



FEMA

# Update on FEMA's Levee Analysis and Mapping Procedure

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**RiskMAP**  
Increasing Resilience Together



# Presentation Overview

1. Background – Levee Analysis and Mapping
2. Proposed Process Modifications
3. Impacts to State of Illinois
4. What's Next?
5. When?
6. Questions

# FEMA's Role - Levees

- FEMA's role is mapping levee-related flood risk and “accredits” levees for mapping purposes only.
- FEMA only accredits levees based on the *certification documentation provided by the community or other interested party*
- FEMA does not own, operate, maintain, inspect, or certify levees or flood control systems



# Levee Certification

## Certification documentation should:

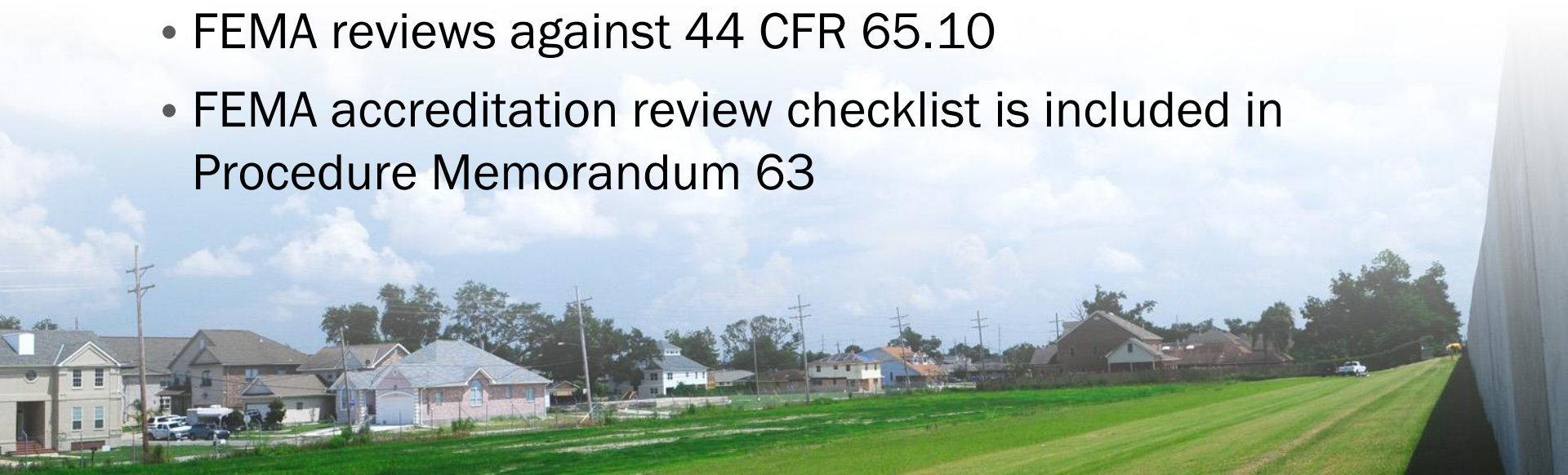
- Document that levee or flood control system *meets Federal design, construction, maintenance, and operations standards* to provide protection from a flood of 1% annual chance or greater
  - Standards are outlined in 44 CFR 65.10
- Be based on investigations and review of the current levee condition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

**FEMA Flood Insurance Rate Maps (FIRMs) are based on *current conditions* and *reflect the existing risk*.**

# Levee Accreditation

Once FEMA receives levee certification package from a community, levee owner:

- FEMA performs a “completeness” review
- FEMA accredits levees based on certification submittal findings received
- FEMA reviews against 44 CFR 65.10
- FEMA accreditation review checklist is included in Procedure Memorandum 63



# Accreditation Requirements

## Listed in CFR 65.10

- 65.10(a) – General Requirements
- 65.10(b) – Design Requirements
- 65.10(c) – Operations Plans
- 65.10(d) – Maintenance Plans
- 65.10(e) – Certification Requirements

# 65.10(b) – Design Requirements

- 65.10(b)(1) – Freeboard
- 65.10(b)(2) – Closures
- 65.10(b)(3) – Embankment Protection
- 65.10(b)(4) – Embankment and Foundation Stability
- 65.10(b)(5) – Settlement Analysis
- 65.10(b)(6) – Interior Drainage
- 65.10(b)(7) – Other Design Criteria



# Current Method - *Mapping Flood Hazards*

- Complete certification of system submitted to FEMA
- Mapped as contained within levee system boundaries
- Certification submittal *not received* or *incomplete*
- Traditionally mapped as if the levee did not provide a reduction in flood risk





# Why Modify our Current Approach?

- Throughout Map Modernization, stakeholders expressed concern on the “without-levee” procedures used to map non-accredited levees
- In February 2011, a group of U.S. Representatives and Senators wrote to FEMA requesting a revision to the current practice of mapping levees and their associated flood risk.
- Stakeholders and Congress felt the historical mapping approach did not reflect the hazard reduction that some non-accredited levees may still afford.



# Requirements for New Approach

## ■ The new Approach had to be:

- Flexible;
- Collaborative
- Understandable and explainable
- Local knowledge and data should be included
- Must address both riverine and coastal levees
- Cost-effective
- Repeatable

## ■ FEMA's Constraints:

- No statutory or regulatory changes
  - 44 CFR 65.10 remains in effect for full levee accreditation
- Cannot make changes to the overarching National Flood Insurance Program

# External Reviews & Stakeholder Engagement

- **Feasibility Review** – FEMA and USACE review to ensure consistency with the Feasibility Criteria (completed)
- **Independent Scientific Body** – focused on technical aspects solution (completed)
- **Community Roundtable** – focus group related to community impacts and input (completed)
- **Public Review** - approach posted online for general public review and comment, includes 3 Online Forums (completed)
  - Public review comment period ended January 30, 2012
  - 160 submittals with 1400+ comments received

# What's New about this New Process?

- **Interactive stakeholder engagement** throughout the analysis and mapping process:
  - FEMA will engage community officials and decision makers in a collaborative discussion
- A **suite of analysis and mapping procedures** of the hazard associated with levees will be reviewed with the interested parties
  - Intention is to recognize of the uncertainty associated with hazard identification behind levees.
  - New Development – Allows communities to **split a levee system into distinct reaches** that are analyzed based on the attributes of the specific reach.

# Local Levee Working Group

## ■ Purpose

- Provide feedback and data so FEMA can make a final decision on how the levee system should be modeled and how the levee-impacted area should be mapped.

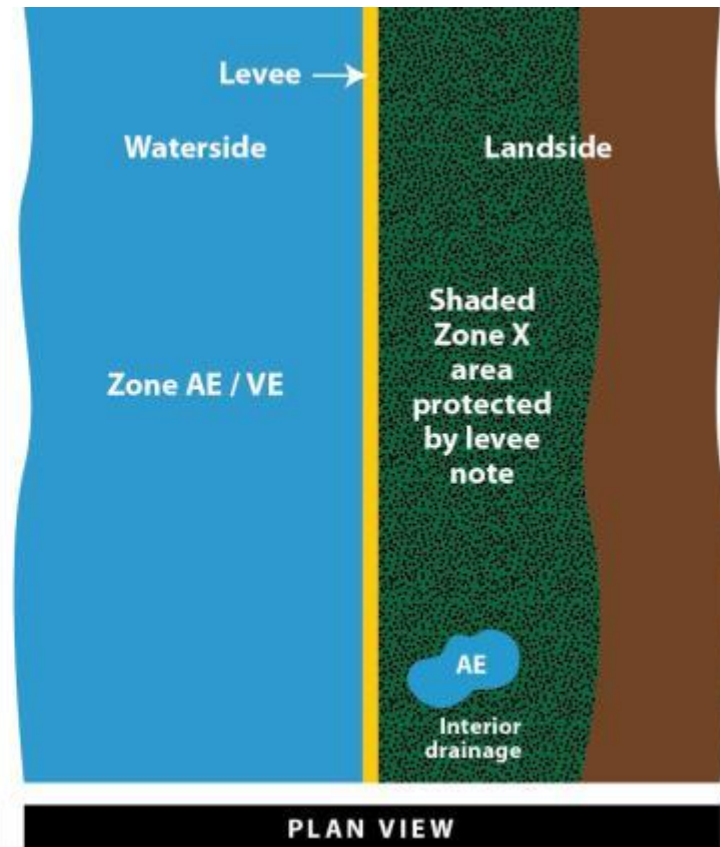
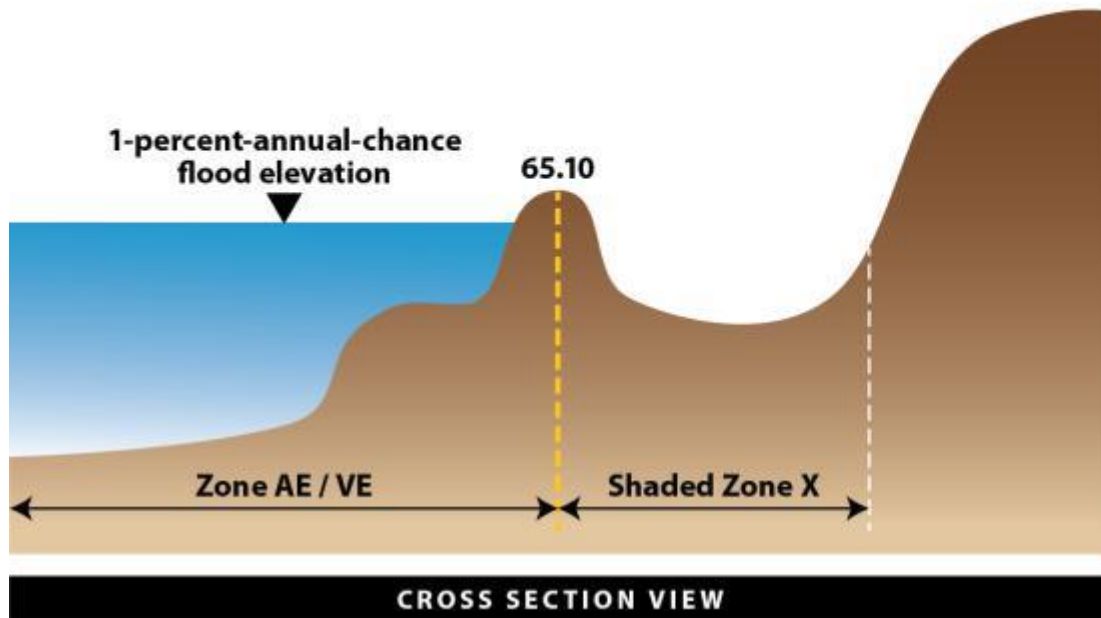
## ■ Participants

- CEO or designee (decision making authority)
- Levee owner
- Floodplain manager
- Local engineer
- FEMA regional representative
- USACE representative (if appropriate)
- CTP or FEMA contractor for project
- Others as determined by the community or region



# Accredited System

- **Criteria:** **Entire** Levee System or Flood Control Structure meets (or exceeds) 44 CFR 65.10 Criteria
- **Mapping Approach:** Mapping as Fully Accredited; Natural Valley Floodplain Analysis to Map Shaded Zone X and Levee Protection Note





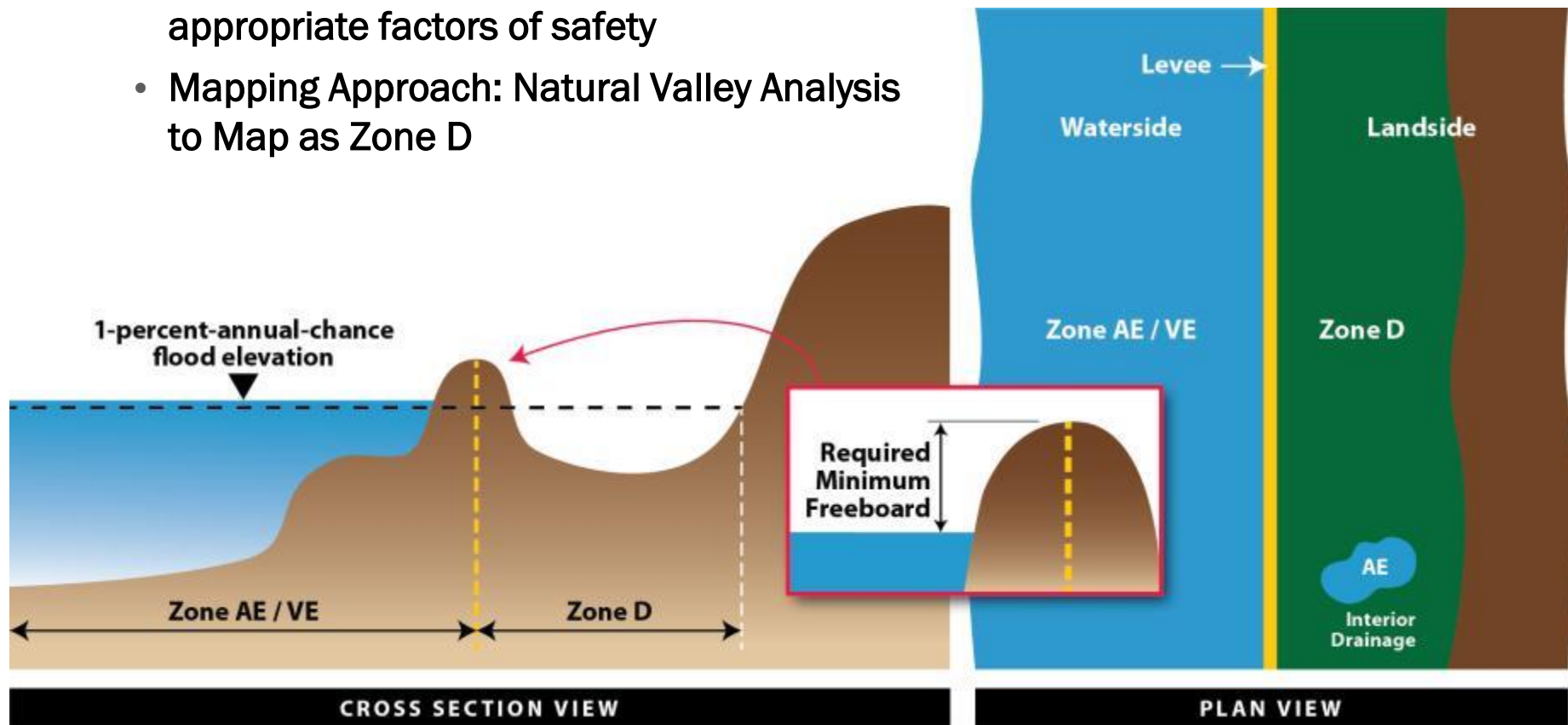
# Non-Accredited Levees

- New process allows a non-accredited levee to be broken into multiple “Reaches”
- A “Reach” is a discrete section of a levee for which one of the five levee analysis procedures can be applied
  - Sound Reach
  - Freeboard Deficient
  - Overtopping
  - Structural Based Inundation
  - Natural Valley
- Primarily data dependent:
  - O&M Plan available?
  - As-Builts/Levee Survey?
  - Evaluation of overtopping erosion?
  - Structurally sound?
  - Closures/Tie-Ins?

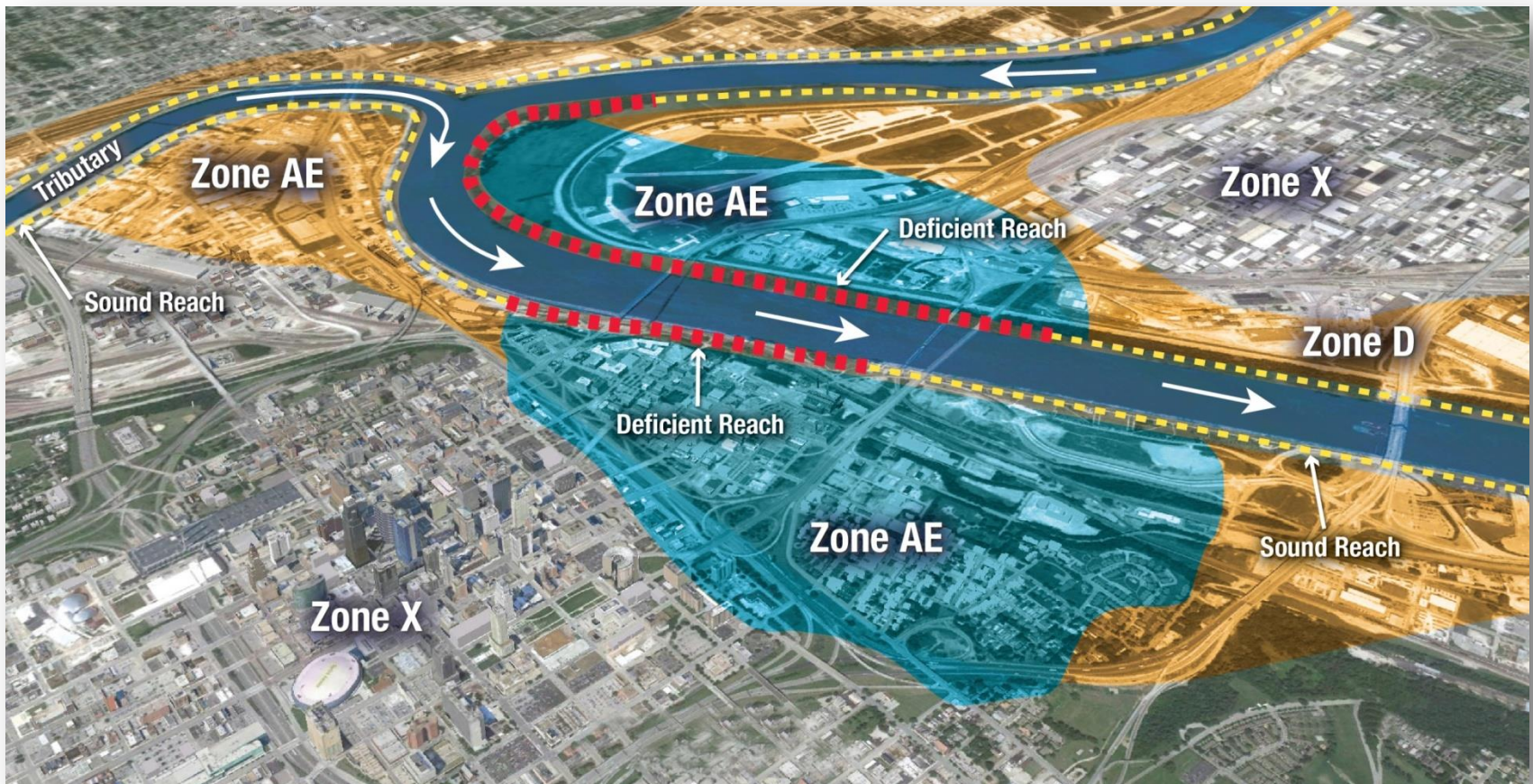
# Sound Reach

## ■ Sound Reach

- Criteria: Levee is designed and constructed to be structurally sound and meet appropriate factors of safety
- Mapping Approach: Natural Valley Analysis to Map as Zone D

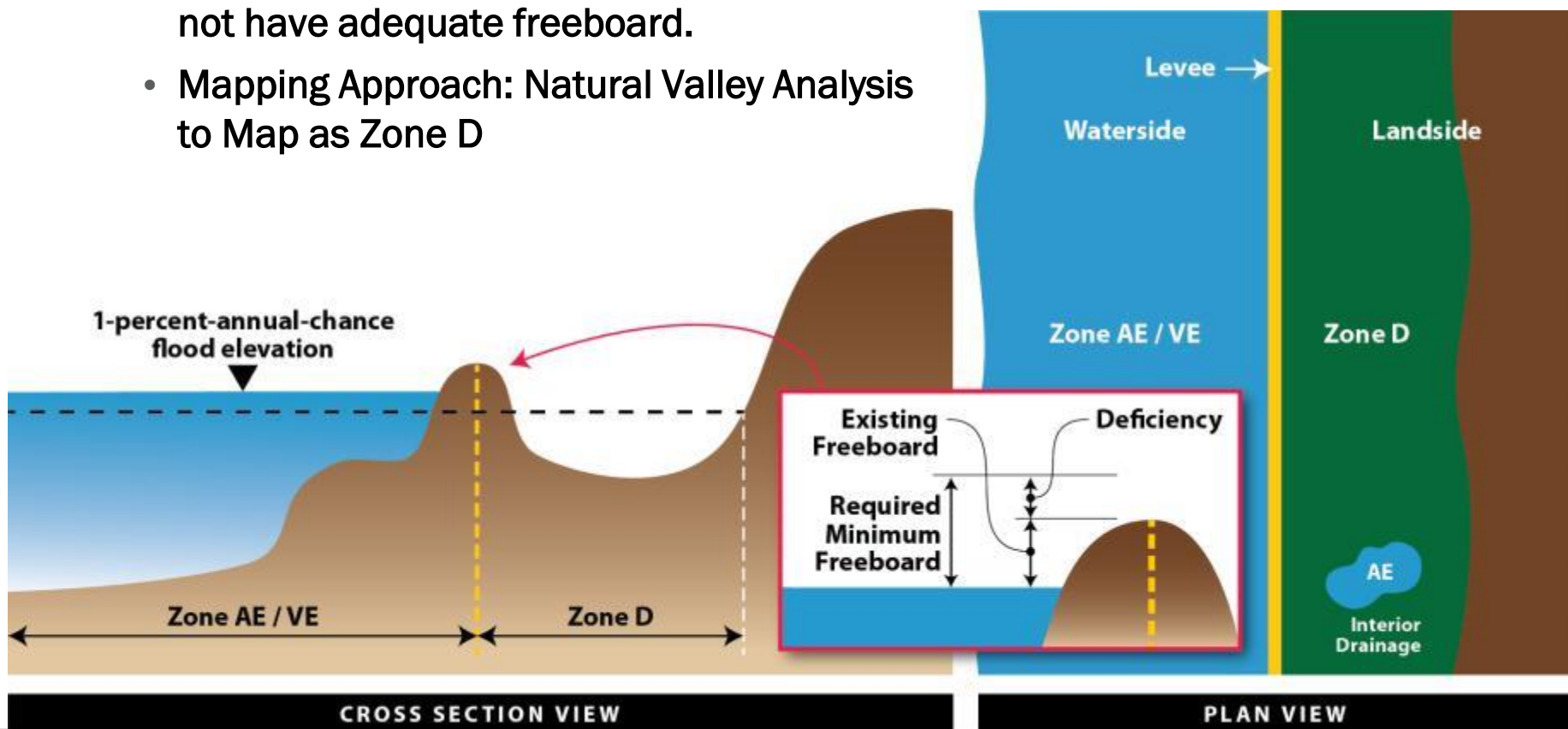


# Sound Reach



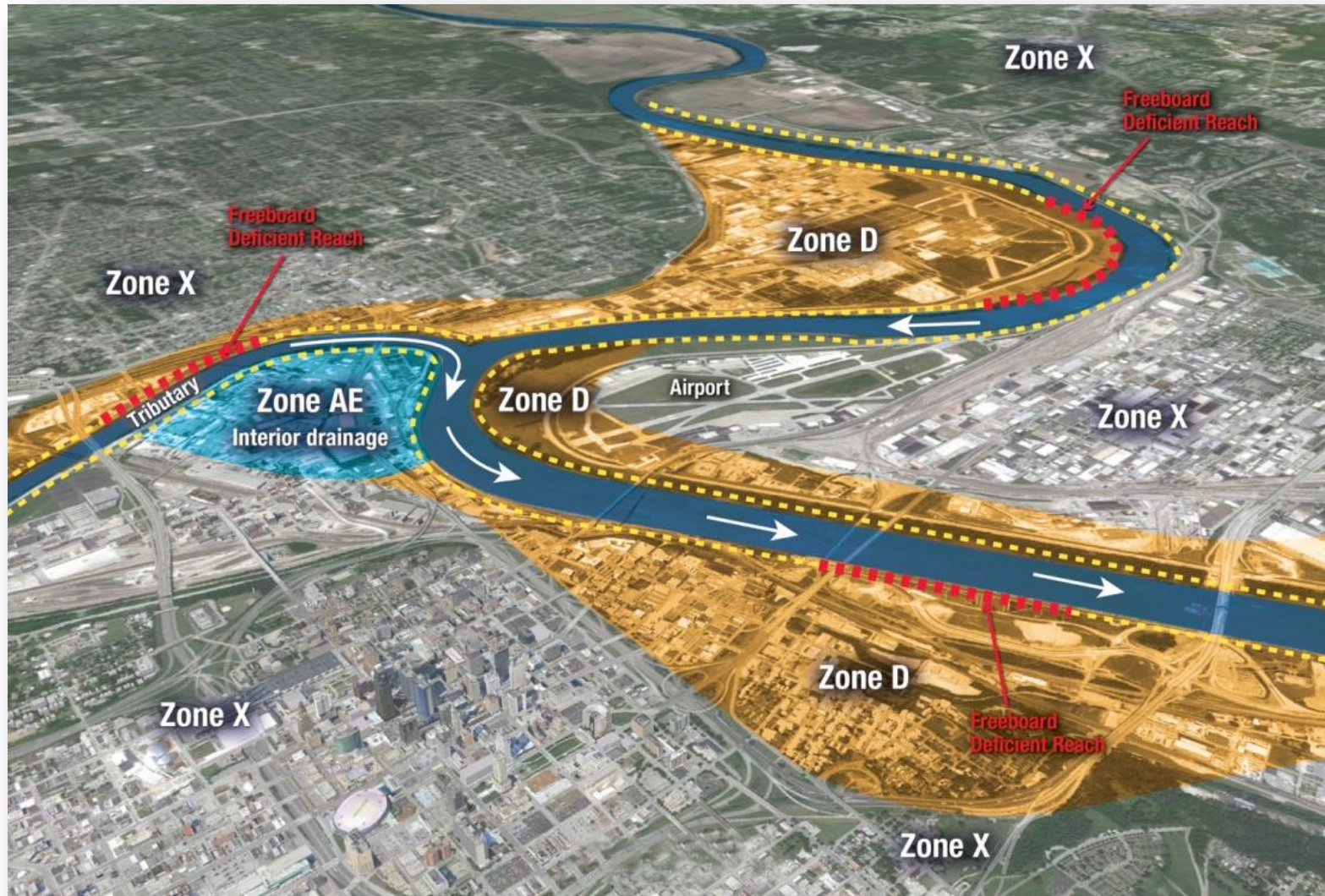
# Freeboard Deficient

- Freeboard Deficiency – Reach or System
  - Criteria: Levee is structurally sound and top is higher than the flood elevation, but does not have adequate freeboard.
  - Mapping Approach: Natural Valley Analysis to Map as Zone D





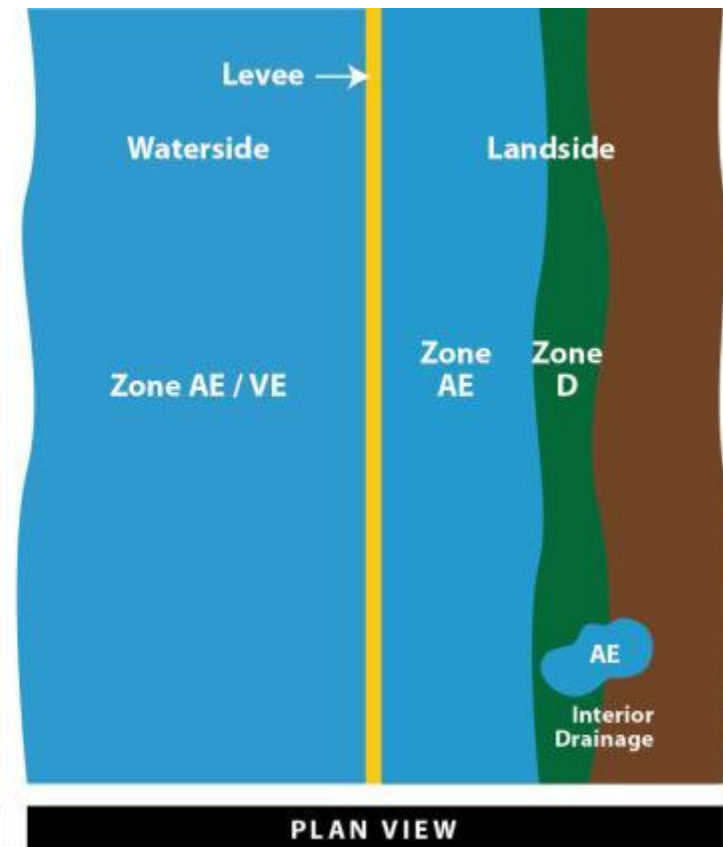
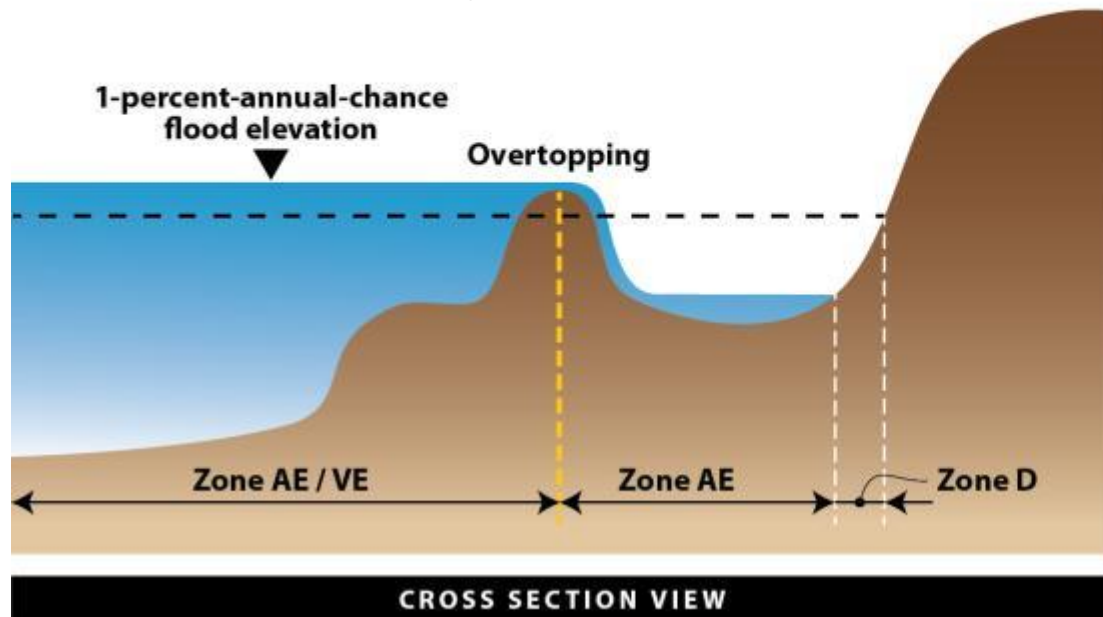
# Freeboard-Deficient Reach



# Overtopping

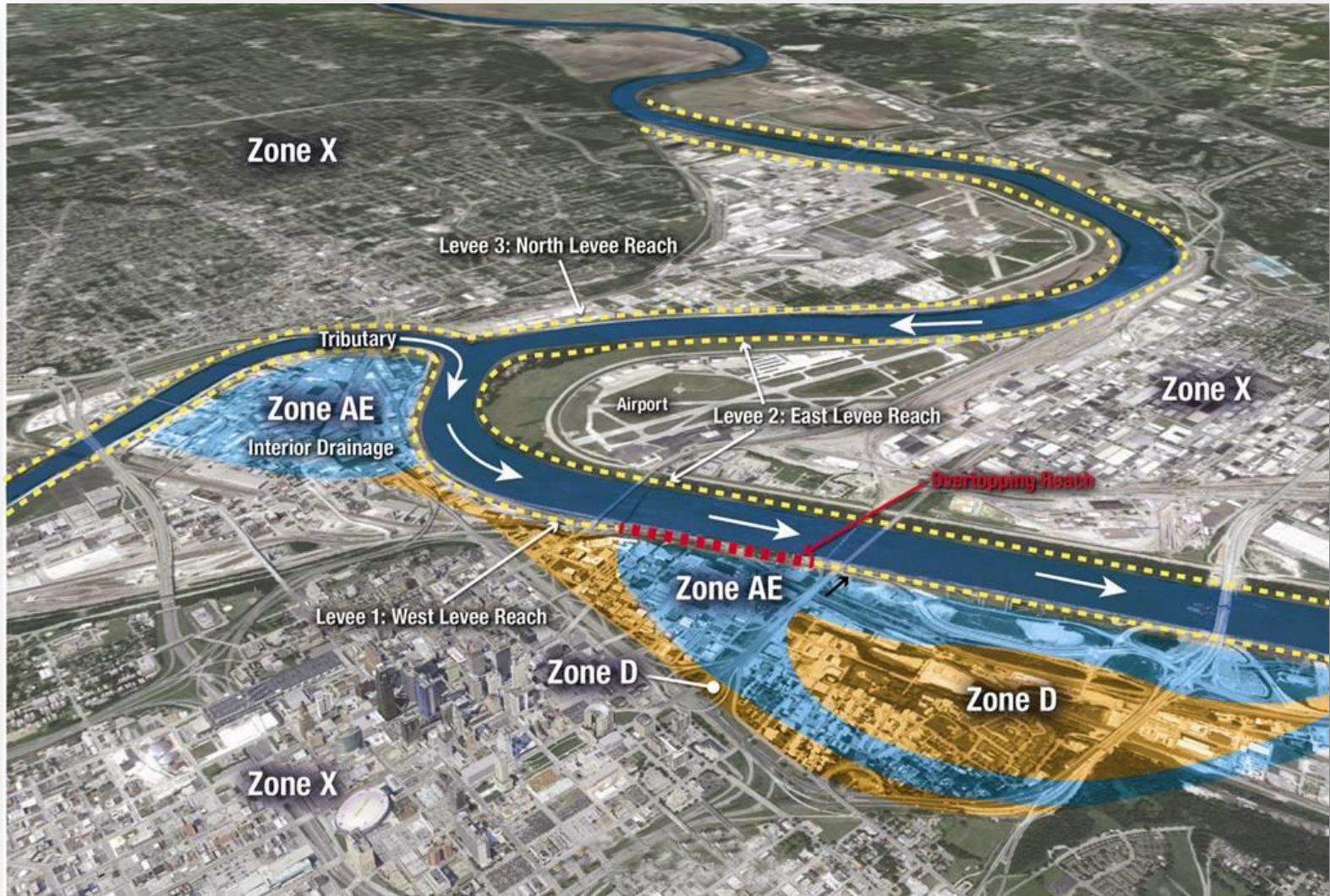
## ■ Overtopping Inundation Analysis

- Criteria: Levee Crest is Lower than the flood elevation, but it can be documented that the levee can structurally withstand the 1% flood
- Mapping Approach: Overtopping Analysis to Map Special Flood Hazard Area; Natural Valley Floodplain Analysis to Map Zone D



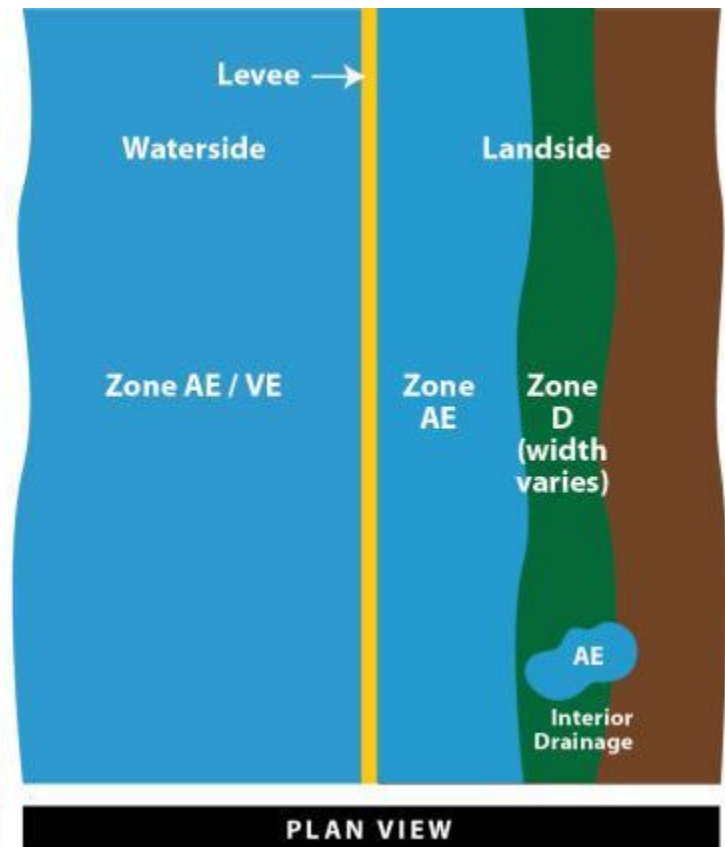
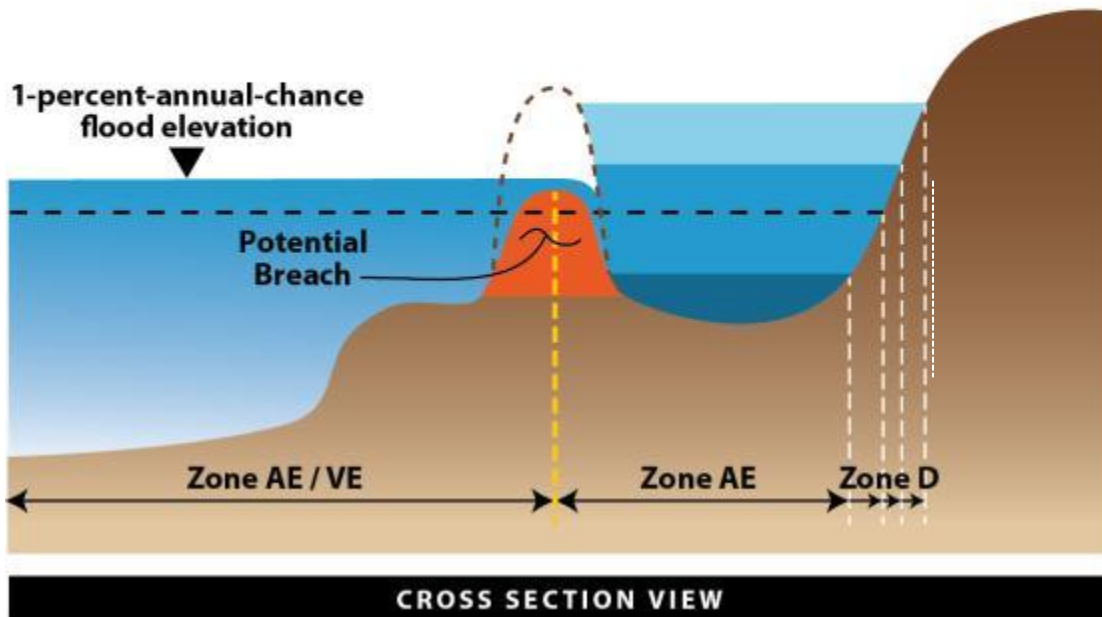


# Overtopping



# Structural-Based Inundation Procedure

- **Structural-Based Inundation Analysis**
  - Criteria: Levee Doesn't Meet 65.10 Criteria and accurate levee elevation information
  - Mapping Approach: Breach Analysis to Map Special Flood Hazard Area; Natural Valley Floodplain Analysis to Map Zone D



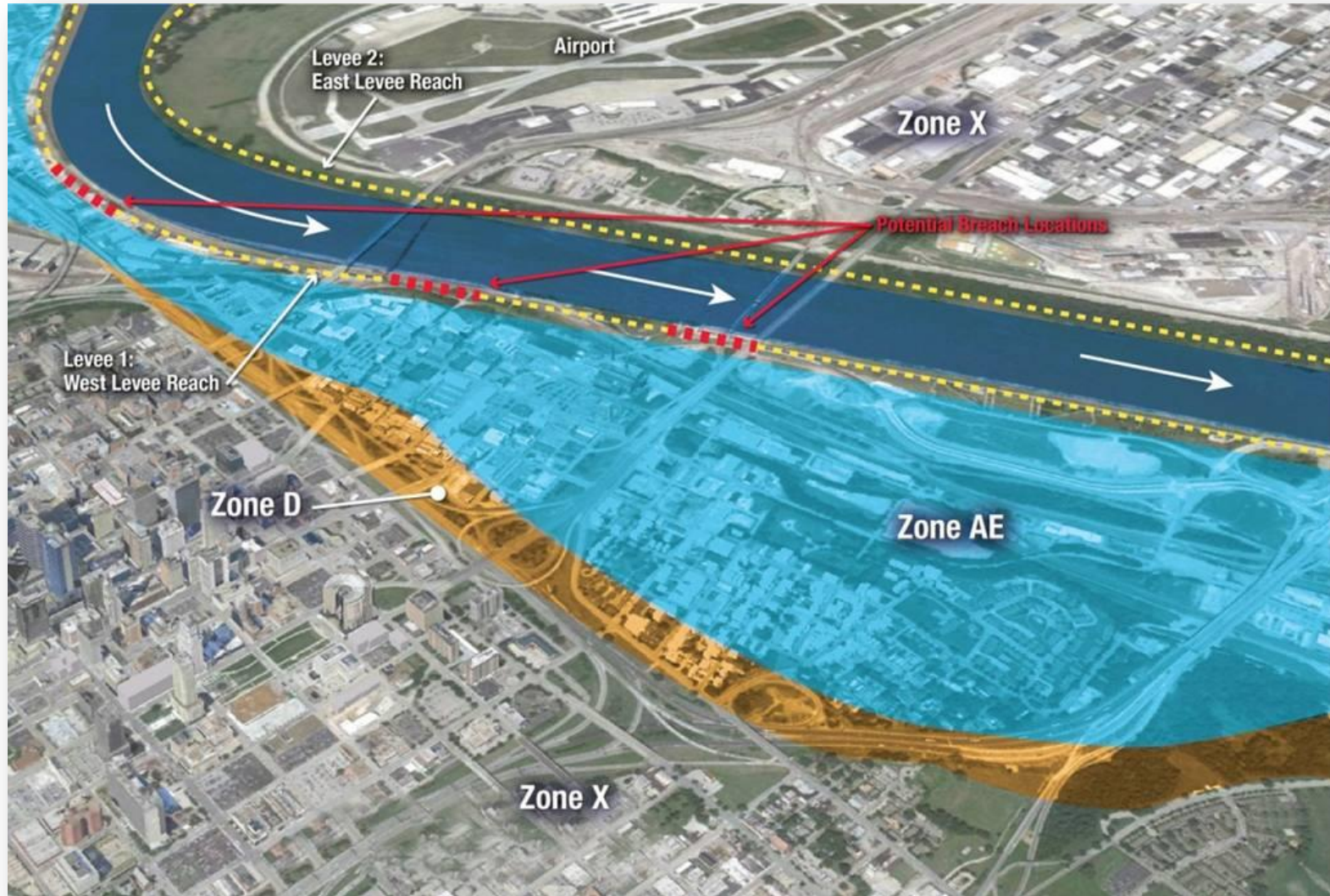
# Structural-Based Inundation Procedure

The flood hazard is reasonably identified when all potential storage areas and flow paths that can be reached by breach flows reflect the potential flood hazard.





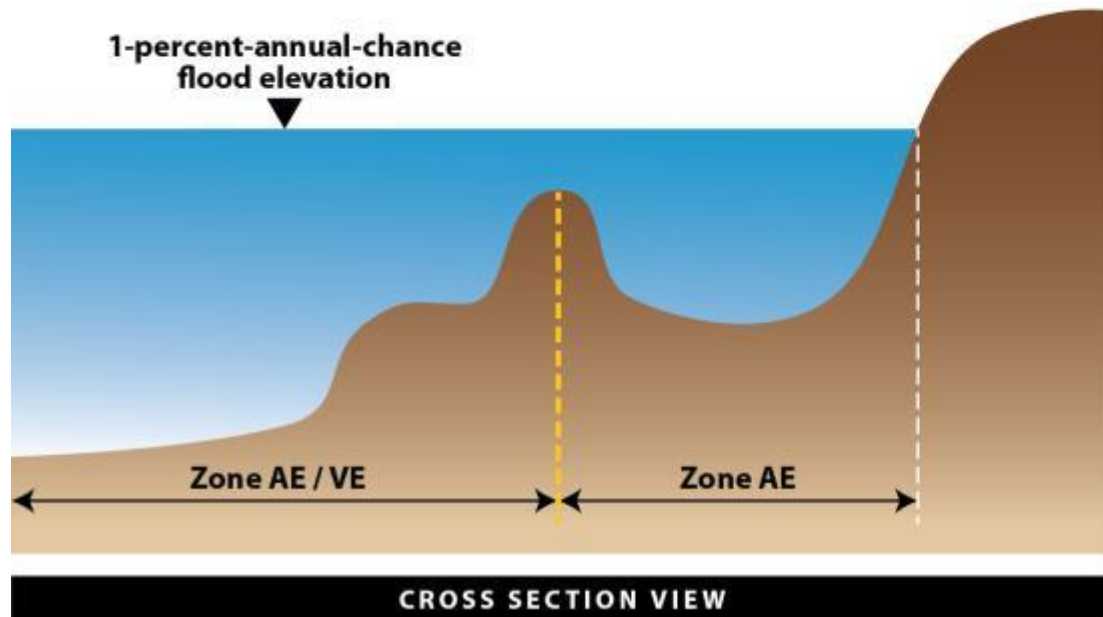
# Structural-Based Inundation



# Natural Valley

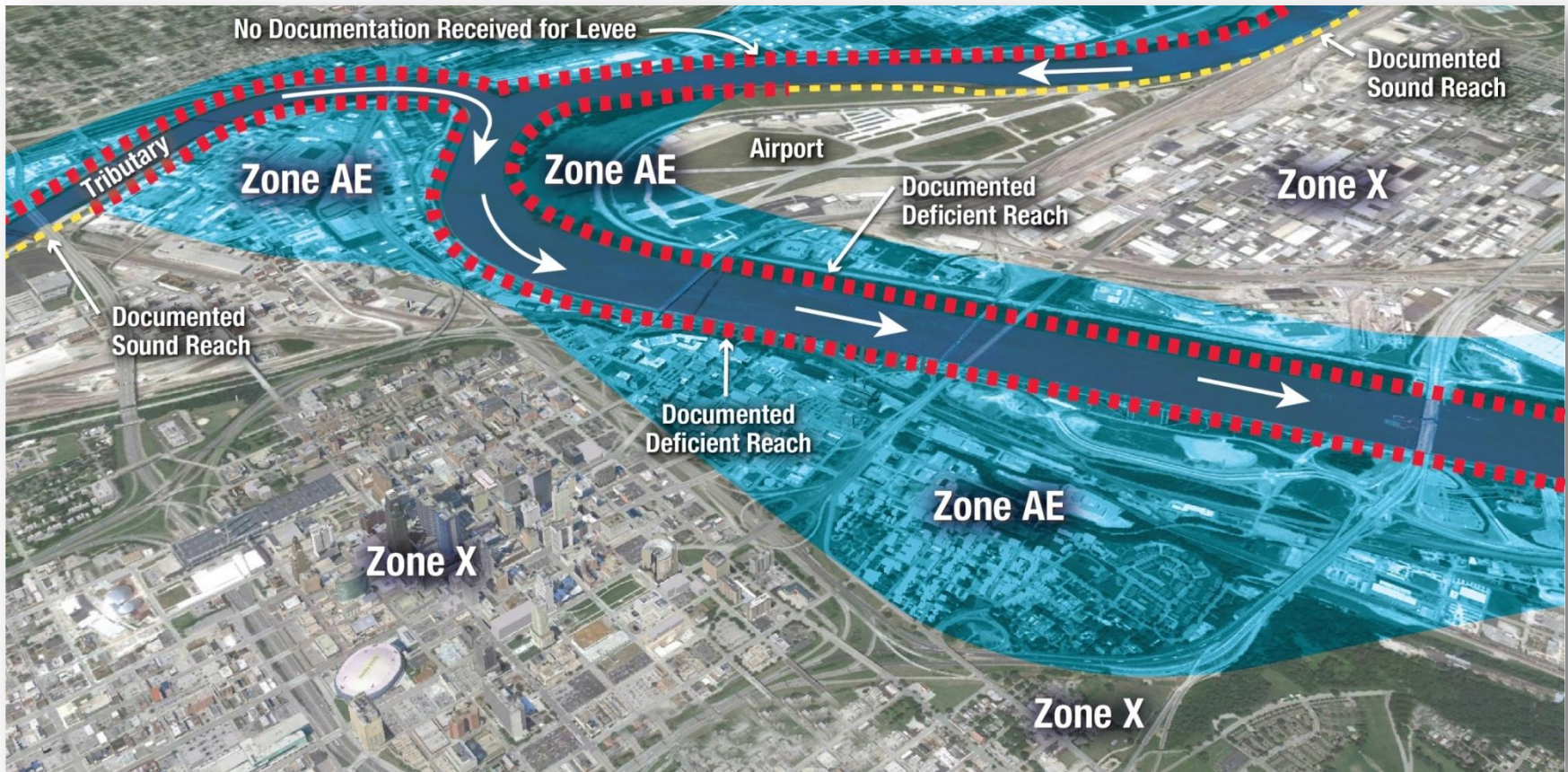
## ■ Natural Valley

- Criteria: Levee Doesn't Meet 65.10 and Doesn't Impact the Flood Elevation
- Mapping Approach: Natural Valley Floodplain Analysis Only to Map Special Flood Hazard Area





# Natural Valley





# Natural Valley Modeling

## ■ Riverine

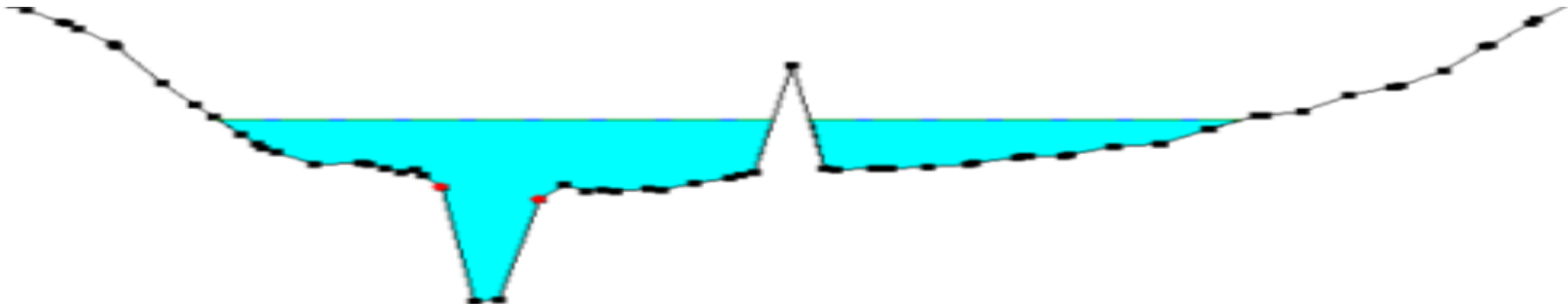
### **Modeled without the levee impeding flow**

- Levee will remain in ground profile,
- Will not prevent water from moving landward

## ■ Coastal:

### **Coastal levee will be included in storm surge model setup**

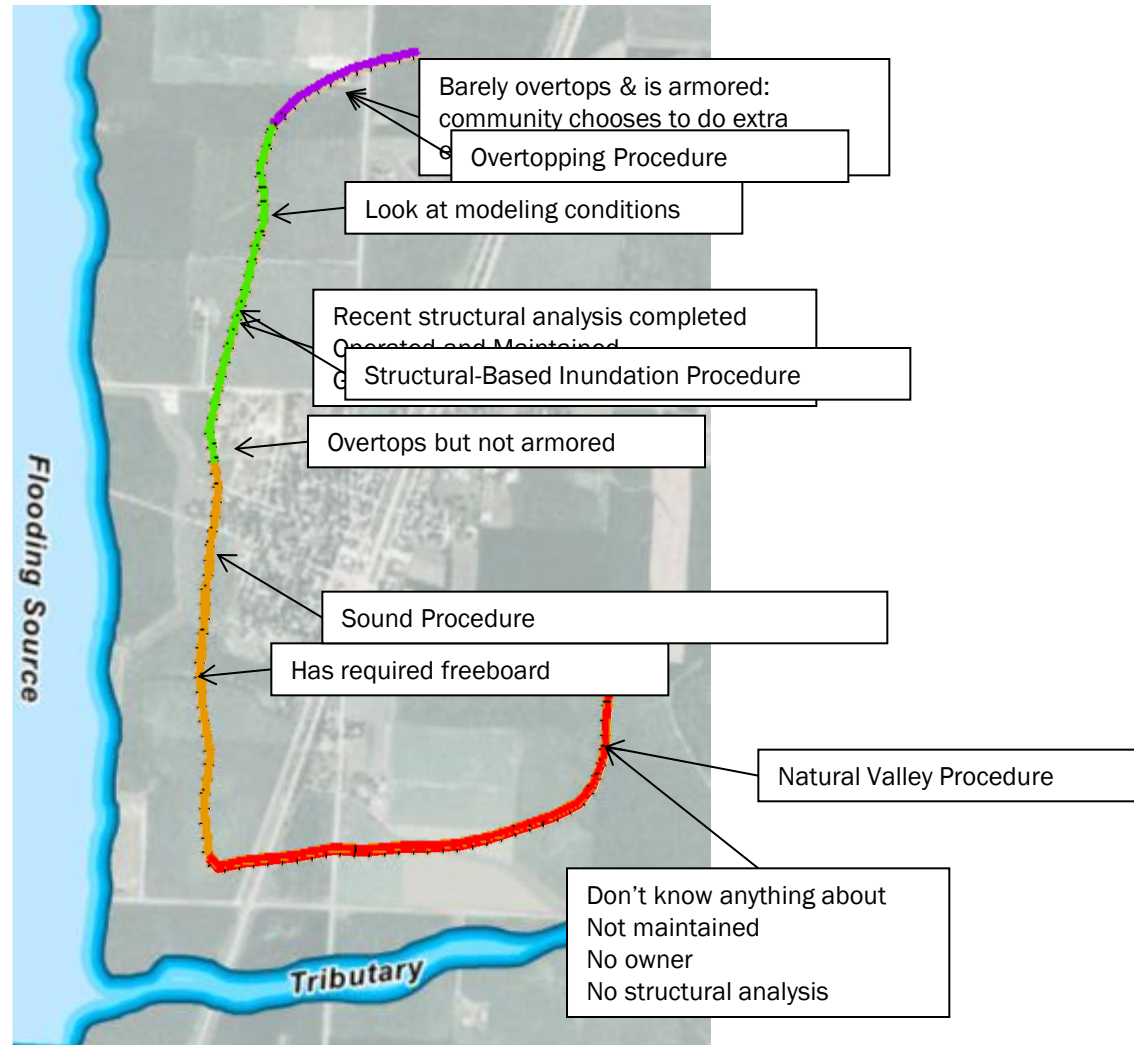
- This BFE will be extended landward
- No wave conditions analyzed landward of levee, unless deemed to be the actual conditions.



# Data Requirements

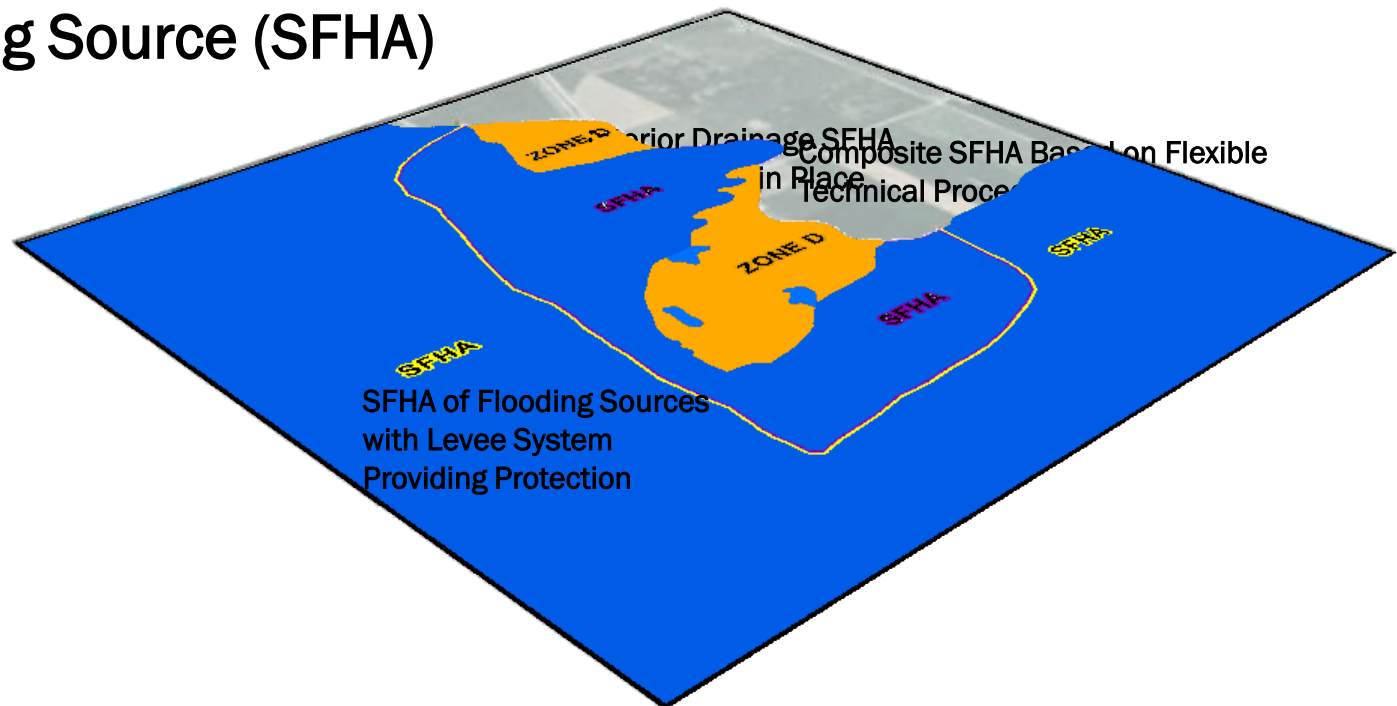
	Sound	Freeboard Deficient	Overtopping Approach	Structural-Based Inundation	Natural Valley
Elevation Information for the Levee Crest and Toe	Required	Required	Required	Required	
BFE + Freeboard Less than Levee Crest	Required				
BFE Less than Levee Crest	Required	Required			
Operations and Maintenance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

# So... What's a Reach?



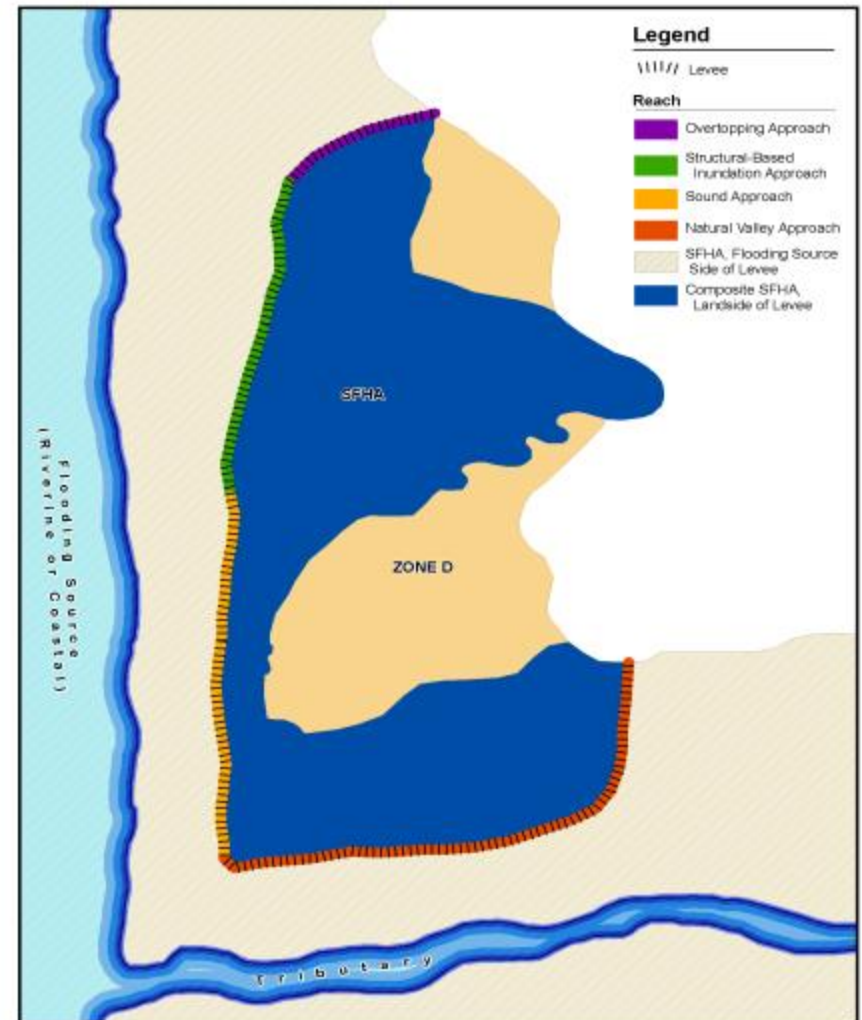
# So...What's the Final Map Look Like?

1. Natural Valley (Zone D)
2. Interior Drainage (SFHA)
3. Landside Hazard (SFHA)
4. Flooding Source (SFHA)



# Final Composite Map

Once each reach is analyzed and mapped, a composite map is created.



# 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
- Minimal NFIP-required floodplain management, but possible to use for floodplain management purposes



# Other Items for Note:

## Riverine Hydraulic Analysis

- Proposed methods generally do not impact the modeling and mapping of flooding sources
- Structural-Based Inundation Approach
  - Flow in the levee flooding source is not to be reduced by the amount that is computed as lost through a breach.

## Floodway Analysis

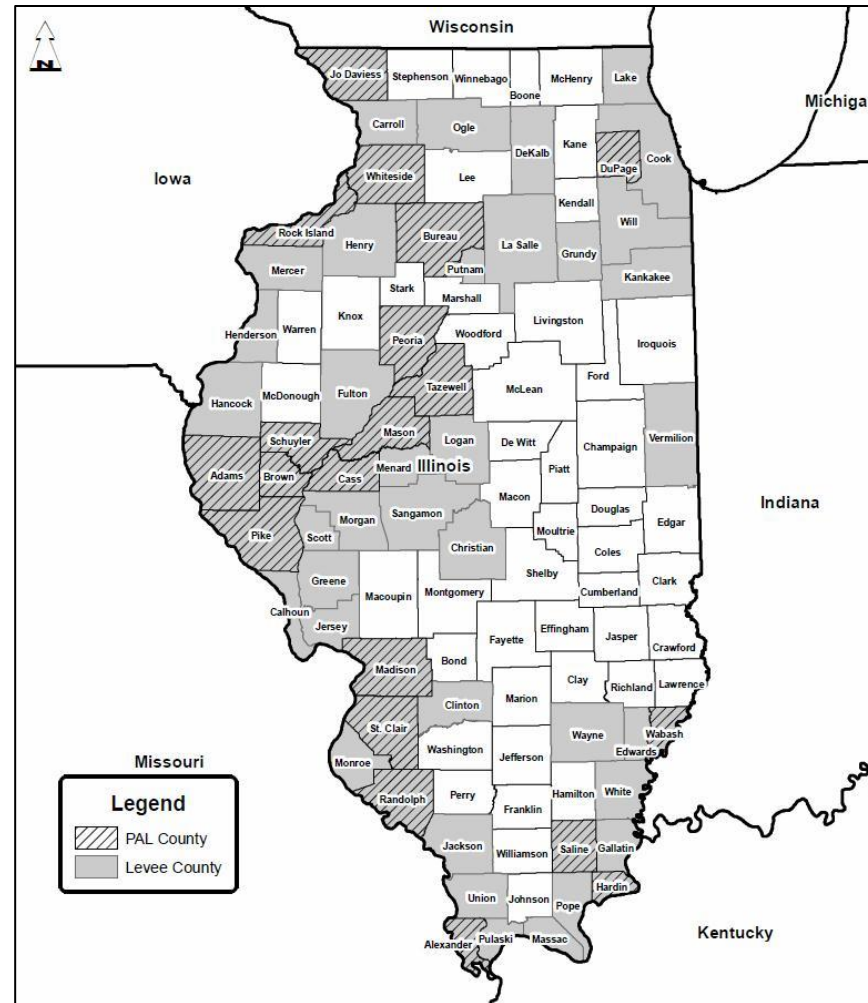
- A levee reach that is hydraulically significant will not have floodways on landward side, unless the community requests an administrative floodway.
- Community may choose to move boundary to landside toe of levee

# Impacts to State of Illinois

Illinois currently has approximately 1600 miles of levees

- 410 levee systems
- 27 levees in 20 counties have been provided Provisionally Accredited Levee (PAL) Status.
- 9 levee systems have met the requirements of 44 CFR 65.10 (6 Provisionally Accredited Levees, 3 Continued Accreditation)

# Illinois Counties with Levees and PALs



# Options moving forward

## Follow New Levee Procedure

- Available to non-accredited and de-accredited levees
- Local coordination to identify levee reaches
- Levee owner must provide data pertaining to proposed reach scenarios agreed upon
- Pilot levee projects not expected to start until Summer 2013.

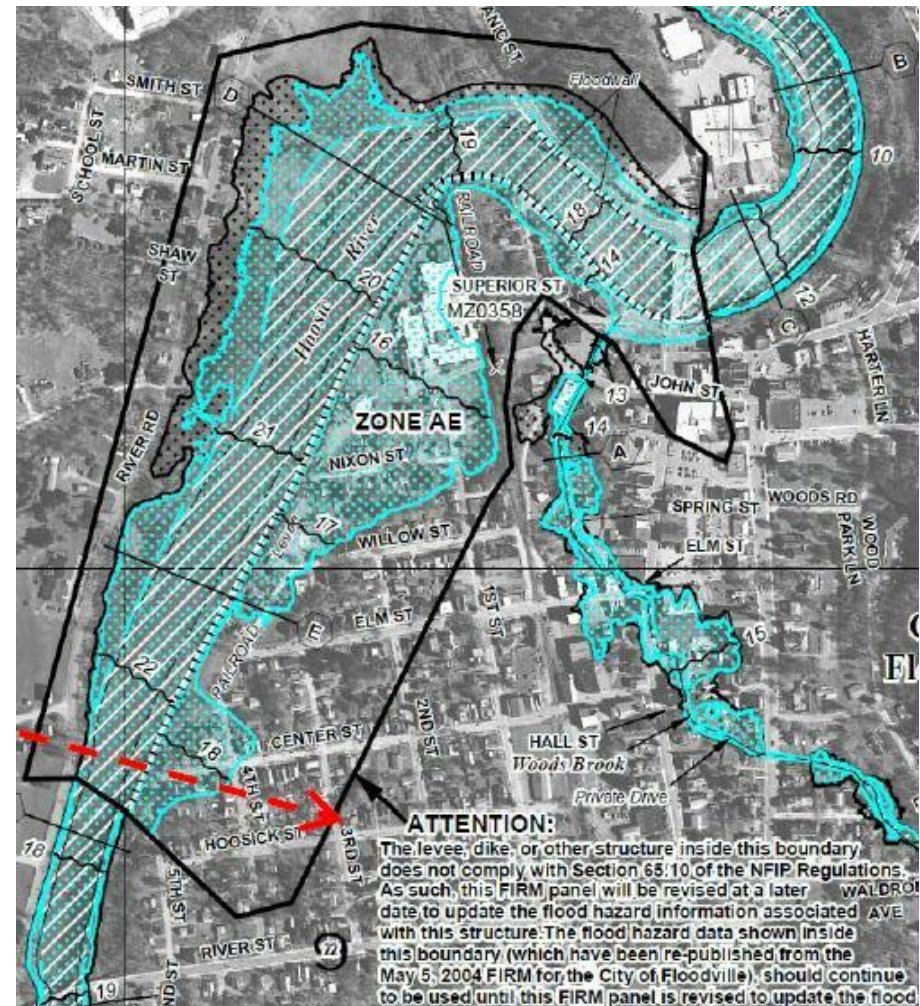
## Waiver Letter

- Community/Levee owner may opt out of new process by providing FEMA a waiver letter
- FEMA will move forward with any levee project using Natural Valley Scenario for all levee reaches.

# Options moving forward

## Seclusion Method

- FEMA may seclude levee area to keep ongoing projects moving.
- Levee area will reflect current effective floodplain
- Will revisit area when new levee procedures are final.



# Exclusion from New Levee Procedure

## **FEMA will move forward with Natural Valley Scenario under following conditions:**

- Structure is not a levee designed for flood control
- Structure is a non-levee embankment (roads, etc)
- Levee does not have an identified owner
- Presence of levee does not impede flow during base flood event



# So What's Next?

- **We have received/reviewed all comments**
  - Currently categorizing them and are deciding what within the approach should be changed.
- **We will work with major stakeholders and participants from past External Stakeholder events to vet the changes to the approach**
- **Finalize the Approach and perform a Cost Analysis**
- **Develop Procedure Memorandum (PM) and Guidance**
- **Publish PM and Guidance**
- **Roll-out Training to Regions and Mapping Partners**
- **Roll-out Approach to Public and Congress**

# When will it affect me?

- We want to get this right, not just get it out...
  - This update is designed to be a **quality-driven** rather than simply a schedule-driven process.
  - We currently **do not have not set a deadline** for moving projects forward.
  - Focus is currently on the **public comments** received
  - We want to compile an approach that will **best suit our requirements and stakeholder expectations**
  - We do not expect to move any on-hold projects forward until Summer 2013
  - At that time, only **select projects** will be moved forward

# Contact Information

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# Questions?



# FEMA