# Proposed Revisions to Madison General Ordinance 37 – Stormwater
# City of Madison, WI
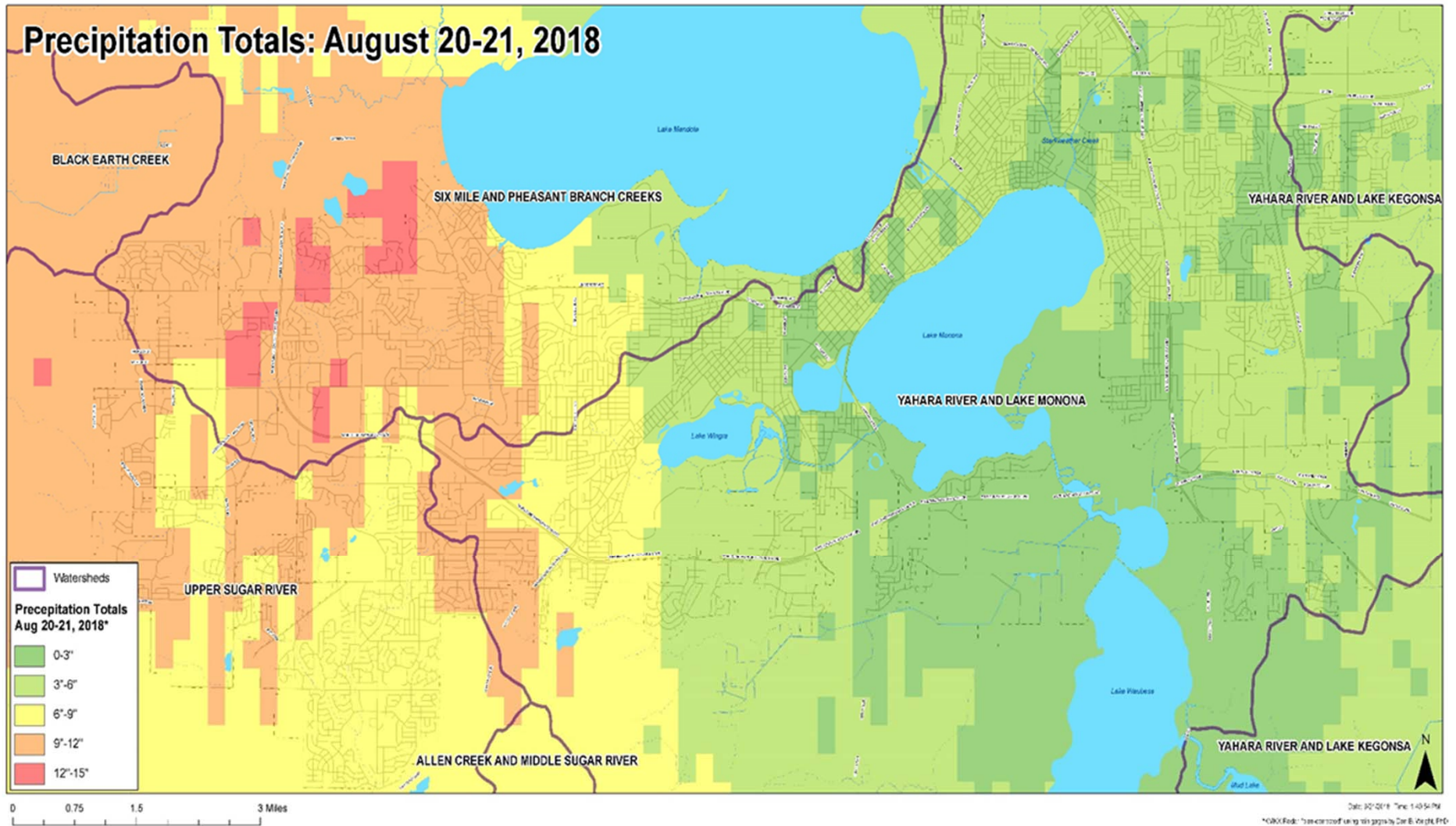


City Engineering
Greg Fries P.E.
Janet Schmidt, P.E.

# Presentation Overview

➢ **BRIEF FLOODING REVIEW** - AUGUST 2018/19
  - Flash Flooding (2018)

➢ **WHAT DOES THE FUTURE HOLD**
  - Climate Change Concerns
  - Changing Rainfall Patterns

➢ **CITY OF MADISON ORDINANCES**
  - Design Changes
  - Existing Stormwater Ordinance
  - Proposed Ordinance Modifications

➢ **REVIEW OF COMMENTS AND RESPONSES**

# Flash Flooding Rainfall August 20-21, 2018



Precipitation Totals: August 20-21, 2018

BLACK EARTH CREEK

SIX MILE AND PHEASANT BRANCH CREEKS

Lake Mendota

YAHARA RIVER AND LAKE KEGONSA

Lake Monona

YAHARA RIVER AND LAKE MONONA

Lake Wingra

UPPER SUGAR RIVER

Watersheds

**Precipitation Totals Aug 20-21, 2018***

- 0-3"
- 3"-6"
- 6"-9"
- 9"-12"
- 12"-15"

ALLEN CREEK AND MIDDLE SUGAR RIVER

YAHARA RIVER AND LAKE KEGONSA

0   0.75   1.5        3 Miles

KMKX Radar that was "bias corrected" using rain gauges by UW Professor Dan Wright

# Historic Flooding: Flash Flooding on August 20-21, 2018

NOAA Atlas 14 Intensity Duration Frequency (IDF) Recurrence Interval

**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) |
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| 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) |

# Historic Flooding: Flash Flooding on August 20-21, 2018

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NOAA Atlas 14 Intensity Duration Frequency (IDF) Recurrence Interval

**SOME AREAS RECEIVED 1,000 YEAR EVENT!**

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

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# What Does the Future Hold?
# Changing Rainfall Patterns

Professor Dan Wright - RainyDay
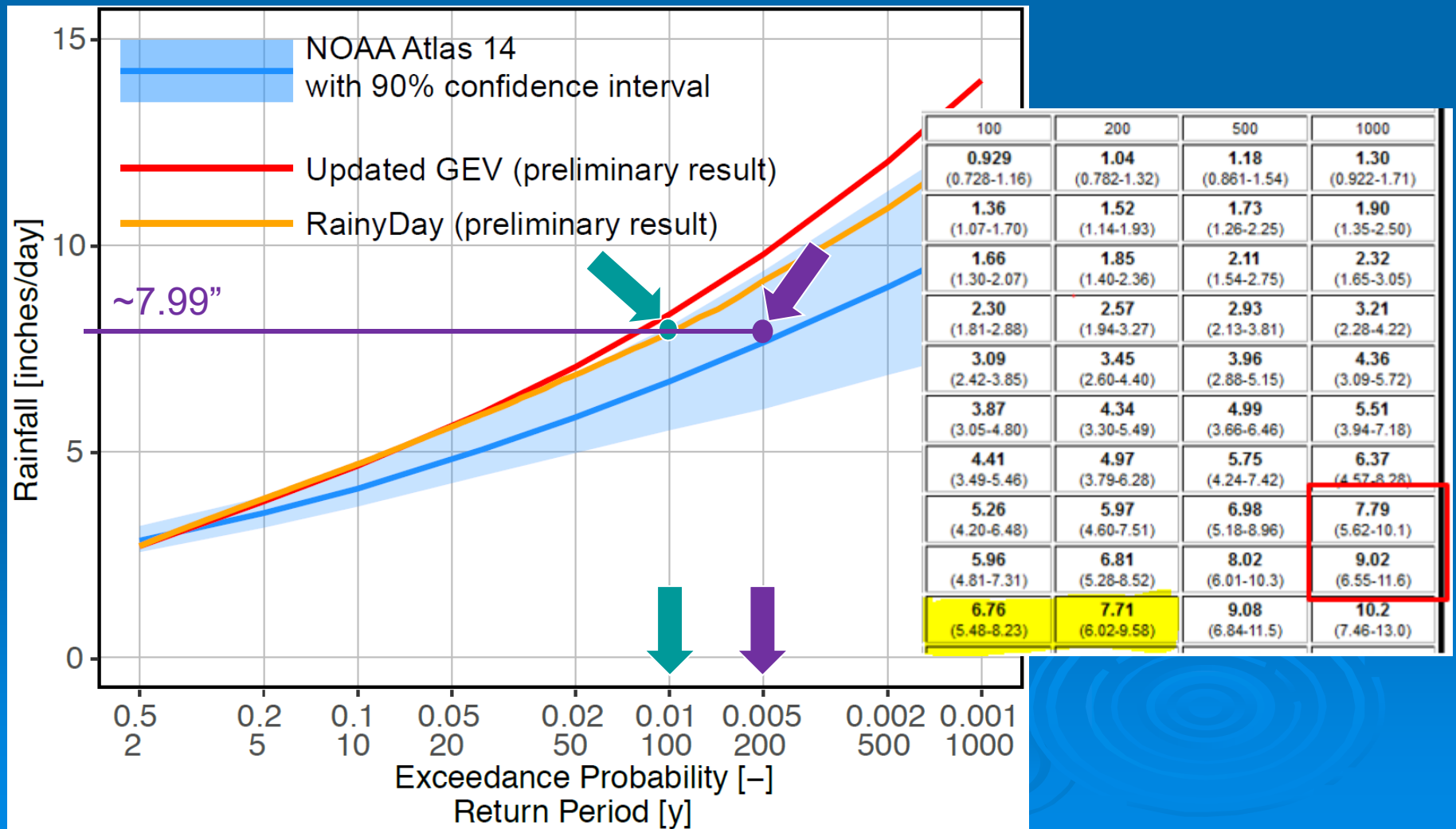
# City of Madison Ordinances:
## NEW DEVELOPMENT

| | NEW DEVELOPMENT | EXISTING REQUIREMENTS | PROPOSED CHANGES |
|---|---|---|---|
| **Quality** | Total Suspended Solids (TSS) | Reduce by 80% | NONE |
| | Oil and Grease | Treat from parking lots, drive thrus or sensitive areas | NONE |
| | Infiltration | Infiltrate 90% of predevelopment infiltration on an average annual basis (not rain event) | NONE |
| **Quantity** | Detention | 1, 2, 10 & 100 year detention | 1, 2, 10, 100 & **200** year detention |
| | Storm Sewer Pipes | 10 Year | 10 year |
| | Culverts under roads | 25 or 50 year | **100 year** |
| | Enclosed depressions | 25 year | **100 year** |
| | Detention basins | 100 year | **200 year** |
| | Grandfathering old detention requirements | Allowed until 2018 flooding occurred | **Prohibited** |
| | Roadways are expected to act as overflows | Events not modeled | **Events are modeled** |
| | Overflow and access | Easement or Outlot | **only outlots accepted** |
| | 100 Yr Routing | None | **No water leaves ROW or public property 100 year** |
| | 500 Yr Routing | None | **500 year is routed through development** **Water allowed to leave ROW or public lands but no structural flooding** |
| | Minimum elevations | None | **Deed restrict properties with minimum opening elevations in critical areas** |

# City of Madison Ordinances:
## REDEVELOPMENT

| | REDEVELOPMENT | EXISTING REQUIREMENTS | PROPOSED CHANGES |
|---|---|---|---|
| **Quality** | Total Suspended Solids (TSS) | Reduce by 60% from new pavement or 40% for entire site within the TMDL | NONE |
| | Oil and Grease | Treat from parking lots, drive thrus or sensitive areas | NONE |
| | Infiltration | NONE | NONE |
| **Quantity** | Detention | NONE | NONE |
| | Storm Sewer Pipes | 10 Year | **10 year** |
| | Peak run-off* | NONE | **Reduce by 15% compared to existing conditions during a 10-year design storm** |
| | Run-off volume* | NONE | **Reduce by 5% compared to existing conditions during a 10-year design storm** |
| | Green Infrastructure* | NONE | **Required rate and volume reductions using green infrastructure for at least the first 1/2 inch of rainfall** |
| | Minimum elevations | Isthmus 851.0 | **Isthmus 852.0; other areas may have minimum opening elevations prescribed in flood prone locations** |

\* if redevelopment has proposed impervious cover **exceeding 80%** of the existing site impervious cover, the site shall meet
peak run-off, run-off volume and green infrastructure requirements

# Comments and Responses

➢ **Comment by Madison Area Builder's Association (MABA)** – What is the planned effective date of the ordinance?

- **Action** – The Ordinance will become effective when the minutes for the Common Council meeting where it is approved become final which is typically 1 week after the meeting. Our current plan is to have this approved at the Common Council on June 2, 2020.

➢ **Comment by MABA** – Has Madison considered that the NOAA Alas 14 may be updated in the near future and what that would mean?

- **Action** – in discussion with people working with NOAA it is likely that a new update is 3-5 years away at a minimum. The more likely scenario is that a Wisconsin IDF curve will be created as part of the WICCI process and we would then adopt that IDF curve.

# Comments and Responses

➢ **Comment by MABA** – Request a delay in implementation of the increase in detention by 18 months to allow projects in the works to proceed as being identified.

- **Action** - City Engineering does not think that it is reasonable to delay implementation of this by 18 months – however we have added language that allows lands that are currently platted to be re-platted within some boundaries and not have to fully comply with the new standards as would normally be required by a new plat process.

➢ **Comment by MABA** – Request inclusion of wording in the ordinance that either caps future increases in the detention requirements or requires Common Council action to address future changes.

- **Action** – Engineering Division does not recommend capping future actions in regard to detention standards, however all changes to MGO require Common Council authorization so we have met this request.

# Comments and Responses

➤ **Comment by Dane County** – City's definition of a closed watershed was not consistent with theirs.

- **Action** - Updated to be consistent with over promulgating Dane County Ordinance.

➤ **Comment by WNDR** - The definition of Final Stabilization was not consistent with NR-151.

- **Action** – Updated to be consistent with NR-151

➤ **Comment** – City was not clear on the how pervious/permeable pavement will be treated for utility charges and for zoning lot coverage standards.

- **Action** – Clarified the definition to make intent clear.

➤ **Comment by League of Women Voters (LoWV)** – League recommends that City acknowledge that future changes to the rainfall file may be required to address continuing knowledge that is being accrued due to changes associated with Climate Change.

- **Action** – As noted above we acknowledge that updates to this code will be needed and as Engineering staff are involved in the current WICCI process we will track this issue closely.

# Comments and Responses

➢ **Comment by Homburg Contractors** – Having redevelopment disturbance set at 4,000 SF creates a disincentive to repair small deteriorating parking lots.

  ● **Action** – Updated the standard to change the threshold for redevelopment to be 10,000 SF.  Note that Dane Co is changing their standard from 4,000 SF to 20,000 SF.

➢ **Comment by Engineering staff** – City's definition of "site" was not consistent with WDNR criteria under NR-151 nor was it internally consistent.

  ● **Action** – Updated the definition to be internally consistent.

➢ **Comment by Vierbicher** – City's design standard for when the safe overflow for the 100 and 500 year storm events was to be applied was unclear.

  ● **Action** – Updated the design standard to make it clear that this only applied to new developments within the limits of the new development.

# Comments and Responses

➢ **Comment by Dane County** – City's erosion control standard for measurement was not consistent with proposed changes in interpretation of the 5 tons/acre/year standard that they enforce.

- **Action** – Updated code to include Dane County language.

➢ **Comment by WDNR** – City did not have language in code similar to NR-151 that prevents backsliding during redevelopment of a site that originally had 80% TSS control requirements as part of its initial development standard.

- **Action** – Updated code to include language provided by the WDNR.

# Comments and Responses

➢ **Comment by Veridian Development** – City's code did not allow for replatting to address changing market conditions without then meeting new detention standards, which would/could be problematic given that the replatted area could occur well after the stormwater features had already been constructed.

  ● **Action** – Updated code to allow replatting for 7-years from the date of adoption of the ordinance under specific conditions that would not require a full resubmittal and approval of the stormwater plan but might require a partial resubmittal.

➢ **Comment by Veirbicher** – City's code was unclear regarding how to treat green roofs from a curve number perspective.

  ● **Action** –Staff worked with Vierbicher to amend to the code to clearly state our intent in a more understandable manner.
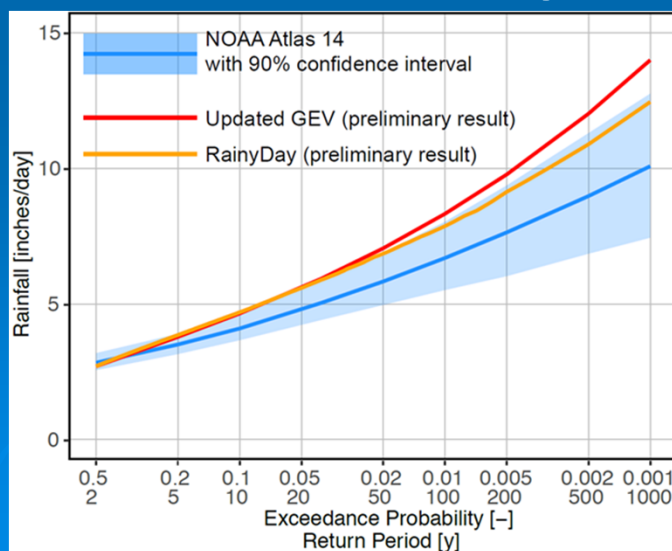
# Comments and Responses

➤ **Comment by CARPC** – City's existing code
was not consistent with existing Dane County
and CARPC standards regarding the
secondary standard of recharge.

- **Action** – Code was updated to be consistent with required language.

➤ **Comment by staff** – More specifics required with regards to how solar panels are treated from a lot coverage perspective.

- **Action** – Solar panels will be addressed on a case by case basis since proposals can differ widely.

➤ **Comment by Friends of Lake Wingra** – New code should include pulverize and overlay of parking lots as redevelopment.

- **Action** – City Engineering cannot do this as this is a Zoning matter and Engineering does not have a permit process separate from Zoning to accommodate this request.

# Comments and Responses

➤ **Comment by Friends of Lake Wingra**– recommend use of a Madison specific intensity duration frequency curve (IDF) as created by Professor Dan Wright on campus.

- **Action** – While we agree that Professor Wright's data is compelling, we do not wish to make the discussion about his research methods. Professor Wright is working with Wisconsin Initiative on Climate Change Impacts (WICCI) to make a more widely recognized IDF curve as part of that process. When that is complete we will review this issue again.

# Comments and Responses

➤ **Comment by Friends of Lake Wingra** – Group recommends increasing the requirement for green infrastructure treatment from the first 1" of rainfall instead of the first ½".

- **Action** – While City Engineering agrees that this action would certainly increase our results, as this is a first step toward distributed green infrastructure (DGI) in Madison and we have received comments objecting to the cost of the new standards we believe that our propose standards represent a reasonable compromise between existing standards and a full move toward DGI.

➤ **Comment by Friends of Lake Wingra** – Group recommends that annual reports for private sites be made accessible to the public on the web.

- **Action** – This is not an Ordinance issue and we will discuss how we might make this possible.

# Comments and Responses

➤ **Comment by Friends of Lake Wingra** – Group recommends an increase on water quality parameters.

  ● **Action** – New development is already required to reach 80% TSS control of the NURP soil distribution curve – this represents approximately the 5 micron particle – movement to a higher standard can only be reached by pressurized filters or infiltration. Additional infiltration requirements are prohibited by State Statute and pressurized filters are impractical. At this point we recommend no changes to water quality requirements.

➤ **Comment by Friends of Lake Wingra** – Group recommends a comprehensive review of Zoning code Chapter 28 of the Madison General Ordinance (MGO) to better coordinate with MGO 37.

  ● **Action** – Engineering and Planning are working on an request for proposals to identify conflicts and barriers between these and other City of Madison codes to identify barriers to DGI. This is expected to be completed in 2020.

# Proposed Schedule



1. Introduced to the Common Council: May 5, 2020

2. Refer to the Planning Commission: May 11, 2020

3. Refer to the Board of Public Works: May 20, 2020

4. Common Council final approval: June 2, 2020

**For video of the final presentation and additional information see our website at:**
**https://www.cityofmadison.com/engineering/StormwaterOrdinanceUpdates.cfm**

# Questions and Discussion