Fwd: Levee Data for Aug. 18th Presentation to Board

From: g.sandstrom@comcast.net
To: cortez@mcleodusa.net, kiddecms@earthlink.net, kmfarley47@comcast.net, dbanner@comcast.net
Subject: Fwd: Levee Data for Aug. 18th Presentation to Board
Date: Jul 26, 2011 1:32 PM
Attachments: Without Levees Letter To FEMA.pdf Without Levees Response From FEMA.pdf Treatment of Levees in Flood Risk Studies Fact Sheet.pdf Levee Approach FAQs.pdf

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From: "Dawn Gladwell" <Dawn.Gladwell@fema.gov>
To: "g sandstrom" <g.sandstrom@comcast.net>
Cc: "Ryan Carroll" <RCarroll@mbakercorp.com>, "Thuy Patton" <Thuy.Patton@state.co.us>, "Dawn Gladwell" <Dawn.Gladwell@dhs.gov>, "Mark Kempton" <mkkempton@acewater.com>, cjpauley@acewater.com, dmaroney@pueblo.us, dwood@pueblo.us
Sent: Tuesday, July 26, 2011 12:02:11 PM
Subject: Levee Data for Aug. 18th Presentation to Board

Dear Gus,

Thank you for helping me setup a time to meet with the Pueblo Conservancy District. As part of presenting draft data to you along the Arkansas and Wild Horse Dry Creek levees we would also like to give you some information about a congressional letter that FEMA received in regards to levees and FEMA's planned approach to address that letter. Before giving this data to you we wanted to have a draft floodplain analysis so that a more informed discussion could occur to discuss what options we have moving forward. Below is a summary of what we plan to cover on the 18th. The analysis that will be presented is a draft version of what is referenced below as "without levee" analysis.

FEMA received a letter from Senatorial and Congressional representatives requesting that FEMA discontinue the use of "without levee" analyses when the levee structure does not meet the regulatory requirements for accreditation. FEMA issued a response letter stating that new methodologies for performing "without levee" analysis will be developed to replace the existing methods; both of these letters are attached for your review. I have also attached a "Treatment of Levees in Flood Risk Studies Fact Sheet" and "Levee Approach FAQs", which I hope will be of assistance in answering some of the questions you may have.

The regulatory requirements for FEMA to recognize the flood protection capabilities of levees are found in the Code of Federal Regulations, Title 44, Section 65.10 (44 CFR Section 65.10). Levee certification requirements per Code of Federal Register (CFR) 44 Section 65.10 have not changed. In order for a levee to be shown as providing protection against the 1-percent-annual-chance flood event, the levee must meet the requirements of 44 CFR Section 65.10. If a levee meets the requirements of 44 CFR Section 65.10, the levee will be accredited or provisionally accredited by FEMA. The area landward of the accredited or provisionally accredited levee will be shown as a moderate-risk flood zone (Zone X shaded) on the Flood Insurance Rate Map (FIRM). If a levee does not meet the requirements of 44 CFR Section 65.10, the levee will not be accredited by FEMA. The areas behind the levee will be mapped as a high-risk flood zone (Zone AE or Zone A) on the FIRM.

The current FEMA methodology for performing "without levee" analysis in areas with levees that do not meet

the requirements of 44 CFR Section 65.10, is to compute the 1-percent-annual-chance flood elevations as if the levee did not exist. None of the subject levee is recognized as providing 1-percent-annual-chance flood protection unless there are portions of the levee system that can meet requirements of 44 CFR Section 65.10 independent of the remaining levee system. However, in response to the congressional request, FEMA is working on a new approach for performing "without levee" analysis for areas with levees that do not meet the requirements of 44 CFR 65.10. The details of the new approach are still being finalized so a new method has not been adopted by FEMA.

The options for the Arkansas and Wild Horse Dry Creek Levees are:

- **Levee accredited on the FIRM** – This option is based on the submittal of data and documentation by the levee owner demonstrating full compliance with 44 CFR 65.10. The area landward of the accredited levee is shown as a moderate-risk flood zone (Zone X shaded).
- **Provisionally Accredited Levee** (PAL) (**for the Arkansas Levee only due to lack of freeboard along the Wild Horse levee**) - A PAL is an option for a levee that FEMA has previously accredited with providing protection on an effective FIRM, and for which FEMA is awaiting data and/or documentation that will demonstrate compliance with the requirements of 44 CFR 65.10. Before FEMA will designate a levee as a PAL, the levee owner and community will need to sign and return an agreement that indicates that documentation required for compliance with 44 CFR 65.10 will be provided within a specified time frame. The area landward of the provisionally accredited levee is shown as a moderate-risk flood zone (Zone X shaded).
- **Levee Not Accredited or De-accredited on the FIRM** – This option will be employed if data and documentation demonstrating full compliance with 44 CFR 65.10 is not submitted and a PAL agreement is not entered into. The area landward of the De-accredited levee is shown as a high-risk flood zone (Zone AE or Zone A) based on the new approach for "without levee" analysis (details being finalized).

We look forward to meeting with the Board on August 18th at 9 am to go over all of this data.

Dawn

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United States Senate

WASHINGTON, DC 20510

February 3, 2011

The Honorable W. Craig Fugate
Administrator
Federal Emergency Management Agency
500 C Street, Southwest
Washington, D.C. 20472

Dear Administrator Fugate:

We write to urge you to use your current authorities to discontinue the Federal Emergency Management Agency's (FEMA) use of "without levees" analysis to determine new Flood Insurance Rate Maps (FIRMs) in cases where a final determination has not been made and an affected community objects to such analysis in favor of more precise methods of flood modeling. "Without levee" modeling methods assume that a levee or flood control structure that exists in physical reality does not exist for the purposes of modeling, reducing the precision of flood maps and eroding public confidence in the mapping process itself.

We value the efforts of the National Flood Insurance Program to accurately reflect flood risk to the American public, but we also understand the negative impact the issuance of insufficiently accurate or insufficiently precise maps can have on communities at a time of economic uncertainty across our country. In investigating the methods and processes FEMA uses to make such flood hazard determinations, we have found that FEMA knowingly assumes that certain flood control structures that do exist in physical reality do not exist in the ensuing FEMA models, primarily for the sake of simplicity.

We support FEMA's efforts to maximize taxpayer dollars by choosing simpler, more cost-effective modeling techniques when appropriate. However, in cases where FEMA treats a flood control structure as if it has been completely wiped off of the map, we may be unnecessarily devaluing property and hurting the economies of cities, towns, counties and businesses. This approach is particularly troubling since FEMA has the tools at its disposal to obtain more precise data. Just because a levee is under repair or needs to be recertified does not mean that it provides no flood protection at all or that its level of protection cannot be sufficiently modeled. Current FEMA modeling techniques allow us to more precisely reflect the level of flood protection of such structures. When American jobs are at risk, FEMA should use the methods readily available to it rather than settle for an all-or-nothing approach, thus shifting the financial burden from the federal government to local governments and their citizens.

For these reasons, we request that you prohibit the use of such all-or-nothing modeling approaches when a community notifies you that it believes that it is negatively affected by "without levees" modeling. Even with such a prohibition in place, we are hopeful that FEMA will continue to use simpler, more cost-effective techniques when no community is harmed.

Thank you for your attention to this matter. Please do not hesitate to contact us if you have any questions about this request.

Sincerely,

RICHARD DURBIN
United States Senator

THAD COCHRAN
United States Senator

MARK PRYOR
United States Senator

ROGER WICKER
United States Senator

TOM HARKIN
United States Senator

KAY BAILEY HUTCHISON
United States Senator

RON WYDEN
United States Senator

PAT ROBERTS
United States Senator

MARY LANDRIEU
United States Senator

MIKE CRAPO
United States Senator

CHARLES SCHUMER
United States Senator

LAMAR ALEXANDER
United States Senator

FRANK LAUTENBERG
United States Senator

DAVID VITTER
United States Senator

JIM WEBB
United States Senator

MIKE JOHANNS
United States Senator

CLAIRE McCASKILL
United States Senator

MARK KIRK
United States Senator

AMY KLOBUCHAR
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JERRY MORAN
United States Senator

JEFF MERKLEY
United States Senator

JOHN BOOZMAN
United States Senator

KIRSTEN GILLIBRAND
United States Senator

ROY BLUNT
United States Senator

United States Senator

United States Senator

U.S. Department of Homeland Security
500 C Street, SW
Washington, DC 20472

FEMA

The Honorable Thad Cochran
United States Senate
Washington, DC 20510

Dear Senator Cochran:

Thank you for your letter dated February 3, 2011, to the Department of Homeland Security, Federal Emergency Management Agency (FEMA). On behalf of your constituents, you joined a number of other Senators in asking that FEMA discontinue the National Flood Insurance Program (NFIP) use of "without levee" analyses when the levee structure does not meet the regulatory requirements for accreditation and an affected community objects to such analysis in favor of more precise methods of flood modeling. You expressed concern that this type of modeling does not consider the impacts of a levee or flood control structure on the 1-percent-annual-chance flood, and erodes public confidence in FEMA's mapping process.

As you are aware, over the past year FEMA has been engaged in a comprehensive review of the NFIP to identify reforms designed to enable FEMA to better address the flood risks faced by the American public. We recognize that our approach to mapping the flood risk associated with levees that do not meet Federal accreditation requirements has been a concern for many. As such, we have included this subject as an important consideration in our ongoing NFIP reform efforts, while also exploring short-term resolutions.

Some changes in the program must take place in the near term. In order to increase the credibility of our Flood Insurance Rate Maps in areas where levees are not accredited, I have directed my staff to replace the "without levee" modeling approach with a suite of methodologies that are technically-sound, credible, and cost-effective. The approach will better meet the needs of our citizens while providing more precise results that better reflect the flood risk in areas impacted by levees. This will not replace the need for levee owners or the associated communities to remain engaged in flood risk management activities or change the existing requirements for them to provide levee accreditation information as outlined in the Code of Federal Regulations (44 CFR 65.10).

The details of this new approach will take some time to finalize. Acknowledging that there are ongoing flood hazard analysis studies where the "without levee" approach has been used, FEMA will temporarily withhold issuing Final Determinations for those communities whose levees do not meet accreditation requirements and would clearly benefit from this new approach. This temporary delay will allow us to properly evaluate affected levees under the new procedures.

While our new procedures are being developed, the risk of flooding remains in many of your communities – whether caused by unforeseen levee failure or heavy rainfall events causing flooding

inside the levee system. We trust that you and the other Senators concerned about this issue will help to ensure the public does not develop a false sense of security regarding flood risk as we work through and implement these changes. I am requesting your continued assistance to promote flood insurance in these neighborhoods. The Preferred Risk Policies that are available to many individuals currently not shown in Special Flood Hazard Areas are cost-effective means to buy down their risk.

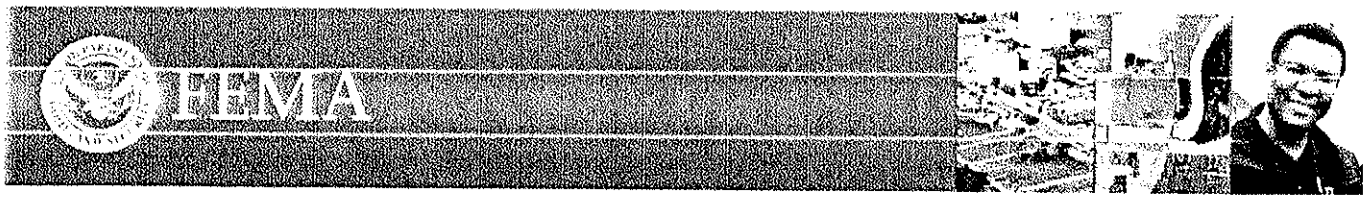
Thank you for your continued interest in this matter and your diligence in helping us find an appropriate resolution. We would be happy to hold a briefing to provide further details on our draft proposal, if that would be helpful. If you need additional information or assistance, please have a member of your staff contact the FEMA Legislative Affairs Division by telephone at (202) 646-4500.

Sincerely,

W. Craig Fugate
Administrator

New methodology does not consider the effect of other structures (railroad lines, roads, etc) that are not specifically designed for flood control. ~~Comments~~ Guidelines will be published in September for public comments.

We need to comment on guidelines March 2012



Treatment of Levees in Flood Risk Studies

Background

As part of its effort to reform the National Flood Insurance Program (NFIP), FEMA is exploring more precise methods for identifying flood risk in areas impacted by levees.

When preparing a flood risk study, FEMA treats accredited levees (levees that meet the requirements of the Code of Federal Regulation, 44 C.F.R. Section 65.10) as providing protection against a 1-percent-annual-chance (or 100-year) flood event. In other words, FEMA assumes that an accredited levee will prevent the flow of water from getting behind the levee during a 1-percent-annual-chance flood.

On the other hand, levees that are not accredited (that do not meet the requirements of 44 C.F.R. Section 65.10) are currently treated as providing no protection against a 1-percent-annual-chance flood event. This means that FEMA assumes water will inundate the area behind a non-accredited levee during a 1-percent-annual-chance flood. This method has been referred to as a "without levee" analysis.

Although it is technically sound, FEMA recognizes that the use of the "without levee" modeling method may be less precise for the establishment of flood zones and resulting insurance rates. Therefore, a new set of more precise modeling methods are being considered for use in flood risk studies. The revised methodologies will account for several typical levee scenarios.

Levee Systems
Need more information on levee systems?
Please visit the levee dedicated pages on the FEMA Web site at:
www.fema.gov/plan/prevent/fhm/[illegible]

The NFIP
Looking for more information on the National Flood Insurance Program? Visit:
www.fema.gov/nfip.

You can also find information about your flood risk and how to find a flood insurance agent at:
www.FloodSmart.gov.

FEMA Library
The FEMA Library is a database of publicly available FEMA resources. Many are available for download, including:

"NFIP and Levees: An Overview Fact Sheet"
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"Living With Levee Systems: Information for Property Owners"
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Requirements of 44 CFR Section 65.10: Mapping of Areas Protected by Levee Systems
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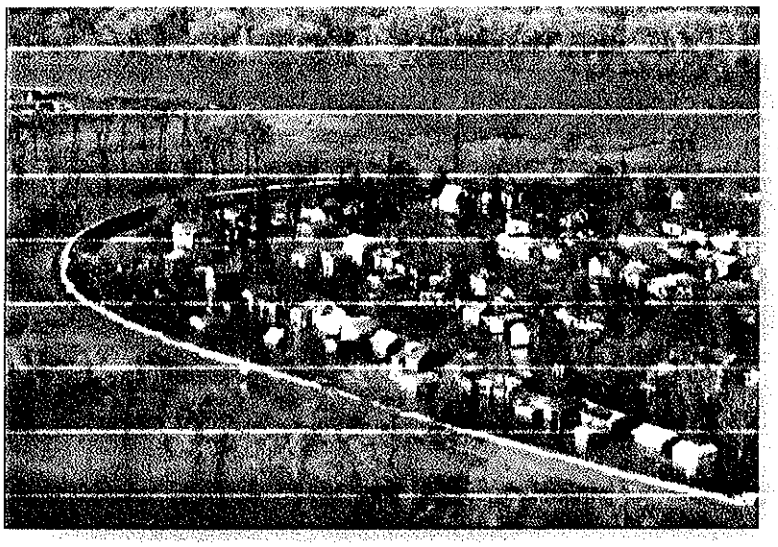


Areas behind levees which are overtopped or breached can experience significant damage and loss of life.

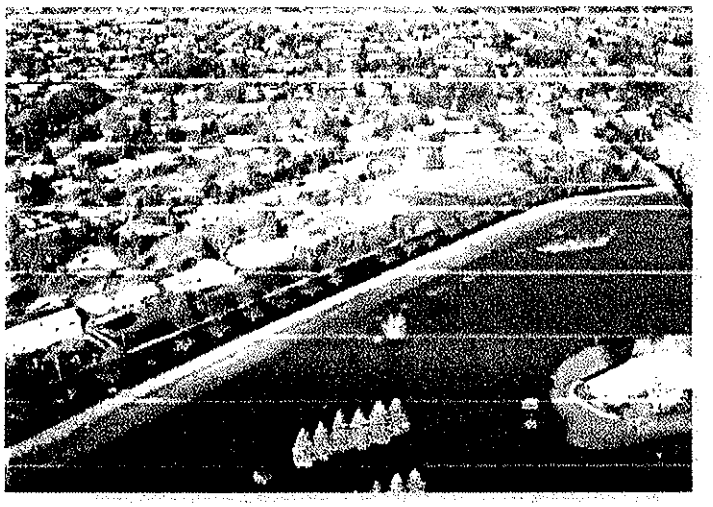
Effectiveness of Levees

The level of protection levees provide can vary greatly based on the physical characteristics of the levee, and the amount, height, and duration of flood waters. Levees that were not designed or built to provide protection from events such as the 1-percent-annual-chance flood may not be large enough to provide adequate protection during such events. Other levees designed, built, and maintained to provide protection from the 0.2-percent-annual-chance (or 500-year) flood may provide adequate protection during a flood of that magnitude.

Levee Accreditation

FEMA has implemented procedures to verify that levee systems shown on effective Flood Insurance Rate Maps (FIRMs) provide protection from the 1-percent-annual-chance flood and continue to meet the current criteria for levee systems established by 44 C.F.R. Section 65.10. When FEMA initiates a mapping revision for a community, the levee owner or community is responsible for providing data and documentation showing that a levee meets the requirements specified in 44 C.F.R. Section 65.10.

FEMA's review to accredit a levee is for the purpose of establishing appropriate risk zones for NFIP maps and to communicate flood risk. FEMA does not determine how a structure or system will perform in a flood event.



Accredited levees may help prevent properties from being flooded during the 1-percent-annual-chance flood.

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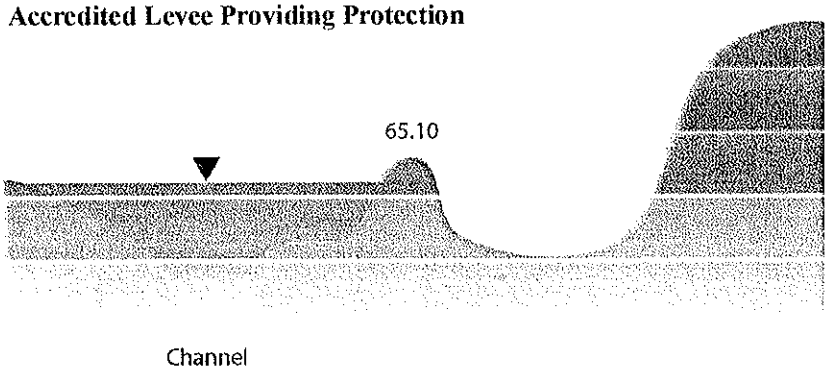
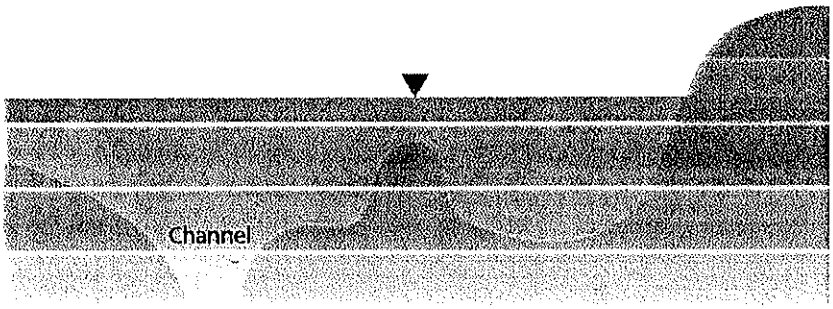
Accredited Levee Providing Protection



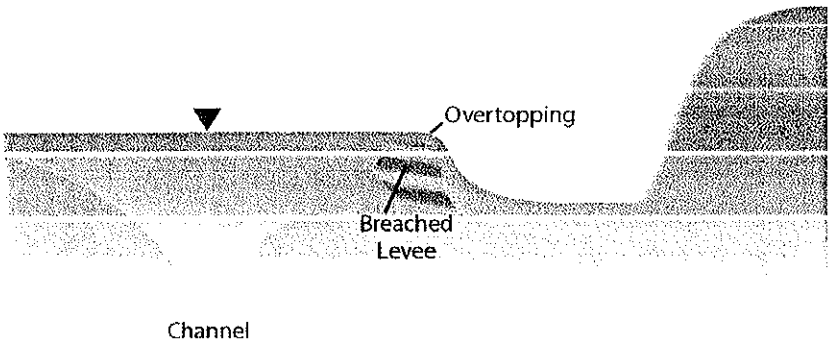
Levees that are designed, built, and maintained to provide protection from large floods such as the 1-percent-annual-chance flood and meet the requirements of 44 C.F.R. Section 65.10 are accredited as preventing the flood waters from getting behind the levee for floods of that magnitude or less.

Levee Not Effective



Some levees are not effective during large flooding events such as the 1-percent-annual-chance flood, and the flood waters are not impeded by the levee.

Overtopping or Breached Levee



When the height of water is above the top of the levee, floodwaters will flow over the levee at which point it is overtopped.

When a part of the levee breaks/fails, leaving an opening for water to flood the land behind the levee, the levee has been breached.

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New Approach to Analyzing Levees

The new levee approach for analyzing levees will provide more precise flood risk information. It will include a suite of methods that are technically-sound, credible and cost-effective. Specifically, levee height and structural characteristics will help to determine if and when overtopping and breach calculations might provide a better estimate of flood hazards.

This new approach will also allow for the consideration of analyses performed at the local level, thereby enhancing FEMA's understanding of the levee system and its components.

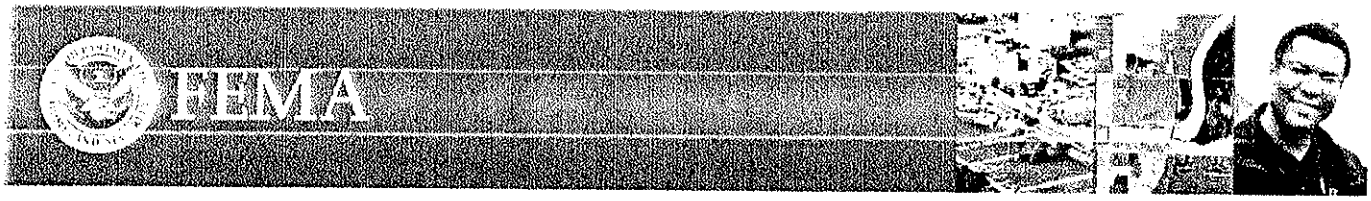
What It Means for Communities

The new approach will provide a more precise assessment of flood risk in areas impacted by levees. Because the new modeling methods may affect the treatment of levee, FEMA will temporarily withhold issuing flood risk study final determinations for those communities whose levees do not meet accreditation requirements of 44 C.F.R. Part 65.10. This temporary delay will allow FEMA to give proper consideration to levees under the new modeling procedures.

It is important to note that using more precise levee modeling methods does not necessarily mean the flood risk behind levees, as depicted on FIRMs, will decrease. A more precise analysis of a given levee system may indicate a greater flood risk than was previously understood in certain areas.

Levees are designed to provide a specific level of protection. They can be overtopped or fail in larger flood events. Levees also decay over time and require regular maintenance and periodic upgrades to retain their level of protection. When levees do fail, they can fail catastrophically.

FIRMs currently carry a warning that overtopping or failure of the levee, dike, or other structure is possible, and that flood insurance and adherence to evacuation procedures are strongly recommended. Accordingly, FEMA urges people to understand their flood risk. Because of the critical role levees play in mitigating flood risk, and their ultimate affect on flood insurance rates and economic well-being, levee owners and associated communities must still remain engaged in flood risk management activities and provide levee accreditation information as outlined in 44 C.F.R. Section 65.10.



FEMA's Approach to Levees

Answers to Frequently Asked Questions

March 10, 2011

Q: Why is FEMA changing the way it maps levees?
A: The "without levee" approach is an effective tool to identify flood risk behind uncertified levees. FEMA recognizes, however, that advances can enable FEMA to use improved models and tools to provide more precise flood risk information, and we are committed to updating our mapping methodology. FEMA also is engaged in a systematic effort to reform the National Flood Insurance Program (NFIP), and we view a change in the manner in which we map levees that do not meet the criteria for accreditation as a step toward a long-term solution.

Q: What is FEMA doing to improve its analysis of levees?
A: FEMA is developing a series of targeted modeling approaches to replace the current "without levee" approach.

Q: Are FEMA and the U.S. Army Corps of Engineers (USACE) aligned in this effort?
A: FEMA and USACE have been and will continue to work as a team to develop the new approach.

Q: Will the public be involved?
A: Yes. FEMA will invite the public to review and comment on the new approach and subsequent guidance.

Q: What about maps already in effect?
A: The new approach will be applied to ongoing and future mapping projects. If a community has questions about existing Flood Insurance Rate Maps (FIRMs), it should coordinate with the appropriate FEMA Regional representative to discuss future map updates.

Levee Systems
Need more information on levee systems?Please visit the levee dedicated pages on the FEMA website at:

Here you will find an array of guidance and information resources to better answer any questions you might have on levee systems.

The NFIP
Looking for more information on the National Flood Insurance Program? Visit:

You can also find information about your flood risk and how to find a flood insurance agent at:

FEMA Library The FEMA Library is a database of publicly available FEMA resources. Many are available for download, including:

"NFIP and Levees: An Overview Fact Sheet"

"Living with Levee Systems: Information for Property Owners"

Requirements of 44 CFR Section 65.10: Mapping of Areas Protected by Levee Systems

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Q: Will the new approach result in smaller Special Flood Hazard Areas (SFHAs)?
A: Not always. SFHAs may decrease, increase or stay the same size as a result of the new approach. The current approach may have overestimated or underestimated flood hazards to some extent. In some scenarios, the anticipated flood risk may be greater than previously identified using our current approach.

Q: Will this new approach impact insurance rates?
A: The rate will be based on the flood hazard identified through the new approach and other factors involved with the particular structure being rated, but the method for rating is not changing.

Q: Will FEMA consider levees with less than a 100-year level of protection?
A: Yes. FEMA is analyzing more precise ways to model flood risk behind levees that are not currently accredited to provide protection against a 1-percent-annual-chance flood (100-year flood). As FEMA continues work on NFIP reform, we will investigate ways to more accurately rate policies in areas behind levees with less than 1-percent-annual-chance flood protection.

Q: Why can't FEMA rate these types of insurance policies today?
A: Rating policies in areas behind levees with less than 1-percent-annual-chance flood protection may require new or modified flood risk zones that do not exist today. This and other considerations may require regulatory and legislative changes.

Q: How soon will the new approaches be developed and in place?
A: A date is not yet set for implementation, but FEMA is working to implement a new approach as soon as possible.

Q: Is the new approach going to be applied to every new mapping activity with unaccredited levees, or do communities need to request it?
A: It will be applied to all new and ongoing mapping activities.

Q: Will my community and/or levee owner still be required to provide FEMA data?
A: Yes. The data requirements for levee accreditation in 44 C.F.R. Section 65.10 will not change, and more precise modeling likely will require more levee data. Communities and/or levee owners still will need to provide data on their levees to enable FEMA to accurately assess the flood risk.

Q: If a community does not agree with the FEMA analysis used in its flood risk study, can it provide FEMA with additional or more detailed information?
A: Yes. As with any study performed by FEMA, local communities can provide additional information for consideration.

Q: Can a community still appeal the findings on the FIRM?
A: Yes. The administrative process currently in effect for flood hazard maps will remain unchanged. There will be an administrative appeal period following issuance of the preliminary FIRM during which a community can provide additional scientific and technical data.

Q: How will the new approach impact the cost of FEMA's flood studies?
A: We are anticipating additional costs for a deeper level of analysis. FEMA will evaluate the cost of applying additional analyses against the value added for a particular study or community based on the risk present in that area. Where there are high levels of risk, additional analysis may be appropriate.

Q: Will FEMA help pay for certification of levees?
A: No. FEMA's authority and mission are in the identification of risk and not in the assessment of the design, construction and maintenance of levees.

Q: Will FEMA finalize maps for communities using the "without levee" analysis?
A: No. FEMA will delay finalizing maps for communities where a levee cannot be accredited until the new approach is finalized.

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FACT SHEET

LEVEES
IDENTIFYING THE RISK

Requirements for Mapping Levees

Complying with Section 65.10 of the NFIP Regulations

As part of a mapping project, it is the levee owner's or community's responsibility to provide data and documentation to show that a levee meets the requirements of Section 65.10 of the National Flood Insurance Program (NFIP) regulations. Links to Section 65.10 and many other documents are available on FEMA's Web site at www.fema.gov/plan/prevent/fhm/lv_fpm.shtm.

The FEMA requirements in Section 65.10 are separated into five categories:

1. General criteria;
2. Design criteria;
3. Operations plans and criteria;
4. Maintenance plans and criteria; and
5. Certification requirements.

The requirements for each of these areas are summarized below.

(A) GENERAL CRITERIA

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 Section 60.3 of the NFIP regulations. Section 65.10 of the NFIP regulations describes the types of information FEMA needs to recognize, on NFIP maps, that a levee system provides protection from the flood that has a 1-percent chance of being equaled or exceeded in any give year (base flood). This information must be supplied to FEMA by the community or other party seeking recognition of a levee system at the time a study or restudy is conducted, when a map revision under the provisions of Part 65 of the NFIP regulations is sought based on a levee system, and upon request by the Administrator during the review of previously recognized structures. The FEMA review is for the sole purpose of establishing appropriate risk zone determinations for NFIP maps and does not constitute a determination by FEMA as to how a structure or system will perform in a flood event.

(B) DESIGN CRITERIA

For the purposes of the NFIP, FEMA has established levee design criteria for freeboard, closures, embankment protection, embankment and foundation stability, settlement, interior drainage, and other design criteria. These criteria are summarized in subsections below.

(B)(1) FREEBOARD

For riverine levees:

- A minimum freeboard of 3 feet above the water-surface level of the base flood must be provided.
- An additional 1 foot above the minimum is required within 100 feet on either side of structures (e.g., bridges) riverward of the levee or wherever the flow is constricted.

- 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.

(B)(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 U.S. Army Corps of Engineers (USACE) Engineering Manual 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 (e.g., drainage layers); and
- Other design factors affecting embankment and foundation stability (e.g., berms).

(B)(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 freeboard standards set forth in B(1).

This analysis must address:

- Embankment loads,
- Compressibility of embankment soils,
- Compressibility of foundation soils,

(C)(2) INTERIOR DRAINAGE SYSTEMS

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

- 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;
- A formal plan of operation, including specific actions and assignments of responsibility by individual name or title;
- Provision for manual backup for the activation of automatic systems; and
- Provisions for periodic inspection of interior drainage systems and periodic operation of any mechanized portions for testing and training purposes; no more than 1 year shall elapse between either the inspections or the operations.

(C)(3) OTHER OPERATION PLANS AND CRITERIA

FEMA may require other operating plans and criteria 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 following maintenance criteria must be met:

- 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(n):
    - Federal or State agency;
    - Agency created by Federal or State law; or
    - Agency of a community participating in the NFIP that must assume ultimate responsibility for maintenance.
- The maintenance 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, the maintenance plan shall specify:
    - Maintenance activities to be performed;
    - Frequency of their performance; and
    - Person by name or title responsible for their performance.

FEMA

Treatment of Levees in Flood Risk Studies

Background

As part of its effort to reform the National Flood Insurance Program (NFIP), FEMA is exploring more precise methods for identifying flood risk in areas impacted by levees.

When preparing a flood risk study, FEMA treats accredited levees (levees that meet the requirements of the Code of Federal Regulation, 44 C.F.R. Section 65.10) as providing protection against a 1-percent-annual-chance (or 100-year) flood event. In other words, FEMA assumes that an accredited levee will prevent the flow of water from getting behind the levee during a 1-percent-annual-chance flood.

On the other hand, levees that are not accredited (that do not meet the requirements of 44 C.F.R. Section 65.10) are currently treated as providing no protection against a 1-percent-annual-chance flood event. This means that FEMA assumes water will inundate the area behind a non-accredited levee during a 1-percent-annual-chance flood. This method has been referred to as a "without levee" analysis.

Although it is technically sound, FEMA recognizes that the use of the "without levee" modeling method may be less precise for the establishment of flood zones and resulting insurance rates. Therefore, a new set of more precise modeling methods are being considered for use in flood risk studies. The revised methodologies will account for several typical levee scenarios.

Levee Systems
Need more information on levee systems?
Please visit the levee dedicated pages on the FEMA Web site at:
www.fema.gov/plan/prevent/fhm/lv_intro.shtm.

The NFIP
Looking for more information on the National Flood Insurance Program? Visit:
www.fema.gov/nfip.

You can also find information about your flood risk and how to find a flood insurance agent at:
www.FloodSmart.gov.

FEMA Library
The FEMA Library is a database of publicly available FEMA resources. Many are available for download, including:

"NFIP and Levees: An Overview Fact Sheet"
http://www.fema.gov/library/viewRecord.do?id=2609

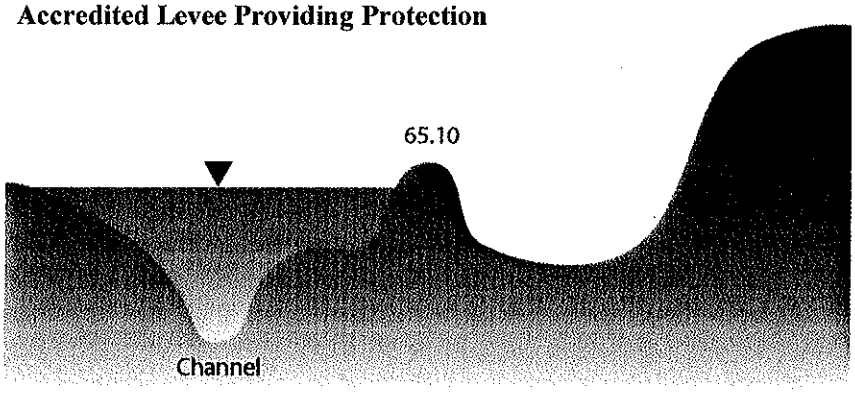
"Living With Levee Systems: Information for Property Owners"
http://www.fema.gov/library/viewRecord.do?id=2741

Requirements of 44 CFR Section 65.10: Mapping of Areas Protected by Levee Systems
http://www.fema.gov/library/viewRecord.do?id=2741.

RiskMAP
Increasing Resilience Together

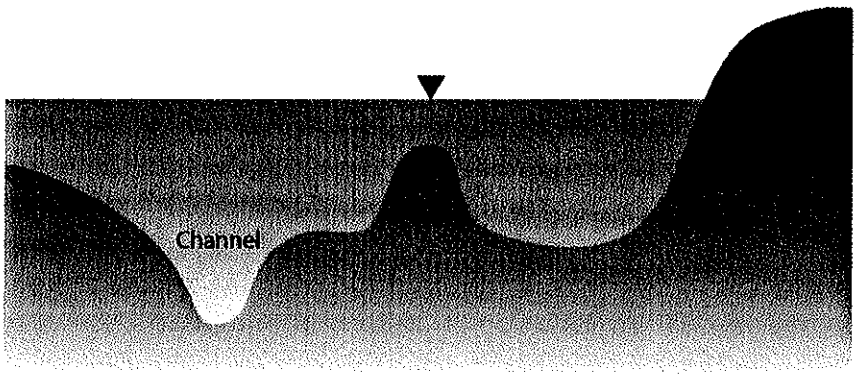
Potential Flood Scenarios

Accredited Levee Providing Protection



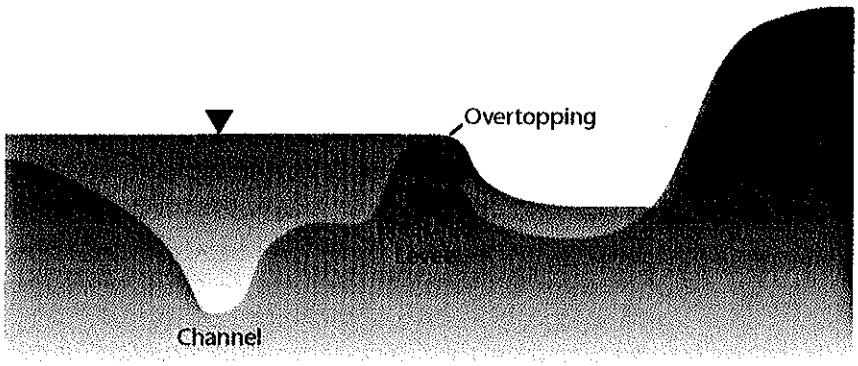
Levees that are designed, built, and maintained to provide protection from large floods such as the 1-percent-annual-chance flood and meet the requirements of 44 C.F.R. Section 65.10 are accredited as preventing the flood waters from getting behind the levee for floods of that magnitude or less.

Levee Not Effective



Some levees are not effective during large flooding events such as the 1-percent-annual-chance flood, and the flood waters are not impeded by the levee.

Overtopping or Breached Levee



When the height of water is above the top of the levee, floodwaters will flow over the levee at which point it is overtopped.

When a part of the levee breaks/fails, leaving an opening for water to flood the land behind the levee, the levee has been breached.

RiskMAP
Increasing Resilience Together

LEVEES
IDENTIFYING THE RISK

Provisionally Accredited Levees

Answers to Questions About Procedure Memorandum No. 43

Providing communities with up-to-date, accurate, and reliable flood hazard and risk information on Digital Flood Insurance Rate Maps (DFIRMs) is one of the primary goals of the Flood Map Modernization (Map Mod) effort undertaken by the Department of Homeland Security, Federal Emergency Management Agency (FEMA). Levee systems have been identified in over one-fourth of the counties that will receive modernized maps—Digital Flood Insurance Rate Maps (DFIRMs)—as part of Map Mod. Therefore, FEMA has been working, and continues to work with Federal, State, and local professionals and technical partners to determine the flood protection and risk-reduction capabilities of the Nation's levee systems and to accurately reflect the flood hazard and risk in "levee-impacted" areas on the DFIRMs. As part of the Map Mod effort, FEMA reviewed its existing guidance regarding the submittal of data and documentation to meet National Flood Insurance Program (NFIP) requirements for the evaluation and mapping of levee-impacted areas. As a result of this review, FEMA issued three Procedure Memorandums to clarify these requirements. The questions and answers below are provided to further explain these requirements.

Q: What is a levee system?

A: A levee system is a flood protection system that consists of a levee, or levees, and associated structures, such as closure and drainage devices, which are constructed and operated in accordance with sound engineering practices. A levee is a manmade structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding

Levee systems are designed to provide a *specific level of protection.* They can be overtopped or fail in larger flood events. They require regular maintenance and periodic upgrades to retain their level of protection. When levee systems do fail, they often fail catastrophically, and the resulting damage, including loss of life, may be more significant than if the levee system had not been built. Everyone should understand the risk to life and property that exists behind levee systems—risk that even the best flood protection system cannot eliminate completely.

Q: What regulations apply to the evaluation and mapping of levee systems and levee-impacted areas?

A: The regulatory requirements of the NFIP are cited at Title 44, Chapter 1, Section 65.10 of the Code of Federal Regulations (44 CFR Section 65.10). According to 44 CFR Section 65.10, it is the community, levee owner, and/or local project sponsor's responsibility to submit the data and documentation showing that a levee system complies with these requirements, including the development and maintenance of an operation and maintenance plan. You may access 44 CFR Section 65.10 through the FEMA Web site at www.fema.gov/plan/prevent/fhm/lv_fpm.shtm.

Q: What are the procedural requirements for evaluating and mapping levee-impacted areas?

A: FEMA has issued three Procedure Memorandums that provide guidance for mapping levee-impacted areas—Procedure Memorandum No. 34 (PM 34) —*Interim Guidance for Studies Including Levees,* Procedure Memorandum No. 43 (PM 43)—*Guidelines for Identifying Provisionally Accredited Levees*, and Procedure Memorandum No.45 (PM 45)—*Revisions to Accredited Levee and Provisionally Accredited Levee Notations* —as clarification to Appendix H of FEMA's *Guidelines and Specifications for Flood Hazard Mapping Partners*. PM 43 describes the various PAL scenarios and how each may be mapped. Information on PM 45, which provides updated information on the map notes that are to appear on DFIRM panels showing accredited and provisionally accredited levee systems, is provided on a separate Fact Sheet. You also may access these three Procedure Memorandums and other related guidance through the FEMA Web site at www.fema.gov/plan/prevent/fhm/lv_fpm.shtm.

Q: How will a PAL be identified on a DFIRM?

A: To identify the PAL, FEMA has been applying and may continue to apply the note below at several locations on DFIRM panels that will become effective before December 1, 2008. The note points to the levee system and is placed on the landward side of the levee system on the affected DFIRM panel(s) in or near the Zone X (shaded) area:

> WARNING: Provisionally Accredited Levee. For explanation, see the Notes to Users.

The following note has been or will be added to the Notes to Users on DFIRM panels that will become effective before December 1, 2008:

> WARNING: This levee, dike, or other structure has been provisionally accredited and mapped as providing protection from the 1-percent-annual-chance flood. To maintain accreditation, the levee owner or community is required to submit documentation necessary to comply with 44 CFR Section 65.10 by (_____,____). Because of the risk of overtopping or failure of the structure, communities should take proper precautions to protect lives and minimize damages in these areas, such as issuing an evacuation plan and encouraging property owners to purchase flood insurance.

The notes that will appear on the DFIRM panels that will become effective after December 1, 2008, are documented in PM No. 45 and in an accompanying Fact Sheet titled "Levee Notes on FEMA Maps: Answers to Questions About Procedure Memorandum No. 45."

Q: How does FEMA determine if a levee system meets the PAL requirements of PM 43?

A: For a levee system to be eligible for PAL designation, the levee system must be shown as providing protection from the 1-percent-annual-chance flood on the effective FIRM. Additional PAL requirements include the submittal of a PAL application package and a 12-month progress report. If applicable, there are other potential requirements, including a letter requesting a maintenance deficiency correction period and submittal of data demonstrating that maintenance deficiencies have been corrected (as appropriate). Specific timeframes for these requirements vary depending on the levee's status; however, more detailed information can be found in the guidance document, titled "Guidelines for Identifying Provisionally Accredited Levees." that accompanied PM 43. This document contains descriptions of different mapping scenarios and is accessible through the FEMA Web site at www.fema.gov/plan/prevent/fhm/lv_fpm.shtm.

For levee systems in the U.S. Army Corps of Engineers (USACE) Program that are shown on the effective FIRM as providing 1-percent-annual-chance flood protection but have known deficiencies, FEMA will coordinate with the appropriate USACE district to determine if the USACE will offer the one-time-only, 1-year maintenance deficiency period.

Q: What if a levee system qualifies for the maintenance deficiency correction period as specified in PM 43?

A: For levee systems not in the USACE Program, if the community/levee owner believes that the levee system meets 44 CFR Section 65.10 requirements with the exception of maintenance deficiencies, then the community/levee owner may qualify for a one-time-only 1-year maintenance deficiency correction period. The community/levee owner will have 90 days from the date of the initial notification letter from FEMA to submit a signed letter requesting the maintenance deficiency correction period.

The community/levee owner then has 12 months to submit 44 CFR Section 65.10-compliant data and documentation or a completed PAL application package (if additional time is needed to compile 44 CFR Section 65.10-compliant data and documentation) to show the levee system as accredited. If the community/levee owner does not provide 44 CFR Section 65.10-compliant data and documentation or a completed PAL application within the 12-month period,

FACT SHEET

LEVEES: IDENTIFYING THE RISK

Meeting the Criteria for Accrediting Levee Systems on NFIP Flood Maps

How-to-Guide for Floodplain Managers and Engineers

A levee system is a flood protection system that consists of a levee, or levees, and associated structures, such as closure and drainage devices, which are constructed and operated in accordance with sound engineering practices. A levee is a manmade structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding.

As part of the flood mapping process, the Department of Homeland Security, Federal Emergency Management Agency (FEMA) and its State and local mapping partners review levee system data and documentation.

It is the levee owner's or community's responsibility to provide data and documentation to demonstrate that a levee system meets National Flood Insurance Program (NFIP) requirements as described in Title 44, Chapter 1, Section 65.10 of the Code of Federal Regulations (44 CFR Section 65.10), which you may view on the FEMA Web site at www.fema.gov/plan/prevent/fhm/lv_fpm.shtm.

To be recognized as providing a 1-percent-annual-chance level of flood protection on the modernized NFIP maps, called Digital Flood Insurance Rate Maps (DFIRMs), levee systems must meet *and continue to meet* the minimum design, operation, and maintenance standards (44 CFR Section 65.10)..

To help clarify the responsibilities of community officials, levee owners, or other parties seeking recognition of a levee system identified during a study/mapping project, FEMA issued Procedure Memorandum No. 34 (PM 34), *Interim Guidance for Studies Including Levees*, on August 22, 2005. PM 34 provided clarification of the procedures provided in Appendix H of FEMA's *Guidelines and Specifications for Flood Hazard Mapping Partners*.

FEMA issued Revised Procedure Memorandum No. 43, *Guidelines for Identifying Provisionally Accredited Levees*, on March 16, 2007, which allows issuance of preliminary and, in some cases, effective DFIRMs while communities/levee owners compile and submit required data and documentation. FEMA issued Procedure Memorandum No. 45, *Revisions to Accredited Levee and Provisionally Accredited Levee Notations*, in April 2008 to clarify map notes for accredited and provisionally accredited levee systems.

This document provides information regarding the types of data and documentation that must be submitted for levee systems to be accredited on DFIRMs, including a checklist and an index of further resources you may wish to consult.

COMMUNITIES WITH LEVEE SYSTEMS SHOULD KNOW:

- The community and/or other party seeking recognition or continued recognition of a levee system must provide data and documentation showing that the levee system provides base (1-percent-annual-chance) flood protection for FEMA to credit the levee system with flood protection on a FIRM or DFIRM.
- Communities *must* actively participate in the levee system documentation process.
- Levee systems without sufficient data and documentation will not be credited with providing base flood protection.
- Some levee systems may qualify for the Provisionally Accredited Levee (PAL) designation.
- Guidance regarding the PAL designation and other levee issues is available at:

www.fema.gov/plan/prevent/fhm/lv_fpm.shtm

Design Criteria*	Section of the NFIP Regulations: 65.10(b)
Description: For levee systems to be recognized (i.e., accredited) 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:	
Checklist for Design Criteria:	
■	**Freeboard.** Minimum freeboard required 3 feet above the Base Flood Elevation (BFE) all along length, and an additional 1 foot within 100 feet of structures (such as bridges) or wherever the flow is restricted. Additional 0.5 foot at the upstream end of a levee. Coastal levees have special freeboard requirements (see Paragraphs 65.10(b)(1)(iii) and (iv)).
■	**Closures.** All openings must be provided with closure devices that are structural parts of the system during operation and designed according to sound engineering practice.
■	**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.
■	**Embankment and Foundation Stability Analyses.** Engineering analyses that evaluate levee embankment stability must be submitted. The analyses provided must evaluate expected seepage during loading conditions associated with the base flood and must 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 (USACE) Engineer Manual 1110–2–1913, *Design and Construction of Levees*, (Chapter 6, Section II), may be used.
■	**Settlement Analyses.** 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. 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 USACE Engineer Manual 1110–1–1904, *Soil Mechanics Design— Settlement Analysis*, must be submitted.
■	**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 1 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.

■	**Manual Backup.** Provision for manual backup for the activation of automatic systems.
■	**Periodic Inspection.** Provisions for periodic inspection of interior drainage systems and periodic operation of any mechanized portions for testing and training purposes. No more than 1 year shall elapse between either the inspections or the operations.

Maintenance Plan — **Paragraph 65.10(d) of the NFIP Regulations**

Description: For levee systems to be recognized as providing protection from the base flood (i.e., accredited by FEMA), the maintenance criteria must be as described herein.

Checklist for Maintenance Plan:

■	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, the plan shall specify the maintenance activities to be performed, the frequency of their performance, and the person by name or title responsible for their performance.

Certification — **Paragraph 65.10(e) of the NFIP Regulations**

Description: Data submitted to support that a given levee system complies with the structural requirements set forth in "Design Criteria" (Paragraphs 65.10(b)(1) through (7) of the regulations) 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 in Section 65.2 of the NFIP regulations. 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 from the base flood.

Checklist for Certification Requirement:

■	All data submitted is certified by Professional Engineer or certified by a Federal agency.
■	Certified as-built levee plans are included in the submittal.

FEMA

New Levee Analysis and Mapping Approaches Being Developed

As part of its effort to reform the National Flood Insurance Program (NFIP), the Federal Emergency Management Agency (FEMA) is exploring more precise approaches for identifying flood hazards in areas impacted by levees.

When preparing a flood risk study, FEMA treats accredited levees (levees that meet the requirements of Title 44, Chapter 1, Section 65.10 of the Code of Federal Regulations (44 C.F.R. § 65.10)) as providing protection against a 1-percent-annual-chance (or 100-year) flood event. In other words, FEMA assumes that an accredited levee will prevent the flow of water from getting behind the levee during a 1-percent-annual-chance flood. Levees that cannot be shown to meet the criteria in 44 C.F.R. § 65.10 are non-accredited. FEMA's current approach when preparing a study for non-accredited levees assumes the flow of water to be both behind the levee as well as on the side of the flooding source.

FEMA has made a commitment to assess the approach currently used to analyze areas behind non-accredited levees and to develop alternative approaches to modeling the flood hazards in these areas on Flood Insurance Rate Maps (FIRMs). FEMA also will not issue Letters of Final Determination (LFDs) for communities impacted by levees or levee systems where FEMA employed the current approach for non-accredited levees. All ongoing mapping projects, including countywide projects, Physical Map Revisions (PMRs) and Letters of Map Revision (LOMRs) in areas of non-accredited levees may be affected by this decision.

What We Are Doing

FEMA is currently reviewing the available technical approaches for the analysis and modeling of flood hazards in the vicinity of levees. The purpose of this effort is to identify the flood risk behind non-accredited levees from the 1-percent-annual-chance-flood for flood insurance, floodplain management, and flood risk communication purposes. FEMA is updating its current levee modeling approach in a systematic manner to more precisely identify the Special Flood Hazard Areas (SFHAs) behind levees. To ensure the approaches are cost-effective and accurately identify the flood hazard, FEMA will create a series of scenarios which may include analyses of breaching or overtopping of levee systems.

For more information:

The NFIP
Looking for more information on the National Flood Insurance Program? Visit: www.fema.gov/nfip.

You can also find information about your flood risk and how to find a flood insurance agent at: www.FloodSmart.gov.

FEMA Library
The FEMA Library is a database of publicly available FEMA resources. Many are available for download, including:

Requirements of 44 CFR Section 65.10:Mapping of Areas Protected by Levee Systems http://www.fema.gov/library/viewRecord.do?id=2741.

FEMA'S Levee Responsibilities:

FEMA is responsible for establishing appropriate risk zone determinations and reflecting these determinations on FIRMs; establishing minimum standards that must be met to have a levee recognized as providing protection. On its FIRMs, FEMA will only recognize those levee systems that are shown to be accredited and meet these minimum standards.

FEMA is *not* responsible for designing, operating, certifying, or maintaining levee systems; examining levees; or determining how a structure or system will perform in a flood event.

U.S. Department of Homeland Security
500 C Street, SW
Washington, DC 20472

FEMA

SEP 25 2006

MEMORANDUM FOR: Mitigation Division Directors
Regions I - X

FROM: David I. Maurstad, Director
Mitigation Division

SUBJECT: Procedure Memorandum No. 43 – Guidelines for Identifying Provisionally Accredited Levees

Background: Early in the implementation of the Flood Map Modernization (Map Mod) Effort, the Department of Homeland Security's Federal Emergency Management Agency (FEMA) recognized that the role of levees in flood risk reduction would be an important part of the efforts of Map Mod. Further, it was acknowledged that the condition of many levees had not been assessed since they were originally mapped as providing 1-percent-annual-chance (base) flood protection. Because of this, FEMA initiated a revised process to gain a better understanding of the actual flood risks for those citizens living and working behind levees nationwide.

On August 22, 2005, FEMA issued Procedure Memorandum No. 34, *Interim Guidance for Studies Including Levees.* The purpose of the memorandum was to help clarify the responsibility of community officials or other parties seeking recognition of a levee by providing information identified during a study/mapping project. Oftentimes, documentation regarding levee design, accreditation, and impacts on flood hazard mapping is outdated or missing altogether. To remedy this, Procedure Memorandum No. 34 provides interim guidance on procedures to minimize delays in near-term studies/mapping projects to aid our mapping partners in properly assessing how to handle levee mapping issues.

Issue:

As part of a study/mapping project, it is the levee owner's or community's responsibility to provide documentation that the levee meets the requirements of Title 44 of the Code of Federal Regulations Section 65.10 of the National Flood Insurance Regulations (44 CFR Section 65.10). Issuance of the required documentation acts to prevent the levee from being shown as not providing base flood protection on a Digital Flood Insurance Rate Map (DFIRM). Procedure Memorandum No. 34 allows for the issuance of a deadline to the community for submitting the required documentation.

While 44 CFR Section 65.10 documentation is being compiled, the release of more up-to-date DFIRM panels for other parts of a community or county may be delayed. To

minimize the impact on the Map Mod goals of mapping areas landward of levees, mapping partners should be provided with guidance that will allow the issuance of preliminary and effective DFIRMs while the levee owners or community are given a reasonable amount of time to compile and submit data and documentation to show compliance with the requirements of 44 CFR Section 65.10.

Action Taken: To minimize the impact of the levee recognition and certification process on the Map Mod program goals, guidelines have been developed that will allow mapping partners to issue preliminary and effective versions of the DFIRMs while the levee owners or communities are compiling the full documentation required to show compliance with 44 CFR Section 65.10. The guidelines are summarized in the attached document entitled "Guidelines for Identifying Provisionally Accredited Levees (PAL)".

The attached document describes the criteria for five scenarios intended for determining when a levee does or does not qualify for the PAL designation. FEMA has established a specified timeframe that allows the community or levee owner time to collect the remaining requirements for 44 CFR Section 65.10 before the levee is shown on the DFIRM as not providing base flood protection. If the levee qualifies for the PAL designation, FEMA will provide the community 90 days to sign and return an agreement that indicates the full documentation for 44 CFR Section 65.10 will be provided within 24 months of the signed agreement. If the signed agreement is not returned to FEMA within 90 days, or if the levee does not meet the PAL requirements, the community is no longer eligible for the PAL designation and the area landward of the levee will be remapped as Zone AE or Zone A depending on the type of study performed for the area.

For levees that are included in the U.S. Army Corps of Engineers (USACE) Federal Program, FEMA will conduct active coordination with the appropriate USACE district to determine those projects that do not provide protection from the 1-percent-annual-chance flood. This collaborative effort will evaluate existing data or project-specific information to identify and validate non-accrediting levees in the USACE's inventory. As part of the USACE's recent levee survey, levee projects have been identified within their inventory to be no longer eligible for Public Law 84-99 rehabilitation assistance based on the project's last inspection. Ineligible status of these projects denotes maintenance deficiencies and indicates that they would not meet the minimum requirements of 44 CFR Section 65.10. The USACE has developed a written notification process to inform communities or levee owners of this status after coordination with FEMA has been conducted. Copies of the USACE notification letter will be provided to FEMA. If a community or levee owner receives this notification letter, the area landward of the identified levee will be mapped as Zone AE or Zone A as appropriate.

Effective on the date of this Procedure Memorandum, for levees that meet the PAL requirement (levees presently shown as providing base flood protection on the effective DFIRM) and for which the community or levee owner cannot readily provide full documentation of 44 CFR Section 65.10, a map note will be placed landward of the levee to indicate the levee is provisionally accredited and any existing Zone X (shaded) area is provisional. If there is no existing Zone X (shaded) area on the effective DFIRM, then

the mapping partner should define the provisional Zone X (shaded) area using the best available data.

The following note must be applied at several locations, point to the levee, and be placed landward of the levee in or near the Zone X (shaded) area:

> WARNING: Provisionally Accredited Levee. For explanation, see the Notes to Users.

The following note to users would read as follows:

> WARNING: This levee, dike, or other structure has been provisionally accredited and mapped as providing protection from the 1-percent–annual-chance flood. To maintain accreditation, the levee owner or community is required to submit documentation necessary to comply with 44 CFR Section 65.10 by (_____,____). Because of the risk of overtopping or failure of the structure, communities should take proper precautions to protect lives and minimize damages in these areas, such as issuing an evacuation plan and encouraging property owners to purchase flood insurance.

The five scenarios for determining whether the levee qualifies for the PAL designation are described in the Attachment, which also summarizes the process for coordinating with community officials and others to acquire the appropriate levee documentation, while moving forward with the production of countywide mapping for communities with levees.

Attachment
Guidelines for Identifying Provisionally Accredited Levees (PALs)

cc: See Distribution List

Distribution List (electronic distribution only)

Office of the Mitigation Division Director

Risk Analysis Branch

Risk Reduction Branch

Risk Insurance Branch

Federal Insurance and Mitigation Divisions in FEMA Regional Offices

Office of Legislative Affairs

Office of General Counsel

National Service Provider

Systems Engineering and Technical Assistance Contractor

Map Service Center

Cooperating Technical Partners

FEMA Contractors

Guidelines for Identifying Provisionally Accredited Levees (PALs)

Introduction

The Federal Emergency Management Agency (FEMA) issued Procedure Memorandum No. 34 (PM 34) on August 22, 2005, to provide interim guidance for processing studies with levees and to define the role of all mapping partners in meeting the requirements under Title 44 of the Code of Federal Regulations Section 65.10 (44 CFR Section 65.10). PM 34 reiterates that the community or other parties seeking recognition of the levee system are responsible for providing information to demonstrate that the levee provides protection from the 1-percent-annual-chance (base) flood. Therefore, as a mapping project is initiated under the Flood Map Modernization (Map Mod) program, the community, levee owner, and/or local project sponsor will be requested to provide the data described in 44 CFR Section 65.10.

The requirement for complying with 44 CFR Section 65.10 is the responsibility of the community, levee owner and/or local project sponsor and often times they find it difficult to promptly provide the full documentation. The lack of readily-available data for 44 CFR Section 65.10 has in some cases caused mapping projects/studies to be delayed or placed on hold until the required information can be compiled and provided to FEMA.

Providing communities with up-to-date, accurate, and reliable flood hazard information on Digital Flood Insurance Rate Maps (DFIRMs) is one of the primary goals of the Map Mod program. Approximately one quarter of the counties being mapped under the Map Mod program have levees shown on their currently effective FIRM. As such, the issue of whether the levee provides base flood protection needs to be addressed. While 44 CFR Section 65.10 documentation is being compiled, the existing flood maps will remain in effect, showing the area behind the levee as providing base flood protection and potentially delaying the release of more up-to-date information for other parts of the community. As a result, communities would potentially be using outdated flood hazard information to regulate floodplain development. In addition, with the existing flood maps still in effect, there may be no requirements for the purchase of flood insurance in areas that are flood prone.

This guidance document outlines five scenarios that will allow the mapping to move forward for selected studies with levees without the full requirements of 44 CFR Section 65.10 being available. With this process, the Regional offices and mapping partners can issue preliminary and effective DFIRMs while providing the communities and levee owners a specified timeframe for the submittal of the full documentation necessary to show compliance with 44 CFR Section 65.10.

The U.S. Army Corps of Engineers (USACE) has initiated a national levee inventory and assessment program to identify the condition, location, level of protection, and maintenance activities for all levees within their jurisdiction. The inventory will assist in the assessment of the risk to public safety associated with levee systems across the Nation. The USACE and FEMA are working together throughout the inventory and

assessment phase to coordinate this effort with Map Mod initiatives. The inventory data collected to date will be used by FEMA to categorize levees into five scenarios described below for which the full documentation for 44 CFR Section 65.10 is NOT readily available.

Definitions

A levee is defined as a man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding. The term does not include structures that are otherwise defined as dams in the Federal Guidelines for Dam Safety.

For the purpose of this guidance, levees are identified as being Federal or non-Federal levees. Levees within the USACE program are defined to include:

- Levees built by the USACE that were authorized for construction by Congress or by USACE continuing authorities (e.g., Section 205);
- Levee projects constructed by non-Federal interests, or other (non-USACE) Federal agencies, and incorporated into the USACE Federal System by specific Congressional action;
- Federal projects that are either operated and maintained by the USACE or turned over to a local sponsor for operation and maintenance; and
- Non-Federal projects within the Rehabilitation Inspection Program (Public Law 84-99).

Non-Federal levees are defined to include:

- Levees not authorized by Congress or other Federal agency authority;
- Levees built by other (non-USACE) Federal agencies and not incorporated into the USACE Federal System;
- Locally built and maintained levees built by a local community; and
- Privately built by a non-public organization or individuals and maintained by a local community.

A "levee owner" can be a Federal or State agency, a water management or flood control district, a local community, a levee district, a non-public organization, or an individual. The "party responsible for operating and maintaining the levee" must be a Federal or State agency, an agency created by Federal or State law, or an agency of a community participating in the National Flood Insurance Program (NFIP).

This document summarizes an approach for identifying a Provisionally Accredited Levee (PAL) and for provisionally mapping the area behind a levee as Zone X (shaded) pending FEMA receipt of all 44 CFR Section 65.10-compliant data and documentation. FEMA established this approach to allow the mapping to move forward for those levees meeting the criteria as identified below for the applicable scenario and to give the communities

and levee owners a specified timeframe for the submittal of the full documentation necessary to show compliance with 44 CFR Section 65.10. Requirements for the PAL are provided below.

Scenario A – Levees not in USACE program that are shown as providing base flood protection

Communication with levee owner/community:

The FEMA Regional office will send a letter to the appropriate levee owner or community identifying those levees for which 44 CFR Section 65.10 documentation is needed (template letter for Scenario A) and provide a copy of this letter to the appropriate USACE district. The FEMA letter will describe the PAL option and request the community and/or levee owner to sign an agreement indicating that to the best of their knowledge the levee in question meets 44 CFR Section 65.10 requirements. The community and/or levee owner will be given 90 days to return the signed agreement to FEMA and the requirements for 44 CFR Section 65.10 must be submitted within 24 months of the date of the agreement. If the signed agreement is not returned to FEMA within 90 days, the community is no longer eligible for the PAL designation. If the full requirements of 44 CFR Section 65.10 are readily available, FEMA will request that the levee owner and/or community provide these documents within 30 days. Certification by a Professional Engineer must accompany the submitted 44 CFR Section 65.10 data stating that the data and documentation submitted at the time of the original study are still pertinent and meet the requirements of Section 65.10 (e). If the full documentation for 44 CFR Section 65.10 is not provided within 24 months of the date of the signed agreement, the area landward of the levee will be remapped and shown as Zone AE or Zone A depending on the type of study performed for the area. A progress report must be provided to FEMA after 12 months to document the progress toward obtaining 44 CFR Section 65.10 data.

Required attachments:

- A description of the requirements to meet 44 CFR Section 65.10 entitled "Mapping of Areas Protected by Levee Systems";
- An agreement for the community/levee owner to sign and send back to FEMA (within 90 days) that says they want the option of the PAL (agreement for Scenario A); and
- Copy of the adopted operation and maintenance plan and records of levee maintenance and operation, as well as tests of the mechanized interior drainage systems, if applicable.

Scenario B – Levees in the USACE program that are eligible for PAL

Levees in the USACE program that meet the following criteria are eligible for the PAL designation.

Criteria to meet Scenario:

- The effective FIRM shows the levee as providing protection from the base flood;
- There is no available information to indicate the levee does not still provide base flood protection; and
- The project inspection rating is within an acceptable range (as defined by USACE).

Communication to the levee owner/community/local project sponsor:

The FEMA Regional Office will send a letter to the appropriate levee owner, community and/or local project sponsor identifying those levees that meet the above criteria and qualify for the PAL option (template letter for Scenario B). The FEMA letter will describe the PAL option and request that the community sign an agreement indicating that to the best of their knowledge the levee in question meets 44 CFR Section 65.10 requirements. The community and/or levee owner will be given 90 days to return the signed agreement to FEMA and the requirements for 44 CFR Section 65.10 must be submitted within 24 months of the date of the agreement. If the signed agreement is not returned to FEMA within 90 days, the community is no longer eligible for the PAL designation. If the full requirements for 44 CFR Section 65.10 are readily available, the levee owner, community and/or local project sponsor will be requested to provide these documents to FEMA within 30 days. Certification by a Professional Engineer must accompany the submitted 44 CFR Section 65.10 data stating that the data and documentation submitted at the time of the original study are still pertinent and meet the requirements of Section 65.10 (e). An official letter from the USACE certifying that the levee has been adequately designed and constructed to provide protection against the base flood may also be submitted in lieu of the certification noted above. If the full documentation for 44 CFR Section 65.10 is not provided within 24 months of the date of the agreement, the area landward of the levee will be remapped and shown as Zone AE or Zone A depending on the type of study performed for the area. A progress report must be provided to FEMA after 12 months to document the progress toward obtaining 44 CFR Section 65.10 data.

Required attachments:

- A description of the requirements to meet 44 CFR Section 65.10 entitled "Mapping of Areas Protected by Levee Systems".
- An agreement for the community/levee owner/local project sponsor to sign and send back to FEMA (within 90 days) that says they choose the PAL option (agreement for Scenario B).

Scenario C – Levees in the USACE program with known deficiencies that are shown as providing base flood protection

For levees in the USACE program that are shown as providing base flood protection on the effective FIRM, but have known deficiencies, the following criteria will be followed.

Criteria to meet Scenario:

- Levee for which the USACE has determined that the levee's recent inspection ratings are listed as Fair, Poor, or Unacceptable;
- Levee for which the USACE has determined the project status in the Rehabilitation and Inspection Program has been switched from active to inactive.

Communication to levee owner/community/local project sponsor:

The FEMA Regional Office will coordinate with the appropriate USACE District regarding levee projects in the USACE inventory that have received an inspection rating of Fair, Poor, or Unacceptable. The FEMA Regional Office in coordination with the USACE will evaluate any existing data or project specific information to determine that the levee does not provide base flood protection. Once these projects have been identified, the USACE will send a notification letter to the community, levee owner and/or local project sponsor informing them that the levee has been switched from an active to an inactive status in the USACE Rehabilitation and Inspection Program and is no longer eligible for PL 84-99 Rehabilitation Assistance due to maintenance deficiencies. These deficiencies will not allow the levee to meet the minimum requirements of the 44 CFR Section 65.10 and subsequently, does not provide base flood protection. The deficiencies will be identified in the USACE letter. A copy of this letter will be provided to the FEMA Regional office. These levee systems will not be eligible for the PAL option.

The FEMA Regional office will then send a letter to the community/levee owner/local project sponsor indicating that this is in follow-up to the notification they received from the USACE (template letter for Scenario C). The FEMA letter will clearly state that the deficiencies in the levee have been determined in coordination with the USACE, and the area landward of the levee will be remapped using Zone AE or Zone A if the levee does not provide base flood protection. The USACE letter will be attached to FEMA's letter to the community/levee owner/local project sponsor as background information.

Scenario D – Levees in the USACE program that are shown as not providing base flood protection

Communication with levee owner/community/local project sponsor:

For those levees in the USACE program that are <u>not</u> currently shown as providing protection from the base flood, no letter will be sent. In this case, there is no issue with

how to map the area behind the levee because it previously has been determined that the levee does not provide base flood protection. The DFIRM will continue to show the levee as not providing base flood protection unless it is determined that the levee actually does provide this level of protection.

Scenario E – Levees in the USACE program that do not meet an adequate level of protection as determined by the USACE and FEMA, but are shown as providing base flood protection

For levees in the USACE program that are shown as providing base flood protection but do not meet an adequate level of protection as determined by the USACE and FEMA, the following criteria will be followed.

Criteria to meet Scenario:

- Levee that is shown as providing protection but does not provide an adequate level of base flood protection as indicated by the USACE levee inventory data and validated through coordination between the USACE district and the FEMA Regional office;
- Levee inspection rating is NOT listed as Fair, Poor, or Unacceptable but the levee may have failed or experienced overtopping by less than the base flood event;
- Local project sponsor has NOT received a letter from USACE identifying the known maintenance deficiencies with the levee.

Communication with levee owner/community/local project sponsor:

For those levees in the USACE program where the USACE and the FEMA Regional office has determined that the levee does not provide an adequate level of protection, the levee owner, community, and/or local project sponsor will be notified by letter (template letter for Scenario E) from the FEMA Regional Office that "in coordination with the USACE, it has been determined that your levee no longer provides protection from the base flood." The reasons the levee no longer provides base flood protection will be identified in the letter (template letter for Scenario E). The community/levee owner/local project sponsor will be instructed to contact the FEMA Regional Office if they have any questions or can provide the documentation necessary to show compliance with 44 CFR Section 65.10. If the community/levee owner/local project sponsor does not provide the 44 CFR Section 65.10 data, the area landward of the levee will be mapped as Zone AE or Zone A depending on the type of study performed for the area.

Mapping of the areas with and without the PAL designation

For levee systems where 44 CFR Section 65.10 criteria have been met, the levee will continue to be mapped as providing protection from the base flood and the PAL

designation is not applicable. The area landward of the levee will be mapped as a Zone X (shaded) with the following note:

> WARNING! This area is shown as being protected from the 1-percent-annual-chance flood hazard by levee, dike, or other structure. Overtopping or failure of this structure is possible, which could result in destructive flood elevations and high velocity floodwaters. There is a chance that large floods will occur that are greater than the level of protection provided by the levee. Communities should issue evacuation plans and encourage property owners behind these structures to purchase flood insurance even if the structure is currently shown as providing protection for the 1-percent-annual-chance flood.

For levee systems that are eligible for the PAL designation, the area landward of the levee can still be mapped as Zone X (shaded) with the following note applied at several locations in or near the zone:

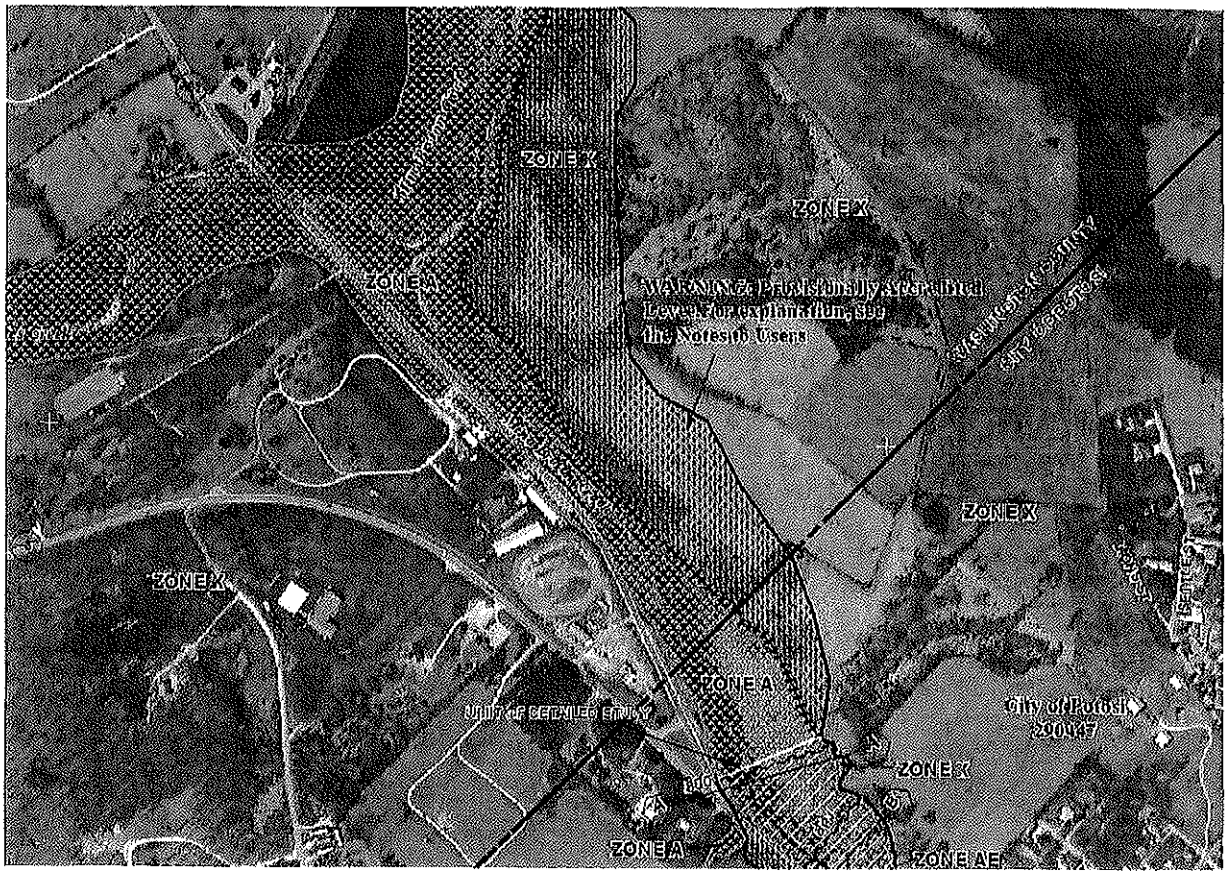
> WARNING: Provisionally Accredited Levee. For explanation, see the Notes to Users.

The accompanying note to users will read as follows:

> WARNING: This levee, dike, or other structure has been provisionally accredited and mapped as providing protection from the 1-percent–annual-chance flood. To maintain accreditation, the levee owner or community is required to submit documentation necessary to comply with 44 CFR Section 65.10 by (_____, ____). Because of the risk of overtopping or failure of the structure, communities should take proper precautions to protect lives and minimize damages in these areas, such as issuing an evacuation plan and encouraging property owners to purchase flood insurance.

The DFIRM shown in Figure 1 is an example where the levee is on the east side of the river and the Zone X (shaded) with the warning note landward of the levee and pointing to the levee. If there is an existing Zone X (shaded) on the effective DFIRM, then the revised levee note can be added to the existing Zone X (shaded) area as shown in Figure 1. If there is no existing Zone X (shaded) area on the effective DFIRM, then the mapping partner should define the provisional Zone X (shaded) area using the best available data.

Figure 1. Example of Zone X (shaded) for the PAL option.


ZONE X
ZONE X
ZONE A
ZONE X
ZONE X
ZONE A
City of Potosi
ZONE X
ZONE A
ZONE AE

Summary of FEMA Requirements for Mapping Levees
Levee Policy Review Task Committee Meeting # 2
December 21, 2005

REGULATORY REQUIREMENTS

44 CFR 59.1 Definitions

- *Levee*-"...a man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding."

- *Levee System*-"...a flood protection system which consists of a levee, or levees, and associated structures, such as closure and drainage devices, which are constructed and operated in accordance with sound engineering practices."

44 CFR 61.12 Rates based on a flood protection system involving Federal funds

- Referred to as the "Brooks Act"

- Flood protection systems involving Federal funds can be mapped as if the system is complete if adequate progress has been made:
  - 100% of total cost authorized
  - At least 60% of total cost appropriated
  - At least 50% of total cost expended
  - All critical features under construction and at least 50% complete
  - Community has not been responsible for any delay in project completion

- Designated as Zone A99 on FIRMs
  - No depths or BFEs specified
  - Mandatory purchase requirement applies

44 CFR 64.3 Flood Insurance Maps

- Zones B and X (shaded) defined as "Area of moderate flood hazards"
  - Purchase of flood insurance is voluntary and at lower rates than A Zones

- On FIRM panel legend, Zone X (shaded) is defined as "Areas of 0.2% annual chance flood; areas of 1% annual chance flood with less than 1 foot or with drainage area less than 1 square mile; and *areas protected by levees from 1% annual chance flood*."

- Majority of FIRMs that post-date the 65.10 criteria (August 25, 1986) include the following standard note in the protected area:

"This area protected from the one percent annual chance (100-year) flood by levee, dike, or other structures subject to possible failure or overtopping during larger floods."

44 CFR 65.10 Mapping of Areas Protected by Levee Systems

- Levee systems must meet, and *continue to meet*, minimum design, operation, and maintenance standards to be recognized as providing protection from the 1% annual chance flood on NFIP maps

- Design criteria

Freeboard	Riverine Levees	▪ 3 foot minimum ▪ Additional 1 foot within 100 feet of either side of structures (e.g., bridges) riverward of levee or where flow is constricted ▪ Occasional exceptions allowed with engineering analyses demonstrating adequate protection with lesser freeboard. ▪ Never less than 2 feet of freeboard accepted ▪ Requests for exception must evaluate uncertainty in the estimated BFE profile and include: – Statistical confidence limits of 100-year discharge – Changes in stage-discharge relationships – Sources, potential, and magnitude of debris, sediment, and ice accumulation
	Coastal Levees	• 1 foot above 1% wave or max. wave runup (whichever is greater) associated with 1% stillwater surge • Occasional exceptions allowed with engineering analyses demonstrating adequate protection with lesser freeboard. • Never less than 2 feet of freeboard above 1% stillwater surge elevation be accepted. • Requests for exceptions must evaluate uncertainty in estimated base flood loading conditions. – Emphasis must be place on effects of wave attack and overtopping levee stability
Closures		• Openings must have closure devices • Closures must be structural parts of the levee during operation and designed according to sound engineering practice
Embankment protection		• Requires engineering analyses demonstrating: – no appreciable erosion of levee embankment during base flood – anticipated erosion will not result in levee embankment/foundation failure through reduction of seepage path and subsequent instability • Engineering analyses to be addressed: – Expected flow velocities – Expected wind and wave action – Ice loading – Debris impact – Slope protection techniques – Flooding duration and velocities – Embankment and foundation materials – Levee alignment, bend, and transitions – Levee side slopes
Embankment and		• Requires engineering analyses evaluating expected seepage

foundation stability	during base flood loading conditions • Analyses must demonstrate seepage into/through levee foundation and embankment will not jeopardize stability • Alternative analysis demonstrating levee is designed and constructed for stability against Case IV loading conditions defined in USACE manual "Design and Construction of Levees" may be used. • Factors to be addressed in analyses include: - Flooding depth - Flooding duration - Embankment geometry and seepage path length - Embankment and foundation materials - Embankment compaction - Penetrations - Other factors affecting seepage and stability
Settlement	• Engineering analysis assessing potential freeboard loss due to settlement showing that minimum freeboard maintained • Assessment must address: - Embankment loads - Embankment soil compressibility - Age of levee system - Construction compaction methods • Detailed settlement analysis must be submitted - Can procedures from USACE manual "Soil Mechanics Design- Settlement Analysis" (EM 1100-2-1904)
Interior drainage	• Analysis identifying source(s) and magnitude of interior flooding - Must be based on joint probability of interior and exterior flooding - Must consider capacity of drainage lines and pumps to evacuate interior floodwaters
Other design criteria	• FEMA may require on case-by-case basis that other design criteria and analyses be submitted • Can be used for levee systems with relatively high vulnerability • "Sound engineering practice" will be the standard

- Operation Plans and Criteria
  - Closure devices and internal drainage mechanical systems must be operated following an officially adopted operation manual
  - Operations must be under jurisdiction of Federal or state agency, an agency created by Federal or state law, or NFIP participating community
  - Must document flood warning system triggering emergency operation activities
    - Must demonstrate sufficient warning time
  - Closures:
    - Formal plan of operation, including specific actions and assignment of responsibility by individual name or title
    - Periodic operation (no less than annually) for testing & training
  - Interior drainage systems:
    - Include storage areas, gravity outlets, and/or pumping stations

        - Formal plan of operation, including specific actions and assignment of responsibility by individual name or title
        - Manual backup for activation of automatic systems
        - Periodic inspection and operation (no less than annually)
    - FEMA may require other operating plans and criteria
        - Sound emergency management practice will be the standard

- Maintenance Plans and Criteria
    - Levee system must be maintained following an officially adopted maintenance plan
    - Maintenance must be under jurisdiction of Federal or state agency, an agency created by Federal or state law, or NFIP participating community
    - Must ensure that stability, height, and integrity of levee and associated structures maintained
    - Must specify maintenance activities to be performed, frequency of their performance, and responsible person by name or title

- Certification Requirements

    - Structural requirements data must be certified by a registered Professional Engineer
    - Certified "as built" plans must be submitted
    - Federal agency with responsibility for levee design may certify that levee has been adequately designed and constructed to provide protection against the base flood in lieu of certification of structural requirements

<u>44 CFR 65.14 Remapping of Areas for which local flood protection systems no longer provide base flood protection</u>

- Describes procedures to designate flood control restoration zones (Zone AR)
- Community may be eligible to apply for this designation if system was:
    - Constructed using Federal funds
    - Recognized as providing protection from the base flood on the effective FIRM
    - Decertified by a Federal agenciy responsible for flood protection design or construction
- Restoration must be completed within certain timeframe
    - 10 years from application submittal for restoration projects with Federal funding (or meet 61.12)
    - 5 years for restoration projects with no Federal funding (61.12 not an option)
- Flood control restoration zones designated as Zone AR
    - Mandatory purchase requirement applies

Rates will not exceed the rates for unnumbered A zones