DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
441 G Street, NW
CECW-EC Washington, DC 20314-1000

*EC 1110-2-6075

Circular
No. 1110-2-6075

1 October 2020

EXPIRES 01 OCTOBER 2022

Engineering and Design

INUNDATION MAPS AND EMERGENCY ACTION PLANS AND INCIDENT MANAGEMENT FOR DAMS AND LEVEE SYSTEMS

1. Purpose. This document provides policy for the use and dissemination of inundation maps and supporting data to ensure consistent nationwide implementation and proper coordination of map products among Operations, Dam Safety, Levee Safety, Hydrologic, Hydraulic & Coastal (HH&C), and Geospatial Communities of Practice (CoPs). This document provides policy for emergency action plans (EAPs) for USACE operated and maintained dams and levee systems.

2. Applicability. This guidance applies to all USACE commands and elements.

3. Distribution Statement. This document is approved for public release. Distribution is unlimited.

FOR THE DIRECTOR:

ALVIN B. LEE
Director, Civil Works

6 Appendixes

* This circular supersedes Chapters 13 and 16 of ER 1110-2-1156 dated 31 March 2014.

CONTENTS

Paragraph **Page**

Appendixes

Table List

Figure List

Glossary

1. Purpose.

a. Inundation Maps.

(1) This document provides policy for the use and dissemination of inundation maps and supporting data to ensure consistent nationwide implementation and proper coordination of map products among Operations, Dam Safety, Levee Safety, HH&C, and Geospatial CoPs.

(2) This guidance pertains to Operations, HH&C, and Geospatial CoPs when preparing inundation maps for emergency action plans (EAPs) and when executing geospatial analysis in support of flood events. The guidance and direction provided here and in referenced documents pertaining to inundation map development will also be used by programs in support of planning and preparedness for flood events, such as Planning Assistance to States, to ensure flood inundation products produced by these programs meet consistent standards.

(3) This requirement does not apply to feasibility studies, including those conducted under the Continuing Authorities Program and studies conducted by non-federal interests under Section 203 of the Water Resources Development Act of 1986, as amended.

b. Emergency Action Plans.

(1) This document expands and tailors current federal guidelines and other available resources for dam and levee emergency action planning for implementation within the USACE Dam and Levee Safety Programs. In addition, this document outlines the requirements for managing and reporting incidents at dams and levee systems in the USACE Dam and Levee Safety Programs.

(2) This guidance pertains to all USACE-operated or maintained dam or levee systems within the USACE Dam Safety Program and Levee Safety Program, and are subject to compliance with Engineer Regulation (ER) 1110-2-1156, Safety of Dams: Policy and Procedures, or applicable Levee Safety Program policies as well as applicable federal guidelines (reference A-24, A-25, and A-26).

(3) Because there are no federal guidelines for emergency action planning for levee systems, USACE has chosen to apply the same approaches for dam emergency action planning to levee systems, including the Hazard Classification System (reference A-10).

(4) This document establishes the requirements for consistent application of certain key EAP features for USACE-operated or maintained dams or levee systems (referred to as levees in this document). The key features requiring particular attention to agency-wide consistency include EAP organization, communications, inundation maps, exercises, security provisions, review and approval requirements, and incident management reporting, authorities, and responsibilities.

(5) This document can serve as a reference document for use by others.

2. Applicability. This guidance applies to all USACE commands and elements.

3. Distribution Statement. This document is approved for public release. Distribution is unlimited.

4. References. All references in this document are listed in Appendix A.

5. Records Management (Recordkeeping) Requirements. The records management requirement for all record numbers, associated forms, and reports required by this regulation are addressed in the Army's Records Retention Schedule—Army (RRS-A). Detailed information for all related record numbers are located in the Army Records Information Management System (ARIMS)/RRS-A at https://www.arims.army.mil. If any record numbers, forms, and reports are not current, addressed, and/or published correctly in ARIMS/RRS-A, see Department of the Army Pamphlet 25-403, Guide to Recordkeeping in the Army.

6. Authorities. The authority to perform dam and levee safety activities, including during incidents, is provided by various statutes, including the National Dam Safety Program Act, Public Law 92-367, as amended (33 United States Code [U.S.C.] 467–467n), and the National Levee Safety Act of 2007, Public Law 110-114, Title IX, as amended (33 U.S.C. 3301–3306), as well as project-specific authorizations.

7. General. The primary objective for the owner/operator during a dam or levee emergency is to prevent catastrophic breach of a project that could cause life loss, economic damages, or environmental harm and to expedite actions to get people out of harm's way if breach or component malfunction is unavoidable. Inundation maps and EAPs are key tools used to achieve this objective.

a. Inundation maps.

(1) For significant-hazard potential projects or high-hazard potential projects, where there is life safety risk, an EAP contains planning scenario inundation maps intended to highlight the downstream critical areas for action.

(2) Inundation maps are also often prepared by USACE during flood emergencies to characterize flood risks and to depict project performance more specific to the event than could be anticipated in the EAP planning scenarios.

(3) Inundation maps produced during flood events should be coordinated with affected local and state emergency management authorities. Using EAP map standards to produce inundation maps during flood events promotes common understanding and consistency with previously provided EAP map products.

b. Emergency Action Plans.

(1) An EAP is a formal document that identifies potential emergency conditions at a project and specifies pre-planned actions to be followed to reduce consequences of the emergency. An EAP is prepared by the owner/operator of a dam or levee project stressing the actions to take to moderate or alleviate the emergency.

(2) The EAP contains procedures and information to assist the project owner/operator in issuing early warning and notification messages. Special attention is given to required coordination between the owner/operator and other stakeholders emphasizing responsibilities during an emergency. These stakeholders include the Federal Emergency Management Agency (FEMA), other federal agencies, state and local emergency management authorities, agencies with flood warning responsibilities, and the public in the potentially affected consequence area.

(3) At a minimum, an EAP for a dam or levee must be closely coordinated with state and local emergency management authorities, who then incorporate elements of the EAP into their emergency preparedness and response plans. Project owners/operators are encouraged to co-develop plans with local emergency management authorities whenever possible or to otherwise coordinate to ensure evacuation plans address EAP scenarios.

(4) Plan name. USACE will consistently name EAPs of the title "[Project Name] Emergency Action Plan (EAP)."

(5) The effectiveness of an EAP is greatly enhanced by utilizing a consistent format that ensures critical aspects of emergency planning are covered.

(6) Both a comprehensive plan and advance coordination with local and state emergency management officials are critical in facilitating a timely response to an emergency. Appendix B Model Checklist for Emergency Action Plans, provides a checklist to assist with the development, update, and review of EAPs. The checklist provides questions testing adherence to federal guidelines and certain EAP objectives within the USACE Dam Safety Program and Levee Safety Program.

(7) Although the checklist is a useful starting point, potential consequences within leveed areas and floodplains vary as a result of breach, overtopping, or operation of a project. For this reason, every EAP must be tailored to site-specific conditions and remain simple enough to encourage its use. The EAP should consider the full range of inundation scenarios and different detection times for a range of incidents.

(8) Guidelines for emergency action planning. The following documents serve as the principal guidance that governs the content, structure, and implementation of EAPs and related inundation maps for the purposes of this EC: Federal Guidelines for Dam Safety (reference A-24), Federal Guidelines for Inundation Mapping of Flood Risks Associated with Dam Incidents and Failures (reference A-26), and Emergency Preparedness Guidelines for Levees: A Guide for

Owners and Operators (reference A-21). Safety of Dams: Policy and Procedures (reference A-10) provides signs of distress descriptions, Operations Security (reference A-8).

8. Inundation Map Dissemination. Inundation maps produced by USACE or in partnership with USACE that support EAPs of USACE-operated or maintained infrastructure or that support flood event planning, response, or recovery will be shared with government stakeholders and with the public, with the public exception option described in Paragraph 8e.

a. Inundation maps must be accessible to all USACE echelons including the USACE Operations Center (UOC). The maps and information used to produce the maps will also be shared internally with all pre- and post-authorization study teams. Table 1 summarizes USACE inundation map release policy.

Table 1
Inundation Map Information Sharing Policy

Information Product (Examples)	Information Sharing Policy
Non-editable data (PDF, hardcopy, web viewers)	Public* Provide disclaimer *Note option to restrict public release
Editable data (Geographic Information System [GIS] format data)	
Supporting data (models, elevation data)	FOUO Federal, state, local agencies Ensure close coordination Consider non-disclosure agreement Consult your Office of Counsel regarding Freedom of Information Act (FOIA) implications
Data owned by others (critical infrastructure GIS data)	Do not share Refer requestor to data owner Consult your Office of Counsel regarding FOIA implications

b. Categories of inundation map data. There are four categories of inundation map data: non-editable (static) data, editable (dynamic) data, supporting (model) data, and data owned by others. Definitions for these data categories are available in the glossary.

c. Dissemination of inundation map data to other federal and state agencies and local governments. USACE provides inundation maps to aid other federal, state, and local agencies in accomplishing their missions, especially emergency management authorities responsible for evacuation plans. USACE provides all categories of inundation map data to these entities, except for data owned by others. Supporting data such as hydraulic models will only be provided upon request and should be closely coordinated to ensure appropriate use within model constraints.

d. Dissemination of inundation map data to the public. USACE policy is open dissemination of both non-editable and editable inundation map data with the public but is restrictive with respect to data owned by others and supporting data.

e. Option to restrict public release of a USACE inundation map. USACE recognizes its responsibility to protect public safety and welfare by effectively communicating information related to risks associated with USACE-operated or maintained dams and levees to stakeholders and the public, while also protecting the security of those dams and levees by safeguarding sensitive information.

(1) If a district determines the security risks at a specific USACE-operated or maintained dam or levee outweighs the benefits of making the inundation maps publicly viewable for that project and/or area of responsibility (AOR), the District Commander, in coordination with the District Dam or Levee Safety Officer (DSO/LSO) and OPSEC Officer, may develop a memorandum describing and justifying the restriction for concurrence by the major subordinate command (MSC) DSO/LSO and Commander. Then the memorandum is submitted to the USACE Director of Civil Works and the USACE DSO/LSO for approval.

(2) These decisions are made and coordinated as part of the EAP development, dam/levee safety risk assessment, and/or Critical Infrastructure Protection and Resilience security assessment processes and schedules and not during an emergency situation. Concerns about public reaction to estimated inundation extents produced during an emergency event are not indicative of a credible security threat to a USACE project and/or AOR.

(3) When requested by the public, the FOIA may mandate full or partial release of withheld documents. Memoranda documenting safety concerns should be considered by FOIA counsel but are not determinative in the FOIA analysis.

f. Standard USACE inundation map sources.

(1) Inundation maps will be made available via the common inundation map capabilities shared by the National Inventory of Dams (NID, https://nid.sec.usace.army.mil), the National Levee Database (NLD, https://levees.sec.usace.army.mil), and Access to Water Resources Data (http://water.usace.army.mil) per the following dissemination policy. The standard inundation map sources include a security model that has been coordinated with Office of Counsel and Operations Security.

(2) The inundation maps from these USACE-hosted sources will also be made available to other federal inundation map distribution systems, such as Department of Homeland Security (DHS) Homeland Infrastructure Foundation-Level Data (HIFLD, https://gii.dhs.gov/hifld) and the federal geoportal (http://www.geoplatform.gov). Further information including roles and responsibilities for ensuring current content in standard USACE inundation map sources is provided in Appendix F.

g. Dissemination of inundation map data during declared emergencies. During declared emergencies, USACE may choose to host event-specific inundation map websites to support flood fight efforts in addition to the standard USACE inundation map sources listed in 8f.

(1) These websites may be hosted by districts, MSCs, or the UOC in keeping with the scope of the emergency (local, regional, or national-level emergency). These websites link to inundation maps published to the standard USACE inundation map sources. This ensures all USACE-hosted sources of inundation maps depict consistent information for the event and all USACE sources are consistent with other federal sources utilizing USACE-produced inundation maps.

(2) Related geospatial flood fight data. In addition to inundation maps, geospatial data is often created in support of flooding events. As directed in reference A-18, all geospatial data must be provided to the UOC for inclusion into the USACE Common Operating Picture (UCOP). This includes, but is not limited to, georeferenced data such as lock closure locations, flood fighting staging sites, and potential levee breach locations. Any data used by a district or MSC to generate a map/slides presented at UOC updates must be provided to UOC for inclusion into UCOP.

(3) Disclaimer for release. Depending on the quality and accuracy of the source data, inundation model results vary greatly in quality and accuracy. Sharing those results with the state and local emergency response authorities, the community, and the public, even when preliminary, promotes preparedness, emergency response, and recovery efforts. Before sharing, products must have appropriate caveats, such as, "This data/map was created on dd/mm/yyyy by USACE using the best available data at the time. It may or may not accurately reflect existing conditions."

9. Inundation Map Requirements.

a. Inundation Maps Supporting Emergency Action Plans of USACE Operated and Maintained Infrastructure.

(1) The Modeling, Mapping, and Consequences Production Center, Mandatory Center for Expertise (MMC MCX) produces EAP inundation maps for USACE operated or maintained dams and levee systems.

(2) USACE is responsible for incorporating inundation maps into EAPs developed by USACE, disseminating those EAPs, and augmenting EAP maps beyond the established standard when warranted. Inundation maps are a necessary component of an EAP and are used to facilitate timely notification by the project owner/operator and evacuation of potentially affected areas by emergency management agencies. Inundation maps delineate the areas that would be flooded due to a project breach, overtopping, or operational release.

(a) For dams, including dam appurtenant features, and levees, inundation maps can show the predicted extent of inundation from breach or non-breach flooding combined with antecedent flow assumptions, if applicable. Inundation may be a result of normal reservoir operation, emergency operation, structural failure, or other operational events.

(b) An example of a non-breach inundation is discharge through a dam spillway or levee overtopping without breach. An example of a breach inundation is breach of a dam or levee embankment. EAP inundation maps are not required when the project breach or overtopping does not cause any incremental flooding, when project breach or overtopping would not exceed downstream channel capacities or flood stages, or when consequences are limited to loss of service (e.g., navigation or hydropower disruption due to loss of pool).

(3) EAP inundation maps are required for any high- or significant-hazard potential project and are to be disseminated with EAPs.

(4) When required, EAP maps must be prepared for the inundation scenarios described in Table 2.

Table 2
Inundation Scenarios Required for EAP Inundation Mapping

USACE	Equivalent Designation in Federal Guidelines (Reference A-26)
Dams	
Normal high breach	Sunny day with project failure
Maximum high breach	Flood with project failure
Maximum high non-breach*	Flood without project failure
Intermediate high non-breach*	
Levees	
Breach prior to overtopping	No existing federal guidance
Overtopping with breach	
Overtopping without breach*	

*Non-breach scenarios involve operational releases such as from spillways and regulating outlets.

(a) The term “failure” is used within inundation scenario names on many USACE EAP inundation maps. For the purpose of this EC, “failure” and “breach” are equivalent terms for map scenarios. Over time, the Dam Safety and Levee Safety Programs will continue to work toward consistent use of the term “breach.”

(b) The maximum high (MH) breach pool is commonly the maximum inflow design flood elevation. It includes full utilization of available surcharge, flood, conservation, and both inactive and dead storage. The MH breach pool scenario typically results in the greatest areal extent, depth of downstream inundation, and life safety and economic consequences.

(c) The intermediate high (IH) breach pool corresponds to an elevation that occurs in an unusual event, specifically an elevation that is halfway between the top of active storage (TAS) and the MH pool elevations. The IH pool includes some surcharge storage and results in a significant increase in discharge above the downstream channel capacity.

(d) The TAS breach pool corresponds to the highest elevation that can be obtained under normally regulated operating conditions (e.g., full pool or flood control pool).

(e) The normal high breach pool corresponds to the 10% exceedance duration pool elevation (exceeded about 10% of the time or 36 to 37 days per year on average) which can be obtained under normal regulated operating conditions. This scenario represents a relatively high, but normal, pool condition that can be expected to occur every year.

(f) The top of levee (TOL) breach scenario represents the worst case in terms of flooding of the leveed area that can be attributed to the performance of the levee infrastructure. The levee overtopping scenarios demonstrate the impact of a large flood that exceeds the capacity of the levee. The relative frequency of the loading conditions for the TOL and overtopping scenarios varies based on the height of the particular levee system. A critical breach location, which can affect the areal extent of flooding behind levees, is typically assumed.

b. Inundation maps supporting flood events.

(1) A flood event inundation map shows either past, current, or predicted extent of floodwater within a study area for past, ongoing, or future flood events. Flood event inundation maps are typically produced by districts and divisions within the Corps Water Management System. If a district office cannot support the creation of inundation maps, the MMC MCX will support the creation of inundation maps through activation of the USACE Flood Inundation Mapping (FIM) cadre.

(2) Timing. While every flood event is different, inundation maps should be created under the following conditions using the MMC MCX FIM standard operating procedure.

(a) During an inland flood event, USACE will be prepared to create inundation maps to monitor and manage USACE water management infrastructure once one of the following has occurred:

- Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 (reference A-1) is activated by an emergency declaration.

- District Emergency Operations Center (EOC) is activated for a declared flood emergency.

- When the pool level of a USACE reservoir is expected to exceed normal operating limits and/or result in some uncontrolled release of flood pool via spillways or in events where

flood control releases would be expected to be perceived as elevated beyond normal limits in the downstream reaches.

- Releases from USACE facilities are expected to result in river levels above the flood stage or authorized control levels, whichever is greater.

- At the discretion of the district commander.

(b) During a coastal flood event, USACE civil works districts will produce maps showing potential storm surge effects on civil works projects/infrastructure and/or Army installations within the projected hurricane path. These storm surge flood inundation maps (FIMs) for hurricanes should begin at 3 days before the National Hurricane Center's projected landfall. The next FIM is produced at two days before landfall, and then at least daily until one day after landfall. Instructions are in the USACE FIM Standard Operating Procedures (Reference A-19).

(3) Inundation maps requested by stakeholders. Inundation maps may be requested by state and local governments and may include areas that are not under USACE water management control. When authorized, PL 84-99 may be used to create inundation maps or the district office can delegate the task to the MMC MCX through activation of the USACE FIM cadre. Products must comply with policy, data standards, and processes defined in this EC.

(4) Inundation maps supporting flood event planning and preparedness for areas with no USACE infrastructure. Through programs such as Floodplain Management Services, Silver Jackets, and PAS, USACE districts often work with local communities to develop inundation maps to support flood preparedness activities. Inundation maps supporting preparedness must meet the inundation mapping and dissemination standards established in this EC.

10. Inundation Map Standards and Data Management. All inundation maps developed by USACE will meet the same minimum map standards and data management policies described below.

a. Inundation map standards. The USACE inundation map standard is followed for all types of inundation maps discussed in Paragraph 9. Coordination with the MMC MCX is required to obtain the most current and appropriate inundation map templates. The MMC MCX maintains the USACE inundation map standard, as well as map templates and production tools to support efficient inundation map preparation. An example of the map standard index and map sheet template used for EAP inundation maps is included in Appendix F.

(1) While the actual production work may be completed locally, coordination with the MMC MCX is mandatory prior to beginning work on inundation maps so the most current and appropriate guidance can be provided for a specific project.

(2) The USACE inundation map standard is intended to provide a consistent, user-friendly (i.e., easy to read/interpret), and accurate product for use during USACE and federal/state/local emergency management functions. The standard places emphasis on quality and presentation of the map features which are derived from hydrologic and hydraulic model outputs. Other map data and features, such as base map layers and critical infrastructure locations, achieve compliance with federal guidelines through the use of national databases and map services.

b. Additions to inundation map standards. The USACE inundation map standard defines the minimum acceptable map format. Additions, enhancements, or improvements exceeding the standard are allowable when warranted by project-specific requirements.

c. The MMC MCX maintains a knowledge base that includes examples of inundation map enhancements that have been made for specific projects. Districts are encouraged to review the knowledge base when planning local inundation mapping projects, and to submit examples of enhancements for incorporation in the knowledge base.

d. Inundation Map Database. Districts and MSCs must provide a copy of the locally developed maps and supporting data to the MMC MCX.

(1) The MMC MCX is responsible for consolidating the information into the USACE Flood Inundation Map Database. This ensures official, published inundation maps are available in USACE internal reporting systems such as district, division, and headquarters (HQ) common operating pictures, are supplied to federal geospatial clearinghouses and are available via the NID, NLD, and Access to Water Resources Data, as appropriate.

(2) Furthermore, this ensures that USACE-produced inundation maps are compliant with Spatial Data Standards for Facilities, Infrastructure, and Environment (SDSFIE) and have appropriate geospatial metadata. Inundation map data features in the SDSFIE are compliant with the Integrated Water Resources Science and Services data standards.

11. Emergency Action Plan Requirements. EAPs are required to be developed by USACE for all USACE operated or maintained dams and levees, including appurtenant structures that would impact different consequence areas than the main dam or levee. EAPs are strongly recommended for all other dam and levee systems within the USACE Dam Safety and Levee Safety Programs. This requirement is more expansive than the federal guidelines, which only require EAPs for high and significant hazard potential projects.

a. EAP format and content should follow the specifics outlined in this document, including the model checklist in Appendix B, but should be scaled appropriately based on consequences. At a minimum, the EAP must include information on notification, emergency detection, response, incident management, and preparedness.

b. For projects that are similar and on the same waterway or in the same basin, one EAP may be developed for the system with a different notification flowchart for each project. An example of implementation of a system EAP would be for navigation projects on the same waterway.

c. Organization. Consistent document organization promotes readability of the EAP and enhances effectiveness during exercises and incidents. The goal is a concise document providing easily accessible information that guides emergency actions of all EAP participants. The following topic organization is recommended: (I) Summary of EAP Responsibilities, (II) Notification Flowcharts, (III) Statement of Purpose, (IV) Project Description, (V) Incident Response Process, (VI) Roles and Responsibilities, (VII) Preparedness, and (VIII) Inundation Maps.

d. Other EAP sections, appendices, and references should be incorporated as necessary based on the type of project. For example, levee EAPs, EAP appendices, or related documents referenced in the EAP should include a section that discusses flood fighting techniques tailored specifically as SOPs for the system. Other typical content or references include a glossary of terms, sample checklists for emergency response and flood response activities, a sample emergency responsibility assignment matrix, a surveillance plan, and the project's operations and maintenance (O&M) manual.

e. Communications. Good communication is a key element for successful execution of any EAP. This includes not only internal communications between USACE team members, but also communication between all others with a role in an emergency event. Districts should always strive to raise the level of public awareness (e.g., utilization of the media and internet) as it relates to project operations and emergency response procedures.

(1) Communications tools and technologies to be used, as well as backups, should be considered. A detailed communications plan is recommended to be included as part of the official notification section or as a stand-alone appendix to the EAP in order to reinforce its importance. Items recommended for inclusion are discussed below.

(2) Notification flowcharts. Flowcharts of persons to be notified for each emergency condition and procedures for notification must be included in the EAP. Flowcharts effectively depict the order of notification and notification responsibilities. The flowcharts must include a description of the primary and secondary means of communication to be used, a listing of telephone numbers and addresses, and other information needed for reliable and prompt contact.

(a) Common notification recipients for USACE operated or maintained projects are listed in Table 3. Additional guidance for internal reporting is provided in Paragraph 14.

(b) Flowcharts should be modified as necessary for the particular project. It may be appropriate to define separate flowcharts for each emergency level if the primary goal for emergency response varies by emergency level.

Table 3
Common Notification Recipients (USACE Operated or Maintained)

Component	Dam Safety Element	Levee Safety Element
USACE Internal—District Command Chains	Chief of Operations	Chief of Operations
	Operations Project Manager (OPM) Dam Safety Program Manager (DSPM) DSO	Levee Safety Program Manager (LSPM) LSO
	Water Management/Regulator	Water Management/Regulator
	District Emergency Manager (EM)	District EM
	District Commander	District Commander
External—Principal Local Officials	Local and State Emergency Management Authorities	Local Maintainer Local and State Emergency Management Authorities
External—Other Federal Officials	National Weather Service (NWS)	NWS
External—Public	Downstream population affected	Individuals and communities in leveed areas
USACE Internal—Higher Command Chains	Chief of Operations	Chief of Operations
	MSC HQ	MSC HQ

(3) Emergency levels. The primary purpose of pre-defined emergency levels is to provide clear external communications of project condition and project owner/operator incident management activities. The emergency level helps to define the primary goal of emergency response, such as to intervene to prevent breach or to communicate that breach is occurring to expedite evacuation by emergency management agencies. Existing dam or levee risk assessments may be useful to inform and identify potential failure modes.

(a) Districts must develop local internal procedures that will vary based on unique district organization and project characteristics. To ensure consistent external communications, the following emergency levels will be used in all USACE project EAPs. Reference A-25 defines the emergency levels and the following is additional guidance to be followed. Note, for levee projects and dam projects with the possibility of overtopping, the terms “breach,” “overtopping,” or “overtopping/breach” may be used specific to the unique situation.

(b) High flow emergency. The high flow emergency level indicates that flooding is occurring on the river system, but there is no apparent threat to the integrity of the dam/levee system. The high flow emergency level is used by the dam/levee system owner to convey to outside agencies that downstream areas may be affected by the project’s release.

- USACE water management policies and procedures are to be used for external communication of flood conditions resulting from a high flow operational release.

- Dam/levee safety and water management communications must be closely coordinated in situations where high flow operational releases are either warranted in response to a dam/levee safety emergency or coincide with a dam/levee safety emergency.

(c) Non-breach emergency. The non-breach emergency level is appropriate for an event at a dam/levee that will not, by itself, lead to a breach, but requires investigation, increased monitoring/mitigation, and notification of internal and/or external personnel.

- The project owner/operator's primary goal is to communicate risk and response activities within the USACE chain of command. The need to perform external communication is situational, based on level of awareness through unofficial channels.

- Internal dam/levee safety status, and possibly emergency management status, is elevated. Upward internal reporting is required.

(d) Potential breach emergency. The potential breach emergency level indicates that conditions are developing at the dam/levee that could lead to breach. Potential breach conveys that time is available for analyses, decisions, and actions before the dam/levee could fail.

- The project owner's/operator's primary goals are to intervene to attempt to prevent breach and to communicate risk to downstream or leveed area stakeholders.

- Internal dam/levee safety status and emergency management status are elevated. Upward internal reporting and external communication are required.

(e) Imminent breach emergency. The imminent breach emergency level indicates time has run out and the dam/levee has breached, is breaching, or is about to breach. Imminent breach typically involves a continuing and progressive loss of material from the dam/levee.

- It is not usually possible to determine how long a complete breach will take to develop. Therefore, once a decision is made that there is no time to prevent a breach, the imminent breach emergency warning must be issued.

- The primary goal is to communicate risk to downstream or leveed area stakeholders.

- Internal dam/levee safety status and emergency management status are elevated. Upward internal reporting and external communication are required.

(4) Emergency announcements and communications. External emergency level communications provide situational awareness and trigger implementation of stakeholder action plans. Externally communicated emergency levels and internal dam/levee safety and emergency

management procedures should be aligned. However, this emergency level guidance does not address internal detection and response levels or processes.

(a) Example external emergency announcements and communications for each emergency level must be included in an EAP, with instructions for adaptation based on specifics of an emergency situation. Announcements should be coordinated with the Public Affairs Officer. General consistency of emergency announcements throughout USACE is necessary for common understanding throughout the emergency management community and general public.

(b) The primary responsibility of USACE is to provide these communications to emergency management officials and to the NWS. Close coordination with these organizations is necessary in rare instances where USACE deems it is necessary to make announcements directly to the public to avoid an imminent threat to life or property. At a minimum, the long form emergency announcement must include and describe the message components in Table 4. Further discussion and example notification scripts are provided in Appendix D, Emergency Notifications.

Table 4
Emergency Announcement Message Components

Announcement	Message Component
Emergency Signal	Level: alert, watch, or warning
Source	District
Threat	Project Condition: non-breach, potential breach, or imminent breach Flow Condition: high flow or normal flow
Location	Project name and location Rivers/streams affected Impact area boundaries (easily understood)
Guidance	Nature of emergency/condition Sources of additional information Action for public to take
Time	Expected course of events

(5) Dissemination to the general public in the immediate vicinity of the project. A description of the procedure and means for dissemination of warnings directly to the general public in the immediate vicinity of the project must be included in all EAPs. The procedure should consider estimates of the detection, notification, and warning times for these locations, and specifically state the organization with primary responsibility for issuing initial warnings. Pre-coordinating these actions with official warning and evacuation authorities is essential to ensure effectiveness.

(a) In rare instances where threat to life or property is imminent, USACE may need to temporarily take the lead in issuing public warnings and undertake evacuation actions in advance of local authorities. In such instances, USACE should only undertake such activities until such

time as local authorities are notified and able to effectively assume those responsibilities. The EAP must clearly identify where (specific locations) and under what circumstances USACE will undertake public warning and evacuation actions.

(b) Example situations include campgrounds, individual structures, and small communities in the immediate consequence zone. For larger communities, even if standard warning and evacuation processes are determined to not be timely, USACE may not have the resources in place to temporarily lead warnings or evacuations. In these instances, dedicated emergency warning systems may need to be put in place to reduce warning times.

f. Operational Responsibilities. Each EAP must include information to help in making immediate operational decisions for a range of emergencies relevant to the project. Information must be included to identify the need for and sources of equipment, material, labor, and other necessities for carrying out emergency repairs. Items to be considered for inclusion as appendices or referenced from other documents include:

(1) a problem assessment chart (see Appendix E);

(2) a schedule of operations; an emergency gate operation plan; a reservoir dewatering plan (dams only);

(3) a description of equipment and materials to be stockpiled for use in carrying out emergency operations and repairs;

(4) assignments of responsibilities for carrying out emergency operations and repairs;

(5) a description of needs for equipment, material, and labor not available at the site which are needed to carry out each type of emergency operation or repair; and

(6) a listing of nearby contractors and other sources of needed equipment, material, and labor including a description of procedures for securing their assistance on an emergency basis.

g. Districts will ensure that any changes in operations, including interim risk reduction measures, associated with EAPs are compliant with environmental and cultural resources requirements.

h. Documentation control and protection of sensitive information. Districts must develop a distribution list for those involved in implementing the EAP. The list must be reviewed and updated annually.

(1) EAPs that contain sensitive information should be protected as follows. Each copy of the EAP that is distributed should be controlled by copy number and a notice requesting that additional copies of the EAP not be made. Outdated copies should be returned to the owner/operator or destroyed to prevent misuse. Information deemed FOUO must be marked and

disseminated according to Army Regulation (AR) 380-5, AR 25-55, Department of Defense Manual (DoDM) 5200.01, and Department of Defense (DoD) Directive 5400.07.

(2) Sensitive information includes information that could pose a security risk or aid those intending to do harm to a USACE project but may be shared on a need-to-know basis. When sharing sensitive information, the districts must inform recipients which information is sensitive, and that the sensitive information must not be publicly released.

(3) Technical data and personal contact information should not be provided to the public. Detailed technical information is typically not required by emergency management authorities, although enough information must be provided for them to perform their duties. Technical information includes, for example, engineering details (text and drawings) specific to the project, location of deficiencies, inspection reports, potential modes of failure, and facility details.

(4) Technical information can be shared by keeping specific engineering details in controlled EAP copies, while removing such details from copies distributed to outside agencies that have no specific need for the information.

(5) Districts must coordinate with the District Operational Security Officer and District Office of Counsel, who assist in determining the sensitivity of information, ensuring sensitive information is appropriately labeled as FOUO and redacted as appropriate, and determining if the information may be withheld from public release under a FOIA exemption or by the provisions of the Privacy Act of 1974, as amended.

i. It is acceptable to disseminate EAPs electronically for rapid dissemination and usability. EAP authors are encouraged to establish document organization schemes that allow for efficient production of EAP versions both with and without sensitive information content.

j. The EAP may reference other response and contingency plans that exist for the project, such as for fires, loss of power, oil leaks or chemical spills, bridge collapses, and active shooter incidents that are traditionally not addressed in an EAP. This helps to convey the comprehensiveness of planning conducted for a broad range of incidents.

12. Emergency Exercise Requirements.

a. Purpose of exercises. Training and regular exercises are necessary to maintain proper operational readiness. In addition to training and exercises, annual meetings between project owners/operators and emergency responders can facilitate a better understanding of roles and responsibilities and enhance emergency readiness.

b. The state of readiness should also be determined through periodic and regular simulations of emergency events. These emergency exercises should be initiated by the project owner/operator and involve all of the key players who would normally be involved in an actual event. Consideration should be given to combining exercises for projects in the same watershed

or multiple projects in the same geographical area. Periodic exercises result in an improved EAP as lessons learned during the exercise can be incorporated into the updated document.

c. Participants in exercises.

(1) Nearly any dam or levee safety incident has detection and reaction components. Joint district participation in exercises should, therefore, include dam/levee safety and related technical elements such as the DSO/LSO, the DSPM/LSPM, the Emergency Management Office, project staff, district operations staff, district water management office, public affairs, and technical support elements.

(2) Local downstream emergency management authorities should participate, and state emergency management authorities may participate. Federal officials such as NWS and FEMA officials should participate.

d. The exercise program should ensure both the technical aspects (e.g., internal district performance relating to detection and decision making) and the emergency management aspects of dealing with appropriate local, state, and federal officials are fully covered and evaluated. Periodic exercises that address both technical and emergency management aspects are necessary as part of the comprehensive exercise program. Focusing on only one aspect at the expense of the other can be dangerous as it could lead to a false sense of security regarding readiness.

e. Exercise frequency.

(1) The frequency and complexity of emergency exercises should correspond directly to the Dam Safety Action Classification (DSAC) or Levee Safety Action Classification (LSAC) and the hazard potential classification of the project. The definitions of the various hazard potential classifications are in ER 1110-2-1156, Appendix J. The DSO/LSO is responsible for management oversight and ensuring implementation of exercises at USACE-operated or maintained projects.

(2) At a minimum, the EAP exercise schedule listed in Table 5 must be followed for all projects having life loss or significant economic loss implications. Emergency events can be credited as an exercise provided that EAP notification processes are followed, the incident is properly documented, and the lessons learned from the incident are incorporated into the updated EAP. Credit for lower-order exercises can be claimed provided that a higher-order exercise is conducted and has a sufficiently broad scope to meet the goals of the lower-order exercise.

Table 5
Dam and Levee Emergency Exercise Frequency

<table>
<tr><th>Exercises / Classifications</th><th>Seminar</th><th>Drill</th><th>Tabletop</th><th>Functional</th><th>Full Scale</th></tr>
<tr><td>DSAC/LSAC 1 and High Hazard Potential</td><td rowspan="3">Annual</td><td rowspan="3">Annual</td><td>Biennial, recommended for odd years</td><td>Biennial, recommended for even years</td><td rowspan="3">At DSO/LSO discretion</td></tr>
<tr><td>DSAC/LSAC 2 and High Hazard Potential</td><td>Biennial</td><td rowspan="2">At DSO/LSO discretion</td></tr>
<tr><td>DSAC/LSAC 3, 4, or 5 and High Hazard Potential and All Significant Hazard Potential</td><td>Year 5, 10, etc.</td></tr>
<tr><td>All Low Hazard Potential</td><td colspan="5">Initial orientation seminar or drill. Subsequent exercises at the DSO/LSO discretion.</td></tr>
</table>

f. Exercise levels. The definitions of the exercise levels are included in Appendix C. It is recommended that all exercises be based on a potential failure mode of concern for the particular project. If an exercise has not been conducted in the last 5 fiscal years, it is recommended to start with a seminar or drill, followed by a tabletop exercise (TTX), and work up to the exercise level appropriate for the DSAC/LSAC.

(1) Districts are also encouraged to conduct systems exercises for neighboring projects and projects with overlapping downstream reaches and projects within the same local emergency management jurisdictions. The exception is the highest risk projects (DSAC/LSAC 1 and DSAC/LSAC 2) where exercises must be specific to each project.

(2) Low hazard potential dams and levees, regardless of the assigned DSAC/LSAC, require only an initial orientation seminar or drill and then subsequent exercises at the discretion of the DSO/LSO. At their discretion and judgment, districts may choose to periodically conduct something more elaborate (e.g., tabletop, functional, or full-scale) if they deem the situation warrants.

(3) By requiring greater exercise frequency at DSAC/LSAC 1 and DSAC/LSAC 2 dams and levees, the safety programs are balancing adherence to federal guidance exercise frequency recommendations with risk-informed decisions to best utilize constrained O&M funding.

g. Homeland Security Exercise and Evaluation Program (HSEEP).

(1) The HSEEP is a capabilities- and performance-based exercise program which provides a standardized policy, methodology, and terminology for exercise design, development, conduct, evaluation, and improvement planning (Reference A-22). HSEEP policy and guidance are presented in detail in HSEEP Chapters I–III.

(2) Adherence to the HSEEP policy and guidance ensures exercise programs conform to established best practices and helps provide unity and consistency of effort for exercises at all levels of government. Use of the policy and guidance presented in HSEEP is recommended to

ensure that exercise programs conform to established best practices and aids in interaction with emergency service partners. Additional information about HSEEP is available from DHS at https://www.fema.gov/media-library/assets/documents/32326.

13. Incident Management. Incident management authorities and responsibilities for USACE operated or maintained projects are shared among command, dam/levee safety, emergency management, and operations functions. The incident management approach for events at USACE projects, as summarized below, follows the policies and procedures of the USACE Civil Emergency Management Program (references A-9 and A-12).

a. Dam or levee emergency level.

(1) USACE emergency levels for dams and levees are listed in Paragraph 11.e.(3). District commanders establish the dam or levee emergency level for a dam or levee incident, which establishes district posture and facilitates execution of EAP response and notification actions.

(2) Authority to establish the project emergency level for an incident is delegated to Deputy District Commanders, and all supervisors in the dam or levee safety program chain from the District Commander through the Dam or Levee Safety Program Officer to the Operations Division Chief to the OPM as needed to ensure rapid response and notification.

b. Declaration of emergency.

(1) Civil Emergency Management Program. In conjunction with determining the dam/levee emergency level, it may be necessary for District Commanders to issue a formal declaration of emergency. A declaration of emergency is necessary to implement Civil Emergency Management Program authority, as further explained in ER 500-1-1 and Engineer Pamphlet (EP) 500-1-1.

(2) Authority to issue a declaration of emergency is delegated to Deputy District Commanders and all supervisors in the chain from the District Commander to the Chief of Emergency Management. District Commanders may withhold authority to issue a declaration of emergency, either by written correspondence, or via a published Operation Plan.

c. Roles and responsibilities. To ensure appropriate coordination and communication of dam and/or levee incidents it is important that command, safety program, and emergency management and OPM points of contact (POCs) are included in EAP notification flowcharts.

(1) District Commander. The District Commander declares and manages project incidents and emergencies, with delegations noted in Paragraph 13.a. The District Commander is responsible for deciding courses of action to ensure life safety and reduce risk of project failure. The District Commander is also responsible for coordinating decisions with higher command when regional or national impacts may occur.

(2) Dam Safety Officer and Levee Safety Officer. The DSO and LSO serve as principal technical advisors to the District Commander for dam and levee safety incidents. Upon issuing a declaration of emergency, these officers serve on the Crisis Management Team (CMT). CMT are responsible for upward reporting as specified in Paragraph 13. Upon issuing a declaration of emergency, district DSPMs/LSPMs serve on the Crisis Action Team (CAT).

(3) District EM. The district EM serves as principal advisor to the District Commander for disasters and emergencies.

(a) Upon issuing a declaration of emergency, the district EM serves on the CMT and provides overall management of USACE emergency/disaster operations.

(b) Within the National Incident Management System framework, the district EM serves as the primary POC with state and local Incident Managers. Further responsibilities of the district EM are provided in EP 500-1-1, including responsibility for upward reporting in the emergency management chain.

(4) Operations Project Manager. The OPM is responsible for monitoring activities, notifications of distress to the district office, and other functions as defined in the project operations and maintenance manual, the EAP, and/or the Water Control Manual. During declared emergencies, the OPM is the manager on site and involvement with the CMT and CAT is crucial.

(5) Operations Division Chief. The district Operations Division Chief serves on the CMT and is fully involved with managing the emergency event in coordination with the district senior leadership team.

d. Coordinating project emergency level and emergency operations center activation level. As stated in Paragraph 11.e.(3), USACE uses standard emergency levels for all external coordination and communication. Table 6 provides recommended alignment of USACE project emergency levels with appropriate USACE EOC activation levels as defined in EP 500-1-1.

Table 6
Recommended Alignment of Dam and Levee Emergency Levels and Emergency Operation Center Activation Levels

<table>
<tr><th>Project Emergency Level
EOC Activation Level</th><th>IV
Normal
Operations</th><th>III
Emergency
Watch</th><th>II
Partial
Activation</th><th>I
Full
Activation</th></tr>
<tr><td>High Flow Emergency</td><td rowspan="2">--</td><td colspan="3" rowspan="2">Based on severity, hours of field operations, and required EOC posture</td></tr>
<tr><td>Non-Breach Emergency</td></tr>
<tr><td>Potential Breach Emergency</td><td>--</td><td>--</td><td colspan="2">Based on severity, hours of field operations, and required EOC posture</td></tr>
<tr><td>Imminent Breach Emergency</td><td>--</td><td>--</td><td>--</td><td>X</td></tr>
</table>

e. Project-specific authorities and responsibilities. Specific authorities and responsibilities for incident management should be documented in district all hazards plans, project surveillance plans, and EAPs.

f. Exercises and training. Dam and levee safety exercises and training materials for incident management should be designed to test awareness of incident management processes and responsibilities. Project-specific dam and levee safety training materials for project personnel should address the USACE incident management approach to ensure understanding and responsibilities at all organizational levels.

14. Incident Reporting: Internal. When evidence of distress is reported to the district DSO/LSO, the DSO/LSO must confirm the situation and determine if an engineering evaluation of the condition is needed or remedial measures are required. If additional action is warranted, the district DSO/LSO will coordinate with the district EM and the Operations Division to initiate MSC coordination, develop the commander-nominated Serious Incident Report (SIR), and draft follow-up Situational Reports (SITREP).

a. SIRs are defined in Chapters 8-2 and 8-3 of AR 190-45. SITREPs are defined in ER 500-1-1 and EP 500-1-1. Districts develop and release SIRs via Engineering Link (ENGLINK) and draft SITREPs. MSCs review and release SITREPs via ENGLINK.

b. The district DSO/LSO is responsible for notifying the MSC DSO/LSO and MSC DSPM/LSPM by telephone, with follow-up documentation via email. The MSC DSO/LSO coordinates with the MSC EM to support SIRs, SITREPs, and other products as required to ensure event severity is properly characterized, and forwards the SIR or SITREP and all subsequent reports to the dam and levee safety incident email (DLL-HQ-Dam_Levee_Incident). The HQ DSPM/LSPM coordinates with the MSC for any follow-up information and informs the HQ Deputy DSO/LSO and the HQ DSO/LSO.

c. For evidence of distress on dams, the district DSO is responsible for submitting an MSC DSO-endorsed narrative summary of the incident including an assessment of risks and appropriate photographs within the incident manager module of the Dam Safety Program Management Tool.

d. Since all USACE projects are different, engineering judgment must always be exercised in determining whether or not an item warrants upward reporting. Generally, anything that has the potential for life loss or significant negative economic implications, or anything that could garner political or media attention should be reported. Example problem assessment charts for example incidents for dams are in Appendix E. Figure 1 shows upward reporting of distress.

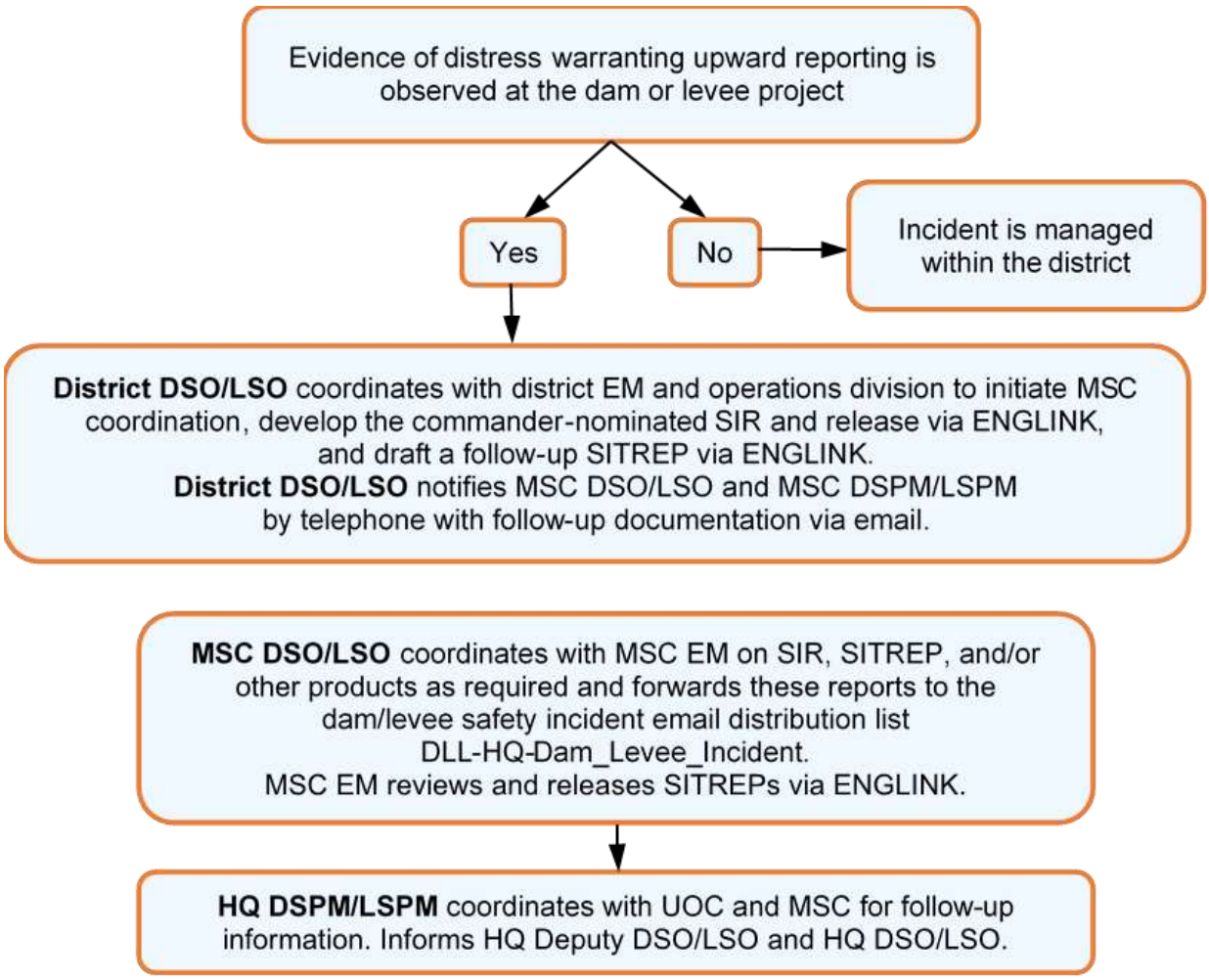


Figure 1. Reporting Evidence of Distress to Dam and Levee Projects to USACE Operations Center and Headquarters Dam Safety Officer/Levee Safety Officer

15. Security Provisions. A comprehensive EAP considers security provisions, including those needed for the potential of man-made disasters (e.g., acts of terrorism) surrounding a project during an emergency event. Potential man-made disasters are particularly critical as they can potentially occur with no warning, thereby resulting in very little response time.

16. Review and Approval of Emergency Action Plans. Table 7 identifies the organizations responsible for review and approval of EAPs and EAP updates.

Table 7
Emergency Action Plan Review and Approval for USACE Operated or Maintained Projects

Status	District	MSC
Projects with new EAP or significant update	Formulate, recommend, and implement. Reviewed by district DSO/LSO.	Reviewed and approved by MSC DSO/LSO
All projects	Annual review required; update when needed. Update notification list annually.	Review during periodic inspection/assessment

17. Emergency Action Plan Funding. Development and approval of EAPs and maps are funded with project-specific O&M funds, with the exception that the MMC MCX is centrally funded to support development of inundation scenarios and EAP maps as part of periodic assessments (PAs) and risk assessments. MMC MCX priorities are established by the assessment schedules and any direct requests for support to the MMC MCX Director outside the assessment cycle.

a. Exercise funding. Exercise planning and participation directly related to a specific USACE project will be funded with project-specific O&M funds.

b. Incident management funding. Guidance for flood response activities, authorized consistent with PL 84-99, is provided in ER/EP 500-1-1 and use of the Flood Control and Coastal Emergencies appropriation is further provided in ER/EP 11-1-320.

THIS PAGE INTENTIONALLY LEFT BLANK

Appendix A
References

1. Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988, 42 United States Code (U.S.C.) §§ 5121-5207. https://www.fema.gov/media-library-data/1519395888776-af5f95a1a9237302af7e3fd5b0d07d71/StaffordAct.pdf

2. Emergency Response. Pub. L. No. 84-99. http://www.usace.army.mil/Media/Fact-Sheets/Fact-Sheet-Article-View/Article/475476/emergency-response/

3. DoDM 5200.01, DoD Information Security Program, Volume 4, Controlled Unclassified Information. https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodm/520001_vol3.pdf

4. DoD Directive 5400.07, DoD FOIA Program. https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodm/520001_vol3.pdf

5. AR 25-55, The Department of the Army Freedom of Information Act Program. https://armypubs.army.mil/epubs/DR_pubs/DR_a/pdf/web/r25_55.pdf

6. AR 190-45, Law Enforcement Reporting. https://armypubs.army.mil/ProductMaps/PubForm/Details.aspx?PUB_ID=1001044

7. AR 380-5, Department of the Army Information Security Program. https://armypubs.army.mil/ProductMaps/PubForm/Details.aspx?PUB_ID=4067

8. AR 530-1, Operations Security. https://armypubs.army.mil/epubs/DR_pubs/DR_a/pdf/web/r530_1.pdf

9. USACE, ER 500-1-1, Civil Emergency Management Program. http://www.publications.usace.army.mil/Portals/76/Publications/EngineerRegulations/ER_500-1-1.pdf?ver=2013-09-08-233252-360

10. USACE, ER 1110-2-1156, Safety of Dams: Policy and Procedures. http://www.publications.usace.army.mil/Portals/76/Publications/EngineerRegulations/ER_1110-2-1156.pdf?ver=2014-04-10-153209-550

11. USACE, ER 1130-2-530, Flood Control Operations and Maintenance Policies. http://www.publications.usace.army.mil/Portals/76/Publications/EngineerRegulations/ER_1130-2-530.pdf?ver=2013-09-08-233436-963

12. USACE, EP 500-1-1, Civil Emergency Management Program: Procedures. http://www.publications.usace.army.mil/Portals/76/Publications/EngineerPamphlets/EP_500-1-1.pdf?ver=2013-08-22-090238-750

13. USACE, Risk Management Center, EP 1110-2-17, A Guide to Public Alerts and Warnings for Dam and Levee Emergencies. https://www.publications.usace.army.mil/Portals/76/Users/182/86/2486/EP%201110-2-17.pdf?ver=2019-06-20-152050-550

14. USACE, Hydrologic Engineering Center, Emergency Planning for Dams: Bibliography and Abstracts of Selected Publications. http://www.hec.usace.army.mil/publications/researchdocuments/rd-17.pdf

15. USACE, Hydrologic Engineering Center, Example Emergency Plan for Blue Marsh Dam and Lake. http://www.hec.usace.army.mil/publications/researchdocuments/rd-19.pdf

16. USACE, Hydrologic Engineering Center, Example Plan for Evacuation of Reading, Pennsylvania, in the Event of Emergencies at Blue Marsh Dam and Lake. http://www.hec.usace.army.mil/publications/researchdocuments/rd-20.pdf

17. USACE, Hydrologic Engineering Center, Flood Emergency Plans Guidelines for Corps Dams. http://www.hec.usace.army.mil/publications/researchdocuments/rd-13.pdf

18. USACE, Emergency Support Function #3 Field Guide. https://rsc.usace.army.mil/sites/default/files/ESF3%20FG%20FINAL%20June2019.pdf

19. USACE, Modeling Mapping and Consequences Production Center, Standard Operating Procedures for USACE Dam Breach Studies.

20. DHS, 2007, Dams Sector Security Awareness Guide: A Guide for Owners and Operators. https://www.nj.gov/dep/damsafety/docs/dssa_guide508.pdf

21. DHS, 2012, Emergency Preparedness Guidelines for Levees—A Guide for Owners and Operators. https://www.fema.gov/media-library-data/1493669998010-ca277a2ca7dd95f5011a63771cfbd368/Emergency_Preparedness_Guidelines_For_Levees_2012.pdf

22. DHS, 2013, HSEEP. https://www.fema.gov/media-library-data/1580929080128-43a6a087f3956a7e51ae506514598053/Homeland-Security-Exercise-and-Evaluation-Program-Doctrine2020Revision.pdf

23. DHS, National Incident Management System Integration Center. https://www.dhs.gov/xlibrary/assets/foia/mgmt_directive_9500_national_incident_management_system_integration_center.pdf

24. FEMA, 1979, Federal Guidelines for Dam Safety, FEMA 93. https://www.fema.gov/media-library-data/20130726-1502-20490-5785/fema-93.pdf

25. FEMA, 2013, Federal Guidelines for Dam Safety, Emergency Action Planning for Dams, FEMA P-64. https://www.fema.gov/media-library-data/5b20db599c212f77fd5e85d256f471a3/EAP_Federal_Guidelines_FEMA_P-64.pdf

26. FEMA, 2013, Federal Guidelines for Inundation Mapping of Flood Risks Associated with Dam Incidents and Failures, First Edition, FEMA P-946. http://crsresources.org/files/600/630_dam_guidance.pdf

27. CEATI International, Inc., Report T122700#-0233, Development of Standardized Inundation Maps Produced Using Geographic Information Systems. https://www.ceati.com/projects/publications/publication-details/?pid=0233

28. Operations Order 2015-11, USACE Response to All Hazards Events (geo appendix).

THIS PAGE INTENTIONALLY LEFT BLANK

Appendix B
Model Checklist for Emergency Action Plans

1. Purpose.

a. This checklist supports the development and review of EAPs for USACE-operated or maintained projects ensuring adherence to federal guidelines and meeting certain USACE Dam Safety and Levee Safety Program objectives. The checklist follows the outline recommended by the Federal Guidelines for Emergency Action Planning for Dams (FEMA P-64) for dam EAPs and is designed in such a way as to promote collaboration and project-specific customization as EAPs are prepared.

b. The checklist poses a set of questions promoting dialogue and ensuring the EAP responses are well-thought-out and inclusive of all necessary stakeholders and parties. The checklist ensures EAP sections occur in an appropriate logical order. The checklist questions encourage an appropriate amount of detail within an EAP and the inclusion of all relevant information.

2. Approach. The checklist is modeled after a worksheet developed by the National Dam Safety Review Board EAP Work Group, with modifications to emphasize certain USACE Dam Safety and Levee Safety Program objectives.

3. Emergency Action Plan Checklist.

a. EAP Organization.

(1) Is the EAP logically organized? Is important information readily accessible and easy to understand?

(2) Document adheres to title guidelines: [Project Name] Emergency Action Plan.

(3) EAP adheres to order of information presentation and main section headings recommended in federal guidelines: (I) Summary of EAP Responsibilities, (II) Notification Lists, (III) Statement of Purpose, (IV) Project Description, (V) Incident Response Process, (VI) Roles and Responsibilities, (VII) Preparedness, and (VIII) Inundation Maps.

b. Summary of EAP Responsibilities. Summarize the critical steps for responding to an incident and implementing the EAP.

c. Notification Flowcharts.

(1) Identify who is to be notified, by whom, and with what priority (i.e., names, positions, telephones numbers, and radio call numbers). Note: One list, or a set of lists, may be

needed depending on the complexity of the hazards associated and different lists may be required based on the emergency level.

(2) Identify primary district command, safety program, water management, operations, public affairs, and emergency management POCs. Identify responsibilities and POCs for reporting up these chains from the district through MSC to HQ.

(3) What is the emergency level of the notification list if more than one list is required?

(4) Describe the process and the individuals who will notify project owner/operator representative and/or emergency management authorities.

(5) Describe the process and parties involved in the prioritization of notifications, including specifically who will be notified.

d. Statement of Purpose. Include a brief statement describing the purpose and scope of the plan.

e. Project Description.

(1) Describe the project, including its location, NID Identification Number (NIDID) if a dam or NLD system identification number if a levee, and the project vicinity map with project features.

(2) Describe areas with the shortest response time where the project owner/operator has unique and elevated warning and evacuation responsibilities, if any:

(a) Roads are adversely affected from a breach or overtopping.

(b) Type of affected roads primary, secondary, or other (private, fire)?

(c) Residential structures are adversely affected from a breach or overtopping.

(d) Commercial structures are adversely affected from a breach or overtopping.

(e) Critical facilities: schools, hospitals, long-term care facilities, etc.

(f) Downstream impacts (dams, levees, utilities, water or sewage facilities, and public places such as parks and campgrounds).

(g) Responsibility for initiating and directing the evacuation process for these locations.

(3) Describe the maximum affected area. Provide an overview of affected communities and infrastructure. For dams, be certain to note any impacts upstream of the project that could require emergency response.

f. Incident Response Process. An incident is defined as an event occurring at a dam or levee that could potentially result in a dam or levee safety issue.

(1) Step 1: Incident Detection, Evaluation, and Emergency Level Determination.

(a) Describe the current measures in place for detecting existing or potential performance issues.

(b) What operating information, such as normal and abnormal reservoir level data or past performance records, exists for detecting and evaluating breach or overtopping?

(c) Describe the monitoring equipment, such as water level sensors and early warning systems.

(d) Describe the monitoring and instrumentation plans that are currently in place.

(e) Describe the process for analyzing and confirming incoming data to promote performance issue detection and evaluation.

(f) Describe the inspection procedures and results after an incident has occurred.

(g) Describe the process for determining which emergency levels apply to an incident.

(h) Use the emergency levels recommended in this ER (non-emergency, non-breach emergency, potential breach emergency, or imminent breach emergency). Provide rationale for differing emergency levels, if used.

(2) Step 2: Notification and Communication.

(a) Describe the process for coordinating with emergency management authorities.

(b) Describe the process for internal coordination among operations, safety program, water management, emergency management, public affairs, and command functions.

(c) Establish process for determining district EOC activation level is aligned with incident type and severity.

(d) Describe any checklists or pre-scripted messages that help adequately describe the emergency situation to emergency management authorities.

(e) Include example pre-scripted messages for each emergency level as attachments.

(f) Describe the process in place to make periodic status reports to the affected emergency authorities and other stakeholders according to the notification lists and associated procedures.

(3) Step 3: Emergency Actions.

(a) Describe what actions to take to mitigate performance issues in order to prevent breach.

(b) Describe the process, at the action level, for how the project owner/operator will continually assess the status of the situation and keep other relevant parties informed through established communication channels.

(c) Describe the process for how emergency levels might be reassessed during Steps 2 and 3 as the situation either improves or deteriorates.

(d) Describe the security measures required to secure the affected operational areas to protect operations personnel and the public.

(e) Describe the authorities for taking emergency actions at the project, for the chain of command from the District Commander through the DSO/LSO to the OPM. Include discussion of how authorities vary by incident type, and severity, if appropriate.

(4) Step 4: Resolution and Follow-Up.

(a) Describe the process and associated tools/mechanisms that currently exist to determine that an incident at the project has been fully resolved.

(b) Describe the process and the relevant parties involved in conducting an after-action review (AAR) at the resolution of an incident. The description should address the following items:

- Description of the events leading up to, during, and following the incident.

- Description of significant actions taken by each participant and improvements for future emergencies.

- Description of the strengths and deficiencies found in the incident management process, materials, equipment, staffing levels, and leadership.

(c) Description of any corrective actions identified and a planned course of action to implement recommendations.

g. Incident Response. Describe the responsibilities of all involved parties to ensure effective and timely action is taken should an emergency occur at the project. Verify operations staff on site are empowered to immediately react to emergencies and to initiate notifications.

(1) Project Owner/Operator.

(a) Describe the process, at the action level, for the following duties of a project owner/operator:

- Detecting and evaluating safety incidents
- Classification of safety incidents
- Notification of emergency management authorities

(b) Describe the chain of command within the district and how the chain of command changes upon declaration of an emergency. Note: Responsibilities should be coordinated with appropriate levels of management to ensure full awareness of organizational capabilities.

(2) Notification and Communication.

(a) What is the process for determining which individuals are to notify emergency management authorities? Who is responsible for this process? Is this process clearly documented and made available to all relevant parties? Note: When developing the EAP, the project owner/operator and local authorities should discuss and determine the most efficient protocol to follow.

(b) Describe the process and relevant parties involved for issuing flood warnings and the process for determining who has primary responsibility for this process.

(c) Describe the process to determine if/when the district may activate its EOC to serve as a central coordination POC.

(d) Who is the Public Information Officer responsible for disseminating information and handling inquiries?

(3) Evacuation.

(a) What are the notification, warning, and evacuation responsibilities of the project owner/operator?

(b) What are the notification, warning, and evacuation responsibilities of the local emergency management authority?

(c) How does the project owner/operator coordinate with the appropriate authorities when routine notifications and evacuation do not suffice (e.g., residence located immediately downstream of a dam or a campground that would be inundated within minutes of a dam failure)?

(d) See examples of threats with associated protective actions in Tables B-1 and B-2.

Table B-1
Example Protective Actions Based on Breach Threat Level for Dams and Levees

PHYSICAL OBSERVATIONS*	THREAT LEVEL DESIGNATION	FLOOD THREAT	PROTECTIVE ACTION OPTIONS
Water flowing through breach in embankment	Imminent Breach Emergency	Imminent or in progress	• Evacuate—vehicle • Evacuate—pedestrian • Evacuate—vertical • Evacuate—safer structure • Expedient protection of people • Avoid area
Rapidly enlarging sinkhole	Potential Breach Emergency	Very likely	• Evacuate—vehicle • Expedient protection of possessions • Avoid area
New seepage areas with cloudy discharge or increasing flow rate	Non-Breach Emergency	Possible, but not certain	• Expedient protection of possessions • Seek or monitor information • Prepare to evacuate
***This column contains examples of physical observations; these observations should be tailored to fit individual projects.**			

Table B-2
Example Protective Actions Based on Threat Level for High Flow Emergencies

FLOOD THREAT	PROTECTIVE ACTION OPTIONS
Significant for some occupied structures and evacuation routes	• Evacuate—vehicle • Evacuate—pedestrian • Avoid area • Expedient protection of structures • Expedient protection of possessions
Some near river in unoccupied areas	• Evacuate—pedestrian • Seek or monitor information • Avoid area • Prepare to evacuate
None outside of channel	• Evacuate—pedestrian if in or on water • Avoid area (water) • Continue normal activities

(4) Monitoring, Security, Resolution, and Follow-Up.

(a) Who is responsible for on-site monitoring during an emergency incident?

(b) How are status updates provided so everyone involved is informed of developing conditions?

(c) What are the provisions for security measures during an emergency? For additional information on dam security measures, see the DHS Dams Sector Security Awareness Guide: A Guide for Owners and Operators, 2007 (reference A-20).

(d) Who is involved in determining when the incident has been safely resolved?

(e) What coordination is required when making the decision to terminate response effort?

(f) What are the project's recovery activities? How do these activities impact a critical public utility such as water supply or electricity?

(g) How are follow-up evaluations coordinated after an emergency? Who is involved in the evaluation?

(h) How are the results of the follow-up evaluation documented in a written report?

(5) EAP Coordinator.

(a) Who is the EAP Coordinator?

(b) What is their responsibility regarding EAP-related activities?

(c) How does EAP Coordinator prepare revisions to the EAP?

(d) How does EAP Coordinator establish training seminars?

(e) When and how does EAP Coordinator coordinate EAP exercises?

h. Preparedness. Describe preparedness actions already completed, as well as established pre-planned actions, that can be taken after the development of emergency conditions for the following categories.

(1) Surveillance and Monitoring.

(a) For an unattended project, what are the remote surveillance systems that include instrumentation for continuous monitoring of headwater levels, tailwater levels, and project load levels that should be considered?

(b) For project owners/operators with operations centers that are attended 24-hours a day, what are the systems for monitoring the water level rate of change and alarms when prescribed limits or levels are exceeded?

(c) For automated monitoring systems, what provisions are made for power interruptions and loss of communications with the monitoring instrumentation?

(d) What are the procedures for providing continuous surveillance for periods of actual or forecasted high flows?

(2) Evaluation of Detection and Response Timing. What is the total EAP implementation time? Assess by evaluating time required for incident detection, emergency level determination, and notification of appropriate entities involved.

(3) Access to the Site.

(a) What are the primary and secondary routes for reaching the site using various access methods (e.g., foot, boat, helicopter, or snowmobile)? Are the response times for these routes indicated in the EAP?

(b) Identify if access roads or emergency service routes may be inundated or washed out during spillway flow or high releases.

(c) Identify access roads or emergency services routes that could be unusable due to high pool levels.

(4) Response During Periods of Darkness.

(a) What is the response to potential or actual emergency conditions during periods of darkness?

(b) What are the special instructions for the project operation and/or emergency management authorities?

(5) Response During Weekends and Holidays.

(a) What is the response during weekends or holidays?

(b) Who are the designated response personnel? Is alternate (non-business) contact information needed?

(c) Are there special instructions for project operation and/or emergency management authorities? If so, what are the instructions?

(6) Response During Periods of Adverse Weather.

(a) What is the response with specific actions during adverse weather conditions when the project is attended?

(b) What is the response with specific actions during adverse weather conditions when the project is unattended?

(c) What are the methods of access to the site (e.g., foot, boat, or snowmobile)?

(7) Alternative Sources of Power.

(a) What are the alternative sources for spillway gate operations, pumps, or other emergency needs?

(b) What is the location of each alternative power source, its mode of operations, and (if portable) a means of transportation with routes to be followed?

(8) Emergency Supplies and Information.

(a) What is the name and contact information (including back-ups) for suppliers, additional personnel, contractors, consultants, and any other entities that may be needed to assist the project owner or emergency management authorities in responding to a project emergency?

(b) What are the materials needed for emergency repair, including routes?

(c) What is the equipment needed for emergency response or repair and its location? Who will operate the equipment?

(d) Who are the local contractors, vendors, and suppliers for project-related equipment and supplies? Provide contact information and maps/directions to their locations.

(e) Where applicable, describe the following:

- The need for coordination of information on flows based on weather, runoff forecasts, breach/overtopping, and other emergency conditions.

- If applicable for dams, the actions to be taken to lower the reservoir water surface elevation and when and how this should be taken.

- If applicable for dams, the actions to be taken to reduce the inflow to the reservoir from upstream projects.

- If applicable for dams, the actions to be taken to reduce downstream flows, such as increasing or decreasing outflows from downstream projects on the waterway on which the project is located or its tributaries.

(9) Training and Exercising.

(a) What is the training performed at the project, and how often is it performed?

(b) Describe the process and/or activities for thoroughly testing coordination and communication roles and responsibilities during comprehensive EAP exercises.

(c) What is the proposed exercise schedule and plan for an EAP exercise program?

(10) Alternative Systems of Communications. What are the alternative communications (e.g., emergency sirens, cellular phones, text alerts, direct connect, email, intranet, radios, social media, and couriers) and the operating procedures and special instructions for the use of these systems?

(11) Public Awareness. Describe the public awareness measures that are performed.

i. Inundation Maps. Ensure coordination with the MMC MCX to obtain current maps or, if district-produced, to obtain current map templates and instructions for implementing the EAP map standard. Document the following:

(1) Overview.

(a) Describe mapping scenarios and assumptions.

(b) Describe purpose and use.

(c) Include disclaimer.

(d) Describe data sources.

(e) Describe model approach, results, and assumptions (pool levels, antecedent flow conditions, breach formation).

(2) Map Sheets.

(a) Publication date.

(b) Arrival and peak times and elevations provided at select locations.

(c) Legend.

(d) Index.

(3) Dissemination of Maps.

(a) Incorporated into EAP and disseminated with EAP.

(b) If locally produced, GIS layers and map sheets provided to MMC MCX for consolidation in national databases.

(c) Posted to USACE Inundation Map Database.

(d) Accessible via NID/NLD.

THIS PAGE INTENTIONALLY LEFT BLANK

Appendix C
Exercise Guidance

1. Introduction. This appendix provides general guidance for USACE districts to consider as districts develop emergency exercises for USACE operated or maintained dams and levees. The appendix is written in the context of all owners/operators of dams or levees, as it provides overall best practices for exercises. Owners/operators of dams and levees should test their EAPs on a regular basis to identify areas of strength and areas that need improvement. Exercises should be conducted in partnership with entities that have a response role or could be affected by an incident at a dam or levee.

a. Several documents are available online that specifically address how to design an exercise. Through HSEEP, DHS is a primary source of exercise design guidance. Specifically, DHS state: "The Homeland Security Exercise and Evaluation Program (HSEEP) doctrine consists of fundamental principles that frame a common approach to exercises. Applying these principles to both the management of an exercise program and the execution of individual exercises is critical to the effective examination of capabilities."

b. The HSEEP guidance document does not address exercise design criteria but is intended to present relevant information in a manner that supports dam and levee owners/ operators in their efforts to develop an exercise scenario. By understanding how a project can be affected by various incidents or events, owners/operators are better prepared to look for areas of improvement and create better relationships and understanding among their partners. Information about HSEEP is available from DHS at https://hseep.dhs.gov/pages/1001 About.aspx.

c. Exercises promote prevention, protection, and responses to incidents and emergencies, and may also be extended to include recovery operations. Exercising demonstrates both the effectiveness of the EAP in an actual situation and the levels of readiness of key personnel. Periodic exercises result in an improved EAP when lessons learned during the exercise are incorporated into an updated EAP document. This also serves the purpose of creating familiarity with the EAP for the entities that have a response role.

d. When conducting an exercise, dam and levee owners/operators should include entities defined in the EAP with a response role. Owners should also consider including other partners without a response role, such as upstream property owners or neighboring downstream jurisdictions that may be affected by an incident. To facilitate the participation of partners, exercises can also be coordinated with, or be integrated into, other event exercise scenarios for earthquakes, floods, hurricanes, and other hazards.

2. Risk Assessment. Risk assessments are performed on dam and levee projects to determine project performance issues. Risk assessments also determine populations and critical infrastructure at risk within flooded areas. Emergency exercises can be tailored to account for risks to project performance and consequences based on results of the risk assessment. Risk

assessment guidance for dams can be obtained from ER 1110-2-1156, Appendix L (reference A-10).

3. Exercise Types. Discussion-based and operations-based exercises defined within the HSEEP framework are discussed below. Although it is not required that every exercise program include all seven exercise types, the program should be built from the ground up, beginning with simple exercises and advancing to more complex exercises. Sufficient time should be provided between each exercise to learn and improve from the experiences of the previous exercise.

a. Discussion-Based Exercises. Discussion-based exercises familiarize participants with current plans, policies, agreements, and procedures or may be used to develop new plans, policies, agreements, and procedures. Discussion-based exercises include:

(1) Seminars and workshops. These types of exercises consist of informal discussion of roles and responsibilities and/or introduction of policies, procedures, plans, and responsibilities.

(2) TTXs. This type of exercise is an informal discussion of a simulated emergency in a low-stress environment. Participation can involve, but is not limited to, project owner/sponsor, state and local EMA, and local officials. This is useful for evaluating plans and procedures, such as an EAP, and can resolve questions of coordination and responsibilities.

b. Operations-Based Exercises. Operations-based exercises validate plans, policies, agreements, and procedures; clarify roles and responsibilities; and identify resource gaps in an operational environment. Types of operations-based exercises include:

(1) Drill. A drill is a coordinated, supervised activity usually employed to test a single specific operation or function within a single entity, such as testing sirens and warning systems, calling suppliers, checking material on hand, and conducting a call-down drill of those listed on the notification flowchart.

(a) For internal, project-specific responsibilities, try running a no-notice drill. A no-notice drill is conducted when project operators want to test a response activity without notifying staff beforehand. There is always the possibility that real-time response actions will be required without warning of an impending incident. No-notice drills are an important tool in identifying areas for improvement.

(2) Functional Exercise. A functional exercise examines and/or validates the coordination, command, and control between various multi-agency coordination centers, such as EOCs and joint field offices. A functional exercise does not involve first responders or emergency officials responding to an incident in real time.

(3) Full-Scale Exercises. The full-scale exercise is a multi-agency, multi-jurisdictional, multi-discipline exercise involving functional joint field offices, emergency operation centers,

and first responders' or emergency officials' responses to a simulated event, such as activation of the EOC and role-playing to simulate an actual emergency event.

(4) Functional and full-scale exercises are considered comprehensive exercises that provide the necessary verification, training, and practice to improve the EAP and the operational readiness and coordination efforts of all parties responsible for responding to emergencies at a dam or levee. The basic difference between these two exercise types is that a full-scale exercise involves actual field movement and mobilization; in a functional exercise, field activity is simulated. The primary objectives of a comprehensive exercise (functional and full-scale) are to:

(a) Reveal the strengths and weaknesses of the EAP, including specified internal actions, external notification procedures, and adequacy of other information, such as inundation maps.

(b) Reveal deficiencies in resources and information available to the dam or levee owner/ operator and partners.

(c) Improve coordination efforts between the dam or levee owner/operator and partners. Close coordination and cooperation among all responsible parties is vital for a successful response to an actual emergency.

(d) Clarify the roles and responsibilities of the dam or levee owner/operator and emergency management authorities.

(e) Improve individual performance of the people who respond to the dam or levee breach or other emergency conditions.

(f) Gain public recognition of the EAP.

4. Frequency of Exercises. The seminar, drill, TTX, and functional exercises should receive the most emphasis in an EAP exercise program. The following are recommended frequencies for these exercise types. Dam and levee owners/operators, in consultation with their partners, should determine actual frequencies appropriate for their dam or levee. USACE will apply the exercise frequency shown in Table 5 of the main EC.

a. A full-scale exercise should be considered when there is a specific need to evaluate actual field movement and deployment. When a full-scale exercise is conducted, safety is a major concern because of the extensive field activity.

b. If a dam or levee owner/operator has the capability to conduct a full-scale exercise, a commitment should be made to schedule and conduct the entire series of lower-level exercises before conducting the full-scale exercise. At least one functional exercise should be conducted before conducting a full-scale exercise. Functional and full-scale exercises should also be coordinated with other scheduled exercises, whenever possible, to share resources and reduce costs.

5. Evaluation of Exercises.

a. Emergency exercises and equipment tests should be evaluated. Immediately after an exercise or actual emergency, an AAR should be conducted with all involved parties to identify strengths and deficiencies in the EAP. The AAR should focus on procedures and other information in the EAP, such as outdated telephone numbers on the notification flowchart; inundation maps with inaccurate information; and problems with procedures, priorities, assigned responsibilities, materials, equipment, and staff levels.

b. The AAR should also address the procedures that worked well and the procedures that need improvement. Responses from all participants involved in the exercise should be considered. The AAR should discuss and evaluate the events before, during, and after the exercise or actual emergency; actions taken by each participant; the time required to become aware of an emergency and to implement the EAP; and improvements for future emergencies. After the AAR is completed, the EAP should be revised, as appropriate, and the revisions disseminated to all involved parties.

6. Exercise Development. Typically, developing an exercise consists of a planning and design processes. The level of effort required for planning and design is commensurate with the degree of difficulty of the exercise. A drill will take less effort than a functional exercise. The overall exercise planning process includes:

a. Basis for conducting an exercise.

b. Design and development.

c. Conduct of the exercise.

d. Evaluation of the exercise.

e. Improvement planning (i.e., identify areas of improvement and implement corrective actions).

7. Exercise Design. The design process is the most extensive part of the exercise planning process and typically includes the following steps:

a. Scope.

(1) What capabilities will be tested and who will be involved?

(2) Example Exercise Scope.

(a) This TTX will emphasize the roles and responsibilities of Raging River Power Company personnel, and other affected agencies, in response to an incident at Raging River Lake

Dam. It will be conducted in a no-fault, low-stress, learning environment as a valuable training tool for those involved.

(b) The TTX will involve reacting to a potential dam safety incident on July 4. Affected jurisdictions and agencies include [insert list of all affected partners].

b. Purpose.

(1) What is the exercise focused on achieving?

(2) Example Exercise Purpose.

(a) The purpose of this exercise is to provide participants with an opportunity to evaluate current concepts, plans, and capabilities for a response to an incident at Raging River Lake Dam.

(b) This exercise will focus on roles with regard to the dam owner/operator responsibilities for:

- Detecting an emergency situation.

- Evaluation of the severity of the situation and decisions relating to response actions (including actions to preserve the integrity of the dam).

- Communications of internal and external notifications during an incident at Raging River Lake Dam.

c. Scenario.

(1) What is the incident or event to be used for testing and evaluating participant capabilities? This should directly reflect the results of the risk assessment and be a scenario most likely to affect the dam or levee. The EAP should identify many of the potential emergency situations (i.e., initiating condition or triggering events) that may affect the dam or levee. It is recommended that more than one incident be tested and that cascading effects should also be considered.

(2) Example Exercise Scenario. The area has received 3 inches of rain in the past 72 hours from a series of pop-up thunderstorms and the weather service is forecasting unstable weather patterns over the next several days that are likely to result in thunderstorms capable of producing rainfall rates up to 2 inches per hour, hail, and tornados.

(a) Exercise Objectives. The objectives should focus on activities that would or could occur in the context of the exercise scenario. Example exercise objectives:

- Detection and Evaluation. Raging River Power Company personnel recognize an emergency situation using initiating conditions in the EAP and classify the severity of the situation using the emergency levels defined in the EAP.

- Detection and Evaluation. Operations personnel use a problem assessment chart to determine what information is needed by engineering staff and what corrective actions should be taken.

- Notifications. Coordinate and control dissemination of accurate operational information (e.g., discharge from dam, flood stage/elevation, timeframes, contact information, emergency duration, termination of incident, pre-scripted message) and resources in a timely manner from the Raging River Lake Dam to all participating agencies.

- Operational Coordination. Clarify agency roles and responsibilities in support of an emergency situation at the dam and associated flooding downstream.

- Public Information. Discuss options to provide timely information to the population and assist in minimizing chaos. Review plans to preclude dissemination of conflicting data.

- Warning and Evacuation. Identify specific warning and evacuation response actions for each emergency level to include in an EAP.

- Warning and Evacuation. Evaluate the ability of the [insert a responsible entity] and other affected agencies and jurisdictions to implement emergency response actions, including warning and evacuating populations at risk, as outlined in their EAPs and other applicable procedures.

(b) Scenario Events and Timelines. In most instances, an exercise will be conducted in a compressed timeframe. In reality, the example exercise scenario provided in Paragraph C-7c would likely cover several days. However, the actual exercise time may only be a few hours. It is critical during the exercise design process to provide sufficient context for participants; identify and describe the timing of events; develop injects; and provide an appropriate amount of time for discussion of actions taken by exercise participants.

(c) Evaluation Guidelines. Exercise staff must ensure that participants are aware of how the exercise will be evaluated. The evaluation process results in reviewing what worked well and where improvements are needed.

(d) Updating the EAP. Though not part of the exercise process, updates to the EAP are typically derived from the exercise outcomes. After identifying areas of improvement, dam and levee owners/operators and their partners need to determine what corrective actions are necessary to how those actions will be implemented. When these activities are completed, the EAP will be revised.

8. List of Categorized Exercise Topics. The following is a list of example exercise topics to aid in designing emergency exercises.

a. Communications: Internal (those with a role in the emergency response—onsite and offsite).

(1) Notifications.

(a) Is everyone who needs to know the situation included?

(b) How long does it take to complete the call list?

(c) Is the NWS on the list?

(d) If impacts to neighboring jurisdictions, are they contacted and when?

(e) Are alternate contacts identified?

(2) Notification methods.

(a) Landline/cell phone viability.

(b) Radios.

(c) Are redundant communications in place?

(3) Media engagement. Who should media requests be directed to?

(4) Are all terms and emergency levels clearly understood?

b. Communications: External/general public (onsite and offsite).

(1) Utility of pre-scripted messages.

(2) Notification methods.

(a) Landline/cell phone viability.

(b) Media.

(c) Radios.

(d) Sirens.

(e) Social networking sites.

(f) Are redundant communications in place?

(3) Tailored language for audience.

(4) Notification of neighboring communities.

c. Structural Issues/Risk-Driving Potential Failure Modes.

(1) Spillway gate failure.

(2) Gantry crane failure; bring in a crane to open Tainter gate.

(3) Internal erosion/seepage/piping.

(4) Structural movement and instability.

(5) Structural fire.

(6) Closure failure.

d. Response.

(1) Location of incident command post.

(2) Who is needed and when?

(3) Who is doing what?

(4) Coordination between onsite and offsite resources.

(5) Evacuations.

(a) How long does it take to contact affected parties?

(b) How do you handle people who are unwilling to evacuate?

(6) Response scenarios.

(a) Mass casualty.

(b) Identification and preparation of family assistance centers.

(c) Critical facilities in inundation zones.

(d) Evacuation of boaters.

(e) Missing persons/search and rescue.

(f) Loss of power and/or potable water.

(g) Blocked evacuation routes.

(h) Accessibility and receipt of state support/resources.

(i) Suspicious activity (persons, vehicles, etc.).

(j) Ability to mobilize necessary equipment (owned or by contract).

(k) Use of the emergency management entity's Emergency Operations Plan and SOPs.

(7) If a breach/overtopping occurs, how long does it take to respond and protect assets in the immediate downstream area?

e. Flood fighting.

(1) Types of potential emergencies requiring flood fighting.

(2) Equipment and materials to be stockpiled.

(3) Assignments of responsibilities for flood fighting and repairs.

(4) Access to equipment, material, and labor not available at the site.

(5) Access to nearby contractors and other sources of needed equipment, materials, and labor.

f. Effects/impacts.

(1) Industries.

(2) Other dams and levees.

(3) Marinas.

(4) Failed infrastructure such as gas/oil pipelines, cell towers, etc.

(5) Emergency response facilities such as fire departments, emergency medical services, EOC, and police departments.

(6) Hospitals, daycares, schools, and other areas of population congregation.

g. Traffic control.

(1) Offsite.

(2) Evacuations.

(3) Reentry.

h. Power loss.

(1) Power loss onsite/back-up power.

(2) If facility is hydroelectric, power loss to the community.

i. Technological.

(1) Power grid failure (internal or external).

(2) Equipment failure (spillway or outlet works).

(3) Cyber attack.

j. Recovery.

(1) Debris management.

(2) Infrastructure repair.

(3) Shelters.

(4) Re-entry by evacuees.

(5) Economic impacts.

(6) Length of time to repair dam or levee.

k. Inundation maps.

(1) Depth of water at cross-sections provided?

(2) Time to arrival and crest.

(3) List of impacted properties and uses (residential versus non-residential).

(4) Identification of critical facilities.

(5) Can users read and understand the maps?

(6) Identify liaison to aid in inundation map interpretation.

l. Security.

(1) Terrorist.

(2) Active shooter.

(3) Explosives.

(4) Bomb threat.

(5) Sabotage.

(6) Vandalism.

(7) Other criminal action.

m. Environmental.

(1) Hazardous waste spill/contamination.

(2) Loss of, or negative impact to, fish or wildlife.

THIS PAGE INTENTIONALLY LEFT BLANK

Appendix D
Emergency Notifications

1. Purpose. This appendix provides details on how to structure and when to utilize emergency notifications. Example scripts are provided. The publication, "A Guide to Public Alerts and Warnings for Dam and Levee Emergencies," (reference A-13) was used to develop the following scripts. A copy of the publication can be found using the link provided in Appendix A.

2. Definitions.

a. **ALERT**: Severity signal used as a descriptor in external communications to indicate a low degree of danger; typically used to signal the end of a previously communicated emergency or to provide information about a non-emergency situation that has obtained awareness through unofficial communications channels.

b. **WATCH**: Severity signal used when the risk of breach or high flows has increased significantly, but its occurrence or timing is uncertain. The purpose of the communication is to ensure broad emergency management and public awareness of the situation in preparation for, and in the advance of, the need to initiate evacuations.

c. **WARNING**: Severity signal used when a breach or high flow is occurring, is imminent, or has a very high probability of occurring. A warning is used for conditions posing an imminent threat to life and property. The purpose of the communication is to initiate evacuations.

d. High flow: Any controlled operational release, uncontrolled operational release, or breach flow that may result in increased flooding and could require evacuations.

Table D-1
Notifications Required for Emergency Condition

Emergency Level/Project Condition	Flows	Signal	External Notification Required?	Internal Notification Required?
High flow	High	**WATCH** or **WARNING** depends on level of severity	Yes	Yes
Non-breach	Normal	**ALERT**	Situational	Yes
	High	**WATCH**	Yes	Yes
	High	**WARNING**	Yes	Yes
Potential breach	Normal	**WATCH**	Yes	Yes
	High	**WARNING**	Yes	Yes
Imminent breach	High	**WARNING**	Yes	Yes

3. Long Message Notification Script. Long messages, such as press releases, emails, and telephone calls to emergency management authorities and the NWS should be presented in the order specified in Subparagraphs a.(1)–(7).

a. Script order.

(1) Heading.

(2) Signal.

(3) Source.

(4) Threat.

(5) Location.

(6) Guidance.

(7) Time.

b. Template. Each of these message components are identified in brackets in the provided sample messages to highlight the components and are not to be used in actual communications. *Italicized text* represents information that would be filled in on an emergency-specific basis.

(1) The heading serves as a subject line in email communications and a title for press releases. It would not be used within telephone scripts.

(2) Signal: **WARNING**, **WATCH**, or **ALERT**.

(3) Project Condition: Imminent breach, potential breach, or non-breach.

(4) Flow Condition: imminent high flow, potential high flow, or non-high flow.

[HEADING] **[SIGNAL] [project condition] [flow condition] [project name, location]**

This is a [SIGNAL] declaration by the [SOURCE] U.S. Army Corps of Engineers (USACE), [*District Name*] District ([*District Acronym*]). [THREAT] A [*project condition*] due to [*describe cause*] exists at [LOCATION] [*Project Name, (NIDID or NLD System ID), nearest community, state*].

[GUIDANCE] Flooding can be expected [*characterize and indicate if evacuations are warranted*]. Additional information is available in the [*reference EAP*], including appropriate USACE contacts for situational verification. The [*District Name*] District Emergency Operations Center [*indicate operations level*]. Updates will be provided as available.

[TIME] [If applicable, high flow:] Discharges from [*source, outlets/spillway/combination*] of [*rate in cfs*] will begin at [*time, day, date, year*] down the [water body] and will continue through [date].

[TIME] [If applicable, non-high flow:] Discharges are anticipated to remain at normal operational levels.

4. Short Message Notification Script.

a. Short messages using media with character limits, such as Wireless Emergency Alert, Short Message Service, Twitter, and text messaging should be presented in the order specified in Subparagraphs a(1)–(5).

b. Script Order.

(1) Source.

(2) Guidance.

(3) Threat.

(4) Location.

(5) Time.

5. Example Notification Scripts. The following long message notification scripts are examples of the template in Subparagraph E-3.b. applied to a USACE project and intended to initiate communications with emergency management authorities and the NWS. GUIDANCE elements of the message should be adjusted for public notifications. See "A Guide to Public Alerts and Warnings for Dam and Levee Emergencies" (reference A-13) for additional long message examples and for short message examples. When developing short messages, it is important that the information is consistent with the information provided in the long messages. It is also

important to understand the requirements imposed by and the limitations of systems used to disseminate short messages.

a. Example 1: Warning.

[HEADING] **WARNING Imminent Dam Breach and Imminent High Flows, Westville Dam, Southbridge, Massachusetts**

This is a [SIGNAL] **WARNING** declaration by the [SOURCE] U.S. Army Corps of Engineers (USACE), New England District (CENAE). [THREAT] A breach of the dam and resulting high flows and major flooding is imminent [LOCATION] at Westville Dam (NID MA00972), Southbridge, Massachusetts and areas in the downstream floodplain.

[GUIDANCE] This is a request to immediately initiate emergency response procedures and evacuation plans for threatened areas. USACE, in coordination with Southbridge County Emergency Management, encourages residents of Southbridge, MA within the flood zone to evacuate immediately. This flood zone includes the Southbridge neighborhoods of McKinstry Brook and Cady Brook.

[GUIDANCE] Major flooding can be expected within the floodplain from the Westville Dam as far downstream as the city of Norwich, Connecticut. This includes the communities of Southbridge in Massachusetts and Quinebaug, Putnam, Danielson, Jewett City, and Norwich in Connecticut. Additional information is available in the Westville Dam Emergency Action Plan (CENAE, 2012), including appropriate USACE contacts for situational verification. The New England District Emergency Operations Center has been activated. Updates will be provided as more information becomes available.

[TIME] Flood waters will reach Southbridge, Massachusetts in less than 30 minutes following the breach. Flood water arrival times for other downstream communities are as follows: Quinebaug (1 hour), Putnam (4 hours), Danielson (9 hours), Jewett City (18 hours), Norwich (20 hours).

b. Example 2: Watch.

[HEADING] **WATCH Potential Dam Breach and Imminent High Flows, Westville Dam, Southbridge, Massachusetts**

This is a [SIGNAL] **WATCH** declaration by the [SOURCE] U.S. Army Corps of Engineers (USACE), New England District (CENAE). [THREAT] A potential for dam breach due to a progressing seepage condition exists [LOCATION] at Westville Dam (NID MA00972), Southbridge, Massachusetts.

[GUIDANCE] This is a request to immediately initiate emergency response procedures and assess the need to evacuate threatened areas. Flooding can be expected along the river

floodplains and some low-lying areas may need to be evacuated. Additional information is available in the Westville Dam Emergency Action Plan (CENAE, 2012), including appropriate USACE contacts for situational verification. The New England District Emergency Operations Center has been activated. Updates will be provided as available.

[TIME] Discharges from the outlet works of 3,800 cfs will begin at 1100 on Wednesday, January 30, 2015, down the Quinebaug River and will continue through February 5, 2015.

c. Example 3: Alert.

[HEADING] **ALERT Non-Breach Incident, Westville Dam, Southbridge, Massachusetts**

This is an [SIGNAL] **ALERT** declaration by the [SOURCE] U.S. Army Corps of Engineers (USACE), New England District (CENAE). [THREAT] There is no immediate threat to [LOCATION] Westville Dam (NID MA00972), Southbridge, MA.

[GUIDANCE] Signs of distress and/or adverse conditions have been identified along the downstream side of the dam embankment. Additional information is available in the Westville Dam Emergency Action Plan (CENAE, 2012), including appropriate USACE contacts for situational verification. The New England District Emergency Operations Center has been activated. Updates will be provided as more information becomes available.

[TIME] Normal discharges from the outlet works of 800 cfs are currently in effect and will continue through February 5. Normal flows can be expected along the Quinebaug River through the City of Southbridge, Massachusetts during this period of time.

d. The following is an example of a final message without the message components labeled.

****ALERT** Watch Cancellation, Westville Dam, Southbridge, Massachusetts**

ALERT The U.S. Army Corps of Engineers (USACE), New England District (CENAE) has cancelled the watch condition at the Westville Dam (NID MA00972), Southbridge, Massachusetts, as the issues that prompted the condition have been resolved.

THIS PAGE INTENTIONALLY LEFT BLANK

Appendix E
Example Problem Assessment Chart and Notification Flowchart for Dams and Levees

Problem assessment charts provide example problems and their associated corrective actions. Problem Assessment Charts can be keyed to project condition/severity and should be tailored to project-specific needs.

EXAMPLE PROBLEM ASSESSMENT CHART

SEEPAGE				
PROJECT CONDITION	PROBLEM	CORRECTIVE ACTIONS	DATA TO REPORT TO DISTRICT OFFICE	NOTES
Non-Emergency	New Seepage. There is a new wet or soft area on the downstream embankment slope or abutment or in the vicinity of the embankment toe that is not normal or has not been previously documented.	Observe periodically as directed by the Project Engineer. Verify seepage water is clear and does not move material. Document changes in conditions.	Size and location of the seepage area. Flag area and collect GPS coordinates of wet area. Document the date and time the seepage was discovered, location (station and range), approximate size, quantity of seepage, and color of seepage. Document date and amount of precipitation prior to the date seepage first observed.	
Non-Breach Emergency	Boils and Heavy/Increased Seepage. Concentrated seeps or boils that stabilize with clear flowing water. Boil activity appears to be limited to shallow strata.	Control seepage by ringing the area with a sandbag or earthen ring dike, constructing an inverted filter over the area, pump existing relief wells (if applicable), or installing well points or other systems to relieve subsurface water pressures.	Size and location of the seepage area. Collect GPS coordinates of wet area. Document the date and time the seepage was discovered, location (station and range), approximate size, quantity of seepage, and color of seepage. Provide flow rate estimates. Indicate condition of remedial measures.	
Potential Breach Emergency	Piping. Active boils are removing material from the foundation or embankment. Settlement may be occuring. Cloudy or muddy water is evident and flow rates are increasing.	Initiate controlled reservoir drawdown in accordance Water Control Manual. Investigate flow at upstream entrance. Place inverted filter over downstream seepage outlet. Install instrumentation to monitor pressures.	Size and location of the seepage area. Collect GPS coordinates of wet area. Document the date and time the seepage was discovered, location (station and range), approximate size, quantity of seepage, and color of seepage. Provide flow rate estimates. Indicate condition of remedial measures.	
Imminent Breach Emergency	Severe Piping and Settlement. Large boils carrying material at an increasing rate. A vortex is identifiable in the reservoir.	Open all gates to lower pool levels as fast as possible. Locate upstream entrance and attempt to reduce flow. Place inverted filter over downstream seepage outlet. Install instrumentation to monitor pressures.	Size and location of the seepage area. Collect GPS coordinates of wet area. Document the date and time the seepage was discovered, location (station and range), approximate size, quantity of seepage, and color of seepage. Provide flow rate estimates. Indicate condition of remedial measures.	

EXAMPLE PROBLEM ASSESSMENT CHART

RESERVOIR WHIRLPOOL				
PROJECT CONDITION	**PROBLEM**	**CORRECTIVE ACTIONS**	**DATA TO REPORT TO DISTRICT OFFICE**	**NOTES**
Non-Emergency	Small whirlpool immediately upstream of intake tower or spillway gates with no evidence of unusual seepage downstream.	Observe periodically as directed by the Project Engineer. Document changes in conditions.	Size and location of whirlpool. Document downstream seepage conditions and signs of settlement. Does debris entering the whirlpool disappear or come back to the surface?	
Non-Breach Emergency	N/A	N/A	N/A	
Potential Breach Emergency	A vortex is noticed in the reservoir and associated with downstream seepage concerns.	Initiate controlled reservoir drawdown in accordance Water Control Manual. Attempt to plug upstream entrance by placing large rocks, construction material, debris, hay bales, bentonite, fencing, filter cloth, etc. into the upstream entrance.	Size and location of whirlpool. Document downstream seepage conditions and signs of settlement. Document type and amount of material used to plug upstream entrance.	
Imminent Breach Emergency	A whirlpool is causing piping within the embankment or abutment. Downstream seepage is increasing and muddy. Efforts to plug the vortex and control seepage have failed. The embankment and/or abutments are experiencing cracking and/or settlement.	Open all gates to lower pool levels as fast as possible. Continue to attempt to plug upstream entrance. Continue to attempt to control downstream seepage and piping.	Size and location of whirlpool. Document downstream seepage conditions and signs of settlement. Document type and amount of material used to plug upstream entrance.	

EXAMPLE PROBLEM ASSESSMENT CHART

SINKHOLE				
PROJECT CONDITION	PROBLEM	CORRECTIVE ACTIONS	DATA TO REPORT TO DISTRICT OFFICE	NOTES
Non-Emergency	Sinkhole found. Source easily linked to a known source that is not related to seepage.	Excavate area adjacent to sinkhole and reconstruct area to design specifications.	Size and location of the sinkhole. Flag area and collect GPS coordinates of sinkhole. Document the date and time the sinkhole was discovered, location (station and range), approximate depth, and source of sinkhole.	
Non-Breach Emergency	Sinkhole develops behind or closely adjacent to the stilling basin.	Excavate area adjacent to sinkhole and reconstruct area to design specifications.	Size and location of the sinkhole. Flag area and collect GPS coordinates of sinkhole. Document the date and time the sinkhole was discovered, location (station and range), approximate depth, and source of sinkhole.	
Potential Breach Emergency	(a) Sinkhole develops in the vicinity of previous or current seepage and piping concerns. (b) Sinkhole is located above the conduit.	(a) Attempt to remediate seepage concerns. Place riprap in sinkhole. (b) Close gates immediately. Inspect conduit for cracks or damage.	Size and location of the sinkhole. Flag area and collect GPS coordinates of sinkhole. Document the date and time the sinkhole was discovered, location (station and range), approximate depth, and source of sinkhole. provide amount of riprap placed. Provide description of conduit condition.	
Imminent Breach Emergency	N/A - Refer to Seepage Problem Assessment Chart	N/A - Refer to Seepage Problem Assessment Chart	N/A - Refer to Seepage Problem Assessment Chart	

EXAMPLE PROBLEM ASSESSMENT CHART

SLIDE ON THE EMBANKMENT				
PROJECT CONDITION	**PROBLEM**	**CORRECTIVE ACTIONS**	**DATA TO REPORT TO DISTRICT OFFICE**	**NOTES**
Non-Emergency	Shallow sloughing of topsoil or riprap. Slide does not threathen the embankment core or crest height. Cause of the slide is known and not related to seepage.	Excavate area adjacent to the slide and reconstruct area to design specifications. Read adjacent instrumentation.	Size and location of the slide. Flag area and collect GPS coordinates of slide. Document the date and time the slide was discovered, location (station and range), approximate depth, and source of slide. Provide adjacent instrumentation readings.	
Non-Breach Emergency	Small localized slide or longitudinal cracking. Crack has formed near the crest or on the embankment slope. The crack is open and there is a vertical offset.	Excavate area adjacent to the slide and reconstruct area to design specifications. Read adjacent instrumentation.	Size and location of the slide. Flag area and collect GPS coordinates of slide. Document the date and time the slide was discovered, location (station and range), approximate depth, length and width of cracking, and source of slide. Provide adjacent instrumentation readings. Indicate if the slide is progressing.	
Potential Breach Emergency	Slope failure threatens the embankment core. Deep seated failure mass encompasses the dam crest but remnant embankment maintains 10 feet of freeboard above the pool.	Initiate controlled reservoir drawdown in accordance Water Control Manual. Construct a stability berm on the downstream toe of the slide. Excavate area adjacent to the slide and reconstruct area to design specifications. Read adjacent instrumentation.	Size and location of the slide. Flag area and collect GPS coordinates of slide. Document the date and time the slide was discovered, location (station and range), approximate depth, length and width of cracking, and source of slide. Provide adjacent instrumentation readings. Indicate if the slide is progressing.	
Imminent Breach Emergency	Massive slope failure. Deep seated failure mass encompasses the dam crest and the remnant embankment is expected to slump below pool levels.	Open all gates to lower pool levels as fast as possible. Construct a stability berm on the downstream toe of the slide. Attempt to raise dam crest elevation. Attempt to relieve seepage pressures.	Size and location of the slide. Flag area and collect GPS coordinates of slide. Document the date and time the slide was discovered, location (station and range), approximate depth, length and width of cracking, and source of slide. Provide adjacent instrumentation readings. Indicate if the slide is progressing.	

EXAMPLE PROBLEM ASSESSMENT CHART

EMBANKMENT CRACKING				
PROJECT CONDITION	PROBLEM	CORRECTIVE ACTIONS	DATA TO REPORT TO DISTRICT OFFICE	NOTES
Non-Emergency	Discontinous crack. A minor crack in the crest that does not extend completely through the dam or minor cracking on the embankment surface.	None.	Size and location of the crack. Flag area and collect GPS coordinates of crack. Document the date and time the crack was discovered, location (station and range), and approximate width and depth.	
Non-Breach Emergency	Open and continuous crack. Crack extends completely through the dam. Pool level and forecast levels are below the base of the crack.	Trench or backfill crack after extents of crack are determined.	Size and location of the crack. Flag area and collect GPS coordinates of crack. Document the date and time the crack was discovered, location (station and range), and approximate width and depth.	
Potential Breach Emergency	Water leakage through crack. Crack extends through the dam and water is passing through the crack. Erosion of the crack can be prevented or leakage can be plugged.	Initiate controlled reservoir drawdown in accordance Water Control Manual. Plug upstream entrance of the crack. Seal crack.	Size and location of the crack. Flag area and collect GPS coordinates of crack. Document the date and time the crack was discovered, location (station and range), and approximate width and depth. Document if crack, water leakage, or erosion rates change.	
Imminent Breach Emergency	Crack erosion. Leakage intensity is increasing. Crack erosion will initate formation of a breach. Remedial measures have failed.	Open all gates to lower pool levels as fast as possible. Attempt to plug upstream entrance and seal the crack.	Size and location of the crack. Flag area and collect GPS coordinates of crack. Document the date and time the crack was discovered, location (station and range), and approximate width and depth. Document if crack, water leakage, or erosion rates change.	

EXAMPLE PROBLEM ASSESSMENT CHART

EROSION				
PROJECT CONDITION	PROBLEM	CORRECTIVE ACTIONS	DATA TO REPORT TO DISTRICT OFFICE	NOTES
Non-Emergency	Observed distress to riprap or revetments while under normal operating conditions.	Coordinate repair efforts with Project Engineer.	Size and location of the erosion. Flag area and collect GPS coordinates of erosion. Document the date and time the erosion was discovered, location (station and range), and approximate depth. Document estimated rate of change.	
Non-Breach Emergency	Embankment or stilling basin is displaced. Erosion is evident by settlement and caving.	Fill eroded area with bedding and riprap. Adjust outlet releases as necessary.	Size and location of the erosion. Flag area and collect GPS coordinates of erosion. Document the date and time the erosion was discovered, location (station and range), and approximate depth. Document estimated rate of change.	
Potential Breach Emergency	Embankment or stilling basin is displaced during flood conditions. Erosion is evident by settlement and caving. Erosion is progressive and threatens embankment stability.	Fill eroded area with bedding and riprap. Adjust outlet releases as necessary.	Size and location of the erosion. Flag area and collect GPS coordinates of erosion. Document the date and time the erosion was discovered, location (station and range), and approximate depth. Document estimated rate of change.	
Imminent Breach Emergency	Extensive erosion is threatening a slide that would result in a dam breach.	Fill eroded area with bedding and riprap. Adjust outlet releases as necessary.	Size and location of the erosion. Flag area and collect GPS coordinates of erosion. Document the date and time the erosion was discovered, location (station and range), and approximate depth. Document estimated rate of change.	

EXAMPLE PROBLEM ASSESSMENT CHART

STRUCTURAL DEFORMATION				
PROJECT CONDITION	**PROBLEM**	**CORRECTIVE ACTIONS**	**DATA TO REPORT TO DISTRICT OFFICE**	**NOTES**
Non-Emergency	Measureable movement is noted but not increasing. Seepage is minor. No evidence of earthen material movement.	None.	Size and location of the movement. Document the date and time the movement was discovered, location (station and range), and approximate width and depth of any cracking. Document any seepage flow.	
Non-Breach Emergency	Relative movement of monoliths, intake tower, or similar components. Separation from adjoining structure is measurable. Earthen material is discharging from the crack. Seepage is increasing and/or muddy.	Plug holes or cracks, if possible.	Size and location of the movement. Document the date and time the movement was discovered, location (station and range), and approximate width and depth of any cracking. Document any seepage flow.	
Potential Breach Emergency	Movement of gravity structures. Global movement, including foundations, or movement of large monoliths associated with a seepage concern.	Initiate controlled reservoir drawdown in accordance Water Control Manual. Plug and seal hole and/or crack.	Size and location of the movement. Document the date and time the movement was discovered, location (station and range), and approximate width and depth of any cracking. Document any seepage flow.	
Imminent Breach Emergency	N/A - Refer to Seepage Problem Assessment Chart	N/A - Refer to Seepage Problem Assessment Chart	N/A - Refer to Seepage Problem Assessment Chart	

EXAMPLE PROBLEM ASSESSMENT CHART

CONDUIT/PIPE CRACKING				
PROJECT CONDITION	PROBLEM	CORRECTIVE ACTIONS	DATA TO REPORT TO DISTRICT OFFICE	NOTES
Non-Emergency	Existing crack. Crack length and depth is minor. No earthen material is noticed. Seepage is constant and clear.	None.	Size and location of the crack. Document the date and time the crack was discovered, location (station and range), and approximate depth.	
Non-Breach Emergency	A new crack is noticed or an existing crack has changed. Earthen material is discharging from the crack. Seepage is increasing and muddy.	Plug holes or cracks, if possible.	Size and location of the crack. Document the date and time the crack was discovered, location (station and range), and approximate depth. Document seepage conditions.	
Potential Breach Emergency	Seepage is increasing and carrying embankment material. Abnormally muddy water is flowing from the conduit. Seepage is significant such that in impairs inpsection access.	Initiate controlled reservoir drawdown in accordance Water Control Manual. Plug and seal hole and/or crack.	Size and location of the crack. Document the date and time the crack was discovered, location (station and range), and approximate depth. Document seepage conditions.	
Imminent Breach Emergency	N/A - Refer to Seepage Problem Assessment Chart	N/A - Refer to Seepage Problem Assessment Chart	Size and location of the crack. Document the date and time the crack was discovered, location (station and range), and approximate depth. Document seepage conditions.	

EXAMPLE PROBLEM ASSESSMENT CHART

EMBANKMENT OVERTOPPING				
PROJECT CONDITION	**PROBLEM**	**CORRECTIVE ACTIONS**	**DATA TO REPORT TO DISTRICT OFFICE**	**NOTES**
	Reservior flooding. Forecasted pool levels within critical surveillance levels.	Follow Dam Surveillance Plan.	Follow Dam Surveillance Plan.	
Non-Breach Emergency	Reservior flooding. Forecasted pool levels within surcharge or spillway releases.	Follow Dam Surveillance Plan.	Follow Dam Surveillance Plan.	
Potential Breach Emergency	Pool levels encroach into freeboard zone. Erosion of crest and/or downstream embankment from seepage and/or wave overwash.	Open all gates to lower pool levels as fast as possible. Attempt to armor and raise crest. Utilize filter fabric to stabilize sheet flow on downstream embankment and reduce erosion. Use sandbags as needed.	Follow Dam Surveillance Plan.	
Imminent Breach Emergency	Flow over dam causing severe erosion of crest and downstream slope.	Open all gates to lower pool levels as fast as possible. Attempt to armor and raise crest. Utilize filter fabric to stabilize sheet flow on downstream embankment and reduce erosion. Use sandbags and jersey barriers to increase crest height.	Follow Dam Surveillance Plan.	

EXAMPLE PROBLEM ASSESSMENT CHART

EARTHQUAKE				
PROJECT CONDITION	PROBLEM	CORRECTIVE ACTIONS	DATA TO REPORT TO DISTRICT OFFICE	NOTES
Non-Emergency	Tremor is felt at the project.	None.	Follow Dam Surveillance Plan.	
Non-Breach Emergency	Liquefaction. A significant earthquake has occurred at the project and there is evidence of foundation liquefaction (embankment cracking, bulging, settlement, sloughing, or displacement).	None.	Follow Dam Surveillance Plan.	
Potential Breach Emergency	Earthquake and slope failure. Liquefaction has initiated a slope failure with deep seated movement.	Initiate controlled reservoir drawdown in accordance Water Control Manual. Construct a stability berm on the downstream toe of the slide. Excavate area adjacent to the slide and reconstruct area to design specifications. Read adjacent instrumentation.	Follow Dam Surveillance Plan.	
Imminent Breach Emergency	N/A - Refer to Slide Problem Assessment Chart	N/A - Refer to Slide Problem Assessment Chart	N/A - Refer to Slide Problem Assessment Chart	

EXAMPLE PROBLEM ASSESSMENT CHART

TAINTER GATE				
PROJECT CONDITION	PROBLEM	CORRECTIVE ACTIONS	DATA TO REPORT TO DISTRICT OFFICE	NOTES
Non-Emergency	Tainter gate will not open or close but discharges can be controlled within the reservoir operating regulations under current conditions/forecasts.	If the gate will not open or close due to a burned out motor, use patch cord method described in O&M Manual. If electrical service is out, use emergency diesel generator to run motor. Observe constantly until flow is controlled. If gate is stuck, look for deformations in the structure.	Follow Dam Surveillance Plan.	
Non-Breach Emergency	Tainter gate will not open. Elevation expected to rise above flood control pool unless discharges can be made.	Consult with OD and ED regarding traouble shooting, alternative operation, water control, and forecasts.	Follow Dam Surveillance Plan.	
	Tainter gate failure, resulting in uncontrolled release that violates the reservoir operating plan.	Incidate EAP accordingly and contact downstream stakeholders. Observe situation constantly until pool is lowered to a point repairs can be safetly made to the gate.	Follow Dam Surveillance Plan.	
Potential Breach Emergency	Tainter gate will not open. Elevation expected to rise above surcharge pool unless discharges can be made.	Consult with OD and ED regarding traouble shooting, alternative operation, water control, and forecasts.	Follow Dam Surveillance Plan.	
Imminent Breach Emergency	Tainter gate will not open. Elevation expected to rise above top of dam unless discharges can be made.	Consult with OD and ED regarding traouble shooting, alternative operation, water control, and forecasts.	Follow Dam Surveillance Plan.	

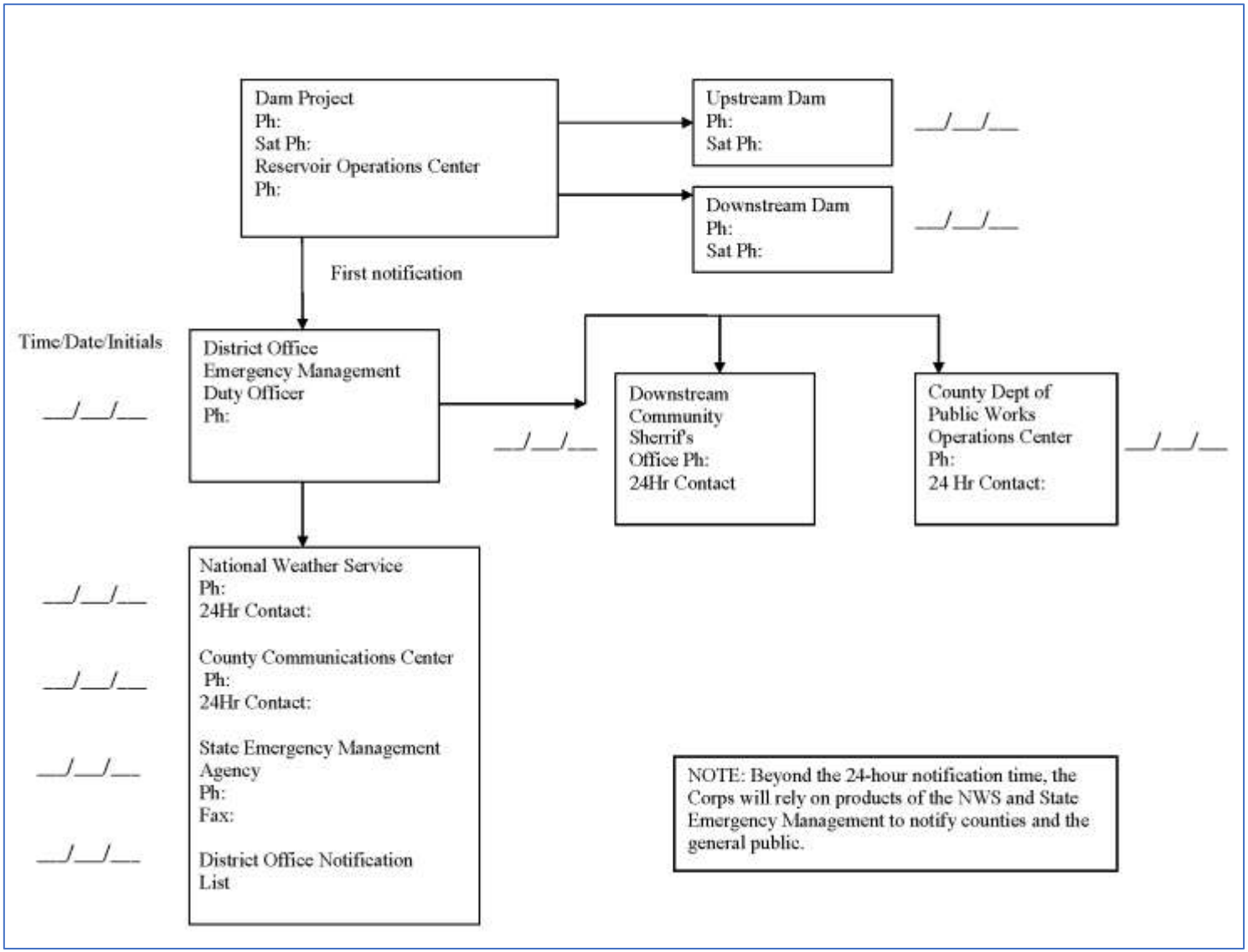


Figure E-1. Example Notification Flowchart

Appendix F
USACE Inundation Map Standard

1. Roles and Responsibilities. The USACE Flood Inundation Map Database maintained by the MMC MCX is used to disseminate USACE-produced inundation maps to standard USACE and other federal inundation map sources.

a. Districts and MSCs.

(1) Post locally produced inundation maps to the USACE Flood Inundation Map Database.

(2) Use local capabilities such as the Corps Water Management System to produce inundation maps during flood events.

(3) Lead local and regional efforts to disseminate and communicate availability of inundation map products.

b. MMC-MCX.

(1) Maintain the USACE Flood Inundation Map Database,

(2) Produce EAP maps for USACE projects and post them to the USACE Flood Inundation Map Database once reviewed by districts unless notified that the maps are restricted from public release,

(3) Support districts and MSCs in producing inundation maps during flood events upon request through the capabilities of the USACE FIM Cadre,

(4) Maintain linkages between the USACE Flood Inundation Map Database and standard USACE inundation map sources such as the NID, NLD, and Access to Water.

c. HQ USACE.

(1) Lead national efforts to disseminate and communicate availability of inundation map products to other federal agencies.

(2) Make inundation maps broadly available throughout USACE via the UCOP.

2. Example. The following pages provide an example of the USACE inundation map standard. Further documentation of the map standard and mission of the USACE FIM Cadre is provided in references A-19 and A-28.

PURPOSE AND USE

These inundation maps have been prepared in accordance with the Federal Guidelines for Dam Safety (FEMA Publication 64, FEMA 2004) to identify and delineate areas that could be affected by flooding in the event of a dam failure. The inundation maps support the dam owner and emergency management officials to facilitate timely notification and evacuation of areas affected by a dam failure or flood condition.

DISCLAIMER

This map has been compiled using the best information available and is believed to be accurate, however, its preparation required many assumptions. Actual conditions during a dam failure may vary from those assumed, so the accuracy cannot be guaranteed. The limits of flooding shown and the temporal data should only be used as a guideline for emergency planning and response actions. Actual areas inundated and inundation timing will depend on specific flooding and failure conditions and may differ from the areas shown on the maps.

MAPPING NOTES

The coordinate system used in the preparation of this map is Universal Transverse Mercator (UTM), horizontal datum is NAD 83, GRS80 spheroid. Differences in datum, spheroid or projection used in the production of map sheets for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of these maps. Flood elevations are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. Accuracy of the map scales for varying paper sizes is valid only if printed according to specification guidelines.

READING USNG LOCATIONS

The primary coordinate system displayed in these maps is the U.S. National Grid (USNG). A USNG location is composed of the world Grid Zone Designation (GZD), the two letter 100,000m grid ID, and the grid coordinate. To read USNG locations from these maps, locate the GZD and grid ID values at the bottom of each sheet. Then use the two-digit UTM principal digits displayed on the map. Ignore the small UTM superscript numbers that are provided for reference purposes. USNG coordinate strings can be 4, 6, 8, or 10 digits long; having coordinate precision of 1,000m, 100m, 10m or 1m. The left half of the coordinate string is the easting value and the right half is the northing value. The first two easting and northing digits should be the principal UTM digits as displayed on the map. Additional digits refine the accuracy of the coordinate pair. Additional resources pertaining to the USNG can be found at http://www.fgdc.gov/usng/index.html

INUNDATION ELEMENTS

*See Disclaimer

Normal High Pool Inundation - area inundated by dam failure occurring when pool elevation is at the 10% exceedance duration pool

Maximum Pool Inundation Area - area inundated by dam failure occurring when pool elevation is at the top of the impounding structure

Failure Wave Arrival Time (hours) - time from dam break initiation until increased flow due to dam break arrives at a given location along the stream centerline; measured for the maximum scenario

Reference Mile - mileage downstream from the study dam

Cross Section - labeled by letter designator

NATIONAL LEVEE DATABASE ELEMENTS

Levee Station Points - locations along a levee defined by the measured distance along the levee

Closure Structure Lines - structures along a levee designed to be closed in the event of flooding

Levee Centerlines - surveyed centerline of earthen levee

Floodwall Lines - surveyed location of floodwall segments

BASE MAP ELEMENTS

BOUNDARIES

- 100,000 Meter USNG Grid
- Municipality Boundary
- County Boundary
- State Boundary
- International Boundary

TRANSPORTATION

- Minor Roads
- State Highway or Major Road
- Interstate or US Highway
- Railway Lines

BASE MAP ELEMENTS

INFRASTRUCTURE LOCATIONS

- USACE Dams
- Non-USACE Dams
- Schools
- Colleges and Universities
- Broadcast Communications
- Airports
- Heliports
- Law Enforcement
- Correctional Facilities
- Fire Stations - Fire Only
- Fire Stations - Fire/EMS
- Emergency Medical Services
- Hospitals - General
- Wastewater Treatment Plants
- Potable Water Treatment
- Natural Gas Storage
- Petroleum Bulk Stations and Terminals
- Chemical Industries
- Nuclear Fuel Manufacturing
- Electric Substations
- Fossil Fuel Electric Power Generation and Other Power Generation
- Nuclear Electric Power Generation
- Hydroelectric Power Generation
- Intermodal Shipping Facilities

INUNDATION ELEMENTS were created from the modeling effort for this study. Floodplain boundaries (Normal High Pool and Maximum Inundation Areas) were computed using one dimensional HEC-RAS software from the USACE Hydrologic Engineering Center unless otherwise noted. More information regarding modeling methods used in this study is provided in the study report.
Date of model creation: Month YEAR.
Model Approved by: [Model Technical Lead], P.E., MMC Technical Lead

Reference mile points indicate mileage downstream from the study dam along the modeled stream centerline.

FAILURE WAVE ARRIVAL TIME
Failure wave arrival is calculated as the time at which the difference between the hydrograph from the failure simulation and the hydrograph from the corresponding non-failure simulation exceeds 2 feet. Failure wave arrival time points denote the elapsed time following initial dam breach, until increased flow directly resulting from dam breach arrives at a given location.

FAILURE WAVE DATA TABLES reflect data from model output at locations on the map sheet. For 1D HEC-RAS models, data is calculated at the cross section shown on the map, these cross sections are selected from the model cross sections to represent the flow on each map sheet that intersects with the model centerline. For 2D models, data included in the failure wave data table reflect the model output at the model element location denoted on the maps by the lettered point.

READING FACING PAGE GRAPHS
The graphs located on the pages adjacent to map sheets depict the inundation along the stream centerline as interpolated between model cross sections. The areas on the graphs are created at specific times throughout model run-time as shown in the legend and show the progression of the failure wave downstream from left to right on the graph.

The X axis of the graphs represents reference miles, or miles along the stream centerline downstream of the study dam. Water surface elevation is shown on the Y axis.

The gray polygon (Flow at Dam Break) represents the water surface at the time of failure, not at the initial timestep of the model. It may represent flooding caused by increased releases prior to failure.

Multiple sheets may be represented on the graph, dotted vertical lines represent the sheet boundaries as they intersect the stream centerline. All lettered cross sections that appear in the maps also appear in the profile graphs at the reference mile location they occupy in the maps.

Structure points that appear on the graphs do not depict actual real-world structures and are only used to depict the density of structures at a given reference mile and elevation range.

Infrastructure points shown on the graphs are shown at approximate elevations and reference miles (distance from the stream centerline is not taken into account).

BASEMAP ELEMENTS
The source of most BASEMAP ELEMENTS is USACE CorpsMap data, which is a compilation of prominent nationwide datasets. Below are the nationwide datasets used for the source of base map data and the layers extracted from each:

-Homeland Security Infrastructure Program (HSIP): Airports, Broadcast Communications, Chemical Industries, Colleges and Universities, Correctional Facilities, Electric Substations, Emergency Medical Services, Firestations, Fossil Fuel Electric Power Generation and Other Power Generation, Heliports, Hospitals, Hydroelectric Power Generation, Intermodal Shipping Facilities, Law Enforcement, Natural Gas Storage, Nuclear Electric Power Generation, Nuclear Fuel Manufacturing, Pipelines, Petroleum Bulk Stations and Terminals, Schools, Wastewater Treatment Plants, Railways and Municipality Boundaries.

-Environmental Systems Research Institute (ESRI): County, State, and International boundaries.

-FEMA Hazus data 2012 release: Potable Water Facilities.

-USACE AGC National Inventory of Dams (NID): USACE Dams, and Non-USACE Dams.

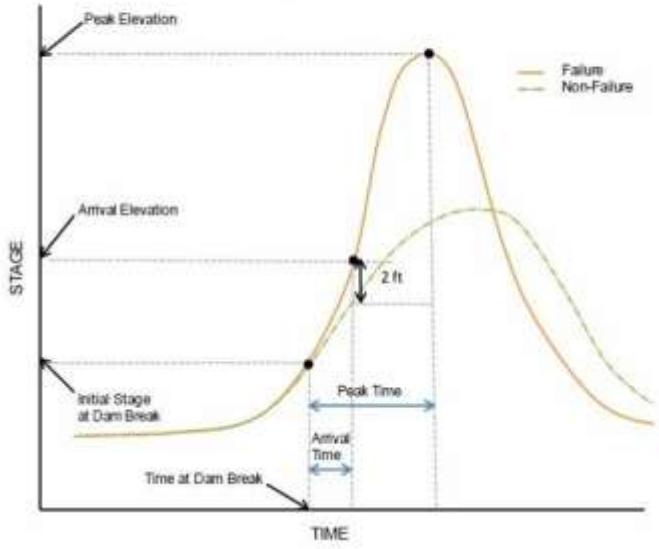
-National Levee Database (NLD): Closure Structure Lines, Floodwall Lines and Levee Centerlines.

-National Geospatial-Intelligence Agency (NGA): MGRS/USNG Grid

-United States Geological Survey (USGS): River Gages

-SHEET INDEX map sheets are derived from the USGS 7.5' Quadrangle Index.

Calculation of Failure Wave Data Tables Example



ABC Dam Pertinent Project Data

Physical Data (ft, NAVD 88)						
Dam Type	Earth					
Dam Length (ft)	2,100					
Top of Dam Elevation	430.3					
Spillway Crest Elevation	412.7					
Spillway Type	Uncontrolled					
Spillway Width (ft)	170					
No. of Spillway Gates & Dimensions	None					
Outlet Structure Description	Slide/Sluice Gate (3 - 3.5'x7' Gates, 1 - 8' Circular Conduit)					
Hydrology (ft, NAVD 88)						
Drainage Area (sq mi)	62					
PMF Pool Elevation	429.6					
Max. Historic Pool Elevation	415.1 (5/7/1992)					
Hydrologic Loading Condition	**Antecedent Elevation (ft, NAVD 88)**	**Peak Elevation (ft, NAVD 88)**	**Inflow Hydrograph**	**Peak Inflow (cfs)**	**Peak Failure Outflow (cfs)**	**Storage (acre-ft)**
Maximum High Pool	418.7	430.1	PMF	80,000	1,002,100	130,000
Normal High Pool (10% Duration)	355.3	345.4	460 cfs	460	11,100	1,500
Vertical Datum Adjustment (ft NGVD 29 to (ft NAVD 88))	-0.6					

STUDY AREA SPECIFIC MAPPING NOTES FOR ABC DAM

ABC Dam is positioned 25 miles southeast of City Z, or 90 miles south of City Y on the east side of the state. The project operates for flood regulation, irrigation, navigation, and downstream water quality.

ABC Dam is a major tributary of River 1, and flows into the main stem from the north, which is approximately 18 river miles upstream of River 2.

The 2013 MMC Dam XYZ model was used as the base model, with geometric updates to the River 1 reach, based on newer overbank and channel data.

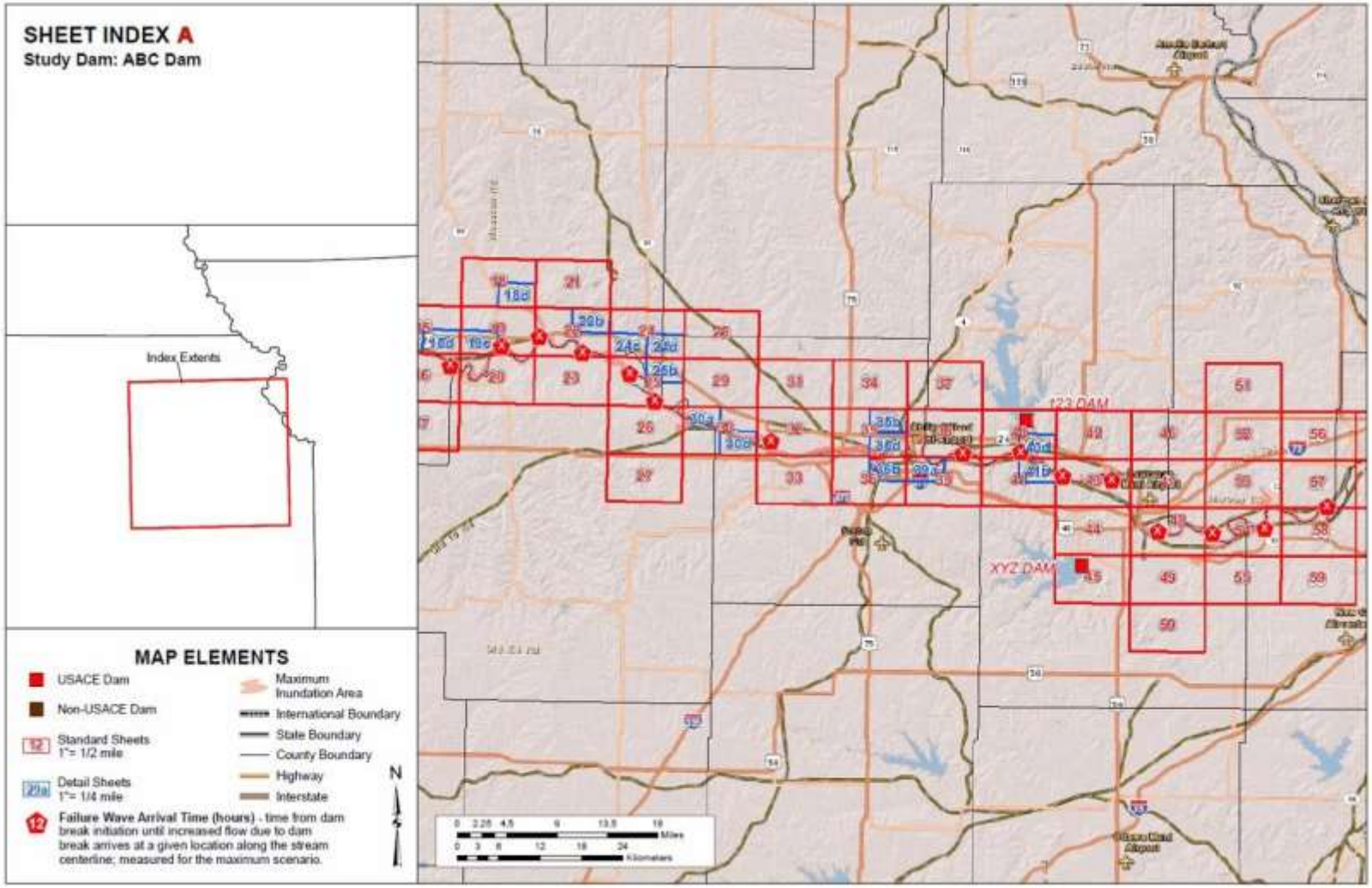
Due to the very wide one-dimensional cross sections in the model areas on the west side of City Z show inundation prior to overland flow coming from River 3. These areas will likely compute consequences not directly attributable to high River 2 flows and stages for certain MMC simulations. For dam failure simulations above the normal high pool failure, these same areas are appropriately inundated.

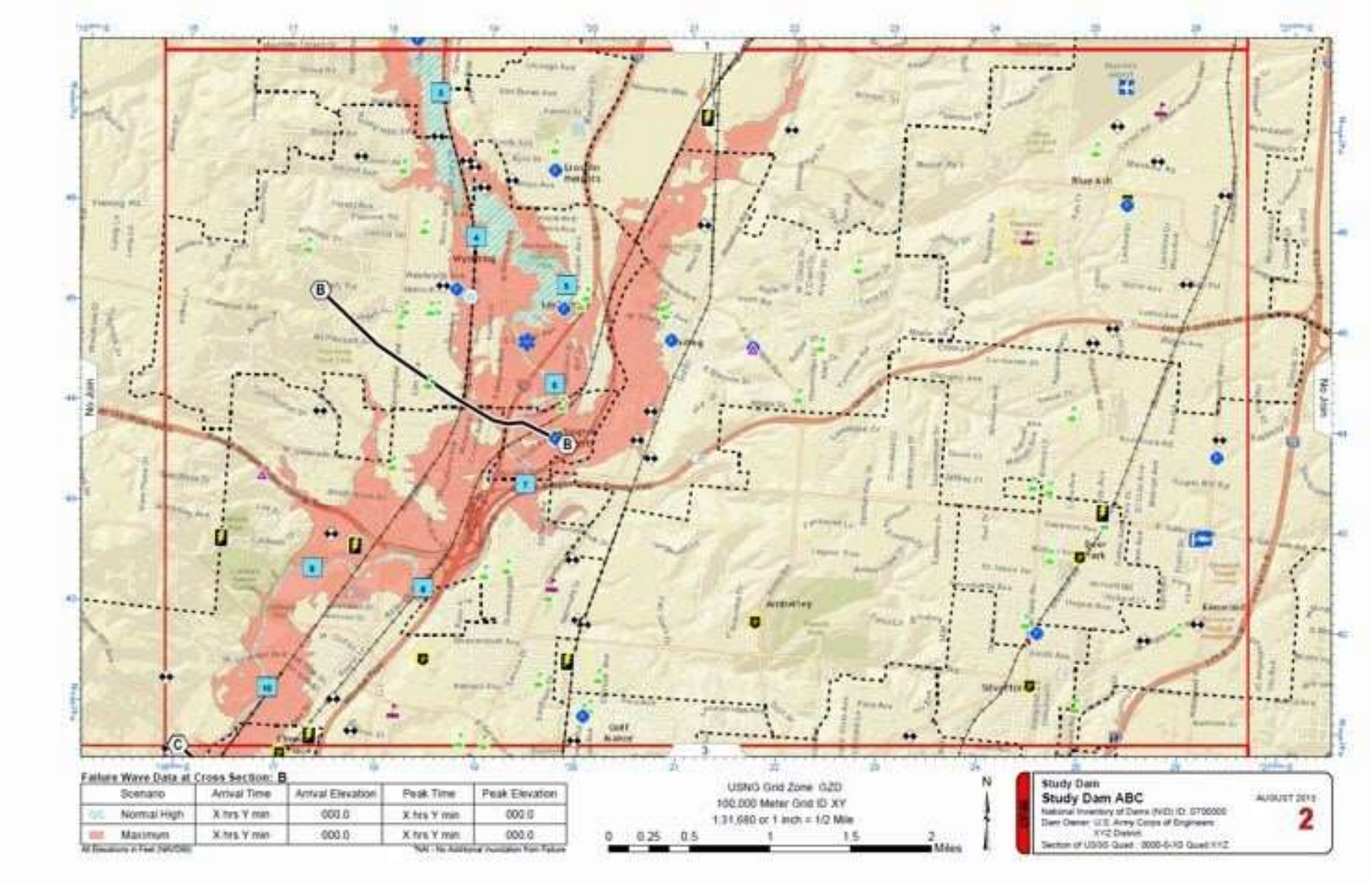
Downstream residual flows are required by the model for computational purposes. For all but the maximum high pool scenario, an estimate of the average annual flow was used, provided that it did not exceed channel capacity. For the maximum high pool scenario, the inflows from the same three modeled reaches were increased to estimate the highest non-damaging flows along each reach, as indicated in the water control manual.

ABC Dam - NIDID

Cross Section	RAS Model			Normal High				Max High					
Letter	RiverCode	ReachCode	Station	Arrival Time	Arrival Elevation	Peak Time	Peak Elevation	Arrival Time	Arrival Elevation	Peak Time	Peak Elevation	Sheet No.	Reference Mile
A	River 1	Reach 1	3.11	0 hrs 31 min	603.6	1 hrs 9 min	649.1	0 hrs 33 min	622.2	1 hrs 9 min	652.1	1	3.82
B	River 2	Reach 2	197.09	1 hrs 5 min	533.7	1 hrs 34 min	567.5	1 hrs 0 min	549.4	1 hrs 34 min	570.4	2	8.86
C	River 2	Reach 2	191.75	1 hrs 43 min	478.6	2 hrs 15 min	511.4	1 hrs 34 min	494.7	2 hrs 9 min	515.6	3	14.24
D	River 3	Reach 3	184.43	2 hrs 36 min	428.2	5 hrs 24 min	448.0	2 hrs 49 min	442.5	5 hrs 15 min	451.2	4	20.68
E	River 3	Reach 3	178.89	3 hrs 41 min	389.3	10 hrs 4 min	400.1	6 hrs 36 min	399.9	10 hrs 0 min	403.7	6	26.22
F	River 3	Reach 3	174.88	9 hrs 22 min	363.9	14 hrs 15 min	374.3	9 hrs 59 min	375.0	13 hrs 0 min	377.3	8	30.31
G	River 3	Reach 3	171.83	10 hrs 3 min	336.1	17 hrs 49 min	352.6	12 hrs 24 min	354.3	15 hrs 15 min	356.0	11	33.39
H	River 3	Reach 3	165.01	11 hrs 32 min	305.0	22 hrs 39 min	319.2	15 hrs 19 min	321.5	19 hrs 30 min	324.4	14	39.27
I	River 3	Reach 3	161.46	12 hrs 33 min	287.0	25 hrs 4 min	299.1	18 hrs 28 min	301.5	22 hrs 4 min	302.6	15	43.83
J	River 3	Reach 3	153.97	13 hrs 55 min	265.4	28 hrs 15 min	274.9	20 hrs 27 min	277.5	24 hrs 0 min	278.7	18	51.35
K	River 3	Reach 3	148.42	18 hrs 5 min	245.3	30 hrs 30 min	249.9	22 hrs 2 min	252.6	26 hrs 19 min	254.6	19	57.91
L	River 3	Reach 3	141.36	18 hrs 55 min	227.6	32 hrs 45 min	233.7	24 hrs 39 min	236.3	28 hrs 9 min	237.3	21	63.98
M	River 3	Reach 3	137.47	21 hrs 28 min	215.9	36 hrs 0 min	222.9	25 hrs 11 min	225.8	30 hrs 0 min	228.3	23	67.89
N	River 3	Reach 3	132.26	22 hrs 44 min	210.3	37 hrs 39 min	217.6	27 hrs 53 min	220.3	31 hrs 24 min	221.4	25	73.06
O	River 3	Reach 3	127.48	27 hrs 7 min	201.5	39 hrs 45 min	206.3	28 hrs 17 min	209.3	33 hrs 39 min	211.5	26	77.85
P	River 3	Reach 3	124.08	29 hrs 2 min	191.3	42 hrs 54 min	199.0	28 hrs 56 min	202.8	35 hrs 34 min	207.3	29	82.25
Q	River 3	Reach 3	118.03	29 hrs 14 min	174.3	45 hrs 54 min	188.0	30 hrs 41 min	192.2	37 hrs 39 min	196.7	28	88.30
R	River 3	Reach 3	114.11	30 hrs 17 min	172.5	47 hrs 4 min	183.8	31 hrs 47 min	188.1	38 hrs 15 min	191.5	30	91.22
S	River 3	Reach 3	109.99	32 hrs 39 min	169.0	48 hrs 15 min	176.3	32 hrs 42 min	180.5	40 hrs 9 min	183.3	32	94.34
T	River 3	Reach 3	107.08	34 hrs 35 min	164.5	49 hrs 54 min	170.8	34 hrs 58 min	174.8	41 hrs 19 min	177.7	33	98.25

*NAI No additional inundation


SHEET INDEX A
Study Dam: ABC Dam
Index Extents
MAP ELEMENTS
USACE Dam
Non-USACE Dam
Standard Sheets 1"= 1/2 mile
Detail Sheets 1"= 1/4 mile
Failure Wave Arrival Time (hours) - time from dam break initiation until increased flow due to dam break arrives at a given location along the stream centerline; measured for the maximum scenario.
Maximum Inundation Area
International Boundary
State Boundary
County Boundary
Highway
Interstate
N
123 DAM
XYZ DAM


Failure Wave Data at Cross Section: B
Scenario
Arrival Time
Arrival Elevation
Peak Time
Peak Elevation
Normal High
X hrs Y min
000.0
X hrs Y min
000.0
Maximum
X hrs Y min
000.0
X hrs Y min
000.0
USNG Grid Zone: 0ZD
100,000 Meter Grid ID: XY
1:31,680 or 1 inch = 1/2 Mile
0 0.25 0.5 1 1.5 2 Miles
N
Study Dam
Study Dam ABC
AUGUST 2019
2

AAR	After-Action Review
AR	Army Regulation
AOR	Area of Responsibility
CAT	Crisis Action Team
CMT	Crisis Management Team
CoP	Community of Practice
DHS	Department of Homeland Security
DoDM	Department of Defense Manual
DSAC	Dam Safety Action Classification
DSO	Dam Safety Officer
DSPM	Dam Safety Program Manager
DSPMT	Dam Safety Program Management Tool
DTO	Daily Task Order
EAP	Emergency Action Plan
EC	Engineer Circular
EOC	Emergency Operations Center
EM	Emergency Manager
EMS	Emergency Medical Services
ENGLINK	Engineering Link
EP	Engineer Pamphlet
ER	Engineer Regulation
FEMA	Federal Emergency Management Agency
FIM	Flood Inundation Mapping
FOUO	For Official Use Only
GIS	Geographic Information System
HH&C	Hydrologic, Hydraulic & Coastal
HIFLD	Homeland Infrastructure Foundation-Level Data
HQ	Headquarters
HSEEP	Homeland Security Exercise and Evaluation Program

IH	Intermediate High
IWRSS	Integrated Water Resources Science and Services
LSAC	Levee Safety Action Classification
LSO	Levee Safety Officer
LSPM	Levee Safety Program Manager
MH	Maximum High
MMC MCX	Modeling, Mapping, and Consequences Production Center
MSC	Major Subordinate Command
NID	National Inventory of Dams
NIDID	National Inventory of Dams Identification Number
NLD	National Levee Database
NWS	National Weather Service
O&M	Operations and Maintenance
OPM	Operations Project Manager
PA	Periodic Assessment
PAS	Planning Assistance to States
POC	Point of Contact
PL	Public Law
SDSFIE	Spatial Data Standards for Facilities, Infrastructure, and Environment
SIR	Serious Incident Report
SITREP	Situational Report
TAS	Top of Active Storage
TOL	Top of Levee
TTX	Tabletop Exercise
UCOP	USACE Common Operating Picture
UOC	USACE Operations Center
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code