

Flood Inundation Mapping and Alert Network (FIMAN)

<https://fiman.nc.gov/fiman/>

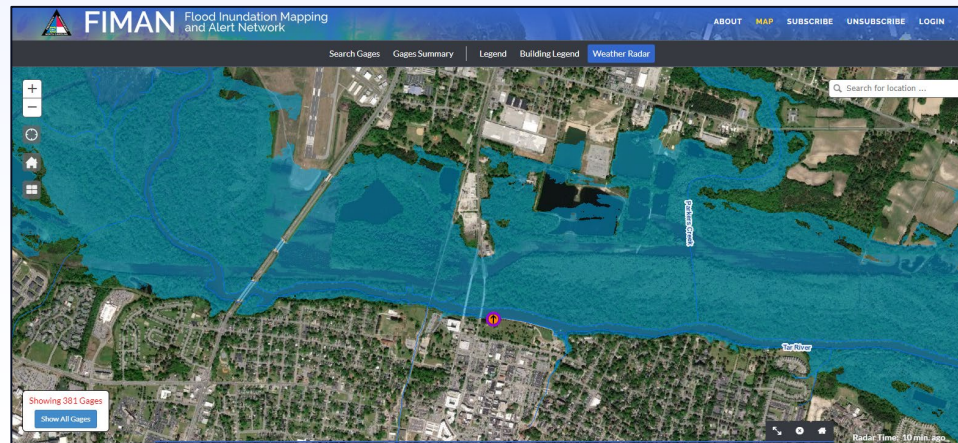


North Carolina Emergency Management



FIMAN Goals

- Real-time flood inundation mapping (current and forecast)
- Alerts
- Leverage vast investment in data
- Assist in risk-based decisions during and before disaster
- Partnerships with local, state, and federal agencies



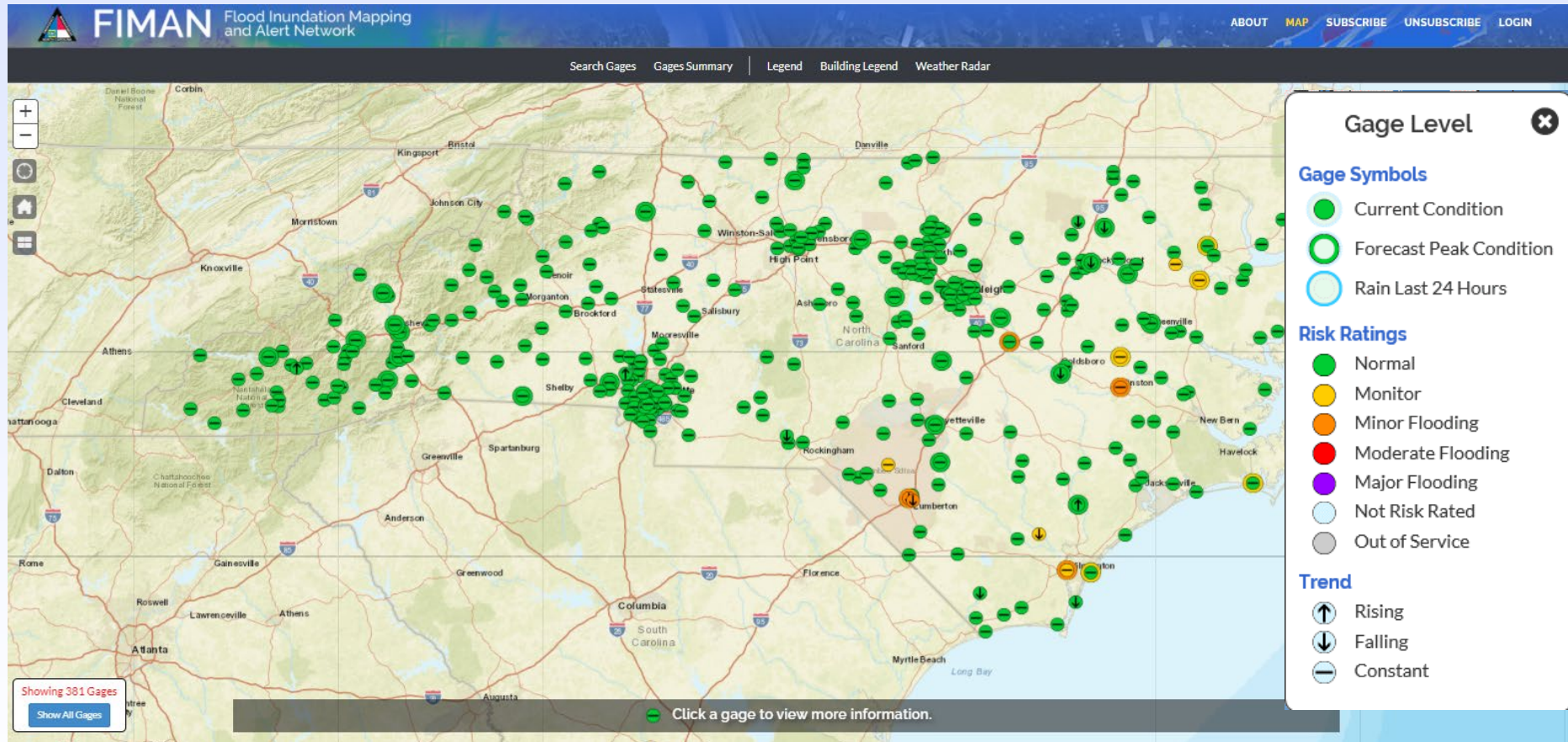
FIMAN

Real-time flood mapping solution

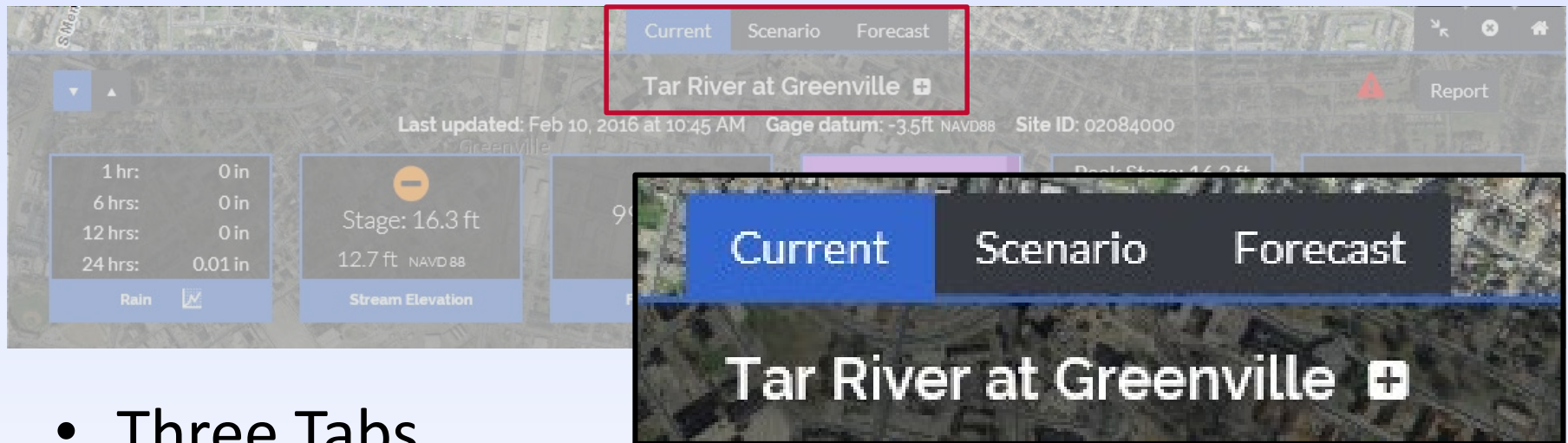
- Gauges
- Telemetry
- Pre-made inundation libraries
- Web tool to efficiently communicate



Home Screen / Current Severity



Gage View - Dashboard Concept



- Three Tabs
 - **Current:** Provides most recent inundation extent
 - **Scenario:** Planning tool for visualization and impact
 - **Forecast:** Shows timeline using NWS forecast data
- Info Widgets
 - Interactive for rainfall, stage, flow, forecast, impacts

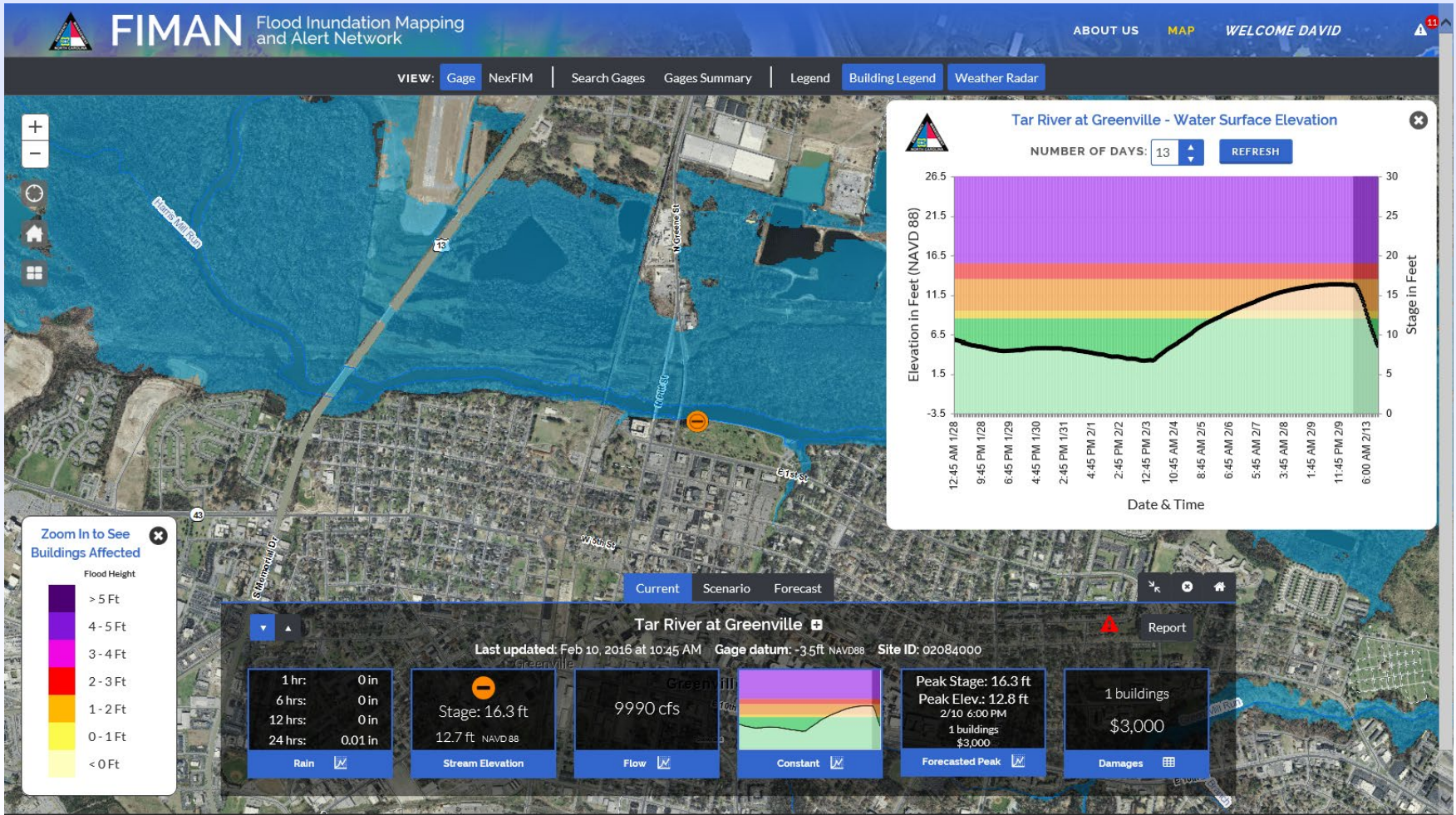
Current Inundation Level and Map



North Carolina Emergency Management



Gage Stage Charts + Forecast



Real Time Flood Impacts

FIMAN Flood Inundation Mapping and Alert Network

ABOUT US MAP WELCOME DAVID KEY

VIEW: Gage NexFIM Search Gages Choose River Scenarios Building Damages Building Legend Hot Spots Report Legend Weather Radar

Neuse River near Goldsboro Buildings in Inundation Extent

Current Elevation: 65 Ft

Current Flood Depth	Total		Residential		Commercial		Public	
	Count	Est. Damag...	Count	Est. Damag...	Count	Est. Damag...	Count	Est. Damag...
Sub Structure	18	\$16,000	16	\$14,000	2	\$2,000	0	\$0
0 - 1 ft	2	\$5,000	2	\$5,000	0	\$0	0	\$0
1 - 2 ft	1	\$75,000	0	\$0	1	\$75,000	0	\$0
2 - 3 ft	2	\$24,000	1	\$15,000	1	\$9,000	0	\$0
3 - 4 ft	0	\$0	0	\$0	0	\$0	0	\$0
4 - 5 ft	0	\$0	0	\$0	0	\$0	0	\$0
> 5 ft	0	\$0	0	\$0	0	\$0	0	\$0
TOTAL	23	\$120,000	19	\$34,000	4	\$86,000	0	\$0

*Additional buildings may be impacted outside of the inundation extent.

Stream Elevation Flow Rising Forecasted Peak Damages Impact

FIMAN Flood Inundation Mapping and Alert Network

NC Floodplain Mapping Program
4105 Reedy Creek Drive
Raleigh, NC 27607

Mailing Address
4218 Mail Service Center
Raleigh, NC 27699-4218

Phone: (919) 715-5711
Fax: (919) 715-0408

SIGN UP FOR GAGE ALERTS



North Carolina Emergency Management



First Floor Elevation Collection – Mobile LiDAR



Real Time Alerts

FIMAN Flood Inundation Mapping and Alert Network

ABOUT MAP ACCOUNT LOG OUT

VIEW: Gage NexFIM Search Gages Gages Summary Legend Building Legend Weather Radar

ALERT SETTINGS

Tar River at Greenville

Alerts My Account

Stage			
15.5 ft.	Major Flooding		
13.5 ft.	Moderate Flooding		
9.5 ft.	Minor Flooding		
8.5 ft.	Monitor		

ALERTS WILL BE SENT WHEN THE FOLLOWING CONDITIONS ARE MET:
Click to Activate/Deactivate

Rises Above Falls Below Forecast to Rise

Forecast to Fall

Selected conditions will be applied to all gage alerts.

View your alert settings for the following Gage:

Tar River at Greenville

Gage Level

Gage Symbols

- Current Condition
- Forecast Peak Condition
- Rain Last 24 Hours

Risk Ratings

- Normal
- Monitor
- Minor Flooding
- Moderate Flooding
- Major Flooding
- Not Risk Rated
- Out of Service

Trend

- ↑ Rising
- ↓ Falling
- Constant

Tar River at Greenville

Last updated: Aug 8, 2017 at 11:00 AM Gage datum: -3.5 ft NAVD88 Site ID: 02084000

<p>1 hr: 0 in</p> <p>6 hrs: 0.33 in</p> <p>12 hrs: 0.67 in</p> <p>24 hrs: 0.67 in</p> <p>Rain </p>	<p>Stage: 3.5 ft</p> <p>0 ft NAVD88</p> <p>Stream Elevation </p>	<p>428 cfs</p> <p>Flow </p>	<p>Constant </p>	<p>No data available</p> <p>Forecasted Peak </p>	<p>No Damages Assessed</p> <p>Damages </p>
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Flood Scenario Mode



VIEW: [Gage](#) [NexFIM](#) | [Search Gages](#) [Gages Summary](#) | [Legend](#) [Building Legend](#) [Weather Radar](#)

Search for location ...



Zoom In to See Buildings Affected

Flood Height

- > 5 Ft
- 4 - 5 Ft
- 3 - 4 Ft
- 2 - 3 Ft
- 1 - 2 Ft
- 0 - 1 Ft
- < 0 Ft

Current Scenario Forecast

Drag to simulate flood severity

Stage (ft) 9.5 11.5 13.5 15.5 17.5 19.5 21.5 23.5 25.5 27.5 29.5

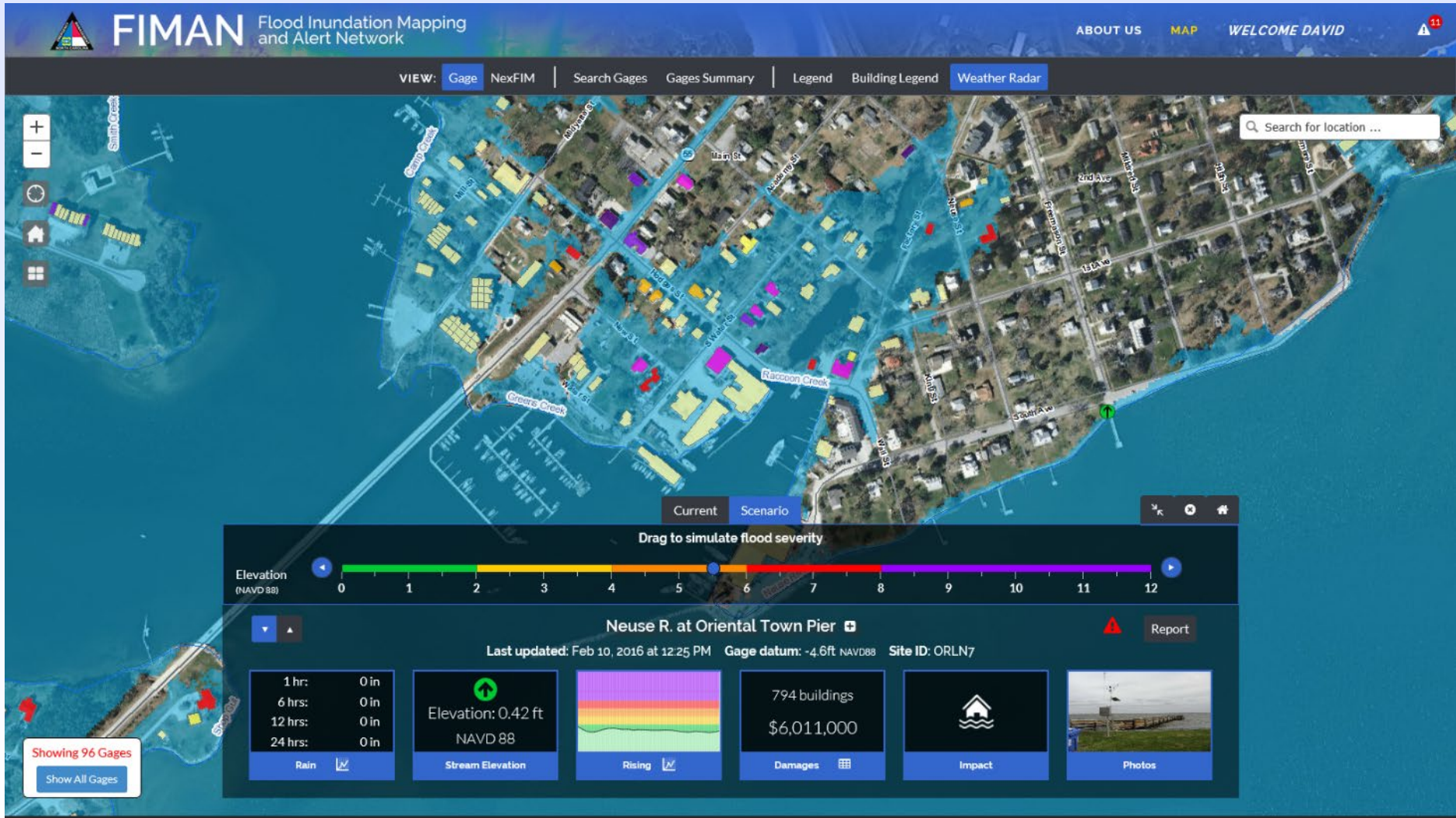
Elevation (NAVD 88) 6 8 10 12 14 16 18 20 22 24 26

Tar River at Greenville Report

Last updated: Feb 10, 2016 at 11:45 AM Gage datum: -3.5ft NAVD88 Site ID: 02084000

1 hr: 0 in 6 hrs: 0 in 12 hrs: 0 in 24 hrs: 0.01 in	Stage: 16.3 ft 12.7 ft NAVD 88	9990 cfs	Constant	Peak Stage: 16.2 ft Peak Elev.: 12.7 ft 2/11 12:00 AM No est. damages forecast Forecasted Peak	1,172 buildings \$27,294,000 Damages
Rain	Stream Elevation	Flow	Constant	Forecasted Peak	Damages

Coastal Libraries



FIMAN-T

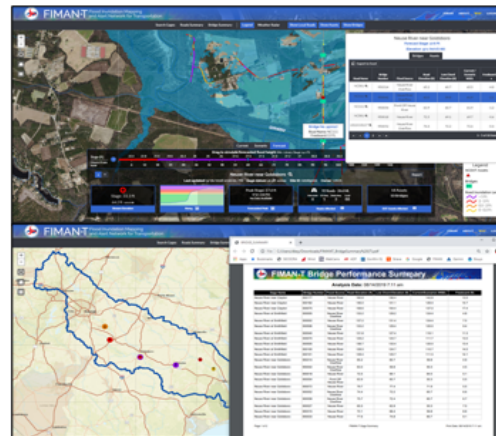
Flood Inundation Mapping and Alert Network for Transportation (FIMAN-T)



OVERVIEW OF INNOVATION

Building on the emergency response successes of North Carolina's Flood Inundation Mapping and Alert Network (FIMAN), NCDOT and NCEM have partnered to develop FIMAN for Transportation (FIMAN-T). FIMAN-T is a web-based tool that provides NCDOT officials and emergency management stakeholders with real-time and forecasted flood inundation depths along roadways, bridges, and other NCDOT assets in support of risk-based decision-making during flood events. The goal of FIMAN-T is to provide visualization and metrics for roadway inundation, bridge hydraulic performance (freeboard, overtopping, etc.) and identify potentially impacted NCDOT assets. This will enhance NCDOT's responsiveness during flooding events by generating data and reports for use in disaster response and planning.

FIMAN-T leverages real time riverine and coastal gauge measurements, 3D inundation mapping coupled with LIDAR-derived roadway elevation layers to accurately estimate flooding depths over roadways for both current and forecasted conditions. The application features an interactive dashboard allowing users to navigate between current conditions, modeled scenarios, and forecasted conditions where available. The dashboard also features different "info-widgets" that provide detailed information including stream elevation, an interactive stage hydrograph, and forecasted peak.



FIND OUT MORE . . .

FIMAN: <https://fiman.nc.gov/>

FIMAN-T: [NCAFPM March 2020 Webinar Slides](#)

[NCDOT Hydraulics - Hurricane Action Plan](#)
(MS Sharepoint access granted by request)

NCDOT Hydraulics Unit

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BENEFITS

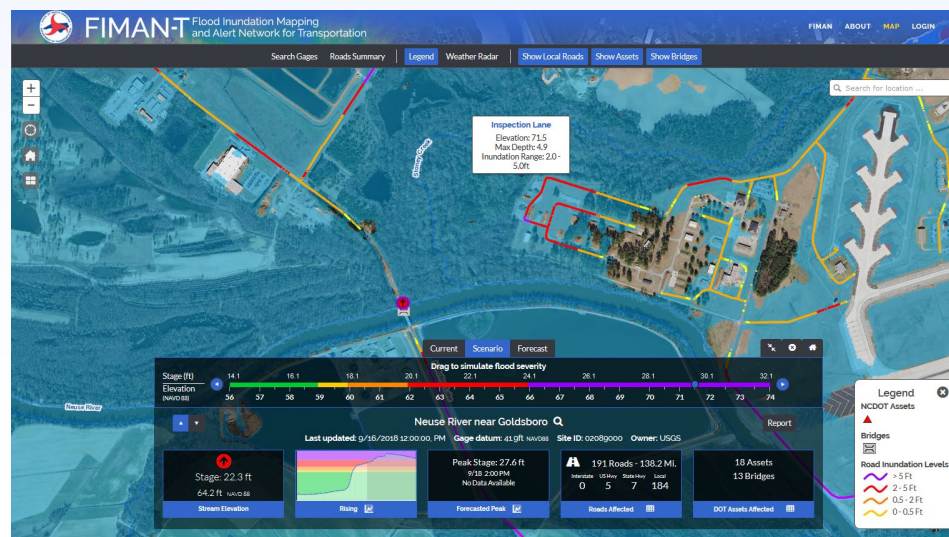
- NCDOT personnel and stakeholders are provided real-time and forecasted roadway inundation depths and summaries for hundreds of miles.
- FIMAN-T provides real-time and forecasted bridge hydraulic performance such as freeboard, pressure flow and overtopping conditions.
- Real-time reports are generated for Emergency Operations Center Briefings.

Keywords: Flood Warning, Emergency Response, Situational Awareness, Roadway Flooding, Inundation Mapping

FIMAN-T: Current, Forecast and Scenario Road Impacts

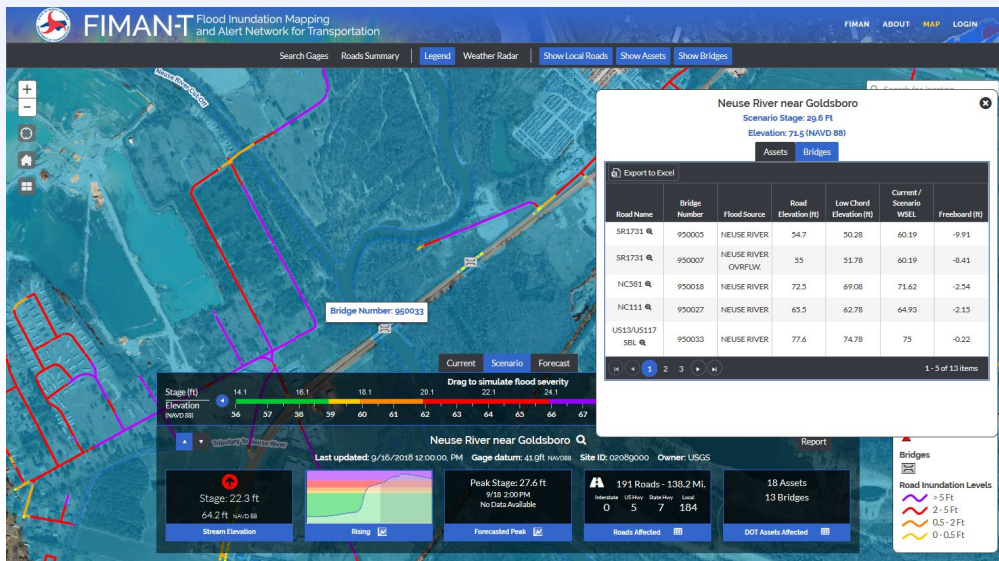
FIMAN-T displays impacts to roads, bridges, and assets in 3 ways:

- Current: Using gage readings every 15 minutes, the web application displays real-time flooding extents and impacts.
- Scenario: Allows users to show impacts at various flood levels for scenario planning.
- Forecast: Based on the NWS forecasted hydrograph, FIMAN-T allows impacts to be visualized at the predicted peak flooding.

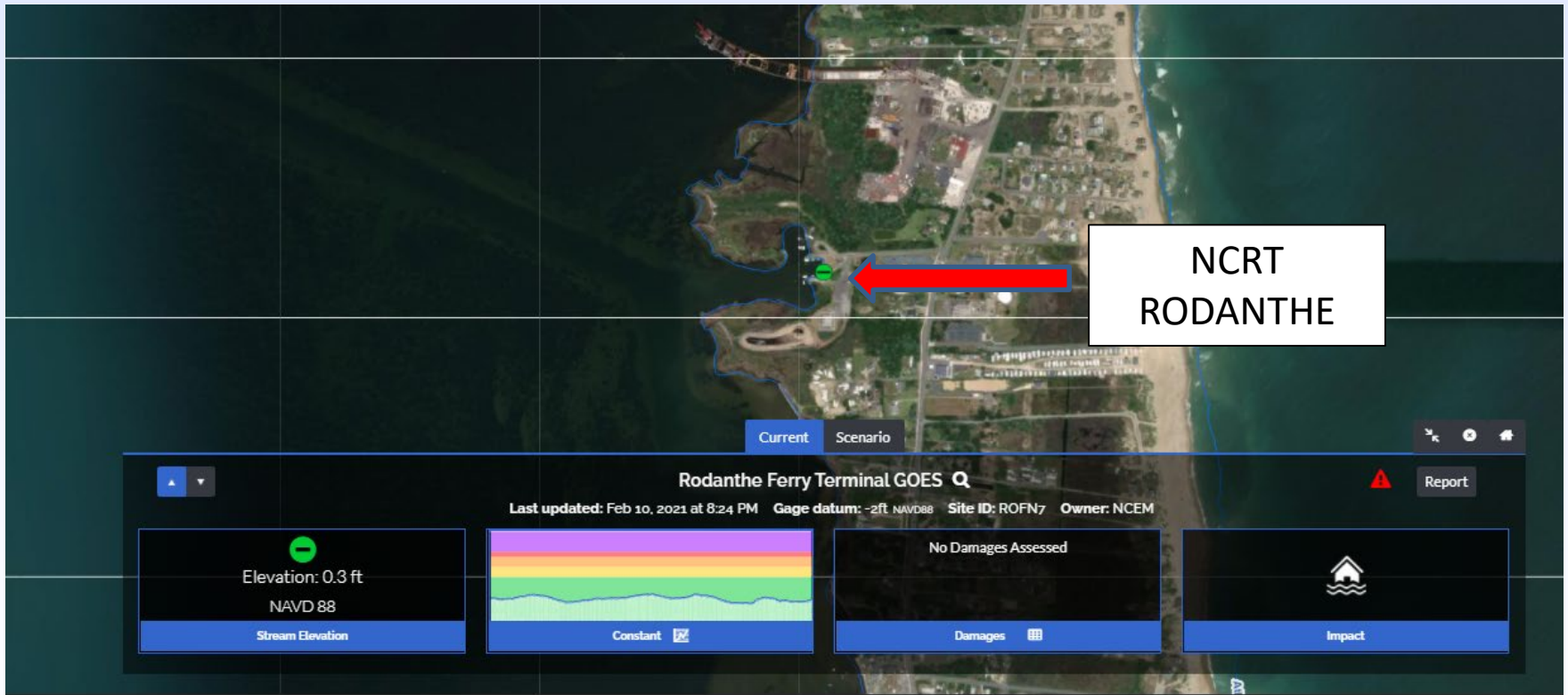


FIMAN-T: Additional Functionality

- Displays information about bridge and asset impacts.
- Displays tables for roads, bridges, and assets that are sortable by many additional attributes including Road Type, Maximum Water Depth, Bridge Freeboard, etc.
- Automatically generates aggregated reports displaying miles of roads inundated.
- Easily exports data to KML files for use in Google Earth.



Coastal Gauge



Comparing LiDAR based flood mapping to surveyed edge of water

High Water Mark (HWM) Photo Application

High Water Mark Location

Please Mark the location of the building or object that exhibits a high water mark from flooding. Search for your location by using the buttons provided below, or use the zoom and pan tools to move the map to your exact location. Attach a photo to help surveyors locate the mark.

1. Enter Information

Name of Collector

Photo Type

High Water Mark

Notes (<150 char)

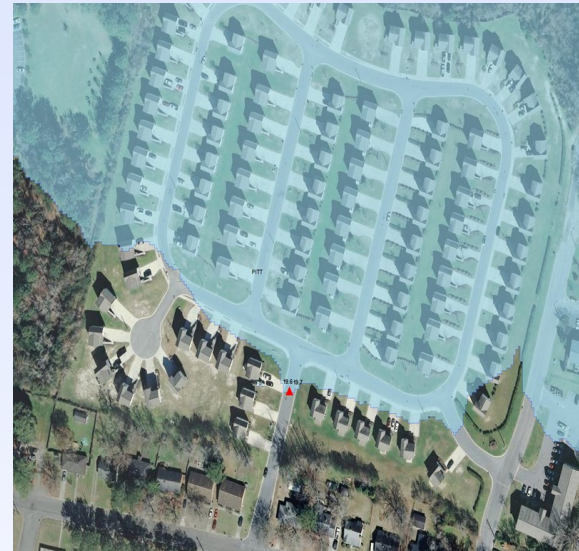
Attach a photo of the high water mark

Select File

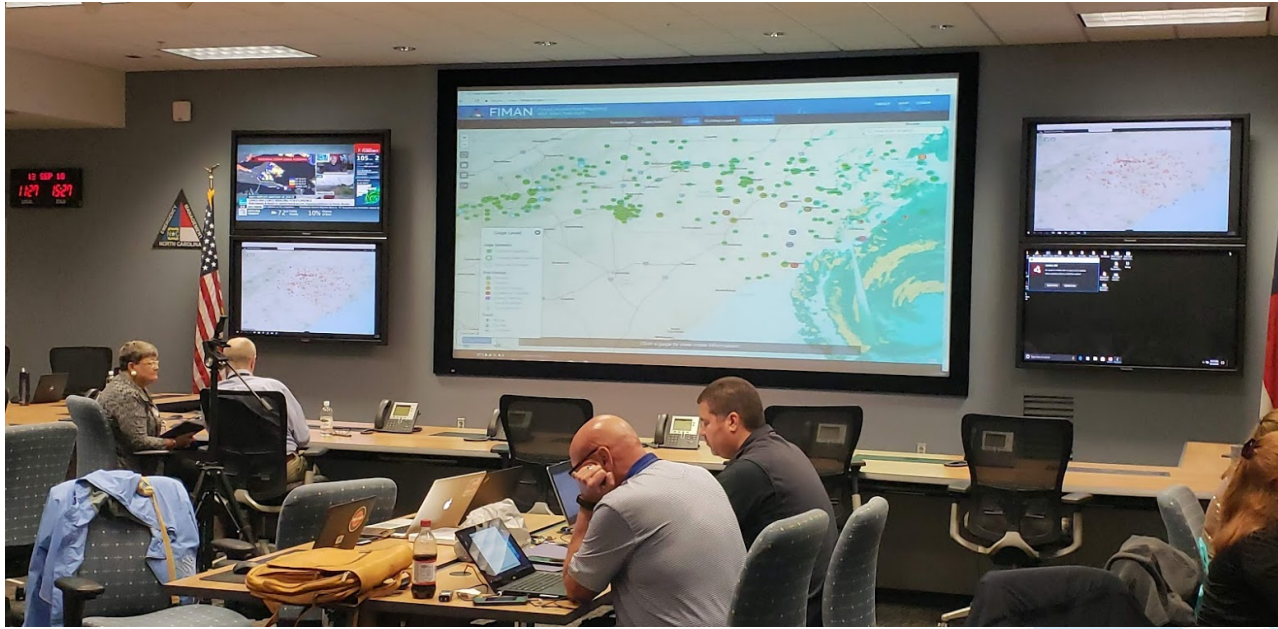
2. Select Location

Specify the location for this entry by clicking/tapping the map or by using one of the following options.

Search Lat/Lon

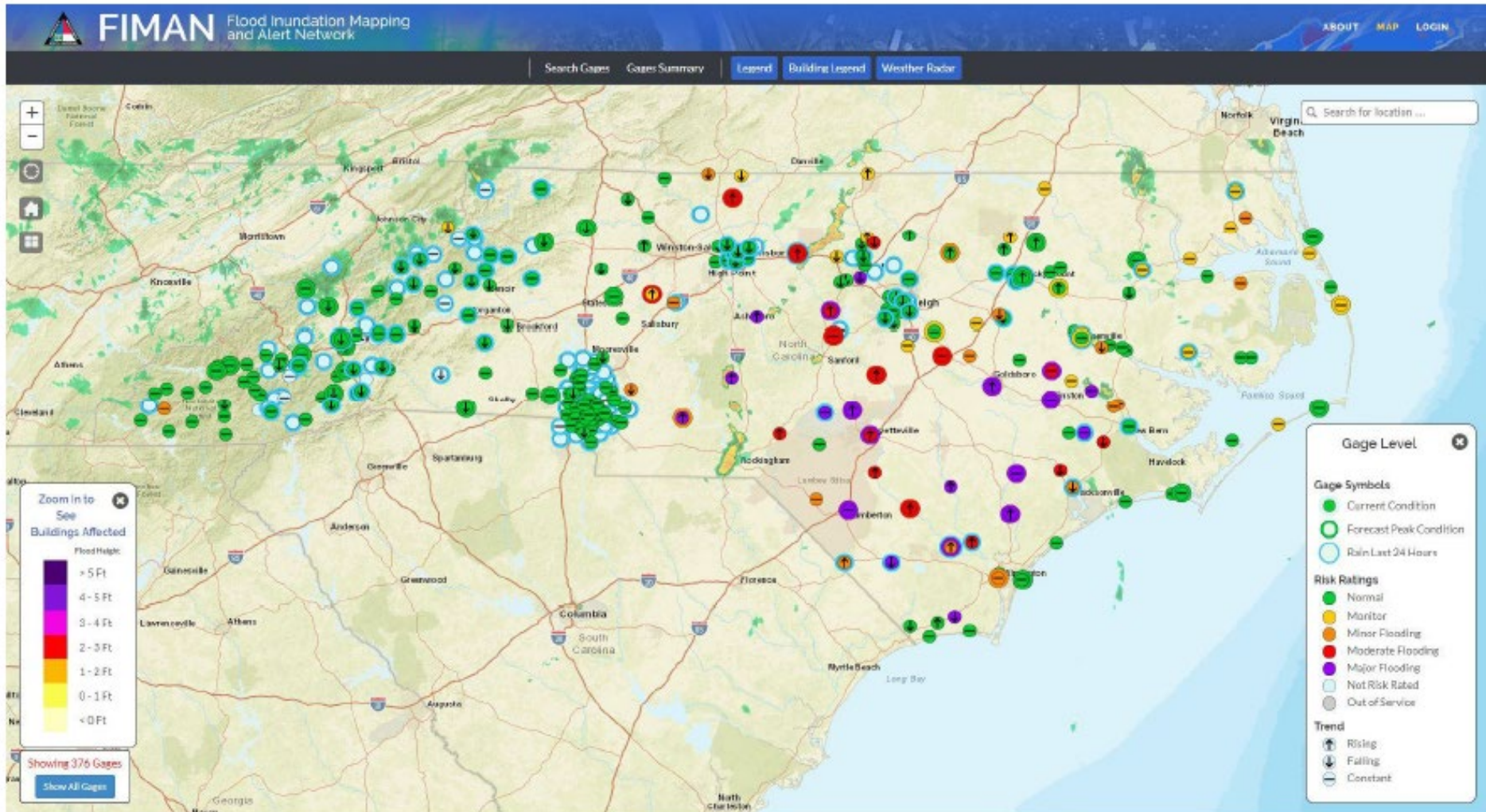


Vital Component of EOC Operations



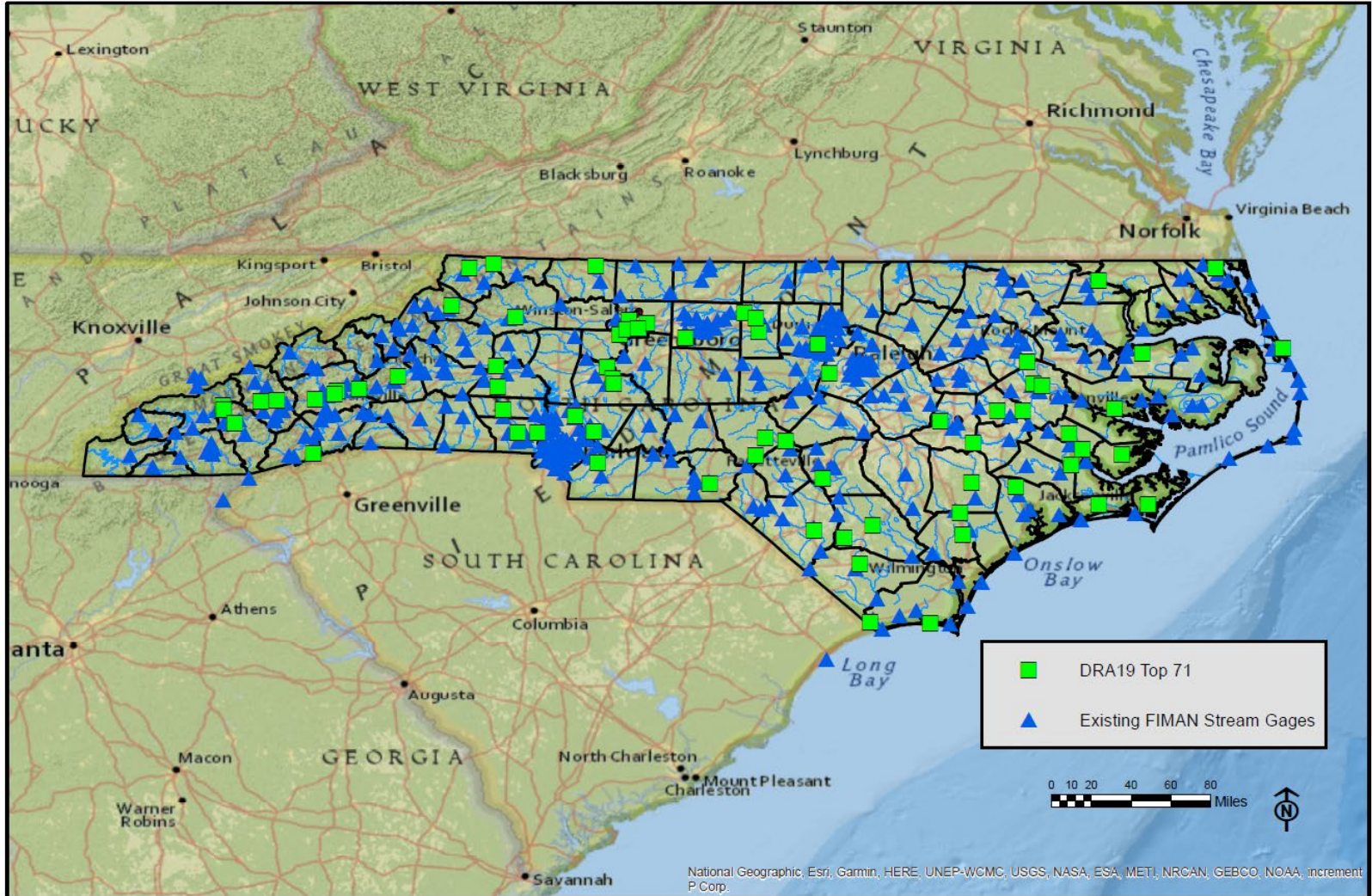
9/17/18

FIMAN Current and Forecast Conditions - Hurricane Florence - 9/17/2018 4:31 PM



New Stream Gauges

Existing and Proposed Riverine/Coastal Gauges
NC Disaster Recovery Act of 2019



Questions?

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North Carolina Emergency Management

