Appendix A

Stakeholder Engagement - LLPT Meeting #1.0 Presentation

Whitehall, NY, Washington County Levee Flood Hazard Identification

Local Levee Partnership Team (LLPT) Meeting 1

September 25, 2018

FEMA

Photo credit Google

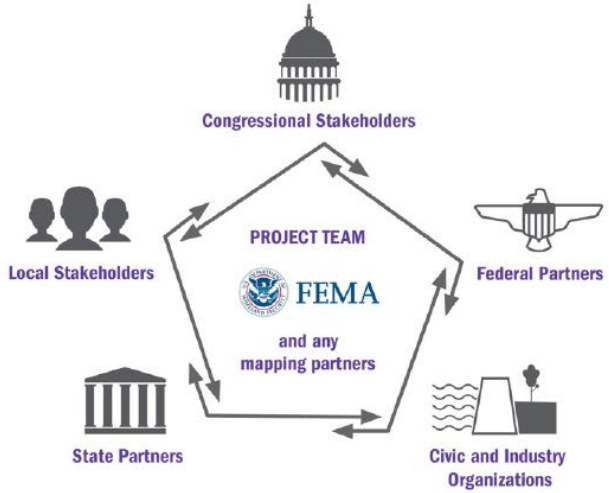
" Levees reduce the risk of flooding. But no levee system can eliminate all flood risk. There is always the chance that a flood will exceed the capacity of a levee, no matter how well it was built. Levees do not always perform as intended. In fact, levees sometimes fail even when a flood is small."

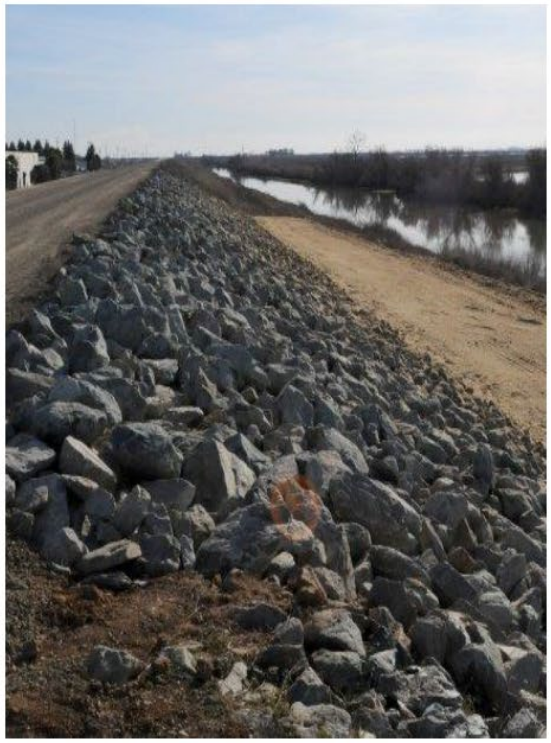
— American Society of Civil Engineers

FEMA

The Focus is on Flood Risk

The Federal Emergency Management Agency (FEMA) works with Federal and State partners, local communities and other stakeholders to assess and communicate flood risks in areas impacted by non-accredited levees.





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Today's Agenda

1. Levee System Overview
2. Levee Flood Hazard Identification
3. Path Forward & Next Steps

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Levee System Overview

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Whitehall flooding timeline

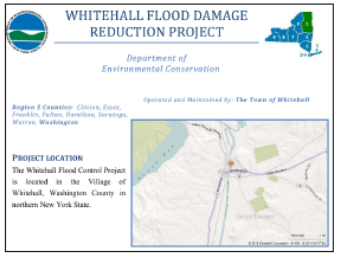
- 1935 - Champlain Canal & Wood Creek Levee System built

- 1974 – Levee overtops causing damage to EB Metals Inc.*
- 1986 – Levee improvement? *
- 1988 – Levee overtops causing damage to EB Metals Inc. *
- 1996 – Flash flooding – Levee overtopping? **
- 1998 – Flooding in the area – Levee Overtopping? **
- 2011 – Flooding in the area – Levee Overtopping? ***

FEMA

* Based on 2010 Whitehall Flood Damage Reduction Project
** Based on 2009 Washington County HMA
*** Based on 2011 web-article (poststar.com)

Whitehall flooding timeline

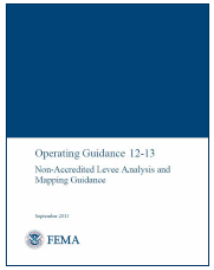


Levee Completed
1935

Flood Boundary and Floodway Map
1977

Effective Flood Insurance Rate Map (FIRM)
1985

FEMA 44 CFR 65.10
Mapping of Areas Protected by Levee Systems
1986



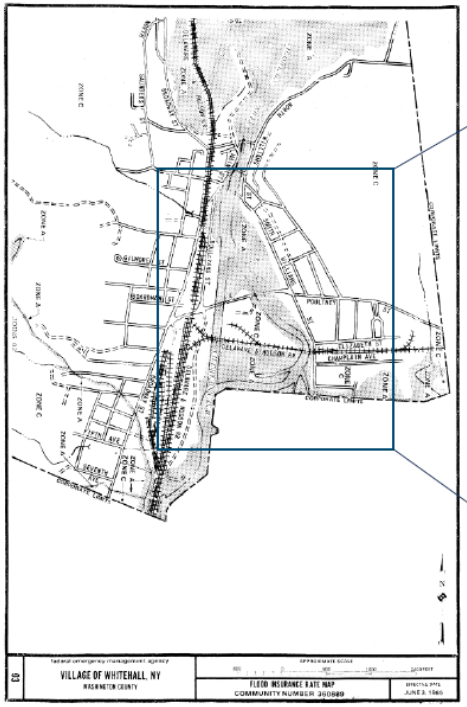
Congress requests that FEMA revise practice of mapping levees and their associated flood risk
2011

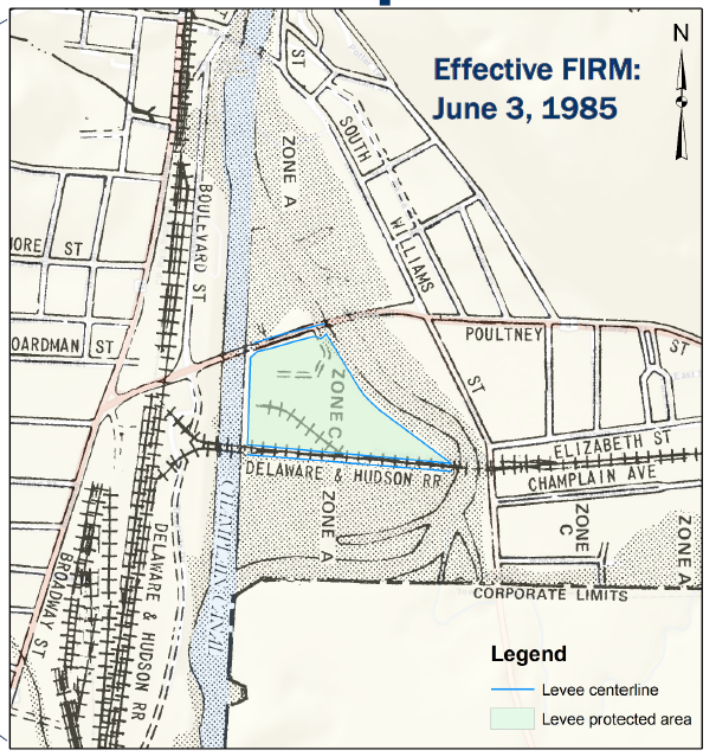
FEMA Approach Document & Operation Guidance finalized
2013

Convene Local Levee Partnership Team
Today

FEMA

Effective Flood Insurance Rate Map





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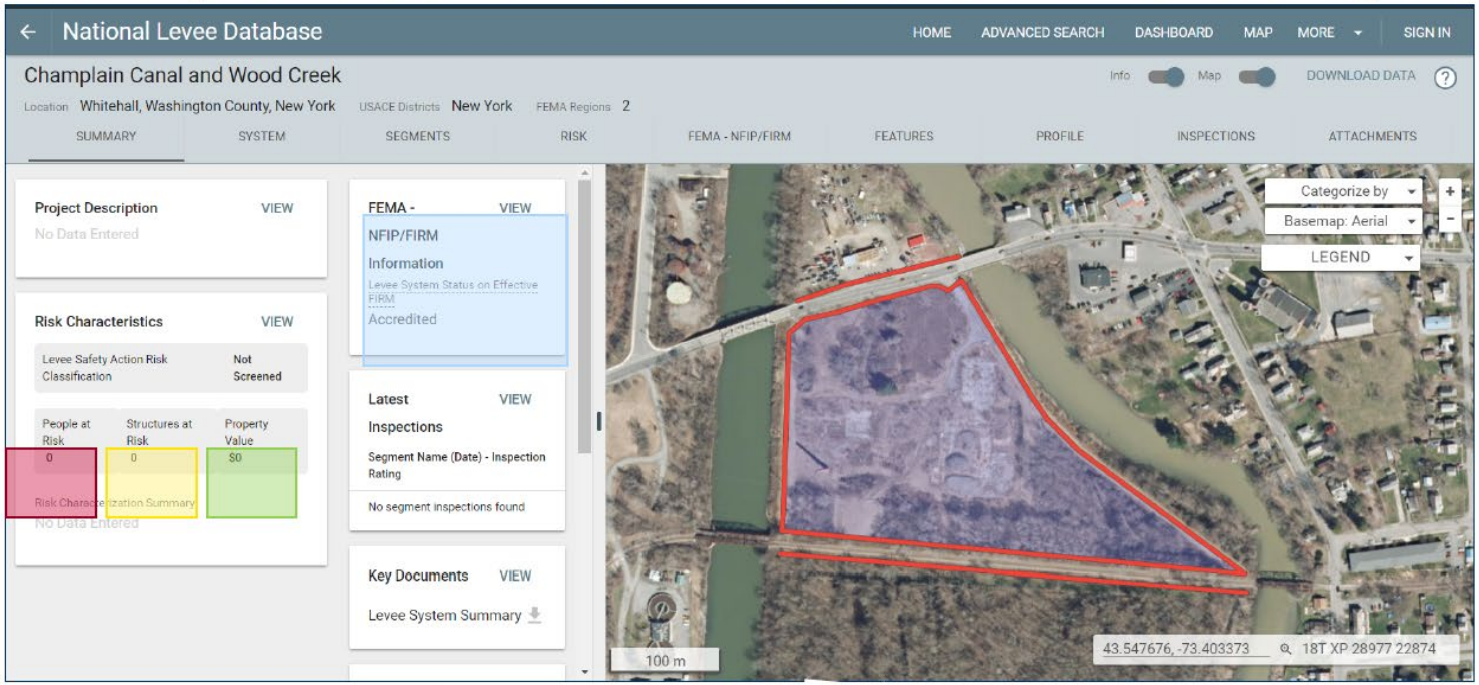
Champlain Canal & Wood Creek Levee System



NLD – Data is not up to date (Levee is not accredited)

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Levee Flood Hazard Identification

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How Levee Systems Are Categorized

- Non-Accredited Levee System
- Accredited Levee System
- Certified Levee System

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FEMA Recognizes Non-accredited Levee Systems Do Impact Flood Risk

Developed Analysis and Mapping Procedures for Non-Accredited Levees

Approach Document
Finalized **July 2013**

Operation Guidance
Finalized **Sept. 2013**

FEMA

Analysis and Mapping Procedures for Non-Accredited Levees

Includes:

- Interactive stakeholder engagement
- A suite of analysis and mapping procedures to review the flood hazard associated with levee systems.
- Allows for levee system to be analyzed as "**Reaches**" based on the attributes of the specific reach.

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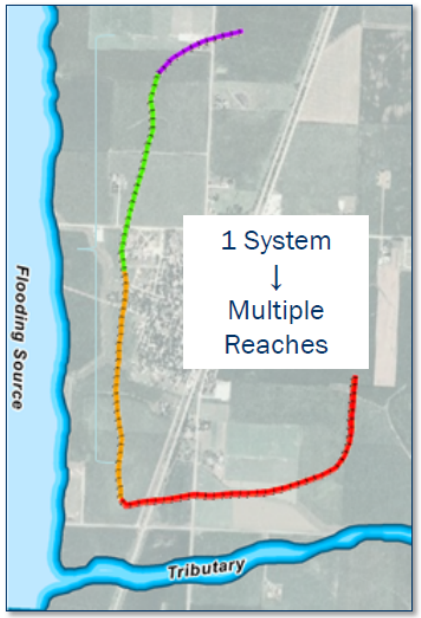
Breaking a Levee System into Reaches

- The first step is to **analyze risk** for the levee system **by dividing it into segments**.
  - These segments, known as **reaches**, allow FEMA to more precisely evaluate the flood hazard for that area.
- A system can be broken up into multiple reaches in order to analyze the flood risk in its vicinity.



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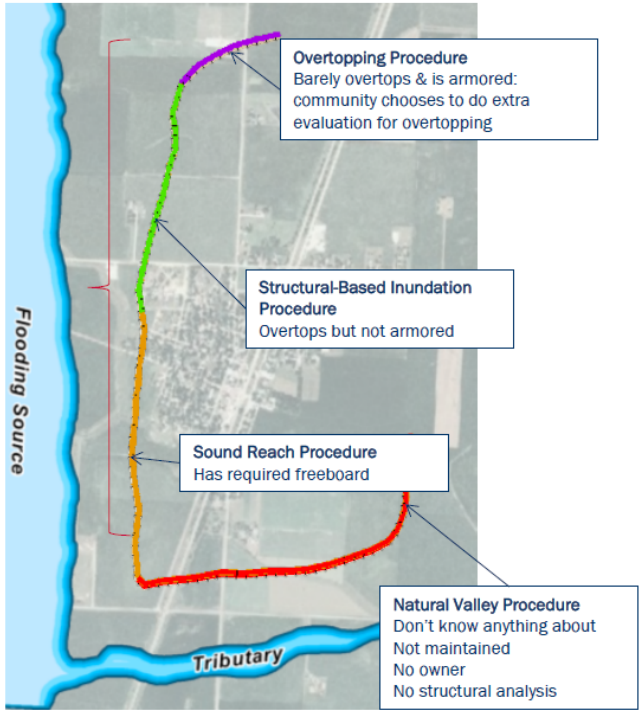
Reach Analysis Procedures

- Natural Valley Procedure
- Structural Based Inundation Procedure
- Overtopping Procedure
- Freeboard Deficient Procedure
- Sound Reach Procedure



Benefits of Applying Procedures to Individual Reaches

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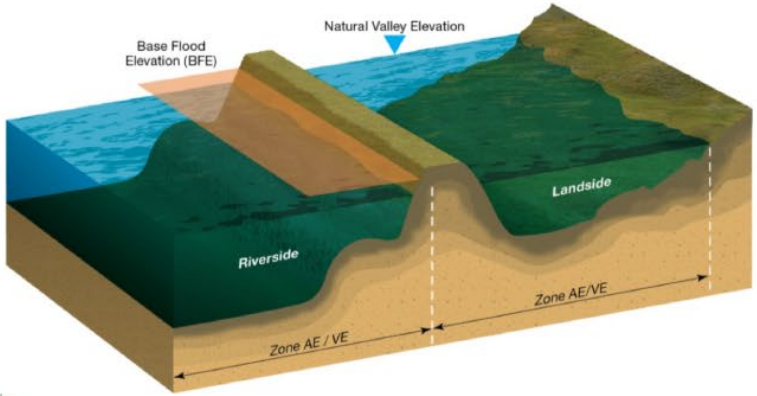
Natural Valley Procedure

This analysis identifies the landside flood risk as though the levee does not impact the flood elevation.

Application: Levee does not meet 44CFR65.10



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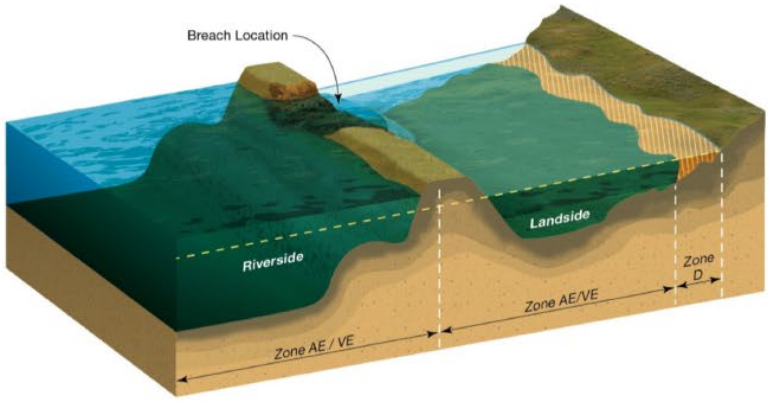
Structural-Based Inundation Procedure

This analysis identifies the landside flood risk by estimate of hypothetical breach analyses.

Application: Levee does not meet 44CFR65.10



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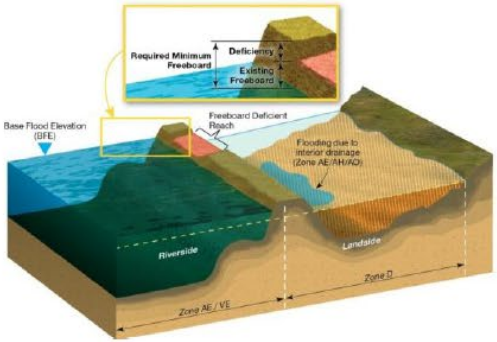
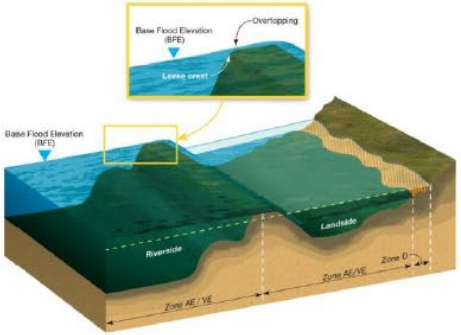
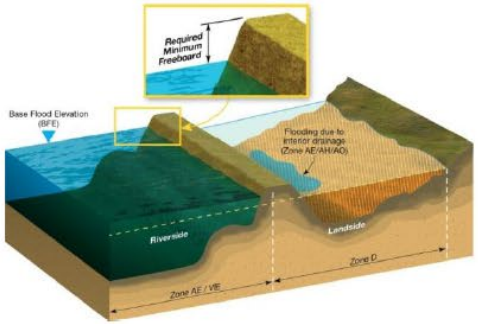
Other Potential Reach Analysis Procedures

- Freeboard Deficient Procedure
- Overtopping Procedure
- Sound Reach Procedure







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Mapping Path Forward Based on Data

	Reach Procedures				
	Sound **	Freeboard Deficient **	Overtopping **	Structural-Based Inundation *	Natural Valley *
Elevation Information for the Levee Crest and Toe	✓	✓	✓	✓	
BFE + Freeboard Less than Levee Crest	✓				
BFE Less than Levee Crest	✓	✓			
Operations and Maintenance Plan	✓	✓	✓	✓	
Structural Design Requirements	✓	✓	✓	✓	
Inspection Reports	✓	✓	✓	✓	
Evaluation of Overtopping Erosion Potential			✓		

* - No cost to community

** - Potential additional cost to community

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Path Forward & Next Steps

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Suggested Path Forward Based on Data

	Natural Valley *
Elevation Information for the Levee Crest	-
Operations and Maintenance Plan	-
Structural Design Requirements	-
Inspection Reports	-
Evaluation of Overtopping Erosion Potential	-
BFE Less than Levee Crest	-
BFE + Freeboard Less than Levee Crest	-

* - No cost to community

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Whitehall
Local Levee Partnership Team (LLPT)

Group of stakeholders participating in the discussion of levee flood risk and providing feedback and local levee data to FEMA relating to the levee system.

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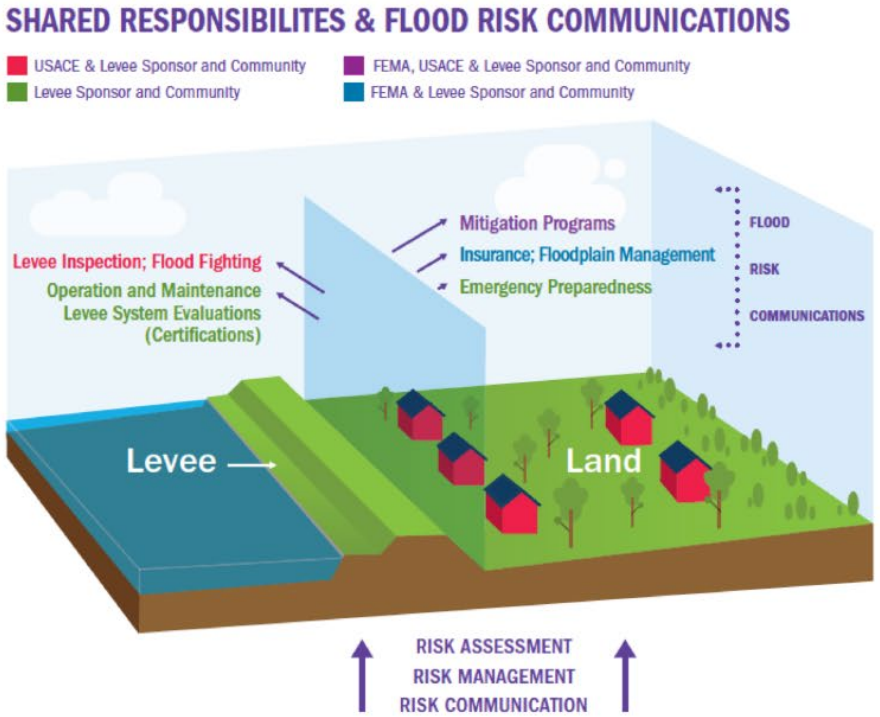
Shared Levee Responsibilities



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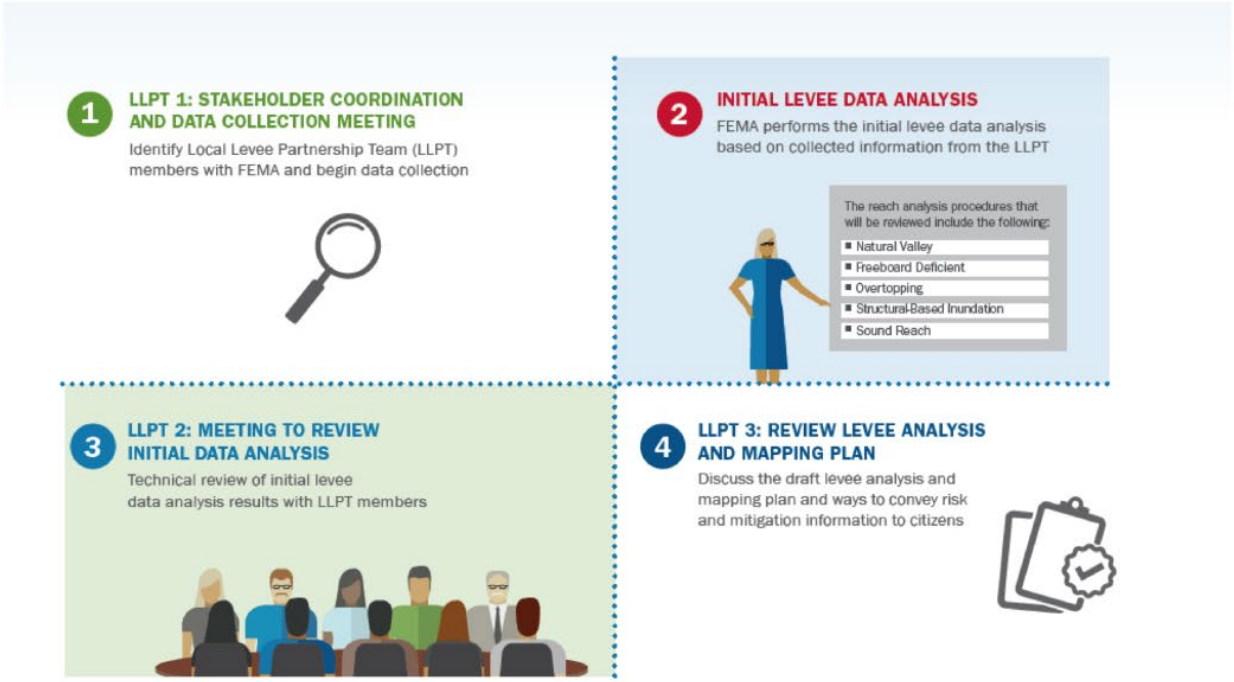
Levee Analysis and Mapping Procedure



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Levee System Data & Documentation Needed

Identify other community information, resources, developments in the community, and current mitigation projects currently underway

- Elevation Information for the Levee System (Toe & Crest)
- Design Base Flood Elevation (BFE)
- Structural Design Information
- Geotechnical Evaluation
- Interior Drainage Analysis
- Operation and Maintenance Plans
- As-built Plans
- Levee Inspection Reports

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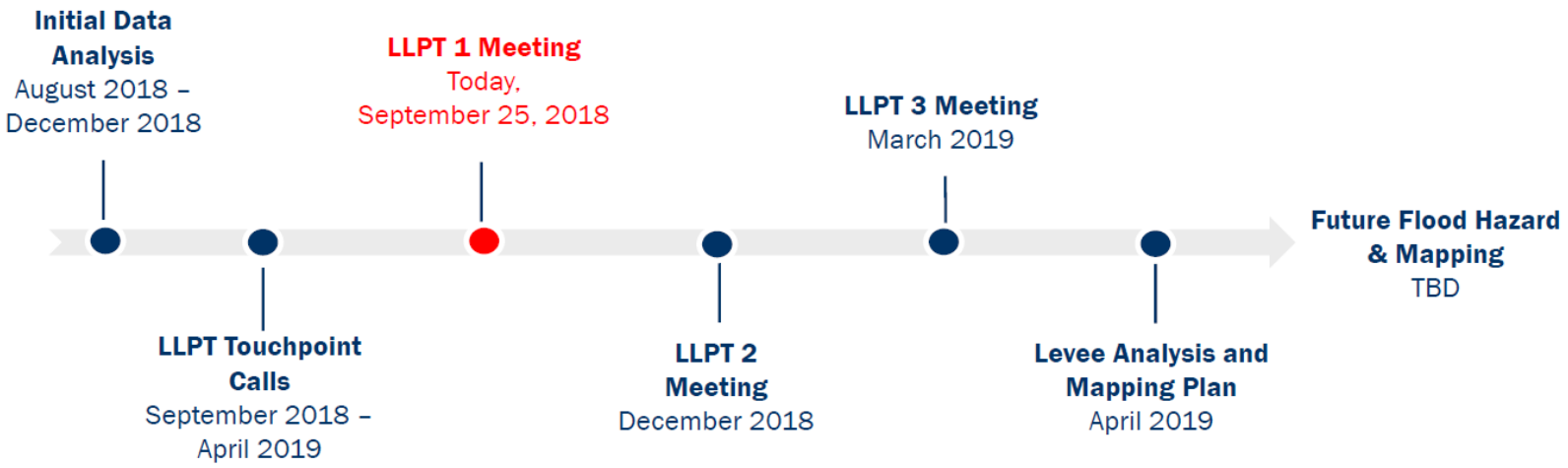
Whitehall LLPT Timeline:



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QUESTIONS?

Contact:
Shudipto Rahman, Project Engineer
FEMA Region II
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E-mail: shudipto.rahman@fema.dhs.gov

Srikanth Koka, Engineer
Starr II
Phone: 703-849-0584
E-mail: skoka@dewberry.com

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Contacts

	Title	Employee	Phone Number
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		Alan Springett, Alternative Project Monitor alan.springett@fema.dhs.gov	(212) 680-8557
Production and Tech. Services	Project Engineers, Floodplain Analysis and Mapping	Srikanth Koka skoka@dewberry.com	(703) 849-0584
		Seth Lawler slawler@dewberry.com	(703) 849-0213
Outreach	Community Engagement and Risk Communication (CERC) – Resilience Action Partners	Matt Kroneberger matt.kroneberger@ogilvy.com	(212) 237-6373

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Thank You
Challenges, Innovation, The way forward

Appendix B

Stakeholder Engagement - LLPT Meeting #1.0 Information

Whitehall, NY
LLPT 1 Meeting Notes

ATTENDEES

JOHN ROZELL
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Town of Whitehall
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GLEN GOSNELL
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TIM HARDY
Washington County Department of Public Safety
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CORINNA ALDRICH
District Manager -
Washington County Soil and Water Conservation District
Phone: 518.692.9940
Email:
corrina.aldrich@ny.nacdnet.net

TOWN AND VILLAGE OF WHITEHALL, NY

DATE: Tuesday, September 25, 2018 **TIME:** 11:00 AM–12:30 PM

LOCATION: Whitehall Municipal Center Ste. 3 – 57 Skenesborough Drive Whitehall, NY

Action Item	Owner
1. Meeting attendees to begin uploading data and relevant information to the project File Transfer Protocol (FTP) site and email skoka@dewberry.com upon completion. **Project FTP Site - Login Information** **Browser link:** https://projsftp.stantec.com **Login name:** LLPT0959 **Password:** 8747251	Community Leaders
2. Community leaders to email Matt Kroneberger at matt.kroneberger@ogilvy.com to indicate if they are NOT interested in becoming a member of the Montour Falls Local Levee Patnership Team (LLPT)	Community Leaders
3. All: Work to identify individual owners / easements of levee system	Community Leaders, NYSDEC

AGENDA

- Provide an overview of levee systems
- Discuss levee flood hazard identification
- Identify the LLPT members

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Whitehall, NY
LLPT 1 Meeting Notes

ATTENDEES *Continued*

LAURA CHADWICK
Washington County Real Property Tax Services
Phone: 518.746.2130
Email:
lchadwick@co.washington.ny.us

PAMELA LANDI
Washington County Planning
Phone: 518.746.2290
Email:
plandi@co.washington.ny.us

ARVIND GOSWAMI
NYS Department of Environmental Conservation
Phone: 518.402.8186
Email:
arvind.goswami@dec.ny.gov

BRAD WENSKOSKI
NYS Department of Environmental Conservation
Phone: 518.402.8280
Email:
brad.wenskoski@dec.ny.gov

THOMAS MCDONALD
NYS Canal Corporation
Phone: 518.237.6373
Email:
thomas.mcdonald@canals.ny.gov

SHUDIPTO (SHU) RAHMAN
FEMA Region II Project Monitor-Regional Engineer
Phone: 202.702.4273
Email:
shudipto.rahman@fema.dhs.gov

OVERVIEW

The Federal Emergency Management Agency (FEMA) Region II levee team, the U.S. Army Corps of Engineers (USACE), and the New York State Department of Environmental Conservation (NYSDEC) worked with Town and Village of Whitehall officials to identify flood hazards for non-accredited levees as they relate to the Champlain Canal and Wood Creek levee system.

Detailed discussions covered potential analysis scenarios and the required technical data for each analysis option. Also discussed was the participation of interested community, State, and Federal officials and stakeholders in the Local Levee Partnership Team (LLPT). This group will share data and participate in discussions on the potential analysis and mapping options throughout the duration of the levee project. The LLPT will also be able to review the plan document summarizing the activities and outputs from the project. They will also weigh in on the path forward for identifying and mapping the flood risk associated with the levee.

Currently, the levee is shown on the 1985 Flood Insurance Rate Map (FIRM) as reducing flood risk (providing protection) on the land side of the levee system. However, FEMA does not have any data to show that the levee meets the minimum FEMA requirements to provide such protection.

FEMA reiterated that the levee analysis and mapping approach will give the community a better understanding of how much the levee reduces the flood risk under current conditions.

Whitehall, NY
LLPT 1 Meeting Notes

ATTENDEES *Continued*

SRIKANTH KOKA
Project Manager – STARR II
Phone: 703.849.0584
Email: skoka@dewberry.com

MATT KRONEBERGER
CERC - Outreach support
Phone: 212.237.6373
Email: matt.kroneberger@ogilvy.com

NOTES

Matt Kroneberger, FEMA Outreach Support, opened the meeting and facilitated introductions of speakers Shudipto (Shu) Rahman, FEMA Project Monitor, and Srikanth Koka, STARR II Project Engineer, and the attendees present at the meeting and participating by phone. Shudipto then provided an overview of the FEMA focus on levee hazard identification and risk communication. Shudipto shared a quote from the American Society of Civil Engineers, which emphasized that levees never eliminate all flood risk. Shudipto drew upon contemporary experiences of agricultural levees failing in recent hurricanes in the Carolinas.

Shudipto also provided an overview of the levee system alignment and reviewed a timeline from the 1935 flooding that prompted the construction of the Champlain Canal and Wood Creek levee system, to 2013 when the Operation Guidance for the Analysis and Mapping Procedures for Non-Accredited Levees was finalized. Shudipto spoke to the original intent of the levee system, which was to protect a manufacturing facility that no longer exists.

Srikanth then provided an overview of the levee system and its status on the 1985 FIRM, which depicts the system as reducing flood risk. Srikanth and Shudipto clarified that the levee system includes levees on the banks of Champlain Canal and Wood Creek and that there are no levees on the north and south side of the levee-protected area. It has also been discussed that the levee configuration is incorrectly depicted in USACE's National Levee Database (NLD), which shows levees not only along the banks, but also along both sides of Route 4 and railroad embankments. In addition, it was recognized that the levee crest elevations are not available from either the NLD or any other source. To overcome this limitation, it was decided that Light Detection and Ranging (LiDAR) may be used to extract the levee top elevations. Levee crest elevations are required to assess the freeboard. A discussion of what freeboard means and entails took place later during the presentation.

Srikanth elaborated on FEMA's identification of levees as accredited or non-accredited, and also clarified the meaning of Certified Levee System. Additionally, Federal regulations as they pertain to levee certification were briefly described. Definitions of these terms are provided at the end of the notes.

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Whitehall, NY
LLPT 1 Meeting Notes

Srikanth then discussed the levee system's current non-accredited status. The NLD shows the system as accredited, which is incorrect at present. The levee system is considered non-accredited because FEMA does not have certified engineering data to show that the levee system meets the minimum requirements of Title 44, Chapter 1, Section 65.10 of the Code of Federal Regulations (44 CFR 65.10) to be recognized on the FIRM as reducing the flood hazards posed by a 1-percent-annual-chance or greater flood.

Srikanth then introduced the Analysis and Mapping Procedures for Non-Accredited Levee Systems, which involves interactive stakeholder engagement and provides a suite of analysis and mapping procedures to review the flood hazard associated with levee systems.

A levee system can also be evaluated as separate reaches, each analyzed based on its unique characteristics, to develop a composite risk for the levee system. Srikanth reviewed each levee reach analysis procedure listed below:

- Natural Valley
- Structural-Based Inundation
- Freeboard Deficient
- Overtopping
- Sound Reach

Srikanth also reviewed the data requirements associated with each reach analysis procedure to map the levee flood risk on a future FIRM. For the Natural Valley and Structural-Based Inundation procedures, FEMA can evaluate and map the flood risk with no additional data from the levee stakeholders; however, to map the other reach analysis procedures, certified 44 CFR 65.10 data would be required.

Srikanth noted that the Natural Valley accreditation procedure requires the least information from the community. This procedure does not require the community to obtain certification or hire an engineer. This procedure would review the affected floodplain as though the levee did not exist.

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Whitehall, NY
LLPT 1 Meeting Notes

Srikanth then made a request for relevant technical data regarding the levee system, hydrology, or hydraulic analyses of affected or nearby streams, and project data that may be available from the levee stakeholders. This data can be shared on the file transfer site:

Login Information
Browser link: https://proisftp.stantec.com
Login name: LLPT0959
Password: 8747251

As previously noted, the FIRM for Whitehall is from 1985. This Levee Discovery project will help identify potential options for mapping the flood risk associated with the levee system. Srikanth noted that there is a Washington County flood hazard mapping project happening concurrently.

Srikanth and Shudipto reviewed the main components of a Levee Discovery Project, which include:

- Formation of an LLPT composed of levee stakeholders and subject matter experts who will collaborate to collect data and determine a path forward;
- An initial technical analysis involving review of the Natural Valley and Structural-Based Inundation reach analysis procedures;
- A Levee Analysis and Mapping Plan that will summarize the data collection, characteristics of the levee system and potential reaches, determination of a path forward, and anticipated schedule.

Community officials raised the question of why this project is analyzing flood risk for a leveed area with no current development. Shudipto noted that this analysis is necessary for providing detailed information that would be integrated into the updated countywide flood hazard study. However, FEMA recognizes the lack of development in the leveed area and proposed an option to forego the additional analysis procedures and proceed with a Natural Valley mapping approach for the Wood Creek and Champlain Canal levee system. This option would eliminate the need for future formal LLPT meetings (though any additional discussion is welcome) and deliver an abbreviated LLPT plan that summarizes the history and characteristics of the levee system and results of the Natural Valley analysis. Any data or information gathered during this Levee Discovery effort will be maintained on the file transfer site.

FEMA 5 RiskMAP Increasing Resilience Together

Whitehall, NY
LLPT 1 Meeting Notes

In addition to discussion on the Wood Creek levee, community members also spoke to flooding more broadly in Whitehall, and how flood events in the community relate to the local canal system, which includes locks and dams identified as being operated by the New York State Canal Corporation.

Matt, Shudipto, and Srikanth encouraged all in the discussion to reach out to share questions or comments at any point in this process. Contact information was distributed.

DISCUSSION

QUESTION:
Town of Whitehall:
Who is accountable for the levee system?

ANSWER:
FEMA: One of the goals of the LLPT process is to discover this information in dialogue with all local stakeholders.

Town of Whitehall: The Town is taking care of maintenance. Louis Pratt, Highway Superintendent, also pays the State Canal Corporation $50 yearly for a permit, but it is unclear what that permit buys the Town.
The last time the levee was inspected was in 2011.

NYSDEC: In the National Levee Database, the Wood Creek Levee is noted as locally maintained, constructed, and operated. NYSDEC has tried to inspect this system multiple times and has sent letters of deficiency to the Town of Whitehall. The USACE considers the levee as inactive according to its database.

QUESTION:
FEMA, STARR II:
What further information does the locality have on the levee?

ANSWER:
Town of Whitehall:
In 1986, the Town was given a $150,000 grant issued by the State of New York to make repairs to the levee.
We do not know how much of the grant was used and we do not have as-built drawings.

Whitehall, NY
LLPT 1 Meeting Notes

QUESTION:
Town of Whitehall:
What would happen if a developer wanted to build on the area affected by the levee? For instance, what if a McDonald's was planned development for the [affected] area?

ANSWER:
NYSDEC: The site exists in an area that is affected by a Brownfield agreement. There are restricted land uses as a result of this.
Further contacts for building in Brownfield agreement sites are:

Mike McLean – NYSDEC mike.mclean@dec.gov.ny
Wendy Keener – NYSDOH wendy.kueher@health.ny.gov

QUESTION:
Washington County Soil and Water Conservation District:
When FEMA does reach back out, would you have an idea of what the storm event flood levels would be?

ANSWER:
STARR II:
Yes. Effective maps may or may not have that information on them, but they would display storm event flood levels on the canal and creekside.
The understanding is that analysis would be better defined by the forthcoming countywide study.

QUESTION:
Town of Whitehall:
Why are you [FEMA] looking at just this levee?
There are more houses at risk in other parts of Whitehall.
Other flooding in Whitehall has mostly come from the north, due to water being backed up from the dam—the water there is controlled by power companies and stretches over the Canadian border.

ANSWER:
FEMA: We are looking into this [Wood Creek] levee as we look to address unaccredited levees throughout the Region.
STARR II: In addition to this process, other flooding issues that may affect Whitehall are currently being analyzed in part of an ongoing countywide study. There is a study forthcoming of the Lake Champlain watershed.

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Whitehall, NY
LLPT 1 Meeting Notes

DEFINITIONS

(Source: *Guidance for Flood Risk Analysis and Mapping, Levees, February 2018*)

Accredited Levee System - A levee system that FEMA has shown on a FIRM that is recognized as reducing the flood hazards posed by a 1-percent-annual-chance flood. This determination is based on the submittal of data and documentation as required by 44 CFR 65.10 of the NFIP regulations. The area landward of an accredited levee system is shown as Zone X (shaded) on the FIRM except for areas of residual flooding, such as ponding areas, which are shown as Special Flood Hazard Area (SFHA).

Certification - As stated in 44 CFR 65.2(b), certification of analyses is a statement that the analyses have been performed correctly and in accordance with sound engineering practices. Certification of structural works is a statement that works are designed in accordance with sound engineering practices to provide risk reduction from the base flood. Certification of "as built" conditions is a statement that the structure(s) has been built according to the plans being certified is in place and is fully functioning. Certification documentation is the responsibility of the local project sponsor.

Non-Accredited Levee System - A levee system that does not meet the requirements in the NFIP regulations at Title 44, Chapter 1, Section 65.10 of the Code of Federal Regulations (44 CFR 65.10), Mapping of Areas Protected by Levee.

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Appendix C

Letter of Acceptance for use of Natural Valley Levee Analysis and Mapping Procedure

Letter of Acceptance for Use of

Natural Valley Levee Analysis and Mapping Procedure

The undersigned has received the letter from FEMA dated January 17, 2019, and the document entitled "*Analysis and Mapping Procedures for Non-Accredited Levees*". We understand that FEMA is planning to update the Flood Insurance Rate Maps for Washington County, New York and FEMA proposes using the Natural Valley Procedure for the levee located between Champlain Canal and Wood Creek.

The Town of Whitehall hereby submits to FEMA our agreement to the use of the Natural Valley Procedure for the above-named levee system. We understand the modeling and mapping procedures involved with the Natural Valley Procedure. Our agreement to the Natural Valley Procedure will allow FEMA to move forward with a new flood hazard study for Washington County, New York.

Community CEO John Rozell (signature)

John Rozell (print)

Date: 2-8-19

Other (if applicable)_____(signature)

_____(print)

Date: _____

Appendix D

FEMA's Levee Accreditation Checklist

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

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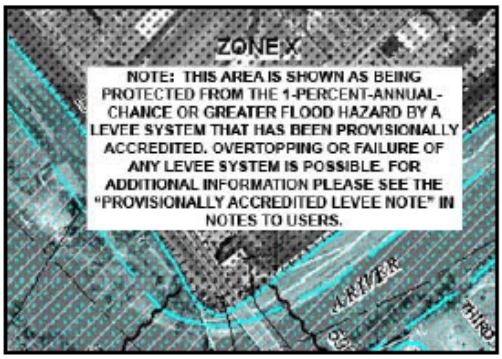
HOW FEMA WILL MAP LEVEE SYSTEMS

FEMA mapping requirements are designed to provide the people living and working behind levee systems with accurate, up-to-date flood hazard and risk information so that they may make wise decisions to minimize damage and loss of life. FEMA does not evaluate the performance of a levee system—this is the responsibility of the levee owner. FEMA is responsible for establishing levee system evaluation and mapping standards, determining flood insurance risk zones, and reflecting these determinations on DFIRMs.

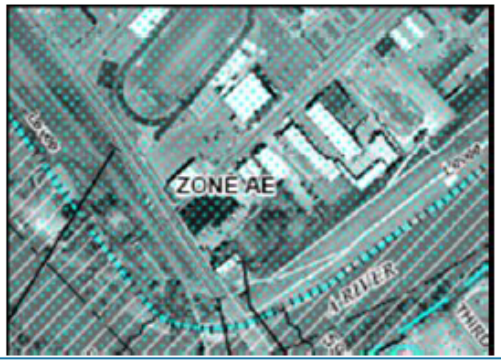
Accredited Levee System

An accredited levee system is a system that FEMA has determined can be shown on a DFIRM as providing a 1-percent-annual-chance or greater level of flood protection. This determination is based on the submittal of data and documentation required by 44 CFR Section 65.10. The area landward of an accredited levee system is shown as a moderate-risk area, labeled Zone X (shaded), on the DFIRM except for areas of residual flooding, such as ponding areas, which will be shown as high-risk areas, called Special Flood Hazard Areas (SFHAs). Flood insurance is not mandatory in Zone X (shaded) areas, but is mandatory in SFHAs. FEMA strongly encourages flood insurance for all structures in levee-impacted areas.



Provisionally Accredited Levee (PAL) System

The PAL designation may be used for a levee system that FEMA has previously accredited with providing 1-percent-annual-chance flood protection on an effective FIRM/DFIRM, and for which FEMA is awaiting data and/or documentation that will show the levee system is compliant with 44 CFR Section 65.10. Before FEMA will apply the PAL designation to a levee system, the community or levee owner will need to sign and return an agreement indicating the data and documentation required for compliance with 44 CFR Section 65.10 will be provided within a specified timeframe. The impacted area landward of a PAL system also is shown as a moderate-risk area, labeled Zone X (shaded). Therefore, flood insurance is not mandatory for insurable structures in the levee-impacted area; however, it is strongly encouraged by FEMA as are other protective measures.



Levee System Not Accredited or De-accredited

If the levee system is not shown as providing 1-percent-annual-chance flood protection on an effective FIRM, the system is considered "not accredited" and the levee-impacted area is mapped as Zone AE or Zone A on a DFIRM, depending on the type of study performed for the area. If the levee system was previously shown as providing 1-percent-annual-chance flood protection on an effective FIRM or DFIRM, but does not meet the PAL requirements or is no longer eligible for the PAL designation, FEMA will de-accredit the levee system and re-map the levee-impacted area as an SFHA, labeled Zone AE or Zone A depending on the type of study performed . Flood insurance will be required for insurable structures with federally backed mortgages in SFHAs.

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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.

Operation Plan*	Paragraph 65.10(c)(1) of the NFIP Regulations
Description: For a levee system to be recognized (i.e., accredited), the operational criteria must be as described below. All closure devices or mechanical systems for internal drainage, whether manual or automatic, must be operated in accordance with an officially adopted operation manual, a copy of which must be provided to FEMA by the operator when levee or drainage system recognition is being sought or when the manual for a previously recognized system is revised in any manner. All operations must be under the jurisdiction of a Federal or State agency, an agency created by Federal or State law, or an agency of a community participating in the NFIP.	
Checklist for Operation Plan:	
☐	**Flood Warning System.** Documentation of the flood warning system, under the jurisdiction of Federal, State, or community officials that will be used to trigger emergency operation activities; and demonstration that sufficient flood warning time exists for the completed operation of all closure structures, including necessary sealing, before floodwaters reach the base of the closure.
☐	**Plan of Operation.** A formal plan of operation including specific actions and assignments of responsibility by individual name or title.
☐	**Periodic Operation of Closures.** Provisions for periodic operation, at not less than one-year intervals, of the closure structure for testing and training purposes.
☐	**Interior Drainage Plan.** See below.
Interior Drainage Plan	**Paragraph 65.10(c)(2) of the NFIP Regulations**
Description: Interior drainage systems associated with levee systems usually include storage areas, gravity outlets, pumping stations, or a combination thereof. These drainage systems will be recognized by FEMA on NFIP maps for flood protection purposes only if the following minimum criteria are included in the operation plan.	
Checklist for Interior Drainage Plan:	
☐	**Flood Warning System.** 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.
☐	**Plan of Operation.** A formal plan of operation including specific actions and assignments of responsibility by individual name or title.

	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.

A NOTE ABOUT FLOOD RISK AND FLOOD INSURANCE

Levee systems are designed to provide a *specific level of protection*. They can be overtopped or fail during larger flood events.

Levee systems also decay over time. They require regular maintenance and periodic upgrades to retain their level of protection. When levees do fail, they often fail catastrophically. The resulting damage, including loss of life, may be much greater than if the levee system had not been built.

For all these reasons, FEMA strongly encourages people in levee-impacted areas to understand their flood risk, know and follow evacuation procedures, and protect their property by purchasing flood insurance protection, by floodproofing, or by taking other protective measures.

CHECKLIST INFORMATION

The checklist provided in this fact sheet is meant to assist local community officials and levee owners in gathering the data and documentation that will be required for FEMA to show a levee system as providing 1-percent-annual-chance flood protection on the community's DFIRM. Where possible, text from the actual NFIP regulations (44 CFR Section 65.10) was used.

The checklist is set up according to the appropriate paragraph of 44 CFR Section 65.10. For example, Design Criteria can be found in Paragraph 65.10(b):

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.

For a comprehensive description of each item in this checklist, please see Appendix H of the *Guidelines and Specifications for Flood Hazard Mapping Partners*. Locations of this resource, and other useful resources, are provided below.

INDEX OF RESOURCES

This fact sheet is accessible, along with an assortment of other levee-related resources, through a dedicated portion of the FEMA Web site. The gateway to the FEMA-provided levee information, which is organized by stakeholder group to assist levee owners, community officials, and other stakeholders, is www.fema.gov/plan/prevent/fhm/lv_intro.shtm. The FEMA resources referenced in this fact sheet, listed below, are directly accessible through www.fema.gov/plan/prevent/fhm/lv_fpm.shtm.

- Procedure Memorandum No. 34, *Interim Guidance for Studies Including Levees*
- Revised Procedure Memorandum No. 43, *Guidelines for Identifying Provisionally Accredited Levees*.
- Procedure Memorandum No. 45, *Revisions to Accredited Levee and Provisionally Accredited Levee Notations*
- Appendix H, "Mapping of Areas Protected by Levee Systems," of *Guidelines and Specifications for Flood Hazard Mapping Partners*.
- Section 65.10. *Mapping of Areas Protected by Levee Systems* of the NFIP regulations.

Flood insurance information can be found at www.fema.gov/business/nfip or on the NFIP's consumer Web site, www.FloodSmart.gov.

Links to the USACE Web site also are provided on the levee-dedicated pages; the resources discussed in this fact sheet are accessible through the USACE Web page at www.usace.army.mil/publications/eng-manuals.

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