Essex County, NJ
Levee Flood Hazard Identification

Township of South Orange Village

Local Levee Partnership Team (LLPT) Meeting 1

November 18, 2020

FEMA

Photo credit NOAA/NASA

Agenda

1. Introductions
2. Background and Context
3. Levee System Overviews
4. Path Forward & Next Steps

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

— American Society of Civil Engineers

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Our Purpose Today

- Overview of the Levee Discovery Project including a discussion of existing levee systems.
- Discuss FEMA's role and history with levee systems.
- Review options to identify and map flood risk.
- Introduce the Local Levee Partnership Team (LLPT) concept and discuss data collection.
- Discuss next steps and the path forward.

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Understanding Flood Risk

- Mapping flood hazard associated with levees requires additional considerations.
- Understanding local flood risk facilitates implementing actions to increase resilience.
- To study this risk, FEMA initiates Levee Discovery Projects that bring key stakeholders up to speed on the conditions of a levee/flood protection system, and inform any future flood hazard identification efforts

Why Now?

- FEMA Region II is actively engaging with communities that have non-accredited levee systems.
- Information developed though the discovery process will assist in future flood risk projects.
- Latest map update was 13 years ago.
- Several projects that could impact flood risk have been completed since then.

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FEMA's Role – Levee Systems

- FEMA assesses levee-related flood risk as part of the flood hazard identification work conducted through the RiskMAP program
- FEMA can accredit levees that meet the criteria of CFR 65.10 through *certification documentation provided by a community or other interested party*
- FEMA does not own, operate, maintain, inspect, or certify levees or flood control systems

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Township of South Orange Village

Levee System Overviews

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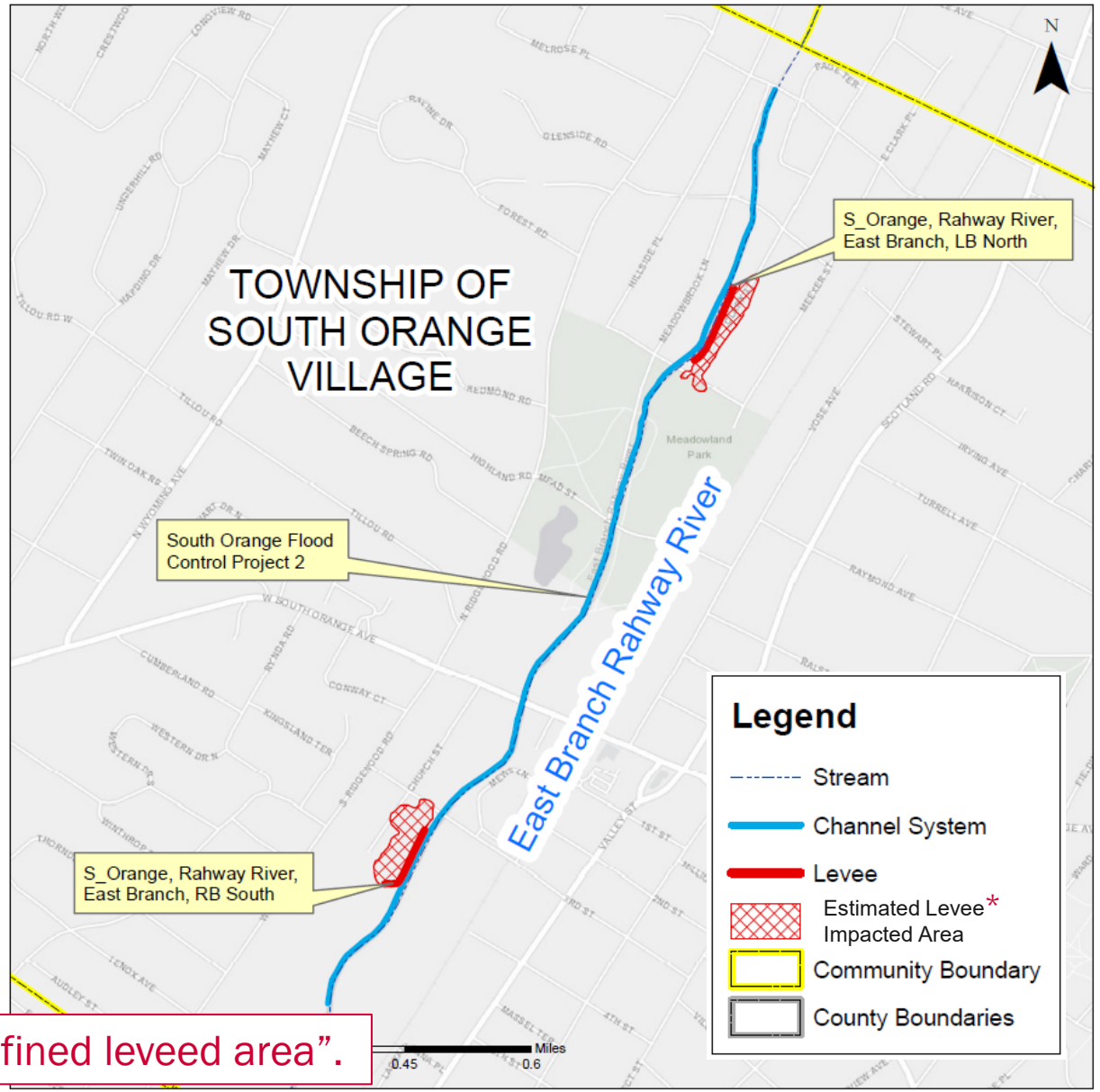
Levees of South Orange Village

- 2 levee systems
  - S_Orange, Rahway River, East Branch, LB North (Left Bank North Levee)
  - S_Orange, Rahway River, East Branch, RB South (Right Bank South Levee)
- 1 channel system
  - South Orange Flood Control Project 2 (flood control channel)



*referenced in the levee plan as “refined leveed area”.

South Orange Flood Control Channel

National Levee Database

HOME | ADVANCED SEARCH | DASHBOARD | MAP | MORE | SIGN IN

South Orange Flood Control Project 2

Info | Map | DOWNLOAD DATA

Location Newark, Essex County, New Jersey USACE Districts New York FEMA Regions 2

SUMMARY | SYSTEM | SEGMENTS | RISK | FEMA - NFIP/FIRM | FEATURES | PROFILE | ATTACHMENTS

Levee System Overview VIEW

No Data Entered

Levee Performance and Potential Lost Benefits VIEW

Risk	Not Screened

What is Behind the Levee?

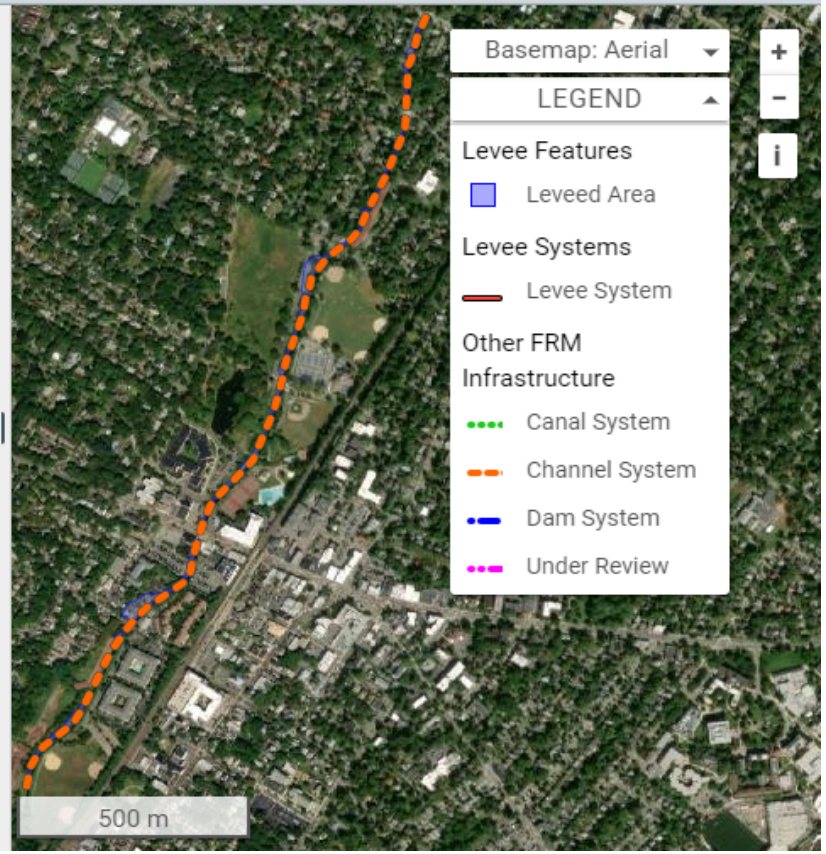
Population	Structures	Property Value
0	1	$498K

Structure and Features VIEW

Total Miles	Length of Embankment (miles)
1.24 Miles	1.24
Length of Floodwall (miles)	**Year Constructed**
0	1976
Maximum Average Height	**Number of Closure Structures**
No Data Entered	No Data Entered

Key Documents VIEW

Levee System Summary



Source: National Levee Database (NLD)
https://levees.sec.usace.army.mil/#/levees/system/1205200001/summary

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Left Bank North Levee System

National Levee Database

HOME ADVANCED SEARCH DASHBOARD MAP MORE SIGN IN

S_Orange, Rahway River, East Branch, LB North

Info Map DOWNLOAD DATA

Location East Orange, Essex County, New Jersey USACE Districts New York FEMA Regions 2

SUMMARY SYSTEM SEGMENTS RISK FEMA - NFIP/FIRM FEATURES PROFILE ATTACHMENTS

Levee System Overview VIEW

The South Orange Flood Risk Management Project is located on the left and right banks of the East Branch Rahway River, in the Township of South Orange Village. The South Orange Village, Essex County, NJ, is located on the East Branch of the Rahway River, approximately 23 miles upstream of the mouth of the Rahway River in the metropolitan portion of northern New Jersey. The upstream project limit is approximately 450 feet upstream of the Montrose Avenue Bridge, at the northerly boundary line of the Township of South Orange; and the downstream project limit being a bridge carrying a spur of the Consolidated Railroad Corporation (CONRAIL) system at approximately the southerly boundary of the Village. The project consists of a combination of levees and flood damage reduction channels.

The South Orange Flood Risk Management Project was authorized by Congress in the Flood Control Act of 1965, approved on October 27, 1965. Construction of the project was completed in 1976. The South Orange Village is responsible for operating and maintaining the flood risk management systems; a federally authorized, non-federally operated and maintained, urban flood risk management project.

According to the GDM, dated 1969, the project was designed to protect a total of 70 acres and involved 7,217

What is Behind the Levee?

Population	Structures	Property Value
0	1	$1.24M

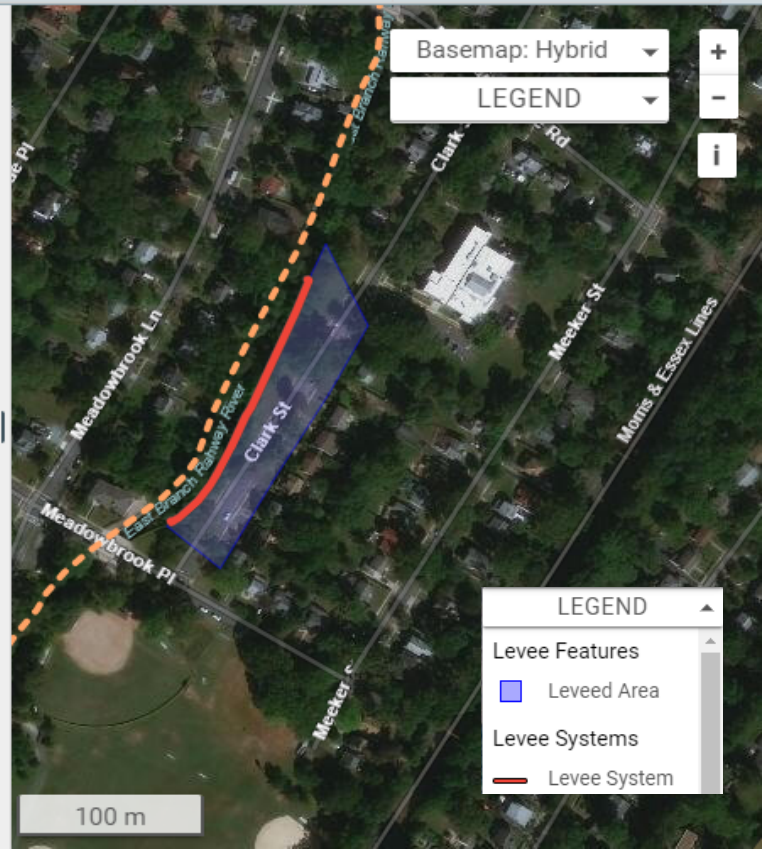
Structure and Features VIEW

Total Miles	Length of Embankment (miles)
0.1 Miles	0.1
Length of Floodwall (miles)	Year Constructed
0	1976
Maximum Average Height	Number of Closure Structures
1.71	No Data Entered

FEMA - NFIP/FIRM Information VIEW

FIRM Status

Accredited Levee System



Source: National Levee Database (NLD)

https://levees.sec.usace.army.mil/#/levees/system/4505000025/summary

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Right Bank South Levee System

National Levee Database

HOME ADVANCED SEARCH DASHBOARD MAP MORE SIGN IN

S_Orange, Rahway River, East Branch, RB South

Info Map DOWNLOAD DATA

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What is Behind the Levee?

Population	Structures	Property Value
0	2	$243K

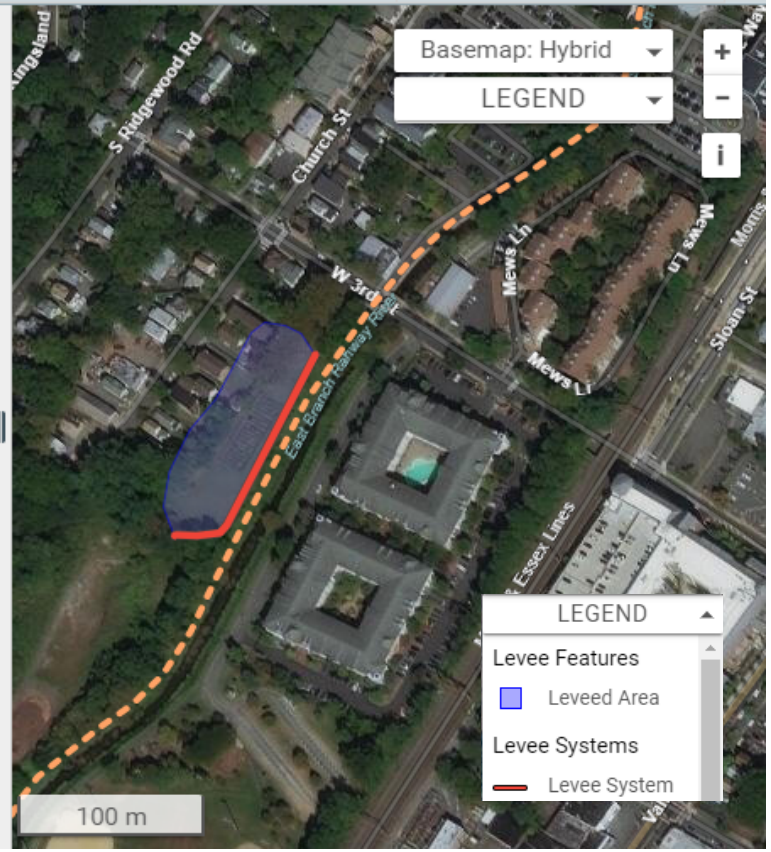
Structure and Features VIEW

Total Miles	Length of Embankment (miles)
0.09 Miles	0.09
Length of Floodwall (miles)	Year Constructed
0	1976
Maximum Average Height	Number of Closure Structures
2.80	No Data Entered

FEMA - NFIP/FIRM Information VIEW

FIRM Status

Accredited Levee System



Source: National Levee Database (NLD)

https://levees.sec.usace.army.mil/#/levees/system/4505000026/summary

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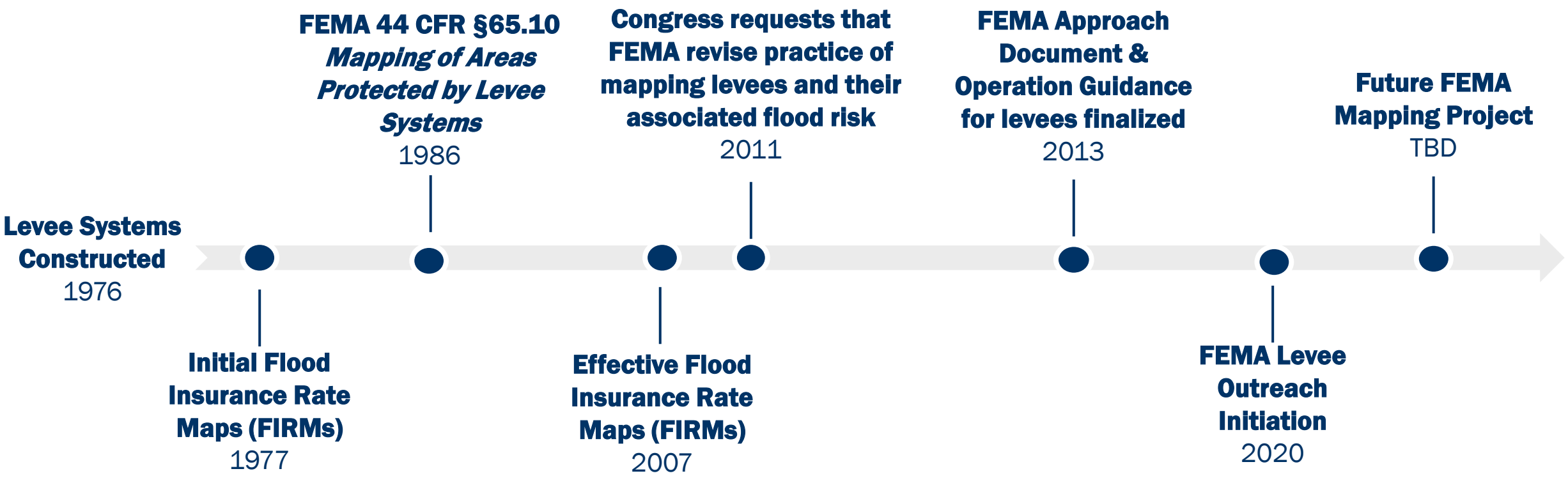
USACE 2016 Periodic Inspection Reports

SOUTH ORANGE FLOOD RISK MANAGEMENT PROJECT

- Built in 1976 to provide 100-yr protection
  - 2007 FEMA Flood Insurance Study (FIS) reports updated 100-yr peak flows
  - System no longer provides 100-yr protection
- Several project modifications since 2007 effective FEMA study
  - Bridge and channel reconstruction, interior drainage modifications
- USACE Minimally Acceptable Rating
  - Primarily due to missing data and documentation
- Noted 44 CFR 65.10 data was not available

FEMA History with Essex County Levee Systems



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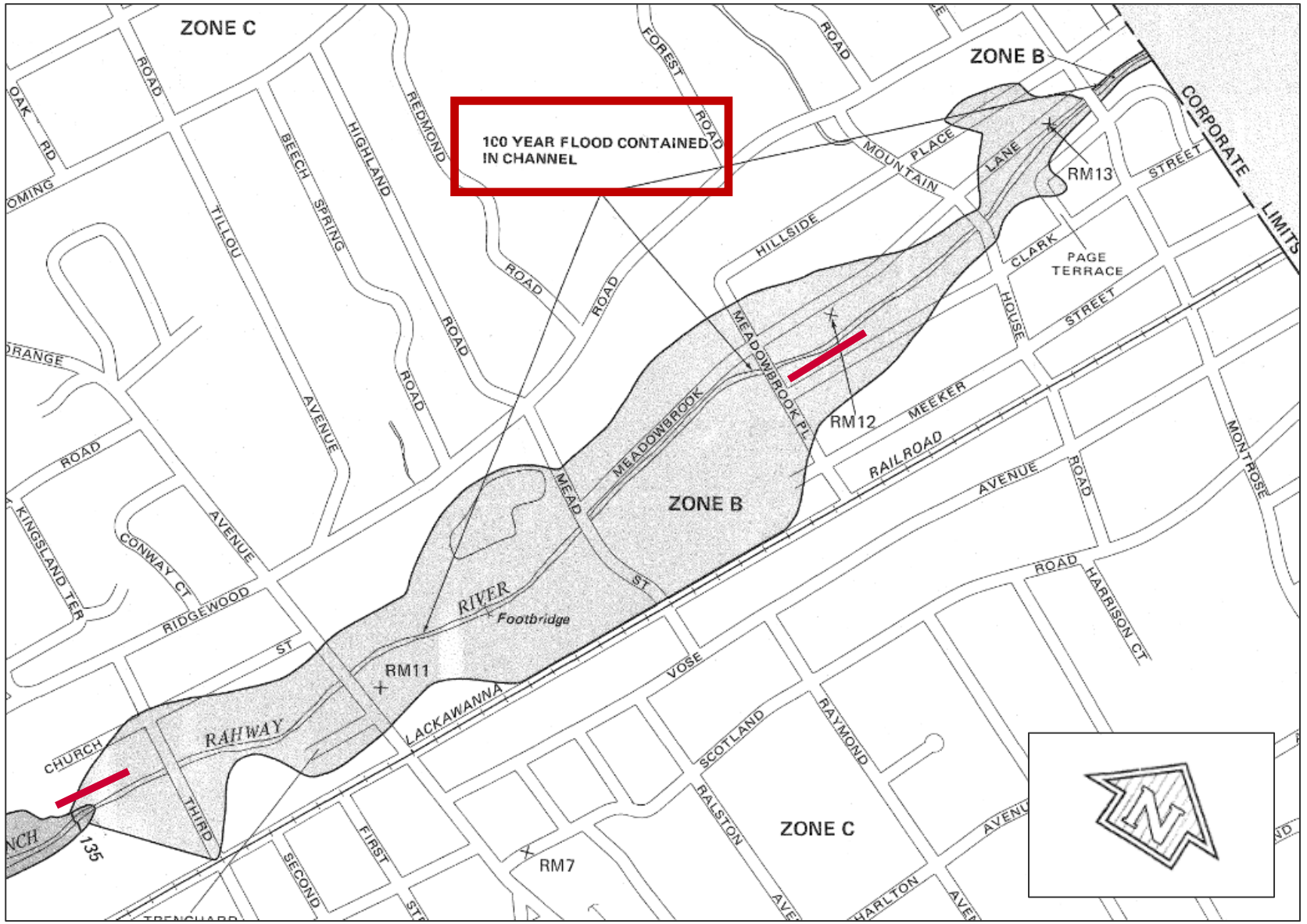
Initial FIRMs (1977)

Township of South Orange Village
Community-Panel: 340194 0001 A
Effective Date: July 18, 1977



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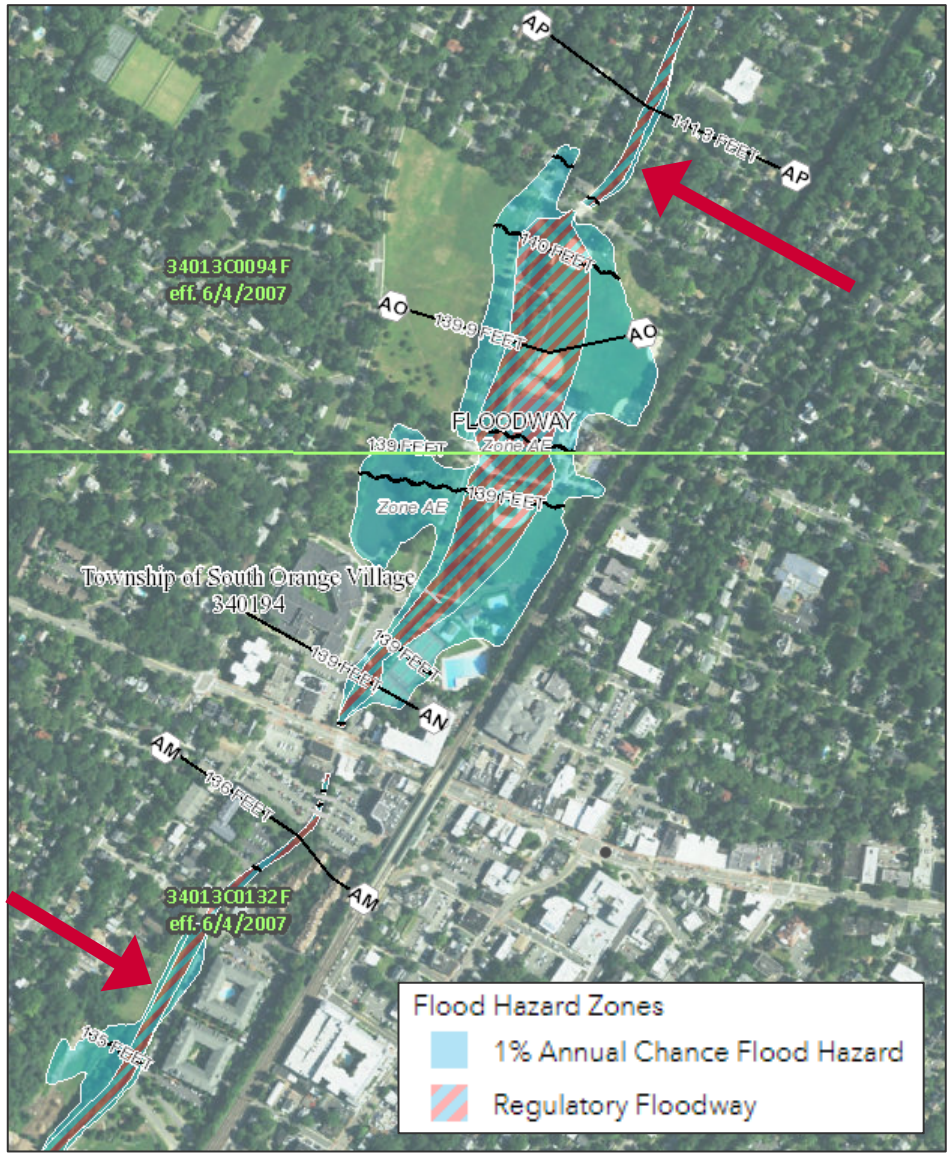
Effective FIRMs (2007)

- FEMA effective mapping no longer contained in channel
  - 100-year floodplain
  - Floodway
- 2 effective FIRM panels
  - 34013C 0094 F
  - 34013C 0132 F
  - Effective Date: June 4, 2007



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Effective FIRMs (2007)

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How Levee Systems Are Categorized

Accredited Levee System:

1. Certified Levee documentation* has been provided that demonstrates all requirements of 44 CFR §65.10 have been met.
2. Levee impacted area shown on FIRM(s) as reducing flood hazard from the one-percent-annual-chance flood.

Non-Accredited Levee System:

1. Certified Levee documentation* that demonstrates all requirements of 44 CFR §65.10 have been met has not been provided.
2. Levee impacted areas shown on FIRM(s) as not reducing flood hazard from the one-percent-annual-chance flood.

* **Certified levee documentation: As-built plans and additional data must be submitted to support that a given levee system complies with the structural requirements. This data must be certified by a registered professional engineer or a Federal agency with responsibility for levee design.**

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Levee Certification

Certification documentation should:

- Document that levee or flood control system *meets federal design, construction, maintenance, and operations standards* to provide protection from a flood of 1% annual chance or greater
  - Standards in 44CFR§ 60.3 outlined in 44 CFR§65.10
- Be based on investigations and review of the current levee condition by a state-licensed Engineer

FEMA Flood Insurance Rate Maps (FIRMs) are based on *conditions current at time of study* and *reflect the regulatory risk.*

Analysis And Mapping Procedures For Non-Accredited Levees

Includes:

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

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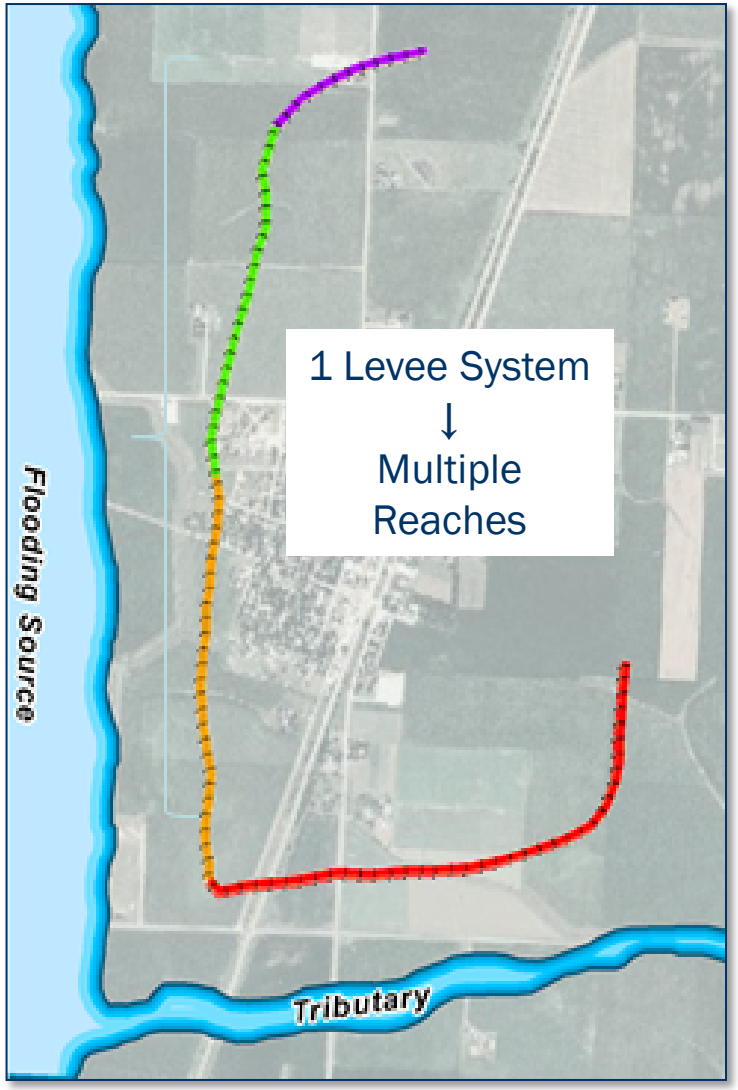
What Is A Levee Reach?

- A levee reach is a segment of a levee system, generally with similar characteristics, where a single technical procedure may be applied.
- Used to identify Special Flood Hazard Area (SFHA) within the levee impacted area. SFHA is that area inundated during a one-percent-annual-exceedance flood.



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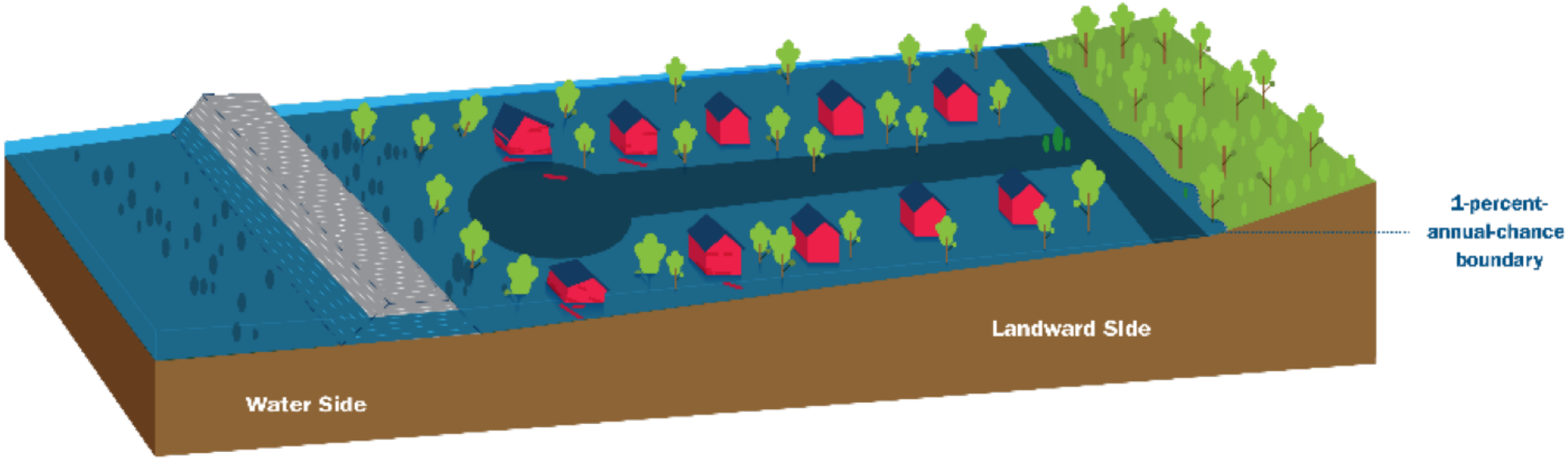
Natural Valley Procedure

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

Application: Levee does not meet
44 CFR §65.10, data not available



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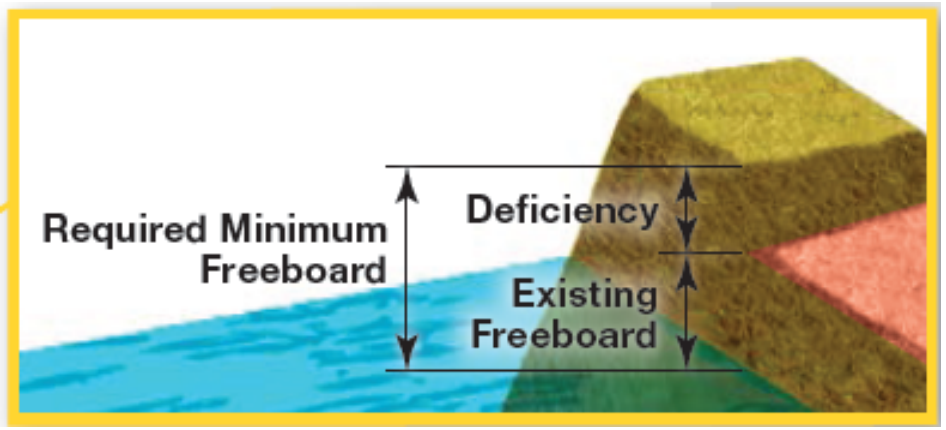
What is Freeboard?

- For levees and purposes of the NFIP, **freeboard is the vertical distance between the levee crest and the water level** that can be expected during the 1-percent-annual-chance flood.

- Freeboard is a **factor of safety** that tends to **compensate for the many uncertain factors** that could contribute to flood heights greater than the 1-percent-annual-chance flood (for NFIP) and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed.



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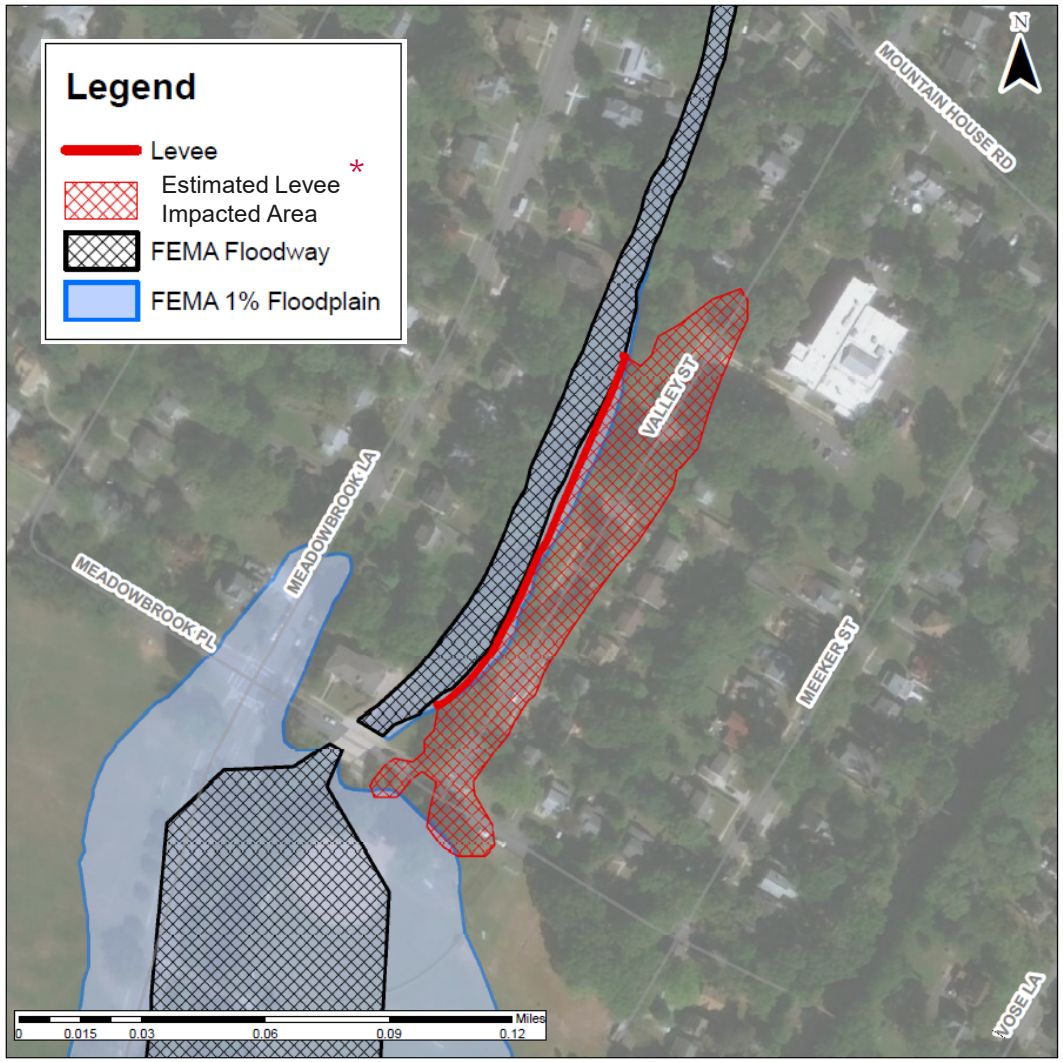
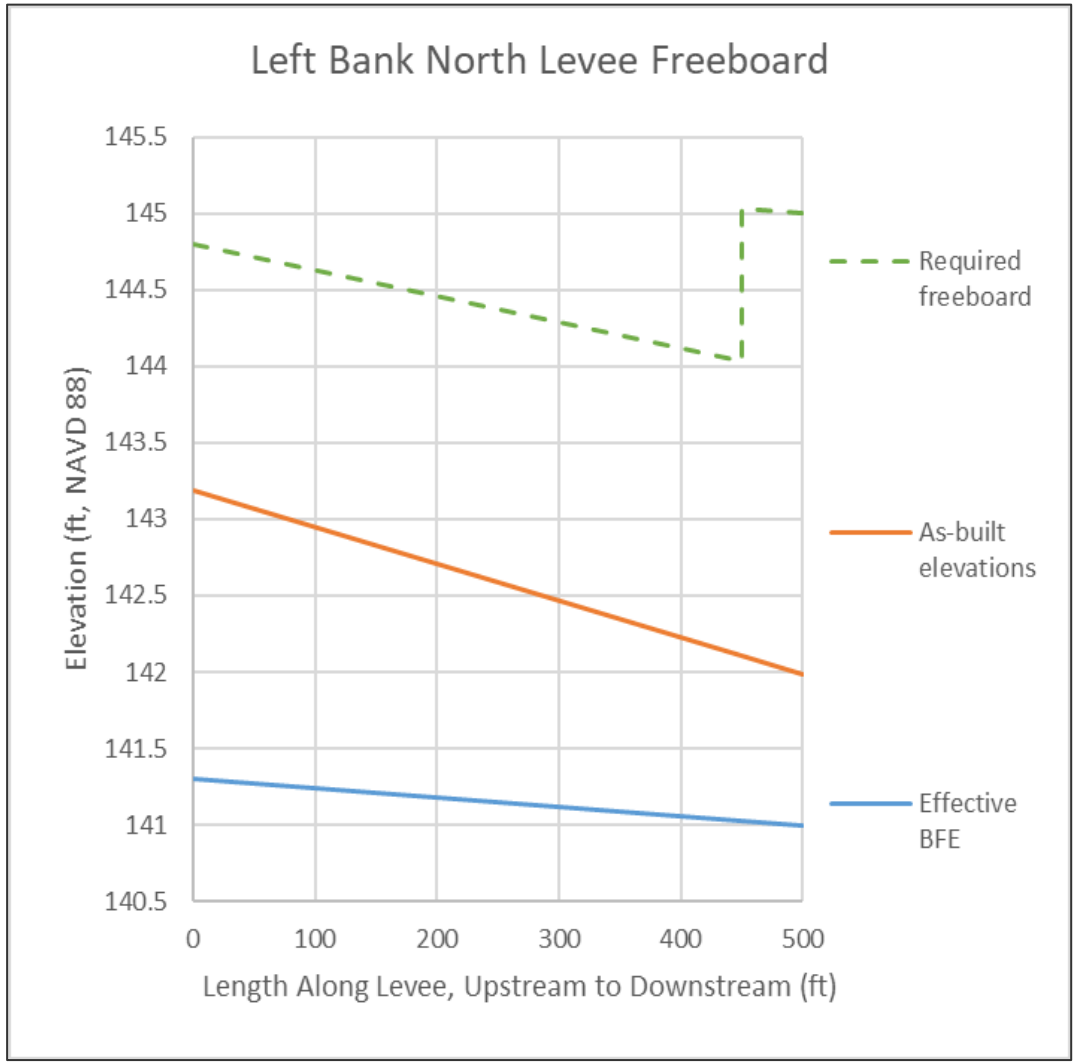
Left Bank North Levee





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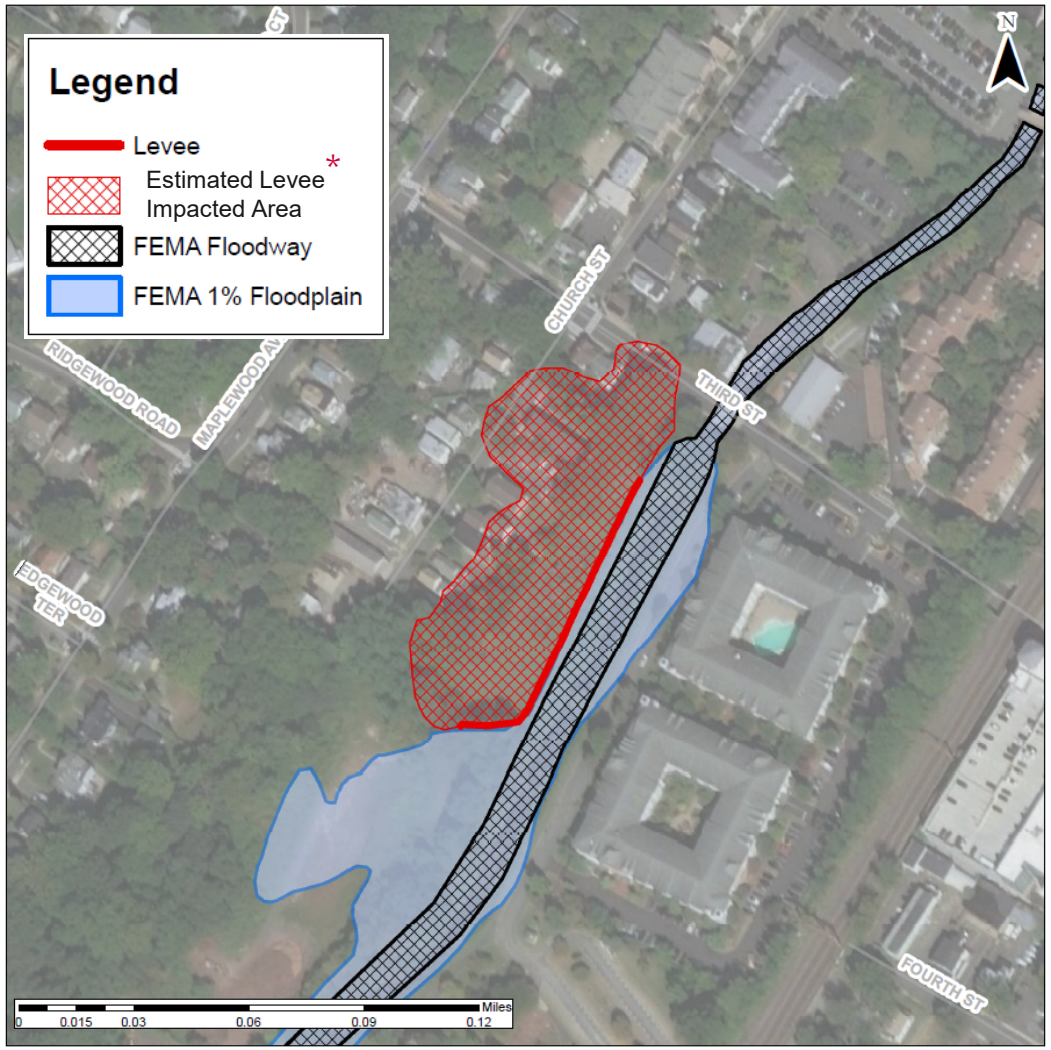
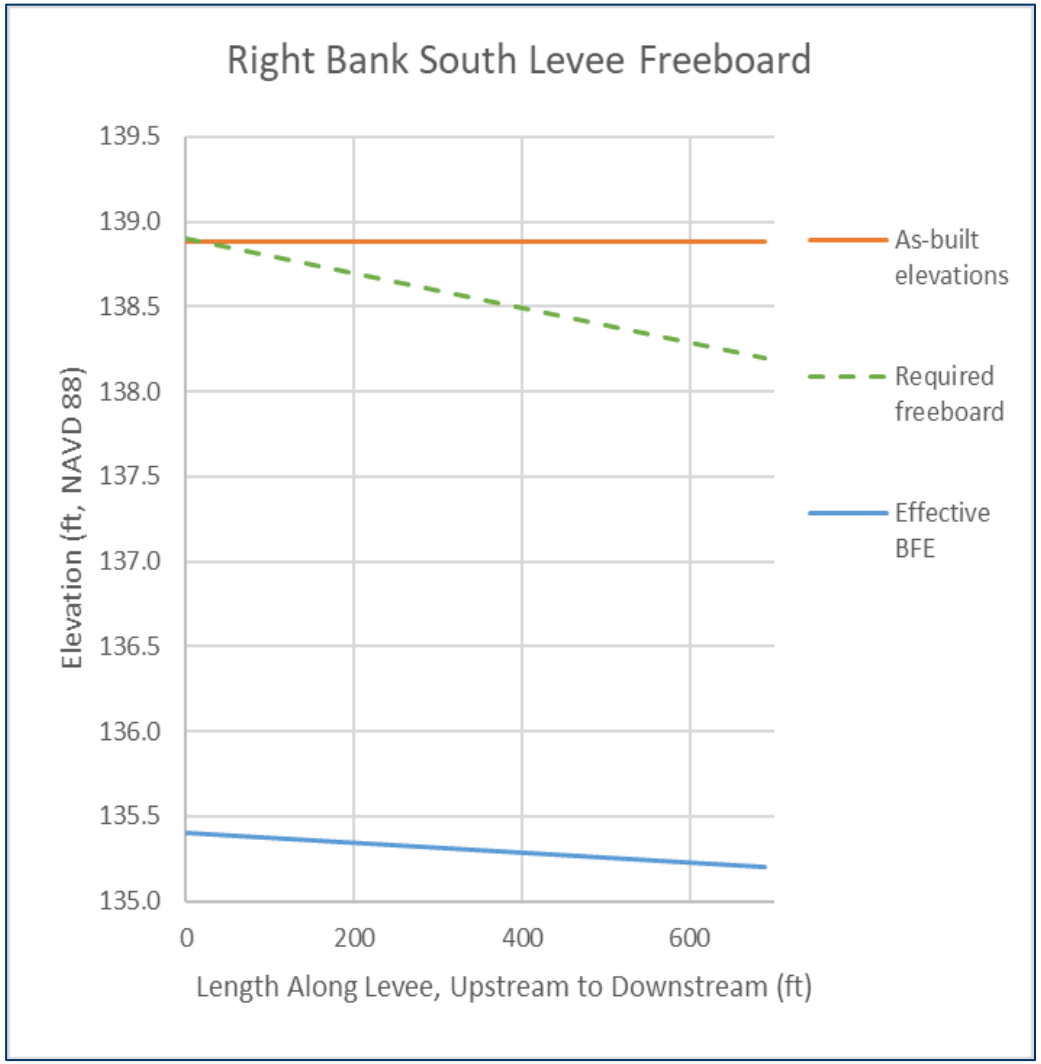
*referenced in the levee plan as “refined leveed area”.

Right Bank South Levee





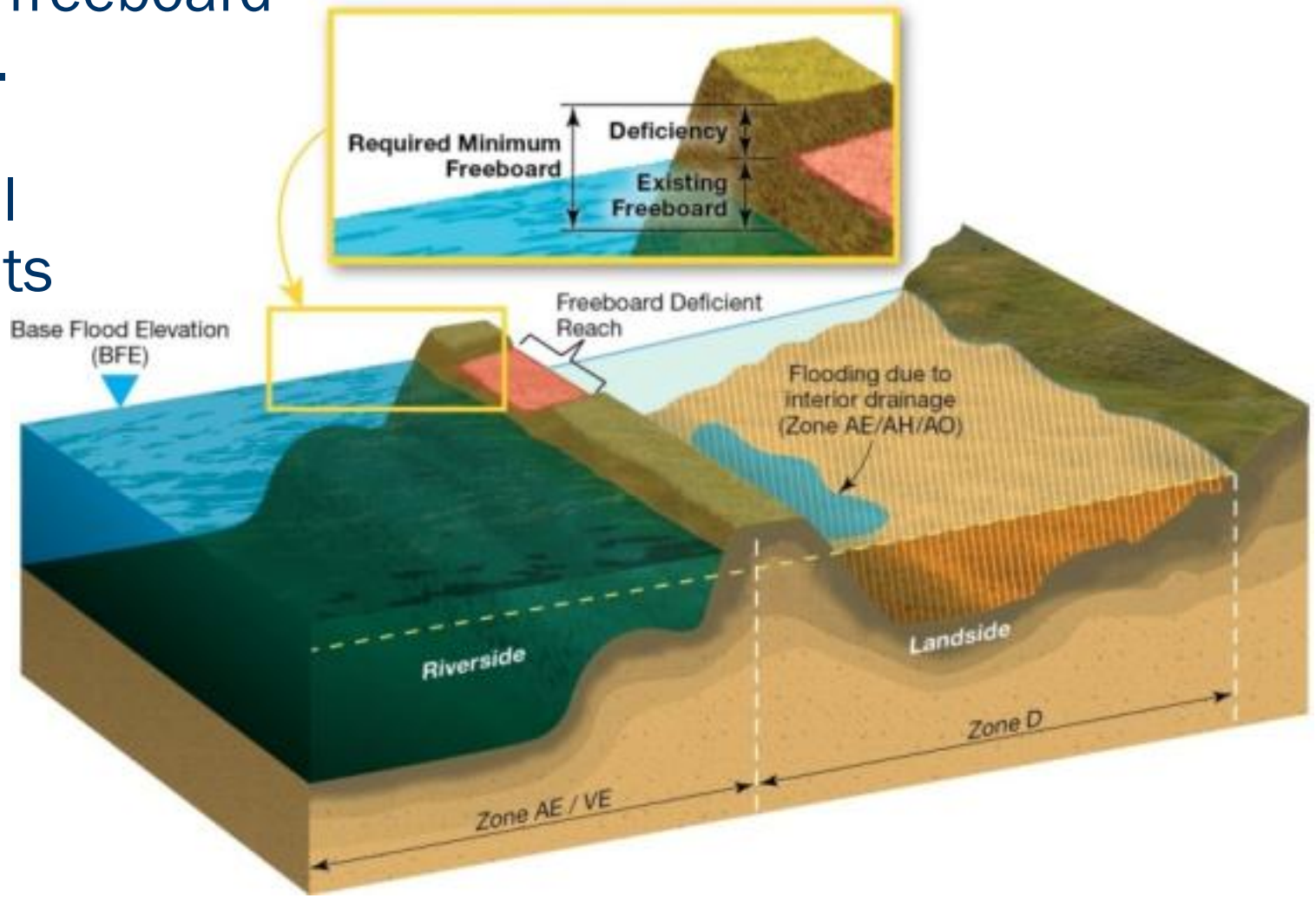
FEMA

*referenced in the levee plan as “refined leveed area”.

Freeboard Deficient Procedure

This analysis takes the levee height above the base flood into account when it does not fully meet freeboard standards for accreditation.

Application: Levee meets all 44 CFR §65.10 requirements except the minimum freeboard requirement.



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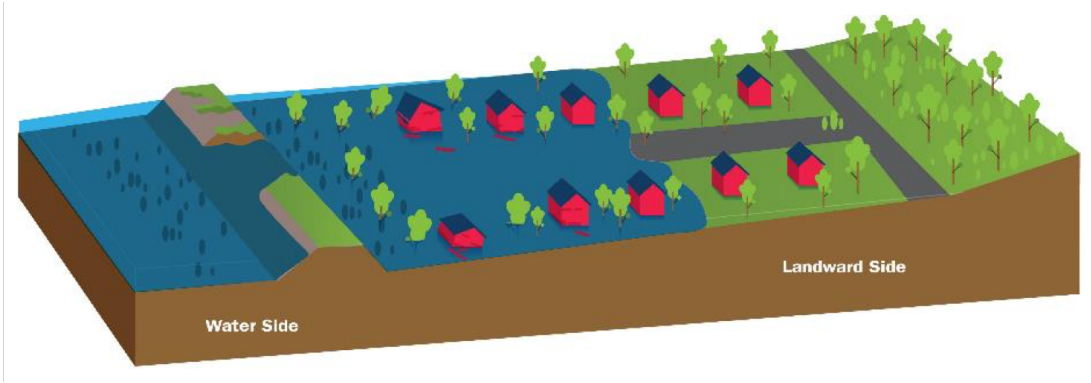
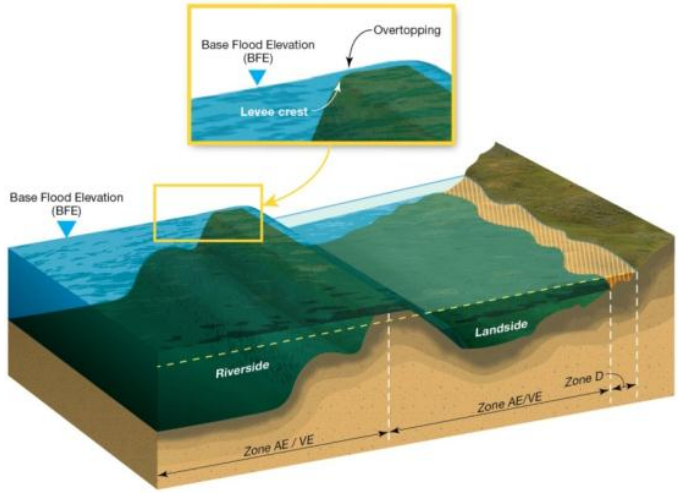
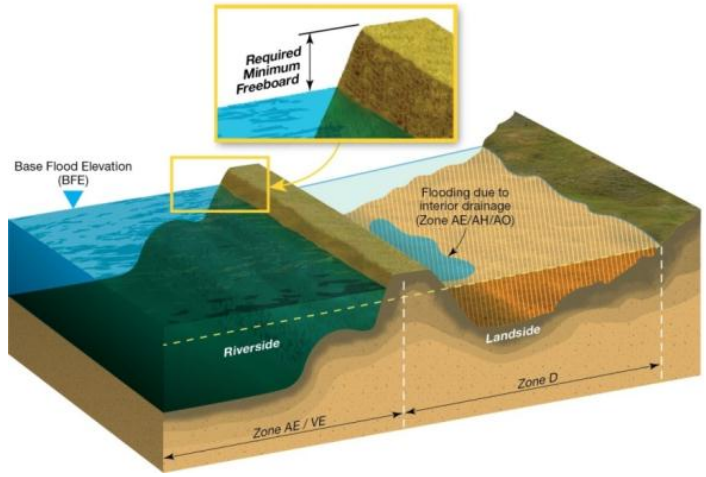
Other Analysis Procedures

- Structural-Based Inundation Procedure
- Overtopping Procedure
- Sound Reach Procedure







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Zone D

- Defined as “undetermined, but possible, flood hazards”
- No federal mandatory purchase requirement
- Insurance rates are similar to a Zone A
- Complicated for an individual to get a reduced insurance rate
- Floodplain management requirements applied at discretion of local officials (as long as community complies with NFIP standards cited at 44 CFR 60.3(a))

Mapping Path Forward is Based On Data

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

✓- Required

* - No cost to community

** - Potential additional cost to community

Likely most applicable procedures for these levees

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Local Levee Partnership Team (LLPT)

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

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Levee Analysis And Mapping Procedure

1 LLPT 1: STAKEHOLDER COORDINATION AND DATA COLLECTION MEETING

Identify Local Levee Partnership Team (LLPT) members with FEMA and begin data collection

2 INITIAL LEVEE DATA ANALYSIS

FEMA performs the initial levee data analysis based on collected information from the LLPT

The reach analysis procedures that will be reviewed include the following:

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

3 LLPT 2: MEETING TO REVIEW INITIAL DATA ANALYSIS

Technical review of initial levee data analysis results with LLPT members

4 LLPT 3: REVIEW LEVEE ANALYSIS AND MAPPING PLAN

Discuss the draft levee analysis and mapping plan and ways to convey risk and mitigation information to citizens

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Watershed and Stream Data & Documentation Requested

- Survey Information and/or As-Built Plans
  - Channel improvement projects
  - Bridge/culvert crossings
  - Utility crossings
  - Stream cross-sections
  - Interior drainage systems
- Stream Gage Data
- Surveyed High Water Marks
- Information Regarding Projects that may impact flows

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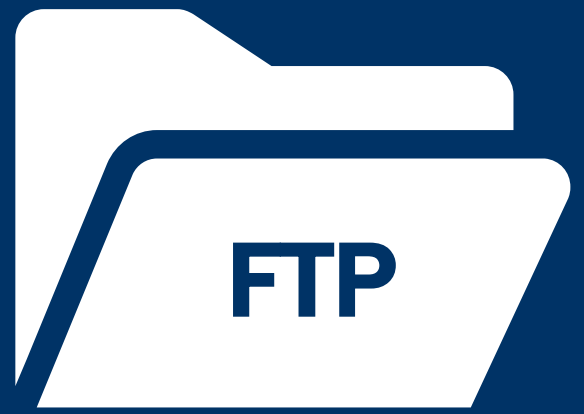
Levee System Data & Documentation Requested

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

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

FTP Links to be Emailed for Data Sharing



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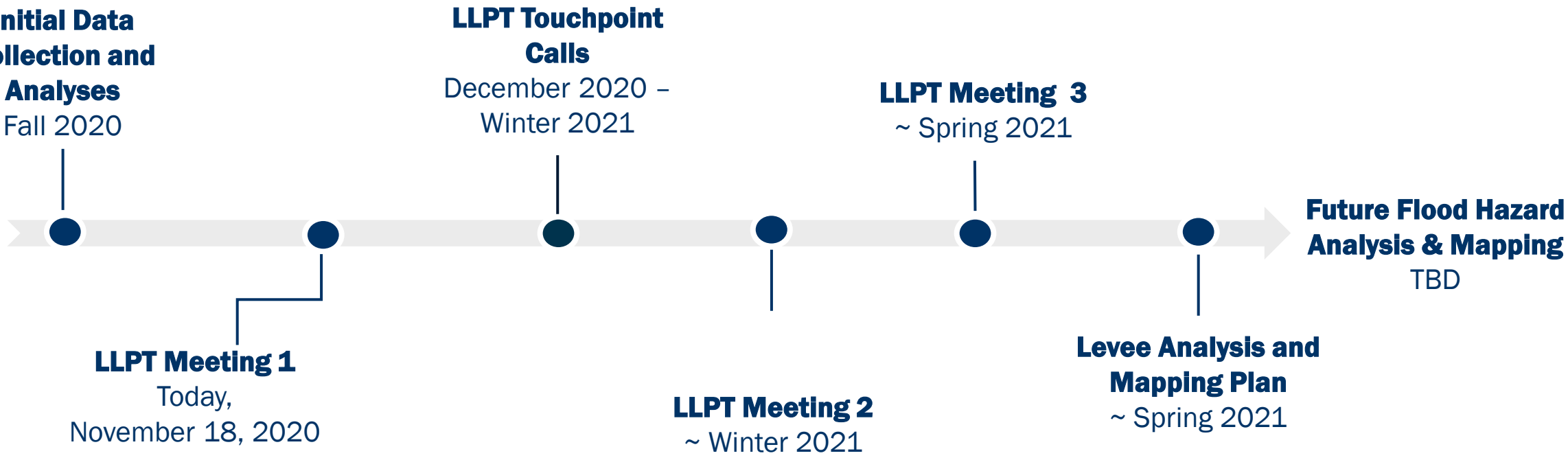
LLPT Timeline:



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QUESTIONS?

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Contacts

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Outreach	Community Engagement and Risk Communication (CERC) – Resilience Action Partners	Anton Getz agetz@mbakerintl.com	(609) 807-9570

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Thank You

Challenges, Innovation, The way forward

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Thank You

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