

HCFCFCD's Model and Map Management System (M3)

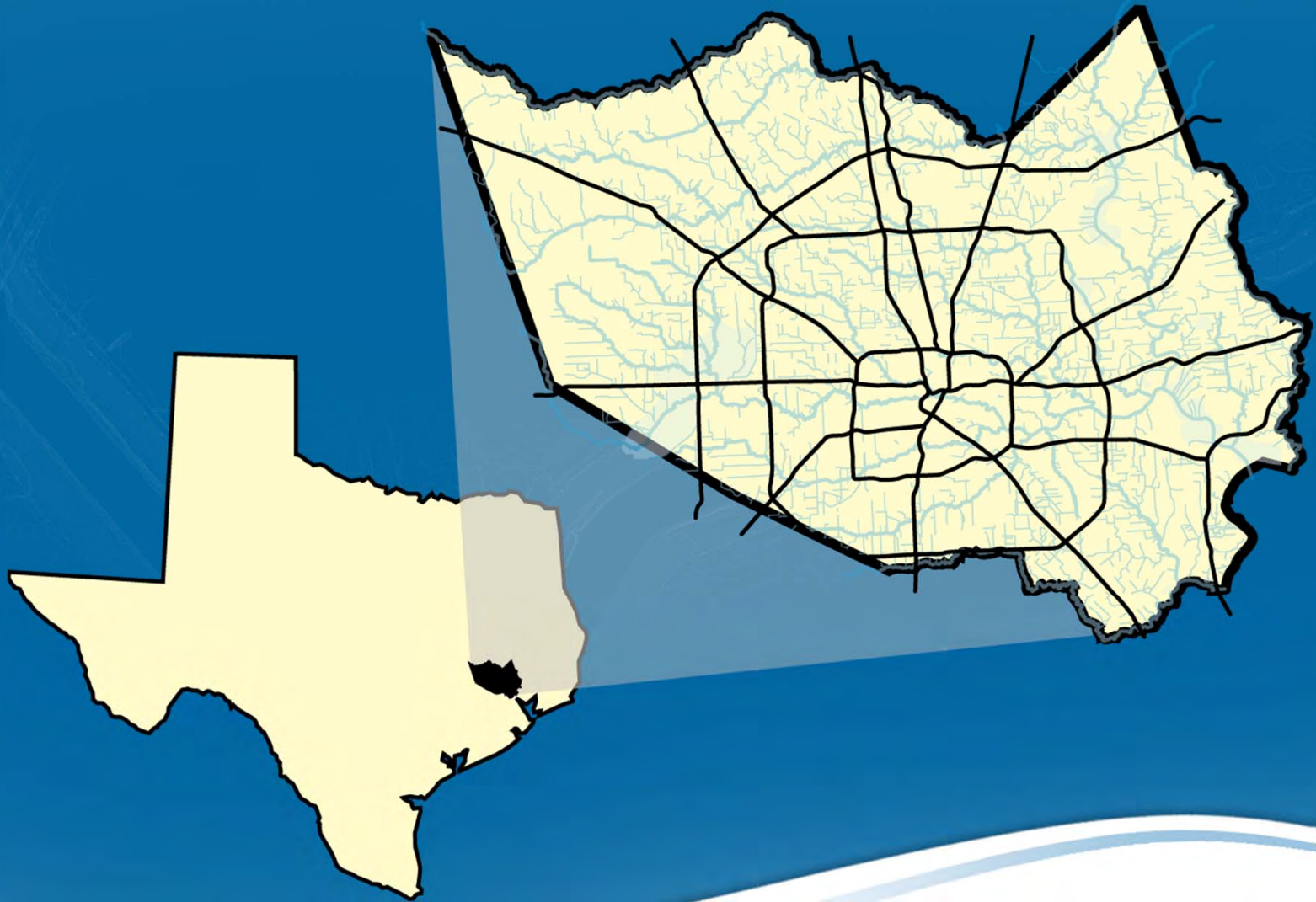
Ataul Hannan, P.E.,CFM
Planning Division Director
Harris County Flood Control District

NAI-CHARM Resilience Workshop
March 24, 2021

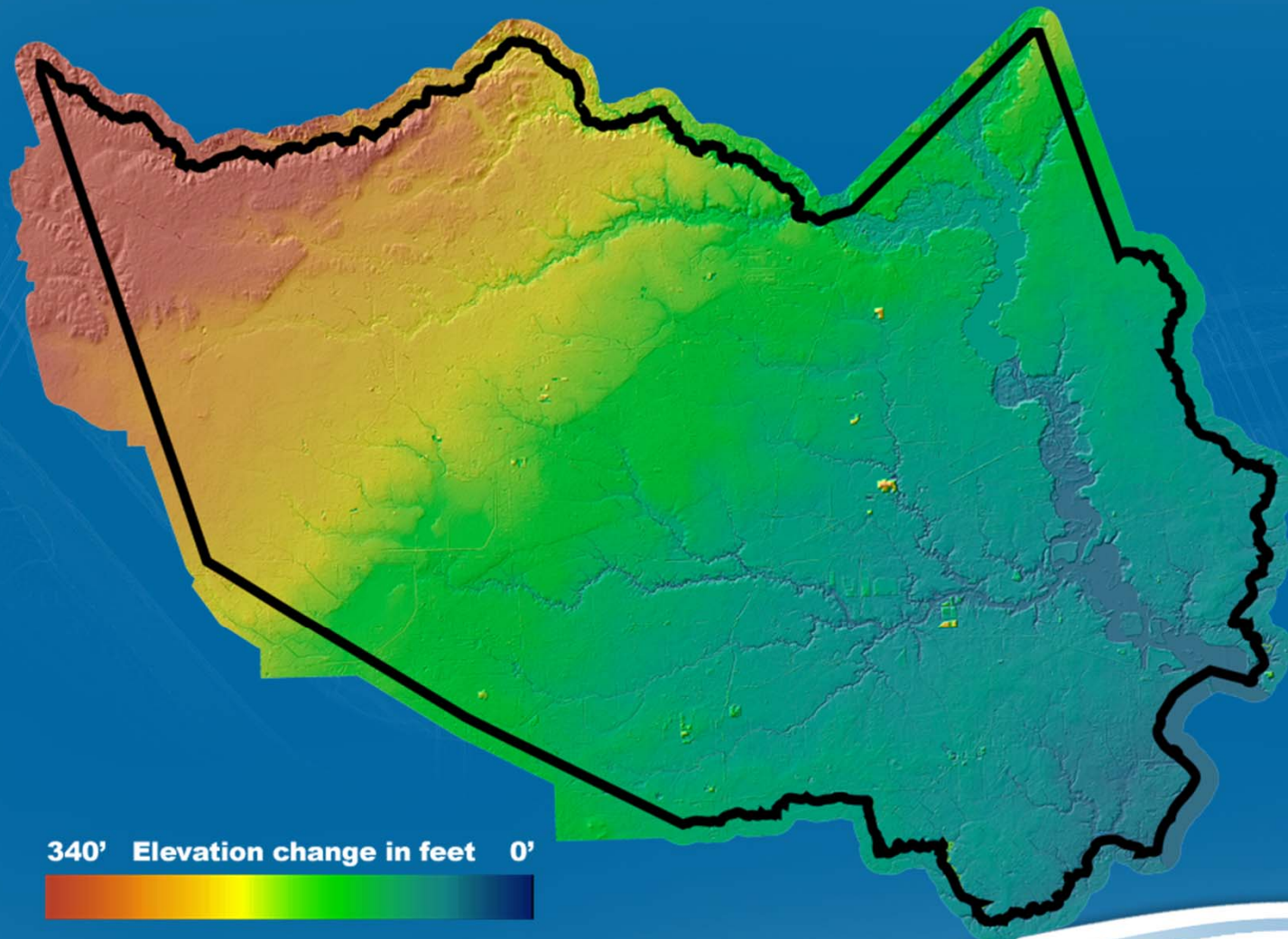
Overview

- **Background**
- **Model Management**
- **Benefit of the Program**

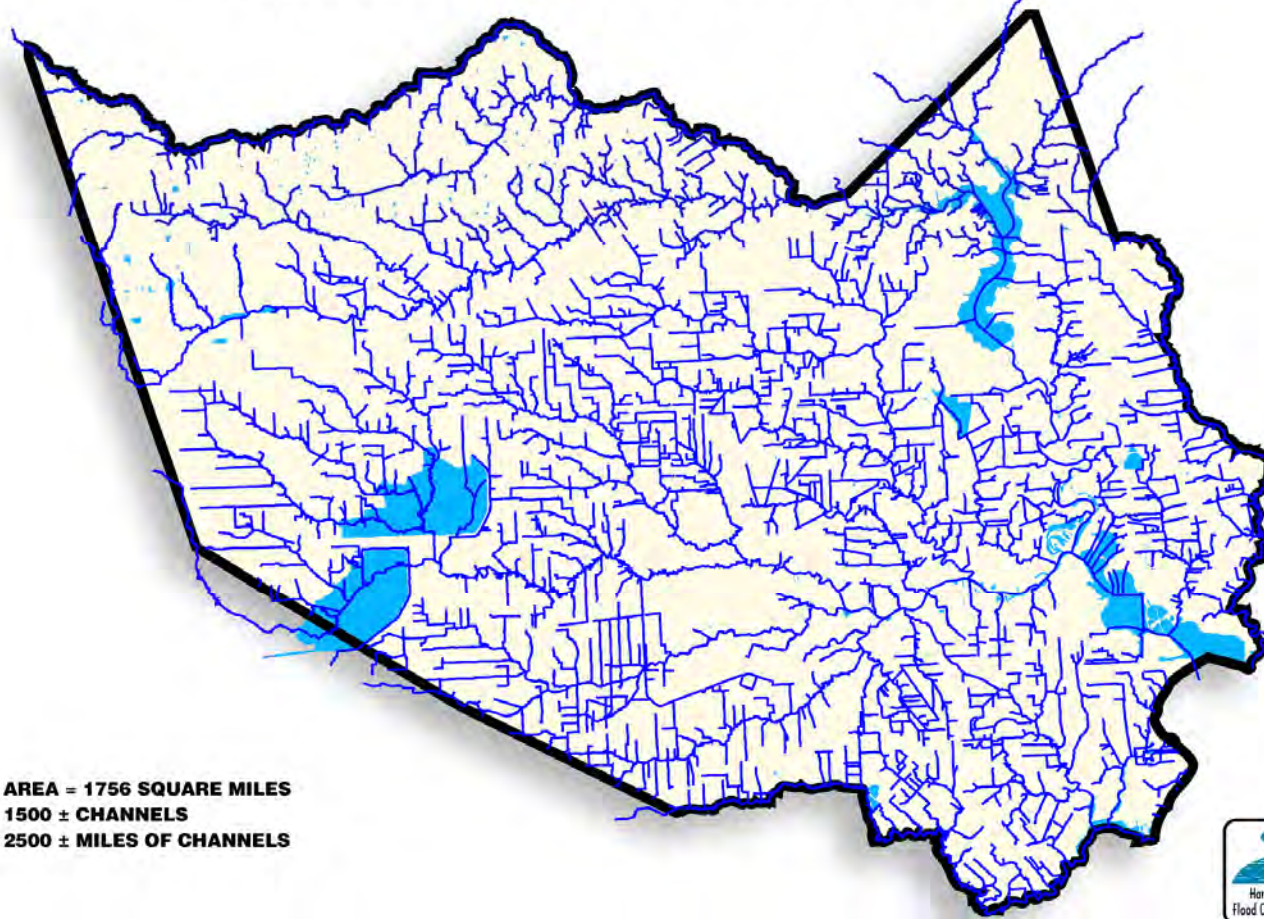
Harris County



Harris County Terrain



Open Channel Network



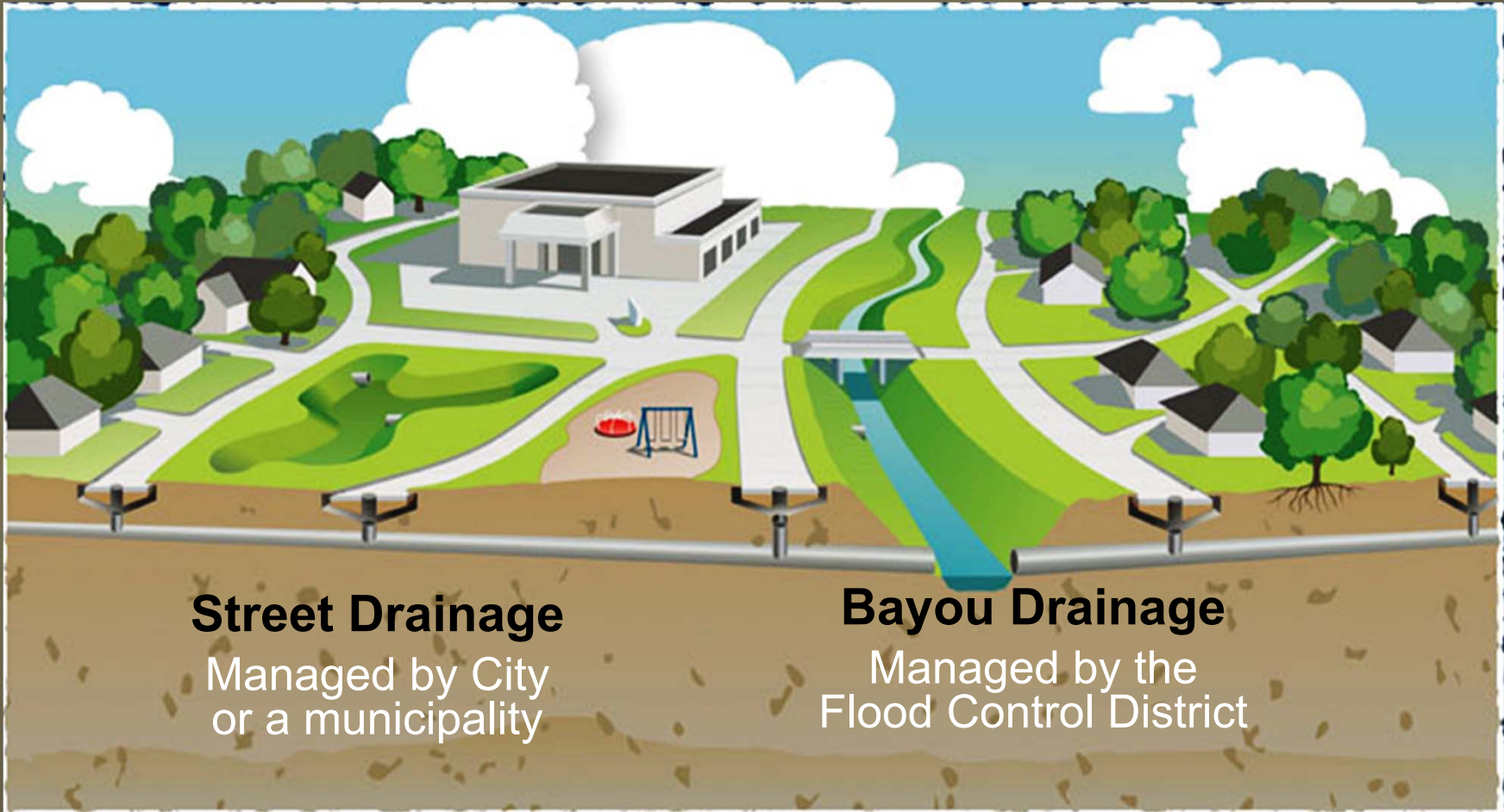
Our Mission

Provide flood damage reduction projects that work, with appropriate regard for community and natural values.

We accomplish this by:

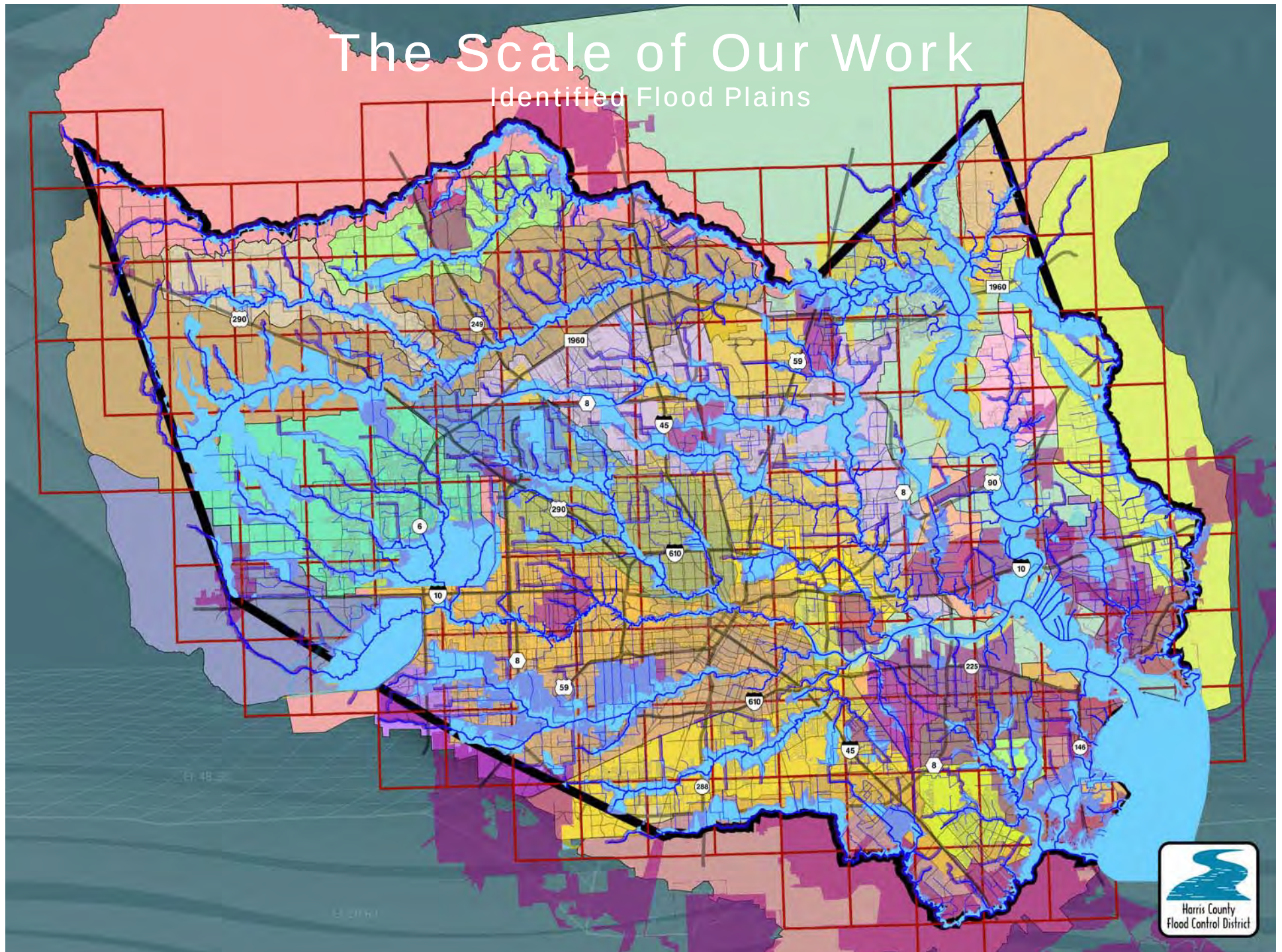
- Devising flood damage reduction plans
- Implementing the plans
- Maintaining the infrastructure

Jurisdiction Example



The Scale of Our Work

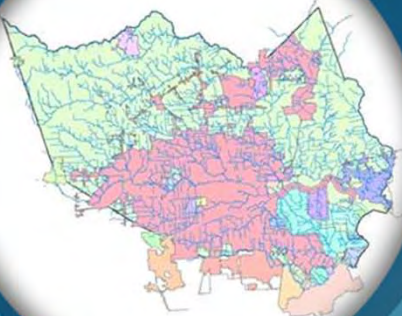
Identified Flood Plains





FEMA

FEMA



FPA

HARRIS COUNTY
FLOOD
CONTROL
DISTRICT

HCFCDD



Tropical Storm Allison



Background

- Tropical Storm Allison Recovery Project (TSARP)
- HCFCD and FEMA partnered in the aftermath of Tropical Storm Allison (June 2001) to update the Flood Insurance Study for Harris County
 - New Topographic Data (LiDAR)
 - Reanalyzed landuse conditions
 - Generate new H&H models
 - Published updated FIRMs for the County

MODEL MANAGEMENT

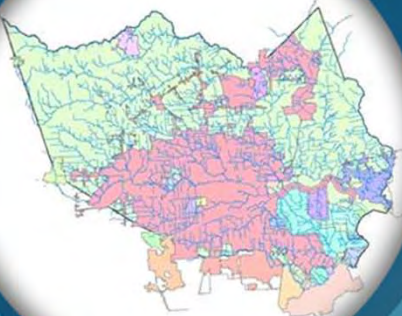
Why Model Management

- Protect the investment
- Current and accurate information to local community & FEMA



FEMA

FEMA



FPA

HARRIS COUNTY
FLOOD
CONTROL
DISTRICT

HCFCDD



Challenge

- Recognized the different objectives of FEMA, Floodplain Administrators, and HCFCD
- Recognized the limitations of some communities (financial and technical)
- How do we (HCFCD, FEMA and Local Floodplain Administrators) maintain the models and supporting data?

Model Management Objectives

- **Continually manage and maintain the integrity of the effective model set**
- **Foster a partnership between HCFCD and the Floodplain Administrators**
- **Facilitate and expedite model and data distribution**
- **Coordinate concurrent development activities in watersheds**

Standards

Purpose

- Maintain the integrity of the models and supporting data
- Ensure model modifications are made in a consistent manor so others can easily understand changes

The screenshot displays the HCFCD website's 'Model and Map Management System' (M3) page. The header includes the HCFCD logo, navigation links (Home, About The District, Programs & Projects, Learning Center, Maps & Exhibits, FAQs, Downloads, Links, News & Media), and a search bar. A sidebar on the left lists various programs and projects, with 'Model and Map Management System' highlighted. The main content area features a large banner for the M3 system, followed by a description of its purpose: to manage FEMA effective floodplain models for Harris County. Below this, there are two sections for requesting models: 'Information Model Request' for projects outside the FEMA regulatory floodplain and 'M3 Model Request' for projects within it. Each section has a 'REQUEST' button. A 'Notice' section follows, detailing the transition from older FEMA models to the M3 system and providing information on software versions and guidance manuals. A 'Downloads' section lists several files for download, including FEMA Modeled Streams, HCFCD H&H Modeling Standards, HCFCD Hydrologic & Hydraulic Guidance Manual, HEC-HMS 3.3.0, and HEC-RAS 3.0.1. At the bottom, instructions are provided for downloading files to a disk.

Harris County Flood Control District contact us | search:

HCFC Home | About The District | **Programs & Projects** | Learning Center | Maps & Exhibits | FAQs | Downloads | Links | News & Media

Your Opinion Matters... Take Our Quick Survey

- Capital Improvement Program
- Major Projects
- Major Studies
- FloodWise
- Geographic Information Systems
- Greens Bayou Wetlands Mitigation Bank
- Home Buyout
- Model and Map Management System**
 - Home
 - M3 Register
 - M3 Tracked Project Information Only
- Property Management
- Stormwater Quality
- Trails and Our Bayous
- Tree Planting Program
- TS-Allison Recovery Project
- Vegetation Management
- Watershed Environmental Baseline Program

Model and Map Management System

M3

Model and Map Management (M3) System

The Harris County Flood Control District's Model and Map Management (M3) System is an interactive tool designed to manage changes to the Federal Emergency Management Agency's (FEMA) effective floodplain models for Harris County. The goal of the M3 System is to distribute FEMA effective models to the general public, track ongoing changes to the models resulting from development projects, and facilitate communication between FEMA, Harris County Flood Control District, Local Floodplain Administrators, and the community. For more information regarding the M3 System please contact M3 Customer Service.

FEMA Effective Model Request

To check out FEMA effective models, please select from the following options below.

Information Model Request

Request models for research purposes or analysis of development projects located entirely outside of the FEMA regulatory floodplain.

REQUEST

M3 Model Request

Request models for analysis of development projects located in the FEMA regulatory floodplain and/or preparation of FEMA Letter of Map Change Submittals.

REQUEST

Notice

1. The hydrologic (HEC-HMS) and hydraulic (HEC-RAS) models on the DVD titled "FEMA Revised Preliminary Flood Insurance Rate Maps" are **no longer valid**, and all FEMA effective models for Harris County are available through the M3 system.
2. All FEMA submittals for development projects tracked by the M3 System must comply with the HCFCD Hydrologic and Hydraulic Modeling and Management Standards.
3. The official model software versions are HEC-HMS 3.3.0 and HEC-RAS 3.0.1. The use of different software versions must be pre-approved by the Harris County Flood Control District.
4. For general guidance regarding hydrologic and hydraulic methodologies utilized in Harris County please download the HCFCD Hydrology and Hydraulics Guidance Manual.

Downloads

- FEMA Modeled Streams (PDF, 985 KB, 06/18/2007)
- HCFCD H&H Modeling Standards (PDF, 448 KB, 12/08/2009)
- HCFCD Hydrologic & Hydraulic Guidance Manual (PDF, 36.9 MB, 12/21/2009)
- HEC-HMS 3.3.0 (ZIP, 46.5 MB, 10/09/2008)
- HEC-RAS 3.0.1 (ZIP, 19.8MB, 07/06/2007)

To download and save a file to disk:
PC:Right-click the link and choose the option, "Save Target As..."
Mac:Control-click the link and choose the option, "Download Link to Disk"

Home | About the District | Programs & Projects | Learning Center | Maps & Exhibits | FAQs | Downloads | Links | News & Events | Contact Us | Employment Search | Site Map | Terms, Conditions & Notices | Privacy | Accessibility | ©2008 Harris County Flood Control District. All Rights Reserved.

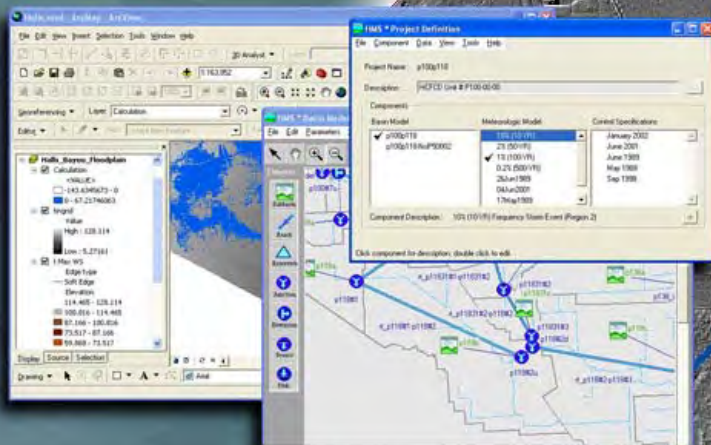
www.hcfcd.org/m3

Standards

The image shows two overlapping browser windows. The left window displays the Harris County Flood Control District website at <http://www.hcfc.org/m3/>. The website has a navigation menu on the left with links such as 'Your Opinion Matters...', 'Capital Improvement Program', 'Major Projects', 'FloodWise', 'Geographic Information Systems', 'Greens Bayou Wetlands Mitigation Bank', 'Home Buyout', 'Model and Map Management System', 'M3 Login', 'M3 Register', 'Model Check-Out', 'Property Management', 'Stormwater Quality', 'Trails and Our Bayous', 'Tree Planting Program', 'TS-Allison Recovery Project', 'Vegetation Management', and 'Watershed Environmental Baseline Program'. The main content area is titled 'Model and Map Management System' and includes a 'Notice' section with three items regarding hydrologic models, engineering submittals, and official model software. A 'Downloads' section lists 'HCFC Modeling Standards (PDF)', 'Transition Plan (PDF, 168 KB, 0)', 'HEC-2 Guidelines (PDF, 11,000)', and 'TSARP White Papers'.

The right window shows a PDF document titled 'HCFC Modeling Standards_Final_Jan2008.pdf' at http://www.hcfc.org/m3/files/HCFC_Modeling_Standards_Final_Jan2008.pdf. The document is displayed in a Windows Internet Explorer browser window. The PDF content includes a 'Table of Contents' with sections like 'Section 1 - Introduction', '1.1 Preface', '1.1.1 Overview', '1.1.2 When Required', '1.1.3 When Not Required', '1.1.4 Types of Standards', '1.1.4.1 Model Development and Management', '1.1.4.2 GIS Standards', and '1.1.4.3 Modeling Study'. The main text of the PDF discusses 'Hydraulics' and '3.2.6 River' standards, stating that the maximum length for a River or Reach name shall be 16 characters (maximum allowed by HEC-RAS). It also mentions '3.2.7 Reach' and '3.2.8 Station' standards, providing examples of naming conventions like 'E100-00-00_0050' and 'E1010101-1_0050'.

www.hcfc.org/m3

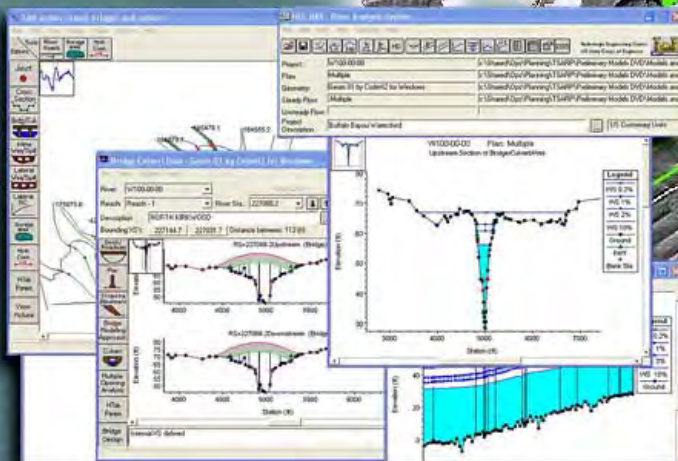


HEC-HMS

Model & Map

Channel Cross Sections tied to LiDAR

HEC-RAS



GIS Standard

Harris County Flood Control District contact us | search:

HCFC Home About The District Programs & Projects Learning Center Maps & Exhibits

- Capital Improvement Program
- LOMR Delegation Program
- Major Projects
- Major Studies
- FloodWise
- Geographic Information Systems
- Greens Bayou Wetlands Mitigation Bank
- Home Buyout
- Model and Map Management System Home
- M3 Tracked Projects Information Only
- Property Management
- Stormwater Quality
- Trails and Our Baysous
- Tree Planting Program
- TS-Arlison Recovery Project
- Vegetation Management
- Watershed Environmental Baseline Program

M3
MODEL & MAP MANAGEMENT

Model and Map Management (M3) System

The Harris County Flood Control District's Model and Map Management System (M3) manages changes to the Federal Emergency Management Agency (FEMA) effective models resulting from development projects, and facilitate community contact M3 Customer Service.

Floodplain Model and Supporting Data Request

To obtain FEMA effective models and supporting data, please select:

Informational Model Request

Request models for research purposes or analysis of development projects located entirely outside of the FEMA regulatory floodplain.

REQUEST

Notice:

1. The hydrologic (HEC-HMS) and hydraulic (HEC-RAS) Flood Insurance Rate Maps are no longer valid, and all through the M3 system.
2. All FEMA submittals for development projects tracked by M3 and Hydraulic Modeling and Management Standards.
3. The official model software versions are HEC-HMS 3.3.0 versions must be pre-approved by the Harris County Flood Control District.
4. For general guidance regarding hydrologic and hydraulic download the HCFCD Hydrology and Hydraulics Guidant

Downloads

- FEMA Modeled Streams (PDF, 985 KB, 06/18/2007)
- HCFCD H&H Modeling Standards (PDF, 448 KB, 12/05/20)
- HCFCD Hydrologic & Hydraulic Guidance Manual (PDF, 3)
- GIS Standards Document (PDF, 780 KB, 05/25/2011)
- HEC-HMS 3.3.0 (ZIP, 46.5 MB, 10/09/2008)

HARRIS COUNTY FLOOD CONTROL DISTRICT

GIS DATA FORMAT STANDARDS FOR DELIVERABLES

FEMA CLOMR / LOMR SUBMITTALS

Planning Department
5/25/2011



Harris County Flood Control District
9900 Northwest Freeway
Houston, TX 77092
phone: 713-694-4000

This document is to be followed by outside Agencies in formatting their Geographic Information System (GIS) data supporting their Federal Emergency Management Agency (FEMA) Conditional Letter of Map Revision (CLOMR) and Letter of Map Revision (LOMR) submittals to the specifications and requirements of the Harris County Flood Control District.

Modeling Standards Highlights

- **Model Version (HEC-HMS/HEC-RAS)**
 - HEC-HMS (v3.3.0)
 - HEC-RAS (v3.0.1)
- **No model truncation (Section 4.3.3)**
- **Use current model set (Section 5.2)**
- **Tracking number (Section 5.2)**
- **New/modified cross sections (Section 3.4.4)**
- **Nomenclature change (Section 3.2)**

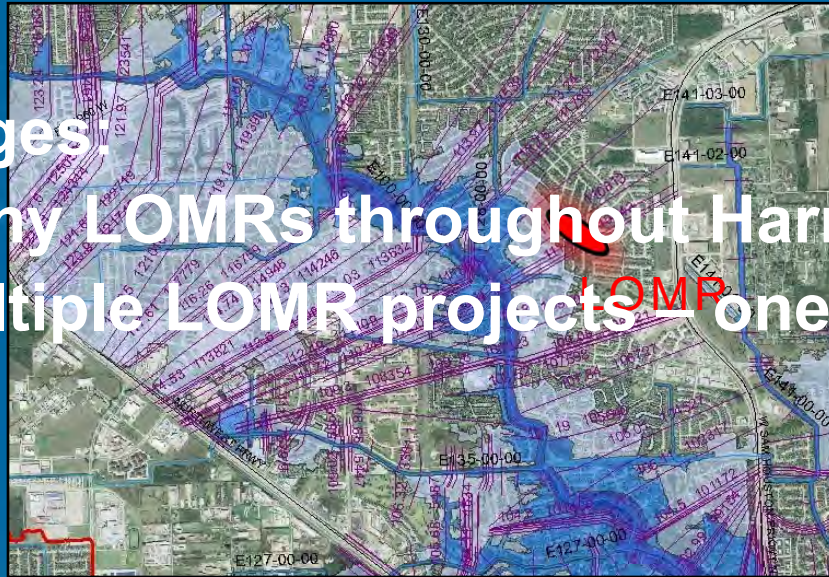
Continuous Updates

Objective:

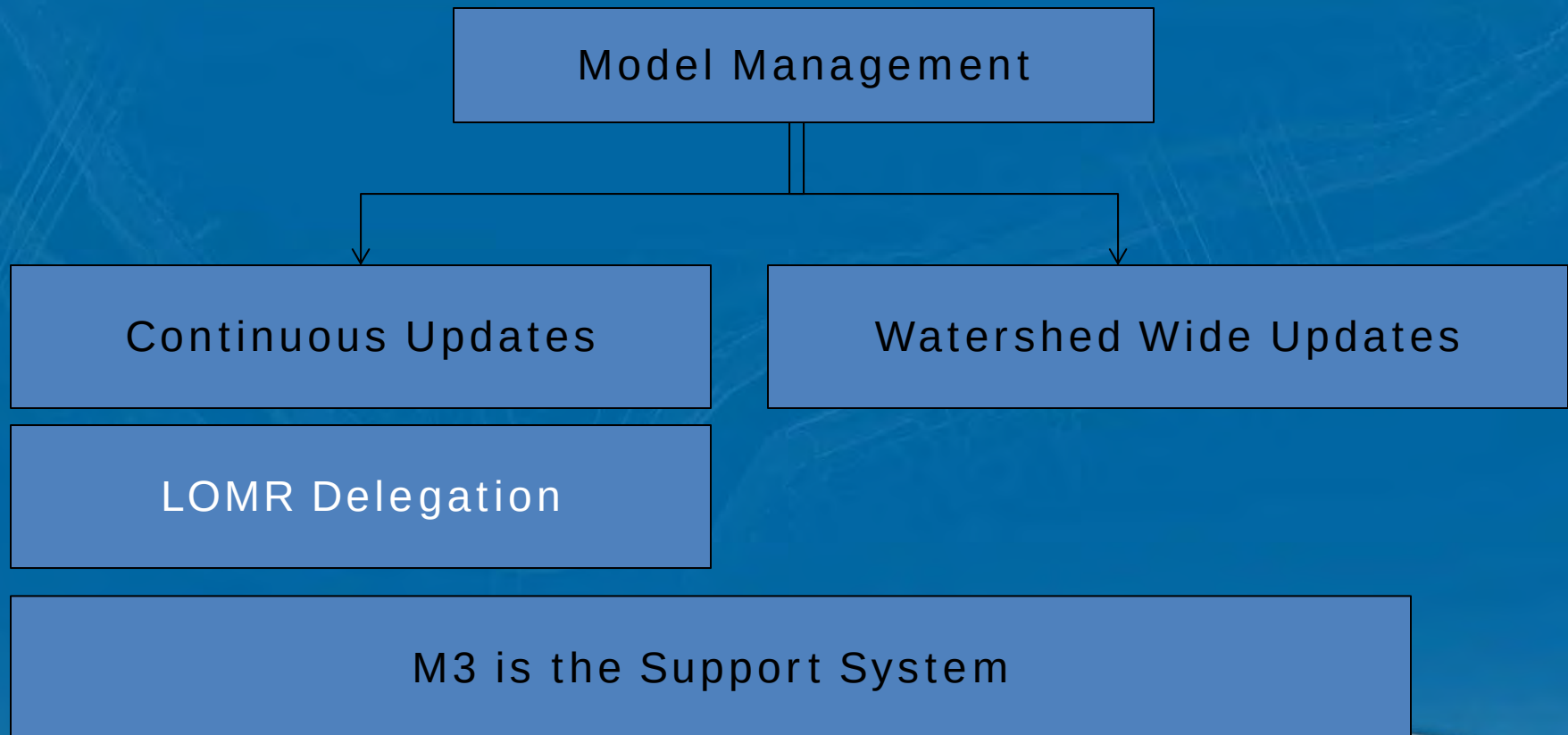
Continually update the models and associated data sets due to changes in Floodplain and Floodways which require a LOMR

Challenges:

- Many LOMRs throughout Harris County
- Multiple LOMR projects – one stream



Model Management How ?



Our Agreement with FEMA

Mapping Activity Statement (MAS)

- **Continuous Update Process (MAS No. 14)**
- HCFCFCD Custodian of models

Memorandum of Understanding

- **HCFCFCD Responsibilities:**
 - Provide current/accurate models from web
 - Provide technical resource
 - Provide training (yearly workshops)
 - Cursory review
- **Local Community Responsibilities:**
 - Obtain models from HCFCFCD
 - Follow Standards
 - Provide HCFCFCD a copy of map revision submittal for review prior to signing Community Acknowledgement Form

Legend:

- Baytown
- Bellevue
- Bunker Hill Village
- Deer Park
- B. Lago
- Friendswood
- Galena Park
- Heidelberg Village
- Alhambra Village
- Houston
- Humble
- Hunters Creek Village
- Jacinto City
- Jersey Village
- Italy
- La Porte
- League City
- Missouri City
- Morgan's Point
- Waxahatch Bay
- Paradise
- Pearland
- Piney Point Village
- Seabrook
- Shorecrest
- South Houston
- Countryside Place
- Spring Valley
- Clayton
- Taylor Lake Village
- Thomson
- Unincorporated (Harris)
- Waller
- Waller
- West University Place
- Harris County



What is M3?

Harris County Flood Control District contact us | search:

HCFC Home | About The District | **Programs & Projects** | Learning Center | Maps & Exhibits | FAQs | Downloads | Links | News & Media

M3Test-HCFCD_PGDB_v11.mxd - ArcMap - ArcInfo

File Edit View Insert Selection Tools Bookmarks Window Help

1:157,860

Editor Task: Create New Feature Target:

Model and Map Management System **M3** Current User: 13069 (Admin)

Model Explorer Request Portal Request Processor Settings and Administration Help Center

To Get Started: Request Filter: Requests Requiring Processing Current Request: E000780

Request Workflows

- 1. Process Information Request
 - Step 1. Associate Models with Request
 - Hydraulic Models
 - E100-00-00
 - E101-00-00
 - E115-00-00
 - E116-05-00
 - E117-00-00
 - E121-00-00
 - Model: EffectiveFEMASStudy (H...
 - Model: BaseLineStudy (HEC-RAS)
 - Model: PlanningStudy (HEC-RAS)
 - E122-00-00
 - E124-00-00
 - E125-00-00
 - E127-00-00
 - E135-00-00
 - E141-00-00
 - Hydrology Models
 - E100-00-00
 - Step 2. Specify Impacted Requests
 - Step 3. Package Request Response
 - Step 4. Send Response to Requestor
 - Step 5. Notify Impacted Requestors

Model: EffectiveFEMASStudy (H...

What are my Options?

- ☐ Open Model Readme File...
- ☐ Open Model...
- ☐ Show complete model reach...
- ☒ Include Model in Request Response
- ☒ Remove Model From Request Response

Map: A map of Harris County showing various water bodies and infrastructure. Key features include K-Cypress Creek, E-White Oak Bayou, U-Addicks Reservoir, and W-Salt Lake Bayou. A red dot on the map indicates the location of the current request, E000780, near the intersection of Highway 290 and Highway 45. A callout box identifies the request as "E000780 Edminster, Hinshaw, Russ, and Associates".

Display Source Selection M3 Workbench

Drawing Arial 10 B I U A 3049944.77 13912711.49 Feet

Flood Control District

PC:Right-click the link and choose the option, "Save Target As..."
Mac:Control-click the link and choose the option, "Download Link to Disk"

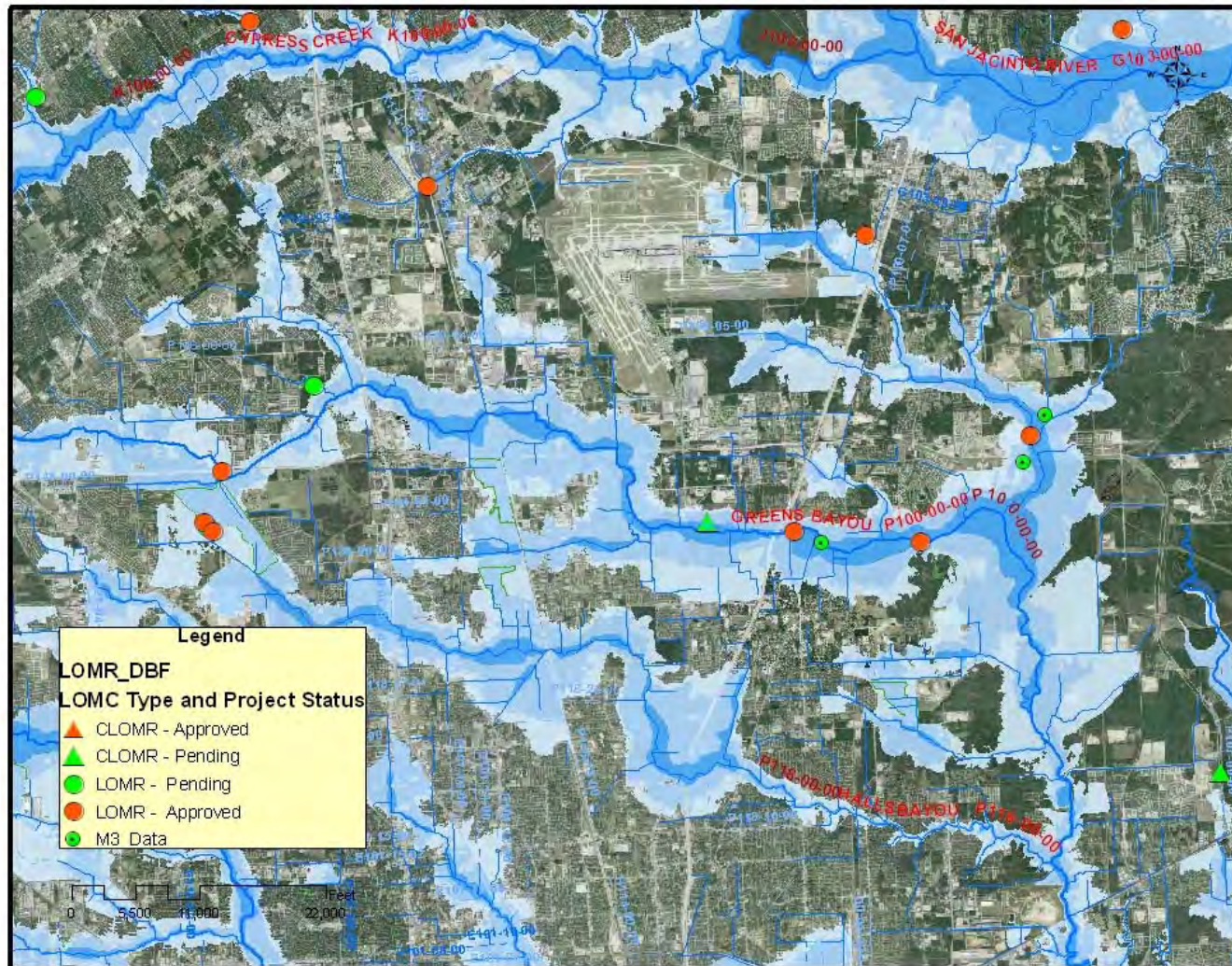
Home | About the District | Programs & Projects | Learning Center | Maps & Exhibits | FAQs | Downloads | Links | News & Events | Contact Us | Employment
Search | Site Map | Terms, Conditions & Notices | Privacy | Accessibility | ©2008 Harris County Flood Control District. All Rights Reserved.

M3 Functionality

Model and Map Management (M3) System

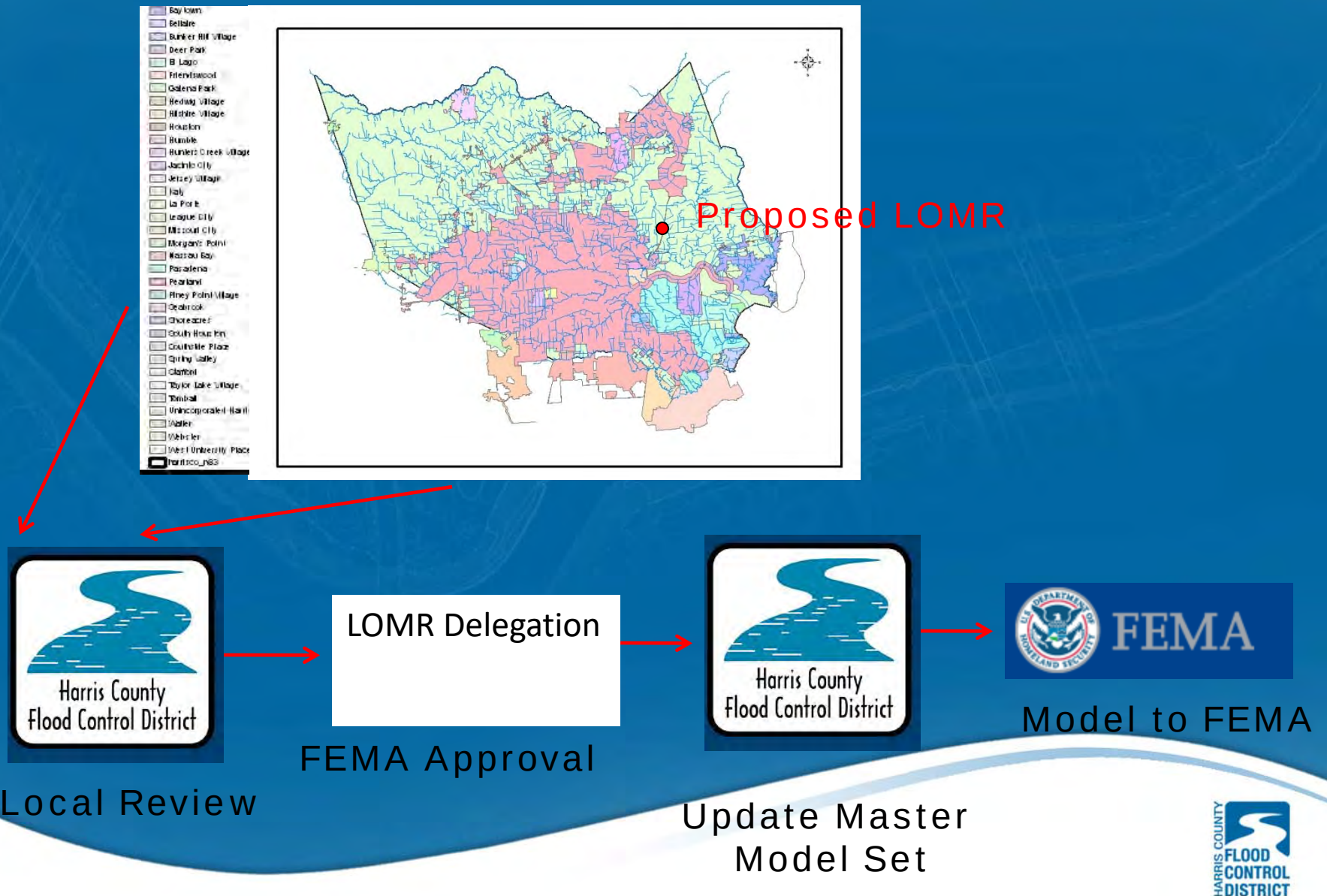
- **Distribute models and supporting data**
- **Tracks projects changes to models**
- **Facilitate communication between projects**
- **Assist HCFCFCD in the review process**

Notifications



Average 20 to 30 LOMRs per year

Continuous Updates with LOMR Delegation



Model Management

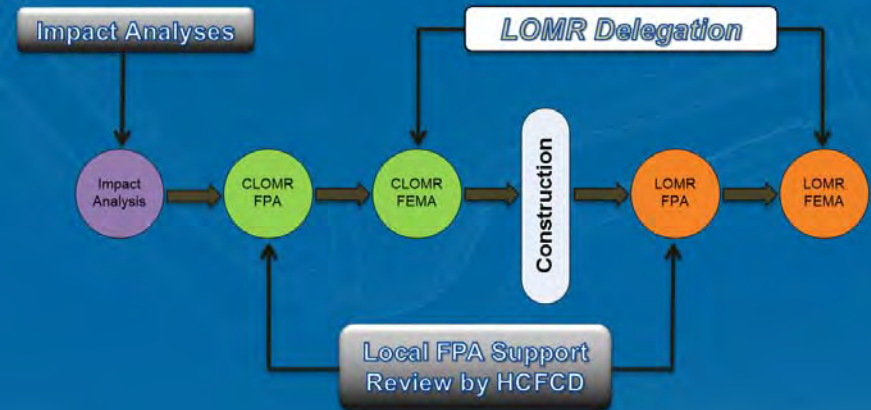
LOMR Delegation (2010)

LOMC requests must obtain several review approvals:

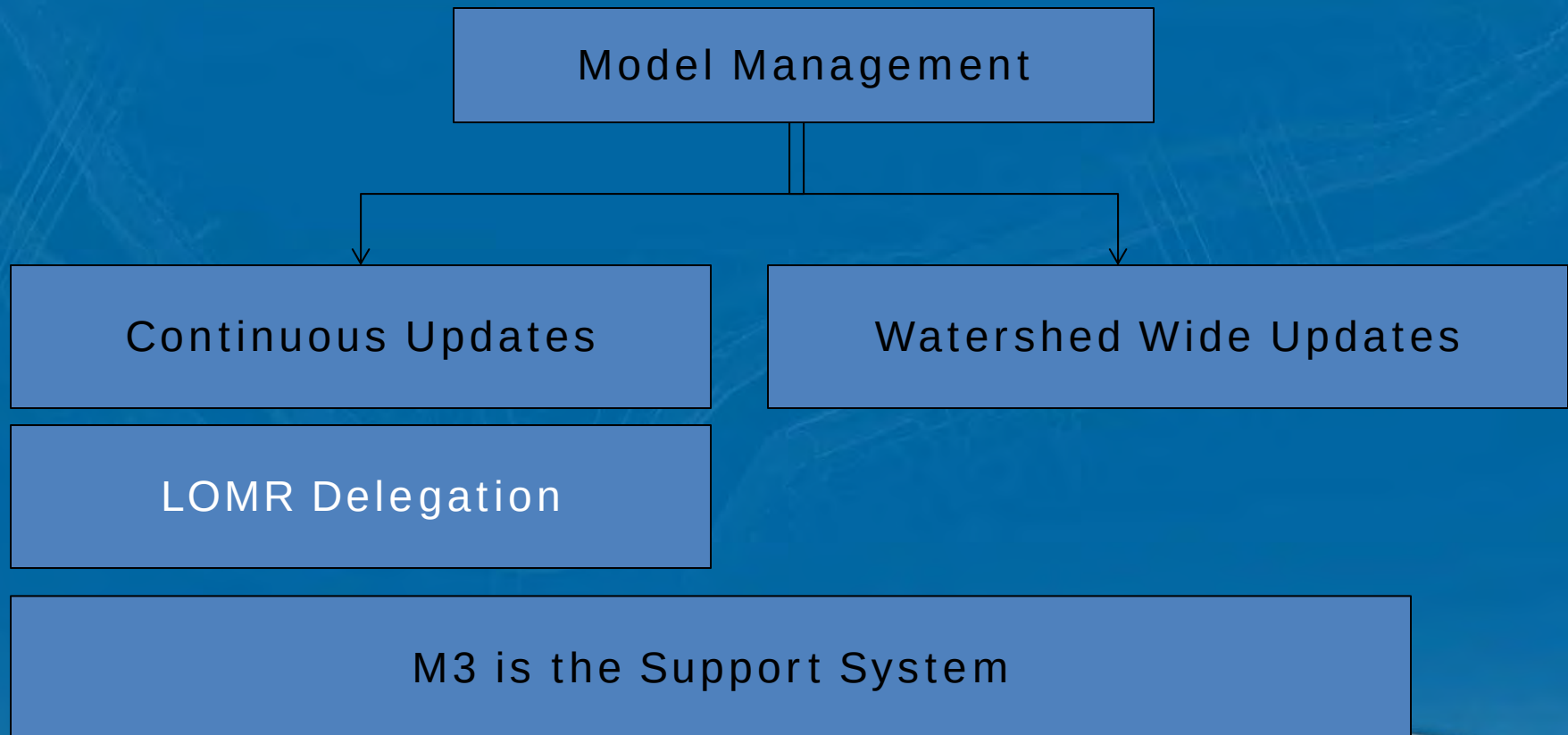
Impact Analyses: HCFCFCD reviews proposed project impact analyses to ensure that they will not cause flood impacts

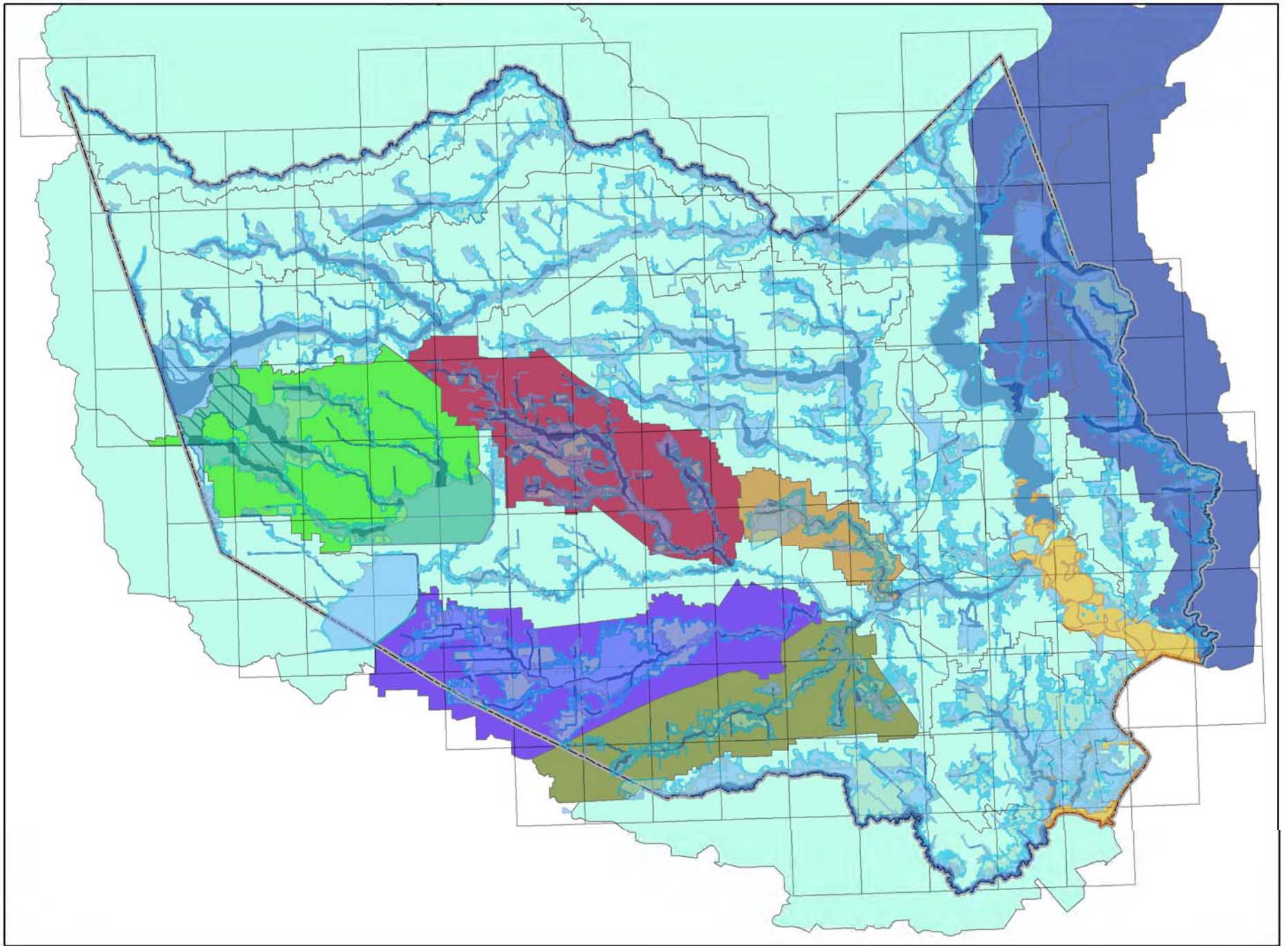
CLOMRs & LOMRs

- Local Review: HCFCFCD reviews submittals prior to FPA signature of the MT-2 Form 1 to ensure local modeling and mapping standards are met
- FEMA Review: HCFCFCD processes submittals to ensure FEMA standards are met prior to issuance of LOMRs and CLOMRs



Model Management How ?

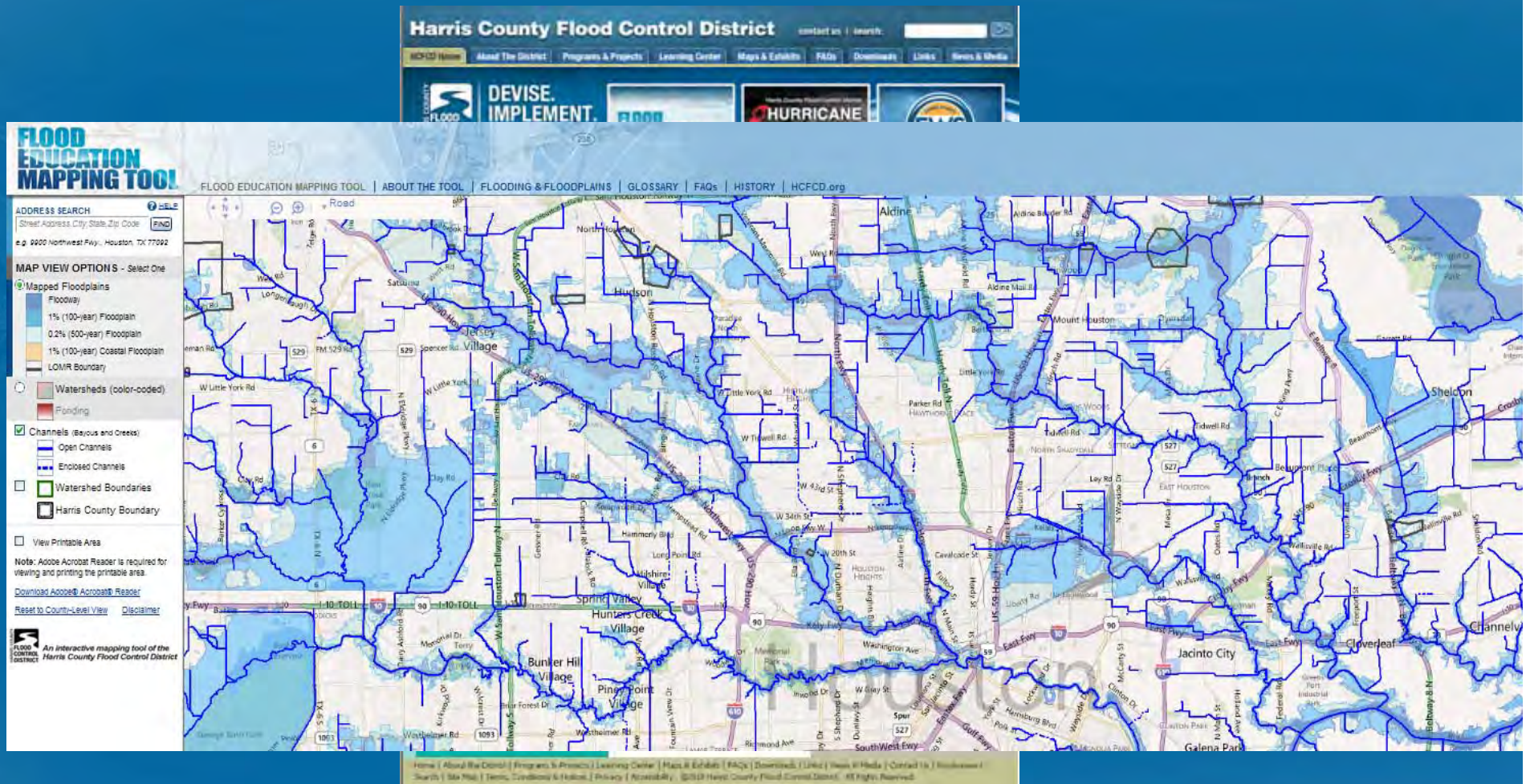




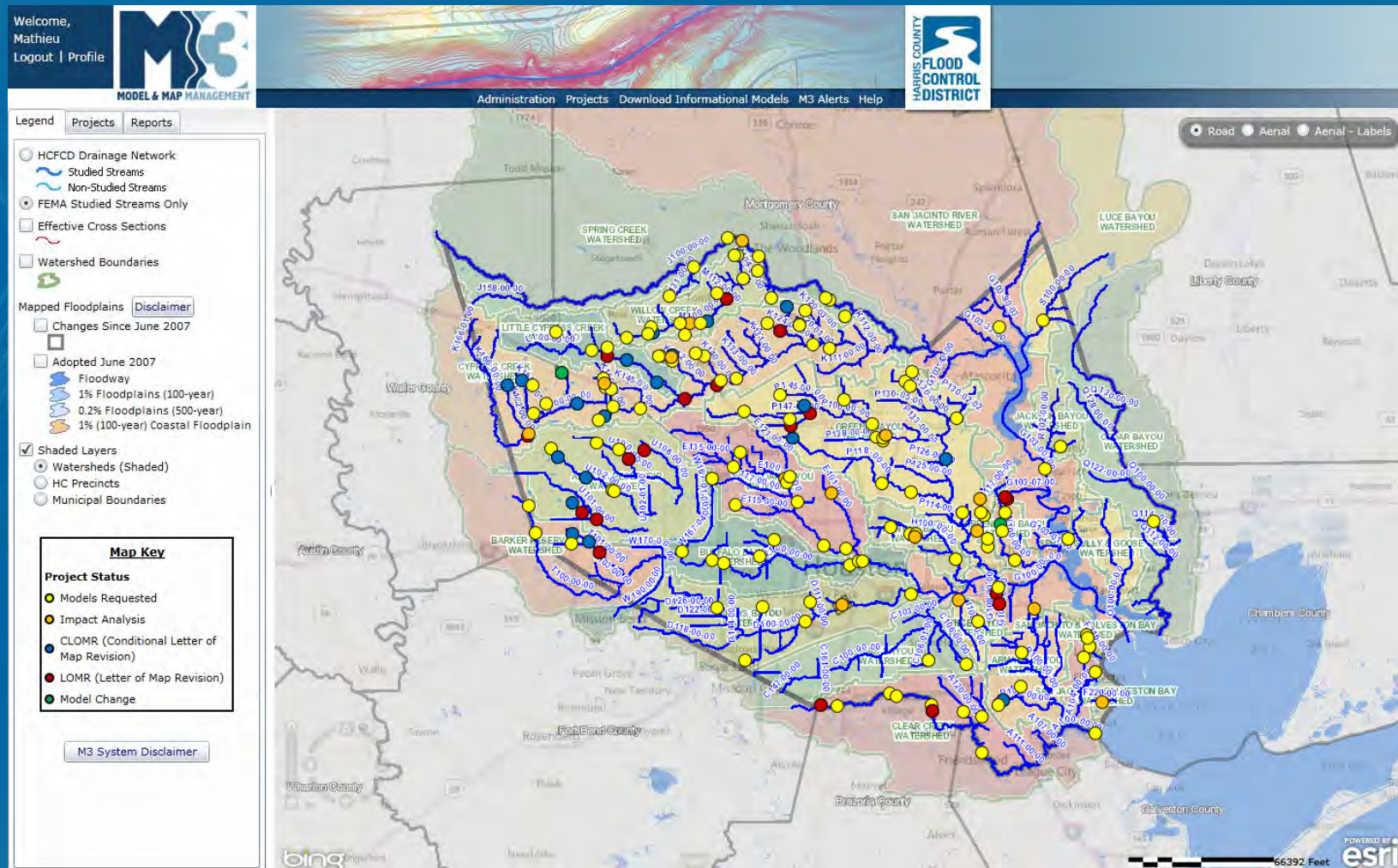
Benefits of the Program

- Most current and accurate models and supporting data come directly from HCFCF – one source
- HCFCF, FEMA and local communities are all in the same datum
- Knowledge of local area and issues
- Accessible during review process
- Technical resource
- Cut down review time
- Reduce the Risk

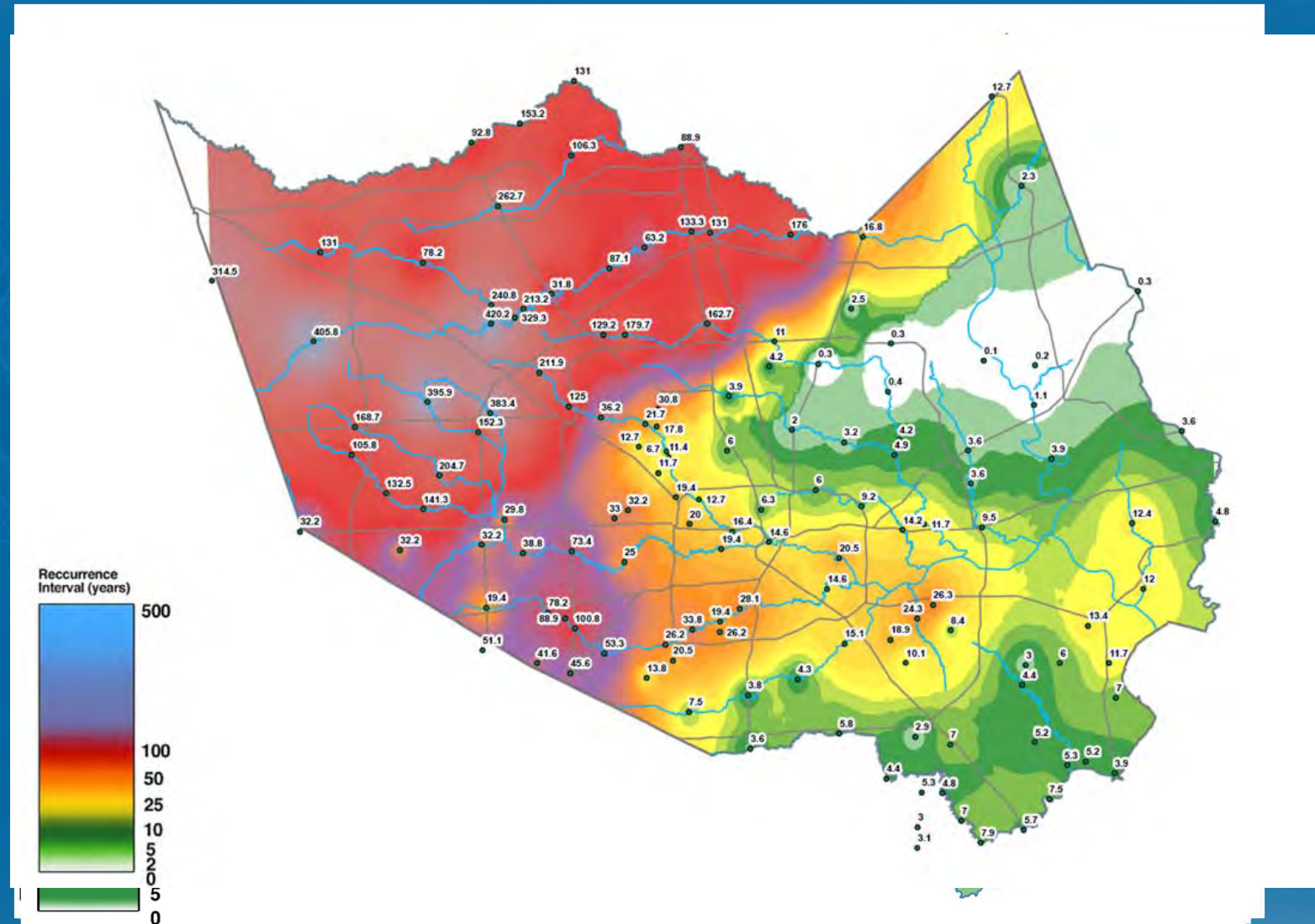
Harris County Current Map



Map Interface



Rainfall Heat Maps



veston; Inland Harris; Inland Jackson; Inland Matagorda; Madison; Matagorda Islands; M

ABOUT FWS ▼

Showing channel status at 8/29/2017 12:53 PM CDT

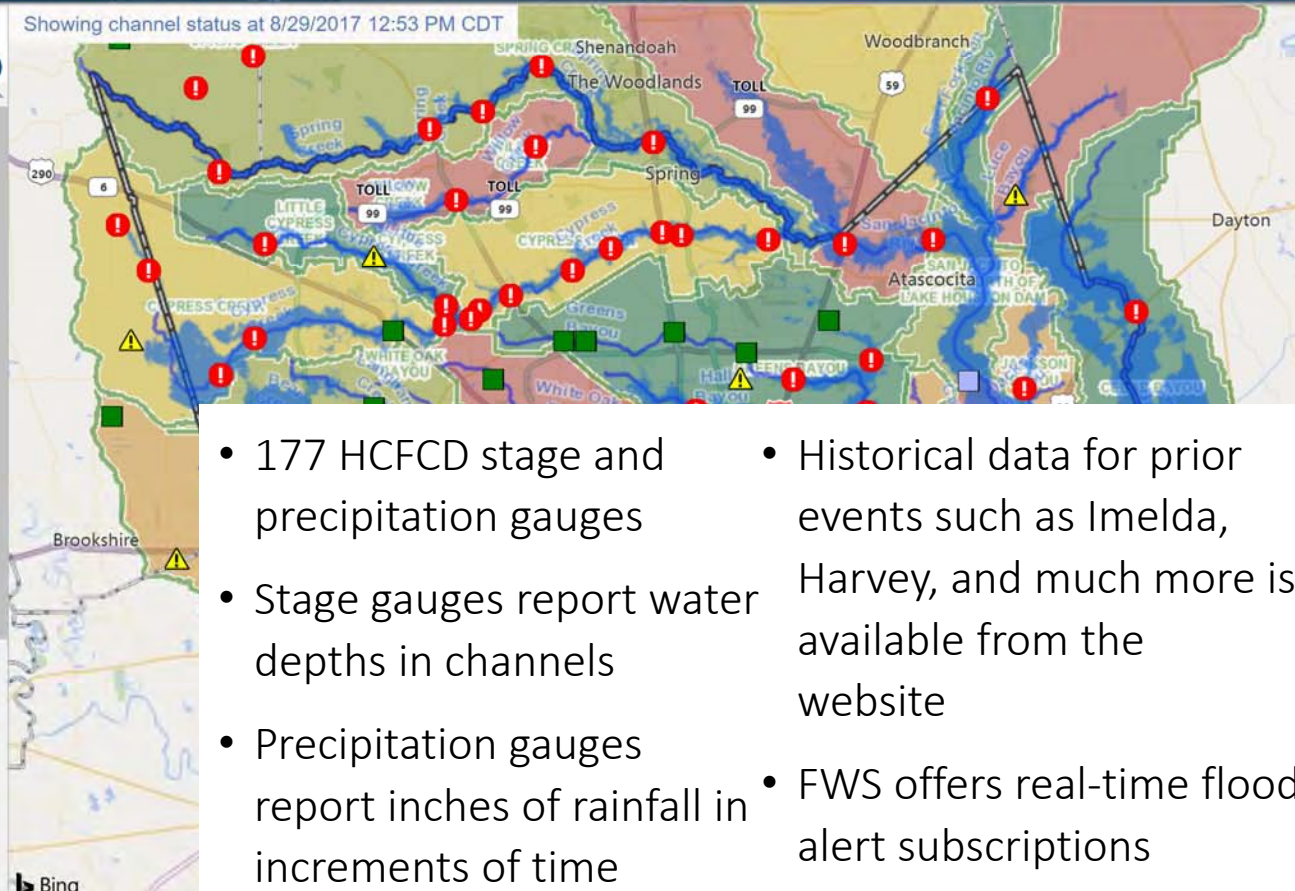
☒ Watersheds
☒ Channels
☒ Inundation Map
☐ 0.00 Rainfall
☒ Channel Status
☐ Channel Status not Defined
☐ No Flooding
☐ Flooding Possible
☐ Flooding Likely

SURFACE LEVEL DATA

Current Historical
at 8/29/2017 12:53 PM  
Show Historical

Sites by Agency
Harris County Flood Control Dist... ▼

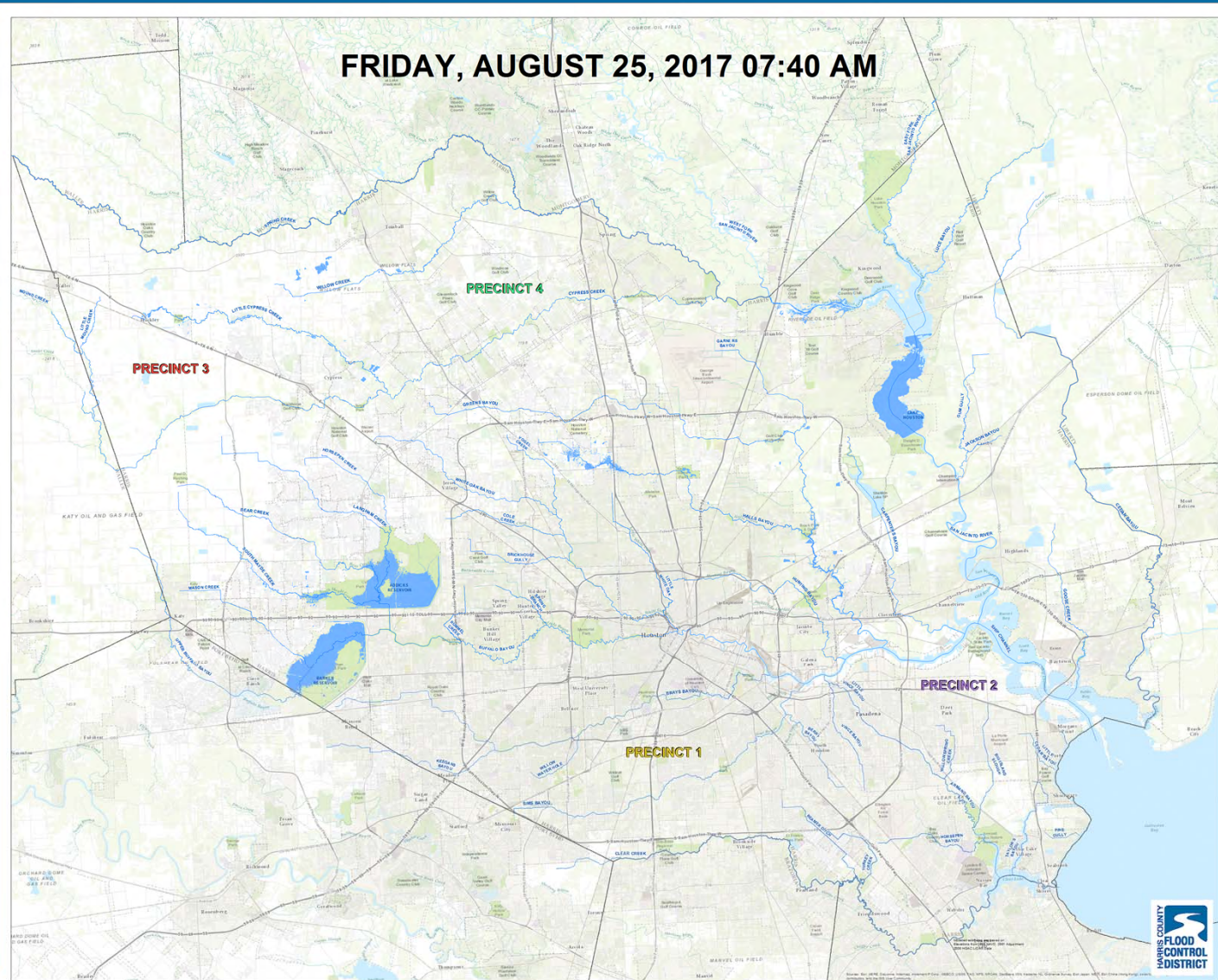
Site by Location
(Select Site) ▼



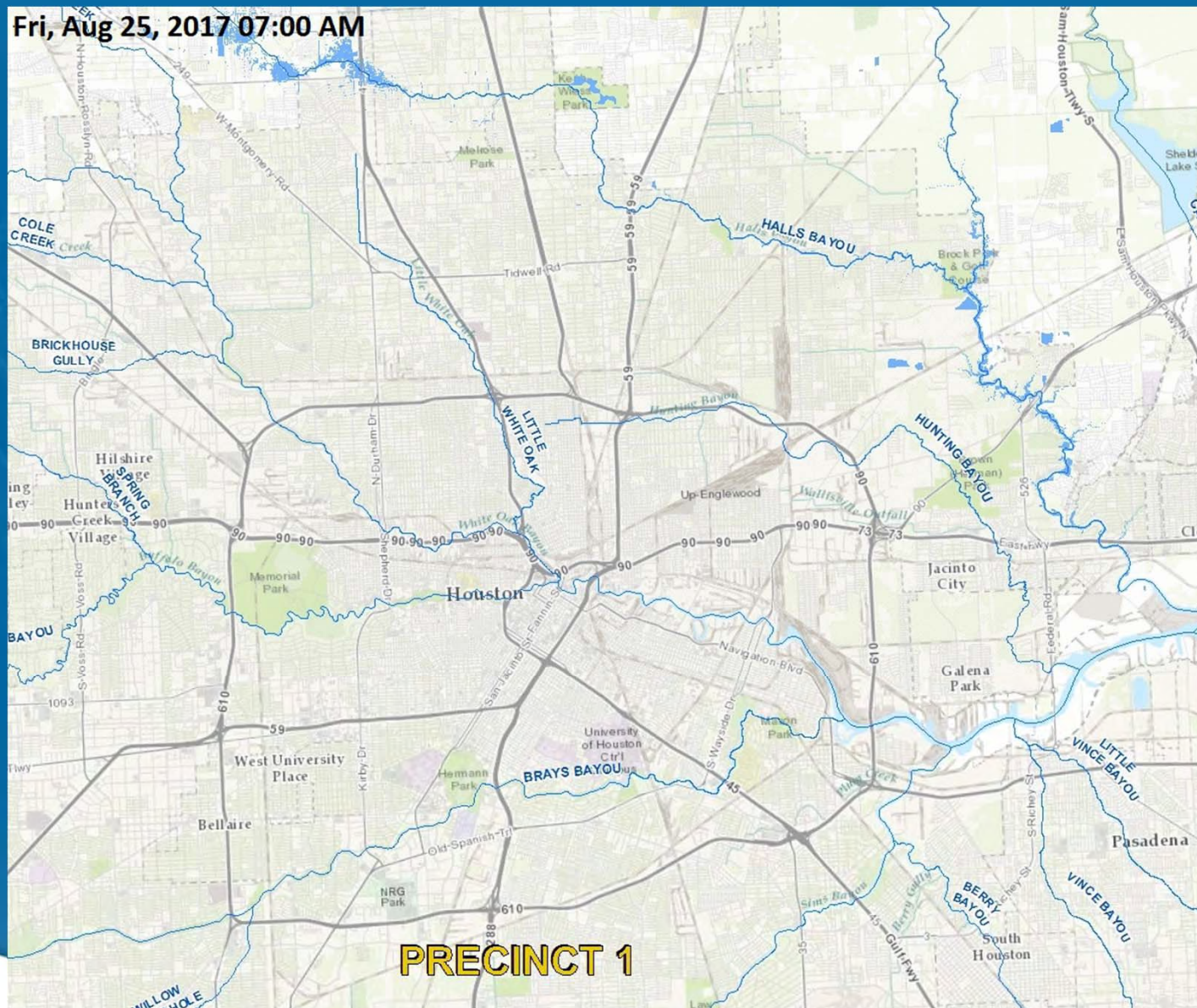
- 177 HCFCD stage and precipitation gauges
- Stage gauges report water depths in channels
- Precipitation gauges report inches of rainfall in increments of time
- Historical data for prior events such as Imelda, Harvey, and much more is available from the website
- FWS offers real-time flood alert subscriptions

Real time inundation Map for Hurricane Harvey

August 25 – 31, 2017

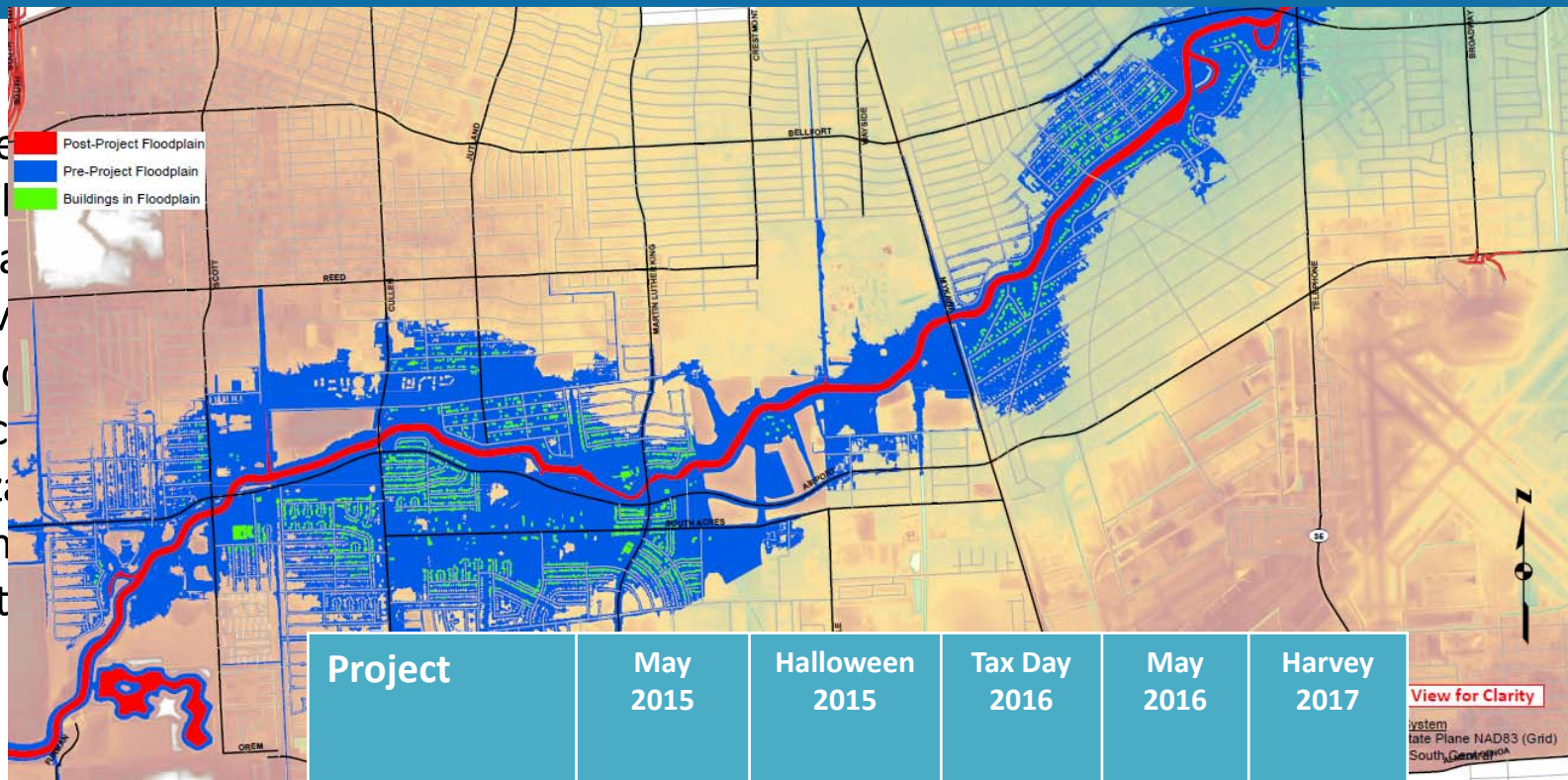


Flood inundation for Hurricane Harvey around Houston Metro area



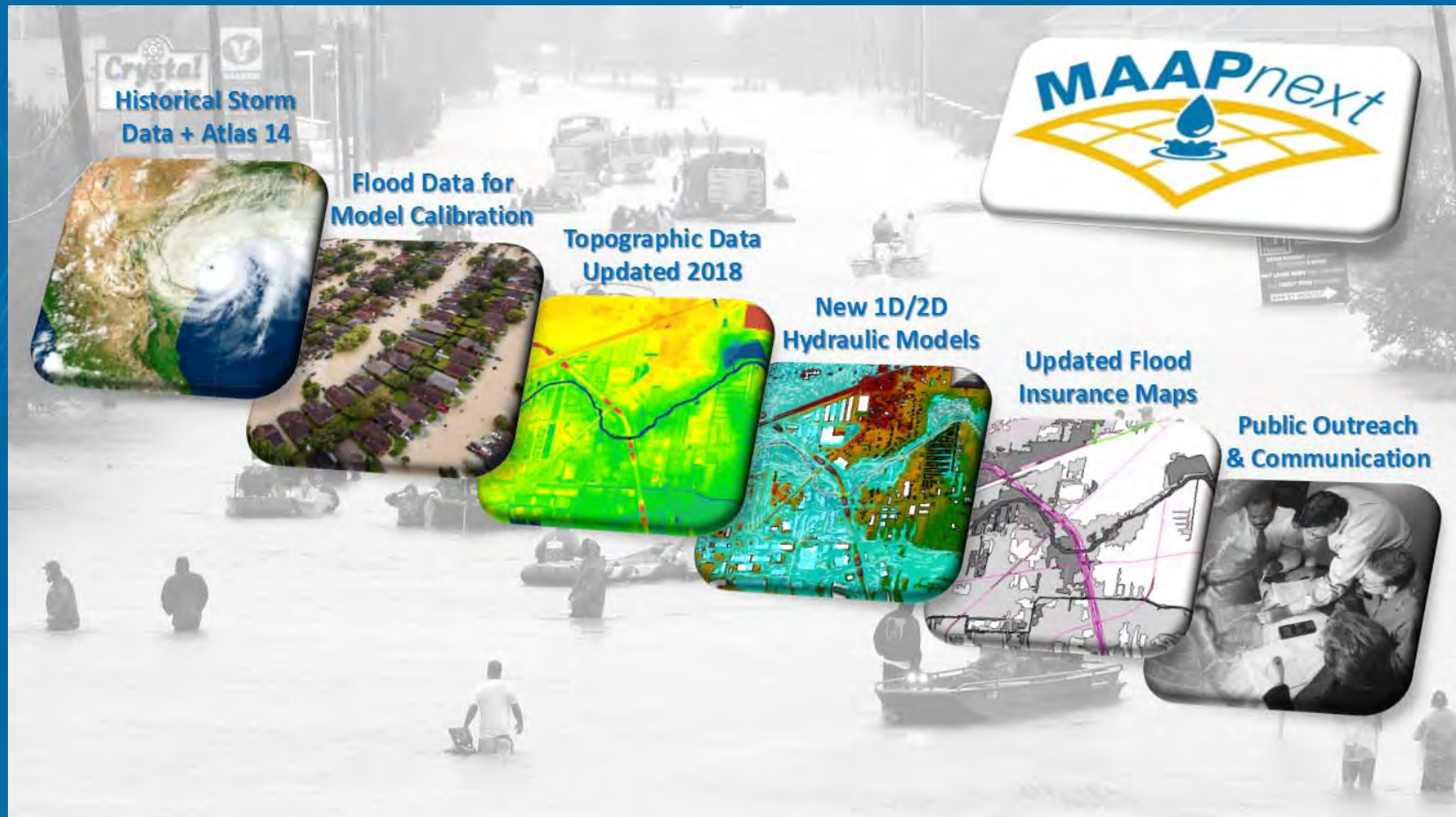
Return on Investment

In water and W... regional improv... the flood signific... in a siz... investm... event t...



Project	May 2015	Halloween 2015	Tax Day 2016	May 2016	Harvey 2017
Brays	7,300	1,900	2,300	-	10,000
Sims	1,700		-	-	6,500
White Oak	1,600	-	1,800	-	5,500
Other Watersheds	-	-	1,500	-	-
Buyouts	485	155	-	390	2,076

MAAPnext



QUESTIONS????



Reduce the risk and rediscover the beauty