



Wastewater Utility Emergency Response Plan

Template and Instructions

Introduction

This template assists wastewater utilities with developing an Emergency Response Plan (ERP). An ERP describes your utility's strategies, resources, plans, and procedures to prepare for and respond to an incident, natural or man-made, that threatens life, property, or the environment. Incidents can range from small main breaks or localized flooding to large scale hurricanes, earthquakes, or system contamination, among other examples.

When an incident occurs that requires response, you will need to activate the procedures and protocols described in your ERP. This can include implementing personnel emergency roles and responsibilities, activating your utility's Incident Command System (ICS) organization, recalling personnel on vacations, and notifying external agencies such as your local emergency management agency, police, fire department, and state regulatory agency.


As you respond to an incident, you should immediately begin documenting your decisions, actions, and expenditures. This step is important for justifying incident costs and potentially seeking reimbursement once the incident is resolved. Good incident documentation involves creating a paper trail for receipts, records, photographs, and personnel timesheets. Access both the Federal Emergency Management Agency (FEMA) [Public Assistance Program](#) and EPA's [Fed FUNDS](#) websites for guidance on documenting incident costs.

How to Use this Template

Use this template as a starting point in building an ERP. Since each wastewater utility has unique challenges in managing and operating its incident response, you may want to include additional sections, appendices, or references to external information tailored to your utility's needs (e.g., including Incident Specific Response Procedures with large wastewater dischargers for a pretreatment failure, an appendix containing safety procedures related to water quality sampling by boat). You may also use a completely different format, such as a state regulatory agency or wastewater association template. If you already have an ERP, use the template Table of Contents as a checklist to see if you are missing any items in your ERP. Before you begin, save the ERP template to your computer, delete the EPA cover page from the template and consider the following steps to help gather the key information to develop your ERP:



1. Conduct a risk assessment (RA): the findings identified in your RA will enhance the effectiveness of your ERP. For example, your RA may identify hurricanes as a significant risk for your utility and outline cost-effective countermeasures to lower your risk. Your ERP, grounded in the results of the RA, then describes the processes and procedures that can be implemented to mitigate hurricane impacts (e.g., flooding) to your utility. see EPA's [Vulnerability Self-Assessment Tool](#) for more information on conducting an assessment.
2. Identify regulatory requirements: states may have regulatory requirements for ERP content and may also provide templates. Check with your state primacy agency for further information.
3. Identify other plans: your ERP should "dovetail" with other emergency plans in your community (e.g., county emergency operations plan) as much as possible.
4. Coordinate with response partners: teaming with partners and stakeholders (e.g., local government, local community organizations, other utilities) allows all parties to understand the proper response processes and procedures used during a wastewater incident.
5. Plan for resources: the resources your utility owns or has access to (i.e., personnel, equipment, supplies, and facilities) will influence how you develop your ERP procedures. You will need to develop strategies to obtain needed resources that you do not own or that are not readily available in your community.



Since an ERP may contain sensitive information, make sure to store it in a safe and secure location. Consider storing one copy on-site and one off-site in case you are unable to access your offices or facilities during an incident. You may also wish to store an electronic copy on a shared drive or other digital platform easily accessible by your utility personnel. Similarly, up-to-date plans and schematics of your treatment plant and collection system (e.g., location of chemical rooms, lift stations), as well as up-to-date operations manuals could be kept in at least two secure locations, preferably one being with the final version of the ERP or referenced where to find them.

Your ERP should be viewed as a living and evolving document with established maintenance guidelines for routine and non-routine updates, the circumstances under which the updates will occur, and the personnel or departments responsible for the updates. For example, you should conduct an incident debrief or after-action conference immediately following any ERP activation to review and discuss what worked well and what areas of the ERP may need improvement. Assign someone the responsibility to make modifications or additions to the ERP based on your discussions.

Lastly, once your ERP is complete, consider training your utility personnel and response partners on its contents and their individual roles and responsibilities. Conducting periodic trainings for both senior and new personnel helps to ensure that your ERP procedures will be effectively implemented during an actual response. Tabletop exercises are an effective means to practice and test your response procedures – access EPA’s [Tabletop Exercise Tool](#) website to learn how.

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1 UTILITY INFORMATION

During an incident, you need to have system information about your wastewater utility readily available for your personnel, first responders, repair contractors/vendors, the media, and other response partner agencies.

1.1 Utility Overview

Provide basic information about your utility in the table in this section. The information required here should be readily available.

You may also choose to provide additional detailed information about your utility, such as collection system maps, plan drawings, site plans, lift station locations, and operations manuals. This information may serve as orientation materials for response partners and others who may not be familiar with your utility. You can use the checklist in this portion of the ERP template to ensure that applicable and relevant documents, as appropriate, are included or referenced as a part of your ERP.

1.2 Personnel Information

It is important to have a personnel roster available during an incident, so you can quickly contact your employees. Attach your staff roster or fill out the table provided in this section.

1.3 Utility Components

In the tables provided, list as appropriate all the components necessary to maintain effective operation of your utility. This includes information on your collection system, treatment plant(s), onsite and offsite treatment chemical storage, lift station(s), outfall(s) and other key facilities as appropriate. If you use an asset management system, you may simply generate a list of your primary components and insert that list into this section. See EPA's Asset Management [website](#) for more information.

1.4 Industry Chemical Handling and Storage Facilities

Industry surrounding your utility can also be impacted by incidents such as accidental releases, wildfires, hurricanes, floods, or earthquakes. It is important that you understand what chemicals may be released in your area during an incident and how they may impact your utility operations.


As you complete the tables in this section, you should consult your Local Emergency Planning Committee (LEPC), which will know the locations of Tier II chemical handling and storage facilities in your area. You may also refer to online planning tools, such as EPA's Drinking Water Mapping Application (DWMAPS) [website](#), to help you locate potential sources of contamination in your area.

1.5 Safety

Having easy access to safety materials and important safety information and procedures will help protect utility personnel during an incident. You can use the tables in this section of the ERP template to record that information, or, if your utility has a Health and Safety Plan, you can simply reference that in this section.

1.6 Response Resources

Having an accurate inventory of available resources (e.g., equipment, supplies) either maintained onsite or readily available offsite (e.g., neighboring wastewater system) allows utility responders to know what resources are immediately available during an incident. Resource typing defines and categorizes resources by capability and classifies resources by "kind" and "type". For example, a generator is a "kind" of resource, and a 50Kw generator is a "type" of generator.



Resource typing is performed to ensure that a uniform system exists when requesting or providing resources. Resources that you can inventory and type include both personnel (e.g., special skills, licenses) and equipment. You can learn more about resource typing by accessing the FEMA Resource Typing [website](#) or the AWWA Water Sector Resource Typing document.

Insert an existing inventory sheet or fill out the table provided in this section. Insert copies of any equipment manuals or instruction sheets, as applicable, at the back of your ERP.

1.7 Key Local Services

In the table provided note the closest locations of key logistical and medical services that you or mutual aid and assistance providers may need during an incident. These include hospitals, gas stations, and other facilities like drugstores or ATM machines. Include a map or maps if available.

2 RESILIENCE STRATEGIES

This section of your ERP should contain strategies and resources to improve the resilience of your system, including the physical security and cybersecurity of your system. Resilience strategies incorporate how you will assign roles and responsibilities, how you will work with response partners, and how you intend to communicate during an incident. Further information regarding both physical security and cybersecurity can be found in Section 3.1 below.

2.1 Emergency Response Roles

An effective ERP involves active participation of a variety of both utility and external response partner agency personnel, each having well-defined roles and responsibilities. Your ERP should identify the roles and responsibilities in a manner that works well for your utility and your response partner agencies. It is important to first establish an Emergency Response Lead (ER Lead) and Alternate ER Lead at your utility. The ER Lead could have overall responsibility for developing and updating the ERP and be actively involved in forming partnerships with external stakeholders. The roles and responsibilities outlined in your ERP should cover your utility response actions as well as what response actions are expected from local, state, and federal supporting agencies during an incident. Both your utility's ER Lead and the alternate may need to be accessible 24 hours a day, seven days a week.

At smaller utilities with limited staff, personnel may fill multiple emergency response roles out of necessity. For example, the ER Lead may not only be the main point of contact during an incident but may also serve as the Public Information Officer and Operations Section Chief as well.

In this section, use the table to describe the roles and responsibilities for key utility and external response partner personnel. Similarly, identify response partners outside of your utility (e.g., law enforcement, public health) and describe their roles and responsibilities.

At the local level, the use of memoranda of understanding, mutual aid and assistance agreements, and other agreements can be invaluable for wastewater utilities in time of need. These documents contain legal language that is mutually agreed upon by the parties to the agreements and generally define worker's compensation, indemnification, and other response related considerations. For mutual aid and assistance, utilities can participate in Water and Wastewater Agency Response Networks (WARNs), or other local water utility response networks. A WARN is a group of "utilities helping utilities" within a state to respond to and recover from emergencies by sharing resources with one another. Learn more by accessing EPA's [WARN](#) website.

2.2 Incident Command System (ICS) Roles

Your utility should consider integrating a standardized incident management structure, such as the Incident Command System, into your response procedures. ICS is used to organize both near-term and long-term field-level operations for a broad spectrum of emergencies from small to complex incidents, both natural and manmade. ICS is used by all levels of government - federal, state, local, and tribal - as well as by many private-sector and nongovernmental organizations. ICS is also applicable across disciplines (e.g., fire, police, public works), allowing your local, state, and federal response partners to more easily integrate into your utility response structure, or vice versa.

You can learn more about ICS at the FEMA [ICS Resource Center](#) website, which provides ready-to-use forms such as the ICS Form 207, Incident Organization Chart. This chart can be completed for your utility and inserted into your ERP.

2.3 Communication

Communication during an incident is critical to relay information to employees, government agencies, the public, the media, and others about potential risks to health, infrastructure, and the environment. This information should be presented in a timely and accurate manner to enhance understanding of an incident, build trust and credibility, encourage constructive dialogue, and provide guidance on appropriate protective actions following the incident. Good communication procedures outlined in your ERP will guide your utility personnel on when and how to communicate (e.g., who is responsible for notifying the utility emergency response team and outside agencies, and what information should be relayed), how to work with response partners and the media, how to compose messages, and how to deliver messages (e.g., website, television, social media). You should also consider contingency measures for loss of communications (e.g., a switch to 2-way radios, meet at a certain location).

2.3.1 Internal Communication

Internal communications should address what, when, and how a message will be provided to utility personnel who are directly and indirectly involved in an incident. Internal communications and notification lists should outline the personnel responsible for activating communications, the order in which notification occurs, and the members of the emergency response team (as defined in the ICS structure). In addition, your strategy should provide information on the specific communication method(s) that could be used (e.g., telephone, radio, e-mail, face-to-face). Use the table in this section to list all utility emergency response team members, their response role, title, and contact information.

2.3.2 External Response Partner Communication

Your external response partner notification list should ensure that all appropriate partners are notified. Procedures should also be established as to who should be notified, when they should be notified, and who is responsible to make the notifications from your utility. It is recommended that local response partners be engaged first, followed by county, state, and federal agencies as appropriate. Also, keep in mind any specific state regulatory notification requirements. In some instances, these agencies may require that they be notified within a specified time from when your utility first experiences or notices an incident that may significantly impact operations. Sending a utility representative to your local emergency operations center (EOC), if asked or coordinated for in advance, helps with external partner communication during a longer duration incident. The table in this section of the ERP template can be used to list all your utility's response partners as well as contact information.

After initially notifying your partners of an incident, the next step is regular sharing of incident information as it becomes available. Many localities use web-based information management systems (e.g., WebEOC®) that provide a single access point for the collection and dissemination of emergency or incident-related information. Group e-mails could also be used, or you could leverage an agency such as your local Emergency Management Agency (EMA) to help keep your partners informed.

2.3.3 Communication with Critical Customers

A list of critical customers should be maintained as a part of your ERP. Some of these customers could be given priority notification due to their reliance on wastewater services either for public health (e.g., hospitals, long-term care facilities, emergency shelters, sensitive populations), based on usage (e.g., large commercial, industrial, or government customers who may not be able to store wastewater onsite), or high wastewater volume customers (e.g., significant industrial users identified under Publicly Owned Treatment Works pretreatment programs). The table in this section of the ERP template can be used to list all your critical customers and their contact information. If this list is extensive you may wish to include it as an appendix.

2.3.4 Communication Equipment Inventory

You should inventory and track all your utility's communication equipment to help ensure maintenance is scheduled as appropriate and that equipment replacement can be planned. Service plans and contracts should also be tracked to make sure they are current. Use the table to inventory your communications equipment (e.g., mobile phones, two-way radios) if you did not already include it in Section 1.6 of the template.

2.4 Media Outreach and Risk Communication

List contact information in the table provided for all media outlets that your utility may coordinate with during notification efforts. For example, this may include newspapers, social media sites, television, and radio stations. Using a Public Information Officer as described in the Incident Command System will help to ensure consistent messaging.

2.5 Public Notification Templates

Insert your templates for public notifications in this portion of the ERP template, or reference where they may be found. Be sure that your templates are consistent with any requirements in your NPDES permit. Check your state regulations for public notification requirements regarding sanitary sewer overflows or combined sewer overflows. You may wish to consider developing a communications plan and drafting both press releases and discharge restriction notices (e.g., do not flush) in advance. EPA's Wastewater Response Protocol Toolbox [Module 5: Wastewater Utility Public Health and Environmental Impact Response Guide](#) contains guidance on implementing a public notification strategy.


3 EMERGENCY PLANS AND PROCEDURES

This section of your ERP should contain plans, procedures, and equipment that can be used in the event of a malevolent act or natural hazard that threatens your utility's ability to collect and treat wastewater. Two types of emergency response plans and procedures should be considered as part of your ERP: Core and Incident-specific. Both types are listed in this section.

3.1 Core Response Procedures

Core procedures are the "building blocks" for incident specific response procedures, since they apply across a broad variety of incidents (e.g., hurricane, earthquake, flood). List all your core procedures here.

Access - A significant challenge your utility may face after a major incident is gaining access to critical facilities and other locations to assess damage and implement repairs. Access to sites may be hampered by debris, road and bridge damage, downed power lines, snow and ice, and roadblocks established by law enforcement agencies for public protection. Use the table in this section to identify access related challenges in your area and identify ways to mitigate those challenges.



DHS's [Crisis Event Response and Recovery Access \(CERRA\) Framework](#) website informs local officials and emergency planners of key components and best practices to consider when planning for access and re-entry operations.

The CERRA Framework specifically identifies wastewater utility personnel as first responders that require access to wastewater utility assets during and after disasters. You may wish to find out if your jurisdiction is applying the principles and concepts of this framework.

Physical Security - Protecting utility facilities, equipment, and vital records is essential to restoring operations once an incident has occurred. Your ERP should identify measures aimed at securing and protecting your utility. Use the table in this section to describe physical security measures for your utility assets. You can learn more about physical security measures under the Detection Strategies section of the template.

Cybersecurity - Cyber-attacks on electronic information technology (IT) and operational technology (OT) are increasingly common. These attacks can result in the loss of critical communications with employees, customers, and process controls; the destruction of records and networks; and the theft of valuable utility and customer data. Impacts from cyber-attacks can have a severe adverse impact on water utility operations and entail high costs for response and recovery. Your utility should consider adopting cybersecurity best practices to reduce vulnerabilities to cyber-attacks and develop, implement, and drill response and recovery procedures for cyber incidents to minimize impacts in the event of a successful attack. Use the provided table to describe the processes and procedures your utility will use during a cyber incident. You can learn more about cybersecurity response by accessing EPA's website for a [Cybersecurity Incident Action Checklist](#) and by reviewing the National Institute of Standards and Technology's [Cybersecurity Framework](#).

Power Loss - Your utility should consider preparing for a loss of power and know what to do to respond and recover from such an incident. An extended power loss can have devastating impacts on your utility and the community you serve. Inoperable pumps at a wastewater utility can lead to sewage overflows that damage the environment, wastewater treatment technologies and threaten public health. Use the table in this section to describe your utility's resources and procedures for the loss of grid power. EPA's Power Resilience Guide [website](#) can help you to better prepare and respond to an unexpected power loss.

Emergency Alternate Wastewater Services - Your ERP should consider clearly defining how your utility, along with other external response partners such as emergency management, would supply alternate wastewater services to your community during both short-term (days) and long-term (weeks to months) outages. Alternate wastewater services may include interconnections with neighboring wastewater utilities or providing portable toilets. List your emergency alternate wastewater services in the table provided. You can learn more about emergency alternate wastewater services by accessing EPA's [Wastewater Response Protocol Toolbox](#) guidance.

Sampling and Analysis - Wastewater contamination emergencies could result in a surge of water sampling and analysis that can quickly overwhelm resources or require laboratory expertise unavailable to most utilities. To prepare internally for incidents, your utility can complete the tables in this section and include pre-identified sampling sites, procedures for sample collection of both known and unknown contaminants, chain of custody, sample preservation, sample transport, as well as a list and locations of contract analytical laboratories. You could also consider consulting with your state clean water regulatory agency on the issue of water sampling and analysis. You can learn more about resources to help develop sampling procedures and coordinate laboratory support by accessing EPA's Water Laboratory Alliance (WLA) [website](#).

Family and Utility Personnel Well Being - Your personnel are more likely to report for duty or stay on the job during an incident if they know they and their families are safe and cared for. Use the table provided to identify actions that could be taken before, during, and after an incident that are unique to each hazard (e.g., hurricanes, floods, earthquakes). Actions may include alternate work locations, on-site emergency supplies such as cots, and ensuring that staff have developed

family disaster plans. The [ready.gov](https://www.ready.gov) website can assist with preparing individual family disaster plans. Local emergency management agencies can also help identify the hazards in your area and outline the local plans and recommendations for each hazard.

Your utility should also consider how it wants to support personnel who may be working extended shifts during an incident. The [All-Hazard Consequence Management Planning for the Water Sector](#) document provides a list of actions you could take to support personnel.

3.2 Incident-Specific Response Procedures

Incident-Specific Response Procedures (ISRP) are specialized procedures tailored to a particular type of incident. These incidents typically align with those vulnerabilities identified in your RA. ISRPs provide a quick approach for responding to a specific incident and complement actions already initiated under your ERP. You may only need one or two pages to cover specific response information since you have already addressed basic emergency response steps under your core response procedures. An ISRP should be an accessible (i.e., “rip and run”) document that can be detached and taken to the field.

Incidents include but are not limited to the following:

- Pandemic
- Cybersecurity
- Earthquake
- Extreme Cold and Winter Storms
- Extreme Heat
- Flooding
- Hurricane
- Tornado
- Tsunami
- Volcanic Activity
- Wildfire
- Power Outage

You can insert your utility’s existing ISRPs into this section of the ERP template. EPA also provides several [incident action checklists](#) (IACs) that you can use to help develop your own ISRPs. Or you can use EPA’s IACs as your utility’s ISRPs by checking the appropriate activities. These customized IACs can then be inserted into your ERP. EPA also developed the [Wastewater Response Protocol Toolbox](#) that can help you address preparedness and response needs for threats and contamination incidents (e.g., chemical, biological, radiological) in wastewater systems.

4 MITIGATION ACTIONS

This section of your ERP should include actions, procedures, and equipment which can obviate or significantly lessen the impact of a malevolent act or natural hazard on the public health and wastewater services provided to your community and individuals, including the development of alternative wastewater services and construction of flood protection barriers. These mitigation actions, procedures, and equipment help your utility to better withstand and rapidly recover from hazardous incidents (e.g., flooding, earthquake), thereby increasing overall resilience. It is more cost-effective to mitigate the risks from natural disasters than it is to repair damage after the disaster. Examples of mitigation projects include:

- Elevation of electrical panels at a lift station to prevent flooding damage
- Replacement of piping with flexible joints to prevent earthquake damage
- Reinforcement of water towers to prevent tornado damage

Mitigation measures require financial investment by the utility; however, mitigation could prevent more costly future damage and improve the reliability of service during a disaster. Learn more about hazard mitigation, including coordinating with your community’s local mitigation planners, identifying potential disaster-specific mitigation projects, and funding proposed mitigation projects by accessing the [Hazard Mitigation Guide for Natural Disasters: A Starter Guide for Water and Wastewater Utilities](#) on EPA’s website.

4.1 Storage and Treatment Mitigation Actions

Information on interconnected utilities helps you to maintain awareness of how these utilities may mitigate impacts during incidents. Interconnections allow two (or more) utilities to each have backup wastewater services by relying on each other. For example, your utility may have an interconnect and piping in place so that you can divert wastewater to another utility for storage or treatment. Or maybe you can establish a temporary connection with a neighboring utility during an incident. Other storage or treatment mitigation options could include the use of portable toilets, home waste treatment devices, packaged systems, contracts with wastewater hauling companies, or contracts with more than one treatment chemical supplier. You can list these kinds of mitigating actions in the table provided in the template.

4.2 Other Mitigation Actions

Mitigation actions should be based on the countermeasures identified from your utility's RA and implemented before an incident occurs. For example, system facilities or controls can be raised, and berms constructed ahead of time to protect against flood damage. List your utility's other mitigation actions in the table provided here; refer to the appendix for additional practical mitigation options for various threats. To learn more about specific mitigation options for utilities, see the following online resources from EPA:

[Flood Resilience Guide](#) - Helps utilities know the local flooding threat and identifies practical mitigation options to protect critical assets.

[Power Resilience Guide for Water and Wastewater Utilities](#) - Helps utilities identify how to increase their resilience to power outages.

[Earthquake Resilience Guide for Water and Wastewater Utilities](#) – Helps utilities to be more resilient to earthquakes. It contains best practices from utilities that have used mitigation measures to address the earthquake threat.

[Resilient Strategies Guide for Water Utilities](#) - Helps utilities understand how extreme weather events can impact utility operations and missions and provides examples of different actions utilities can take to prepare for potential impacts.

5 DETECTION STRATEGIES

This section of your ERP should contain strategies that can aid in the detection of malevolent acts or natural hazards that threaten the security or resilience of your utility. These detection strategies can be almost no-cost (e.g., instituting a “See Something, Say Something” campaign at your utility) or require more resources (e.g., installing motion sensors and video cameras to monitor for facility break-ins or tampering) to implement. Effective response to an emergency requires timely detection, which allows your utility to implement its ERP as soon as possible.

The most appropriate method of detecting a possible incident depends on the type of threat. Where possible, multiple detection methods should be used. This increases your utility's ability to receive timely warning of an imminent threat or incident. Examples of effective strategies for detecting common threats are listed below, and you can list your utility's strategies in the table provided in this section.

5.1 Unauthorized Entry into Utility Facilities

Properly installed and maintained intrusion detection systems provide almost instantaneous notification of break-ins and other unauthorized access into your utility facilities, but notifications from local law enforcement officers and community watch groups are also effective.

5.2 Wastewater Contamination

Notification of wastewater contamination may come from many different agencies and organizations including your local drinking water utility, a manufacturing facility, 911, LEPC, or local watershed groups. Therefore, it is important to build working relationships with these entities and exchange emergency contact information.

Potential contamination in your influent can be detected through systematic tracking of complaints (e.g., illegal dumping complaints and incidents on a map to detect patterns), physical security monitoring at access points to the collection system (e.g., increased police patrols, security cameras), grab sample analysis (e.g., in response to a specific incident or complaint), and online influent water quality monitoring (e.g., water quality probes connected to the SCADA system for auto-generated alerts). Proactive wastewater monitoring throughout a utility collection system and treatment process to establish baseline quality and to assess utility treatment efficacy to address certain contaminants is frequently conducted under a utility's pretreatment program.

5.3 Cyber Intrusion

Learning about and reporting cyber threats helps all utilities to be better prepared to detect and respond to this kind of malevolent act. Rapidly adopting security patches and implementing corrections to system vulnerabilities are key actions all utilities could consider taking to reduce the risk of a cyber-attack. For example, signing up for alerts on the Department of Homeland Security's [cyber alerts](#) website provides timely information about current security issues, vulnerabilities, and exploits.

5.4 Hazardous Chemical Release

Routine inspection of your hazardous chemical storage facilities will aid in detecting problems that could lead to an unexpected chemical release. Identified problems can be fixed to help prevent emergencies. Air monitors, such as for chlorine gas, can alert you to any leaks in a timely fashion.

5.5 Natural Hazards

Natural hazards such as extreme weather can cause severe damage to your utility. Real-time tools such as EPA's online [Water Utility Response On-The-Go Mobile Application](#) can help you track severe weather and access other information for an efficient response.

5.6 Power Outages

Your utility can detect impending power outages more effectively by signing up to receive notifications from your power provider for any planned maintenance activities or brown outs.

APPENDIX: PRACTICAL MITIGATION OPTIONS FOR UTILITIES

After assessing risks from various threats (e.g., natural disasters, malevolent acts) and developing an emergency response plan as required by AWIA, utilities should pursue countermeasures or mitigation actions to reduce risk. Mitigation actions such as flood barriers, seismic pipe, and intrusion detection, reduce risk by reducing adverse impacts from the threat and enabling your utility to restore services more rapidly. As a supplement to the [Emergency Response Planning Instructions and Template](#), this document identifies some practical mitigation options for various threats. To help you find ways to fund these mitigation options, see EPA's [Federal Funding for Utilities –Water/Wastewater– in National Disasters \(Fed FUNDS\)](#).

All-Threats

- Join a mutual aid network (Water/Wastewater Agency Response Network)
- Coordinate with key partners and critical customers (e.g., hospitals)
- Train and exercise your emergency response plan

Power Outage

- Contact your power utility and local emergency management agency to prioritize restoration of key facilities
- Define power needs for key assets (lift station) to ensure proper backup
- Install connections to rapidly hook up generators to your key systems
- Purchase, rent or borrow a backup power generator (e.g., mutual aid)
- Secure generators against wind, flooding (i.e., elevate) and seismic activity
- Maintain fuel on-site and/or have multiple ways to obtain fuel (vendors)
- For additional mitigation options, see EPA's [Power Resilience Guide](#)

Flooding

- Implement a program to keep all drains and culverts clear of debris
- Use sandbags to make a quick and low-cost barrier to minor flooding
- Install flap valves on low-lying overflow pipes to protect finished water
- Secure or elevate chemical/air tanks to prevent floating and content release
- Elevate, relocate or floodproof instrumentation, electrical controls, pumps,
- Install gates and backflow valves to prevent flooding of lift station and keep list of pump vendors
- Move assets (e.g., vehicles) to higher ground and develop alternative ways to access your facilities
- For additional mitigation options by asset, see EPA's [Flood Resilience Guide](#)

Earthquake

- Retrofit occupied utility buildings to prevent collapse
- Seismically retrofit water towers to protect public from catastrophic failure
- Reinforce “backbone” by retrofitting pipelines to critical facilities (hospitals)
- Replace inflexible joints with flexible or ball joints on storage tanks and pumps
- Install buttress walls on water basins and automatic shutoff valves on tanks
- Design upper casing on wells to resist loads or locate outside of seismic zone
- For more mitigation options by asset, see EPA's [Earthquake Resilience Guide](#)

Drought

- Implement a leak detection and repair program to reduce lost water
- Consider interconnections with other water systems and water reuse
- Consider adding raw water storage and aquifer recharge
- Develop conservation program with public outreach and join [WaterSense](#)
- Coordinate water usage with neighboring irrigation districts and communities
- For more mitigation options, see EPA's [Drought Response and Recovery Guide](#)

Wildfire

- Remove debris, dead trees, and other fire-hazard materials
- Institute high fire danger procedures such as smoking bans and fire bans
- Install fire-resilient building materials
- Modify treatment process for sediment in water
- Install backflow valves on service connections, fireproof concrete meter boxes, and use brass meters to prevent contamination of distribution pipes from volatile organic compounds
- For more mitigation options, see EPA's [Incident Action Checklist for Wildfires](#)

Tornado

- Reinforce water tower legs and welds
- Remove sources of potential flying debris and bolt down chemical tanks
- Design new facilities, control rooms and offices to withstand high winds
- Secure and anchor any trailers or temporary structures and designate them as non-habitable during severe weather
- For more mitigation options, see EPA's [Incident Action Checklist for Tornadoes](#)

Future Extreme Weather Events and Climate Change Impacts

- For adaptation strategies for future extreme weather (e.g., intense rain events) and ecological changes, see EPA's [Resilient Strategies Guide](#)
- View [case studies](#) for adaptation and climate change mitigation

Physical Intrusion and Cyber Attack

- Install access control, guards, perimeter fencing, harden doors, site lighting, intrusion sensors, alarms, security camera, and hardened ladder access
- Train and drill employees on cybersecurity, including cyber incident response
- Employ screening program and cyber security training programs
- Segregate process control networks and apply firewalls
- Use strong passwords, implement patches, and monitor network intrusions
- For more mitigation options, see EPA's [Malevolent Acts for Community Water Systems](#)

Contamination

- Train operators and maintenance/repair staff to prevent contamination
- Install backflow prevention and on-line water quality monitoring devices
- Develop a source water monitoring program
- For more mitigation options, see EPA's [Malevolent Acts for Community Water Systems](#)