



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](http://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](http://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](http://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



*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 system established by 44 C.F.R. Section 60.3. 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.

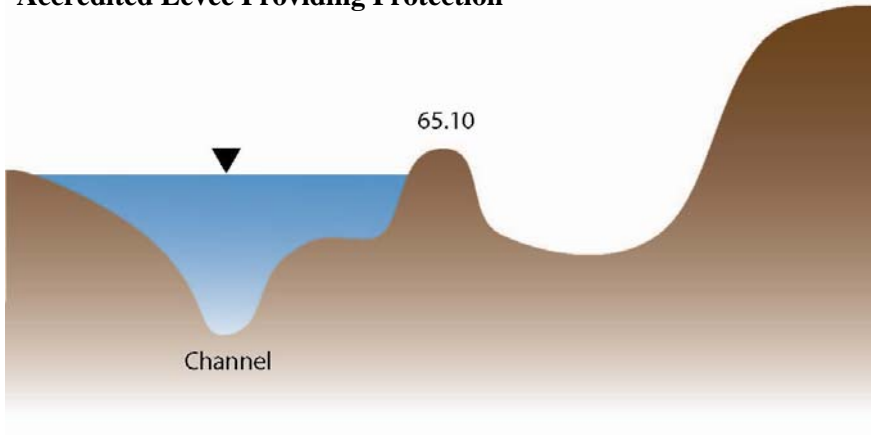
FEMA's review to accredit a levee is for the purpose of establishing appropriate risk zones for NFIP maps and to communicate flood risk. FEMA does not determine how a structure or system will perform in a flood event.



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

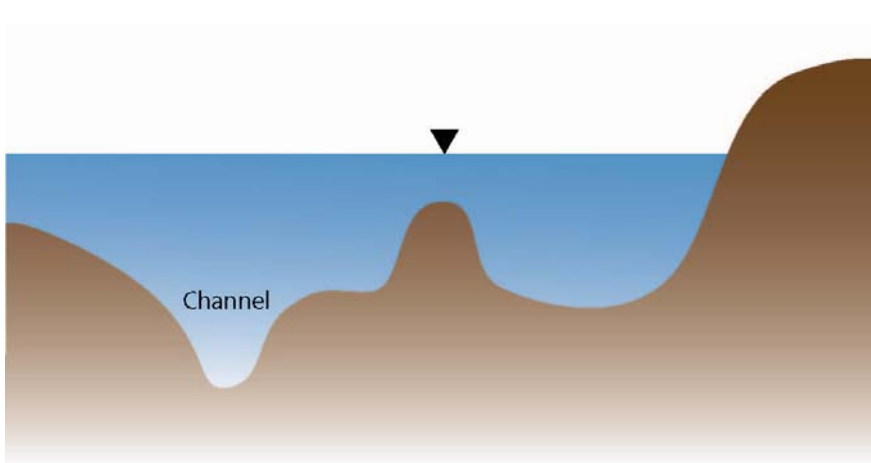
## Potential Flood Scenarios

### Accredited Levee Providing Protection



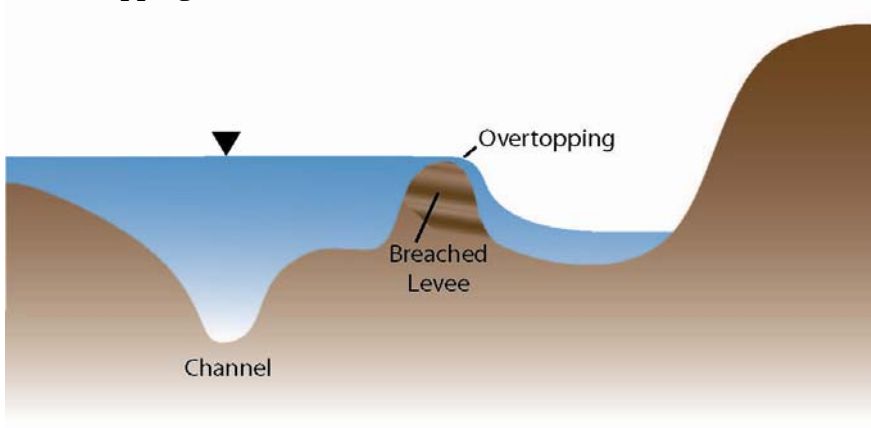
*Levees that are designed, built, and maintained to provide protection from large floods such as the 1-percent-annual-chance flood and meet the requirements of 44 C.F.R. Section 65.10 are accredited as preventing the flood waters from getting behind the levee for floods of that magnitude or less.*

### 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.*

## **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 a 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. 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.