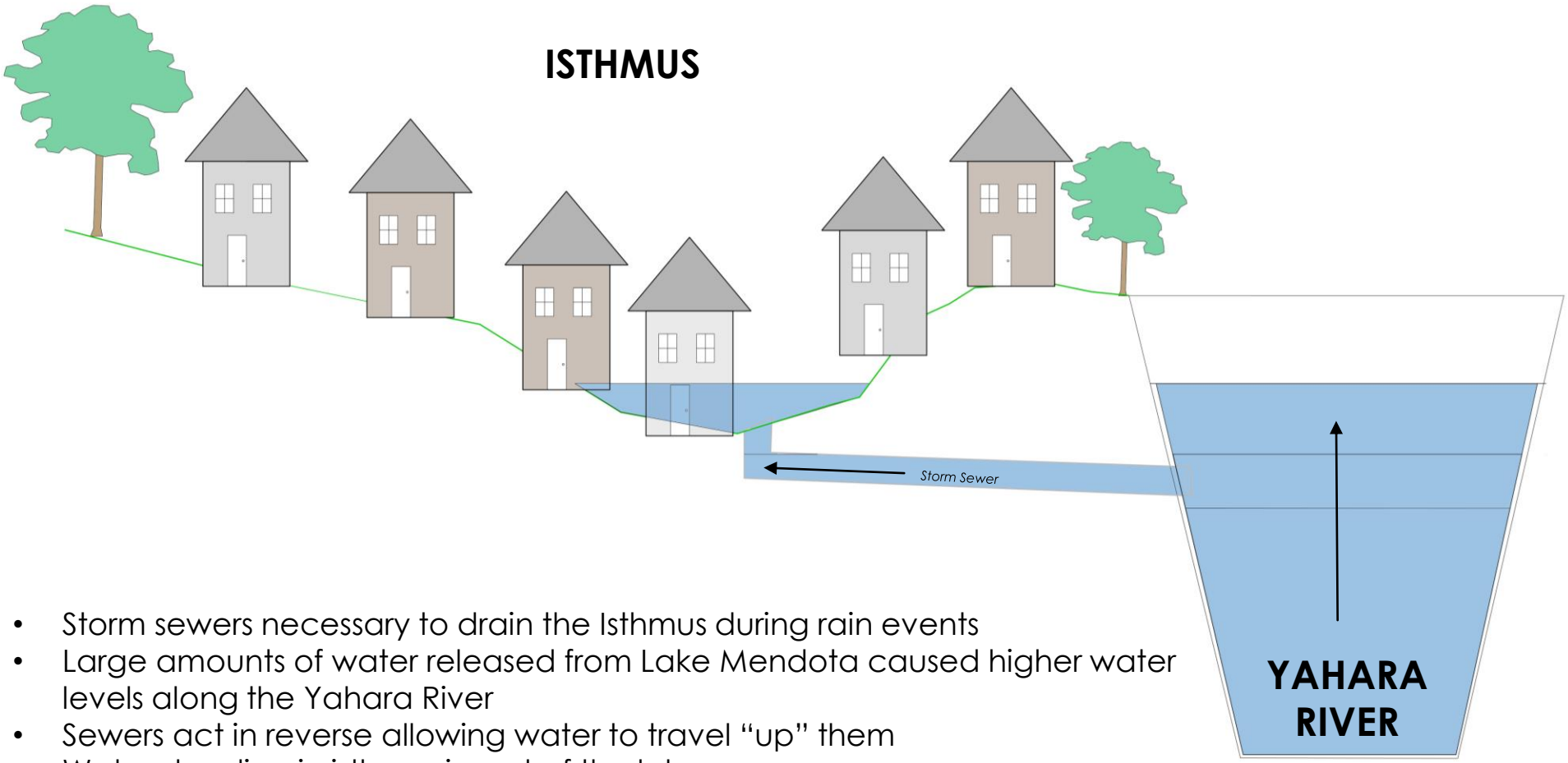
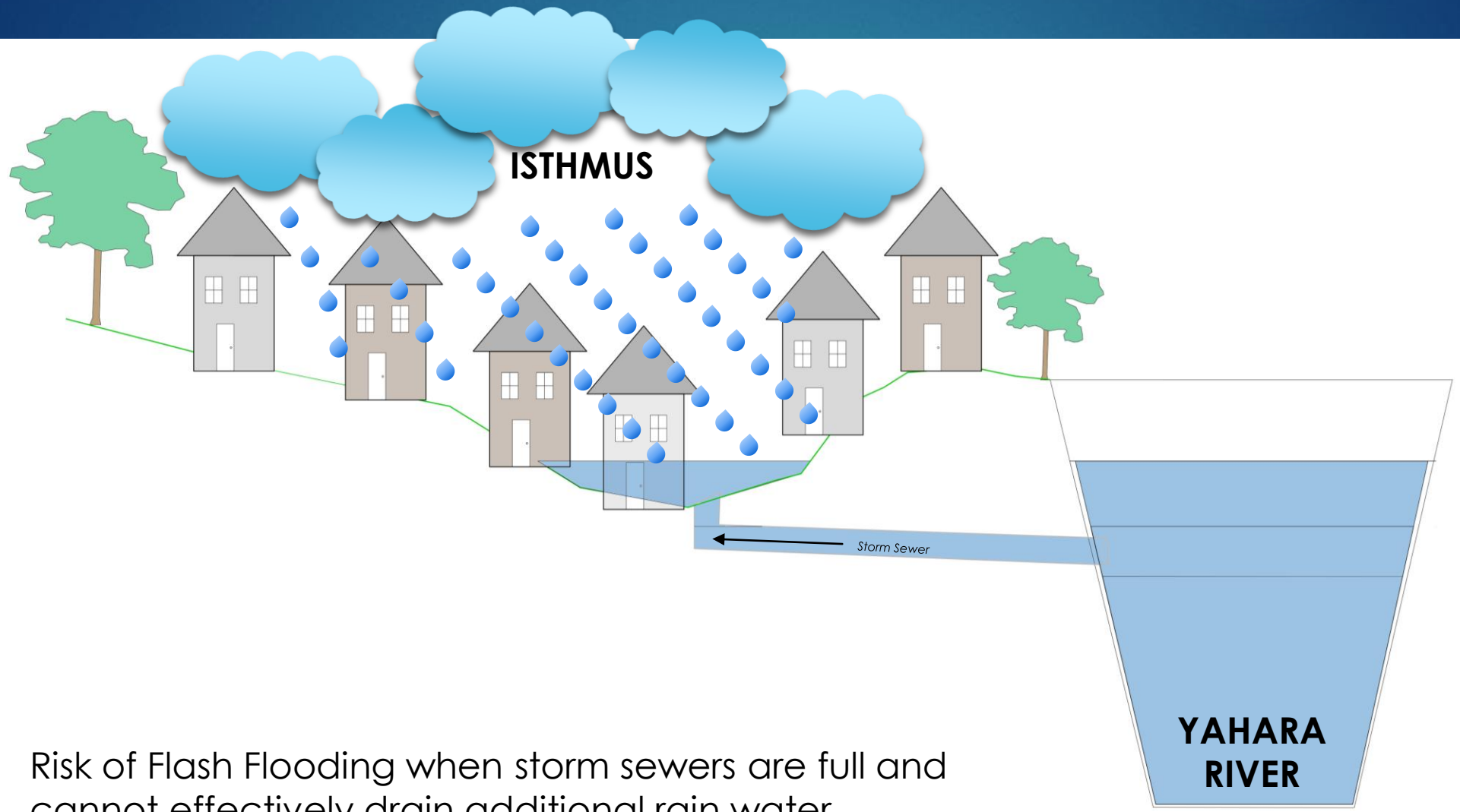


Isthmus Sewer Animation Example



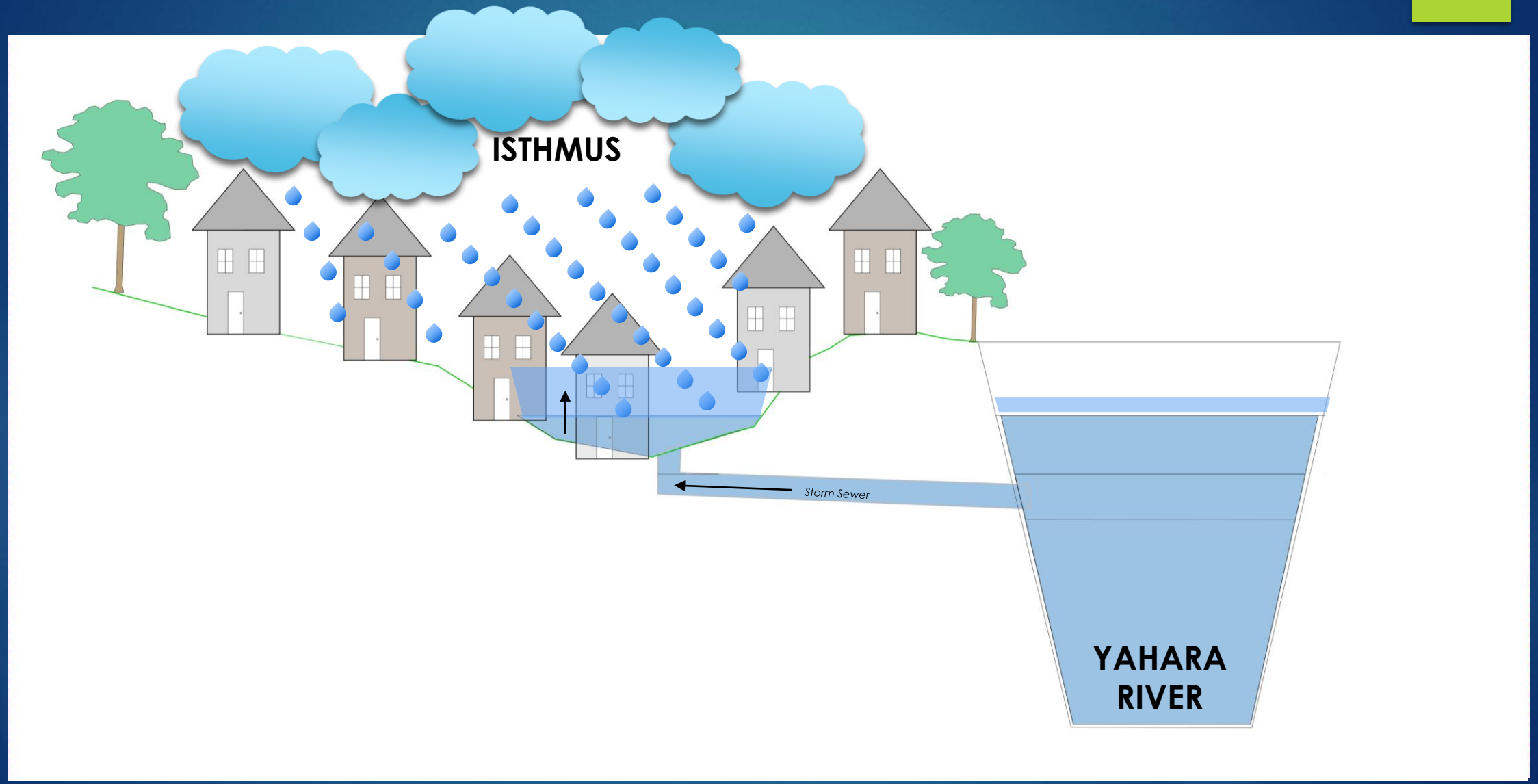
- Storm sewers necessary to drain the Isthmus during rain events
- Large amounts of water released from Lake Mendota caused higher water levels along the Yahara River
- Sewers act in reverse allowing water to travel “up” them
- Water standing in isthmus is part of the lake

Isthmus Sewer Animation Example-Flash Flooding

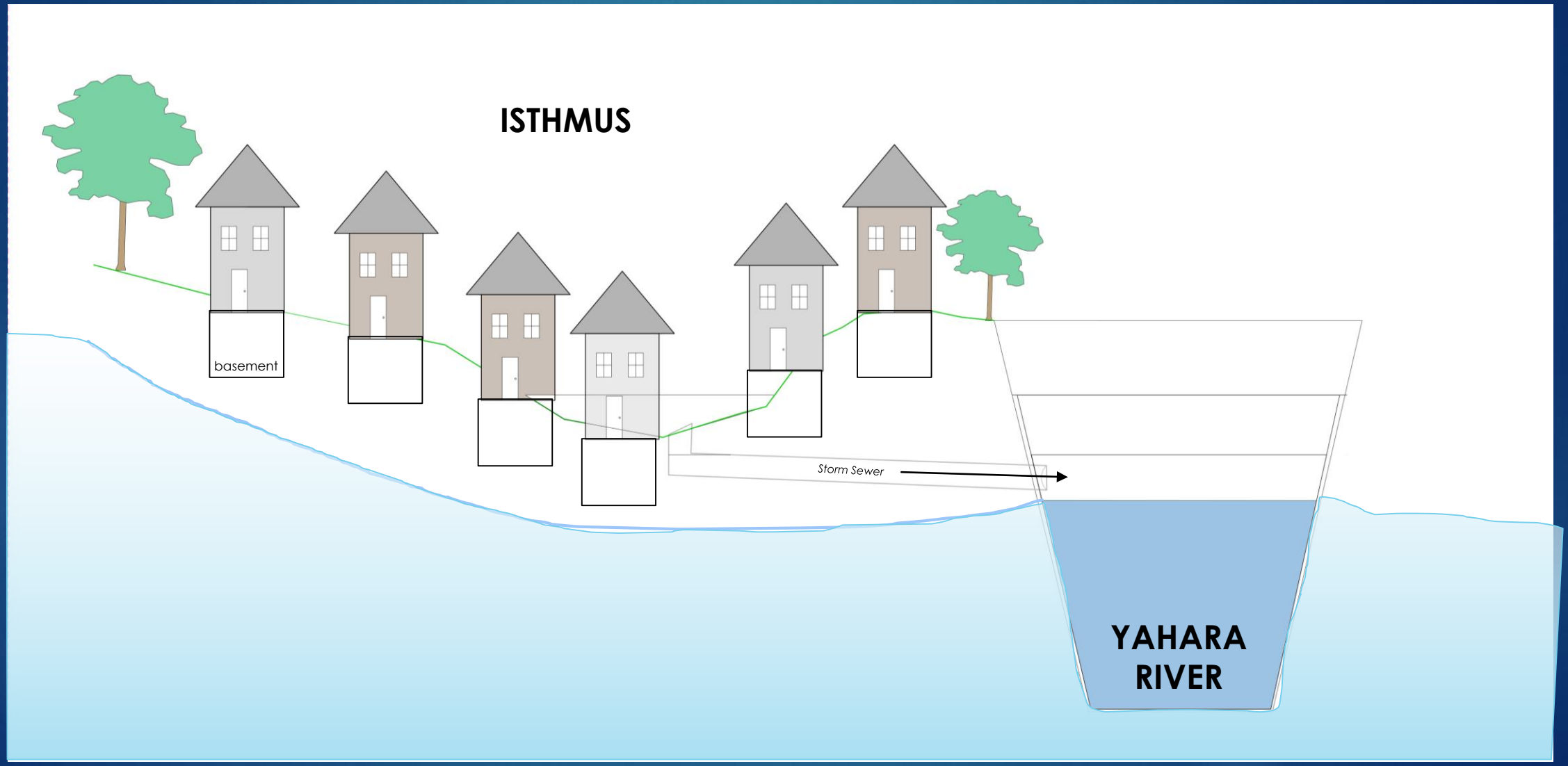


Risk of Flash Flooding when storm sewers are full and cannot effectively drain additional rain water

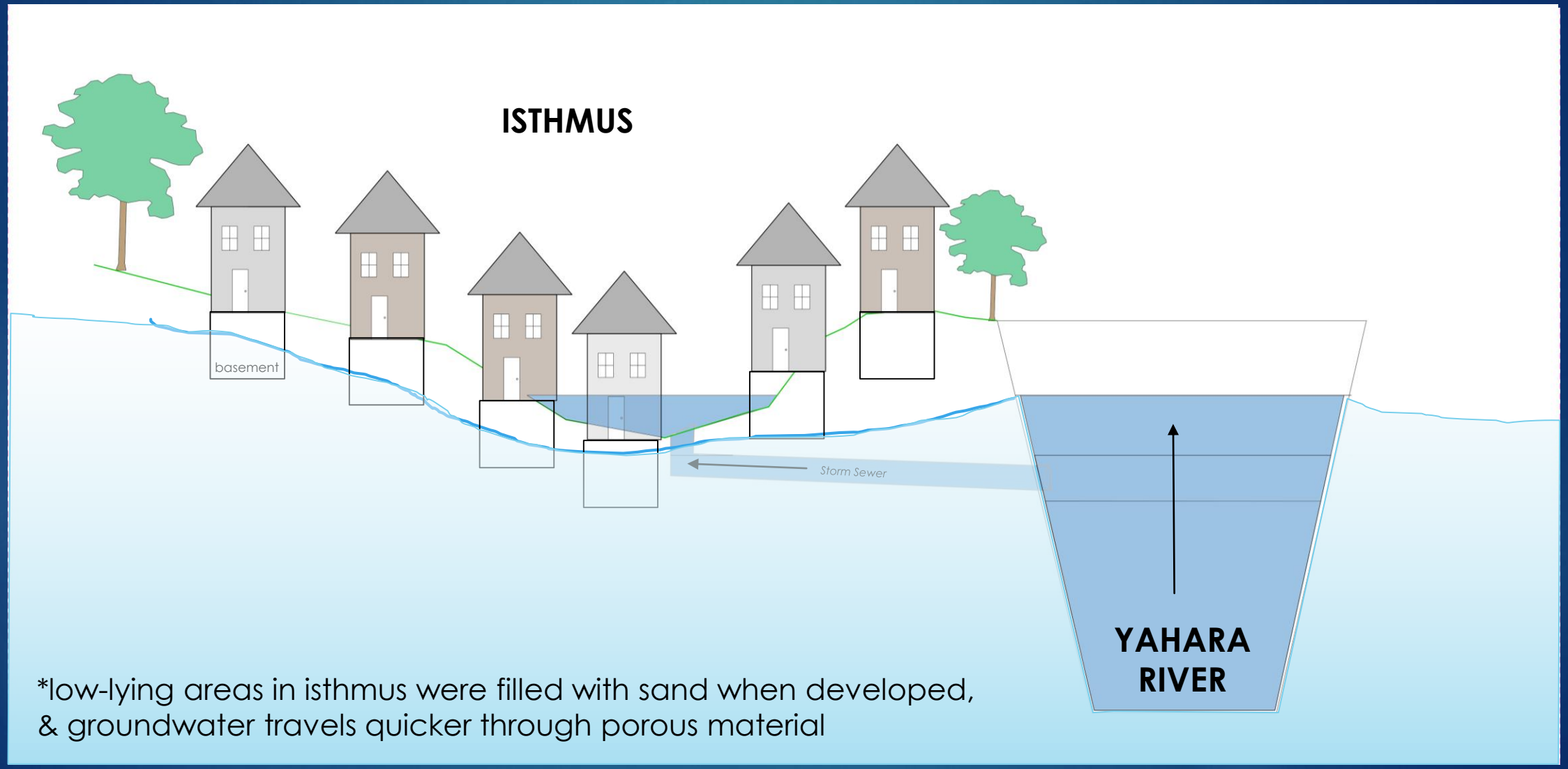
Isthmus Sewer Animation Example-Flash Flooding



Isthmus Sewer Animation Example-Ground Water

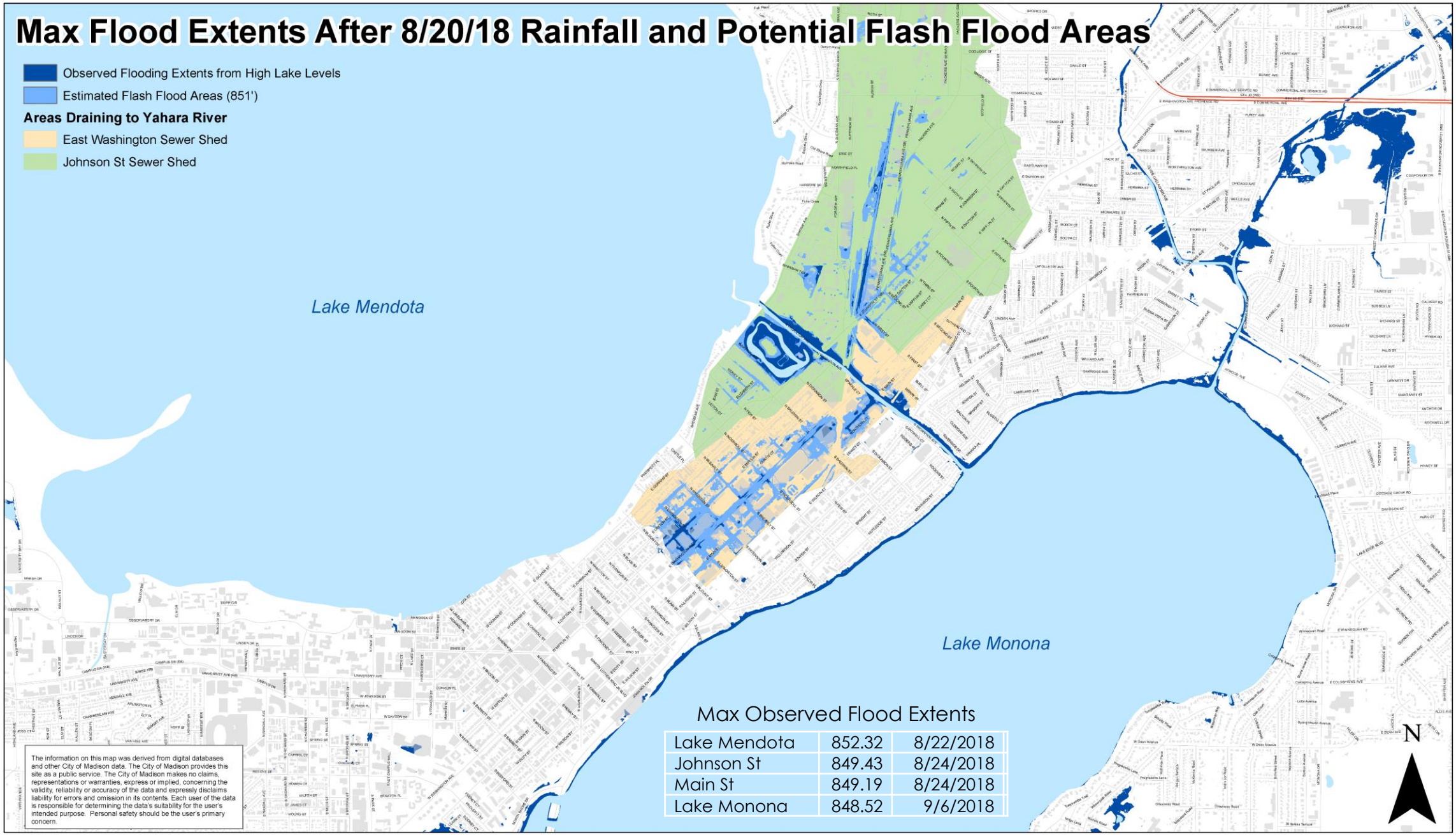


Isthmus Sewer Animation Example-Ground Water



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

Max Flood Extents After 8/20/18 Rainfall and Potential Flash Flood Areas



Max Observed Flood Extents

Lake Mendota	852.32	8/22/2018
Johnson St	849.43	8/24/2018
Main St	849.19	8/24/2018
Lake Monona	848.52	9/6/2018

Date: 9/26/2018 Time: 12:13:40 PM

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Max Flood Extents After 8/20/18 Rainfall and Potential Flash Flood Areas

Observed Flooding Extents from High Lake Levels

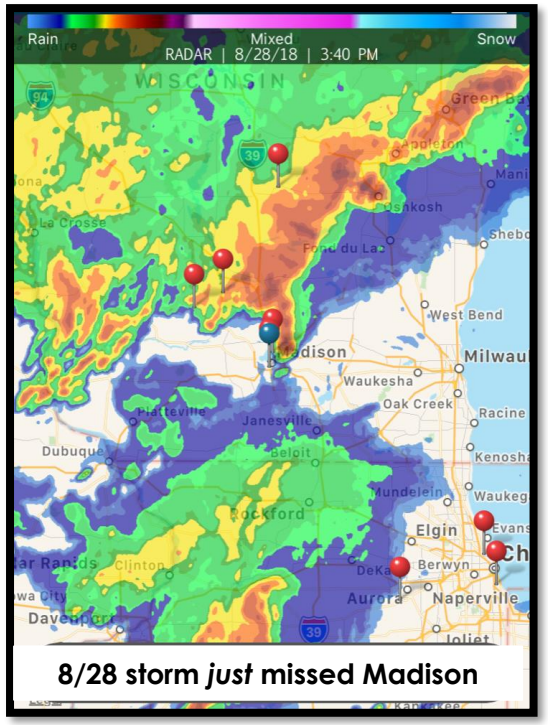
Estimated Flash Flood Areas (851')

Areas Draining to Yahara River

East Washington Sewer Shed

Johnson St Sewer Shed

City was proactive and prepared for potential flash flooding



8/28 storm *just* missed Madison

endota

Lake Monona

N

0 0.25 0.5 1 Miles

Date: 9/26/2018 Time: 12:13:40 PM

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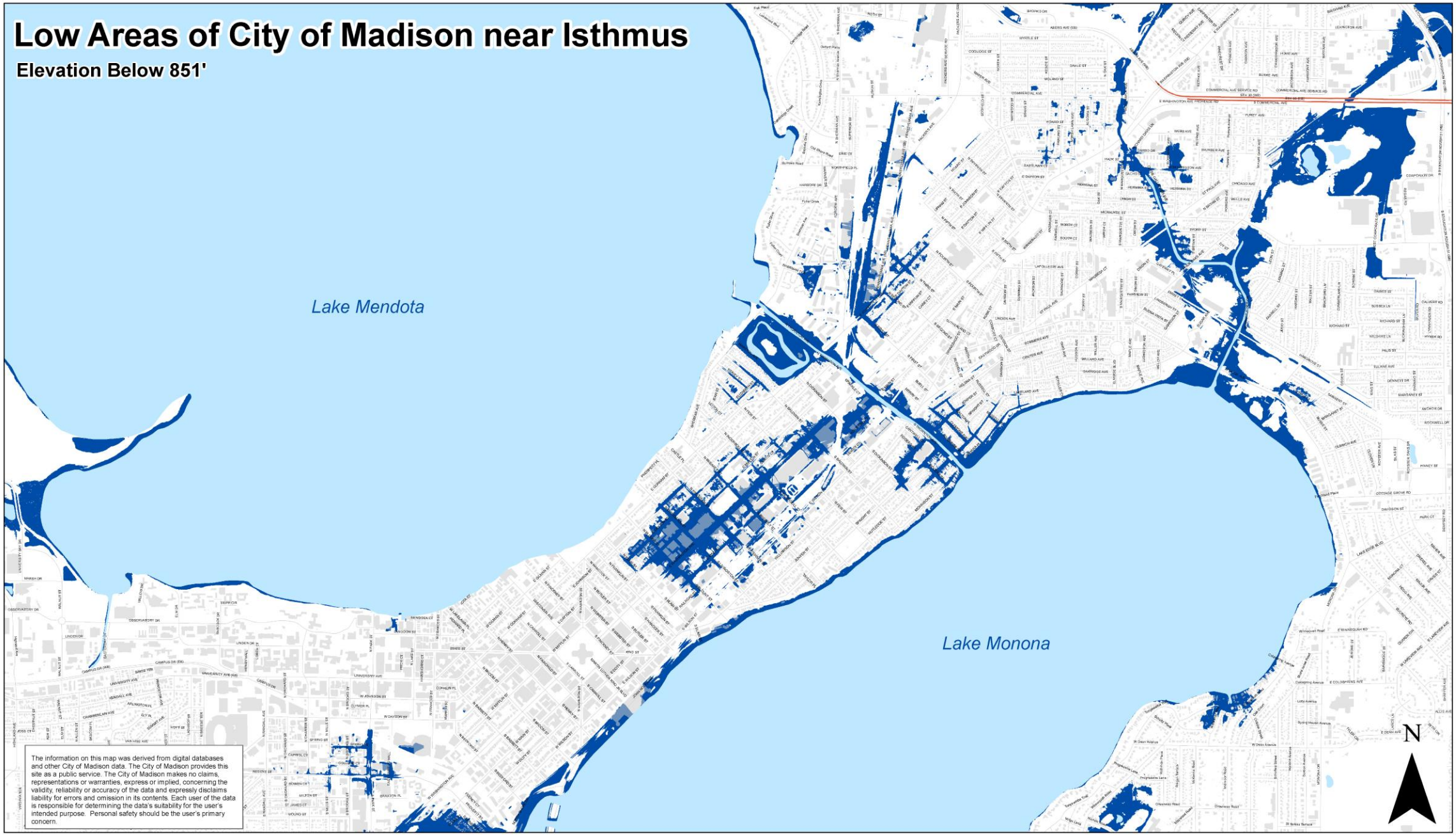
Low Areas of City of Madison near Isthmus

Elevation Below 851'



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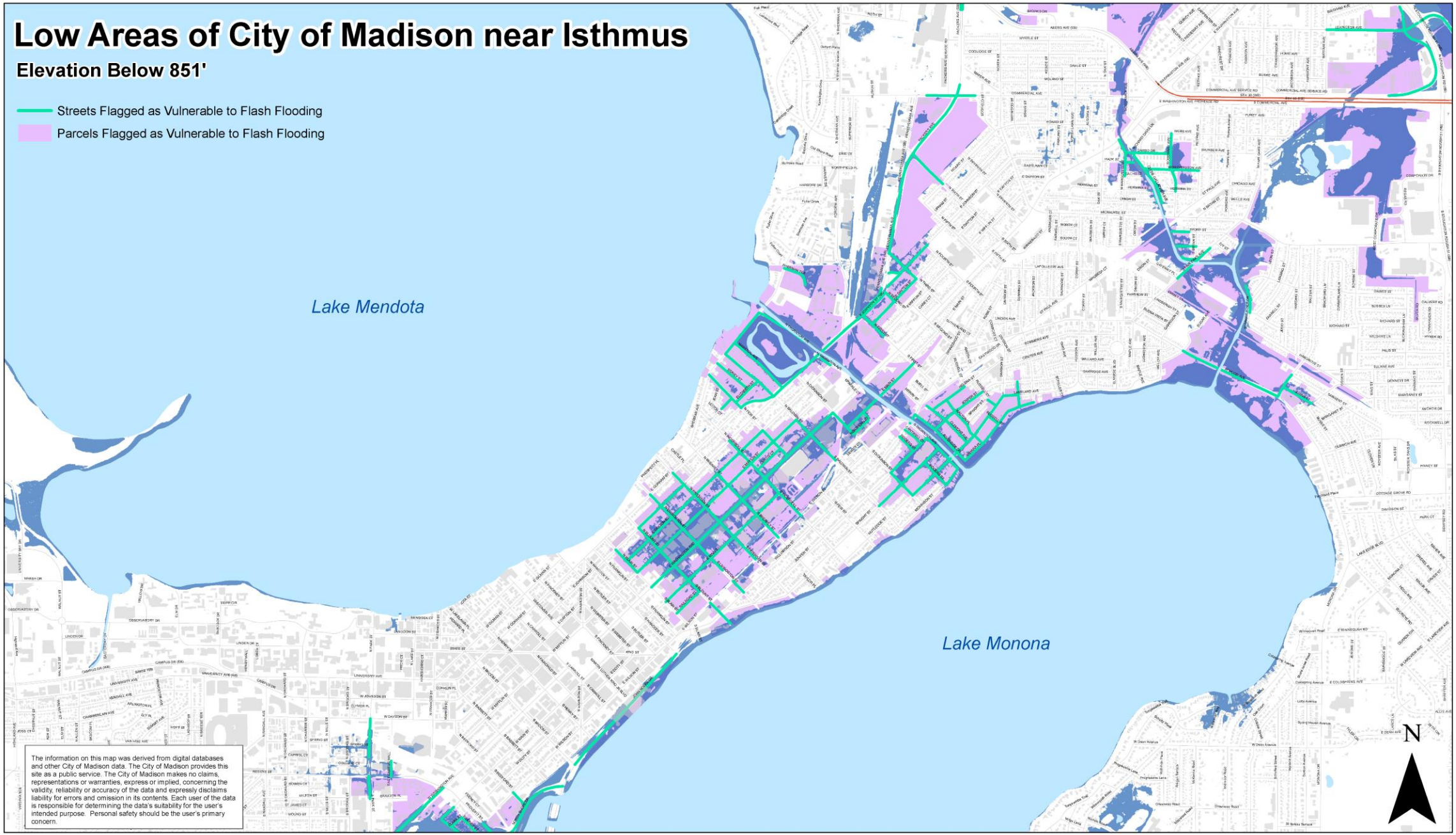
Low Areas of City of Madison near Isthmus

Elevation Below 851'

Streets Flagged as Vulnerable to Flash Flooding

Parcels Flagged as Vulnerable to Flash Flooding



0 0.25 0.5 1 Miles

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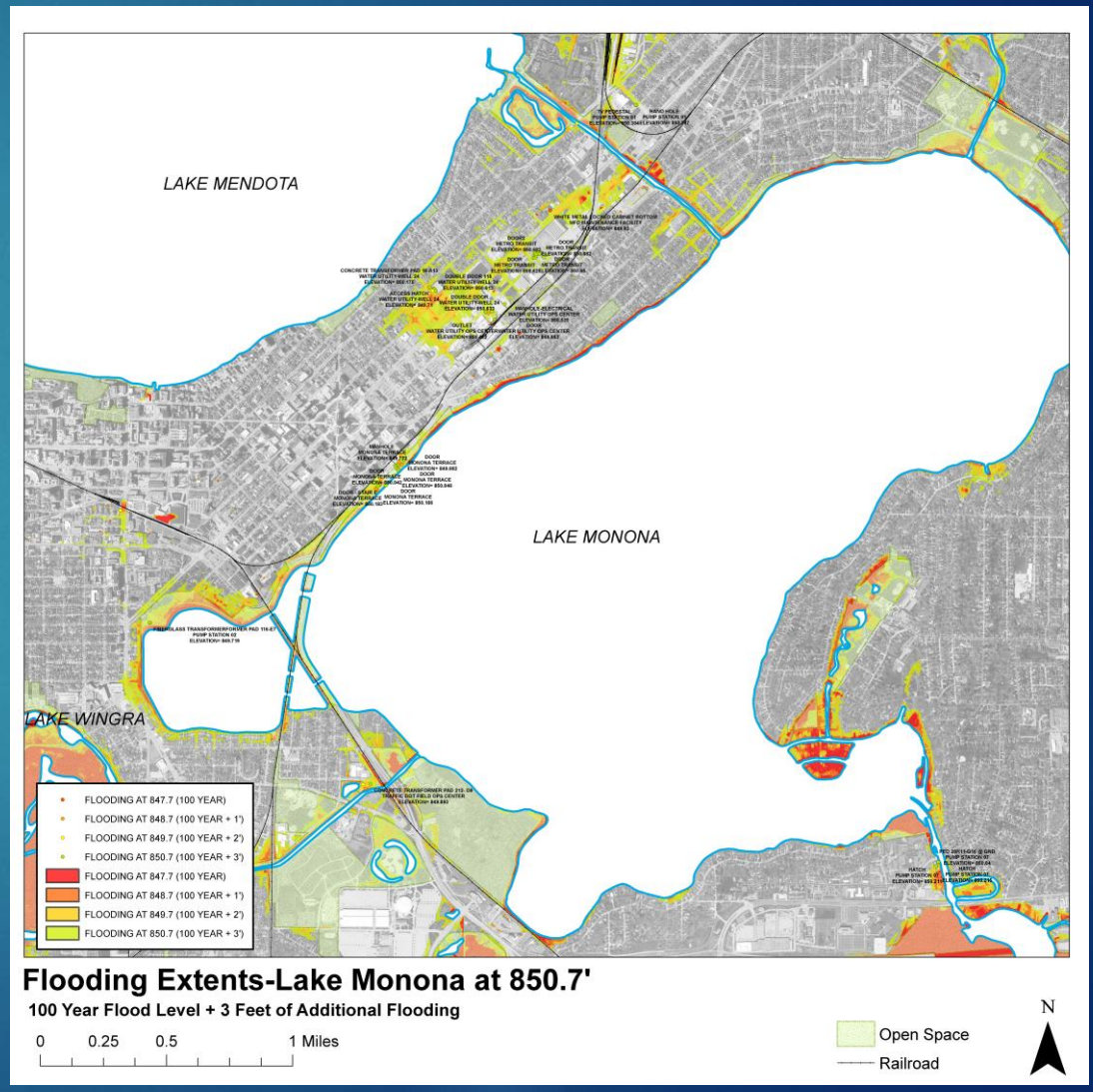
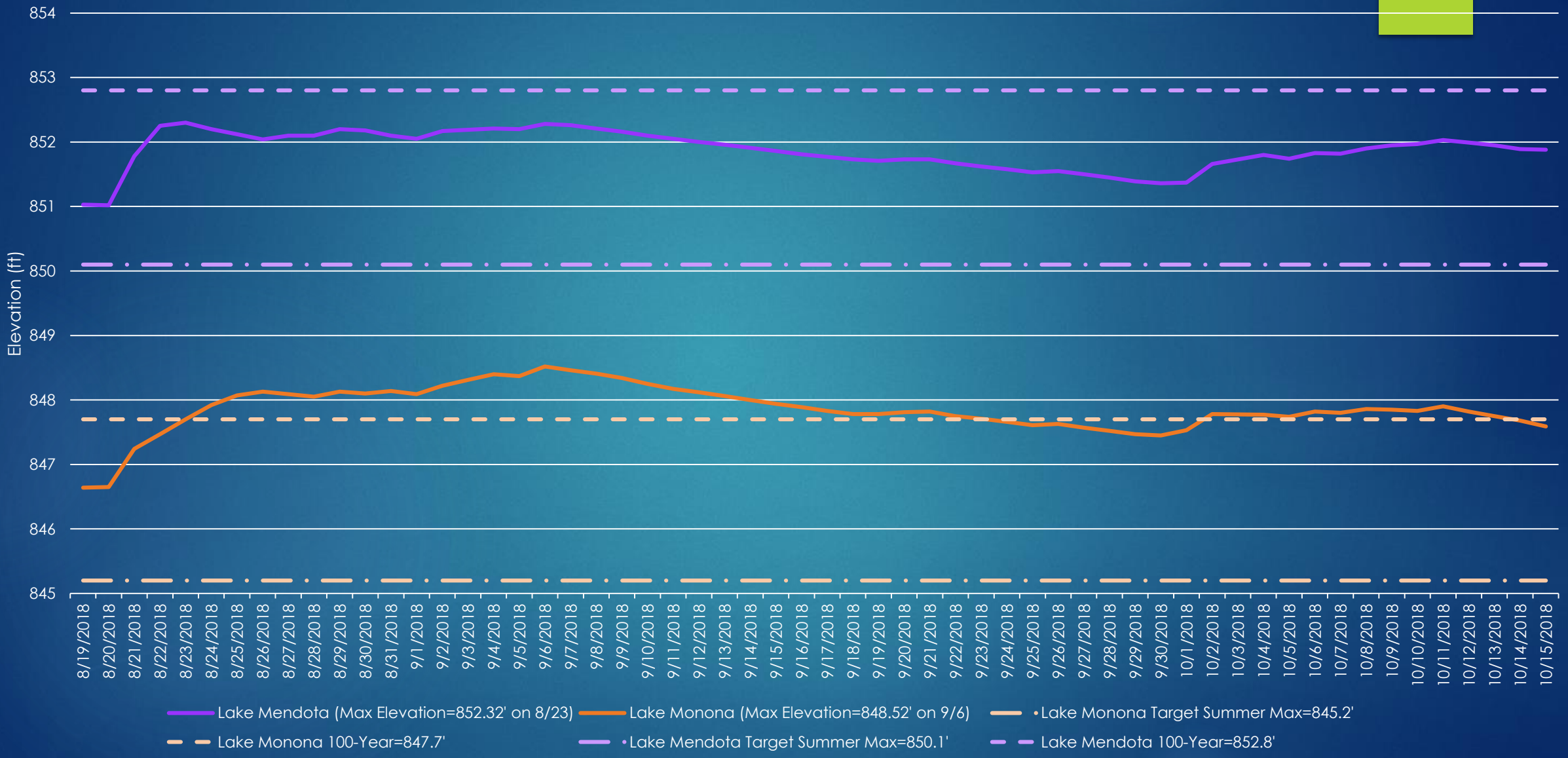
City amid-Preparations for High Lake Level Flooding

- Table Top (11/17)
- Utility Plan-identifying vulnerabilities and creating contingency plans
  - Installed generators above max flood stage at pump stations
- Sanitary System Study-impact of extreme I&I
- Fire Dept AASPIRE Intern - developing public information
- Critical Elevations Survey
  - 33 + locations (Water Utility, Monona Terrace, Metro Transit, MMSD Schools, Pump Stations)
- Debris Management Planning

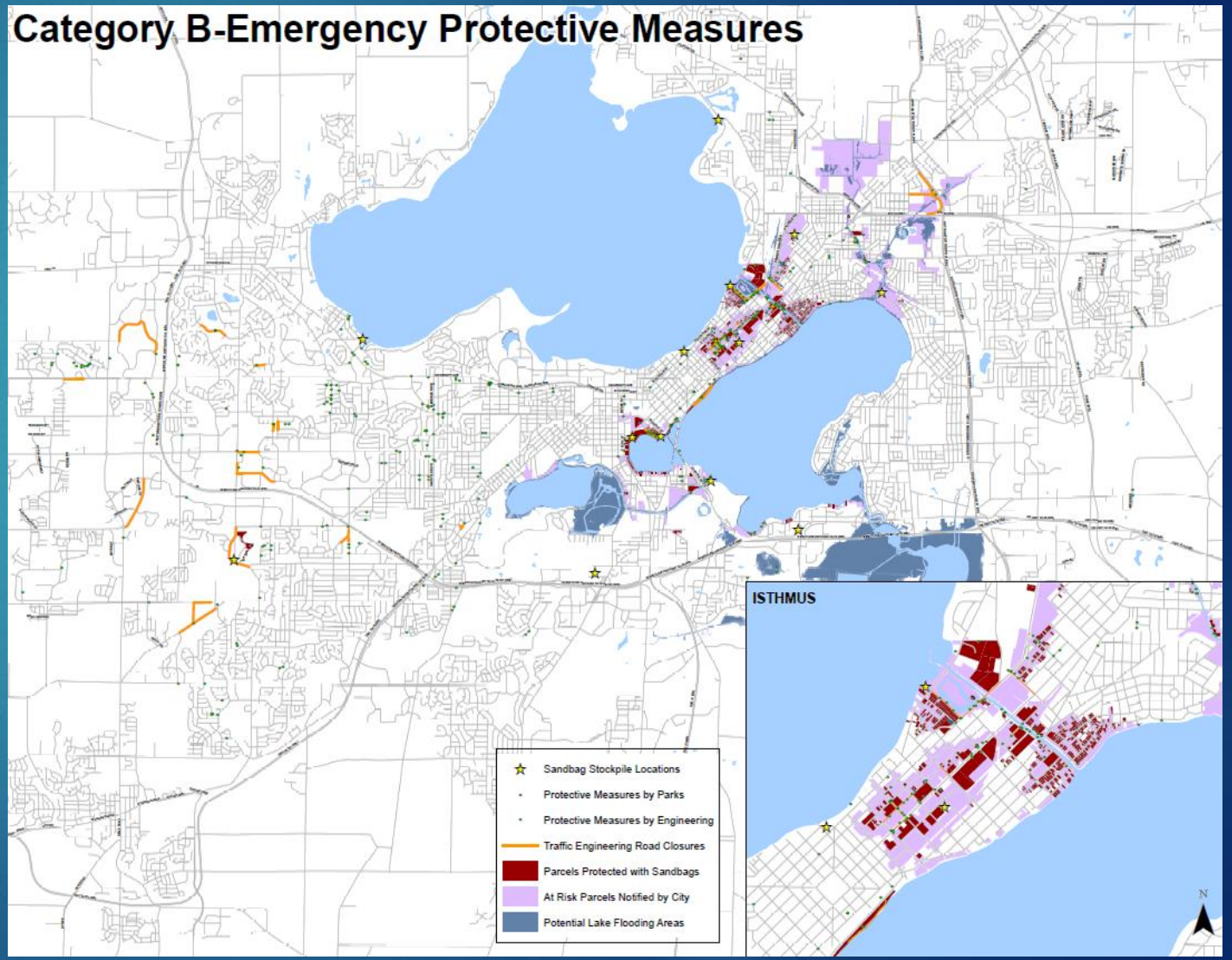


Lake Levels 8/19/18 to 10/15/18



SANDBAGS

- 225,000 Sandbags Provided
- City Staff worked 13 days, 24/7 on protective measures
- National Guard Deployed
- Estimated cost to date $907,000 +
- Removal plan developed and will be public once the risk of flooding has diminished sufficiently

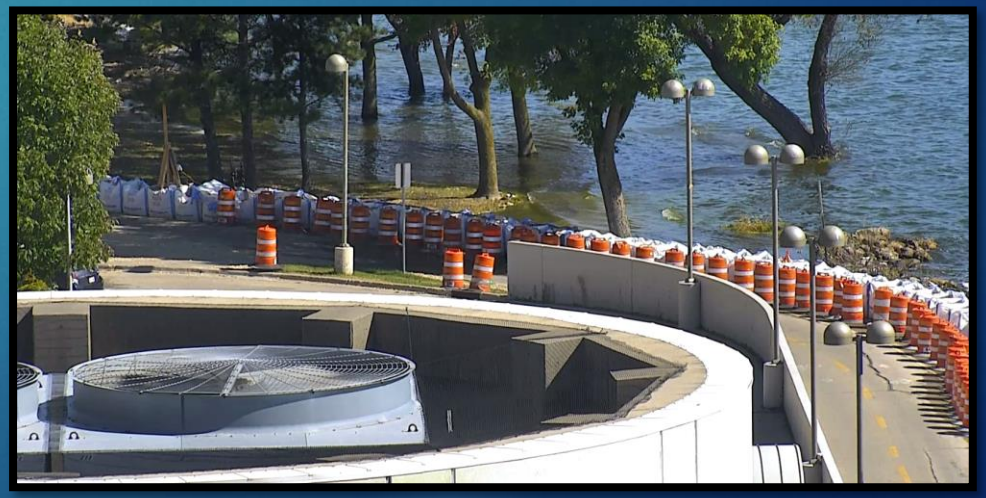


SANDBAGS

Damages – Isthmus Flooding

High Lake Levels: August 20th -Present

- What can we control?
  - Protect critical infrastructure
  - Keep people and property safe
  - Effective public messaging + coordinating volunteer efforts



Monona Terrace

High Lake Levels: August 20th -Present

- What can't we control?
  - Quantity of water or elevation along Yahara River
  - Monona outlet
  - Quantity of water coming into the system
    - Runoff either stored in Mendota, or passed onto downstream lakes

Yahara River

High Lake Levels: August 20th -Present

- Protection of Tenney Locks
  - Lake Mendota operated in a manner to prevent dam failure
  - Water released in a controlled manner
    - (1-3"/day allowed people to prepare for rising lake levels)
    - Better than dam failure for those at risk of flooding
    - Less water released while raining to try and protect isthmus

Railroad bridge at Starkweather Creek

City Protocols for Flood Response

- August 20th induced flooding
  - Sandbagging + Critical infrastructure protection
    - Additional armoring of John Nolen Dr shorelines
    - Rubber "sealing" manhole covers
    - Used critical elevation survey to prioritize protecting important infrastructure (Water Utility operations, Well 14 etc)
  - Road closures
    - Preparing signage in advance, removing parking (Willy St)
    - Sandbagging + pumping bike path at Monona Terrace
  - Public outreach
    - National Guard coordination
    - Volunteer coordination

City Protocols for Flood Response

- Future measures
  - Continuing development of plan to protect isthmus from high lake levels
    - Assessing feasibility of new infrastructure to reroute storm sewer during high lake levels
    - Raising Johnson St at Tenney
    - Continuing efforts for utility coordination
    - Increased outreach/preparedness for residents
  - Public Information Officer

Works Cited + Additional Mapping Info

- Flood mapping data from City 2016 LiDAR data. The information on this map was derived from digital databases and other City of Madison data. The City of Madison provides this site as a public service. The City of Madison makes no claims, representations or warranties, express or implied, concerning the validity, reliability or accuracy of the data and expressly disclaims liability for errors and omission in its contents. Each user of the data is responsible for determining the data's suitability for the user's intended purpose. Personal safety should be the user's primary concern.
- Rain accumulation data from KMKX Radar that was "bias corrected" using rain gauges by UW Professor, Dan Wright
- https://www.wisconsinhistory.org/Records/Image/IM33727
- USGS Quadrangle maps show historic wetlands