Levee Accreditation Life Cycle: Design with Community in Mind

2017 KC Urban Stormwater Conference

What's in store

1. **Our Roles with Levees**
2. Levees in the NFIP
3. Resiliency Behind Your Levee

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Quick Facts

- Approx 31,200 levee miles
- Located in all 50 States
- 14,500 miles in USACE inventory
- 85% locally owned & maintained
- 17.4% are accredited

* Approximate numbers as of July 2016

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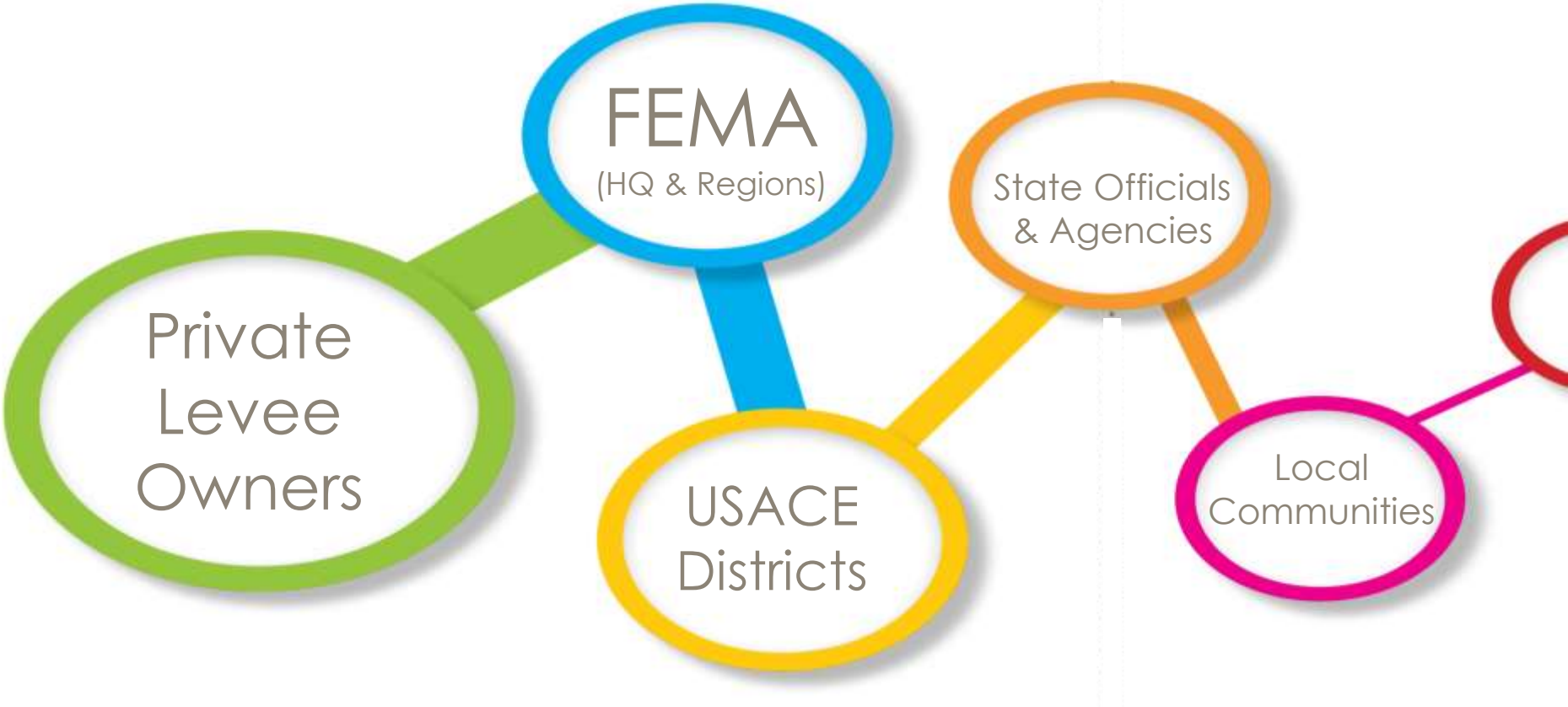

Levee Partnership Team

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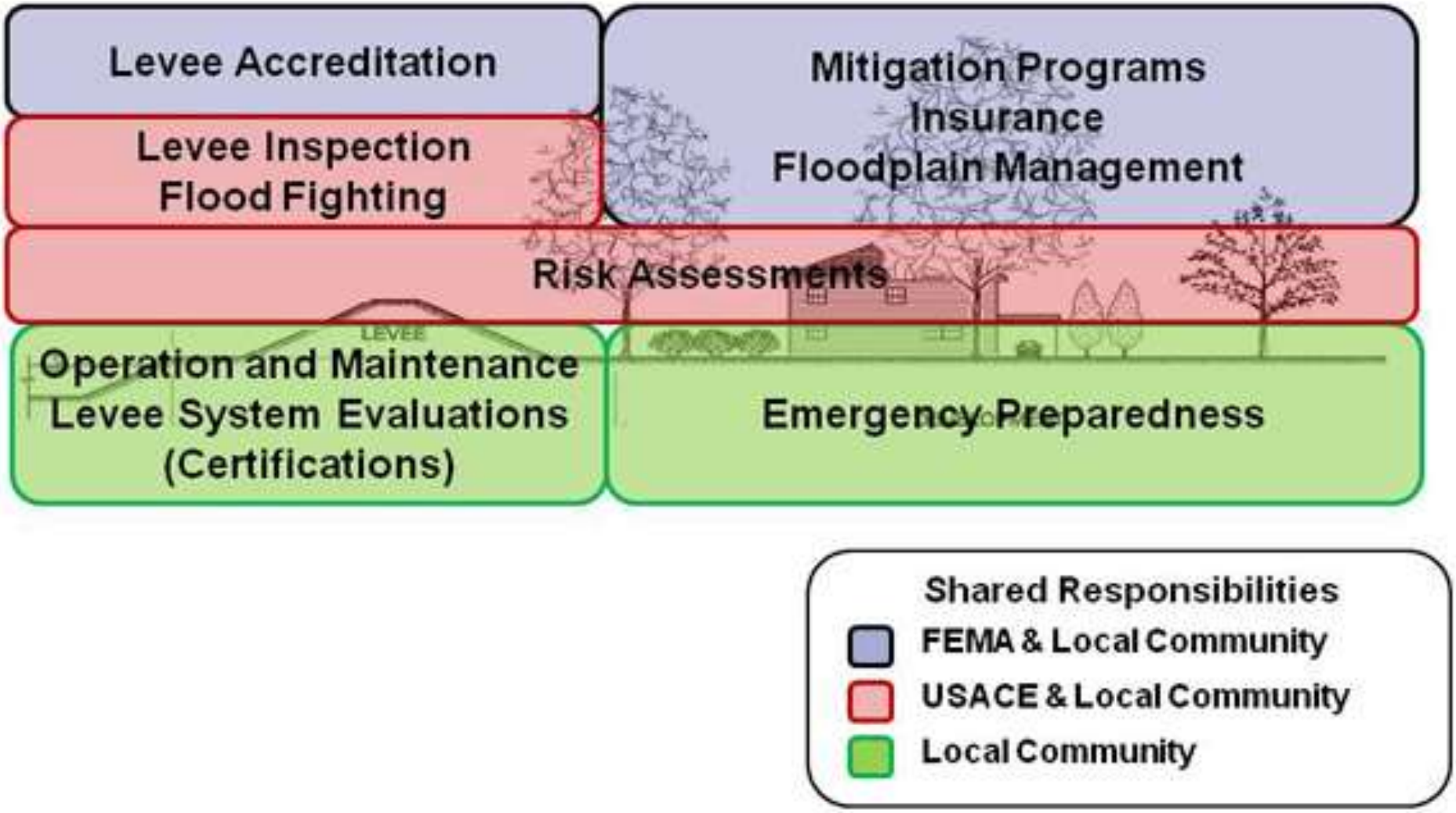
USACE and FEMA Programs



USACE: Levee Timeline

June 16, 1775

George Washington appoints first Engineer

1880's

USACE to start regulating dam construction

1936

Flood Control Act of 1936 – declared flood control is a proper activity of federal government

1941

Flood Control Act of 1941 – established Public Law 84-99

US Army Corps' Role - Levees

- Maintain national inventory of levee systems through National Levee Database (NLD)

- Inspect and Assess approximately 2,500 levees nationwide

- Communicate risk related issues and concerns.

FEMA: Levee Timeline

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1968

National Flood Insurance Act

1973

Flood Disaster Act

*Flood Insurance required in SFHA

1986

Established detailed requirements for evaluation of levees (44 CFR 65.10)

2005

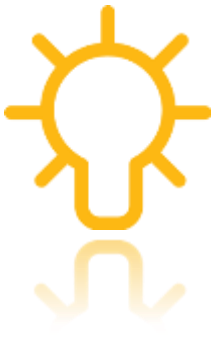
Established Provisionally Accredited Levee (PAL) Designation

2013

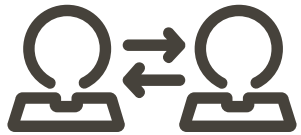
Levee Analysis and Mapping Procedures (LAMP)

2014

Memo of Understanding between USACE and FEMA for Alignment of Levee Activities, Information, and Messaging





FEMA's Role - Levees

- FEMA's role is mapping levee-related flood risk and communicate flood risk.
- FEMA only accredits levees for establishing appropriate risk zone determinations for NFIP maps.
- FEMA does not own, operate, maintain, inspect, or certify data for levees or flood control systems.

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What's in store

1. Our Roles with Levees
2. **Levees in the NFIP**
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Levees in NFIP

- Levee – A man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding.
- 44 CFR 65.10 – establishes the criteria for levee systems to meet to be accredited on FIRMs
- Accredited Levee – A levee shown on the FIRM as providing protection from the 1-percent-annual-chance flood.

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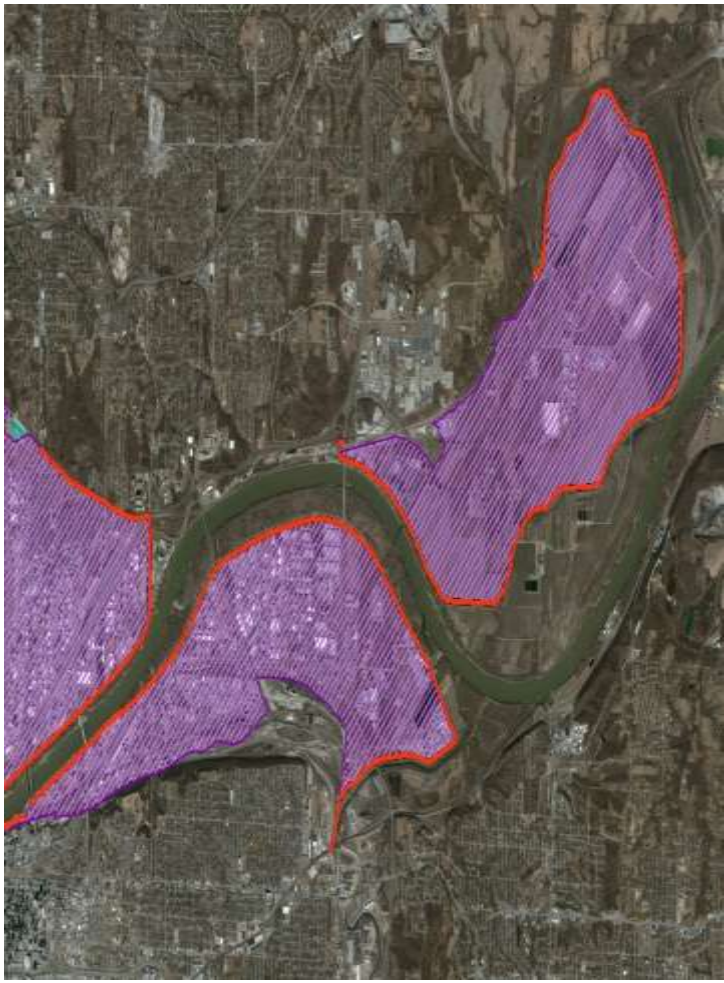
Levees in NFIP

- Interior Area – USACE EM 1110-2-1413 defines as "the area protected from direct riverine, lake, or tidal flooding by levees, floodwalls, or seawalls and low depressions or natural sinks."
- PAL – Provisionally Accredited Levee
- LAMP – Levee Analysis and Mapping Procedures



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Levee Analysis and Mapping

Identification

- Identify levees
- Levee ownership and background
- PAL eligible / Accredit / Not Accredit

Planning & Analyses

- PAL Progress Reports
- 65.10 Data Documentation
- LAMP Plan

Mapping

- Accredit on FIRM
- Not Accredit on FIRM (Levee Analysis and Mapping Process)
- Natural Valley

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Common Approach Towards Certification

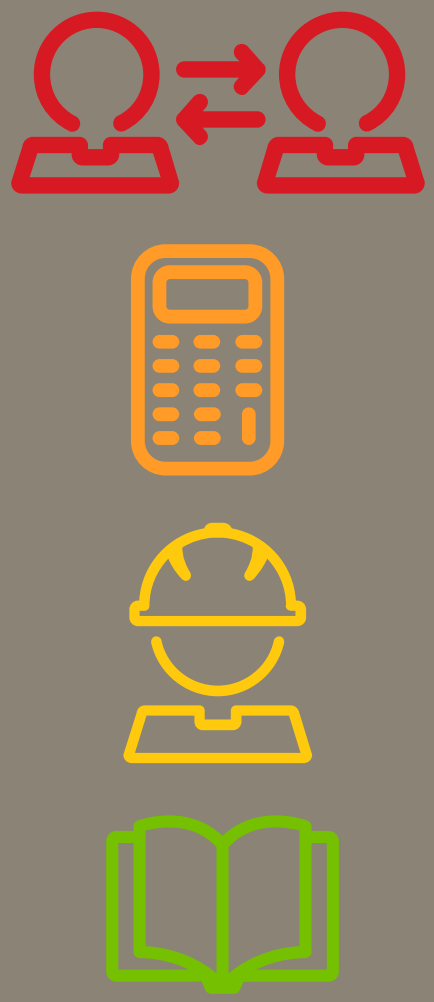
Phased Approach

Phase I – Gap Analysis

Phase II – Engineering Analysis

Phase III – Design and Construction (if necessary)

Phase IV – Preparation of Supporting Documentation to FEMA



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NFIP REQUIREMENTS AND RELATION TO USACE ACTIVITIES

NFIP REQUIREMENTS (44 CFR 65.10)		COMPLIANCE CAN BE DETERMINED THROUGH		
CFR CRITERIA CATEGORY	CFR CRITERIA SUBCATEGORY	USACE INSPECTION	USACE SCREENING	USACE RISK ASSESSMENT
Design Criteria	Freeboard (levee height)	NO	RARELY	YES
	Closure devices for all openings	NO	RARELY	YES
	Embankment protection	NO	RARELY	YES
	Embankment and foundation stability	NO	RARELY	YES
	Settlement	NO	RARELY	YES
	Interior drainage	NO	NO	AS APPROPRIATE*
Operation Plans	Closures	YES	YES	YES
	Interior drainage systems	YES	YES	YES
Maintenance Plans		YES	YES	YES

*Interior Drainage. Though the accreditation requirement for interior drainage may not be covered during a USACE risk assessment, USACE and FEMA will ensure the data needed to address interior drainage will be collected.

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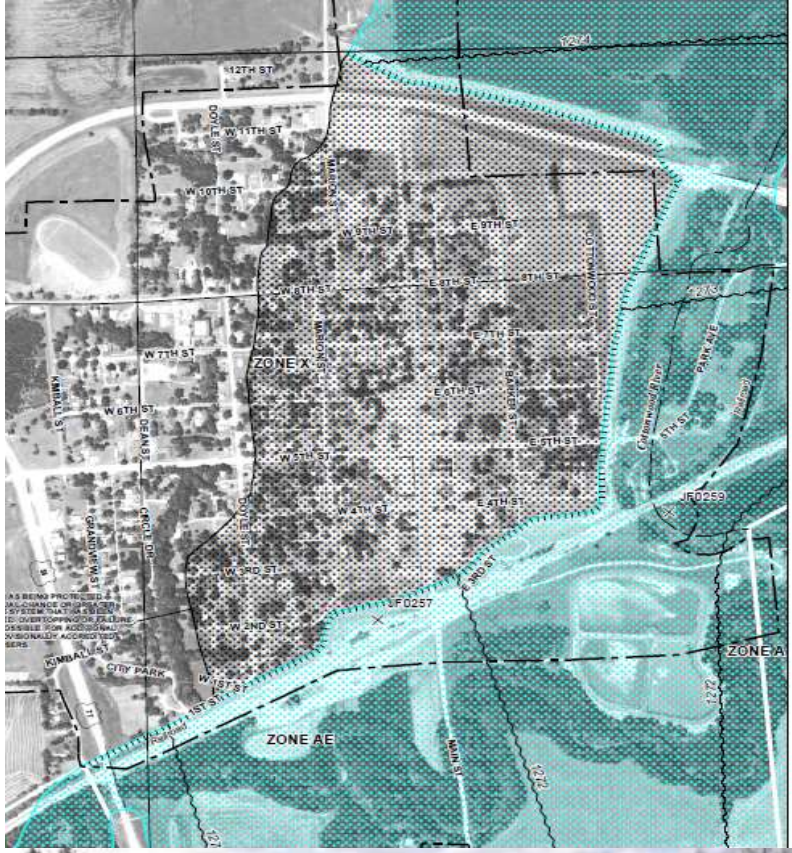
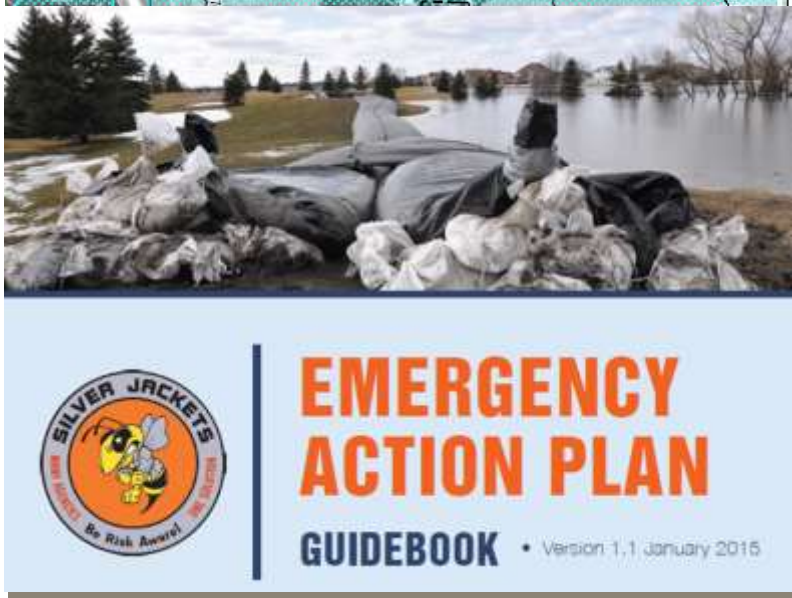
Accreditation Requirements

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

	Complete	Incomplete	Comments
65.10(b)(1) – Freeboard		✗	Has only 1ft 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		✗	Need water surface elevation of areas greater than 1 foot of depth
65.10(b)(7) – Other Design Criteria		✗	Needs operation of sandbag closure Needs official adoption
		✗	Needs official adoption
	○		As-Builts provided in the O&M Plan

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Additional Requirements

65.10 (e) Certification

- Data submitted to support that a given levee system complies with the structural requirements set forth in 65.10(b)(1-7) must be certified by a Registered Professional Engineer.
- Certified as-built plans must be submitted

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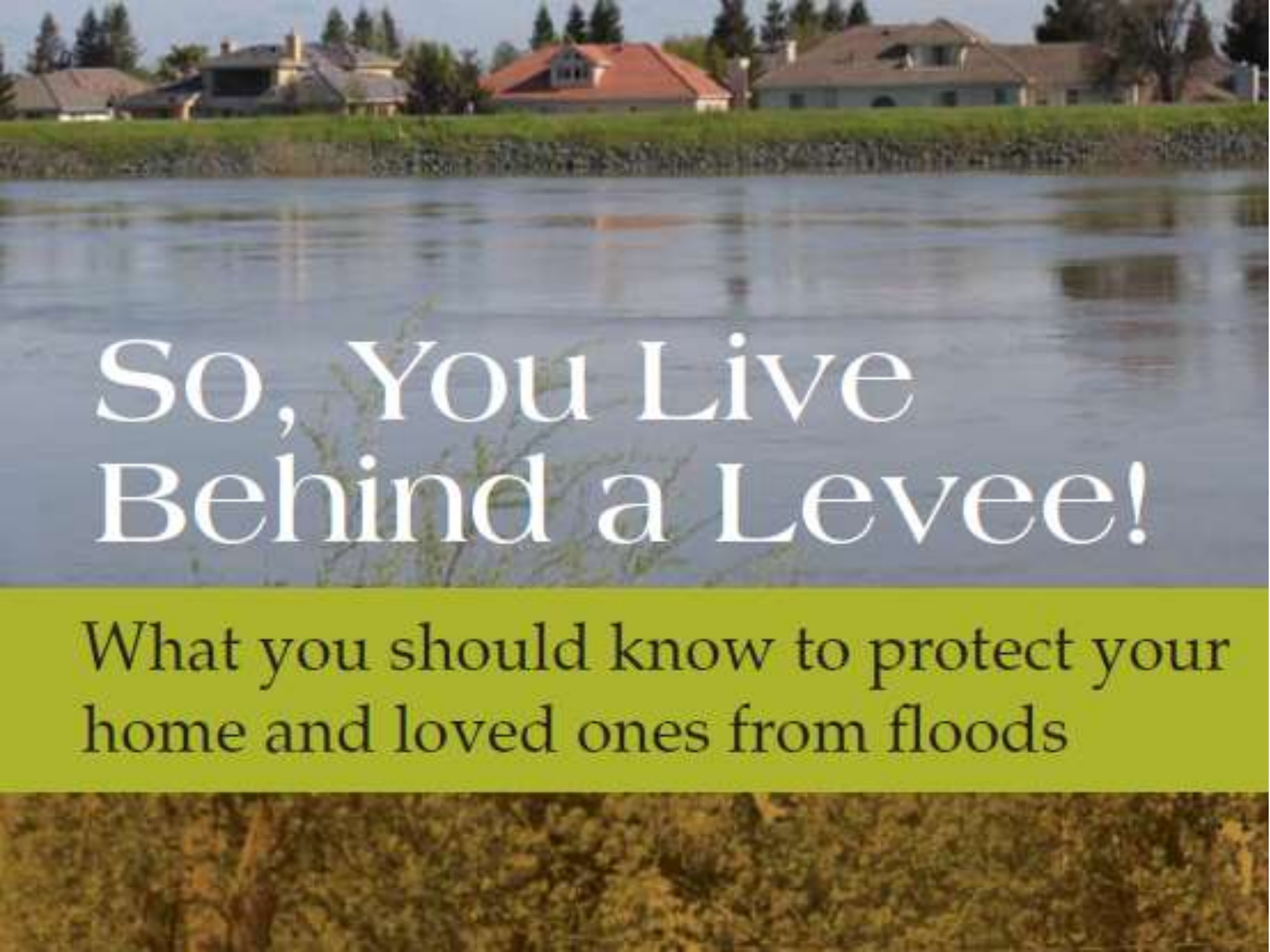
Can you sit down and relax?



So, You Live Behind a Levee!

What you should know to protect your home and loved ones from floods

Maintaining FEMA Accreditation

- Triggers?
  - FEMA Map Update
  - Certifying engineer conditions
- Data management
  - Continue to meet design, operation, and maintenance standards
  - Continually maintain the levee
  - Document modifications to levee system
  - All modifications sealed by PE

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Levee Analysis & Mapping Procedure (LAMP)

- Levee Analysis and Mapping Procedures (LAMP)
- New Approach (July 2013)
- More options to levee owner for partial credit if can't fully certify
- Levee owner and communities engaged with decisions

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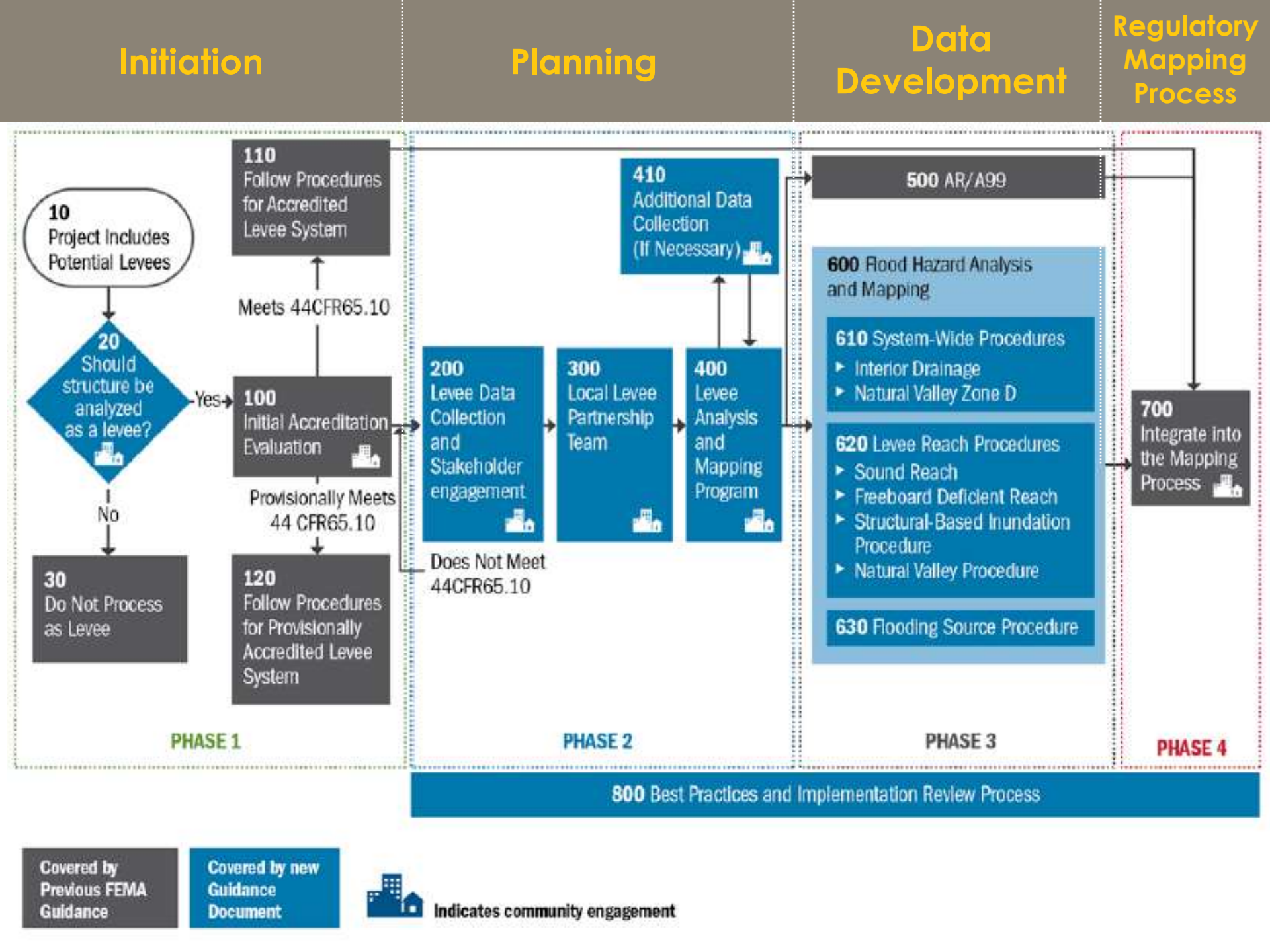
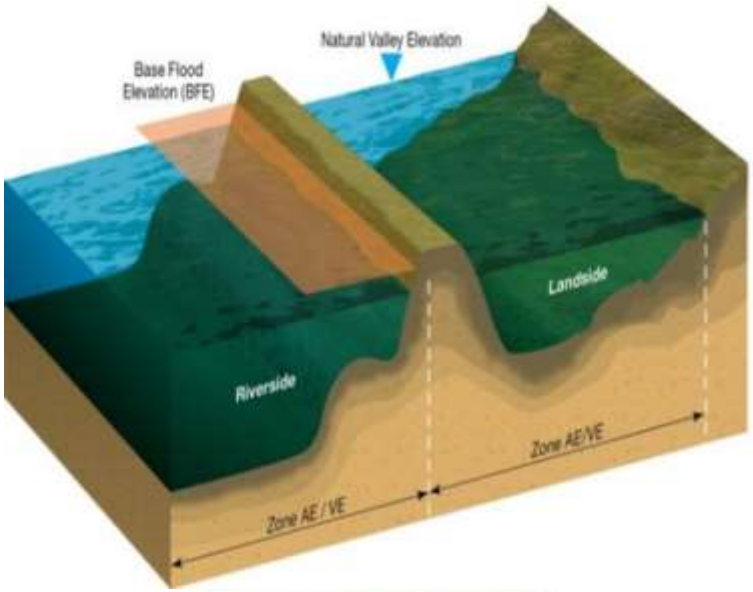
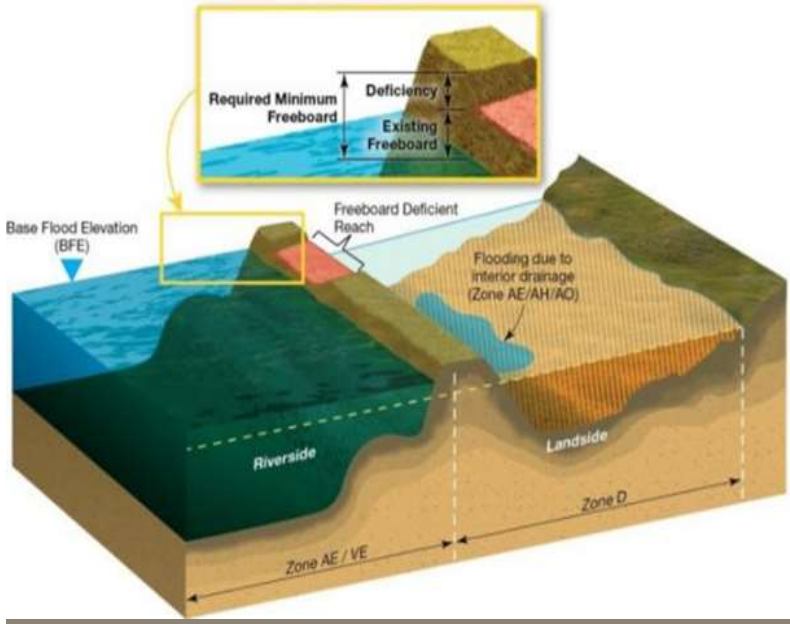

Initiation
Planning
Data Development
Regulatory Mapping Process
10 Project Includes Potential Levees
20 Should structure be analyzed as a levee?
Yes
No
30 Do Not Process as Levee
110 Follow Procedures for Accredited Levee System
Meets 44CFR65.10
100 Initial Accreditation Evaluation
Provisionally Meets 44 CFR65.10
120 Follow Procedures for Provisionally Accredited Levee System
200 Levee Data Collection and Stakeholder engagement
300 Local Levee Partnership Team
400 Levee Analysis and Mapping Program
410 Additional Data Collection (If Necessary)
Does Not Meet 44CFR65.10
500 AR/A99
600 Flood Hazard Analysis and Mapping
610 System-Wide Procedures
Interior Drainage
Natural Valley Zone D
620 Levee Reach Procedures
Sound Reach
Freeboard Deficient Reach
Structural-Based Inundation Procedure
Natural Valley Procedure
630 Flooding Source Procedure
700 Integrate into the Mapping Process
PHASE 1
PHASE 2
PHASE 3
PHASE 4
800 Best Practices and Implementation Review Process
Covered by Previous FEMA Guidance
Covered by new Guidance Document
Indicates community engagement

LAMP Approaches

- Natural Valley (always applied initially and for the entire system)
- Sound Reach
- Freeboard Deficient
- Overtopping
- Structural-Based Inundation





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Enhanced Hydrologic & Hydraulic Modeling

- 2D Modeling for Levees
- Flood mapping and flood animations
- Benefits of 2D Modeling

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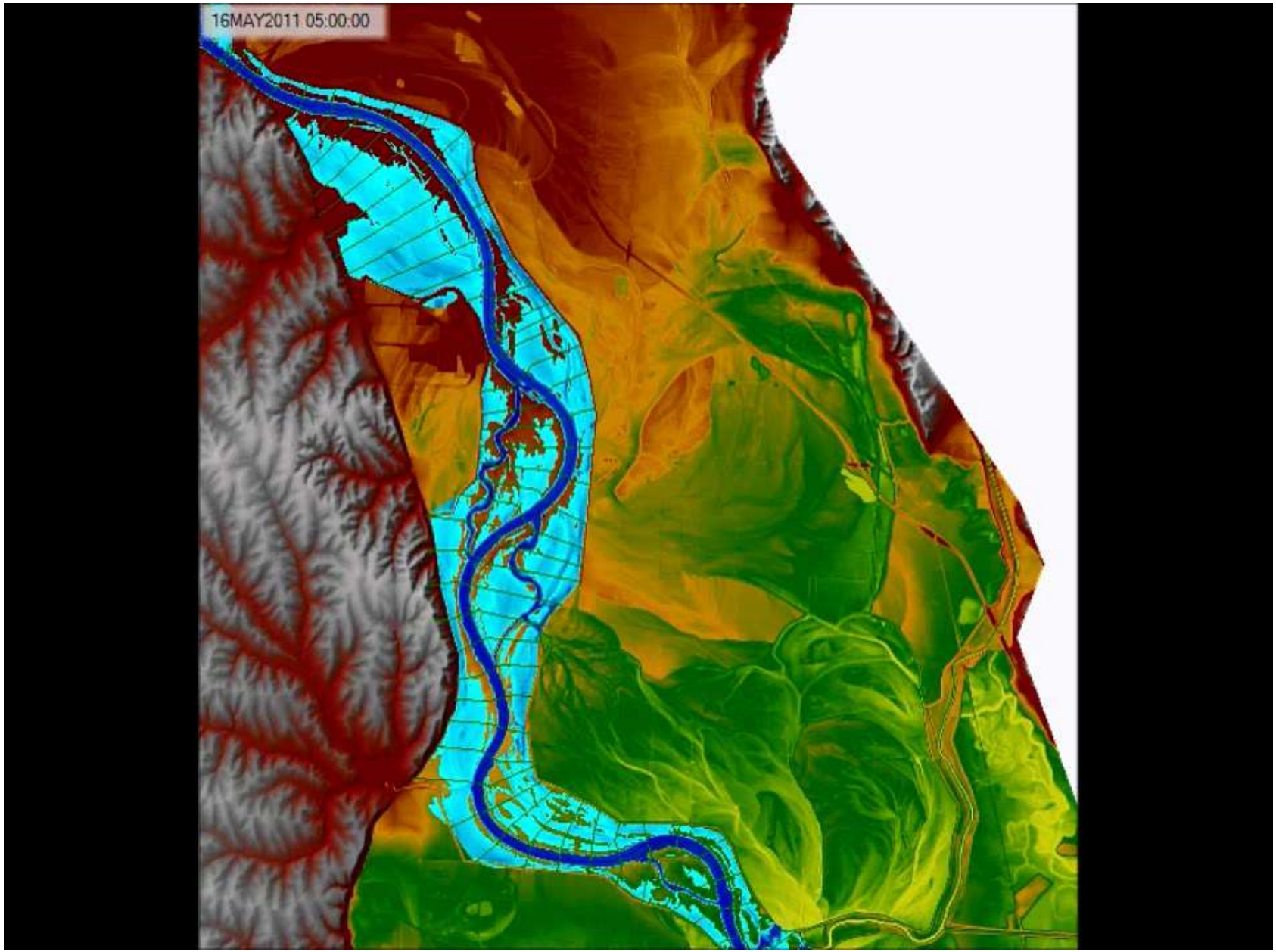

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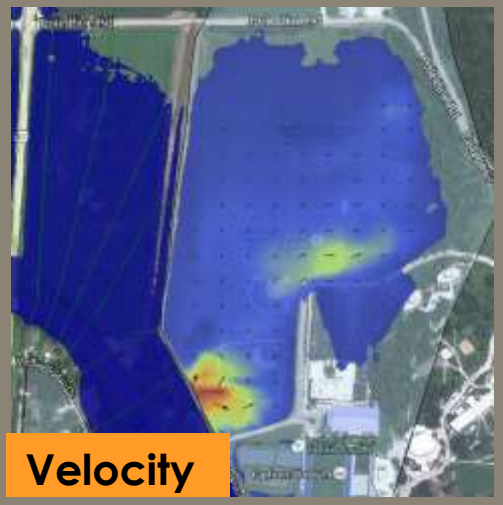
Benefits of 2D Modeling

- Inundation in leveed floodplain = Complex Hydraulic Process
- 2D Levee breach modeling
  - Improved accuracy
  - Value-added results
- Valuable resource for floodplain management



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Risk Awareness

Know your History

FEMA's Flood Risk Products for Levees

Visualize the Hazard

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Great Missouri River Flood
CIRCA 2011
Great Missouri River Flood 2011
WATER LEVEL

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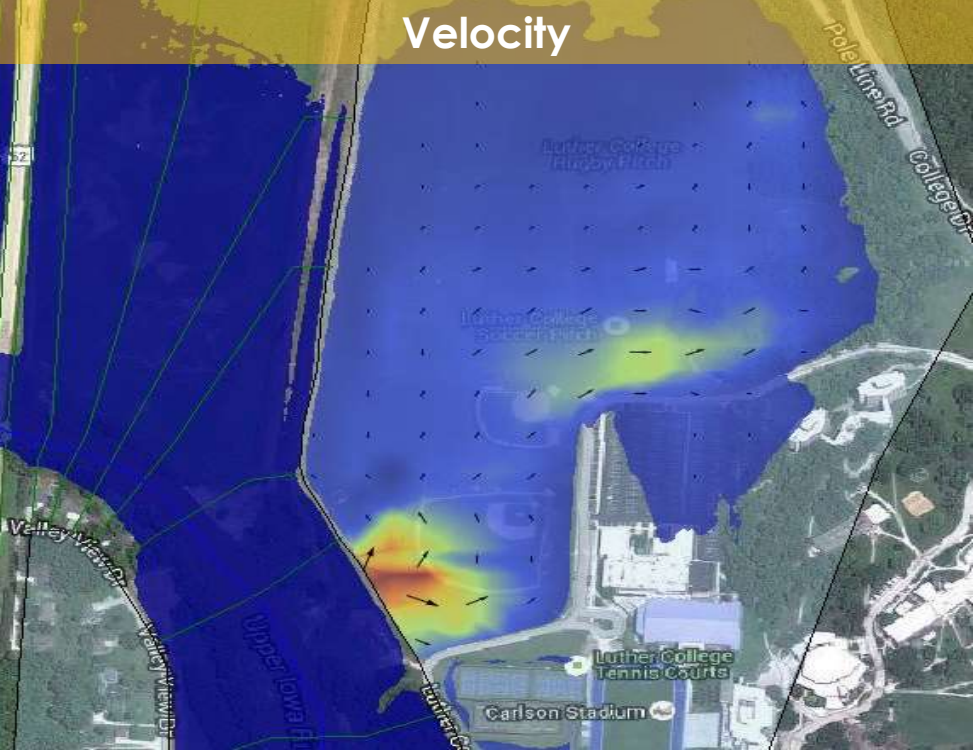
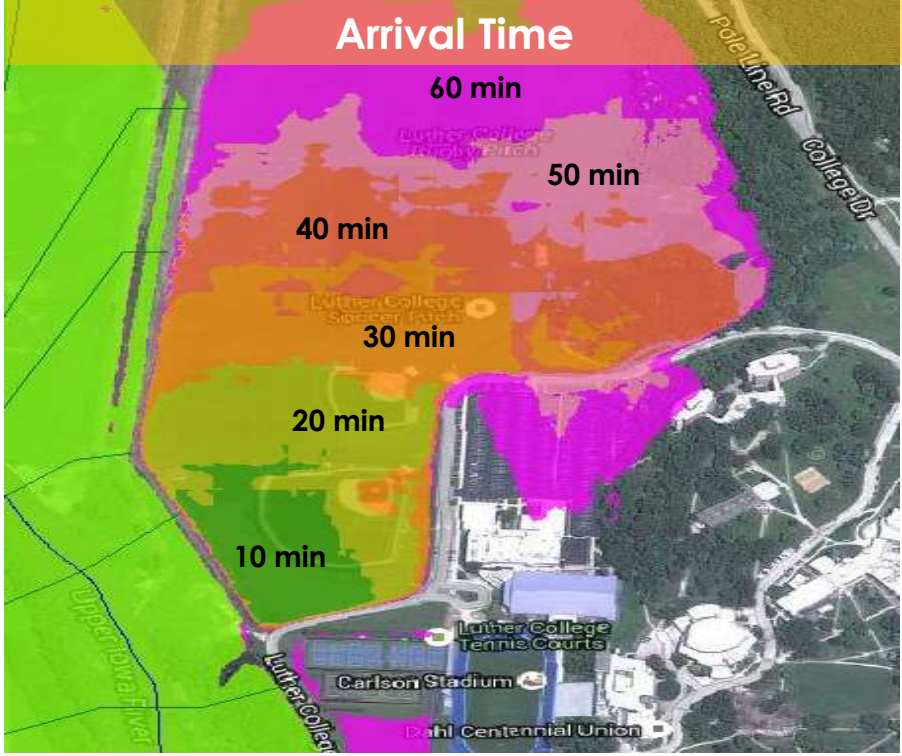
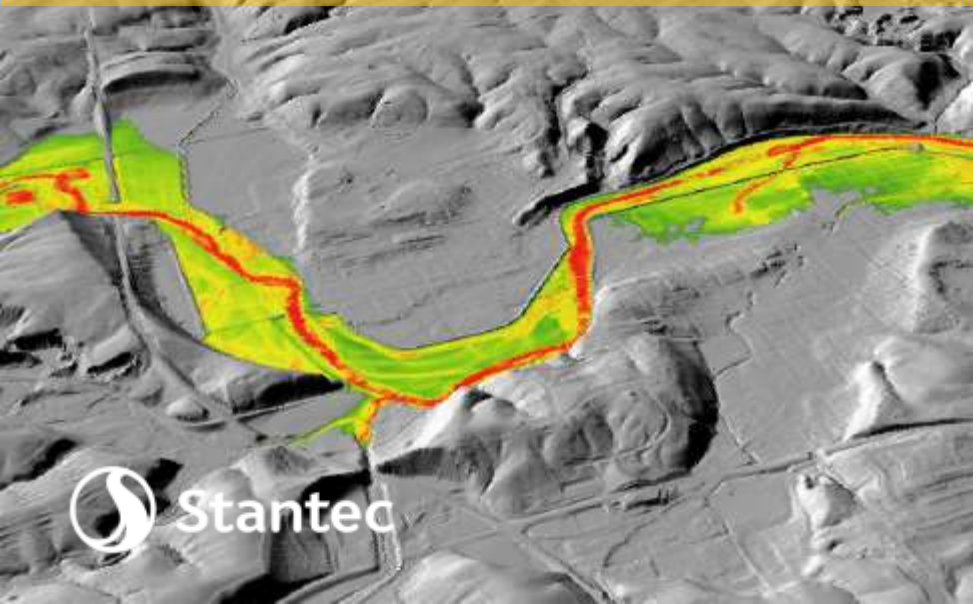
Velocity



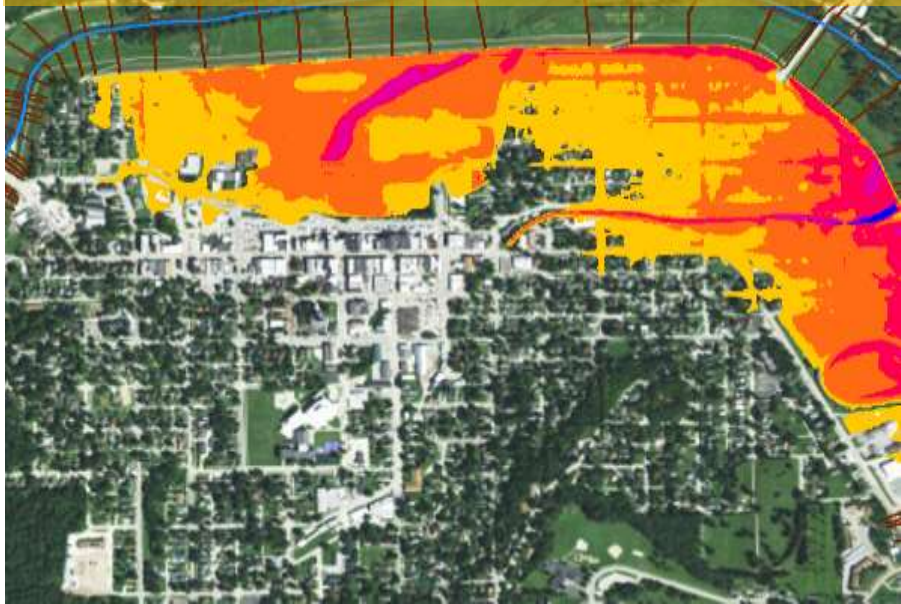
Arrival Time



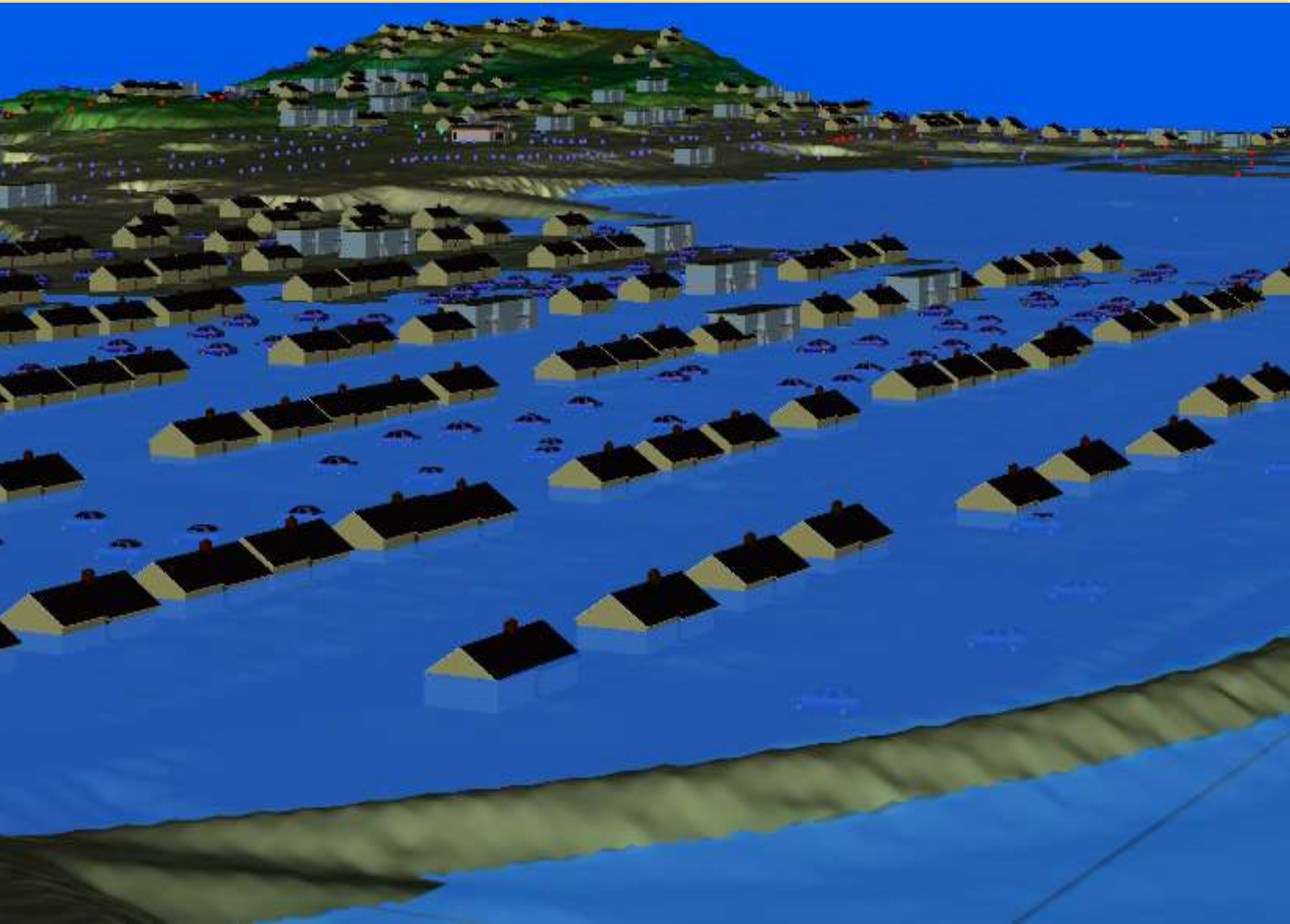
Mapping



Depth Grid



3D Mapping



Street View

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Embed This

The Cost Of Flooding

4 foot flood

Stereo - etc.	$2,000
Washer/Dryer	$980
Accent Furniture & Accessories	$1,630
Loss of Personal Items	$5,500

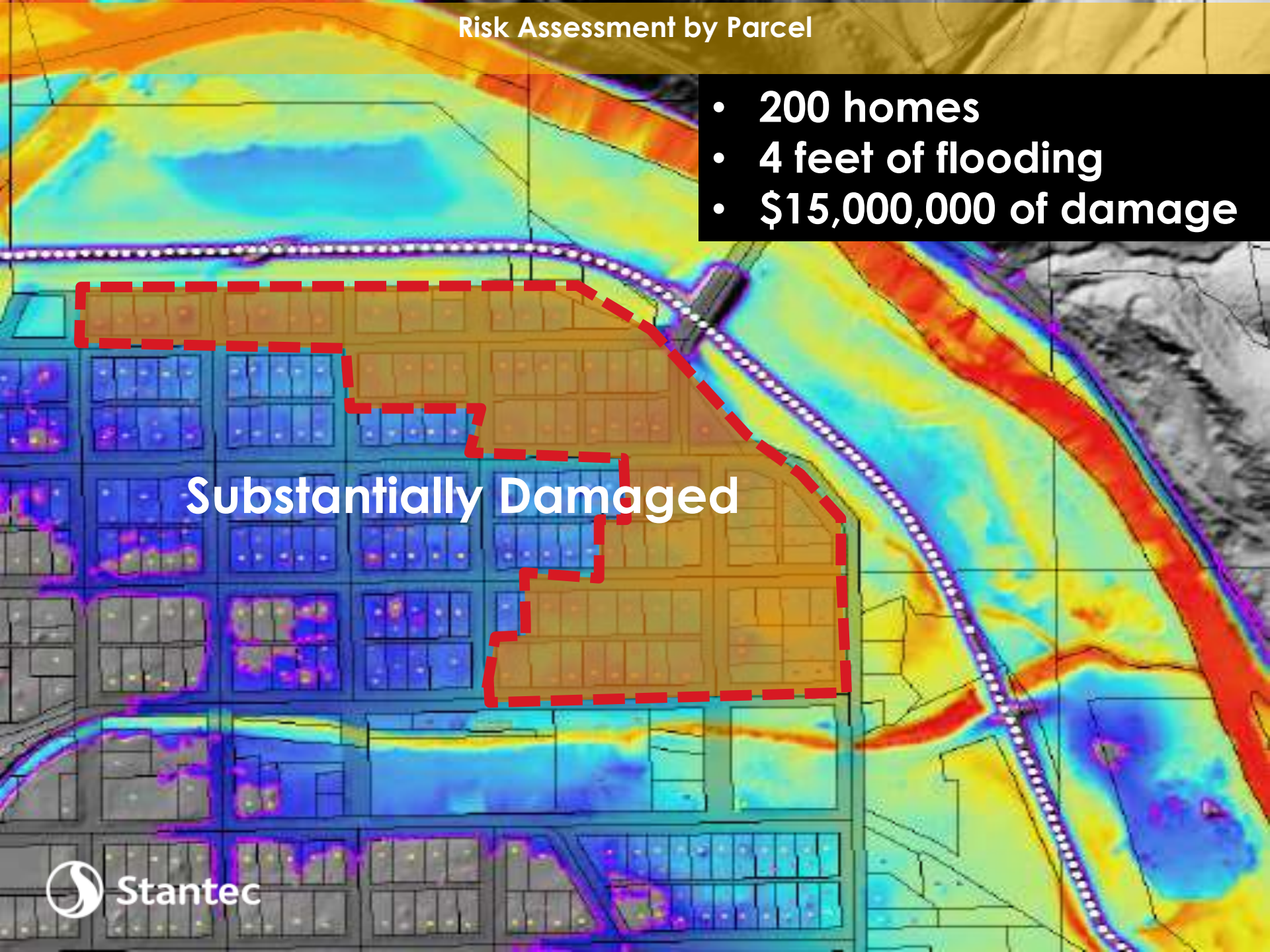
Total Losses **$74,580**
2,000 Square Foot Home

See 1,000 Square Feet

Estimates are for illustrative purposes only and should not be used to estimate any actual flood loss. A flood certified insurance adjuster making a room-by-room item-by-item, detailed estimate of covered flood damage is the only estimating method approved by and acceptable to the National Flood Insurance Program. These estimated costs are based on an average U.S. home of 1,000 and 2,000 square feet, built on a slab and with typical household items. Costs vary from State to State and home to home.

NATIONAL FLOOD INSURANCE PROGRAM

Risk Assessment by Parcel



Conclusion

- Levees are an aging infrastructure needing maintenance and upgrades
- Certification of data to 65.10 is only a portion of the overall resiliency to community
- Data Analytics to support Awareness
- Adapt to change

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Questions?

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