

Action Plan

Category 9 – Flood Emergency Planning, Response and Recovery

Action 9.3 - Install Flashing Warning signs and Flood Sensors



Overview and Implementation Strategy:

The District is made up of 68.34 square miles, including both land and water. The city is densely populated, accounting for about 10,000 people per square mile along with critical infrastructure and essential services. Nestled in the floodplain between the Anacostia River to the east and Potomac River to the West, DC is susceptible to coastal, riverine and interior flooding causes immense impact to infrastructure, safety and livelihoods of residents. Through the analysis of climate change impact to the District and the changing land use and development, flooding impacts are also expected to change and become more severe.

To maximize the opportunity for flood analysis for these changes and mitigation strategies as well as minimize the threat and disruption to residents and essential services, the District proposes to install weatherproof LED-enhanced warning alerts and remote flood sensors at flood prone areas in the District.

The weatherproof LED-enhancing weather alert would indicate to commuters that a street is under high-water conditions. Such a warning system could determine high water levels through ultrasonic or radar sensors. Another option is through a system called a contact closure. This type of high-water warning system operates through sensors positioned at the target water level. When these sensors get wet, stainless-steel electrodes meet, essentially functioning as a switch that sends power to LED warning lights, triggering them to begin flashing. The lights continue to flash until the water recedes, turning off the switch. These sensors can also send power to a transmitter, which can communicate with a city's supervisory control and data acquisition system.

The installation of remote flood sensors in those same identified areas would continuously report water levels. When water levels rise, the flood sensor will automatically send warnings in real time, via ALERTDC, to residents and District response agencies that flooding has occurred in a particular area. The District can also decide on a depth of water, above which motorists should not attempt to drive through and traffic should be re-routed. The flood sensors will also collect water levels for data analysis and future flood mitigation strategies and projects.

HSEMA, in coordination with DDOT and DOEE, have identified locations that are prevalent to flooding events. Through various outreach with District partners, such as WMATA and Silver Jackets, HSEMA has received feedback about additional locations. HSEMA continues to coordinate with District agencies at inter-agency meetings and conferences to promote the value and need for flood sensors and signs to safeguard essential services and livelihoods.

Impacted City Ward/ANC:

- Wards: 2, 3, 4, 6, 7, 8
- See [Master Sheet](#) for all identified locations, as it stands. The Master Sheet is subject to change based on inter-agency feedback to prioritize and add locations.

Lead Agency:

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- District of Columbia Department of Transportation
 - DDOT will be installing and maintain the flood signs and sensors.
 - DDOT has identified flood prone locations for both weatherproof LED-enhancing weather alerts and remote flood sensors

Supporting Agencies, Roles/Commitments:

- Homeland Security and Emergency Management Agency (HSEMA)
 - The weatherproof LED-enhanced warning alert signs and flood sensors will be paid for through federal HMGP funding. HSEMA will be developing the grant application and submitting for federal funding.
 - Participate in outreach opportunities to showcase the Action Plan with District partners and collaborate to prioritize and identify additional locations including recommending locations identified through emergency response
 - The Flood Sensors will connect with AlertDC to provide real-time notifications to residents and response agencies when flooding in an area has occurred
- Department of Energy and Environment (DOEE)
 - DOEE is providing regulatory consult and permitting assistance, if needed, for DDOT.
 - DOEE has identified flood-prone locations for weatherproof LED-enhancing weather alerts and flood sensors
 - Data collected from the flood sensors can assist in the development of the Integrated Flood Model via agency coordination and buy-in
- WMATA
 - WMATA has identified flood prone locations weatherproof LED-enhancing weather alerts
 - WMATA has identified flood prone locations for remote flood sensors
- USGS
 - USGS has identified flood prone locations for remote flood sensors to be installed
- DC Water
 - DC Water has identified flood prone locations for remote flood sensors to be installed
- Office of Planning
 - Neighborhood Planning and Design Division will assist in the sign design process
 - State Historic Preservation Office will consult on the development of the scope of work

Background:

Impact of this Effort on Task Force Goal:

- Most flood fatalities are caused by people attempting to drive through water, or people playing in high water. The depth of water is not always obvious. The roadbed may be washed out under the water, and you could be stranded or trapped. Rapidly rising water may stall the engine, engulf the vehicle and its occupants, and sweep them away. Look out for flooding at highway dips, bridges, and low areas. These flood warning systems are triggered by rising water levels and immediately activate weatherproof LED-

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enhanced warning alerts to indicate a roadway is under high-water conditions. Therefore, commuters will know to avoid driving through the flood waters.

- The impact of this effort will prevent fatalities, injuries and destruction of property such as vehicles.
- Many roadways, bridges and surrounding areas in the District are subject to flooding, as well. Installing flood sensors in these locations, residents and District response agencies will be able to receive real-time alerts regarding flooding. This will provide a warning for residents to avoid an area, as well as provide situational awareness to District agencies for response procedures.
- The flood sensors will also measure and collect water levels to provide data to District agencies that would assist with flood mapping, analysis, and strategizing mitigation projects.

Historical Context:

How did we arrive at this particular situation?

On September 2020, the District was impacted by severe flooding causing thousands of dollars in damages to infrastructure and disruption to resident's livelihoods. Following this incident, the Office of City Administrator established the Flood Task Force to identify policies and projects to bolster flood readiness while equitably protecting the District's residents and economy from damage that floods cause.

Installing flashing warning signs in flood prone intersections was identified as a valuable project to the Task Force's mission because most flood related deaths are the result of commuters crossing flooded intersections and drowning.

The flood warning signs would provide real time warnings to commuters to avoid a flooded intersection. It would also transmit water measurements to a data acquisition system to provide the District data that can be used for analysis and future projects that would mitigate against flooding.

The project team has also identified the opportunity of installing flood sensors. The identified locations, see Master Sheet, are areas prone to heavy flooding, and as a result road closures. The flood sensors can connect with public alerting systems, such as ALERTDC, to notify residents are flooded roads to avoid. Flood sensors can also collect flood measurements for analysis to assist with mitigation strategies for flood resilience.

What Actions have already been taken?

DDOT had presented the idea to HSEMA with a list of identified locations. However, at the time, there were no funding opportunities to purchase and install the equipment. In 2021, President Biden announced HMGP COVID, offering the funding opportunity to the District to back DDOT's initiative.

DDOT has identified the vendors for the signs and sensors, as well as locations under their jurisdiction.

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HSEMA has presented the action at the DC Silver Jackets meeting in April. This showcase has encouraged feedback from District partners, including identification of additional locations and prioritizing locations over others. District partners include WMATA and the National Planning Commission.

HSEMA will continue to showcase the ongoing project to partner agencies, to increase awareness and inter-agency coordination that would increase the number of locations for the signs and sensors could be installed.

What are options to alleviate flooding impacts?

Options to alleviate flooding impacts would be to ensure that storm drains are clear of debris so water can drain without obstacles. Another option includes expanding storm water management to increase the capacity of water that drainages can handle during a heavy rain event.

Additional options to alleviate flooding can be derived from the analysis of flood data that the flood sensors would be able to collect that should be included in the Integrated Flood Model that DOEE is developing.

Equity

How does this action assist vulnerable communities?

- A number of the signs will be placed in vulnerable social-economic areas within the District to provide fair awareness of flooding across the District.
- The signs provide real-time awareness for the threat of flooding, where some segment of the population may not have access to other forms of alerts.
- A number of the identified locations for the sensors will be installed in vulnerable areas in the community, where flooding has serious impact. This will provide real-time alerts to residents via ALERTDC to avoid an area.
- The sensors will also collect flood data that officials can use for flood mapping and analysis, which will strategize projects aimed at mitigation flooding in those areas so communities are no longer stricken with the disruptive and disastrous impact of flooding.

Timeline:

Fiscal Year	Responsible Agency	Action
2020	DDOT	DDOT had identified the installation of flood warning signs at flood prone intersections as a project
2021	DOEE	DOEE had identified the installation of flood sensors at flood prone areas in the District to collect data for flood mapping and alert notifications as a project
		DOEE, HSEMA and DDOT coordinated to identify locations and funding opportunities for both projects
2022	HSEMA	HSEMA will submit an application for HMGP funding to fund the installation of flood signs and sensors at multiple locations

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HSEMA to establish working group to continue showcasing the project to District partners and the public to further identify additional locations and funding opportunities

Upon the identification of vendors, HSEMA will work with the vendors and HSEMA Operations to connect the flood sensors with ALERTDC as well as DOEE and DC Water for their flood mapping.

HSEMA &
Office of
Planning

HSEMA and OP Neighborhood and Design Division will coordinate

DDOT

DDOT will utilize their contractor to perform market research of vendors. Upon the identification of the vendors, DDOT's contractor will purchase and install the flood signs and sensors

2023

Interagency
Agency
Working
Group
DDOT

The established Working group will continue to showcase the project for increased awareness and coordination with District agencies to assist in location identification, prioritization and funding opportunities

HSEMA

DDOT's contractor will install the flood sensors and signs at the identified locations

HSEMA Operations to implement sensors and signs warning systems into ALERTDC. Considerations to be made for notifying residents without cellphones

Budget:

Total Estimated Cost: The total estimated cost of each LED Warning Sign with installation is

Cost Breakdown by Phase / Action:

- \$26,950.00 per LED Warning Signs
- \$13,349.65 per LED Warning Signs installation
- \$3,907.75 per Flood sensors
- \$13,349.65 per Flood sensors installation

Long Term Budget Requirements: The initial effort of this Action Plan will focus on using HMGP funds – only available for 2023. Initial funds from HMGP may not be enough for all the

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signs and sensors that will be necessary for calibrating the Integrated Flood Model, or for all the flood prone areas identified by this research.

Fiscal Year	Responsible Agency	Funding Source	Amount to be Requested	Description
2023	HSEMA	HMGP	Federal: \$400,000	This will fund the installation of X of signs and X sensors at identified locations.
2024 and beyond	HSEMA	Local/ Federal Grants	\$200,000	This will fund the continued installation of signs and sensors until all areas identified in the research have been serviced.

Public Outreach and Input:

Public outreach & engagement approach/actions:

Public outreach for each location will be conducted by DDOT as part of the project process as sites are identified and plans for installation finalized.

What were the Public Comments of relevance to this Action?

Recent flooding at the Metro underpass at Rhode Island Avenue NE, and at the I-295 underpass at Nannie Helen Burroughs Ave NE have underscored the importance of installing warning signs to prevent motorists from attempting to drive through flood waters in these areas. Residents and businesses have contact Task Force agencies asking for action at these locations.