U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Weather Service
N3533 Hardscrabble Road
Dousman, WI 53118

December 19, 2025

MEMORANDUM FOR: Karin L. Gleason
Chief, Monitoring Section
Climate Science and Services Division
National Centers for Environmental Information (NCEI)

FROM: Sarah Marquardt
Senior Service Hydrologist
National Weather Service, Milwaukee/Sullivan, WI

SUBJECT: SCEC Report for Wisconsin 24-Hour Precipitation Record on August 9-10, 2025

Summary

Several rounds of heavy rain from thunderstorms with high rainfall rates caused widespread and severe flash flooding and significant river flooding in southeast Wisconsin on the evening of August 9 through the morning of August 10, 2025. There were many stranded vehicles, water rescues, and damaged roads, homes and businesses throughout the Milwaukee area. ***An observation of 14.55 inches of precipitation at James Madison High School in Northwest Milwaukee was reviewed by the State Climate Extremes Committee and it was determined to be a new 24-hour precipitation record for the state of Wisconsin.*** The previous record was 11.72 inches on June 24, 1946 near Mellen, WI in Ashland County, WI.

About the Station and Observation

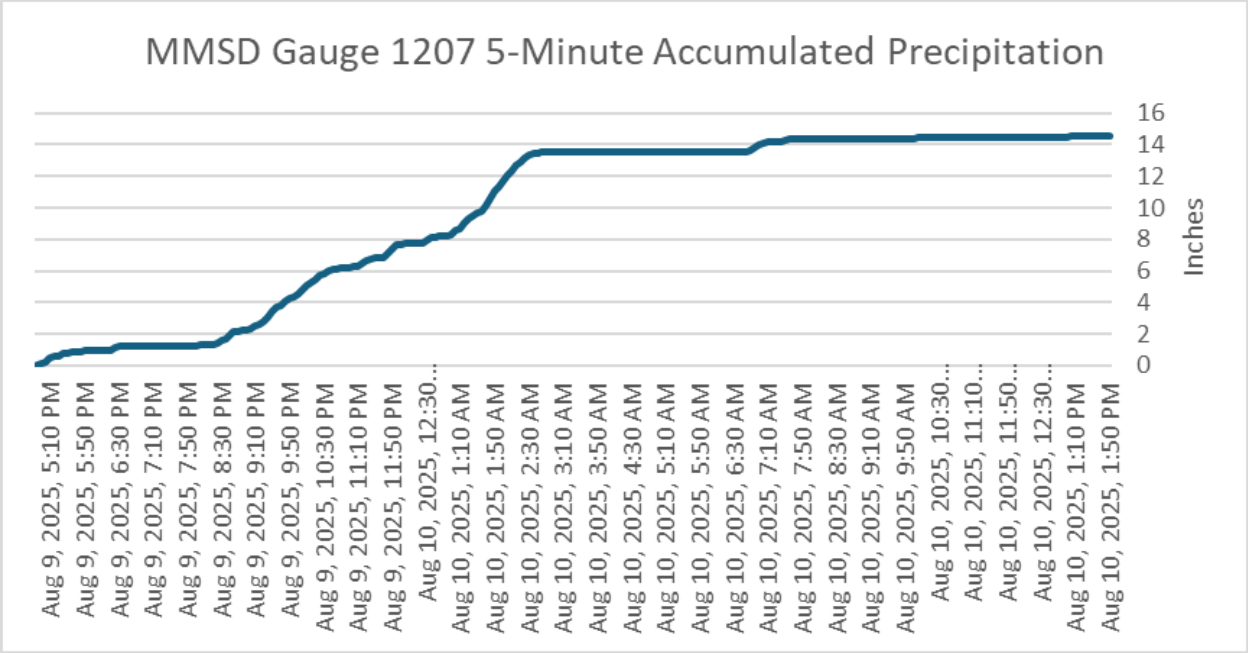
Station Metadata:
Gauge ID: WS1207
Location: Roof of James Madison High School - Milwaukee Public School, 8135 West Florist Avenue
Lat / Lon: 43.1264, -88.0132
Model / Manufacturer: 6021, All Weather Incorporated
Owner: Milwaukee Metropolitan Sewerage District (MMSD)
Installation Date: 8/10/2011
Most Recent Calibration Date: 5/8/2025 passed calibration at 0.96 inches

Calibration on August 13, 2025, after the event, was low on the first attempt with 0.91 inches. Gauge was cleaned and passed on the 2nd attempt with 0.95 inches. MMSD calibration tolerance is +/- 5%.

The precipitation was measured by a tipping bucket rain gauge that is part of the Milwaukee Metropolitan Sewerage District (MMSD) mesonet. The mesonet measures precipitation in 5-minute increments that are publicly available and archived on the MMSD website. Observations that went into the rainfall total were recorded from 5 PM CDT August 9 to 1:50 PM CDT August 10, 2025, a 21-hour time period.

NWS WFO Milwaukee Observation Program Leader, Ben Miller, conducted a site visit with MMSD staff on Wednesday, August 13. Miller observed the MMSD calibration process and conducted a site survey while at the gauge site and determined the siting was satisfactory. He found that there are no obstructions that block an accurate catch of the gauge. Miller noted the observed precipitation was likely an undercatch, due to calibration being on the low side. Pictures of the gauge and a table with siting details are in the Appendix.

Observed 5-minute precipitation totals in inches:

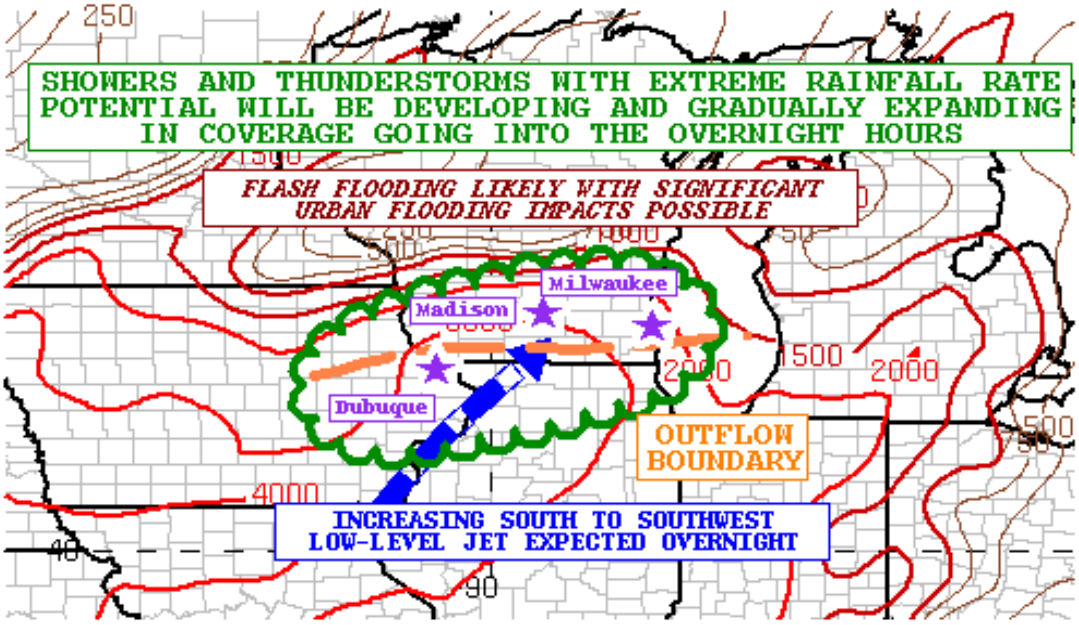


Meteorological Conditions and Plausibility of the Observation

A very warm and moist air mass was in place at the onset of this event. The air mass remained unstable throughout the night, due to warm, moist advection. There was a deep warm layer (over 4 km) in the atmosphere, allowing for highly-efficient rain rates. Wind shear was moderate, but as storms shifted northeast, additional storms developed, resulting in storm training. All these factors provide favorable conditions for heavy rain.

A west-to-east outflow boundary from storms during the late afternoon and early evening hours stalled across far southern Wisconsin and remained in place throughout this event. During the

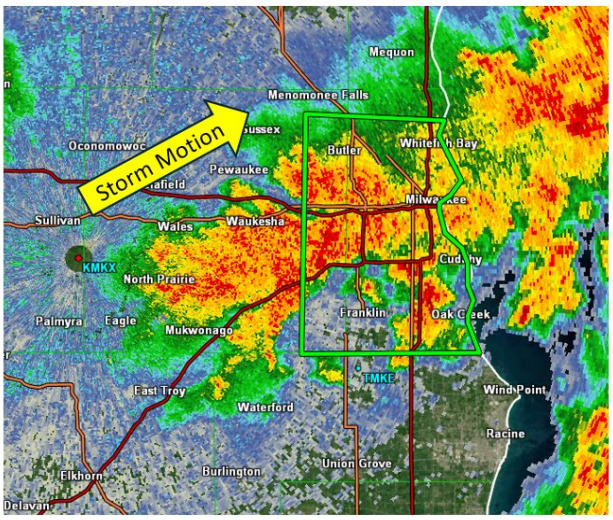
evening hours, a low-level jet increased in magnitude and was pointed over southeast Wisconsin, providing the focus for several rounds of heavy rain. Storms repeatedly developed north of this boundary and moved into the Milwaukee area throughout Saturday night.



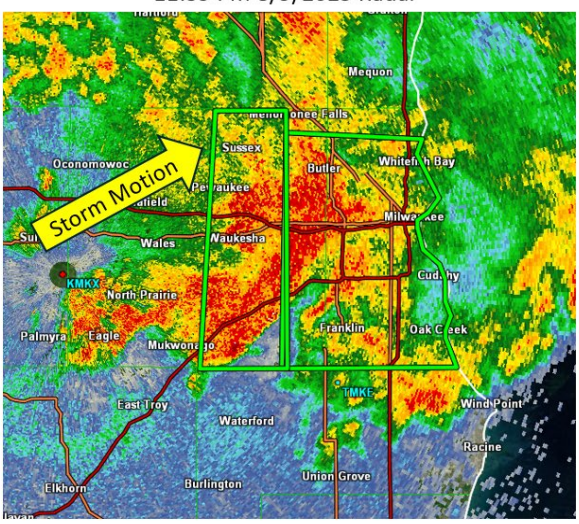
RAP32 ML CAPE (lowest 90MB) j/kg 250809/2300f002
WPC MPD #0888

The majority of the heavy rain fell between 6 pm August 9 and 3 am August 10. Rain rates were 1 to 3 inches per hour for several hours. These rates were observed at several MMSD sites across Milwaukee County. MRMS radar estimates in northern Milwaukee County ranged from 10 to 12 inches.

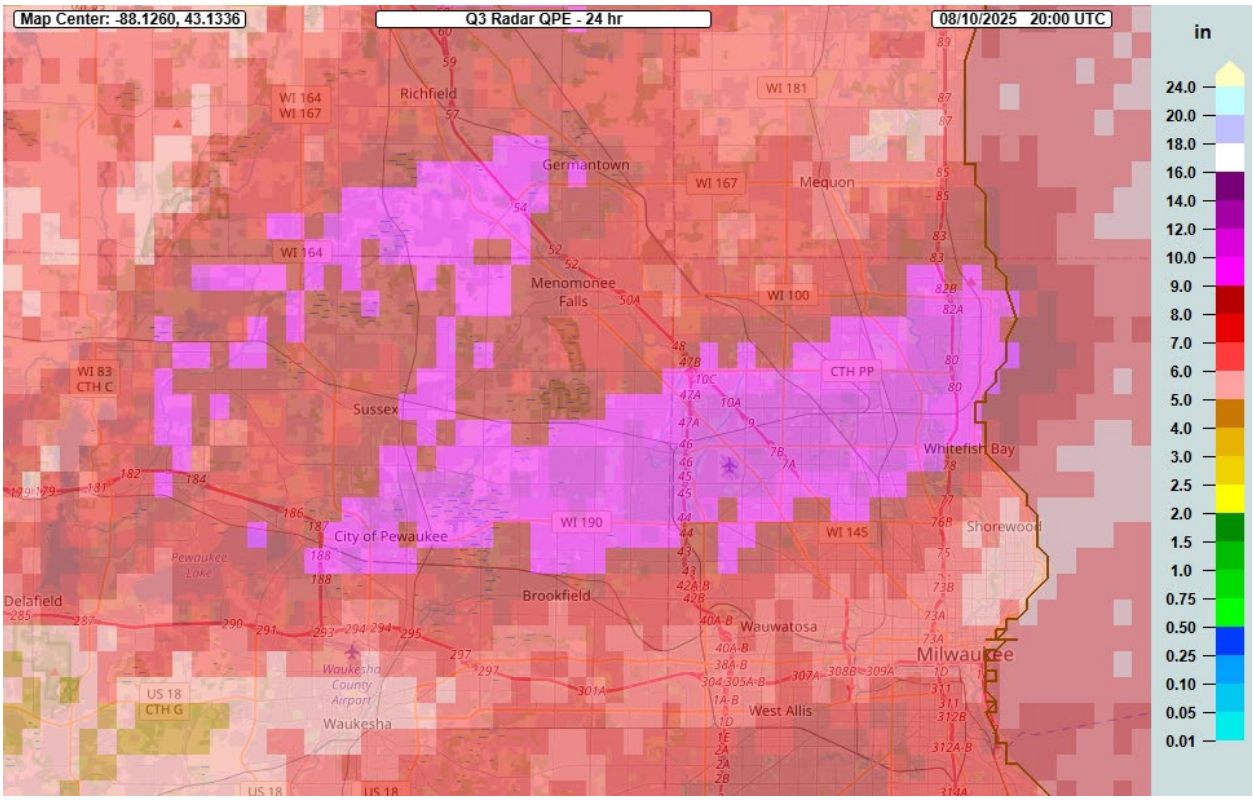
8:18 PM 8/9/2025 Radar



11:39 PM 8/9/2025 Radar

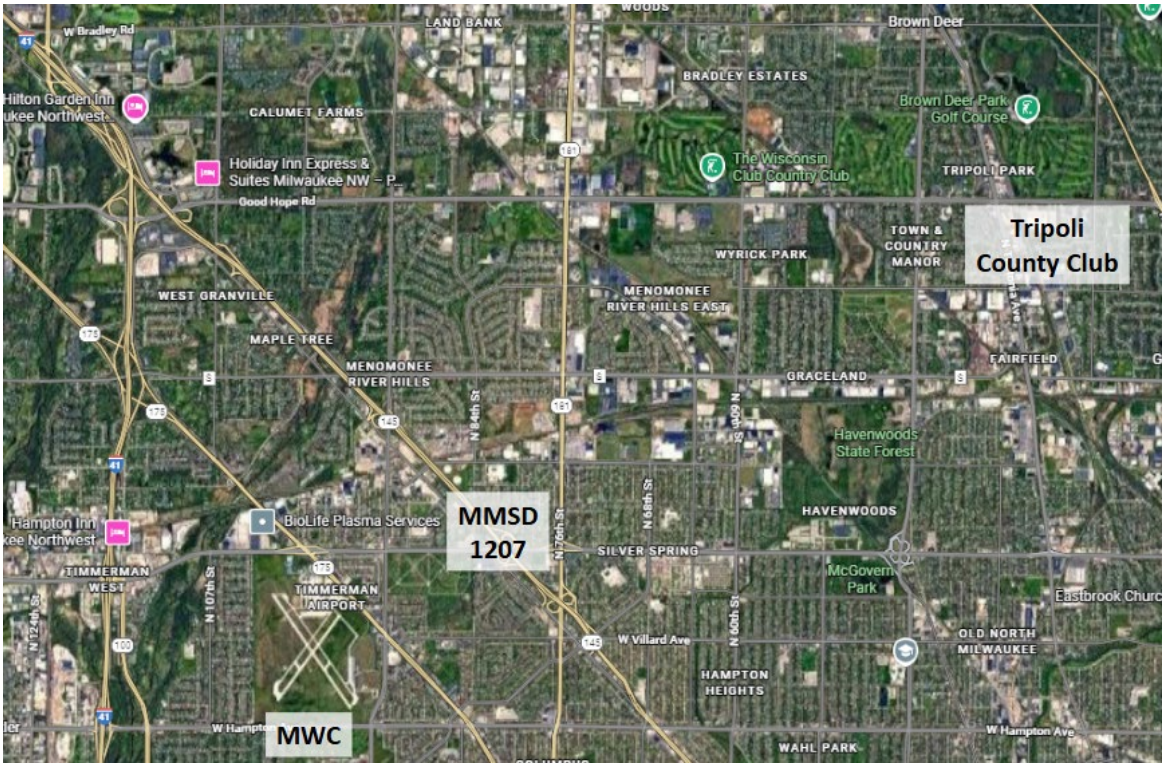


MRMS 24-hour precipitation estimates ending 3 pm August 10, 2025:



Nearby Observations and Radar Estimates

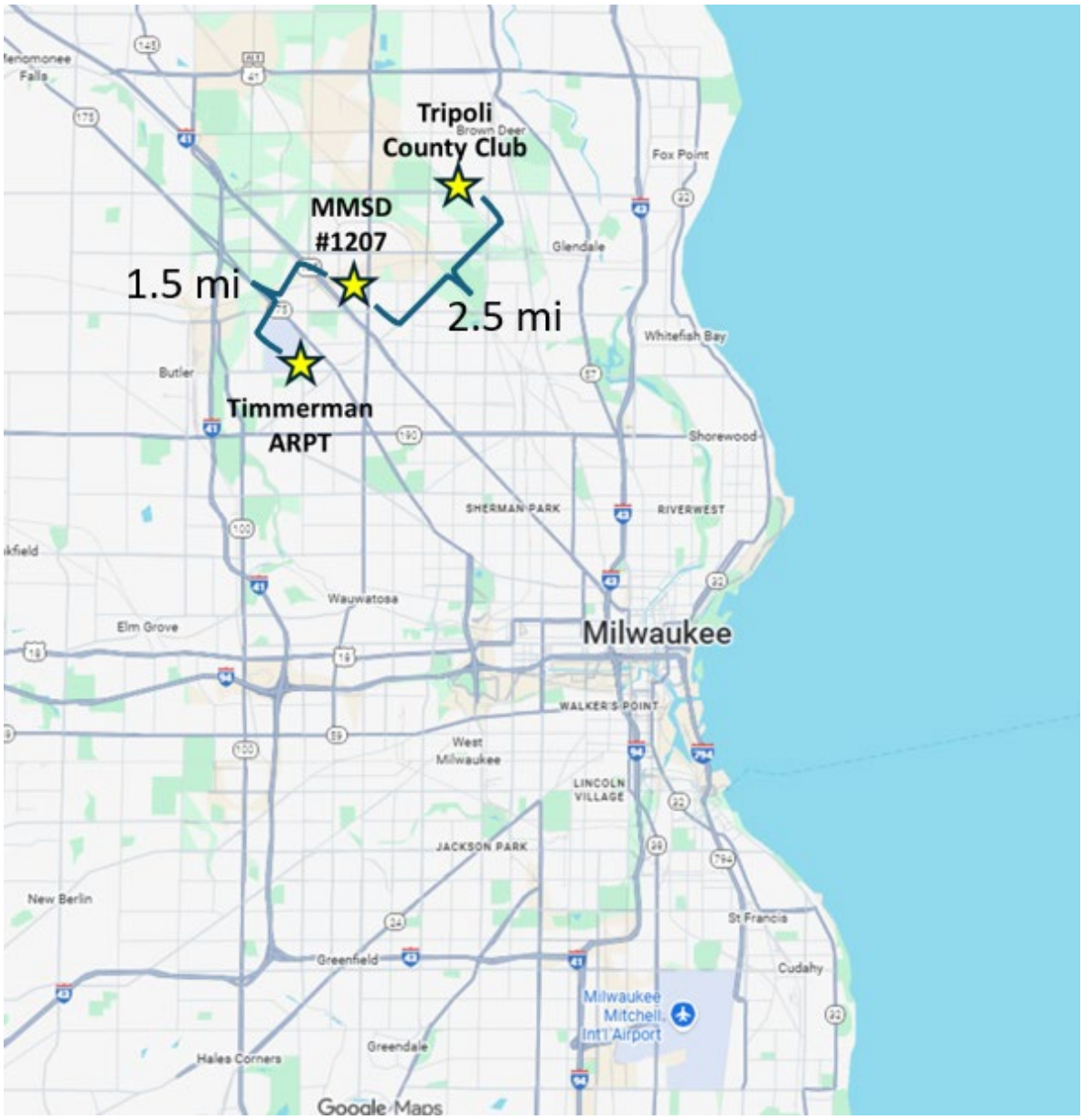
Map of MMSD #1207 and neighboring observation locations:



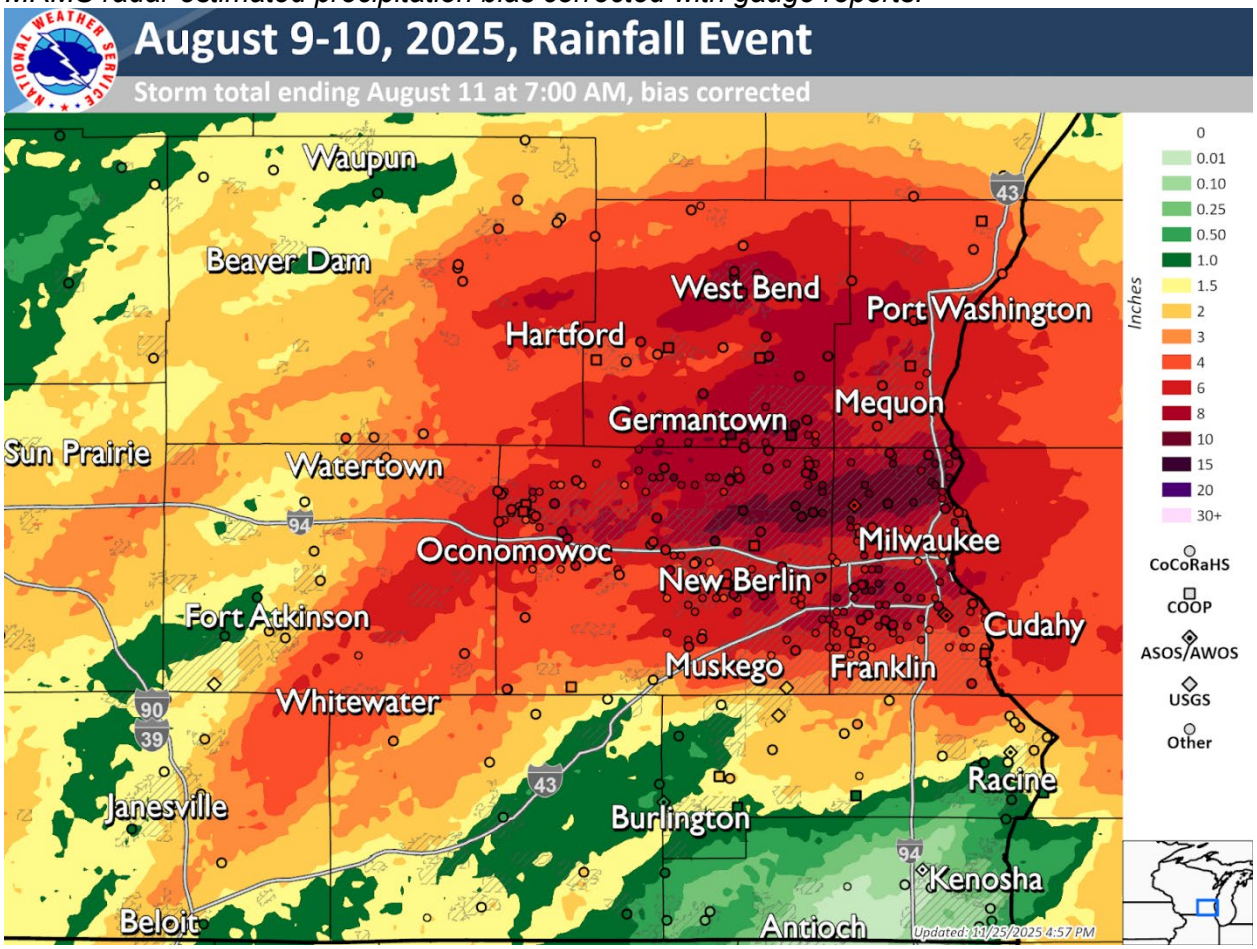
MWC (Timmerman Airport) had a 2-day total ending August 11 of 16.20 inches. This value was measured with a 4-inch plastic CoCoRaHS style gauge. The majority of this rainfall occurred within a 24-hour time period. The co-located AWOS received 0.18 inch outside the 24-hour window on the night of August 10 into August 11. Using these reports together results in a 24-hour total of 16.02 inches ending August 10. This gauge was not used to establish the new 24-hour Wisconsin precipitation record because the siting was compromised by a recently installed railing around the Air Traffic Control Tower catwalk.

Tripoli Country Club (7401 N 43rd St. Brown Deer, WI 532089) installed a Perry weather station with a tipping bucket rain gauge on the roof of a building on May 15, 2025. This gauge reported 15.20 inches from 4 pm CDT August 9 to 4 pm CDT August 10. This gauge was not used to establish the new 24-hour Wisconsin precipitation record because the gauge was recently installed, has no history, there is no metadata associated with this equipment, and the data are not publicly available.

Zoomed out View of the Milwaukee metro area:

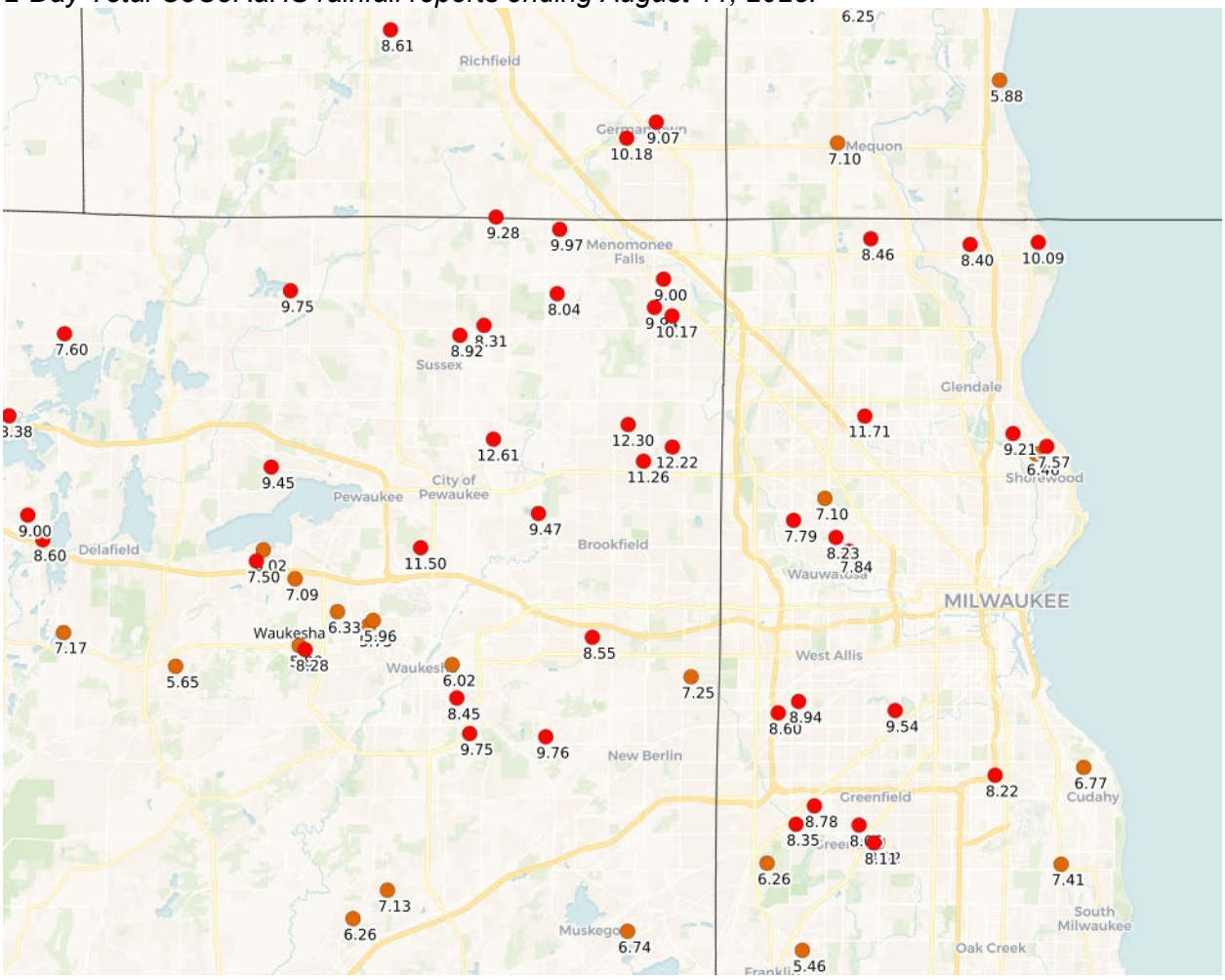


MRMS radar estimated precipitation bias corrected with gauge reports:



CoCoRaHS reports over a 2-day period ending August 11 show widespread values of 9 to almost 13 inches across northern Milwaukee and northeast Waukesha counties. The site that reported 12.30 inches north of Brookfield noted the gauge overflowed on the morning of August 10, so the actual total was higher. The majority of this rain fell within the 24-hour period from the evening of August 9 through the morning of August 10, 2025. There is a spatial gap in CoCoRaHS observations where the Timmerman Airport, MMSD #1207 and Tripoli County Club are located, which is where the highest radar estimates are located.

2-Day Total CoCoRaHS rainfall reports ending August 11, 2025:



Other Possible 24-Hour Precipitation Records

In addition to the current Mellen, WI 11.72-inch record, the SCEC discussed other potential record events, including major regional rain events that occurred in 2007, 2008, and 2018. All potential record precipitation amounts were either less than what was measured during the August 9-10, 2025 event, had poor siting, or were not acceptable gauges to measure the most intense precipitation totals. It was determined that the 14.55 inch 24-hour total from August 9-10, 2025 was indeed the largest known and plausible record for the state of Wisconsin.

State Climate Extremes Committee - Voting Members

- Sarah Marquardt, Senior Service Hydrologist, NWS Milwaukee/Sullivan
- Jeff Boyne, (Acting) Climate Service Program Manager, NWS Central Region
- Melissa Widhalm, Associate Director, Midwestern Regional Climate Center
- Ed Hopkins, Wisconsin State Climate Office
- Karin Gleason, Climate Monitoring Chief, National Centers for Environmental Information

Non-Voting Members

- John Gagan, Science and Operations Officer, Acting Meteorologist in Charge, NWS Milwaukee/Sullivan
- Ben Miller, Observation Program Leader, NWS Milwaukee/Sullivan
- Tamara Houston, National Centers for Environmental Information
- Stephen Baxter, NWS Headquarters

Finding of the Committee

A meeting to discuss the details of the potential record and a vote was held on December 11, 2025. The committee voted unanimously to approve the record 24-hour precipitation amount of 14.55 inches that fell on August 9-10, 2025 at James Madison High School in Northwest Milwaukee.

NCEI Monitoring Chief Decision:

Approved
as recommended in boldface above:

Not approved
returned to SCEC with no action taken:

GLEASON.KARIN.LYNN.1365855877 Digitally signed by GLEASON.KARIN.LYNN.1365855877 Date: 2025.12.16 15:35:09 -05'00'	

Appendix One

Table 1. MMSD Gauge 1207 Site Survey (obstructions)

Obstruction	Azimuth	Distance to Obstruction	Angle from top of TBRG to Obstruction
Building	015-090-140	78-32-85	5-13-6
Trees	210-245	75-110	4-5
Trees	285-295-305	280-215-185	5-8-9
Tree	335-350	70-70	19-19

Figures 1-4
Pictures of the Milwaukee Metropolitan Sewerage District Rain Gauge #1207

Figure 1: Looking East:

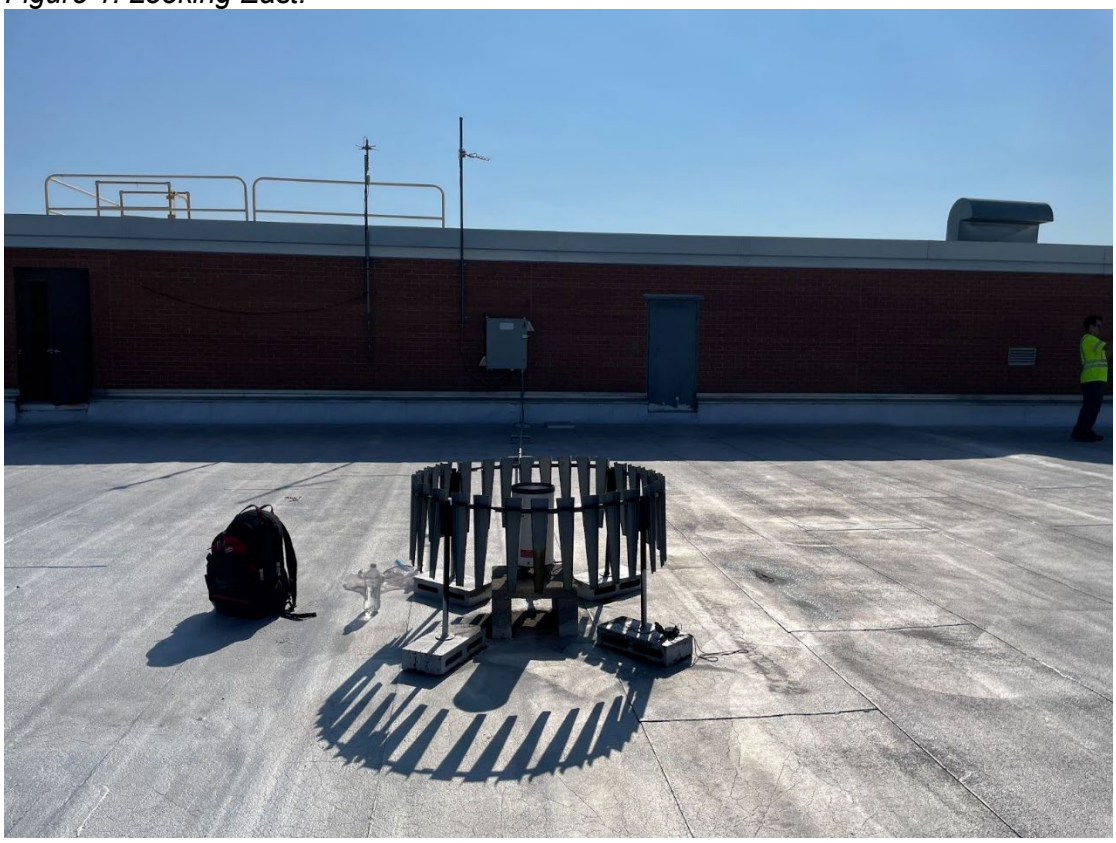


Figure 2: Looking South:

Figure 3: Looking West:

Figure 4: Looking North: