



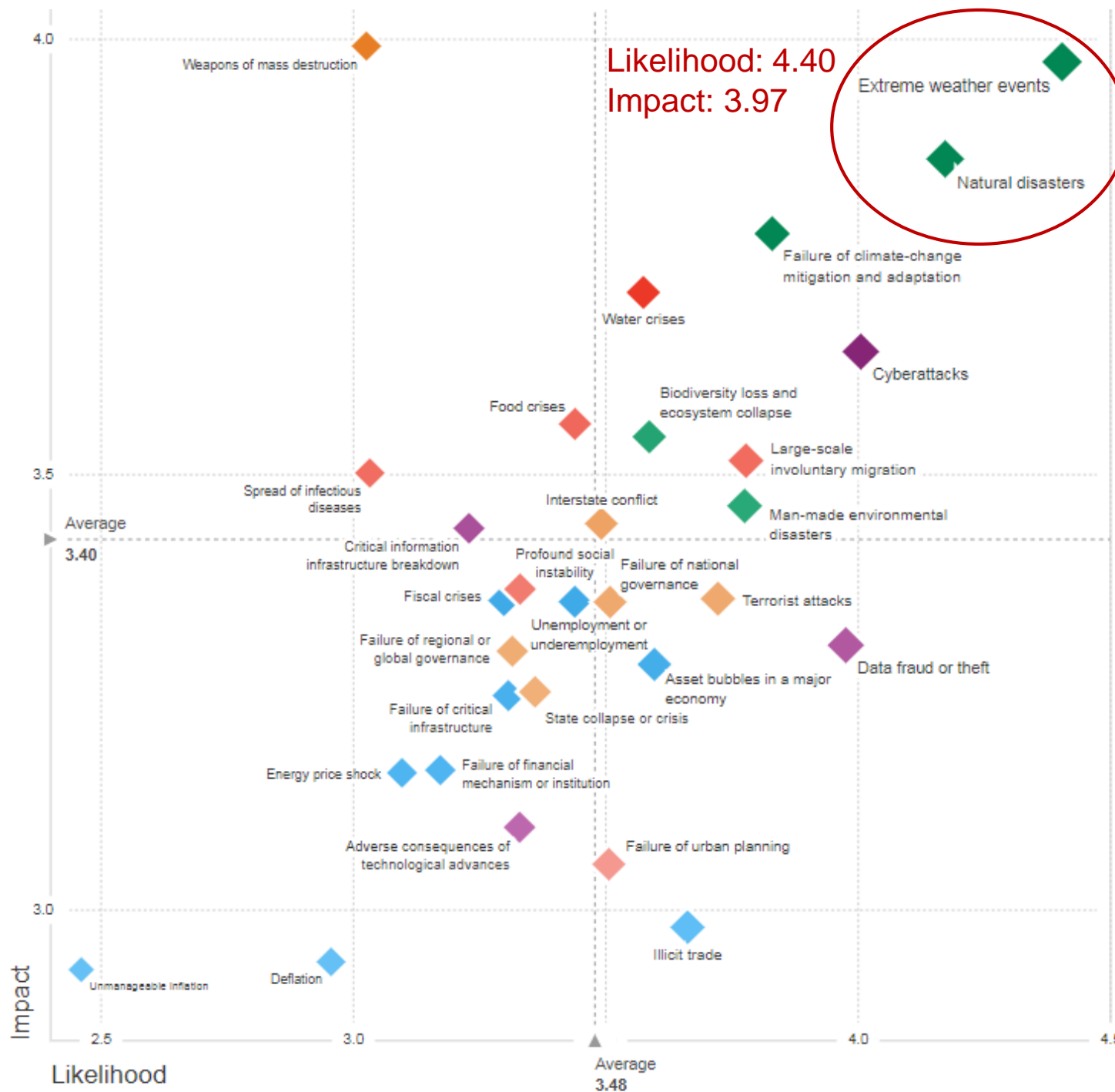
STEPHEN C. COSTELLO
CHIEF RESILIENCE OFFICER

HOUSTON HARVEY RECOVERY & FLOOD RESILIENCE

2018 NATIONAL ENERGY CODES
CONFERENCE

JULY 16TH, 2018



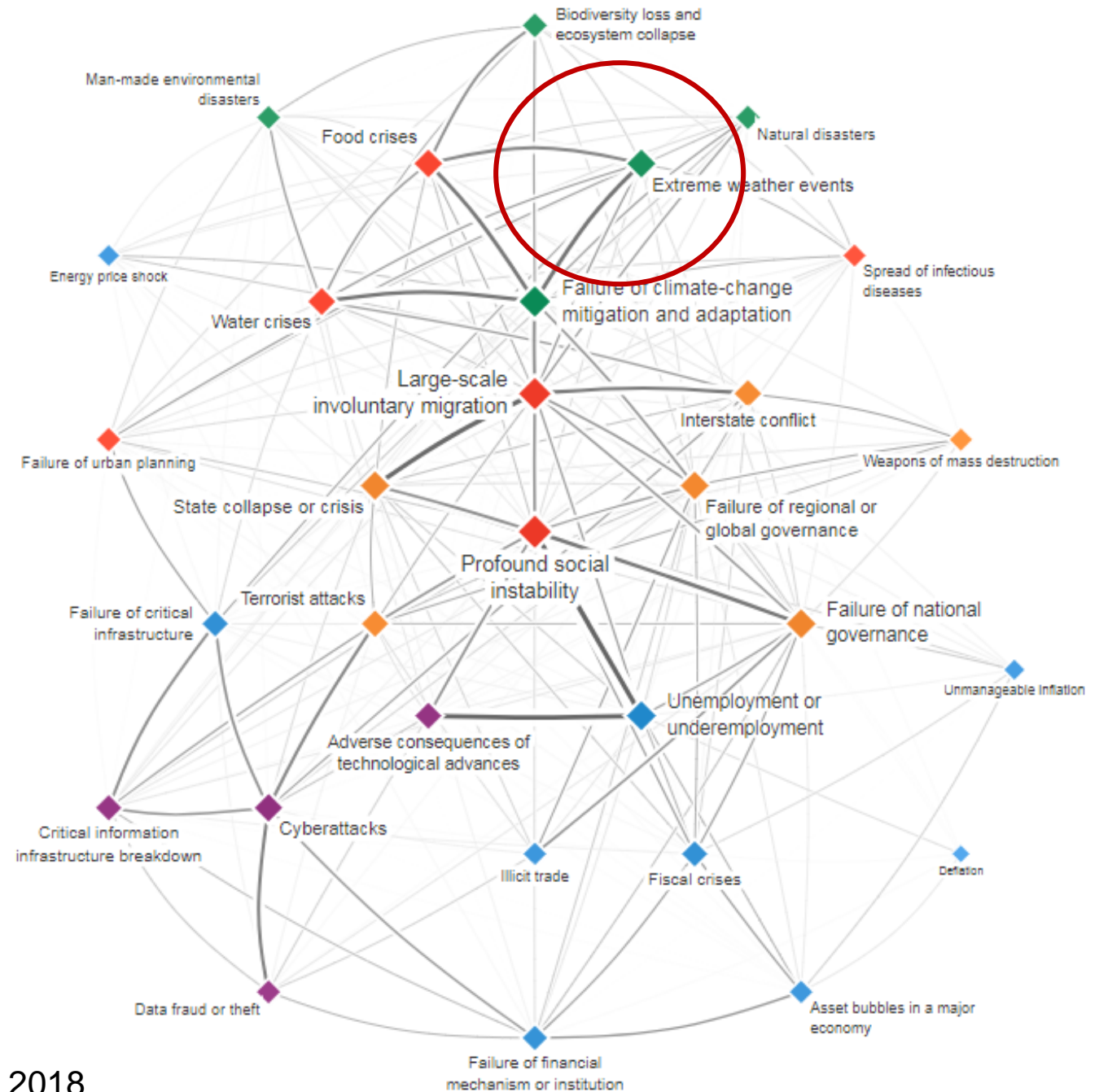


30 identified Global Risks

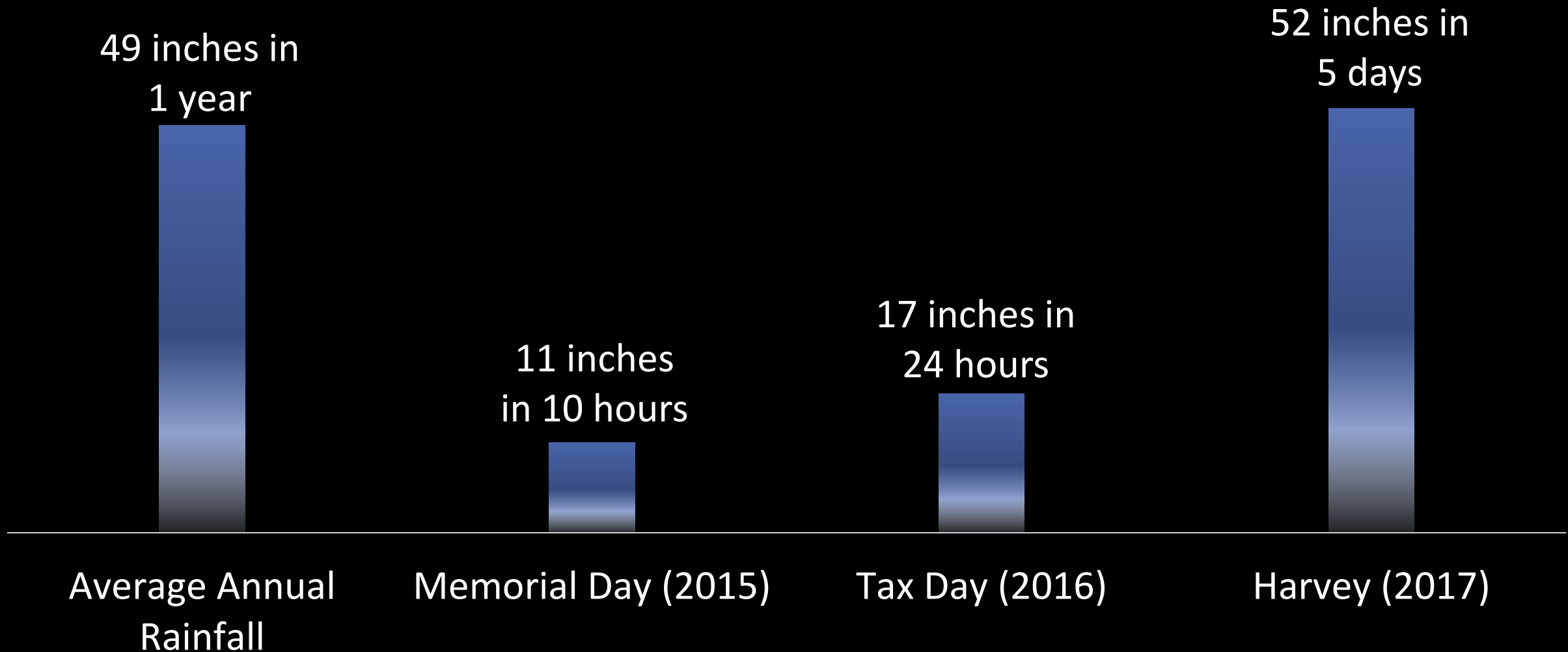
Extreme weather events have been considered within the **Top 5 Global Risks** since 2014

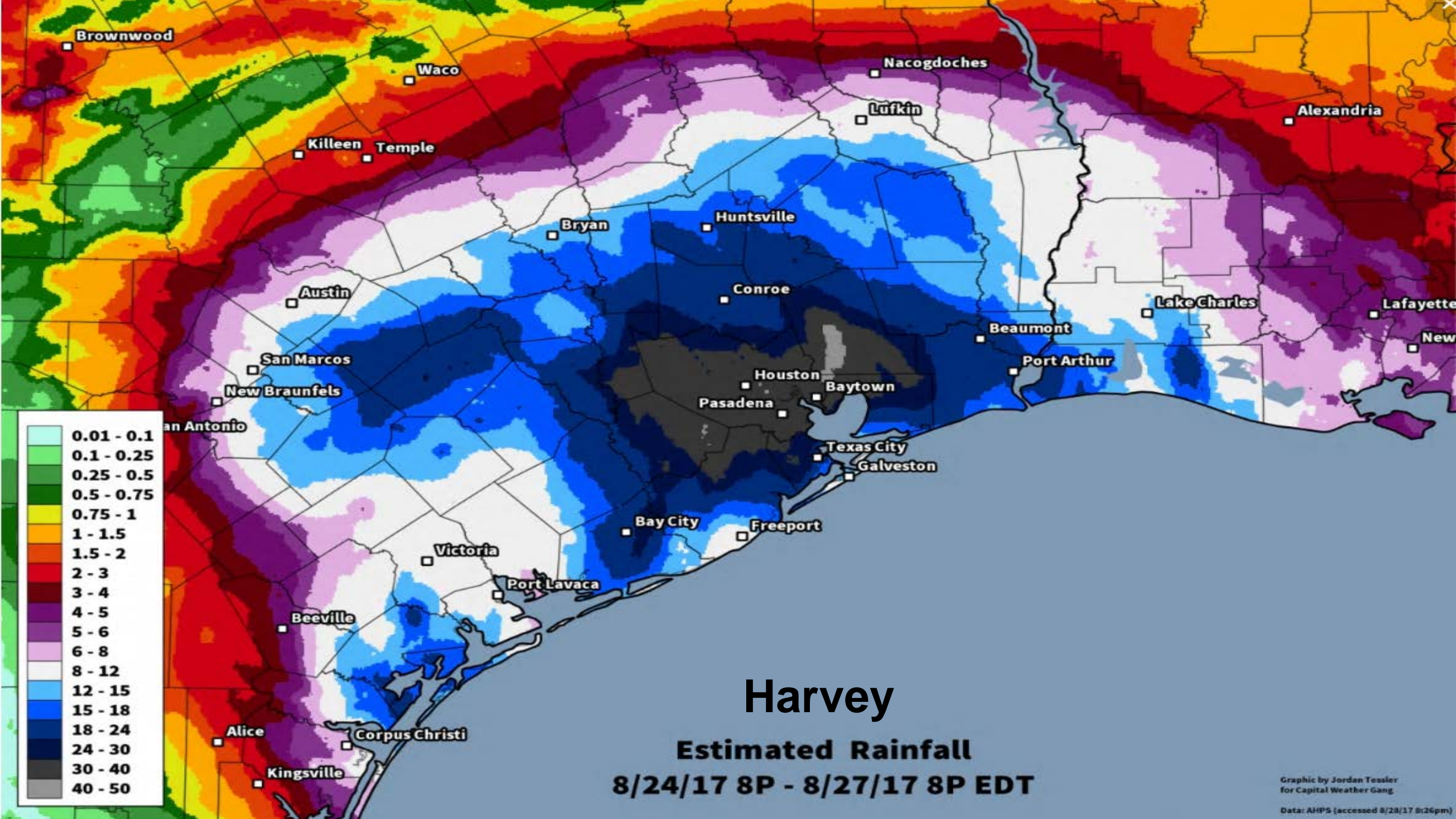
Source: Global Risks Report 2018
World Economic Forum

Extreme weather events are highly interconnected



3 Major Floods in 3 Consecutive Years





Harvey Impacts to infrastructure

\$125 B in Harvey damages statewide according to National Hurricane Center



Bayou Flooding

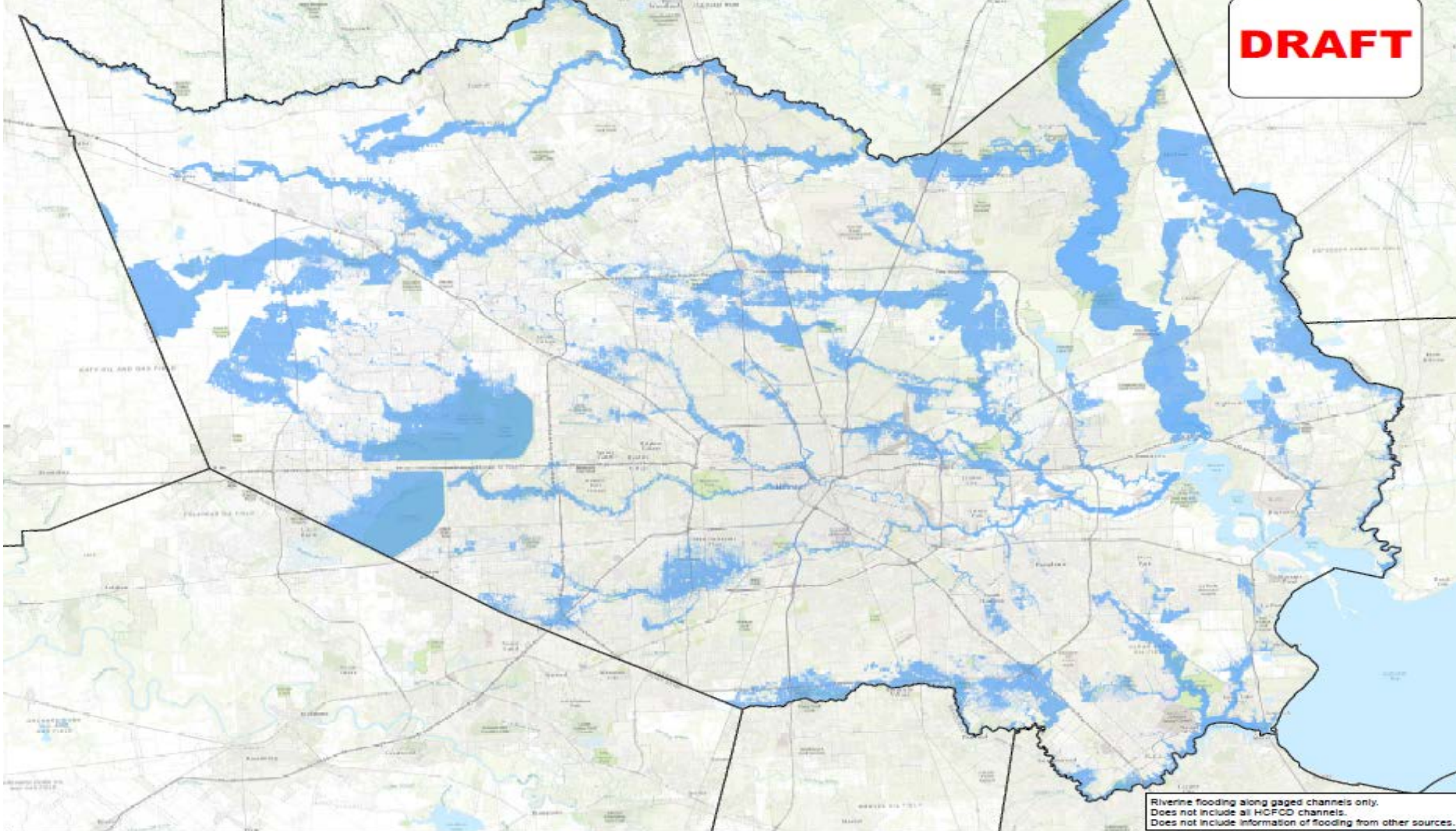


Reservoir Releases



Highway Inundation – U.S. 59

DRAFT



Harvey Estimated Maximum Riverine Inundation

Estimates include data through August 31 at 7:00 AM



Harvey Impacts



INCHES
OF RAIN



41,500
SQ. MILES
IMPACTED
ACROSS TEXAS



365,000
DAMAGED HOMES


135,584 
APPROVED APPLICATIONS



37,000
IN SHELTERS



8500+
CALLS
AUGUST 2017

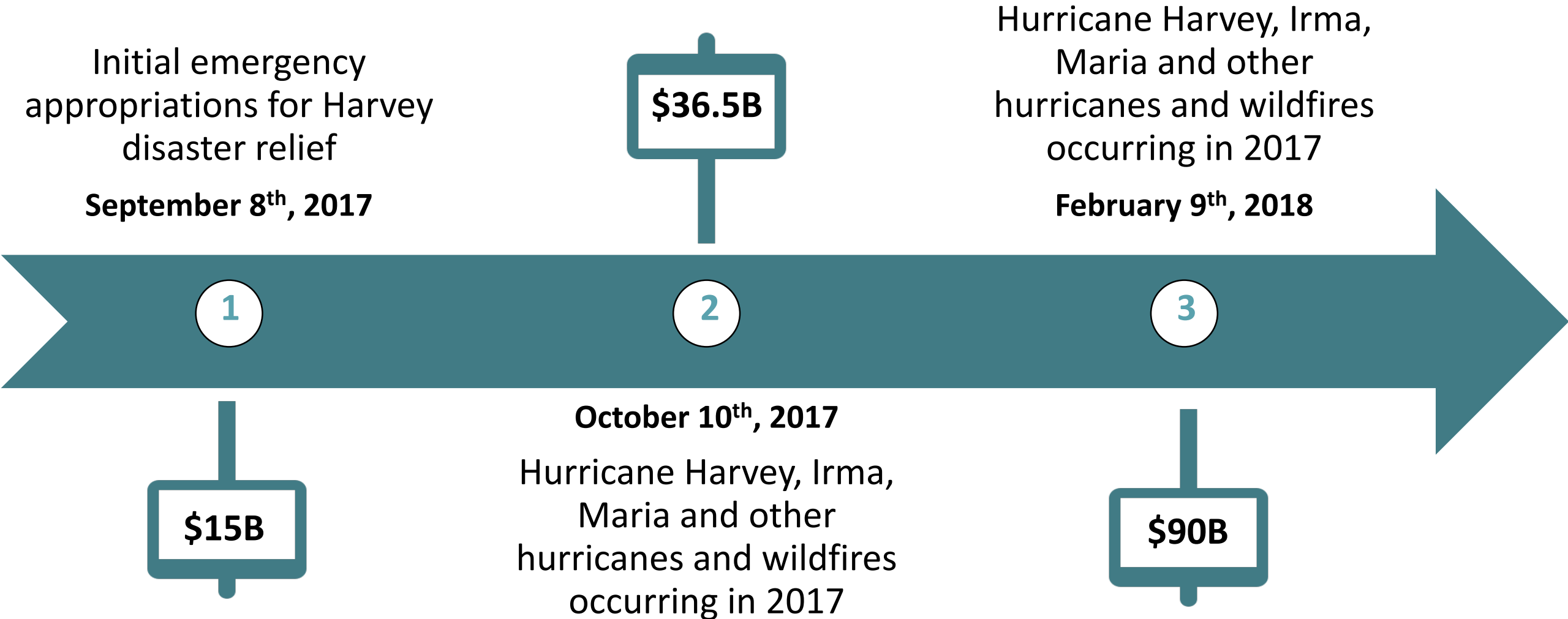
18% 

COUNTY RESIDENTS
SUFFERING SERIOUS
PSYCHOLOGICAL
DISTRESS POST
HARVEY¹

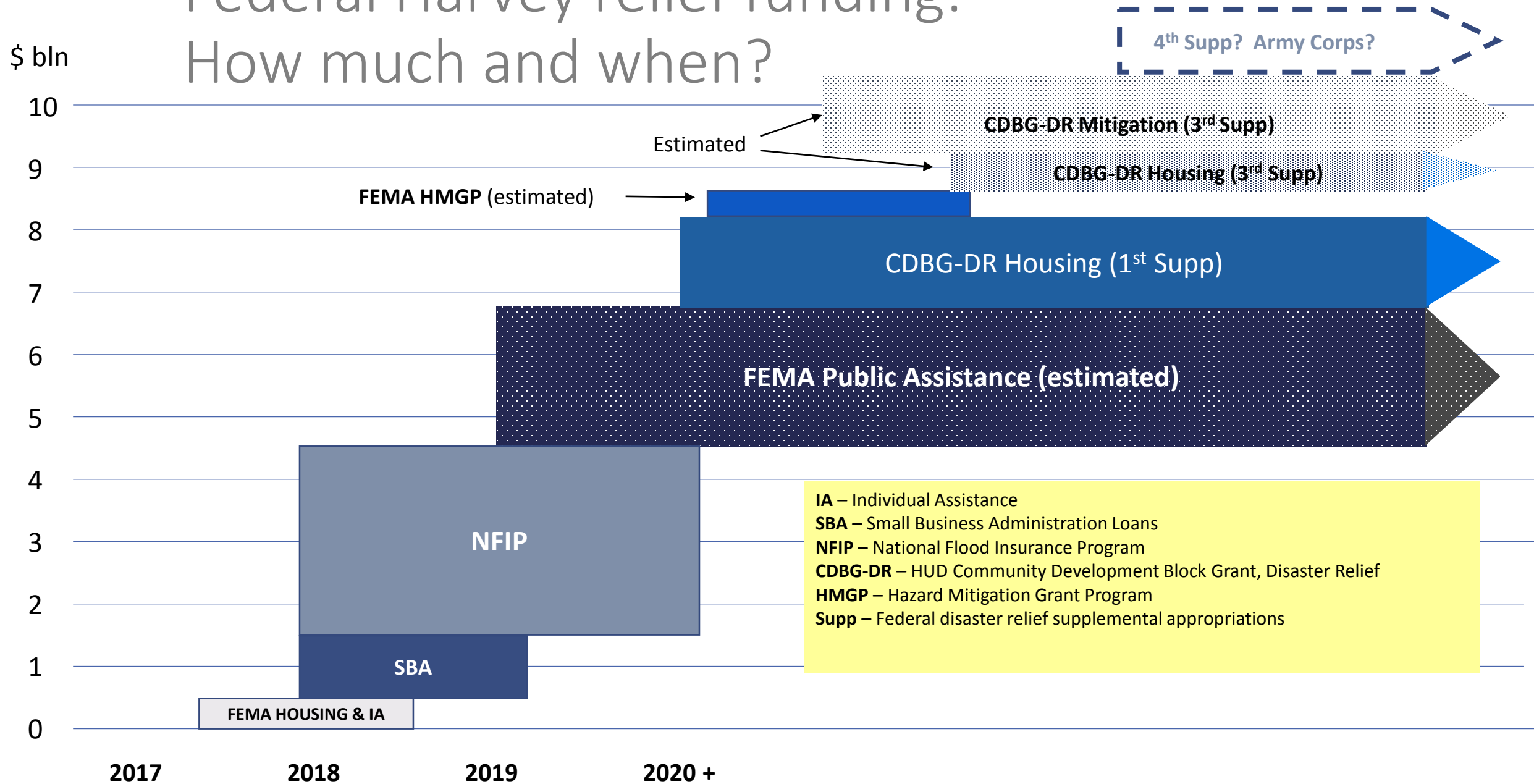


256,845
VOLUNTEER
HOURS

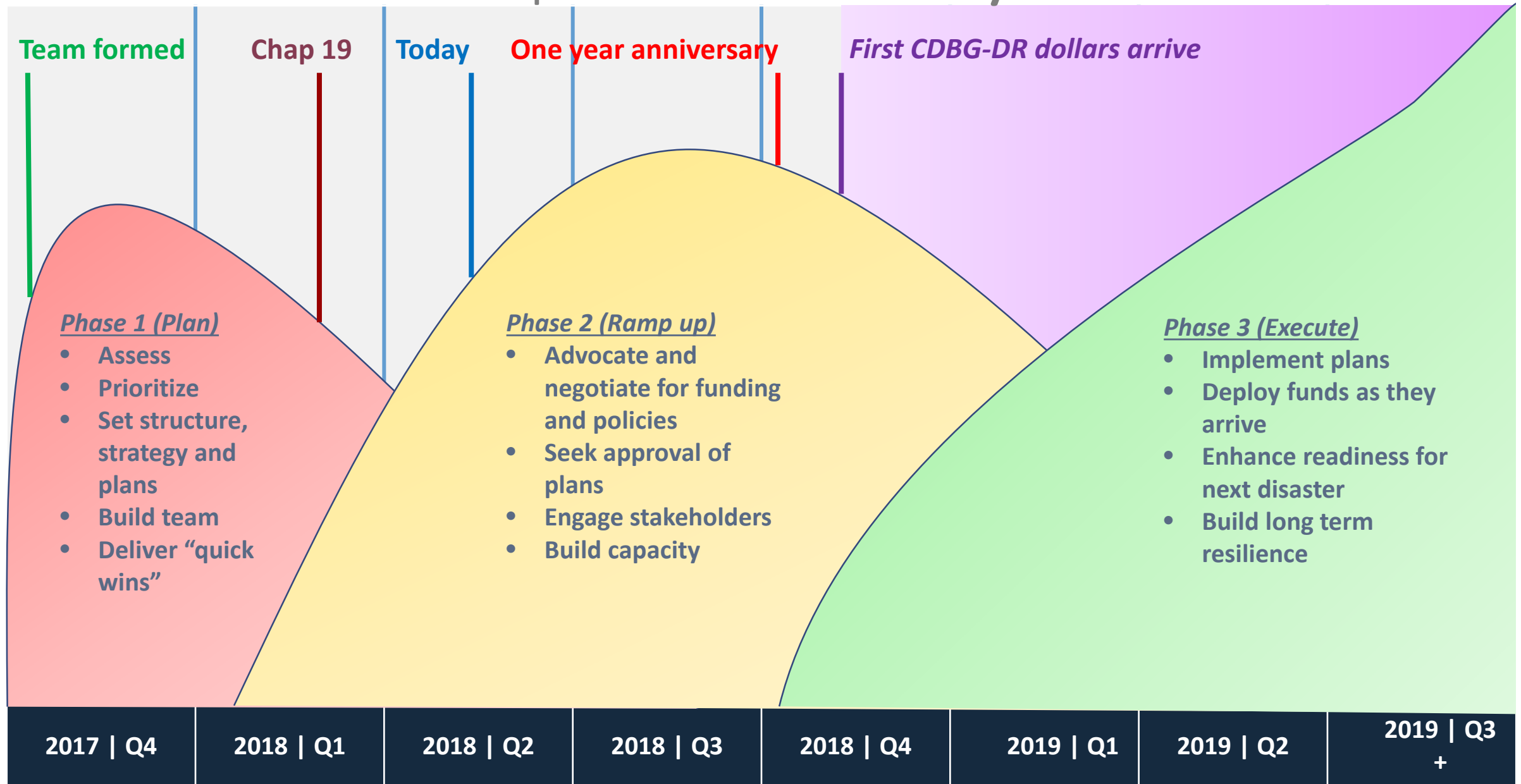
Federal Disaster Relief



Federal Harvey relief funding: How much and when?



No. 1 Houston's path to recovery & resilience



Harvey Recovery Team



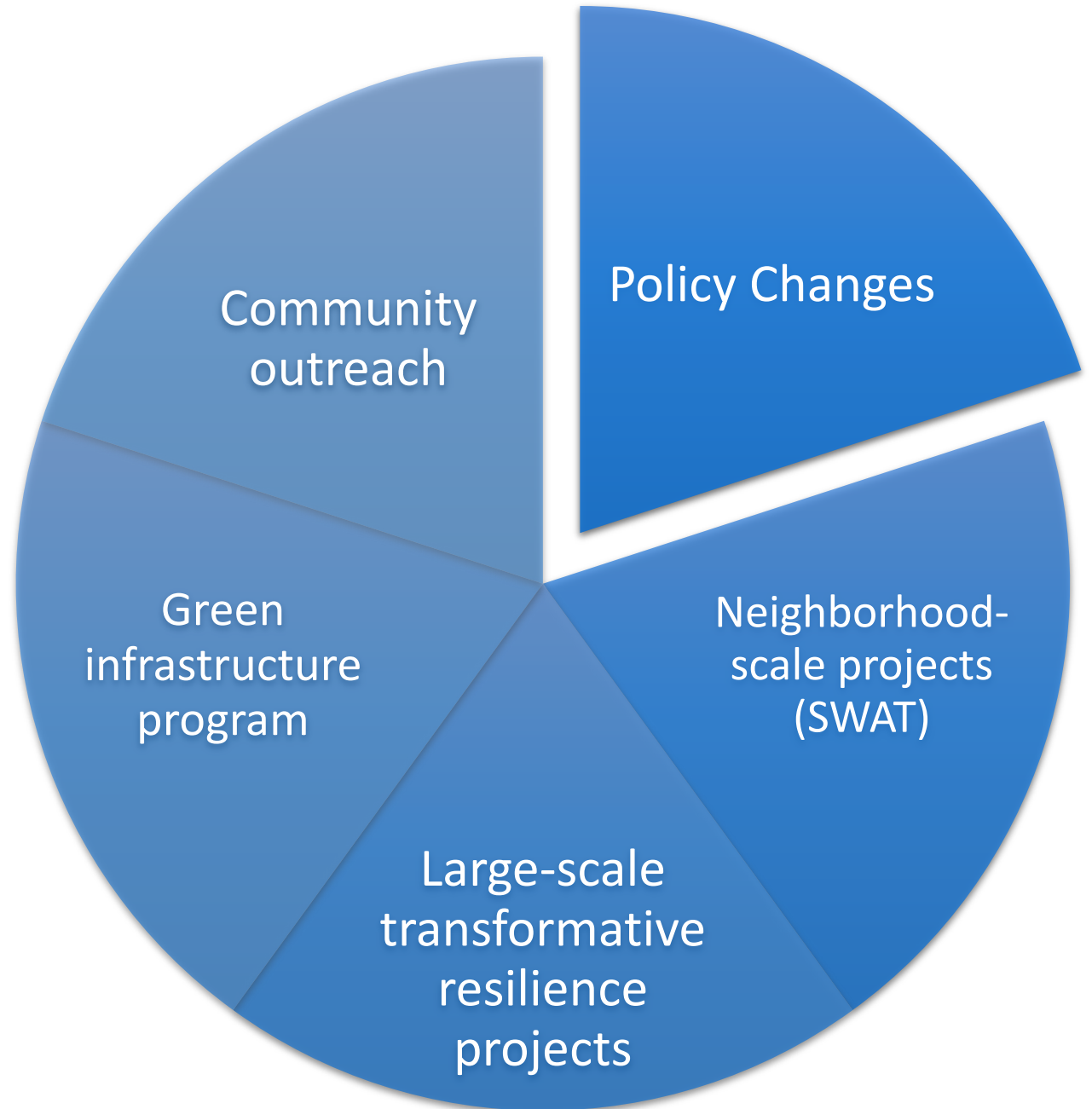
Housing

Infrastructure

Resilience

No. 2 Building long-term resilience

collaborate to
design strategies
for resiliency and
flood risk
mitigation



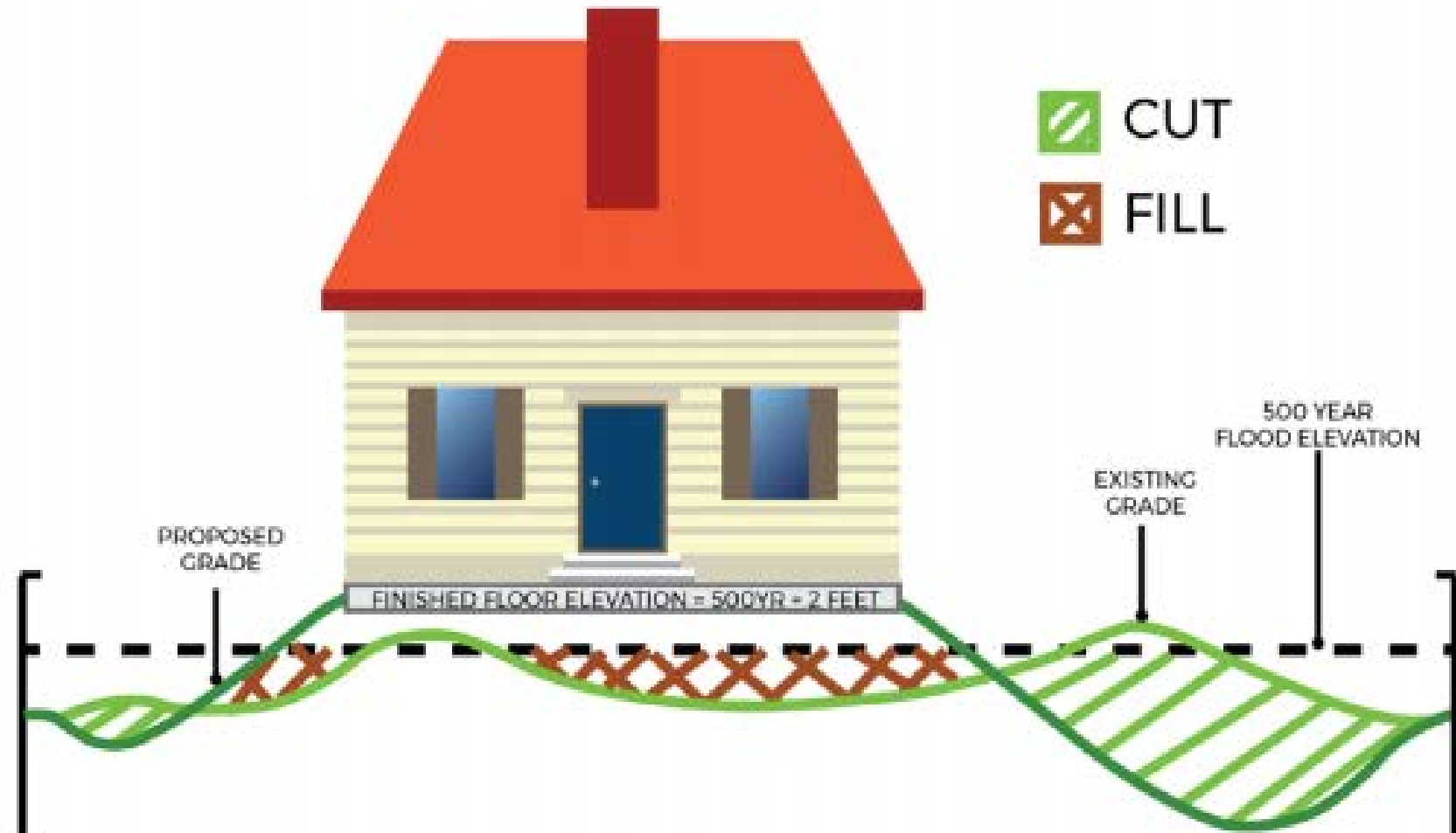
POLICY CHANGES

Floodplain Regulations
Chapter 19

Design Standards
Chapter 9 and 13

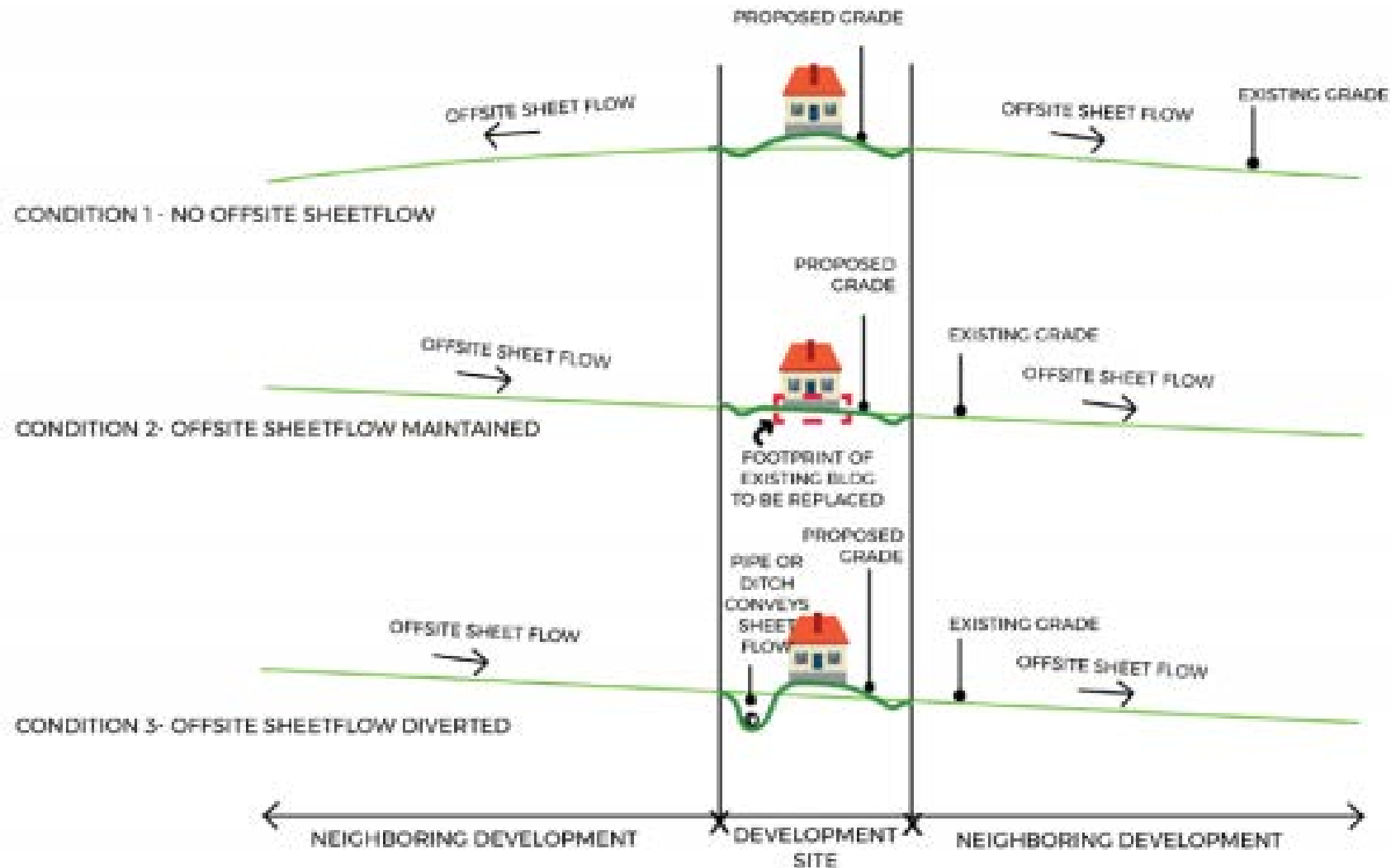
ZERO NET FILL

Cut Equals or Exceeds Fill



GUIDELINES HIGHLIGHTS

Sheet Flow Conditions



RECOMMENDATIONS

DETENTION

RECOMMENDATIONS	CHANGES / NO CHANGES	IDM OR IBC REFERENCE
ELIMINATE DETENTION CREDIT FOR EXISTING IMPERVIOUS COVER	<i>Redevelopments required to meet same detention requirements as new developments.</i>	<i>IDM pg. 9-23 to 9-26 and 9-4;9.04G</i>
PROVIDE DETENTION CREDIT FOR LOW IMPACT DEVELOPMENT TECHNIQUES	Included reference to Chapter 13. No additional changes to IDM. ¹	<i>IDM pg. 9-26;9.05H3j and pg. pg. 13-6 to 13-17; 13.05 B1-7</i>
PAYMENT OF FEE IN LIEU OF DETENTION	No changes to IDM. Proposed study to be conducted.	<i>IDM pg. 9-23; 9.05H2a)</i>
ENCOURAGE PRIVATE SECTOR INVOLVEMENT	Included Developer Participation Contract (DPC).	<i>IDM pg. 9-11;9.05C2b(3)</i>
ALLOW FOR THE SALE OF EXCESS DETENTION CAPACITY	Included Developer Participation Contract (DPC).	<i>IDM pg. 9-11;9.05C2b(3))</i>

1. Currently conducting green storm water infrastructure study, with the support of Houston Endowment, to determine incentives for private sector, including potential future changes to IDM.

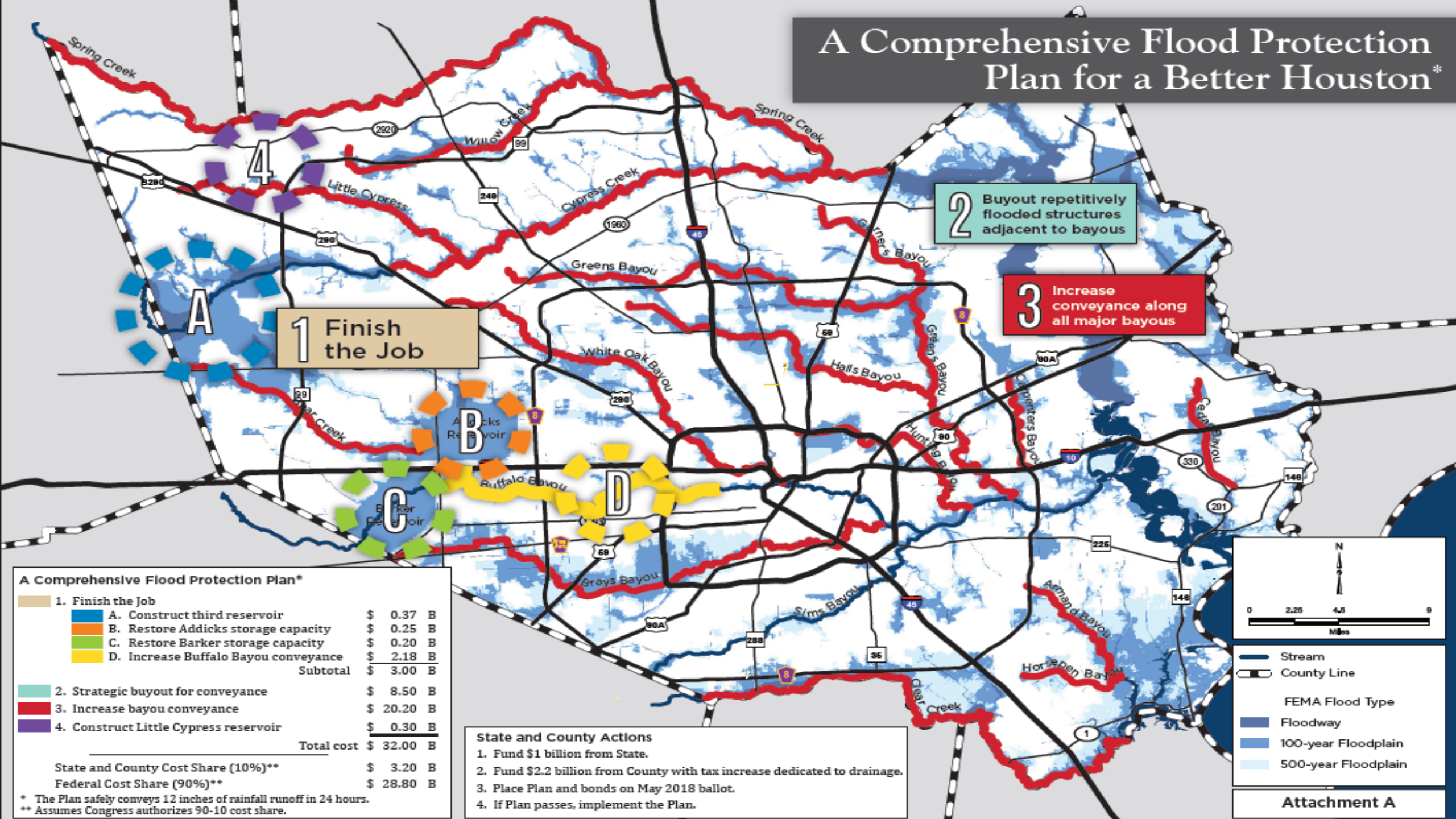
RECOMMENDATIONS FILL

RECOMMENDATIONS	CHANGES / NO CHANGES	IDM OR IBC REFERENCE
REMOVE THE ONE-ACRE THRESHOLD CHAPTER 9 SECTION 9.02(C)	Demonstrate no impact to sheet flow for all developments.	<i>IDM pg. 9-1</i>
CLARIFY CONTRADICTORY LANGUAGE IN IDM CHAPTER 9 SECTION 9.02(C)	Clarification language included. Sites may also be allowed to drain existing run off to existing drainage patterns.	<i>IDM pg. 9-1</i>
CLEARLY DEFINE “ENGINEERED GRADING” IN HOUSTON AMENDMENTS TO 2012 IBC	Clarification language included.	<i>IBC</i>
CHANGE THRESHOLD AMOUNT FOR ENGINEERED GRADING FROM 5000 CY TO 1000 CY IN HOUSTON AMENDMENTS TO 2012 IBC	Grading equal to 1,000 CY or more will be considered ‘engineering grading’ and will require application for grading permit.	<i>IBC 106.3</i>

RECOMMENDATIONS ENCROACHMENTS

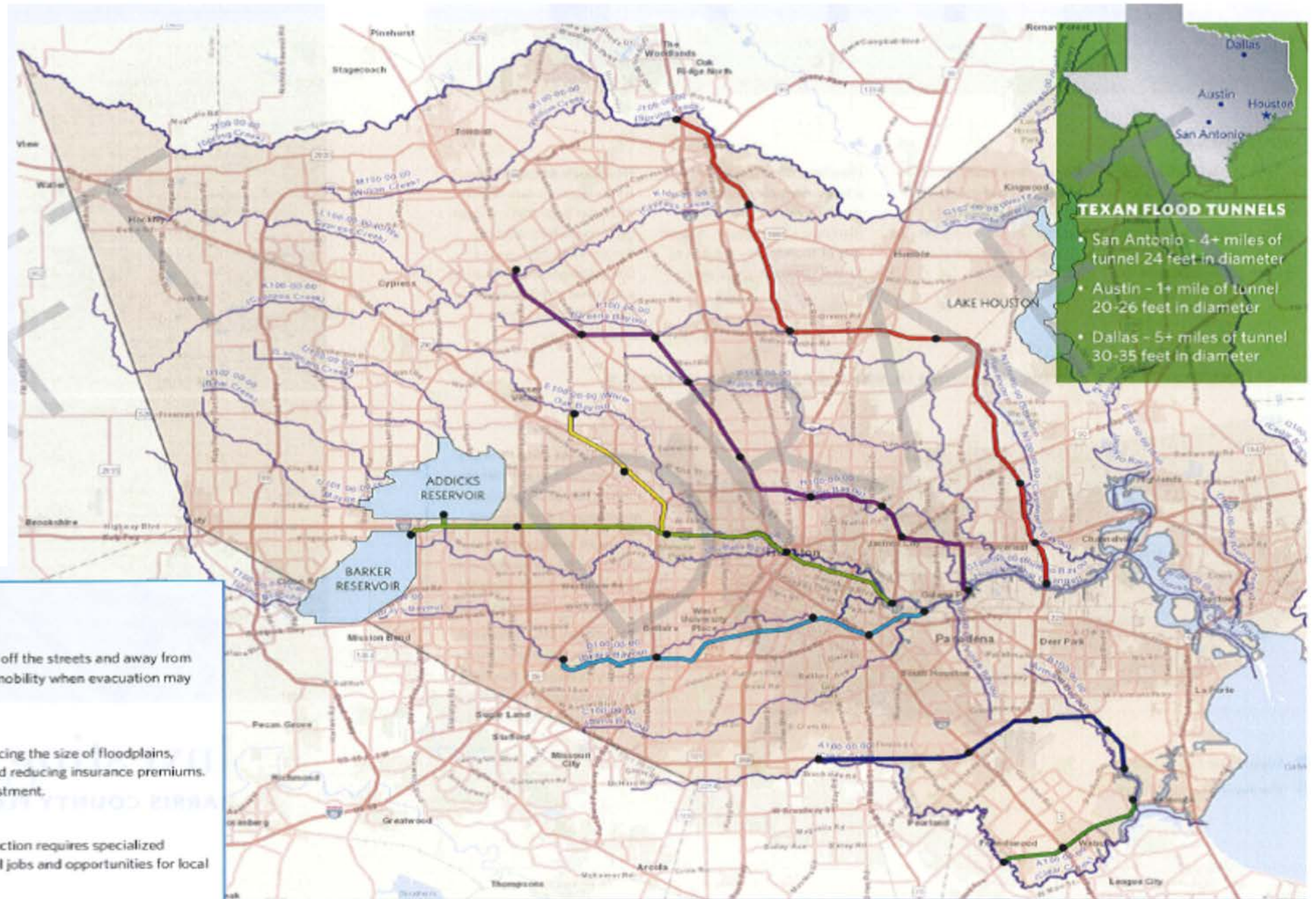
RECOMMENDATIONS	CHANGES / NO CHANGES	IDM OR IBC REFERENCE
FULLY ENFORCE ALL APPLICABLE RULES TO RE-ESTABLISH DRAINAGE IN THE PUBLIC RIGHT OF WAY	Added calculations and drawings requirements for design of street parking pads over existing ditch (ordinance Chapter 42).	<i>IDM pg. 9-20 to 9-21; 9.05.E.3.c</i>
INITIATE PUBLIC EDUCATION CAMPAIGN TO INFORM CITIZENS OF THEIR RESPONSIBILITIES REGARDING ROADSIDE DRAINAGE	No changes to IDM.	--

A Comprehensive Flood Protection Plan for a Better Houston*



Attachment A

Alternative Solutions



Contact



Stephen Costello
stephen.costello@houstontx.gov
832-393-0811

Questions?