

# Texas Association of Environmental Professionals

**Alan R. Black, P.E.**

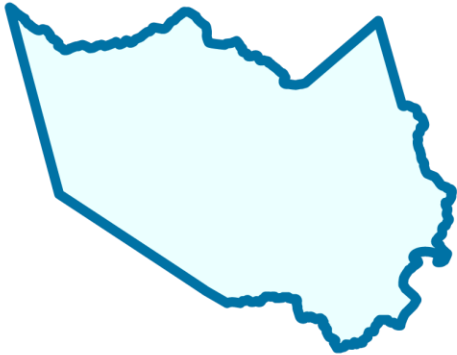
Director of Operations

**Harris County Flood Control District**

## OUR MISSION

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

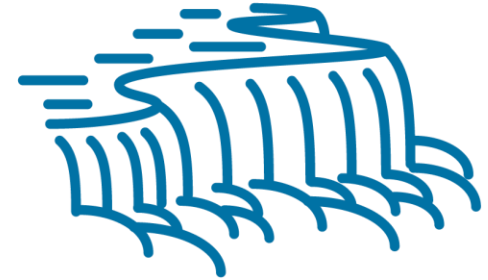
# How Much Water Is 1 Trillion Gallons?



Enough to cover Harris County  
**33 inches deep**



Enough to fill the Astrodome  
**3,200 times**



The same amount that  
goes over Niagara Falls in  
**15 days**

## How Much Rain Fell?

Average Annual Rainfall: **50 Inches**

Rainfall at Clear Creek: **47.4 Inches**

Average Rainfall From  
Harvey: **33 Inches**



## Flooding Impact

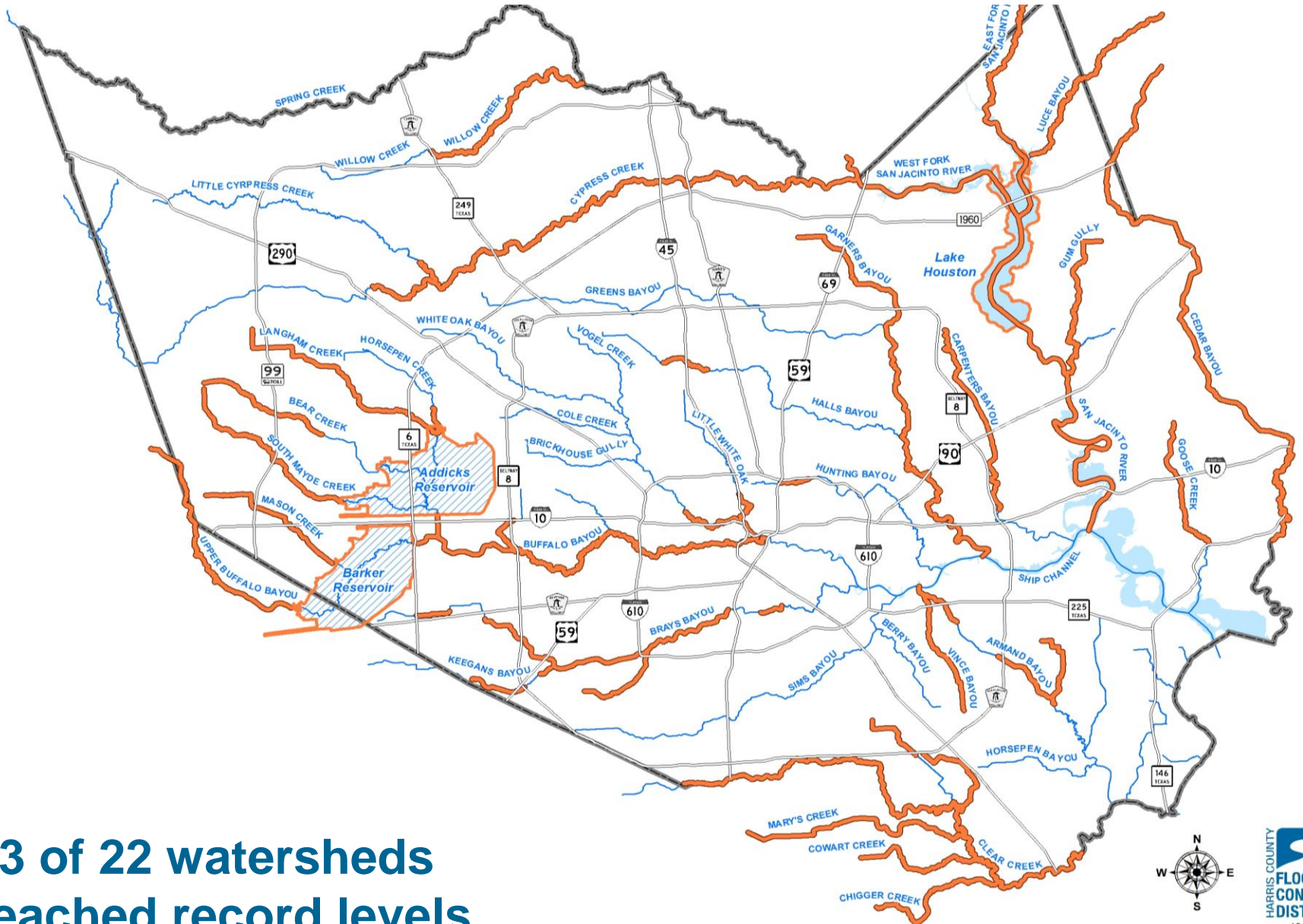


It is estimated that Harvey flooded more than

**150,000+ structures  
in Harris County**

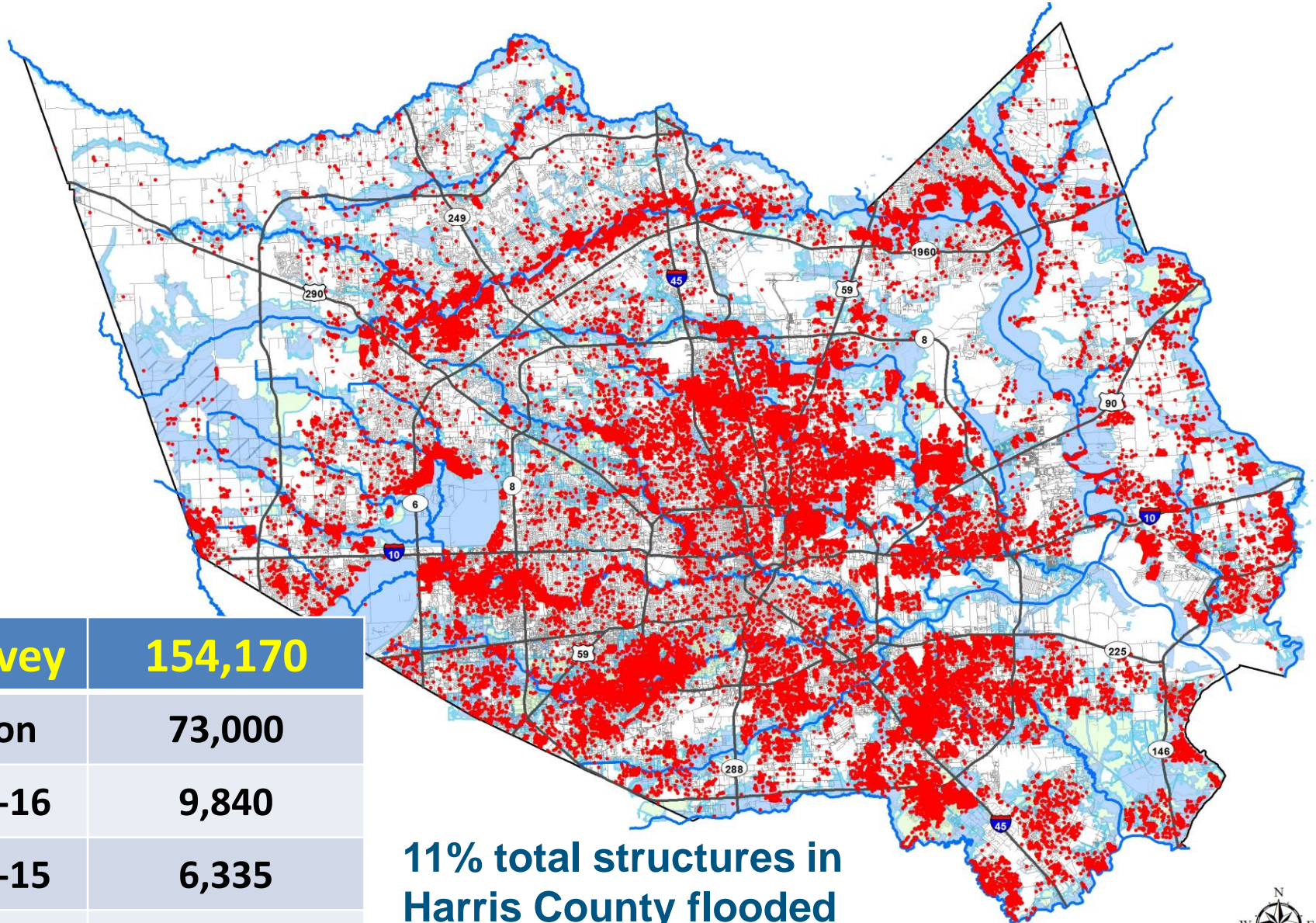
# Record Flood Levels

Hurricane Harvey, August 25-29, 2017



13 of 22 watersheds reached record levels

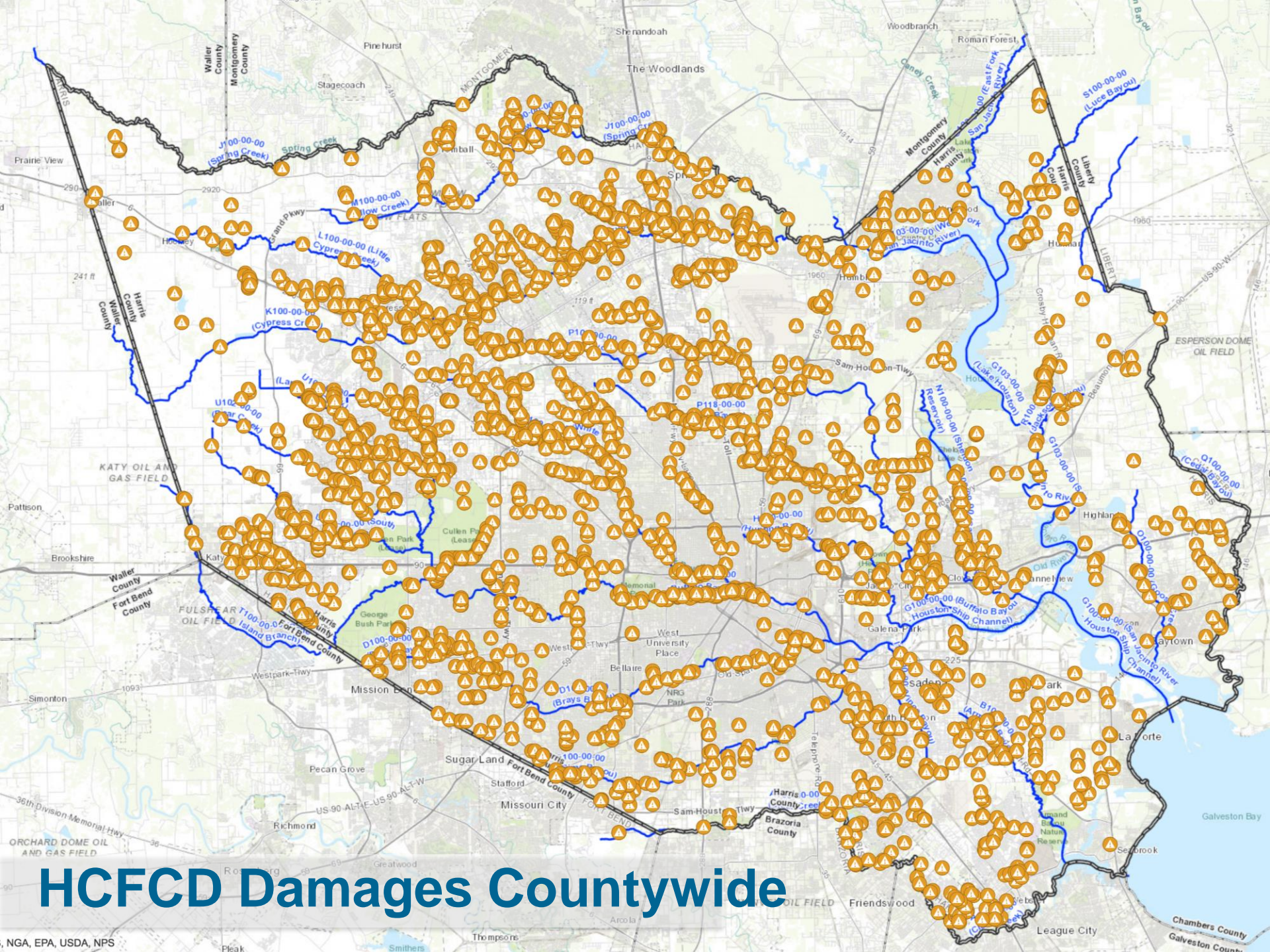
# Harvey House Flooding



<b>Harvey</b>	<b>154,170</b>
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**





# HCFCD Damages Countywide

# Recovery and Repairs

## Complete

- \$8.9 million in debris removal
- \$5.5 million in emergency repairs

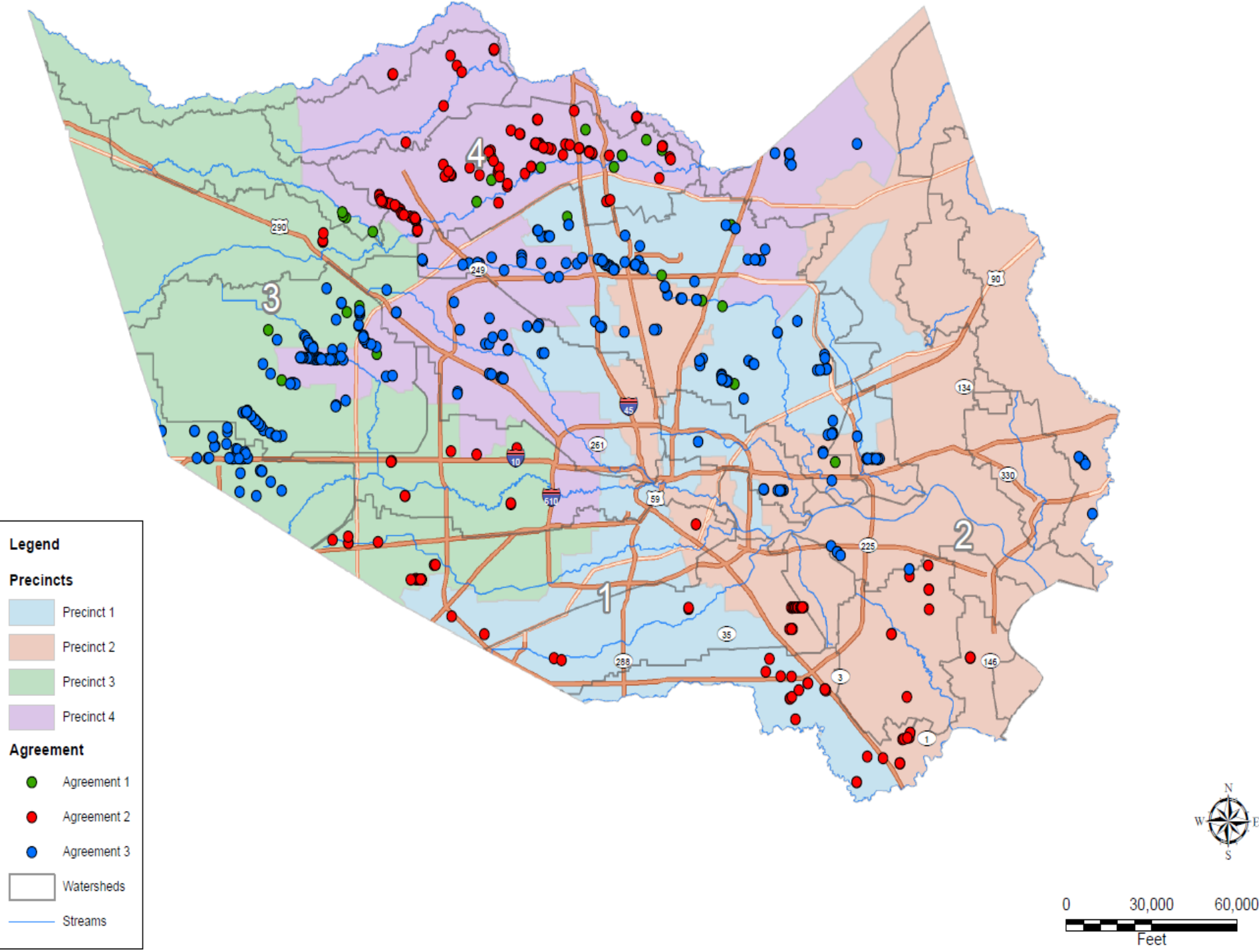
To date, approximately \$7.3 million in reimbursements has been received from FEMA and the State of Texas





# Recovery and Repairs Underway

- **\$150 million repair investment**
  - \$80 million from NRCS
  - \$17 million from FEMA
  - \$2 million from USACE
  - \$51 million local (HCFCD)



# Resiliency

- **\$2.5 Billion Bond Election**
- **\$900 Million towards Local Match**
- **~\$5 Billion in Projects**

# Bond Approved on Aug. 25



Channel Modification



Stormwater Detention



Channel Maintenance



Storm Repair



Home Buyouts



Engineering Study



Other Jurisdiction

- **237** projects across all watersheds
- **38** projects added based on community input (\$400M+)

	\$2.5B	Bond funds
+	~\$2.3B	Partner funds
=	~\$4-5B	Total

# Bond Planning

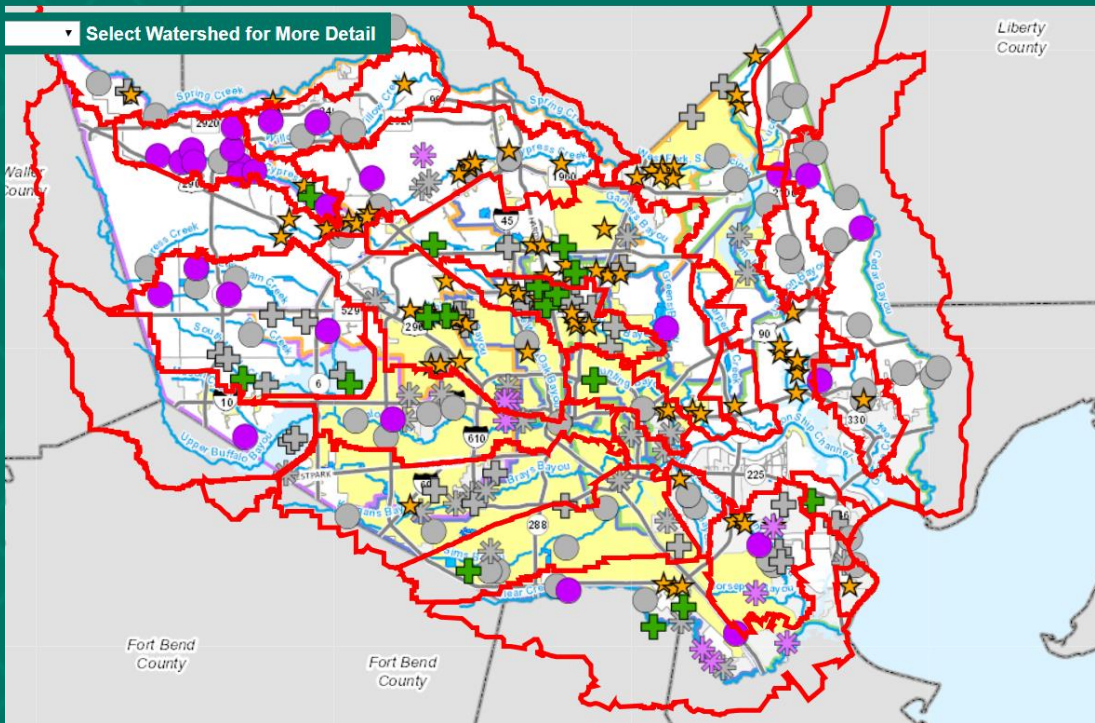
- **Planning \$5B in Projects over 10 years**
  - Readiness
  - Benefits
  - Opportunities (and timing) for Federal funding
  - Local Partners
  - Staff Resources
- **Reporting System**
  - Full transparency
  - Similar to Bond Program interactive map
  - <https://www.hcfcd.org/2018-bond-program/>

# Bond Progress

## By the Numbers

- **\$2.1 Billion in 146 Projects “in motion”**
- **104 Local Neighborhood Studies (HCED)**
- **\$239 Million in active construction**
  - **Active projects 79% complete**
- **\$350 Million in construction advertisements this year**
- **Spending is \$25 Million per month**

# Bond Program



- \$2.5 Billion Bond Election
- \$900 Million towards Local Match
- ~\$5 Billion in Projects

To date, \$71 Million in local funds has secured an additional \$255 Million in Harvey related federal funds

# Bond Progress Buyouts



The graphic is intended to show the progress of Harris County Flood Control District-managed buyouts conducted during and after Hurricane Harvey.

[www.hcfc.org/hurricane-harvey/home-buyout-program](http://www.hcfc.org/hurricane-harvey/home-buyout-program)





# How is



funded for disaster recovery & resiliency?



### State-level Grantees



Includes Local Match for Federally Funded Projects

Varies by Project

10% Local Match

10% Local Match

25% Local Match

25% Local Match

0% Local Match

Varies: 20% Local Match for Harvey



FEMA

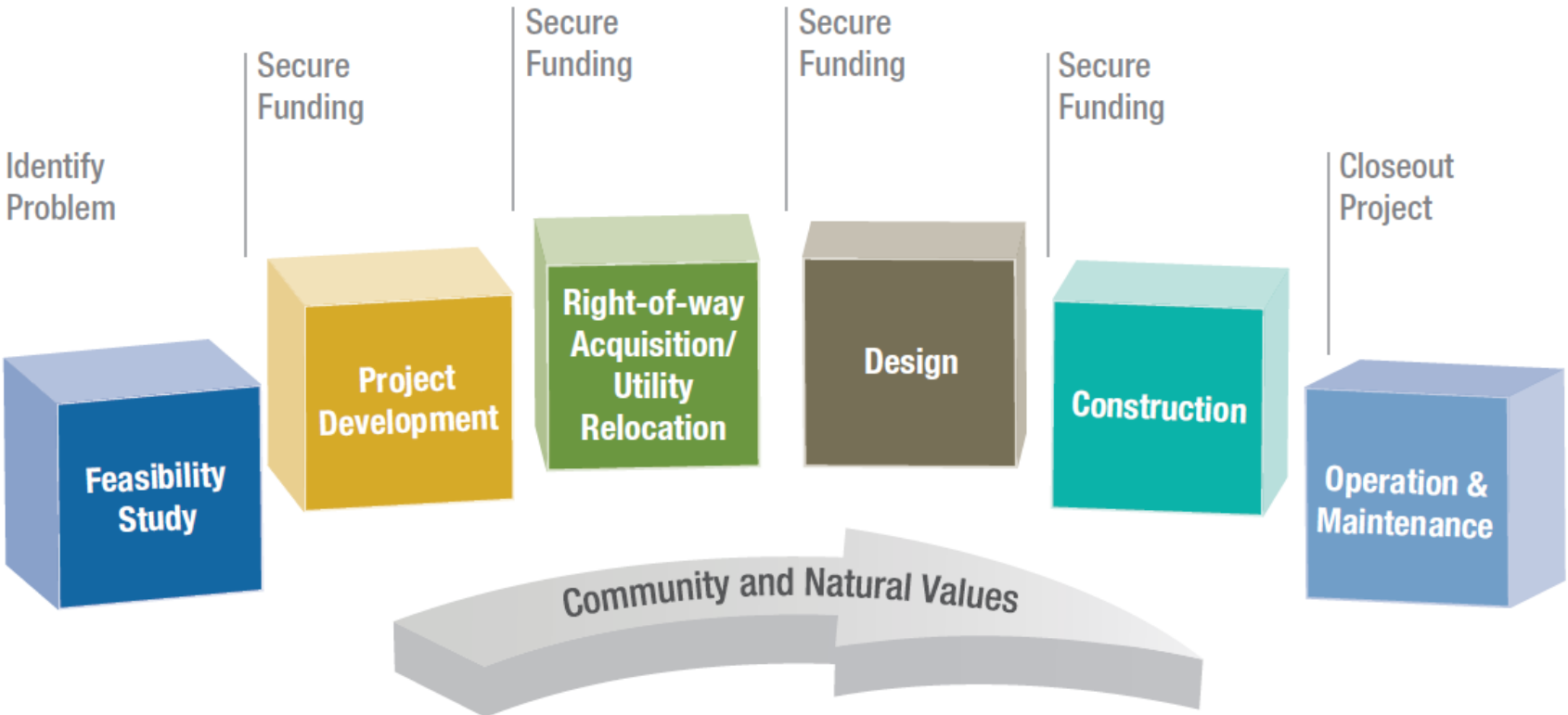
\*10% Local Match for Hurricane Harvey



← **\$2-3 Billion** →



# Flood Damage Reduction Project Lifecycle





The screenshot shows the website's navigation menu with the following items: ABOUT, TECHNICAL MANUALS, DOWNLOADS, GLOSSARY, FAQs, PRESS ROOM, WORK WITH US, CONTACT US, and a language selector. The main content area features a large image of construction equipment on a dirt site. Overlaid on this image is the text "2018 BOND PROGRAM" and "What happens now?" with a yellow "LEARN MORE" button. To the right, there is a "FIND YOUR WATERSHED" section with an address input field and an example address: "e.g. 9900 Northwest Fwy, Houston, TX 77092".

HARRIS COUNTY FLOOD CONTROL DISTRICT

ABOUT TECHNICAL MANUALS DOWNLOADS GLOSSARY FAQs PRESS ROOM WORK WITH US CONTACT US  Select Language

HURRICANE HARVEY 2018 BOND PROGRAM PROJECTS & STUDIES OUR PROGRAMS DRAINAGE NETWORK INTERACTIVE MAPPING TOOLS FLOODING & FLOODPLAINS BENEFITS OF DAMAGE RE

## 2018 BOND PROGRAM

What happens now?

[LEARN MORE](#)

### FIND YOUR WATERSHED

Enter your address

e.g. 9900 Northwest Fwy, Houston, TX 77092

[www.hcfcd.org/2018bondprogram](http://www.hcfcd.org/2018bondprogram)

# Types of Flooding

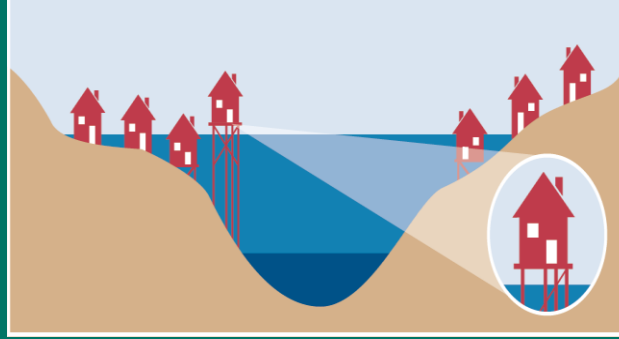
## COASTAL



### OCCURS WHERE:

- Ocean and large lake coastlines
- Tropical Storms & Hurricanes exacerbate flood chance/reach
- Storm surge likely
- Wave action possible

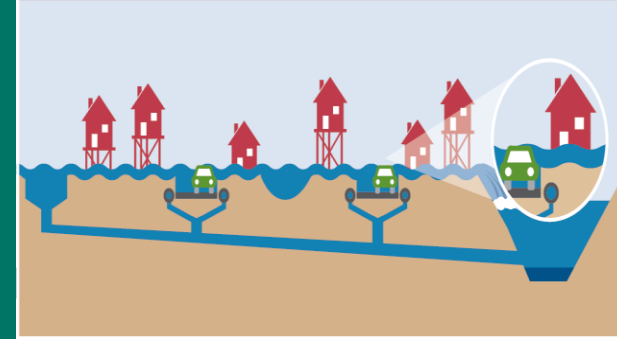
## MAJOR RIVER



### OCCURS WHERE:

- Expansive natural floodplain
- Major Rivers and Streams
- Low-lying riverbeds
- Flood water gather and spread
- Streams drain slowly

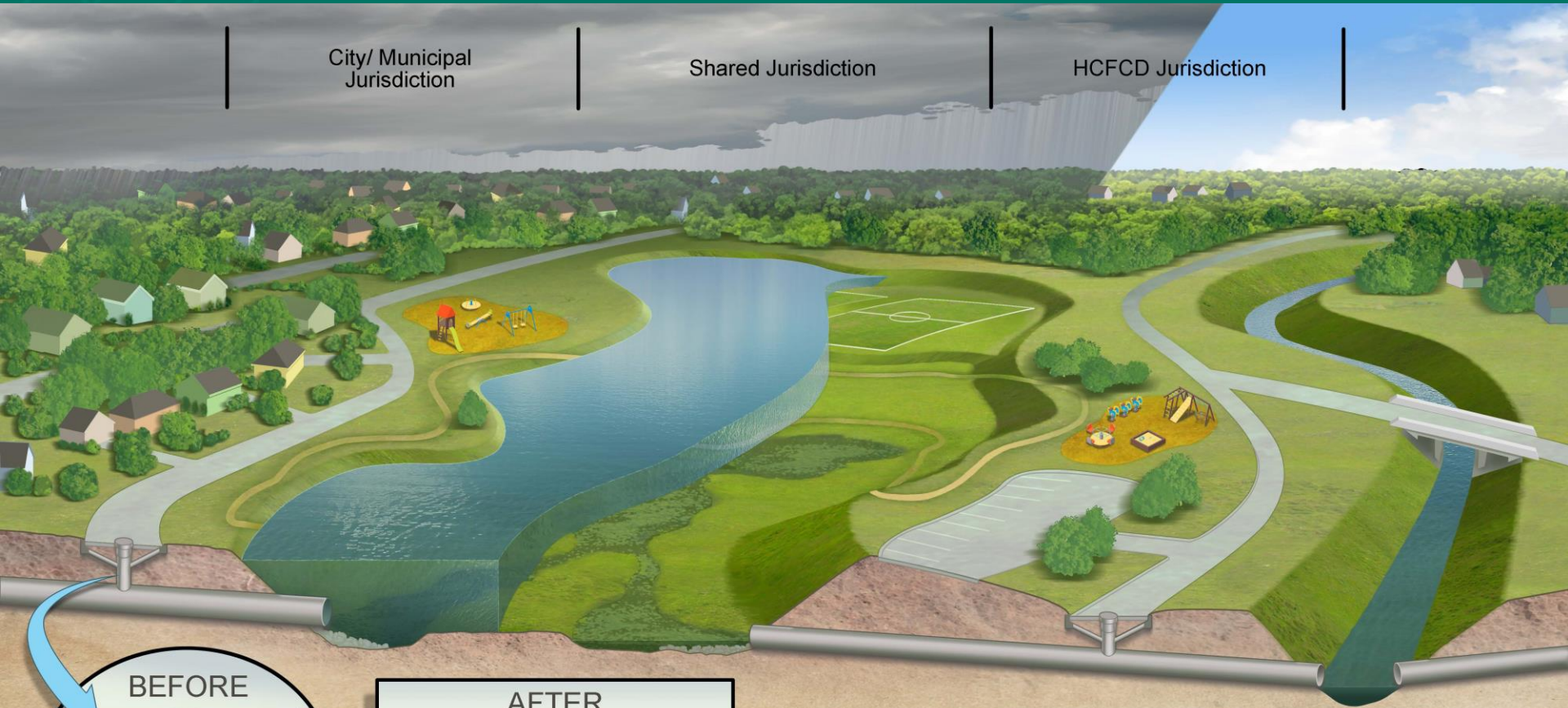
## OVERLAND/LOCAL DRAINAGE



### OCCURS WHERE:

- Local drainage overwhelmed
- Ditches, swales, and pipe systems unable transport all flood water
- May occur ANYWHERE

# Jurisdiction



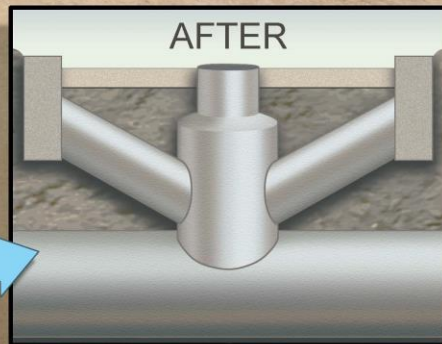
City/ Municipal  
Jurisdiction

Shared Jurisdiction

HCFCD Jurisdiction



BEFORE



AFTER

1. County/Municipal neighborhood drainage and HCFCD infrastructure pre-dates current criteria. Neighborhood streets are re-graded and re-constructed by the City with more inlets and bigger storm sewers to get the water out of the neighborhood faster.
2. That increased flow is mitigated in a new stormwater detention basin that HCFCD constructs in consultation with the City who then maintains the basin. Water is held in the basin and slowly released through a restricted outfall pipe.
3. The stormwater detention basin also provides greenspace and opportunities for recreation such as public parks, which the City constructs and maintains
4. Because the increased flows are mitigated in the stormwater detention basin, the water flowing to the HCFCD maintained channel is unchanged and does not increase flooding elsewhere.

# Bond Progress

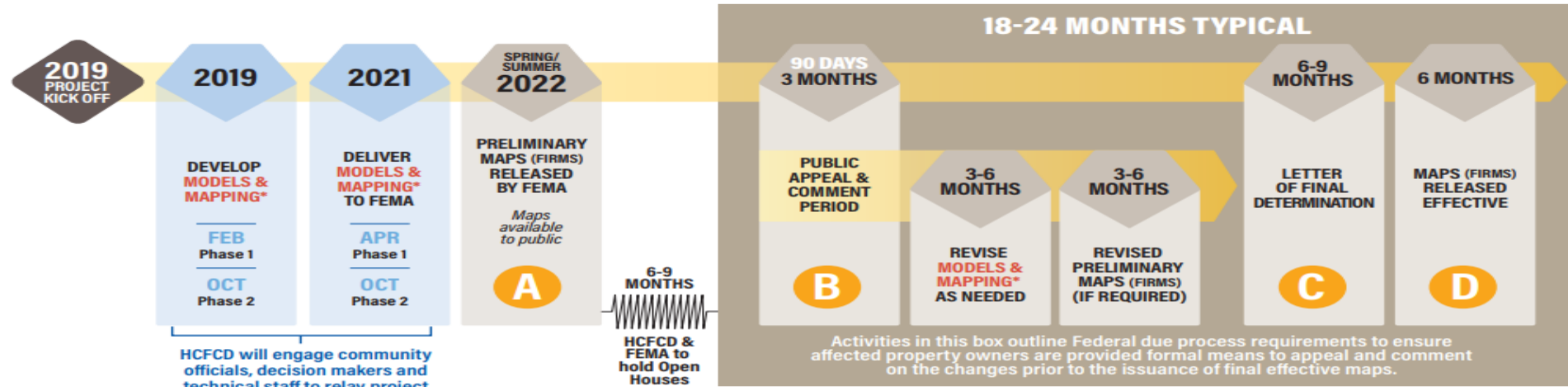
www.MAAPNext.org

## FLOOD INSURANCE RATE MAP (FIRM) UPDATE TIMELINE

Milestone Responsibility ◆ HCFC D ◆ FEMA

March 2019

Harris County Flood Control District, in partnership with the communities it serves, and with funding from FEMA, will be embarking on an update of the flood hazard information available to the public. This multi-year project will engage community leaders and technical staff in the development of updated flood hazard information.



HCFC D will engage community officials, decision makers and technical staff to relay project findings. These touchpoints will allow HCFC D to discuss study findings throughout their creation and preparation.

### \*MODELS AND MAPPING

The following data is included in the initial development of Models and Mapping

- Terrain (Ground Data)
- Field Surveys
- Hydrologic Models
- Hydraulic Models
- Floodplain Extents
- Flood Risk Products

Models and mapping will be revised as necessary based on technical data delivered during Appeal and Comment period.