

# Template Emergency Action Plan

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Levee Name

Levee Location

EAP Coordinator:

MM/DD/YY

# Instructions for Use

*An Emergency Action Plan (EAP) is a formal document that specifies actions to be taken at a levee to minimize loss of life and damage to property. An effective EAP will help to ensure the proper materials are readily available, the appropriate people are engaged, and processes are in place to respond to an incident at a levee.*

*The level of detail in the EAP should be commensurate with the potential impact of a levee breach or overtopping. A levee with no population behind it may not require an extensive plan while levees with a large population behind them require a robust planning effort that addresses all areas of incident response, especially when there are identified performance concerns that could result in breach prior to overtopping. Levees with greater potential for significant consequences tend to involve more entities that must coordinate to effectively respond to an incident. Every EAP should be tailored to the unique characteristics of the levee, taking into consideration the impacted communities.*

*The levee EAP should be developed and implemented in close coordination with all incident response partners. Typically, federal, state, tribal, and local emergency management authorities will have plans to address local emergencies from their perspective. The levee EAP must work in coordination with these larger plans. It may be appropriate to nest a levee EAP within a county or city EAP.*

## Understanding the Format

*Within the template, three text formats are used to denote different types of information:*

- *Blue italic text is used for instructions. These paragraphs are labeled as “Instructions” and describe information that should be included in each section and things to consider as the information is developed. This instructional language may be deleted and replaced with the described information.*
- *Black text labeled “example Language” is text that may work ‘as-is’ for many levees. Example language should be edited or deleted, as needed.*
- *Red text is used to indicate levee information that must be filled in to tailor the example language for a specific levee.*

## LEVEE INFORMATION IN THE NATIONAL LEVEE DATABASE

The National Levee Database is the national repository for levee data. Each levee has its own public webpage, including a description of the levee. This provides levee owner/operators an opportunity to share current information with the communities behind their levee. The NLD can also store information about levee features.

To provide updated data:

- Contact the local U.S. Army Corps of Engineers office.
- Email [nld@usace.army.mil](mailto:nld@usace.army.mil).
- Call 1-877-LEVEEUS.
- Use the data change request button on the NLD homepage (<https://nld.sec.usace.army.mil>).

*The levee EAP should be revisited annually to ensure information (e.g., roles and contact information) is current. If an update is needed, all involved organizations should be given an opportunity to review the EAP and be provided access to the most current version. In addition, the EAP should be updated after EAP exercises and floods to incorporate lessons learned.*

*This template includes the following sections:*

**Section 1 – Emergency Action Plan Overview:** *This section provides information about the levee and the area behind the levee to inform response actions.*

**Section 2 – Incident Identification and Response Process:** *This section describes the levee owner/operator's process to identify, classify, and respond to incidents on the levee. The intent of this section is to provide quick access to the information required to execute the incident identification and response process at the levee, including related roles and responsibilities.*

**Section 3 – Roles and Responsibilities:** *While Section 2 focuses on roles and responsibilities directly related to the incident identification and response process at the levee, Section 3 provides broader information covering the roles of all major response partners and their responsibilities related to planning, preparation, and response.*

**Section 4 – Preparedness:** *This section allows for planning and developing solutions for a variety of miscellaneous issues that could arise during a flood, rather than waiting until an emergency is occurring.*

**<Levee Name>**

# EMERGENCY ACTION PLAN

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- Appendix D – Floodfight Monitoring Points
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- Appendix G – Primary Evacuation Routes
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- Appendix I – Emergency Action Plan Updates
- Appendix J – Emergency Action Plan Exercises

# 1 EAP Overview

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## 1.1 Purpose

**INSTRUCTIONS:** This section is intended to quickly describe the purpose of this Emergency Action Plan (EAP). At a minimum, provide the name of the levee, the flood source(s), and the name of the levee owner(s)/operator(s) and any other entities responsible for operating the levee during a flood. Describe the purpose of this plan and how it relates to the levee operations and maintenance (O&M) manual or plan. Typically, routine flood operations are included in the O&M manual.

### EXAMPLE LANGUAGE:

This Emergency Action Plan (EAP) is specifically written for the <Levee Name> to be used during a flood due to <flood source(s)>. This plan is a guideline for the <Levee Owner/Operator or Other Responsible Organization Name>, to effectively identify and respond to incidents. Routine flood operation and maintenance (O&M) activities required during a flood, such as closing gates and operating closure structures and pump stations, are covered in the O&M manual, <Title of O&M Manual>. The O&M manual can be accessed <describe actual or virtual location and how the manual can be accessed>. This EAP is a living document and will be revisited annually to ensure it remains current.

## 1.2 Inundation Maps

**INSTRUCTIONS:** Inundation maps show what could be flooded should the levee or one of its components fail or overtop. Inundation maps are used to inform the timing and extent of evacuations should they be required. This section describes the inundation maps for the levee, which should be included in Appendix A of this EAP. This section should state the source of the maps and provide some information about the scenarios and assumptions used to create them. Some sources of inundation mapping include:

1. Inundation modeling with levee breach analysis using hydraulic software, such as HEC-RAS (<https://www.hec.usace.army.mil/software/hec-ras/>).
2. A levee-specific risk assessment that can consider different breach locations and potential consequences.
3. The National Levee Database (NLD) (<https://nld.sec.usace.army.mil/>) displays a shaded area behind all levees called the leveed area. The leveed area shown in the NLD is a conservative estimate of the maximum extent behind the levee that could be potentially inundated if the levee was to breach or be overtopped at any location along the levee.
4. The National Inventory of Dams (NID) (<https://nid.sec.usace.army.mil/>) displays inundation maps for certain dams that can be used to identify if a levee is within a dam's inundation area.

EXAMPLE LANGUAGE:

The inundation maps in Appendix A depict the area that is most likely to be impacted by a levee breach or overtopping. These maps were compiled by <creator of the inundation maps> using the best information available; however, preparation of these maps required many assumptions. The limits of flooding shown should only be used as a guideline for emergency planning and response actions. Actual areas inundated will depend on specific flooding and breach conditions and may differ from the areas shown on the maps.

**INSTRUCTIONS:** Option 1. Use the paragraph below for inundation modeling conducted using hydraulic software and delete options 2 and 3.

EXAMPLE LANGUAGE:

The inundation maps were developed using <name of software> for <the number of breach and overtopping locations for which the inundation maps were developed>. The breach prior to overtopping locations were selected based on <describe reasons for selecting the breach prior to overtopping locations – for example, areas of known deficiencies, location resulting in highest consequences, representative location, other>. The overtopping scenario is based on the elevation of the location where a flood is most likely to first overtop the levee and is identified by comparing the top of levee profile with water surface profiles of <flood source>.

**INSTRUCTIONS:** Option 2. Use the paragraph below for maps from a risk assessment and delete options 1 and 3.

EXAMPLE LANGUAGE:

The inundation maps were developed using model results from the recent <Screening/Semi-Quantitative/Quantitative> Risk Assessment. The maps show inundation areas for <describe the number of breach locations for which the inundation maps were developed>. These locations were selected based on <describe reasons for selecting the breach locations – for example, areas of known deficiencies, representative example>. The overtopping scenario is based on the elevation of the location where a flood is most likely to first overtop the levee and is identified by comparing the top of levee profile with water surface profiles of <flood source>.

**INSTRUCTIONS:** Option 3. Use the paragraph below for maps from the National Levee Database and delete options 1 and 2.

EXAMPLE LANGUAGE:

The inundation maps were obtained from the National Levee Database (NLD). The NLD maps are simple maps showing the maximum extent of inundation that could occur due to a levee breach, often referred to as the leveed area. The maps were developed assuming hydraulic loading to the top of the levee and inundation of the leveed area to the hydraulic loading

elevation at the time of breach. These maps are a conservative estimate of inundation extent that do not include details like depth grids.

## 1.3 Levee Location

**INSTRUCTIONS:** This section describes the location of the levee relative to nearby communities, towns, or cities and the county(ies) and the state(s) in which the levee is located. The location relative to flood source(s) should also be described, by providing information such as the distance to the flood source, the bank of the river it is on, river miles, or other location identifiers. It is also important to identify if the levee is upstream or downstream of a dam or other levees. If so, this will require coordination with the dam owner, other levee owner/operators, and the state to plan how response would be coordinated in the event the dam or other levees are part of a larger flood emergency. Understanding how the levee relates to communities and flood sources can inform what actions to take and the urgency of those actions.

Include a location map of the levee to show its location in the context of the surrounding community(ies), other flood risk management projects, and the flood source(s) in Appendix B.

### EXAMPLE LANGUAGE:

The <Levee Name> is located on the <east/west/north/south bank of watercourse or body of water> within <City, County, State> < between river miles # and # or near x community>. A location map of the levee is included in Appendix B that includes the levee, surrounding communities, the flood source, and access points for the levee.

## 1.4 Access to the Levee

**INSTRUCTIONS:** The purpose of this section is to ensure responders know how to access the levee and are prepared to deal with potential issues such as locked gates and flooded roadways. This section should include:

- A list of levee access points with directions to each.
- Issues or special conditions associated with the access points or with access to the levee in general. For example:
  - Locked gates, including who to contact or where to get keys.
  - Animals grazing on the levee.
  - Roadway flooding.
  - Adjacent businesses that will be operating during floods, including 24-hour contact information for the business if needed for access.
  - Coordination with landowners to cross or access adjacent private property.
  - Other situations that may require unique access considerations.

Examples of access information that might be included are in Table 1-1 A map of access points and areas of the levee with unique access considerations can be included on the map in Appendix B, or a separate map can be provided.

EXAMPLE LANGUAGE:

The primary access point(s) for the levee are listed in Table 1-1. *<If more detail is needed to explain any of the table entries, provide that information here.>* Access points are included on the map in Appendix B.

**Table 1-1. Levee Access**

Access Point	Security Measure	Lock Details	Contact	Contact info	Access Issues?
Main Street	Locked manual swing gate	Key in Rm 101 of Water Plant	Bill Smith – City Engineer	555-555-5555	Gate provides security for Water Treatment Plant
North of Hwy 71	Locked manual swing gate	Combination 54-89-52	John Jones	444-444-4444	
South of Hwy 71	Cattle guard	NA	John Jones	444-444-4444	Livestock between Hwy 71 and Rt. 52
Rural Route 52	Cattle guard	NA	Sarah Green	333-333-3333	Rt. 52 frequently flooded by rainfall

## 1.5 Description of Levee

**INSTRUCTIONS:** Generally, describe the levee and the features it includes. This section should be as detailed as necessary to be useful. Examples of feature information that might be included are in Table 1-2. This section can also provide a description of the leveed area including land use, major communities, and the number of people and value of property behind the levee.

### EXAMPLE LANGUAGE:

The <Levee Name> was originally constructed <dates or timeframes> in response to <event or circumstance that motivated levee construction>. The levee is <#> miles long and consists of <#> miles of earthen embankment, <#> miles of floodwalls, and additional features as listed in Table 1-2. Performance concerns that have occurred during past floods are discussed in Section 2.1.2.2.1 of this EAP.

<Levee Owner/Operator> operates and maintains the levee, including <high level discussion of specific responsibilities during a flood>.

**Table 1-2. Levee Features**

Levee Features	Length/Number	Additional Information
Embankment length	# miles/feet	Waterside and landside slopes (1V:xH)
T-wall floodwall length	# miles/feet	Height
I-wall floodwall length	# miles/feet	Height Located on embankment?
Gravity pipes (gated)	#	Size/type of gate
Pressure discharge pipes	#	Size
Closures	#	Size/type
Pump stations	#	Number of pumps/capacities
Seepage relief wells	#	Material/diameter
Seepage berms	# miles/feet	Width/drainage layer?
Cutoff walls	# miles/feet	Depth
Toe drains	# miles/feet	Embankment or floodwall?

The levee reduces flood risk to the communities of <community names> from <riverine/hurricane/coastal> flooding from the <flood sources>. Within the <#> acre leveed area is <agricultural/industrial/commercial/residential/recreational development>, including <noteworthy developments>. Critical infrastructure within the leveed area includes <police, fire, hospitals, schools, other>. There are <#> people living and/or working within the leveed area. Critical infrastructure within the leveed area includes <list hospitals, schools, major highways, and other critical infrastructure within the leveed area>.

## 2 Incident Identification and Response Process

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**INSTRUCTIONS:** This introductory section will serve as a high-level ‘how to’ for the levee owner/operator’s incident identification and response process. The intent is to provide a quick overview of the process by listing the major steps, identifying the individuals that are responsible for each step, and pointing to more detailed information in subsections of Section 2. If there are multiple levee segments that make up the levee, more than one owner/operator may have a role in responding to levee incidents. This introductory section should:

- Provide a list of the levee owner(s)/operator(s) that are responsible for operating the levee during floods, including identifying and responding to incidents on the levee. (This will likely be the same as the list of those responsible for levee operations and maintenance noted in Section 1.) If more than one levee owner/operator is responsible, a table may be useful to list each owner/operator and describe their responsibilities.
- Complete/edit the flowchart in Figure 2-1 to provide an overview of the levee owner/operator’s incident identification and response process, including responsible personnel with primary contact information. The steps in Figure 2-1 correspond to sections in this EAP template. Both the EAP template and Figure 2-1 can be changed, as needed, to reflect the incident identification and response process for a specific levee.
- Develop a flowchart(s) to guide communication with partners regarding conditions at the levee. It may be beneficial to create more than one flowchart to address emergency vs non-emergency communications. An example flowchart for communication with partners is included in Figure 2-2. This example should be replaced with a notification flowchart developed for this levee in coordination with all partners that have a role in flood warnings and evacuations.
- Provide a list of individuals / entities responsible for making decisions about and executing flood warnings and evacuation notices. Typically, the levee owner/operator provides up to date information on the condition of the levee to local emergency management agencies and local municipalities throughout the flood. Municipalities, local jurisdictions, and emergency management agencies are typically responsible for the issuance of public warnings and evacuations within their jurisdictions. The National Weather Service is typically responsible for the issuance of watches, warnings, and other alerts for flood emergencies based in part on information provided by the levee owner/operator, emergency management agencies, or local jurisdictions. It is important to coordinate with these entities when defining communication roles and responsibilities for a levee.
- Include a more detailed contact list with names and contact information. This should be provided in Appendix C and include the following, at a minimum:

### DEFINITIONS

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An **incident** is an unexpected occurrence that requires some level of response to ensure or restore levee integrity or functionality.

An **emergency** is any incident, whether natural, technological, or human-caused, that has escalated to the point where life and/or property is at risk.

- *Individuals responsible for implementing and overseeing the levee owner/operator's incident identification and response process.*
- *Incident response partners (emergency management agencies, municipalities and jurisdictions, National Weather Service, police and fire departments, other).*
- *Floodfight resource providers.*

*The Federal Emergency Management Agency's (FEMA) Incident Command System is a resource for developing a response process for a levee. It is a standardized, scalable, all-hazards incident management approach that provides methods for team organization and in-the-moment response planning.*

#### EXAMPLE LANGUAGE:

**<Levee Owner(s)/Operator(s)>** operate the **<Levee Name>** during floods. This includes both routine O&M of levee features and incident identification and response. Procedures for routine operation of levee features immediately prior to and during a flood are included in **<O&M manual title>**.

The incident identification and response process is listed below. A process flowchart is included as Figure 2-1.

- Monitor flood source and conduct flood inspections (Section 2.1).
- Determine incident classification (Section 2.2).
- Communicate with partners as shown in Figure 2-2 (Section 2.3).
- Determine and implement floodfight actions (Section 2.4).
- Fulfill responsibilities associated with evacuations (Section 2.5).

A flowchart showing the minimum communication required between incident response partners during a levee incident and the order in which notifications will occur is included in **<Figure 2-2>**. There **<is/are> <#>** notification flowchart(s) for the **<Levee Name>**: the **<notification chart for non-emergency incidents (non-breach and high flow incidents)/the notification flowchart for levee emergencies (potential and imminent breach incidents)/other communication flowchart>**.

The following is a summary of responsibilities associated with making decisions about and executing flood warnings and evacuation notices. A more complete discussion of the responsibilities held by the entities below is included in Section 3.

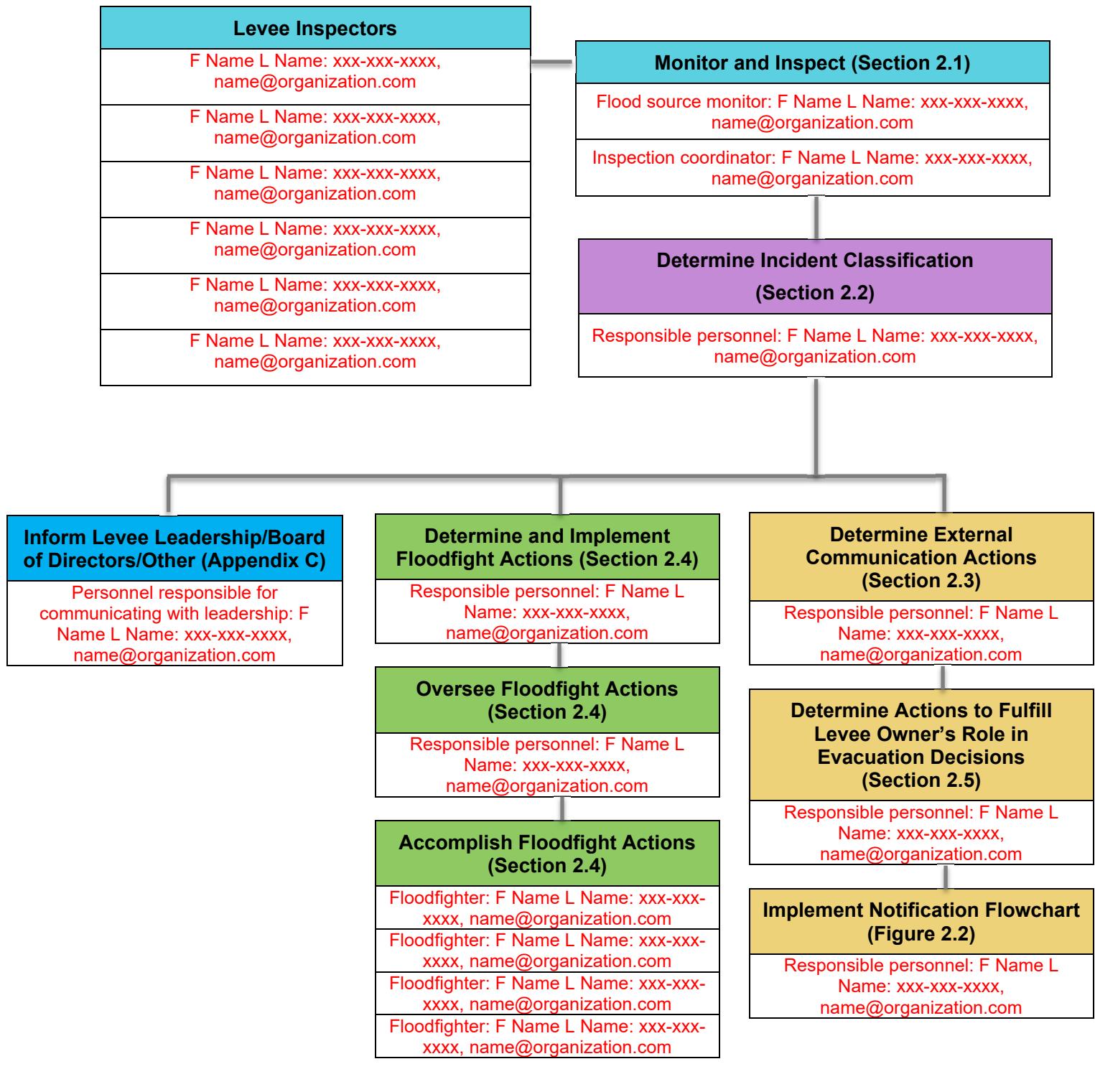
- **<Levee Owner/Operator Representative Position Title>**: Makes the final decisions on communications to ensure life safety, including **<providing levee information/other>** to **<local emergency management agencies>** and **<local municipalities/jurisdictions>**.
- **<Levee Owner/Operator Representative Position Title>**: Determines appropriate actions to fulfill the levee owner/operator role in evacuation decisions.
  - *(This bullet can be combined with bullet above if the same person is responsible.)*

- **<Levee Owner/Operator Representative Position Title>**: Executes communications, including communication related to evacuations, with **<local emergency management agencies>** and **<local municipalities/jurisdictions>**.
  - *(This bullet can be combined with bullet above if the same person is responsible.)*
- **<Emergency Management Agency>**: Responsible for **<making evacuation decisions, the issuance of public warnings, and calling for evacuations>** within their respective jurisdictions.
- **<Local Municipality/Jurisdiction>**: Responsible for **<making evacuation decisions, the issuance of public warnings, and calling for evacuations>** within their jurisdiction.
- **National Weather Service**: The National Weather Service is responsible for the issuance of watches, warnings, and other alerts of a potential or pending flood emergency based on information and recommendations from **<levee owner/operator>** and/or **<leveed area EMA>**.

More detailed contact information is provided in Appendix C for levee owner/operator personnel, external partners, and floodfight resource providers.

**Figure 2-1. Levee Owner/Operator Incident Identification and Response Process**

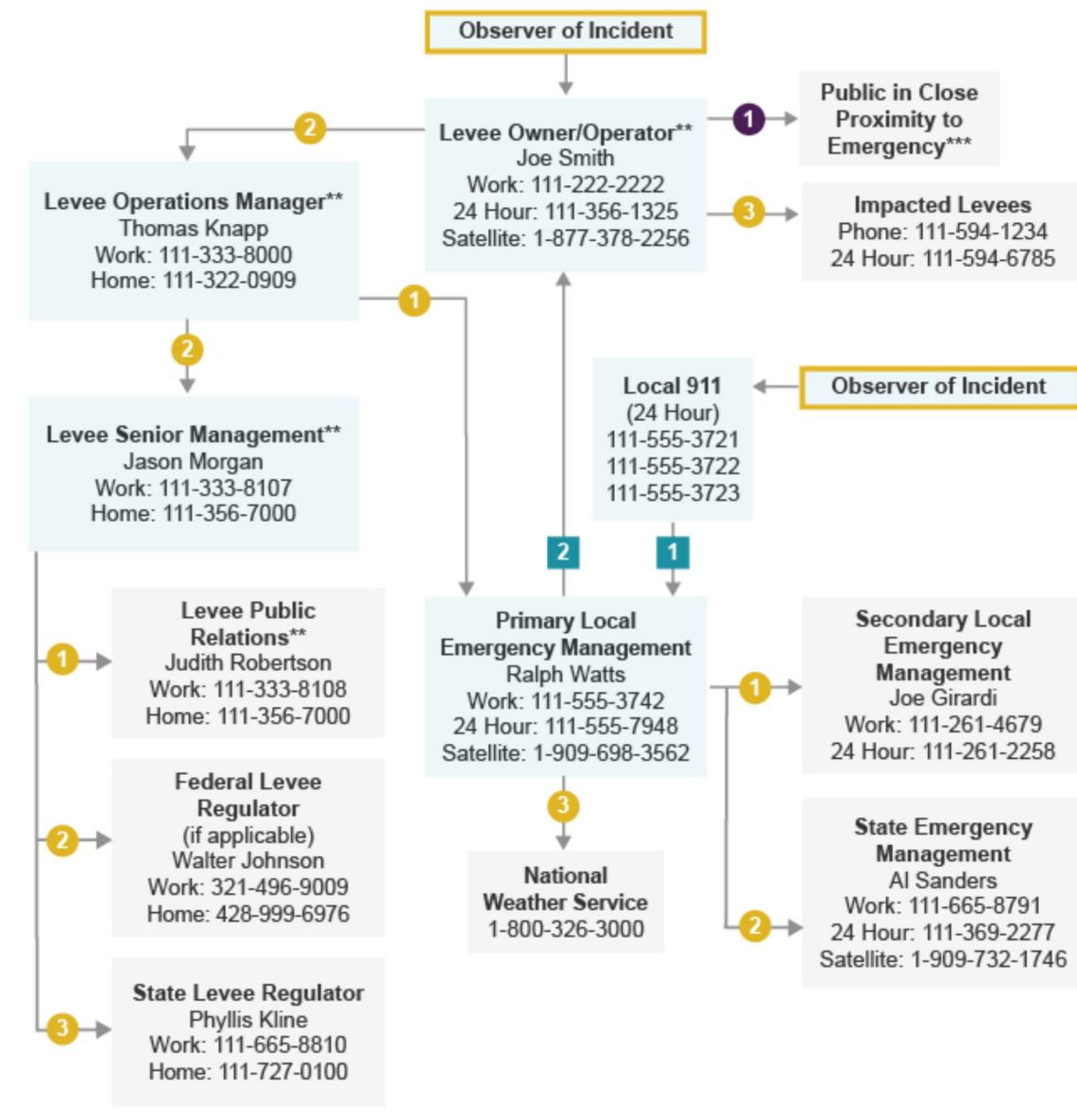
**INSTRUCTIONS:** Replace the red text with personnel and contact information for this levee.



**Figure 2-2. Example Notification Flowchart**

**INSTRUCTIONS:** Replace this example notification flowchart with one or more flowchart(s) that reflect the notification process for this levee.

## Example Notification Flowchart



# = call sequence

\* Use this chart in coordination with Notification Contract Table for additional contact information

\*\* Levee personnel should refer to emergency action plan for sample warning messages

\*\*\* This notification by the levee owner/operator should only occur during an emergency which could have immediate impacts to people and property, where expeditious notification to those in close proximity to the emergency is critical and cannot be accomplished through a typical notification process

## 2.1 Monitor and Inspect

### 2.1.1 Flood Source Data

**INSTRUCTIONS:** Flood source monitoring is performed during floods to allow for early identification of conditions that could cause performance concerns or overtopping of the levee. Flood source monitoring before floods (during normal operations) is typically described in the O&M manual.

This section should include a description of the flood source information to be monitored. Typically, this will be a gage on the flood source, a predicted or observed rainfall, or hurricane/storm predictions. If the data source used is a prediction or forecast, the data considered during development should be described (e.g., the forecast includes predicted 24-hour rainfall).

EXAMPLE LANGUAGE:

<Name of data source> will be monitored to allow for early identification of flood source conditions that could cause a levee incident.

**INSTRUCTIONS:** Option 1. Use the paragraph below if including information from a river gage.

EXAMPLE LANGUAGE:

The <Gage Name> gage is located at <River Mile or other location information>. Typically, river forecasts at this gage are provided <when?> and take into account past precipitation and predicted precipitation amounts approximately <#> hours into the future from forecast issuance time.

<Provide link to gage data>

**INSTRUCTIONS:** Option 2. Use the paragraph below if including information from hurricane or rainfall forecasts.

EXAMPLE LANGUAGE:

The National Weather Service provides <hurricane/storm/rainfall> forecasts which are updated <frequency>. OR The National Weather Service provides actual rainfall accumulations for the <geographic area> which are updated <frequency>.

<Provide link to forecast/data>

### 2.1.1.1 Monitoring Flood Source Data During Floods

**INSTRUCTIONS:** This section should describe flood source monitoring to inform actions during a flood. At a minimum, the description of flood source monitoring should include:

- The frequency at which flood source data will be monitored during floods. This can be developed by considering how often flood source data updates are available, how quickly flood source conditions can change, and how much time is needed to respond to flood source changes (floodfight actions or evacuations). Typically, there are at least two monitoring frequencies, one for normal operations (typically discussed in the O&M manual) and one for during floods. It may be necessary to have additional frequencies for various levee loadings/flood source conditions, especially if flood source conditions can change quickly.
- Information to tie the flood source data to levee performance and overtopping conditions such as:
  - The overtopping frequency for the levee and the most likely overtopping location. If possible, tie the overtopping frequency to a gage reading on the flood source or other monitored flood source data.
  - The flood source conditions that are likely to initiate performance concerns.
  - The flood source conditions that are likely to cause performance issues that could result in emergency conditions.
- Information that will help inform how likely the levee is to breach during overtopping such as:
  - Noting how many times the levee has overtopped.
  - The location, depth, and length of overtopping along the levee.
  - How long overtopping occurred.
  - Whether overtopping resulted in a levee breach.
  - If the levee has never overtopped, stating the maximum load on the levee in terms of frequency, gage reading, and percent levee loading, as well as when and where the loading occurred.

There are a number of websites that offer access to flood source data, including:

- The National Weather Service provides all kinds of weather and water outlook and forecast information on the website: <https://www.weather.gov/>.
- The National Weather Service's "Weather Ready Nation" initiative website is available to help communities/individuals with information to be ready and prepared for the impacts of weather and water events: <https://www.weather.gov/wrn/>.
- The National Hurricane Center maintains a continuous watch for tropical storm activity and issues tropical storm related forecasts, watches, and warnings for the United States and its Caribbean territories. <https://www.nhc.noaa.gov/>

#### EXAMPLE LANGUAGE:

Data and forecasts issued for **<flood source>**, basin-wide rainfall that could impact **<flood source>**, and rainfall that could induce interior flooding will be monitored.

During floods, flood source data will be monitored **<hourly/twice a day/daily/other>** to provide early warning of conditions that may cause incidents at the levee. The **<Levee Name>** overtops **<during an approximate <#> Annual Exceedance Probability (AEP) event>** OR when the **<Gage Name>** reads **<#>**. The likely overtopping location is **<describe location>**. This location is within **<# miles>** of **<community name(s)>**.

Performance issues related to **<state the way(s) in which this levee is most likely to fail>** have typically started **<during an approximate <#> Annual Exceedance Probability (AEP) event>** OR when the **<Gage Name>** reads **<#>**.

Performance issues are likely to result in emergency conditions **<during an approximate <#> Annual Exceedance Probability (AEP) event>** OR when the **<Gage Name>** reads **<#>**.

Information on how the leveed area is expected to be flooded after an overtopping or breach is provided in Section 2.5.

**INSTRUCTIONS:** Option 1: Use this paragraph as starter language if your levee has overtopped in the past.

#### EXAMPLE LANGUAGE:

The levee has overtopped **<#>** times. Previous overtopping events **<did/did not>** breach the levee. Maximum overtopping conditions occurred in **<year>** when **<#>** locations overtopped by a depth of **<#>** feet for up to **<#>** hours, resulting in **<#>** breaches.

**INSTRUCTIONS:** Option 2: Use this paragraph as starter language if your levee has not overtopped in the past.

#### EXAMPLE LANGUAGE:

The levee has never overtopped. The maximum loading on the levee occurred in **<year>**. **<Discuss the maximum load on the levee in terms of frequency, gage reading, and percent levee loading>**.

#### 2.1.1.2 Responding to Flood Source Conditions

**INSTRUCTIONS:** This section describes how the individual responsible for monitoring flood source conditions will communicate to inform inspection frequencies (Section 2.1.2.1) and incident classifications (Section 2.2). This section also provides a list of flood source conditions that will trigger this communication.

#### EXAMPLE LANGUAGE:

As illustrated by the incident identification and response process flowchart (Figure 2-1), the individual responsible for monitoring the flood source will report flood source conditions that trigger flood inspections (Table 2-1) to the individual responsible for coordinating inspections.

The individual responsible for monitoring the flood source will also report flood source conditions that trigger an incident response to the individual responsible for determining incident classifications.

The following flood source information will trigger a response:

- Overtopping: <Describe the flood source conditions that will trigger a response for overtopping.>
- Performance concern(s): <Describe the flood source conditions that will trigger a response due to a likely performance concern. Describe the performance concern (seepage/erosion/stability) including severity and location.>

### 2.1.2 Flood Inspections

**INSTRUCTIONS:** *Flood inspections are performed immediately prior to a predicted flood, during a flood, and shortly after a flood. Typically, the procedures for flood inspections performed before and after the flood are described in the O&M manual. During flood inspections are performed to observe levee performance and identify incidents. Procedures for during flood inspections are described in this section of the EAP.*

#### EXAMPLE LANGUAGE:

The flood inspection process described below was developed to identify issues early during floods. Flood inspections also provide an opportunity to document levee performance to inform future levee management actions.

#### 2.1.2.1 Inspection Frequency and Rigor During a Flood

**INSTRUCTIONS:** *This section describes the frequency and rigor of inspections during a flood tied to flood source conditions. To determine appropriate flood source triggers, think about the following:*

- *The type and severity of past performance concerns.*
- *Any performance concerns identified during the most recent risk assessment.*
- *The flood source conditions that caused or are expected to cause performance concerns.*
- *If and how quickly performance concerns worsened or are expected to worsen as the height of water against the levee increases.*
- *Any uncertainty about how the levee will perform during flood source conditions higher than those that have occurred in the past.*

- *What would be impacted should the levee fail.*

*Leveed areas with a population at risk or a potential for economic damage warrant more frequent inspections, especially if a performance concern exists that could result in failure of the levee before it overtops. Performance issues, particularly seepage issues, often occur at lower flood levels over time. Table 2-1 can be used to document the gage measurement or other event that will trigger inspections and how often inspections will take place.*

*For each flood source trigger, describe the necessary frequency and rigor of inspections, including number of inspectors, required knowledge or training for inspectors, specialized disciplines needed, the extent of the inspection, how inspections are performed (walking/driving/drones/other), required documentation, and areas of special focus.*

#### EXAMPLE LANGUAGE:

Flood inspections are initiated when **<the stage on the xx river reaches xx/when xx inches of rain fall within a xx hour period over the xx drainage area>**. Once this condition is reached, the **<Levee Owner/Operator>** will ensure the entire levee is inspected at a frequency of **<frequency>**. Flood inspections are accomplished by **<levee district personnel/volunteers/other>** **<walking/driving>** the levee and take approximately **<#>** hours to complete. The inspection staff should include at least **<#>** individuals in **<#>** teams. During this phase, the levee is loaded to a level that is not anticipated to cause performance concerns. Flood inspections are needed to verify levee performance and operation of levee features should be performed as described in **<the O&M manual>**.

**INSTRUCTIONS:** Repeat the paragraph below for each additional inspection frequency.

#### EXAMPLE LANGUAGE:

Flood inspection frequency is increased when **<the stage on the xx river reaches xx/when xx inches of rain falls within a xx hour period over the xx drainage area/other>**. Once this condition is reached, the entire levee will be inspected at a frequency of **<frequency>**. Typically, these inspections are accomplished by **<levee district personnel/volunteers/other>** **<walking/driving/other>** and take approximately **<#>** hours to complete. The inspection staff should include at least **<#>** individuals in **<#>** teams. **<Describe any specialized knowledge or training required and how many inspectors with this knowledge are needed and why they are needed>**. **<List any areas of special focus or locations that should be inspected at an increased frequency>**.

More frequent and rigorous flood inspections will also be performed if an incident that is classified, or has the potential to be classified, as an emergency is identified. In this case, only a portion of the levee may be inspected more frequently. The frequency, method (e.g., driving, walking, drone, etc.), areal extent, specialized knowledge/training needed, and additional documentation required will be determined by the individual responsible for determining floodfight actions (Figure 2-1).

**Table 2-1. Flood Inspection Frequencies**

< > Gage (River Mile <#> or Other Trigger)	Inspection Frequency
< > to < >	Once per day
< > to < >	Twice per day
< > +	At least every 6 hours

### 2.1.2.2 Flood Inspection Process – During a Flood

**INSTRUCTIONS:** This section provides the process for accomplishing inspections during a flood. The process description should include how inspections will be documented, including any equipment and/or checklists that will be used.

#### EXAMPLE LANGUAGE:

Inspectors will document performance concerns in the field. Areas of performance concern shall be physically flagged in the field and reported to the inspection coordinator who in turn will report performance concerns to the individual that determines incident classifications (Figure 2-1).

Inspections will be documented using <equipment and/or checklist to be used>. The inspector's report will accurately locate the affected area by <levee station and offset from the levee/GPS coordinates/other>. The visual condition of the levee feature will be described in detail with the time and date recorded. The inspector will provide a sketch of the problem area and/or photographs.

#### 2.1.2.2.1 Inspection of Known Issues

**INSTRUCTIONS:** This section provides a list of areas that should be inspected closely during floods. It is recommended that the list be included as Appendix D for easy update. These locations include:

- Areas that experienced performance incidents during past floods, a description of floodfight measures used in the past, their effectiveness, and any lessons learned.
- Areas that were repaired or modified since the last flood.
- Areas of concern identified during the most recent inspection or risk assessment.

#### EXAMPLE LANGUAGE:

Areas that experienced performance concerns during past floods, areas that were repaired or modified since the last flood, and areas of potential performance concerns identified during the most recent inspection or risk assessment should be inspected closely during floods. A list of these locations is provided in Appendix D.

### 2.1.2.2.2 Inspection of Levee Features

**INSTRUCTIONS:** *This section should include guidance for inspecting all levee features. Guidance should draw the inspector's attention to performance issues that are likely or that have been observed in the past. Risk assessments, if available, can help provide information on likely performance issues and locations. The list of features and areas of focus provided below are general for all levees. Additions, deletions, and edits will likely be required to reflect the needs of a specific levee.*

#### EXAMPLE LANGUAGE:

Flood inspections shall also include observation and documentation of the following, at a minimum:

1. General Items
  - a. Gage readings on the levee or at identified levee features. Include frequency of readings.
  - b. Verify that all necessary access roads and ramps along the levee are usable.
  - c. Take photographs of all significant issues. Use date/time stamp on the camera when possible.
2. Levees
  - a. Look for sandboils, depressions or unusual wet areas on the landside slope and landside of the levee. Sandboils can appear many feet from the levee toe.
  - b. Look for sandboils in landside ditches.
  - c. Look for slides or sloughs in levee slopes.
  - d. Look for wave wash or scouring of the riverside levee slope.
  - e. Look for low areas in the levee crown.
  - f. Look for water flowing from animal burrows and around structures.
  - g. Look for cracks developing in the levee crown and slopes.
  - h. Look for obstructions.
3. Floodwalls
  - a. Inspect for wet areas, soft areas, seepage, sandboils, and sink holes landward of the floodwall.
  - b. Look for settlement or deflection (movement) of the floodwall.
  - c. Inspect the landside of the floodwall for any leakage, especially around the monolith joints.
  - d. Look for bank caving which may affect the structural stability of the floodwall.
  - e. Inspect toe drain risers (discharging/non-discharging).
4. Closure Structures
  - a. Look for seepage through closure interfaces.
  - b. Check for movement of the closure structure.
5. Gravity Drainage Pipes Through and Beneath the Levee

- a. Verify gates are performing properly.
  - b. Check for seepage around the gravity pipes on the landside.
  - c. Check the levee in the vicinity of the pipe for depressions and sinkholes.
  - d. Check the pipe headwall for movement.
6. Pressure Discharge Pipes
  - a. Verify pipes are not leaking.
  - b. Check the levee in the vicinity of the pipe for depressions and sinkholes.
7. Pump Stations
  - a. Look for sink holes or wet areas around the perimeter of the pumping plant and discharge pipes, and/or settlement of the pump house, all of which could potentially be the result of damaged conduits.
  - b. Look for sandboils in pump station ponding areas and ditches, especially when pumping has lowered the water elevation in these features.
  - c. Verify proper ventilation (fans on, vents open, etc.) of the pumping plant, to prevent overheating of pump motors.
  - d. Verify that assigned operators are on duty.
  - e. Verify O&M manuals are on site and are being followed.
8. Relief Wells
  - a. Monitor relief wells to ensure they are performing as expected.
  - b. Check relief outlets for debris or obstructions.
  - c. Check relief well ditches for erosion and sandboils.
9. Trash Racks/Debris Dams
  - a. Check trash racks and debris dams for significant accumulation of trash and debris.
  - b. Check surrounding areas for erosion and/or diverted flow that could cause erosion.

## 2.2 Determine Incident Classification

**INSTRUCTIONS:** *Incident classifications are used to categorize incidents based on the likelihood of the incident causing inundation of the leveed area. Examples of incidents are performance concerns, malfunction/misoperation of a levee component, or overtopping of the levee. The incident classification communicates urgency, indicates how frequently the issue needs to be inspected, the level of floodfight action needed, and the level of communication required.*

*The incident classifications provided in Table 2-2 are standard classifications used by federal agencies. Levee owner/operators can adopt these classifications or develop their own. One benefit of using the standard classifications is that the terminology may be understood by a wider audience.*

*For incident classification to be useful, some consideration must be given to the performance issues that correspond to each classification and the floodfight and communication actions that correspond to each classification. An example of how this can be done is provided in the tables*

*in Appendix E. These tables must be edited to address levee specific performance concerns and actions.*

*If high flow conditions (defined in Table 2-2) are possible within the leveed area, a description of the specific high flow condition that can occur should be added to the incident classification description in the table. If features that can result in high flow conditions are not part of the levee, the high flow condition incident classification can be deleted from the table.*

#### EXAMPLE LANGUAGE:

Incident classifications are used to categorize incidents based on the likelihood that they could cause inundation of the leveed area. The incident classification communicates urgency, indicates how frequently the issue needs to be inspected, the level of floodfight action needed, and the level of communication required. Incident classifications used for this levee are provided in Table 2-2. Appendix E includes tables with descriptions of performance concerns associated with the levee that correspond to each incident classification as well as corresponding typical inspection, floodfight, and communication actions.

The individual responsible for determining classifications for incidents identified through flood source monitoring and flood inspections will coordinate within the levee owner/operator's organization—as described in the incident and response process flowchart (Figure 2-1)—to initiate floodfight and communication actions.

**Table 2-2. Incident Classifications**

Classification	Description
High Flow Incident	Indicates that water is flowing through or over the levee as intended by design. This classification level may be used to convey that the leveed area may be affected by overtopping flows, but there is no apparent threat to the integrity of the levee. Examples of high flow water releases that could come through or over a levee include through a spillway, pipe, outlet, or by designed overtopping.
Non-Breach Incident	Indicates a levee incident that will not, by itself, lead to a breach, but requires investigation, increased inspection/floodfight action, and notification of internal and/or external personnel. The levee owner/operator might define a certain water elevation or storm surge that requires increased inspection above normal operation and maintenance procedures as non-breach.
Potential Breach Emergency	Indicates that levee conditions are developing that could lead to breach or overtopping. Potential breach conveys that time is available for analyses and decisions, and actions should be taken to prevent escalation of the incident to a full breach.
Imminent Breach Emergency	Indicates the levee has breached/overtopped, is actively breaching/overtopping, or is about to breach/overtop. Imminent breach typically involves a continuing and progressive loss of material from the levee.

## 2.3 Communicate

**INSTRUCTIONS:** Early and transparent communication is critical to maximize available response and evacuation time. This section describes the levee owner/operator's responsibilities associated with communicating levee condition information to partners, as well as any responsibilities associated with flood warnings or evacuation notices. Figure 2-2 in Section 2 should illustrate how information will flow between the levee owner/operator and other partners during a levee incident. Section 2 also describes the roles and responsibilities of all partners associated with flood warnings and evacuation notices.

This section should document how communication decisions are made within the levee owner/operator's organization.

Pre-scripted notifications are recommended. If incident classifications are used, pre-scripted messages can be developed for each incident classification and included as an appendix. (See Appendix F for example messages that can be modified or replaced to reflect the conditions at a specific levee.)

### EXAMPLE LANGUAGE:

This section documents responsibilities for coordination during a flood. **<Levee Owner/Operator>** communication responsibilities include:

**<Providing information about levee conditions to <list entities>>.**

AND/OR

**<Making evacuation recommendations to <list entities>>.**

AND/OR

**<Making evacuation decisions and communicating them to <list entities>>.**

The levee owner/operator personnel responsible to determine and implement external communication actions (Figure 2-1) will ensure that adequate information concerning levee condition is provided to flood response partners and those within the leveed area.

Communication decisions and messages are informed by the incident classifications described in Section 2.2. Early and transparent communication is critical to maximize available response and evacuation time. Coordination with partners will follow **<the Notification Flowchart(s) in Figure 2-2, other>**.

Example pre-scripted notifications for each incident classification are provided in Appendix F. The notifications cover the following conditions:

**High Flow Incident.** Messaging for this condition should convey that isolated and expected inundation of the leveed area is occurring or is about to occur. Typically, this will be due to levee overtopping at a location that has been designed and reinforced to allow overtopping without damage to the levee, but it could be due to other causes. Populated areas are not expected to be impacted by flooding.

**Non-Breach Incident.** Messaging for this situation should convey that the levee is performing or is expected to perform well, but leveed area residents should stay aware of the flood situation as it develops. There is not currently an emergency on the levee.

**Potential Breach Emergency.** Generally, messaging for this situation should convey that "some amount of time" is available for analyses/decisions to be made before levee breach is certain. A breach may eventually occur, but pre-planned actions (such as floodfighting) may moderate or alleviate flooding. Time is available to issue warnings and/or take preparedness actions. Voluntary evacuations may be considered.

**Imminent Breach Emergency.** Messaging for this situation should convey that there is no longer time available to attempt corrective measures and that levee breach is imminent or occurring. At this stage, evacuation notices/recommendations should be issued. If breach or overtopping is occurring, evacuation should be initiated immediately.

## 2.4 Implement Floodfight Actions

**INSTRUCTIONS:** *Being prepared to react in a timely manner and apply proven floodfight actions can help prevent, limit, or control flooding behind the levee. Actions can be developed to:*

- *Address performance concerns that could cause a breach.*
- *Prevent breach during overtopping.*
- *Control the location of overtopping.*
- *Manage water that enters the leveed area due to overtopping or malfunction/ misoperation of a levee feature.*
- *Prevent levee overtopping. In the event of an emergency levee raise, ensure the raise will not increase flooding on others or jeopardize the stability of the levee.*

*Although each flood is unique, this section should lay a foundation for a consistent floodfight by providing a list of levee-specific floodfight actions to address known performance concerns. Examples of tables that can be used to link severity of performance concern to actions and incident classifications are included in Appendix E. (This appendix is first mentioned in Section 2.2 of this EAP.) These tables are generic and likely do not apply directly to any specific levee. They should be edited and additional tables created for performance concerns as needed.*

### EXAMPLE LANGUAGE:

Standard floodfight actions for the types of performance concerns typically observed on the **<Levee Name>** are included in Appendix E.

The primary performance concern(s) for **<Levee Name> <is/are> <seepage/erosion/levee slope stability failure/floodwall instability/other>**. Floods above **<# feet>** stage historically cause this performance concern to start. In the past, response to this performance concern has included **<list floodfight actions used>**. These methods **<were/were not>** successful. A full list of performance concerns that occurred during past floods is included in Appendix D.

## 2.5 Evacuate

**INSTRUCTIONS:** Complete this section with a description of the evacuation notification process for the leveed area and the levee owner/operator's role in that process. This section should identify the entity that has the authority to issue evacuation notices and how the levee owner/operator will coordinate with them. This section should further describe the levee owner/operator's responsibilities related to providing levee information to those responsible for evacuations. If the levee owner/operator has the responsibility to recommend or issue evacuation notices, describe the decision making and communication process used to determine if an evacuation notice is warranted and how to communicate that notice to the impacted public.

Provide a map of primary evacuation routes. Evacuation plans and routes will usually be developed by entities other than the levee owner/operator. Appendix G has been set aside in this template for this purpose.

EXAMPLE LANGUAGE:

<Entity or specific person> has the authority and responsibility to issue evacuation notices to the public. Evacuation notices are disseminated to the public through <describe format and mode of delivery for evacuation notices (for example: reverse 911, media outlets, other)>. <Levee Owner/Operator> responsibilities include <describe the levee owner/operator's responsibilities related to informing or executing evacuation decisions and actions>.

### 2.5.1 Evacuation Background Information

**INSTRUCTIONS:** This subsection should provide information about the leveed area to assist in making evacuation decisions. An example of the kind of information to be covered includes:

- Characteristics of the leveed area such as size, municipalities in the leveed area, population, number of buildings, number of agricultural acres, and critical infrastructure.
- Inundation characteristics, including how quickly populated areas could be inundated, how quickly the entire leveed area could be inundated, and likely depth of inundation.
- Flood warnings and any past evacuation efforts, including the effectiveness of the existing flood warning process, if there is an evacuation plan, and how flood-aware the population is.

There are software tools—such as LifeSim (<https://www.rmc.usace.army.mil/Software/LifeSim/> for more information)—that can be used to help model evacuation routes and how many and how quickly people will evacuate. In addition, HUREVAC (<https://www.hurrevac.com/>) is an internet tool that assist with planning for and executing evacuations in advance of a tropical storm.

EXAMPLE LANGUAGE:

The <Levee Name> leveed area encompasses <#> acres and includes <list municipalities>. There are <#> people living and working within the leveed area.

Should the <Levee Name> be overtopped or breached, the entire leveed area would be inundated within <# days/hours>. Maximum flood depths of <#> feet and greater could be experienced in <location with greatest flood depths>. Flood waters are anticipated to reach populated areas within <# hours/days>. <Municipality> <maintains/does not maintain> effective relationships and communications with the emergency management agency. They <have/do not have> an effective flood warning system. Leveed area inhabitants are generally <aware/unaware> of their flood risk and of the importance of monitoring emergency notifications and evacuation notifications, <increasing/decreasing> the likelihood of an effective evacuation if a breach were to occur.

Primary evacuation routes out of the leveed area to high ground are shown in Appendix G.

## 2.6 Termination of the Emergency

**INSTRUCTIONS:** *When this EAP is activated, an official termination of response must be made once the incident has been resolved. This section describes the process to make and communicate a determination that an incident at the levee has been resolved, including the process for notifying emergency management agencies and other partners.*

*Actions to take after a flood to return the levee to pre-flood conditions are typically included in the O&M manual.*

### EXAMPLE LANGUAGE:

An official termination of response must be made once the incident has been resolved. <Person by position title or entity with responsibility for terminating response> will terminate response when <describe condition that will define the end of the response action, such as a gage reading on the flood source or other>.

The notification process to inform partners that the EAP activation has been terminated <will follow the external communication flowchart in Figure 2-2/other>.

## 3 Roles and Responsibilities

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**INSTRUCTIONS:** This section provides a detailed list of the roles and responsibilities of the organizations involved in responding to incidents on the levee. The information provided here should describe the entities responsible for all typical incident response actions and decisions. The entities listed below will typically have a role in incident response, but the list of organizations and their responsibilities may differ from levee to levee.

### EXAMPLE LANGUAGE:

The following is a high-level listing of the roles and responsibilities held by the organizations that work together to respond to incidents at the levee. This list includes communication- and evacuation-related roles and responsibilities that are also presented in Section 2 for easy access within the context of the incident identification and response process.

### 3.1 <Levee Owner/Operator>

#### 3.1.1 General Responsibility of the <Levee Owner/Operator>

### EXAMPLE LANGUAGE:

Responsibilities of the <levee owner/operator> include:

- Operate and maintain the levee.\*
- Monitor flood source conditions and forecasts before\* and during floods.
- Inspect the levee once a flood is predicted\* and during floods.
- Perform/coordinate floodfight activities as needed.
- Keep <list specific local municipalities, EMAs, and jurisdictions> aware of conditions on the levee.
- Maintain an inventory of floodfighting materials and equipment and assess their condition regularly and before floods.\*
- Maintain a list of available heavy equipment, trucks, and boats.\*
- Maintain a list of material suppliers that can be called upon during a flood.\*
- Maintain and update this Emergency Action Plan.

\* **INSTRUCTIONS:** The processes and information associated with these actions are typically included in a levee's O&M manual. The EAP developer can choose to include this information in the EAP; however, it is recommended that the EAP be kept as streamlined as possible so that it is easy to navigate during an emergency.

## 3.2 <County Name> County Emergency Management Agency

EXAMPLE LANGUAGE:

In the event of a flood, the county EMA responsibilities include:

- Initiate the county EMA Emergency Operations Center.
- Coordinate flooding and levee preparedness planning with community's emergency response organizations, state resources, and levee owner/operator(s).
- Support all floodfighting activities with resources.
- Provide assistance with search/rescue/recovery of flood victims.
- Prepare and distribute emergency public information.
- Issue public warnings and evacuation notices.
- Brief media, public officials, and other interested groups on flooding and levee status.
- Coordinate damage assessment of public property through an assigned damage assessment coordinator.

## 3.3 <State Name> Emergency Management Agency

EXAMPLE LANGUAGE:

In the event of a flood, the state EMA responsibilities include:

- Initiate the state EMA Emergency Operations Center.
- Coordinate flooding and levee preparedness planning with county's emergency management agency, state resources, and federal resources.
- Support floodfighting activities with resources.
- Provide assistance with search/rescue/recovery of flood victims.

## 3.4 <Federal Agency>

EXAMPLE LANGUAGE:

In the event of a flood, the <Federal Agency> responsibilities include:

- Initiate the <Federal Agency's> Emergency Operations Center.
- Coordinate flooding and levee preparedness planning with the county, tribal, and state's emergency management agency.

## 3.5 <Local Jurisdictions/Municipalities/Tribes>

EXAMPLE LANGUAGE:

<Local Jurisdiction, Municipality, or Tribe> will be responsible for the following during a flood:

- Issues public warnings and evacuation within their respective jurisdictions.
- The jurisdictions' fire-EMS, police, public works, and emergency management representatives will work with <Levee Owner/Operator> to recommend voluntary evacuations for repetitive floods and low-lying areas within the levees.
- Assist with search and rescue operations.

### **3.6 <Name> Local Law Enforcement**

#### EXAMPLE LANGUAGE:

Law enforcement activities include:

- Provide security control and limit access onto and along the levee.
- Assist in warning and alerting the public.
- Establish and maintain traffic control.
- Coordinate evacuation efforts.
- Provide security in evacuated areas.
- Assist with search and rescue efforts to flood victims.

## 4 Preparedness

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**INSTRUCTIONS:** The purpose of this section is to make a plan for issues that could arise during a flood so that those problems do not have to be solved in the midst of an emergency. Take the time to think through the specific issues that could occur at the levee and make a plan to address them. Additional subsections may need to be added to address unique situations.

EXAMPLE LANGUAGE:

This section and its subsections cover a variety of miscellaneous topics related to preparing to respond to an incident at a levee.

### 4.1 Response During Non-Business Hours

**INSTRUCTIONS:** Discuss processes and staffing for non-business hours and periods of adverse weather to ensure response operations. This should include who will be on-call during non-business hours and how they can be contacted. Contact information should be included in Appendix C.

EXAMPLE LANGUAGE:

<Position title of responsible levee owner/operator personnel> is responsible for ensuring response operations are staffed during non-business hours, when required. Specifically this individual will:

- When a levee loading is predicted, contact non-business hours response team members listed in Appendix C to confirm their availability for non-business hours response.
- If conditions on the levee warrant response during non-business hours, contact the team members from Appendix C and provide specific instructions.

If emergency lighting is needed, <describe available lighting, provide location and method of transport to the levee, or describe how lighting can be resourced and provide contact info for supplier in Appendix C>.

### 4.2 Response During Adverse Weather

**INSTRUCTIONS:** Discuss processes and staffing during periods of adverse weather to ensure response operations. This should include the person, by position title, responsible for making sure the levee is adequately staffed during adverse weather conditions and a list of adverse conditions with the following information:

- Special response actions and safety considerations.
- Equipment needed.
- Staffing needed.
- Weather-specific safety measures and access methods.

- Weather conditions under which work on the levee would cease.

EXAMPLE LANGUAGE:

<Position title of responsible levee owner/operator personnel> is responsible for ensuring response operations are safely staffed when required during adverse weather. Possible adverse weather conditions include:

- <Weather condition>. <Describe special response actions, safety considerations, equipment needed, staffing needed, weather specific safety measures and access methods, and severity that would require response actions to cease>.

## 4.3 Power and Alternative Sources of Power

**INSTRUCTIONS:** Discuss any levee features that require electric power to operate (e.g., pumping plants, automated closures), and describe how these features will be operated in the event electricity is lost. Discuss normal methods and sources for supplying fuel for diesel and gasoline powered pumps and generators, as well as alternative options if normal methods fail.

EXAMPLE LANGUAGE:

Table 4-1 lists all levee features that require power to operate, as well as primary and secondary sources of power. Contact information for all vendors is located in Appendix C.

**Table 4-1. Primary and Secondary Power Sources**

Feature	Power Needs	Primary Power	Primary Source	Secondary Power	Secondary Source
Feature name	Volts/amps OR gallons of fuel per day OR other	Electricity/diesel fuel/batteries/other	Vendor or utility	Electricity/diesel fuel/batteries/other	Vendor or utility

## 4.4 Communication Alternatives

### 4.4.1 Normal Conditions

**INSTRUCTIONS:** Describe normal communication channels (e.g., cell phones, two-way radios, weather radios, other). Include any issues with cell service on the levee, if pertinent.

EXAMPLE LANGUAGE:

<Cell phones/two-way radios/weather radios/other> are the primary means of communication on the levee. Cell phone numbers for all team members are provided in Appendix C.

Cell phone service can be intermittent in **<location(s)>**. When working in these areas, responders should carry a backup means of communication.

#### **4.4.2 Backup and Emergency Communications**

**INSTRUCTIONS:** During emergency conditions, normal modes of communication can be overwhelmed or lose power. Describe the plan for alternate communication methods should normal channels fail. What alternative methods will be used and how will you access them? For example, should cell towers become overwhelmed, two-way radios or CB radios might be good alternatives.

EXAMPLE LANGUAGE:

When working in areas or during times in which the primary means of communication is unavailable or unreliable, the backup means of communication is **<method>**. **<Method>** can be obtained by contacting **<position title of responsible levee owner/operator personnel>**. **<Method>** is available at **<location>**.

### **4.5 EAP Coordination and Updates**

**INSTRUCTIONS:** An EAP coordinator should be assigned that is responsible for authoring the EAP and ensuring it is reviewed and updated annually (at least) to maintain accuracy of information. This section will identify the EAP coordinator and the frequency of EAP updates. This section should also discuss distribution of the EAP and how updates will be documented (Appendices I and J).

EXAMPLE LANGUAGE:

**<Position title of responsible levee owner/operator personnel>** is the EAP coordinator and will be responsible for EAP updates. At a minimum, the EAP will be reviewed immediately following each flood or EAP test/exercise and updated as needed. The frequency and scope of EAP tests is described in Section 4.6. The EAP and all updates to it will be distributed to the list of organizations in Appendix H. Updates will be documented in Appendix I.

### **4.6 EAP Exercises**

**INSTRUCTIONS:** This section will describe how the EAP will be tested/exercised and how lessons learned will be incorporated into it. Describe the frequency and content of EAP tests. State who is responsible for accomplishing the testing and who will be involved in it. Tests should involve internal personnel and incident response partners.

At a minimum, an EAP test should be performed annually that includes a discussion of roles and responsibilities, confirmation of contact information, and a call-down drill. More in-depth exercises are warranted for levees with potential for loss of life, high economic consequences, and/or an identified performance concern that could result in breach prior to the levee being overtopped. State who is responsible for documenting lessons learned and ensuring they are incorporated into the EAP. A record of EAP tests and exercises should be provided in Appendix J.

EXAMPLE LANGUAGE:

<Levee Owner/Operator> will test this EAP on a regular basis to identify areas of strength and areas that need improvement. The <EAP coordinator> is responsible for ensuring testing and exercises occur and are documented, as well as for updating the EAP to reflect lessons learned. Updates to the EAP will be approved by <levee owner/operator with approval authority>.

Exercises will be conducted in partnership with entities that have a response role or could be affected by a levee emergency. A list of previous EAP tests and exercises is provided in Appendix J.

Each year, an EAP test will be performed that includes, at a minimum, a discussion of roles and responsibilities, confirmation of contact information on the notification lists, and a call-down drill of those listed on the notification flow charts. The following entities will be engaged during the EAP test: <local jurisdictions and municipalities>, <EMAs>, <others integral to flood response>.

**INSTRUCTIONS:** *In addition to the paragraphs above, also include the paragraph below for levees with significant life safety consequences This paragraph may also be included for other levees.*

EXAMPLE LANGUAGE:

Once every 5 years, a tabletop exercise, functional exercise, or full-scale exercise will be performed instead of the EAP test. The exercise will include:

- A verbal walk-through of a simulated flood emergency, including field identification and notification of performance concerns, classification of the incident, and floodfight response actions.
- Routine and emergency communication with <local jurisdictions and municipalities> and <EMAs>, including evaluating the evacuation decision-making process and reviewing the process for incident/emergency notifications to the public.

Lessons learned will be documented by <person, by position title, responsible for documenting lessons learned and updating the EAP> and used to update the EAP as described in Section 4.5. The following entities will be engaged during the EAP test: <local jurisdictions and municipalities>, <EMAs>, <others integral to flood response>.

In addition, <levee owner/operator> will participate in exercises conducted by local, county, tribal (if applicable), or state EMAs.

## Appendix A – Inundation Maps

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**INSTRUCTIONS:** Provide inundation maps for the levee. Potential sources include:

- A levee breach analysis using hydraulic software, such as HEC-RAS, <https://www.hec.usace.army.mil/software/hec-ras/>.
- A levee specific risk assessment that can consider different breach locations and potential consequences.
- The National Levee Database (NLD) (<https://nld.sec.usace.army.mil/>), which displays a shaded area behind all levees called the leveed area. The leveed area shown in the NLD is a conservative estimate of the maximum extent behind the levee that could be potentially inundated if the levee was to breach or overtop, regardless of location along the levee.
- The National Inventory of Dams (NID) (<https://nid.sec.usace.army.mil/>), which displays inundation maps for certain dams that can be used to identify if a levee is within a dam's inundation area.

## Appendix B – Levee Location and Access Map

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**INSTRUCTIONS:** *Provide a map or maps that show the location of the levee, all levee features, and levee access points. It is helpful to include the location of locked gates or other obstacles.*

## Appendix C – Contact Lists

**INSTRUCTIONS:** Provide a table that lists and provides contact information for levee owner/operator organization members, employees, and volunteers that will be involved in operating the levee during floods and responding to emergencies. Example entries are provided in the fill-in-the-blank template.

**Table C-1. <Levee Owner/Operator> Members, Staff, and Volunteers Contact Information**

\*After hours contact information provided only for those available for non-business hours emergency response.

**INSTRUCTIONS:** Include tables that list and provide contact information for external organization, agencies, resource suppliers, and any other entities you need to coordinate with during a flood. Separate tables for different types of entities or related to specific types of communication may be helpful to make contact information easier to find.

**Table C-2. Local Jurisdictions and Municipalities**

Entity	Function	Address	Contact	Phone Number
City of Orange	Local jurisdiction			
Blue Town	Local jurisdiction			
Greenville	Local jurisdiction			

**Table C-3. Emergency Management Agencies**

Entity	Function	Address	Contact	Phone Number
Local emergency management agency	Emergency management			
County emergency management agency	Emergency management			
State emergency management agency	Emergency management			

**Table C-4. Floodfight Material and Equipment Sources**

Material or Equipment	Company/Organization Name	Address	Phone Number
Sandbags			
Sand and gravel			
Riprap/rock			
Polyethylene sheeting			
Equipment rental			
Generators			
Emergency lighting			

**Table C-5. Other Contact Information**

Entity	Address	Primary Contact	Phone Number
Public utilities adjacent to levee			
Businesses adjacent to levee			
Local hospital			
Local red cross			
Local salvation army			
Local police department			
Local fire department			

## Appendix D – Floodfight Monitoring Points

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**INSTRUCTIONS:** *Provide a list of all issues that should be monitored closely during floods, including:*

### EXAMPLE LANGUAGE:

The following is a list of all issues that should be monitored closely during floods.

Location:

Type of distress and description:

Priority:

Floodfight action taken:

Effectiveness of action:

Location:

Type of distress and description:

Priority:

Floodfight action taken:

Effectiveness of action:

Location:

Type of distress and description:

Priority:

Floodfight action taken:

Effectiveness of action:

## Appendix E – Typical Incident Classifications and Floodfight Actions

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**INSTRUCTIONS:** *Provide a description of performance concerns that correspond to each incident classification and of typical floodfight actions used to respond to those performance concerns. Tables that document this information can be useful but are not required. The following tables are generic and likely do not apply directly to any specific levee; they should be edited, and additional tables created for other performance concerns as needed.*

EXAMPLE TABLES AND LANGUAGE ON THE PAGES THAT FOLLOW:

**Table E-1. Overtopping: Example Guidance Table for Determining Incident Level and Response Actions**

Incident Level	Action	Actions to Be Taken
HIGH FLOW  Water level has exceeded or is forecasted to exceed the top of the planned overtopping section and is not expected to breach the levee.	Notify	Notify all flood response partners of the high flow incident in accordance with the EAP. Issue high flow notifications to stakeholders and the public.
	Monitor	Monitor continuously until stable performance of the overtopping section is verified. Monitoring can be adjusted to hourly or even daily dependent upon flood source predictions and how certain the flood response team is that good performance will continue.
	Floodfight	No floodfight actions required.
POTENTIAL BREACH  Water level is XX feet below the top of the levee and is predicted to rise. If water flows over the levee, the levee is expected to breach.	Notify	Notify all flood response partners. Issue potential breach notification in accordance with the EAP. Consider voluntary evacuation notices for areas that will be impacted quickly or areas and populations that take more time to evacuate.
	Monitor	Monitor the levee continuously, focusing on areas anticipated to overtop first. Monitor flood source forecasts as they are provided.
	Floodfight	<p>Identify low areas in the levee crest. If possible, raise these areas to match the surrounding area using available resources (sandbags, gravel, deployable materials). Reinforce the landside slope with available resources if possible (plastic sheeting, filter fabric).</p> <p>If there are sufficient resources and doing so will not transfer flood risk to others, consider raising the levee temporarily to prevent overtopping.</p> <p>If raising the levee is not feasible or advisable, reinforce the landside slope in areas where overtopping is most likely to occur to reduce the likelihood of a breach.</p> <p>If overtopping of the levee is unavoidable, consider relief cuts to minimize inundation depths and erosion within the leveed area.</p>
IMMINENT BREACH  Water is flowing or is predicted to flow over the levee. If water flows over the levee, the levee is expected to breach.	Notify	Notify all flood response partners. Initiate evacuation procedures in accordance with the EAP.
	Monitor	If safe to do, monitor the levee continuously, focusing on areas anticipated to overtop first. Monitor the levee after it is overtopped to document performance. Drones or other remote observation tools may be considered.
	Floodfight	Monitor flood source forecasts as they are provided.
		Continue floodfight actions described under potential breach if safe to do so. If water starts to flow over the levee, evacuate to a safe distance.

**Table E-2. Erosion: Example Guidance Table for Determining Incident Level and Response Actions**

Incident Level	Action	Actions to Be Taken
NON-BREACH  Shallow erosion at or above the waterline that does not threaten levee integrity.	Notify	Notify the flood response team of the erosion issue. Consider issuing non-breach notice to partners and the public describing erosion, floodfight actions, and the status of the levee.
	Monitor	Monitor at least daily. Rainfall events or rises in the flood source elevation may warrant more frequent monitoring.
	Floodfight	Cover with plastic sheeting. Consider placing riprap if the flood source is on the rise and erosive conditions could worsen.
POTENTIAL BREACH  Significant erosion into the embankment or foundation, or erosion below the water line. No cracks or slope movement are observed. Floodfight actions are expected to be successful.	Notify	Notify the flood response team of the erosion issue. Issue potential breach notification in accordance with the EAP. Consider starting voluntary evacuations of areas that will be impacted quickly by a breach and populations requiring more time to evacuate.
	Monitor	Monitor at least once every 6 hours if conditions are stable. Monitor continuously if the flood source is rising.
	Floodfight	Place a layer of protective riprap on the levee or channel slope. The size of the riprap and the thickness of the layer should be determined based upon the velocity of the flood source.
IMMINENT BREACH  Severe erosion into the embankment or foundation, or erosion below the waterline. Cracks or slope movement are observed above the erosion. Floodfight actions are not possible or are not effective.	Notify	Follow the notification process and evacuation process predetermined in the EAP. Notify the flood response team of the erosion issue.
	Monitor	Monitor continuously. Monitoring the levee performance on-site may not be safe; monitor from a safe location. Drones or other remote observation tools may be considered.
	Floodfight	Floodfight actions are likely not safe. If safe and possible, continue to reinforce the area impacted by erosion with riprap. Should landside seepage or slope stability issues be observed in association with the waterside erosion, evacuate to a safe distance.

**Table E-3. Slope Stability: Example Guidance Table for Determining Incident Level and Response Actions**

Incident Level	Action	Actions to Be Taken
NON-BREACH  A superficial slough or slide that does not impact the levee crown and does not extend significantly into the embankment.	Notify	Notify the flood response team of the slope failure. Consider issuing non-breach notice to partners and the public describing slope issues, floodfight actions, and the status of the levee.
	Monitor	Monitor at least daily. Rainfall events or rises in the flood source elevation may warrant more frequent monitoring.
	Floodfight	Cover with plastic sheeting or gravel to prevent erosion of exposed soils. Do not add weight (gravel or riprap) to the failure surface or above the failure without first adding weight to the toe of the slope.
POTENTIAL BREACH  Slope failure extends significantly into the levee slope or is impacting the levee crown. The slope is not moving further. Small amounts of clear seepage may be observed, but the landside slope is firm and there are no boils. Floodfight actions are expected to be successful.	Notify	Notify flood response team of the slope failure. Issue potential breach notification in accordance with the EAP. Consider starting voluntary evacuations of areas that will be impacted quickly by a breach and populations requiring more time to evacuate.
	Monitor	Monitor at least twice a day if conditions are stable. The presence of throughseepage warrants more frequent monitoring.
	Floodfight	Reinforce the slope with available materials (e.g., soil, gravel, sand, riprap, other). Build reinforcing layer up from the toe of the levee.
IMMINENT BREACH  Slope failure extends significantly into the slope or through the crown. The failure is progressing. Seepage is moving material, or the landside slope is soft and saturated from throughseepage. Floodfight actions are not possible or are not effective.	Notify	Follow the notification process and evacuation process predetermined in the EAP. Notify the flood response team of the slope failure.
	Monitor	Monitor continuously. Monitoring the levee performance on-site may not be safe; monitor from a safe location. Drones or other remote observation tools may be considered.
	Floodfight	If safe to do so, continue to reinforce the landside slope. If the slope or toe become too soft to traverse, a quick condition occurs, or the soil starts to move, evacuate the area immediately.

**Table E-4. Seepage: Example Guidance Table for Determining Incident Level and Response Actions**

Incident Level	Action	Actions to Be Taken
NON-BREACH  Seepage without soil movement or sandboils that are easily managed with routine floodfight measures.	Notify	Notify the flood response team of the seepage issue. Consider issuing non-breach notice to partners and the public describing seepage, floodfight actions, and the status of the levee.
	Monitor	Monitor at least daily. A rising flood source may warrant more frequency monitoring. As flood water rises, seepage issues are likely to worsen and sandboils could form.
	Floodfight	Place a ring of sandbags or a barrel around each sandboil. The ring or barrel must have a water discharge elevation that allows water to flow while slowing the water flow enough to prevent soil movement.
POTENTIAL BREACH  Localized seepage or boil(s) observed along the levee with muddy discharge and increasing flow. Emergency floodfight measures are required but are expected to be successful.	Notify	Notify the flood response team of the seepage issue. Issue potential breach notification in accordance with the EAP. Consider starting voluntary evacuations of areas that would be impacted quickly by a breach and populations requiring more time to evacuate.
	Monitor	Monitor at least once every 6 hours if conditions are stable. Monitor continuously if the flow rate or the material movement from the boils is increasing or if the flood source is rising.
	Floodfight	Place a ring of sandbags or a barrel with a water discharge elevation that allows water to flow while stopping soil movement. Continue to raise the height of the sandbag ring as necessary to prevent soil movement. If the size or number of boils makes sandbag rings ineffective, (1) place an emergency seepage berm over the entire seepage area using available resources (berm material should be less permeable than the underlying soils), or (2) build an impermeable soil ring around the entire seepage area to impound water over the seepage area and create a water berm.
IMMINENT BREACH  Sandboils becoming increasingly active, moving large amounts of material and floodfighting actions have not been successful.  Cracks, sinkholes, or subsidence of nearby embankment has been observed. Floodfight actions are not possible or are not effective.	Notify	Follow the notification process and evacuation process predetermined in the EAP. Notify the flood response team of the seepage issue.
	Monitor	Monitor continuously. Monitoring the levee performance on-site may not be safe; monitor from a safe location. Drones or other remote observation tools may be considered.
	Floodfight	Floodfight actions are likely not safe. If safe and possible, continue to reinforce the area impacted by the sandboil(s) by placing additional gravel or sand over the area, or raising the soil ring creating the water berm. If the water level within the water berm is not rising quickly enough, water can be pumped in. Should the ground surface become very soft, quick, or start to move, evacuate the area immediately.

## Appendix F – Pre-Scripted Messages

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**INSTRUCTIONS:** Pre-scripted messages for a variety of possible incidents can be developed so that emergency or other information can be promptly provided during a flood. Example messages are provided below; replace with specific messages for the levee and leveed area. It is important to note that when providing location information in the examples below, use landmarks or other locations that can be easily identifiable by the public. Examples include street names, parks, etc. It is also important to use plain language.

### Imminent Breach Emergency – Draft Public Announcement:

EXAMPLE LANGUAGE:

#### Urgent Public Announcement: Example

Due to <performance concern>, there is an imminent danger of the <Levee Name> on the <name of flood source> failing near <location>. Should the levee fail, areas near <location> will flood <describe how deep and fast water could be moving and consequences to people and property in plain language>. Residents located in the communities of <names of communities> near <location> should evacuate to <safe location> immediately. Emergency personnel are monitoring conditions, and information will continue to be released as soon as possible.

### Potential Breach Emergency – Draft Public Announcement:

EXAMPLE LANGUAGE:

#### Urgent Public Announcement: Example

Due to high water in the <flood source>, there is a danger of water flowing over the top of the <Levee Name> near <location>. If this were to happen, <describe consequences to people and property in plain language>. The <levee owner/operator> is monitoring the levee and will notify local officials should conditions change. It is recommended that residents in the communities of <names of communities> near <location> evacuate immediately, due to the limited time available to safely leave the area if water begins to flow over the top of the levee.

### Non-Breach Incident – Draft Public Announcement:

EXAMPLE LANGUAGE:

#### Flood Notification: Example

Due to high water in the <flood source>, there is water near the top of the <Levee Name> but it is not expected to flow over and cause flooding. The <levee owner/operator> is currently monitoring the levee and making any necessary repairs to ensure the levee continues to

operate properly. However, conditions can change quickly, so it is important for residents in the communities of <names of communities> near the <Levee Name> to pay attention to emergency notifications.

## **High-Flow Incident – Draft Public Announcement:**

EXAMPLE LANGUAGE:

### **Flood Notification – High Flow Conditions: Example**

Due to high water in the <flood source>, there is water flowing over the top of the <Levee Name> in designated areas at <location>. The levee in this location has been designed to allow for overtopping without damage to the levee and surrounding areas. Inundation in <describe area that will be inundated, including depth of water if it can be estimated> is expected to be limited and the community areas of <names of communities> are not expected to be impacted. However, conditions can change quickly, so it is important for residents in the communities of <names of communities> near the <Levee Name> to pay attention to emergency notifications.

## Appendix G – Primary Evacuation Routes

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**INSTRUCTIONS:** *Provide a map of primary evacuation routes.*

## Appendix H – Emergency Action Plan Distribution

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**INSTRUCTIONS:** *Provide a list of entities that will receive a copy of the EAP.*

### EXAMPLE LANGUAGE:

The EAP and all updates shall be distributed to the levee owner/operator's emergency response partners. Some portions of this document may include sensitive information and should be clearly marked as such and not be reproduced or distributed beyond the list below.

1. State emergency management agency
2. County emergency management agency
3. Tribal emergency management agency (if applicable)
4. City of XXXX
5. Town of XXXX
6. Utility companies
7. Adjacent levee owner/operators
8. USACE
9. FEMA

## Appendix I – Emergency Action Plan Updates

**INSTRUCTIONS:** Provide a list of EAP updates, including version number, a description of changes, date of the changes, and who approved the changes.

## EXAMPLE LANGUAGE:

The EAP is updated periodically in order to ensure accurate information related to roles, responsibilities, staffing, and contact information and to capture institutional knowledge of floodfight operations. As changes are made to the EAP, details pertaining to the edits shall be listed in Table I-1. The updated EAP will be distributed to those parties listed on the distribution list within the EAP.

**Table I-1. Record of Changes to the EAP**

## Appendix J – Emergency Action Plan Exercises

**INSTRUCTIONS:** Provide documentation of EAP tests and exercises, including a description of the test or exercise, the date, and who supervised it.

## EXAMPLE LANGUAGE:

EAP training exercises should be conducted, as described in Section 4.6, to ensure all parties can sufficiently perform their role during an actual emergency situation. Documentation of the training activities should be recorded in Table J-1.

**Table J-1. Record of EAP Exercises**