Levee Analysis and Mapping Plan
Kingston Flood Protection Project

City of Kingston, New York

April 2018

FEMA

RiskMAP
Increasing Resilience Together

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Acronyms

BFE	Base Flood Elevation
CERC	Community Engagement and Risk Communication
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
LLPT	Local Levee Partnership Team
LOMR	Letter of Map Revision
NAVD 88	North American Vertical Datum of 1988
NFIP	National Flood Insurance Program
NGVD 29	National Geodetic Vertical Datum of 1929
NYSDEC	New York State Department of Environmental Conservation
SFHA	Special Flood Hazard Area
STARR II	Strategic Alliance for Risk Reduction
USACE	U.S. Army Corps of Engineers

Definitions

The terms below have been used in this document. Additional terms are provided in FEMA's *Analysis and Mapping Procedures for Non-Accredited Levee Systems* (July 2013) in the Glossary of Levee Terms. This document is available from the FEMA Library at https://www.fema.gov/media-library-data/20130726-1922-25045-4455/20130703_approachdocument_508.pdf.

Base Flood Elevation (BFE) – The elevation of a flood having a 1-percent chance of being equaled or exceeded in any given year.

Levee Analysis and Mapping Procedures* – Levee Analysis and Mapping Procedures include Sound Reach, Freeboard Deficient, Overtopping Analysis, Structural-Based Inundation, and Natural Valley. Details on these approaches can be found in FEMA's *Analysis and Mapping Procedures for Non-Accredited Levee Systems* (July 2013).

Leveed Area* – A spatial feature in the NLD defined by the lands from which flood water is excluded by the levee system.

Levee Reach – Any continuous section of a levee system to which a single analysis and mapping procedure may be applied.

Levee System – A flood hazard-reduction system that consists of a levee, or levees, and associated structures, such as closures, pumps and drainage devices, which are constructed and operated in accordance with sound engineering practices**.**

Local Levee Partnership Team (LLPT) – A work group that can be facilitated by FEMA when a non-accredited levee system in a community or project area will be analyzed and the areas landward of the levee system will be mapped. The primary function of this group is to share information/data and identify options based on stakeholder roles and knowledge.

Non-Accredited Levee System – A levee system that does not meet the requirements spelled out in the National Flood Insurance Program (NFIP) regulations at Title 44, Chapter 1, Section 65.10 of the Code of Federal Regulations (44CFR§65.10), *Mapping of Areas Protected by Levee Systems*, and is not shown on a FIRM as reducing the flood hazards posed by a 1-percent-annual-chance or greater flood.

Zone A – An area inundated by 1-percent-annual-chance flooding, for which no BFEs have been determined.

Zone D – Area of undetermined but possible flood hazard.

*All definitions on this page except for this one are from FEMA's Analysis and Mapping Procedures for Non-Accredited Levee Systems (July 2013)

0 Executive Summary

The Federal Emergency Management Agency's (FEMA's) Flood Insurance Study (FIS) report and Flood Insurance Rate Map (FIRM) for the City of Kingston (City), Ulster County, New York depict the leveed area of the non-accredited Kingston Flood Protection Project (Kingston Levee) as high risk Special Flood Hazard Area (SFHA). FEMA's guidance was revised in 2013 to incorporate a new Levee Analysis and Mapping Procedure which provides a suite of flexible procedures to perform flood hazard analysis and mapping (see Section 1 of this report). The City has a levee discovery project where the levee system is being studied using the Levee Analysis and Mapping Procedures (see Section 2). This study will help identify potential options the City may have to show the levee as providing reduced flood hazard on the FIRM.

In February of 2017, FEMA Region II partnered with stakeholders in the City to form a collaborative Local Levee Partnership Team (LLPT) and worked to determine potential Levee Analysis and Mapping Procedures for the Kingston Levee (see Sections 3 and 4 respectively). The process involved the collection and group evaluation of available data, creation and evaluation of an initial data analysis (see Section 5), and detailed discussions on mapping needs.

The information gained through the extensive coordination of the LLPT and the initial data analysis performed, supports the development of this document — a plan outlining potential reach analysis procedures. This document informs the potential paths forward for the City (see Section 6). The City is currently weighing the benefits and costs of considering the Freeboard Deficient Procedure for the Kingston Levee and the Sound Reach Procedure for Interstate 587 (I-587) to depict the flood hazard for leveed areas of the Kingston Levee. The effective FIRM dated November 16, 2016 depicts the leveed area of the non-accredited Kington Levee as high risk Special Flood Hazard Area (SFHA). Should the City elect to revise the FIRM in the future through the Freeboard Deficient and Sound Reach Procedures or accreditation, the City may pursue a Letter of Map Revision (LOMR) instead of waiting for the FEMA Regional Office to incorporate updates into future mapping studies.

1 Introduction

Under FEMA's prior levee approach, a levee system that did not meet the National Flood Insurance Program (NFIP) requirements outlined in Title 44, Chapter 1, Section 65.10 of the Code of Federal Regulations (44CFR§65.10) was analyzed and mapped as if it provided no protection during a base (1-percent-annual-chance) flood. This was known as the "without levee" approach.

Some stakeholders expressed concern about the "without levee" approach. Members of both the U.S. House of Representatives and the U.S. Senate echoed this concern and asked FEMA to consider discontinuing the "without levee" approach. Accordingly, FEMA drew on current modeling techniques to refine the identification of flood hazard reduction that non-accredited levee systems provide. This process recognizes the uncertainty associated with hazard identification of leveed areas.

FEMA, its Production and Technical Services contractor Strategic Alliance for Risk Reduction (STARR II) and Community Engagement and Risk Communication contractor (CERC) initiated the Levee Analysis and Mapping Procedures process for the levee in the City. Recent technological

advances in data collection methods and hydrologic and hydraulic modeling were leveraged as part of this process. FEMA's Levee Analysis and Mapping Procedures for non-accredited levees is a more refined approach to mapping flood hazards in leveed areas.

The Levee Analysis and Mapping Procedures process also:

- Leverages local knowledge and data, with proactive stakeholder engagement in LLPTs;
- Aligns available resources for engineering analyses and mapping commensurate with the level of risk in leveed areas; and
- Considers the unique characteristics of each levee system from an engineering perspective.

The levee system in the City is non-accredited. At the request of the community, FEMA is using the Levee Analysis and Mapping Procedures process to develop refined flood hazard mapping in leveed areas. This will inform the City's decision on how they would like to depict the levee-related flood hazards in the City.

This report is the result of the collaboration between FEMA, the City, Ulster County, New York State Department of Environmental Conservation (NYSDEC), U.S. Army Corps of Engineers (USACE), and other stakeholders. This report documents the evaluation of data, initial data analysis, as well as the community's preferred Levee Analysis and Mapping Procedure.

2 Levee System Description

2.1 Flood Protection Measures in the City of Kingston

The Kingston Levee is a USACE designed and constructed project comprised of approximately 1,600 feet of earthen levee, 950 feet of concrete flood wall, along with retaining walls, two pump stations, and other drainage appurtenances designed to reduce the flood risk on the right bank of the Esopus Creek Reach 1[1]. The levee system is located between Washington Avenue and Interstate 587 (I-587) in the City, Ulster County, New York as shown in Figure 1.

[1] Esopus Creek Reach 1 as identified in the FIS report for Ulster County, New York (All Jurisdictions) revised November 18, 2016.

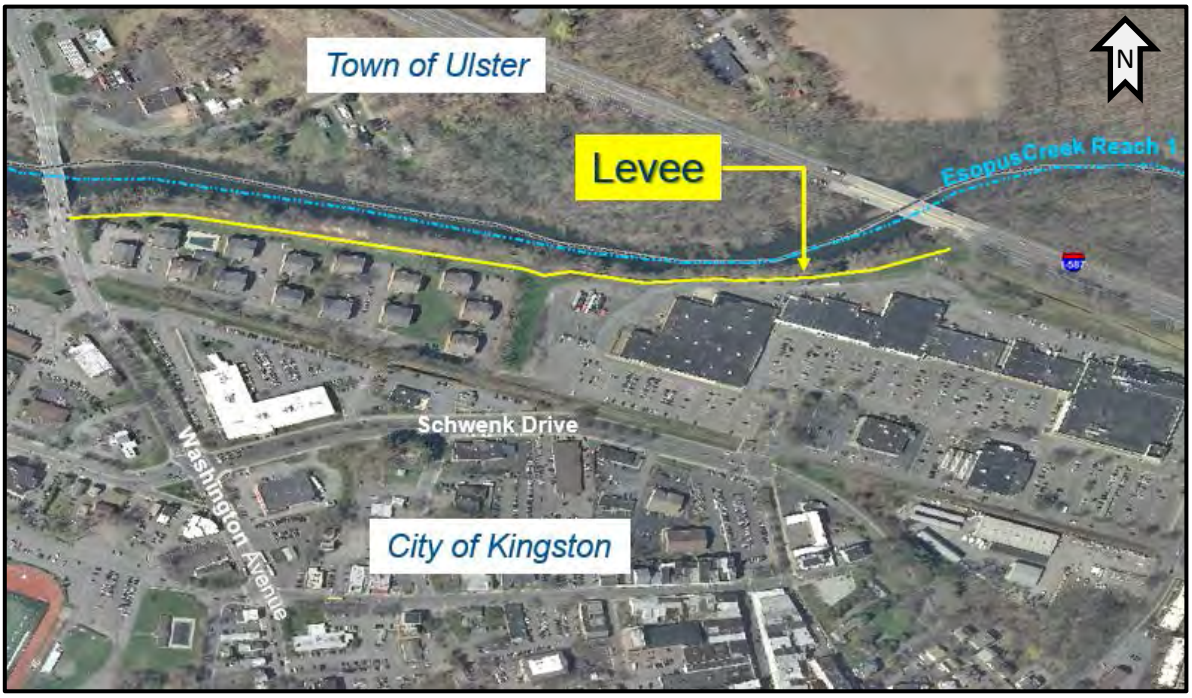

Figure 1: General Location Map

2.2 Pump Stations

One pump station house and one over the wall pump station are part of the Kingston Levee. According to the Operation and Maintenance Plan for the Kingston Levee, the pump station house consists of two identical pumps with capacity ranging from 11 to 16 cfs. The over-the-wall pump station is comprised of one 12-inch diameter pipe with two 8-inch diameter quick connects built to discharge flow over the floodwall from the interior drainage pond. The location of the pump stations and the over-the-wall pump station connection are shown in Figure 2.

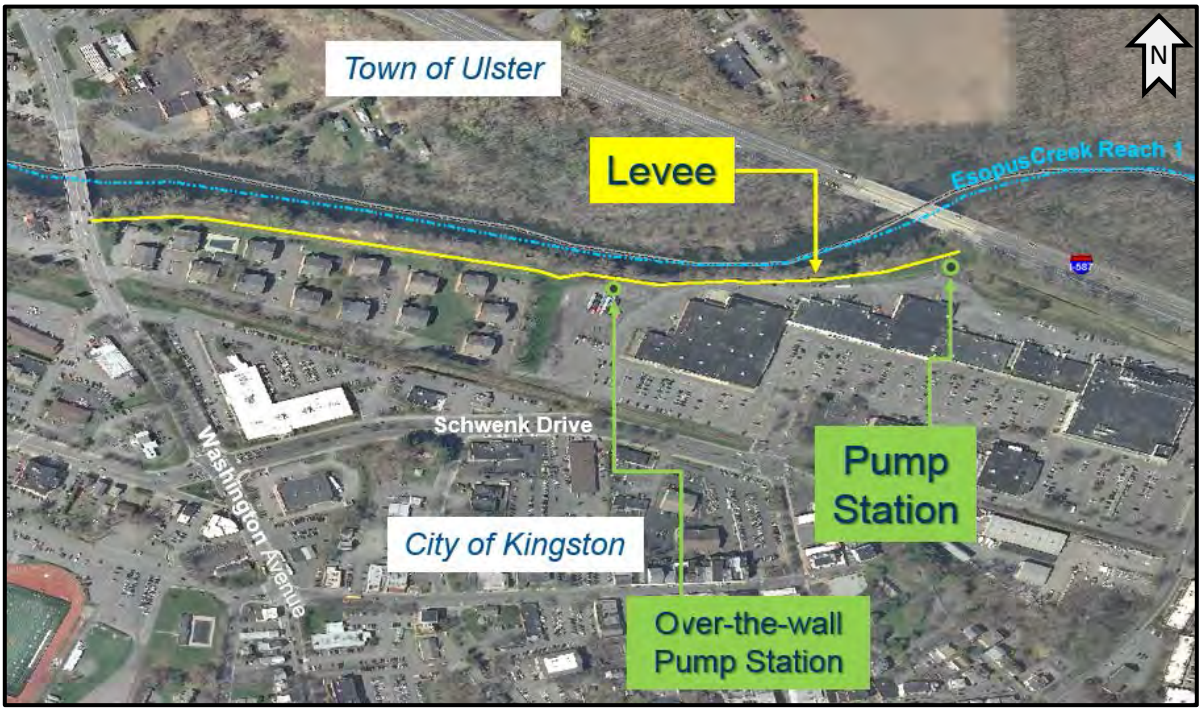

Figure 2: Pump Stations

2.3 Community NFIP and FIRM History

Tables 1 and 2 summarize the communities' NFIP and FIRM history.

Table 1. Summary of Project Area

County	Community	Participating in the NFIP?	Estimated Number of Potentially Impacted Structures in Leveed Area[2]
Ulster County	City of Kingston	Yes	14 Apartment Structures, 1 Utility Substation, 18 Commercial Structures (including 1 shopping center), Wiltwyck Fire Station

[2] Levee protected area from 1-percent-annual-chance flood hazard from November 16, 2016 FIRM.

Table 2. Community Map History

Community Name	Initial Identification	Flood Hazard Boundary Map Revision Date(s)	FIRM Effective Date	FIRM Revision Date(s)
City of Kingston	May 17, 1974	November 28, 1975 January 18, 1980	May 1, 1985	November 18, 2016

A countywide FIS report was issued for Ulster County, New York on November 18, 2016. According to the FIS report, "Documentation provided by the NYSDEC indicates the Kingston Levee does not meet the freeboard requirements of 44 CFR 65.10 of the NFIP Regulations. Accordingly, the levee has been mapped as not providing protection against the 1-percent-annual-chance flood."

3 Local Levee Partnership Team

The LLPT was formed to provide FEMA with data and input, including feedback on the procedures to be used for analyzing and mapping the levee reach, based on local levee conditions. The stakeholders who participated in the LLPT for this project are listed in Table 3.

Table 3. LLPT Participants

LLPT Member	Contact Information
Steve Noble	Mayor, City of Kingston 845-334-3902; snoble@kingston-ny.gov
Ralph Swenson	City of Kingston 845-334-3967; rswenson@kingston-ny.gov
Joe Chenier	City of Kingston 845-331-0682; jchenier@kingston-ny.gov
Alan Adin	City of Kingston 845-334-3968; aadin@kingston-ny.gov
Aaron Bennet	Ulster County 845-688-3047; aben@co.ulster.ny.us
Kathy Fallon	Office of Congressman John Faso 845-514-2322; kathy.fallon@mail.house.gov
Bill Nechamen*	NYSDEC**Since this meeting, Bill Nechamen has retired. Alan Fuchs will assume his roles.*
Brad Wenskoski	NYSDEC 518-402-8082; Brad.wenskoski@dec.ny.gov
Alan Fuchs**	NYSDEC 518-402-8185; Alan.fuchs@dec.ny.gov ***Took over for Bill Nechamen when Bill retired.*
Arvind Goswami	NYSDEC 518-402-8186; Arvind.goswami@dec.ny.gov
John Harrington	NYSDEC 845-256-3055; John.harrington@dec.ny.gov
Lynn Meeker	NYSDEC Lynn.meeker@dec.ny.gov
Ali Buchowski***	USACE ****Since meeting left NY District USACE, Encer Schaefer now covering.*
Anna Servidone	NYSDEC 518-402-8147; Anna.servidone@dec.ny.gov
Brittney Hyde	USACE Brittney.R.Hyde@usace.army.mil
Alan Springett	FEMA Region II 26 Federal Plaza, New York NY 13820 212-680-8557; alan.springett@fema.dhs.gov
Shudipto Rahman	FEMA Region II, Project Monitor 26 Federal Plaza, New York NY 13820 202-702-4273; shudipto.rahman@fema.dhs.gov

LLPT Member	Contact Information
Stephanie Nurre	STARR II, FEMA Mapping Consultant Project Manager 135 S. LaSalle Street, Suite 3100 312-262-2284; stephanie.nurre@stantec.com
David Hayson	STARR II, FEMA Mapping Consultant 513-842-8200; david.hayson@stantec.com
Paige Mandy	CERC, FEMA Outreach Consultant 212-880-5295; paige.mandy@ogilvy.com
Thomas Song	CERC, FEMA Outreach Consultant 914-343-6696; thomas.song@mbakerintl.com

4 Stakeholder Engagement

4.1 LLPT Meeting 1

A FEMA-led project team engaged the Kingston Levee stakeholders at the LLPT Meeting 1 held at City Hall on February 21, 2017. The overall intent of the meeting was to gain local insight on the status and data available for the levee system, introduce the Levee Analysis and Mapping Procedures concepts with respect to the levee system, and begin to establish the stakeholders who would like to participate in the LLPT.

An overview of the methods available to depict flood risks of leveed areas under current Levee Analysis and Mapping Procedures guidance was also discussed during the meeting along with a timeline for the levee project. Additional details regarding the LLPT 1 meeting are provided in Appendix A.

4.2 LLPT Meeting 2

On September 12, 2017, the LLPT Meeting 2 was held to review the Initial Data Analysis and discuss outcomes from the data collection process. During the meeting, the FEMA project team discussed the results of the Initial Data Analysis for the Natural Valley Procedure, Structural-Based Inundation Procedure, and the Freeboard Deficient Procedure. The Sound Reach Procedure and the Overtopping Procedure were not applicable due to the levee crest elevations being elevated above the BFE but not meeting minimum freeboard requirements. Additional details regarding the LLPT 2 meeting are provided in Appendix B and information from the data collection are provided in Appendices C through F.

4.3 LLPT Meeting 3

A LLPT Meeting 3 was held on January 22, 2018 to review the draft levee analysis and mapping plan with the LLPT prior to it being finalized.

5 Initial Data Analysis

FEMA project team members of STARR II developed an Initial Data Analysis, which is an approximate analysis using available data to approximate the floodplain boundary for each relevant Levee Analysis and Mapping Procedures approach. This informed the discussions in LLPT Meeting

2 and the touchpoint call prior to LLPT Meeting 3. Details of the reach analysis and application of reach analysis procedures are provided below. Supporting data is provided in Appendix G.

5.1 Reach Analysis

Topographic data and top of levee survey data were reviewed to define the levee system and identify if the levee system should be evaluated as separate reaches for application of the reach analysis procedures. A levee reach is any continuous section of a levee system to which a single reach analysis procedure may be applied.

The Kingston Levee is located riverside of a low area in the topography between Washington Avenue and I-587. A breach or failure at any point along the levee could cause inundation of the low area landside of the levee. For hydraulic modeling purposes, there is no reason to evaluate the levee system as separate reaches because it would not refine the flood risk analysis of the leveed area.

It should be noted; however, that the Kingston Levee system ties-in to high ground at the upstream end near Washington Avenue and ties-in to the I-587 embankment as high ground at the downstream end. The existing ground at the upstream end of the levee system near Washington Avenue appears to be approximately at or above the elevation of the 1-percent-annual-chance flood; however, it should be further investigated if the high ground is part of the roadway embankment or could be considered natural high ground. For the purposes of the reach analysis, the upstream end of the levee is considered to tie-in to natural high ground.

The downstream end of the levee system ties-in to the I-587 embankment. The interstate embankment would be considered a non-levee reach, as it was not originally designed as a levee, but serves as an extension of the levee as the levee ties-into it. Because non-levee reaches are not recognized as levees, they cannot be mapped as reducing flood risk on a FIRM. FEMA conservatively maps the flood risk associated with non-levee features, such as stream crossings and associated embankments, as existing conditions instead of using the Natural Valley procedure (without levee condition). The flood risk associated with existing condition may be more conservative due to the ponding of floodwaters that can occur upstream of restrictive stream crossings.

A non-levee reach could be considered a levee (subject to accreditation or reach analysis procedures) if it can be certified to meet the minimum requirements of 44CFR§65.10, including that it is operated, and maintained as a levee. The burden of proof may fall on the stakeholder seeking recognition of the embankment as a levee, as the Federal Highway Administration (FHWA) issued a September 10, 2008 memorandum stating that “the FHWA discourages DOTs in certifying highway embankments as levee or allowing any such certification by any entity.”

For the purposes of the Initial Data Analysis, the I-587 embankment was considered an existing condition except for one reach analysis procedure described under Section 5.4.

5.2 Natural Valley Procedure

The Natural Valley Procedure is completed for all levee systems to identify the potential leveed area associated with the 1-percent-annual-chance flood. This is completed through hydraulic

modeling of the levee system as though it is not reducing flood risk by allowing flow to be conveyed on both sides of the levee. For the Natural Valley Procedure, only the Kingston Levee reach was evaluated. The I-587 embankment was included in the model as existing condition.

5.3 Structural-Based Inundation Procedure

For the Structural-Based Inundation Procedure, a hypothetical breach analysis was completed using HEC-RAS 5.0.3 (2-Dimensional, unsteady flow) at 3 locations along the Kingston Levee (upstream, central, and downstream). The breach locations were developed for modeling purposes only and not indicate historic or future breach development at these locations. The I-587 embankment was included in the model as existing condition.

5.4 Freeboard Deficient Procedures

For the purposes of the initial data analysis of the Freeboard Deficient Procedure, the Kingston Levee crest elevations were assumed to be elevated at or above the BFE. The levee crest data from multiple sources, including the USACE National Levee Database, NYSDEC survey, and City survey were compared to the 44CFR§65.10 required freeboard profile for the levee system. The profile comparison is included in Appendix C. The I-587 embankment was assessed under two conditions: as a Sound Reach (recognized as a levee) and Natural Valley.

5.5 Review of Initial Data Analyses

It should be noted that the findings of the Initial Data Analysis are non-regulatory and are intended to inform the path forward for identification of flood risk associated with the levee system. The findings may be used for emergency planning purposes; however, they are subject to change and due process, and should not be used outside of this levee stakeholder group for any regulatory activities. The flood risk due to interior drainage in the leveed area associated with the Freeboard Deficient and Sound Reach Procedures is also <u>not</u> depicted. Evaluation of interior drainage in the leveed area is part of the 44CFR§65.10 requirements that must be submitted to FEMA prior to updating the FIRM to depict Freeboard Deficient and Sound Reach Procedure.

The effective FIRM currently shows the flood risk of the leveed area as Zone A SFHA. The Natural Valley procedure yielded similar results to the effective HEC-2 hydraulic analysis which also depicts the levee system as not reducing flood risk. Figure 3 illustrates the approximate inundation area for the 1-percent-annual-chance flood for the Natural Valley Procedure using HEC-RAS 5.0.3 (1-Dimensional, steady-state flow). Figure 4 shows the approximate depth grid for the Natural Valley Procedure.

Figure 3: Natural Valley Procedure

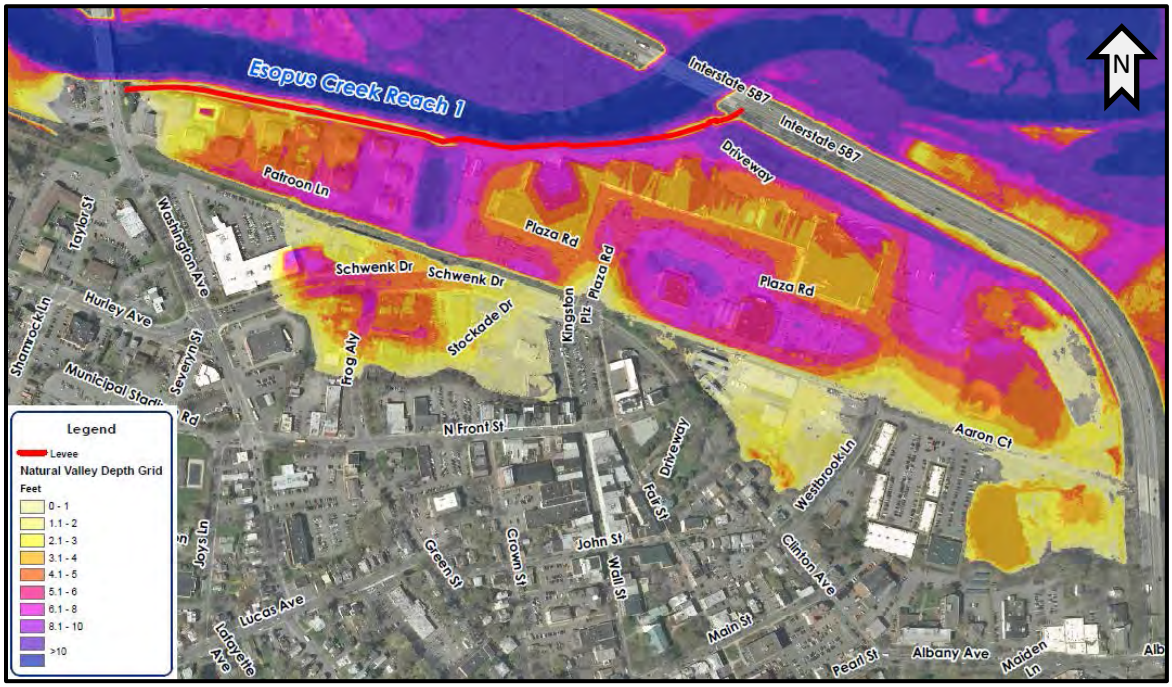

Figure 4: Natural Valley Procedure Flood Depth Grid

The Structural-Based Inundation Procedure yields a slightly larger inundation area compared to the Natural Valley analysis. This analysis is more conservative than the Natural Valley analysis and could be used by the community for emergency planning purposes. Figure 5 shows the composite

inundation area resulting from these analyses completed using HEC-RAS 5.0.3 (2-Dimensional, unsteady flow). Figure 6 shows the approximate depth grid for the Structural-Based Inundation Procedure.

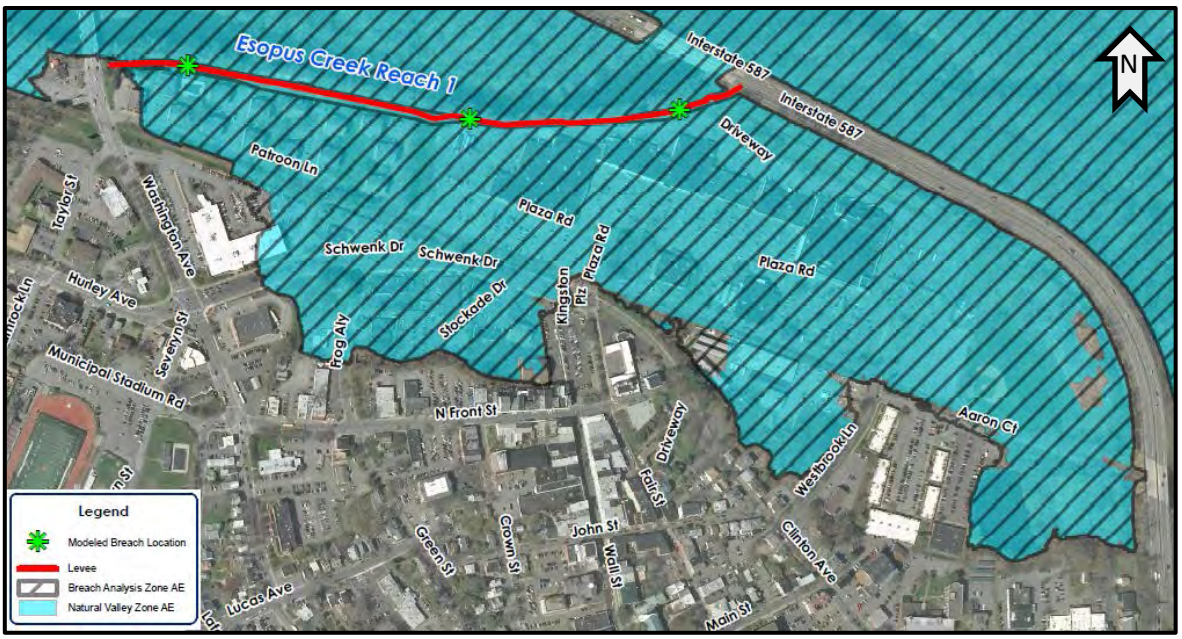

Figure 5: Structural-Based Inundation Procedure

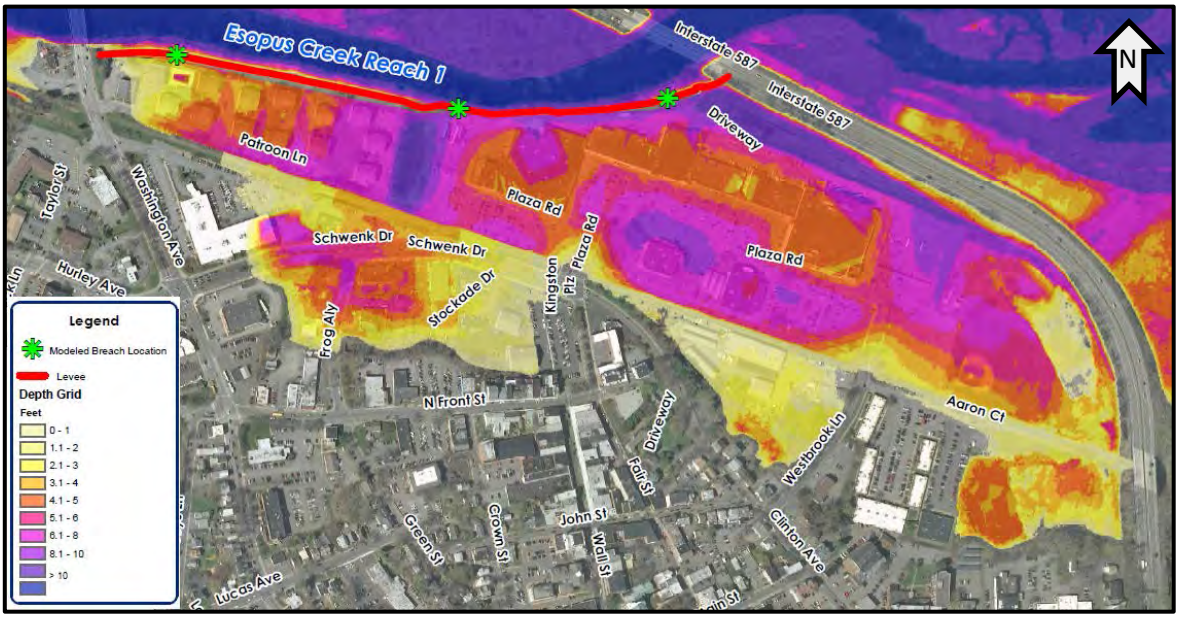

Figure 6: Structural-Based Inundation Procedure Flood Depth Grid

To revise the FIRM to reflect the Freeboard Deficient Procedure for the Kingston Levee reach, 44CFR§65.10 compliant data would need to be received and accepted by FEMA showing the minimum levee crest elevations at or above the BFE for Esopus Creek Reach 1.

As noted above, the I-587 embankment was evaluated under two reach analysis procedures: as a Sound Reach (recognized as a levee) and Natural Valley (without levee) conditions.

Figure 7 shows the resulting flood risk should I-587 be recognized and certified as a levee and the Kingston Levee certified as Freeboard Deficient. The flood risk of the leveed area was conservatively estimated to be equal to that of the Natural Valley Procedure; however, a more detailed analysis could be part of future studies. The resulting flood risk of the leveed area could be depicted as Zone D.

Zone D is defined by FEMA as unidentified, but possible flood risk and could require flood insurance at rates estimated to be similar to Zone A. Zone D, however, is not considered SFHA and does not have mandatory flood insurance purchase for federally back mortgages and has minimal floodplain management requirements.

Figure 8 shows the resulting flood risk should I-587 be evaluated as Natural Valley and the Kingston Levee certified as Freeboard Deficient. The resulting flood risk associated with the Natural Valley inundation of I-587 could be shown as Zone AE SFHA and the residual inundation area could be shown as Zone D. No additional data requirements are associated with the Natural Valley evaluation of I-587; however, the Kingston Levee reach would still need to be certified as Freeboard Deficient.

Summary results from the Initial Data Analysis are included in Table 4.

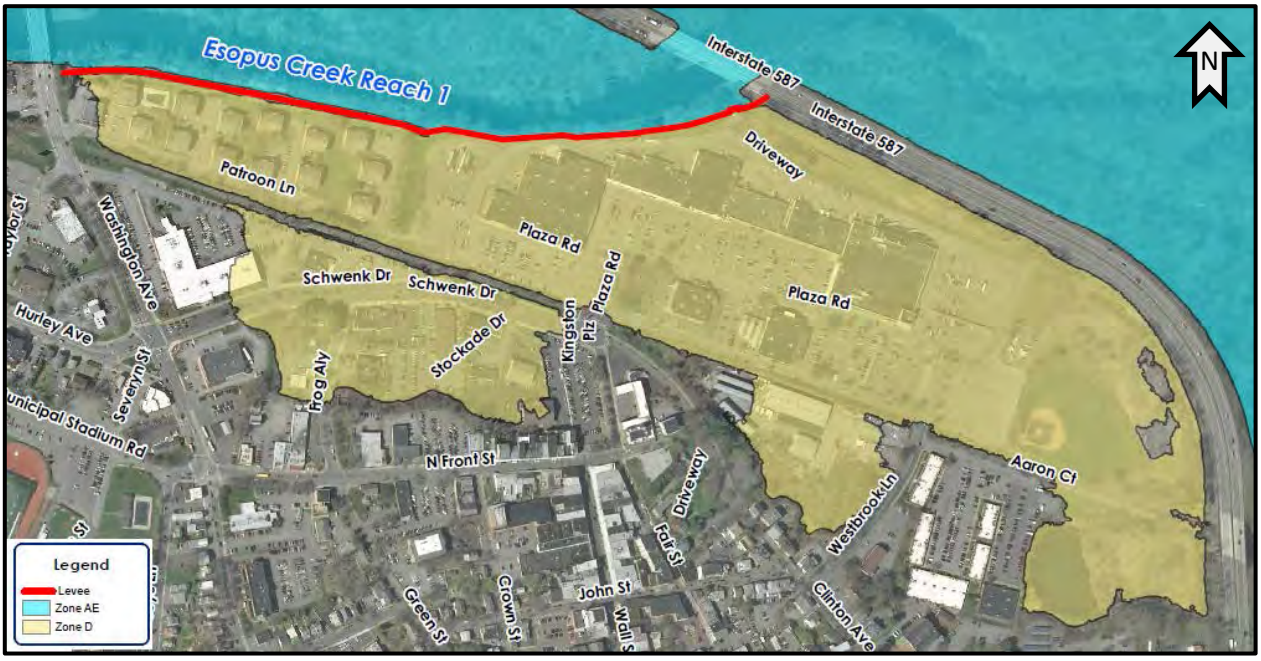

Figure 7: Freeboard Deficient and Sound Reach Procedures

Figure 8: Freeboard Deficient and Natural Valley Procedures

Table 4. Results from the Initial Data Analysis

Approximate Length of Levee Segment (ft)	Approximate # Structures Impacted	Comments: Natural Valley Procedure	Comments: Structural-Based Inundation Procedure	Comments: Freeboard Deficient Procedures	Comments: General
2,550	14 Apartment Structures, 1 Utility Substation, 18 Commercial Structures (including 1 shopping center)	• Similar results to effective analysis that depicts levee system and not reducing flood risk.	• More conservative results than Natural Valley Procedure. May be utilized for emergency planning.	• There is insufficient freeboard for the majority of the Kingston Levee. • I-587 is a non-levee feature and would mapped using the Natural Valley procedure. For I-587 to be recognized as a levee, it would need to be owned, operated, and maintained as a levee and meet the minimum requirements of 44CFR§65.10.	• It may be difficult for I-587 to be recognized as a levee.

6 Path Forward

6.1 Levee Analysis and Mapping Procedures

The Kingston Levee included in this study is shown as non-accredited on the effective FIRM, which depicts the Natural Valley condition based on the effective HEC-2 hydraulic model. At the request of the City, FEMA engaged the community through the Levee Analysis and Mapping Procedures process to help identify potential options to evaluate the flood risk for the leveed area. The community is considering moving forward with the Freeboard Deficient Procedure that could map the flood risk of the leveed area as Zone D; however, they are currently weighing the costs and benefits prior to moving forward.

Should the community be able to provide 44 CFR§65.10 compliant data for I-587 and for all but freeboard criteria (Freeboard Deficient Procedure) and the levee crest is certified to be at or above the 1-percent-annual-chance flood elevation, the flood risk of the leveed area could be shown as a combination of Zone AE and Zone D as shown in Figure 8. If the community also provides 44 CFR§65.10 compliant data for I-587, including that I-587 is operated, and maintained as a levee, the flood risk of the leveed area could be shown as Zone D as shown in Figure 7. If the community does not provide 44 CFR§65.10 compliant data, the effective FIRM dated November 17, 2017 will remain unchanged.

Due to the recent flood risk mapping for the levee system becoming effective November 18, 2016, FEMA does not anticipate updating the flood risk maps in the near future; however, the 44 CFR§65.10 compliant levee data in support of the Freeboard Deficient Procedure may be submitted at any time through the LOMR process to update the FIRM. It is recommended that the community coordinate with FEMA Region II in advance of any submittal to keep the Region apprised of the levee status. FEMA's Levee Accreditation Checklist has been included in Appendix F for reference.

7 References

FEMA: Non-Accredited Levee Analysis and Mapping Guidance, September 2013

USACE, National Levee Database (GeoDatabase Version 3.0 dated 07-28-2015), 2015.

Appendix A
Stakeholder Engagement - LLPT Meeting 1 Information

Full Appendix Provided Separately

City of Kingston
LAMP Kick-off Meeting
City of Kingston, Ulster Co, NY

Tuesday, February 21, 2017
1:30-3:00 pm
Kingston City Hall
420 Broadway
Kingston, NY 12401

Attendees: See attached sign-in sheet.

Presentation: Attached.

Background:

The City of Kingston Levee System is located along the south bank of the Esopus Creek between Washington Street and I-587 and is comprised of both earthen and floodwall sections. The levee system was shown as providing protection on the Federal Emergency Management Agency (FEMA) 1984 Flood Insurance Rate Map (FIRM); however, for the 2009 Countywide Flood Insurance Study (FIS), survey data indicated the structure failed to meet minimum requirements of Title 44 Chapter 1 of the Code of Federal Regulations Section 65.10 (44 CFR §65.10) for freeboard. The levee was not shown as providing protection on the 2009 FIRM, 2011 revision, or the recent November 2016 FIRM.

The City of Kingston is interested in potential options moving forward to assess the flood risk associated with the levee system. The purpose of the meeting was to provide an overview of the Levee Analysis and Mapping Procedure (LAMP) process and potential analysis scenarios, initiate assembly of a Local Levee Partnership Team (LLPT), discuss available data for analysis, and define next steps and coordination.

Notes:

A sign-in sheet was passed around to the group and is available for review.

Presentation

Andrew Martin introduced the project team and provided an overview of the LAMP process in relation to the Kingston Levee System including the:

- Discovery Phase;
- Advanced Analysis Phase; and
- Mapping Phase.

A. Martin also discussed the formation of the LLPT comprised of levee stakeholders and subject matter experts who will work collaboratively to provide technical data and comments to assist in determining the path forward.

Alan Springett then discussed the LAMP analysis and methodology and data requirements, which included the following:

- Ability to address the levees by reaches. For the Kingston Levee, due to the limited extent and hydraulic connection of the entire levee impact area, separating the levee into different reaches is not viable. The single reach can be analyzed using different LAMP procedures. These are as follows:
    - Natural Valley;
    - Structural Based Inundation;
    - Overtopping;
    - Freeboard Deficient Reach; and
    - Sound Reach.

- LAMP results may yield Zone D designation for a portion of the levee impact area if certain requirements are met.
    - No federal mandatory flood insurance purchase requirement.
    - Zone D requires only minimal floodplain management (though local communities may enact and enforce more stringent management through local ordinances).
    - Decision to require flood insurance purchase lies with lending institution.
    - Lenders are required to treat all customers consistently.
    - Zone D is defined as "undetermined, but possible, flood hazards" which could pose challenges getting reduced flood insurance premiums resulting from the uncertainty within the designation.
    - FEMA sets rates for cost of flood insurance and has systematic application policy for consistency.

A. Springett also discussed that a Levee Analysis and Mapping plan will be prepared to summarize the data collection, flood hazard analysis and mapping options. He also provided the anticipated schedule for the LAMP Discovery Phase. A draft of the plan will be provided to the LLPT for review and comment. This typically follows a second meeting to review available data and a first pass analysis for Natural Valley. A meeting is typically held to review the technical components of the plan followed by a summary of the LAMP plan presented to the community officials at a council meeting.

A. Springett also discussed incorporating discussion of levee risk and planning actions into Hazard Mitigation Plans.

Discussion

Q: Is the without levee condition mapped on the current FIRM?
A: A. Springett - Yes.

Q: Dennis Larios - Are there funds for geotechnical analysis?
A: FEMA – No, this is the responsibility of the community; however, grants may be available from various agencies.

Q: D. Larios - Is the top of levee survey the community's responsibility?
A: FEMA – Yes.

Q: Arvind Goswami – Why cover overtopping scenario when levee has more than 1 foot of freeboard?
A: A. Springett – All potential LAMP scenarios were covered for awareness. Situation could change depending on factors such as survey or new hydrologic and hydraulic analyses.

Q: A. Springett – Will 1D or 2D analysis be completed for LAMP assessment?
A: S. Nurre – Depends on scope identified for analysis.

Q: What is general timeframe for moving forward?
A: FEMA – Approximate timeframe for LAMP Discovery phase is estimated to be around 6 months.

Q: Who should data be sent to?
A: Data should be provided to Alan Springett (who may be deployed) and Stephanie Nurre, who will serve as the technical project coordinator going forward. Paige Mandy will support engagement activities.

Q: Bill Nechamen – FEMA will not update levee that is in USACE levee system (PL 84-99 program).
A: FEMA – More likely to support mitigation of risk behind a flood control project. Not going to fund levee improvement.

Q: D. Larios - Is there any indication of how much accreditation would cost?
A: A. Springett - Through LAMP we will know more regarding the risk associated with the levee and will have more data.
A: A. Martin – Could reach out to communities that have accredited levees, such as Nichols, NY, Williamsport, PA, Amsterdam, NY.

Q: D. Larios - When was 3 feet of freeboard enacted by FEMA?
A: FEMA – Around 1986.

Q: D. Larios - Does city need geotechnical analysis now?
A: S. Nurre – LAMP may provide more data to facilitate this decision.
A: A. Springett – Community may proceed while LAMP is on-going.
A: B. Nechamen – Would be good to get analysis as it is necessary for all but natural valley. [needed for freeboard deficient, overtopping, sound reach scenarios]

Q: Mayor Noble – Could we get better data?
A: A. Springett – If we receive better data/H&H study.
A: A. Martin – A change in flowrate could facilitate decision for updated study.

B. Nechamen: Lower Esopus is an old study. Downstream gage has lower historic flow rate than upstream gage. Could be cause for re-evaluation. DEC is pushing DEP to update hydrology for Lower Esopus. Flowrate could decrease based on peak historic flowrate. May also look at including natural storage areas in study.

A. Springett: LAMP study is non-regulatory but could be leveraged to facilitate making decisions on path forward in the future.

D. Larios: 1985 FEMA analysis seems to be consistent with BFEs experienced in area. Warning of 20-24 hours prior to peak passing through.

A. Martin: Earlier discussion with Mayor included discussion of potential Provisionally Accredited Levee (PAL) scenario. A. Springett noted that minimum of 2 feet of freeboard would need to be provided to qualify for PAL.

A. Goswami: Noted that map showing number of structures impacted by levee could be useful in the future.

B. Nechamen: 2005 was the flood of record. D. Larios noted that he walked the levee in 2005 and it appeared as though the levee had at least 1 foot of freeboard.

Q: A. Martin – Other potential stakeholders to invite to participate in LLPT?
A: NYDEP, Ulster County Soil & Water, Ulster County OEM, property owners (FEMA does not usually invite property owners to LLPT due to technical nature of discussions, but is open to discuss this idea)

Action Items

- P. Mandy will send presentation, sign-in sheet, and meeting notes to attendees, as well as an FTP link to post materials. Email will also include request for acknowledgement of those who wish to participate in the LLPT.
- Follow-up will include outreach to DEP to see if they have any additional information.
- S. Nurre to provide summary of accreditation requirements to meeting attendees.

Department of Homeland Security
Federal Emergency Management Agency
Region II – Mitigation Division

FEMA

KINGSTON MEETING SIGN-IN SHEET

Meeting Date/Time: Tuesday, February 21, 2017
1:30 PM – 3:30 PM

#	Name – PLEASE PRINT	Title	Organization/Town	E-Mail
1	STEPHANIE NURRE	FEMA TECH SERVICE	STARR II	stephanie.nurre@stantec.com
2	Alan Springett	FEMA Region 2	Region II	Alan.Springett@fema.dhs.gov
3	RALPH SWENSON	CITY ENGR	CITY OF KINGSTON	rswenson@kingston-ny.gov
4	DENNIS LARIOS	Brinnier & Larios, PC	Kingston, plus Brinnier & Larios, PC	dmlarios@blengineers.com
5	Dennis Doyle	Director UC Planning	Ulster County	ddoy@co.ulster.ny.us
6	Amanda Bennett	Env. Planner Ulster Co. Environment	Ulster County	aben@co.ulster.ny.us
7	Joe Chenier	Supt of PW	C of Kingston	jchenier@kingston-ny.gov
8	SHUDIPTO RAHMAN	FEMA R2	FEMA / R2	SHUDIPTO.RAHMAN@FEMA.DHS.GOV
9	Steve Noble	Mayor	City of Kingston	snoble@kingston-ny.gov
10	Jim Noble	Alderman at Large	City of Kingston	jnoble39@aol.com
11	Brad Wenskoski	Environmental Program Specialist	NYS DEC	brad.wenskoski@dec.ny.gov
12	Kelli Higgins-Roche	ENV Eng.	"	kelli.higgins-roche@dec.ny.gov

Department of Homeland Security
Federal Emergency Management Agency
Region II – Mitigation Division

FEMA

#	Name – PLEASE PRINT	Title	Organization/Town	E-Mail
13	BRENNA ROBINSON	DIRECTOR, OFFICE OF ECONOMIC & COMMUNITY DEV.	CITY OF KINGSTON	brobinson@kingston-ny.gov
14	Kathy Fallon	Constituent Services Representative	Congressman John Faso	Kathy.Fallon@mail.house.gov
15	ANDREW WRIGHT	ARCHITECT	WRIGHT ARCH PLLC	WRIGHTARCHITECTS@gmail.com
16	Berhanu Gonfa	(EE2) Environmental Eng'r	NYS DEC	berhanu.gonfa@dec.ny.gov
17	Arvind G. Goswami	E-Engineer-2	NYSDEC – Albany	Arvind.goswami@dec.ny.gov
18	John Harrington	General Mechanic	NYSDEC – New Paltz	john.harrington@dec.ny.gov
19	Eddie Boyle	Deputy Super.	city of kingston	eboyle@kingston-ny.gov
20	Bill Nechamen	Chief - Flood Plain Mgmt	NYS DEC	william.nechamen@dec.ny.gov
21	ALAN ADIN	ENGINEERING TECHNICIAN	CITY OF KINGSTON	aadin@kingston-ny.gov
22				
23				
24				
25				
26				
27				

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.

- An additional 0.5 foot above the minimum at the upstream end of the levee, tapering to not less than the minimum at the downstream end of the levee, is also required.

Exceptions to the minimum riverine freeboard requirements above may be approved if the following criteria are met:

- Appropriate engineering analyses demonstrating adequate protection with a lesser freeboard must be submitted.
- The material presented must evaluate the uncertainty in the estimated base flood elevation profile and include, but not necessarily be limited to:
    - An assessment of statistical confidence limits of the 1-percent-annual-chance discharge;
    - Changes in stage-discharge relationships; and
    - Sources, potential, and magnitude of debris, sediment, and ice accumulation.
- It must be also shown that the levee will remain structurally stable during the base flood when such additional loading considerations are imposed.

Under no circumstances will freeboard of less than 2 feet be accepted.

For coastal levees, the freeboard must be established at 1 foot above the height of the 1-percent-annual-chance wave or the maximum wave runup (whichever is greater) associated with the 1-percent-annual-chance stillwater surge elevation at the site.

Exceptions to the minimum coastal freeboard requirements above may be approved if the following criteria are met:

- Appropriate engineering analyses demonstrating adequate protection with a lesser freeboard must be submitted.
- The material presented must evaluate the uncertainty in the estimated base flood loading conditions. Particular emphasis must be placed on the effects of wave attack and overtopping on the stability of the levee.

Under no circumstances will a freeboard of less than 2 feet above the 1-percent-annual-chance stillwater surge elevation be accepted.

(B)(2) CLOSURES

The levee closure requirement is that all openings must be provided with closure devices that are structural parts of the system during operation and design according to sound engineering practice.

(B)(3) EMBANKMENT PROTECTION

Engineering analyses must be submitted to demonstrate that no appreciable erosion of the levee embankment can be expected during the base flood, as a result of either currents or waves, and that anticipated erosion will not result in failure of the levee embankment or foundation directly or indirectly through reduction of the seepage path and subsequent instability.

The factors to be addressed in such analyses include, but are not limited to:

- Expected flow velocities (especially in constricted areas);
- Expected wind and wave action;

- Ice loading;
- Impact of debris;
- Slope protection techniques;
- Duration of flooding at various stages and velocities;
- Embankment and foundation materials;
- Levee alignment, bends, and transitions; and
- Levee side slopes.

(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,

- Age of the levee system, and
- Construction compaction methods.

A detailed settlement analysis using procedures such as those described in USACE Engineering Manual EM 1110-1-1904 must be submitted.

(B)(6) INTERIOR DRAINAGE

An analysis must be submitted that identifies the source(s) of such flooding; the extent of the flooded area; and, if the average depth is greater than 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. Interior drainage systems usually include storage areas, gravity outlets, pumping stations, or a combination thereof.

For areas of interior drainage that have average depths greater than 1 foot, mapping must be provided depicting the extents of the interior flooding, along with supporting documentation.

(B)(7) OTHER DESIGN CRITERIA

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

(C) OPERATIONS PLANS AND CRITERIA

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

(C)(1) CLOSURES

Operation plans for closures must include the following:

- 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;
- A formal plan of operation, including specific actions and assignments of responsibility by individual name or title; and
- Provisions for periodic operation, at not less than 1-year intervals, of the closure structure(s) for testing and training purposes.

(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.

(E) CERTIFICATION REQUIREMENTS

Data submitted to support that a given levee system complies with the structural requirements set forth in B(1) through B(7) above 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 against the base flood.

Appendix B
Stakeholder Engagement - LLPT Meeting 2 Information

Full Appendix Provided Separately

Meeting Notes

CITY OF KINGSTON
LEVEE FLOOD HAZARD IDENTIFICATION
LOCAL LEVEE PARTNERSHIP TEAM (LLPT) MEETING 2

September 12, 2017 2:00-4:00 PM (EST)

Location:
Kingston City Hall
420 Broadway
Kingston, NY 12401

ATTENDEES

MAYOR STEVE NOBLE
City of Kingston

RALPH SWENSON
City of Kingston

ADIN ALAN
City of Kingston

JOE CHENIER
City of Kingston

ALEX WINCHELL
City of Kingston

AARON BENNETT
Ulster County

KATHY FALLON
Office of Congressman John Faso

JOHN HARRINGTON
NYS Department of Environmental Conservation

LYNN MEEKER
NYS Department of Environmental Conservation

ALAN FUCHS
NYS Department of Environmental

BRAD WENSKOWSKI
NYS Department of Environmental Conservation

ARVIN GOSWAMI

Action Item	Owner
1. Create Natural Valley and Freeboard Deficient analyses depth grids to share with the community.	STARR II
2. Provide a response on the effects of non-levee embankments (such as the railroad embankment between Washington Avenue and Schwenk Drive) on the levee analysis and mapping procedures. This can be found on the file transfer site. **Browser link**: https://projsftp.stantec.com **Login name:** KNYLD1415 **Password:** 5723813	FEMA
3. Provide contact information for the Village of Nichols and City of Amsterdam to the City of Kingston to obtain background on their levee accreditation processes experience.	FEMA
4. Add available top of levee survey data from the City of Kingston to the levee profile exhibit.	STARR II
5. Determine if wrap-around flow from the east, under Interstate 587 and the railroad embankment impacts the landside of the levee	STARR II

AGENDA

- Review Kingston's Levee Flood Hazard
  - Local Levee System
  - Analysis and Mapping Procedures for Non-Accredited Levees
- Application of Reach Study Procedures
- Review Results of Initial Data Analysis

Meeting Notes

NYS Department of Environmental Conservation

SHUDIPTO RAHMAN
FEMA

STEPHANIE NURRE
STARR II

THOMAS SONG
FEMA Outreach Consultant

PAIGE MANDY
FEMA Outreach Consultant

- Esopus Creek
- Discuss Next Steps in the Process

OVERVIEW

Thomas Song opened the meeting and facilitated introductions of attendees. Shudipto Rahman then provided a summary of the coordination efforts and data collected to date. Stephanie Nurre presented the draft results of the initial data analysis for the levee system along Esopus Creek to the City of Kingston Local Levee Partnership Team (LLPT). The discussion reviewed the levee crest profile that appears elevated above the Base Flood Elevation (BFE), except for one low spot near the downstream end. It was concluded the entire length of the levee did not meet minimum freeboard requirements.

NOTES

The Esopus Creek Natural Valley Procedure included a transformation of the effective HEC-2 hydraulic model into a HEC-RAS model (in the study area) using the effective flowrate for the 1-percent-annual-chance flood for the City of Kingston current effective Flood Insurance Study (FIS). The resulting inundation area was not significantly different than that of the current effective Flood Insurance Rate Map (FIRM).

The Structural-Based Inundation Procedure identifies the landside inundation area during hypothetical breach scenarios. The resulting inundation map is a composite of the 1-percent-annual-chance inundation areas for hypothetical breaches at upstream, downstream, and midpoint locations along the levee system. Due to the topography of the area, the inundation area associated with the Structural-Based Inundation Procedure is not significantly different from the Natural Valley inundation. The depth grid for the Structural-Based Inundation Procedure was also discussed as a potential hazard mitigation planning tool.

The Freeboard Deficient Procedure roughly shows the area that could be identified as a Zone D flood zone if the levee crest were above the BFE, but the levee does not provide at least 3 feet of freeboard. This procedure can be applied if all data in accordance with 44 CFR 65.10, besides minimum freeboard, is certified and deemed acceptable by FEMA.

Meeting Notes

The City shared with FEMA their goal of accrediting the levee system; however, they need time to assess what will be the best path forward for them since the levee currently does not meet minimum freeboard requirements. Much of the discussion focused on clarifying the potential options, as well as discussing the next steps toward accreditation after which, a Letter of Map Revision (LOMR) would be needed to update the flood hazard in the levee impact area shown on the effective FIRM. FEMA identified other communities that have gone through or are currently going through the levee accreditation process. FEMA will provide Kingston LLPT members with contact information for the City of Amsterdam and/or Village of Nichols, which are currently pursuing accreditation of their levee systems.

Kingston would like to redevelop the area mapped on the edge of the Natural Valley map along the existing railroad embankment to include a new residential development on the site of an existing parking lot. Additionally, a new Hannaford grocery store is being considered in the parking lot of the existing plaza where a Hannaford store is currently located. FEMA and Kingston officials discussed the importance of taking mitigation actions when developing this area to help mitigate flood risk long-term. Additionally, FEMA clarified that the railroad embankment is a non-levee feature. Therefore, it will not be identified as a factor in reducing the flood risk.
City officials raised questions about Zone D and what types of flood insurance is mandated in this zone. Currently, the potentially impacted area consists of a mix of residential apartments for seniors and commercial development. While FEMA explained that Zone D is defined as "undetermined, but possible, flood hazards" with no Federal mandatory insurance purchase requirements, mortgage companies may still require the purchase of flood insurance to protect their investment. FEMA could coordinate a discussion on flood insurance and related topics with FEMA specialists if the City of Kingston is interested.

City officials recommended that any questions regarding the Top of Levee (TOL) survey be directed to their engineer, Dennis Larios (not present at this meeting). Stephanie from STARR II will re-examine the TOL survey data and update the top of levee profile exhibit to include this information.

FEMA reviewed next steps in the LLPT process, which are to collect any additional data from the community, refine the analyses as necessary, draft a levee analysis and mapping plan, and plan for the LLPT 3 meeting to discuss the plan. FEMA and the community discussed focusing part of the next discussion on non-levee embankments, particularly Interstate 587 and the existing railroad embankment. FEMA will be in

touch with city when the levee mapping plan is near completion to determine if a touchpoint before the final LLPT meeting is needed or wanted. It expected this contact should take place mid-late November.

DISCUSSION

- QUESTION: NYSDEC asked if the analysis considered pump stations.
  - RESPONSE: Not for Natural Valley or Structural Based Inundation Procedures, but it is something that would-be part of the interior drainage analysis needed for Freeboard Deficient, Over Topping, and Sound Reach Procedures.
  - RESPONSE: The city also noted that there are culverts under the railroad embankment that convey flow near Schwenk Drive.

- QUESTION: Is there wrap-around flow from the east, under Interstate 587 and the railroad embankment that impacts the landside of the levee?
  - RESPONSE: It does not appear so, but it can be reviewed in further detail.

- QUESTION: Is Interstate 587 considered part of the levee structure?
  - RESPONSE: No, it's being modeled as a roadway. It is a non-levee feature.

- QUESTION: Does a levee have to be designed for a 500-year flood?
  - RESPONSE: The U.S. Army Corps of Engineers designed and built this levee to their design standards. FEMA's requirements for accreditation include the need for a levee to have 3 feet of freeboard on the 1-percent-annual-chance flood level. This may or may not equal or exceed the 0.2-percent flood elevation. The 0.2 percent flood elevation depends upon stream discharge and channel capacity beyond the scope of this study.

- QUESTION: Is there some way to harden the railroad embankment, so it could be considered a levee?
  - RESPONSE: If Kingston officials want to show a structure as reducing flood risk, it must meet the same criteria as an accredited levee would. It is possible; however, the railroad embankment may be at a disadvantage as it was not designed, operated, or maintained and ownership is also part of the equation. The community would have to either be responsible for O&M to ensure continuing maintenance to levee standards, or have an agreement to that level of maintenance with the railroad owner/operator.

Meeting Notes

- QUESTION: If the City of Kingston hires an engineer to do the certification work and the engineer provides a completed report, who provides that report to FEMA?
    - RESPONSE: Kingston may provide the report to FEMA.

- QUESTION: Once the City of Kingston submits the certified data and the levee is accredited, how long does it take to change the FIRM?
    - RESPONSE: Data would be submitted through the LOMR process, which has a 90-day comment period every time new data is received. The timeline varies, but it may be 1 to 1.5 year for the LOMR to become effective. It would be more efficient for the City to develop a Conditional Letter of Map Revision process with FEMA to ensure requirements are identified as early in the design process as possible to provide the most effective process going forward.

Meeting Notes

Department of Homeland Security
Federal Emergency Management Agency
Region II – Mitigation Division

FEMA

KINGSTON MEETING SIGN-IN SHEET

Meeting Date/Time: Tuesday, September 12, 2017
2:00 PM – 4:00 PM

#	Name – PLEASE PRINT	Title	Organization/Town	E-Mail
1	John Harrington	General Mechan	NYS DEC	john.harrington@dec.ny.gov
2	Lynn Meeker	COS 2	NYS DEC	Lynn.meeker@dec.ny.gov
3	ALAN FUCHS		" "	ALAN.FUCHS@ "
4	Kathy Fallon	Constituent Services	Congressman John Faso	Kathy.Fallon@mail.house.gov
5	ALAN ADIN	CITY OF KINGSTON	- ENGINEERING TECH.	aadin@kingston-ny.gov
6	Joe Chenier	Supt. of PW	C. of Kingston	jchenier@kingston-ny.gov
7	Allen Wiedmeier	JR OPERATOR	KINGSTON WWTF	AWIEDMEIER@KINGSTON-NY.GOV
8	Alana Bennett	Env. Planner	UC Dept Environment	abenn@ucdistrict.ny.us
9	Steve Noble	Mayor	City of Kingston	SNoble@Kingston-NY.gov
10	RACHA CUNNINGHAM	CITY OF KINGSTON	KINGSTON	rcunningham@kingston-ny.gov
11				
12				

Meeting Agenda

CONTACT INFORMATION

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FEMA Region II Project Monitor
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STEPHANIE NURRE
Mapping Project Manager
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THOMAS SONG
Outreach support
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Email: thomas.song@mbakerintl.com

PAIGE MANDY
Outreach support
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Email: paige.mandy@ogilvy.com

CITY OF KINGSTON COORDINATION CALL

November 27, 2017 1:00 PM (EST)

Phone: 571-209-6390; Code: 995484987#;
Web: https://meetings.mbakercorp.com/orion/joinmeeting.do?MeetingKey=995484987

AGENDA:

- Introductions
- Post LLPT 2 Meeting Updates
  - Top of levee survey provided by City of Kingston
  - Non-levee embankments
- Draft Levee Analysis and Mapping Plan
  - Preview
- Next Steps
  - Schedule LLPT3 Meeting
- Open Discussion

Meeting Notes

CITY OF KINGSTON
LOCAL LEVEE PARTNERSHIP TEAM TOUCH POINT

November 27, 2017

Location: Webinar

ATTENDEES

MAYOR STEVE NOBLE
City of Kingston

RALPH SWENSON
City of Kingston

DENNIS LARIOS
City of Kingston

DENNIS DOYLE
Ulster County Planning Department

AARON BENNETT
Ulster County Planning Department

KATHY FALLON
Office of Congressman John Faso

BRAD WENSKOSKI
NYS Department of Environmental Conservation

ARVIND GOSWAMI
NYS Department of Environmental Conservation

LYNN MEEKER
NYS Department of Environmental Conservation

KELLI HIGGINS-ROCHE
NYS Department of Environmental Conservation

ANNA SERVIDONE
NYS Department of Environmental Conservation

ALAN SPRINGETT
FEMA REGION II

SHUDIPTO RAHMAN
FEMA REGION II

DAVID HAYSON
STARR II

Action Item		Owner
1.	FEMA to coordinate call with the City of Nichols to arrange an informational discussion about accreditation process.	FEMA
2.	FEMA/NYSDEC to look into the I-587 situation to see if it was designed as part of a flood control levee.	FEMA/NYSDEC
3.	FEMA to share 44 CFR 65.10 requirements' checklist for the City of Kingston to review accreditation next steps for I-587.	FEMA
4.	FEMA to provide a draft levee analysis and mapping plan for LLPT review.	FEMA
5.	FEMA will schedule a LLPT 3 meeting to review the draft levee analysis and mapping plan (webinar).	FEMA

AGENDA

- Connect with the Local Levee Partnership Team (LLPT) before presenting the plan
- Discuss next steps

MEETING SUMMARY

Stephanie Nurre reviewed top of levee survey results. She also discussed the draft results for Freeboard Deficient options for the Kingston Levee paired with Natural Valley and Sound Reach Procedures for the non-levee reach of Interstate 587 (I-587). These options will be included in the draft Levee Plan.

The City has been considering their options and the steps needed to move toward accreditation of the levee system.

FEMA provided a preview of the Levee Analysis and Mapping Plan. The plan includes information on the following:

- Levee overview
- LLPT and stakeholder engagement
- Meeting minutes

Meeting Notes

STEPHANIE NURRE
STARR II

CURTIS SMITH
STARR II

TOM SMITH
FEMA Outreach Consultant

SYLVIA SCHMIDT
FEMA Outreach Consultant

THOMAS SONG
FEMA Outreach Consultant

PAIGE MANDY
FEMA Outreach Consultant

- Initial data analysis and findings
- Path forward
- Supporting data collected as part of this effort

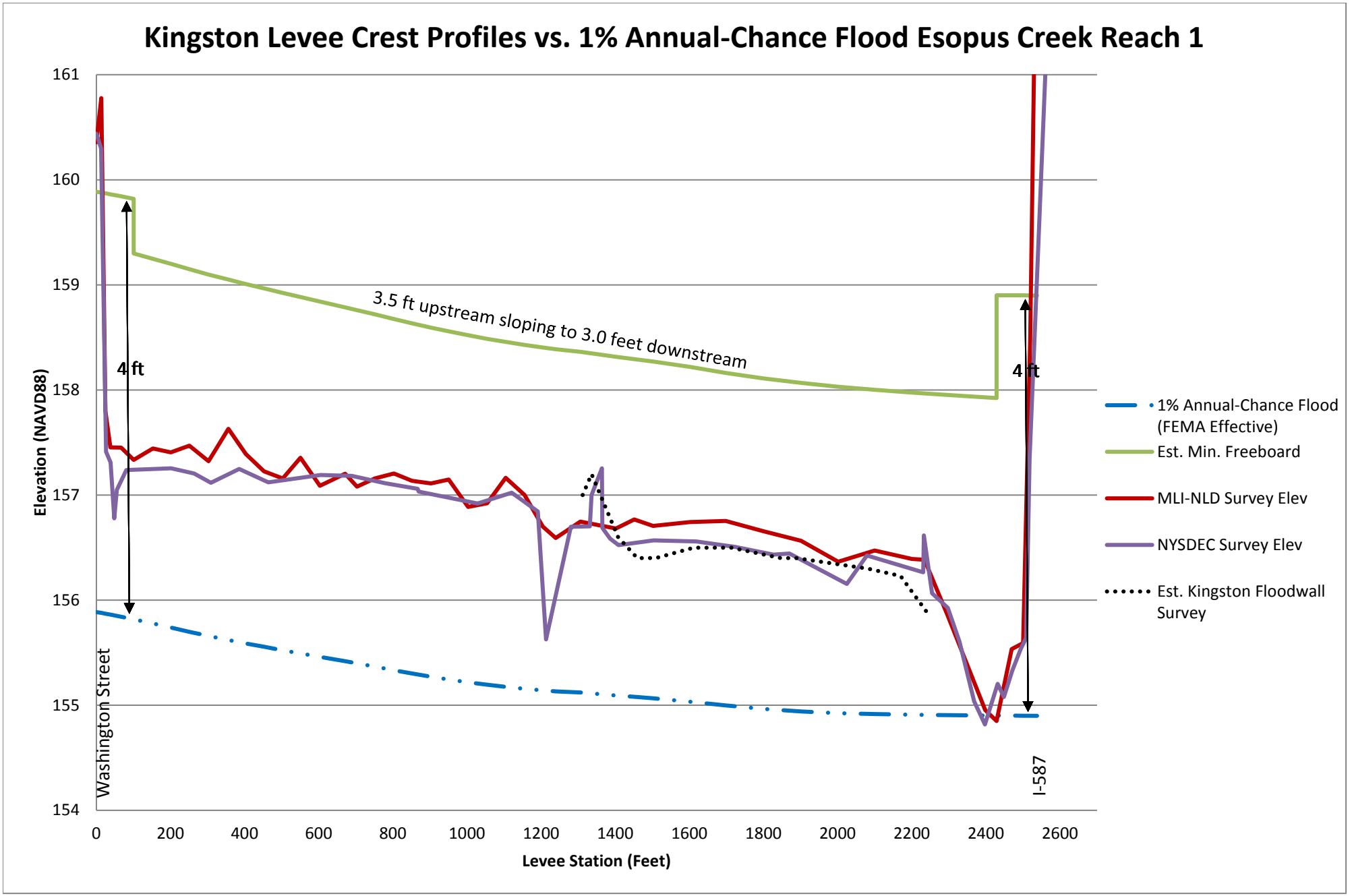
DISCUSSION

- QUESTION: Regarding the I-587 Sound Reach, the City understood that NYSDEC and the U.S. Army Corps of Engineers (USACE) designed the embankment as part of the flood control project. Can this be clarified?
    - ANSWER: Anna Servidone, NYSDEC, does not believe so, but will try and find the information.
    - FEMA will reach out to the Department of Transportation to see if they have any additional information.

- QUESTION: Can you give us more background on what we need to provide for I-587 to be considered as a levee?
    - ANSWER: Embankment would need to meet the same 44 CFR 65.10 requirements as any levee system seeking recognition and accreditation by FEMA. The certifying engineer would need to address 44 CFR 65.10 requirements, including:
        - Freeboard
        - Structural design
        - Operational and maintenance plans
        - Work with the Department of Transportation to navigate the owned, operated, maintained component of the levee system
    - A geotechnical analysis of the levee system components is part of the analysis for the structural design requirements.

- QUESTION: If information from the USACE or NYSDEC identified that I-587 was developed as a flood control structure, would I-587 be exempt from all the accreditation requirements explained above?
    - ANSWER: I-587 would still need to meet 44 CFR 65.10 requirements.

Appendix C
Freeboard Profile Comparison


Kingston Levee Crest Profiles vs. 1% Annual-Chance Flood Esopus Creek Reach 1
Elevation (NAVD88)
161
160
159
158
157
156
155
154
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
Levee Station (Feet)
3.5 ft upstream sloping to 3.0 feet downstream
4 ft
4 ft
Washington Street
I-587
1% Annual-Chance Flood (FEMA Effective)
Est. Min. Freeboard
MLI-NLD Survey Elev
NYSDEC Survey Elev
Est. Kingston Floodwall Survey

Appendix D
Site Photographs

I-587 and Kingston Levee Pump Station

Kingston Levee Looking East to Pump Station

Kingston Levee Floodwall and Over-the-Wall Pump Connection

Kingston Levee Floodwall and Earthen Embankment Transition

Kingston Levee Looking West Behind Apartments

Southeast Corner of Washington Avenue Near Kingston Levee

Appendix E
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:

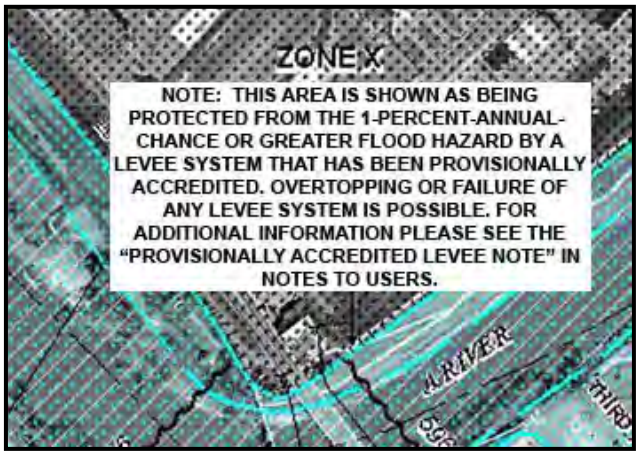
www.fema.gov/plan/prevent/fhm/lv_fpm.shtm

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.

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.

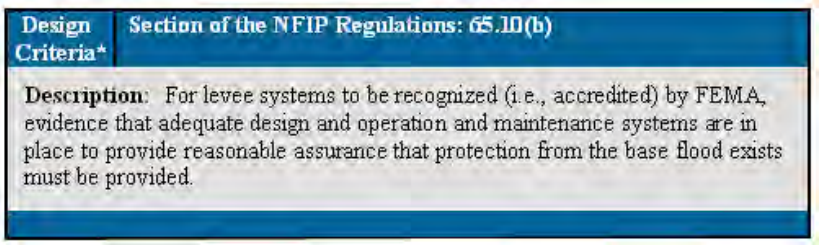
Levee systems also decay over time. They require regular maintenance and periodic upgrades to retain their level of protection. When levees do fail, they often fail catastrophically. The resulting damage, including loss of life, may be much greater than if the levee system had not been built.

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.

Appendix F
Collected Data

Appendix Provided Separately

Appendix G
Initial Data Analysis

Appendix Provided Separately