

Raleigh, NC Leverages Enhanced Rain Data and Hydrologic Modeling To Improve Flood Response



Mitigating risk by better anticipating flood conditions

In recent years, the city of Raleigh, North Carolina has experienced a measurable increase in the frequency and severity of rainfall, which has translated to recurring severe floods. Additionally, Raleigh's urban creeks are prone to flash floods that can cause severe damage in very little time and with very little warning.

With the growing flood risk, Raleigh identified a need to take a more proactive approach to flood risk mitigation and response. The city partnered with AEM to implement its Flood Early Warning System (FEWS), "a program to forecast flooding conditions before and during a storm." One of the key objectives of the program was to help emergency managers, first responders, and other field personnel proactively anticipate when and where flooding would occur and where resources would be needed to save lives and mitigate damage.

Overcoming operational limitations

Even before implementing FEWS, Raleigh had no shortage of field instrumentation, including cameras, flashing signs, stream gauges, and rain gauges. But even with all that data and technology, they were still limited in their ability to reliably anticipate when and where flooding was going to take place. Specifically, they were facing three key limitations:

1. LIMITED RAINFALL VISIBILITY

The city lacked visibility into how much rainfall was falling in communities between rain gauges.

2. SLOW DATA REFRESHES

The city received field updates only about once every hour; yet, a damaging flash flood could run its course in less than an hour.

3. LACK OF PREDICTIVE CAPABILITIES

Raleigh Stormwater staff needed a solution that could reliably predict the impact of rainfall on flooding throughout the city based on available forecasted information.

FROM REACTIVE TO PROACTIVE FLOOD MANAGEMENT

In 2018, Raleigh experienced an historic rain event that produced a damaging flash flood. Although there were no rain gauges in the immediate vicinity of the flood, it's estimated that more than three inches fell in about an hour. The resulting flood took out an entire section of road and the underlying culvert. The frightening part was that city staff weren't aware of the event until it was already over.

This moment was a catalyst. Raleigh saw a need to proactively anticipate flood conditions before they happened, and in areas that had limited rain gauge coverage. They partnered with AEM's Vieux & Associates brand to help make that vision a reality.



We felt that the Vieux model...worked better than other proposals for urban areas and the flashy flood situations that we have. I think we made a wise choice because the watch points that we have in our system, it's amazing how accurate they are...on the timing and the height.

— Kelly Daniel
Flood Early Warning System Engineer &
Project Manager

