Southeastern Wisconsin Regional Planning Commission

PRECIPITATION FREQUENCY IN SOUTHEASTERN WISCONSIN

PRECIPITATION FREQUENCY

The below information was compiled to aid in stream and stormwater analyses and includes recommended precipitation depths and rainfall distributions, as well as recurrence interval determinations for recent storms in the Region. This information can be used for developing peak flows for use in floodplain mapping and stormwater analyses and design.

The most current precipitation depth-duration-frequency information for Wisconsin and Southeastern Wisconsin can be found in NOAA Atlas 14, Precipitation-Frequency Atlas of the United States, Volume 8, Version 2.0: Midwestern States (Colorado, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Oklahoma, South Dakota, Wisconsin), published in 2013. The report can be accessed here.

The Wisconsin portion of the NOAA study that produced Atlas 14 was funded by the Wisconsin Departments of Natural Resources (WDNR) and Transportation (WisDOT) and the Commission. Commission staff recommend using Atlas 14 precipitation data in stormwater and floodland management applications. The data supersedes data provided in a Commission technical report on rainfall frequency prepared in 2000, which can be accessed here.

The Commission still recommends its storm time distribution, issued on March 30, 2006, for use in stormwater and floodland management applications, including regulatory floodplain mapping studies, in Southeastern Wisconsin.

Atlas 14 precipitation frequency data for durations from 5 minutes to 60 days and frequencies of 1 year to 1,000 years are provided in tabular and graphical formats and as GIS-compatible ASCII grids on the NOAA Hydrometeorological Design Studies Center Precipitation Frequency Data Server (PFDS) here. Generalized maps of the data are also provided, but NOAA recommends use of the PFDS point-and-click interface or the GIS-compatible ASCII grids to obtain precipitation values for analysis purposes.

Commission staff have coordinated with the United States Department of Agriculture Natural Resources Conservation Service (NRCS), WDNR, and WisDOT regarding the application of Atlas 14 in Wisconsin. Precipitation depths developed by NRCS for each county in Southeastern Wisconsin for durations ranging from 5 minutes to 60 days, and for recurrence intervals from one year through 1,000 years can be found here.

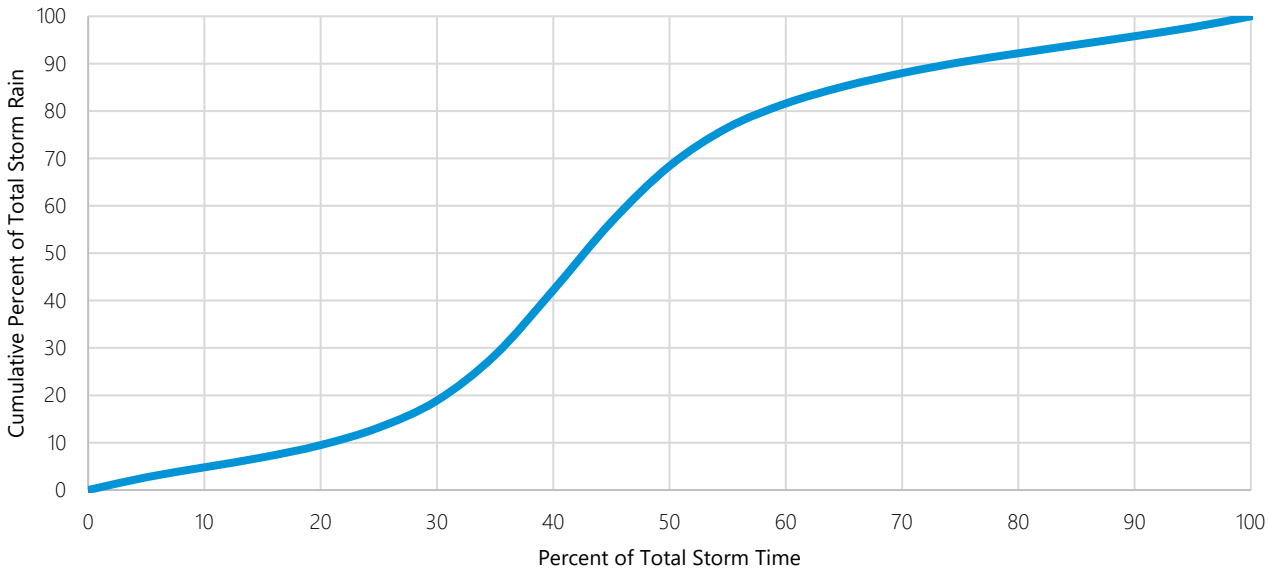
NRCS has also developed new distributions consistent with the Atlas 14 precipitation information. Technical guidance on this effort is now located at the USDA Field Office Technical Guide – WI (FOTG) website. Background information on the new distributions can be found here (see EFH-2-Estimating_Runoff.pdf). The MSE3 24-hour rainfall distribution can be found here (see New_WI_NRCS_MSE3_and_MSE4_Storm_Distributions_Data*.xls). The MSE3 distribution applies to the full range of storm durations.

Table 1
Commission-Recommended Rainfall Distribution

Percent of Total Storm Time	Cumulative Percent of Total Storm Rain
0	0.0
5	2.7
10	4.8
15	6.9
20	9.5
25	13.2
30	18.9
35	28.5
40	42.2
45	56.6
50	68.4
55	76.5
60	81.6
65	85.2
70	88.0
75	90.3
80	92.2
85	94.0
90	95.8
95	97.7
100	100.0

Source: SEWRPC, 2/2024

Figure 1
Commission-Recommended Rainfall Distribution



WDNR has indicated that either the NRCS time distribution applicable to Southeastern Wisconsin or the 2006 Commission distribution presented in the table and figure above are acceptable for studies to delineate regulatory one-percent-annual-probability (100-year recurrence interval) floodplain boundaries. A description of the procedure used to develop the Commission distribution can be found here. The Commission-recommended rainfall distribution was developed for a range of storm durations and depths, up to, and including, 48 hours.

It is recommended that either the Commission or MSE3 distribution be applied with the Atlas 14 precipitation information to develop design storms for a range of durations and the storm, or storms, producing the highest peak flow(s) be used for analysis purposes.

A joint NRCS/Commission presentation on Atlas 14 provides summary information on the development and application of Atlas 14 precipitation frequency information.