



BUYING GUIDE

# Building Resilience: A Guide to Selecting the Right Flood Warning System

# Contents

Facing growing flood risks	...	<b>03</b>
Essential components of a flood warning system	...	<b>04</b>
Start with the right software	...	<b>05</b>
Our versatile lineup of flood stations	...	<b>06</b>
• Vantage Flood Station	...	<b>07</b>
• Ascend Flood Station	...	<b>08</b>
• Apex Flood Station	...	<b>09</b>
• Compare our flood stations	...	<b>10</b>
A complete flood solution	...	<b>11</b>
Let's start a conversation	...	<b>12</b>



## Facing growing flood risks

Flooding is the most widespread weather-related disaster, impacting nearly every part of the world where rainfall occurs.

While some floods are seasonal and predictable, like those caused by snowmelt, others—like flash floods—can happen suddenly with devastating effects. Currently, 1.8 billion people are at risk of flooding globally, and in the U.S., 98% of counties have experienced flood events over the past 25 years.

Floods are becoming more frequent and severe due to urban growth and climate change, putting more people and property at risk. To stay safe, communities are adopting **Flood Early Warning Systems (FEWS)**, which help emergency teams respond faster, alert the public, and save lives. Choosing the right FEWS for your community can depend on many factors, including the complexity of local hydrology and funding. Many FEWS are first established as flood warning systems that monitor current conditions and automatically warn when dangerous thresholds are reached.

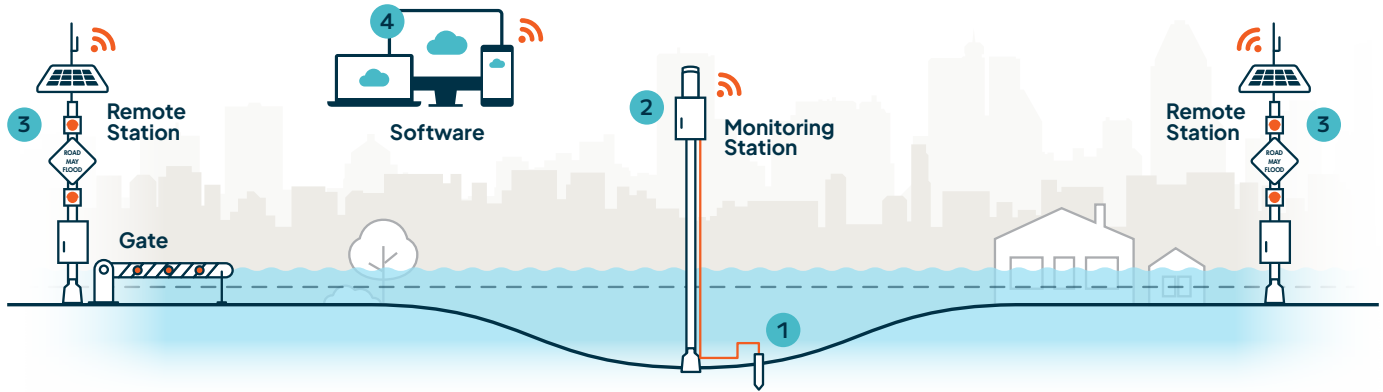
### GET STARTED WITH FLOOD WARNING SYSTEMS

Investing in flood protection pays off—every \$1 spent can save \$5–8 in potential damages. But selecting the right flood warning system for your community can feel overwhelming. From understanding the basics to navigating gauges, data loggers, telemetry, and software, there's a lot to consider. This guide will walk you through the essentials, helping you understand the key components of a flood warning system, what factors to consider for your community, and how AEM's solutions can make a difference.



# Essential components of a flood warning system

At their core, flood warning systems use sensors and software to gather real-time data and provide critical alerts to emergency managers and the public about rising water, road hazards, and other dangers. Let's walk through the main components and what to consider when determining the best fit for your needs.



## Factors to consider

### 1 SENSORS

Sensors collect rainfall, stream level, and other environmental conditions that indicate the onset of a flood event.

- What information do you need? Options include water level, rainfall, temperature and wind, or live images.
- Do you need more than one sensor for redundancy or to measure additional parameters?
- What are conditions at the monitoring site? A shallow stream might require a different sensor than a debris-laden river.

### 2 DATA COLLECTION & COMMUNICATIONS

This part of the system records sensor readings and sends updates to a central application at regular intervals.

- How often do you want to collect and transmit data?
- What is the best method of communications based on location?
- How will you receive data if the primary communication network fails during an event?

### 3 REMOTE WARNING STATIONS (OPTIONAL)

For flooded roadways, remote warning stations with flashing beacons or barrier gates automatically activate to alert motorists of hazardous conditions ahead.

- What level of warning is needed—flashing beacons and a sign, or physical barrier gates to restrict access?
- Should the system support remote control and continue operating if connectivity is lost?

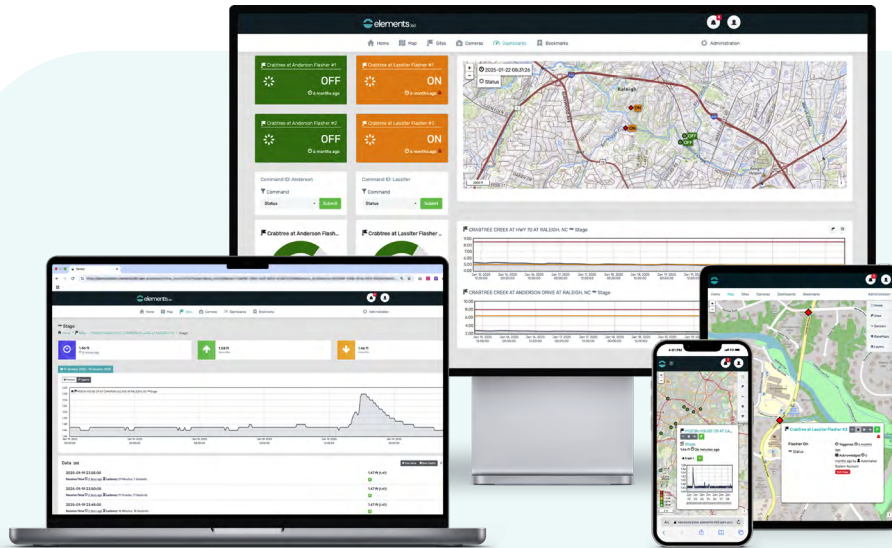
### 4 DECISION SUPPORT AND ALERTS

The decision support application provides a centralized view of live flood data in dashboards, maps, and charts, allowing you to monitor and alert on conditions in real time.

- Do you want to integrate data from federal, state, and other regional partners?
- Will different stakeholders need access to different dashboards and information?
- How will you share this information with the public, if needed?



# Start with the right software



Before choosing sensors or hardware, it is essential to select a decision support and alerting application. This software is the brain of your flood warning system, bringing all the data together, delivering alerts, and guiding decisions in real time. Without it, even the best equipment can't deliver the speed or clarity you need in a crisis.

## AEM Elements® 360: The hub of your flood warning system

AEM Elements 360 brings together real-time data from your flood warning stations and other key sources, giving you instant access to rainfall, stage, and flow data. It's the application of choice for turning data into better decisions and faster response times.



### All your flood data in one place

Bring together rainfall, stage, flow, and more from your flood monitoring network for a complete view of flood conditions.



### Clear and custom dashboards

Get the information you need fast with easy-to-use dashboards, maps, and graphs that display flood warning station data and alerts.



### Smart alerts, your way

Get instant notifications when action is needed, with alerts tailored to your needs—like rising water levels or activated flashers and gates.



### Share critical information with the public

Build trust, reduce confusion, and help the community prepare by sharing real-time flood updates from AEM Elements 360 on a public website.

# Our versatile lineup of flood stations

AEM offers a comprehensive portfolio of flood warning stations to fit any budget or application. Whether you need a single station, are expanding an existing network, or are building a new Flood Early Warning System (FEWS) from the ground up, AEM has you covered.



## VANTAGE FLOOD STATION

Cost-effective, packaged solution for water level monitoring in nuisance flooding areas or to infill your existing flood network.

## ASCEND FLOOD STATION

Flexible station for more robust needs, offering expanded parameters, communications options, and durability features.



## APEX FLOOD STATION

Fully customizable, advanced flood warning station with ALERT2 and redundant sensors for maximum accuracy and reliability.

# Vantage Flood Station

The Vantage Flood Station is the perfect entry point for communities that want to increase flood awareness and safety but have limited budgets. By combining AEM's accurate water level sensor or multi-parameter weather station with a cellular gateway, communities get affordable flood detection technology without sacrificing performance.

Designed as an easy-to-install, packaged system, the Vantage Flood Station is ideal for secondary roads and smaller installations in need of reliable coverage. This option is a smart choice for small municipalities and counties seeking to fill gaps in their existing flood monitoring network or get started with a small station.



## KEY FEATURES

<b>Sensors (1 sensor per station)</b>	<ul style="list-style-type: none"> <li>• Water level</li> <li>• Multi-weather</li> </ul>
<b>Data collection and communications</b>	Cellular gateway with mesh radio nodes
<b>Driver warning (optional)</b>	Flashing beacon and sign
<b>Customization</b>	Turnkey package
<b>Installation</b>	Self-installation preferred
<b>Budget</b>	\$



# Ascend Flood Station

The Ascend Flood Station provides a mid-level solution with greater flexibility and customization for challenging locations. It supports additional sensor options, such as a radar stage sensor for fast-moving streams and low-maintenance multi-weather sensors for harsh conditions. In addition, multiple communication protocols ensure continuous operation, even in hard-to-reach areas.

Like the Vantage Flood Station, the Ascend Flood Station is ideal for secondary locations or filling gaps in existing flood monitoring networks. However, it provides additional features, including multiple sensors at a single location to enhance accuracy and redundancy, and local data logging for improved reliability. A durable, metal enclosure also makes this station more suitable for harsh environments. The Ascend Flood Station is a great choice for customers seeking enhanced monitoring capabilities with greater flexibility and customization.



## KEY FEATURES

<b>Sensors</b>	<ul style="list-style-type: none"> <li>• Water level</li> <li>• Rain gauge</li> <li>• Multi-weather</li> </ul>
<b>Data collection and communications</b>	<ul style="list-style-type: none"> <li>• Cellular</li> <li>• Satellite: GOES or Iridium</li> </ul>
<b>Driver warning (optional)</b>	Flashing beacon and sign
<b>Customization</b>	Limited customization
<b>Installation</b>	Professional installation recommended
<b>Budget</b>	\$\$





# Apex Flood Station

AEM's Apex Flood Station is the ultimate solution for accurate and reliable flood monitoring and warning. Designed for the most demanding installations, this fully customizable system includes a wide range of sensors that can be tailored to specific monitoring needs and harsh or remote environments. To support faster and more reliable data transmission, the system is available with ALERT2 protocol. ALERT2 is ideal for large, complex flood warning networks that require fast, dependable information with built-in redundancy.

Suitable for large counties, cities, flood districts, and transportation agencies, the Apex Flood Station provides unmatched reliability and accuracy to support rapid, life-saving decisions capabilities with greater flexibility and customization.



## KEY FEATURES

<b>Sensor options</b>	<ul style="list-style-type: none"> <li>• Water level</li> <li>• Rain gauge</li> <li>• Multi-weather</li> <li>• Camera</li> </ul>
<b>Data collection and communications</b>	<ul style="list-style-type: none"> <li>• ALERT2 / VHF radio</li> <li>• Cellular</li> </ul>
<b>Driver warning (optional)</b>	<ul style="list-style-type: none"> <li>• Flashing beacon and sign</li> <li>• Barrier gate</li> </ul>
<b>Customization</b>	Fully customizable
<b>Installation</b>	Professional installation required
<b>Budget</b>	\$\$\$

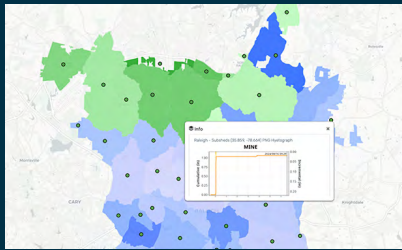
# Compare our flood stations

FEATURES	KEY BENEFITS	VANTAGE FLOOD STATION	ASCEND FLOOD STATION	APEX FLOOD STATION
AEM Elements 360 application for monitoring and managing stations	Quick and easy access to data and alerts in one centralized location, ensuring faster responses and better decision-making.	●	●	●
Cellular communications	Reliable, cost-effective connectivity for real-time updates, even in widely distributed networks.	●	●	●
Flooded road warning: Flashing beacon and sign (optional)	Automatically alerts drivers to flood hazards in real time, reducing accidents and enhancing public safety.	●	●	●
Remotely trigger flooded roadway warning station (flashers or gates)	Enables immediate hazard response and control of warning station from any location.	●		●
Satellite communications (GOES, Iridium, Inmarsat)	Ensures connectivity in remote areas with no cellular coverage, maintaining reliable monitoring and alerts.		●	●
Redundancy in communications	Provides backup connectivity to ensure uninterrupted operation, even if the primary system fails.		●	●
Two-way communications	Enables remote control and status updates, reducing trips to site and minimizing downtime.		●	●
Local data logging	Ensures data is stored securely on site for reliability, even during connectivity outages.		●	●
Supports multiple sensors at each site	Improves data accuracy and reliability through redundancy, ensuring continuous monitoring.		●	●
Increased durability (metal enclosures, etc)	Rugged design withstands harsh environments, extending system lifespan and reducing maintenance.		●	●
ALERT2 communications (IP and Radio)	Easily expand the system with any compatible monitoring stations, remote stations, and software suites.			●
Flooded road warning: Barrier gates (optional)	Physically restricts access to hazardous areas, offering the highest level of safety.			●
DOT certified design	Meets industry standards for quality and safety, ensuring compliance with transportation regulations.			●
Camera (option)	Provides visual confirmation of conditions for better situational awareness and response.			●
Budget	Scalable options to meet your budget now and as needs evolve.	\$	\$\$	\$\$\$

# A complete flood solution

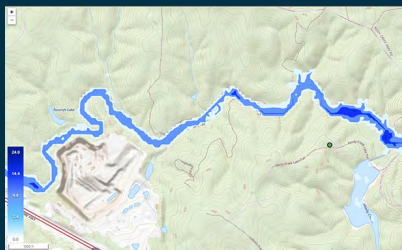
Unlock the full potential of your Flood Early Warning System with advanced data sources beyond your sensor network. AEM offers tools like Gauge-Adjusted Radar Rainfall (GARR) and Vflo® Flood Forecast to give you an even clearer picture of flood risks. With these powerful insights, you can plan smarter, act faster, and protect your community more effectively.

## KEY FEATURES



### Gauge-Adjusted Radar Rainfall

GARR fills the gaps in your flood warning system with accurate rainfall data between sensors. By uniquely combining radar and gauge data, it delivers precise rainfall measurements that enhance your FEWS, improving predictions and response to flood risks.



### Vflo Flood Forecast Model

Vflo Flood Forecast strengthens your flood warning system with high-resolution, predictive modeling that simulates surface and subsurface runoff. By integrating real-time and forecast rainfall data, including GARR, it gives emergency managers and first responders the precise predictions they need to stay ahead of floods.

## Trusted expertise to tackle rising flood challenges

At AEM, we're at the forefront of flood early warning, providing the expertise, analysis, and accurate predictive models essential to building flood resilience. Our expert team collaborates with you to assess your unique risks and design and deliver the best solution to maximize safety while maintaining operational continuity.



**Risk  
Assessment**



**Network  
Design**



**Hydrologic  
Forecast**



**Installation and  
Maintenance**





## Let's start a conversation

At AEM, we understand that every community's flood monitoring and warning needs are unique to their water and flood risk management strategies as well as their region's climate and geography. That's why our team of hydrology solutions experts is here to help you craft an end-to-end flood early warning solution that works for your team, your needs, and your budget.

To learn more about how we can help you maximize situational awareness and increase efficiency of response in the face of growing flood risks, be sure to contact AEM today so we can start a conversation about solution alignment for your needs.



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