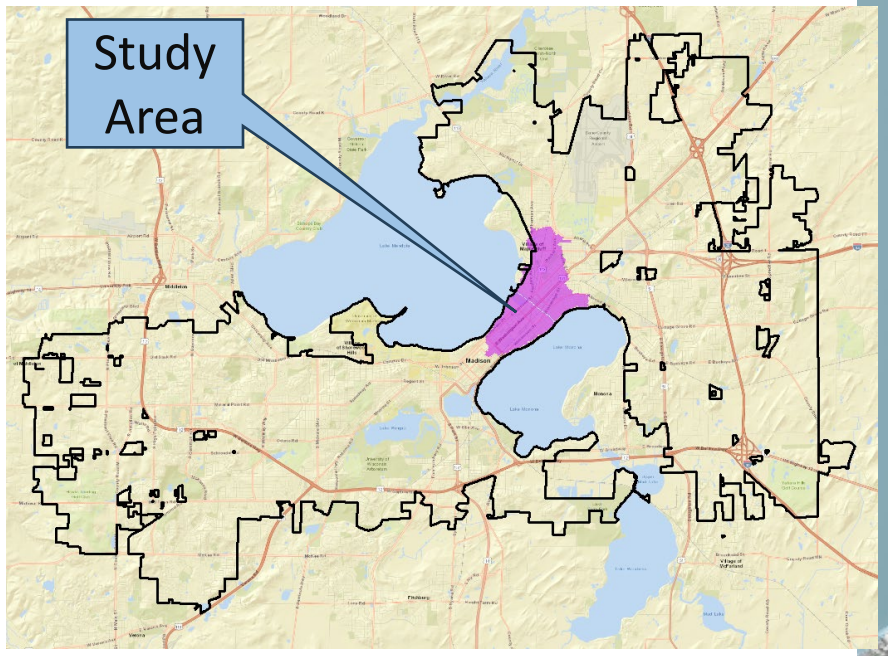
East Isthmus and Yahara Watershed Study



Demetral Park

Lake Mendota

Tenny Park

Yahara River

Starkweather Creek

Olbrich Park

Lake Monona

BB Clarke Beach Park

Watershed Study Process

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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Flood Mitigation Targets

10% Chance Event

- No surcharging of storm sewer onto roadway (storm sewer pipes are sized to carry storm)

4% Chance Event

- 0.2’ at Centerline of Road (roads passable for emergency vehicles)

1% Chance Event

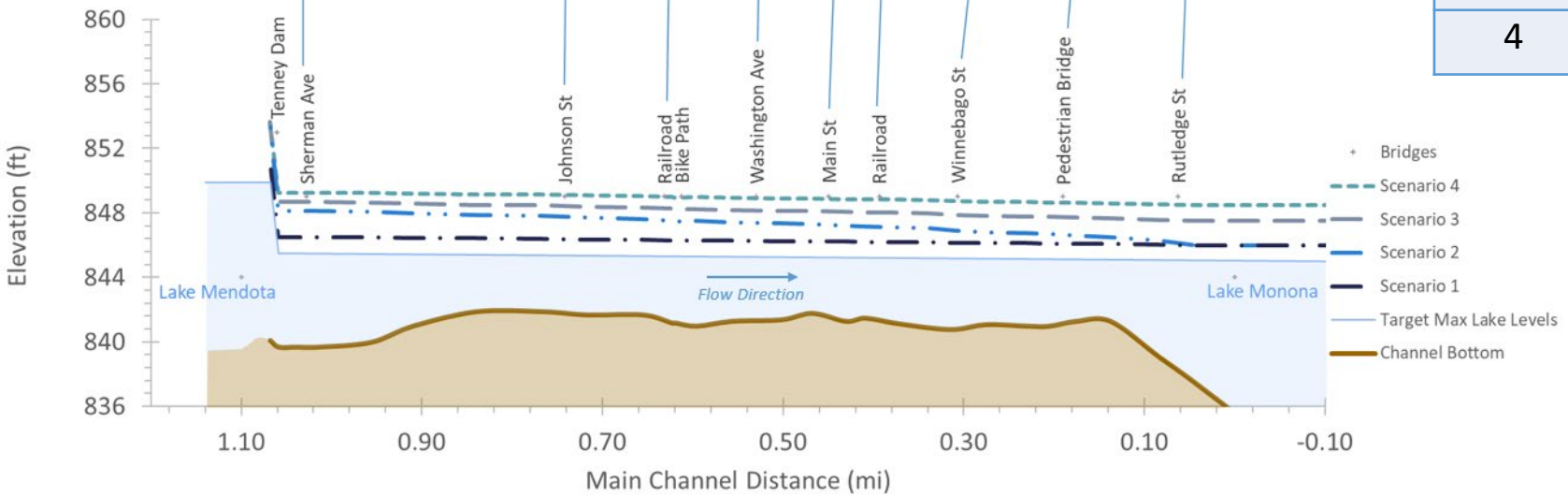
- No structure (home/building) flooding
- No greenway crossing overflow (stormwater does not come out of greenway and flow over the road)

0.2% Chance Event

- Safe conveyance of overflow

% Annual Chance	24-hr rainfall depth
10%	4.09 in
4%	4.98 in
1%	6.66 in
0.2%	8.94 in

Variety of Lake Levels Considered in Study



Scenario	Yahara River Discharge (cfs)	Lake Monona Elevation (ft)
1	250	846.0
2	700	846.0
3	700	847.5
4	700	848.5

Less likely to occur, more conservative

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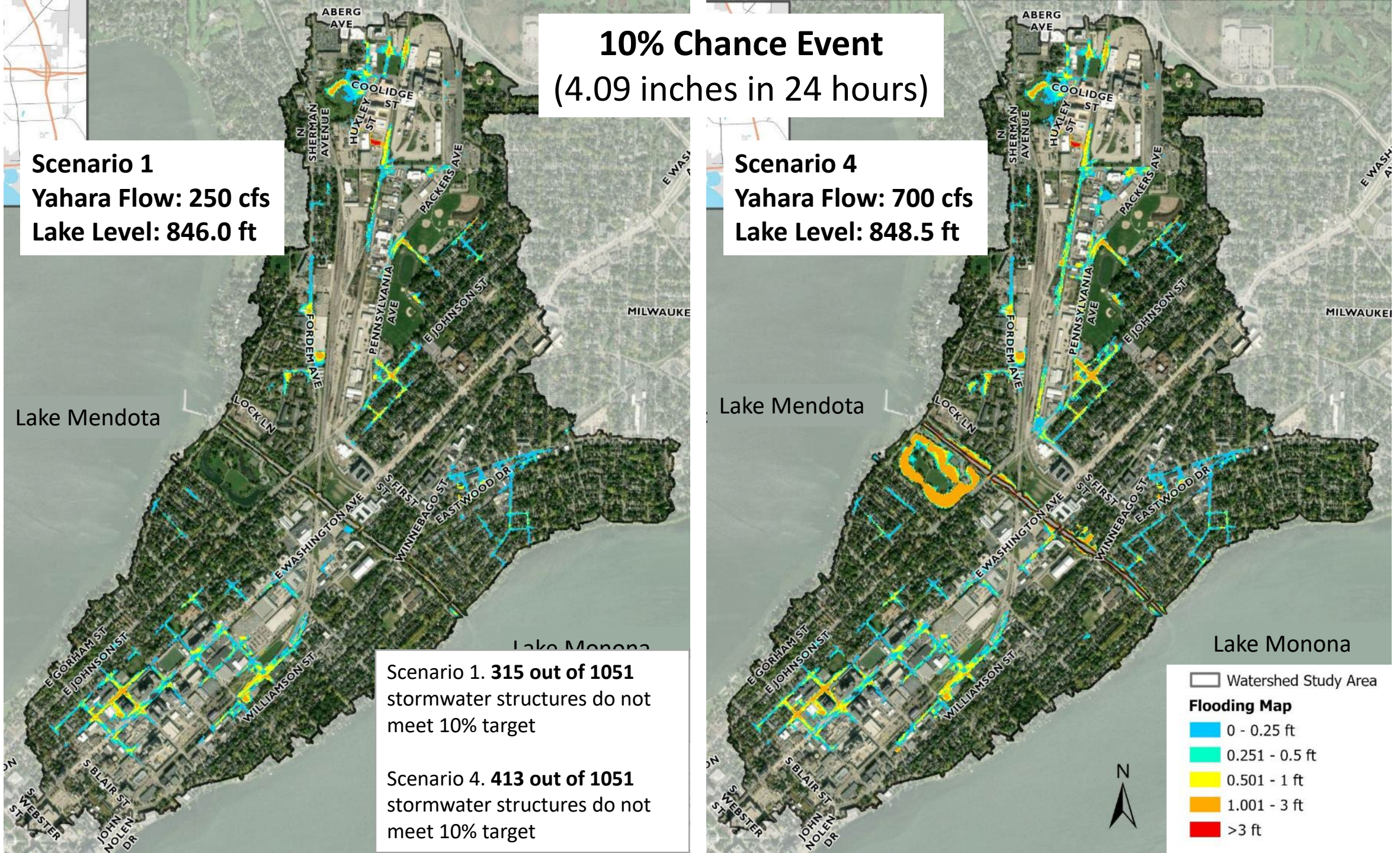
Existing Conditions Inundation Mapping

10% Chance Event
(4.09 inches in 24 hours)

Scenario 1
Yahara Flow: 250 cfs
Lake Level: 846.0 ft

Scenario 4
Yahara Flow: 700 cfs
Lake Level: 848.5 ft



Scenario 1. **315 out of 1051** stormwater structures do not meet 10% target

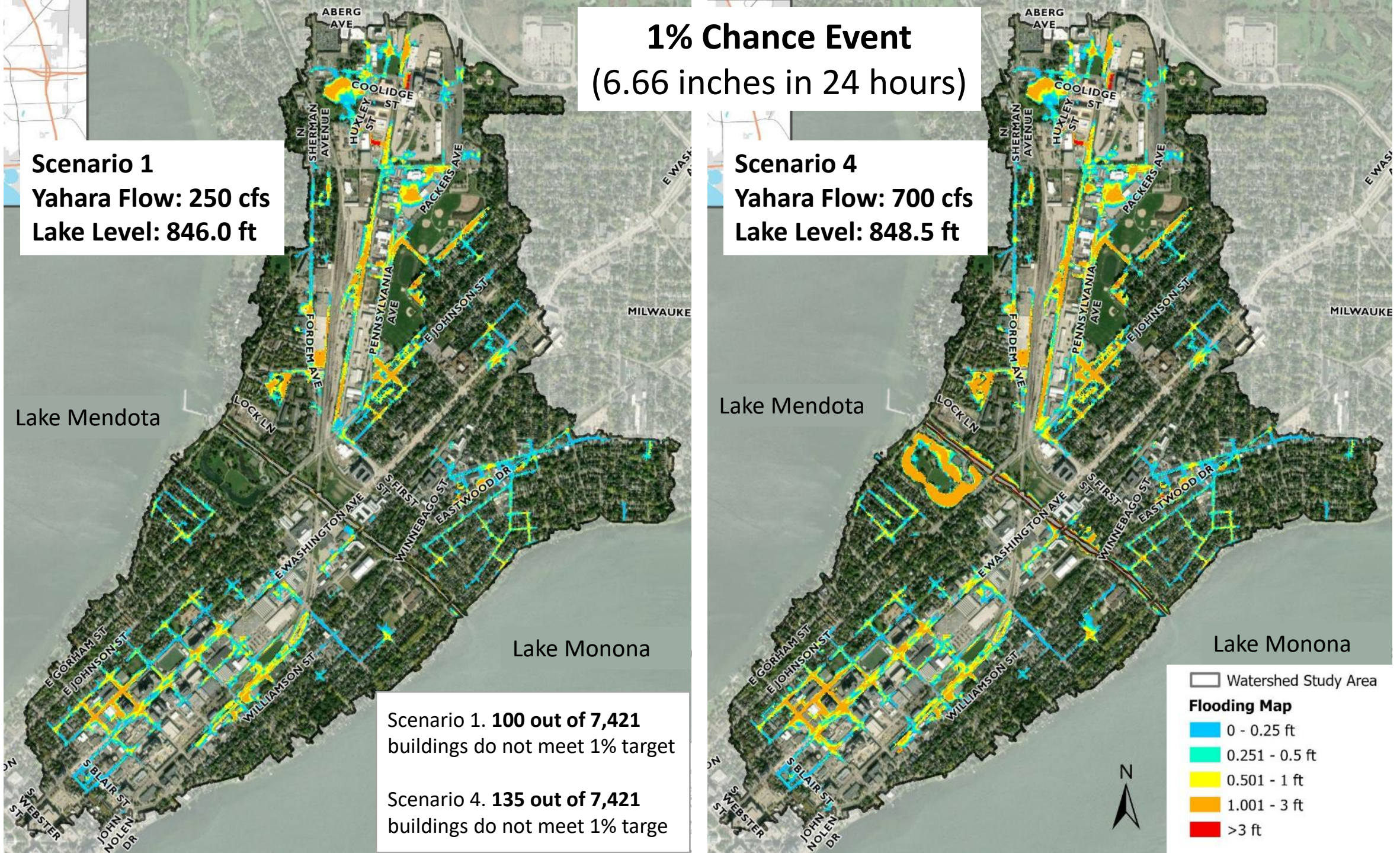
Scenario 4. **413 out of 1051** stormwater structures do not meet 10% target

Existing Conditions Inundation Mapping

1% Chance Event
(6.66 inches in 24 hours)

Scenario 1
Yahara Flow: 250 cfs
Lake Level: 846.0 ft

Scenario 4
Yahara Flow: 700 cfs
Lake Level: 848.5 ft



Scenario 1. **100 out of 7,421** buildings do not meet 1% target

Scenario 4. **135 out of 7,421** buildings do not meet 1% targe

Proposed Solutions Process (to date)

- Iterative process
  - Brainstormed solutions
  - Analyzed and evaluated
  - Removed non-viable solutions
  - Developed a “suite of solutions” over several meetings
- Met with City Agencies for feedback & revised solutions as needed
- Public Input at PIM 3
- Meeting tonight

- Solutions are:
  - **Conceptual** and serve as an overarching plan for the watershed.
  - **No implementation timeline** at this point.
    - Prioritized along with all other solutions from all watersheds across the city.
    - Highest priority solutions will then be budgeted for.
  - Detailed designs will be completed; including public outreach, permitting, coordination with other agencies and BCC’s as needed, etc.

Watershed Study Solutions

Stormwater Storage Evaluation

- Evaluated underground storage near flooded areas (Reynolds Park, Demetral Park)

- Results -> higher costs, and lesser benefits than the pipe improvements, and had significant negative short-term impacts to park recreation and high operational costs.
  - Ex: 25’ deep underground storage needed at Reynolds Park (and would need to be pumped out)

→ **Pipe improvements were most effective way to meet flood mitigation targets**

Proposed Solutions

~56,500 feet of local storm sewer improvements

<u>Standalone Projects (large box culverts)</u>

- Commercial Ave
- Pennsylvania Ave
- E Johnson St
- Wilson St (Few St to Brearly St)
- Capital City Trail (Brearly St to Livingston St)
- Paterson Relief
- Blount St

Photo of a box culvert (square stormwater pipe)

Local Storm Sewer Improvements

- Coordinated with future street reconstruction projects

- Recently rebuilt streets likely won't see upgrades for many years

For Park lands:

- Replacing existing storm sewers and outfalls with larger pipes.

All Storm Sewer Improvements

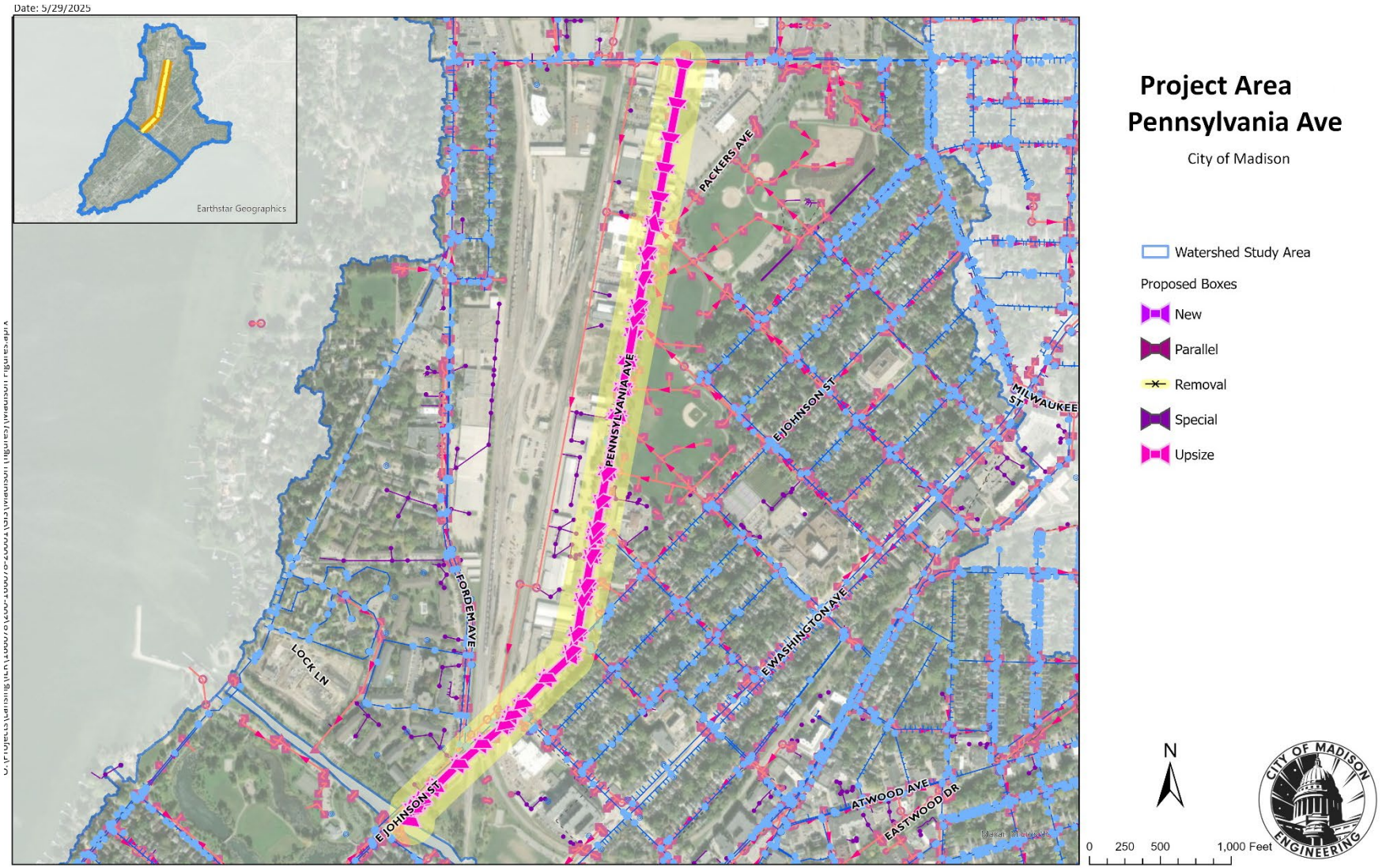
- Local storm sewer improvements (previous slide) +

Standalone Projects

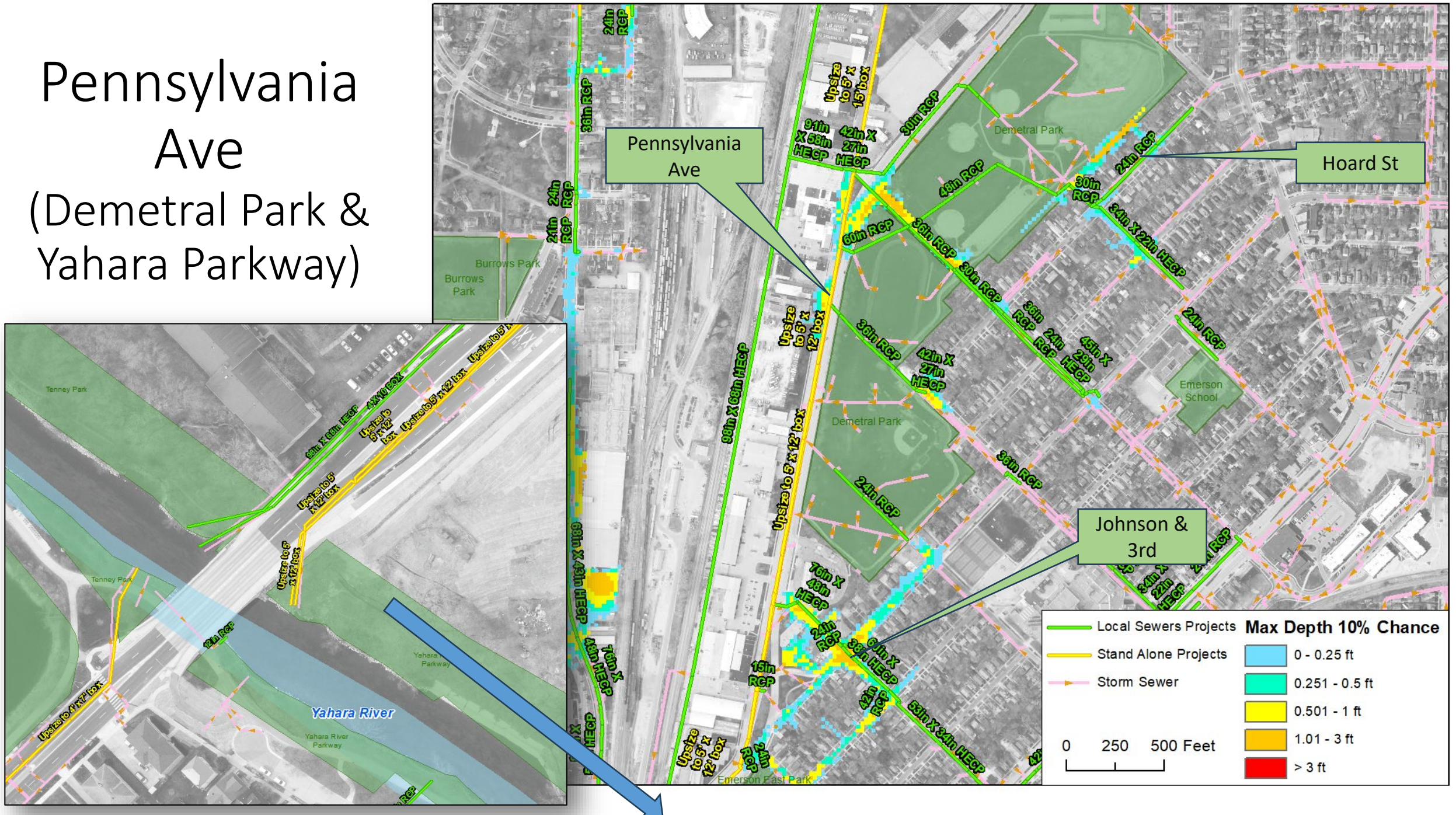
1. Capital City Trail (Brearly St to Livingston St)
2. Wilson St (Few St to Brearly St)
3. Pennsylvania Ave
4. Commercial Ave
5. E Johnson St
6. Paterson Relief
7. Blount St

3. Pennsylvania Avenue (Commercial Ave to Yahara River)

- Increase conveyance along Pennsylvania Ave to Yahara River.
- Dual 5’ by 12’ box culverts.
- Relieves flooding on Johnson and Third St.
- Est. Cost $33.2M

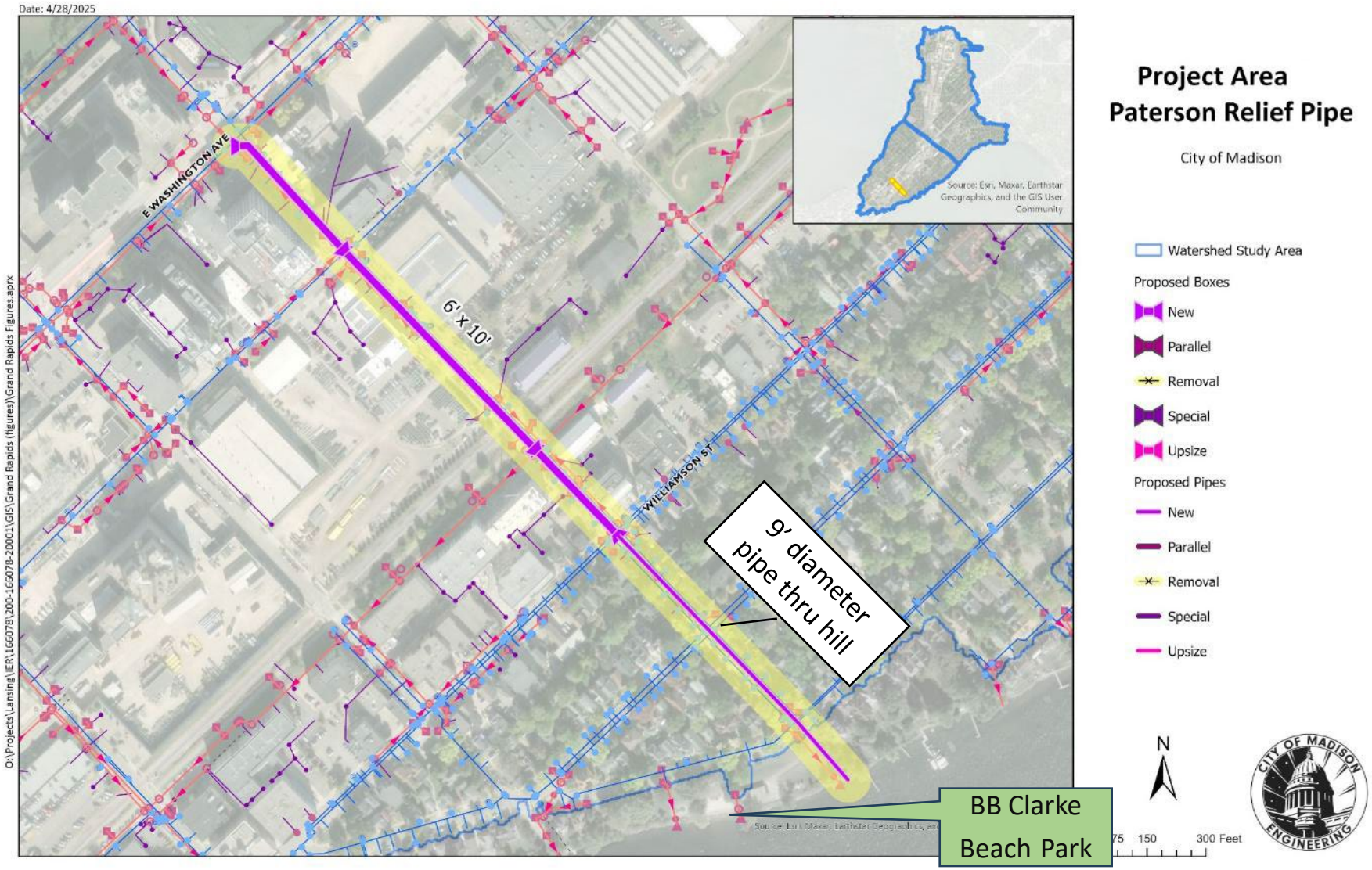


Pennsylvania Ave (Demetral Park & Yahara Parkway)

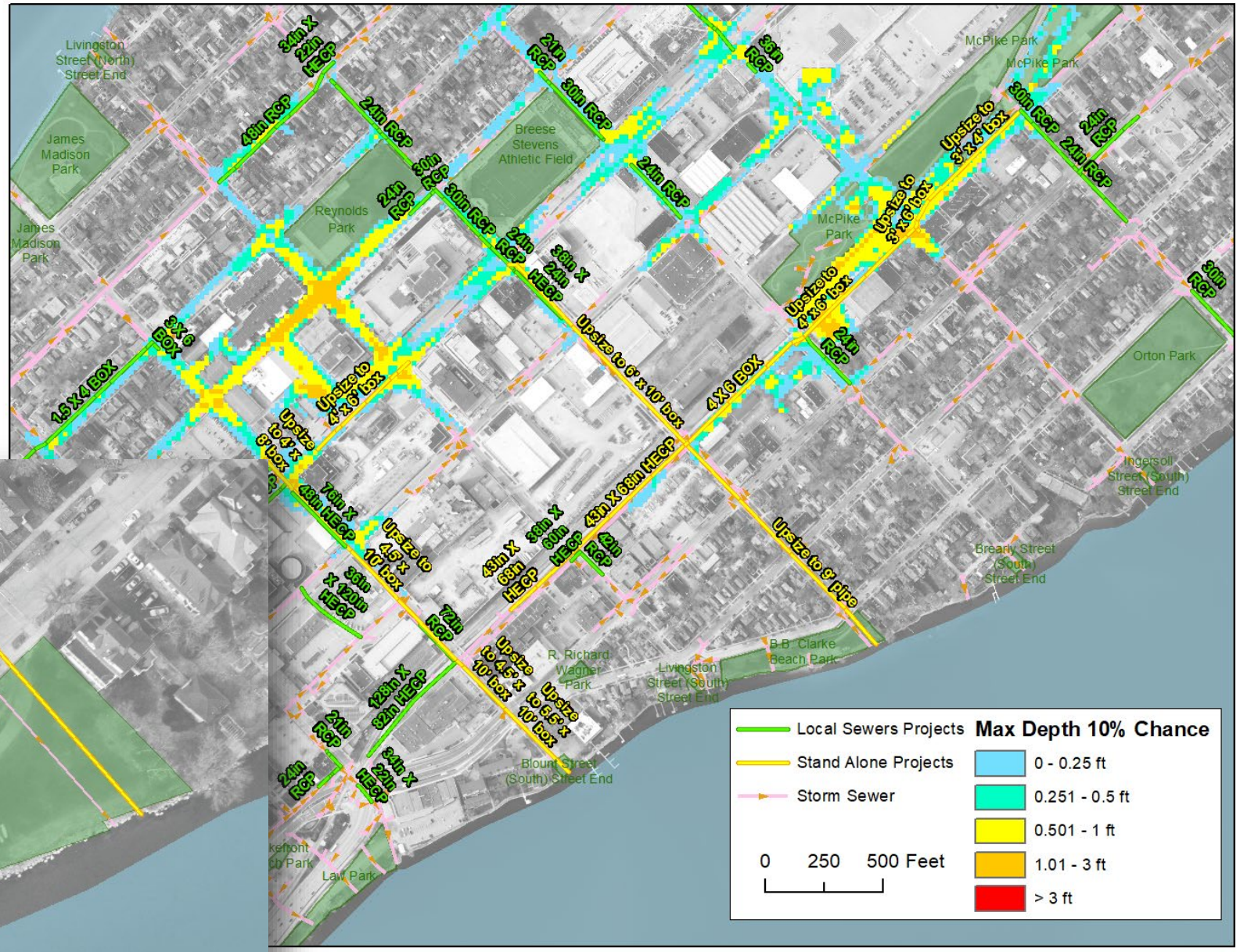


6. Paterson Relief Pipe (E Washington Ave to Lake Monona)

- Primary relief pipe for flooding on E Washington
  - Relieves flooding at Mifflin and Livingston as well
- Existing outfall at this location
- 9’ diameter pipe - depths require tunneling
- Est. Cost $8.8 M



Paterson Relief Pipe
(BB Clarke Beach Park)



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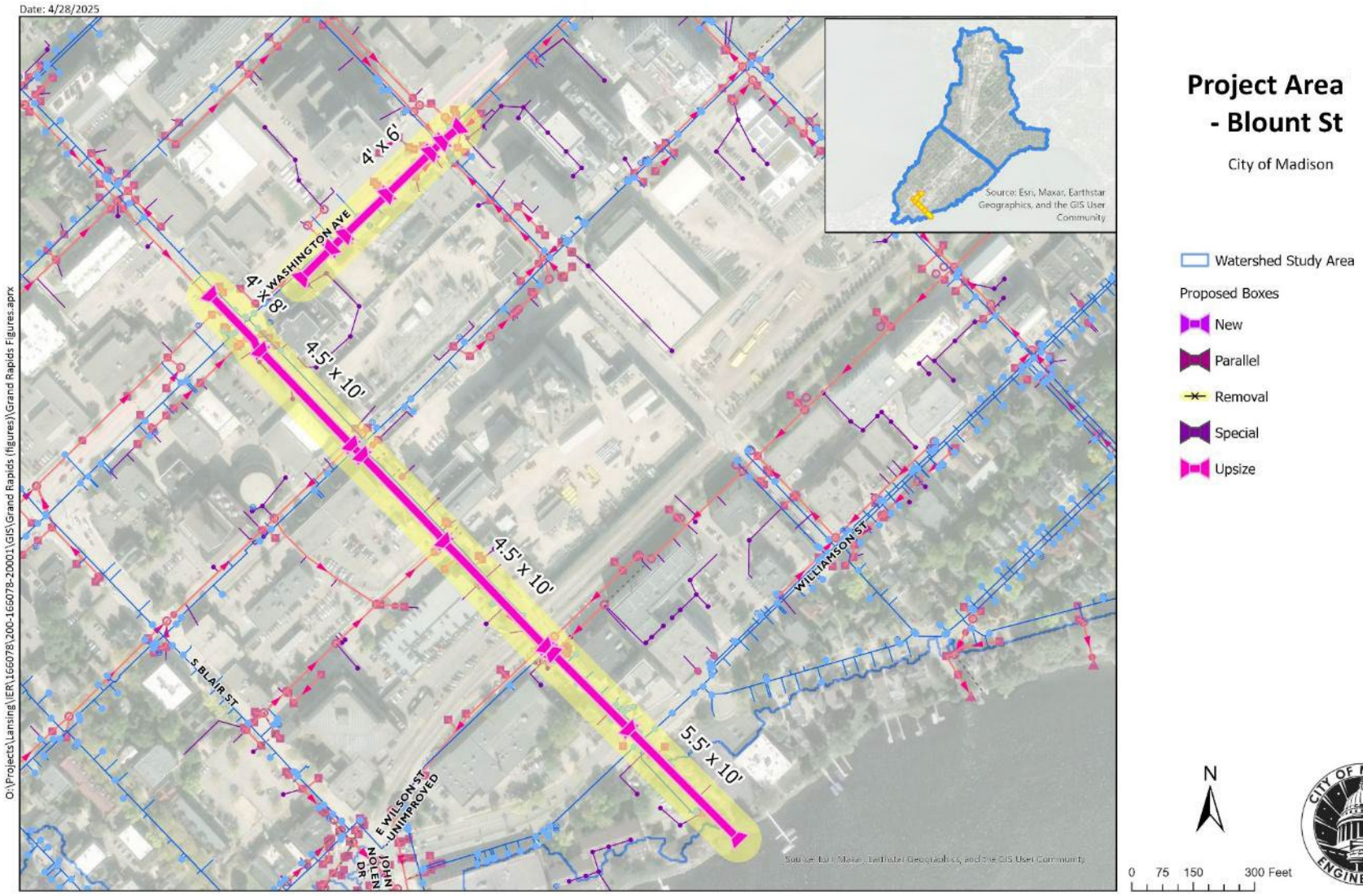
7. Blount Street (E Washington Ave to Lake Monona)

- Increase conveyance to Lake Monona to help drain low areas.
- Est. Cost $6M



Blount Street

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Local Sewers Outfalls

Tenny Park

Upsize existing 36” RCP and 98” x 68” in HECP to 98” x 68” and 4’ x 10’ box respectively

Local Sewers Outfalls

Yahara River Parkway

East Main (3X)

Eastwood

Jenifer St (2X East)

Spaight St

Local Sewers Outfalls

Yahara Place Park

Dunning St

Schurz Ave

Russell St

Local Sewers Outfalls

Hudson Park

Miller Ave

Local Sewer Outfalls

Street Ends

- Few St

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Existing Conditions Inundation Mapping

10% Chance Event
(4.09 inches in 24 hours)

Scenario 1
Yahara Flow: 250 cfs
Lake Level: 846.0 ft

Scenario 4
Yahara Flow: 700 cfs
Lake Level: 848.5 ft

Lake Mendota

Lake Monona

Scenario 1. **315 out of 1051** stormwater structures do not meet 10% target

Scenario 4. **413 out of 1051** stormwater structures do not meet 10% target

Watershed Study Area

Flooding Map

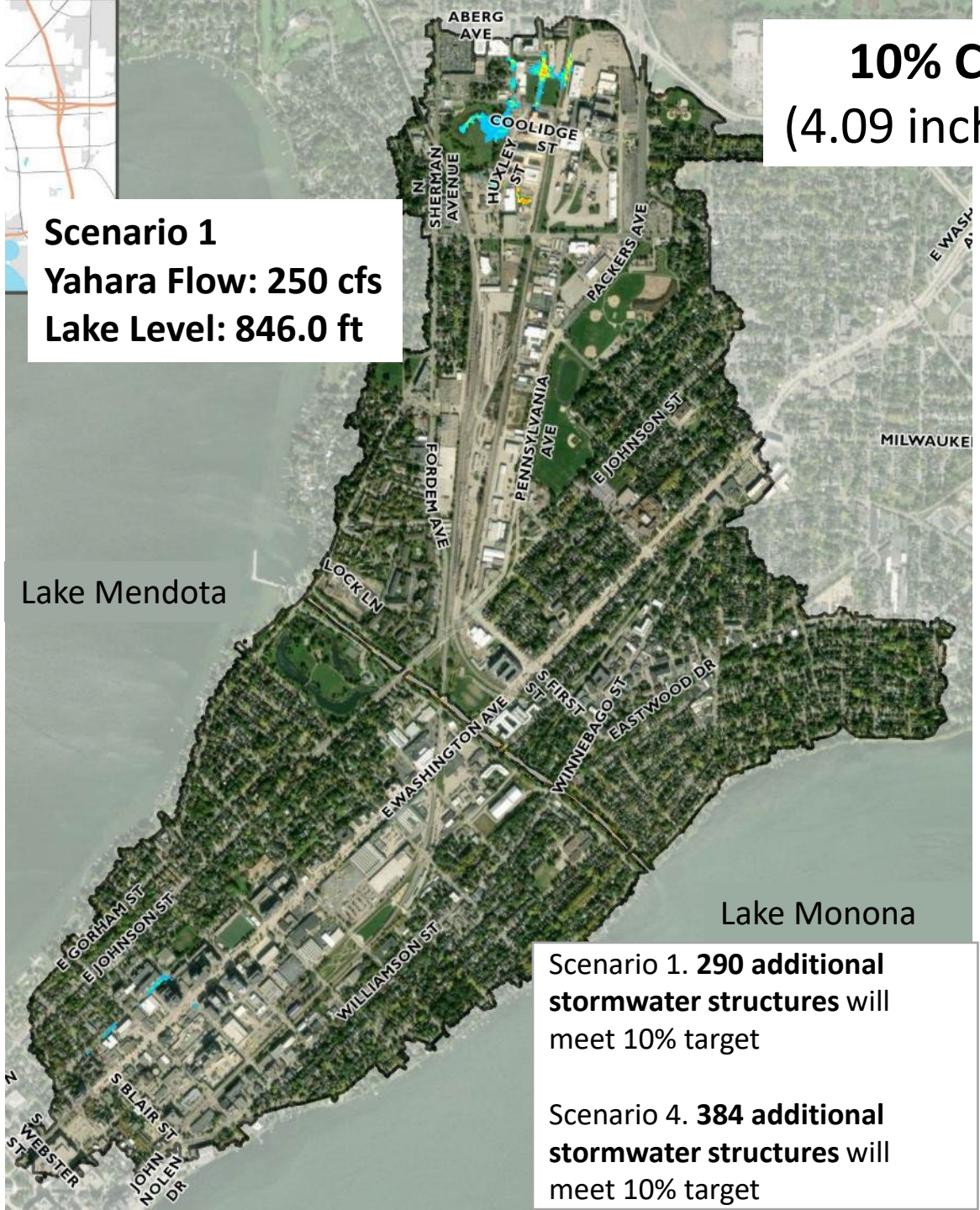
- 0 - 0.25 ft
- 0.251 - 0.5 ft
- 0.501 - 1 ft
- 1.001 - 3 ft
- >3 ft

N

Proposed Conditions Inundation Mapping

10% Chance Event
(4.09 inches in 24 hours)

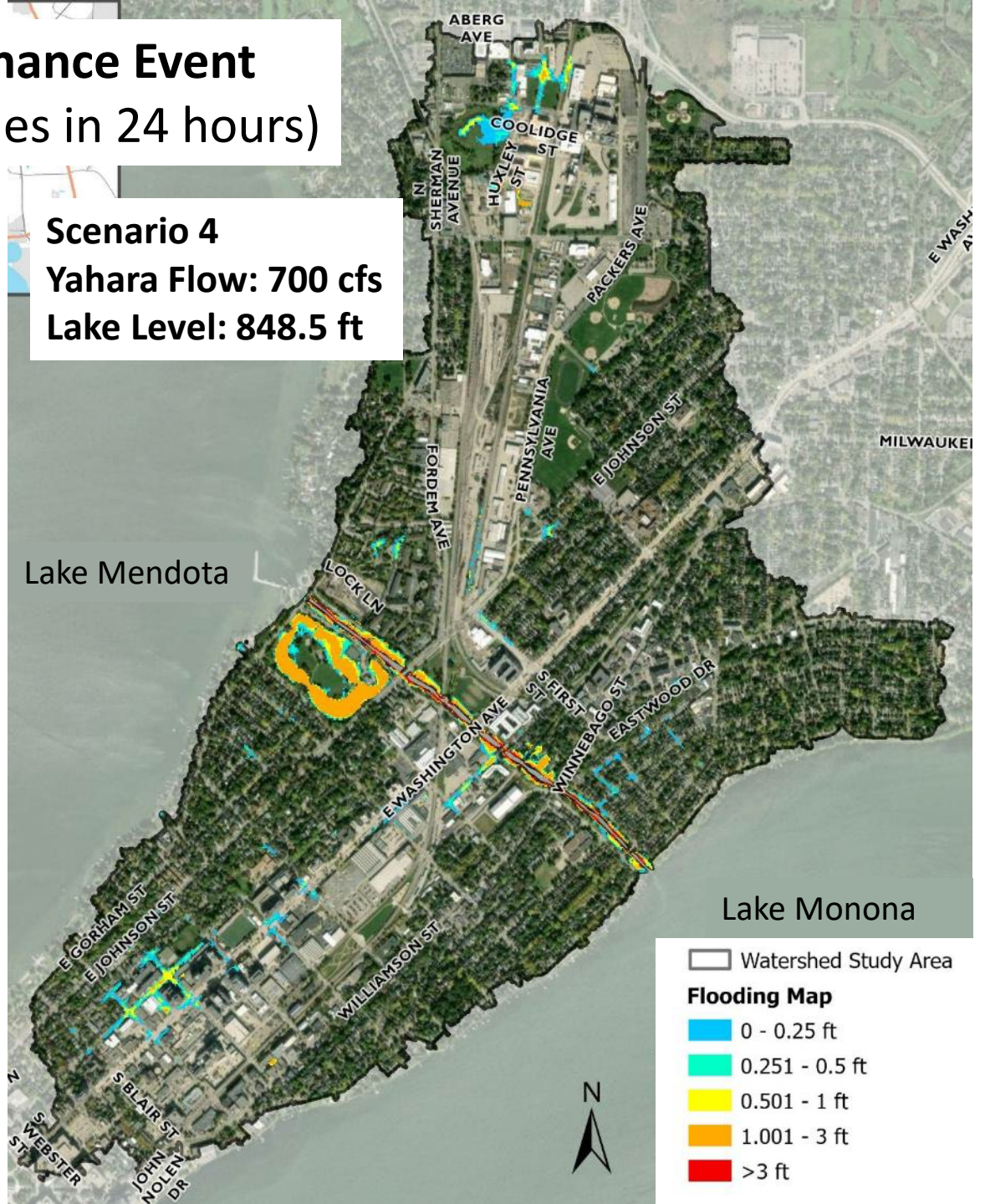
Scenario 1
Yahara Flow: 250 cfs
Lake Level: 846.0 ft



Scenario 1. **290 additional stormwater structures** will meet 10% target

Scenario 4. **384 additional stormwater structures** will meet 10% target

Scenario 4
Yahara Flow: 700 cfs
Lake Level: 848.5 ft



Existing Conditions Inundation Mapping

1% Chance Event
(6.66 inches in 24 hours)

Scenario 1
Yahara Flow: 250 cfs
Lake Level: 846.0 ft

Scenario 4
Yahara Flow: 700 cfs
Lake Level: 848.5 ft

Lake Mendota

Lake Monona

Scenario 1. **100 out of 7,421** buildings do not meet 1% target

Scenario 4. **135 out of 7,421** buildings do not meet 1% target

Watershed Study Area

Flooding Map

- 0 - 0.25 ft
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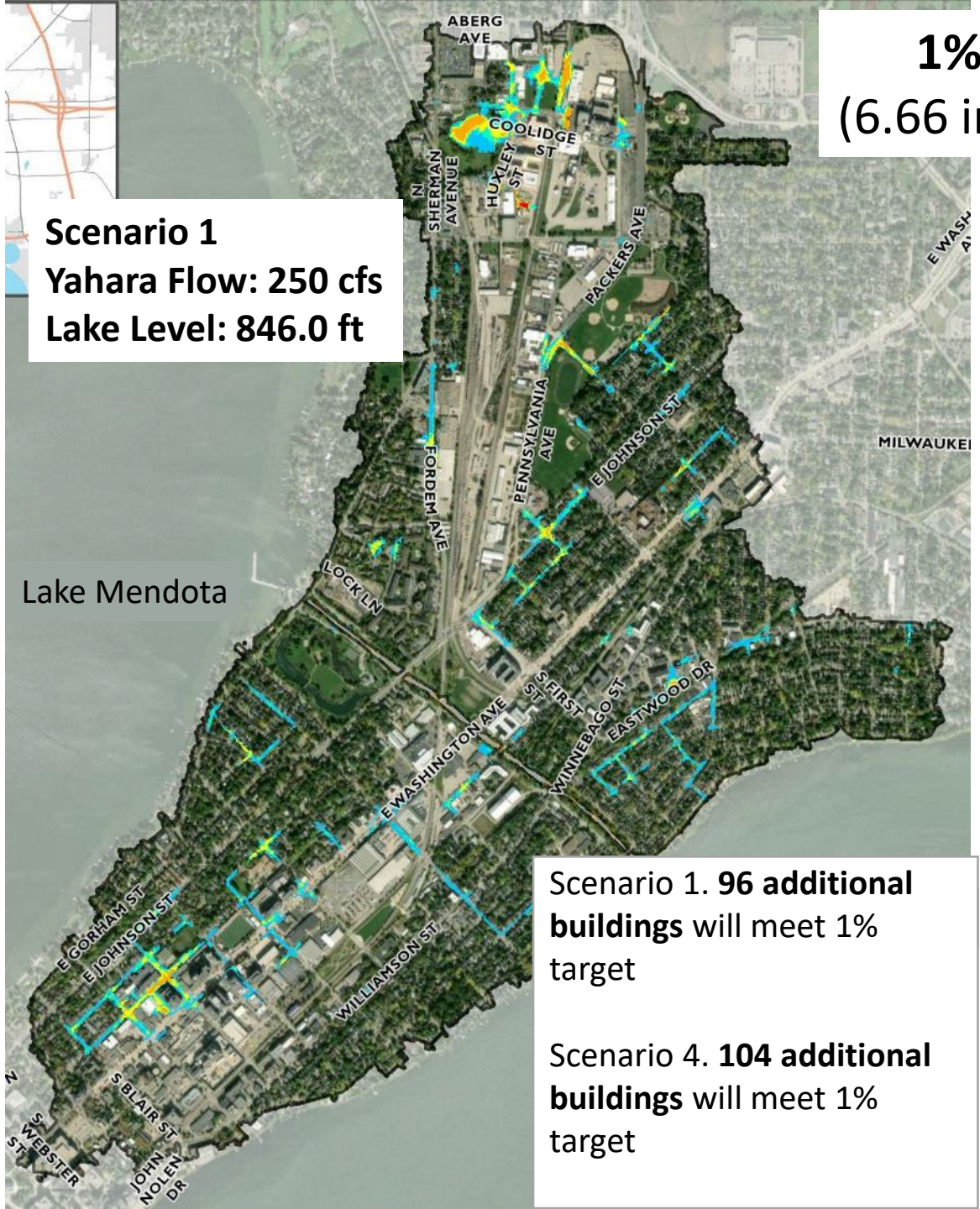
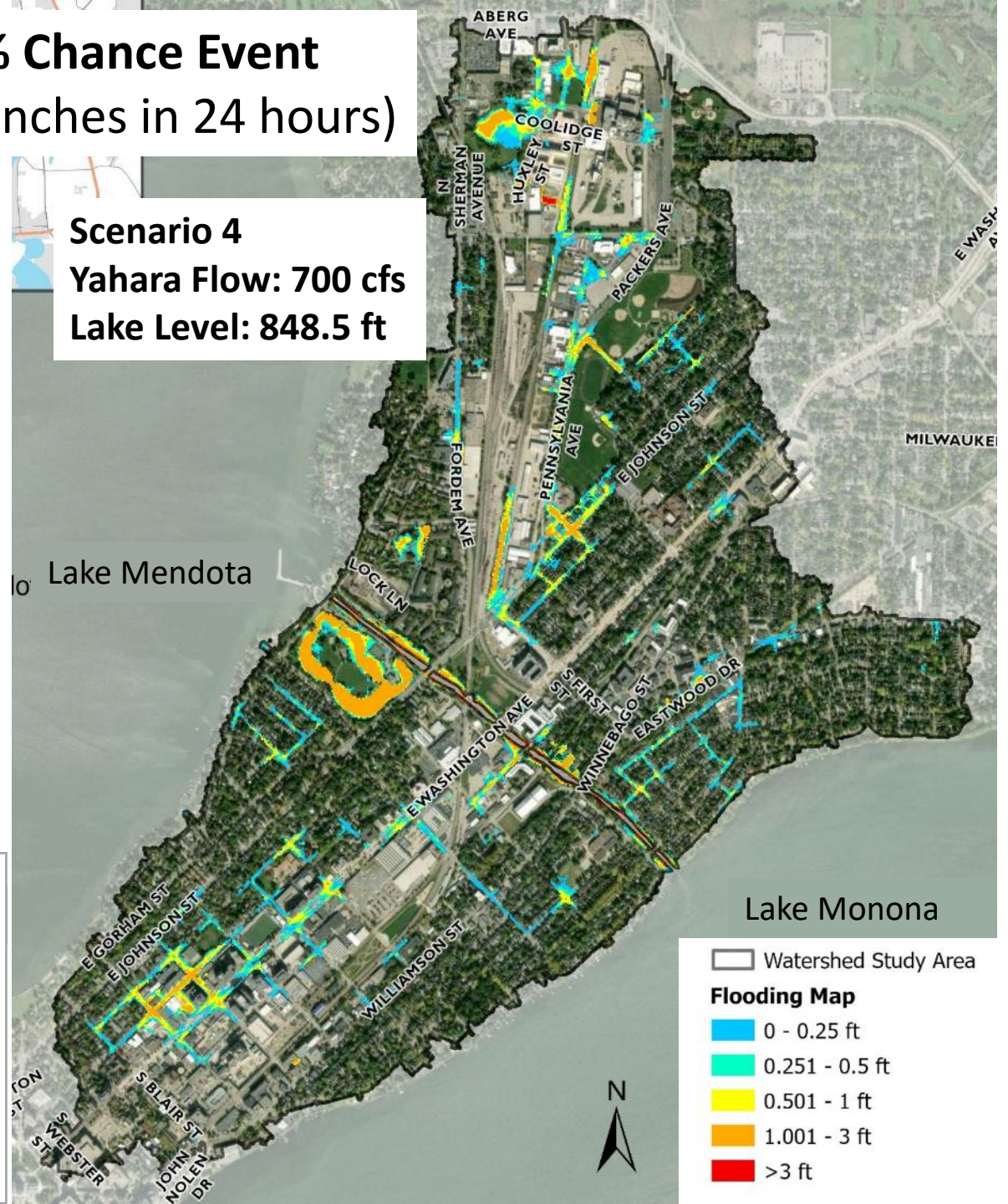
N

Proposed Conditions Inundation Mapping

1% Chance Event
(6.66 inches in 24 hours)





Scenario 1. **96 additional buildings** will meet 1% target

Scenario 4. **104 additional buildings** will meet 1% target

Dredging on Yahara River thru Isthmus- Analysis

- Modeled impact of dredging from Lake Mendota to Lake Monona to assess benefits from a flash flooding perspective with the watershed study.
- Cut of 1.5’ of bed material, totaling ~8,700 CY
- Cut of 3.5’ of bed material, totaling ~20,000 CY
- Ran both dredging depths on all 4 lake level/river scenarios in our flood models to see the impact the dredging has on flash flooding around isthmus

Scenario	Yahara River Discharge (cfs)	Lake Monona Elevation (ft)
1	250	846.0
2	700	846.0
3	700	847.5
4	700	848.5

Dredging on Yahara Thru Isthmus - Findings

- **Dredging to 838' has the largest impact on Scenario 2** (minimal for other scenarios)**.**
  - **Eliminates flooding on E Washington Ave in small storms**
  - **Does *not*** significantly reduce flooding in small storms at:
    - Johnson/Third
    - Wilson near McPike Park
    - Mifflin and Livingston (but does reduce flooding more than at other 2 locations)
  - **Little impact 10% chance (10-year) storm and larger**

→ All these benefits can be achieved with proposed pipe improvements, while also reaching flood mitigation targets for larger storms

Extremely difficult and expensive

- Corridor is a **Historic Landmark Parkway**, on the **National Register of Historic Places**
- **Difficult, Limited Access** for construciton
- **Dewatering and disposal** will be a huge undertaking, and very expensive.
- Unknowns could **significantly increase the cost**
  - **Contamination** – if landfilled, tipping fees will be cost prohibitive
  - Extensive **relocation of utilities**

- A ballpark estimate for dredging cost: **~$10M** (cost could be **significantly** higher)

Next Steps

- Finalize Report
  - Draft Final report
  - Public Comment
    - 30 days to comment on report that will be posted on the project webpage
  - Final Report Approval
    - BPW
    - BPC
- Implement solutions as part of Capital Improvement Plan Budgeting Process

Questions/Discussion