Levee Analysis and Mapping Plan
Pillar of Fire Levee

Township of Franklin, Somerset County, New Jersey

February 2020

FEMA

RiskMAP
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Acronyms

BFE	Base Flood Elevation
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
LAMP	Levee Analysis and Mapping Procedure
LLPT	Local Levee Partnership Team
LOMA	Letter of Map Amendment
LOMC	Letter of Map Change
LOMR	Letter of Map Revision
NAVD 88	North American Vertical Datum of 1988
NGVD 29	National Geodetic Vertical Datum of 1929
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 Procedure (LAMP) Approach* – Levee Analysis and Mapping Procedures include Sound Reach, Freeboard Deficient Procedure, Overtopping Analysis, Structure 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* – All land areas that would be subject to inundation by the 1-percent-annual-chance flood if the levee system were not present.

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

Levee Segment - A discrete portion of a levee system that is operated and maintained by a single entity.

Levee System – A flood hazard-reduction system that consists of one or more levee segments and other features such as floodwalls and pump stations, which are interconnected and necessary to ensure exclusion of the design flood from the associated leveed area, and which are constructed and operated in accordance with sound engineering practices.

Local Levee Partnership Team (LLPT) – A work group that is 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 in the NFIP regulations at Title 44, Chapter 1, Section 65.10 of the Code of Federal Regulations (44 CFR § 65.10) and is not shown on a FIRM as reducing the base flood hazards.

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)

0.0 Executive Summary

The Federal Emergency Management Agency's (FEMA's) Flood Insurance Study (FIS) and Flood Insurance Rate Map (FIRM) for the Township of Franklin, Somerset County, New Jersey, must be revised to reasonably account for the hazard reduction impacts of non-accredited levees. FEMA's guidance was revised in 2013 to incorporate a new Levee Analysis and Mapping Procedure (LAMP) that provides a suite of flexible procedures to perform flood hazard analysis and mapping (see Section 1). In the Township of Franklin, FEMA Region II has initiated a Levee Discovery project where the LAMP (see Section 2) are being applied to the Pillar of Fire Levee. This study will help identify potential options the levee owner may consider for the depiction of flood hazard within the levee-impacted areas on a future FIRM.

In May 2019, FEMA Region II partnered with stakeholders in the Township of Franklin to form a collaborative Local Levee Partnership Team (LLPT) and worked to determine the potential LAMP for the Township of Franklin's Pillar of Fire levee system (see Sections 3 and 4 respectively). The process involved the collection and group evaluation of available data, creation and evaluation of 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 initial data LAMP analysis (see Section 5). The information collected and the analysis performed allows for the development of this document—a plan outlining potential reach procedures. This document informs the path forward (see Section 6). A meeting of the LLPT in November 2019 allowed FEMA to present the initial data LAMP analyses and discuss the options for moving forward. Based on the limited information at this time, the Township of Franklin has selected the Natural Valley procedure with the understanding that initial data analysis will be augmented with updated Hydrologic and Hydraulic study prior to revised mapping.

This LAMP Plan summarizes the discussions and decisions by FEMA and project stakeholders on how best to map the flood hazards landward of the Pillar of Fire levee system.

1.0 Introduction

FEMA, its Production and Technical Services contractor Strategic Alliance for Risk Reduction II (STARR II), and Community Engagement and Risk Communication contractor *Resilience Action Partners* initiated the LAMP process for the levee in the Township of Franklin. Recent technological advances in data collection methods and hydrologic and hydraulic modeling were leveraged as part of this process. The LAMP process is a more refined approach to mapping flood hazards in areas landward of levee system than the former approach.

The LAMP process includes the following advantages:

- 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 Pillar of Fire levee system in the Township of Franklin is currently designated as a Zone X (shaded) in the 2016 FIS. FEMA is using the LAMP process to develop refined flood hazard mapping in areas landward of the levees. This will provide a more realistic representation of levee-related flood hazards in the Township of Franklin.

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 risk reduction 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):** FEMA performs analysis and shares results with the LLPT to validate results against available data and documentation. Results are compared to the effective FIS to update the LAMP Plan, if necessary. FEMA encourages that draft maps prepared at this stage be used as best available data for floodplain management.
- **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 as the regulatory basis for local floodplain management.

This report describes the LAMP Plan for the Pillar of Fire levee system, a result of the collaboration between FEMA, the Township of Franklin, Somerset County, New Jersey, the New Jersey Department of Environmental Protection (NJDEP), and other local stakeholders. This report documents the progress through Phase 1, including the initial data analysis results and data evaluation, as well as the community selection of the preferred LAMP Approach.

2.0 Levee System Description

2.1 Flood Risk Reduction Measures in the Township of Franklin

The Pillar of Fire levee system (see Figure 1) is comprised of a single earthen embankment structure designed to reduce the flood risk from the Millstone River (see Figure 1) in the Township of Franklin, Somerset County, New Jersey. This levee was built to protect Alma White College buildings and ground in the property owned and maintained by Zarephath.

Table 1. Township of Franklin Levee Data.

Owner	Zarephath Church – Pillar of Fire
Maintained by	Zarephath Church – Pillar of Fire
Built	1950
Flooding Source	Millstone River
Length	Approximately 0.41 Miles
Pump Stations	0
Closure Structures	0
Drainage Structures	5 Structures (assessment based on 2013 Record Drawings)

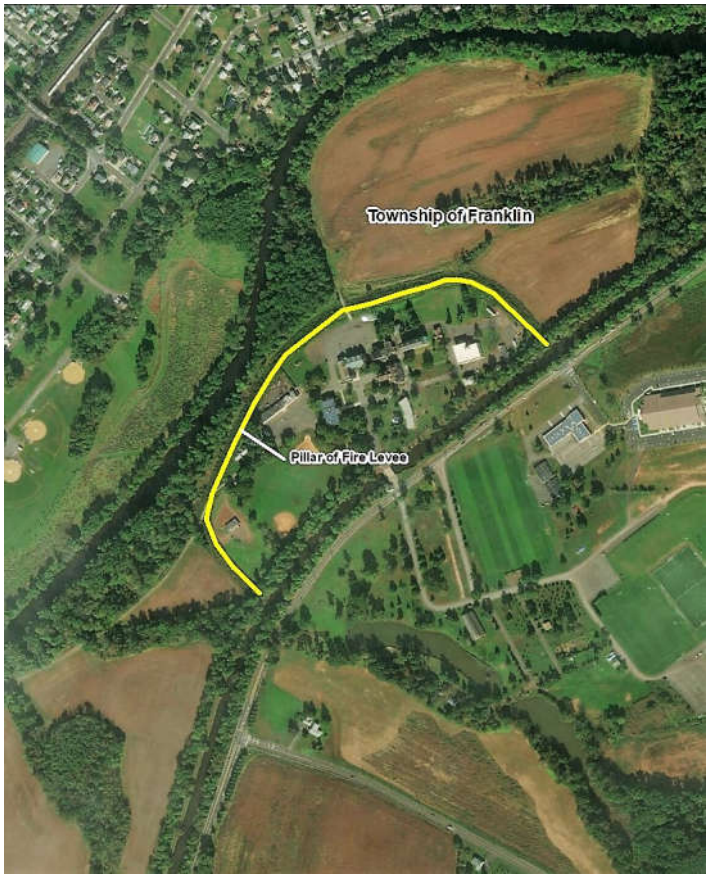

Figure 1: General Location Map.

2.2 Levee Analysis and Mapping Procedures Flood Risk Project

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

Table 2. Summary of Communities in Project Area.

County	Community	Participating in the NFIP?	Approximate Number of Structures Impacted by Levee System
Somerset County	Township of Franklin	Yes	6

Table 3. Community Map History.

Community Name	Initial Identification	Flood Hazard Boundary Map Revision Date(s)	Initial FIRM Effective Date	FIRM Revision Date(s)	FIRM Effective Date
Township of Franklin	October 12, 1973	September 17, 1976	May 15, 1980	March 16, 1989	September 28, 2007

The effective FIS for the Township of Franklin states that the top of the levee is at an approximate elevation of 41.1 feet North American Vertical Datum of 1988 (NAVD88) based on a 2000 survey provided by the Pillar of Fire in which the 1-percent-annual-chance profile is below the top of the levee. The Base Flood Elevation (BFE) at the levee is 40.4 feet NAVD88. The levee was overtopped by the flood of August 28, 1971, approximately equal to the 1-percent-annual-chance flood event.

2.3 Levee Analysis and Mapping Procedures Process Tasks

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

Table 4. Project Tasks.

Task	Details	Tentative Start/End Dates*
LLPT Compilation (Phase 0)	Identification and outreach to individuals to serve on the LLPT.	April- June 2019
Perform Initial Levee Analysis and develop LAMP Plan (Phase 1)	FEMA to collaborate with the LLPT to develop analysis based on Field Reconnaissance findings and Levee Analysis and Mapping Plan.	July – November 2019
Flood Risk Outreach (Phase 2)	LLPT to assess results of the Field Reconnaissance and Perform Levee Analysis tasks. LLPT to work at the local level to disseminate findings that could impact local communities.	November 13, 2019
Complete LAMP Plan; Finalize LAMP mapping (Phase 2)	FEMA to complete detailed analysis based on chosen approach, develop mapping, and finalize LAMP Plan; develop final analysis and mapping.	TBD
Produce and Issue Preliminary Products (Phase 3)	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.

3.0 Local Levee Partnership Team

Several stakeholders were identified as members of the LLPT (See Table 5). 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
Scott Thomas	Senior Engineer, Franklin Township Phone: 732-873-2500 x.6237 Email: scott.thomas@franklinnj.gov
Douglas Vornlocker	Director, Somerset County Emergency Management Phone: 908-725-5070 Email: vornlocker@co.somerset.nj.us
Ken Otrimski	Deputy Coordinator, Somerset County Emergency Management Phone: 908-541-5014 Email: otrimski@co.somerset.nj.us
Walt Lane	Somerset County Planning Phone: 908-231-7021 Email: lane@co.somerset.nj.us
Valerie Bogart	Somerset County Engineering Phone: 908-203-6026 Email: vbogart@co.somerset.nj.us
Margaret Collier	Project Manager Pillar of Fire Ministries Phone: 732-236-1053 Email: mcollier@pillar.org
Joseph Ruggeri	NJ Department of Environmental Protection Phone: 609-292-2296 Email: joseph.ruggeri@dep.nj.gov
Kunal Patel	NJ Department of Environmental Protection Phone: 609-292-2296 Email: kunal.patel@dep.nj.gov
Shudipto Rahman	FEMA Region II Project Monitor Phone: 202-702-4273 Email: shudipto.rahman@fema.dhs.gov
Scott Yi	Project Manager, STARR II Phone: 240-264-8082 Email: scott.yi@atkinsglobal.com
Trevor Cone	Regional Service Center, Region II Phone: 212-330-6157 Email: trevor.cone@stantec.com
Matt Kroneberger	*Resilience Action Partners* - Outreach support Phone: 212-237-6373 Email: matt.kroneberger@ogilvy.com

4.0 Stakeholder Engagement

4.1 Stakeholder Engagement Meeting #1 (Community Meeting, LLPT 1)

A FEMA-led project team engaged with Township of Franklin, levee owners/operators, and other stakeholders during the LLPT meeting #1 on June 20, 2019. During this meeting, a brief review of the LAMP was conducted by the FEMA project team, and a discussion pertinent to this levee impacting the Township of Franklin followed. During this discussion, the LLPT reviewed the levee system and history of performance and provided an overview of the LAMP and potential analysis scenarios (See Appendix A for minutes for the LLPT 1).

4.2 Stakeholder Engagement Meeting #2 (Community Meeting, LLPT 2)

On November 13, 2019, the LLPT 2 meeting 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 and Structure-Based Inundation (SBI) Procedure. During the discussion, FEMA stated that the results of Natural Valley and SBI are very similar due to the shape of levee. Therefore, Natural Valley was the preferred procedure as it does not attribute any cost or data requirement to the community. (See Appendix B for minutes for the LLPT 2)

4.3 Stakeholder Engagement Meeting #3 (Community Meeting, LLPT 3)

The LLPT 3 meeting was held on March 10, 2020, to review the first phase of the Levee Analysis and Mapping Procedure. During the meeting, the FEMA project team discussed the results of the first phase and the approximate timeline moving forward. (Appendix C will hold the minutes for the LLPT 3)

4.4 Data Collection

Through the Stakeholder Coordination and Data Collection process, FEMA requested all available data, information, and documentation associated with the levee system from the LLPT. Table 6 provides a summary of the data, information, and documentation collected during the Stakeholder Coordination and Data Collection process. The data has been included in Appendix D.

Table 6. Data Collection Summary

Data Type	Data Description	Source	Date Obtained
Levee Crest	Township of Franklin, As-Built Drawings May 2013	Pillar of Fire	2019
Effective Flood Insurance Study	Somerset County, New Jersey (All Jurisdictions), FEMA, Revised November 4, 2016	FEMA Map Service Center	2019
Effective Flood Insurance Rate Map	Somerset County, New Jersey (All Jurisdictions), FEMA, September 28, 2007	FEMA Map Service Center	2019
Topography	Somerset Co. NJ LiDAR (2008)	NOAA Office for Coastal Management	2019
As-Builts	Township of Franklin, Permitting Plan April 2012 and As-Built Drawings May 2013	Pillar of Fire	2019

5.0 Initial Data Analysis

FEMA developed an initial data analysis, which is an approximate analysis using a relatively low level of detail, to approximate the floodplain boundary for each relevant LAMP approach. This informed the discussions in LLPT Meeting 2.

5.1 Reach Analysis

A levee reach is any continuous section of a levee system to which a single reach analysis procedure (Section 5.2 through 5.3) may be applied. Based on the review of the available levee crest data, the Pillar of Fire Levee appears to below the BFE for the most part. For this reason, this levee was considered a single reach for the initial data analysis. The reach analysis procedures that apply are the Natural Valley and Structure-Based Inundation Procedures. FEMA can evaluate and map the flood risk without additional data from the levee stakeholders. A profile exhibit showing the estimated levee crest elevations from the Township of Franklin compared to the 1-percent-annual-chance flood elevation is provided in Section 5.4.

5.2 Natural Valley Procedure

The Natural Valley Procedure allows flow to be conveyed on both sides of a non-accredited levee. Figure 2 illustrates the results of the Natural Valley initial data analysis using HEC-RAS 5.0.3 (1-dimensional, steady-state flow).

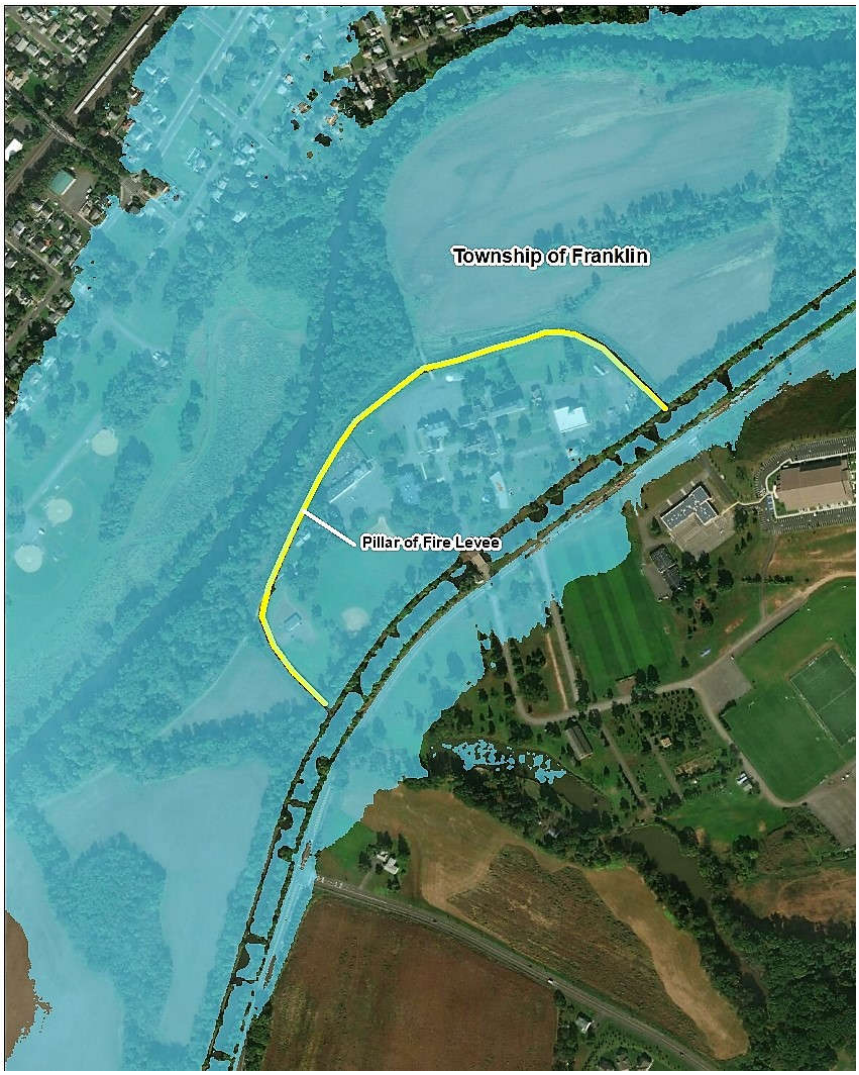

Figure 2. Natural Valley Procedure Mapping.

5.3 Structure-based Inundation Procedure

Initial data analyses (2-dimensional flow) were developed for two levee breaching scenarios using HEC- RAS 5.0.3. The results of these analyses are mapped in Figure 3. The procedural guidance outlined in the LAMP requires multiple breaches be applied to each levee system; however, due to the ring levee like alignment, only upstream and downstream locations were selected for breaches. When applied to the Pillar of Fire Levee, this procedure results in flood depths similar to the Natural Valley Procedure depths.

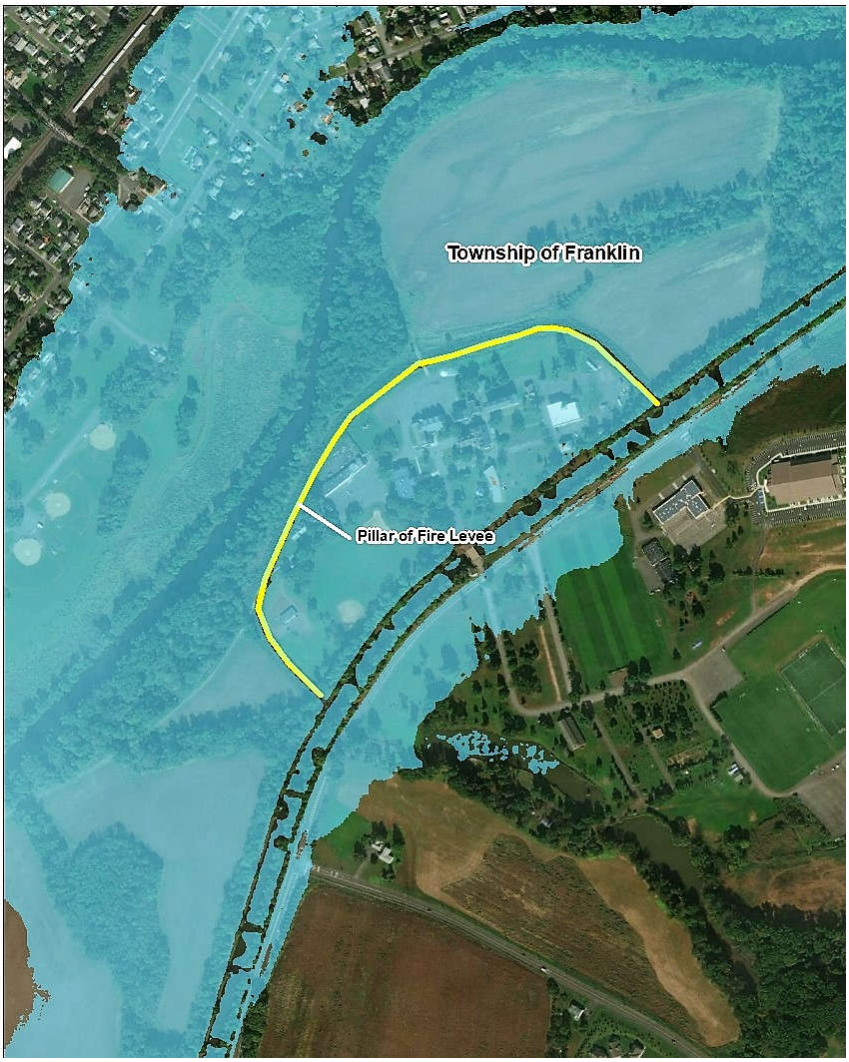

Figure 3: Structure-based Inundation Procedure Mapping.

5.4 Review of Initial Data Analyses

Summary results from the initial data analysis, Natural Valley Procedure and Structure-based Analysis, are included in Table 7. (See Appendix B for LLPT 2 Meeting Notes):

Table 7. Results from the Initial Data Analysis.

Type	Approximate Length of Levee Segment (ft)	Flooding Source(s)	Approximate # Structures Impacted	Comments: Natural Valley Procedure	Comments: Structure-Based Inundation (SBI)	Comments: General
Levee	2900**	Millstone River	6*	• Similar flood hazards to the Effective.	• SBI procedure shows a similar area in the floodplain compared to Natural Valley. • The SBI procedure shows flood depth as being approx. 1 foot or, less above the Natural Valley depths	• Based on the initial data analysis, Natural Valley is the recommended path forward

* National Levee Database information
** Survey Data

6.0 Path Forward

6.1 Levee Analysis and Mapping Procedures Phase 2 Analysis

The Pillar of Fire Levee is currently shown as providing Zone X (shaded) on the landward side of the levee on the effective FIRM. No data in support of the 44 CFR 65.10 requirements have been received by FEMA regarding the levee system; therefore, it is considered non-accredited.

FEMA engaged the Township of Franklin and all stakeholders through the LAMP for non-accredited levees process to help identify potential options to map the flood hazard for the levee-impacted area.

Based on the results of the initial data analysis and subsequent discussions during the LLPT 2 meeting between levee stakeholders and FEMA, it was concluded that future map updates would be informed by the results of the Natural Valley Procedure for Pillar of Fire Levee.

The timeline of future map updates to map the flood hazard has yet to be determined, but the standard due process will apply to inform the community of future map updates within the community.

7.0 References

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

FEMA, F*lood Insurance Study, Somerset County, New Jersey, (All Jurisdictions)*, November 4, 2016.

FEMA, *Guidance for Flood Risk Analysis and Mapping, Levees*, February 2019.

USACE, National Levee Database (https://levees.sec.usace.army.mil/#/), 2019.

NOAA Office for Coastal Management, 2008 New Jersey LiDAR, 2008

Pillar of Fire, Pillar of Pire Permitting Plan, April 2012 and As-Built Drawings, May 2013

Appendix A
Stakeholder Engagement - LLPT Meeting #1 Information

Appendix B
Stakeholder Engagement - LLPT Meeting #2 Information

Appendix C
Stakeholder Engagement - LLPT Meeting #3 Information

Appendix D
Collected Data

Appendix E
Initial Data Analysis: Modeling and Mapping files