



**STORMWATER MANAGEMENT COMMISSION
MEMORANDUM**

TO: Lake County Stormwater Management Commission
FROM: Kurt Woolford, Chief Engineer
DATE: April 23, 2019
RE: Bulletin 70 Rainfall Update

ACTION REQUESTED: POLICY DISCUSSION

SMC staff presented the updated rainfall study to the Municipal Advisory Committee (MAC) and the Technical Advisory Committee (TAC). Based on feedback at these committee meetings and external inquiries, there is a need to issue a Technical Memorandum to all Community Enforcement Officers that provides guidance on how to review existing and new permit applications.

The updated rainfall report did not determine point rainfall amounts for each of the 180+ rain gage stations used in the study. Rather, the update provides regional values by averaging groups of points within 10 separate climatic regions in Illinois. Lake County is in the Northeast Region (see enclosed ISWS Rainfall Presentation). The point-to-point analysis was not performed due to funding limitations. Currently, the WDO uses point rainfall data for the Waukegan station located at the Waukegan Regional Airport.

Dr. Momcilo Markus, co-author of the updated Bulletin 70 report, produced an updated, back-of-the-envelope, estimate for the Waukegan station. Compared to the original Bulletin 70 Waukegan point, his estimate was approximately 10% larger for the 100-year, 240-hour event.

Rainfall Amount Source	Inches	Increase (inches)	Increase (%)
Current WDO Standard / Original Bulletin 70 – Waukegan Point	9.56	0.00	0
Original Bulletin 70 – Northeast Region	11.14	1.58	17%
Updated Bulletin 70 – Northeast Region	12.65	3.09	32%
Updated Bulletin 70 -Waukegan Point Estimate	10.53	0.97	10%

SMC Staff have contacted the ISWS regarding the process to perform and fund a local analysis for Lake County.

Currently, the best available data is the updated rainfall for the Northeast Region. Rain gage stations measure precipitation that falls directly on a specific point location. The complexity and randomness of storm patterns are important items to consider when using a single point to represent a large area.

For example, in July 1996, Aurora received a historic 16.94 inches of rainfall in a 24-hour period. In July 2017, Lake County experienced record-breaking flooding, however the Waukegan station reported low values since it was outside of the heavy rainfall pattern (see enclosed July 2017 Flood exhibit). The largest rainfall event in Wisconsin's history occurred in August 2018 around the Madison area.

Based on the historical observations of what has been experienced, Aurora, Madison, and Libertyville have a significantly higher flood risk than Waukegan. Scientists at the ISWS do not believe this and have said, "Waukegan has been lucky for the past 80 years."

The ISWS published another report in December 2017 that includes the results of future climate models for Cook, DuPage, Lake, and Will Counties. The results of the report forecast that the highest increases in rainfall will occur in Lake County. As with all models, there are varying degrees of confidence, uncertainty, and errors.

A second report from the ISWS is due this summer and will revisit the distribution curves that are used for floodplain modeling. It is our understanding that IDNR will require the updated Bulletin 70 rainfall starting on January 1, 2020 for all regulatory floodplain modeling under their jurisdiction. IDNR recommends that the updated rainfall be used now as best available data. We have asked the IDNR and ISWS if Lake County-specific rainfall amounts (produced by ISWS) would be acceptable for regulatory floodplain studies.

Based on discussion at the TAC meeting, detention volume sizing and siting is the #1 item of concern. Base flood elevations (BFEs), depressional/compensatory storage, and overland flow paths are other critical provisions that need to be evaluated and considered. Other provisions in the WDO are "workable" but may have an increased cost on development.

It was identified at TAC, that the current 100-year detention design requirement (6.5 inches) would only provide storage for a 25-year design using the updated Northeast Region rainfall (6.45 inches). To achieve a 100-year storage design (8.57 inches) required an approximate 30% increase in volume, which reduces the net buildable area on many development sites. Possible considerations to adjust detention sizing criteria were discussed e.g., release rates, soil types/curve numbers, 50-year design, and 3-stage restrictors. What is "reasonable" for detention is the question that remains difficult to answer. Considerations need to include minimizing flood risk for both proposed developments and existing downstream properties and buildings.

There was also discussion on the potential adverse impacts from larger basins and extended drawdown periods e.g., water temperature, erosion, vegetation, and other environmental stresses.

Additional analysis and evaluation will be performed to determine these impacts using a sample of existing permitted sites. The TAC raised many good points and ideas worth implementing. One idea is to require that permit applicants submit an alternative analysis using the new rainfall. The results of the analysis would be considered for design changes, if possible, but not required. This requirement is implemented in Aurora.

Another idea is to recommend a factor-of-safety number or percentage, primarily for building protection elevations.

As we await and prepare additional information, we request a policy discussion to offer guidance on our technical approach.

If you should have any questions, please feel free to contact me at (847) 377-7720 or kwoolford@lakecountylil.gov.