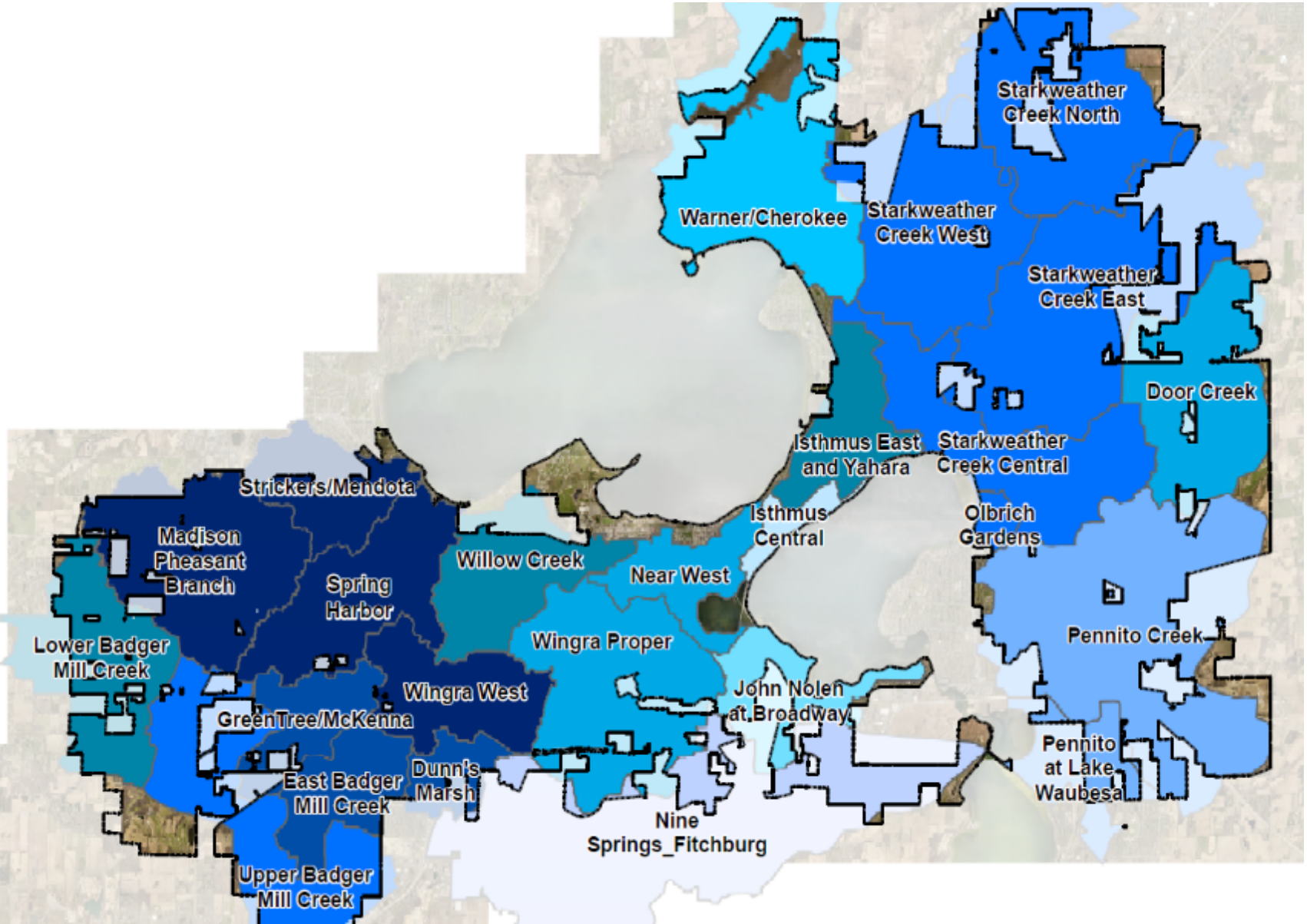
Pheasant Branch Watershed Study Solutions

by City of Madison Engineering Division

February 22, 2023

Watershed Study Phasing



Legend

Municipal Boundary

Watershed Study Areas

Start Year and Month

- 2019 March
- 2019 July
- 2020 March
- 2021 March
- 2022 March
- 2023 March
- 2024 March
- 2025 March
- 2026 March
- 2027 March

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Schedule

Spring - Fall 2019

Create and Calibrate Model

Summer 2020

*2nd Public Meeting**

Winter 2021/2022

3rd Public Meeting

Fall 2019 - Winter 2020

Identify Flood Impacts

Spring 2020 - Winter 2021/2022

Evaluate Solutions

Winter 2022/2023

Finalize Study

*Presentations from PIM1 and PIM 2 can be found on the Watershed Study Website

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Pheasant Branch Watershed Report Milestones

- PIM 1: 5/4/2019
- PIM 2: 6/16/2020
- PWI : 12/3/2020
- PIM 3: 2/10/2022
- Report Final Draft finished : 10/26/2022
  Report Public comment periods 8/2/2022-9/2/2022
- BPC : February, 2023
- BPW: February, 2023

- FINAL REPORT:
- https://www.cityofmadison.com/engineering/documents/projects/Pheasant_Branch_Watershed_Study_Final_Report.pdf

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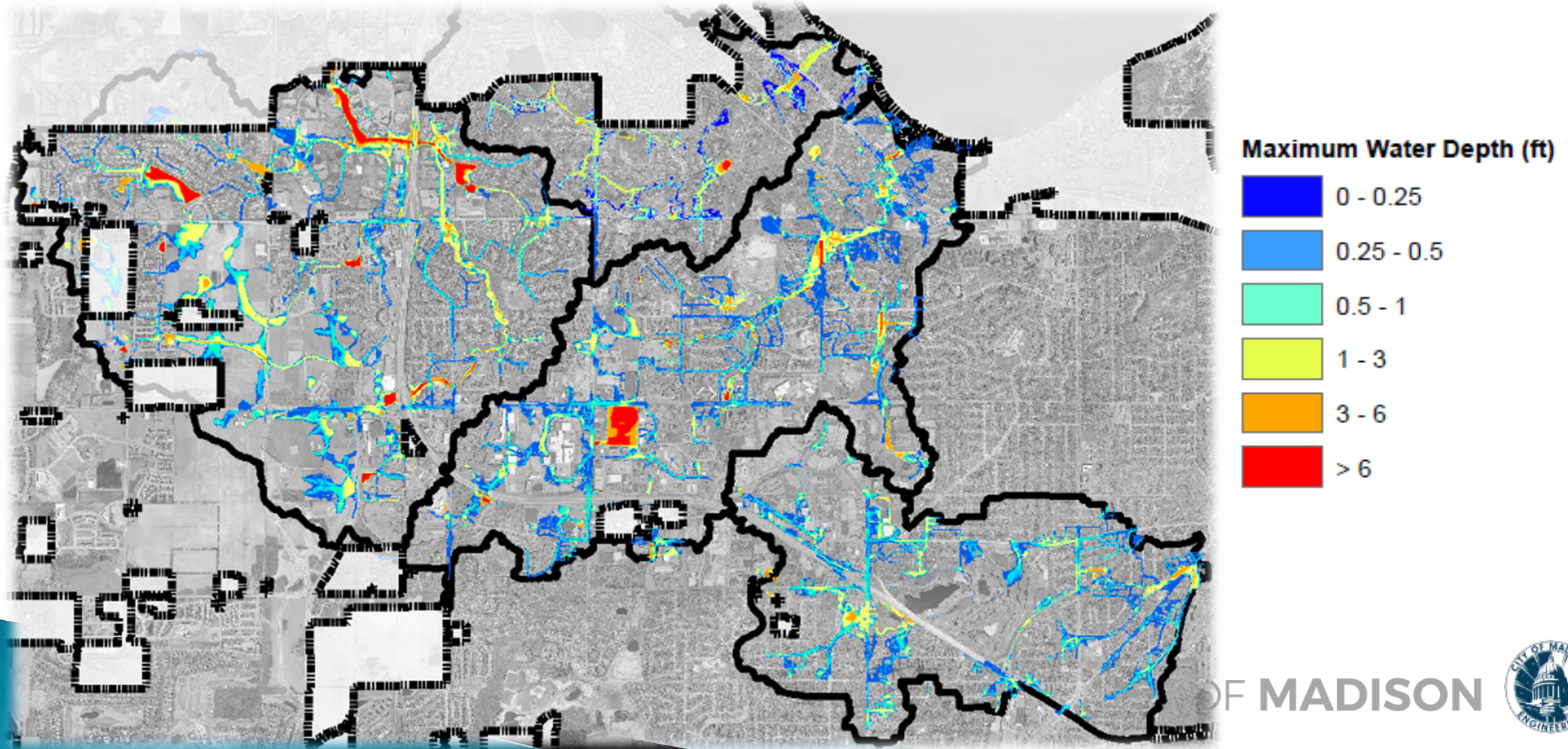
Existing Conditions 1% Chance (100-yr) Event Inundation Mapping



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Proposed Solutions – *Concepts Only**

1. Old Sauk Trails Business Park Pond and Greenways
2. Pleasant View Road Reconstruction*
3. Swallowtail Pond Reconstruction*
4. Blackhawk Pond Reconstruction
5. Wexford Pond and Greenway Reconstruction
6. Sauk Creek Greenway Reconstruction
7. Target Area Relief Sewer
8. Old Sauk Road/Westfield Intersection Reconstruction
9. Greenway Crossing Reconstruction
10. Local Road Sewer Improvements
11. Regional Pond Land Reserves
12. Terrace Inlet Installation
13. MGO 37 Recent Revisions
14. Impact on Middleton
15. Green Infrastructure Analysis

*Only solutions in design phase – WisDOT projects

All Inundation Depths on Following Proposed Solutions Sides are for 1% Chance Event

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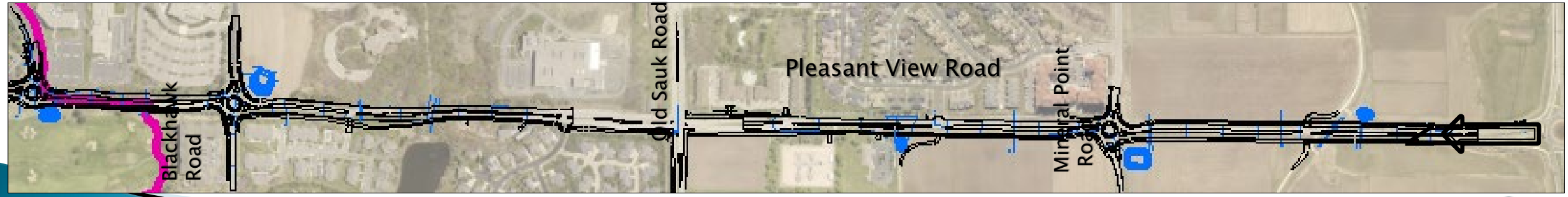
1. Old Sauk Trails Business Park Pond and Greenway Reconstruction

Challenges

- Sanitary Sewer conflicts
- Trees
- Cost
  - $9,600,000
  - Will be receiving FEMA BRIC Grant $6.6M +/-
  - Design will begin 2023

2. Pleasant View Road Reconstruction

- Phase I: University Avenue (Middleton) to Old Sauk Road (Madison)
- Phase II: Old Sauk Road to Mineral Point Road
- Separate Public Outreach for Project
- Stormwater sized to meet current flood mitigation targets
- Phase 1 work to begin late February 2023



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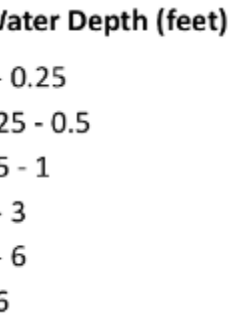
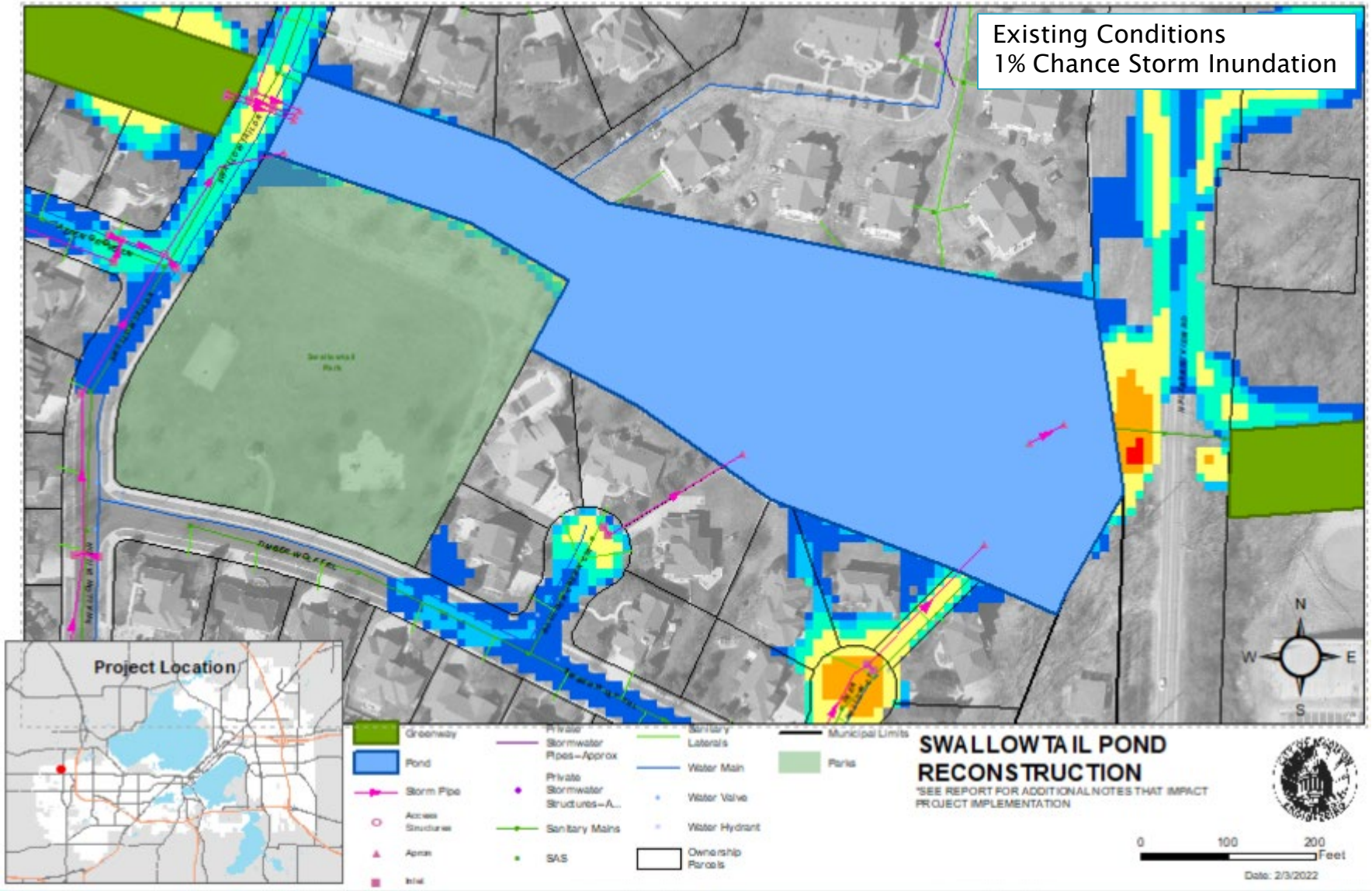
3. Swallowtail Pond Reconstruction

Flooding Issues

- 10% chance storm road impassability
- 1% chance storm inundation of structures





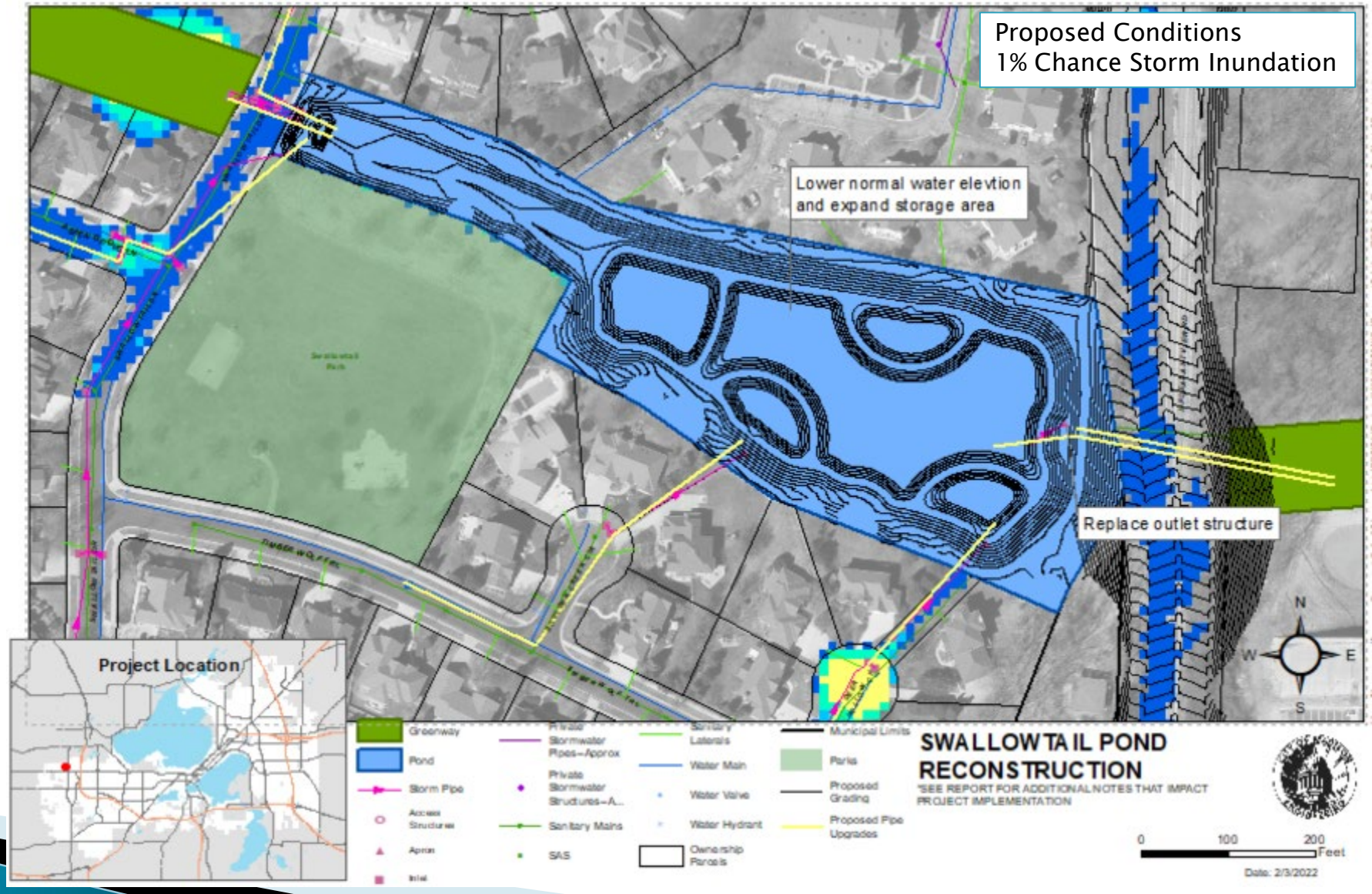
3. Swallowtail Pond Reconstruction

Proposed Improvements

- Excavate existing pond area
- Re-construct outlet structure

Reduced Flood Risk

- Removes 4 structures from 1% chance flood risk
- Improves street passability for 140 feet of streets
- Reduces flood risk of downstream properties



3. Swallowtail Pond Reconstruction

Challenges

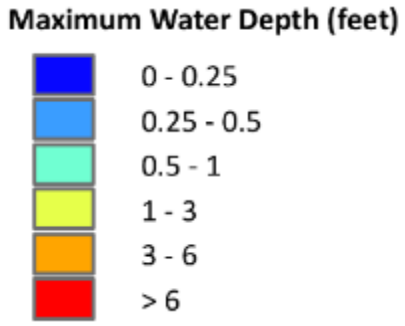
- Design for maintenance crew access
- Sanitary sewer relocation/lowering

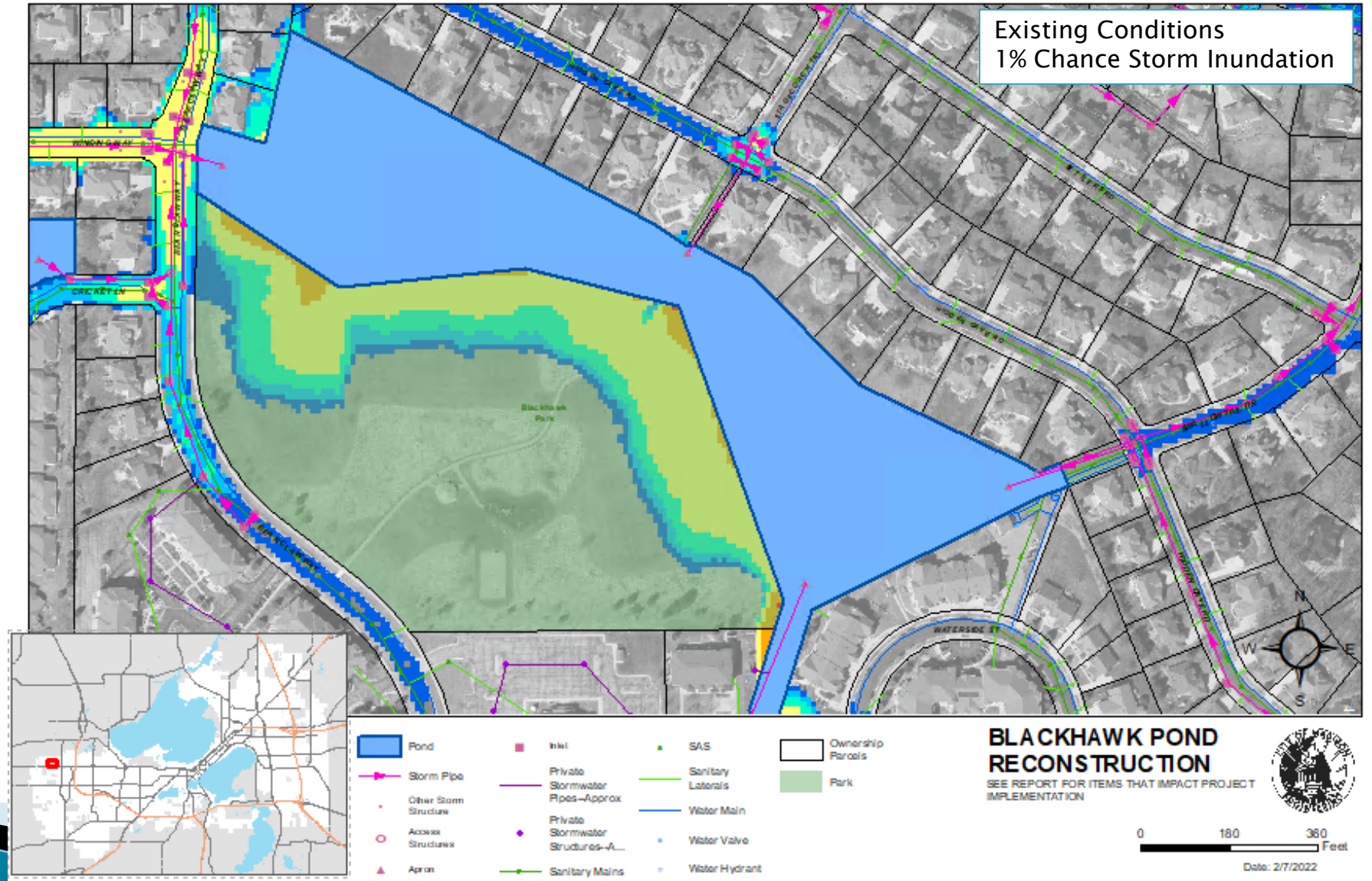
➢ Construction to start late February, 2023

4. Blackhawk Pond Reconstruction

Flooding Issues

- 10% chance storm road impassability
- 1% chance storm inundation of structures





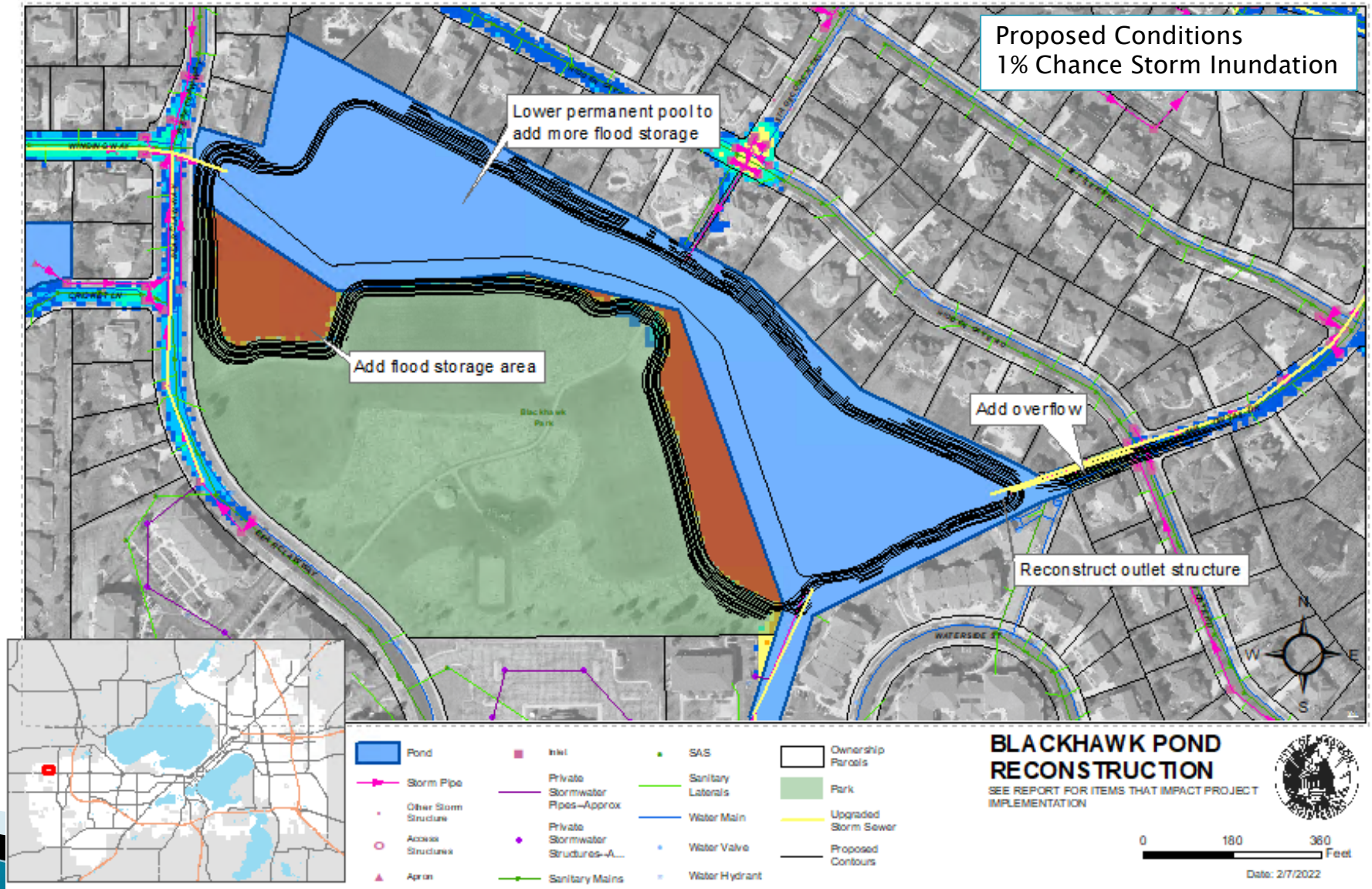
4. Blackhawk Pond Reconstruction

Proposed Improvements

- Lower pond normal pool
- Add storage
- Re-construct outlet structure
- Add pond overflow

Reduced Flood Risk

- Removes 3 structures from 1% chance flood risk
- Improves street passability for 1,650 feet of streets
- Reduces flood risk of downstream properties



4. Blackhawk Pond Reconstruction

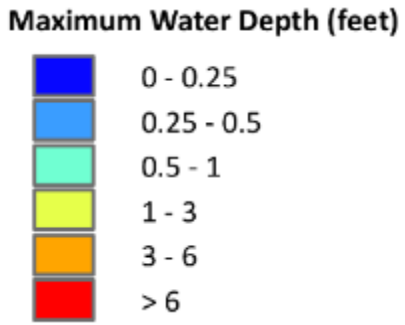
Challenges

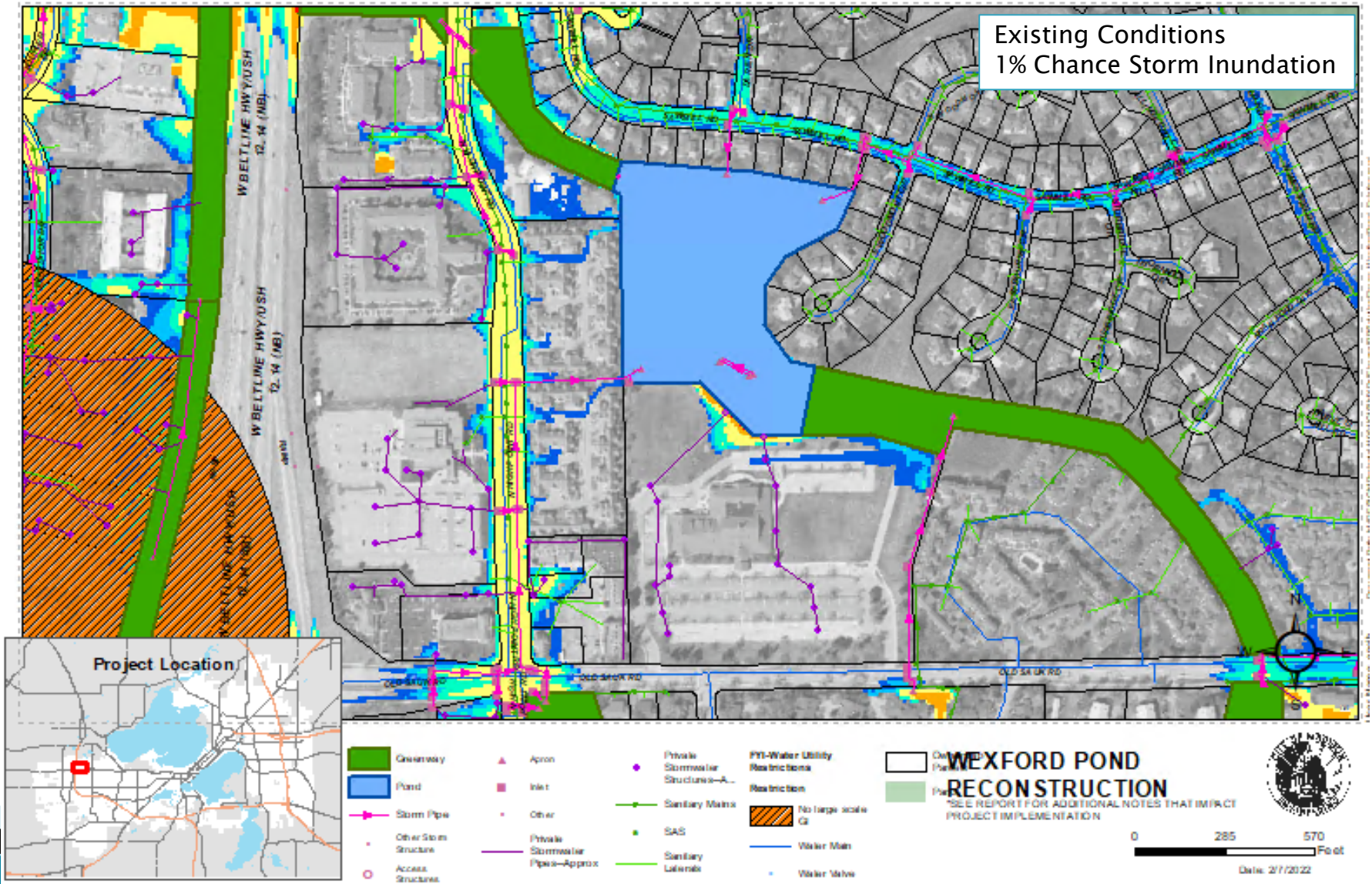
- Impacts City of Madison Parks Property
- Overflow requires modification to street
- Cost
  - $6,900,000
  - City looking for grant opportunities

5. Wexford Pond Reconstruction

Flooding Issues

- 10% chance storm road impassability
- 1% chance storm inundation of structures





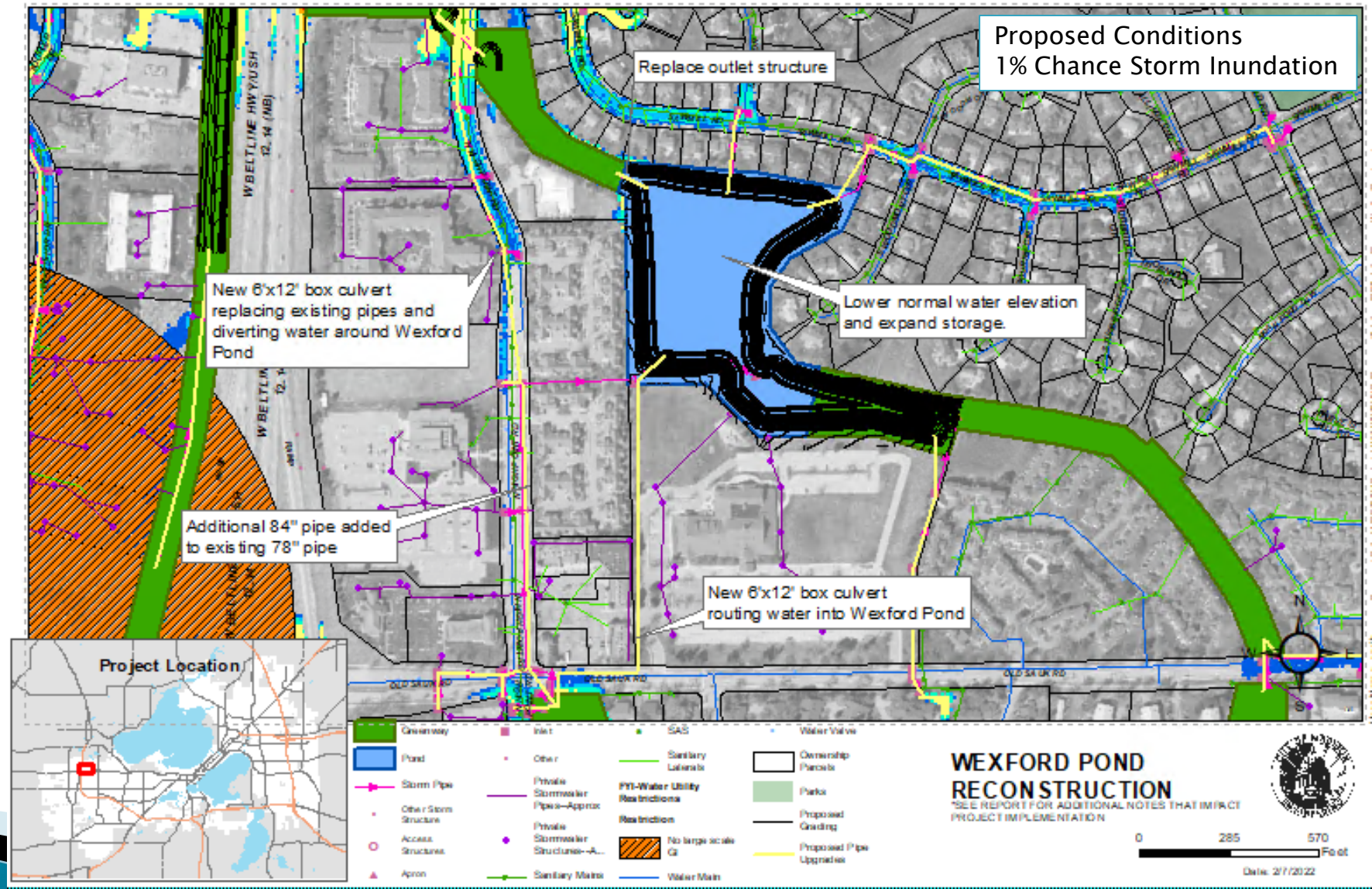
5. Wexford Pond Reconstruction

Proposed Improvements

- Lower pond normal pool
- Add storage
- Re-construct outlet structure
- Add pond bypass

Reduced Flood Risk

- Removes 5 structures from 1% chance flood risk
- Improves street passability for 436 feet of streets
- Reduces flood risk of downstream properties



5. Wexford Pond Reconstruction

Challenges

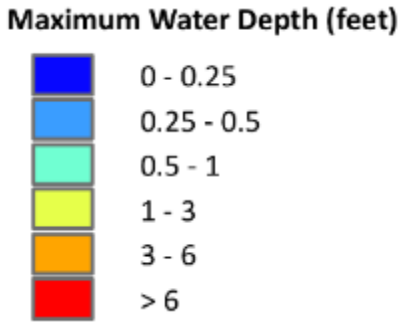
- Construction and Maintenance Access
- Outlet capacity limited by downstream conditions
- Cost: $4,800,000

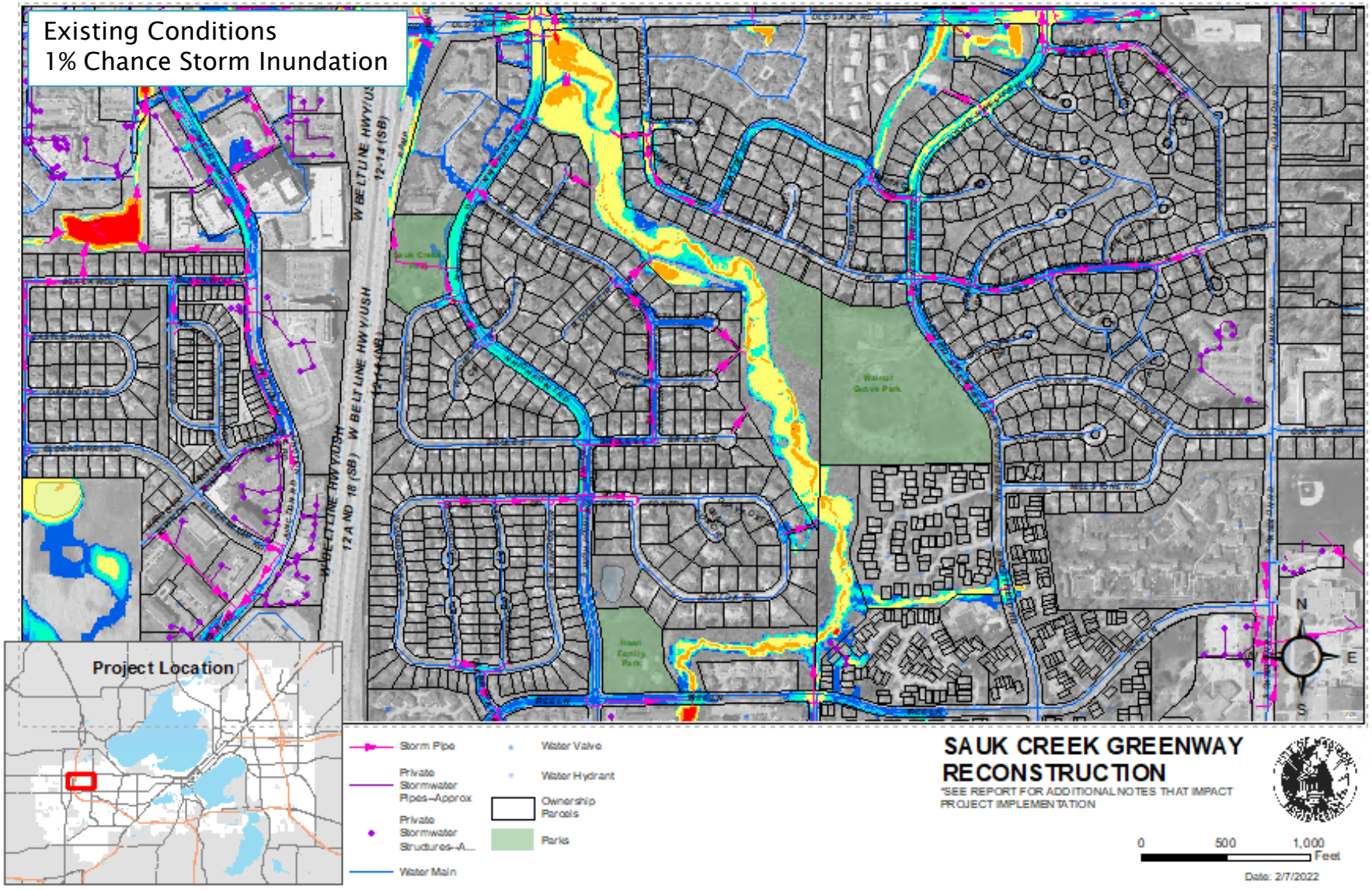
- Immediate project will be dredging only – in design
- PIM for dredging will be held soon
- Watershed study solution constructed after downstream conditions addressed

6. Sauk Creek Greenway Reconstruction

Flooding Issues

- 10% chance storm road impassability
- 1% chance storm inundation of structures





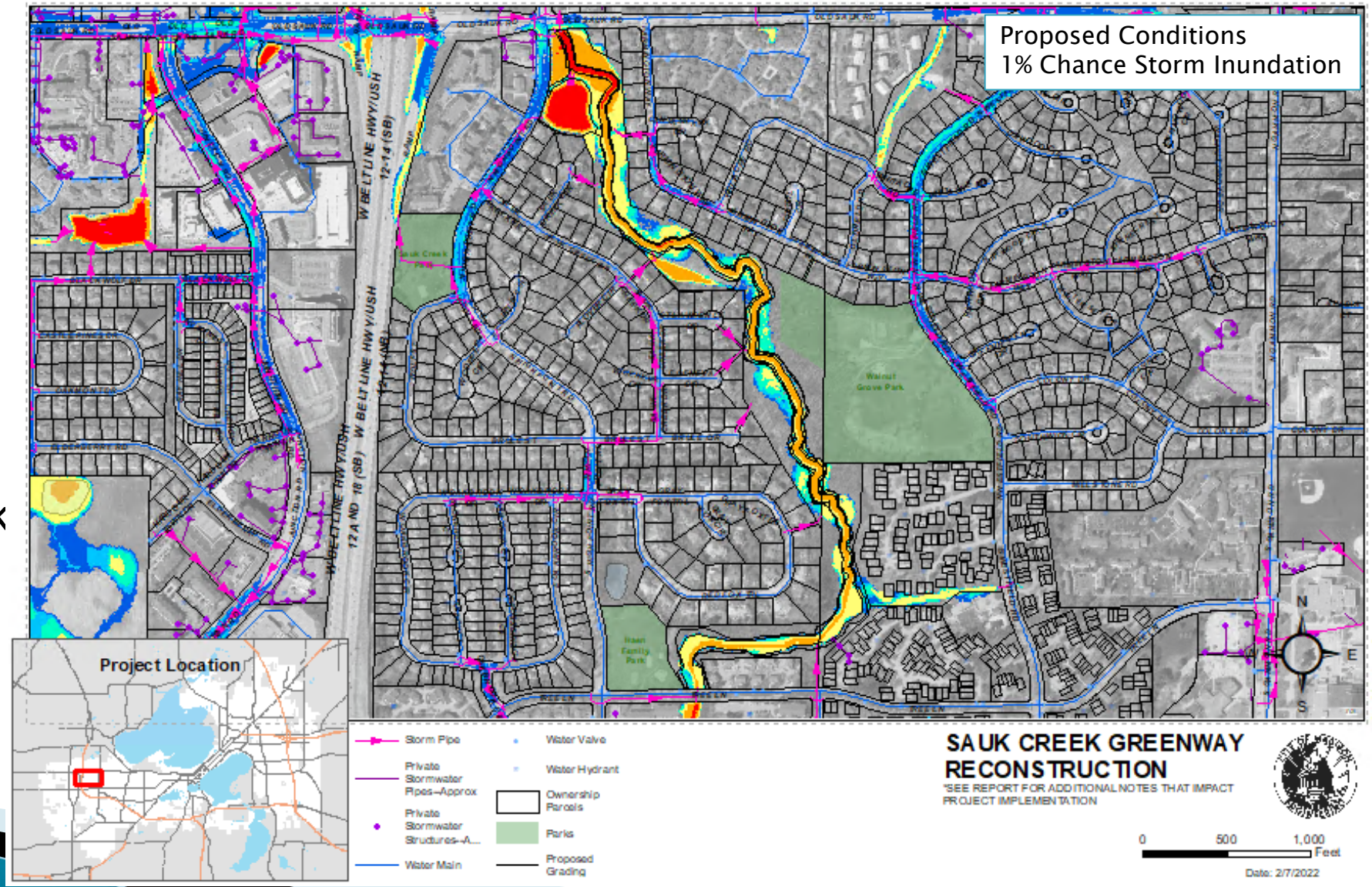
6. Sauk Creek Greenway Reconstruction

Proposed Improvements

- Regrade main channel
- Stabilize channel
- Add some additional storage

Reduced Flood Risk

- Removes 2 structures from 1% chance flood risk
- Reduces flood risk of downstream properties



6. Sauk Creek Greenway Reconstruction

Challenges

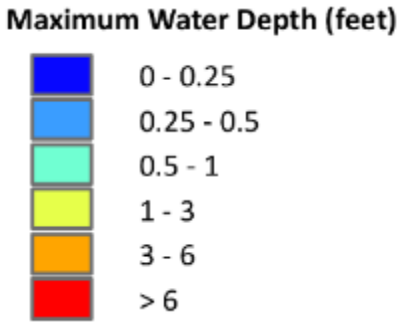
- Construction and Maintenance Access
- Quality tree preservation
- Accommodate additional flow as watershed develops
- Cost: $4,000,000

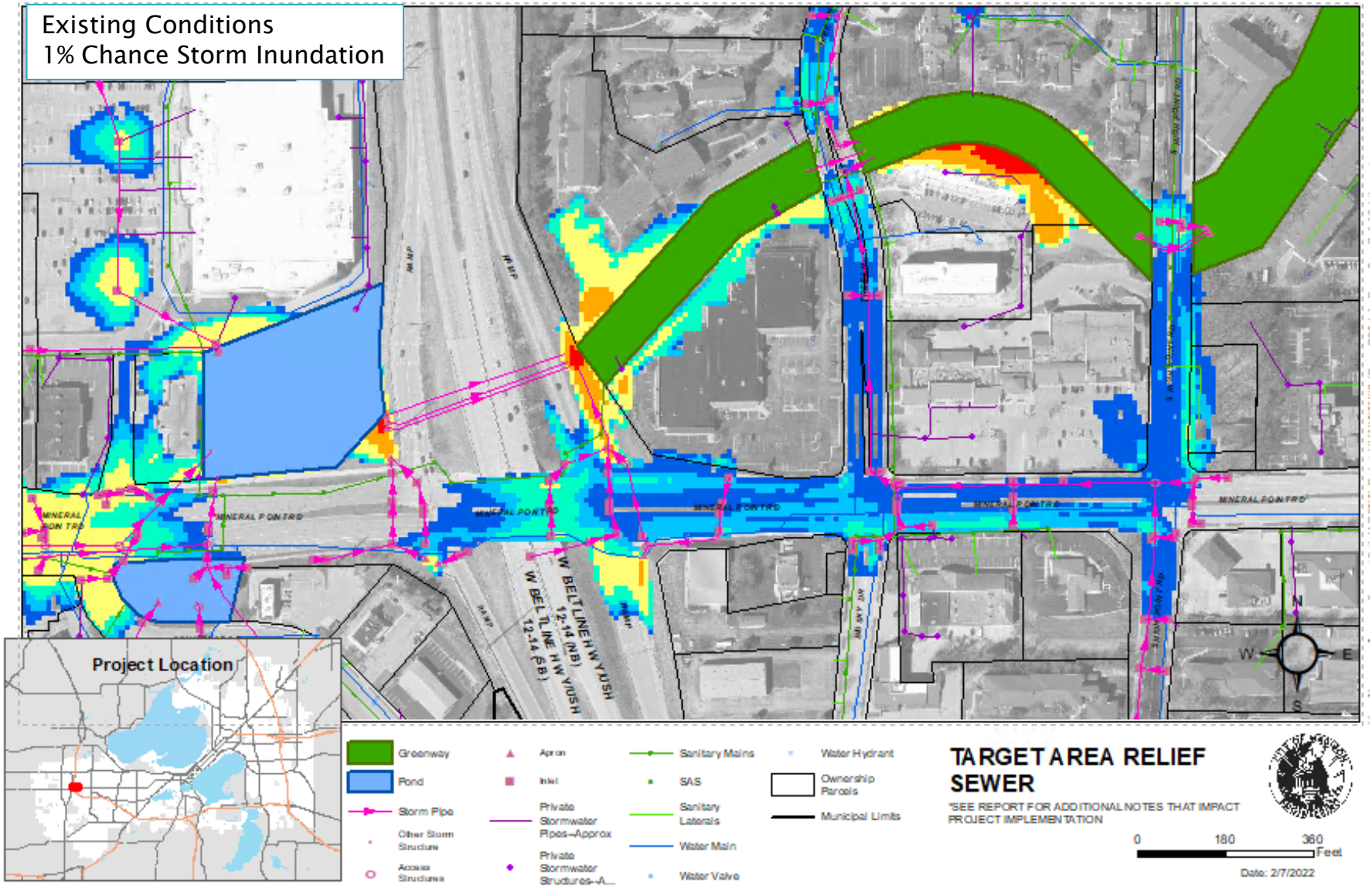
- Project in design
  - Collecting survey for detailed design
  - PIM for project will be held in spring 2023 to restart engagement

7. Target Area Relief Sewer

Flooding Issues

- 10% chance storm road impassability
- 1% chance storm inundation of structures





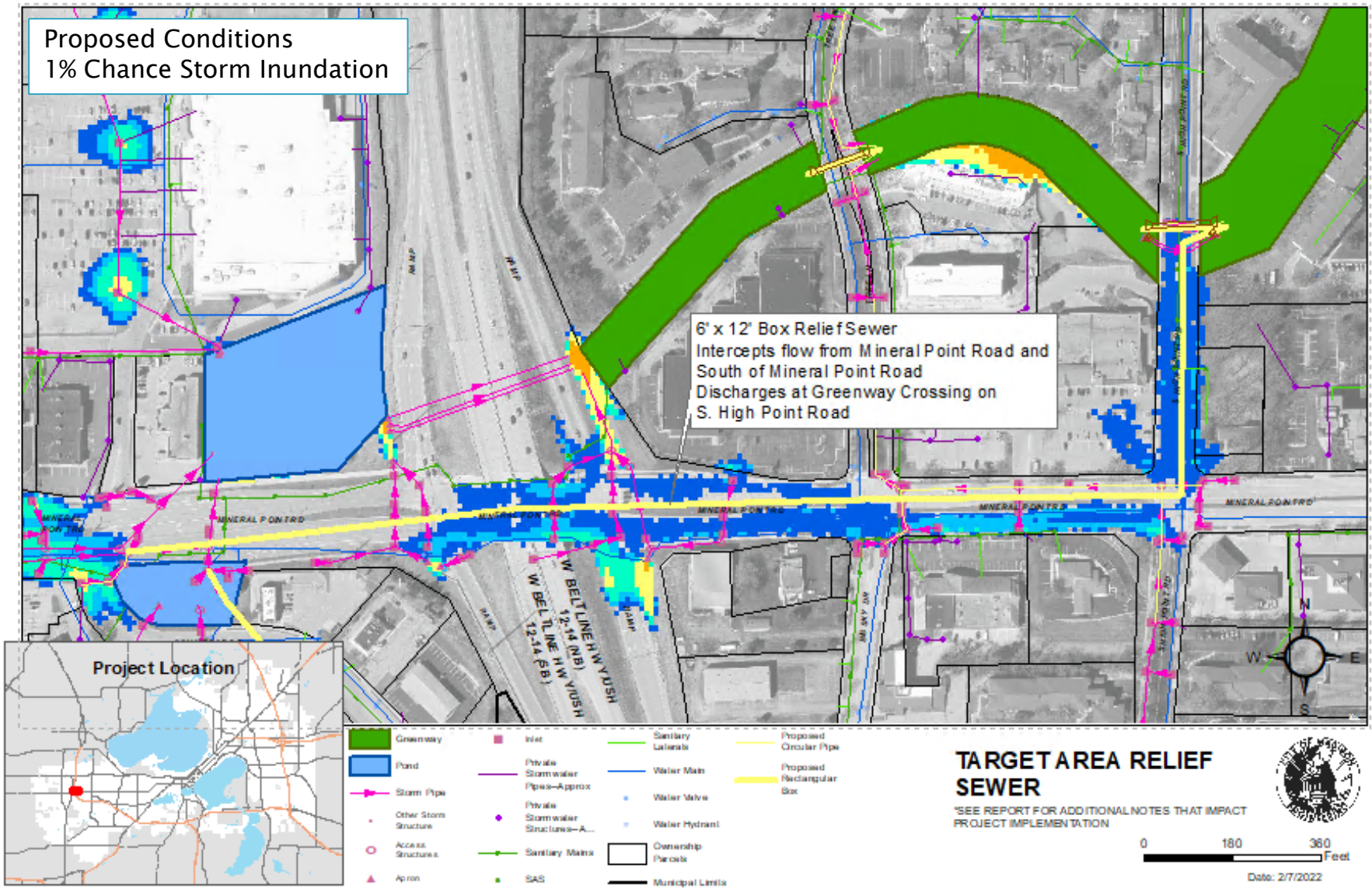
7. Target Area Relief Sewer

Proposed Improvements

- Install box culvert to bypass two trunk sewers around Target Pond

Reduced Flood Risk

- Removes 1 structure from 1% chance flood risk
- Improves street passability for 150 feet of streets
- Reduces flood risk of upstream properties



7. Target Area Relief Sewer

Challenges

- Major arterial road
- Portion of construction occurs under Beltline
- Utility conflicts
- Cost: $11,100,000

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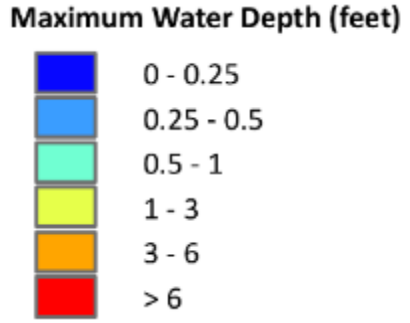
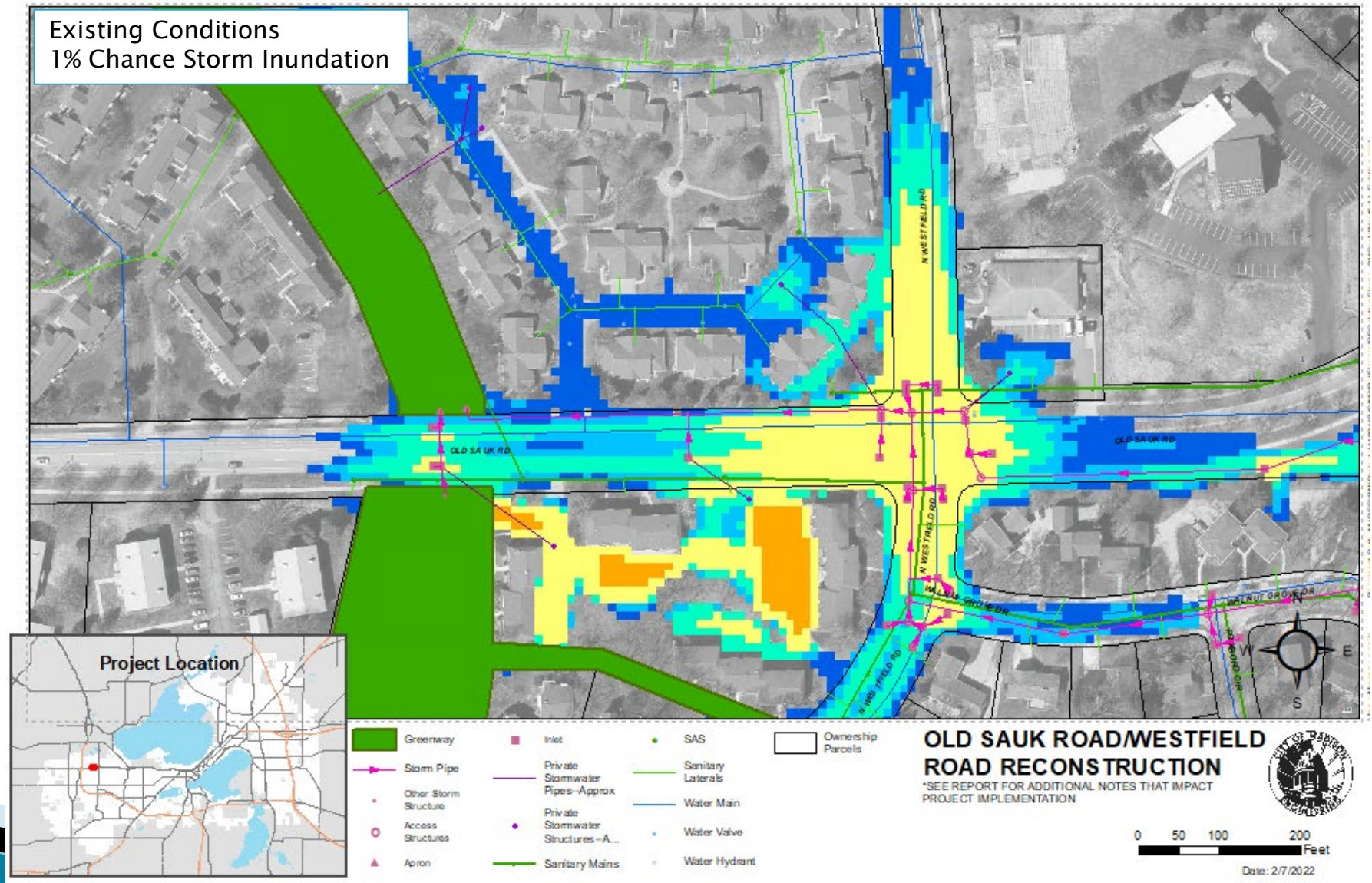
8. Old Sauk Road/Westfield Road Intersection Reconstruction

Flooding Issues

- 10% chance storm road impassability
- 25% chance storm road impassability





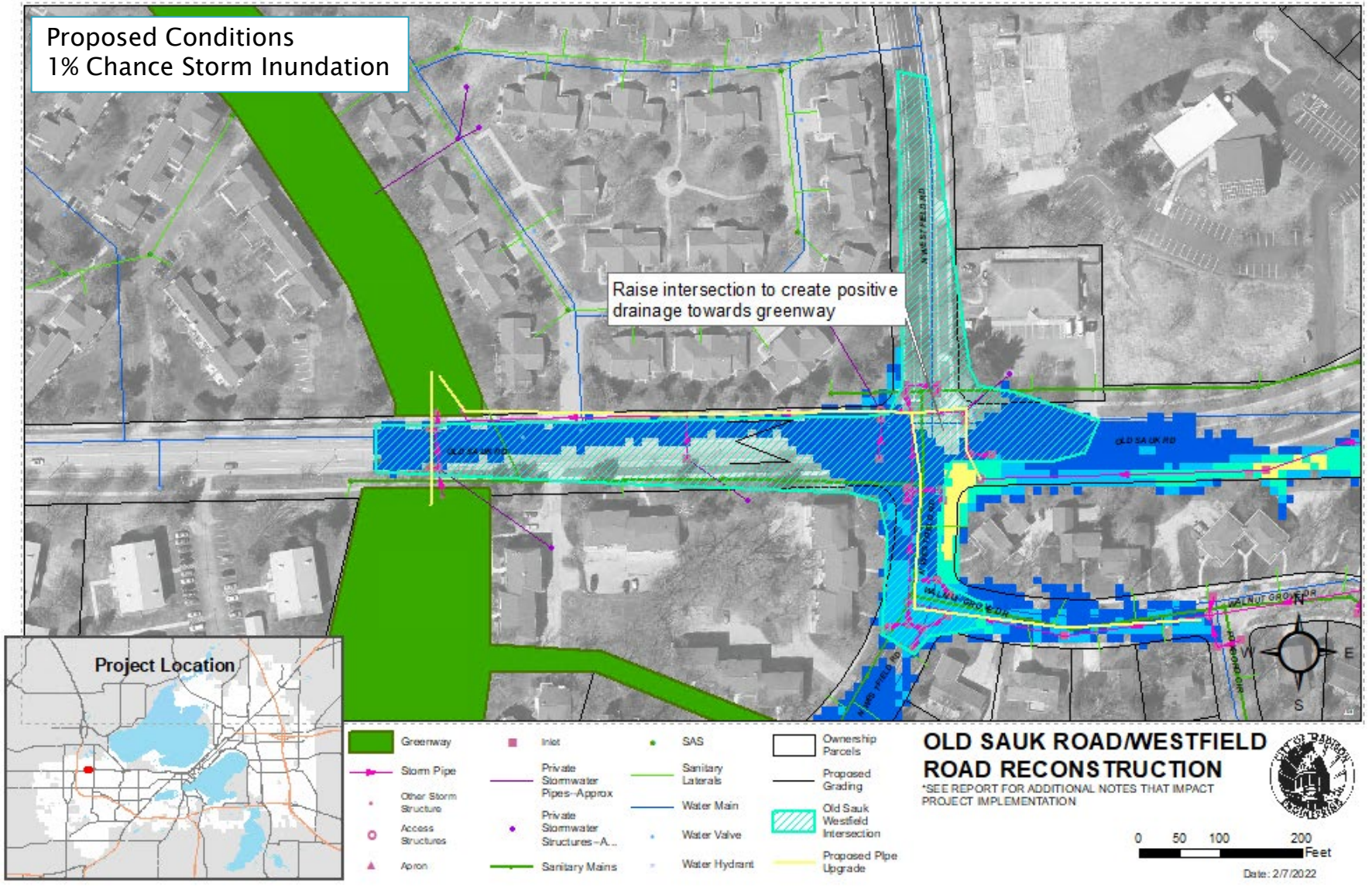
8. Old Sauk Road/Westfield Road Intersection Reconstruction

Proposed Improvements

- Raise intersection by 1-2 feet
- Upsize storm sewer serving intersection

Reduced Flood Risk

- Removes 3 structures from flood risk
- Improves street passability for 670 feet of streets



8. Old Sauk Road/Westfield Road Intersection Reconstruction

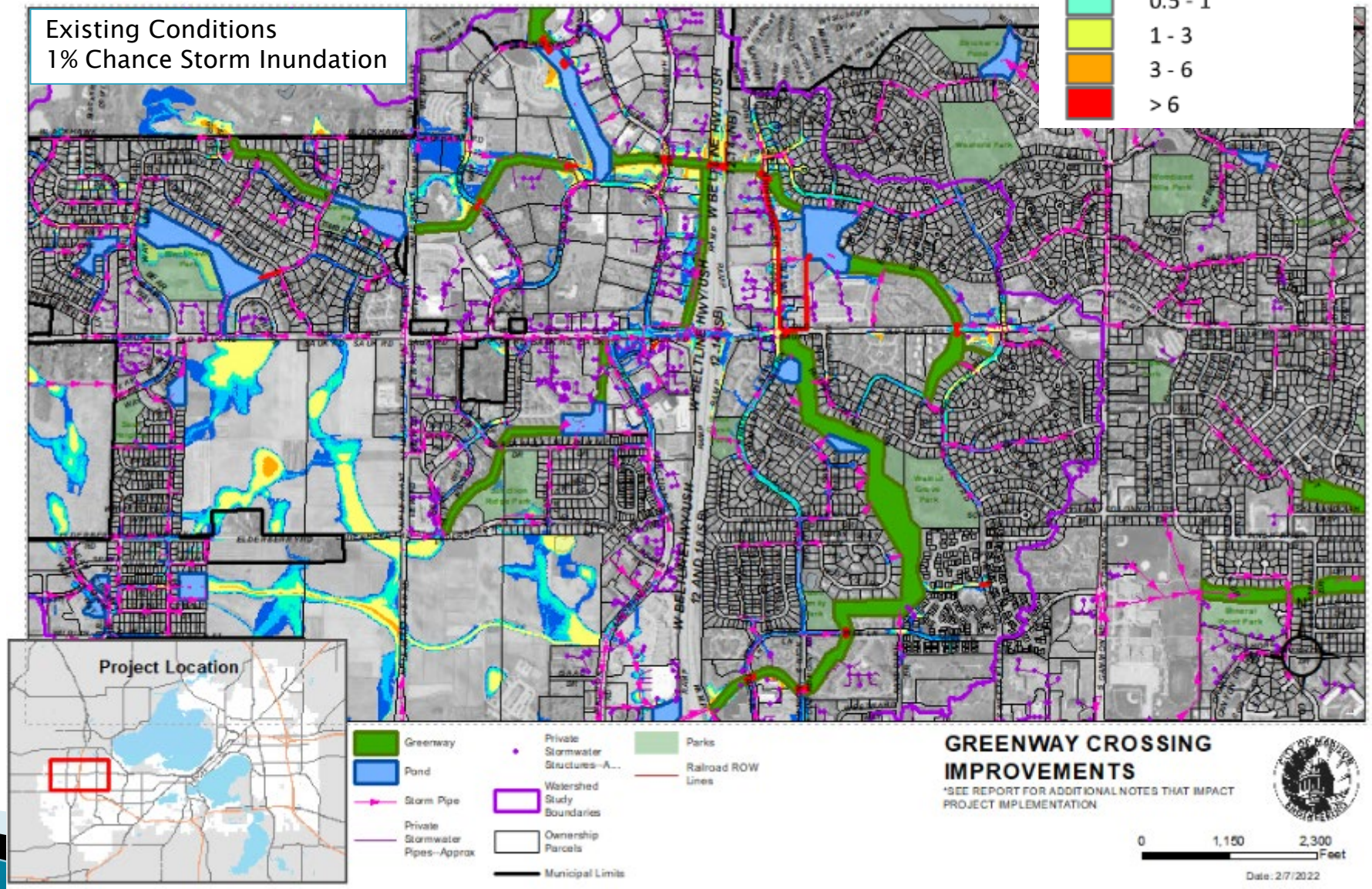
Challenges

- Major arterial road
- Minor driveway conflicts
- Utility conflicts
- Cost: $1,900,000

9. Greenway Crossing Reconstruction

Flooding Issues

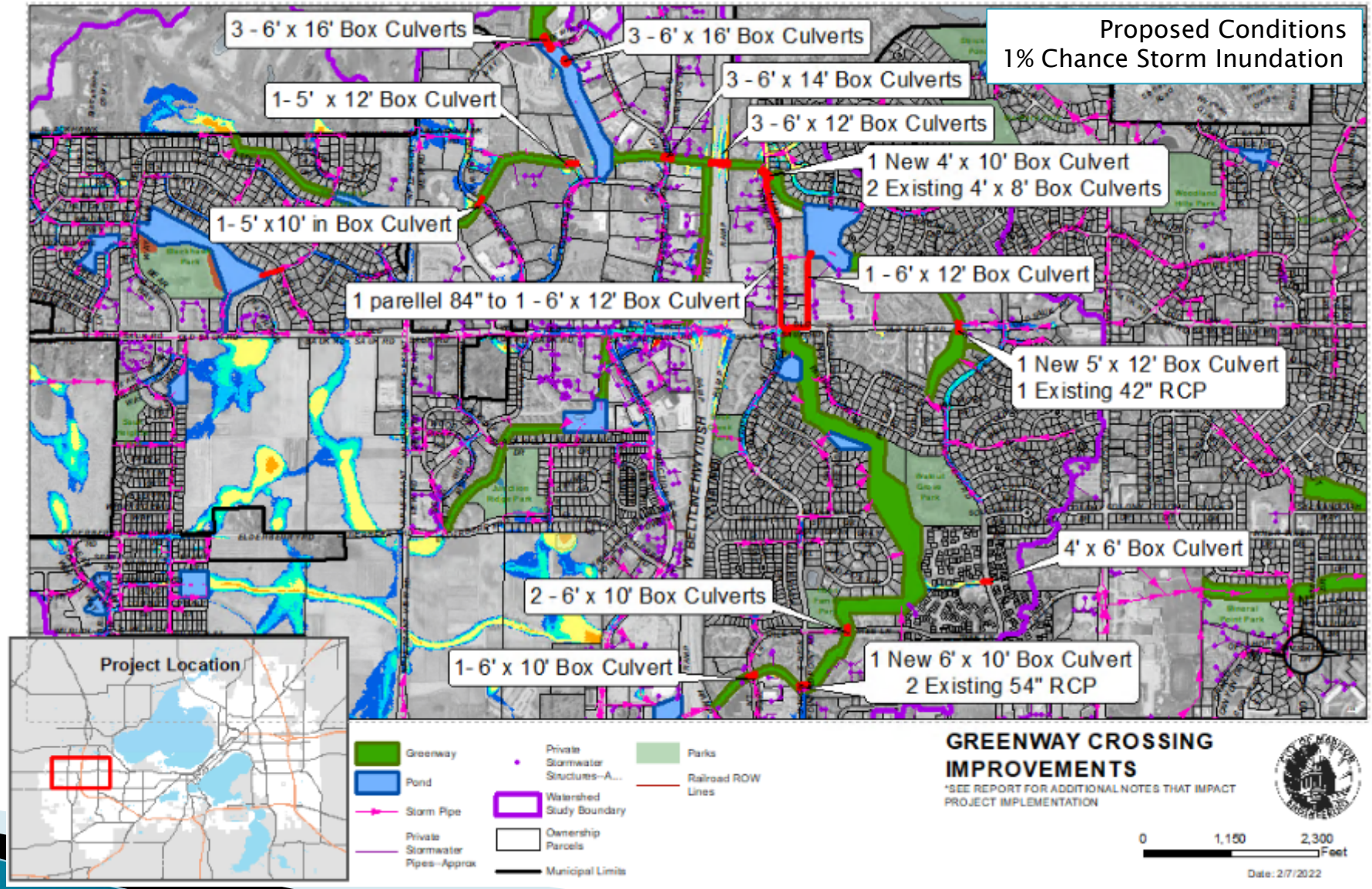
- Road overtopping



9. Greenway Crossing Reconstruction

Objective

- Eliminate roadway overtopping in 1% chance event

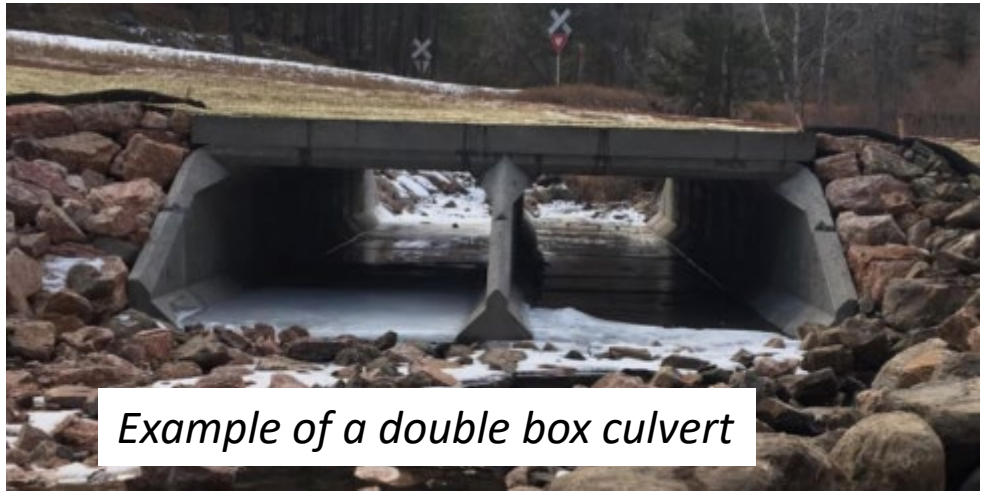


9. Greenway Crossing Reconstruction

Challenges

- Utility conflicts
- Depth of greenway to road
- Cost: $400,000 - $9,800,000

Example of a single box culvert



Example of a double box culvert

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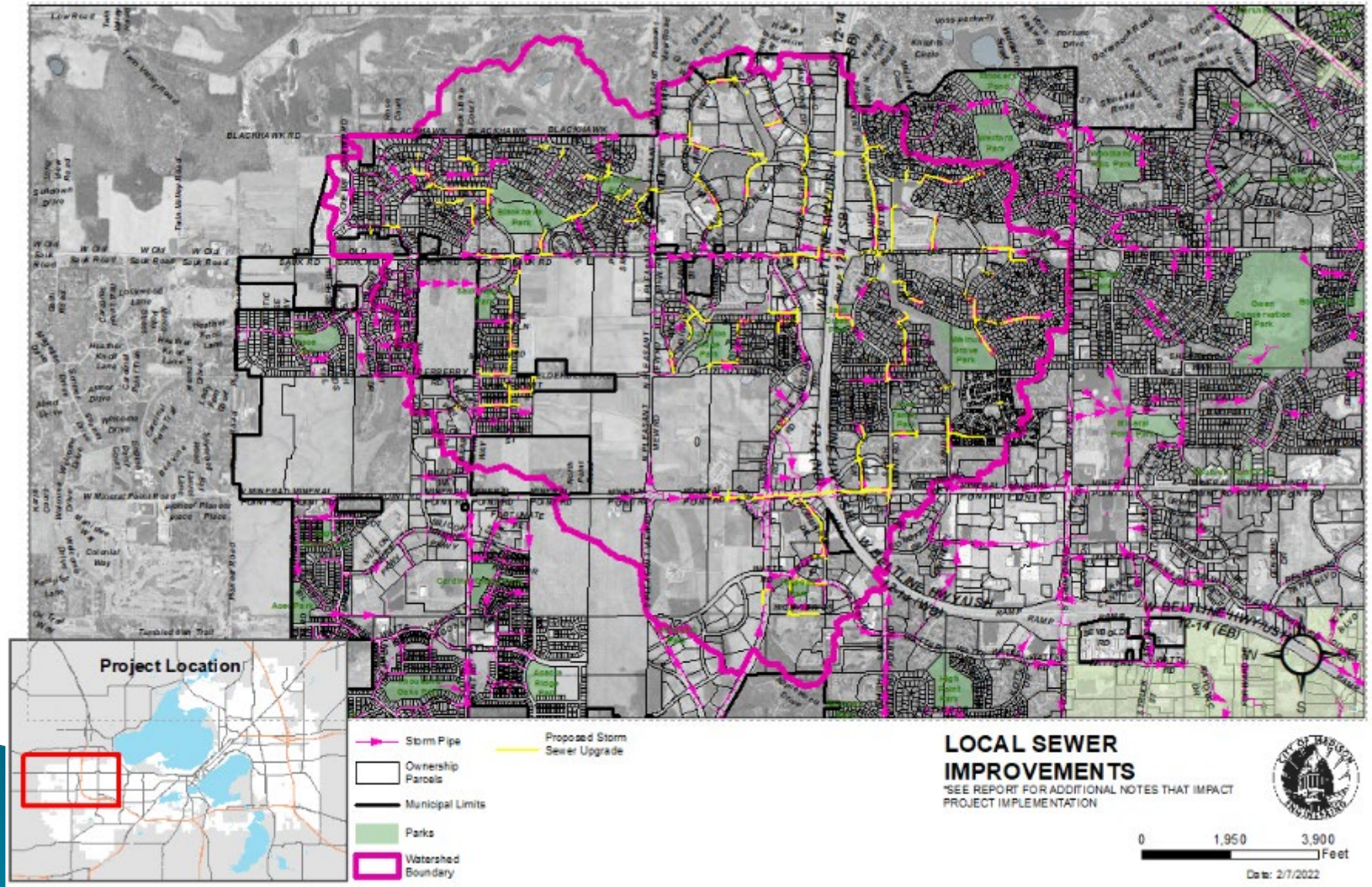
10. Local Storm Sewer Improvements



- Will be implemented in conjunction with street reconstruction projects
- Long-term process
  - Streets resurfaced about every 30 years
  - Reconstructed about every 75 years

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11. Theoretical Regional Pond Land Reserves

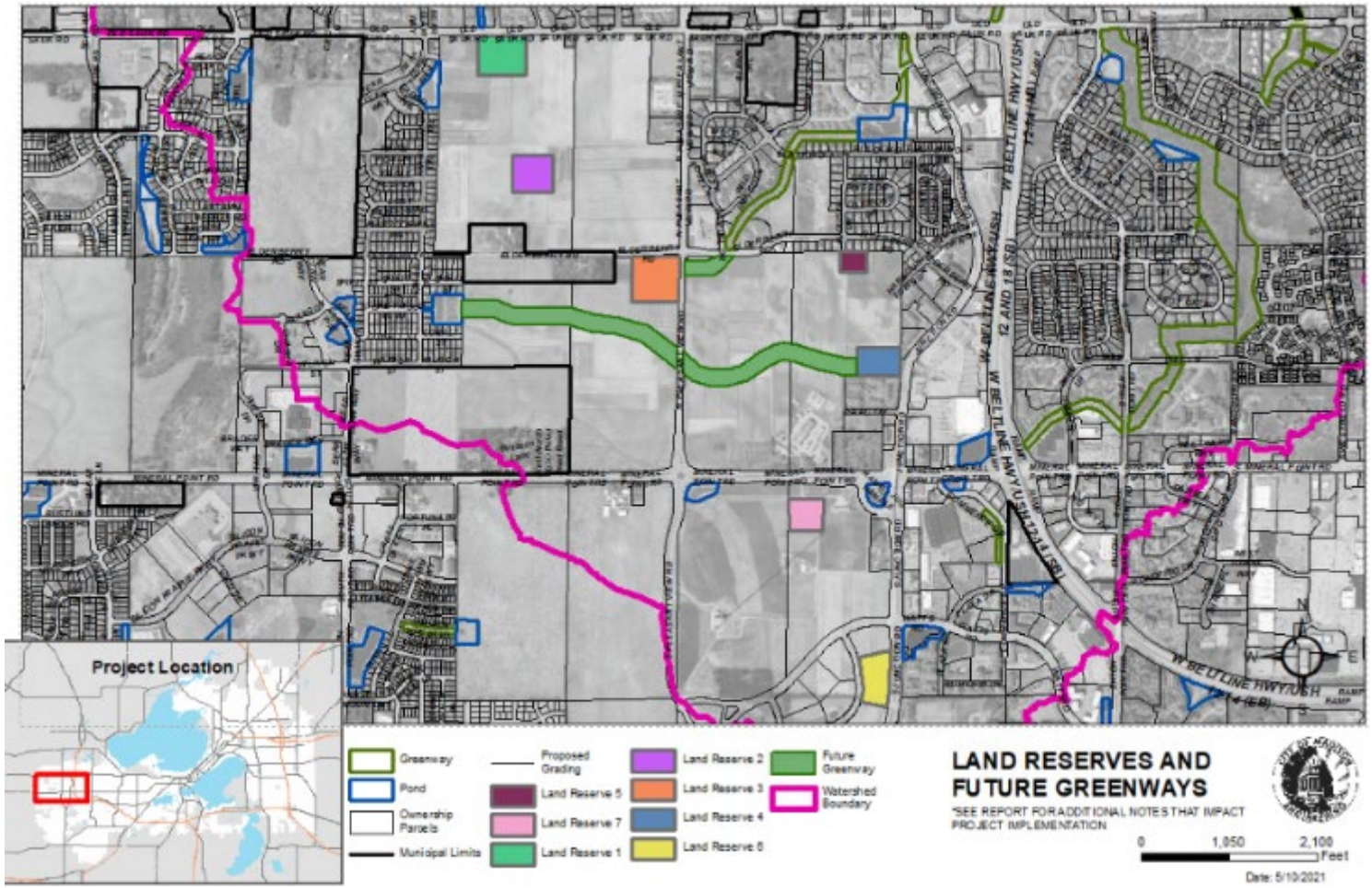
- A shape of land to store current water that ponds

Land Reserve	Unintended Detention Volume (ac-ft)	Area of Land[1]	Area of Land with Buffer[2]
1	17.1	5.7	6.2
2	12.9	4.3	4.8
3	18.9	6.3	6.8
4	10.4	3.5	3.9
5	4.5	1.5	1.8
6	12.4	4.1	4.6
7	9.4	3.1	3.5

[1]Assuming 3 feet deep

[2] 4:1 side slopes plus 10 foot outer buffer

- Ordinance requires land developers account for this existing water when land is developed



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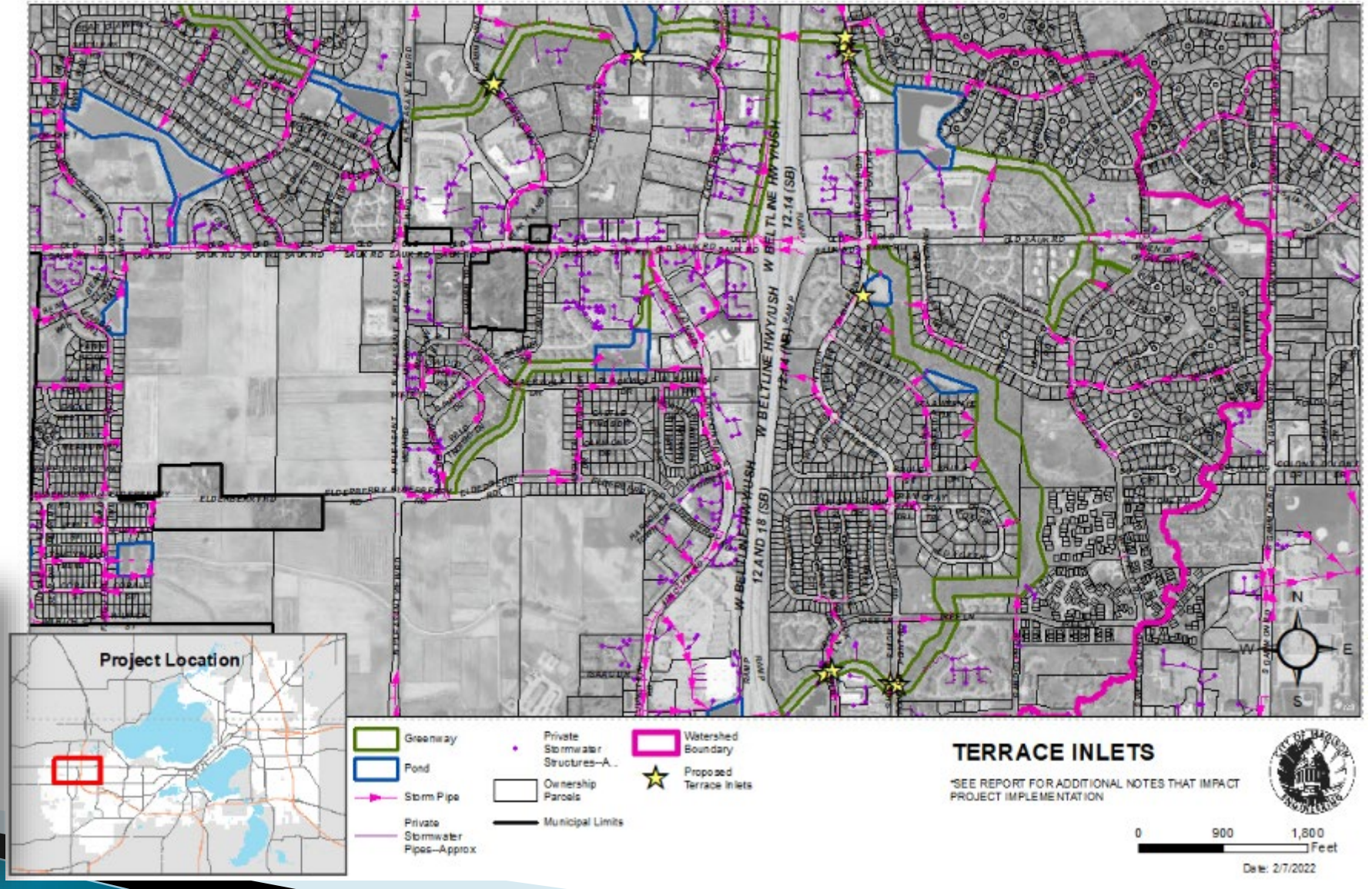
12. Terrace Inlet Installation

- Installed in 2021
- Locations chosen based on where stormwater cannot discharge to channels

Street Inlet

Terrace Inlet

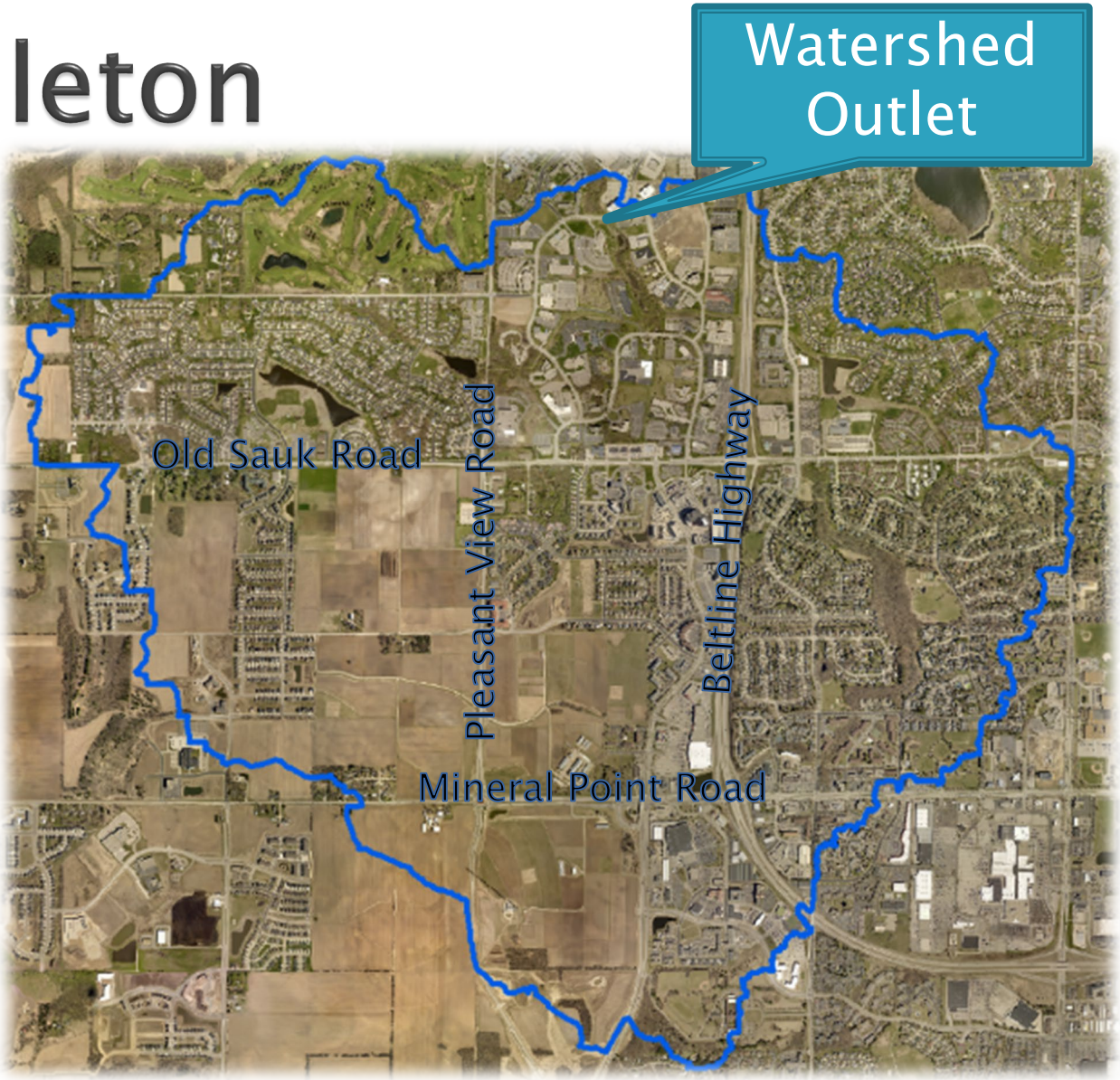


13. Municipal Government Ordinance (MGO) 37 Recent Revisions

- New Development
  - Added 0.5% chance detention requirement
  - Increased sizing standards for greenway crossings
  - Low building openings for critical areas
- Re-Development
  - Reduce 10% chance peak flow by 15%
  - Reduce 10% chance runoff volume by 5%
  - Green Infrastructure required
  - Low building openings for critical areas
- Utilize models created for watershed studies

14. Impact on Middleton

- This watershed discharges into Middleton
- Target:
  - No adverse impacts downstream of watershed
- Model results show:
  - Ultimate proposed peak water surface elevation less than existing
  - Ultimate proposed peak flow equal to or less than existing



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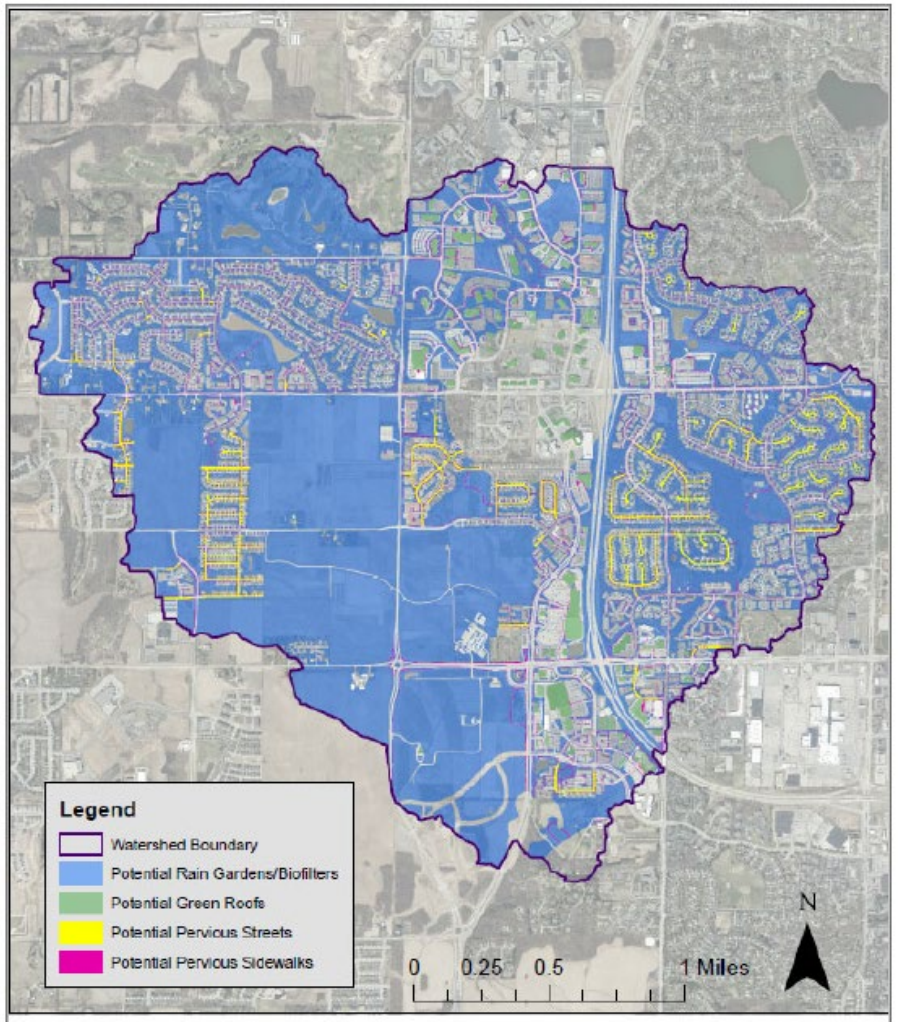
15. Green Infrastructure Analysis

- Evaluated Green Infrastructure as Flood Reduction solution
- Found that significant Green Infrastructure needs to be installed to meet flood reduction targets
  - This is because Green Infrastructure is generally meant for smaller storms, not flood storms
- The cost to install Green Infrastructure to meet flood targets is approximately twice as much as Grey Infrastructure in Pheasant Branch Watershed
- Will continue to advocate for Green Infrastructure but sole purpose will not be Flood Control

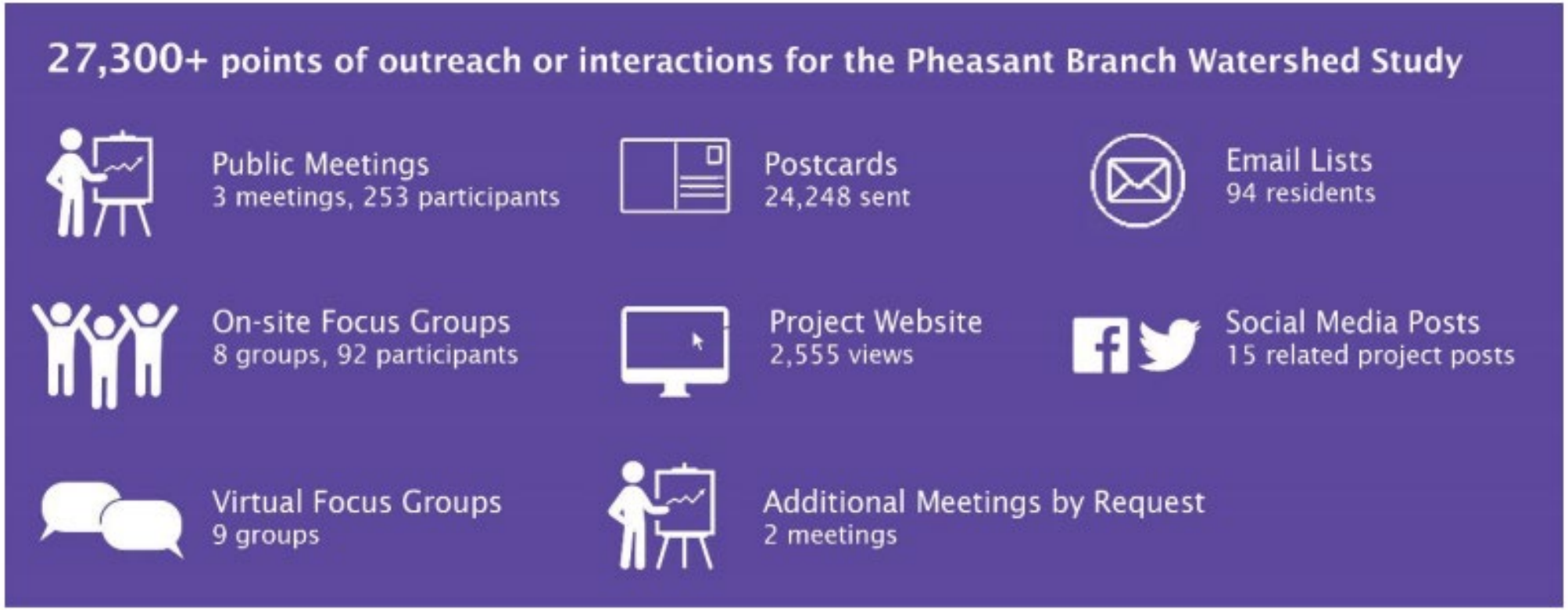


Pheasant Branch Watershed
Potential Areas for Volume Control Infrastructure

Results

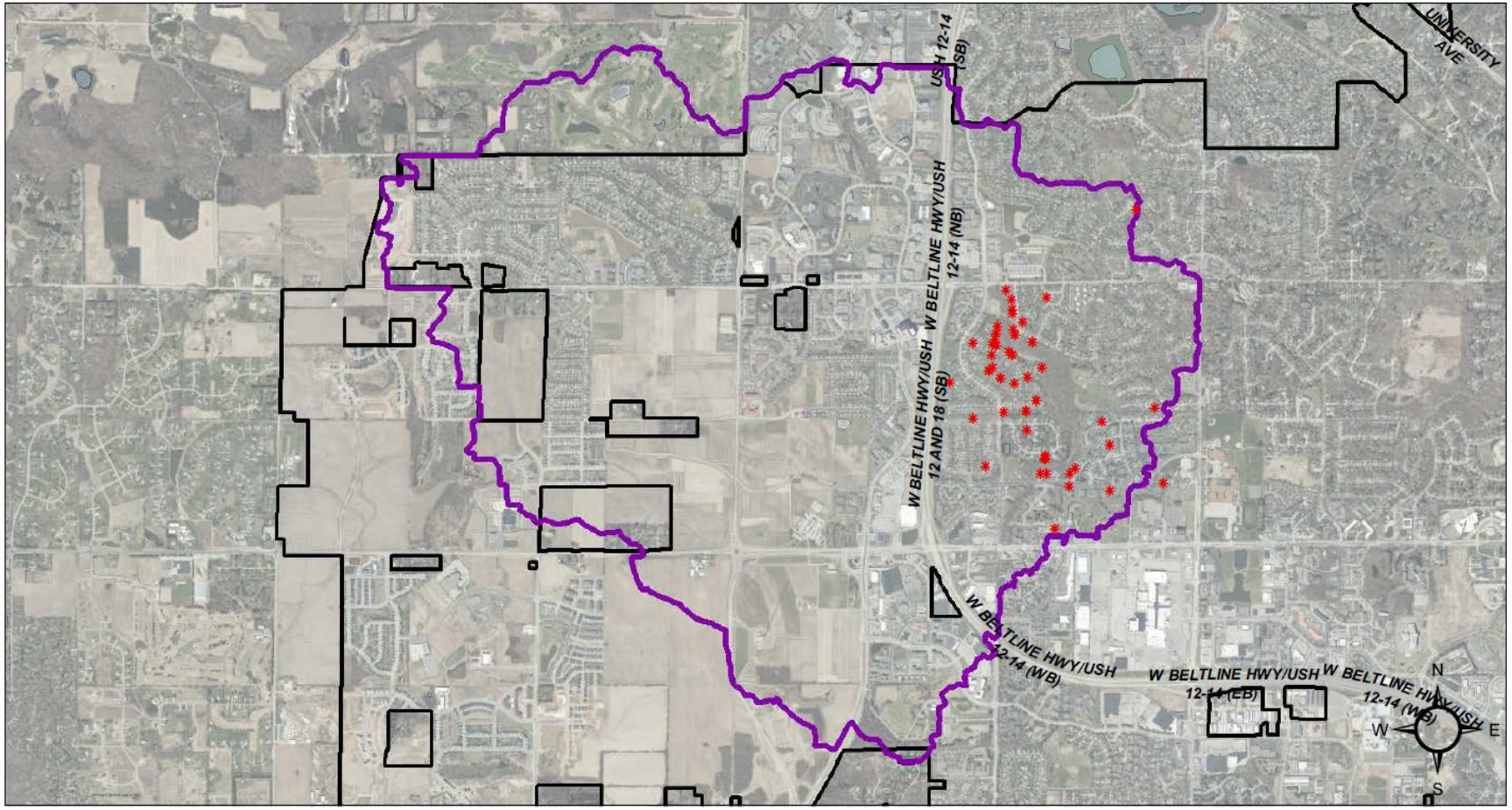
- **10% Chance Storm Event – Target: Eliminate storm sewer surcharge**
  - Existing: 10.3 lane miles out of the 52.1 lane-miles of streets do not meet the target
  - Proposed:1.0 lane-miles do not meet the target.
- **4% Chance Storm Event – Target: maintain drivability of city streets**
  - Existing: 2.9 lane-miles out of the 52.1 lane-miles of streets do not meet the target
  - Proposed: 0.8 lane-miles do not meet the target
- **1% Chance Storm Event – Target: No structure flooding**
  - Existing: 118 structures out of 2,920 structures in the watershed do not meet the target.
  - Proposed: 57 structures do not meet the target.
- **Greenway Crossings – Target: Pass 1% storm**
  - Existing: 14 of 14 greenway crossings do not meet the target
  - Proposed: all greenway crossings in the watershed DO meet the target.

Public Comments on the Pheasant Branch Report



- 56 public comments provided on final report
  - 46 addresses were mapped
  - 10 didn't have addresses or they were not entered correctly.

Public Comments on the Pheasant Branch Report



Legend

- Municipal Limits
- Watershed Boundary
- Pheasant Branch Public Comment

Public Comments
Pheasant Branch Watershed

0 2,000 4,000 Feet

Date: 1/26/2023

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Comments Received

- Sauk Creek Greenway project
  - Tree removal and wildlife/habitat/potential bike path
  - Budget
  - Public Engagement

    Created FAQ for Sauk Creek Website to address concerns
    - Sauk Creek Greenway will need to be stabilized but will not be used for flood control in any meaningful way.
- Tamarack Trails/Tree Lane area
  - Localized flooding
- Upstream flood storage (Target/Menards and undeveloped areas)