MAAPnext

Greater Houston Builders Association Developers Council

April 1, 2026



A COUNTY SHAPED BY WATER









During Hurricane Harvey, **68% of all structures** in Harris County that flooded were **outside of the 1% mapped floodplain.**

MAAPnext

Developing A Modern Understanding of Flood Risk



National + Local Expertise

Led by FEMA and supported locally by HCFCD

Cutting-Edge Modeling

Updated rainfall data, topography, and key projects from HCFCD

Community Support

Helping community understand and have their voice heard on new FEMA draft maps

Collaborating to Update FEMA Regulatory Maps

FEMA

Leads process to update regulatory floodplain maps

Issues official draft products & maps throughout process

Flood Control District

Supports FEMA's efforts on behalf of the community by providing local perspective

34 Floodplain Administrators

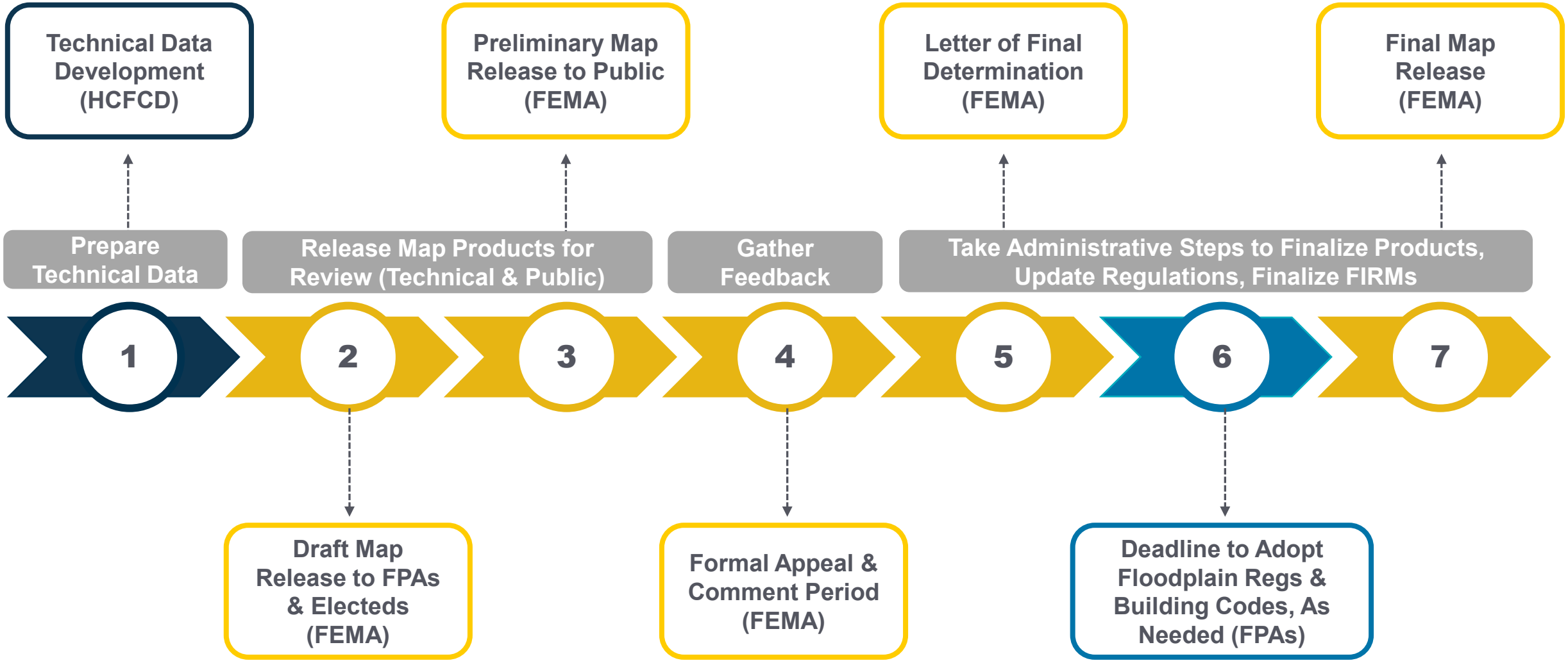
Coordinate with public & local elected officials to gather feedback on draft products

Update local regulations, as needed

Harris County Residents

Review maps and provides feedback to FEMA & floodplain administrators

FEMA's Process to Update Maps



Technical Work for Harris County



1,600+

total miles of channels studied, adding 400 new miles



30%

increase in rainfall amounts



100%

updated Harris County topography

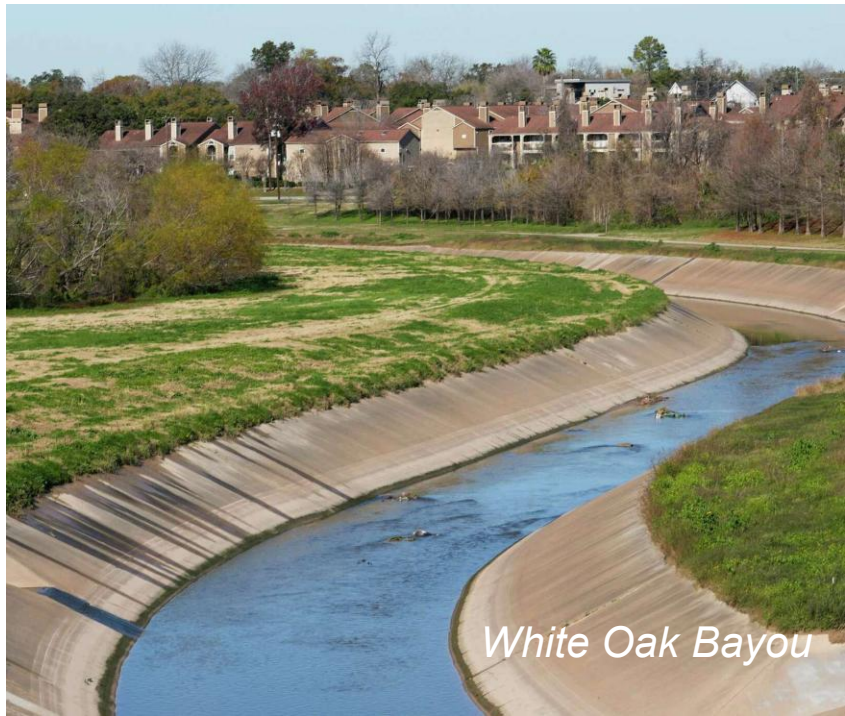

Halls Bayou


Little Cypress Creek


Sims Bayou


Hunting Bayou


Brays Bayou

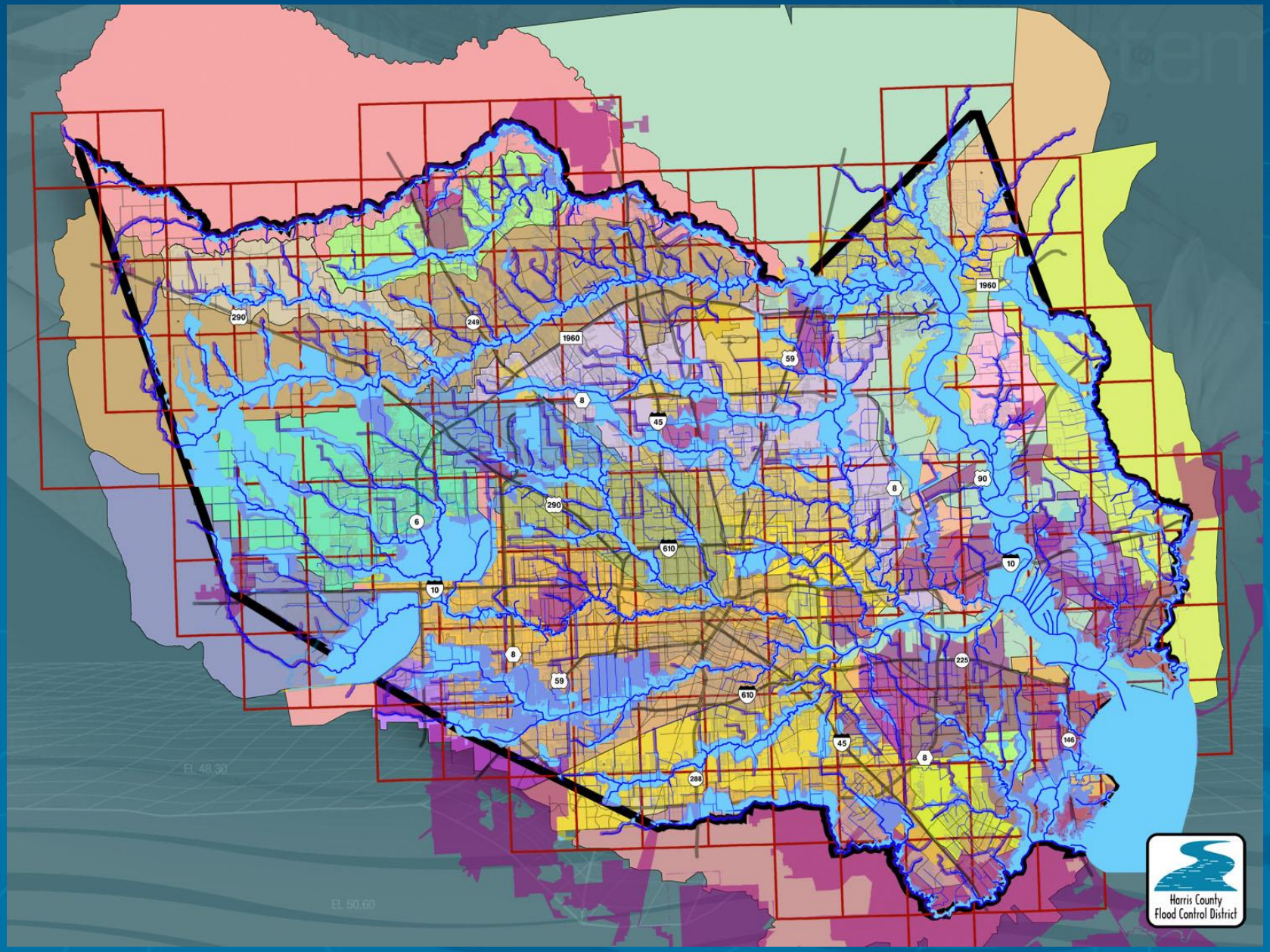

White Oak Bayou

The Process

Our Work With FEMA to Update Maps

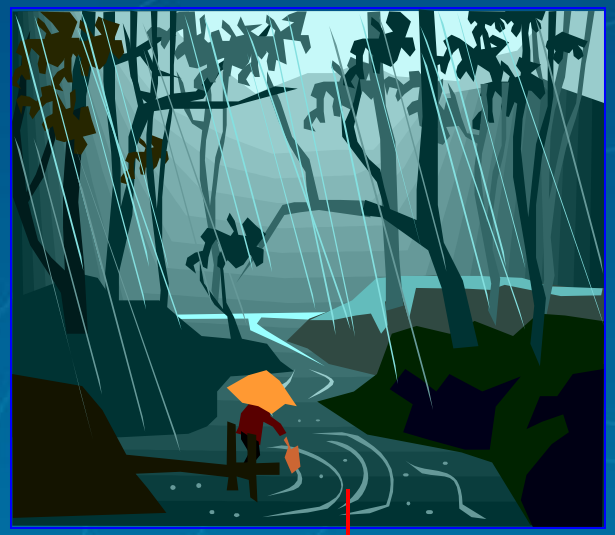
The Scale of Our Work

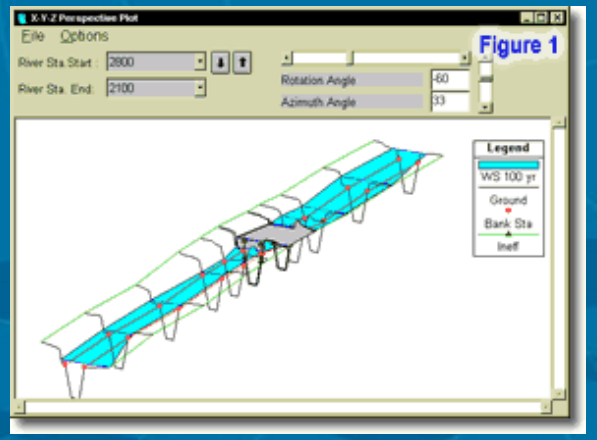
Identified Flood Plains

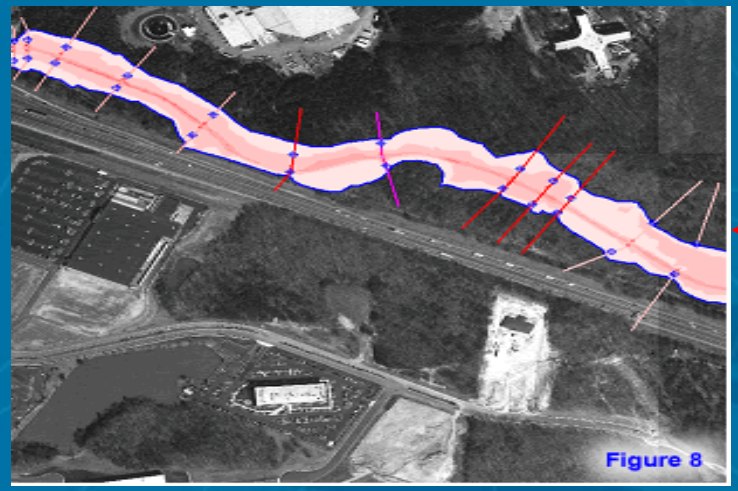


Mapping Process



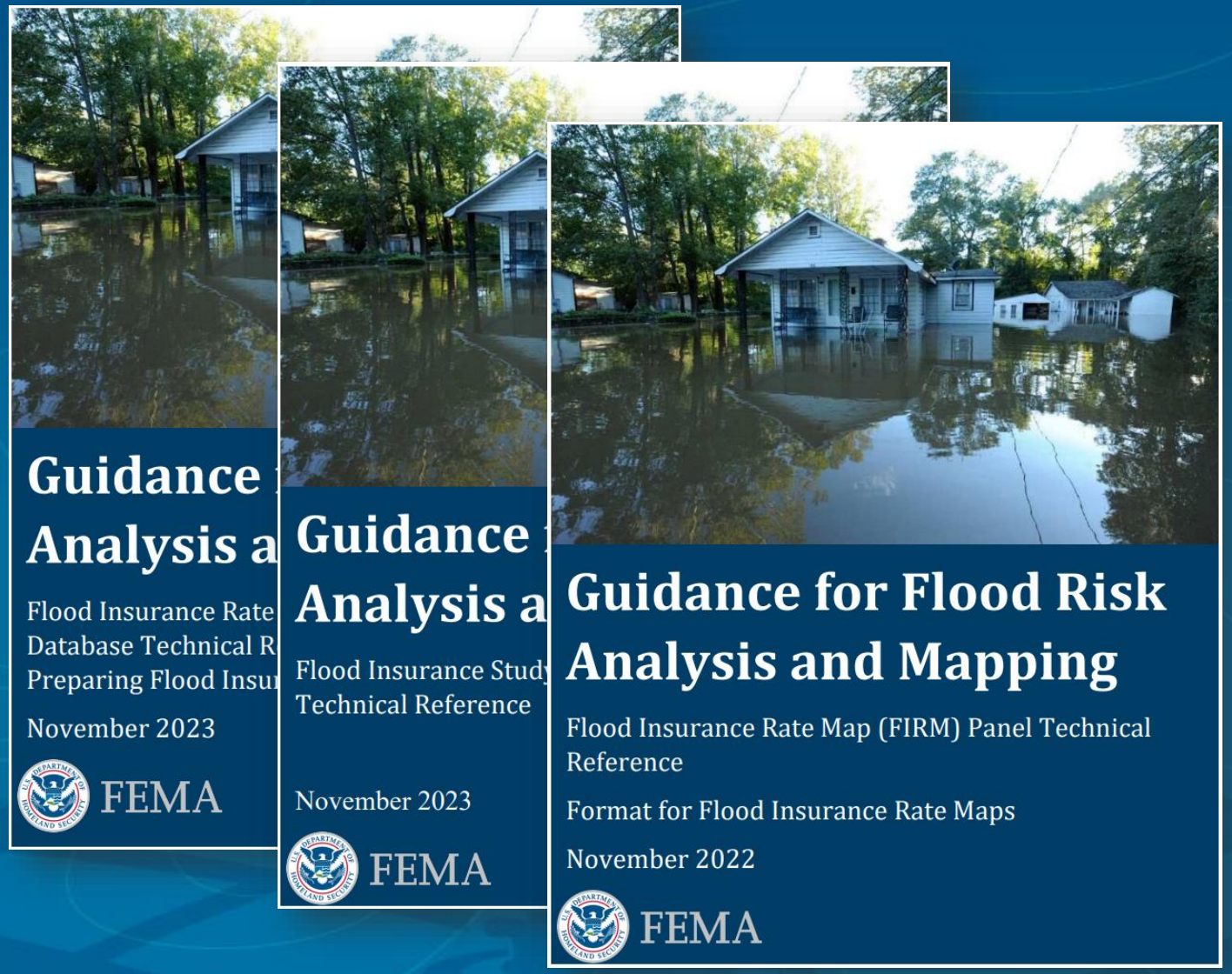






Federal Guidance

- Title 44 CFR, Sections 59-80 (NFIP Regulations)
- FEMA Technical References
  - Preparing Flood Insurance Rate Map (FIRM) Databases
  - Flood Insurance Study (FIS) Report
  - Format for FIRMs
- NOAA Atlas 14 Rainfall



HARRIS COUNTY FLOOD CONTROL DISTRICT

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FEMA



FPA

HCFCD

The start of the Journey

- Harris County Flood Control District
  - Cooperating Technical Partner since 2000
  - TSARP 2001
  - Model Management 2010
  - LOMR Delegation 2010
  - 1D/2D modeling for overflow 2012
  - MAAPnext - FY18, FY19, FY20
  - Extensive coordination with FEMA
  - Includes Communications and support after maps are released

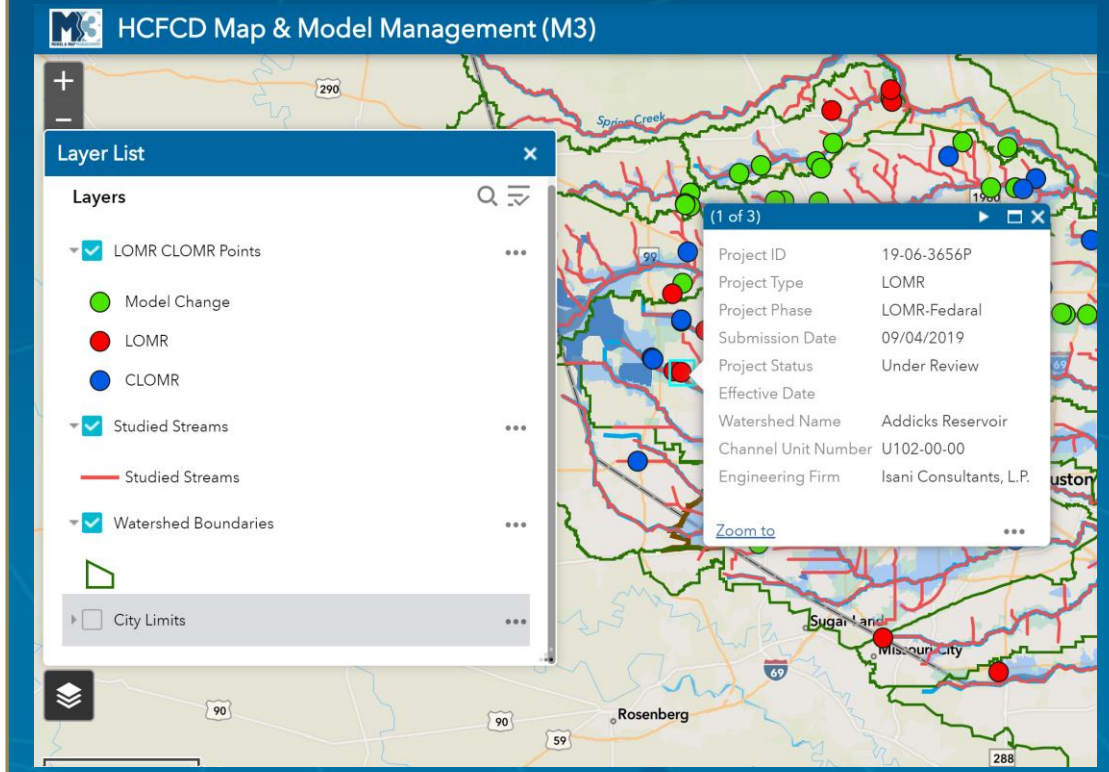
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Model Management

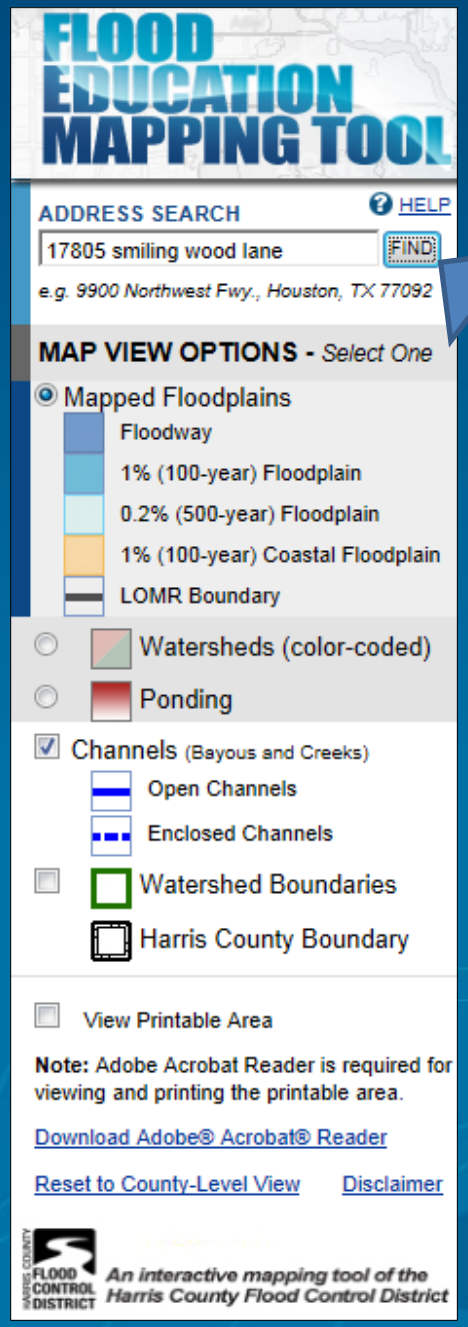
M3 System (2009)

M3 has 4 primary objectives:

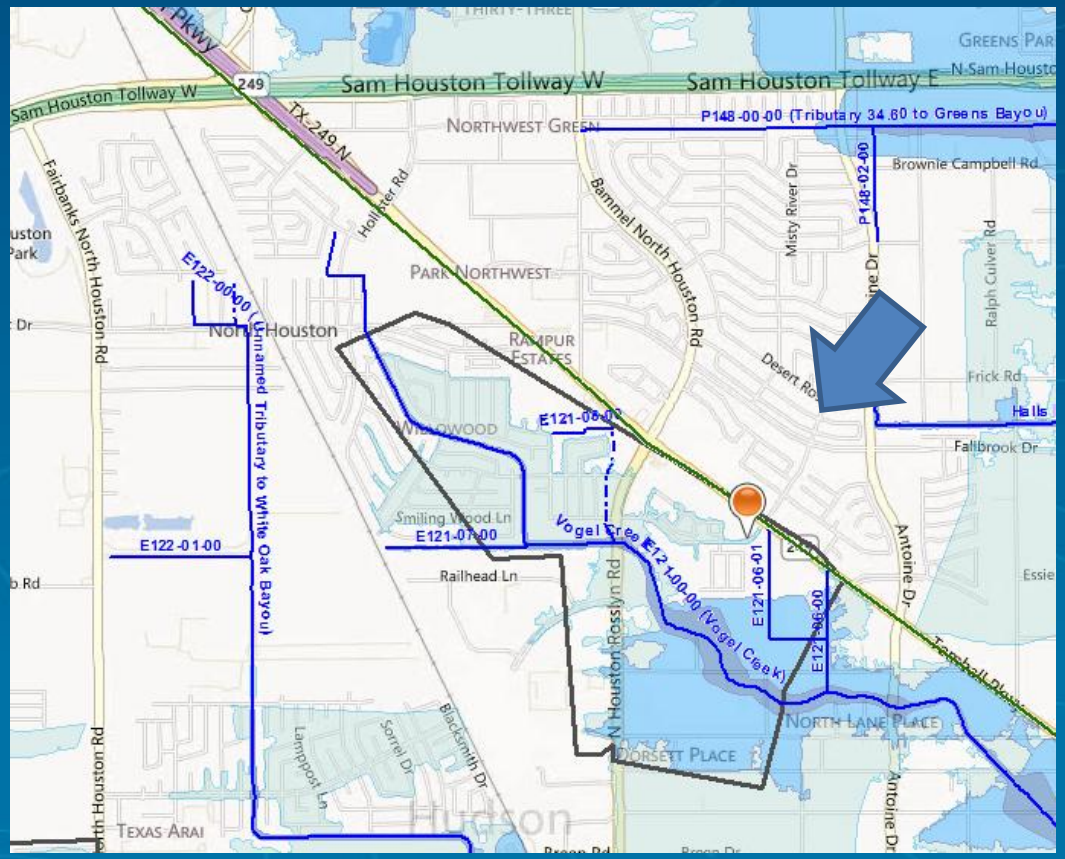
- Continuously manage and maintain the effective model set to incorporate changes from LOMRs and PMRs
- Establish and enforce local mapping and modeling standards through Local Review via partnerships with Floodplain Administrators
- Help coordinate concurrent development activities in watersheds
- Provide a web application to distribute effective models and information



Flood Education Tool

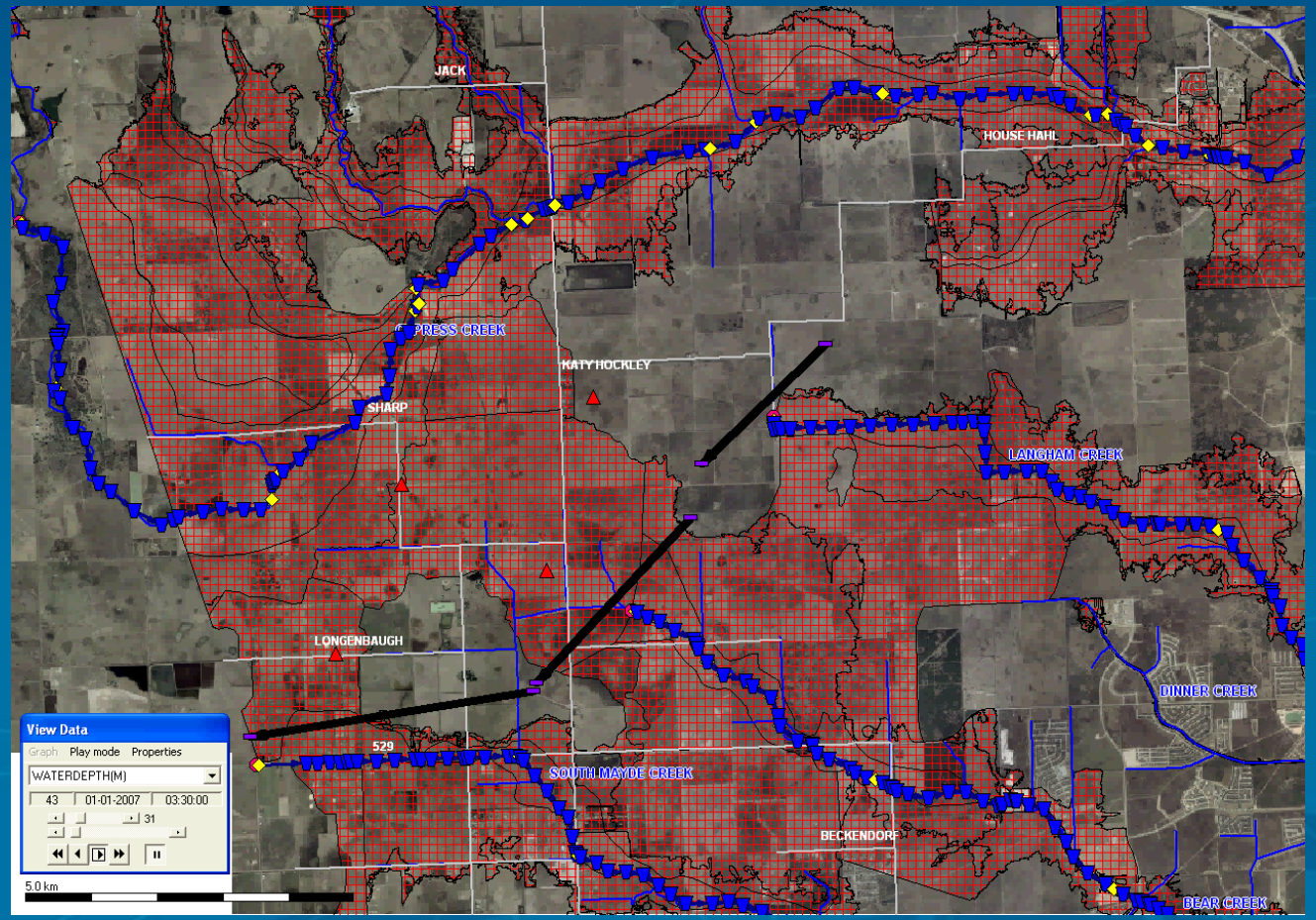


Type an address in the address search bar and click “Find”



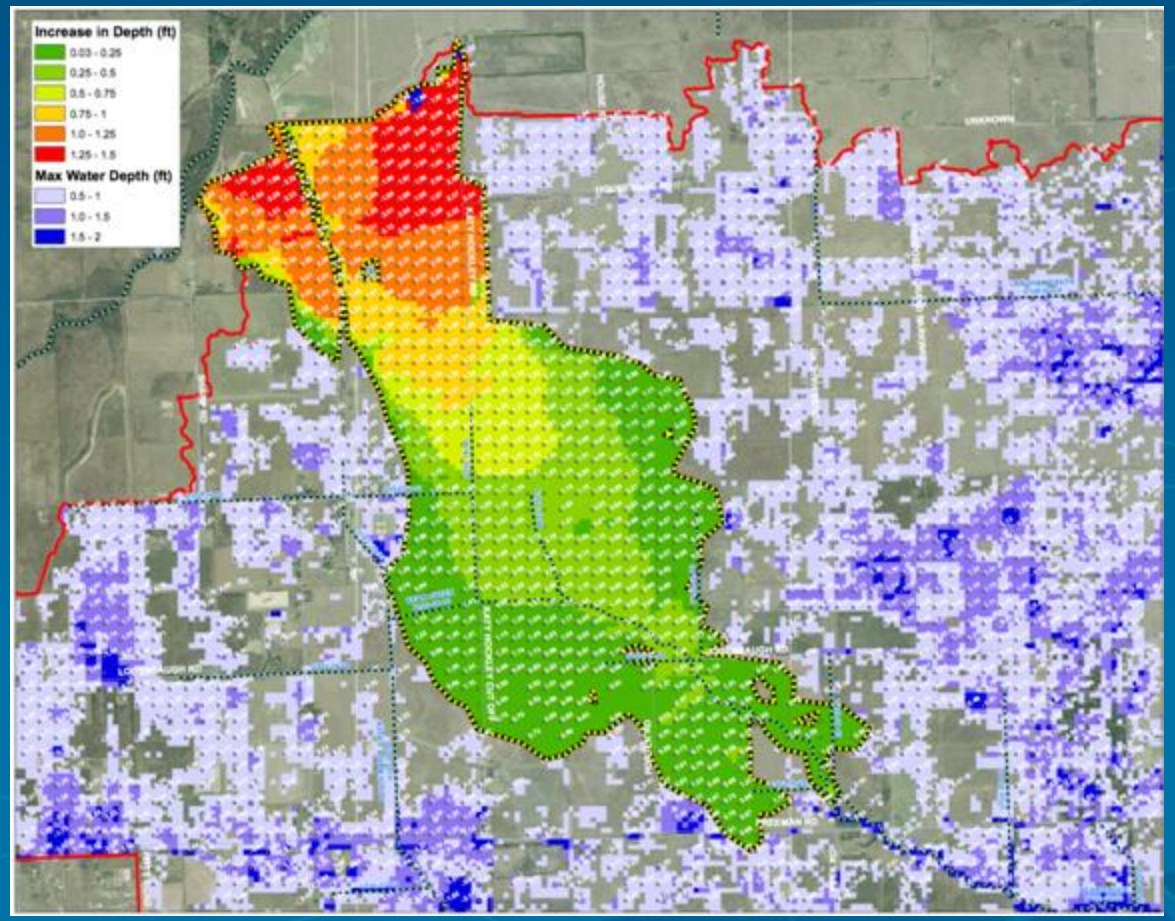
The map will zoom to that address and the floodplains will appear. A text window also will appear with information specific to the address entered, including contact information for the local floodplain administrator and watershed information with a link to that watershed’s information page on www.hcfcd.org.

1D/2D Modeling

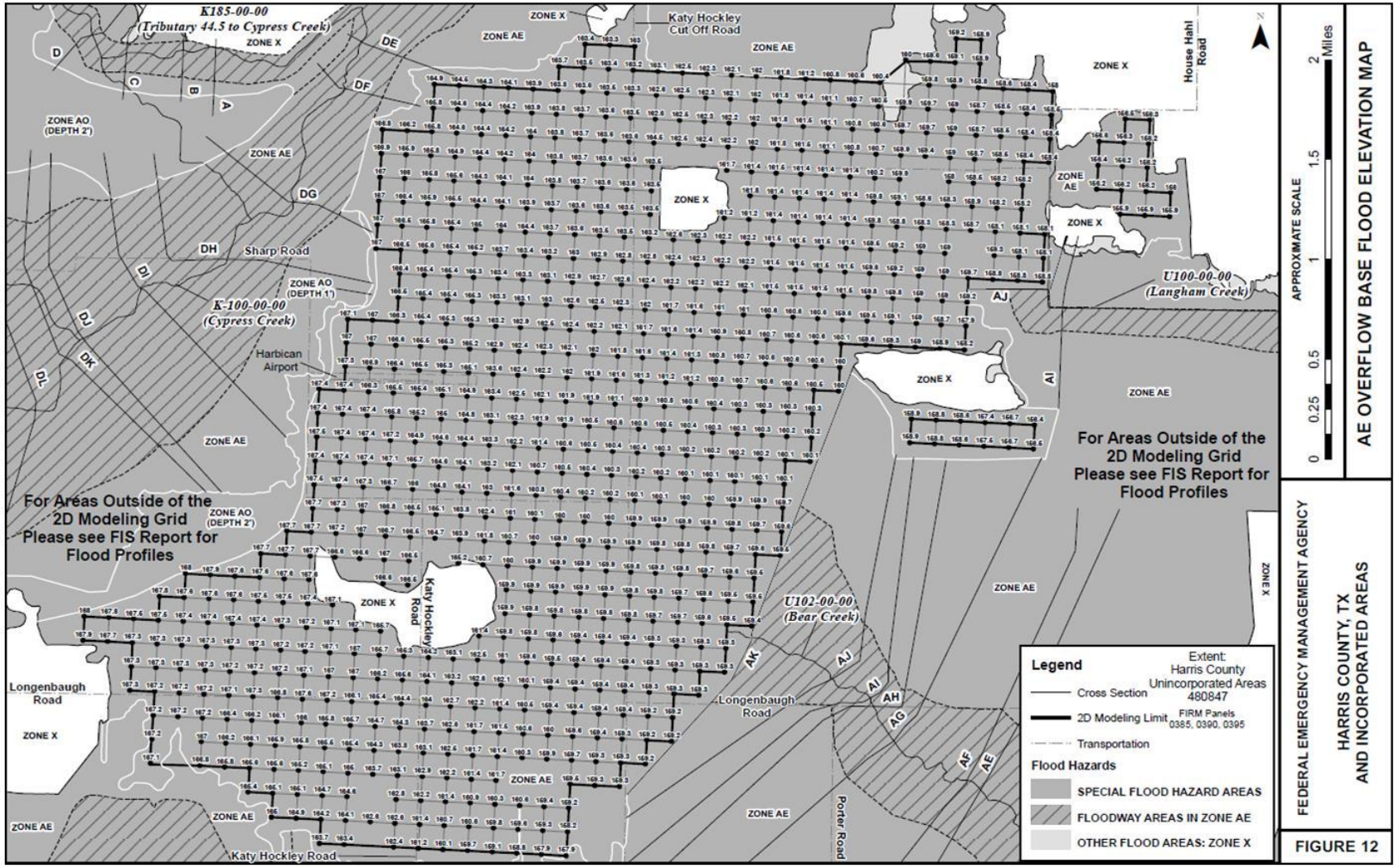


AH

Conveyance Zone for Cypress Overflows



2D Defined Zone AE Profile Alternative



The start of the Journey

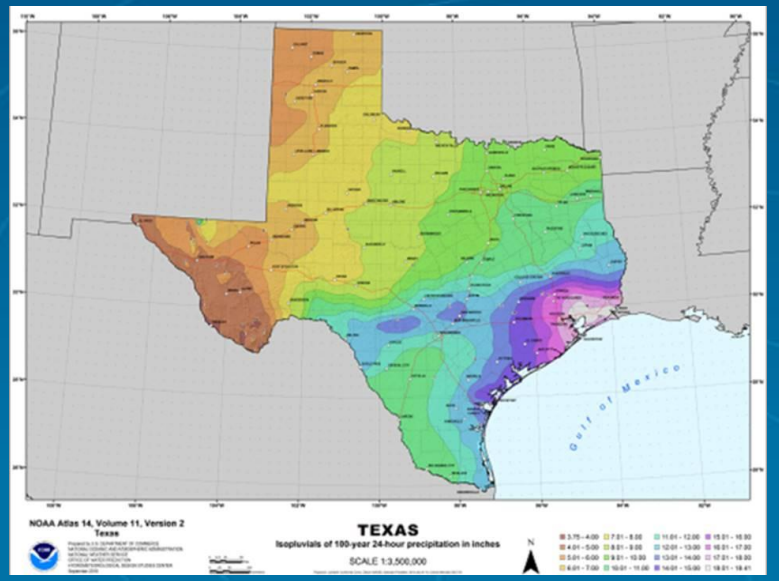
- Cooperating Technical Partner since 2000
- TSARP 2001
- Model Management 2010
- LOMR Delegation 2010
- 1D/2D modeling for overflow 2012
- Vogel Creek **2 panels**(16-06-0527P) 11/04/2016
- Sims upstream **5 panels**(15-06-0693P) 05/18/2016
- Sims Bayou **12 panels** 05/02/2019
- Addicks Watershed **12 panels 11/15/2019**
- MAAPnext - FY18, FY19, FY20
- Extensive coordination with FEMA
- Includes Communications and support after maps are released

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Key Changes

- Rainfall – NOAA Atlas 14
  - ~30% **Increase** in 100-YR
    - Approx. 13” to 18”
  - ~36% **Increase** in 500-YR
    - Approx. 19” to 25”

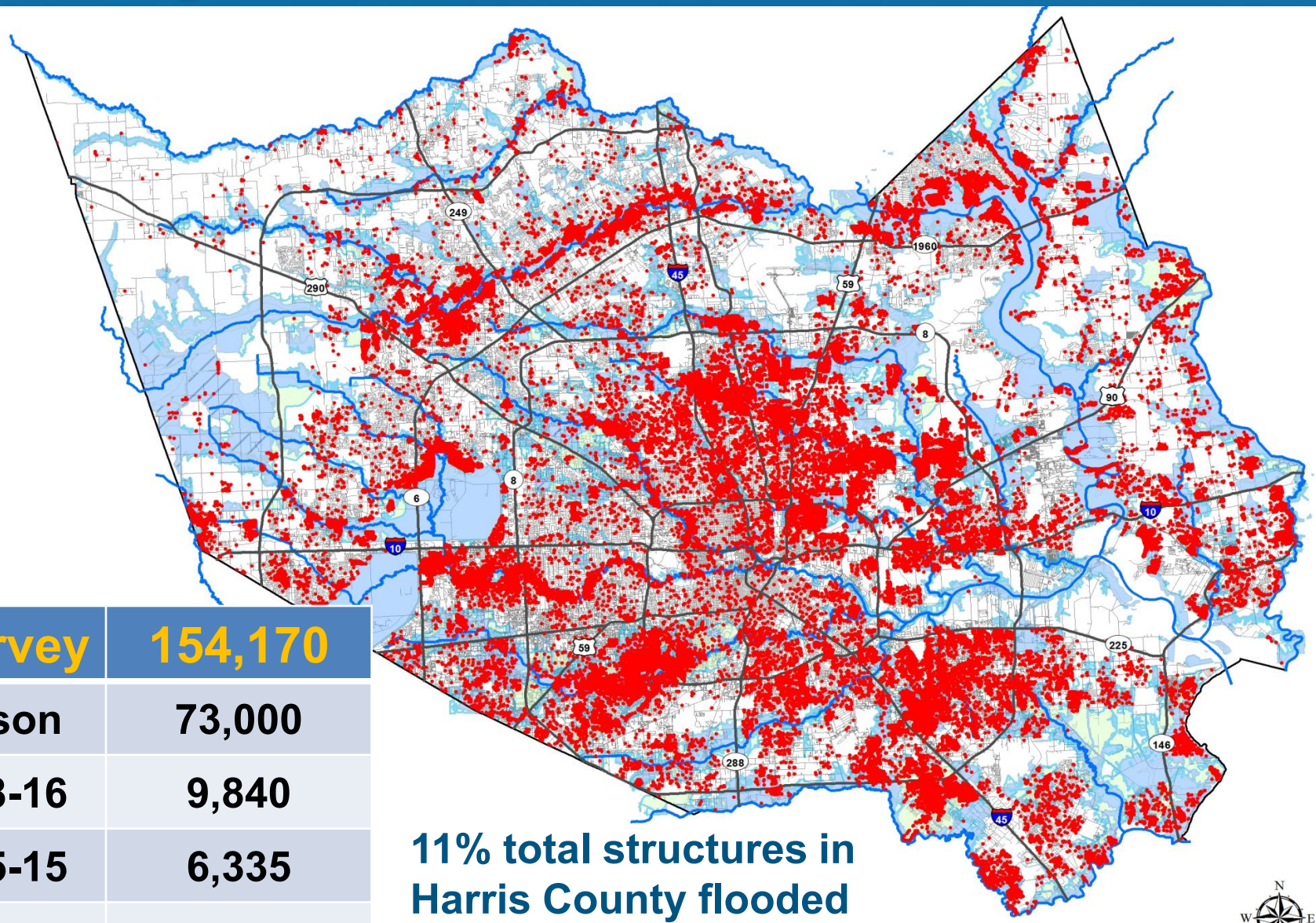


MAAPnext 100-Year Rainfall is approximately equal to Current 500-Year Effective Rainfall totals

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Study Drivers & Need



Harvey	154,170
Allison	73,000
4-18-16	9,840
5-25-15	6,335
6-19-06	3,370

11% total structures in Harris County flooded

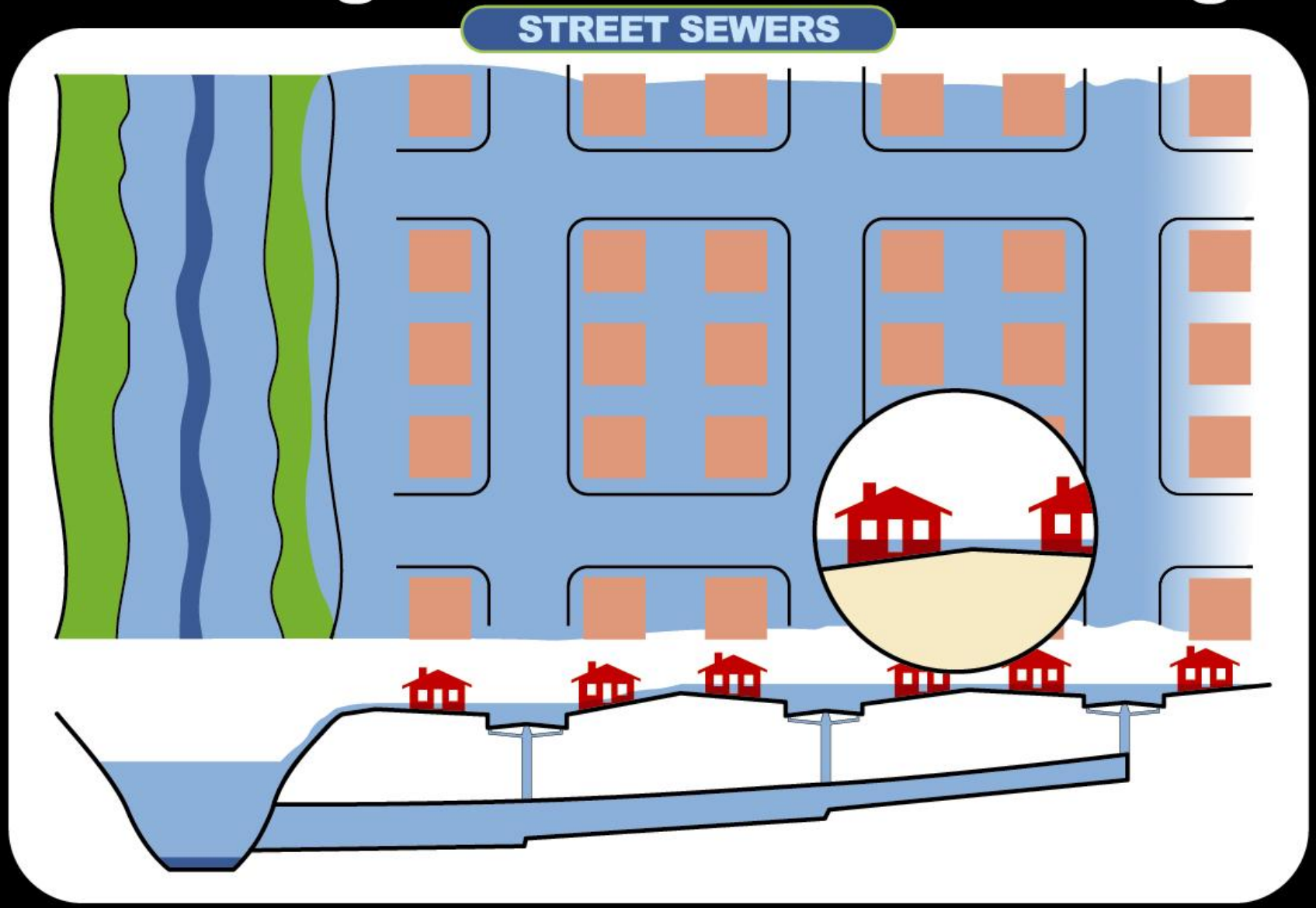
105,340 or 68% outside 1% floodplain

HARRIS COUNTY FLOOD CONTROL DISTRICT

Harvey Versus Other Major Floods

Duration	Harvey August 2017	Allison June 2001	Tax Day April 2016	October 1994
1-hr	6.8	5.7	4.7	3.7
2-hr	11.9	9.9	7.3	4.7
3-hr	14.8	13.5	8.3	5.3
6-hr	18.9	21.2	13.9	7.2
12-hr	20.9	28.3	16.7	12.0
24-hr	25.6	28.4	17.4	20.9
2 days	34.5	28.5	17.5	23.1
4 days	47.7	38.5	N/A	28.9

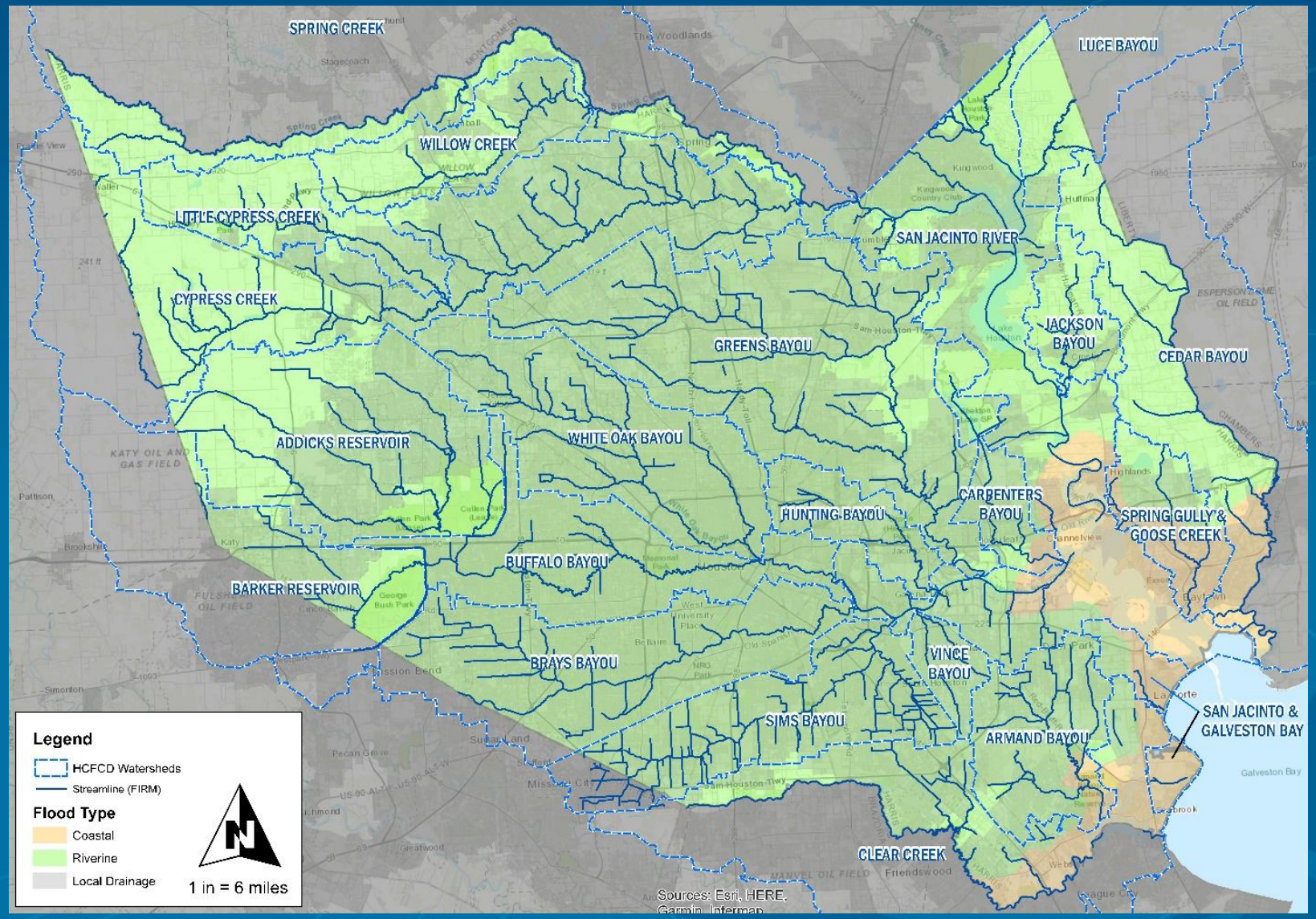
Ponding & Sheet Flow Flooding



FLOODING FROM INTENSE LOCAL RAINFALL
(Longer Duration)

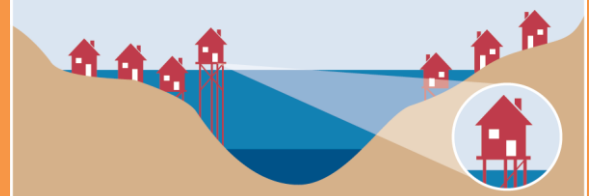
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Flooding Types



FIRMs – Flood Hazard Depicted

RIVERINE



COASTAL

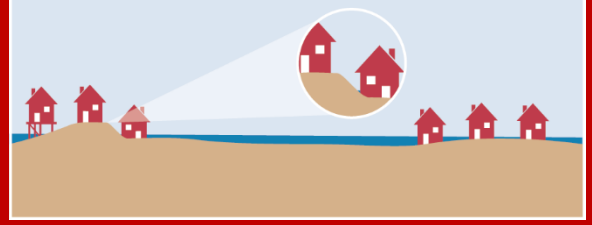


FIRMs – Flooding Not Depicted

OVERLAND/LOCAL DRAINAGE



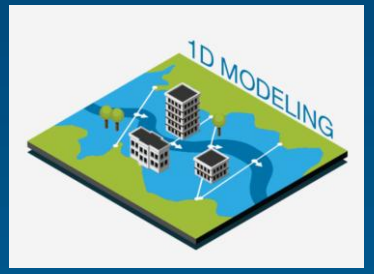
SHALLOW



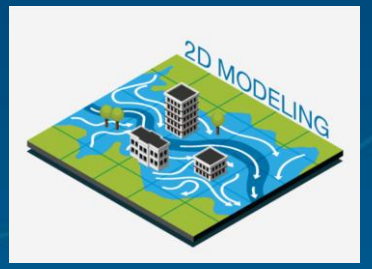
WHAT IS MAAPNEXT?

- The Modeling, Assessment and Awareness Project (MAAPnext) is a comprehensive, county-wide floodplain study that developed new:
  - Flood Insurance Rate Maps (FIRMs
  - Flood Insurance Study Report
  - Flood Risk Products
  - Engineering Tools
  - Educational Resources
  - Online Interactive Mapping Tools





Challenges & Approaches



Hydrology Inputs

- NOAA Atlas 14
  Texas release 09/2018
- Increases for estimated 24 hour rainfall
  3-4” across Harris County

Urban Environment & Hydrology

Urbanization of Basin

- Basin Development Factor

Ponding/Shallow Flood

- Rain on Grid

Flood Elevation & Extent

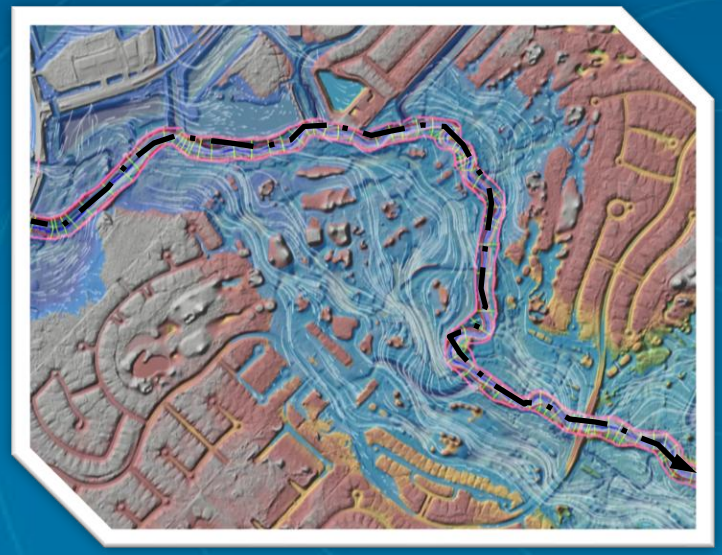
- Unsteady State Model
  (FEMA exception – SID73)
- Coupled 1D-2D Model
  (FEMA exception – SID73)
  Main Channel – 1D
  Floodplains – 2D
- Floodway Delineation with Product Number
  (velocity and depth)
  (FEMA exception – SID69)
  (FEMA exception – SID72)

Support Local Floodplain Management

- Defend Floodway Areas
  Floodway is safety based
  Floodway maintains critical flood capacity/storage areas
- Existing Local Higher Standards
  No Adverse Impact review will have access to data
  Harder for fill placement in critical floodplain storage

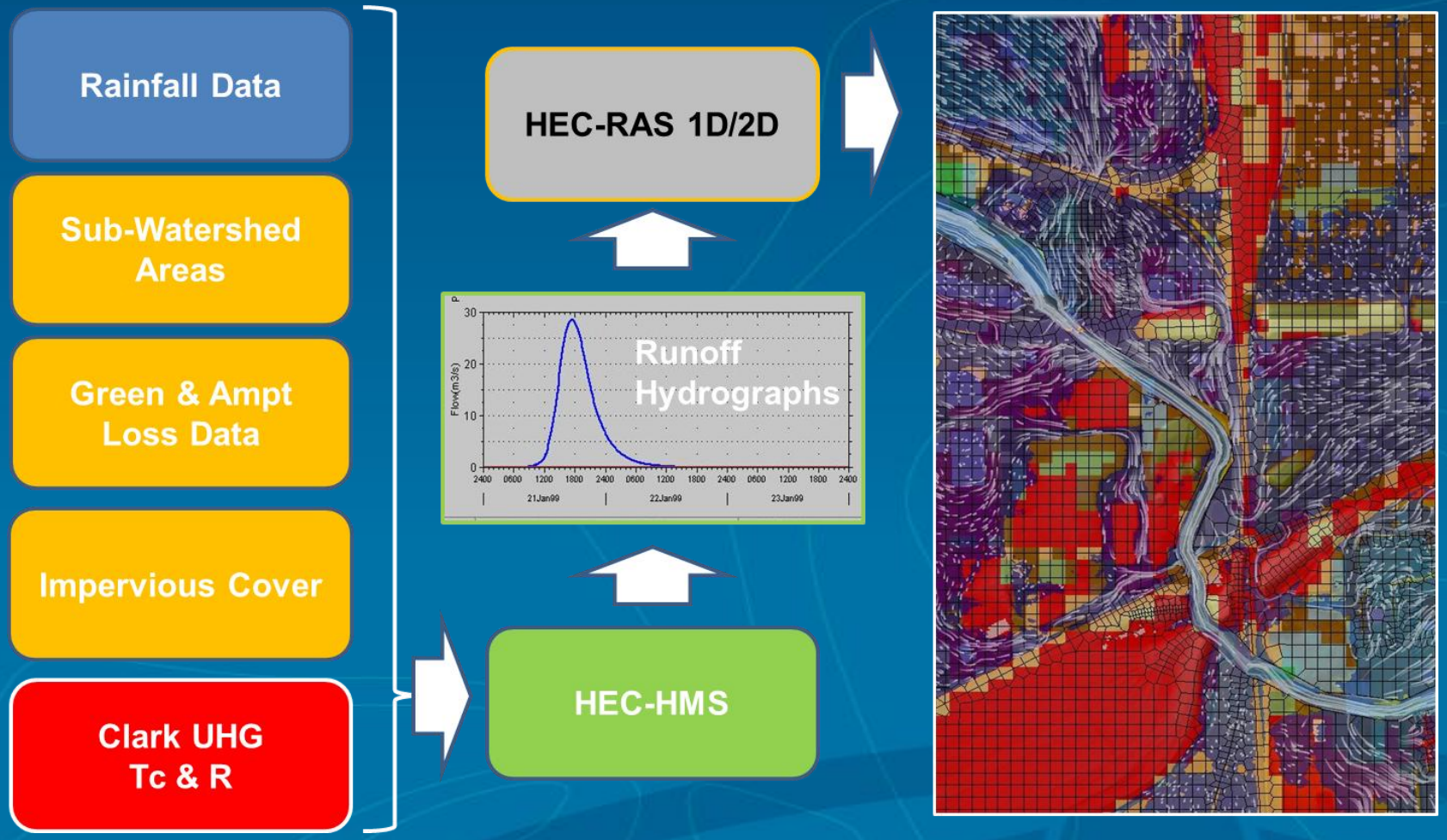
1D vs. 1D/2D





1D/2D Model & Floodplain

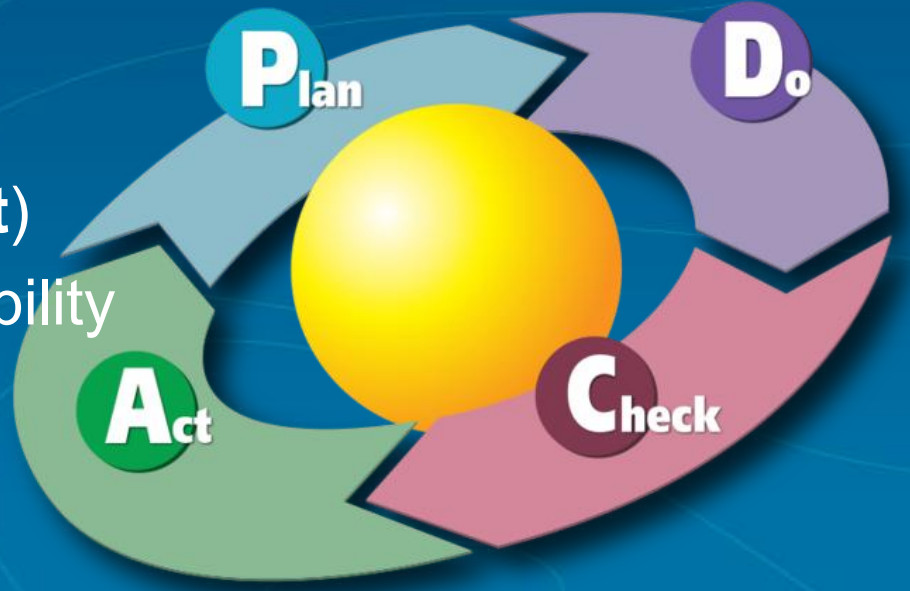
MAAPnext Model Tech



Flow hydrographs are inserted directly into the HEC-RAS model at specific locations or along user-defined stream segments.

Quality Management

- Trained Consultants At Project Initiation
- Trained QC Staff Later (Chris Goodell – **Kleinschmidt**)
- Heavy Emphasis on Quality, Consistency, & Accountability
- Built-In Flexibility / Availability of PMT Staff
- Standardized QC Templates
- Comment Responses Required from Consultants
- Nationally Recognized HEC-RAS Experts provided technical assistance

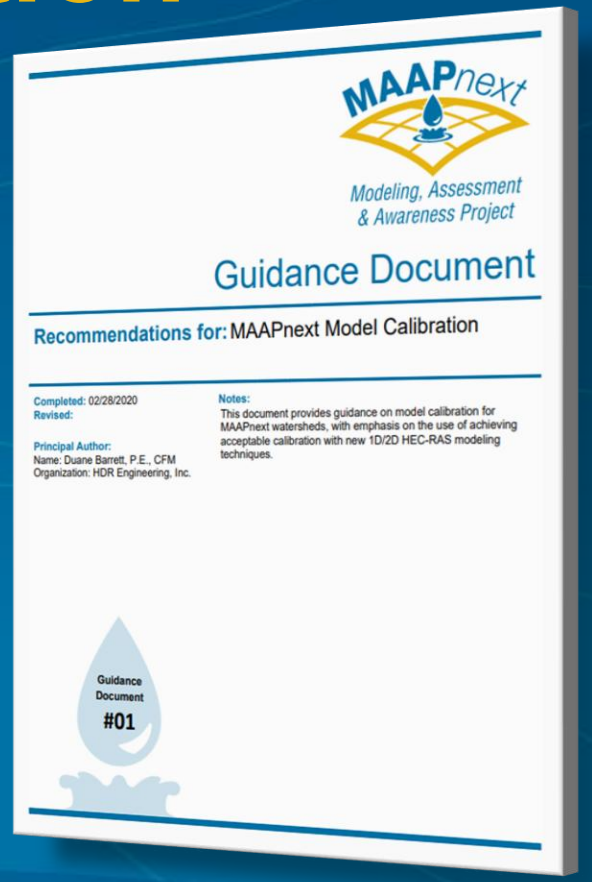


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Guidance & Documentation

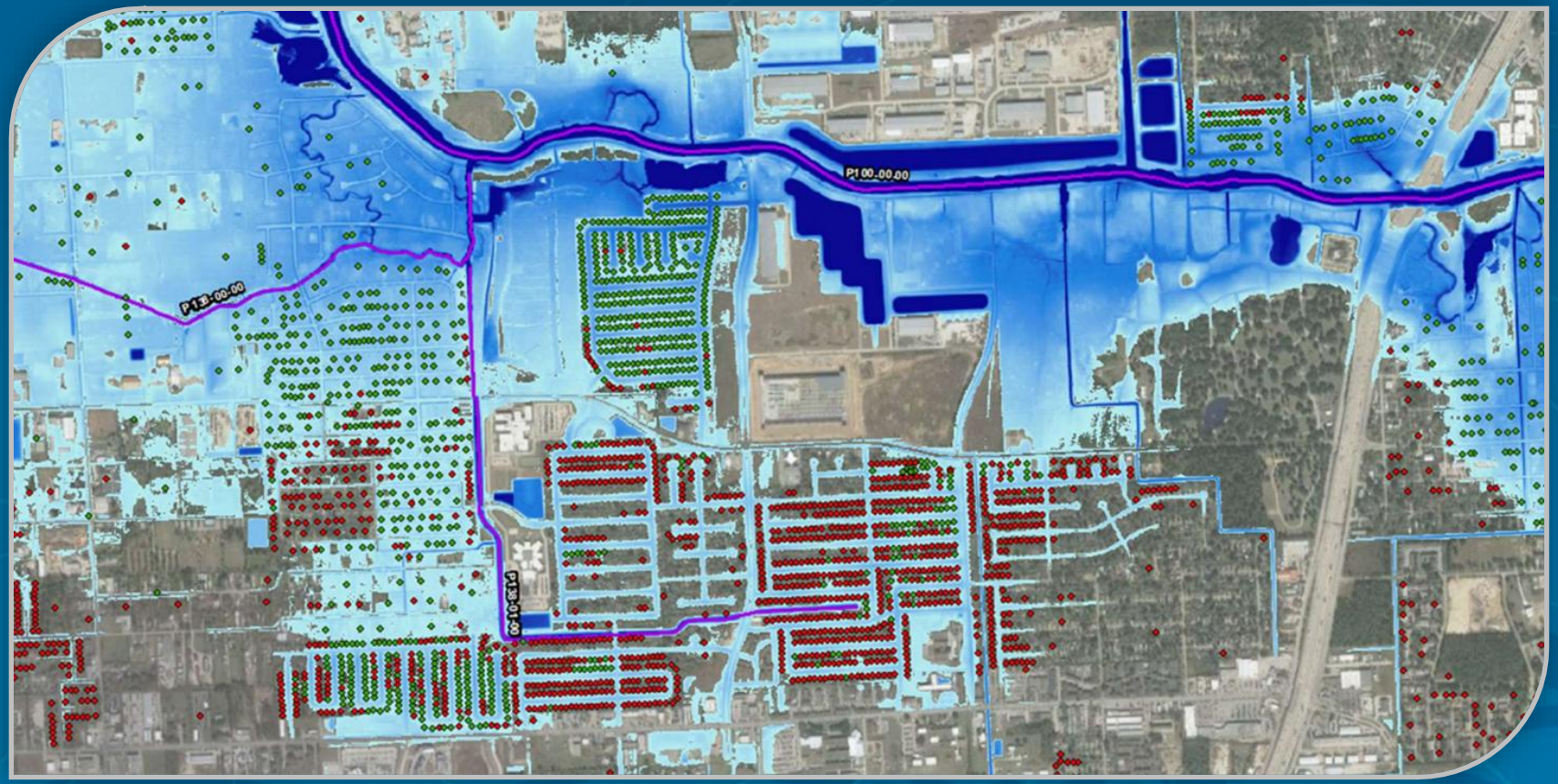
- Fourteen (14) Technical White Papers
- Twenty-Five (25) Guidance Memoranda
  - Hydrologic & Hydraulic Modeling
  - Floodplain & Floodway Delineation
  - Calibration Requirements
  - Development of Flood Risk Products
  - Combined Probability for Coastally Influenced Areas
  - Overflow and Confluence Coordination
- Training Materials for Watershed Study Consultants



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Mapping Calibration Results

- Validated by mapping raw results against known flooding complaints from each storm



What's Next

Moving the Project Forward and Soliciting Public Feedback

Where We Are Today



FEMA has released draft maps to the 34 floodplain administrators and associated local elected officials for review.

X

Not final – these are draft maps

X

Not regulatory – these have not been adopted as "best available"

X

Not part of a formal comment process

Looking Ahead

At least **21 – 33 months left in the FEMA process** before FIRMs could become effective

WE ARE HERE

Draft data release from FEMA to FPAs & elected officials

90 days

Preliminary data release from FEMA to public; Community outreach begins (open houses)

6-9 months

Formal appeal & comment period hosted by FEMA

90 days

Revisions to models & mapping by FEMA, based on community input and in coordination with FPAs

3-12 months

Letter of Final Determination from FEMA to FPAs & elected officials

6 months

Final effective maps (FIRMs) released by FEMA

Note: *This timeline is based on the ideal, standard process and does not account for any potential delays. For reference, draft maps were released in 2004 for TSARP and were not effective until 2007.*

Online Tool

HCFCD.org/MAAPnext

