

BUILD FLOOD RESILIENCE

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INTRODUCTION

The services provided by drinking water and wastewater utilities are vital to the health and resilience of a community. However, extreme summer weather, such as heavy seasonal rainfall can trigger flooding that can disrupt drinking water and wastewater services, underscoring the need for long-term resilience solutions in the water sector.

Any drinking water or wastewater utility, large or small, can be at risk of sustaining significant and costly flooding damages. To better prepare for the upcoming summer season, your utility can take steps before, during and after weather emergencies using the U.S. Environmental Protection Agency's (EPA) suite of easy-to-use tools and resources.

IDENTIFY RESPONSE ACTIONS AND CRITICAL CUSTOMERS

Floods are one of the most common and widespread

weather-related natural disasters. They can be caused by a variety of weather events, including heavy summer rains. The EPA has developed the [Flooding Incident Action Checklist](#) (IAC) that lists activities utilities can conduct to prepare for, respond to and recover from flooding emergencies.

The planning measures outlined in the Flooding IAC encourage utilities and community partners to work together before potential incidents to identify priority water customers, obtain their contact information and develop a plan to restore those customers first, in case of prolonged water service disruptions. Further, confirming with local law enforcement before an incident that your water utility response access credentials are valid can make all the difference when staff are urgently needed to restore flood-ravaged facilities.

PREPARE FOR CASCADING IMPACTS: POWER OUTAGES

The summer season can bring heavy seasonal rains and flash floods. These conditions can overwhelm existing infrastructure and lead to pipe breaks, flooded facilities and widespread power outages. Power loss can have devastating impacts on drinking water and wastewater utilities and the communities they serve. Inoperable pumps at drinking water utility infrastructures can compromise firefighting operations and cause local health care facilities and restaurants to close. EPA developed the [Power Resilience Guide for Water and Wastewater Utilities](#) to provide information and strategies for strengthening relationships with electric providers and increasing water sector resilience to power outages from floods, as well as from other weather emergencies.

The Power Resilience Guide identifies steps your utility can take to establish emergency communication protocols, determine your utility's power prioritization status, and maintain onsite fuel >>>

EPA

Incident Action Checklist – Flooding

The actions in this checklist are divided up into three “rip & run” sections and are examples of activities that water and wastewater utilities can take to prepare for, respond to and recover from flooding. For on-the-go convenience, you can also populate the “My Contacts” section with critical information that your utility may need during an incident.

Flooding Impacts on Water and Wastewater Utilities

Flooding is common throughout much of the United States and can be caused by heavy precipitation events, storm surge, levee or dam failures or inadequate drainage. These events often occur with little or no notice, and can cause extensive damage to drinking water and wastewater infrastructure. Flooding impacts to utilities often include, but are not limited to:

- Infrastructure damage, possibly resulting in service interruptions
- Pipe breaks due to washouts, which could result in sewage spills or low water pressure throughout the service area
- Debris blockage at an intake or uncharted water and wastewater lines due to falling trees
- Loss of power and communication lines
- Combined sewer overflows (CSOs)
- Water quality changes to source waters and treated effluents, including increased turbidity, increased nutrients and other potential contaminants
- Restricted access to the facility due to debris, flood waters and damage to roadways from washouts and sinkholes
- Loss of water quality testing capability due to restricted facility and laboratory access and damage to utility equipment

The following sections outline actions water and wastewater utilities can take to prepare for, respond to and recover from floods.

Example of Water Sector Impacts and Response to a Flood

Warwick, Rhode Island Wastewater Treatment Plant Flooding

In March of 2010, a monthly record of nearly 16 inches of rain caused extreme flooding along the Pawtuxet River in the City of Warwick, Rhode Island, and left the Warwick Wastewater Treatment Plant completely flooded. Staff members were forced to move critical mobile equipment to higher ground as flood waters rose and threatened electrical equipment. The flood took the facility and six pumping stations along the Pawtuxet River offline. The Warwick Sewer Authority was forced to purchase five large portable pumps to keep up capacity.

Although the levees in Warwick were built three feet higher than the 100-year flood level, the river reached three feet above the levees during the 2010 flood. Rhode Island Department of Emergency Management (RIDEM) personnel recommended that the wastewater treatment plant be designed to higher flood levels (e.g., 500-year flood) to mitigate future damage from flooding events. Since the flood, the utility moved its Supervisory Control and Data Acquisition (SCADA) system to the second floor from the ground floor of the operations building. The utility has also purchased several new generators and other energy efficient equipment.

Source: Brown University Center for Environmental Studies, “Emergency Management in Rhode Island: A Look at the State’s Level of Preparedness and Management of Hazards, Catastrophes, and Mass Casualty During the March 2010 Floods”

Source: Treatment Plant Operator Magazine, January 2011 issue, “Mitigation and Creation of Top Rhode Island Wastewater Plant Flood Resilience and Lessons Learned from the Severe Floods of March 2010”



storage, among other recommended actions. The Guide also highlights case studies from water utilities that have successfully implemented power resilience measures.

TRANSFORM PREPAREDNESS INTO MITIGATION

While preparedness measures can strengthen your utility's resilience to flood-related impacts, putting long-term mitigation planning for flooding incidents into practice is the most effective way to ensure your utility and community can better withstand and recover from disasters. To assist planning for long-term mitigation projects, EPA's [Hazard Mitigation Guide for Natural Disasters](#) provides examples of mitigation projects for disaster scenarios that drinking water and wastewater utilities may encounter during a flood, such as purchasing or renting a generator to prepare for power outages and elevating wellheads to mitigate the impacts of flooding from summer rains or water runoff. The Guide encourages drinking water and wastewater utilities to work with



their local mitigation planners to execute priority projects that are consistent with the overall community strategy.

The Hazard Mitigation for Natural Disasters Guide also includes information on eligibility for funding, such as federal grants or loans, to support mitigation work. This includes the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program (HMGP) which can be used by communities to implement hazard mitigation projects following a Presidential Disaster Declaration.

IDENTIFY FEDERAL FUNDING OPPORTUNITIES FOR MITIGATION

There are several federal programs, including HMGP to help utilities understand and obtain federal disaster and mitigation funding. EPA developed the [Federal Funding for Water and Wastewater Utilities in National Disasters \(Fed FUNDS\)](#) tool so that utilities can quickly screen funding programs from U.S. Department of Housing and Urban Development, U.S. Department of Agriculture, Small Business Association, FEMA and EPA to identify those that are applicable to your utility. It also provides examples of successful utility applications and tips for funding.

CONSOLIDATE INFORMATION IN AN EMERGENCY RESPONSE PLAN

Another key aspect in planning for and responding to flood-related incidents is developing a robust [Emergency Response Plan \(ERP\)](#). An ERP describes strategies, resources, plans, and procedures to prepare for and respond to an incident, natural or man-made, that threatens life, property, or the environment. Under [America's Water Infrastructure of 2018 \(AWIA\) Section 2013](#), community water systems serving over 3,300 people are required to [develop or update an ERP](#). The information, plans and procedures developed when utilizing the [Flooding IAC](#), [Power Resilience Guide for Water and Wastewater Utilities](#) and [Hazard Mitigation Guide for Natural Disasters](#) contribute to the foundation of your ERP. Compiling this information provides a clear and concise process for unexpected emergencies and fosters a culture of preparedness at your utility.

INTERESTED IN LEARNING MORE?

To learn more, visit www.epa.gov/waterresilience or join the *What's Going On* newsletter email list by contacting WSD-outreach@epa.gov. With the help of EPA's free water resilience resources, you can help ensure that your utility continues to provide safe and reliable services to your customers during emergencies.

CONTACT INFORMATION

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