Item 7D.
BCWMC 12-15-16

HENNEPINWESTMESONET

Fact Sheet

Description: The HennepinWest Mesonet is a network of remote sensors which provide highly-accurate, near real-time measurements of weather, soil and water conditions. This data is immediately sent to a central database where software automatically develop graphic products to show what is happening across Hennepin County and surrounding areas for emergency leaders to use in critical situations. Information is also archived for future analysis.

Purpose of the mesonet network: The HennepinWest Mesonet is a life-safety tool designed to gather and synthesize vital data on weather, soils and water to help emergency leaders make critical public warning and tactical decisions. Recent experiences across the Twin Cities metro area reveal a long-standing vulnerability to dangerous weather or human-caused conditions that form very quickly without clear advance indications. Fatal tornadoes in Rogers, MN (*2006*) and in North Minneapolis, MN (*2011*) both point to a need for more complete and rapid surface observations from a network of sensors spread across the area. A fatal landslide in Saint Paul, MN (*2013*) also shows that near real time soil temperature and saturation data across the metro could be useful in providing alerts for evolving dangerous conditions. Other vulnerabilities exist in our area to rapid-onset flash flooding, straight-line winds or hazardous materials releases which require many sensors with quick detection capability to provide useful pubic warning or evacuation decision-making.

Purpose of individual stations: One of the most important features of the HennepinWest Mesonet is having sensor stations located across a wide area in order to be able to see threats develop in real time to trigger key warning decisions earlier. A station located at an airport 25 miles away is poorly located to provide useful warning indications across a whole region. Also, if these stations do not report data that is in real-time, their use for warning is negligible. Each Mesonet station represents the small area where it is located and helps protect the residents and infrastructure located there by providing high-quality immediate data.

Description of individual stations: Stations are located on a small patch of ground about 40 feet square of natural grass, which is surrounded by an area free from any wind obstructions out to about 90 feet from the center. A 30 foot aluminum structure holds most of the sensors that detect wind speed, direction, temperature, humidity and barometric pressure. Rain gauges and soil sensors are placed on or in the ground nearby. Stations use solar energy and require no external power. Data is sent via cellular phone or radio to the network data base. Depending on circumstances, a small perimeter fence may be installed to protect the equipment at the station.

Narrative

Accurate and timely weather, climate, and hydrologic data are essential to maintain the health, safety and welfare of Hennepin County communities. Hennepin County Emergency Management is developing the Hennepin West Mesonet to closely monitor hazards. Violent weather that forms tornadoes, extreme winds, lightning, hail and flash flooding can strike quickly during the summer. In winter, blizzards, sustained heat waves and arctic cold blasts can harm vulnerable people. Deep frosts can disable essential services such as water and sewer. Detailed weather information is also critical to public alert and emergency operations including severe weather warning, firefighting, flood control, and toxic material response, for example. Currently, official weather sensors are designed and located to serve just a few sectors, principally aviation and major freeway networks, Hennepin County Emergency Management is building a system that leverages existing official weather sensors, and identifies and fills and coverage gaps. The Hennepin West Mesonet is also much more than weather information. USGS stream gage data as well as manual data from Watershed Districts within Hennepin County are plotted on the website as well. In addition, during the winter months, frost depth data is collected at various sites around Hennepin County to monitor deep frost years for water main, fire hydrant, or other utility disturbances. This software project will ensure that Hennepin West Mesonet data will also be easily accessible to researches, industry and the public to multiple uses and benefits of this information.

Our partner coalition currently includes: The National Weather Service (NWS), the Minnesota Department of Transportation, City of Minneapolis, Three Rivers Par District, Minnehaha Watershed District, Wright-Hennepin Cooperative Electric, City of Maple Grove, Minnesota Vikings, United States Geological Survey (USGS), Minnesota Natural Resources – State Climatology Office.

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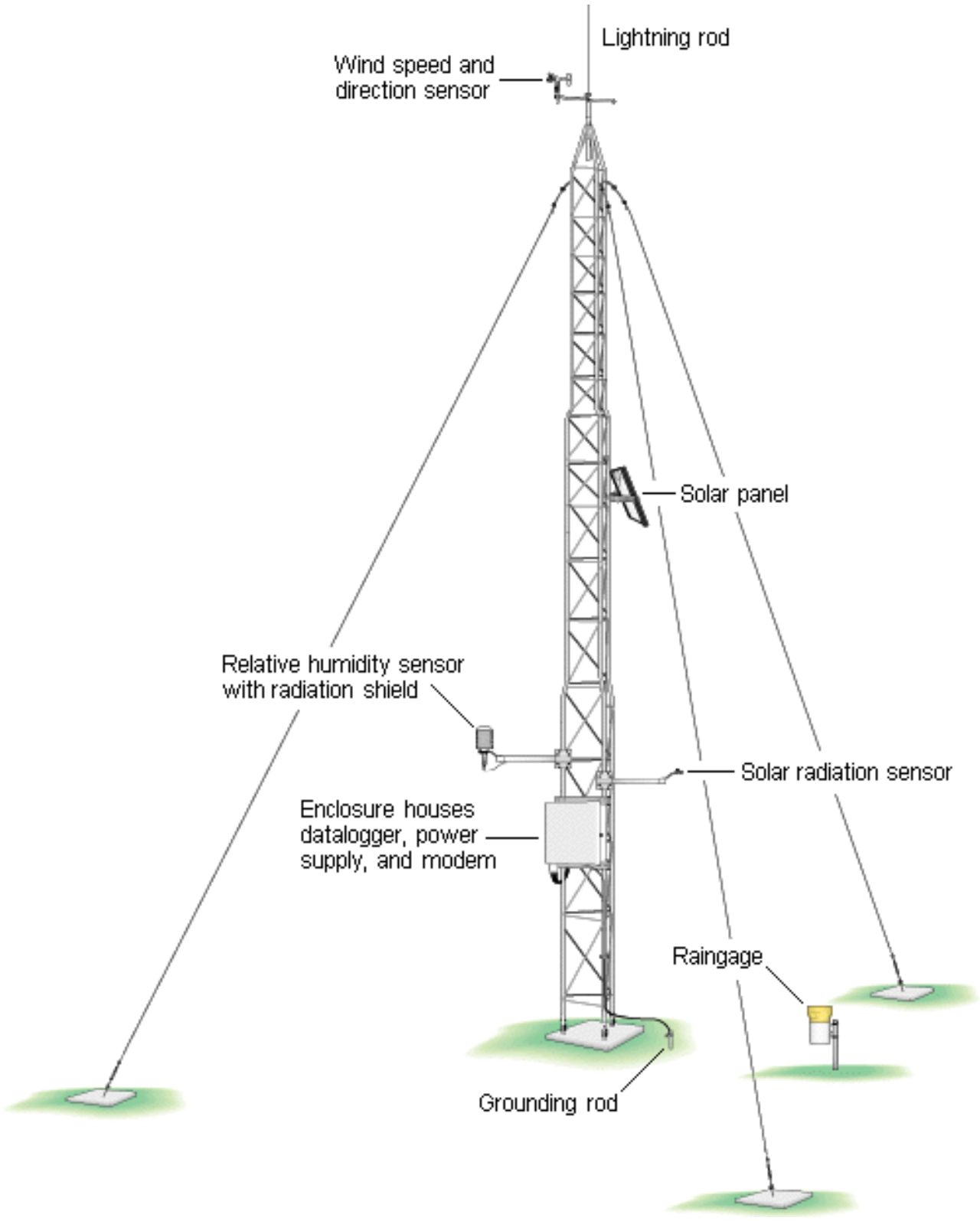


Frequently Asked Questions

Q: Who operates the HennepinWest Mesonet?

A: Hennepin County Emergency Management, with the guidance of an advisory board made up of many other departments and agencies

Q: Why are existing weather stations not adequate?

A: The overall number of surface stations in the Metro area today is too small to provide the fine detail optimal for many public warning decisions. The locations of most existing stations are at public airports or along interstate highways so data is not relevant for people and facilities located away from these stations. Many stations were set up to report climate information that is old (up to one hour) rather than up to the minute real-time data, which makes them nearly useless in warning and evacuation situations. Networked private stations are often located poorly and can get erroneous readings for winds or temperatures. Few of these stations are ever calibrated or maintained using strict operational accuracy standards which may also lead to unreliable measurements.

Q: Can't other tools, such as Doppler radar, do the same job?

A: No. Doppler radar is a fantastic tool, and has been made even more useful after recent upgrades made by the National Weather Service, however there are some things that radar cannot do at all, cannot do as well, or cannot do as quickly. Some of these shortfalls relate to the length of time that Doppler needs for a single scan – five minutes. Another is that the radar beam cannot see the surface due to the curvature of the Earth, so a Doppler radar picture actually shows what is taking place a thousand or more feet in the air. Hazardous material incidents require surface wind measurements to accurately model. Finally, when areas are very close to the radar site, ground clutter or other radar beam characteristics can degrade performance near the surface. Mesonet stations and radar complement each other and can be used together to develop accurate real-time situational awareness.

Q: Is the Mesonet station structure an antenna?

A: No. An antenna is defined as a conductor or system of conductors used for either radiating electromagnetic energy into the atmosphere or for collecting electromagnetic energy from the atmosphere. The station structure itself does not collect or broadcast any electromagnetic energy. However, when cell phone signals are used to convey data from sensors to the database a tiny cell phone antenna no larger than one on a personal cell phone is used.

Frequently Asked Questions

Q: How much does a station cost?

A: Stations are located on lands which are owned by Hennepin County, or on lands of other public jurisdictions or corporate partners by agreement. Station equipment costs around $9,000 to obtain. Mesonet technicians install and maintain the equipment and the site. Site study and installation costs are variable depending on the requirements for the location. Cell data transmission from each station cost about $300 dollars a year.

Q: What standards are used to set-up and maintain the HennepinWest Mesonet?

A: The standards used to select station sites and set-up sensor instruments are from the World Meteorological Organization (WMO) and the United States National Weather Service (NWS). The calibration, maintenance and sensor replacement standards are those used by the Oklahoma Mesonet, the pioneering first Mesonet established in the nation.

Q: Is the data available to the public?

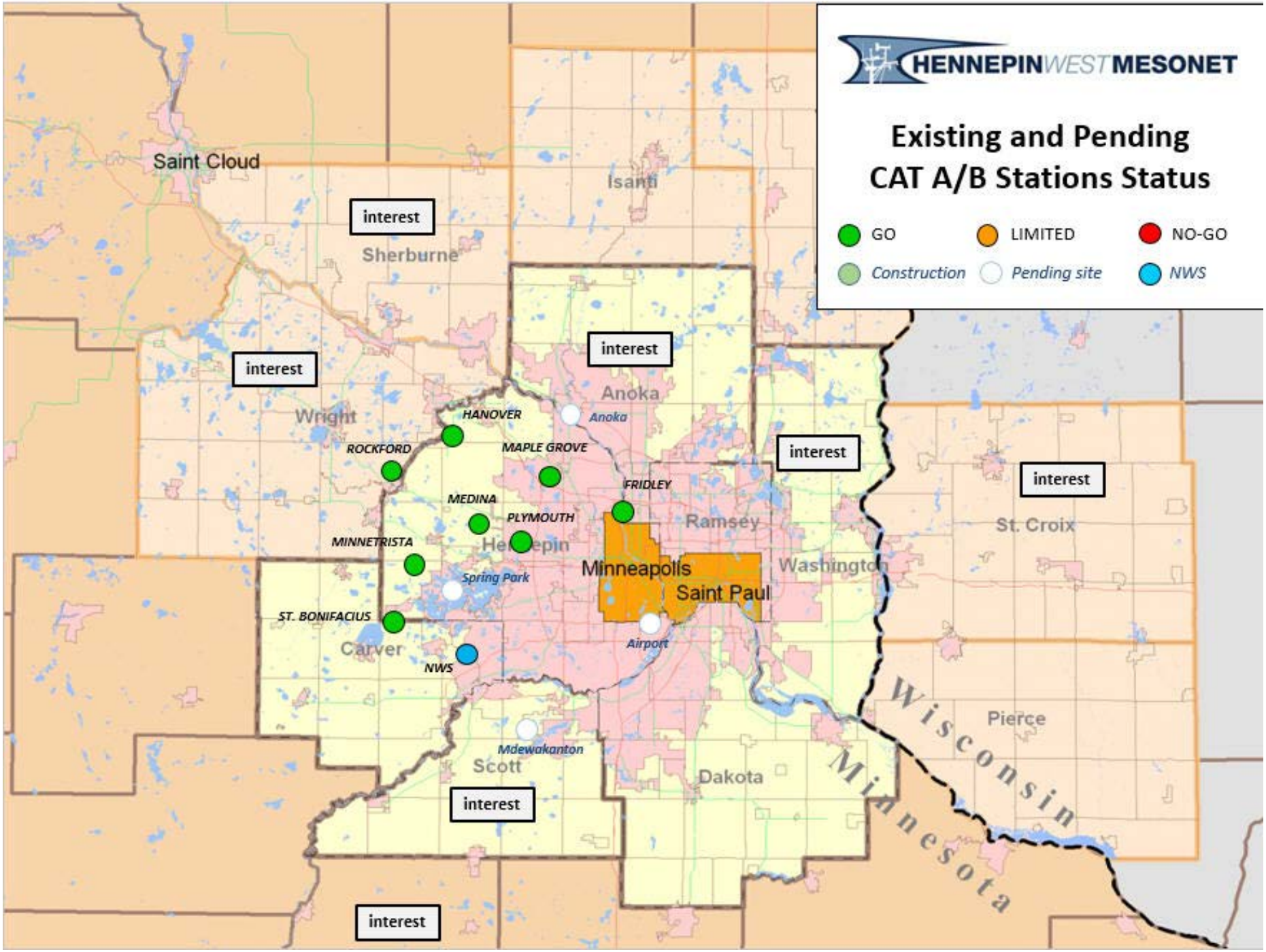
A: Yes. The HennepinWest website has a lot of useful data and graphics. It can be found at *<http:hennepinwestmesonet.org>*

Q: Is the Mesonet just used for natural hazards like extreme weather?

A: No. Accurate and up-to-the-minute weather data from a nearby sensor station is crucial for emergency response leaders to take actions and make quick evacuation decisions for accidents where toxic chemicals are spilled. Reliable local weather data is also vital for fighting fires. The data is also critical to respond to a terrorist attack where chemical, radiological or biological agents are dispersed.

Q: Are there other uses for the Mesonet besides public safety?

A: Yes. Anyone needing very accurate, locally specific weather data can use the HennepinWest Mesonet. Sectors that should consult this data include agriculture, transportation, construction, building heating/cooling engineers, turf grass and landscape managers, environmental monitors, and others. Residents who just want to keep up on the weather should also consult the Mesonet.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Existing and Pending
CAT A/B Stations Status
GO
LIMITED
NO-GO
Construction
Pending site
NWS
Saint Cloud
Isanti
Sherburne
interest
interest
interest
interest
interest
interest
interest
Anoka
Wright
HANOVER
Anoka
ROCKFORD
MAPLE GROVE
FRIDLEY
MEDINA
PLYMOUTH
Ramsey
St. Croix
MINNETRISTA
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Pierce
Wisconsin
Minnesota
Mdewakanton
Scott
Dakota