White Oaks Stormwater Management Study

February 25th, 2015

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Agenda

1. Problem description
2. Information gathering
3. Flooding evaluation
4. Potential improvement options
5. Grant programs
6. Next steps

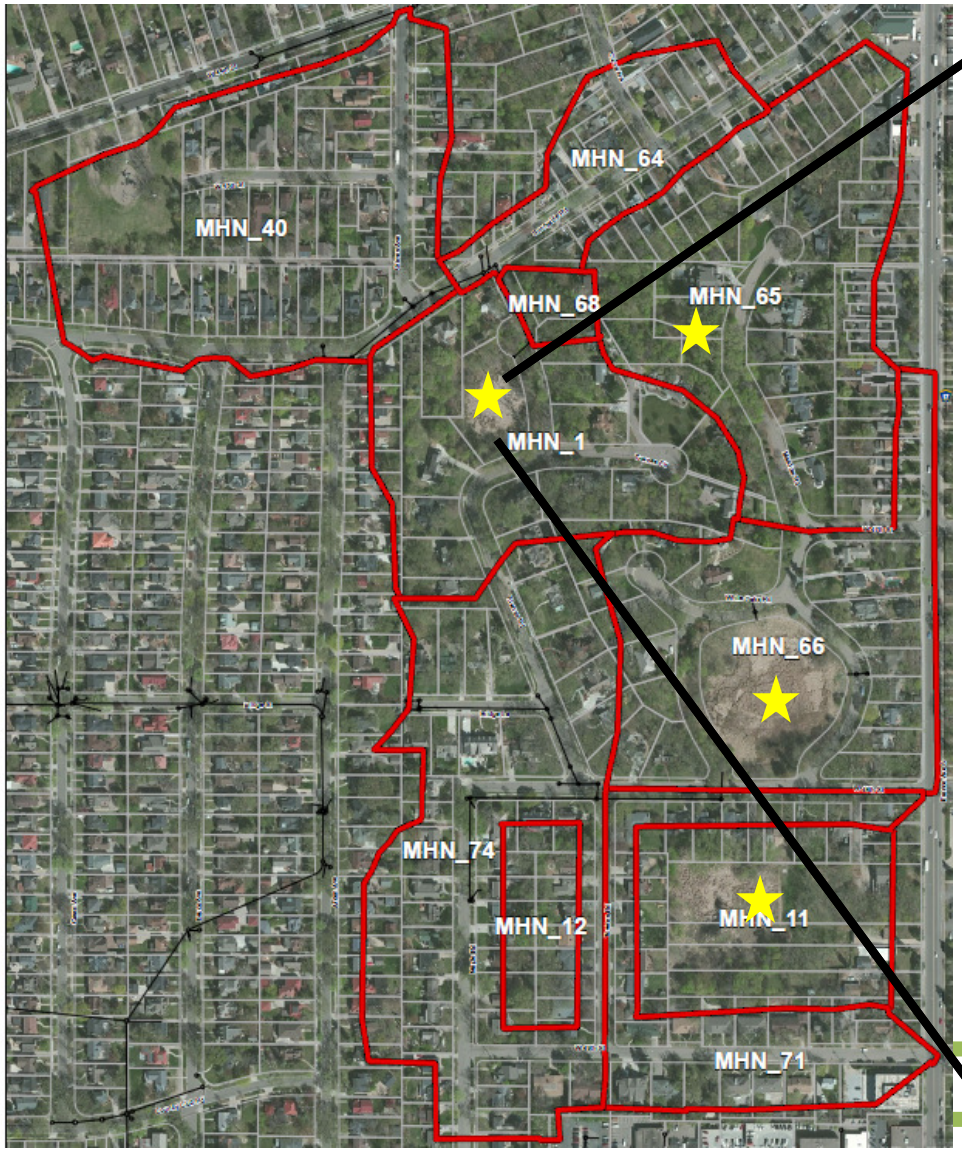
Problem Description

- Water levels in land-locked wetlands too high for too long
- Potential impacts include
  - Flooding
  - Vegetation
  - Aesthetics
- Addition of stormwater in 2000 from Arden Avenue flood improvement project has increased water to MHN_1 wetland
- November 2013 meeting with residents/stakeholders – confirmed concerns about standing water, including aesthetics and vegetation impacts

2014 Information Gathering

- Wetland Assessment
  - Delineation
  - Identify wetland type
  - Functions and values assessment
- Water Level Monitoring

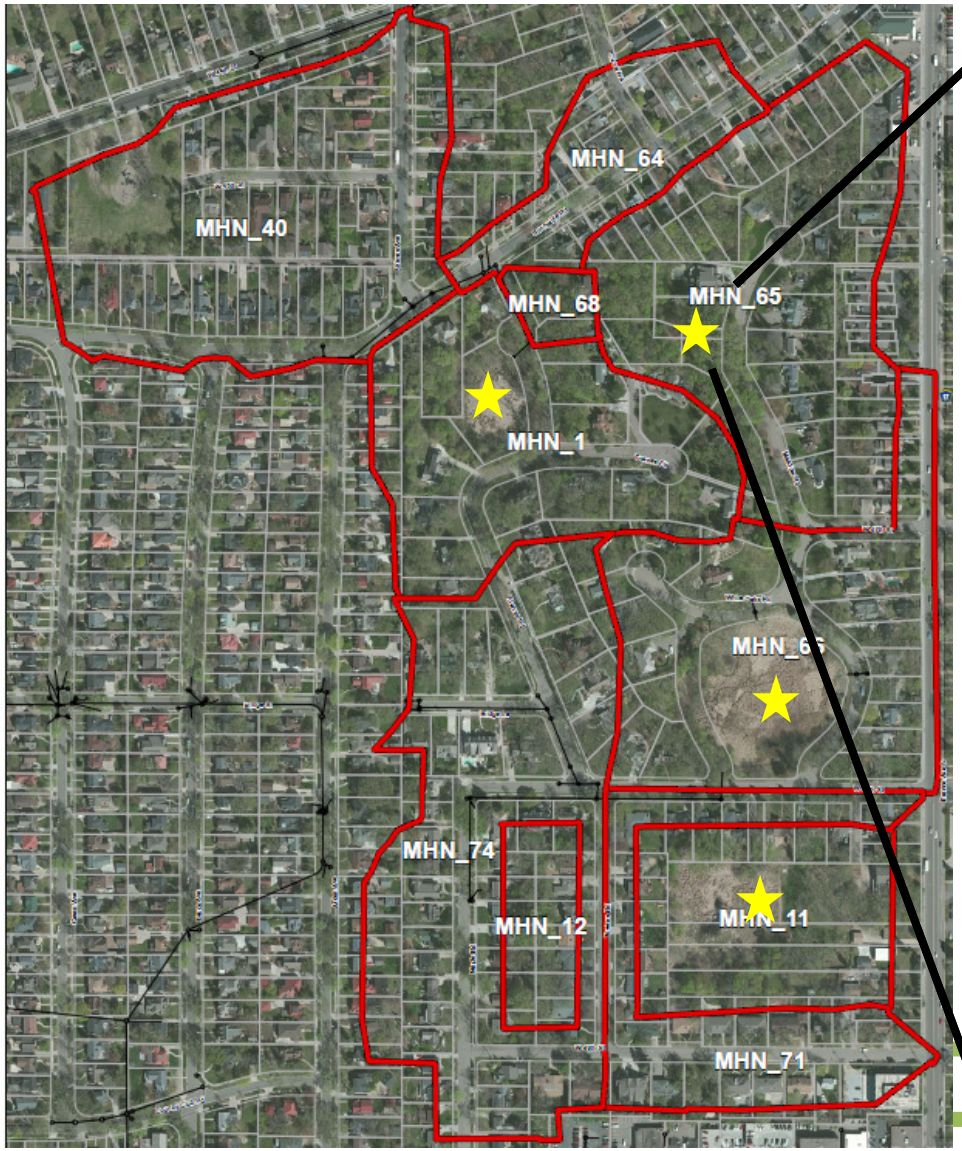
Wetland Assessment- MHN_1



MHN_1: Shallow Marsh/Floodplain Forest

- 1.1 acres
- Shallow marsh dominated by narrowleaf cattail
- Floodplain Forest dominated by silver maple, boxelder, and green ash

Wetland Assessment- MHN_65



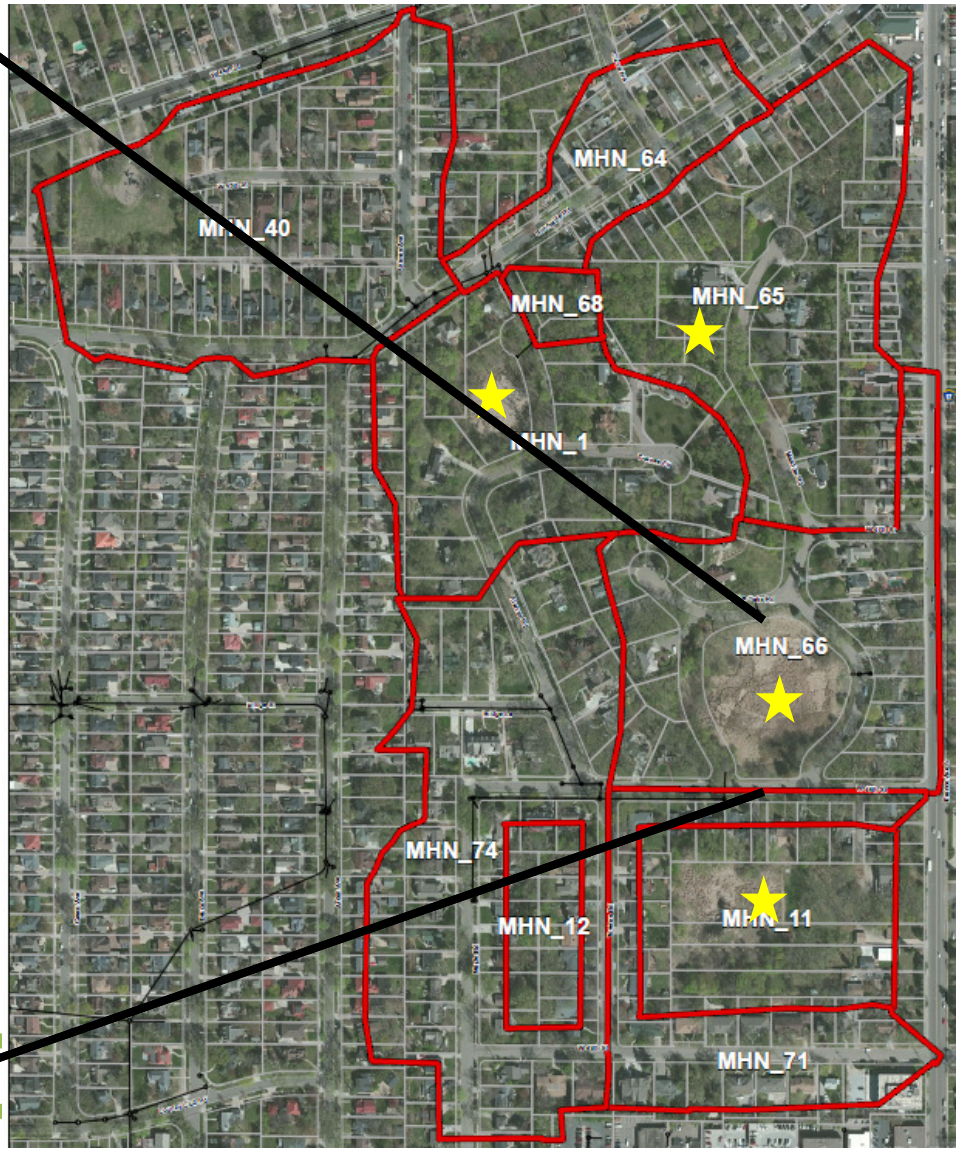
MHN_65: Floodplain Forest

- 0.2 acres
- Dominated by silver maple
- Other species include elm, boxelder, dogwood, and buckthorn

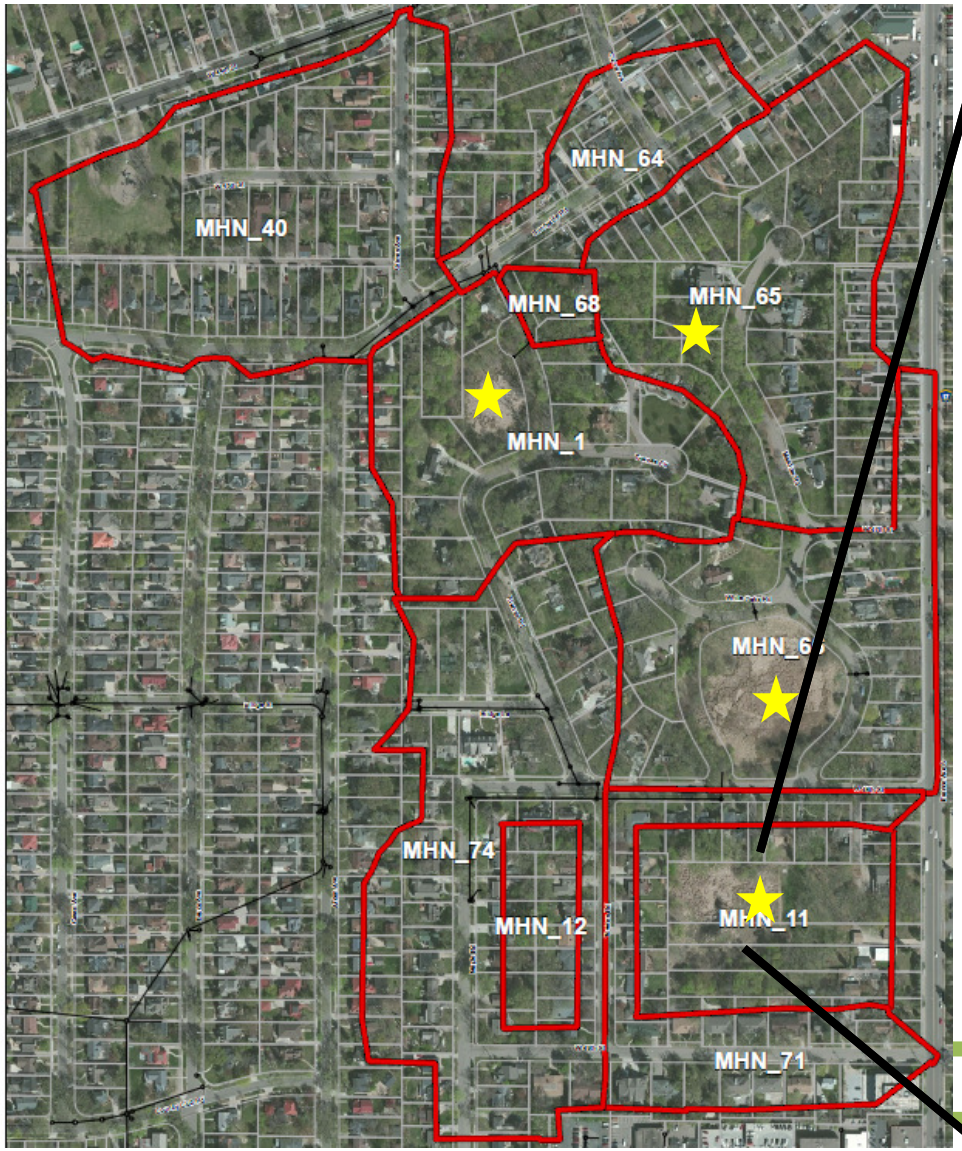
Wetland Assessment- MHN_66

MHN_66: Deep Marsh/Shallow Marsh/ Fresh(Wet) Meadow

- 2.2 acres
- Dominated by narrowleaf cattail and hybrid cattail
- Fringes with reed canary grass, green ash, silver maple, elm, and buckthorn



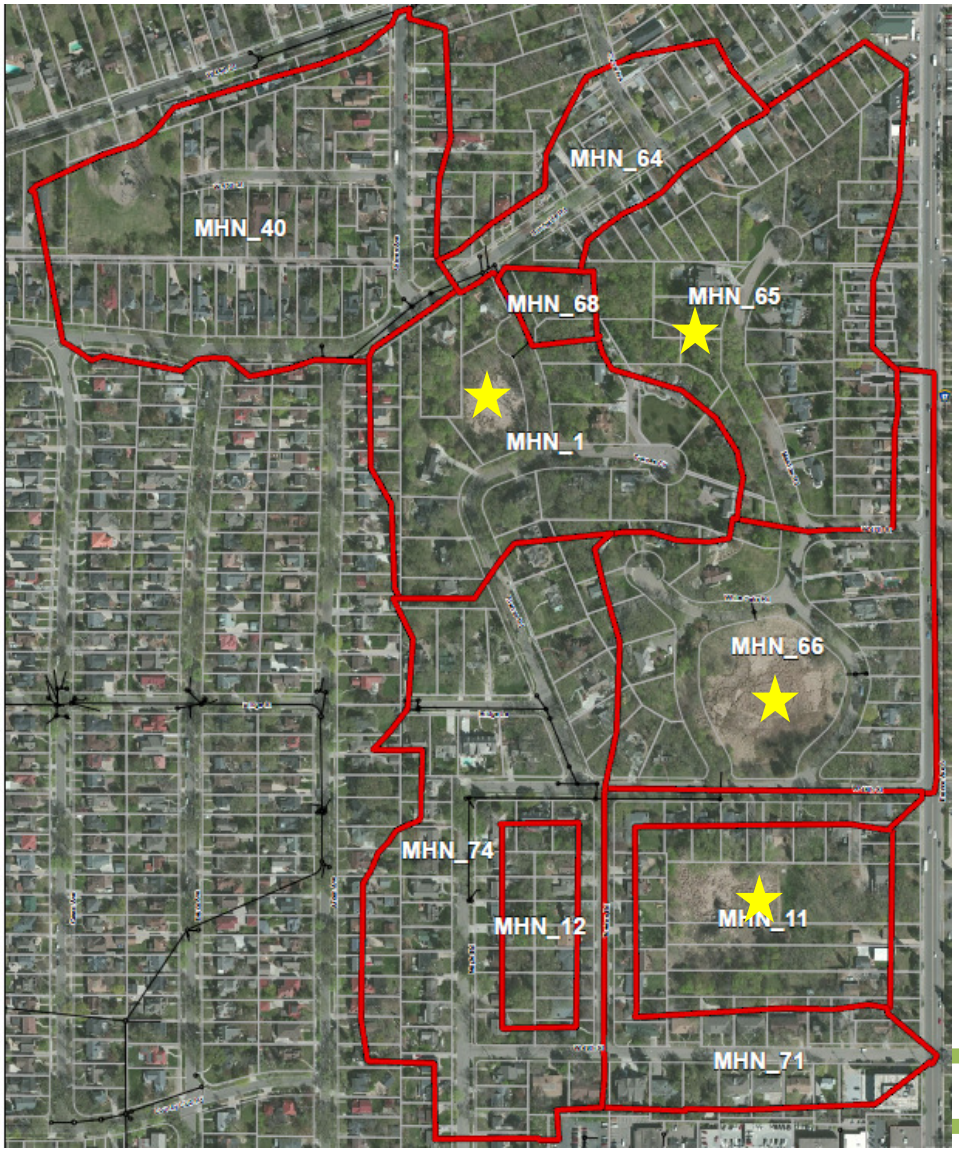
Wetland Assessment- MHN_11



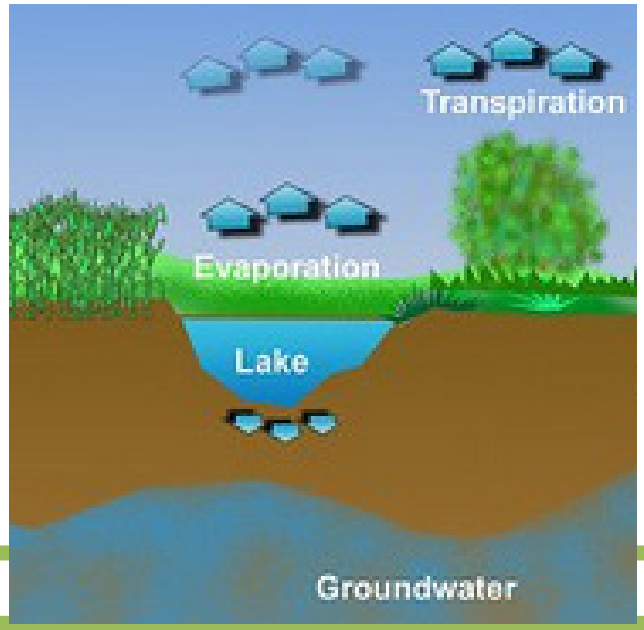
MHN_11: Deep Marsh/Shallow Marsh/ Floodplain Forest

- 1.7 acres
- Dominated by narrowleaf cattail, duckweed, reed canary grass
- Fringe species include black willow, peach-leaf willow, and boxelder

White Oaks area is "land-locked"

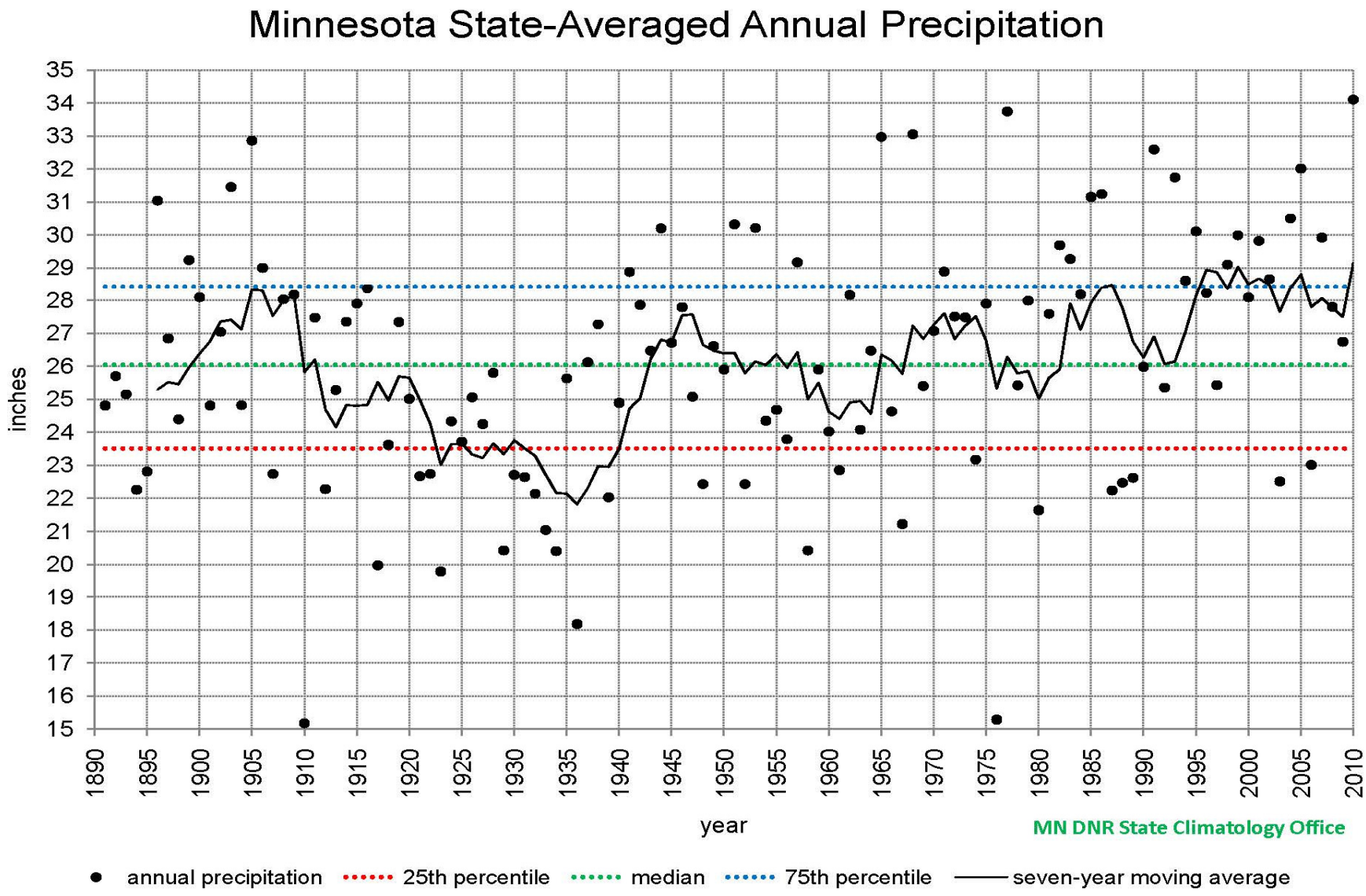


- No piped outlet from area
- Runoff can only leave through groundwater interaction and/or evaporation



Source: Nebraska DNR

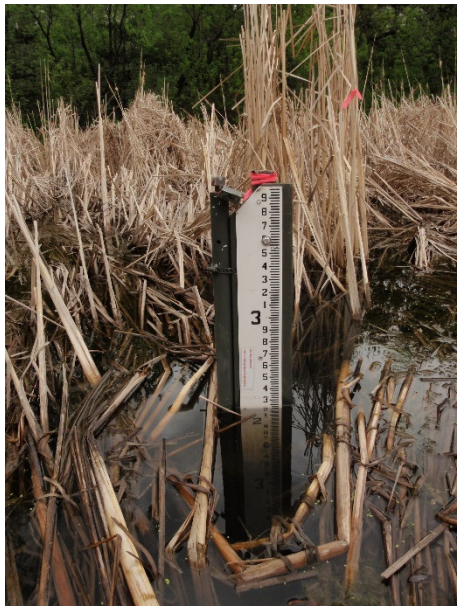
Land-locked areas sensitive to fluctuations in precipitation patterns

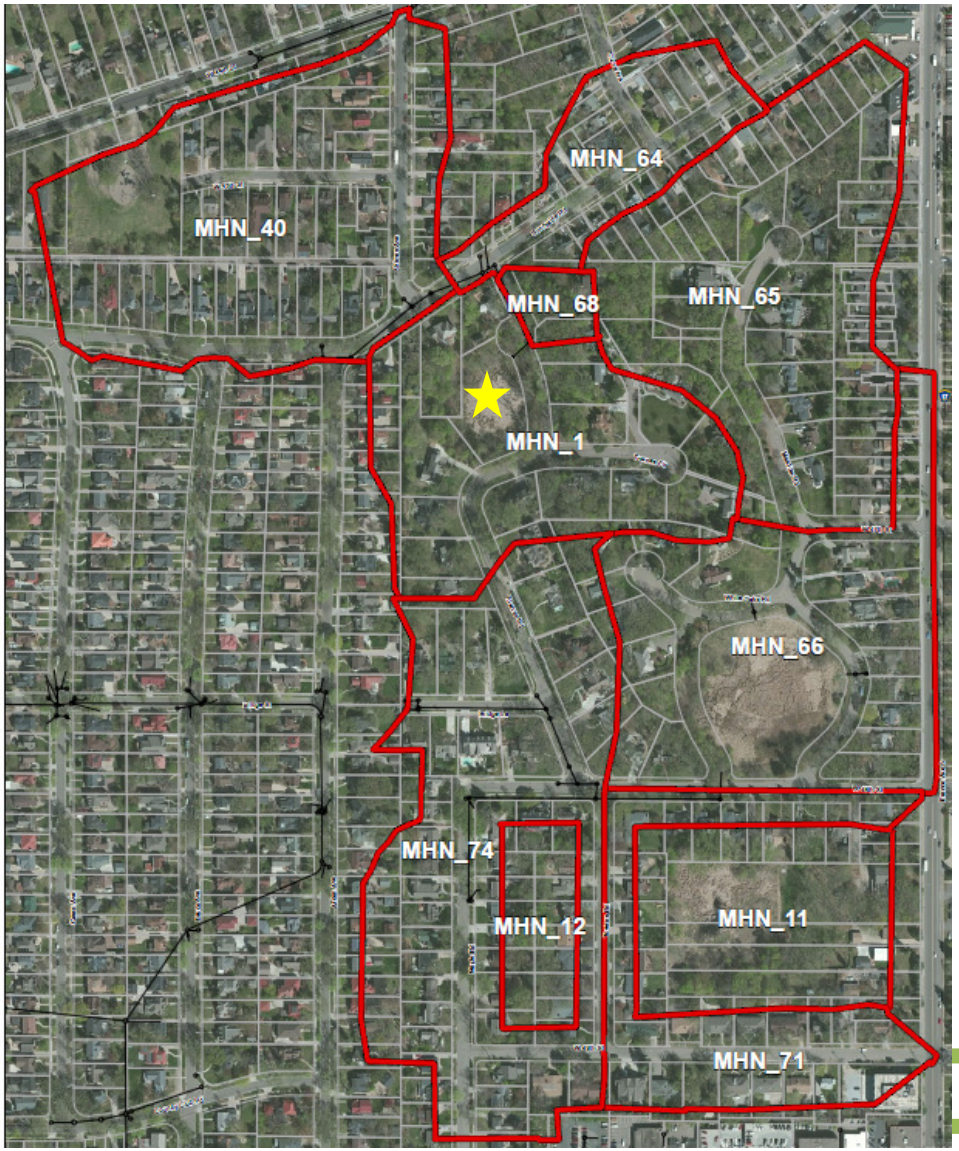


2014 water level monitoring

- Monitored four wetlands from April to mid-September

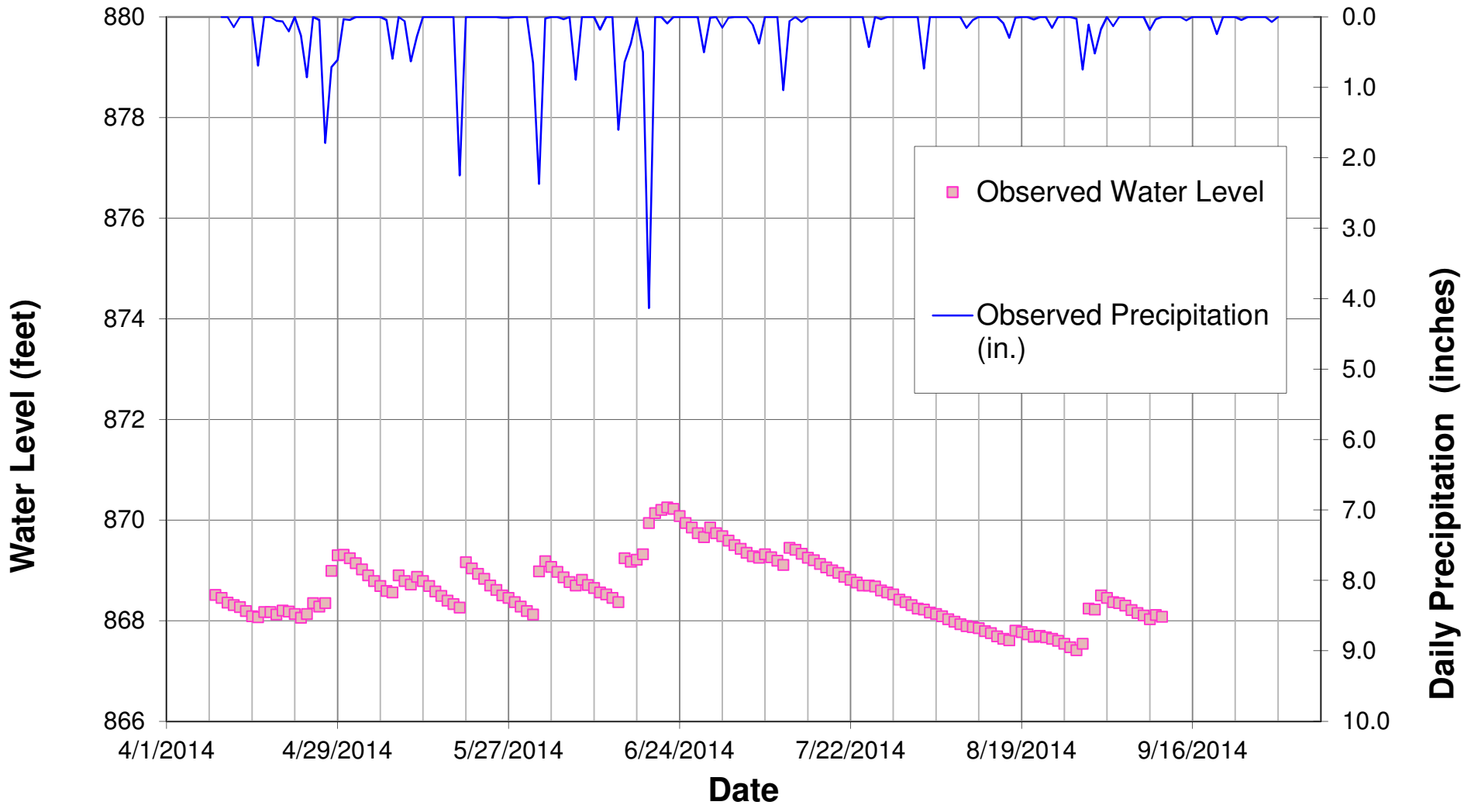
- Used monitoring data to understand interaction with groundwater and calibrate computer model




MHN_64
MHN_40
MHN_68
MHN_65
MHN_1
MHN_66
MHN_74
MHN_12
MHN_11
MHN_71

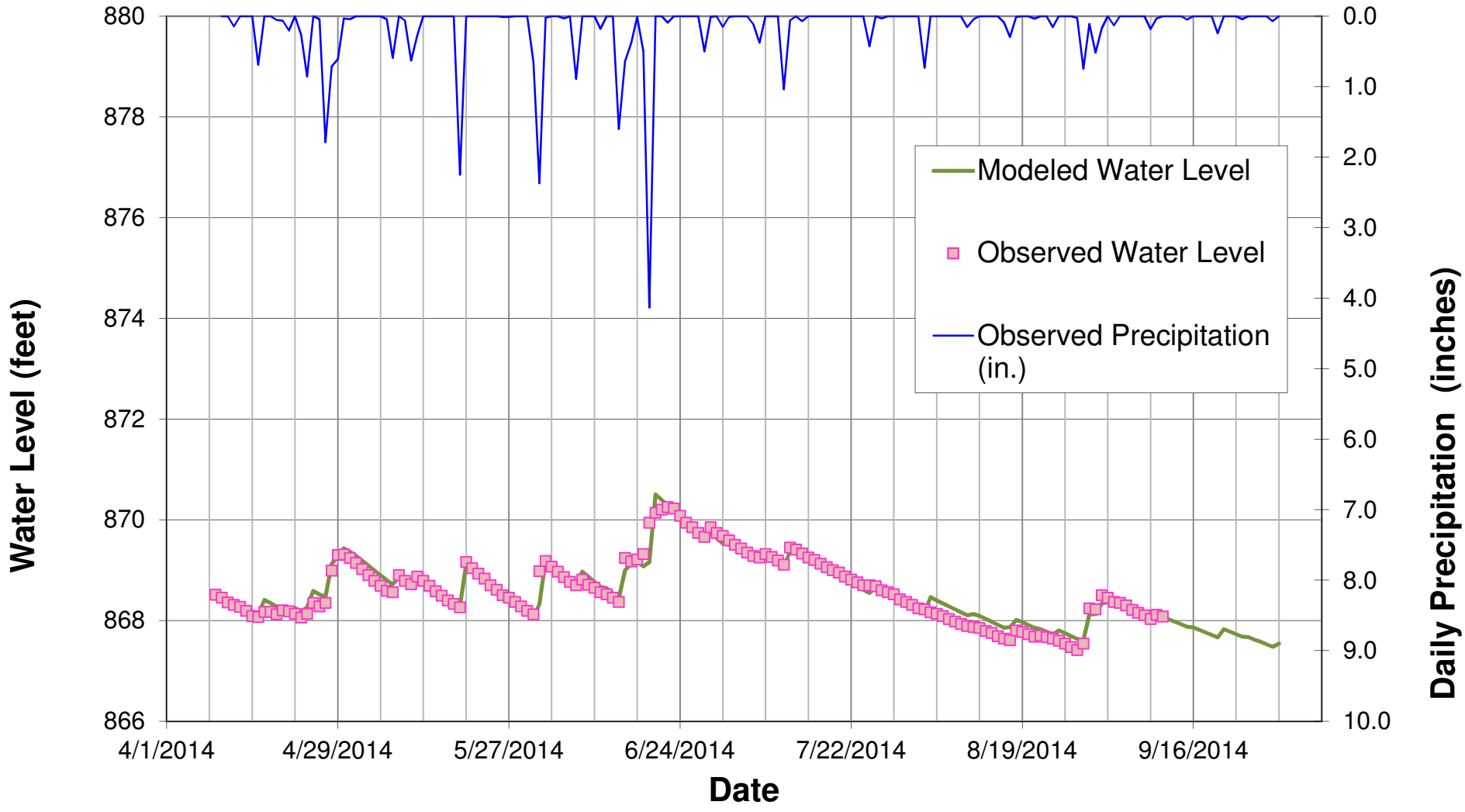
Water levels fluctuate in response to precipitation

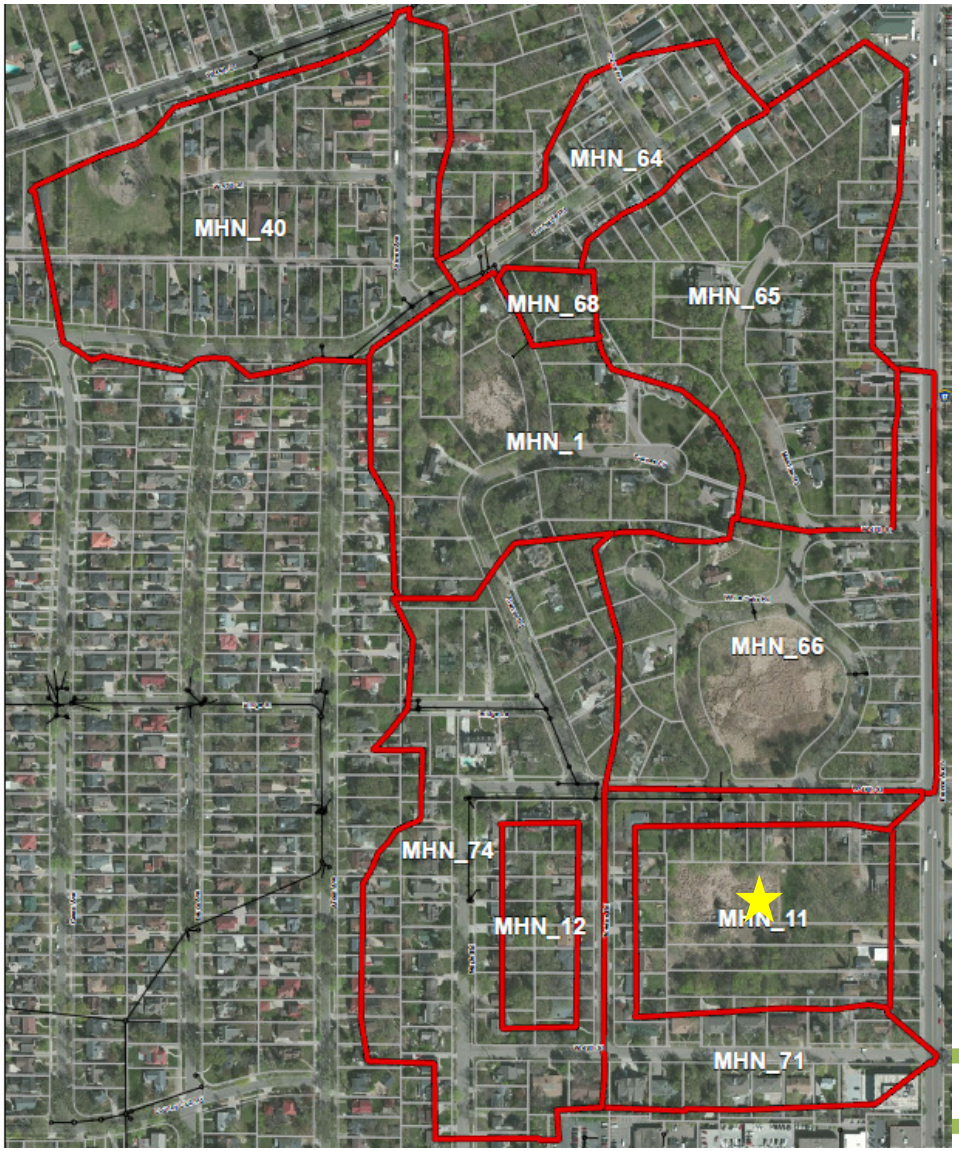
Wetland MHN_1 (Townes Road)



Water level data used to calibrate model

Wetland MHN_1 (Townes Road)




MHN_64
MHN_40
MHN_68
MHN_65
MHN_1
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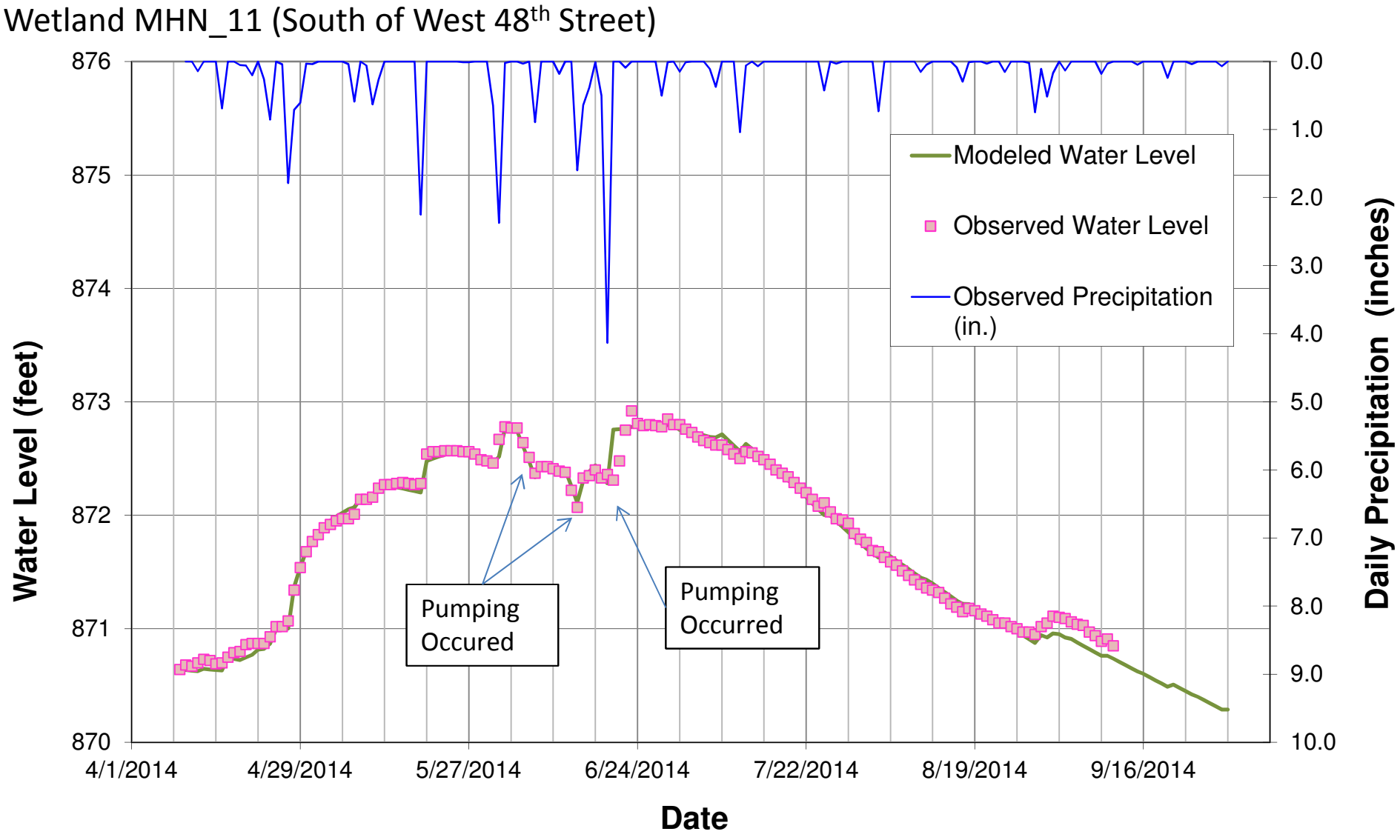
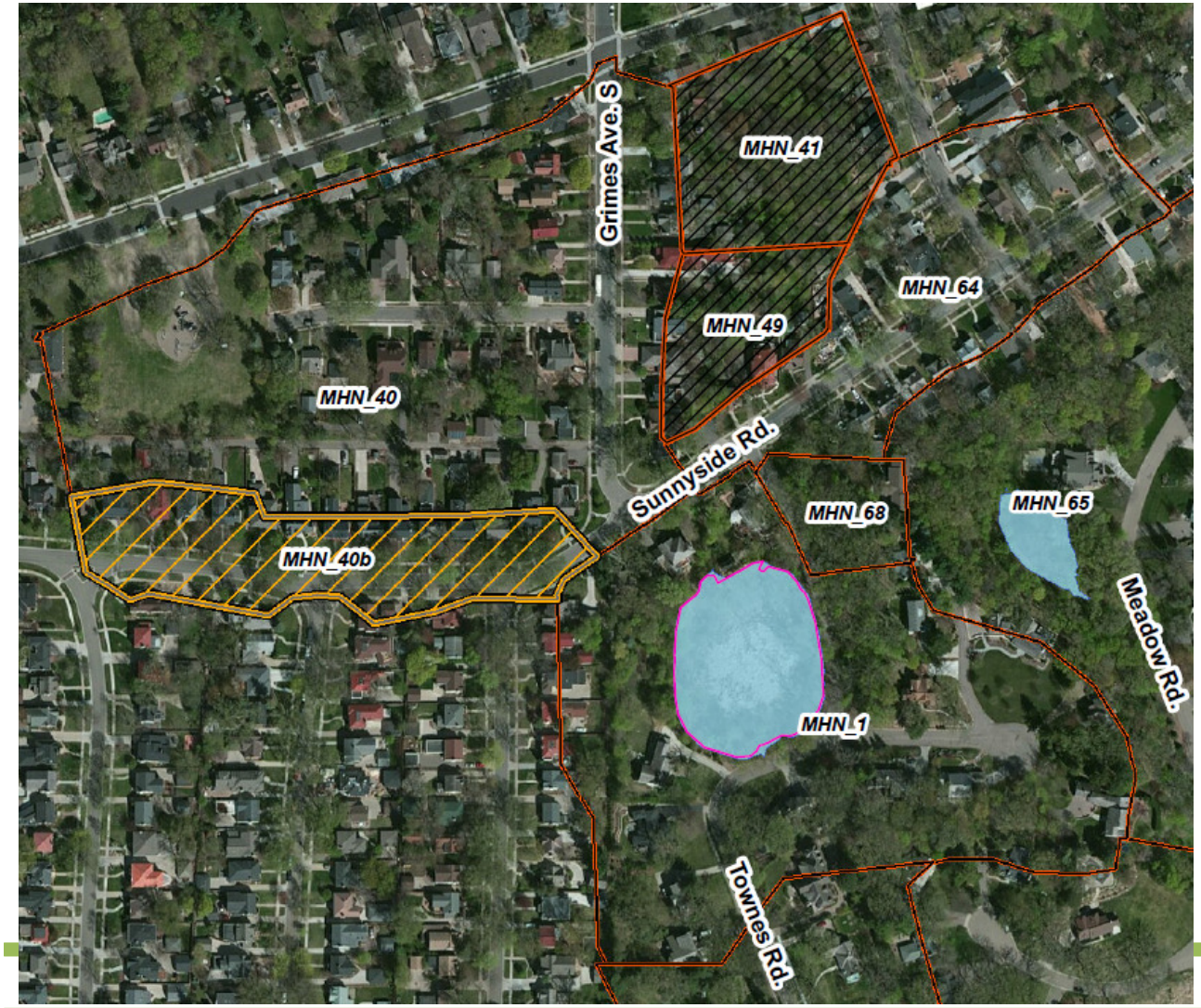
MHN_74
MHN_12
MHN_11
MHN_71

Wetlands varied in their response to wet 2014 conditions

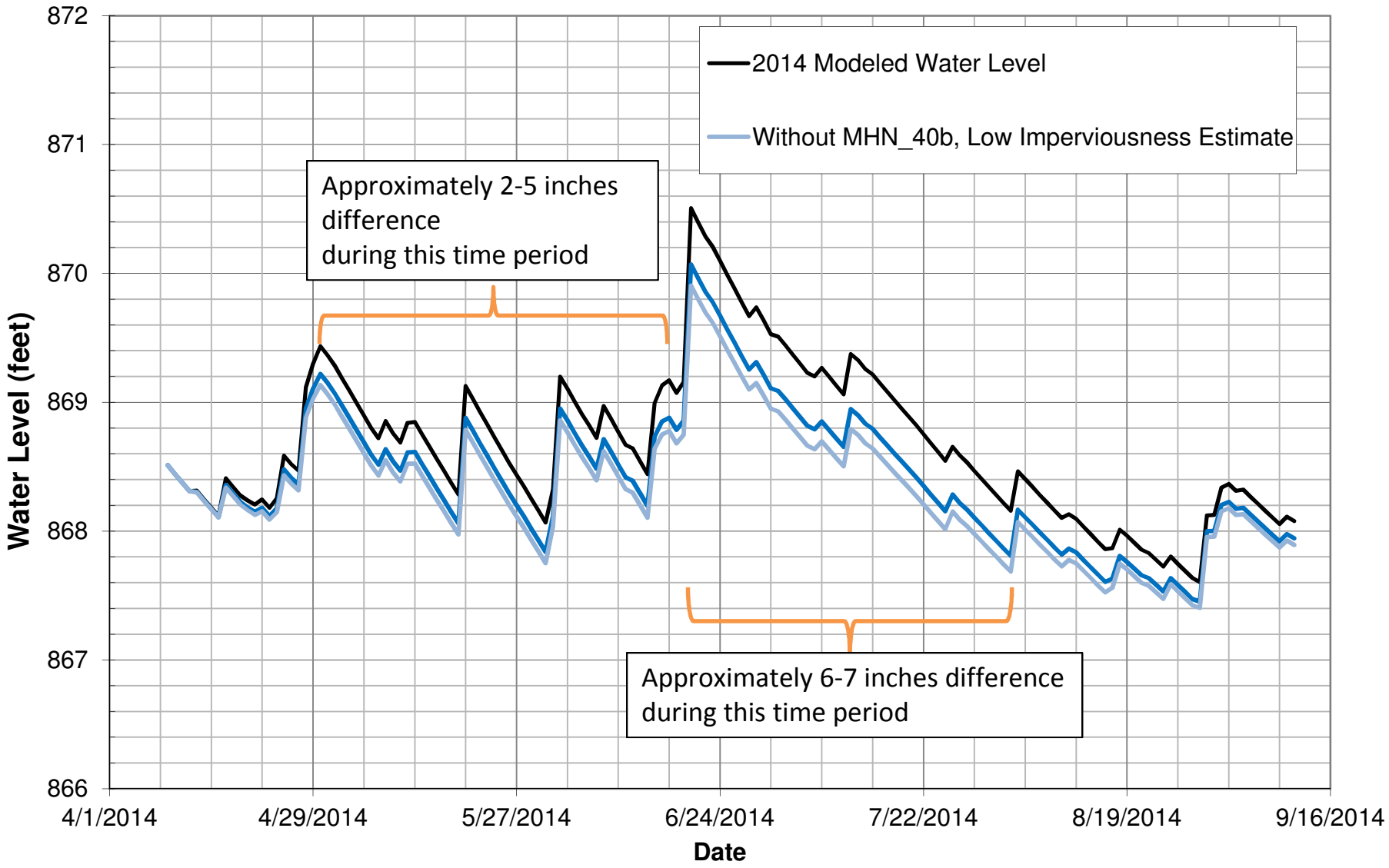


How did the 2000 drainage alteration affect water levels in MHN_1?

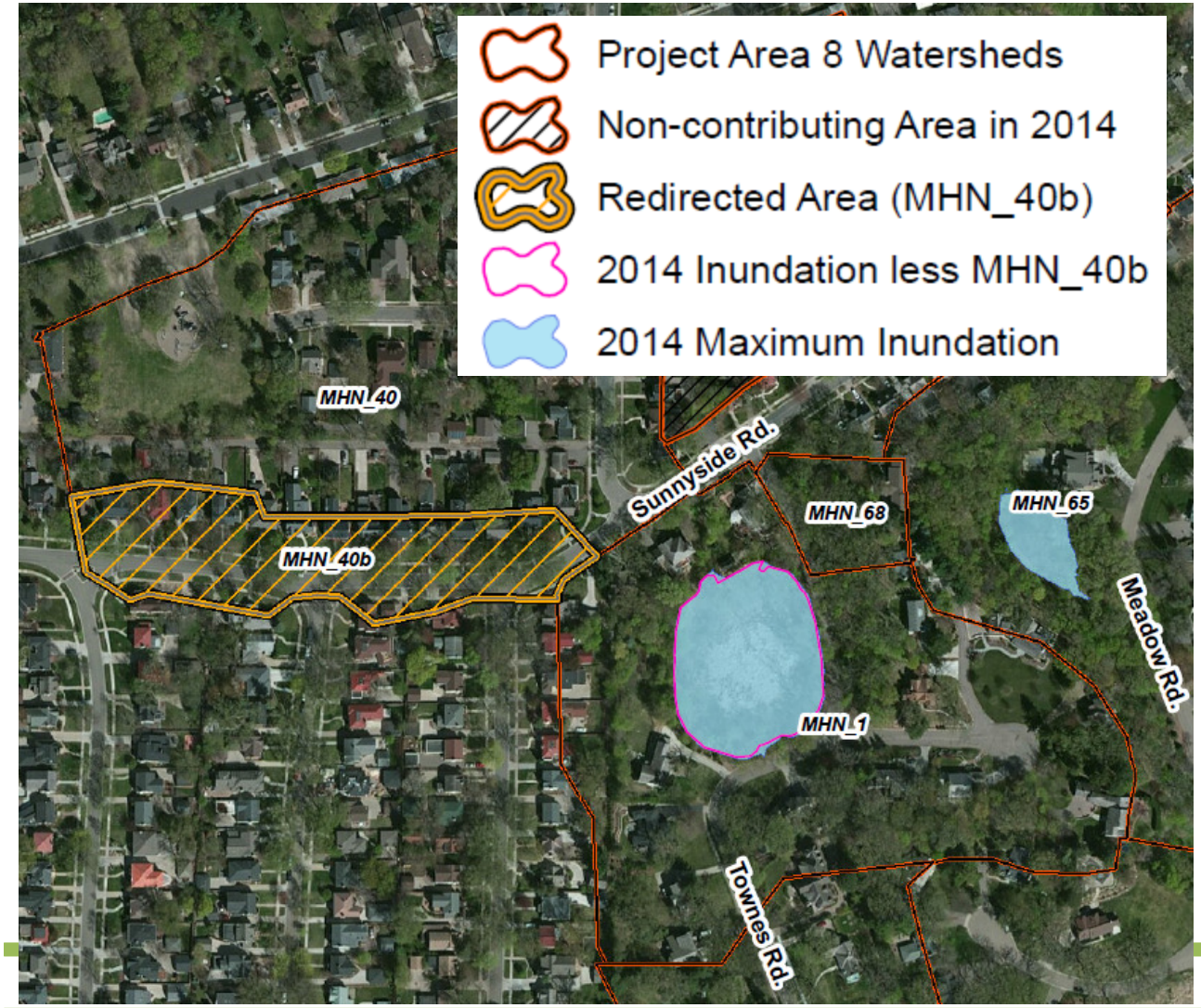


- Additional ~3 acres re-routed to MHN_1 as part of a 2000 City project to improve a flooding problem on Arden Avenue.
- Total drainage area of 31 acres
- 11% area is contributing impervious

How did the additional area affect water levels in MHN_1 in 2014?



2000 City project rerouted stormwater to the wetland in MHN_1



Analysis results:

- 2” – 7” of additional water depth (based on 2014 data)
- There are other reasons for higher water, including residential redevelopment (higher % impervious)

Flooding Evaluation

2014 High Water Elevations

100-Year Frequency Flood Elevations
(based on 10-day snowmelt event)

100-year flood elevations in comparison with critical low entry elevations, by subwatershed

	MHN_1	MHN_11	MHN_65	MHN_66
Critical surveyed low entry elevation	**879.2** (4600 Townes Rd.)	**874.8** (4833 Townes Rd.)	--	--
Lowest road elevation adjacent to wetland, based on 2011 LiDAR elevation data	873.5	--	874.3	873.5
Peak flood elevation for the 100-year 10-day snowmelt/runoff event (assumes wetlands start dry)	878.2	873.0	878.1	876.3

Flooding Evaluation

- Good news! No structural flooding (homes, garages)
- Some road overtopping, similar to other areas within the city.

Goals

- City policy is to provide stormwater management that meets a 100-year level of protection, when feasible.
  - 100-year level of protection focuses on **preventing property damage** and **assuring a reasonable degree of public safety** following a 100-year (or 1% probability) event
  - Numerous locations throughout City with structural flooding issues (46 projects identified in the City's Comprehensive Water Resources Management Plan)

Goals

- Typically, city projects address structural flooding.
  - White Oaks wetlands meet the goal of avoiding structural flooding (100-year level of protection)
- Resident concerns extend beyond flooding (nuisance high water levels, vegetation impacts, water quality) but may not fall within typical city level of service

Improvement Options

- Several improvement options evaluated to reduce flood potential and water level fluctuation
  1. Installation of permanent pump station and connect wetlands via storm sewer
  2. Reduce stormwater volume to wetland(s) through implementation of green infrastructure

Improvement Option: Pumped Outlet and Wetland Connection

Estimated cost = $800,000

Improvement Benefits- Pumped Outlet

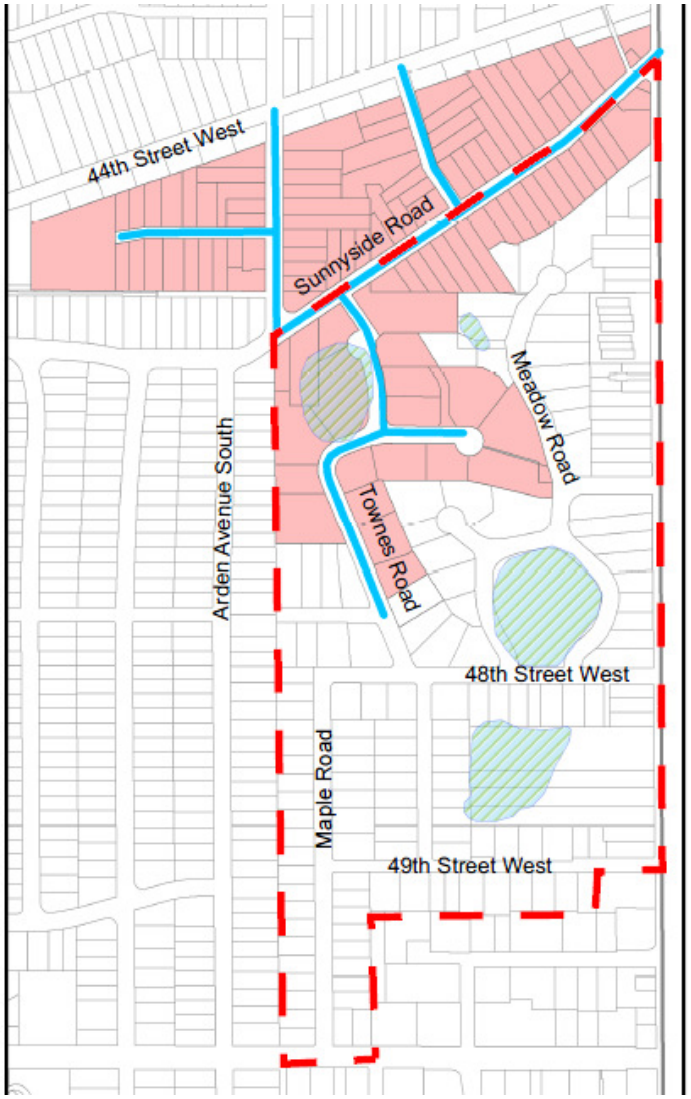
- Provides a benefit for both flood levels **and** overall water levels, depending on how the pump is managed
- This improvement option is costly
- There is potential for negative water quality impacts on Minnehaha Creek, so permitting may be challenging
- This option does not address water quality of water entering wetlands

Improvement Options

- Several improvement options evaluated to reduce flood potential and water level fluctuation
  1. Installation of permanent pump station and connect wetlands via storm sewer
  2. **Reduce stormwater volume to wetland(s) through implementation of green infrastructure**

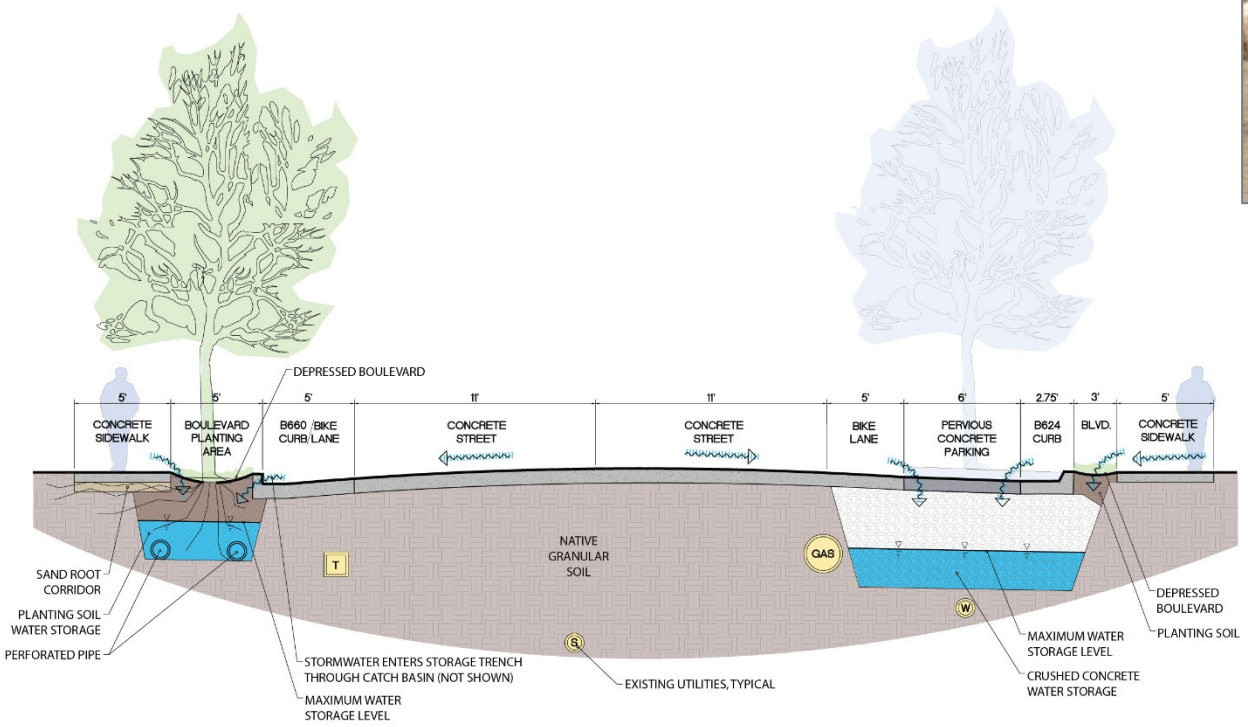
Improvement Option: Reduced Stormwater Volume through Green Infrastructure/Living Streets

- Upcoming 2016 road reconstruction project presents opportunity to implement green infrastructure and Living Streets components



Green Infrastructure/Living Streets

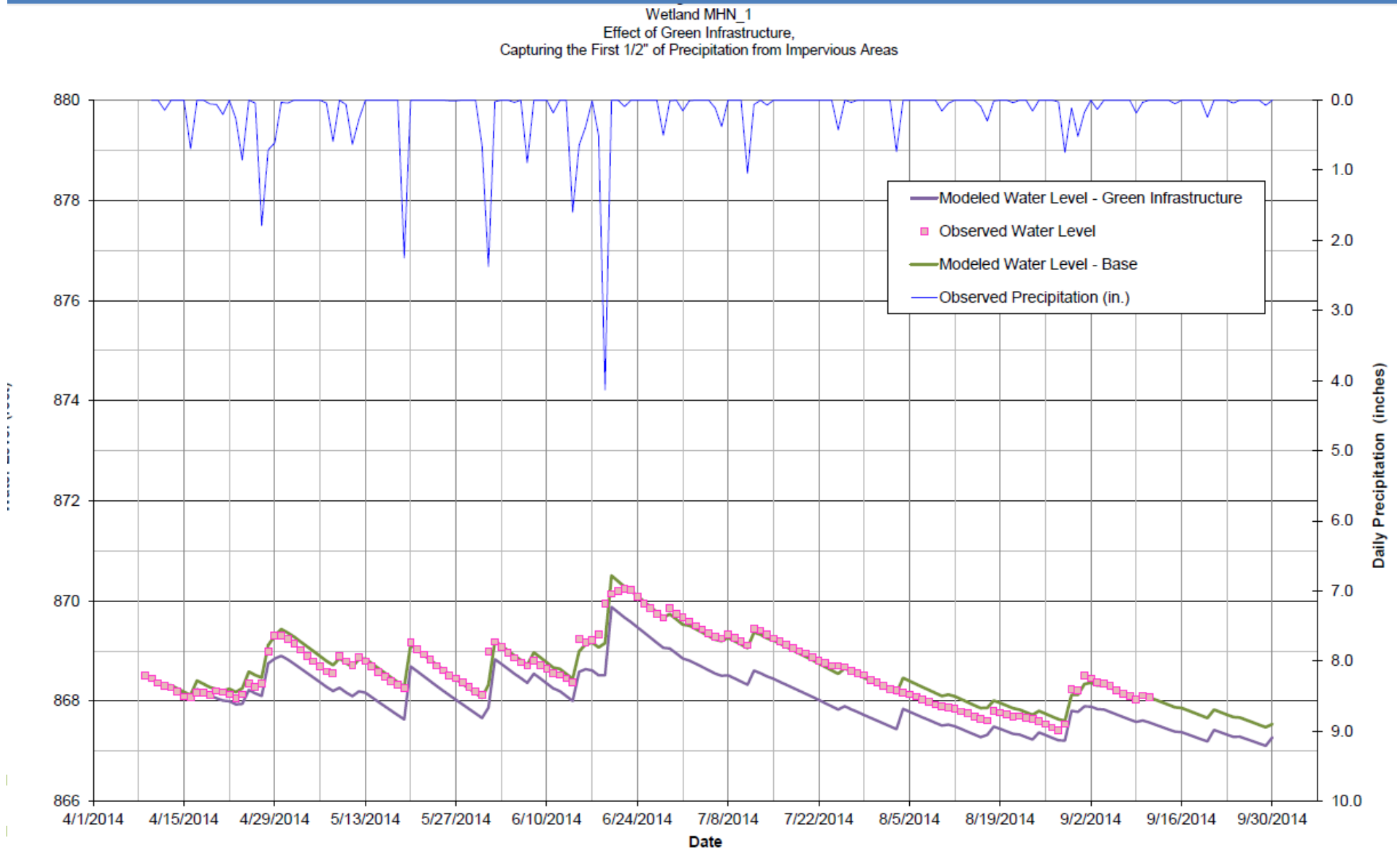
- Using stormwater management techniques that mimic nature by infiltrating and/or storing rainfall runoff where it lands



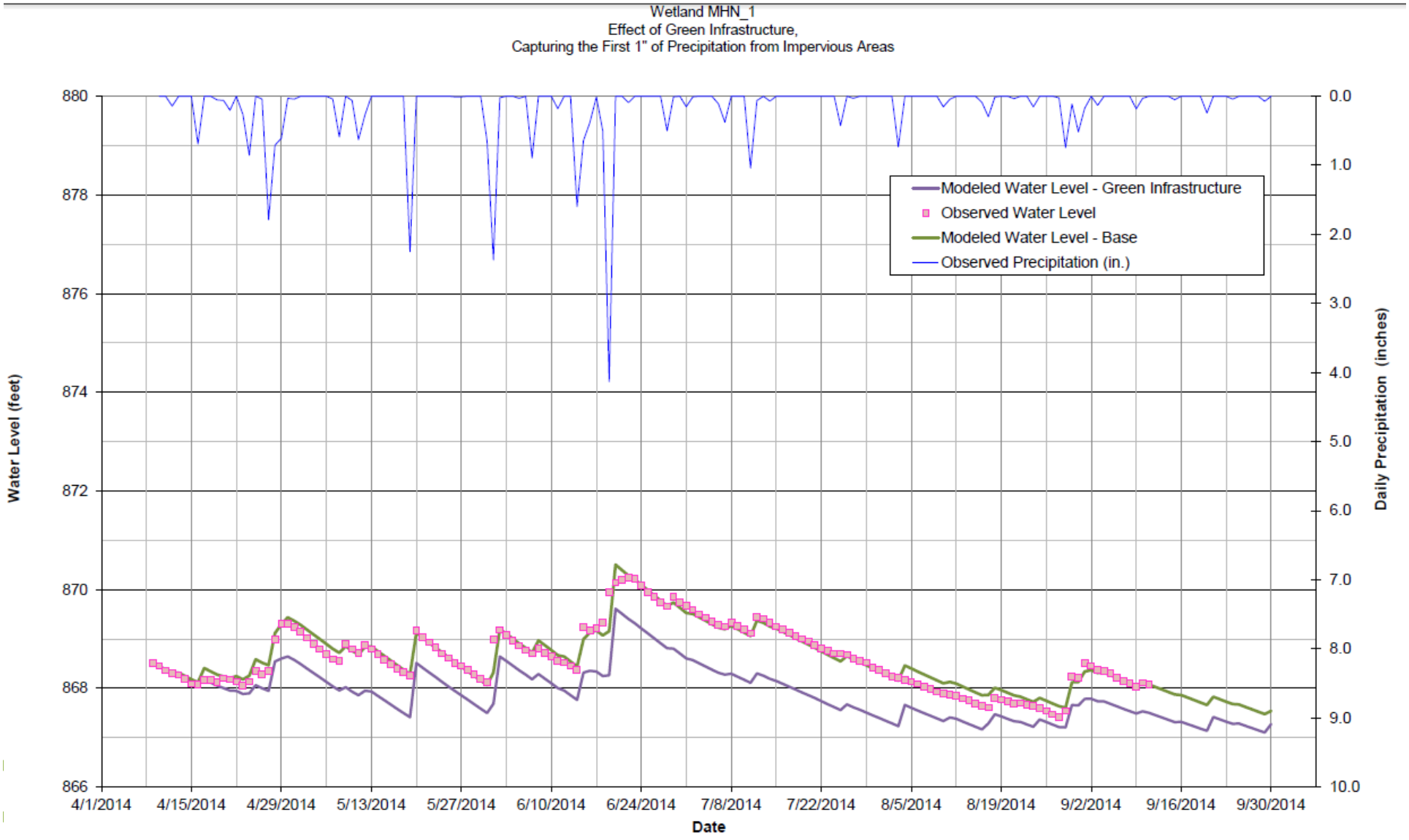
- Incorporating green infrastructure into roaway design

Green Infrastructure/Living Streets

Benefits of capturing first ½-inch of rainfall



Benefits of capturing first 1-inch of rainfall



Improvement Benefits- Pumped Outlet

- Reduces overall water levels
- Reduces the amount of phosphorus and sediment reaching wetlands
- Extent of benefit depends on feasibility of capturing first ½-inch or 1-inch of rainfall from roadways or other impervious surfaces

  -Depends on many factors, including soil type, existing utilities, cost, public acceptance

Improvement Benefits- Green Infrastructure/Living Streets

- Runoff from 2016 road reconstruction project area only affects wetland MHN_1 (Townes Road)
- Estimated costs for incorporating green infrastructure into 2016 road reconstruction project ranges from $65,000 to $2,500,000, depending on treatment level and technique
- 2016 road reconstruction project area likely not large enough to “roll back the clock” on increased water levels

Other Opportunities for Privately-led Improvements

- Residents can start now by implementing runoff reduction techniques (disconnect downspouts, install rain gardens and barrels, impervious surface reductions)

- Grants available for wetland and habitat protection and/or restoration
  - Public and private sources
  - City may be willing to partner for grant contracting

Other Opportunities for Privately-led Improvements

- City may be willing to partner with residents to grant access to city-owned wetland parcels for vegetation management

- Grants available for wetland and habitat protection and/or restoration
  - Public and private sources
  - City may be willing to partner for grant contracting

Minnehaha Creek Watershed District

Grants cost-share programs include

- Shoreline and streambank stabilization
  - $5,000 grants for residential projects

- Stormwater Best Management Practices (BMPs) to reduce the amount of rainwater and snowmelt runoff going into lakes, streams, and wetlands
  - Up to $2,500

http://www.minnehahacreek.org/grants

Other Assistance Sources

- City Energy and Environment Commission has additional information on Living Streets
- Local Master Water Stewards can advise and help
- City forestry department
- MN Board of Water and Soil Resources (BWSR) for wetland restoration and vegetation management guidance

MN Board of Water & Soil Resources Wetland Restoration Information

- (http://www.bwsr.state.mn.us/wetlands/)

This is one step on the path.
Next steps include:

- Finalize report
- Update City Council
- Continue to analyze options in greater detail due to road reconstruction design for 2016
- Final design and public hearing in December 2015
- City invites feedback

Questions?