CITY OF FITCHBURG
HILLSIDE HEIGHTS
STORMWATER SOLUTIONS

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raSmith

CREATIVITY BEYOND ENGINEERING

AGENDA

- Discuss the problem
- Discuss current findings
- Background / history
- Obtain input from the neighborhood on the problem/solutions
- Discuss potential solutions

- Create a prioritized roadmap for implementation

What are trying to address????

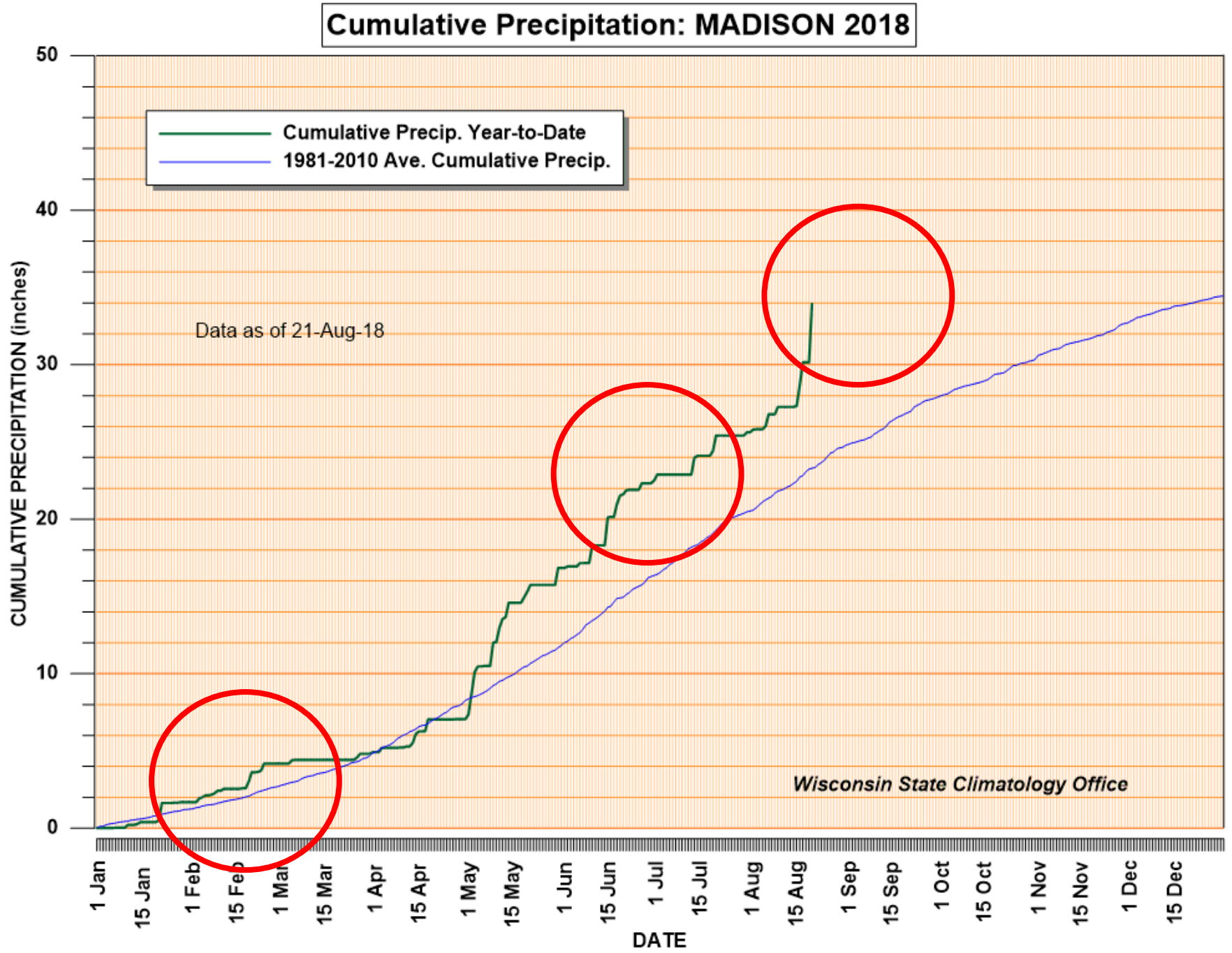
- Structural damage to property
- High groundwater (basement/sump pumps/septic)
- Nuisance water on property
- Ancillary impacts (park water, issues mowing, etc.)

- Others??

Recent significant rainfalls

- 2018 (August) 6.25” rainfall (9 hours)
- 2018 (June) 4.6” rainfall after 2.1” rainfall
- 2018 (February) Frozen ground/thaw, release of frozen pipe under Fish Hatchery Road
- 2008 (June) Wettest June on record

- Others?

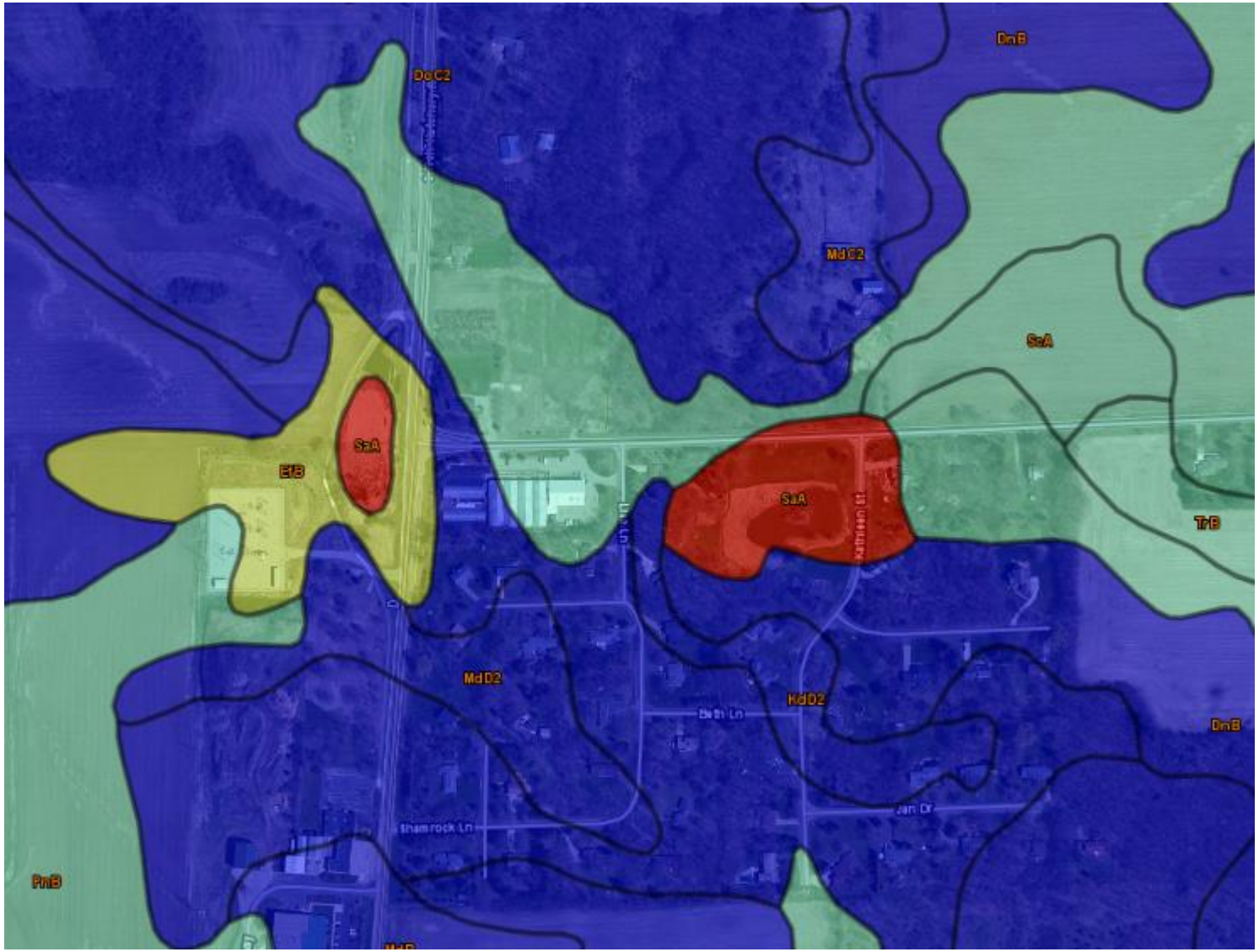

Cumulative Precipitation: MADISON 2018
Cumulative Precip. Year-to-Date
1981-2010 Ave. Cumulative Precip.
Data as of 21-Aug-18
Wisconsin State Climatology Office
CUMULATIVE PRECIPITATION (inches)
0
10
20
30
40
50
1 Jan
15 Jan
1 Feb
15 Feb
1 Mar
15 Mar
1 Apr
15 Apr
1 May
15 May
1 Jun
15 Jun
1 Jul
15 Jul
1 Aug
15 Aug
1 Sep
15 Sep
1 Oct
15 Oct
1 Nov
15 Nov
1 Dec
15 Dec
DATE

1955 Aerial

- 1960 Aerial

2017 Aerial

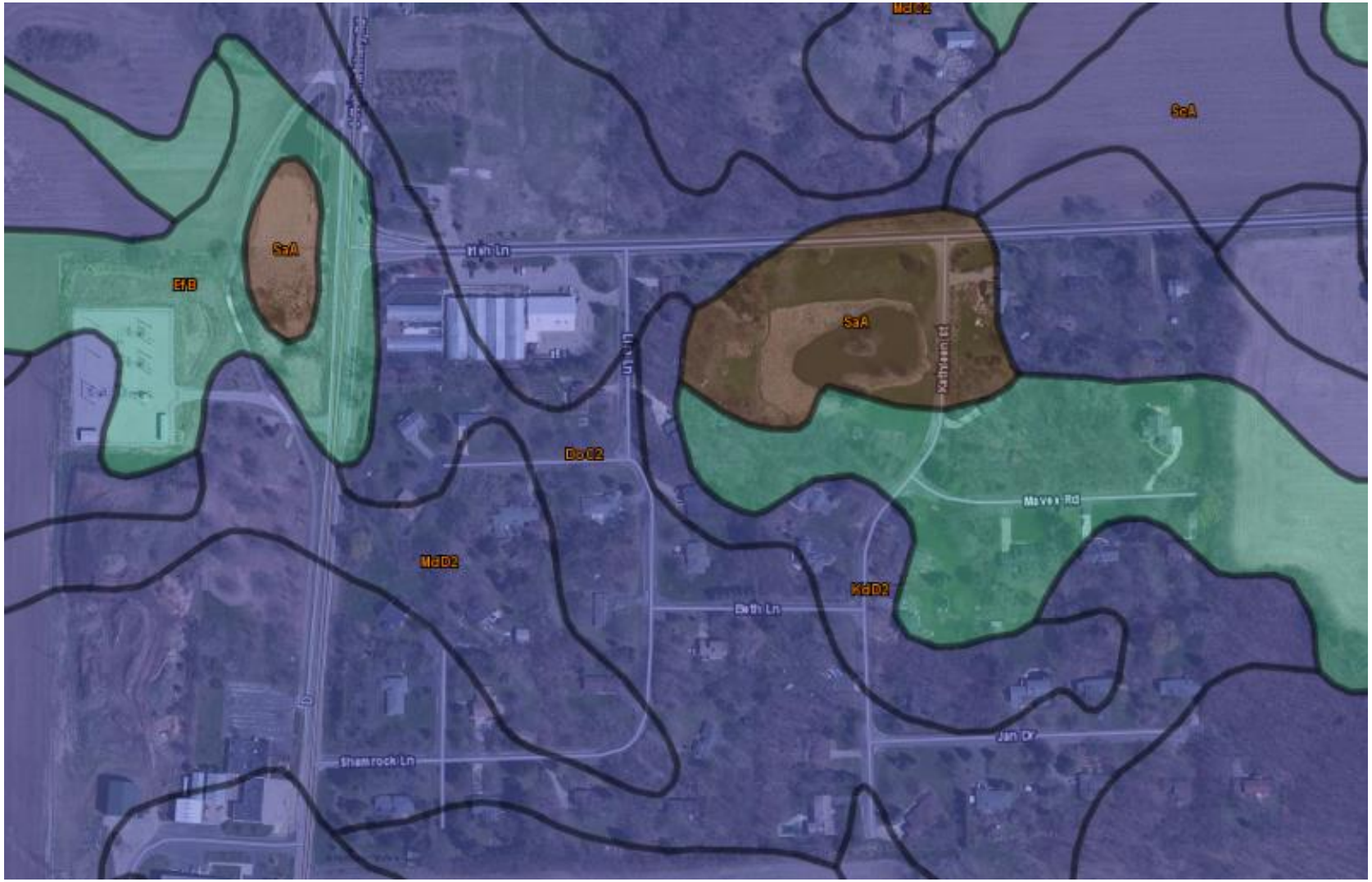
Depth to groundwater



- RED – Less than 6”
- YELLOW – 24”-40”
- GREEN – 40”-80”
- BLUE - >80”

- Water is close to surface

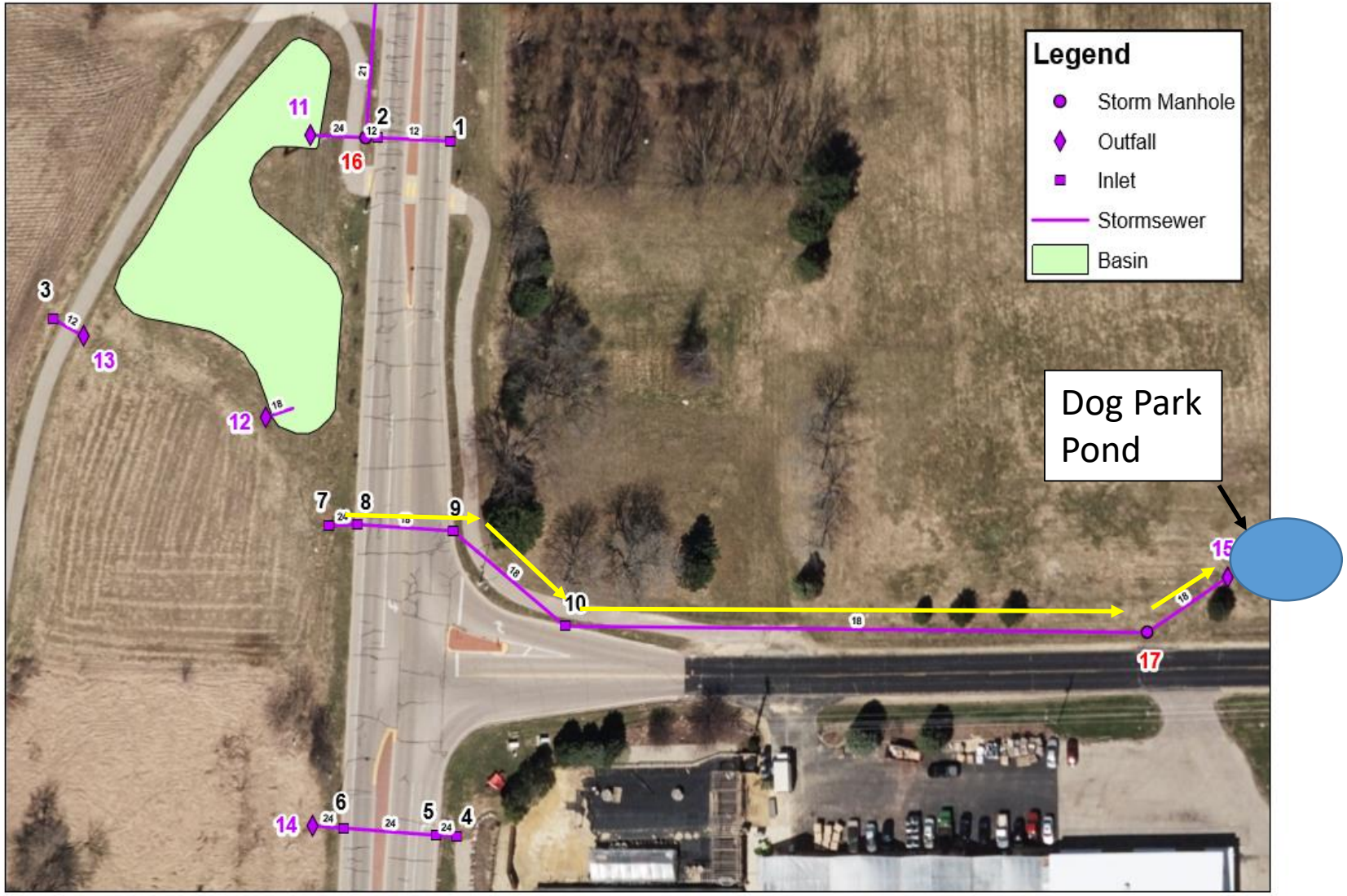
Hydrologic Soil Group



- Soils around pond are clay. Slow to soak into ground.
- Confirmed with previous dredging.


16.2
Acres
20.5
Acres
12.5
Acres
11.8
Acres
2.6
Acres
10.2
Acres
17.2
Acres
25.5
Acres
126.3
Acres
29.7
Acres

Irish Lane Drainage Map



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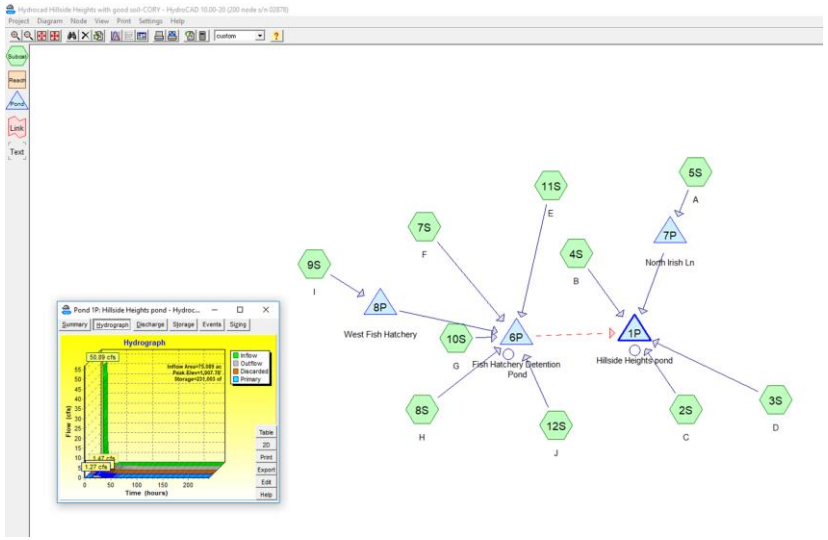
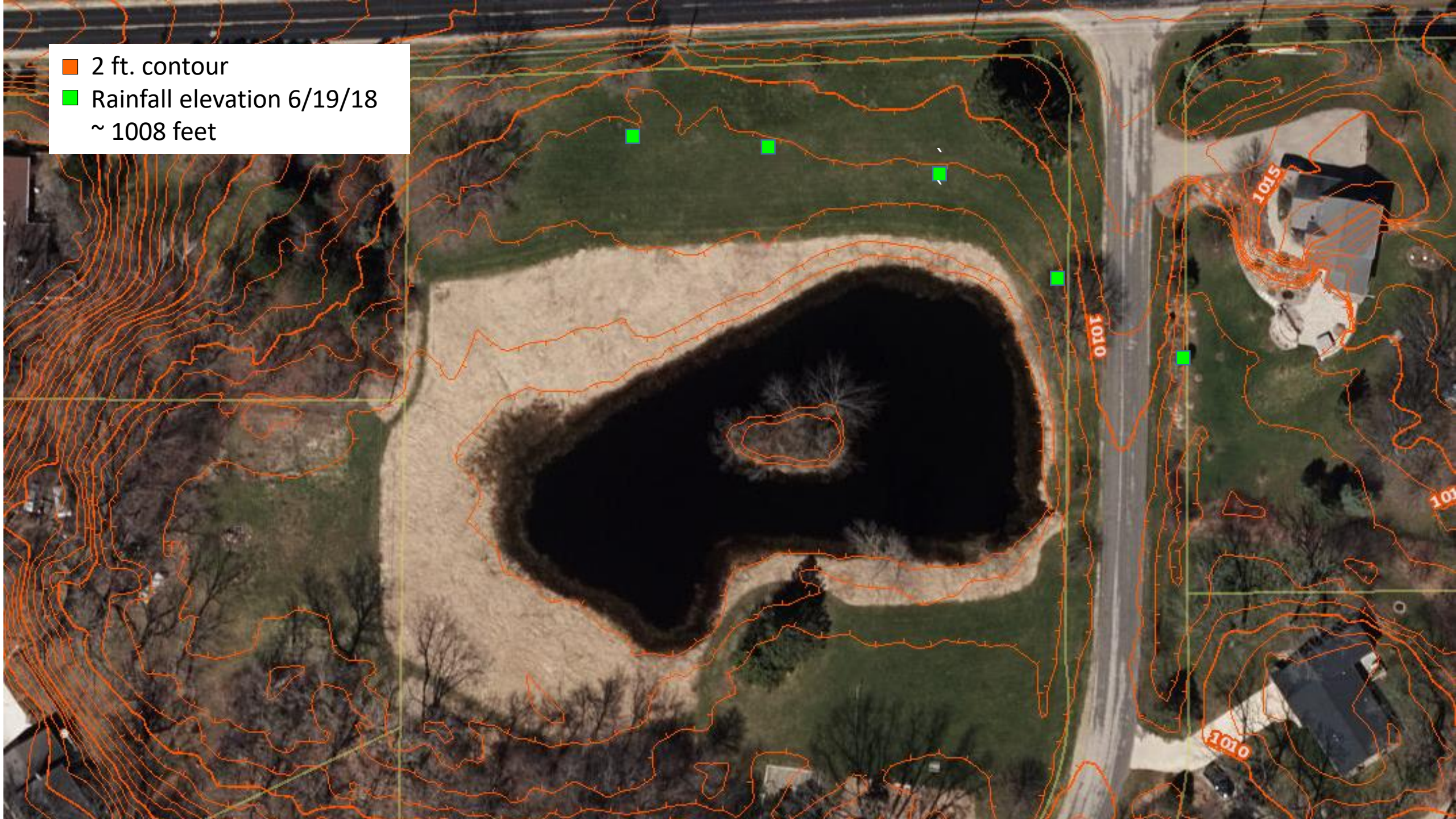
Findings from modeling

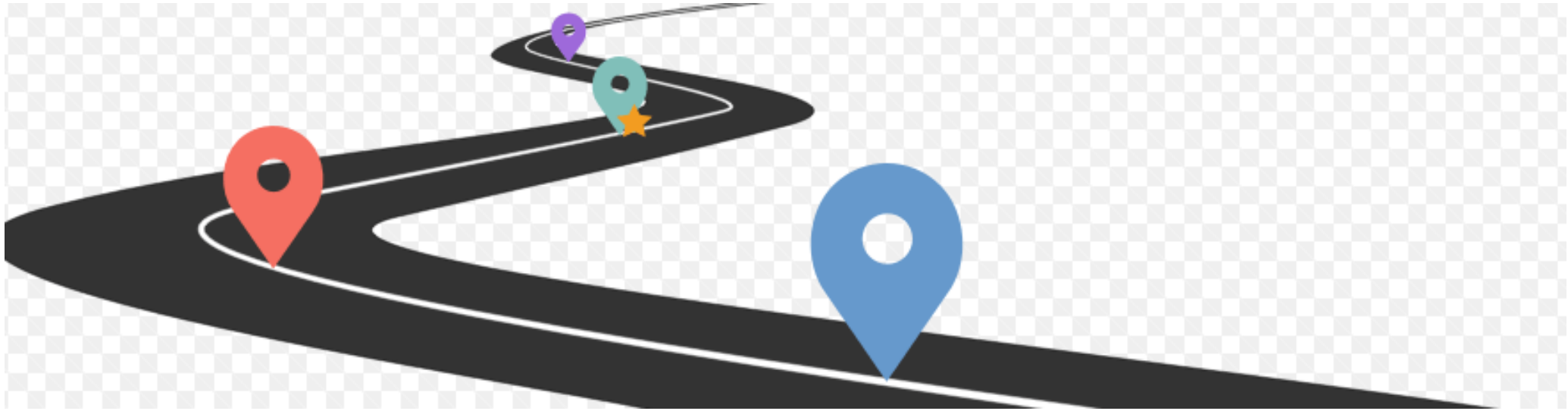
- Little runoff (and ponding) is generated for rainfalls less than 2-inches
- Pond infiltration (based on soils) is very low and has minimal effect on flood height
- The drainage area ratio to pond area is 55:1.
- Excavating the pond as much as possible only increases live pond volume by 8%
- A gravity outlet is very flat and requires a significant distance to outfall. Capacity is therefore very low and does not lower flood height significantly.
- 2008 Fish Hatchery Road (CTH D) culverts have potential to significantly impact Hillside Heights.
- Evaluated many alternatives that we will discuss on following slides.



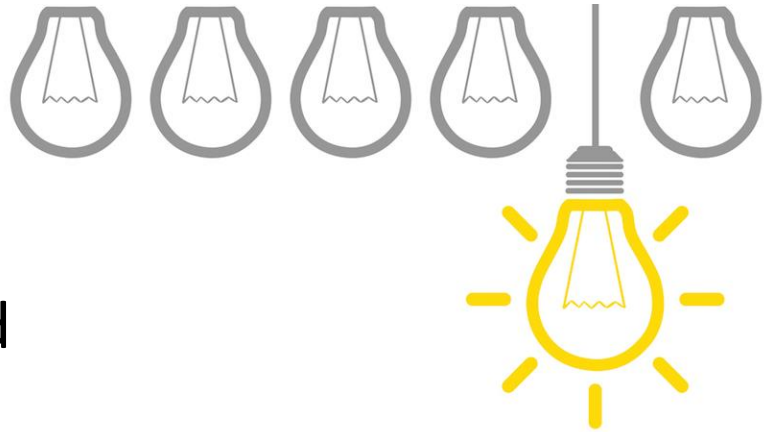

2 ft. contour
Rainfall elevation 6/19/18
~ 1008 feet
1015
1010
1010

Discussion / Roadmap to implementation

- What options would you like to see implemented?
- What order makes the most sense?



Potential Solutions



- Add valve to control water from Fish Hatchery Road
- Pump when necessary
- Add storage around Hillside Heights pond
- Dog park pond - repair infiltration
- Lower overtop elevation to east
- Add gravity pipe outlet to drain higher flows east
- Flood proof homes/property
- Improve infiltration in Hillside Heights depression

- Others?

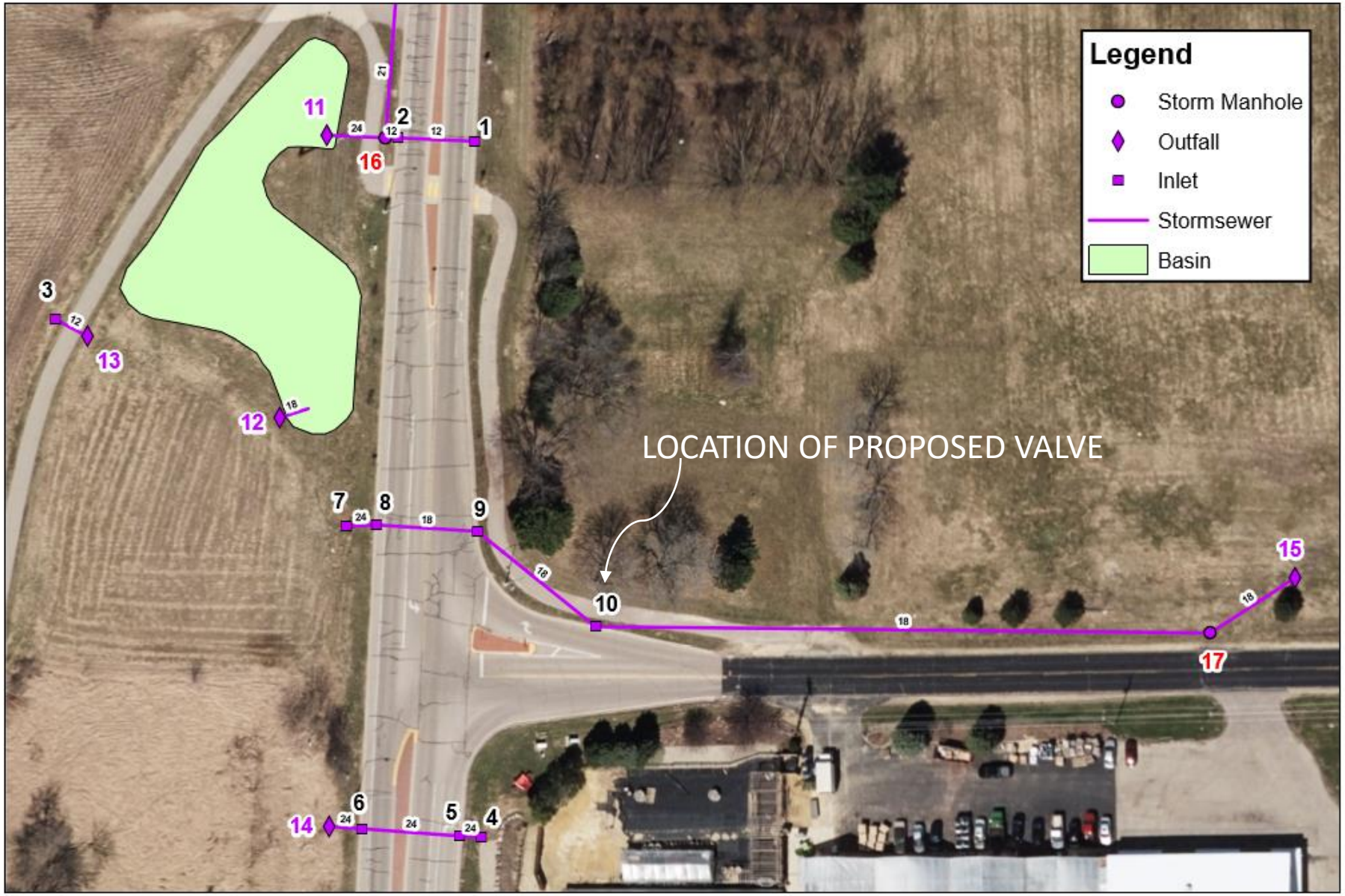
SUMMARY TABLE

				Cost		
IMPROVEMENTS	100-year Flood Improvement (FEET)	10-Year Flood Improvement (FEET)	1-Year Flood Improvement (FEET)	Low	High	Notes
Valve FHR	2.96	0.33	0	$10,000	$15,000	
Add Storage	0.19	0.44	0	$40,000	$50,000	Could be done by City Crews
Pump	0.38	*	*	$20,000	$75,000	Helps to lower pond quickly after events
Infiltration at Dog Park	0	0	Slight	*****	*****	*****Will be completed with other budgets
12” Culvert	0.76	0.3	0	$134,000	$150,000	Could cause wetland impact and downstream impacts
3-15” Culverts	3.6	0.52	0	$450,000	$500,000	Could cause wetland impact and downstream impacts
15” Culvert, Storage, and Valve	3.78	0.55	0	$185,000	$220,000	Could cause wetland impact and downstream impacts
Lower Overtop to East	2.48	0.55	0			Work on private property - not feasible
Divert South Farm Field	0	0.06	0.06			Causes downstream impacts – not feasible
Increase Infiltration in Pond						Could cause wetland impact – not feasible

Add Valve to Control Water from Fish Hatchery Road

- Adding a valve would reduce the amount of water able to move from Fish Hatchery Road to Hillside Heights pond
- City would still be able to open valve during large rainfall events to reduce flooding on Fish Hatchery Road when it would not cause damages to Hillside Heights
- Benefits large rain events and slightly improves small events
- Cost Estimate: ≈$10,000

Irish Lane Drainage Map



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Pump

- Continue to pump when necessary
- Could be a permanent setup/temporary setup with permanent intake/temporary setup
- Estimated Cost to buy and install a pump: ≈$20,000-$75,000 (depends on what method the City chooses)
- Cost of pump rental has been roughly $3,000 per event
- Permitting would depend on wetland impact/level of intake
- Could be implemented quickly

Excavation Around Hillside Heights Pond

- Excavate land to the north and south of Hillside Heights Pond
- Have 4 by 1 grading to provide maximum amount of storage in area
- About 1 acre-foot of additional storage would be created
- Cost Estimate: ≈ $40,000 to $50,000


Wetland delineation
1 ft. contour
5 ft. contour
Proposed contours

Dog Park Site

- Repair infiltration pond.
- Compost was not incorporated in to sand and had a lot of clay

- Make pond bigger in dog park.
  - Drainage area is less than 5 acres
  - Not much water to store (unless pumped from downstream)

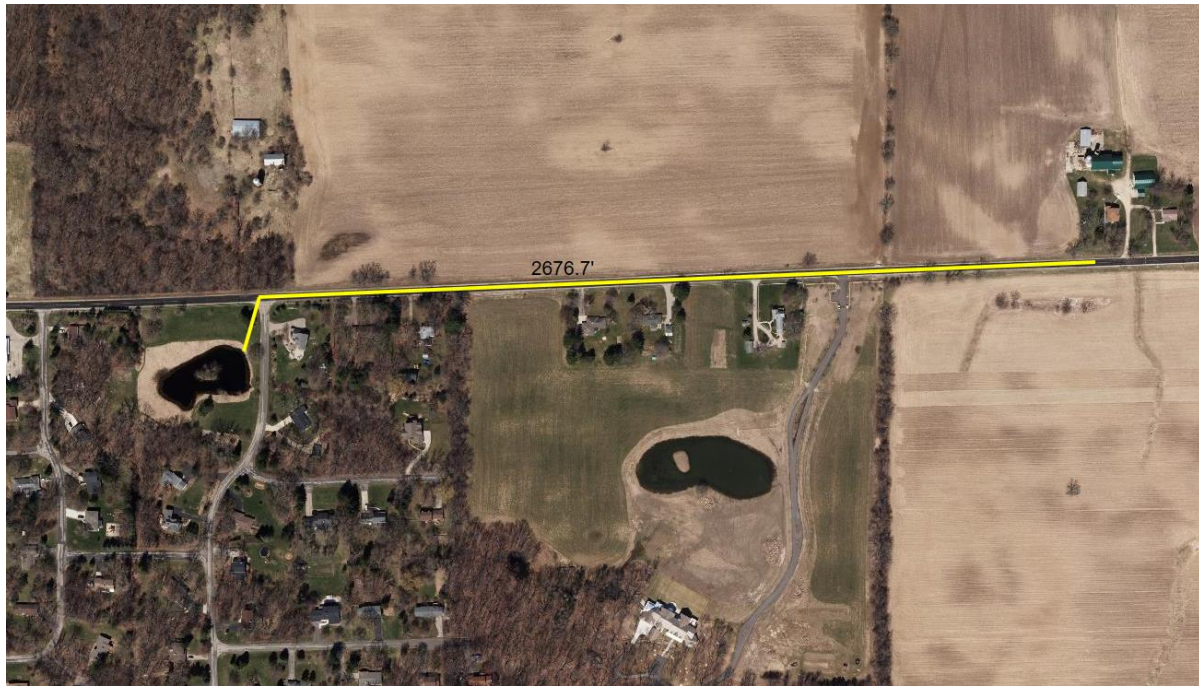
- Pumping water to the dog park site would ultimately drain back into the Hillside Heights Pond and could raise groundwater levels

Lower Overtop Elevation to East

- Lower berm elevation to east of Hillside Heights Pond
- Allow for easier flow of water out of Hillside Heights depression
- Would need to be lowered quite significantly to have a real effect
- Would require work on private property and could increase downstream flooding

Culvert from Hillside Heights Pond

- Add an outfall to Hillside Heights pond
- Would need to be nearly 3,000 feet long in order to drain water away from pond
- Issues
  - Flooding downstream
  - Rights of way
  - May need to dig on private land
- Cost Estimate: ≈$134,000-$500,000
  - Depends on size/capacity



Potential downstream impacts from additional downstream flow from new culverts

Improve Infiltration in Hillside Heights Depression

- Previous dredging in the area revealed dense blue clay and boulders in soil around Hillside Heights Pond (confirms soil survey)
- Likely would need to excavate very deep to reach sandy soils
- Would need extensive geotechnical investigation
- Could adversely increase groundwater levels
- Would be a permitting issue as this would drain wetland

Farm Field South of Pond

- Drain farm field to the east
- Small drainage area directly contributes to Hillside Heights Pond
- Redirecting this runoff would decrease flood heights less than 0.1-foot
- Would be challenging to make water flow another direction because it is surrounded by higher elevations in every other direction
- Could cause flooding elsewhere

THANK YOU!!!!!!!!!!!!!