

# SAFER Study Overview

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## Solutions for **A**dvancing **F**loodplain **E**valuation & **R**esilience



**Long-range** planning effort to help Harris County and its communities become more resilient to future flood events by developing large-scale, federally eligible flood risk reduction strategies that reflect local priorities and future conditions.

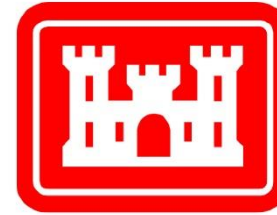
### Key points:

- Locally led Section 203 Federal Flood Risk Management Feasibility Study
- Integrates engineering, environmental, and community priorities
- Positions Harris County for 65% Federal / 35% Local cost sharing
- Aligns with ongoing Flood Control District and Flood Resilience Plan efforts

# What is Section 203?

Federal permission established to allow non-federal sponsors to conduct, on their own, feasibility studies that would, when completed and transmitted by the Secretary to Congress, serve as the basis for authorization of new Federal water resources projects.

*Section 203 of the Water Resources Development Act of 1986, as amended by Section 161 of the Water Resources Development Act of 2020 (33 U.S.C. § 2231). + Existing Federal Project Authorizations*



**US Army Corps  
of Engineers®**

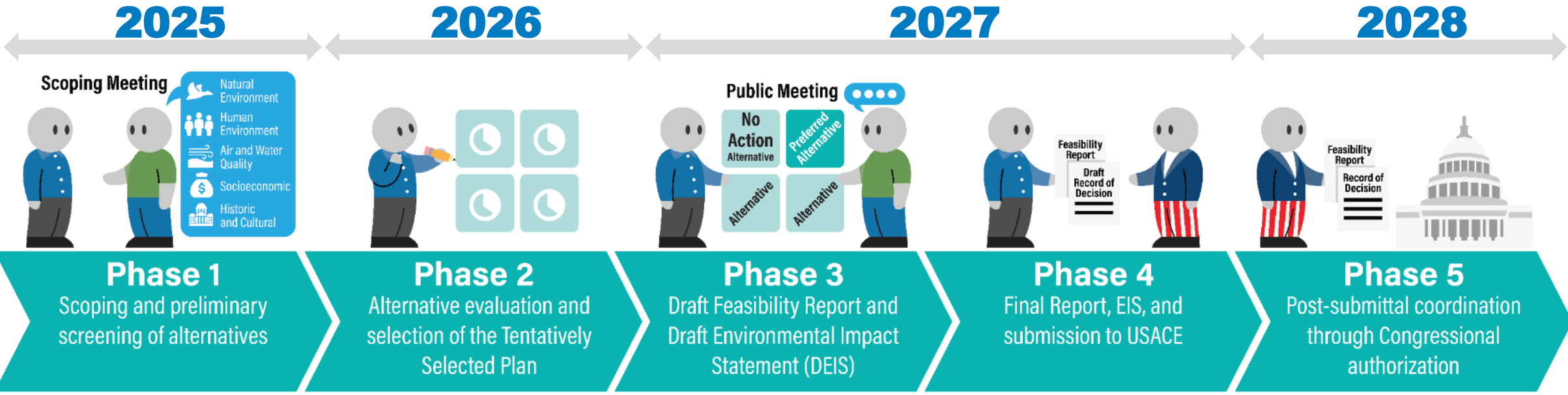


# SAFER Study Considerations

- Must follow **U.S. Army Corps of Engineers** planning policy
- Must comply with **Federal environmental requirements** (e.g., NEPA)
- Focuses on identifying Federal interest based on **economic, environmental, and social benefits** (comprehensive benefits)



# SAFER Study Process & Timeline



**COMPLETE** WE ARE HERE

## Key federal study milestones completed:

- ✓ Section 203 authorization
- ✓ Public noticing
- ✓ Public scoping meetings

# Alternatives Development PHASE 1



**SAFER Study**

*Solutions for Advancing Floodplain  
Evaluation and Resilience*

# What Phase 1 Accomplished

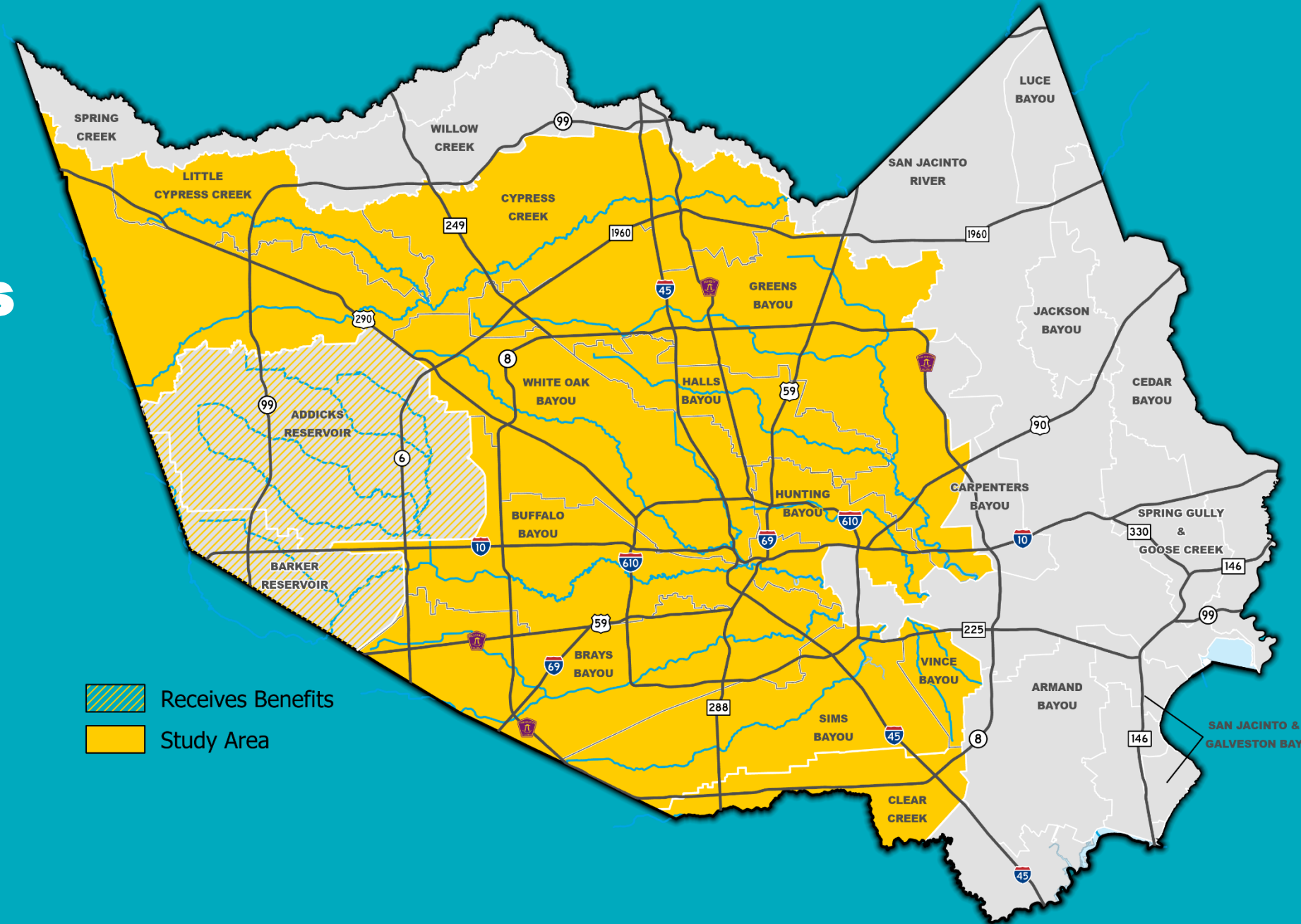
- **Defined** study problems, opportunities, goals, and constraints
- **Initiated** environmental review (NEPA) process
- **Built** a comprehensive benefits framework and supporting tools
- **Updated** MAAPnext H&H models to reflect 50+ year projections (development, rainfall, sea level rise)
- **Screened** a wide range of alternatives in each watershed for detailed study in Phase 2

# Alternatives Development Approach

- Identifying large (watershed-scale) alternatives within all 11 watersheds.
  - **Anchor alternatives:** main stem bayou improvements
  - **Ancillary alternatives:** to extend improvements further up tributaries
- Evaluating potential for integrated solutions spanning multiple watersheds.
- Utilizing comprehensive benefits framework to objectively compare “traditional” solutions (e.g. channel widening) to “novel” solutions (e.g. tunnels)

# Study Area: 11 Watersheds

- Underlying federal authority
- Share similar drainage, development, and flooding conditions
- Already connected or could be connected in the future
- Opportunities for multi-watershed, system-scale solutions



# Types of Measures Considered

## No-Build Option

- Used as a baseline to compare efforts against

## Non-Structural Measures

- Floodplain preservation
- Buyouts / acquisitions
- Floodproofing
- Structure elevation

## Structural Measures

- Channel improvements
- Stormwater detention
- Tunnels
- Reservoirs
- Diversions
- Levees / floodwalls
- Pump stations

## Natural & Nature-Based Features

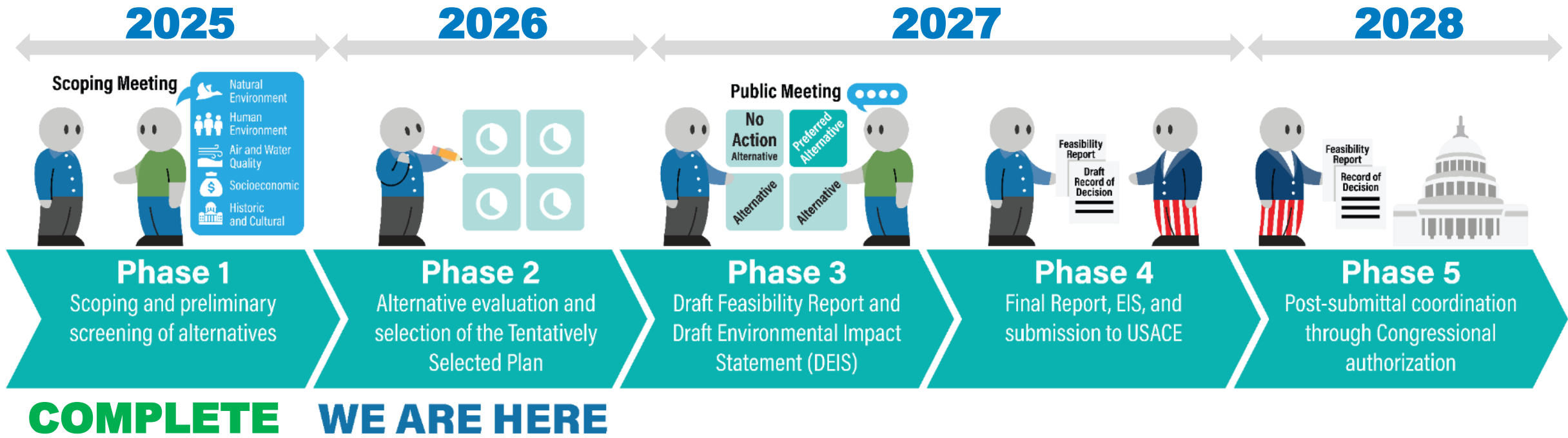
- Wetlands
- Riparian corridors
- Natural channel design

# **Alternatives Development**

## **PHASE 2**



# SAFER Study Process & Timeline

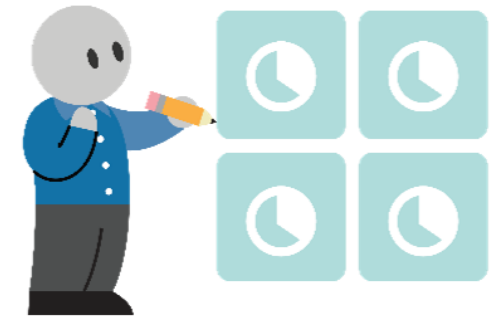


## Phase 2 Scope of Work (~ 12 months):

1. Continued agency engagement and public/stakeholder outreach
2. Preliminary Benefit Evaluations of Alternatives
3. Continuation of environmental documentation and agency consultation
4. Identification of the Tentatively Selected Plans (TSP)

# Key Considerations: Phase 2 Analyses

- How does each alternative perform?
- Can alternatives be optimized further?
- What is the most efficient mix of “traditional” and “novel” improvements?
- How does each alternative perform in terms of traditional Federal economic benefits?
- How does each alternative perform within a broader a Comprehensive Benefits framework?
- Can synergies be gained from integrated / interconnected systems?
- Can we justify Federal interest in our preferred types of improvements?

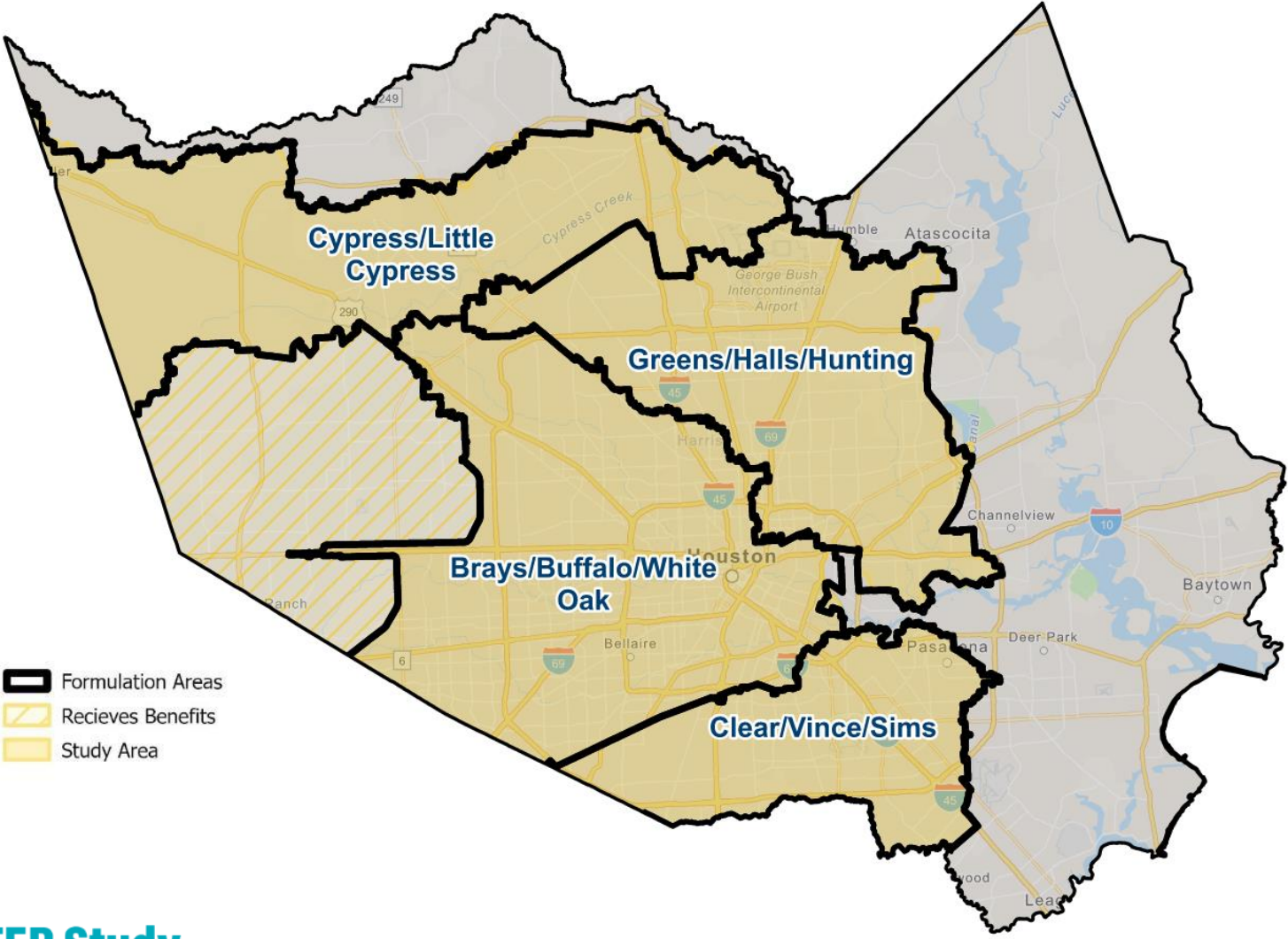


## Phase 2

Alternative evaluation and  
selection of the Tentatively  
Selected Plan

**WE ARE HERE**

# SAFER Study: Formulation Areas



- ## WATERSHED AREAS FOR PHASE 2
- Cypress / Little Cypress
  - Greens / Halls / Hunting
  - Brays / Buffalo / White Oak
  - Clear / Vince / Sims

# Preliminary Array of Anchor Alternatives (1 of 2)

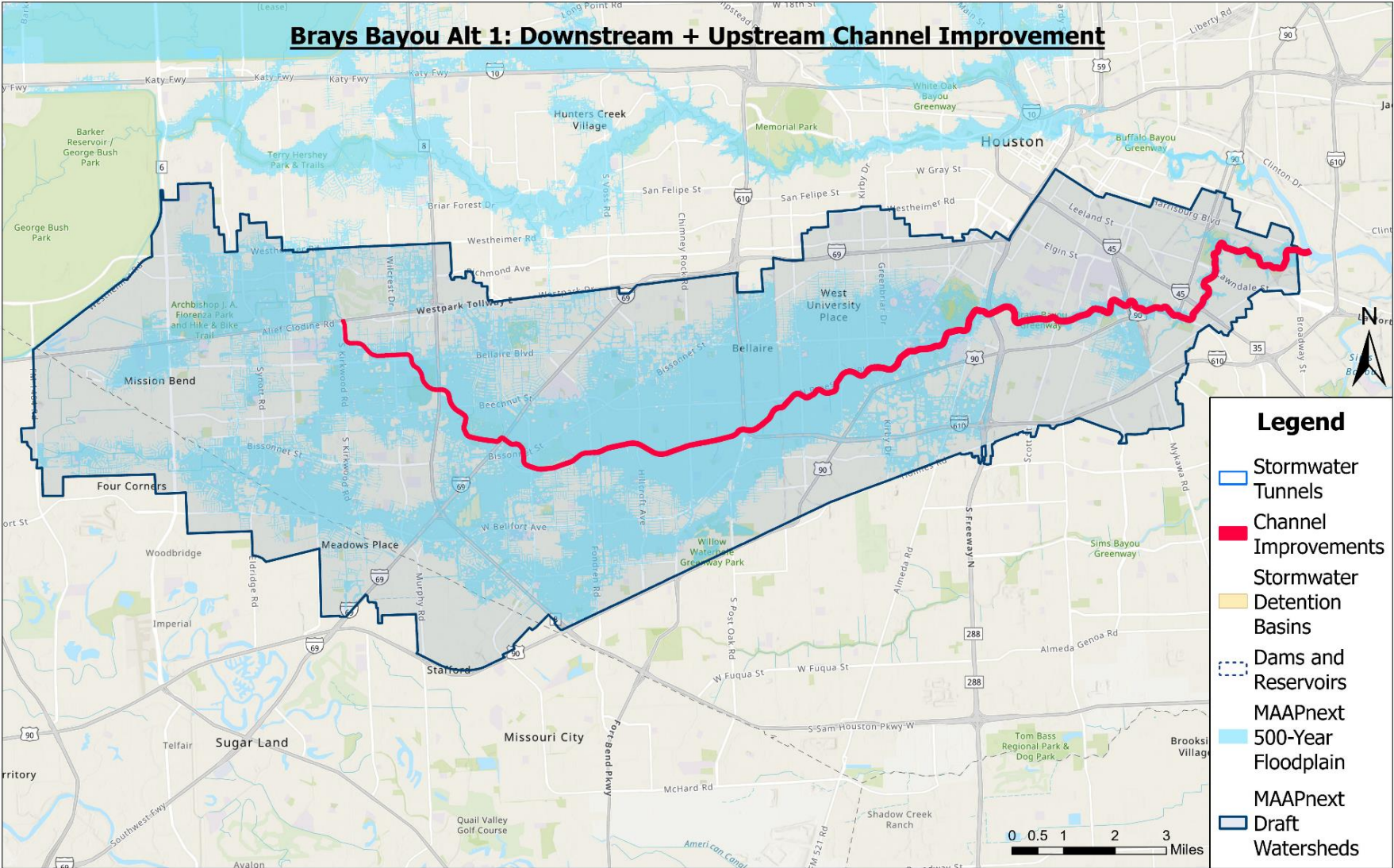
Upstream Cypress	Cypress	Little Cypress
<ul style="list-style-type: none"> <li>Alt 1u: Reservoir</li> <li>Alt 2u: Shallow Detention</li> <li>Alt 3u: Channel + Detention</li> <li>Alt 4u: Non-Structural</li> </ul>	<ul style="list-style-type: none"> <li>Alt 1d: Detention Basins</li> <li>Alt 2d: Channel + Detention</li> <li>Alt 3d: Tunnel</li> <li>Alt 4: Non-Structural</li> </ul>	<ul style="list-style-type: none"> <li>Alt 1: Full Channel</li> <li>Alt C1: Full Tunnel (connecting to Cypress Tunnel)</li> <li>Alt C2: Downstream Tunnel (connecting to Cypress Tunnel) + Midstream Channel</li> <li>Alt 2: Non-Structural</li> </ul>
Greens	Halls	Hunting
<ul style="list-style-type: none"> <li>Alt 1: Full Channel</li> <li>Alt 2: Mid-stream Tunnel + Tunnel Diversion to San Jacinto River</li> <li>Alt C1: Midstream Tunnel to G/H/H Tunnel + Midstream Intakes to G/H/H Tunnel + Downstream Channel</li> <li>Alt C2: Midstream Tunnel + Tunnel Diversion to San Jacinto River</li> <li>Alt 3: Non-Structural</li> </ul>	<ul style="list-style-type: none"> <li>Alt 1: Full Channel</li> <li>Alt C3 (Halls): Midstream Tunnel to G/H/H Tunnel + Midstream Intake to G/H/H Tunnel + Downstream Tunnel to G/H/H Tunnel</li> <li>Alt C4: Midstream Channel + Midstream Intake to G/H/H Tunnel + Downstream Channel</li> <li>Alt C5: Midstream Tunnel + Tunnel Diversion to San Jacinto River</li> <li>Alt 2: Non-Structural</li> </ul>	<ul style="list-style-type: none"> <li>Alt 1: Full Channel</li> <li>Alt 2: Full Tunnel</li> <li>Alt 3: Downstream Tunnel + Upstream Channel</li> <li>Alt C6: Downstream Tunnel Diversion to G/H/H Tunnel + Lockwood Intake to G/H/H Tunnel</li> <li>Alt C7: Downstream Channel + Lockwood Intake to G/H/H Tunnel</li> <li>Alt 4: Non-Structural</li> </ul>

\*SUBJECT TO CHANGE

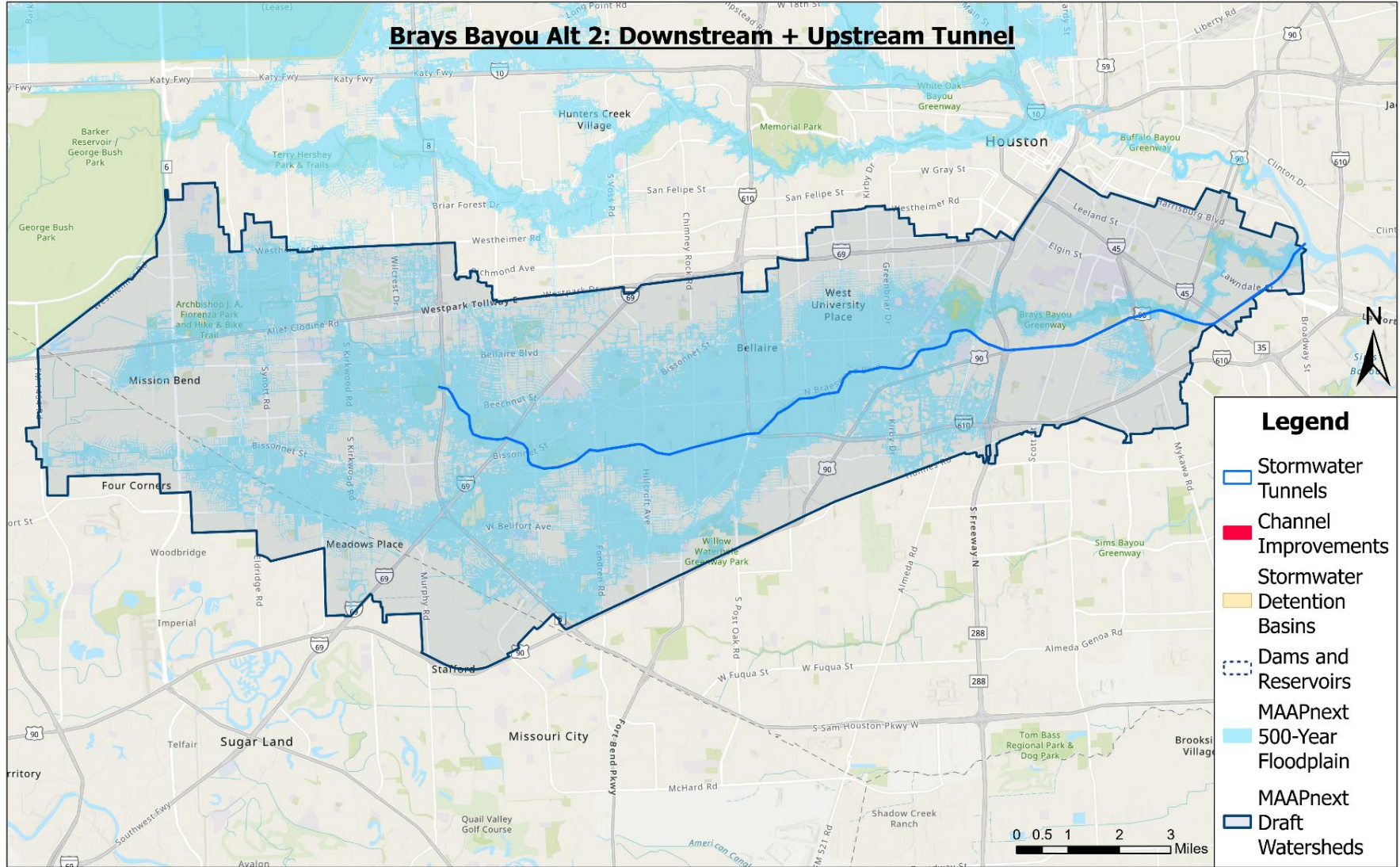
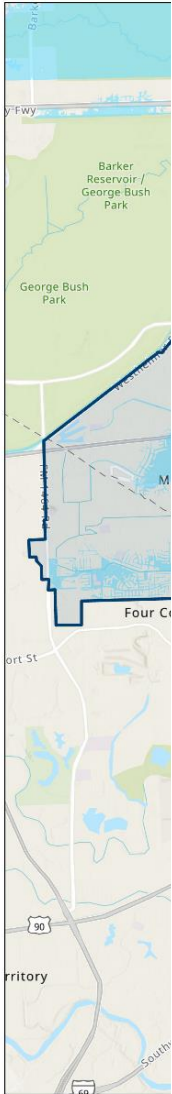
# Preliminary Array of Anchor Alternatives (2 of 2)

Buffalo	Brays	White Oak
<ul style="list-style-type: none"> <li>Alt 1: Full Channel</li> <li>Alt 2: Downstream Tunnel + Upstream Channel</li> <li>Alt 3: Full Tunnel</li> <li>Alt 4: Non-Structural</li> </ul>	<ul style="list-style-type: none"> <li>Alt 1: Full Channel</li> <li>Alt 2: Full Tunnel</li> <li>Alt 3: Downstream Tunnel + Upstream Channel</li> <li>Alt C1: Downstream Tunnel + Tunnel Diversion to Buffalo Tunnel</li> <li>Alt 4: Non-Structural</li> </ul>	<ul style="list-style-type: none"> <li>Alt 1: Full Channel</li> <li>Alt C2: Downstream Tunnel (connecting to Buffalo Tunnel) + Midstream and Upstream Channel</li> <li>Alt C3: Downstream and Midstream Tunnel (connecting to Buffalo Tunnel) + Upstream Channel</li> <li>Alt 2: Non-Structural</li> </ul>
Sims	Vince	Clear
<ul style="list-style-type: none"> <li>Alt 1: Full Channel</li> <li>Alt 2: Downstream Tunnel + Upstream Channel</li> <li>Alt C1: Downstream Tunnel Diversion to Vince Tunnel + Upstream Channel</li> <li>Alt 3: Non-Structural</li> </ul>	<ul style="list-style-type: none"> <li>Alt 1: Full Channel</li> <li>Alt 2: Downstream Tunnel + Upstream Channel</li> <li>Alt 3: Non-Structural</li> </ul>	<ul style="list-style-type: none"> <li>Alt 1: Full Channel</li> <li>Alt C2: Downstream Channel + Midstream Tunnel Diversion to Sims Tunnel</li> <li>Alt C3: Downstream Tunnel Diversion to Vince Tunnel + Midstream Tunnel Diversion to Sims Tunnel</li> <li>Alt C4: Downstream Tunnel Diversion to Vince Tunnel + Midstream Channel</li> <li>Alt 2: Non-Structural</li> </ul>

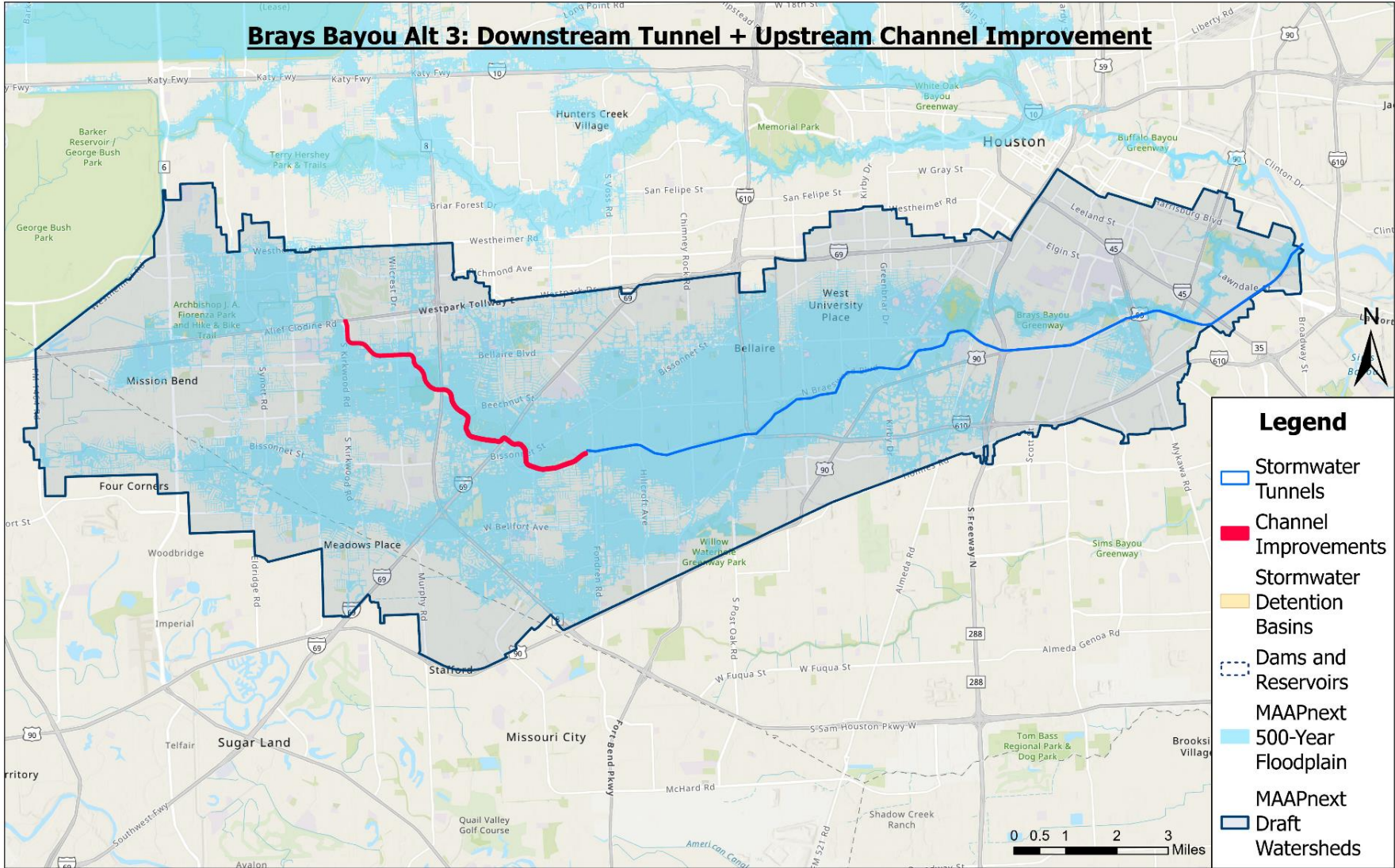
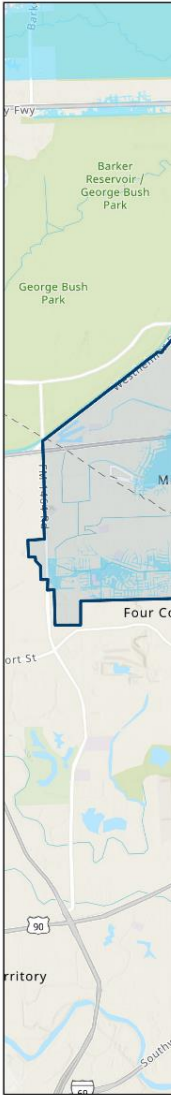
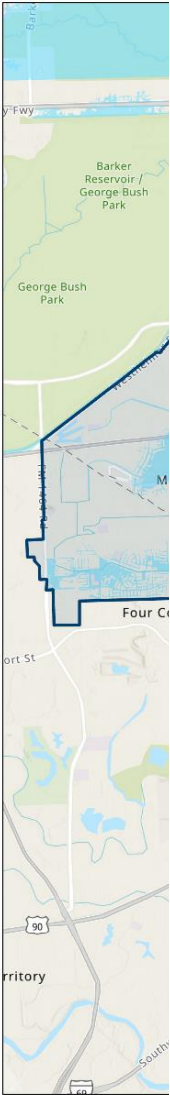
# Alternative Variations (Brays Bayou example)



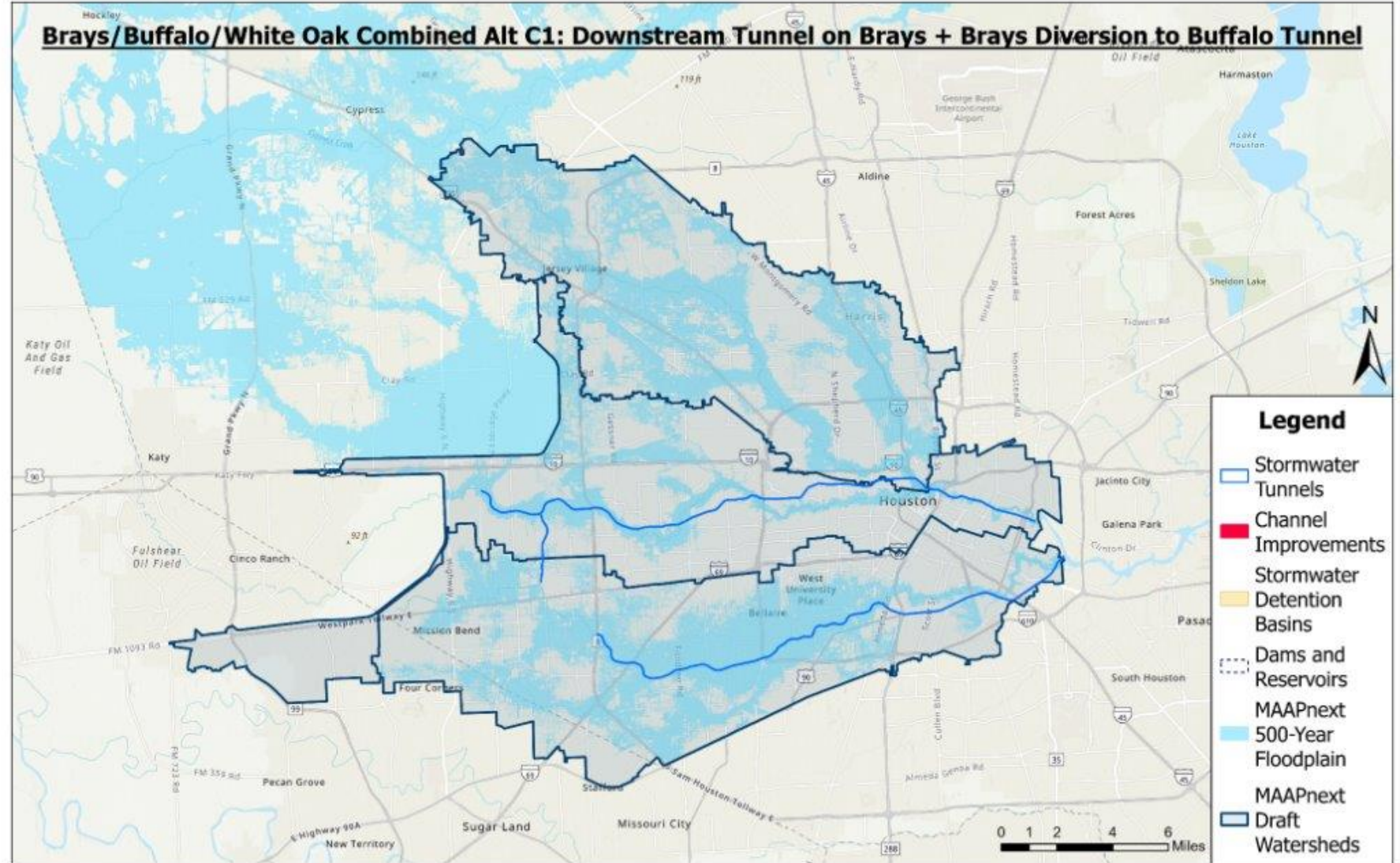
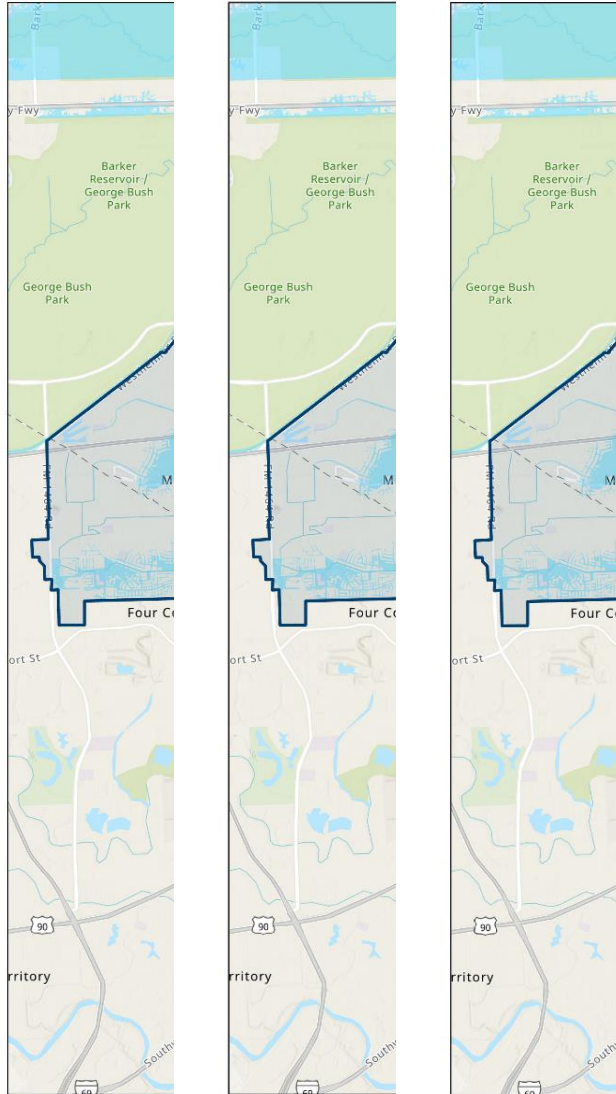
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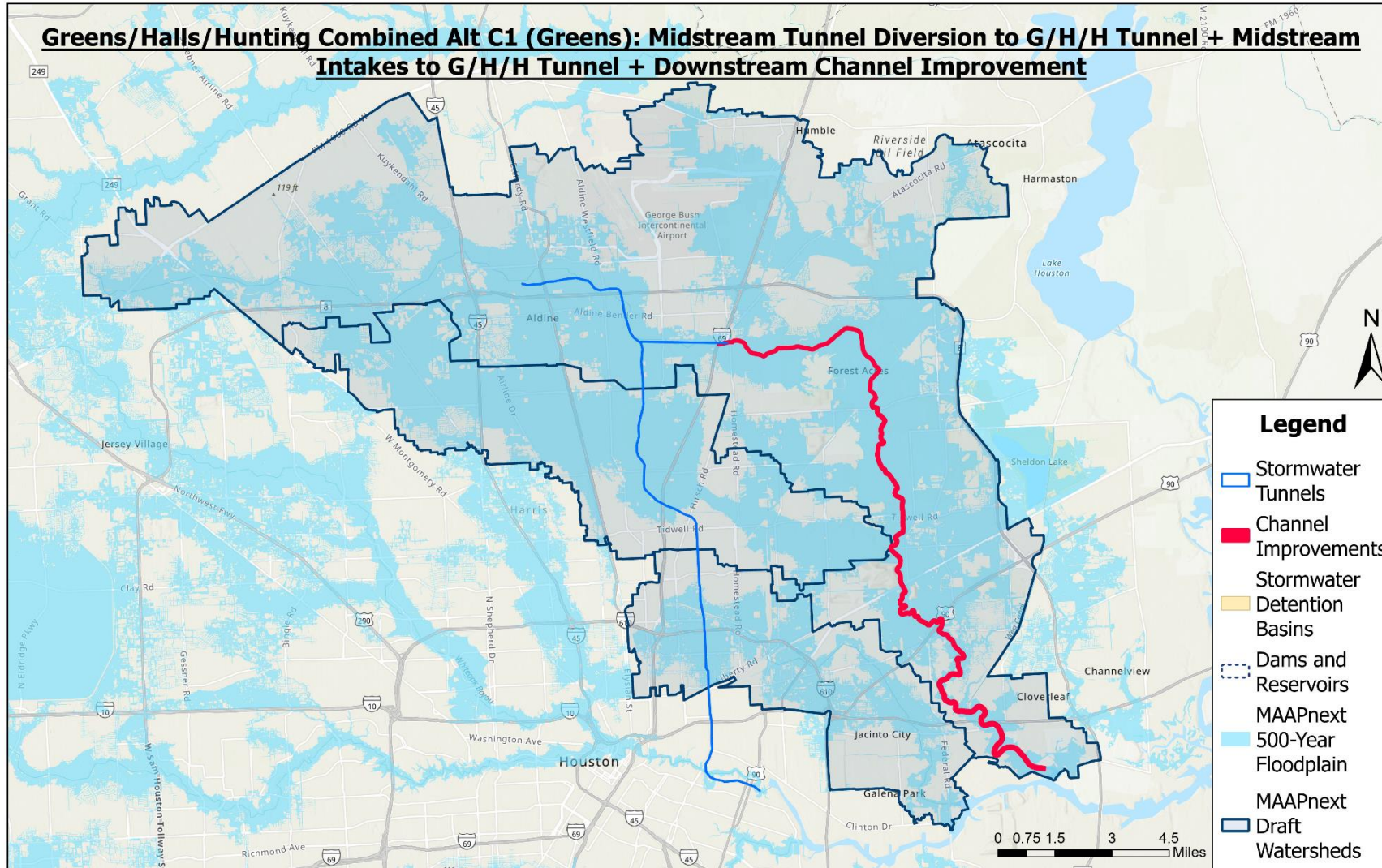
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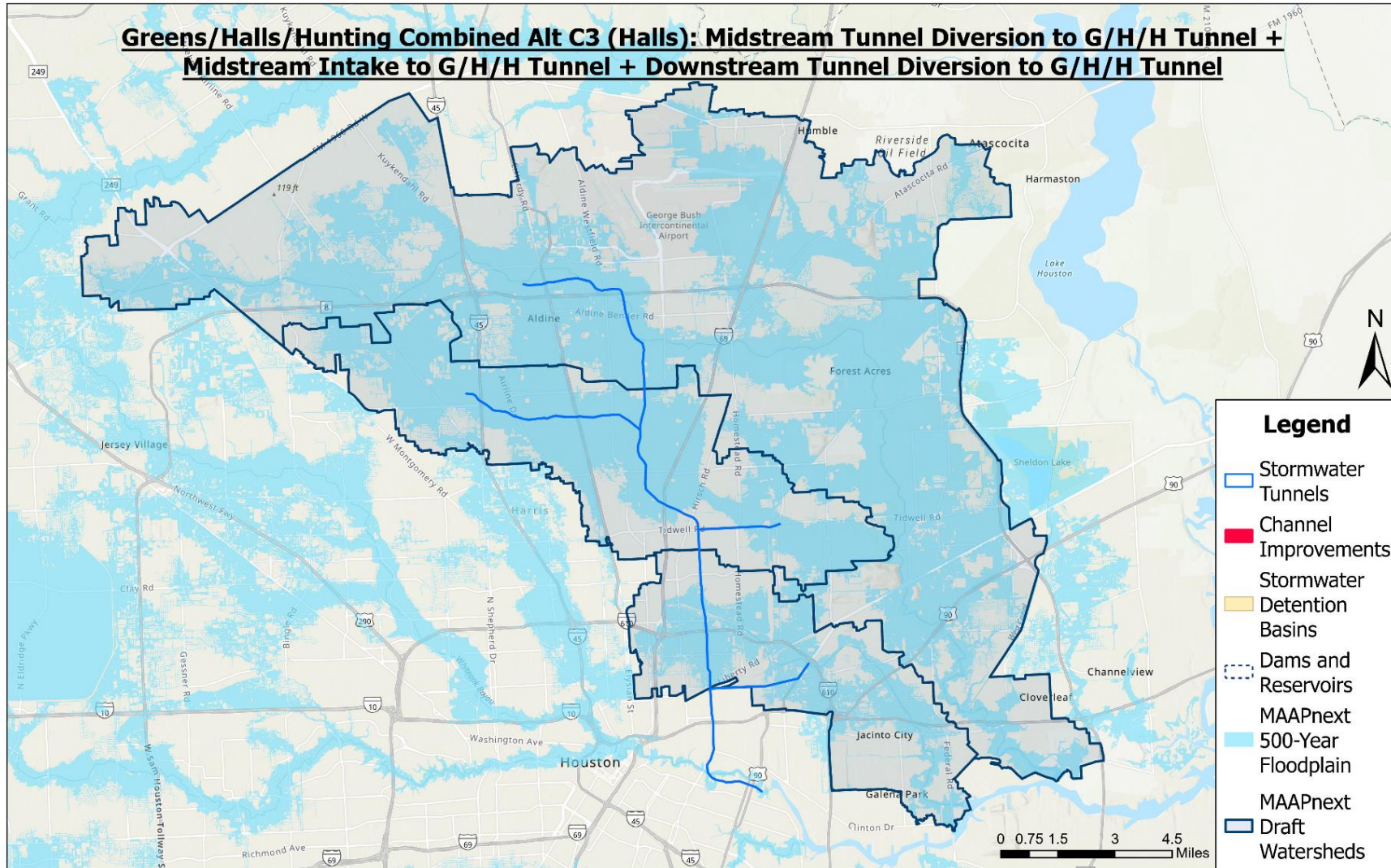
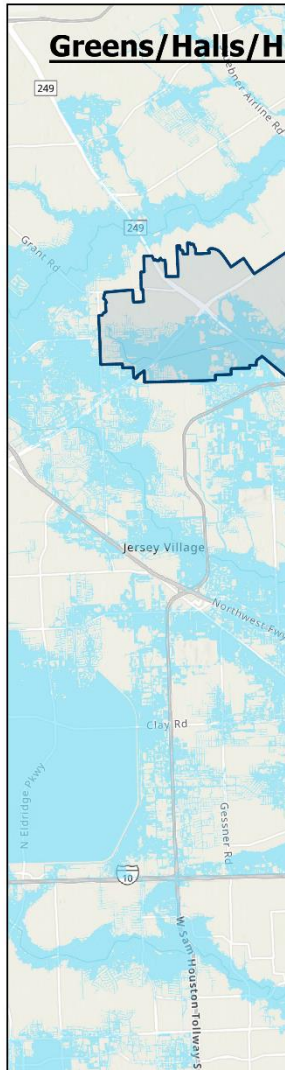
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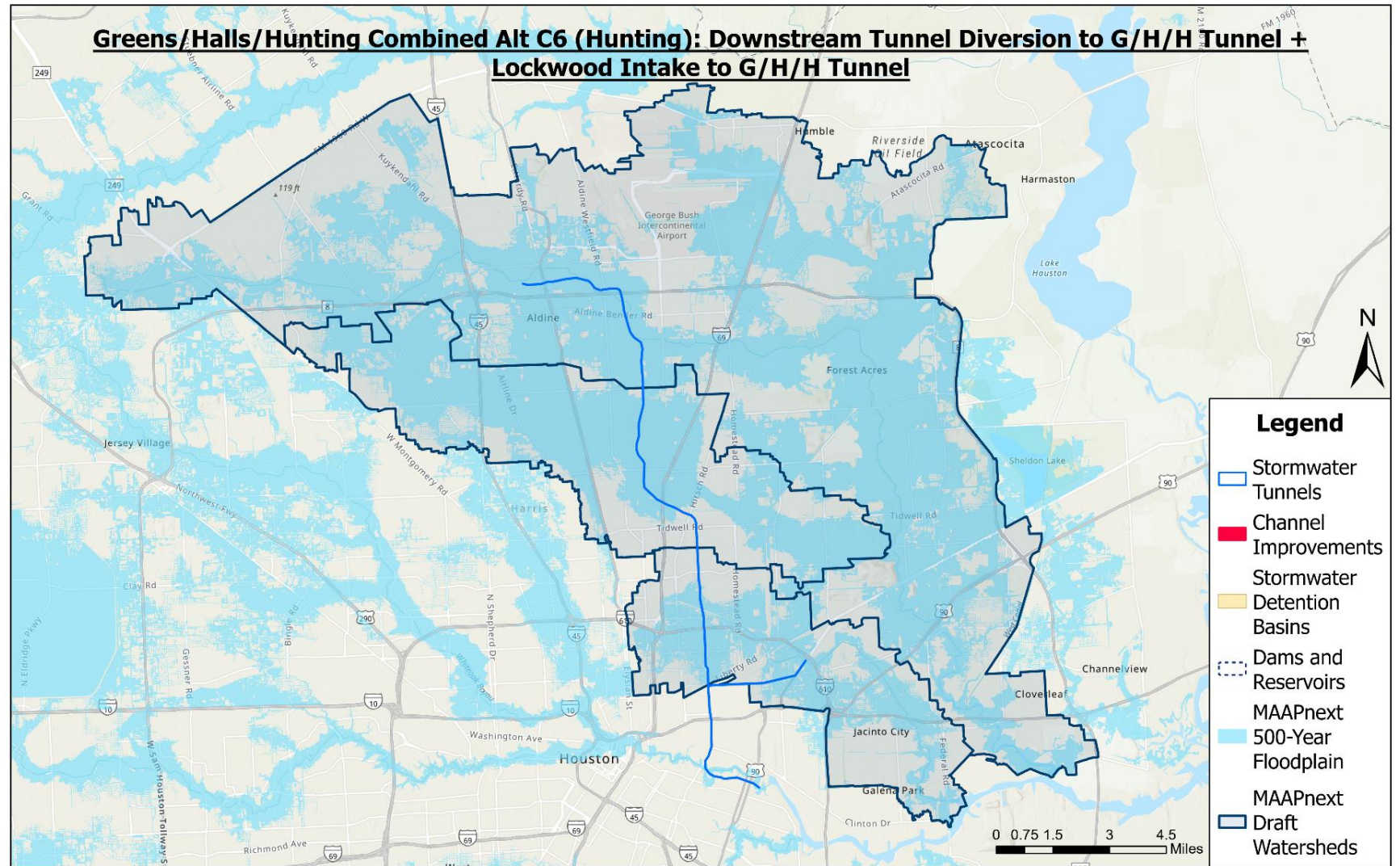
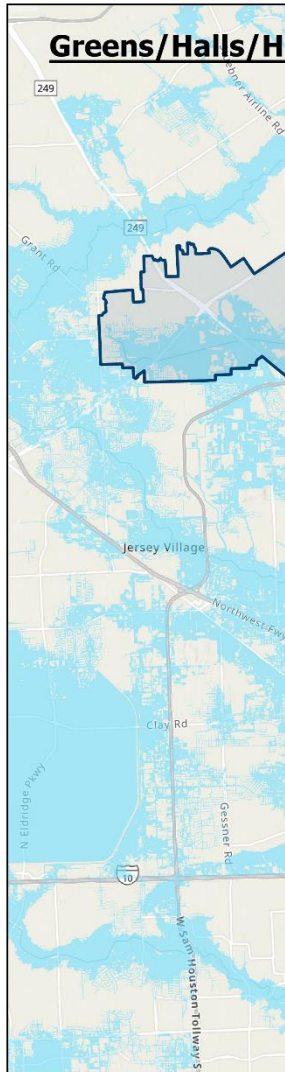
# Integrated Systems (Greens / Halls / Hunting example)



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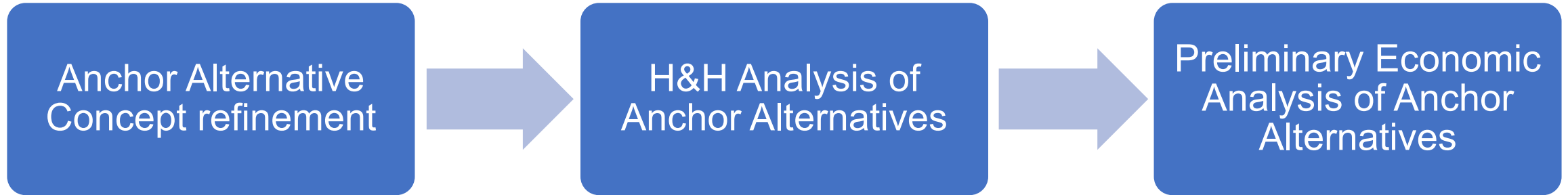
# Ancillary Measures

- **Ancillary Measures:** extensions / add-ons which can further extend the benefit or the proposed project to additional areas in the watershed
- Threshold for inclusion of Ancillary Measures in Phase 2:
  - Measure which could potentially move the needle in terms of project justification (significant benefits which could be achieved by extension of the project)
  - Measure which is unlikely to be strongly influenced by the Anchor alternatives
  - Typically: a major tributary with a large amount of non-main-stem driven flood damages

# Next Steps

# Phase 2 Schedule Highlights

- Anchor Tentatively Selected Plan (TSP) Identification (Q3 2026)



- Final TSP Identification (Q4 2026)
- Briefings to USACE-HQ Leadership (Q4 2026/Q1 2027)
- Start of Phase 3 (Q1 2027)

# Questions?

Thank you for your time and interest in the SAFER Study!  
Visit [theSAFERstudy.org](https://theSAFERstudy.org) for more information.