



**US Army Corps  
of Engineers®**



**FEMA**



# **Flood Protection Structure Accreditation Task Force: Final Report**

November 2013



FEMA

## Message from the Administrator and the Assistant Secretary of the Army (Civil Works)

The United States Army Corps of Engineers (USACE) and the Federal Emergency Management Agency (FEMA) are pleased to present this report, titled “Flood Protection Structure Accreditation Task Force: Final Report.” This Final Report was prepared jointly by our two agencies in response to the requirements of section 100226(d)(2) of Public Law 112-141, the Moving Ahead for Progress in the 21st Century Act (more commonly referred to as “MAP-21”), and serves as the final report required by that section.

This Final Report describes actions that USACE and FEMA will take to align processes and information related to USACE levee inspections and assessments and the National Flood Insurance Program levee accreditation requirements. It also provides Task Force recommendations for future changes to further reduce risks to life safety and to continue progress towards more comprehensive alignment between USACE and FEMA.

As required by section 100226(d), we are providing this Final Report to the following congressional committees:

- Senate Committee on Banking, Housing and Urban Affairs;
- Senate Committee on Environment and Public Works;
- House Committee on Financial Services;
- House Committee on Transportation and Infrastructure; and
- House Committee on Natural Resources.

Any inquiries related to this Final Report may be directed to Ms. Jennifer Greer, Chief of USACE Future Directions Branch at 202-761-4113.

Jo-Ellen Darcy  
Assistant Secretary of the Army – Civil Works

Date:

JUL -2- 2013

W. Craig Fugate  
Administrator  
Federal Emergency Management Agency

Date: NOV 4 2013

## Executive Summary

The U.S. Army Corps of Engineers (USACE) and the Federal Emergency Management Agency (FEMA) are pleased to deliver this Final Report of the Flood Protection Structure Accreditation Task Force in accordance with Section 100226 of Public Law (P.L.) 112-141, due July 2013. The primary charge of the Task Force was to align agency processes so information collected for either program can be used interchangeably and to align the information and data collected by or for the USACE Inspection of Completed Works (ICW) program so it is sufficient to satisfy National Flood Insurance Program (NFIP) accreditation requirements specified in 44 Code of Federal Regulations (CFR) 65.10.

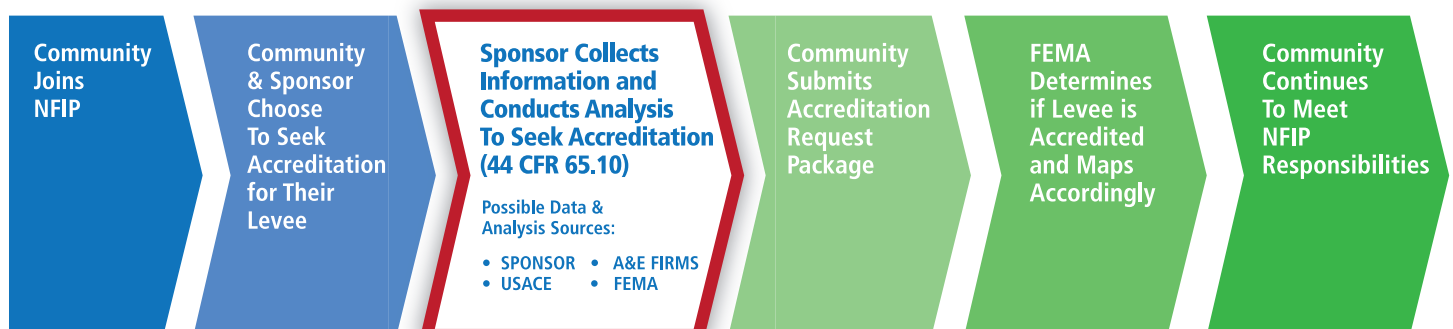
### Background & Context

**USACE LEVEE SAFETY PROGRAM AND THE FEMA NATIONAL FLOOD INSURANCE PROGRAM ARE FUNDAMENTALLY DIFFERENT PROGRAMS (NFIP).** The USACE Levee Safety Program and FEMA's National Flood Insurance Program have

different authorities and purposes. Both agencies are concerned with life safety, reduction of property damage due to floods and communicating flood hazards and risks. However their respective authorities and programs have different missions and therefore serve the public in different ways. These differences are evident in the methods used for collecting information and conducting analysis related to levees. It would be beneficial to levee sponsors to have a common set of standards.

**LOCAL COMMUNITIES AND LEVEE SPONSORS ARE IMPORTANT PARTNERS IN LEVEE SAFETY.** Current law and agency (USACE and FEMA) policies recognize that in order for communities to effectively manage their flood risk, levee sponsors and communities must play a key leadership role. Local sponsors ensure that levees are properly operated and maintained, implement emergency response activities, and make sound floodplain management decisions. Because the integration of these activities are all needed to manage flood risk in a dynamic

## STEPS FOR LEVEE ACCREDITATION FOR A NFIP-PARTICIPATING COMMUNITY



environment, the Task Force developed actions that ensure sponsors and local governments retain a lead role throughout the accreditation process. The figure on page i depicts the major steps and who must take each step in order for a levee to meet and maintain accreditation. The Task Force charge focuses on activities related to the highlighted step in the middle of the figure, *Sponsor Collects Information and Conducts Analysis to Seek Accreditation (44 CFR 65.10)*.

**SCOPE OF THE TASK FORCE: LEVEES COVERED BY THIS EFFORT.** Congress specifically requested that the Task Force focus on information and data collected through the USACE ICW program. ICW levees are typically constructed by USACE and locally operated and maintained once construction is complete. *Levees in the ICW program account for approximately 65 percent (9,500 miles) of the USACE inventory or about 1,400 individual levee systems.* It is important to note that this is only a portion of the 30,000 miles of levees that FEMA has identified in the Mid-Term Levee Inventory through their recent mapping effort. Actions identified by this Task Force will not address the data and informational needs for all levees in the nation that may be seeking accreditation under the NFIP.

*Of the 9,500 miles of ICW levees, approximately 7,800 miles (82%) are currently not accredited by FEMA.* Non-accreditation can be for a variety of reason other than inadequate data and analysis. Some examples include: levee deficiencies, the levee design is lower than the 1% annual

chance exceedance (ACE), or the levee sponsor has not yet decided to pursue accreditation. The exact number of levees for which improved alignment of USACE and FEMA programs regarding data and analysis for levee accreditation is difficult to ascertain. The table below shows the accreditation status of the levees in the ICW program. It can be assumed that levees in the Provisionally Accredited Levee (PAL) process would benefit from data and analysis related to this effort.

## Key Task Force Actions and Recommendations

Routine USACE activities such as inspections and screenings do not collect sufficient information to meet all the requirements for NFIP accreditation because of their purpose and limited scope. USACE risk assessments meet the data needs for a NFIP accreditation decision.

**USACE WILL REVISE ITS RISK ASSESSMENT METHODOLOGY IN ORDER TO ASSESS LEVEE PERFORMANCE FOR VARIOUS LOADINGS INCLUDING THE 1% ANNUAL CHANCE EXCEEDANCE AND USE THIS INFORMATION FOR ACCREDITATION PURPOSES.** The USACE risk assessment methodology will be modified to meet the requirements of Section 100226—to collect data and information that is sufficient to meet NFIP accreditation requirements. The initial step for implementing this modification will be to specifically include analyzing the likelihood the levee system will be able to perform at the 1% ACE event. The NFIP regulations defining

**ICW LEVEES AND THEIR ACCREDITATION STATUS, MAY 2013**

ACCREDITATION STATUS	LEVEE SYSTEM COUNT	LEVEE MILES	NUMBER OF COMMUNITIES
Accredited	70	400	75
In PAL (Accredited)	150	1300	100
Not Accredited	1180	7800	610
<b>TOTAL</b>	<b>1400</b>	<b>9500</b>	<b>785</b>

Please note: The PAL (Provisionally Accredited Levee) designation for a levee system is used when the levee system was previously accredited on an effective Flood Insurance Rate Map and FEMA is awaiting data and documentation that will demonstrate the levee system's compliance with 44 CFR 65.10 of the NFIP regulations.

**NFIP REQUIREMENTS AND RELATION TO USACE ACTIVITIES**

NFIP REQUIREMENTS (44 CFR 65.10)		COMPLIANCE CAN BE DETERMINED THROUGH		
CFR CRITERIA CATEGORY	CFR CRITERIA SUBCATEGORY	USACE INSPECTION	USACE SCREENING	USACE RISK ASSESSMENT
Design Criteria	Freeboard (levee height)	NO	RARELY	YES
	Closure devices for all openings	NO	RARELY	YES
	Embankment protection	NO	RARELY	YES
	Embankment and foundation stability	NO	RARELY	YES
	Settlement	NO	RARELY	YES
	Interior drainage	NO	NO	AS APPROPRIATE*
Operation Plans	Closures	YES	YES	YES
	Interior drainage systems	YES	YES	YES
Maintenance Plans		YES	YES	YES

\*Interior Drainage. Though the accreditation requirement for interior drainage may not be covered during a USACE risk assessment, USACE and FEMA will ensure the data needed to address interior drainage will be collected.

accreditation requirements, 44 CFR 65.10, require detailed engineering analysis. This detailed methodology cannot be fully met by USACE levee inspections or screenings, but can be met through a USACE risk assessment. Risk assessments integrate the analytical methods of traditional engineering and risk-based analysis along with the professional judgment of engineers, review boards, and decision makers in determining reasonable actions to reduce risk. The information available from a risk assessment helps communities and sponsors target investments and risk reduction activities where they are most needed. Risk assessments are also comparable in cost to existing estimates for accreditation data collection and analysis for 44 CFR 65.10 which demonstrates a comparable level of rigor and analysis.

USACE prioritizes where and when it performs a risk assessment of ICW levees based on areas of high life safety risk. The number of risk assessments conducted each year is very limited and will likely not coincide with locations that have an accreditation need. Risk assessment methodologies will be completed by the end of fiscal year 2013.

**USACE WILL REVISE ITS LEVEE INSPECTION AND SCREENING PROCESSES TO BE MORE USEFUL TO SPECIFIC REQUIREMENTS OF 44 CFR 65.10.** The USACE activity that is the most familiar to stakeholders is the regular visual levee inspection and is typically the activity that is assumed sufficient enough for accreditation purposes. However, the requirements of 44 CFR 65.10, which include a detailed engineering analysis, go well beyond the USACE inspection requirements. Screenings are currently being performed on all levees within USACE authorities to support an initial, risk-informed classification of the portfolio and set priorities for more detailed analysis. USACE will revise its inspection and screening processes to identify what and when specific data collected by these activities can be used to fulfill specific, but not all, accreditation requirements and how this information will be communicated to the levee sponsor in a manner that they can use in an accreditation package to FEMA. Due to pending litigation, timeframe for revisions to the inspection process is unknown. Revisions to the screening process will be completed by the end of calendar year 2013.

The table above shows a high level crosswalk of the relationship between the 44 CFR 65.10 criteria and what can be determined with information from three USACE activities that are conducted on ICW levees: inspection, screening and risk assessment. For more information on the details of the requirements under 44 CFR 65.10, refer to *Appendix B: Mapping of Areas Protected by Levee Systems (44 CFR 65.10)*.

**TASK FORCE RECOMMENDS CHANGES TO THE NATIONAL FLOOD INSURANCE PROGRAM TO ACHIEVE ALIGNMENT.** In the current NFIP when levees are accredited, the requirements for mandatory flood insurance and floodplain management are removed. This can result in increased consequences as development in the floodplain intensifies. The Task Force may submit for FEMA consideration—as they implement the provisions in the Biggert-Waters Flood Insurance Reform Act of 2012—the following recommendations that are intended to communicate risks posed by levees, and improve alignment of USACE and FEMA's programs toward a common risk-informed approach.

1. Adopt a risk-informed based framework for levee accreditation;
2. Require flood warning, preparedness, and evacuation plans as accreditation criteria;
3. Require that the scenario for an overtopping event and the associated risk reduction measures to mitigate for such event be analyzed and included in the accreditation package;
4. Strengthen floodplain management measures for leveed areas; and/or
5. Eliminate the concept of levee system accreditation and instead implement a risk-informed suite of NFIP actions.

**USACE AND FEMA WILL DEVELOP A MEMORANDUM OF UNDERSTANDING TO IMPROVE EFFECTIVENESS OF EXCHANGING, DISTRIBUTING AND STORING LEEVE-RELATED INFORMATION.** This Memorandum of Understanding (MOU) will define how the actions in this report will be carried out and will determine when and for what purposes data will be exchanged among the agencies and local sponsors and communities. In addition to the details of the specific actions in the report, the MOU is anticipated to include:

1. Coordinated approaches to align policies to promote life safety and sound national investments;
2. Details on the use of existing agency efforts (i.e. Silver Jackets, Local Levee Partnership Teams) and peer dialogue to communicate risk and coordinate levee activities; and
3. Coordinated approaches to inform community and local sponsor decisions.

The draft MOU is expected to be completed by the end of calendar year 2013.

USACE and FEMA will continue to use the National Levee Database (NLD) as a primary data repository and will continue to work with local sponsors to improve the quality, organization and functionality of the NLD. USACE is in the process of conducting a user evaluation of the current version of the NLD and will use feedback from stakeholders involved in the development of this report to improve usability and inclusion of levee-specific information.

## Stakeholder Involvement Will Continue Throughout Implementation

The Task Force held a one-day meeting and a series of four webinars to seek initial feedback on draft, conceptual-level recommendations under consideration. Over 400 individuals representing levee sponsors participated in the stakeholder involvement activities, including elected and appointed federal, state, local and tribal government officials, the private sector and interested citizens.

Members of the National Committee on Levee Safety are highly knowledgeable experts on levee safety with experience as local sponsors, local, state and regional governments and in the private sector. They assisted the Task Force by sorting, interpreting and analyzing comments and highlighting key areas of improvement that the Task Force included in the final version of the report related to the following areas:

1. Improving key recommendations and actions;
2. Clarity and understandability;
3. Identifying areas of misunderstanding or misinterpretation by stakeholders; and
4. Placing this charge in context of more fundamental USACE and FEMA alignment efforts.

**TASK FORCE ACTIONS ARE CONSISTENT WITH THE NATIONAL COMMITTEE ON LEVEE SAFETY RECOMMENDATIONS FOR ALIGNED FEDERAL PROGRAMS.** USACE and FEMA worked in cooperation with the National Committee on Levee Safety (NCLS) to develop these recommendations and solicit and utilize stakeholder feedback. Actions and recommendations in this report are consistent with one of the key tenets expressed by the NCLS in their 2009 Report to Congress... “in order to ensure that existing and future levee investments have the greatest possible impact, all federal programs that significantly impact governmental and individual decision making in leveed areas must be aligned toward the goal of reliable levees, an informed, involved public and shared responsibility for protection of human life and mitigation of public and private economic damages.” The NCLS also promotes synergies between existing and future levee safety programs and the NFIP, but cautions “that links that are too strong between the National Levee Safety Program (proposed) and the NFIP may further solidify the dangerous untrue belief by some that the 1% annual chance event (100-year) is a ‘safety standard.’” Appendix I includes a letter from the nonfederal members of the NCLS discussing this report and overall federal alignment necessary to promote safe, reliable levees and an involved public.

Overall, stakeholders were supportive of a risk assessment approach to levee accreditation but remain concerned about total costs to communities, including the costs of data collection and analysis, as well as costs to repair, improve and recapitalize aging levees. USACE and FEMA anticipate additional stakeholder involvement as they work to implement the actions in this report.

## ABOUT THE NATIONAL COMMITTEE ON LEVEE SAFETY

The NCLS was created by Congress and authorized by the Water Resources Development Act of 2007, Section IX, to “develop recommendations for a national levee safety program, including a strategic plan for implementation of the program.” The NCLS includes representatives of state governments, local/regional governments, the private sector and two federal agencies (USACE and FEMA).

The NCLS adopted the vision of “an involved public and reliable levee systems working as part of an integrated approach to protect people and property from floods.” In their report entitled *Recommendations for a National Levee Safety Program: A Report to Congress from the National Committee on Levee Safety* (January 2009), the NCLS presented 20 recommendations that, when taken together, will establish the basis for a comprehensive and effective National Levee Safety Program. For a copy of the report and more information about the full NCLS recommendations, see [www.leveesafety.org](http://www.leveesafety.org).



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# TASK FORCE OVERVIEW

## Charge From Congress

Enacted on July 6, 2012, Section 100226 of P.L. 112-141, the Moving Ahead for Progress in the 21st Century Act (MAP-21), requires the U.S. Army Corps of Engineers (USACE) and the Federal Emergency Management Agency (FEMA) in cooperation with the National Committee on Levee Safety (NCLS), to establish a Flood Protection Structure Accreditation Task Force. The purpose of this Task Force is to develop a process to better align the information and data collected by or for the Corps of Engineers under the Inspection of Completed Works (ICW) Program with the flood protection structure accreditation requirements of the National Flood Insurance Program (NFIP) so that:

- Information and data collected for either the USACE ICW program or NFIP levee accreditation process can be used interchangeably; and
- Information and data collected by or for the USACE ICW program is sufficient to satisfy NFIP flood protection structure accreditation requirements.

The legislation identified the following requirements for consideration in developing the process:

- Recommendations from “interested persons in each region” shall be gathered and considered;
- Changes to the ICW program and NFIP accreditation requirements shall be considered; and
- The intent is not to lessen the level of life safety or flood risk reduction.

*See Appendix A: Legislative Language Establishing the Flood Protection Structure Accreditation Task Force* for a copy of the actual wording from Congress.

Products of the Task Force are to be submitted to the Senate Committees on Banking, Housing, and Urban Affairs and Environment and Public Works; and the House Committees on Financial Services; Transportation and Infrastructure; and Natural Resources. The Task Force delivered an interim report on February 20, 2013 to the five Congressional committees noted above that provided information on the approach for meeting the requirements of the legislation. This is the final report of the Task Force, due one year after the July 6, 2012 enactment of the Moving Ahead for Progress in the 21st Century Act (PL 112-141). The Task Force will terminate after submission of this final report; however, USACE and FEMA are committed to partnering together to carry out activities recommended within this report.

## Principles for Developing Recommendations

The Task Force employed the following principles to guide the development and discussion of the actions to be undertaken:

- Hold life safety as the paramount federal government goal.
- Ensure local communities and levee sponsors retain the rights and responsibilities to make decisions regarding participation and activities related to all steps of the NFIP, including levee accreditation decisions.

## FLOOD INSURANCE: AN INVESTMENT IN INDIVIDUAL AND COMMUNITY RESILIENCE

Flood insurance is one of the most effective ways to limit financial damages resulting from flooding and to speed recovery of flood damaged communities.

- Flood insurance reduces the ultimate cost of disaster recovery and overall taxpayer burden by recognizing the responsibility of individuals and communities living in high flood hazard areas to pay a portion of that risk.
- Flood insurance increases awareness and understanding of flooding potential and provides individuals and communities opportunities for better emergency planning and preparedness.
- Flood insurance is a critical resource for homes and businesses. Standard homeowners and business insurance policies do not cover flood damages, a necessary factor in family and community resilience.

- Promote accurate, timely, and understandable communication of risk to the public.
- Encourage transparent communication and processes with all nonfederal partners and stakeholders.

- Ensure that USACE and FEMA programs continue to fulfill their responsibilities to the public based on their specified missions and authorities.

## BACKGROUND & CONTEXT

This section briefly describes USACE and FEMA authorities and programs that relate to the Task Force's efforts. It goes on to describe the group of levees the Task Force actions may impact. Finally, this section describes the role of the levee sponsor and local communities.

### Overview of the National Flood Insurance Program

Flooding is one of the most costly natural hazards in the United States. In 1968, Congress created the National Flood Insurance Program (NFIP) to reduce personal hardships and the loss of property due to flooding. One of the primary purposes of the NFIP is to address the public's inability to secure privately backed insurance for economic losses from flooding. Community participation in the NFIP is voluntary. More than 21,000 communities across the U.S. and its territories participate in the NFIP by adopting and enforcing floodplain management ordinances to reduce future flood damage. In exchange, the NFIP makes federally-backed flood insurance available to homeowners, renters, and business owners in these communities. Recognizing the importance of flood insurance in high flood hazard areas, the NFIP requires federally-regulated lending institutions to make sure that mortgage loans secured for buildings in

high flood hazard areas are protected by flood insurance. This is often referred to as the "mandatory purchase requirement" for those with property in Special Flood Hazard Areas (SFHAs).

### How the Special Flood Hazard Area Is Determined

FEMA issues Flood Insurance Rate Maps (FIRMs) that depict the land area covered by the floodwaters of the base flood. These areas are known as Special Flood Hazard Areas (SFHA). The NFIP uses the 1% annual chance exceedance (ACE) flood standard as the base flood.<sup>1</sup> The 1% ACE means that the area has a one in 100 chance of a given level of flooding being equaled or exceeded in any given year. However, a community may see more than one 1% ACE flood in any year. Within the SFHA, the NFIP requires all new or substantially improved structures be constructed at or above the elevation of the 1% ACE. In addition, the NFIP uses the SFHA to determine where the mandatory purchase requirement for flood insurance applies to properties secured by federally-regulated mortgage lenders in NFIP-participating communities.

<sup>1</sup> Code of Federal Regulations, Title 44, Section 59.1 of the National Flood Insurance Program (NFIP) regulations provides definitions of NFIP terms, including "base flood."

## How Levees Are Treated in the National Flood Insurance Program

Communities or parties seeking recognition of a levee system on NFIP maps must provide data and documentation in accordance with program requirements, detailed in 44 CFR 65.10. See *Appendix B: Mapping of Areas Protected by Levee Systems (44 CFR 65.10)* for the language of the regulation. Accreditation packages submitted by the community must contain detailed information related to design (freeboard, closures, embankment protection, embankment and foundation stability, settlement, and interior drainage); operations plans and criteria (closures and interior drainage); and maintenance plans and criteria. These criteria are intended to demonstrate that the levee system was designed, built, operated, and maintained to the 1% ACE flood.

Once criteria for 44 CFR 65.10 are met, a levee is mapped as accredited on the Flood Insurance Rate Map. The area behind the accredited levee is designated as Zone X (shaded) on the Flood Insurance Rate Map except for areas of residual flooding, such as ponding areas and interior drainage, which may be shown as Special Flood Hazard Areas. Areas designated as Zone X (shaded) are areas of moderate flood hazard. Zone X (shaded) usually includes the area between the limits of the 100-year and 500-year floods and areas landward of an accredited levee system. On the Flood Insurance Rate Map, areas behind an accredited levee system include a note alerting the public that they live behind a levee. Zone X (shaded) areas are outside of the Special Flood Hazard Area, so there are no NFIP building requirements for floodplain management and no mandatory insurance purchase requirement for structures with federally backed mortgages. However, Zone X (shaded) areas are still subject to flooding;

flood insurance is encouraged and may be purchased at a preferred risk rate.

## FEMA's Treatment of Levees Is Evolving

FEMA's treatment of levees has been evolving since the establishment of the NFIP in 1968. Until 2011, FEMA's approach to mapping de-accredited or non-accredited levee systems was to assume that the entire system did not impede the flood waters. This approach was referred to as the "without levee" approach. That approach for non-accredited levees was relatively easy to implement because it did not require an extensive amount of data and was independent of the condition of the levee and its height. One of the challenges with this approach was the fact that though a levee may not meet all the requirements of 44 CFR 65.10, a structure still existed that could have impacts on how the area behind it may be flooded.

In 2011, FEMA began development of a new Levee Analysis and Mapping Process (LAMP) that is flexible and will produce more refined results and supporting data where non-accredited levee systems are involved. LAMP is an interactive process, where levee sponsors, communities and other federal, tribal and local entities are engaged in providing data and information about the condition of a levee system and its past performance. Through the use of a variety of technical analyses, LAMP will provide a more precise way to depict flood hazards behind non-accredited levee systems that replaces the one-size-fits-all "without levee" mapping of all areas behind non-accredited levees as Special Flood Hazard Areas. Where appropriate, it could result in a leveed area having a variety of zones (i.e., Zone D & Special Flood Hazard Area), each with its respective flood insurance rates and floodplain management requirements.

## RELATIONSHIP BETWEEN LEVEES AND THE NATIONAL FLOOD INSURANCE PROGRAM

Even though FEMA accreditation is not a guarantee or warranty of performance of a levee system during a flooding event and that a levee built to the 1% ACE will not exclude all floods, many communities pursue accreditation of a levee system to lessen the financial burden on the property owners to purchase insurance. Though never intended to be a safety standard, the 1% ACE levee soon became a target design level for many communities because it allowed development to continue and provided homeowners relief from mandatory flood insurance within a relatively economical initial construction cost.

See also *Appendix C: History of the 1% Annual Chance Exceedance Standard for Levee Accreditation*.

## LEEVE ANALYSIS AND MAPPING PROCESS – A BIT MORE DETAIL

LAMP is an interactive process, where levee sponsors, communities and other federal and local entities are engaged in not only providing data and information about the condition of a levee system and its past performance but also in determining the appropriate technical procedures. The new suite of procedures—sound reach procedure, freeboard deficient procedure, overtopping procedure, structural-based inundation procedure, and natural valley procedure—will better meet the needs of communities and citizens nationwide. Under LAMP, all non-accredited levees will be analyzed using the natural valley approach, which will determine the extent of the 1% ACE floodplain. Following this analysis, FEMA will work with a Local Levee Partnership Team to assess if other procedures are applicable, based on levee conditions and data availability, and to segment the levee into reaches, where each procedure can be solely applied. If a levee system and its reaches are analyzed using one of the procedures, the resulting Special Flood Hazard Area (SFHA) will be mapped. If the extent of the natural valley exceeds the SFHA, the difference between the two will be mapped as Zone D: an area of undetermined but possible flood hazards. If no other procedure other than natural valley is performed, the natural valley floodplain in its entirety will be designated with the appropriate SFHA zone, and not Zone D.

For more information, please see <http://www.fema.gov/final-levee-analysis-and-mapping-approach>.

FEMA’s mapping of flood hazards associated with levees will continue to evolve, resulting in technical, programmatic and risk management changes that yield products and data that are ever more useful and informative to local governments and citizens.

## The USACE Levee Safety Program

USACE has a variety of authorities related to levees, including project-specific authorizations, continuing authorities to address studies of authorized federal projects, modifications to existing federal projects, technical assistance, and Public Law (P.L.) 84-99 authorities for disaster preparedness, advance measures, emergency response and rehabilitation. The legislation that formed the Flood Protection Structure Accreditation Task Force specifically identified information collected for the USACE Inspection of Completed Work (ICW) program. The ICW program was created to ensure local sponsor compliance with Section 221 of the Flood Control Act of 1970, as amended, which requires a written agreement between USACE and the levee sponsor to identify the “items of local cooperation,” including operation and maintenance requirements. ICW authorities and activities apply to all federally constructed and locally maintained flood risk reduction projects. The USACE Levee Safety Program guides all the levee activities performed under the various USACE authorities, including the ICW program.

USACE created its Levee Safety Program with the mission to assess the integrity and viability of levee systems and recommend courses of action to ensure that levee systems under its authorities do not present unacceptable risks to the public, property, and environment. To this end, USACE

has developed a risk-informed portfolio management process to inform and prioritize levee safety activities.

The basic objectives of the Levee Safety Program and the portfolio management process are to:

1. Conduct assessments of levee systems within the program. Assessments take the form of inspections, screenings, and in some cases risk assessments.
2. Use these assessments to evaluate, prioritize, and justify levee safety activities.
3. Use data and findings from assessment activities to make recommendations to improve life safety associated with levee systems.

USACE collects levee information through a variety of activities such as inspections, planning studies, modification studies, emergency repairs, or other activities. All USACE levee information may be useful and can contribute to making an accreditation decision for the NFIP. For this effort, the Task Force focused specifically on USACE **visual levee inspections, screenings, and risk assessments**. Each of these activities has a defined process which specifies the information collected each time they are conducted; therefore, when possible, linkages can be made to the data needed for accreditation decisions. Other USACE activities, such as planning studies, collect information on a case-by-case basis and the type of information collected varies.

**INSPECTIONS.** Levee condition changes over time: banks erode; closures rust; animals burrow; and pumps wear out. It is important to regularly conduct visual inspections of levees to monitor their overall physical

condition and ensure proper operations and maintenance.

USACE typically conducts two types of inspections. The first type, known as the “routine inspection,” is a visual inspection conducted annually to: 1) identify deficiencies or areas that need monitoring or immediate repair; 2) continuously assess the condition of the levee system to identify any changes over time; 3) collect information necessary to inform decisions about future actions; 4) determine if the levee sponsor is in compliance with the project partnership agreement, if applicable; and 5) determine eligibility for federal rehabilitation funding through the Rehabilitation and Inspection Program (in accordance with P.L. 84-99). These visual inspections are conducted using a standardized inspection checklist to evaluate and rate approximately 125 specific items/components along levee embankments, floodwalls, interior drainage systems, pump stations, and channels. The ratings of individual items are used to assign an overall levee system inspection rating.

The second type, known as the “periodic inspection,” is a more comprehensive inspection, conducted every five years, consisting of a visual inspection and data review. For this effort, the Task Force focused on just the visual inspection process, which is the same for both routine and periodic inspections. It is recognized that the additional information collected during a periodic inspection could be very useful for accreditation, but the information collected during periodic inspections varies for each levee. How information from a periodic inspection can be applied to accreditation will have to be determined on a case-by-case basis.

**SCREENINGS.** USACE is currently performing screening assessments of all levees within USACE’s levee portfolio to support an initial, risk-informed classification of the portfolio and set priorities. A screening is a coarse risk assessment that relies on existing data, historical performance, engineering judgment, and consequence estimation to quickly characterize the relative risks posed by levees in terms of a relative probability of breach and potential risk to life and property. A simplified probabilistic framework is used to account for the likelihood of flood loading, performance of the levee, and consequences due to levee breach or overtopping. Flood loading estimates are made based on available design records, flood insurance studies, gage records, or other readily available information. Estimates of levee performance are based on an engineering assessment of items from inspections and a review of available design, construction, and past performance records. Consequence estimates are made using readily available data from the National Levee Database (NLD), United States Geological Survey National Elevation Dataset, and the FEMA Hazards of the U.S. (HAZUS) database. The results of a screening can be used to identify performance concerns; assess potential consequences for different flooding scenarios; and identify critical issues that require interim risk reduction measures.

**RISK ASSESSMENTS.** Risk assessments are more rigorous than screenings and are conducted to refine and quantify the risk drivers associated with a levee system. Quantitative risk assessments, applied in a consistent and comprehensive manner, facilitate risk identification, including performance and consequence driving factors, and communication; improve the quality of decisions; and help establish priorities and solutions that effectively address the risks. Risk assessments integrate the

**PROVISIONALLY ACCREDITED LEVELS**

The PAL (Provisionally Accredited Levee) designation for a levee system is used when the levee system was previously accredited on an effective Flood Insurance Rate Map, and FEMA is awaiting data and documentation that will demonstrate the levee system's compliance with 44 CFR 65.10 of the NFIP regulations. For levee systems that meet the PAL requirement, FEMA will label the leveed area landward of the levee system as provisionally accredited, with a note on the Flood Insurance Rate Map. The leveed area of the PAL system is shown as Zone X (shaded) on the Flood Insurance Rate Map, except for areas of residual flooding, such as ponding areas and interior drainage, which may be shown as Special Flood Hazard Areas, for the base flood (areas of the 1% ACE).

analytical methods of traditional engineering analyses with sound professional judgment of engineers, review boards, and decision makers to inform selection of reasonable actions to reduce risk. The risk assessment process is scalable based on the key questions and decisions to be made regarding a specific levee system. At this point, USACE is performing risk assessments on a very limited number of levees per year in support of a planning study or on levees of highest risk.

Ultimately the portfolio risk management process will ensure that investments in levee systems are implemented in the most efficient manner. With more than 10 million people living or working behind levees within its jurisdiction, USACE considers the role it has in assessing, communicating, and managing flood risks as its top priority.

**Scope of the Task Force: Levees Covered by This Effort**

The congressional charge specifically requested that the Task Force focus on information and data collected through the USACE Inspection of Completed Works (ICW) program. Levees in the ICW program are those levees that were typically constructed by USACE and locally operated and maintained once construction was completed. *Levees in the ICW program*

*account for approximately 65 percent (9,500 miles) of the USACE inventory or about 1,400 individual levee systems.* It is important to note that this is only a portion of the 30,000 miles of levees that FEMA has identified in the Mid-Term Levee Inventory through their recent mapping effort. Actions identified by this Task Force will not address the data and informational needs for all levees in the nation that may be seeking accreditation under the NFIP.

*Of the 9,500 miles of ICW levees, approximately 7,800 miles (82%) are currently not accredited by FEMA.* Non-accreditation can be for a variety of reason other than inadequate data and analysis. Some examples include: levee deficiencies, the levee design is lower than the 1% ACE, or the levee sponsor has not yet decided to pursue accreditation. The exact number of levees for which improved alignment of USACE and FEMA programs regarding data and analysis for levee accreditation is difficult to ascertain. Table 1 shows the accreditation status of the levees in the ICW program. It can be assumed that levees in the PAL process would benefit from data and analysis related to this effort.

**TABLE 1: ICW LEVEES AND THEIR ACCREDITATION STATUS, MAY 2013**

ACCREDITATION STATUS	LEVEE SYSTEM COUNT	LEVEE MILES	NUMBER OF COMMUNITIES
Accredited	70	400	75
In PAL (Accredited)	150	1300	100
Not Accredited	1180	7800	610
<b>TOTAL</b>	<b>1400</b>	<b>9500</b>	<b>785</b>



FIGURE 1: STEPS FOR LEVEE ACCREDITATION FOR A NFIP-PARTICIPATING COMMUNITY



### Local Communities and Levee Sponsors Are Critical Partners

Critical decisions about land use, flood risk management and mitigation approaches—including construction and maintenance of levees and economic development decisions—are all made at the local level. Local communities, including levee sponsors, flood control boards, and other local and regional government entities, generally have operations and maintenance responsibilities for structures built to reduce the impact of flooding on a community, such as levees or floodwalls.<sup>2</sup> Although varied in their approaches, states support local governments through the development of rules, regulations and statewide ordinances for floodplain management and infrastructure investments.

Levee sponsors and communities have a key leadership role in ensuring the levee is properly operated and maintained, implementing emergency response activities, and making floodplain management decisions. Because of this, it is important that the levee sponsor and community retain a lead role throughout the accreditation process. Figure 1 depicts the major steps and who must take each step for a levee to meet and maintain accreditation. The Task Force charge focuses on activities related to the highlighted step in Figure 1, Sponsor Collects Information and Conducts Analysis to Seek Accreditation (44 CFR 65.10).

<sup>2</sup> USACE has operations and maintenance responsibility for about 2,800 miles of levees and performs levee evaluation for NFIP accreditation purposes for these levees if requested by the local community. These levees are not part of the ICW program.

# COMPREHENSIVE ALIGNMENT OF THE USACE LEVEE SAFETY PROGRAM AND THE NATIONAL FLOOD INSURANCE PROGRAM WILL REQUIRE FUNDAMENTAL CHANGE

## USACE Levee Safety Program and the FEMA NFIP Are Fundamentally Different Programs

The USACE Levee Safety Program and FEMA's National Flood Insurance Program have different authorities and purposes. Both agencies are concerned with life safety, reduction of property damage due to floods and communicating flood hazards and risks. However, their respective authorities and programs have different missions and therefore serve the public in different ways. These differences are evident in the methods used for collecting information and conducting analyses related to levees. It would be beneficial to levee sponsors for these programs to have a common set of standards.

## USACE and FEMA Programs Assess Levees Differently

A community's interaction with the USACE Levee Safety Program revolves around how their levee is expected to perform at the levee's actual design level and what the potential consequences would be in cases of levee breach or overtopping. Levees in the USACE Levee Safety Program include a variety of design levels, some lower than 1% ACE and some significantly higher.

When a community is engaged with FEMA concerning NFIP levee accreditation

requirements, the focus is primarily on structural standards and relative only to the 1% ACE, even if the levee has a higher design level. For example, if a levee built to a 0.2% ACE levee is part of the USACE program, a visual inspection by USACE would assess the levee to the 0.2% ACE design level, but would not specifically address the 1% ACE requirements of 44 CFR 65.10 for accreditation.

## USACE and FEMA Program Activities Are Initiated by Different Events

Alignment is further complicated by the likelihood that the frequency and timing of activities under the USACE Levee Safety Program typically do not align with a new mapping effort by FEMA under the NFIP or accreditation activities initiated by a community.

Table 2 (page 9) provides examples of events that could initiate activity by either USACE or FEMA.

## Implementing Biggert-Waters Flood Insurance Reform Act

Pursuant to Biggert-Waters Flood Insurance Reform Act of 2012, FEMA is studying how to: analyze and map the graduated risk behind levees; adjust floodplain management practices to properly reflect levee-related flood risk; reflect those flood risks through

TABLE 2: EVENTS OR ACTIVITIES THAT COULD INITIATE USACE AND FEMA ACTIVITY

AGENCY	ACTIVITY	INITIATION EVENT
USACE	Inspections	<ul style="list-style-type: none"> <li>■ Scheduled annually</li> <li>■ Flood events</li> </ul>
	Screenings	<ul style="list-style-type: none"> <li>■ Scheduled every five years</li> <li>■ Flood events</li> <li>■ Significant issues observed during inspections</li> <li>■ Maintenance issue identified during inspections</li> <li>■ Levee system improvements/repairs</li> <li>■ Changes in hydraulic conditions</li> <li>■ Significant changes in consequences</li> </ul>
	Risk Assessments	<ul style="list-style-type: none"> <li>■ Significant level of risk identified during screening</li> <li>■ Performance issues observed during high water event</li> <li>■ Levee improvements</li> <li>■ Levee rehabilitation or repairs</li> </ul>
FEMA	New Mapping Study, Letters of Map Revision, PAL, A99 & AR Submittals	<ul style="list-style-type: none"> <li>■ Coordinated Needs Management Strategy</li> <li>■ Newly available topographic, hydrologic, and/or hydraulic data</li> <li>■ Flood events</li> <li>■ Planning studies</li> <li>■ Changes in hydrologic and/or hydraulic conditions</li> <li>■ New or anticipated development</li> </ul>

the setting of insurance rates; and more effectively communicate those risks. To that end, FEMA commissioned several reports from the National Academies of Science’s National Research Council (NRC) specifically related to considering how levees should be treated in the NFIP, the most recent entitled *Levees and the National Flood Insurance Program: Improving Policies and Practices, March 2013*. The NRC recommended that the NFIP should move to a modern risk analysis approach that makes use of modern methods and computational mapping capacity to produce state-of-the-art risk estimates for all areas that are vulnerable to flooding.

FEMA was advised to use the results of modern risk analysis and to develop a multi-measure flood risk management strategy that includes improving the existing risk communication, broadening the collaboration with USACE, and refining the rate setting for areas behind accredited and non-accredited systems. FEMA will leverage the recommendations listed in the NRC’s 2013 report and continue to improve mapping flood hazards associated with levees.

## PROGRAMMATIC EFFORTS AND STUDIES REQUIRING CONTINUED USACE AND FEMA ENGAGEMENT TO ACCOMPLISH AGENCY ALIGNMENT

- Implementation of provisions in the Moving Ahead for Progress in the 21st Century Act (MAP-21).
- Development of the guidance document for the USACE Levee Safety Program.
- Implementation of FEMA's Levee Analysis Mapping Process.
- Consideration of the recommendations from the National Academies of Science on "Levees and the National Flood Insurance Program."
- Consideration of the recommendations from the National Committee on Levee Safety.

**THE ACTIONS IDENTIFIED IN THIS REPORT CONCERNING REVISIONS TO EXISTING PROCESSES WILL NOT ACHIEVE COMPREHENSIVE ALIGNMENT BETWEEN THE TWO AGENCIES.** While this report articulates actions that can and will be done so that information and data collected by or for the USACE ICW program is sufficient to satisfy NFIP accreditation requirements, the opportunity for more comprehensive alignment between USACE and FEMA rests with future efforts, in which Congress must play a critical part.

Both USACE and FEMA remain committed to working together to better align their programs as both the NFIP and the USACE Levee Safety Program continue to evolve.

**ACTION: *USACE and FEMA will continue coordination to achieve more comprehensive alignment.***

## LIFE SAFETY CONSIDERATIONS ASSOCIATED WITH LEEVE ACCREDITATION FOR THE NATIONAL FLOOD INSURANCE PROGRAM

The Task Force explored how risk to life safety was potentially affected by accreditation and further analyzed revisions to the accreditation process that would help reduce risk to life safety. This is consistent with the language in Section 100226, which states "Nothing in this section shall be construed to require a reduction in the level of public safety and flood control provided by accredited levees, as determined by the Administrator for purposes of this section."

Accreditation reflects that the levee system complies with the regulatory requirements set forth under 44 CFR 65.10 indicating that the levee has been adequately designed and is being properly operated and maintained to withstand a flood event up to the 1% ACE. The community and occupants residing behind the levee system are thus reasonably

assured that their flood hazard up to the 1% ACE or risks associated with flooding is reduced.

Accreditation is often sought by local communities to lower insurance premiums and remove the requirements for mandatory flood insurance and floodplain management from areas on the landside of the levee systems that would otherwise be within the 1% ACE floodplain. On the negative side, removal of mandatory floodplain management and flood insurance requirements behind accredited levee systems can lead to more development and growth behind levees. The outcome can be increased vulnerability and consequences should the levee system breach or overtop. Increased consequences mean an increase in flood risk.

## Unintended Consequences of the 1% ACE for Accrediting Levee Systems

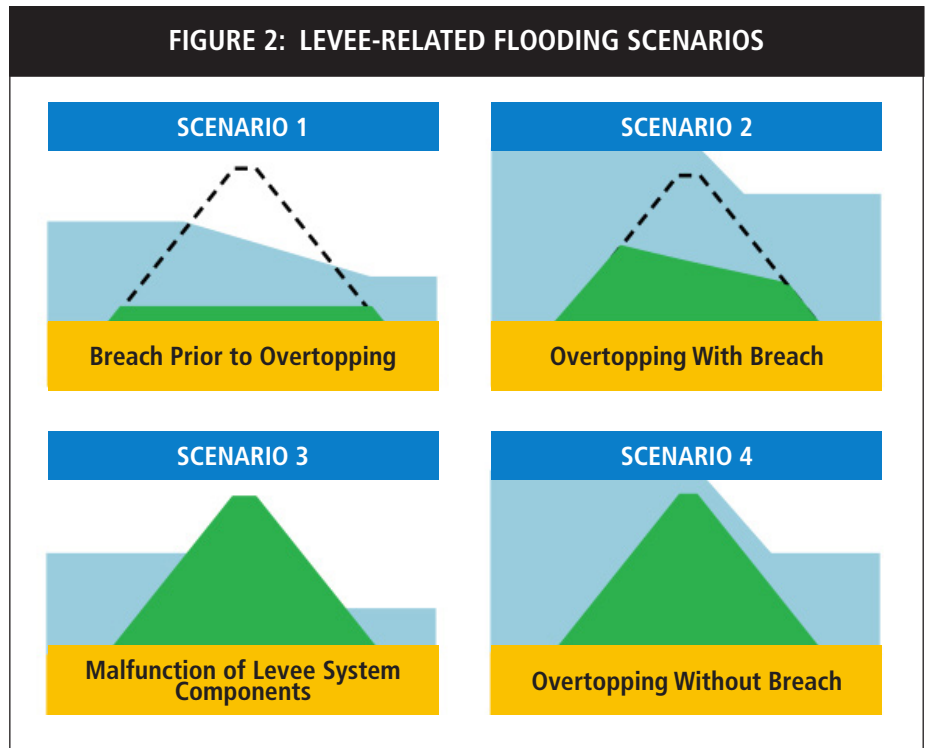
Without a levee, floodplain development restrictions typically result in fewer structures or elevated structures within the 1% ACE floodplain. With accredited levees, the development pattern and associated infrastructure, such as transportation routes, are typically configured as if no, or only minor, flood hazard remains. This can contribute to increasing the life safety risk as potential consequences increase. *Appendix C: History of the 1% Annual Chance Exceedance Standard for Levee Accreditation* provides a more detailed description of the genesis of the 1% ACE for levee accreditation in the NFIP.

### How Do Levees Pose Life Safety Risk?

The principal function of levee systems is to locally reduce flood risk over a limited range of flood events by diverting flood water away from the leveed area. There are four scenarios, as seen in Figure 2, in which flooding could occur when a levee system is present. These potential scenarios need to be acknowledged and associated consequences managed. The four scenarios are:

**SCENARIO ONE – BREACH PRIOR TO OVERTOPPING:** The levee breaches before water reaches the top of the levee. This could be the result of water seeping under the levee causing the levee to erode internally and leading to a breach before the water reaches the top of the levee.

**SCENARIO TWO – OVERTOPPING WITH BREACH:** The levee breaches after it overtops. This may occur after flood water exceeds



the top of the levee and begins to erode the material on the landside that could lead to a breach.

**SCENARIO THREE – MALFUNCTION OF LEEVE SYSTEM COMPONENTS:** A component of the levee system, such as a gate or pump station, could malfunction and result in floodwaters flowing into the leveed area.

**SCENARIO FOUR – OVERTOPPING WITHOUT BREACH:** The floodwaters could exceed the top of the levee, but the levee remains intact.

Each of these four scenarios poses a different risk to life safety because the amount, location, and velocity of the water flowing into the leveed area are different. Each of these factors can influence evacuation effectiveness. In this sense, levee systems transform the flood hazard from the natural conditions that existed prior to the levee

system to a different flood hazard condition with different potential consequences.

## Literature Review Regarding the NFIP and Levees

In the years since the enactment of the NFIP and publication of 44 CFR 65.10, a number of studies were commissioned seeking recommendations on how to address levees within the NFIP.

Several studies were undertaken by the National Research Council (NRC) of the National Academies of Sciences that either addressed levees within the NFIP directly, or offered commentary and suggestions therein (NRC 1982, 2000, 2013). Two interagency task committees were similarly charged and offered commentary and suggestions (IAFPMRC 1994, 2006). Congress commissioned the National Committee on Levee Safety (NCLS) to develop recommendations for a national levee safety program. The NCLS report (NCLS 2009) covered a broad range of issues associated with levee systems, including commentary related to the NFIP. Other significant forums and studies in recent years addressing levees and the NFIP include the Gilbert White Forum (ASFP 2004) and California's FloodSmart program (DWR 2012). Professional journal articles addressing levees and the NFIP have been published by the American Society of Civil Engineers, the Society for Risk Analysis, and the American Water Resources Association. Conference proceedings and white papers have been prepared by various floodplain management organizations that advocate for improving how levees are handled in the NFIP.

The Task Force reviewed the material contained in these studies and analyzed the commentary related to NFIP and levees, or more directly the accreditation of levees for the NFIP. Appendix E includes a list of references the Task Force relied on to generate the following common themes discussed and actions advocated in the existing literature. The themes are not mutually exclusive.

### **THEME 1: IS THE 1% ACE FOR LEVEE ACCREDITATION APPROPRIATE IN ALL CASES?**

In the existing literature, it has been discussed that the 1% ACE flood standard may be insufficient as the basis for levee system accreditation for the NFIP, especially for urban areas. Recommendations in the literature include: higher standards (i.e., 0.2% ACE or 500-year) for levee accreditation; standards for levee accreditation based on the consequences of flooding (e.g., urban areas should have a higher standard for accreditation); and abandoning the accreditation concept.

### **THEME 2: SHOULD THE DETERMINISTIC APPROACH IN 44 CFR 65.10 BE EVALUATED AND/OR REVISED?**

Existing literature contains discussion and findings that include adopting a risk-informed approach to accreditation that would assess consequences along with frequency of flooding.

### **THEME 3: SHOULD THERE BE ADDITIONAL REQUIREMENTS FOR ACCREDITATION?**

There have been numerous previous discussions about adding additional requirements for accreditation. These include requiring technical reviews of NFIP accreditation packages in addition to requirements focused on life safety. For example, some suggest requiring flood warning and evacuation plans and considering stronger flood risk management requirements for areas behind levees.

## **THEME 4: SHOULD THERE BE CHANGES IN HOW FLOOD INSURANCE IS APPLIED TO LEVEED AREAS?**

There are several recommendations in the literature requiring flood insurance for all floodplain areas, including leveed areas. Some suggest that the insurance rates be adjusted to reflect the associated risk. Some suggest that insurance be mandatory behind levees. Some advocate mandatory purchase combined with risk-informed rates. Support for this recommendation in the literature includes the fact that within the 1% ACE, the nature and severity of risk can vary significantly by location or proximity to the levee (see Figure 2: Levee-Related Flooding Scenarios for more detail about types of levee-related flood risk). Additionally, requiring the purchase of flood insurance is believed to increase awareness of property owners and businesses of that risk.

The Task Force may submit the following recommendations to improve life safety to FEMA as they implement the Biggert-Waters Flood Insurance Reform Act of 2012.

1. **Adopt a risk-informed framework for levee accreditation.** This action would replace the deterministic decision criteria now documented in 44 CFR 65.10 with risk assessments that would consider the performance of the levee system and associated consequences. For example, when looking at geotechnical criteria, instead of only considering factors of safety, historic performance during past flood events showing the locations of seepage boils would also be included. This approach is consistent with risk assessments that are now used in USACE's Levee Safety Program, which brings life safety considerations into the decision process and improves the basis for communicating life safety risk to leveed area occupants.
2. **Require flood warning, preparedness, and evacuation plans as accreditation criteria.** Such plans consist of installing equipment and implementing processes and responsibilities to accomplish the following: flood threat recognition, issuance of warnings, public communication for preparedness, emergency response and evacuation plans and post-event recovery. Requiring the existence of viable flood warning, preparedness and evacuation plans will raise life safety awareness among local sponsors and communities. It can greatly lower the vulnerability of floodplain occupants to life-threatening flooding by improving the likelihood of threatened people moving out of harm's way.
3. **Require that the scenario for an overtopping event and the associated risk reduction measures to mitigate for such event be analyzed and included in the accreditation package.** Levee systems at some point in time will be overtopped by a flood event. The likelihood of the overtopping depends on the height of the levee and the flooding regimen of the watershed. Accreditation only addresses the levee system's capability of defending against the 1% ACE flood. There presently are no accreditation factors that address the performance of the levee system for floods that exceed the accreditation standard of the 1% ACE flood. Measures such as engineered overtopping designed to resist or control breaching, diversion of flood waters to open space above or within levee systems, and integration of levee system emergency action plans (directed to the levee itself) with warning and evacuation plans will reduce life safety risk. Having

viable flood warning and evacuation plans is even more essential should an unexpected breach occur.

#### 4. **Strengthen floodplain management measures for leveed areas.**

As mentioned above, the presence of a levee system can reduce the frequency of flooding; however, if flooding should occur under one of the four scenarios, the result may be more catastrophic than if the levee were not there. The main reason is typically with the natural floodplain setting, people are generally more aware of the potential for flooding as opposed to being more surprised if a levee overtops or suddenly breaches. An additional way to mitigate for this is by requiring multiple lines of defense for the consequences of flooding. For example, additional floodplain management measures related to land use, elevating structures, and other building standards can help mitigate for damages should a levee overtop, breach, or have a component malfunction (such as the interior drainage system). Such requirements can increase the awareness of local communities to the residual flood threat and encourage development patterns and associated infrastructure to take account of the potential flooding hazard.

5. **Eliminate the concept of levee system accreditation and instead implement a risk-informed suite of NFIP actions.** This involves a more holistic change within the NFIP from a single “in or out” boundary of 1% ACE for insurance and floodplain management to graduated zones that reflect risk, including consequences. This could include insurance premiums scaled for each parcel/risk zone, whether leveed or not, and implementation of risk-informed floodplain management requirements scaled to the risk zones. This would require evaluating the performance of the levee system to enable detailed mapping of leveed area risk; non-leveed areas would also be mapped to reflect risk by specific parcel/zones.



## USACE RISK ASSESSMENTS PROVIDE ADEQUATE INFORMATION TO MEET ACCREDITATION INFORMATION AND DATA REQUIREMENTS UNDER 44 CFR 65.10

Risk assessment is the USACE ICW activity that can reasonably be modified to collect the data and information needed to meet the intent of the accreditation criteria under 44 CFR 65.10 each time it is conducted. Neither inspections nor screenings collect or analyze information in the detail or with the rigor articulated in 44 CFR 65.10.

### **Risk Assessments Satisfy 44 CFR 65.10 Requirements, but Use a Different Methodology**

USACE uses a risk management approach to identify, evaluate, select, and monitor actions to reduce the level of risk associated with levees within its portfolio. The purpose of risk management is to choose and implement technically-sound and integrated actions that reduce risks in an efficient and effective manner. Risk assessments inform the risk management process; they are a repeatable and scalable process tailored to the decisions to be made concerning a specific levee system.

During a risk assessment, flood risks associated with levee systems are estimated by combining the magnitude and likelihood of hazards with the conditional performance of the levee given the hazard, and the potential consequences that result from each combination of hazard and performance. A comprehensive suite of plausible scenarios and their associated probabilities and consequences are considered from relatively

frequent events to relatively rare events in order to characterize the risk or support credible decisions. Efforts are generally focused on evaluating those scenarios and combinations of scenarios that have the greatest contribution to the total flood risk.

Various types of hazard may be considered (e.g., hydrologic, seismic). These hazards are characterized by all of the relevant parameters (e.g., discharge, stage, duration, velocity, magnitude, ground acceleration) that may influence the performance or consequences.

Identifying, describing, and evaluating the potential performance scenarios that could lead to flooding of the leveed area is one of the most important steps in estimating the flood risk. USACE accomplishes this by following a potential failure modes analysis (PFMA) process that typically includes a group of experts in a facilitated team setting. The goal of the PFMA is to identify the most likely failure modes and to break down the failure modes into a sequence of steps that are separable, understandable, and for which probabilities can be estimated.

The first step of a PFMA is to gather the available evidence, which should include a site characterization (e.g., geology, geomorphology), documentation of the design basis and construction (e.g., computations, engineering drawings, construction records, photographs), and past performance (e.g., instrumentation, flood fighting).

The second step is to identify possible candidate failure modes in a brainstorming session. It is important to consider all of the potential ways in which various conditions and factors can combine in a way that results in flooding.

The third step is to narrow this initial candidate list down to those failure modes that are most likely and have the greatest contribution to the total flood risk. This can be accomplished by a qualitative assessment of the available evidence considering factors that are both adverse (i.e., flooding is more likely) and factors that are favorable (i.e. flooding is less likely). This usually results in a list of fewer than ten potential failure modes for which risks need to be estimated. These risk driver failure modes are then further developed to include a detailed description of the initiating event, the sequence of events that could lead to flooding, the characteristics of the flooding scenarios (e.g., if breach before overtopping), the size, location, time to develop, and the resulting consequences. The descriptions are then carried over to the risk estimation process and are used as the basis for developing event trees that depict each event in the failure mode sequence. Probability estimates for each branch of the event tree are typically made using an informal expert elicitation process that considers all of the available evidence (e.g., engineering analysis, past performance, experience with similar projects, judgment). Reference Figure 2 (page 11) for potential flooding scenarios.

Flooding scenarios identified by the potential failure mode analysis are used to inform the estimation of consequences. Consequence scenarios are developed to encompass the full range of hazards from relatively frequent events through rare events, variations in breach parameters, and variation in exposure conditions (e.g., daytime, nighttime, weekday, weekend, summer, winter).

An estimate of the magnitude (e.g., depth, velocity) and timing (e.g., arrival time, rate of rise) of flooding is made using hydraulic models and other available information. An initial distribution of people, property, and other assets within the flooded area is made using available datasets such as FEMA HAZUS or data from a site-specific structure inventory. People and assets are then redistributed based on the timing and effectiveness of evacuations relative to the arrival of the flood. Relevant flooding characteristics (e.g., depth, velocity, rate of rise) are then applied to the remaining people and assets to estimate the loss of life, economic damage, and other impacts.

The hazard, performance, and consequence components of risk are combined across the full range of scenarios either quantitatively or qualitatively to obtain a probability distribution of consequences.

The risk assessment process is a fundamentally different process than the deterministic evaluations that 44 CFR 65.10 requires for accreditation. Risk assessments typically focus on the weakest link of a given levee system, and sometime require less data collection than a traditional deterministic approach while providing more information required for the risk management process (namely potential consequences). In a risk assessment, USACE looks at a wide range of events, so providing results specific to the 1% ACE is a relatively minor addition. The primary modification to the current USACE risk assessment process, in order to provide the necessary information to inform NFIP accreditation, will be to include performance at the 1% ACE as a key question to be answered by the risk assessment. USACE plans to use risk assessments as its standard process for conducting evaluation for accreditation under the National Flood Insurance Program.

**TABLE 3: NFIP REQUIREMENTS AND RELATION TO USACE RISK ASSESSMENTS**

NFIP REQUIREMENTS (44 CFR 65.10)		COMPLIANCE CAN BE DETERMINED THROUGH
CFR CRITERIA CATEGORY	CFR CRITERIA SUBCATEGORY	USACE RISK ASSESSMENT
Design Criteria	Freeboard (levee height)	YES
	Closure devices for all openings	YES
	Embankment protection	YES
	Embankment and foundation stability	YES
	Settlement	YES
	Interior drainage	AS APPROPRIATE*
Operation Plans	Closures	YES
	Interior drainage systems	YES
Maintenance Plans		YES

\*Interior Drainage. Though the accreditation requirement for interior drainage may not be covered during a USACE risk assessment, USACE and FEMA will ensure the data needed to address interior drainage will be collected.

Table 3 provides an indication of where information collected through the USACE risk assessment process can fulfill the requirements of accreditation.

### A Risk Assessment Approach Provides More Data for Decision Making Than Information Collected for 44 CFR 65.10

An important benefit of embedding an NFIP accreditation decision as part of a risk assessment is placing the decision to seek accreditation and potential impacts of accreditation (no mandatory flood insurance requirement and limited floodplain development restrictions) in the overall context of risk. The current accreditation process tends to drive action focused on just the 1% ACE without consideration of other critical questions such as:

- What is the range of possible flood events that could occur in the area?
- How will the levee perform in the face of this range of events?
- What are the consequences if the levee does not perform as intended?

Table 4 (page 18) provides some concrete examples that demonstrate how a levee sponsor and community might benefit from a risk assessment approach.

A levee sponsor could consider the following before raising a levee a minimum amount to meet the height requirement for accreditation:

- Would it be a wiser long-term investment to also consider measures that reduce risk to life safety, such as reinforcing areas of overtopping?

TABLE 4: EXAMPLES OF THE BENEFITS OF A RISK ASSESSMENT APPROACH

BENEFIT	EXAMPLE
Risk Assessments Help Sponsors Understand Return on Investment for a Variety of Scenarios	A risk assessment may show that a levee that needs to be raised 2 inches to meet the 1% ACE with freeboard to meet the NFIP may only need to be raised slightly more to meet the height for a 500-year event. Would it be a better long-term investment for marginal additional cost?
Risk Assessments Help Focus Activities To Reduce the Greatest Risk First, Improving Effectiveness of Actions by Sponsors	A risk assessment could show that the highest area of uncertainty related to the performance of the levee is not with seepage or erosion, but with culvert condition. Therefore, the focus of data gathering efforts should be on culverts as opposed to an expensive drilling program to collect geotechnical information.
Risk Assessments Provide Information To Help Sponsors Reduce Risk to Life Safety	A risk assessment may show that a levee that meets NFIP accreditation requirements may be at risk of catastrophic results if it is overtopped. This information could be used to plan for appropriate measures, such as where and when to evacuate.

- Would the cost of the additional modifications be worth the reduction in risk?

The risk assessment methodology being implemented by USACE can provide information so these questions can be answered. The result will be additional information to make comprehensive decisions about long-term investments involving a levee system.

**ACTION:** *USACE will revise its risk assessment methodology in order to assess levee performance for various loadings including the 1% ACE and use this information for accreditation purposes.*

The initial step for implementing this action will be to specifically include assessment of the likelihood that the levee system can exclude the 1% ACE event from the leveed area as part of the risk assessment pilots scheduled for Fiscal Year 2013. During the pilots, procedures will be developed to fill the gaps identified by the Task Force. As a result of these pilots, USACE will revise its risk assessment procedures and best practices to implement and revise applicable guidance (Engineer Circular 1110-2-6067, *USACE Process for the National Flood Insurance Program (NFIP) Levee System Evaluation*) for assessing the levee for NFIP accreditation purposes. Once the pilots are complete, USACE will continue to conduct risk assessment, which will include an accreditation determination, per its current approach, in areas of high risk as identified through the screening process and selected

by the USACE levee safety senior oversight group. In addition, USACE will continue to perform risk assessments as appropriate.

Because the USACE Levee Safety Program uses a portfolio risk management process that prioritizes activities based on areas of high risk to life safety, the Task Force does not recommend diverting from this approach by shifting to conduct risk assessments based

on accreditation need. It is recognized that where and when risk assessments will be conducted will likely not correspond with areas that need accreditation information. However, it is critical to retain focus on high priority life safety issues.

## LEVEE INSPECTIONS AND SCREENINGS CAN PROVIDE SOME LIMITED INFORMATION TO LEVEE SPONSORS FOR 44 CFR 65.10 ACCREDITATION PACKAGES

The Task Force has identified a limited number of accreditation criteria that can be linked to specific items in USACE levee inspections and screenings, thereby providing additional information to the levee sponsor seeking and maintaining accreditation status for the NFIP. These changes will improve clarity on how portions of these USACE activities directly relate to specific accreditation requirements.

The limited data from these activities that can be used to make a decision for specific accreditation criteria will likely have minimal reduction to the total cost of an accreditation package. The levee sponsor or community would then have the responsibility to provide the remaining information for accreditation if a USACE risk assessment is not available. USACE intends to make changes to its levee inspection checklist and screening protocols

that will collect some additional data and make data and information already collected more meaningful to NFIP accreditation purposes without changing the fundamental purposes of inspections or screenings.

Since levee inspections focus on the operations and maintenance activities, inspection findings can most directly be linked to the NFIP requirements for operations and maintenance plans. Levee screenings include a limited assessment of expected levee performance, so for a limited number of situations screening results can be linked to the NFIP requirements for design criteria. However, a determination about a specific NFIP accreditation criterion can only be made when the screening results show the levee either clearly meets or clearly does not meet the criteria.

**TABLE 5: NFIP REQUIREMENTS AND RELATION TO USACE INSPECTIONS AND SCREENINGS**

NFIP REQUIREMENTS (44 CFR 65.10)		COMPLIANCE CAN BE DETERMINED THROUGH	
CFR CRITERIA CATEGORY	CFR CRITERIA SUBCATEGORY	USACE INSPECTION	USACE SCREENING
Design Criteria	Freeboard (levee height)	NO	RARELY
	Closure devices for all openings	NO	RARELY
	Embankment protection	NO	RARELY
	Embankment and foundation stability	NO	RARELY
	Settlement	NO	RARELY
	Interior drainage	NO	NO
Operation Plans	Closures	YES	YES
	Interior drainage systems	YES	YES
Maintenance Plans		YES	YES

See Appendix D: Analysis of Modifications to Improve Alignment Between USACE Inspection and Screening Activities and NFIP Accreditation Requirements for more details on the areas of clarifications that will assist in identifying the specific inspection and screening information that relate to NFIP accreditation.

Table 5 provides an indication of where information collected through the USACE inspecting or screening process can fulfill certain requirements for accreditation.

**ACTION:** *USACE will revise the Levee Inspection Checklist and screening process to improve clarity of the relationship to accreditation criteria.*

Ability to make revisions to the inspection process is dependent on the conclusion of pending litigation. Timeframe is unknown at this time. Revisions to the screening process will be completed by the end of calendar year 2013.

## COST IMPLICATIONS

The Task Force assessed the potential cost implications of revising existing USACE processes to better align with accreditation data and information requirements under the NFIP. The Task Force wanted to know:

- What is the range/average cost for putting together an accreditation package for a levee sponsor under 44 CFR 65.10?
- What is the range/average cost to conduct a risk assessment?
- From a cost perspective, how do risk assessments compare with the deterministic approach required under 44 CFR 65.10?
- For comparison, what is the average cost of a USACE levee inspection and screening?

The Task Force collected cost information associated with performing an evaluation for accreditation and the USACE levee activities analyzed by the Task Force. The purpose was to develop a cost range for accreditation, to assess costs associated with potential agency actions, and to be able to compare costs between accreditation in accordance to 44 CFR 65.10 and risk assessments. The Task Force reached out to private sector engineering firms and levee sponsors through contacts from the National Committee on Levee Safety and a stakeholder workshop and asked them to provide the following information without attribution to sponsor or community.

1. Cost to a levee sponsor to gather and analyze data and information sufficient to compile an accreditation package for FEMA under 44 CFR 65.10.
2. Types of activities or conditions that drive the cost.

### Assumptions Regarding Cost of Accreditation and USACE Activities

One of the most common concerns raised by those seeking FEMA accreditation under 44 CFR 65.10 is associated with the cost to collect, compile, and analyze the data required. High costs have led stakeholders to ask if USACE was to do the accreditation evaluation, would it be less costly.

Two incorrect assumptions behind these questions are:

**ASSUMPTION #1:** *Information collected through USACE levee inspections should be sufficient or close to sufficient to fulfill the data requirements for NFIP accreditation.*

In reality, USACE performs visual levee inspections to verify maintenance, emergency preparedness, and levee sponsor responsibilities as they relate to USACE-local sponsor agreements. An inspection checklist is used to document the visual condition of the levee. Often, a visual inspection of the levee is an initial step for accreditation, but most of the effort for accreditation is associated with the engineering analysis associated with the design criteria of 44 CFR 65.10, which is not part of the visual inspection process.

### COMMUNITIES AND SPONSORS ALSO CONCERNED WITH THE COST OF FIXING DEFICIENT LEVEES

While this Task Force focuses on the cost of collecting and analyzing information to compile a package for 44 CFR 65.10, communities are also faced with the cost of correcting deficiencies in their levees. In order to meet minimum requirements associated with the 1% ACE for FEMA accreditation, some communities may have to spend millions of dollars.

## TYPES OF CHANGES THAT COULD IMPACT A LEVEE'S ABILITY TO MAINTAIN ACCREDITATION STATUS

- Development within the watershed can result in higher, faster precipitation runoff rates. This could result in higher water levels.
- Levees can degrade as a result of a flood event even if they do not breach or overtop.
- Natural migration and deepening of river channels can alter seepage conditions in the levee.
- Settlement of the levee embankment occurs over time, often taking many years to complete.
- Structural components, such as culverts and pumps, can wear out.
- Climate variability can change the frequency of flooding events and increase water levels.

**ASSUMPTION #2:** *If USACE constructed the levee, then it should be less costly and require less effort for USACE to provide the accreditation information. Why won't USACE stand behind the levees they built?*

In reality, the average age of levees in the USACE portfolio is 50 years old. Accreditation decisions are based on present day condition of the levee. Levee condition can change over time. USACE would, like any other entity, need to collect current and relevant information to evaluate a levee for NFIP purposes.

## Summary of Cost Information

The cost summary in Table 6 provides a bracketed range of estimated costs associated with compiling complete accreditation packages for a small sample of levee systems completed by private sector firms or levee sponsors in the last five years. The very large breadth of this range of costs is related directly to the amount of work required to prepare the accreditation package. **Costs do not include repair, remediation, or new**

**construction costs expended to meet the requirements of 44 CFR 65.10.**

The work required for each accreditation package generally varies due to the following driving factors:

- Amount and quality of available existing information such as exploration logs, original design documents, and as-built plans.
- Amount of recorded information on past levee performance during large flood events.
- Length, height and age of the levee.
- General physical condition of the levee, such as levee geometry, erosion defects, animal burrow activities, vegetation coverage, levee penetrations, etc.
- Complexity of the levee system (number of gates, closure structures, culverts, pump stations).
- Required field exploration and testing to assess geotechnical and geologic conditions.

**TABLE 6: ESTIMATED COST OF COLLECTING AND ANALYZING INFORMATION AND DATA TO COMPILE AN ACCREDITATION PACKAGE UNDER 44 CFR 65.10\***

SAMPLE SIZE	RANGE	AVERAGE COST PER LEVEE	ACTIVITIES PERFORMED	% OF ACCREDITATION PACKAGE COMPLETED
57 Levees	\$142,500 – \$4,630,000**	\$600,000	<ul style="list-style-type: none"> <li>■ Review and compilation of available information</li> <li>■ Exploratory field work to gain additional information</li> <li>■ Engineering analyses</li> <li>■ Verifying accreditation package</li> </ul>	100%

\*Please note, information collected for this analysis was limited to information from a handful of private firms and sponsors voluntarily provided to the Task Force for this purpose. It does not claim to be geographically or technically representative of all the types of levee systems in the ICW program or those seeking accreditation.

\*\*The levee at the high end of this range was 51 miles long.



**TABLE 7: ESTIMATED COST OF USACE ACTIVITIES AND PERCENTAGE OF ACCREDITATION PACKAGE THAT IS ESTIMATED TO BE ACHIEVED**

SAMPLE SIZE	ACTIVITY	RANGE	AVERAGE COST PER LEVEE	PRIMARY COST DRIVER	ESTIMATED % OF ACCREDITATION PACKAGE COMPLETED
1048 Levees	Inspections	\$3,000 – \$32,000	\$11,500	Complexity of System	5%
150 Levees	Screenings	N/A	\$26,000	District Level Assessment	20%
8 Levees	Risk Assessments	\$250,000 - \$700,000	\$545,000	Potential Failure Modes Analysis	95%*

\* The risk assessment will result in sufficient information about the performance of the levee itself, but there may be additional information related to interior drainage needed. If this is the case, USACE and FEMA will collect the additional information needed.

- Amount of engineering study and analysis required to substantiate that the requirements of 44 CFR 65.10 are met.

Table 7 shows the range and average estimated costs associated with USACE inspections, screenings, and risk assessments. In addition, it shows the estimated level of effort each of these activities may contribute to an accreditation package with the Task Force recommended changes in place.

Based on available cost information and additional feedback, the following conclusions were made regarding costs associated with levee accreditation. The conclusions are illustrative and help refine the big questions related to cost but are not statistically significant.

1. The average cost to compile an accreditation package is approximately \$600,000 per levee. The cost for accreditation will vary for each levee system and is dependent on several factors. The largest cost driver is the amount of engineering study and analysis required to substantiate that the requirements of 44 CFR 65.10 are met.
2. The average cost of a USACE visual inspection is approximately \$11,500 per levee compared to approximately \$600,000 per levee for accreditation. Typically, conducting a visual inspection is an initial step of the accreditation process. If USACE was to collect the data and perform the engineering analysis sufficient for accreditation as part of its inspection process, the cost for inspections would increase.
3. The average cost of a USACE screening is approximately \$26,000 per levee compared to approximately \$600,000 per levee for accreditation. In most cases the screening will result in an inconclusive determination about accreditation because the analysis will not be detailed enough to meet the requirements of 44 CFR 65.10.
4. The average cost of a risk assessment is approximately \$545,000 per levee and is comparable to the cost of approximately \$600,000 per levee for accreditation. The cost of risk assessments is not as influenced by the length of levee as the analysis per 44 CFR 65.10. Risk assessments typically will have a base

cost of approximately \$200,000 to approximately \$300,000 to perform the potential failure mode analysis and the expert elicitation, no matter the length.

5. The cost to modify the USACE risk assessment process to include enough information to be able to make a decision of the performance of the levee at the 1% ACE will likely be minimal (an estimated increase of 5 to 10%). Assessing the 1% ACE also provides further insight to levee performance to inform decision makers on investments.
6. The cost to adjust USACE inspections and screenings to clarify how specific items in the inspections checklist relate to some of the accreditation criteria of 44 CFR 65.10 is negligible.

improve the quality of decisions and establish priorities and solutions that effectively address the risks. The methodology of conducting a risk assessment focuses on the “weakest link” and drills down to understand possible ways the levee could breach or malfunction. Data gathering is focused on supporting credible and significant failure modes, so risk assessments typically have a lower (\$545,000) base cost than accreditation and are less sensitive to cost drivers such as length, numbers of gates/culverts, etc.

Table 8 (page 25) provides an overview of USACE Levee Safety Program activities and costs side-by-side with estimates of costs to complete an accreditation package under 44 CFR 65.10.

**Risk assessments are viewed by the Task Force as a means to meet NFIP data and information requirements for levee accreditation, while providing valuable information to the levee sponsor and community.** They are comparable in cost to existing estimates for accreditation data collection and analysis for 44 CFR 65.10, while providing additional information about risk (including performance and consequence driving factors), enabling the community to

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**TABLE 8: SUMMARY OF LEVEE ACTIVITIES**

LEVEE ACTIVITY	PURPOSE	ACTIVITIES PERFORMED	RESULT OR FINDINGS	FREQUENCY	ESTIMATED COST	PRIMARY COST DRIVERS
USACE Inspection	<ul style="list-style-type: none"> <li>■ Verify operation and maintenance activities</li> <li>■ Identify visual defects</li> </ul>	<ul style="list-style-type: none"> <li>■ Visually inspect using standard checklist</li> <li>■ Quality review and approval</li> <li>■ Communicate results</li> </ul>	<ul style="list-style-type: none"> <li>■ A rating for operations and maintenance</li> <li>■ Overall rating of Acceptable, Minimally Acceptable, or Unacceptable</li> </ul>	Annual	Range \$3,000 – \$32,000	<ul style="list-style-type: none"> <li>■ System length</li> <li>■ Number of features like pump stations</li> <li>■ Number of deficiencies</li> <li>■ Accessibility to inspect</li> <li>■ Travel time to levee</li> </ul>
USACE Screening	<ul style="list-style-type: none"> <li>■ Determine relative risk classification to inform priorities of next actions</li> </ul>	<ul style="list-style-type: none"> <li>■ Gather existing data (no investigations)</li> <li>■ Conduct limited engineering assessment</li> <li>■ Estimate consequences</li> <li>■ Communicate results</li> </ul>	<ul style="list-style-type: none"> <li>■ Identification of risk drivers and recommended actions</li> </ul>	Every 5 years or as needed due to changed conditions	Per levee \$26,000	<ul style="list-style-type: none"> <li>■ Compilation of existing information</li> <li>■ Number of features like pump stations</li> <li>■ Number of deficiencies</li> <li>■ Review and communication process</li> </ul>
USACE Risk Assessments	<ul style="list-style-type: none"> <li>■ Assess how the levee will perform during a wide range of flood events, including associated consequences to inform decisions to manage flood risks</li> </ul>	<ul style="list-style-type: none"> <li>■ Establish key questions</li> <li>■ Gather information and identify gaps</li> <li>■ Perform a potential failure mode analysis</li> <li>■ Conduct expert elicitation to quantify risk</li> <li>■ Answer key questions</li> <li>■ Develop final report</li> <li>■ Communicate results</li> </ul>	<ul style="list-style-type: none"> <li>■ Verification of risk drivers and determination of risk reduction actions</li> </ul>	As needed, prioritized by screening results and risk	Range \$250,000 – \$700,000	<ul style="list-style-type: none"> <li>■ Number of potential failure modes</li> <li>■ Expert elicitation</li> </ul>
NFIP 44 CFR 65.10 Package	<ul style="list-style-type: none"> <li>■ NFIP mapping, flood insurance, and floodplain management</li> </ul>	<ul style="list-style-type: none"> <li>■ Review and compile available information</li> <li>■ Perform exploratory field work to gain additional information</li> <li>■ Conduct engineering analyses</li> <li>■ Compile accreditation package</li> </ul>	<ul style="list-style-type: none"> <li>■ Accredited or non-accredited status</li> </ul>	Desire of local community to have levee recognized on FEMA flood map/remap is initiated due to changed condition	Range \$142,000 – \$4,630,000 (The levee at the high end of this range was 51 miles long.)	<ul style="list-style-type: none"> <li>■ Data available to support engineering analysis</li> <li>■ Magnitude of subsurface investigations required</li> <li>■ System length</li> <li>■ Number of features like pump stations</li> </ul>

## IMPROVING ALIGNMENT OF USACE AND FEMA PROCESSES SO INFORMATION COLLECTED CAN BE USED INTERCHANGEABLY

The Task Force reviewed how and what information is: 1) regularly exchanged between USACE and FEMA; 2) shared with levee sponsors; and 3) provided to other stakeholders (upon request). Based upon this review, specific actions will be implemented to:

- Identify opportunities where existing information can be used to benefit other agency activities.
- Coordinate USACE and FEMA activities, as practical, to mutually support each agency's objectives.
- Improve quality of information exchange by fostering direct dialogue between peer contacts at USACE districts and FEMA regions.
- Continue efforts to expand the amount of levee-specific information in the National Levee Database (NLD) and measures to improve accessibility and availability to users.
- Standardize information sharing practices through a MOU between USACE and FEMA.

### Information Exchange Survey and Identification of Key Agency Products

To gain a better understanding of the types of levee information currently shared between FEMA regional offices and the USACE district offices, the Task Force reached out to these offices to determine what information was being shared routinely between the two

agencies. Both USACE and FEMA offices confirmed that their respective districts and regions are notifying each other of new information such as USACE levee inspection reports, FEMA Flood Insurance Studies and Flood Insurance Rate Map updates. The exchange of less routinely available information, such as information about levee rehabilitation projects (USACE) or NFIP accreditation packages submitted (FEMA) was inconsistent.

Neither agency has specific policies that outline when or what information must be shared and what actions should take place after the information is exchanged.

The Task Force compiled information regarding key levee-related products developed by USACE and FEMA, the frequency with which they are updated, and where they are currently stored (Table 9, page 27). Similar or related activities where data should be shared more consistently include:

- Hydraulic and hydrology analysis and modeling;
- USACE levee inspections and reconnaissance inspections undertaken for NFIP accreditation studies;
- Topographic and levee feature surveys; and
- Engineering analyses associated with USACE risk assessments and NFIP accreditation studies.

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**TABLE 9: KEY LEEVE-RELATED PRODUCTS AND DATA**

PRODUCT	CURRENT RECURRENCE INTERVAL	CURRENT STORAGE LOCATION
<b>USACE ROUTINE PRODUCTS FOR FEDERALLY CONSTRUCTED LEEVES</b>		
Routine Inspection (also applies to nonfederal levees in the Rehabilitation & Inspection Program)	Annual	NLD
Periodic Inspection	5 Years	NLD
<b>USACE NON-ROUTINE PRODUCTS FOR FEDERALLY CONSTRUCTED LEEVES</b>		
Original Design Documents (Feasibility Studies, General Design Memorandums, Definite Project Reports, etc.)	Produced once prior to project construction	Hard copy resides with USACE District Office; additional distribution varies (could be stored as stand-alone documents in NLD)
As-Built Drawings, Operation and Maintenance Manuals	Produced once at time of construction; may or may not be updated	NLD (embedded within Periodic Inspection reports, but could be stored as stand-alone documents)
Crest Elevation/Feature Survey	Baseline surveys completed in 2009-2010 as part of ARRA initiative	NLD
Levee Screening	Currently being completed on entire USACE portfolio; may be updated on 10-year basis	Levee Screening Tool (specific information or reports could be stored as stand-alone documents in NLD)
Risk Assessment	Currently being performed on projects with potentially high risk (as determined by risk screenings); no set frequency for updates	Hard copy resides with USACE District Office; additional distribution varies (could be stored as stand-alone information in NLD)
<b>FEMA-GENERATED AND COLLECTED PRODUCTS</b>		
Flood Insurance Studies (FIS), Maps (FIRMS), DFIRM database	Needs to be reassessed every 5 years	FEMA Map Service Center (digital library available to public); FEMA Regional Office, USACE District Office
Hydrologic and Hydraulic Modeling	Varies (as needed)	FEMA Map Service Center (digital library available to public)
National Flood Hazard Layer	Varies (as needed)	FEMA Mapping Information Platform (digital library available to public)
Accreditation Packages (FEMA PM 63)	Varies	FEMA Map Service Center; FEMA Regional Office, USACE District Office
RiskMAP nonregulatory products	Varies	FEMA Regional Office and local community
<b>SPONSOR DEVELOPED AND COLLECTED PRODUCTS</b>		
Sponsor Collected Data (e.g., Emergency Action/Response Plans, System Wide Improvement Framework (SWIF) plans, Section 408 Project Modification Submittals, Video Inspection of Culverts, Pump Station Megger Testing, etc.)	Varies	Resides with Project Sponsor; USACE District Office should have copies (could be stored as stand-alone documents in NLD)

## THE NATIONAL LEEVEE DATABASE

The National Levee Database (NLD), developed by the U.S. Army Corps of Engineers (USACE), is the focal point for comprehensive information about our nation's levees. Authorized by Congress in 2007, the database contains information to facilitate and inform a variety of activities, such as flood risk communication, levee system evaluations for the National Flood Insurance Program (NFIP), levee system inspections, floodplain management, and risk assessments. The NLD continues to be a dynamic database with ongoing efforts to add levee data from federal agencies, states, and tribes.

Here is what is available in the NLD:

- All levees within the USACE Levee Safety Program;
- Detailed reports on levees in the NLD searchable by state, ZIP code, or address; and
- Various federal database resources integrated into NLD such as the National Weather Service.

## Possibilities for Improving Information Exchange and Risk Communication Between Agencies

USACE and FEMA activities are often undertaken with prescriptive scoping to meet agency specific objectives, policies, and authorities. There are opportunities to utilize existing information to inform other agency work, reduce scope, and improve efficiency.

Agency activities should be comprehensively reviewed and, when practical, activities should be coordinated to leverage benefits. Some examples where existing information could be used to inform other agency work include:

- 44 CFR 65.10 NFIP accreditation packages could be utilized to inform USACE levee risk screenings. Pertinent engineering analyses (i.e., freeboard, hydraulic and hydrologic modeling, seepage, slope stability, erosion, etc.) from NFIP accreditation packages could also be used in USACE levee evaluations, risk assessments and other studies. The reconnaissance site inspections undertaken for the purpose of NFIP accreditation studies are often comparable in scope and could inform USACE inspections.
- USACE data are currently used by levee sponsors in the development of their own NFIP accreditation evaluations. Consultants hired by the levee sponsors commonly visit USACE district offices to request access to pertinent documents, including:
  - Inspection reports;
  - Original design documents; and
  - Operations and maintenance manuals.

- As-built drawings;
- Engineering assessment and analyses; and
- Topographic and feature surveys.

There is still a need to better standardize practices for cataloging and archiving pertinent historic design and other documents. When practical to do so, digital copies of documents should be uploaded to the NLD. There has been significant progress made in recent years locating, cataloging, and digitizing relevant design documents. Some but not all of this information is currently available in the NLD. However, many of these documents still exist only in hard copy format and reside only in USACE district offices. Storage practices for archiving information are not well defined and record retention is not consistent among districts or sponsors.

## Synopsis of USACE and FEMA Data Integration Efforts in Terms of Short- and Long-Term Goals

Data management is critical to both USACE and FEMA in executing their missions. The long-term goal is for both USACE and FEMA to identify those key aspects of data management and exchange that are central to both and develop a data management process centered on the NLD. With the NLD as the central repository for data, each agency can develop a platform that meets the specific needs of their mission while sharing that key data, which in turn supports the other agency's mission and function.

Authorized by Congress in 2007, the NLD currently contains basic information on USACE Levee Safety Program levees, such as attributes of levees and floodwalls (i.e., levee length, leveed area, crest elevation, cross-section profiles, culvert and gate

locations, etc.); inspection reports; and, with very limited availability, design documents, operations manuals, and as-built drawings. Information in the NLD remains dynamic, as new information from a variety of sources is continually collected and loaded.

USACE and FEMA are working together to add levee data from other federal agencies, state agencies, and tribes, with the ultimate goal of including all of the nation's levees. In parallel to that goal, FEMA initiated the development of a Mid-Term Levee Inventory (MLI) database in 2007 to complement the NLD. The Mid-Term Levee Inventory data model was extracted from the NLD to ensure consistency, while addressing data collection and development efforts relevant to items of interest to FEMA. The primary purpose was to capture and supply levee data as FEMA interfaced with communities through the production of county-wide Flood Insurance Study reports and Flood Insurance Rate Maps. Integration of the Mid-Term Levee Inventory into the NLD is ongoing and expected to be complete by December 2013. The integration will enhance the NLD because FEMA has compiled levee data for levees that are not included in the USACE levee portfolio.

As part of the ongoing USACE and FEMA collaboration with the NLD and the Mid-term Levee Inventory database integration, data sharing concepts and the development of additional capabilities within the NLD are under development, which will greatly enhance the ability of each agency to share and manage data within the database. These activities will be particularly valuable in aligning USACE and FEMA data for the purposes of NFIP accreditation. The NLD will then serve as a common repository for both the data associated with USACE levee inspections, design, construction, operation, and maintenance, and the data associated with FEMA's levee accreditation, analysis,

and mapping efforts. When integration of the Mid-Term Levee Inventory data is completed, the NLD will include a reporting mechanism for data available for communities and other federal agencies.

Efforts continue to improve the overall ease and accessibility of the NLD to end users, including non-agency stakeholders. For example, recent additions to the NLD allow sponsors access to all information within the NLD regarding their levee system. Efforts are currently underway to solicit end user feedback and consolidate suggestions into tangible improvements to the function of and content within the NLD. As the NLD becomes more robust with information from both USACE and FEMA, this ability for the sponsor to directly access information about their levee system will provide a valuable tool in communication of risk and evaluation of the levee system.

A comprehensive review of the NLD is underway, which includes stakeholder feedback, review of current data presentation, review of how information is loaded, and various aspects of how to improve the NLD as a risk communication tool. This review is anticipated to be complete by the end of calendar year 2013 with joint recommendations for improvements to the NLD.

When integration of the NLD and Mid-Term Levee Inventory database is completed, USACE and FEMA plan to generate a reporting mechanism for data available for communities and other federal agencies. A Memorandum of Understanding (MOU) specific to the NLD is also being currently developed to outline best management practices between the agencies, which will also outline specific protocols for information sharing. This MOU is anticipated to be executed by the end of 2013.

## Improve Quality of Communication Between USACE and FEMA

In addition to improving access to information through data integration, it is also important that critical information be consistently transmitted between the agencies. Effective communication requires a clear understanding of what information is being sent and its significance. The following are changes in agency business practices that will be further pursued to improve quality in communication:

- Key points of contact from each agency will be identified for information exchange. Protocols will be developed for alerting these individuals when information is transmitted. Acknowledgement of receipt and understanding of critical information will be confirmed.
- For potentially sensitive information, strategic communication plans will be jointly developed between agencies. Processes will be reviewed to ensure periodic interaction and consultation takes place between the agencies, particularly at the USACE district office level and the FEMA regional office. It may be possible to utilize existing standing meetings for this purpose.
- Further dialogue is needed to determine what information should be loaded into the NLD. Consideration should be given to what can be done in the short and long-term (i.e., what is “must have” information that can reasonably be uploaded now and what would be “nice to have” in the future). Nonfederal

partner and stakeholder interests will be included in this evaluation. Better effort must also be made by USACE districts and all other involved stakeholders (e.g., FEMA and sponsors) to make frequent uploads to the NLD to ensure most recent inspection data and documents are available.

- Evaluations of the NLD and the supporting data management tools are ongoing to determine how to improve the ease with which to find and manage information. Efforts involve discussion among many user groups including federal agencies, sponsors, and the public. Topics under consideration include future changes to the NLD to enhance user friendliness in accessing information, managing data, and most importantly adding data to the database. Communication of these proposed changes to the user groups identified and subsequent training events are key to the success of this effort.



## STAKEHOLDER INVOLVEMENT

In accordance with NFIP requirements for levee accreditation, it is the responsibility of the community or other parties seeking accreditation of a levee system to provide the necessary data and analysis. Community officials also play a crucial role in educating citizens about levee-related flood risks and helping citizens and businesses make a rapid recovery if levees do breach or overtop. Because of this leadership role of state, local and tribal governments and levee sponsors, the Task Force solicited feedback from these stakeholders on aligning USACE activities with NFIP accreditation requirements.

The objectives of seeking this feedback were to:

- Ensure that the nature and severity of the problems associated with alignment of USACE and FEMA programs associated with making levee accreditation decisions are well understood, including regional or technical variation.
- Ensure that all USACE and FEMA policies and practices that impact actions leading to accreditation decisions under the NFIP have been identified, and any issues related to these policies and their implementation are well understood by the Task Force.
- Seek input on approaches, including unintended safety, social, economic, and environmental consequences, from local sponsors, levee owners and operators and communities.

### Stakeholder Involvement Activities

On February 27, 2013, the Task Force held a one-day meeting to seek initial feedback on draft recommendations under consideration by the Task Force. Twenty-eight (28) individuals representing communities with levee systems, owners/operators of levee systems, and members from the National Committee on Levee Safety participated. In addition to comments and questions posed at the workshop, 21 of the attendees filled out a questionnaire with additional comments.

In addition, a series of four webinars were offered in March 2013 to update stakeholders interested in the work of the Task Force and to provide opportunity for discussion and feedback on the draft recommendations of the Task Force as they prepare their final report to Congress. Announcements and invitations to the webinars were distributed via email to several broad-based distribution lists to ensure extensive participation, including:

- Levee sponsors/communities with levees in the USACE Levee Safety Program via USACE district levee safety program managers.
- FEMA's Levee Analysis and Mapping (LAMP) approach email distribution list.
- Opt-in list for "levee related information" via the National Committee on Levee Safety website.
- Participants in the National Committee on Levee Safety's Review Team.

### ABOUT THE NATIONAL COMMITTEE ON LEEVE SAFETY

The NCLS was created by Congress and authorized by the Water Resources Development Act of 2007, Section IX, to "develop recommendations for a national levee safety program, including a strategic plan for implementation of the program." The NCLS includes representatives of state governments, local/regional governments, the private sector and two federal agencies (USACE and FEMA).

The NCLS adopted the vision of "an involved public and reliable levee systems working as part of an integrated approach to protect people and property from floods." In their report entitled *Recommendations for a National Levee Safety Program: A Report to Congress from the National Committee on Levee Safety* (January 2009), the NCLS presented 20 recommendations that, when taken together, will establish the basis for a comprehensive and effective National Levee Safety Program. For a copy of the report and more information about the full NCLS recommendations see [www.levesafety.org](http://www.levesafety.org).

**TABLE 10: DEMOGRAPHICS OF STAKEHOLDERS WHO PARTICIPATED IN WEBINARS**

	14-MAR	15-MAR	18-MAR	19-MAR	TOTAL #	TOTAL %
Levee sponsor	8	9	10	10	37	14.8%
Elected official	1	1	0	0	2	0.8%
Federal, state, or local government	42	28	14	49	133	53.2%
Private sector	27	10	13	26	76	30.4%
Interested citizen	1	1	0	0	2	0.8%
<b>TOTAL</b>	<b>79</b>	<b>49</b>	<b>37</b>	<b>85</b>	<b>250</b>	

- The National Committee on Levee Safety and their professional networks, including the National Association of Flood and Stormwater Management Agencies (NAFSMA) and Association of State Floodplain Managers (ASFPM), among others.

Using a web-based registration system, 410 individuals registered for the four webinars. There were at least 283 unique logins for the web meetings. Some agencies/offices participated in the web meeting in group gatherings, so the exact number of participants is unknown.

For each of the four external webinars, a poll was used to gauge the diversity of participation. Across the four webinars, 250 completed the poll. The majority of poll respondents (53%) were from federal, state, or local government. See Table 10 for more detailed information.

All four webinars followed the same format and used the same presentation. A one-hour presentation, jointly presented by USACE and FEMA members of the Task Force, was followed by 20-40 minutes of responding to questions submitted via the “chat” function of the webinar or via email. All questions submitted were answered by the USACE and FEMA presenters.

Public and stakeholder webinars were held on March 14, 15, 18, and 19. On March 20, the recorded web meeting from March 15 was posted on the Task Force website.

Finally, a web-based feedback and comment form was made available following the webinars; 11 additional individuals provided feedback via that venue. For the specific questions asked on the web-based form, see *Appendix F: Detailed Stakeholder Participation Activities*.

## Highlights of Stakeholder Feedback

Comments received across the stakeholder workshop and the webinar are highlighted below.

### OVERALL COMMENTS RELATED TO THE ROLES OF USACE AND FEMA, THEIR LEVEE-RELATED ACTIVITIES AND THE POTENTIAL IMPACTS OF THE TASK FORCE'S WORK

- The process and effort to date are good, but it is a Band-Aid on a larger problem. Currently sponsors and communities are caught between competing interests of the federal agencies. Streamlining and having one organization responsible for levee safety would improve communications and eliminate duplication. These alignment activities are helpful, but only to a certain degree.
- The challenge to align programs will continue as long as FEMA is using the base flood and USACE is using the design flood for levee assessments and certifications [evaluations for the National Flood Insurance Program]. Reform of the NFIP to make it more risk-informed is desirable.
- Both USACE and FEMA programs have rapidly evolved since Hurricane Katrina. There is overall concern about the increased cost and pace of these activities for sponsors and communities.
- There should always be some activities retained by the levee sponsor including operations and maintenance, interior drainage mapping, coordinating with the community regarding mapping, etc. Sponsors should maintain responsibility for implementing the NFIP requirements, including levee accreditation.

- Recommendations should address all levees, not just those in the Inspection of Completed Works Program.
- There was a mixed reaction as to whether floodplain management and evacuation planning should be a requirement for accreditation. All agreed it was good practice for a community with a levee.

### CHANGING INSPECTIONS TO PROVIDE MORE DATA TO SPONSORS FOR ACCREDITATION PACKAGES

- The differences between USACE levee safety activities and the analysis required to meet the requirements of 44 CFR 65.10 are unclear to many stakeholders, including communities with levees. The Task Force included descriptions of the differences between USACE and FEMA levee activities in this report and will work to integrate those messages clearly in routine communications with levee sponsors and communities.
- Some sponsors and communities expressed concerns that the results of inspections conducted by USACE will result in the automatic deaccreditation of levee systems for the NFIP. Stakeholders recommended that should an inspection indicate that an accreditation requirement under 44 CFR 65.10 may no longer be met, that deaccreditation is neither immediate nor a foregone conclusion. A process should exist for the community to consult with FEMA and consider inspection information alongside other elements that could lead to beginning a new mapping study.

## USACE TO CONDUCT RISK ASSESSMENTS FOR ACCREDITATION PURPOSES

- Stakeholders also recommended that changes to FEMA regulations to allow communities to use a risk assessment methodology to meet accreditation requirements could be beneficial; some advocated a transition to a risk assessment approach while others thought communities should have a choice about whether they use the traditional 44 CFR 65.10 deterministic process or a risk assessment. The latter approach spawned a reaction that this would lead to “shopping” for a “yes” answer that could put FEMA in a difficult position.
- The potential shift to a risk assessment methodology also raised concerns of unintended consequences: that USACE risk assessments could be subject to congressional direction focused on accreditation need rather than where prioritized by areas of high risk potential; that some levees that meet requirements could now be de-accredited if a risk assessment were conducted; and that communities that have invested in developing an accreditation package under the current approach would not wish to have to redo these accreditations at additional cost.
- Communities and A/E (architecture and engineering) firms that assemble levee accreditation packages for communities also expressed concern that USACE risk assessments as the only path to NFIP accreditation would trigger Thomas Amendment concerns. The Thomas Amendment, Section 211 of the Water

Resources Development Act of 2000, discusses when USACE can provide specialized or technical services to a state or local government.

## INFORMATION EXCHANGE

- Stakeholders generally agreed that the NLD is a good repository. In addition to inspection reports, screening information and accreditation status, the NLD should also include information about design and history (e.g. age, design), performance and event details (e.g. velocities, recent event information, flows).
- There were differing recommendations related to the potential for USACE information leading to a deaccreditation. For example, some recommended that USACE should filter the data it shares with FEMA to the most relevant information to avoid triggering the deaccreditation process unnecessarily. Other stakeholders thought that any filtering of data would likely be detrimental to open communications relationships. All data (positive and negative) should be shared regularly and without filtering.
- FEMA should consider instituting a process equivalent to the USACE System-wide Improvement Framework Policy that provides sponsors with some grace period to fix certain items.

## Task Force Consideration of Stakeholder Dialogue

Overall, stakeholders were supportive of a risk assessment approach to levee accreditation, but remain concerned about total costs to communities, including the costs of data collection and analysis, as well as costs to repair, improve and recapitalize aging levees. The Task Force anticipates additional stakeholder involvement as USACE and FEMA work to implement the actions in this report.

Some stakeholders continue to operate under the misconception that existing USACE inspection activities gather sufficient information to satisfy the detailed engineering analyses required in 44 CFR 65.10 or that only minor changes to USACE inspection activities or 44 CFR 65.10 would be necessary to align the two processes.

Efficiencies and clarity sought by stakeholders cannot be achieved through aligning existing USACE and FEMA programs. More fundamental change to the NFIP is needed to make it more risk-informed. When that is achieved, alignment would be possible.

## Role of the National Committee on Levee Safety

As highly knowledgeable experts on levee safety with experience as local sponsors, local, state and regional governments and the private sector, the NCLS assisted the Task Force by helping to identify stakeholders, then sorting, interpreting and analyzing comments and highlighting key areas of improvement that the Task Force included in the final version of the report related to the following areas: 1) improving key recommendations and actions; 2) improving clarity and understandability; 3) identifying areas of misunderstanding or misinterpretation by stakeholders; and 4) placing actions in context of more fundamental USACE and FEMA alignment efforts. In addition, the NCLS provided valuable contacts for local levee sponsors and FEMA experts to collect cost information and provided direct feedback on clarity and content for the report. A letter from the NCLS is included in Appendix I of this report.

The Task Force anticipates additional stakeholder involvement as USACE and FEMA work to implement the actions in this report.

## CONCLUSION AND SUMMARY OF ACTIONS BY USACE AND FEMA

The following section is a summary of the actions USACE and FEMA will implement as a result of this Task Force effort.

For these actions to be meaningful, they must be understood in the larger context of levees in the U.S. While better alignment of USACE and FEMA programs may help, there are other, more basic forces at work in relation to levees that sponsors and communities articulate with regularity. They are:

- Levees are aging and degrading. The majority of levees in the USACE portfolio are over 50 years old. As they age, successive loading can weaken structures. This plays out in two primary ways.
  1. Analysis and monitoring costs are rising. As time passes, the need increases for additional data and assessment to evaluate levee performance.
  2. Costs for fixing levee deficiencies may be higher than communities anticipated. As levees degrade, it is likely that the levee will require significant reinvestment or recapitalization. These repair and recapitalization costs are often viewed as significant financial burdens on communities.
- Risk is growing as more people live behind levees. When levees are accredited, the mandatory requirements for flood insurance and floodplain management may be removed. Historically this has often resulted in increased development in the floodplain and more people living and working

within the floodplain. Regardless of the reliability of the levee, overall risk continues to increase as consequences for potential breach or overtopping rise.

### **ACTION #1: CONTINUE COORDINATION TO IMPROVE THE NATIONAL FLOOD INSURANCE PROGRAM AND TO ACHIEVE MORE COMPREHENSIVE ALIGNMENT BETWEEN USACE AND FEMA REGARDING THE TREATMENT OF LEVEES**

The actions identified in this report concerning revisions to existing processes will not achieve comprehensive alignment between the two agencies. USACE and FEMA have different roles, responsibilities, and authorities related to levees. FEMA addresses flood hazard mapping, flood risk communication, flood insurance, and floodplain management related to areas behind levees. USACE addresses a range of operation and maintenance, risk communication, risk management, and risk reduction as part of its responsibilities under the USACE Levee Safety Program.

Levee systems transform the flood hazard from the natural conditions that existed prior to the levee system to a situation of different flooding scenarios each with different consequences. Currently, when levees are accredited, the requirements for mandatory flood insurance and floodplain management are removed. This can result in increased development in the floodplain and more people living and working behind the levee. The overall risk continues to increase as consequences for potential breach or overtopping rise.

While this report articulates actions that can and will be done within existing authorities and programs to meet Section 100226, more comprehensive alignment likely rests with more fundamental change in which Congress and other key stakeholders should play a part. Over the next few years, both the NFIP and Levee Safety Program will continue to rapidly evolve including continuing focus by FEMA on improving the NFIP through implementation of the Biggert-Waters Flood Act of 2012. The Task Force may submit for FEMA consideration the following recommendations that are intended to communicate risks posed by levees and improve alignment of USACE and FEMA's programs toward a common risk-informed approach:

1. Adopt a risk-informed based framework for levee accreditation;
2. Require flood warning, preparedness, and evacuation plans as accreditation criteria;
3. Require that the scenario for an overtopping event and the associated risk reduction measures to mitigate for such an event be analyzed and included in the accreditation package;
4. Strengthen floodplain management measures for leveed areas; and/or
5. Eliminate the concept of levee system accreditation and instead implement a risk-informed suite of NFIP actions.

## **ACTION #2: REVISE USACE RISK ASSESSMENT PROCESS**

Risk assessments provide a comprehensive understanding of the risk associated with a given levee system, including a detailed understanding of the likelihood of flooding in the leveed area (whether through overtopping, component malfunction, or breach prior to overtopping) and consequences of that flooding. The USACE risk assessment methodology will be modified to meet the requirements of Section 100226—to collect data and information that is sufficient to meet NFIP accreditation requirements. By doing so, not only will required NFIP accreditation information be provided to levee sponsors, but additional information will be included so that those sponsors can make risk-informed decisions.

The initial step for implementing this action will be to specifically include assessment of the likelihood that the levee system can exclude the 1% ACE event from the leveed area as part of the risk assessment pilots scheduled for fiscal year 2013. During the pilots, procedures will be developed to fill the gaps identified by the Task Force. As a result of these pilots, USACE will revise its risk assessment procedures and best practices. They will revise applicable guidance (Engineer Circular 1110-2-6067, *USACE Process for the National Flood Insurance Program (NFIP) Levee System Evaluation*) for assessing the levee for NFIP accreditation purposes. Once the pilots are complete, USACE will continue to conduct risk assessments, including an accreditation determination, in areas of high risk as identified through the screening process and selected by the USACE levee safety senior oversight group. In addition, USACE will continue to perform risk assessments in support of planning studies.

Because the USACE Levee Safety Program uses a portfolio risk management process that prioritizes activities based on areas of high risk to life safety, the Task Force does not recommend diverting from this approach by shifting to conduct risk assessments based on accreditation need. It is recognized that where and when risk assessments will be conducted will likely not correspond with areas that need accreditation information. However, it is critical to retain focus on high priority life safety issues.

### **ACTION #3: REVISE USACE LEVEE INSPECTION CHECKLIST**

Most familiar to stakeholders is the USACE regular visual levee inspection. Typically, people assume this activity alone is sufficient for accreditation purposes. However, the requirements of 44 CFR 65.10, which include a detailed engineering analysis go well beyond the USACE inspection requirements. The main purpose of these visual inspections is to verify proper operations and maintenance of the levee system. Typically these inspections are conducted every year or every other year.

The Task Force identified criteria in 44 CFR 65.10 that involve verification of operations and maintenance activities and linked these with specific USACE inspection criteria. USACE is changing its inspection process so that these activities can be verified through the inspection and communicated to the sponsor in a manner that they can use in an accreditation package to FEMA. It is important to note that these criteria are the simplest to verify as they related to verification of operations and maintenance documentation.

The remaining 44 CFR 65.10 accreditation criteria not covered by these revisions to the Levee Inspection Checklist are the criteria that require engineering analyses and data collection. Therefore, the reduction in cost and level of effort for those seeking accreditation associated with the revisions to the USACE Levee Inspection Checklist will be minimal.

The changes to the USACE Levee Inspection Checklist that USACE will make are included in Table 11 (page 39).

The Task Force identified the following considerations that will be made in conjunction with implementation of a revision to the USACE Levee Inspection Checklist.

- The maximum timeframe for which an USACE inspection may be used for accreditation purposes will be 2 years.
- Direct links to accreditation criteria will not be able to be used until the levee is inspected using the revised Levee Inspection Checklist. The Levee Inspection Checklist will be revised so the information associated with accreditation will be easily identified.
- USACE will communicate both instances —when the levee meets the specified accreditation criteria and when a levee does not meet these criteria each time a levee inspection is conducted.



**TABLE 11: REVISIONS TO USACE INSPECTION CHECKLIST TO BETTER ALIGN WITH 44 CFR 65.10**

ACCREDITATION CRITERIA	PROPOSED INSPECTION CHECKLIST REVISIONS
65.10(b)(2) – Closure Design	Revise checklist to identify when there are no closures and therefore that this provision will not be applicable.
65.10(c)(1) – Closure Operation Plans and Criteria	Revise checklist to include requirements for closure materials, equipment, triggering flood elevations or events, trained personnel, and periodic operation.
65.10(c)(2) Interior Drainage Systems – Operation Plans and Criteria	Revise the checklist to include requirements for closure materials, equipment, triggering flood elevations or events, trained personnel and periodic operation related to interior drainage systems.
65.10(d) – Maintenance Plans and Criteria	Revise checklist to verify operations and maintenance manuals, including maintenance activities to be performed, frequency of maintenance, and personnel who are responsible for performance of operations and maintenance.

- The overall inspection rating and other inspection item ratings, though not directly linked to specific accreditation criteria, should be considered when making an accreditation decision. Other inspection items and the overall inspection rating could identify deficiencies indicating that other accreditation criteria cannot be met.

Though this recommendation may be the most simple to make out of all the recommendations, its implementation schedule is the most uncertain. The changes identified by the Task Force are part of a larger revision to the checklist that USACE has been planning. Implementation of a new checklist will depend on issuance of new policy, updates to the Levee Inspection System (software used to conduct USACE levee inspections), and training. In addition, ongoing litigation prevents USACE from issuing any changes to the Levee Inspection Checklist until the litigation is complete. The timeframe for this is unknown.

**ACTION #4: REVISE USACE SCREENING PROCESS**

The Task Force identified areas of clarifications to better identify how specific information in the USACE screening activity can relate to specific criteria in 44 CFR 65.10. Screenings are currently being performed on all levees within USACE authorities to support an initial, risk-informed classification of the portfolio and set priorities for more detailed analysis. USACE intends to have all screenings completed by fiscal year 2015. After fiscal year 2015, it is anticipated that screenings will be accomplished every five years or as needed due to changed conditions. Screenings are usually completed by a multidisciplinary team in one day, using the most recent levee inspection data along with historical performance information, engineering judgment on expected performance, and consequence estimation. The analysis is performed using a web-based model (known as the Levee Screening Tool), which pulls information from the NLD.

**TABLE 12: REVISIONS TO USACE SCREENING PROCESS TO BETTER ALIGN WITH 44 CFR 65.10**

ACCREDITATION CRITERIA	PROPOSED SCREENING REVISIONS
65.10(b)(1) – Freeboard (Levee Height)	Revise the screening scope to include uploading of available profile plots identifying as-built top of levee elevations, surveyed top of levee elevations, and available water surface elevation flood profiles into the Levee Screening Tool. Establish thresholds that will identify when levees clearly meet this accreditation criteria or when levees clearly do not meet this accreditation criteria.
65.10(b)(3) – Embankment Protection	Add a field in the screening tool to capture the height and corresponding frequency of water loading where inadequate performance due to erosion is expected to begin. Addition of this field assists in identifying if inadequate performance due to erosion concerns is expected to begin below the 1% ACE as would be required to inform NFIP accreditation criteria.
CFR 65.10(b)(4) – Embankment and Foundation Stability	Addition of a field in the Levee Screening Tool to capture the levee height and corresponding frequency of water loading where inadequate performance of embankment and foundation seepage and stability begins. Addition of this field assists in identifying if inadequate performance due to seepage and stability concerns is expected to begin below the 1% flood event.
CFR 65.10(b)(5) – Settlement	Revise the levee screening scope to include assessment of settlement/subsidence of the levee system. This includes assessment of the levee profile with an appropriate frequency of levee surveys to identify observed and anticipated settlement/subsidence. A new question will be asked, “Is future settlement or subsidence of the top of levee profile likely?” If the answer is “Yes,” then additional questions about the potential magnitude will be asked. A final question will be asked, “Is expected or potential future settlement or subsidence likely to change the expected ACE for overtopping from the current selection?”

Table 12 summarizes the revisions that will be made to the screening process related to specific accreditation criteria.

In addition, the following will be considerations for the updates to associated policies:

- The maximum timeframe for which an USACE screening may be used for accreditation purposes will be 5 years. Beyond this, USACE will need to confirm if screening information remains valid.
- Information from screenings will not be used for the purposes of accreditation until the levee has been screened with the above revisions in place. USACE district offices will have the discretion to decide to rescreen a levee for the purposes of accreditation if requested by a levee sponsor.
- The Levee Screening Tool should be revised so that the information related to accreditation can be easily identified and obtained.

Implementation of revisions to the screening process will require changes to the web-based Levee Screening Tool, updating the Levee Screening Tool guidance document, and informing USACE districts of the updates and how to apply them. A schedule to incorporate and implement these revisions will be established in calendar year 2013.

## **ACTION #5: USACE AND FEMA TO IMPROVE EFFECTIVENESS OF INFORMATION EXCHANGE AND DISTRIBUTION**

The Task Force has identified the following actions to be implemented to improve information exchange:

- Identify where existing information can be used to benefit other agency activities.
- Coordinate USACE and FEMA activities to mutually support each agency's objectives.
- Improve quality of information exchange through peer dialogue between USACE districts and FEMA regions.
- Continue efforts to expand the amount of project-specific information in the NLD and measures to improve accessibility and availability for users.
- Standardize information-sharing practices through a Memorandum of Understanding (MOU) between USACE and FEMA (See Action # 6).

## **ACTION #6: DEVELOP USACE/FEMA MEMORANDUM OF UNDERSTANDING**

USACE and FEMA will formalize the process for implementing the actions determined by the Task Force through a Memorandum of Understanding (MOU). The MOU will formalize the commitment between USACE and FEMA to:

- Establish a coordinated approach that is aligned with the policies and goals of both agencies in order to promote life safety and sound national investments.
- Identify items of agreement based on the work of this Task Force.
- Serve as the overarching guide for each agency's actions and decisions related to levee activities.
- Describe the coordination activities that will improve alignment and data exchange between the agencies.
- Reference how integration of other related efforts, such as policy development and revisions to programs, will be accomplished.
- Establish an internal launch process for each of the Task Force actions.

The MOU will be signed by the FEMA Administrator and the Secretary of the Army for Civil Works or their designees. The following describes the main anticipated content of the MOU:

## *Risk Assessments*

The MOU shall include an agency-to-agency agreement that allows USACE to use a risk-informed methodology approach to demonstrate the levee meets criteria for NFIP accreditation purposes. Because ultimately the levee sponsor or community still has responsibility for the decision to seek accreditation, the MOU will outline the process to retain this responsibility in cases in which USACE provides results from a risk assessment for the purposes of accreditation.

## *Linkages to Specific Accreditation Criteria*

The MOU will include an agreement between the two agencies related to the clarifications associated with USACE levee inspections and screenings. Specific linkages identified for USACE levee inspections and screenings with the individual accreditation criteria will be defined in corresponding agency policies.

It is important to note that because there will be direct linkages between information USACE collects on a regular basis, the results may include a determination that the levee may no longer meet a specific accreditation criteria. The MOU will address the process for how this information will be communicated to FEMA and the levee sponsor and how USACE and FEMA will respond.

## *Coordination of Levee Activities*

USACE and FEMA have different influences that will indicate when and where levee activities are initiated. For example, the frequency in which USACE conducts a levee inspection can be based on current

condition, potential consequences and occurrence of a flood event. FEMA may initiate a mapping study for an area based on national programmatic goals and metrics, regional priorities, and the needs of states, local communities and tribes. The timing of when USACE conducts a levee inspection or a risk assessment likely will not coincide with the location where there is a need for best available information for accreditation purposes.

The MOU will establish business protocols to improve the overall coordination of programs and levee activities in order to maximize the occurrences of overlap of levee activities so best available information from each agency's activities can be leveraged. The Task Force realized that in order for this to be effective, there has to be advanced coordination of the activities early in the planning of budgetary priorities at all levels—national, regional, and district.

## *Improvement of Data Sharing*

The MOU will document a long-term agreement to use the NLD as the focal point for levee information. Both agencies are aggressively moving forward on the integration of FEMA's Mid-term Levee Inventory data into the NLD. The MOU will establish the business processes between the agencies for access; updates of the data; resolution of data conflicts; notifications of new information; and database upgrades.

There are also on-going activities that can be used to improve data sharing, such as the Silver Jackets Program and the establishment of Local Levee Partnership Teams, as part of FEMA's new Levee Analysis and Mapping Process for non-accredited levee systems.

The MOU will emphasize the use of existing interagency teams to coordinate levee activities and will outline instances in which data from accreditation packages can be used to supplement USACE levee activities.

FEMA should receive any and all levee data USACE provides to the community regarding their levee system, so that FEMA may collaborate with the community regarding their flood hazards.

### *Data to Help Inform Community and Levee Sponsor Decisions*

Depending on the accreditation status of the levee system, the findings from the USACE data, and the current mapping status, the community may decide to pursue accreditation. If FEMA receives USACE findings where the integrity of the levee system may be jeopardized, FEMA can coordinate with the community to ensure they are aware, and so the community/levee sponsor can take the appropriate action.

Based on the data exchange from the MOU, a community or private party may request a letter of map revision. FEMA is obligated to review any map requests and flood hazard data provided by the community. Please note negative USACE findings may not directly lead to a mapping activity to de-accredit the levee system on the NFIP map since a map change may depend on if/when a USACE finding can be adequately addressed.

The community should continue to consult with the USACE and FEMA for any questions related to the best available data, and the status of their NFIP maps. Mapping levee systems on NFIP maps is often effectively handled on a case-by-case basis, with active community participation and coordination.

To provide a sound basis for floodplain management and insurance rating, NFIP maps must present flood hazard information that is correct and up to date. Because flood hazard information is subject to change, FEMA has the map revision process, under which communities may request that effective NFIP maps be revised to incorporate new or corrected flooding information.

While the MOU will describe policies for levee data exchange, the community will continue to serve the lead role for submitting flood hazard data and NFIP map requests to FEMA. Through increased data exchange, the MOU will help strengthen the community and levee sponsor's ability to make informed decisions regarding their flood hazards. USACE and FEMA anticipate a draft MOU to be completed by the end of calendar year 2013.

## Appendix A: Legislative Language Establishing the Flood Protection Structure Accreditation Task Force

This document responds to language set forth in P.L. 112-141, the Moving Ahead for Progress in the 21st Century Act (MAP-21). The Act establishes a cooperative effort between the Federal Emergency Management Agency (FEMA) and the U.S. Army Corps of Engineers (Corps), as follows:

### SEC. 100226. FLOOD PROTECTION STRUCTURE ACCREDITATION TASK FORCE.

(a) **DEFINITIONS.**—In this section—

(1) the term “flood protection structure accreditation requirements” means the requirements established under section 65.10 of title 44, Code of Federal Regulations, for levee systems to be recognized on maps created for purposes of the National Flood Insurance Program;

(2) the term “National Committee on Levee Safety” means the Committee on Levee Safety established under section 9003 of the National Levee Safety Act of 2007 (33 U.S.C. 3302); and

(3) the term “task force” means the Flood Protection Structure Accreditation Task Force established under subsection (b).

(b) **ESTABLISHMENT.**—

(1) **IN GENERAL.**—The Administrator and the Secretary of the Army, acting through the Chief of Engineers, in cooperation with the National Committee on Levee Safety, shall jointly establish a Flood Protection Structure Accreditation Task Force.

(2) **DUTIES.**—

(A) **DEVELOPING PROCESS.**—The task force shall develop a process to better align the information and data collected by or for the Corps of Engineers under the Inspection of Completed Works Program with the flood protection structure accreditation requirements so that—

- (i) information and data collected for either purpose can be used interchangeably; and
- (ii) information and data collected by or for the Corps of Engineers under the Inspection of Completed Works Program is sufficient to satisfy the flood protection structure accreditation requirements.

(B) **GATHERING RECOMMENDATIONS.**—The task force shall gather, and consider in the process developed under subparagraph (A), recommendations from interested persons in each region relating to the information, data, and accreditation requirements described in subparagraph (A).

(3) **CONSIDERATIONS.**—In developing the process under paragraph (2), the task force shall consider changes to—

- (A) the information and data collected by or for the Corps of Engineers under the Inspection of Completed Works Program; and
- (B) the flood protection structure accreditation requirements.

(4) **RULE OF CONSTRUCTION.**—Nothing in this section shall be construed to require a reduction in the level of public safety and flood control provided by accredited levees, as determined by the Administrator for purposes of this section.

(c) **IMPLEMENTATION.**—The Administrator and the Secretary of the Army, acting through the Chief of Engineers, shall implement the process developed by the task force under subsection (b) not later than 1 year after the date of enactment of this Act and shall complete the process under subsection (b) not later than 2 years after the date of enactment of this Act.

(d) **REPORTS.**—The Administrator and the Secretary of the Army, acting through the Chief of Engineers, in cooperation with the National Committee on Levee Safety, shall jointly submit to the Committee on Banking, Housing, and Urban Affairs and the Committee on Environment and Public Works of the Senate and the Committee on Financial Services, the Committee on Transportation and Infrastructure, and the Committee on Natural Resources of the House of Representatives reports concerning the activities of the task force and the implementation of the process developed by the task force under subsection (b), including—

- (1) an interim report, not later than 180 days after the date of enactment of this Act; and
- (2) a final report, not later than 1 year after the date of enactment of this Act.

(e) **TERMINATION.**—The task force shall terminate on the date of submission of the report under subsection (d)(2).

## Appendix B: Mapping of Areas Protected by Levee Systems (44 CFR 65.10)

Requirements for accreditation of levees (and other flood protection structures) for the National Flood Insurance Program are defined in the Code of Federal Regulations, Title 44 (Emergency Management and Assistance), Part 65 (Identification and Mapping of Special Hazard Areas), Section 65.10 (Mapping of Areas Protected by Levee Systems.) The section, as published in the Federal Register on August 25, 1986, reads:

(a) **GENERAL.** For purposes of the NFIP, FEMA will only recognize in its flood hazard and risk mapping effort those levee systems that meet, and continue to meet, minimum design, operation, and maintenance standards that are consistent with the level of protection sought through the comprehensive floodplain management criteria established by § 60.3 of this subchapter. Accordingly, this section describes the types of information FEMA needs to recognize, on NFIP maps, that a levee system provides protection from the base flood. This information must be supplied to FEMA by the community or other party seeking recognition of such a levee system at the time a flood risk study or restudy is conducted, when a map revision under the provisions of part 65 of this subchapter is sought based on a levee system, and upon request by the Administrator during the review of previously recognized structures. The FEMA review will be for the sole purpose of establishing appropriate risk zone determinations for NFIP maps and shall not constitute a determination by FEMA as to how a structure or system will perform in a flood event.

(b) **DESIGN CRITERIA.** For levees to be recognized by FEMA, evidence that adequate design and operation and maintenance systems are in place to provide reasonable assurance that protection from the base flood exists must be provided. The following requirements must be met:

(1) Freeboard.

(i) Riverine levees must provide a minimum freeboard of three feet above the water-surface level of the base flood. An additional one foot above the minimum is required within 100 feet in either side of structures (such as bridges) riverward of the levee or wherever the flow is constricted. An additional one-half foot above the minimum at the upstream end of the levee, tapering to not less than the minimum at the downstream end of the levee, is also required.

(ii) Occasionally, exceptions to the minimum riverine freeboard requirement described in paragraph (b)(1)(i) of this section, may be approved. Appropriate engineering analyses demonstrating adequate protection with a lesser freeboard must be submitted to support a request for such an exception. The material presented must evaluate the uncertainty in the estimated base flood elevation profile and include, but not necessarily be limited to an assessment of statistical confidence limits of the 100-year discharge; changes in stage-discharge relationships; and the sources, potential, and magnitude of

debris, sediment, and ice accumulation. It must be also shown that the levee will remain structurally stable during the base flood when such additional loading considerations are imposed. Under no circumstances will freeboard of less than two feet be accepted.

(iii) For coastal levees, the freeboard must be established at one foot above the height of the one percent wave or the maximum wave runup (whichever is greater) associated with the 100-year still water surge elevation at the site.

(iv) Occasionally, exceptions to the minimum coastal levee freeboard requirement described in paragraph (b)(1)(iii) of this section, may be approved. Appropriate engineering analyses demonstrating adequate protection with a lesser freeboard must be submitted to support a request for such an exception. The material presented must evaluate the uncertainty in the estimated base flood loading conditions. Particular emphasis must be placed on the effects of wave attack and overtopping on the stability of the levee. Under no circumstances, however, will a freeboard of less than two feet above the 100-year stillwater surge elevation be accepted.

(2) Closures. All openings must be provided with closure devices that are structural parts of the system during operation and design according to sound engineering practice.

(3) Embankment protection. Engineering analyses must be submitted that demonstrate that no appreciable erosion of the levee embankment can be expected during the base flood, as a result of either currents or waves, and that anticipated erosion will not result in failure of the levee embankment or foundation directly or indirectly through reduction of the seepage path and subsequent instability. The factors to be addressed in such analyses include, but are not limited to: Expected flow velocities (especially in constricted areas); expected wind and wave action; ice loading; impact of debris; slope protection techniques; duration of flooding at various stages and velocities; embankment and foundation materials; levee alignment, bends, and transitions; and levee side slopes.

(4) Embankment and foundation stability. Engineering analyses that evaluate levee embankment stability must be submitted. The analyses provided shall evaluate expected seepage during loading conditions associated with the base flood and shall demonstrate that seepage into or through the levee foundation and embankment will not jeopardize embankment or foundation stability. An alternative analysis demonstrating that the levee is designed and constructed for stability against loading conditions for Case IV as defined in the U.S. Army Corps of Engineers (COE) manual, "Design and Construction of Levees" (EM 1110-2-1913, Chapter 6, Section II),

may be used. The factors that shall be addressed in the analyses include: Depth of flooding, duration of flooding, embankment geometry and length of seepage path at critical locations, embankment and foundation materials, embankment compaction, penetrations, other design factors affecting seepage (such as drainage layers), and other design factors affecting embankment and foundation stability (such as berms).

(5) Settlement. Engineering analyses must be submitted that assess the potential and magnitude of future losses of freeboard as a result of levee settlement and demonstrate that freeboard will be maintained within the minimum standards set forth in paragraph (b)(1) of this section. This analysis must address embankment loads, compressibility of embankment soils, compressibility of foundation soils, age of the levee system, and construction compaction methods. In addition, detailed settlement analysis using procedures such as those described in the COE manual, “Soil Mechanics Design—Settlement Analysis” (EM 1100-2-1904) must be submitted.

(6) Interior drainage. An analysis must be submitted that identifies the source(s) of such flooding, the extent of the flooded area, and, if the average depth is greater than one foot, the water-surface elevation(s) of the base flood. This analysis must be based on the joint probability of interior and exterior flooding and the capacity of facilities (such as drainage lines and pumps) for evacuating interior floodwaters.

(7) Other design criteria. In unique situations, such as those where the levee system has relatively high vulnerability, FEMA may require that other design criteria and analyses be submitted to show that the levees provide adequate protection. In such situations, sound engineering practice will be the standard on which FEMA will base its determinations. FEMA will also provide the rationale for requiring this additional information.

(c) **OPERATION PLANS AND CRITERIA.** For a levee system to be recognized, the operational criteria must be as described below. All closure devices or mechanical systems for internal drainage, whether manual or automatic, must be operated in accordance with an officially adopted operation manual, a copy of which must be provided to FEMA by the operator when levee or drainage system recognition is being sought or when the manual for a previously recognized system is revised in any manner. All operations must be under the jurisdiction of a Federal or State agency, an agency created by Federal or State law, or an agency of a community participating in the NFIP.

(1) Closures. Operation plans for closures must include the following:

(i) Documentation of the flood warning system, under the jurisdiction of Federal, State, or community officials that will be used to trigger emergency operation activities and demonstration that sufficient flood warning time exists for the completed operation of all closure structures, including necessary sealing, before floodwaters reach the base of the closure.

(ii) A formal plan of operation including specific actions and assignments of responsibility by individual name or title.

(iii) Provisions for periodic operation, at not less than one-year intervals, of the closure structure for testing and training purposes.

(2) Interior drainage systems. Interior drainage systems associated with levee systems usually include storage areas, gravity outlets, pumping stations, or a combination thereof. These drainage systems will be recognized by FEMA on NFIP maps for flood protection purposes only if the following minimum criteria are included in the operation plan:

(i) Documentation of the flood warning system, under the jurisdiction of Federal, State, or community officials, that will be used to trigger emergency operation activities and demonstration that sufficient flood warning time exists to permit activation of mechanized portions of the drainage system.

(ii) A formal plan of operation including specific actions and assignments of responsibility by individual name or title.

(iii) Provision for manual backup for the activation of automatic systems.

(iv) Provisions for periodic inspection of interior drainage systems and periodic operation of any mechanized portions for testing and training purposes. No more than one year shall elapse between either the inspections or the operations.

(3) Other operation plans and criteria. Other operating plans and criteria may be required by FEMA to ensure that adequate protection is provided in specific situations. In such cases, sound emergency management practice will be the standard upon which FEMA determinations will be based.



(d) **MAINTENANCE PLANS AND CRITERIA.** For levee systems to be recognized as providing protection from the base flood, the maintenance criteria must be as described herein. Levee systems must be maintained in accordance with an officially adopted maintenance plan, and a copy of this plan must be provided to FEMA by the owner of the levee system when recognition is being sought or when the plan for a previously recognized system is revised in any manner. All maintenance activities must be under the jurisdiction of a Federal or State agency, an agency created by Federal or State law, or an agency of a community participating in the NFIP that must assume ultimate responsibility for maintenance. This plan must document the formal procedure that ensures that the stability, height, and overall integrity of the levee and its associated structures and systems are maintained. At a minimum, maintenance plans shall specify the maintenance activities to be performed, the frequency of their performance, and the person by name or title responsible for their performance.

(e) **CERTIFICATION REQUIREMENTS.** Data submitted to support that a given levee system complies with the structural requirements set forth in paragraphs (b)(1) through (7) of this section must be certified by a registered professional engineer. Also, certified as-built plans of the levee must be submitted. Certifications are subject to the definition given at § 65.2 of this subchapter. In lieu of these structural requirements, a Federal agency with responsibility for levee design may certify that the levee has been adequately designed and constructed to provide protection against the base flood.

## *Appendix C: History of the 1% Annual Chance Exceedance Standard for Levee Accreditation*

The federal government's efforts to reduce flood losses began in the early 1900s with authorization by Congress of several flood control projects to be carried out by USACE and with the creation of the Tennessee Valley Authority (TVA) in 1933.

With the passage of the first Flood Control Act in 1936, the federal government embarked upon a national program to use flood control structures. In the early 1950s, as it became clear that structural works alone were not sufficient to reduce the increasing losses, nonstructural flood loss mitigation programs were established. Initially, each federal agency adopted its own standards to carry out the various flood hazard reduction programs. For example, in designing and constructing structural works, TVA adopted the "maximum probable flood" as a reference whereas USACE used the "standard projects flood." When TVA started its nonstructural community flood damage prevention program in 1953, it adopted a "regional flood" estimated at about a 50-year level while under the Flood Control Act of 1960 USACE began its nonstructural flood hazard mitigation assistance using an "intermediate" base flood (approximately 100-year level). In the 1950s, the Soil Conservation Service (now the Natural Resources Conservation Service) used the 25-year flood level as a standard in agricultural flood hazard areas and a 100-year level in urbanized areas.

In July 1967, representatives of 26 federal agencies adopted a draft of "Proposed Flood Hazard Evaluation Guidelines for Federal Agencies," where the use of the 100-year flood as the base standard was advocated for the first time. These guidelines dealt with methodologies and standards to be used in developing information about flood hazards, including flood elevation, velocity, floodplain delineation and probability of floods of various magnitudes.

In August 1968, the National Flood Insurance Act created the National Flood Insurance Program (NFIP) and the Federal Insurance Administration within the U.S. Department of Housing and Urban Development (HUD). HUD began its administration of the NFIP by calling a group of experts together to advise the agency as to the best standard to be used for the program. This group recommended the 100-year based on the

fact that this event represents a magnitude/frequency that has a statistical probability of a one in four (25%) chance or occurring during the life of a 30-year mortgage. It was concluded that the 100-year event represents a degree of risk and damage worth protecting against, but also that it is a level that does not impose stringent requirements or the burden of excessive costs on property owners.

During congressional hearings prior to passage of the Flood Disaster Protection Act of 1973 (P.L. 93-234), the Senate Committee on Banking, Housing and Urban Affairs, which has the oversight responsibility for the NFIP, heard arguments regarding the appropriateness of the 100-year base flood standard. Several witnesses advocated a lower standard and some recommended the use of a greater standard. After considering the statements of all interested parties, the committee concluded that the 100-year standard was reasonable and consistent with national objectives in reducing flood losses.

In September 1975, in a report titled "Tulsa, Oklahoma's Participation in the National Flood Insurance Program" the U.S. Government Accounting Office (GAO) noted that it did not question the validity of the 100-year flood level as the acceptable standard for floodplain management. About four years later, in March 1979, the GAO reported to the Secretary of HUD that the use of the 100-year flood as the single national standard of regional flooding conditions has caused considerable controversy over the years. Noting that there were 127 floods between 1968 and 1978 that equaled or exceeded the 100-year flood level in 62 counties, the GAO recommended an evaluation of the 100-year flood as a national standard.

On April 1979, the Federal Insurance Administration and the NFIP were transferred from HUD to the newly created Federal Emergency Management Agency (FEMA), and in June 1981, an interim policy for accreditation of levees as providing risk reduction from the 100-year flood on NFIP maps was promulgated.

In August 1982, as part of President Reagan's Task Force on Regulatory Relief, the Office of Management and Budget

directed FEMA to review (among other issues) the base or 100-year flood standard used in implementing the Executive Order 11988 on Floodplain Management that was issued in May 1977.

In September 1983, FEMA responded to the Office of Management and Budget's request by publishing a report titled "The 100-year Base Flood Standard and the Floodplain Management Executive Order," where it concluded that the 100-year standard is strongly supported and being applied successfully by all levels of government and that no alternatives have been identified that are superior to it.

The debate surrounding the 100-year flood standard (1% ACE) continues today.

## Appendix D: Analysis of Modifications To Improve Alignment Between USACE Inspection and Screening Activities and NFIP Accreditation Requirements

USACE levee inspections consist of visual inspection of the condition of levee features to determine the adequacy of operation and maintenance of the levee system. USACE levee screenings include an assessment of the inspection findings (observed condition), levee design, and past and expected performance of the levee system based on existing information.

This appendix details changes to USACE inspection and screening activities to better align with individual NFIP accreditation requirements. When the modifications to USACE inspections and screenings described herein are implemented, the potential for a levee sponsor to use existing USACE information to inform decisions about specific accreditation criteria will improve. However, reduction in the overall effort to compile a full accreditation package will be relatively small as USACE inspections and screenings do not contain the level of rigor necessary to properly inform most of the design criteria requirements for accreditation.

After the changes described herein have been made, results from inspections and screenings will result in either a positive, negative, or inconclusive finding for individual NFIP criteria as defined below:

**POSITIVE FINDING.** A positive finding by USACE for a specific NFIP accreditation criteria will mean that USACE information is sufficient to determine that a specific criteria of 44 CFR 65.10 has been met and the levee sponsor can use this finding in the accreditation package submitted to FEMA without further analysis of that criteria.

**NEGATIVE FINDING.** A negative finding by USACE for a specific NFIP accreditation criterion will mean that USACE information is sufficient to indicate that the levee likely does not meet that specific accreditation criterion. This may prevent the levee from being accredited or trigger deaccreditation. USACE will communicate negative findings to FEMA and the levee sponsor.

**INCONCLUSIVE.** An inconclusive finding means that USACE information is not sufficient to determine whether or not a specific accreditation criteria has been met.

### Changes to USACE Inspections and Screenings

The changes that USACE will make to its inspection and screening processes to better align with NFIP requirements are described below:

*Freeboard (Levee Height), 44 CFR 65.10 (b)(1)*

- **INSPECTION CHECKLIST.** No changes or findings are recommended within the inspection checklist. The levee height is not evaluated as part of the visual inspection.
- **SCREENING.** Revise the screening scope to include uploading of available profile plots identifying as-built top of levee elevations, surveyed top of levee elevations, and available water surface elevation flood profiles into the Levee Screening Tool.
- **IMPACT OF CHANGE.** In conjunction with this change, USACE will establish thresholds that will identify when levees clearly meet this accreditation criteria or when levees clearly do not meet this accreditation criteria. For example, if the water surface elevation indicates that the top of levee is at the 1000-year level, this clearly would indicate that the levee would meet the 1% ACE requirement with freeboard. USACE would then issue a positive finding for this accreditation criterion. One significant benefit of the USACE screening process is that it provides a central depository for much of the supporting information used to develop an understanding of the risk for an individual levee. By including all available top-of-levee and water surface profile plots in the screening assessment, the risk associated with overtopping will be more clearly addressed and communicated. This will not only improve the USACE screening and risk communication process, it will allow for efficient analysis and communication of the freeboard requirements defined in 65.10(b)(1) for NFIP accreditation.

## *Closures Design, 44 CFR 65.10(b)(2)*

- **INSPECTION CHECKLIST.** No changes or findings are recommended. However, if the levee system has no closures, USACE will indicate that this accreditation criterion does not apply to the levee system.
- **SCREENING.** No changes or findings are recommended within the screening process.

## *Embankment Protection, 44 CFR 65.10 (b)(3)*

- **INSPECTION CHECKLIST.** No changes or findings are recommended within the inspection checklist. The inspection checklist does not include a comprehensive assessment of expected performance of erosion protection as necessary to inform the NFIP accreditation requirement.
- **SCREENING.** Add a field in the Levee Screening Tool to capture the height and corresponding frequency of water loading where inadequate performance due to erosion is expected to begin.
- **IMPACT OF CHANGE.** Changing the screening process by adding the field described above will link results of the USACE screening process to the NFIP criteria for embankment protection (as defined in 44 CFR 65.10(b)(3)). By doing so, the screening process can be used to identify if inadequate performance due to erosion concerns is expected to begin at or below the water surface elevation associated with the 1% ACE event, as would be required to inform NFIP accreditation criteria. For those levees where poor performance is expected at or below the 1% ACE event, a negative finding would be communicated to the levee sponsor and FEMA. For levees where the screening process shows good performance is expected up to the top of the levee, a positive finding would be communicated. All other results will result in an inconclusive finding.

## *Embankment and Foundation Stability, 44 CFR 65.10 (b)(4)*

- **INSPECTION CHECKLIST.** No changes or findings are recommended within the inspection checklist. The inspection checklist does not include a comprehensive assessment of expected performance in relation to the embankment and foundation stability NFIP requirement.
- **SCREENING.** Add a field in the Levee Screening Tool to capture the levee height and corresponding frequency of water loading where inadequate performance of embankment and foundation seepage and stability begins.
- **IMPACT OF CHANGE.** Changing the screening process as described above will assist in identifying if inadequate performance due to embankment or foundation stability concerns is expected to begin below the water surface elevation associated with the 1% ACE event, as would be required to inform NFIP accreditation criteria. For those levees where poor performance is expected below the 1% ACE flood elevation, a negative finding would be communicated to the sponsor and FEMA. For levees where the screening process shows good performance up to the top of the levee is expected, a positive finding would be communicated. All other results will result in an inconclusive finding.

## *Settlement, 44 CFR 65.10(b)(5)*

- **INSPECTION CHECKLIST.** No changes or findings are recommended within the inspection checklist. Levee settlement/subsidence is not evaluated as part of the visual inspection.
- **LEVEE SCREENING.** Revise the levee screening scope to include assessment of settlement/subsidence of the levee system. This includes assessment of the levee profile with an appropriate frequency of levee surveys to identify observed and anticipated settlement/subsidence. A new question will be asked, “Is future settlement or subsidence of the top of levee profile likely?” If the answer is “Yes,” then additional questions about the potential magnitude will be asked. A final question will be asked, “Is expected or potential future settlement or subsidence likely to change the expected ACE for overtopping from the current selection?”
- **IMPACT OF CHANGE.** Adding assessment of potential settlement issues to the screening process will allow a direct link between the screening process and the NFIP requirement for settlement analysis (as defined in CFR 65.10(b)(5)). For levees where no settlement has been observed, none is expected, and design and post-construction engineering analysis is available that concludes future settlement will not reduce levee height (freeboard) beyond required levels, a positive finding will be communicated. For levees where settlement has occurred and is expected to continue, and no plan is in place to address this settlement, a negative finding will be communicated. All other results will result in an inconclusive finding.

## *Interior Drainage (Mapping), 44 CFR 65.10 (b)(6)*

- **INSPECTION CHECKLIST.** No changes or findings are recommended within the inspection checklist. Levee inspection includes visual inspection of condition of interior drainage facilities, but does not include evaluation of interior drainage flood extent (mapping) as part of visual inspection.
- **SCREENINGS.** No changes or findings are recommended within the screening process.

## *Operation and Maintenance Plans and Criteria, 44 CFR 65.10 (c)(1), 44 CFR 65.10 (c)(2), and 44 CFR 65.10 (d)*

- **INSPECTION CHECKLIST.** Revise the Inspection Checklist to include: 1) additional requirements for operations including closure materials, equipment, triggering flood elevations or events, and trained personnel; and 2) requirements for maintenance including regularly updated maintenance plan that defines maintenance activities, frequency of performance, and name or title responsible for their performance.
- **SCREENINGS.** No changes or findings are recommended within the screening process.
- **IMPACT OF CHANGE.** The revised inspection checklist will allow for direct linkage between USACE inspections and the requirements for NFIP accreditation related to operation plans and criteria (CFR 65.10(c)(1) and 65.10(c)(2) and maintenance plans and criteria (CFR 65.10(d)). If available plans meet criteria, a positive finding will be communicated. Otherwise, a negative finding will be communicated.

## Appendix E: References for Literature Review

The Task Force reviewed the body of literature in support of recommendations related to life safety. The following are the reports from which the recommendations were based.

1. Association of State Floodplain Managers Foundation (ASFPM 2004), *Reducing Flood Losses, Is the 1% Chance Flood Standard Sufficient?*
2. California Department of Water Resources (DWR 2012), *Flood Safe California, Urban Levee Design Criteria (URL)*.
3. Interagency Floodplain Management Review Committee (IAFPMRC 1994), *Sharing the Challenge, Floodplain Management into the 21st Century*.
4. Interagency Floodplain Management Review Committee (IAFPMRC 2006), *The National Levee Challenge, Levees and the FEMA Map Modernization Program*.
5. National Committee on Levee Safety (NCLS 2009), *Recommendations for a National Levee Safety Program – A Report to Congress from the National Committee on Levee Safety*.
6. National Research Council of the National Academies (NRC 1982), *A Levee Policy for the National Flood Insurance Program*.
7. National Research Council of the National Academies (NRC 2000), *Risk Analysis and Uncertainty in Flood Damage Reduction Studies*.
8. National Research Council of the National Academies (NRC 2013), *Committee on Levees and the National Flood Insurance Program: Improving Policies and Practices*.

## Appendix F: Detailed Stakeholder Participation Activities

Communities, levee and flood control boards, engineering firms, and the associations and members of Congress that represent those groups, have long encouraged USACE and FEMA to share available data related to levees and to make the best use of that data collected. To better understand areas where stakeholder feedback is consistent or divergent and to collect and consider recommendations made to date that are relevant to the charge, the Task Force engaged in a multi-stage stakeholder involvement effort to solicit ideas, test principles and seek feedback on conceptual level recommendations and actions.

The Task Force conducted the following main stakeholder participation activities.

### November 2012: Examined Letters From Congress to USACE and FEMA on NFIP Accreditation

The Task Force conducted a literature review of existing documents and summarized issues related to NFIP accreditation and “deaccreditation” that had previously been communicated to both USACE and FEMA. Sources of feedback examined include: 1) letters from members of Congress to USACE and FEMA on levee accreditation issues; 2) stakeholder involvement efforts related to USACE and FEMA policy reform efforts (e.g., NFIP Reform, Levee Safety Engineer Circular); and 3) stakeholder comments received by the National Committee on Levee Safety and the Federal Interagency Floodplain Management Task Force.

### February 2013: Stakeholder Workshop

On February 27, 2013, the Flood Structure Accreditation Task Force held a one-day meeting to seek initial feedback on draft recommendations under consideration by the Task Force. Twenty-eight (28) individuals representing communities with levee systems, owners/operators of levee systems, and members from the National Committee on Levee Safety participated. In addition to comments and questions posed at the workshop, 21 of the attendees filled out a more complete questionnaire with additional comments.

### March 2013: Internal and External Webinars

In March the Task Force conducted one webinar each for USACE and FEMA internal audiences. In addition, a series of four webinars were offered in March 2013 to update any stakeholders interested in the work of the Flood Protection Accreditation Task Force and to provide opportunity for discussion and feedback on the draft recommendations of the Task Force participants as they prepare their final report to Congress.

Announcements and invitations to the webinars were distributed via email to several broad-based distribution lists to ensure broad coverage, including:

- Nonfederal sponsors/communities with levees in the USACE Levee Safety Program via USACE district levee safety program managers;
- FEMA’s Levee Analysis and Mapping (LAMP) approach email distribution list;
- Opt-in list for “levee-related information” via the National Committee on Levee Safety;
- Participants in the National Committee on Levee Safety’s Review Team; and
- The National Committee on Levee Safety and their professional networks, including the National Association of Flood and Stormwater Management Agencies (NAFSMA) and Association of State Floodplain Managers (ASFPM).

Using a web-based registration system, 410 individuals registered for the four external web meetings. There were at least 283 unique logins for the web meetings. Some agencies/offices participated in the web meeting in group gatherings, so the exact number of participants is unknown.

For each of the four external webinars, a poll was used to gauge the diversity of participants. Across the four webinars, 250 completed the poll. The majority of poll respondents (53%) were from federal, state, or local government.



All four web meetings followed the same format and used the same presentation. A one-hour presentation, jointly led by USACE and FEMA members of the Task Force, was followed by 20-40 minutes of responding to questions submitted during the web meeting via the “chat” function of the web meeting or via email. All questions submitted were addressed.

Public and stakeholder webinars were held on March 14, 15, 18, and 19. On March 20, the recorded web meeting from March 15 was posted on the Task Force website, <http://www.usace.army.mil/Missions/CivilWorks/LeveeSafetyProgram/TaskForce>.

Finally, a web-based feedback and comment form was made following the webinars; 11 additional individuals provided feedback via that avenue. The following are the specific questions asked on the web-based form:

## Copy of Fillable Web Form Posted on USACE Levee Safety Website

Attached are the key fields of a fillable form that was posted on the USACE Levee Safety Program website in order to collect a standard set of information from interested stakeholders nationally.

1. **DEMOGRAPHICS.** Please select which of the following roles best describes you. Multiple categories may apply, but please select one primary role:
  - a) Levee sponsor
  - b) Elected official
  - c) Federal, state, or local government
  - d) Private sector
  - e) Interested citizen
2. **CHALLENGES.** Describe any significant challenges you have experienced in developing an accreditation package for the National Flood Insurance Program (NFIP) to comply with 44 Code of Federal Regulations (CFR) 65.10.
3. **COST TO COMPLY WITH 44 CFR 65.10.** If you have had recent experience (last 10 years) developing an accreditation package for the NFIP under 44 CFR 65.10, the Task Force is seeking information on the following questions.
  - a) How much did it cost to compile information and analysis to develop the NFIP accreditation package (please exclude any costs of repairing deficiencies or increasing the height of your levee)?
  - b) What were the costliest items?
  - c) Was USACE levee data available and was it used? If USACE data was available and was not used, please explain reasons.
4. **PROVIDING PARTIAL DATA FOR USE IN ACCREDITATION PACKAGES.** The Task Force is considering a recommendation that changes USACE levee inspection and screening processes so USACE could provide information that would meet some of the requirements in 44 CFR 65.10, but not all the requirements. It would reduce some of the costs to compile an accreditation package, but generally not address items such as required engineering analysis.
  - a) Is this recommendation worth considering even though it does not provide complete information sufficient to compile a complete accreditation package? Why or why not?
  - b) For those who watched the Task Force web meeting, please provide any feedback on the specifics of the “positive” or “negative” findings detailed in the presentation/PowerPoint.
5. **RISK ASSESSMENT APPROACH CONDUCTED BY USACE.** The Task Force is considering a recommendation that would allow USACE to provide a technical evaluation for NFIP purposes using a risk assessment approach. The levee sponsor/community would still be responsible for some portions of the accreditation package, such as interior drainage analysis and mapping, formally approved operations and maintenance plans, and ensuring the information is submitted as one accreditation package. Is this an attractive option? Why or why not?

6. **RISK ASSESSMENT APPROACH CONDUCTED BY OTHERS.** In order for others, besides USACE, to use a risk assessment approach for NFIP purposes, 44 CFR 65.10 would need to be changed. Is this an attractive option? Why or why not?

7. **CHANGES TO NFIP REGULATIONS.** Please describe any reforms to FEMA's levee regulations or programs you think should be considered.

8. **TRANSPARENCY AND INFORMATION EXCHANGE.** Currently, USACE provides information to the levee sponsor and to FEMA as part of its regular levee inspection and assessment processes. The Task Force is seeking your feedback on the following three options for exchange of data as it relates to NFIP accreditation.

- a) *As Requested:* USACE provides accreditation-related information (both positive and negative findings) to the levee sponsor and FEMA only at the request of the levee sponsor.
- b) *Every Time:* USACE provides accreditation-related information (both positive and negative findings) to the levee sponsor and FEMA as it becomes available, such as after inspections, screenings, post-flood analysis, etc.
- c) *Status Change:* USACE provides accreditation-related information to the levee sponsor and FEMA only if there is an anticipated change in status. For example, if a levee is currently accredited by FEMA, USACE will only provide accreditation-related information to the levee sponsor and FEMA if it has information that demonstrates the levee may no longer meet one of the accreditation requirements.

Please provide feedback on which of these options you think is the most useful or information about an alternative approach.

9. **MANAGING DATA AND INFORMATION.** The Task Force is recommending that the NLD be the repository used to share levee information in the long term. Levee sponsors will have access to all the information relevant to their levee system.

- a) What is the most important information, data or documents that should be included in the NLD?
- b) Have you used the NLD? If so, please provide comments on its usefulness. If not, please explain the reasons for not using it.

10. **PUBLIC SAFETY.** The Task Force wants to ensure that risks to public safety do not increase behind accredited levees as a result of recommendations of this Task Force. Please provide feedback on the following possible recommendations.

- a) Require flood warning, preparedness, and evacuation plans as an accreditation requirement.
- b) Require public communication activities as an accreditation requirement.
- c) Strengthen floodplain management requirements behind levees to reduce or limit potential consequences.
- d) Require mandatory purchase of flood insurance behind all levees as a means to communicate that living behind a levee is not without risk. Premiums could be risk-based.
- e) Others?

11. **OTHER COMMENTS.** Is there anything else you would like the Task Force to consider as it moves forward in developing recommendations?

## Appendix G: Glossary

Terms defined below are for the purposes of this document. In some cases, USACE and FEMA have different definitions used in regulation or guidance.

**100-YEAR FLOOD:** The median peak flood discharge having a 1% chance of being equaled or exceeded in any given year (1 percent annual chance exceedance or 1% ACE).

**BASE FLOOD:** A FEMA term defined in the National Flood Insurance Program (44 CFR 59.1), means a flood having a 1-percent-annual-chance of being equaled or exceeded in any given year. For the purposes of this report the base flood is also referred to as the 1-percent-annual-chance of exceedance or 1% ACE or 100-year flood.

**BREACH:** The formation of a gap in the levee system through which water may flow uncontrolled onto the adjacent floodplain. A breach in the levee system may occur prior to or subsequent to overtopping.

**COMMUNITY:** Any state or area or political subdivision thereof, or any Indian tribe or authorized tribal organization, or Alaska Native village, or authorized native organization that has the authority to adopt and enforce floodplain management regulations for the areas within its jurisdiction.

**DETERMINISTIC APPROACH:** For the purposes of this document, an approach in which outcomes are precisely determined through known relationships among variables, without consideration of random variation or uncertainties.

**FLOODPLAIN:** Any land area susceptible to being inundated by flood waters from any source.

**FLOOD RISK MANAGEMENT:** Federal and nonfederal policies and programs for managing flood risk. This includes structural and non-structural measures taken to reduce the chance or magnitude of flood damage. These may include implementation of reservoirs, detention storage, channels, diversions, levees, interior drainage systems, floodproofing, levee raising, relocation of buildings, and flood warning and emergency preparedness actions. It also includes policies and programs intended to inform and to influence the decisions made by federal, state, and local government agencies, individuals, businesses and communities in their choice of flood risk reduction measures and decisions to locate assets within the floodplain.

**INSPECTION OF COMPLETED WORKS (ICW):** USACE program that includes inspections of completed federal projects to determine the nonfederal sponsor compliance with project agreements. Some USACE Levee Safety Program activities are covered under the ICW program.

**LEVEE:** Man-made structure, usually an earthen embankment or concrete floodwall, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide reasonable assurance of excluding temporary flooding from the leveed area.

**LEVEE ACCREDITATION:** FEMA has verified that all documentation to demonstrate that a levee system meets 44 CFR 65.10 requirements has been submitted and approved. FEMA will map the appropriate flood hazard zones for the leveed area on the Flood Insurance Rate Map.

**LEVEE CERTIFICATION:** A technical finding that there is reasonable assurance (not absolute guarantee) that a levee system (not a segment or a project) will exclude the 1% annual chance exceedance event (or base flood) from the leveed area based on the condition of the system at the time the determination is made. As part of this evaluation, design, construction, maintenance, and other information are considered. The certification finding must be accomplished by either a registered professional engineer or a federal agency with levee design and construction qualifications such as USACE.

**LEVEE FEATURE:** A levee feature is a structure that is critical to the functioning of a levee system. Examples include embankment sections, floodwall sections, closure structures, pumping stations, interior drainage works, and flood damage reduction channels.

**LEVEE SEGMENT:** A discrete portion of a levee system that is operated and maintained by a single entity.

**LEVEE SYSTEM:** One or more levee segments and features (i.e., floodwalls and pump stations), which are interconnected and necessary to ensure temporary exclusion of flood water from the associated leveed area.

**LEVEED AREA:** The lands from which flood water is temporarily excluded by the levee system.

**LIFE SAFETY:** For the purposes of this document, reducing the threat of loss of life resulting from breach, overtopping, or malfunction of components of a flood risk reduction system.

**OVERTOPPING:** A condition that occurs when the elevation of the still-water level and/or associated waves, wind setup, or surge exceed the top of the levee system.

**PERIODIC INSPECTION:** A USACE levee inspection conducted by a multidisciplinary team that includes the levee sponsor and is led by a professional engineer. Components include evaluating routine inspection items, verifying proper operation and maintenance, evaluating operational adequacy and structural stability, and comparing current design and construction criteria with those in place when the levee was built.

**RISK:** For the purposes of this document, the measure of the probability and severity of undesirable consequences.

**RISK ASSESSMENT:** Risk assessment is a systematic, evidence-based approach for estimating and describing the likelihood and consequences of current and future without action risk; and risk reduced by any proposed risk reduction or management action. Utilizes best available data and acquires new data when warranted to better assess risk.

**ROUTINE INSPECTION:** A USACE visual inspection, typically performed annually, conducted by USACE that verifies proper levee system operation and maintenance.

**SCREENING:** A quantitative and qualitative assessment of the general condition and relative risks associated with individual levee segments to identify the flood risk among the levee systems. Screenings rely on readily available information including routine inspection data and other available information. The screening process is used to evaluate the levee systems in the USACE portfolio.

## *Appendix H: List of Acronyms Frequently Used*

<b>ACE</b>	Annual Chance Exceedance
<b>A&amp;E</b>	Architecture and Engineering
<b>CFR</b>	Code of Federal Regulations
<b>FEMA</b>	Federal Emergency Management Agency
<b>FIRM</b>	Flood Insurance Rate Map
<b>ICW</b>	Inspection of Completed Works
<b>MAP-21</b>	Moving Ahead for Progress in the 21st Century Act
<b>MLI</b>	Mid-Term Levee Inventory
<b>NCLS</b>	National Committee on Levee Safety
<b>NFIP</b>	National Flood Insurance Program
<b>NLD</b>	National Levee Database
<b>NRC</b>	National Research Council
<b>P.L.</b>	Public Law
<b>USACE</b>	U.S. Army Corps of Engineers

*Appendix I: National Committee on Levee Safety  
Letter of Support*

# FLOOD PROTECTION STRUCTURE ACCREDITATION TASK FORCE: FINAL REPORT



July 2013

Jo-Ellen Darcy  
Assistant Secretary of the Army for Civil Works

W. Craig Fugate  
Administrator, Federal Emergency Management Agency

Dear Assistant Secretary Darcy and Administrator Fugate:

The National Committee on Levee Safety (NCLS) applauds the timely delivery of this Report called for in Section 100226 of P.L. 112-141, Moving Ahead for Progress in the 21st Century Act (MAP-21) to improve the alignment and treatment of levees through the U.S. Army Corps of Engineers (USACE) Inspection of Completed Works and the Federal Emergency Management Agency (NFIP) National Flood Insurance Program (NFIP). The NCLS also commends the leadership and dedication of USACE and NFIP program managers to explore fully the levee-related policies, practices, and programs within their authorities to identify opportunities to improve alignment among those programs.

Members of the NCLS were pleased to be advisors to this effort bringing important local, regional and state government and private sector perspectives to the development of these recommendations. We welcome the opportunity to continue to be involved in the implementation of these recommendations and stand ready to assist in other areas related to levee safety.

The NCLS supports the actions in this report and would like to highlight the following actions that are consistent with our report, *Recommendations for a National Levee Safety Program: A Report to Congress from the National Committee on Levee Safety (2009)*:

- Aligning federal programs toward the goal of reliable levees, an informed, involved public and shared responsibility for protection of human life and mitigation of public and private economic damages;
- Using risk-informed approaches to assess, communicate and mitigate risk in leveed areas;
- Communicating risk related to levees, especially as it relates to reducing risk of loss of life and property; and
- Utilizing the National Levee Database as a common repository of levee information in the nation with levee information that is accessible by all levels of the government, levee sponsors and members of the public.

## FLOOD PROTECTION STRUCTURE ACCREDITATION TASK FORCE: FINAL REPORT


We would like to emphasize the Task Force recommendation that calls for a more fundamental look at agency alignment in order to meet fully the intent of the legislation, especially ongoing National Flood Insurance Program changes. The current use of the 1% annual chance event has allowed an increase in the numbers of people and property at risk from flooding in leveed areas. The exemption from flood insurance and floodplain management requirements behind accredited levees also led many to believe mistakenly that they do not need flood insurance and that they are protected from all flooding by that levee. Current efforts to implement the Biggert-Waters Flood Insurance Reform Act of 2012 should fully embrace concepts of risk-informed decision making for assessing levee condition and consequences, insurance requirements and rates, and risk communication to people living and working in leveed areas.

Further, in considering changes to either the NFIP or USACE programs in the future, care should be taken to ensure that levee sponsors and the communities in which they reside retain their legal rights and responsibilities and are positioned to play a leadership role in levee safety. To manage risk in the long term, operations and maintenance of levees must be integrated into activities related to emergency planning and response, risk communication and floodplain management decisions. This is best done at the local, regional and state governmental levels, supported by well-aligned federal programs.

While USACE and FEMA made good faith effort to respond in a complete and comprehensive manner to this congressional charge, alignment of their programs—and well-aligned federal levee policy—will be incomplete without continued progress toward more comprehensive alignment.

Respectfully submitted,

Members of the National Committee on Levee Safety involved in assisting the Flood Structure Accreditation Task Force



Susan Gilson  
Private Sector Representative  
National Association of Flood and  
Stormwater Management Agencies



Karin M. Jacoby, P.E., J.D.  
Local/Regional Representative  
Kansas City, Missouri



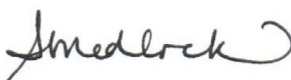
Michael R. Stankiewicz, P.E.  
State Agency Representative



Steve W. Verigin, P.E., G.E.  
Private Sector Representative  
GEI Consultants, Inc.



Leslie F. Harder, Jr., P.E., G.E., PhD.  
Private Sector Representative  
HDR, Inc.



Samantha A. Medlock, J.D., CFM  
Association of State Floodplain Managers



Warren D. "Dusty" Williams, P.E.  
Local/Regional Agency Representative  
Riverside County, California