



Levee Analysis and Mapping Plan

Herkimer Levee

FINAL DRAFT

*Village of Herkimer and Town of Herkimer,
Herkimer County, New York*

March 2017



FEMA

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Table of Contents

Acronyms	iv
Definitions	v
0 Executive Summary	1
1 Introduction	1
2 Levee System Description	2
2.1 Flood Protection Measures	
2.2 Pump Stations and Floodgates	
2.3 Other Levees	
2.4 Non-Levee Embankments	
2.5 LAMP Flood Risk Project	
2.6 LAMP Process Tasks	
3 Local Levee Partnership Team	8
4 Stakeholder Engagement	9
4.1 Stakeholder Engagement Meeting #1 (LLPT1)	
4.2 Stakeholder Engagement Meeting #2 (LLPT2)	
5 First Pass Analysis	10
5.1 Establishing Initial Levee System Reaches	
5.2 “With-Levee” Condition – Bellinger Brook	
5.3 Natural Valley Procedure	
5.4 Structural-Based Inundation First Pass Analysis	
5.5 Freeboard Deficient Procedures	
5.6 Review of First Pass Analyses	
6 Path Forward	16
6.1 LAMP Phase 2 Analysis	
6.2 Levee Accreditation	
7 References	17
Appendix A: Stakeholder Engagement - LLPT Meeting #1 Information	
Appendix B: Stakeholder Engagement - LLPT Meeting #2 Information	
Appendix C: Approach Agreement	
Appendix D: Freeboard Profile Comparison	
Appendix E: Levee Accreditation Checklist	

Tables

Table 1: Herkimer Levee Data	3
Table 2: Summary of Communities in Project Area	6
Table 3: Community Map History	7
Table 4: Project Tasks	7
Table 5: Local Levee Partnership Team Participants.....	8

Figures

Figure 1: Herkimer Levee System Location Map	3
Figure 2: Embankment Location Map	6
Figure 3: Herkimer Levee System LAMP Reaches	11
Figure 4: Bellinger Brook Reach – “With-Levee” Inundation	12
Figure 5: Mohawk Reach - Natural Valley Procedure Inundation	12
Figure 6: West Canada Creek Reach - Natural Valley Procedure Inundation	13
Figure 7: Bellinger Brook Reach - Natural Valley Procedure Inundation	13
Figure 8: Mohawk Reach - Structural-Based Inundation Procedure Inundation	14
Figure 9: West Canada Creek Reach - Structural-Based Inundation Procedure Inundation	14
Figure 10: Bellinger Brook Reach - Structural-Based Inundation Procedure Inundation	15
Figure 11: Herkimer Levee System Composite LAMP Inundation	16

Acronyms

BFE	Base Flood Elevation
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FRMP	Flood Risk Management Project
LAMP	Levee Analysis and Mapping Procedures
LLPT	Local Levee Partnership Team
LOMR	Letter of Map Revision
NYSDEC	New York State Department of Environmental Conservation
SFHA	Special Flood Hazard Area
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

1-Percent-Annual-Chance Flood/Base Flood * – A flood having a 1-percent chance of being equaled or exceeded in any given year.

Levee Analysis and Mapping Procedure (LAMP) Approach – LAMP approaches include Sound Reach, Freeboard Deficient Procedure, Overtopping Analysis, Structural Based Inundation, and Natural Valley.

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 levee, and associated structures, such as closure 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.

Non-Levee Embankment – An embankment not specifically designed, owned, operated, and maintained to reduce flood risk.

Special Flood Hazard Area (SFHA) – An area having special flood, mudflow or flood-related erosion hazards and shown on a Flood Hazard Boundary Map (FHBM) or a Flood Insurance Rate Map (FIRM) Zone A, AO, A1-A30, AE, A99, AH, AR, AR/A, AR/AE, AR/AH, AR/AO, AR/A1-A30, V1-V30, VE or V.

Zone D* – Area of undetermined but possible flood hazard.

*These definitions 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) and Flood Insurance Rate Map (FIRM) for the Village of Herkimer and Town of Herkimer in Herkimer County, New York must be revised to reasonably account for the hazard reduction impacts of a non-accredited levee. FEMA's guidance was revised in 2013 to incorporate a new Levee Analysis and Mapping Procedure (LAMP), which provides a suite of flexible procedures to perform flood hazard analysis and mapping (see Section 1). The Village of Herkimer and the Town of Herkimer have a Flood Risk Management Project (FRMP) where the Herkimer Levee System is being studied using the LAMP process (see Section 2).

In July 2016, FEMA Region II partnered with stakeholders in the Village of Herkimer and the Town of Herkimer to form a collaborative Local Levee Partnership Team (LLPT) to determine potential LAMP approaches for the Herkimer Levee System in both communities (see Sections 3 and 4). The process involved collection and group evaluation of available data, creation and evaluation of risk analysis and mapping, and detailed discussions on mapping needs.

The information gained through the extensive coordination of the LLPT is now supplemented by a recently completed "first pass" LAMP analysis (see Section 5) that informs the path forward (see Section 6) for the Village of Herkimer and the Town of Herkimer, as the levee system impacts both communities. FEMA met with the LLPT in January 2017 to present the first pass LAMP analyses and discuss the options for moving forward.

If the Herkimer Levee cannot be accredited, FEMA will undertake a LAMP Phase II and LAMP Phase III study at a future date to take into account the hazard reduction impacts of the non-accredited levee. The future LAMP Phase II analysis will be focused on refining the Natural Valley Procedure analysis for all reaches and the Structural Based Inundation Procedure for reaches of the Mohawk River.

The Levee Analysis and Mapping Plan summarizes the discussions and decisions by FEMA and project stakeholders on how best to map the flood hazards landward of the Herkimer Levee System within the Village and Town of Herkimer.

The Plan also provides information regarding other local structures and how they may fit into either a LAMP analysis or may require additional study in the future.

1 Introduction

Under FEMA's prior levee approach, a levee system that did not meet the National Flood Insurance Program (NFIP) requirements 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 that such modeling is never precise.

FEMA and its Production and Technical Services contractor (STARR II) implemented the LAMP process for the levee at the Village and Town of Herkimer. Recent technological advances in data

collection methods and hydrologic and hydraulic modeling were leveraged as part of this process. LAMP is a more refined approach to mapping flood hazards in areas landward of levee systems than the former approach. The LAMP 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 the areas impacted by the levee; and
- Considers the unique characteristics of each levee system from an engineering perspective.

The Herkimer Levee System impacting the Village of Herkimer and Town of Herkimer has not been accredited. FEMA is using the LAMP process to develop refined flood hazard mapping in areas landward of the levee. This will provide a more realistic representation of levee-related flood hazards in the Village and Town of Herkimer.

The LAMP process is conducted in four phases:

- **Phase 0: Flood Structure Identification and Review:** Levee systems are identified and verified as being constructed, operated, and maintained as flood control structures. An LLPT is established during this phase.
- **Phase 1: Analysis and Mapping Plan Preparation:** LLPT meetings are held periodically to review available data and documentation. Discussions assist in the preparation of an Analysis and Mapping Plan based on the available information.
- **Phase 2: Analysis Preparation and Results Review (if applicable):** Analysis is performed by FEMA and shared with the LLPT to validate results against available data and documentation. Results are compared to effective FISs to update the scope of work, if necessary.
- **Phase 3: FIRM Update, Due Process and Effective FIRM Issuance:** FIRM panels are updated with Phase 2 results. Communities and FEMA follow all NFIP regulatory due process procedures, and updated FIRM panels are adopted for local floodplain management purposes.

This report is the Levee Analysis and Mapping Plan for the Herkimer Levee System, a result of the collaboration between FEMA, the Village of Herkimer, the Town of Herkimer, New York State Department of Environmental Conservation (NYSDEC), U.S. Army Corps of Engineers (USACE), and other local stakeholders.

2 Levee System Description

2.1 Flood Protection Measures

The Herkimer Levee System (see Figure 1), completed by the USACE in 1964, is an earthen levee system designed to defend against flooding from the Mohawk River, West Canada Creek and Bellinger Brook. Per the USACE National Levee Database levee alignment data, the levee system measures approximately 21,700 feet in length and is composed of approximately: 16,700 feet of levee embankment from Route 5 (State Street) on the west end to the railroad on the east end; 1,800 feet of levee embankment along the east bank of Bellinger Brook north of Route 5; and 3,200 feet of levee embankment along the west bank of West Canada Creek north from the railroad. The levee system sponsor is the State of New York and is

represented by the NYSDEC and the Village of Herkimer which operate and maintain the FRMP, according to a USACE 2010 Periodic Inspection Report.

Table 1: Herkimer Levee Data

Owner	NYSDEC
Maintained by	NYSDEC
Built	1964, Modified: 1976; USACE
Flooding Sources	Mohawk River, West Canada Creek, Bellinger Brook
Length	Approximately 21,700 feet based on NLD
USACE Rehabilitation and Inspection Program Status, Periodic Inspection Rating	Active, Unacceptable (2010)
Top of Levee	Varies
Flooding Source Base Flood Elevation	Varies
Pump Stations	2
Communities Impacted	Village of Herkimer, Town of Herkimer
Upstream Levee Point	-74.997856 Longitude, 43.023872 Latitude (Decimal Degrees)
Downstream Levee Point	-74.975623 Longitude, 43.028869 Latitude (Decimal Degrees)

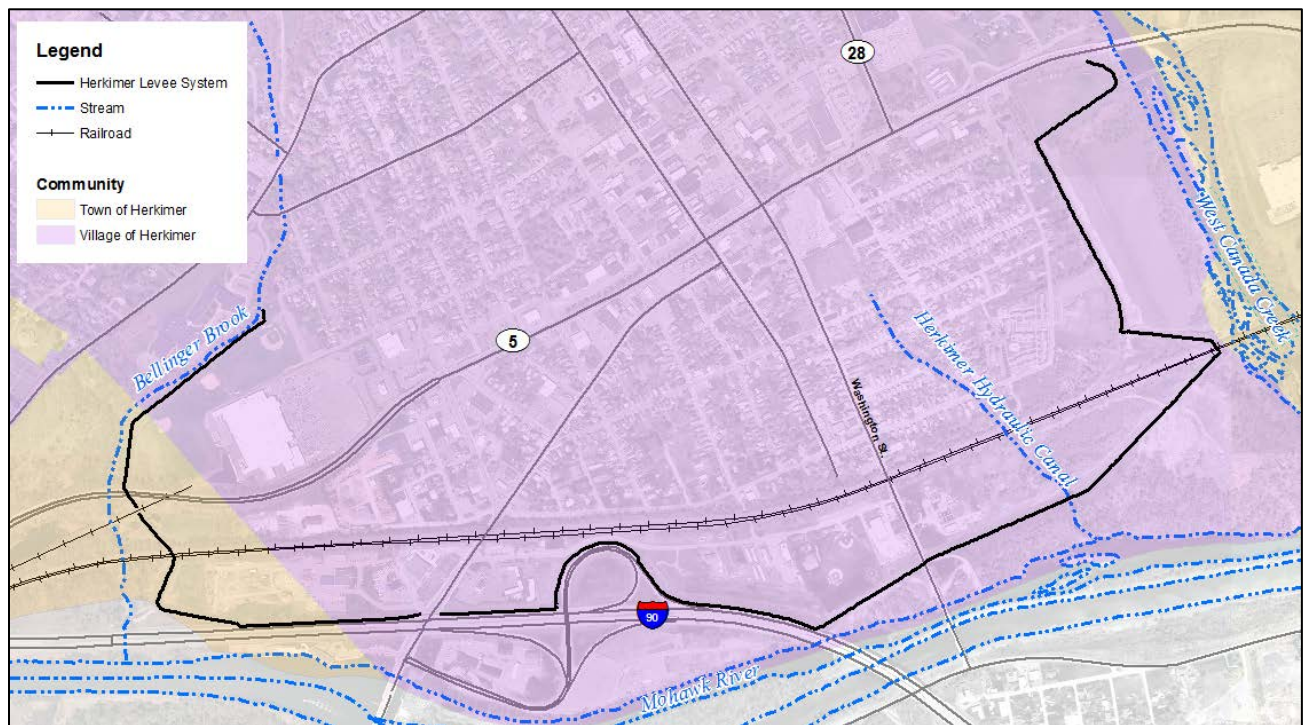


Figure 1: Herkimer Levee System Location Map

2.2 Pump Stations and Floodgates

As-built plans dated 1964 and the 1965 Operation and Maintenance (O&M) Manual for the Mohawk River Basin Flood Control Project that includes the Herkimer Levee System were provided by the USACE. This data identified two pump stations, eight drainage structures, and two culverts associated with the Herkimer Levee System. Pump Station No. 1 is located east of Bellinger Brook between Route 5 and the railroad. Pump Station No. 2 is located at the Herkimer Hydraulic Canal and the Herkimer Levee. Two stop log closure structures are included as part of the Herkimer Levee System flood control works. These closures structures would be erected at Mohawk Street along the Mohawk River and at the railroad spur along Bellinger Brook as noted in the O&M Manual.

2.3 Other Levees

2.3.1 Petrie Levee - Town of Herkimer

North of the Mirror Lake Dam and on the south side of the Herkimer Hydraulic Canal in the Town of Herkimer is the Petrie Subdivision located on the west side of Route 28 (see Figure 2). The State of New York constructed an earthen embankment on the west side of the subdivision to defend against flooding along the Herkimer Hydraulic Canal. This embankment is mowed and has trees removed by the NYSDEC; however, construction plans, as-built plans, or an operation and maintenance manual were not available for the embankment at the time of this report.

The flood risk associated with this levee embankment was not studied, as the Herkimer Hydraulic Canal and Mirror Lake are not mapped Special Flood Hazard Area (SFHA) on the effective Village or Town of Herkimer FIRMs. Since these waterways are currently not studied, the Petrie Levee was not included as part of the LAMP analysis. Future analysis could be warranted by the community or others to assess the flood risk in this area, including the undetermined potential flow from West Canada Creek to back up into the Herkimer Hydraulic Canal. Currently there is a gate located at the entrance to the Herkimer Hydraulic Canal. This gate was designed for both electric and manual operation, but has been disconnected from power and is now completely manual in operation. Maintenance and operations plans for this structure, while not currently a levee issue, are strongly suggested to be included in the local Hazard Mitigation Plan to ensure this structure can and will be operated to reduce potential flood hazards for local residents.

2.4 Non-Levee Embankments

During discussions with the LLPT, additional embankments in the Village of Herkimer and Town of Herkimer were discussed that do not meet the FEMA definition of a levee system (see Definitions) and are, therefore, considered non-levee embankments. These non-levee embankments are described below.

Non-levee embankments do not qualify for LAMP. Current mapping procedures indicate that areas landward of non-levee embankments shall be shown on the FIRM as a SFHA, subject to the flooding by the 1-percent annual chance flood.

2.4.1 Rails to Trails - Village of Herkimer

Per the Preliminary Herkimer County FIS, the State of New York constructed an approximately two-mile-long levee upstream of Route 5 in 1910 that was dressed in 1936 and was referred to as

the Works Progress Administration Levee. Based on discussions with the LLPT, the embankment is noted to be part of a trail system and potentially a former railroad. No data is available for the embankment and the embankment is not identified by the USACE as a levee system.

Per research and discussions with the NYSDEC, while reportedly designed as a levee, the embankment is privately owned and is not actively operated or maintained as a levee. The NYSDEC is neither aware of any construction or as-built plans for this embankment, nor are they aware of any operation and maintenance manuals for the earthen embankment. The NYSDEC also verified that they do not have top of levee survey for this embankment. Because there is no documentation available for this structure and it is not operated or maintained as a levee, it is considered a non-levee embankment and will not be considered as part of LAMP at this time. Should new information be provided in the future, LAMP may be an option.

2.4.2 Retaining Wall - Town of Herkimer

To the north of the Rails to Trails non-levee embankment is a concrete retaining wall on the west side of West Canada Creek extending north to approximately Shells Bush Road. The area landside of the retaining wall is elevated approximately 5 feet or more above the 1-percent annual chance flood. While the retaining wall is not considered a levee, it does serve to protect the west stream bank and landside development from erosive forces of West Canada Creek. The Town of Herkimer expressed concern over this area and noted loss of the wall and adjacent road during the June 2013 flooding and has requested that their engineering consultant explore this area further. As the retaining wall is not a levee, it will not be considered as part of the LAMP analysis.

2.4.3 Interstate 90 and Railroad - Village and Town of Herkimer

Interstate 90 (I-90) located to the south of the Herkimer Levee System and the railroad located to the north of the levee system, shown on Figure 1, are non-levee embankments. Unlike the Herkimer Levee System which was designed and constructed by the USACE for flood control, these embankments may not have been designed with respect to levee standards. Non-levee embankments are not considered for flood control and regulatory mapping procedures require areas landward of non-levee embankments to be designated as SFHA, subject to the flooding by the 1-percent annual chance flood.

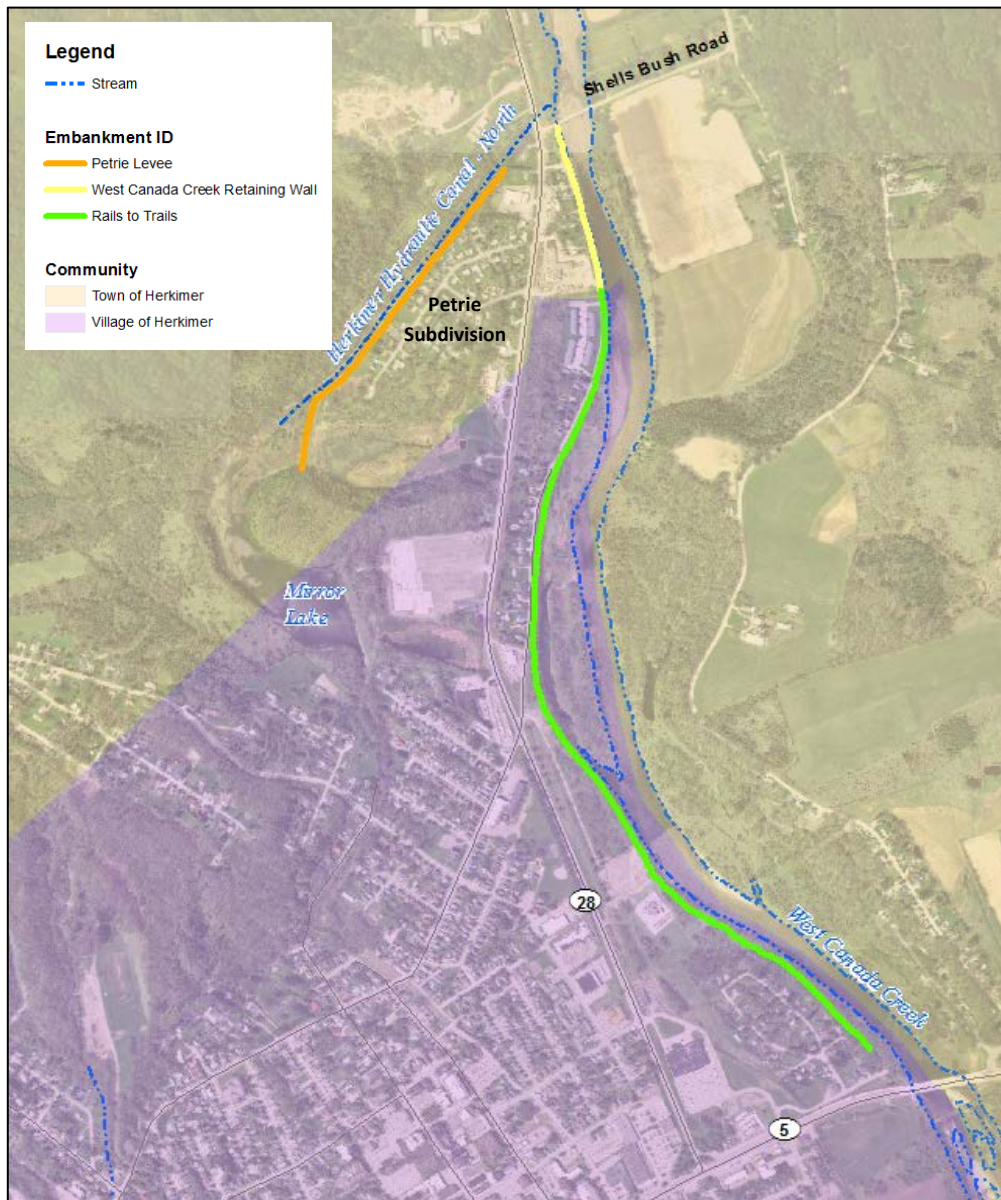


Figure 2: Embankment Location Map

2.5 LAMP Flood Risk Project

2.5.1 Affected Communities

Tables 2 and 3 summarize the communities' NFIP and FIRM history.

Table 2: Summary of Communities in Project Area

County	Community	Participating in the NFIP?	Estimated Number of Structures Impacted
Herkimer County	Village of Herkimer	Yes	550
Herkimer County	Town of Herkimer	Yes	0

Table 3: Community Map History

Community Name	Initial Identification	Flood Hazard Boundary Map Revision Date(s)	FIRM Effective Date	FIRM Revision Date(s)
Village of Herkimer	May 10, 1974	May 28, 1976	June 1, 1978	June 17, 2002; Preliminary FIRM anticipated in 2017
Town of Herkimer	March 8, 1974	May 28, 1976	April 17, 1985	Preliminary FIRM September 30, 2009; Preliminary FIRM for panels impacted by levee anticipated in 2017

The effective FIRM and FIS for the Village of Herkimer were completed after the construction of the Herkimer levee system; however, no data has been provided to identify that the levee system is eligible to be accredited under 44 CFR§65.10 and provides protection from 1-percent-annual-chance flooding.

A countywide FIRM and FIS were issued in preliminary form for Herkimer County, New York on September 30, 2009; however, the panels impacted by the Herkimer levee system were not issued due to unresolved levee issues. To move the production of the countywide FIRM and FIS forward, the preliminary FIRM panels impacted by the Herkimer levee system and the associated revised preliminary FIS are anticipated in 2017 and will use FEMA’s levee “seclusion” mapping practice. This means that flood hazard information from the effective FIRMs will be used to map the flood risk for areas landside of the Herkimer levee system in the Village of Herkimer. Areas on the riverside of the Herkimer levee system will be based on the data associated with the preliminary studies for the Mohawk River and West Canada Creek which may vary slightly from that shown in this report. The riverside flood risk associated with Bellinger Brook will be based on a redelineation of the effective FIS data. Mapping notes will be included on the FIRM and in the FIS to explain that the flood hazards will be updated in the future to reflect the flood risk due to the levee system based on the path forward identified through LAMP.

2.6 LAMP Process Tasks

The LAMP process is divided into six distinct tasks: LLPT Compilation, Field Reconnaissance, Perform Initial Levee Analysis, Flood Risk Outreach, Complete Levee Analysis and Mapping Plan, and Produce Preliminary Products/Issue Preliminary (see Table 4).

Table 4: Project Tasks

Task	Details	Tentative Start/End Dates*
LLPT Compilation	Identification and outreach to individuals to serve on the LLPT.	7/1/2016 – 7/28/2016
Field Reconnaissance	LLPT to determine levee reaches to study and potential analysis of those reaches. Perform field reconnaissance of these reaches.	7/28/2016

Task	Details	Tentative Start/End Dates*
Perform Initial Levee Analysis and develop Levee Analysis and Mapping Plan	FEMA to collaborate with the LLPT to develop analysis based on Field Reconnaissance findings and Levee Analysis and Mapping Plan.	7/28/2016-3/15/2017
Flood Risk Outreach	LLPT to assess results of the Field Reconnaissance and Perform Levee Analysis. LLPT to work at the local level to disseminate findings that could impact local communities.	7/28/2016-3/15/2017
Complete Levee Analysis and Mapping Plan; Finalize LAMP mapping (LAMP Phase II)	FEMA to complete detailed analysis based on chosen approach, develop mapping, and finalize Levee Analysis and Mapping Plan; develop final analysis and mapping.	TBD
Produce Preliminary Products / Issue Preliminary (LAMP Phase III)	FEMA to develop Preliminary Products (including FIRM database) from revised analysis above if that is the direction from FEMA and LLPT.	TBD

*All schedules are tentative and will be adjusted at the pace of the LLPT.

3 Local Levee Partnership Team

Based on the community meeting associated with the 2009 preliminary FIRM issuance, several stakeholders were identified as members of the LLPT. 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 5.

Table 5: Local Levee Partnership Team Participants

LLPT Member	Contact Information	Date Contacted
Bill Nechamen	NYSDEC, Floodplain Management Section 625 Broadway, Albany, NY 12233 518.402.8146; William.nechamen@dec.ny.gov	7/6/2016
Dan Stalteri	Councilman, Town of Herkimer 114 N. Prospect Street, Herkimer, NY 13350 315.723.5187; supervisor@townofherkimer.org	7/6/2016
Dominic Frank	Town Supervisor, Town of Herkimer 114 N. Prospect Street, Herkimer, NY 13350 315.866.8104; supervisor@townofherkimer.org	7/6/2016
Peter Macri	Superintendent, Village of Herkimer 120 Green Street, Herkimer, NY 13350 315.360.0352;	7/6/2016
Tony Carlisio	President, Ward Association 45 West Main Street, Little Falls, NY 13365 315.868.9681; wassocia@twcny.rr.com	7/6/2016
Rob Walker	Herkimer School District 315.868.2950; rwalker@herkimerCSD.org	7/6/2016
Anthony Brindisi	Mayor, Village of Herkimer 120 Green Street, Herkimer, NY 13350 315.866.3303;	7/6/2016
Tom Hart	NYSDEC 315.866.6330 x123; Thomas.hart@dec.ny.gov	7/6/2016

Rich Coriale	NYSDEC 315.793.2560; Richard.Coriale@dec.ny.gov	7/6/2016
Al Ash	NYSDEC 207 Genesee Street, Utica, NY 13501 315.793.2358; albert.ash@dec.ny.gov	7/6/2016
Kerrie O'Keeffe	NYSDEC 585.226.5465; kerrie.okeeffe@dec.ny.gov	7/6/2016
Patrick Lyng	NYSDEC 315.785.6151; patrick.lyng@dec.ny.gov	7/6/2016
Brittney Hyde	USACE Brittney.R.Hyde@usace.army.mil	7/6/2016
Ali Bachowski	USACE Ali.M.Bachowski@usace.army.mil	11/2016
Alan Springett	FEMA Region II 26 Federal Plaza, New York, NY 13820 212.680.8557; alan.springett@fema.dhs.gov	7/6/2016
Thomas Song	FEMA/CERC Contractor 14 Penn Plaza, 225 West 34th St, Suite 1304, New York, NY 10122 Thomas.song@mbakerintl.com	7/6/2016
Cara Spidle	FEMA/CERC 1111 19 th Street NW, 3 rd Fl, Washington, DC 20036 202.729.4288; cara.spidle@ogilvy.com	7/6/2016
Stephanie Nurre	STARR II 135 South LaSalle Street, Suite 3100, Chicago, IL 60603 312.262.2284; snurre@stantec.com	7/6/2016

4 Stakeholder Engagement

4.1 Stakeholder Engagement Meeting #1 (LLPT1)

A FEMA-led project team engaged the affected communities, other stakeholders, and levee owners/operators during LLPT Meeting #1 on July 28, 2016. The overall intent of the meeting was to establish contact, explain the LAMP process, and discuss the application of the LAMP process to the Herkimer levee.

At the first LLPT meeting, FEMA provided a brief overview of risk communication and reviewed the potential levee structures in the Village and Town of Herkimer. FEMA's transition from its previous analysis method for non-accredited levees to the new LAMP, approach, was explained. The three phases of LAMP, the Engagement and Planning Process, Detailed Flood Hazard Analyses, and Map Update, were presented.

FEMA explained the five procedures outlined in the LAMP Final Approach Document and the major distinctions of LAMP in comparison with earlier levee analyses. FEMA and STARR II led a discussion about the applicability of each procedure to the levees. It was concluded that the Overtopping Procedure was not applicable. However, the Natural Valley, and Structural-Based Procedures, Levee Certification, Sound Reach, and Freeboard Deficient Procedures were a possibility. Of these, the Natural Valley Procedure was highlighted as being the most likely

procedure for the levee due to no levee system data being provided to FEMA in support of 44 CFR §65.10 requirements.

FEMA concluded the presentation part of the meeting, by providing an overview of the timeline of the project.

Additional discussion included the levee system along each of the three streams. FEMA explained that at the current stage only a LAMP Phase 1 Study was being performed, and that a detailed analysis and development of regulatory mapping products will occur in the future

The meeting notes, materials, and attendee list for the 1st LLPT meeting are provided in Appendix A.

4.2 Stakeholder Engagement Meeting #2 (LLPT2)

The second LLPT meeting was held via conference call on November 10, 2016 to review the first pass analysis information with the LLPT members (see Section 5). The LLPT was given an opportunity to review the inundation results stemming from the LAMP analyses and determine if an alternate approach or alternate data should be used.

Based on the top of levee elevations used in first pass analysis, there was approximately three feet of freeboard along the levee system; however, the upstream end of the levee along West Canada Creek has less than three feet of freeboard. Additionally, upstream of the levee tie-in along Bellinger Brook, the channel has a history of overflows to the east and south to the landside of the levee and into the Village of Herkimer.

The preliminary analysis indicated that the Natural Valley Procedure and Structural-Based Inundation Procedures could be applicable to the levee system. The best option for the communities, was identified as the Natural Valley Procedure, except for the limited relief of the Structural Based Inundation Procedure to the east and west of Washington Street along the Mohawk River.

FEMA explained that the project information would be captured in a Levee Analysis and Mapping Plan (this document). A 90% complete draft of the plan would be prepared in November/December 2016 and a third LLPT meeting was held in early January, to include attendance by Town and Village Council/ Board Members (separate meetings).

The meeting notes, materials, and attendee list for the 2nd LLPT meeting are provided in Appendix B.

5 First Pass Analysis

FEMA developed a First Pass Analysis, which is a limited analysis developed with available data, to approximate the floodplain boundary for each LAMP approach. This analysis informed the discussions in LLPT Meeting 2, during which the LLPT finalized the LAMP procedures to be recommended for refinement in a future LAMP Phase II study.

5.1 Establishing Initial Levee System Reaches

A key component of LAMP is to define appropriate segmentation of levee systems into levee reaches (see Definitions) to refine potential mapping approaches for each reach based on available data and conditions.

The USACE top of levee survey for the Herkimer levee system compared to the 1-percent annual chance event is provided in Appendix D. Based on this data and the alignment of the levee system adjacent to the Mohawk River, West Canada Creek, and Bellinger Brook, the levee system was divided into 3 reaches. These reaches, shown in Figure 3, were evaluated under the First Pass Analysis to assess the potential flood risk for applicable LAMP procedures as described below.

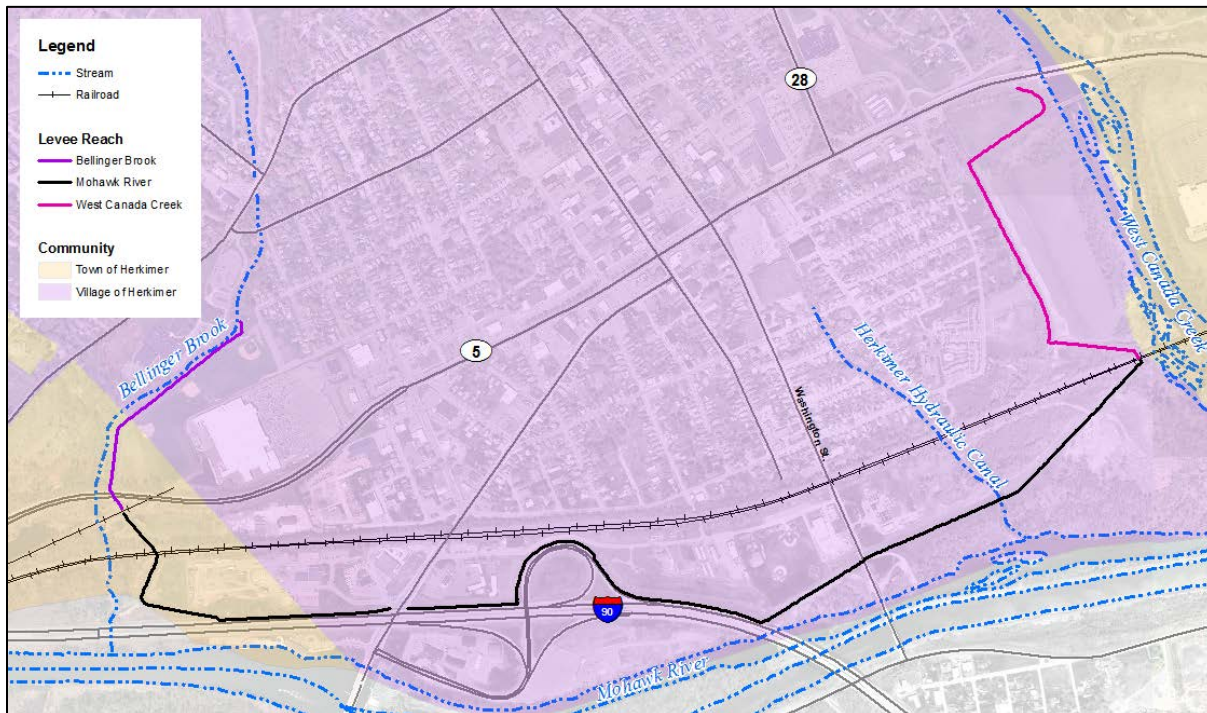


Figure 3: Herkimer Levee System LAMP Reaches

5.2 “With-Levee” Condition – Bellinger Brook

The Bellinger Brook Reach of the Herkimer Levee runs adjacent to the east side of Bellinger Brook to approximately Bellinger Avenue; however, the east bank of Bellinger Brook upstream of Bellinger Avenue does not contain the NFIP identified regulatory 1-percent-annual-chance flood. During 1-percent-annual-chance and larger flood storm events, flow overtops the banks and is conveyed overland to the east and south into the village. Due to the steep upstream ravine like characteristics of the watershed, flows in the channel reach high velocities and have caused damage to adjacent properties, channel instability, and destroyed the West German Street crossing during the June 2013 storm event. Due to the potential impact on the village, a First Pass 2-Dimensional hydraulic analysis was prepared using effective flowrates from the FIS. The resulting estimated inundation area for the 1-percent-annual-chance-flood is illustrated in Figure 4. While this inundation may be conservative, the estimated inundation extents were verified with the LLPT with respect to observed conditions during the June 2013 storm event. Refinements of the First Pass analysis could be performed in the future to refine the estimated inundation area.

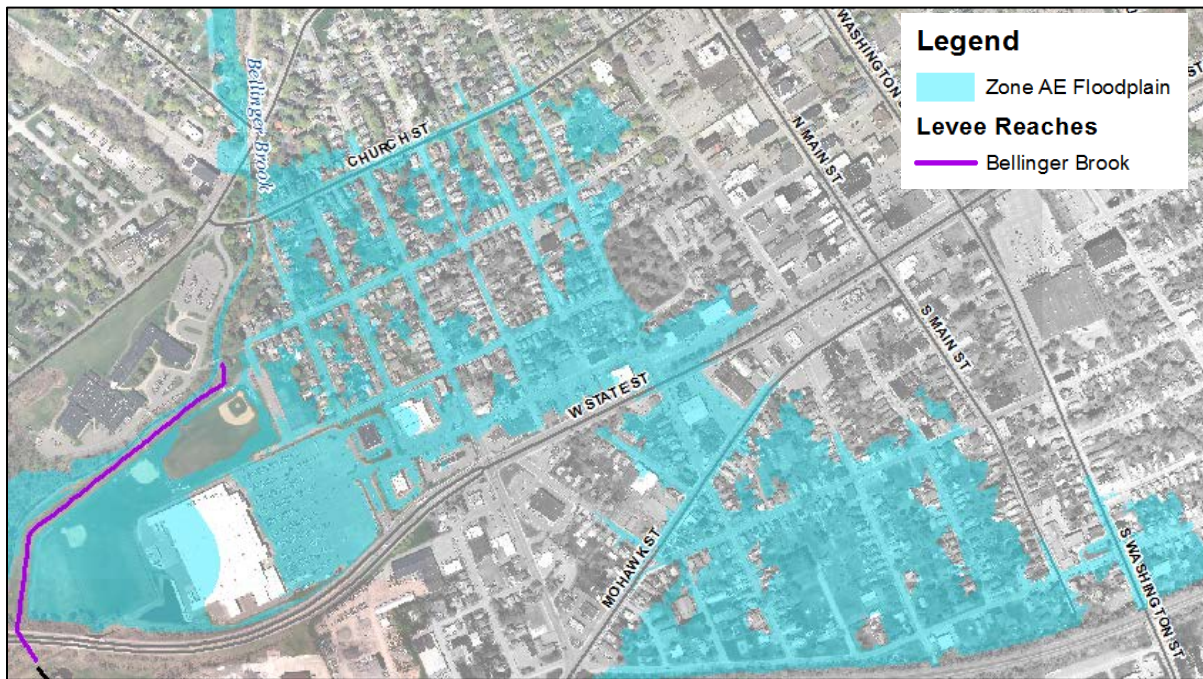


Figure 4: Bellinger Brook Reach – “With-Levee” Inundation

5.3 Natural Valley Procedure

The Natural Valley LAMP Procedure flood hazard mapping allows flow to be conveyed on both sides of a non-accredited levee. Figures 5, 6, and 7 illustrate the individual reach results of the Natural Valley First Pass Analysis using HEC-RAS 5.0.3 for the Mohawk River, West Canada Creek, and Bellinger Brook reaches, respectively.

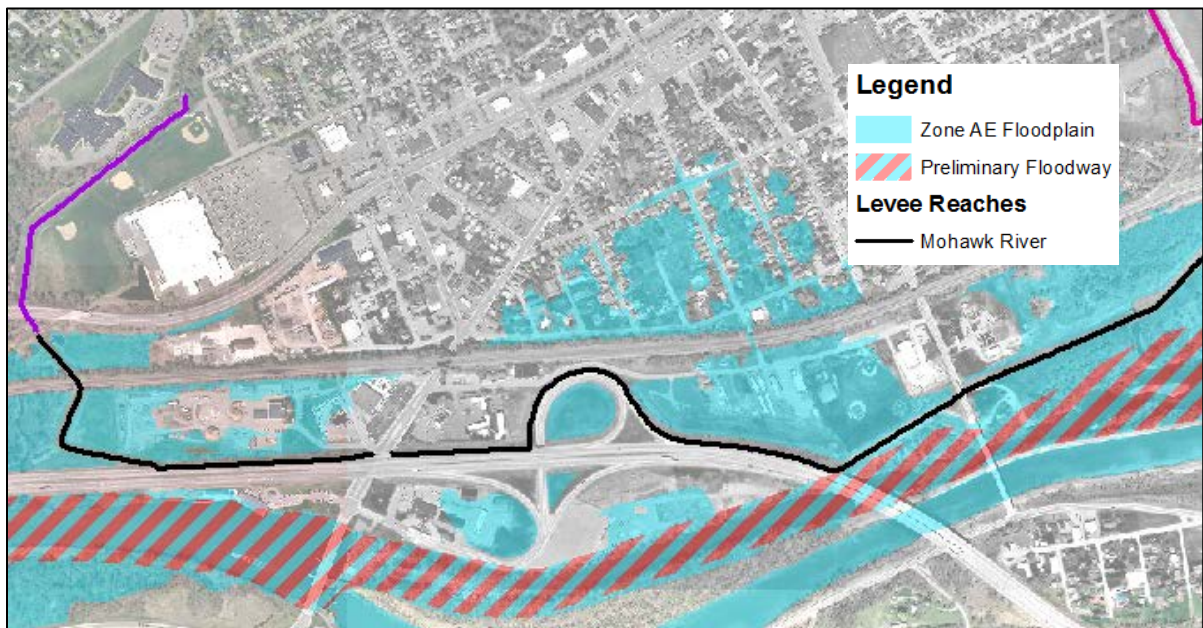


Figure 5: Mohawk Reach - Natural Valley Procedure Inundation

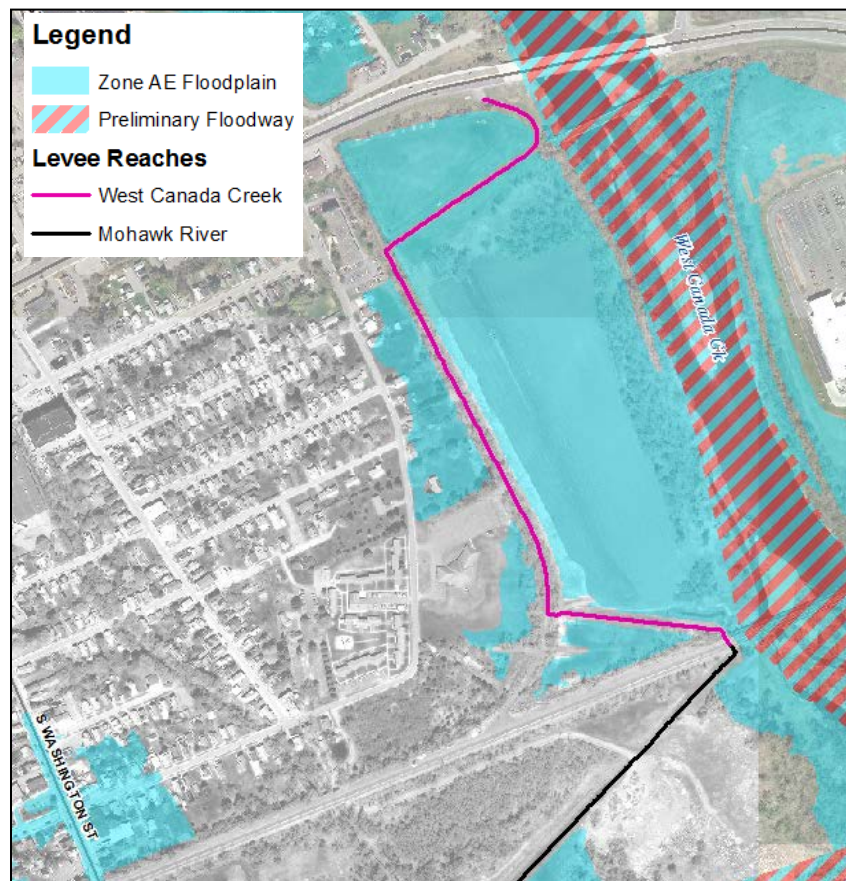


Figure 6: West Canada Creek Reach - Natural Valley Procedure Inundation

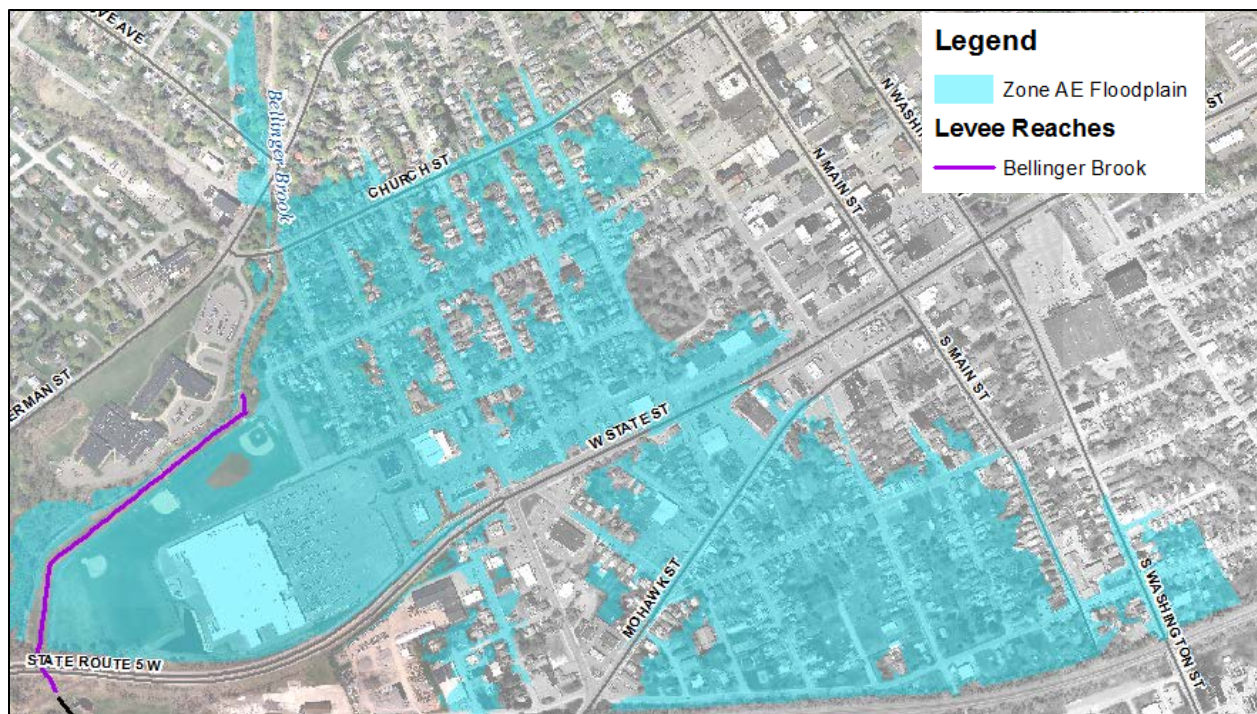


Figure 7: Bellinger Brook Reach - Natural Valley Procedure Inundation

5.4 Structural-Based Inundation First Pass Analysis

First Pass Analyses (2-dimensional) were developed for levee breaching scenarios using HEC-RAS 5.0.3 for each reach. The Mohawk River was estimated to breach in three locations and the West Canada Creek and Bellinger Brook reaches were estimated to be breached in one location along each reach. The results of these analyses for each individual reach are mapped in Figures 8, 9, and 10. These modeled breach locations were only developed for modeling purposes and no levee areas chosen indicate potential for breach development.



Figure 8: Mohawk Reach - Structural-Based Inundation Procedure Inundation

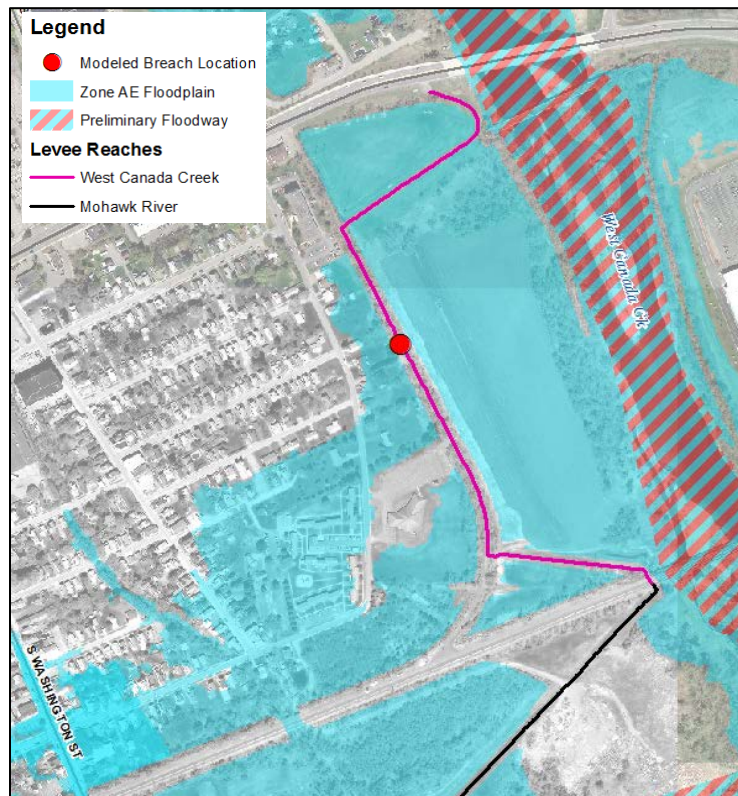


Figure 9: West Canada Creek Reach - Structural-Based Inundation Procedure Inundation

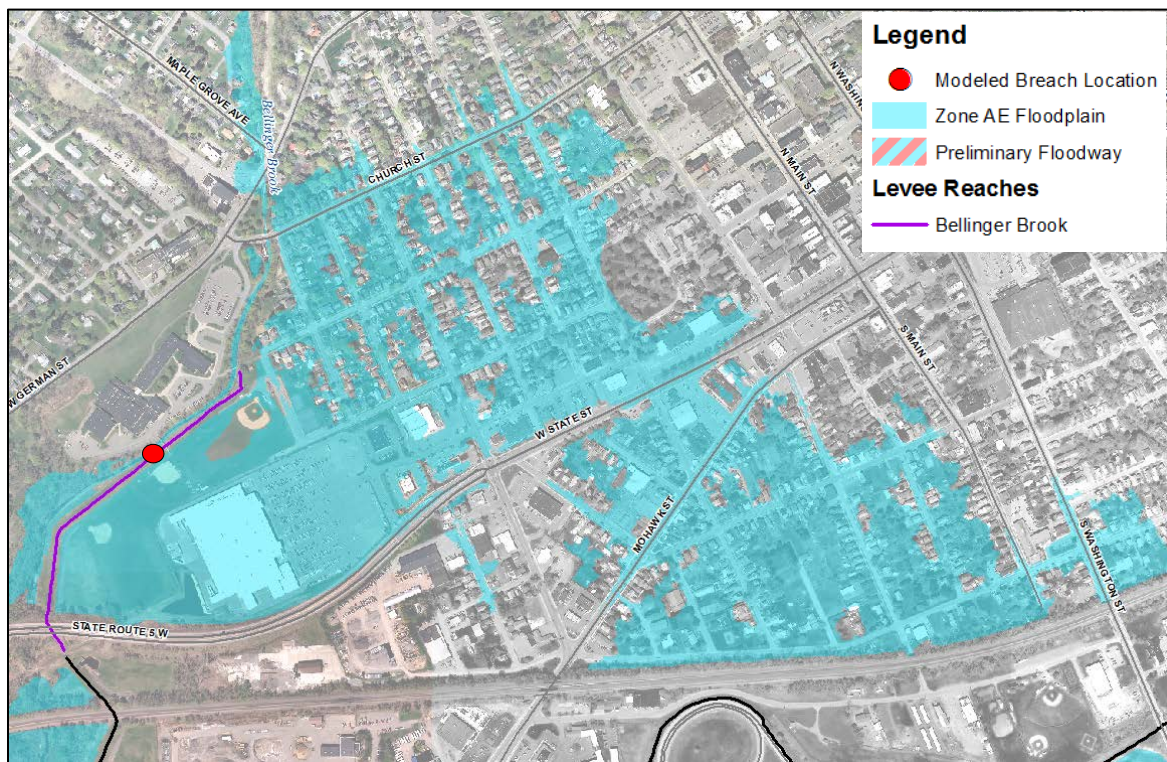


Figure 10: Bellinger Brook Reach - Structural-Based Inundation Procedure Inundation

5.5 Freeboard Deficient Procedures

The available top of levee survey for the West Canada Creek Reach of the Herkimer Levee System indicated that minimum freeboard requirements at the upstream end of the levee may not be met. Should data in support of 44 CFR §65.10 be submitted and show the top of levee at the upstream end above the 1-percent-annual-chance flood, but not meeting minimum freeboard requirements, the levee could be shown using the Freeboard Deficient Procedure. The landside flood risk consistent with the Natural Valley Procedure would be mapped as Zone D floodplain. Alternately, a flood risk analysis could be performed and the levee identified as having allowable freeboard as a result of a positive finding, so long as the freeboard is at least two feet above the BFE.

5.6 Review of First Pass Analyses

Based on the results of the First Pass Analyses noted above, discussions with LLPT members, and review of the collected data, a composite map identifying the potential flood risk landside of the Herkimer Levee System was prepared and is shown in Figure 11.

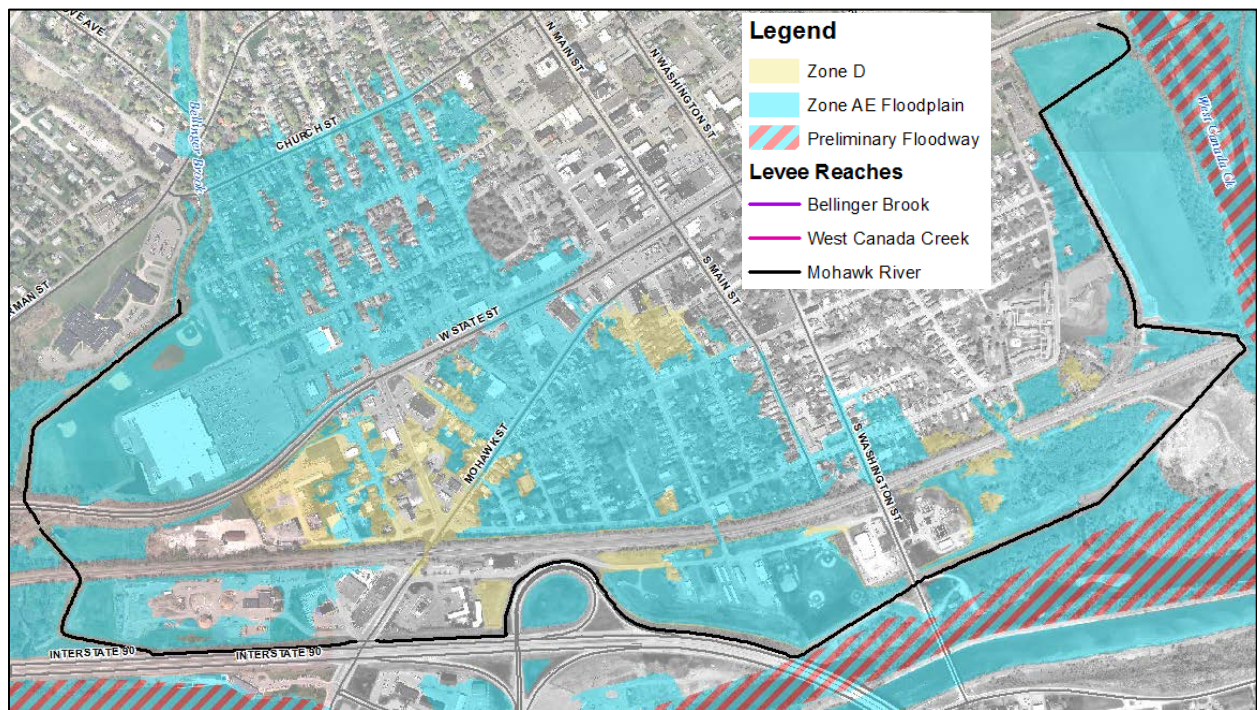


Figure 11: Herkimer Levee System Composite LAMP Inundation

6 Path Forward

6.1 LAMP Phase 2 Analysis

If the Herkimer Levee cannot be accredited, FEMA will undertake a LAMP Phase II and LAMP Phase III study at a future date to take into account the hazard reduction impacts of the non-accredited levee.

The future LAMP Phase II analysis will be focused on refining the Natural Valley Procedure analysis for all reaches and the Structural Based Inundation Procedure for reaches of the Mohawk River. The models and source data will be reviewed and refined with any updated information (e.g., updated discharges, recent surveyed cross sections, updated land cover data, and topographic data). The subsequent LAMP Phase III study will incorporate the LAMP Phase II results into the regulatory NFIP products, namely the FIS report and FIRM.

6.2 Levee Accreditation

If a levee owner/sponsor can demonstrate that the Herkimer Levee System meets the minimum requirements of 44 CFR §65.10 of the NFIP regulations, the landside flood risk could be shown as shaded Zone X; however, due to the out of bank flow upstream of the existing levee along Bellinger Brook, there would still be a large area of the village that would be identified as Zone AE SFHA. FEMA's Levee Accreditation Checklist has been included in Appendix F for reference.

7 References

FEMA, Flood Insurance Rate Map 01-03, Town of Herkimer, New York, Herkimer County, April 17, 1985.

FEMA, Flood Insurance Study, Village of Herkimer, New York, Herkimer County, June 17, 2002.

FEMA, Flood Insurance Study, Herkimer County, New York, All Jurisdictions, Number 36043CV000A, September 30, 2011 (Preliminary).

FEMA, Analysis and Mapping Procedures for Non-Accredited Levee Systems, July 2013.

FEMA, Operating Guidance 12-13 Non-Accredited Levee analysis and Mapping Guidance, September 2013.

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

USACE, Periodic Inspection Report No. 1 – Herkimer, Mohawk River Flood Risk Management Project, Executive Summary, January 2012.

Appendix A
Stakeholder Engagement - LLPT Meeting #1 Information

Appendix B
Stakeholder Engagement - LLPT Meeting #2 Information

Appendix C

Approach Agreement

Appendix D

Freeboard Profile Comparison

Appendix E

Levee Accreditation Checklist