



McKenna Blvd/Park Edge Dr Flooding Update

DECEMBER 13, 2018

Presentation Overview

- ▶ Flash Flooding and Design Standards
- ▶ What Has Been Happening in the Elver Park Watershed?
- ▶ Watershed/Modeling Overview
- ▶ Proposed Public Works Solution Overview
- ▶ Next Steps
 - ▶ Moving Forward
 - ▶ Project Schedule
- ▶ What can Property Owners Do?
 - ▶ Self-Report Online Survey
 - ▶ Understand drainage and how to protect your property
 - ▶ Backflow Preventers and Sump Pumps
 - ▶ Insurance



Background Information

HOW DID WE GET HERE?

Design standards:

- ▶ Design standards – typically look at the cost to accommodate a specific event (say a 10-yr) and the consequences of failure (which might only be a small overtopping of the road with no damage) vs the cost to design for a different more severe event (1000-yr).
- ▶ Why doesn't this always work?
 - ▶ First floor elevations are not set by standards or regulated
 - ▶ Forced exposures such as window wells or doors create vulnerabilities
 - ▶ Inlets clog and don't function as designed
 - ▶ **Design standards change through time**
 - ▶ **Design storms change through time**

Design Standards (Then and Now):

- ▶ First Addition to Park Ridge – platted in 1979
- ▶ Engineering design standards for the City of Madison in 1979 –
 - ▶ Culverts under a road were typically designed for a 10-year event
 - ▶ Detention standards were not adopted until 1983
- ▶ Contemporary engineering design standards for **new development** for the City of Madison are –
 - ▶ Pipes conveying water to a pond in a sub-division are designed for a 10-year event
 - ▶ Culverts under a road are designed for a 100-year event
 - ▶ Drainage of enclosed depressions are designed for a 100-year
 - ▶ Detention basins are designed to control flow rate during the 2-, 5-, 10- and 100-year events
 - ▶ Roads are expected to act as overflow during extreme events (100-year+)

Flash Flooding – Why?

- ▶ Historic rain (what do I mean if I say 100-year event, 1000-year event)

The term "100-year storm" is used to define a rainfall event that statistically has a 1% chance of occurring in any given year" In other words, over the course of 1 million years, these events would be expected to occur 10,000 times. But, just because it rained 10 inches in one day last year doesn't mean it can't rain 10 inches in one day again this year.

- ▶ What event was the Aug 20th rain?

- ▶ To define an event two terms are needed **INTENSITY** and **DURATION**.

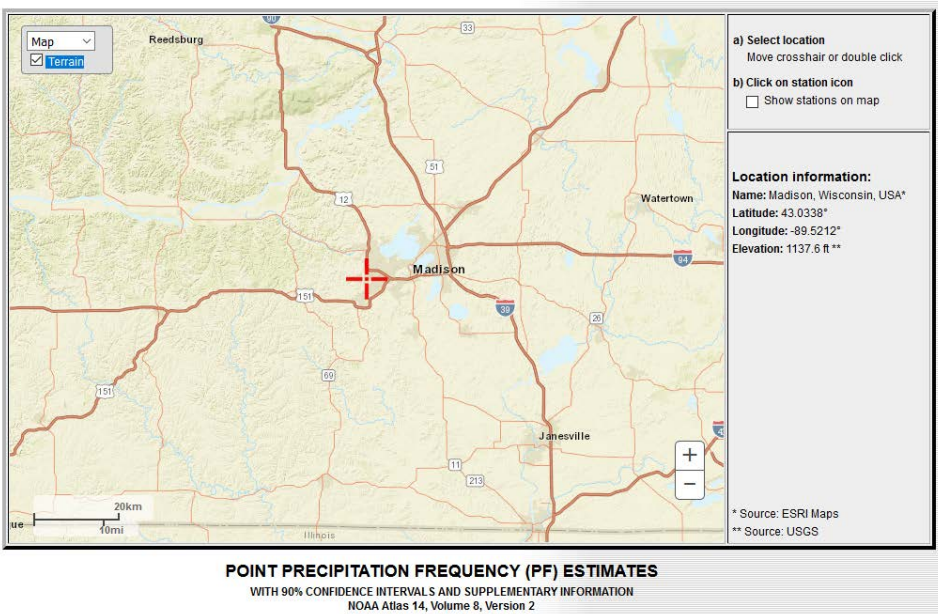
- ▶ There are multiple "100 – year" events. In our area for example:

- ▶ 1 hour 3.09"
 - ▶ 2 hours 3.87"
 - ▶ 12 hours 5.96"
 - ▶ 24 hours 6.76"

Changes in Design Storms

- ▶ Before 2014: TP-40 (Hershfield) rainfall depths/frequencies, SCS Type II storm distribution
 - ▶ TP-40: published in 1961
 - ▶ Period of record: 1938-1958
 - ▶ SCS Type II storm distribution: developed by the Soil Conservation Service in the early 1970s, based on TP-40 rainfall data
- ▶ After 2014: NOAA Atlas 14 rainfall depths/frequencies, MSE 4 storm distribution
 - ▶ NOAA Atlas 14, Vol. 8 (inc. Wisconsin): published 2013
 - ▶ Period of record: through 2010
 - ▶ MSE 4 distribution: developed in 2014/2015 by NRCS
 - ▶ More intense than SCS Type II

Most recent (Atlas 14) rainfalls from NOAA



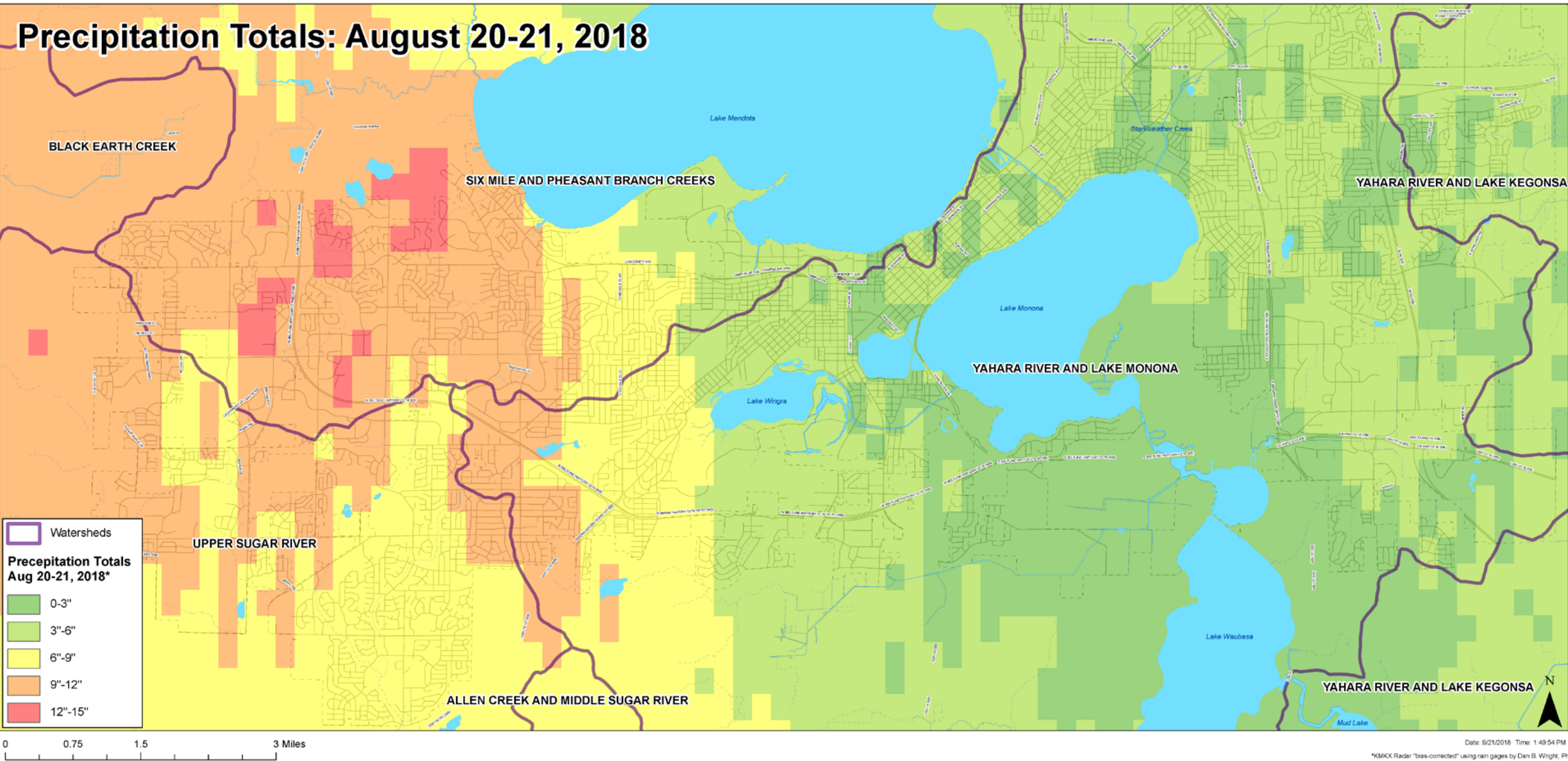
Some areas in Madison and the surrounding areas received 12-15 inches in approximately 8 hours. This is literally off the chart.

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)¹

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.381 (0.327-0.447)	0.437 (0.373-0.511)	0.531 (0.453-0.623)	0.613 (0.520-0.722)	0.732 (0.605-0.889)	0.829 (0.670-1.02)	0.929 (0.728-1.16)	1.04 (0.782-1.32)	1.18 (0.861-1.54)	1.30 (0.922-1.71)
10-min	0.559 (0.478-0.654)	0.639 (0.547-0.749)	0.777 (0.663-0.912)	0.898 (0.761-1.06)	1.07 (0.886-1.30)	1.21 (0.981-1.49)	1.36 (1.07-1.70)	1.52 (1.14-1.93)	1.73 (1.26-2.25)	1.90 (1.35-2.50)
15-min	0.681 (0.583-0.798)	0.780 (0.667-0.913)	0.948 (0.808-1.11)	1.10 (0.928-1.29)	1.31 (1.08-1.59)	1.48 (1.20-1.81)	1.66 (1.30-2.07)	1.85 (1.40-2.36)	2.11 (1.54-2.75)	2.32 (1.65-3.05)
30-min	0.939 (0.804-1.10)	1.08 (0.921-1.26)	1.31 (1.12-1.54)	1.52 (1.29-1.79)	1.82 (1.50-2.20)	2.06 (1.66-2.52)	2.30 (1.81-2.88)	2.57 (1.94-3.27)	2.93 (2.13-3.81)	3.21 (2.28-4.22)
60-min	1.19 (1.02-1.40)	1.38 (1.18-1.62)	1.71 (1.46-2.01)	1.99 (1.69-2.35)	2.40 (1.99-2.92)	2.74 (2.21-3.36)	3.09 (2.42-3.85)	3.45 (2.60-4.40)	3.96 (2.88-5.15)	4.36 (3.09-5.72)
2-hr	1.45 (1.25-1.69)	1.69 (1.46-1.97)	2.11 (1.81-2.45)	2.47 (2.11-2.88)	2.99 (2.49-3.61)	3.42 (2.78-4.17)	3.87 (3.05-4.80)	4.34 (3.30-5.49)	4.99 (3.66-6.46)	5.51 (3.94-7.18)
3-hr	1.60 (1.39-1.86)	1.88 (1.62-2.17)	2.35 (2.03-2.73)	2.77 (2.37-3.22)	3.38 (2.83-4.07)	3.88 (3.17-4.72)	4.41 (3.49-5.46)	4.97 (3.79-6.28)	5.75 (4.24-7.42)	6.37 (4.57-8.28)
6-hr	1.89 (1.65-2.17)	2.20 (1.91-2.53)	2.75 (2.38-3.16)	3.24 (2.79-3.74)	3.98 (3.36-4.78)	4.60 (3.79-5.56)	5.26 (4.20-6.48)	5.97 (4.60-7.51)	6.98 (5.18-8.96)	7.79 (5.62-10.1)
12-hr	2.20 (1.93-2.51)	2.52 (2.21-2.87)	3.10 (2.71-3.54)	3.64 (3.16-4.18)	4.47 (3.82-5.36)	5.19 (4.32-6.25)	5.96 (4.81-7.31)	6.81 (5.28-8.52)	8.02 (6.01-10.3)	9.02 (6.55-11.6)
24-hr	2.51 (2.21-2.84)	2.87 (2.53-3.25)	3.53 (3.10-4.00)	4.14 (3.62-4.71)	5.08 (4.36-6.03)	5.88 (4.93-7.03)	6.76 (5.48-8.23)	7.71 (6.02-9.58)	9.08 (6.84-11.5)	10.2 (7.46-13.0)



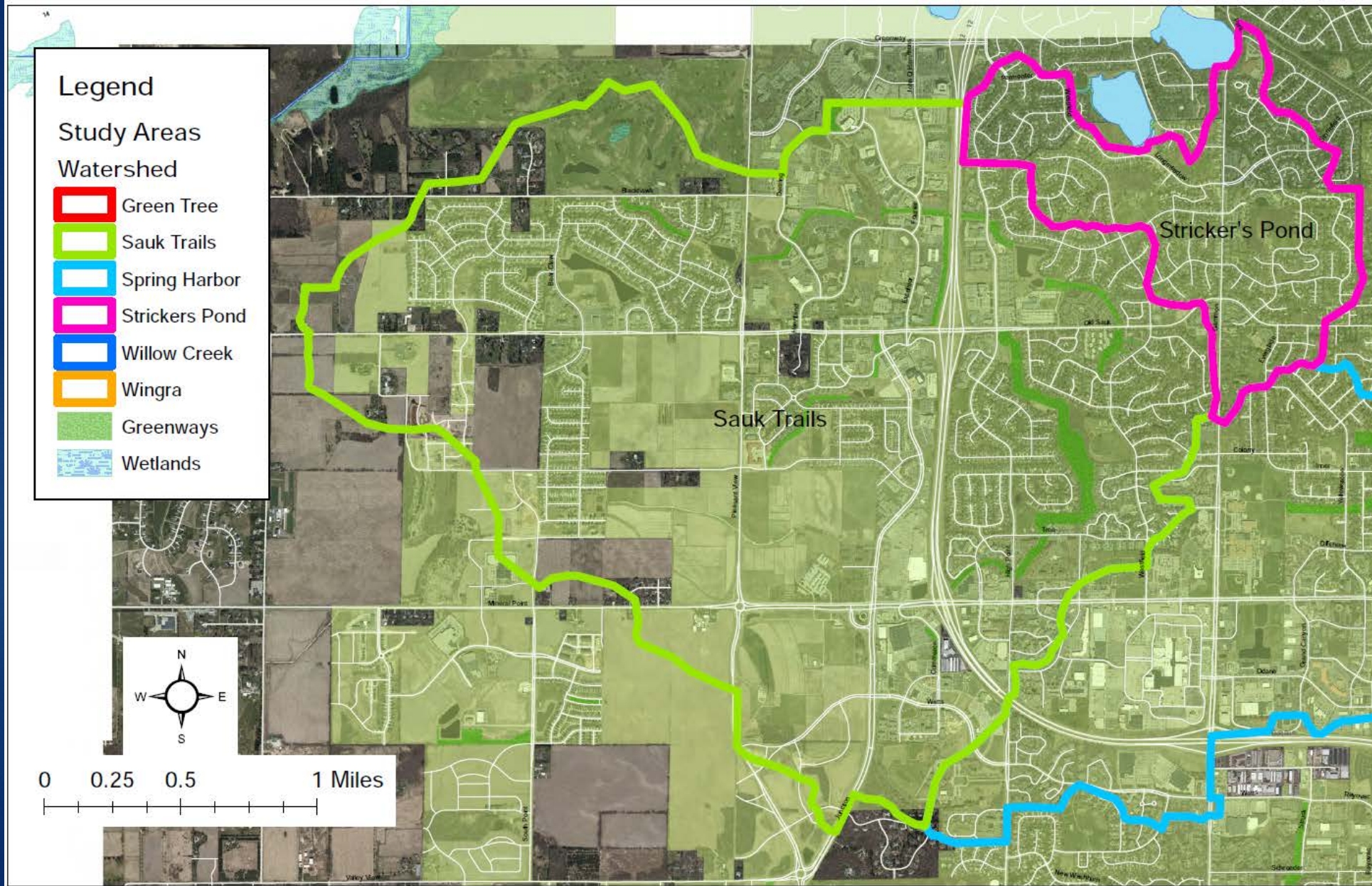
Flash Flooding in Madison: Aug 20-21, 2018



- **WORD OF WARNING:** We can not fix one problem without understanding the impacts! We need to look at the system in its entirety so we are not causing unintended problems



Watershed – Overview



Modeling/Design Challenges

- ▶ Specific modeling/design challenges in the watershed
 - ▶ Grate clogging/greenway maintenance
 - ▶ Culverts under McKenna are undersized
 - ▶ Cunette is very shallowly sloped (0.1%)
 - ▶ Greentree Landfill adjacent to cunette (limits expansion of channel to the east)
 - ▶ Older construction means older design standards for stormwater control and development
 - ▶ Elver Park impacts
 - ▶ Redevelopment always more difficult than new development
 - ▶ Emergency access on McKenna Blvd
- ▶ Aug 20, 2018 forced City Engineering to step back and review design standards
- ▶ BUDGET! We had sufficient funds for a much smaller project in 2017, but only received additional funding Nov 2018.

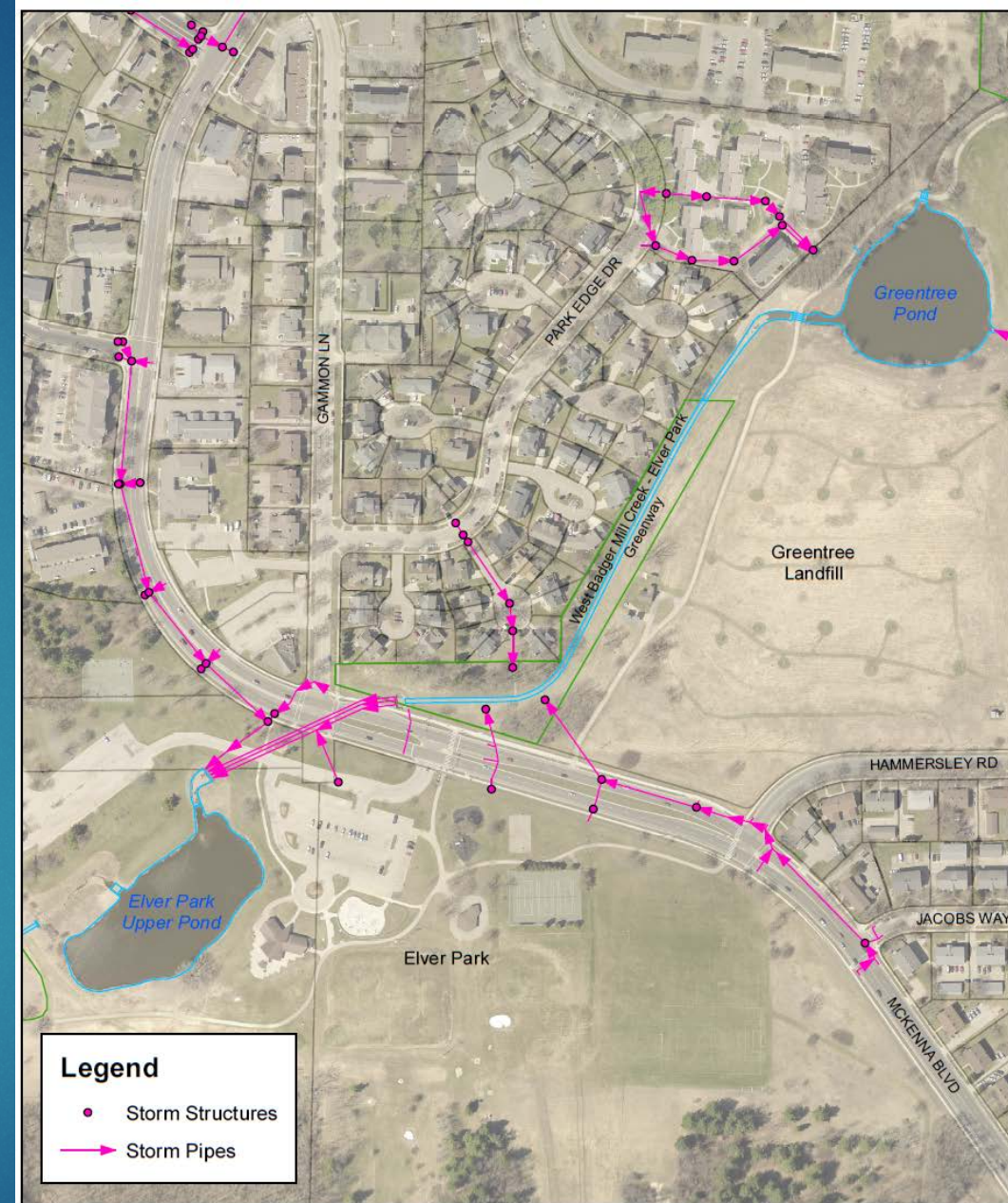


Proposed Public Project Design

WHAT IS THE CITY DOING?

Project Features

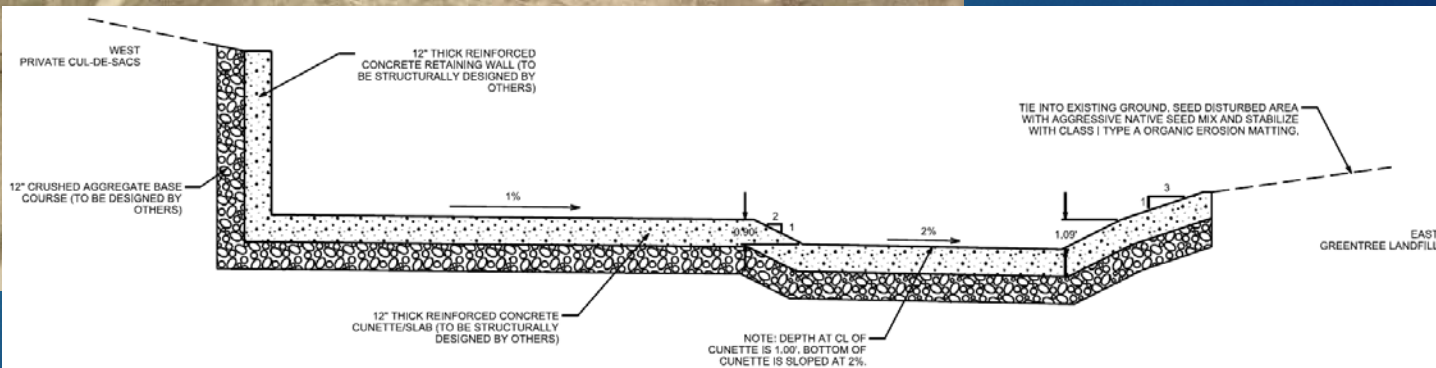
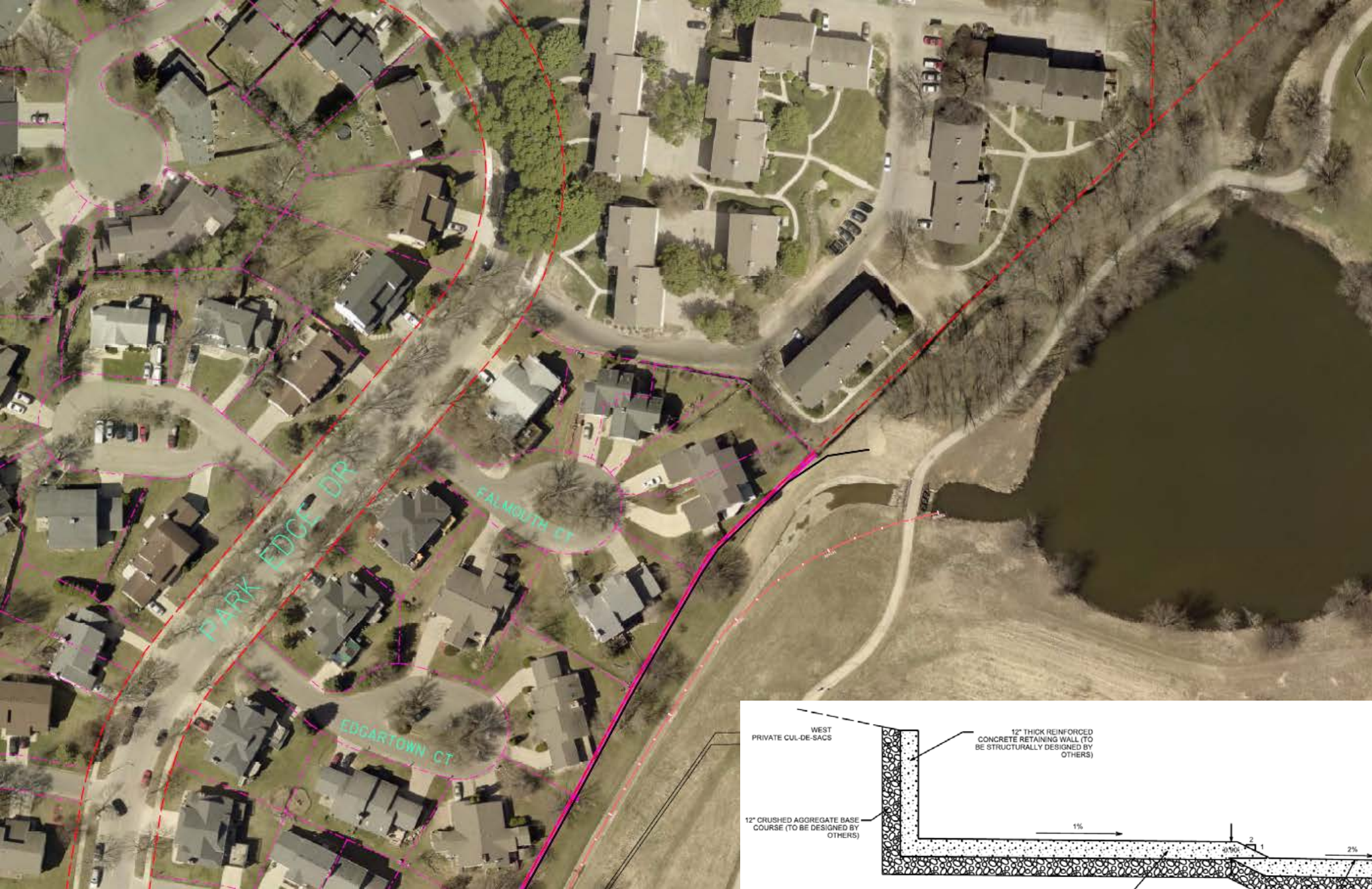
- ▶ Large box culverts (twin-cell 5'x20') carry flood flows under McKenna Blvd
 - ▶ Re-design and construction of inlet and outlet structures for culverts under McKenna Blvd
- ▶ Concrete channel lining
 - ▶ Re-alignment and lowering of cunette
 - ▶ Protective fence/railing
- ▶ Removal and replacement of corrugated metal culverts at inlet and outlet of Greentree Pond
 - ▶ Modification of bike path through Greentree Landfill

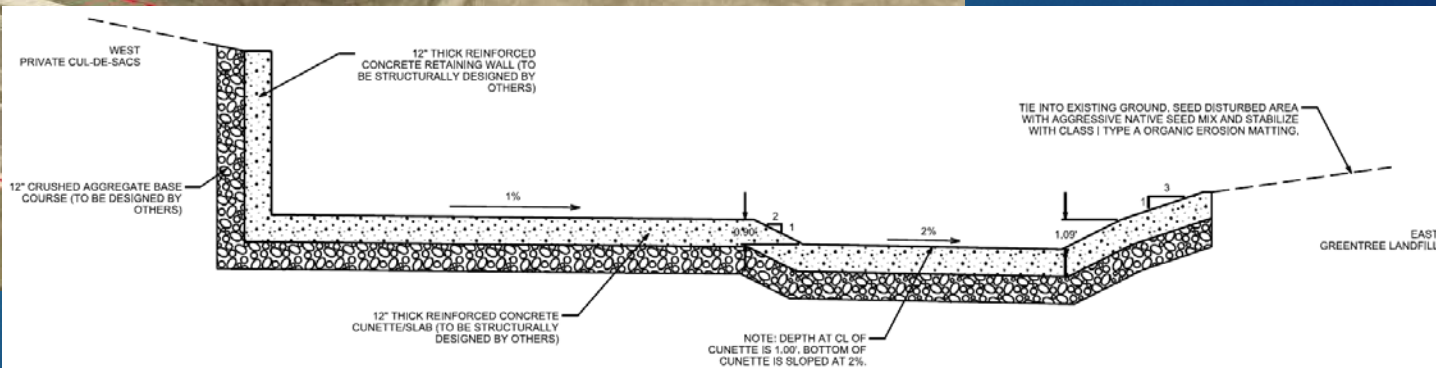
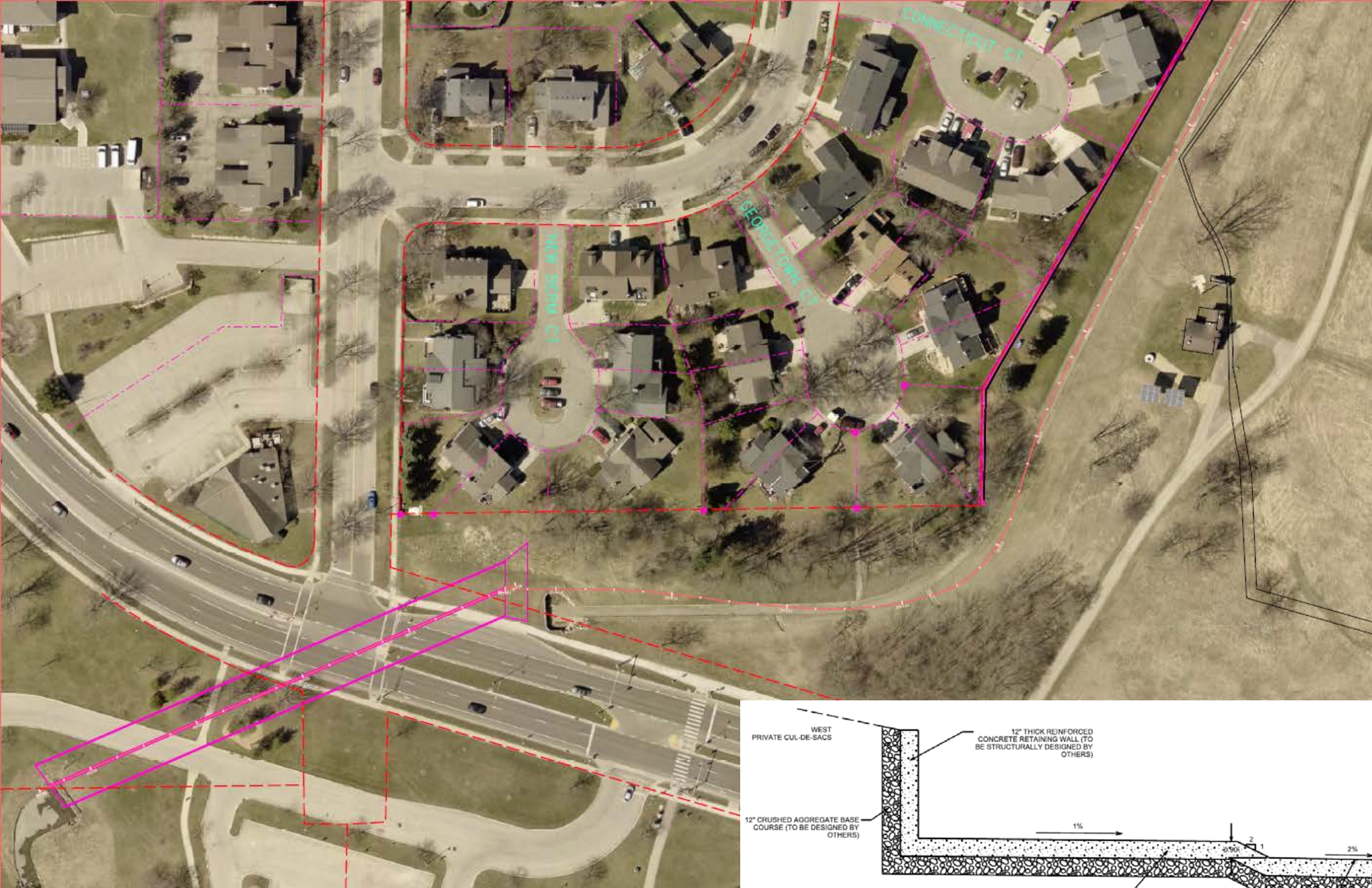


Attachment A: Site Map

0 300 600 1,200 Feet







Next Steps

- ▶ Design:
 - ▶ Winter/Spring 2019
- ▶ Approval (City Boards):
 - ▶ Board of Park Commissioners (Feb 2019)
 - ▶ Board of Public Works (Mar/Apr 2019)
 - ▶ Common Council (Apr/May 2019)
- ▶ Permitting – **submit** Jan 2019
 - ▶ Wisconsin DNR
 - ▶ City of Madison Erosion Control/Stormwater Management
- ▶ Bidding:
 - ▶ Summer 2019
- ▶ Construction:
 - ▶ Late Summer through late Fall 2019
 - ▶ Roughly 4 months

Supplemental Flood Insurance

- ▶ **Consider obtaining flood insurance** and fully understand the insurance coverage. FEMA or private flood insurance are available. Contact your insurance agent for more information.

QUESTIONS

- ▶ City of Madison Project Website
www.cityofmadison.com/flooding
- ▶ Flooding And Self-Reporting at
www.cityofmadison.com/reportflooding
- ▶ Flood Prevention Flyer and website
www.cityofmadison.com/floodprotection

Map Disclaimer

- ▶ Flood mapping data from City 2016 LiDAR data
- ▶ Rain accumulation data from KMKX Radar that was “bias corrected” using rain gauges by UW Professor, Dan Wright
- ▶ The information on the maps 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.