

SUSTAINABLE DEVELOPMENT AND MANAGEMENT OF FLOODPLAINS IN URBAN AREAS:

A COMPARATIVE ANALYSIS OF BRAYS BAYOU TO BUFFALO BAYOU

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TEXAS ASSOCIATION OF ENVIRONMENTAL PROFESSIONALS

THURSDAY, OCTOBER 18, 2018

SUSTAINABLE DEVELOPMENT

A COMPARATIVE ANALYSIS OF BRAYS BAYOU AND BUFFALO BAYOU

- 1. PHILOSOPHICAL FRAME**
- 2. PHILOSOPHICAL FRAME APPLIED TO FLOODPLAIN PLANNING & MANAGEMENT**
- 3. PHILOSOPHICAL FRAME IMPLEMENTED**
- 4. CASE STUDY: BUFFALO VS BRAYS**
- 5. SUSTAINABILITY ASSESSMENT: BUFFALO VS BRAYS**
- 6. SUSTAINABILITY PLANNING FOR RESILIENCE OF MID - BRAYS BAYOU COMMUNITIES**

SUSTAINABLE DEVELOPMENT

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1. PHILOSOPHICAL FRAME

SUSTAINABLE DEVELOPMENT

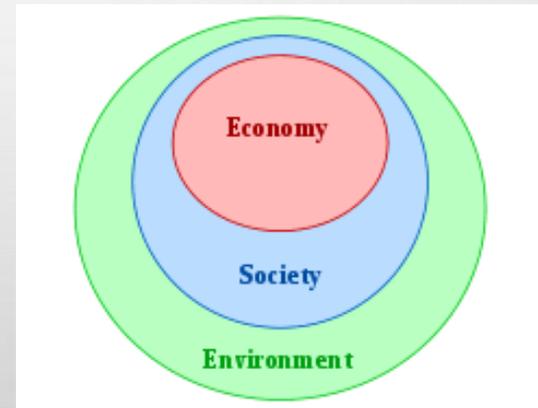
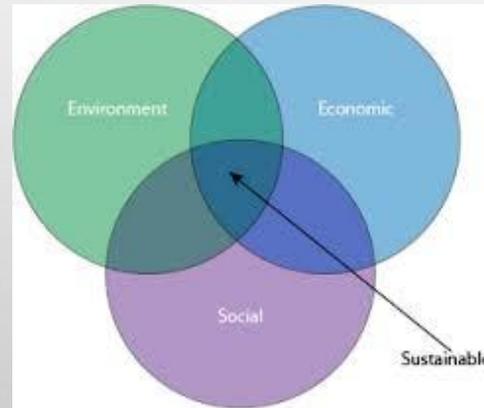
A COMPARATIVE ANALYSIS OF BRAYS BAYOU AND BUFFALO BAYOU

- **DEFINITION OF SUSTAINABLE DEVELOPMENT:**

- Development that meets the needs of the present generation without compromising the ability for future generations to meet their own needs.
 - Brundtland Commission, 1987

- **THREE PILLARS:**

- **Social Development | Economic Development | Environmental Development**



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- **THREE PILLARS:**

- **Social Development | Economic Development | Environmental Development | Rene Passet 1979**



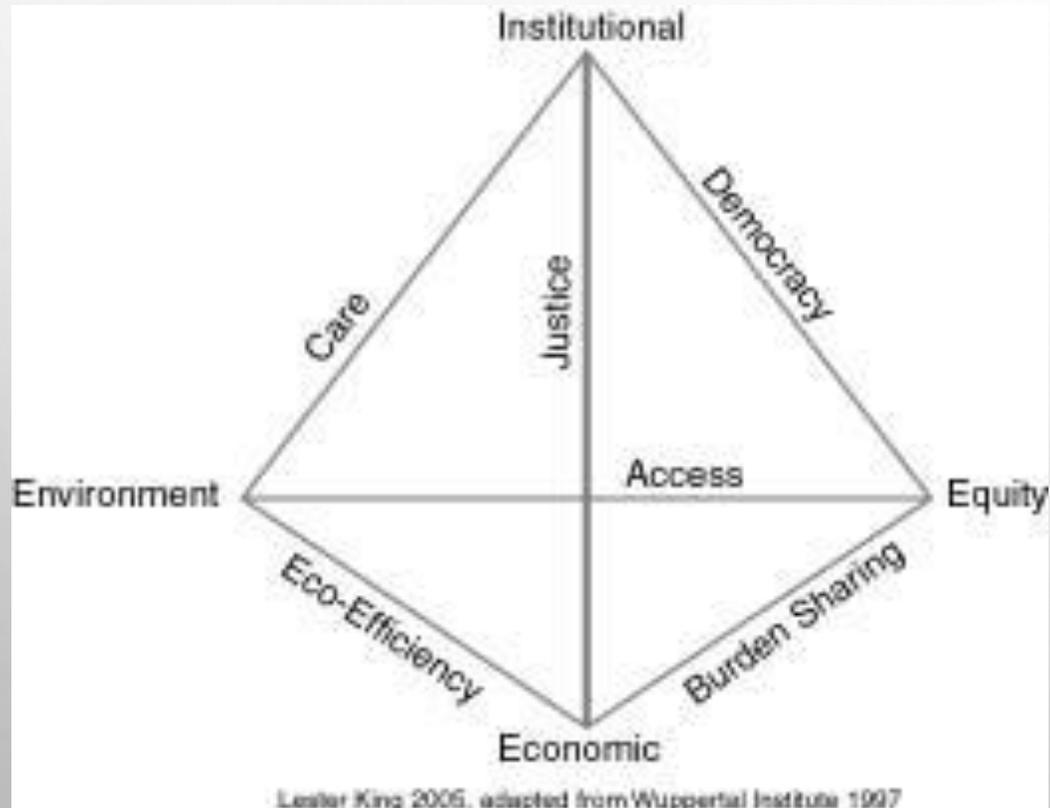
- Scott Campbell, 1996

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1979



Lester King 2005, adapted from Wuppertal Institute 1997

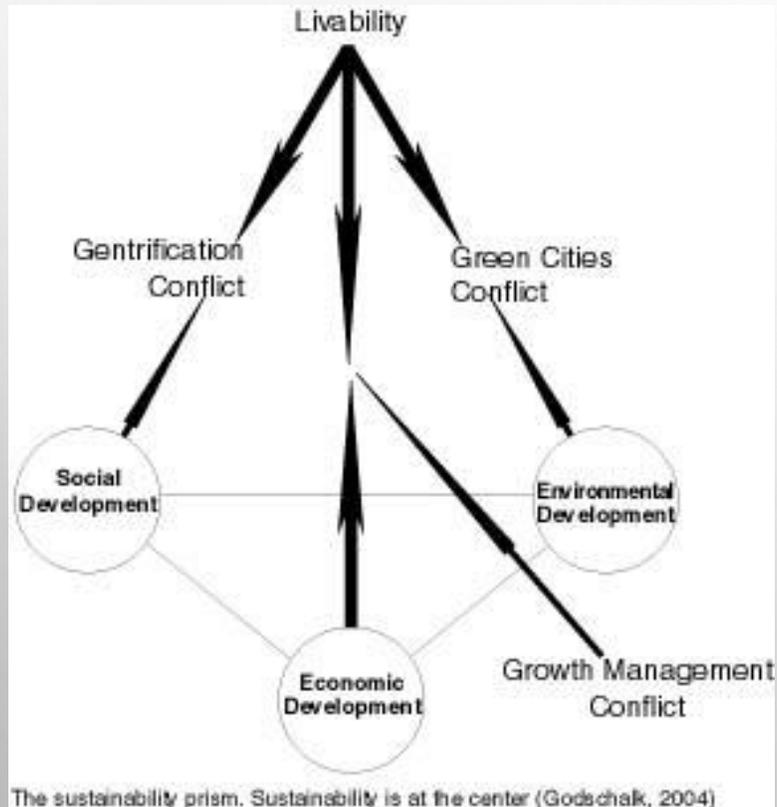
- Wuppertal Institute, 1997

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The sustainability prism. Sustainability is at the center (Godschalk, 2004)

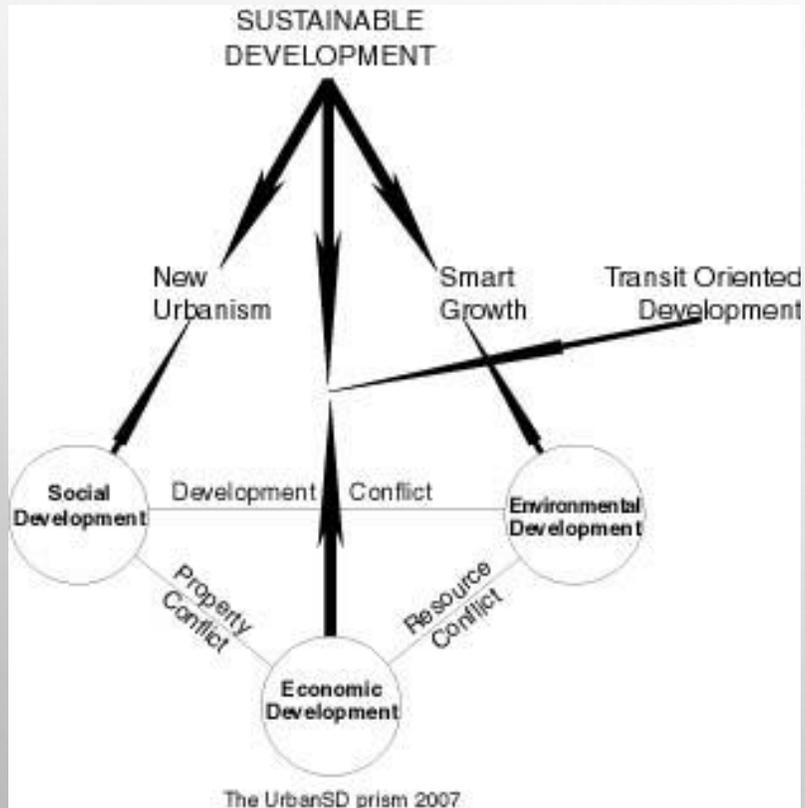
- David Godschalk, 2004

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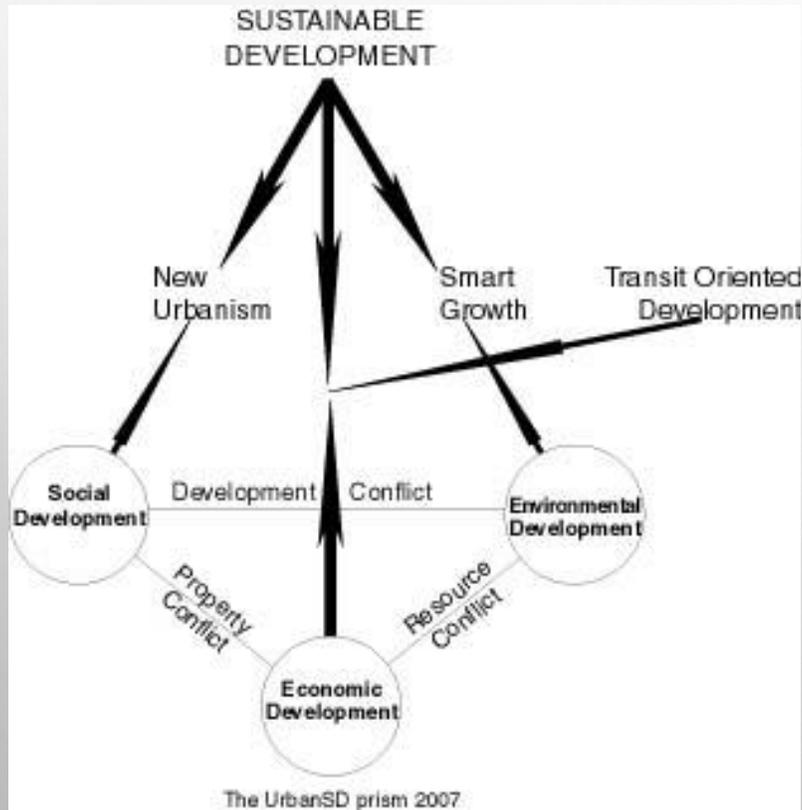
- Lester King, 2007

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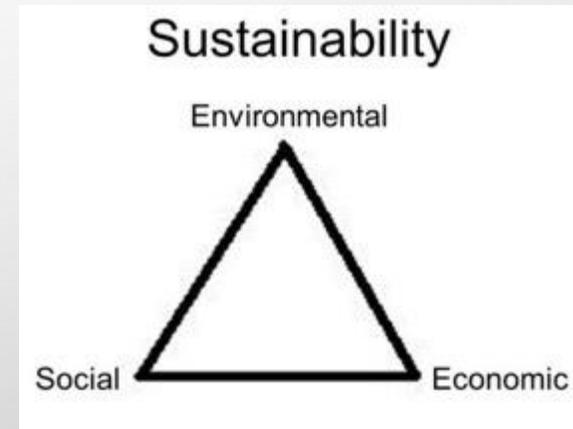
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- Lester King, 2007

- Rene Passet, 1979



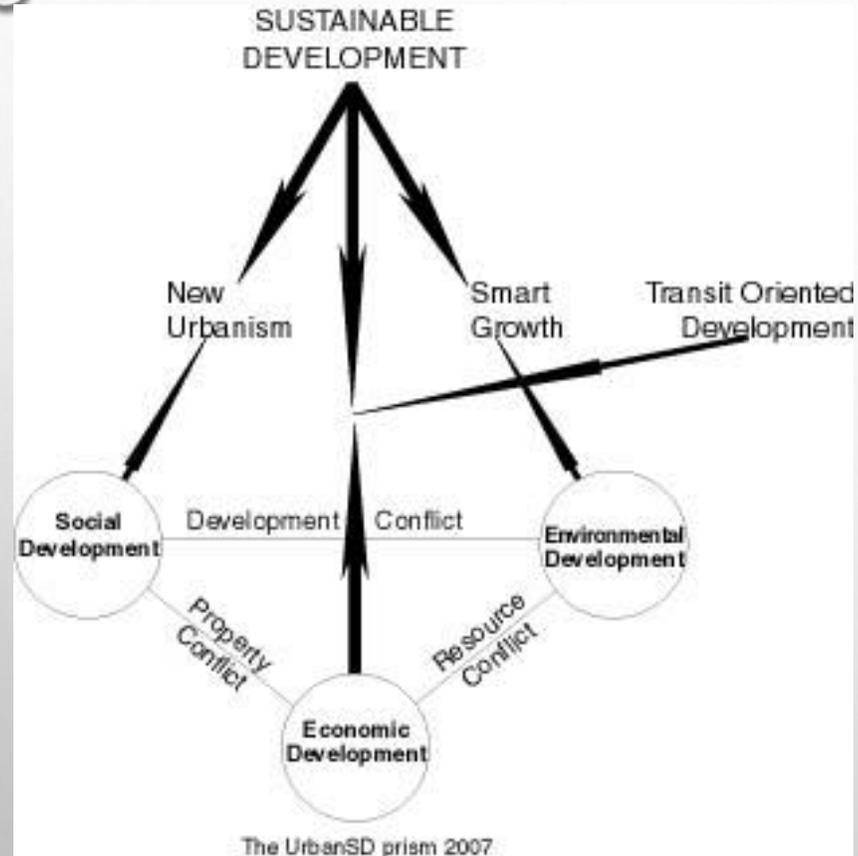
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2. PHILOSOPHICAL FRAME APPLIED TO FLOODPLAIN PLANNING & MANAGEMENT

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THREE PILLARS | INTERSECTIONS

Social Development | Economic Development = Property Conflict

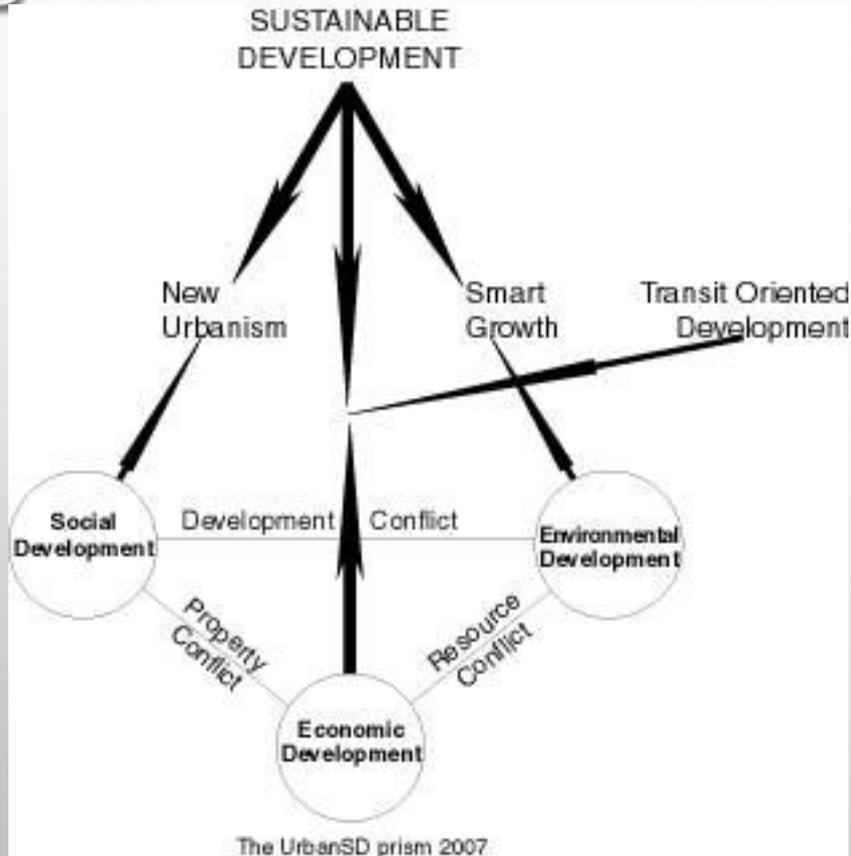
- Richard Fogelson, 1986 – Property Contradiction.
 - Housing and land is defined as Private Commodity, Yet depends on government intervention for beneficial social aspects such as Zoning
- **Peoples Homes vs Flooded property**
- **Existing Communities**
- Homeownership Associations | Subdivision Regulations
- Abraham Maslow, 1943 – Fundamental Needs include 'Shelter'
- NIMBYism
- Property Value Protections
- Takings

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THREE PILLARS | INTERSECTIONS

Environmental Development | Economic Development = Resource Conflict



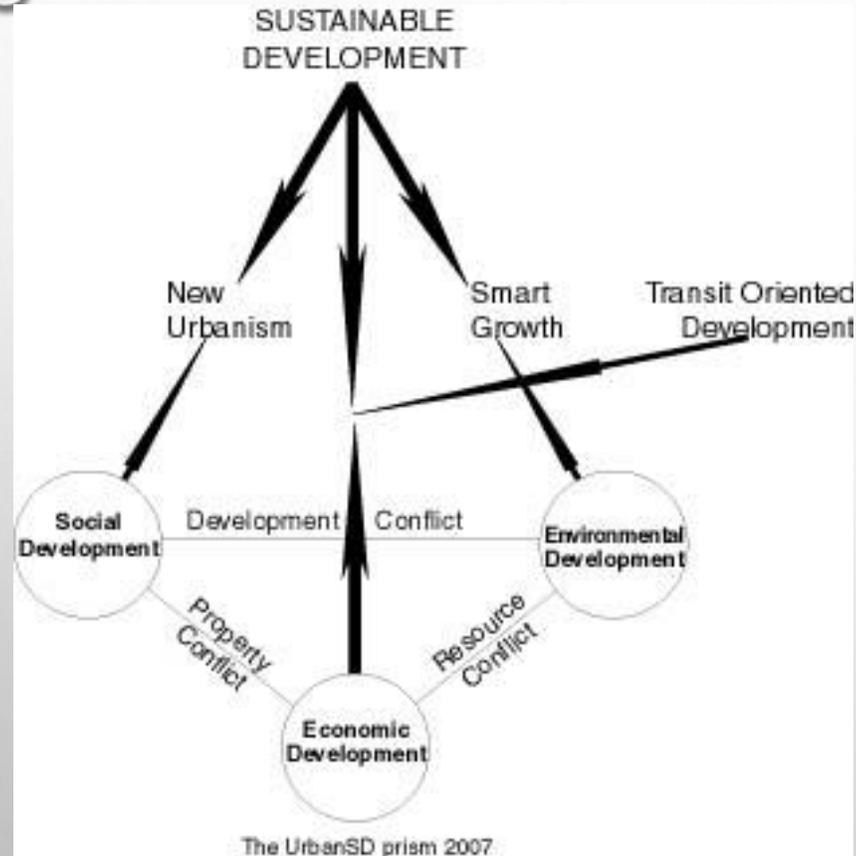
- Wilbert Chapman, 1949 - Sustained Yield
 - How much ecological resource can be consumed without disrupting the natural cycle of growth
- **Business Raw Material vs Ecological Protection**
- Sand Mining Operations in the North-East of the county
- San Jac Waste Pits
- Wetlands along San Jacinto River
- Groundwater extraction / Land Subsidence

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A COMPARATIVE ANALYSIS OF BRAYS BAYOU AND BUFFALO BAYOU

THREE PILLARS | INTERSECTIONS

Social Development | Environmental Development = Development Conflict



- NEPA, 1969 – Purpose
 - “To declare a national policy which will encourage productive and enjoyable harmony between man and his environment...”
- **Foster Social Equity & Protect the Environment**
- **Green Infrastructure?**
- **Protect Existing Communities vs Protect Floodplains**
- Developing New Subdivisions in Natural Floodplains
- How do we objectively prioritize resilience projects across Harris County or Houston? Do we divide the funds equally?

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3. PHILOSOPHICAL FRAME IMPLEMENTED

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VISION FOR SUBDIVISION DESIGN in FLOOD HAZARD AREAS

APA 2015

Adopt a comprehensive and integrated approach to protecting **floodplains** and other natural areas and aligning **development** with **community goals**, in order to increase community resiliency and reduce flood hazard risks.

Environment – **Floodplains**

Economic – **Development**

Social – **Community Goals**

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PRINCIPLES FOR SUBDIVISION DESIGN in FLOOD HAZARD AREAS

APA 2015

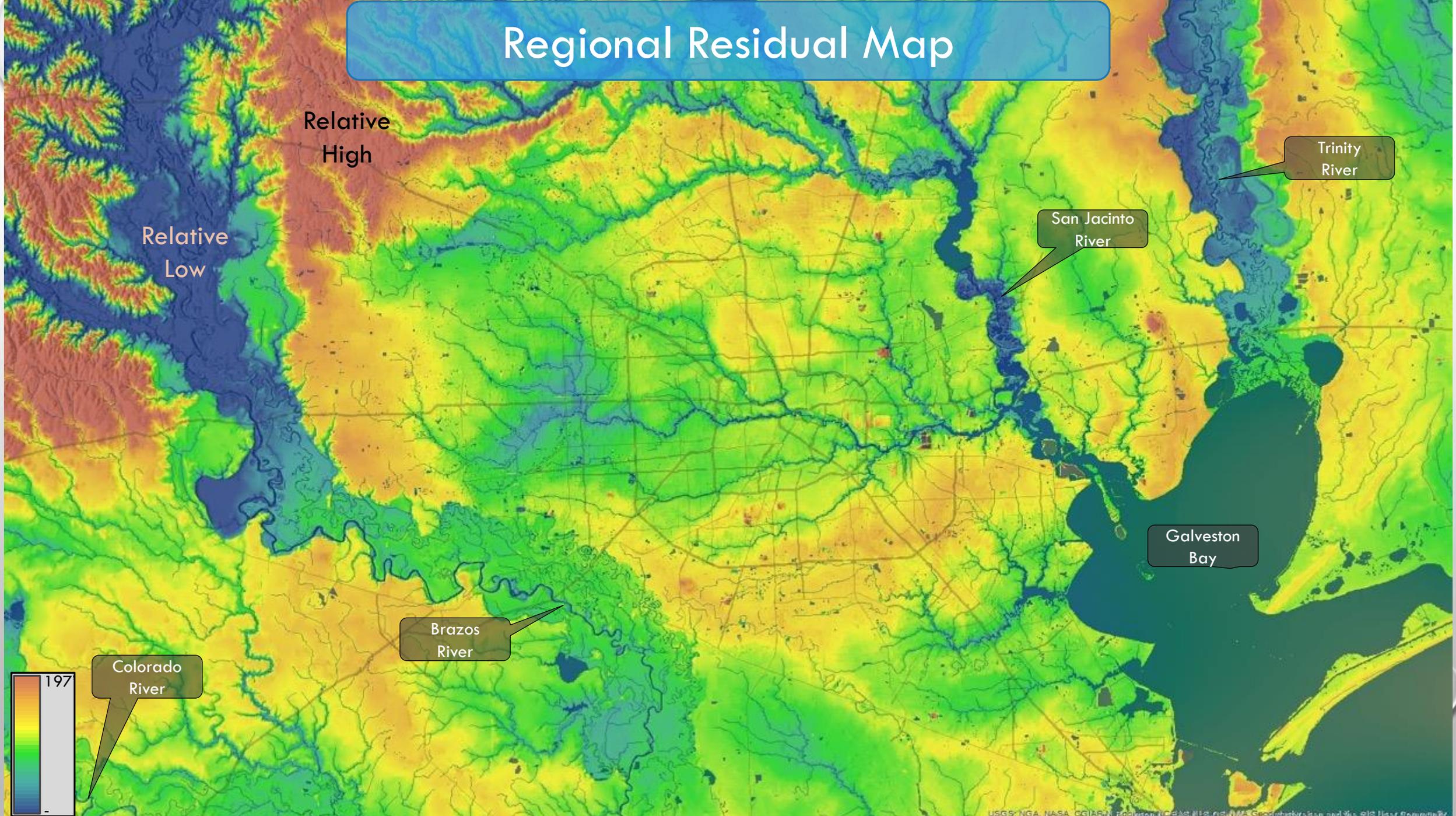
- 1. Development Conflict:** Maintain **natural** and **beneficial** functions of the floodplain.
- 2. Development Conflict:** Avoid new **development** in the floodplain whenever feasible.
- 3. Development Conflict:** Consider future conditions of the floodplain, including **development impacts** and **climate change**.
- 4. Property Conflict:** Adopt a **No Adverse Impact** approach to floodplain management.
- 5.** Focus on data-driven decision making, using only the best available data to assess risk and inform decisions.

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4. CASE STUDY: BUFFALO VS BRAYS

Regional Residual Map



Trinity River

San Jacinto River

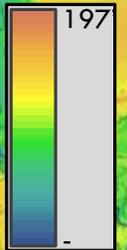
Galveston Bay

Brazos River

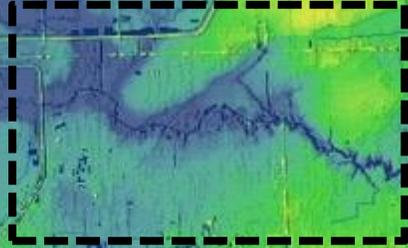
Colorado River

Relative High

Relative Low

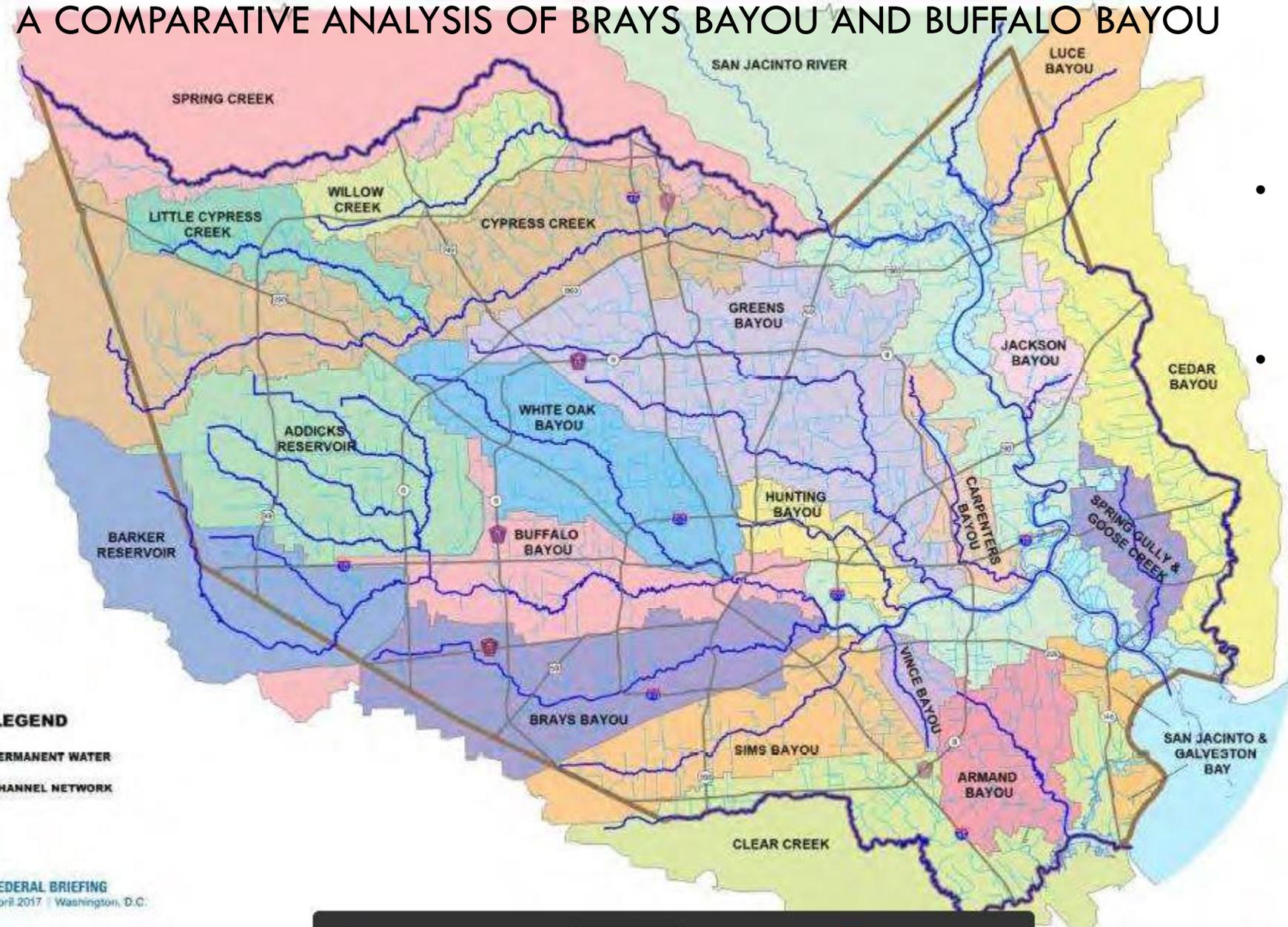


Buffalo Bayou Drainage



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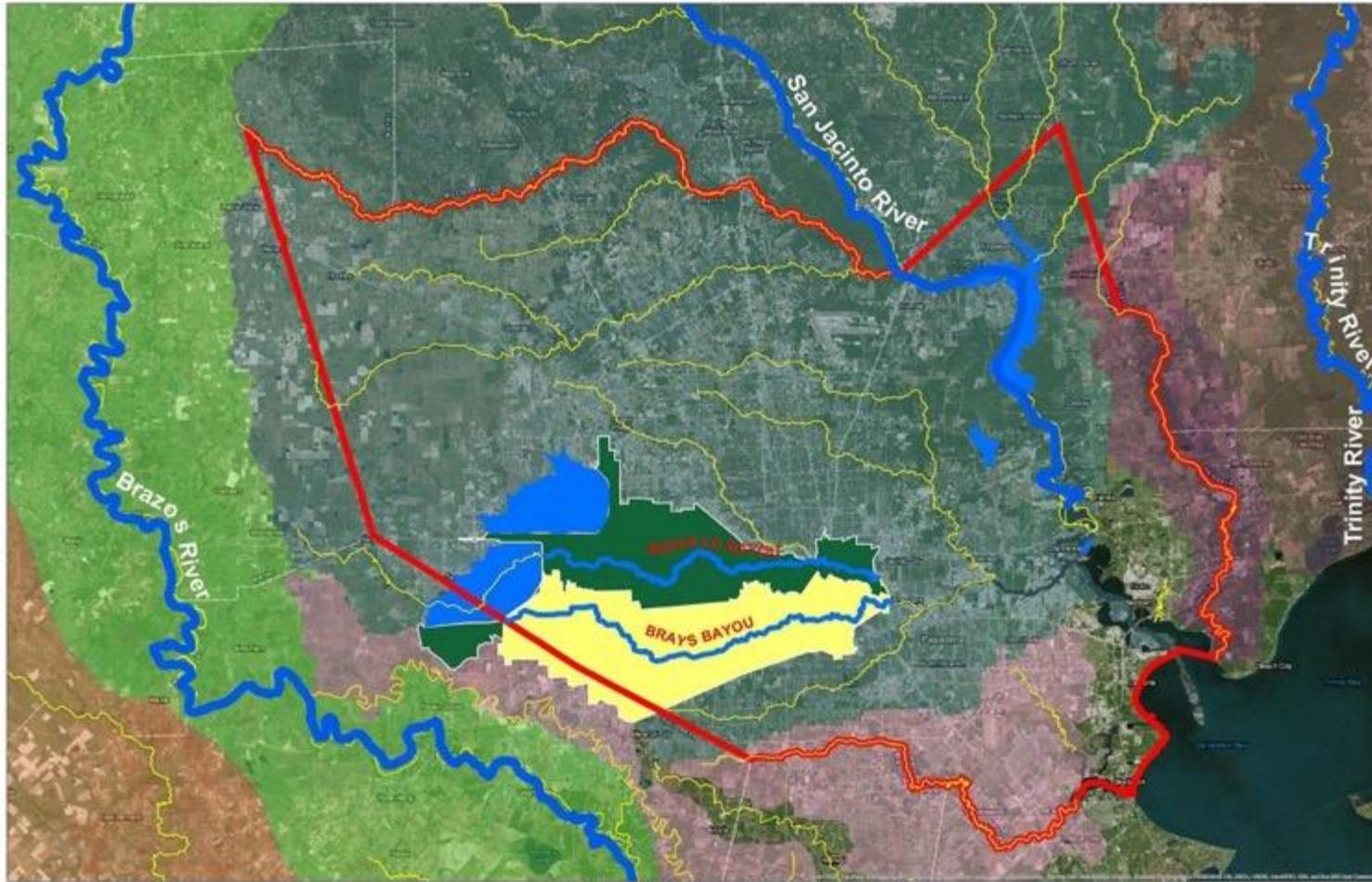


- **BUFFALO BAYOU WATERSHED**
 - 102 Sq. Miles
 - 444,602 population (2010)
- **BRAYS BAYOU**
 - 127 Sq. Miles
 - 717,198 population (2010)

SUSTAINABLE DEVELOPMENT

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Brays Bayou & Buffalo Bayou Watersheds



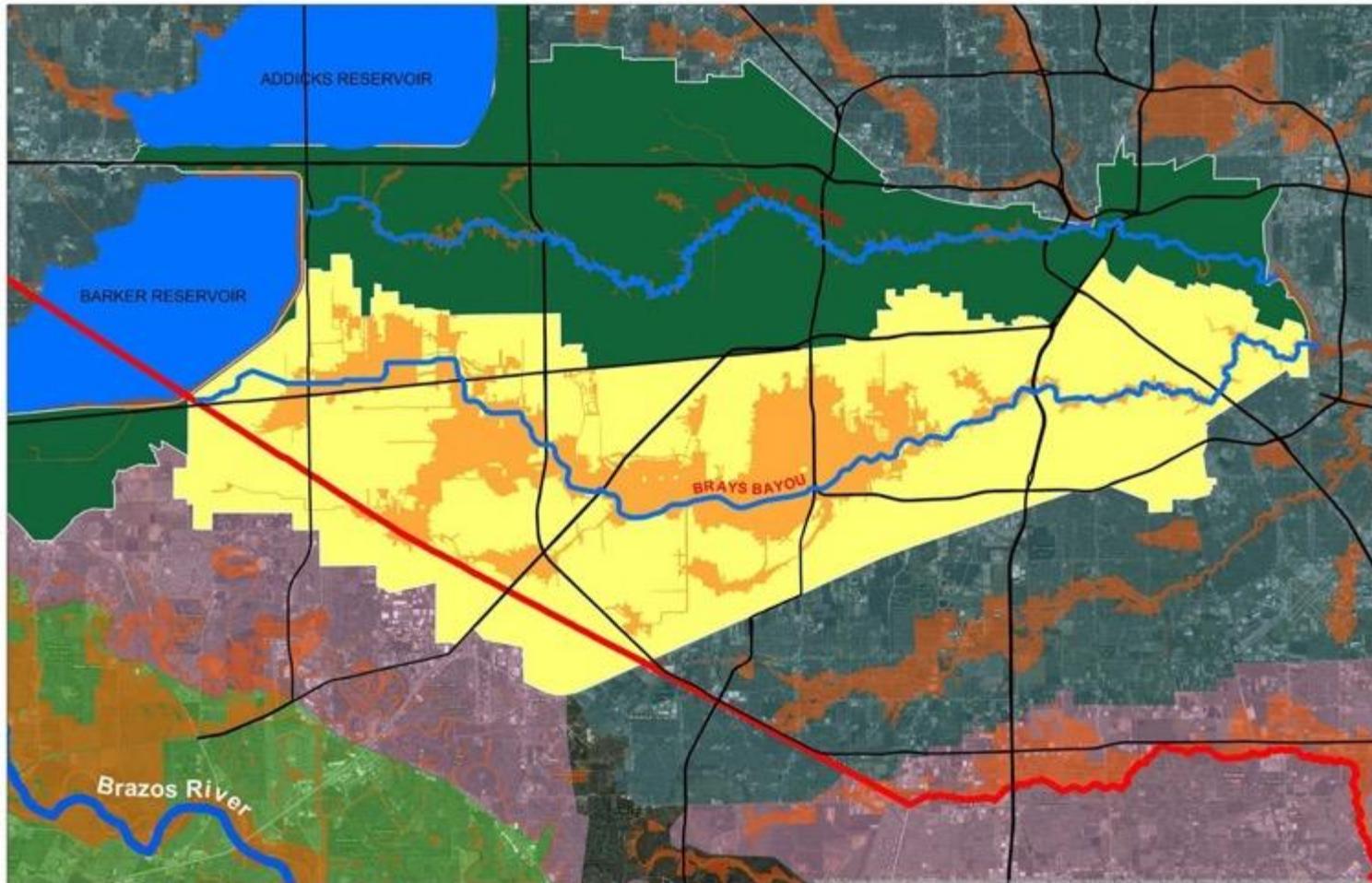
Brays Bayou & Buffalo Bayou Watersheds

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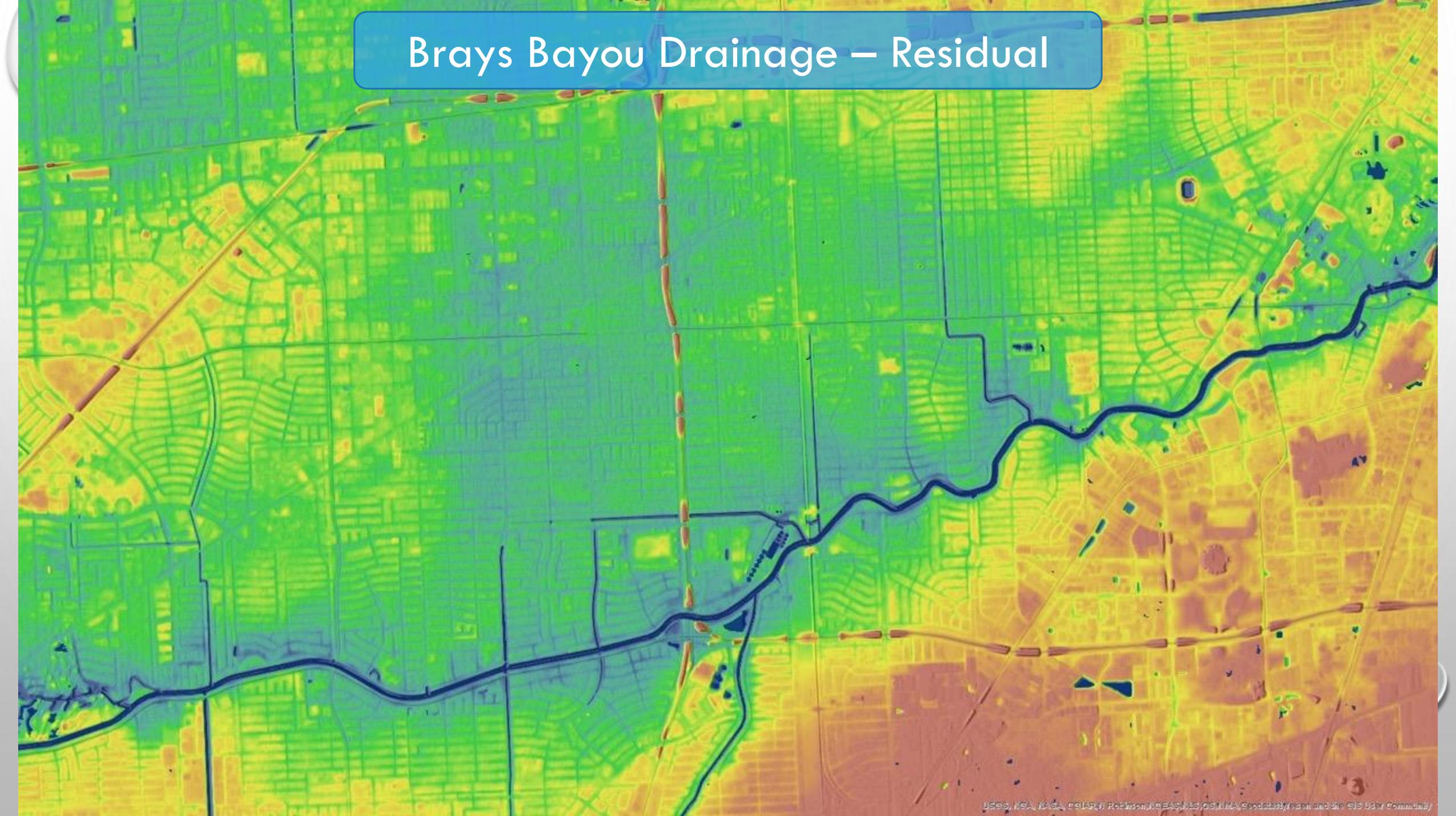
Brays Bayou & Buffalo Bayou 100-Yr Floodplain



Brays Bayou & Buffalo Bayou 100-Yr Floodplain

- BUFFALO BAYOU WATERSHED
 - 102 Sq. Miles
 - 444,602 population (2010)
 - **Homes Lost in Harvey – 17,090 (HCFCFCD 2018)**
- BRAYS BAYOU
 - 127 Sq. Miles
 - 717,198 population (2010)
 - Channelized 1960(Concrete)
 - **Homes Lost in Harvey – 23,810 (HCFCFCD 2018)**

Brays Bayou Drainage – Residual



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Houston Flood Plain Expansion 2000 - 2012

Floodplain Expansion

25.5% - Houston in Floodplain

148,853 – Housing units in Floodplain

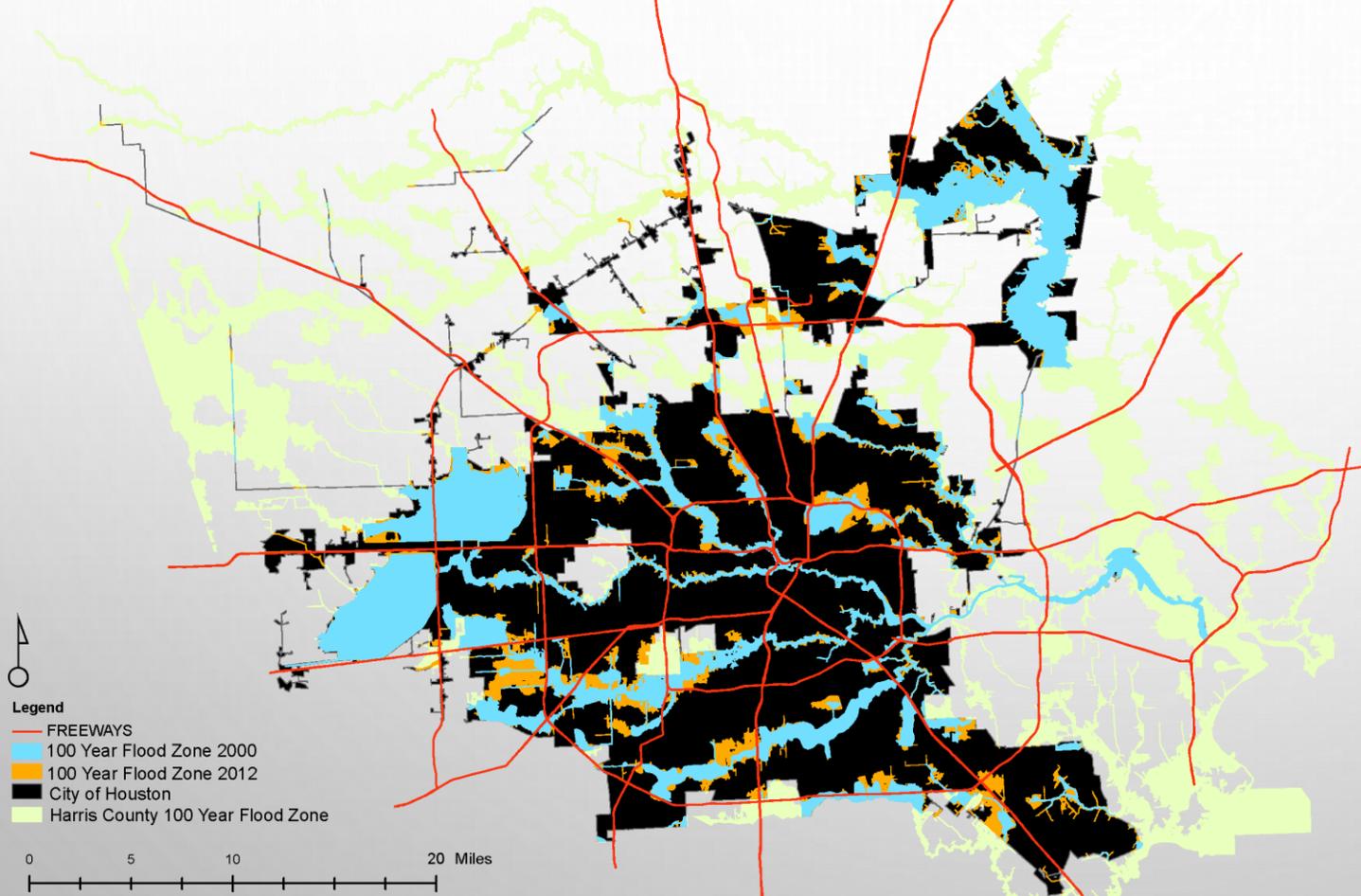
\$18.5billion – Housing damage risk

Land Cover

78% - Urbanized

16% - High Intensity Development

46% - Medium-low Intensity
Development

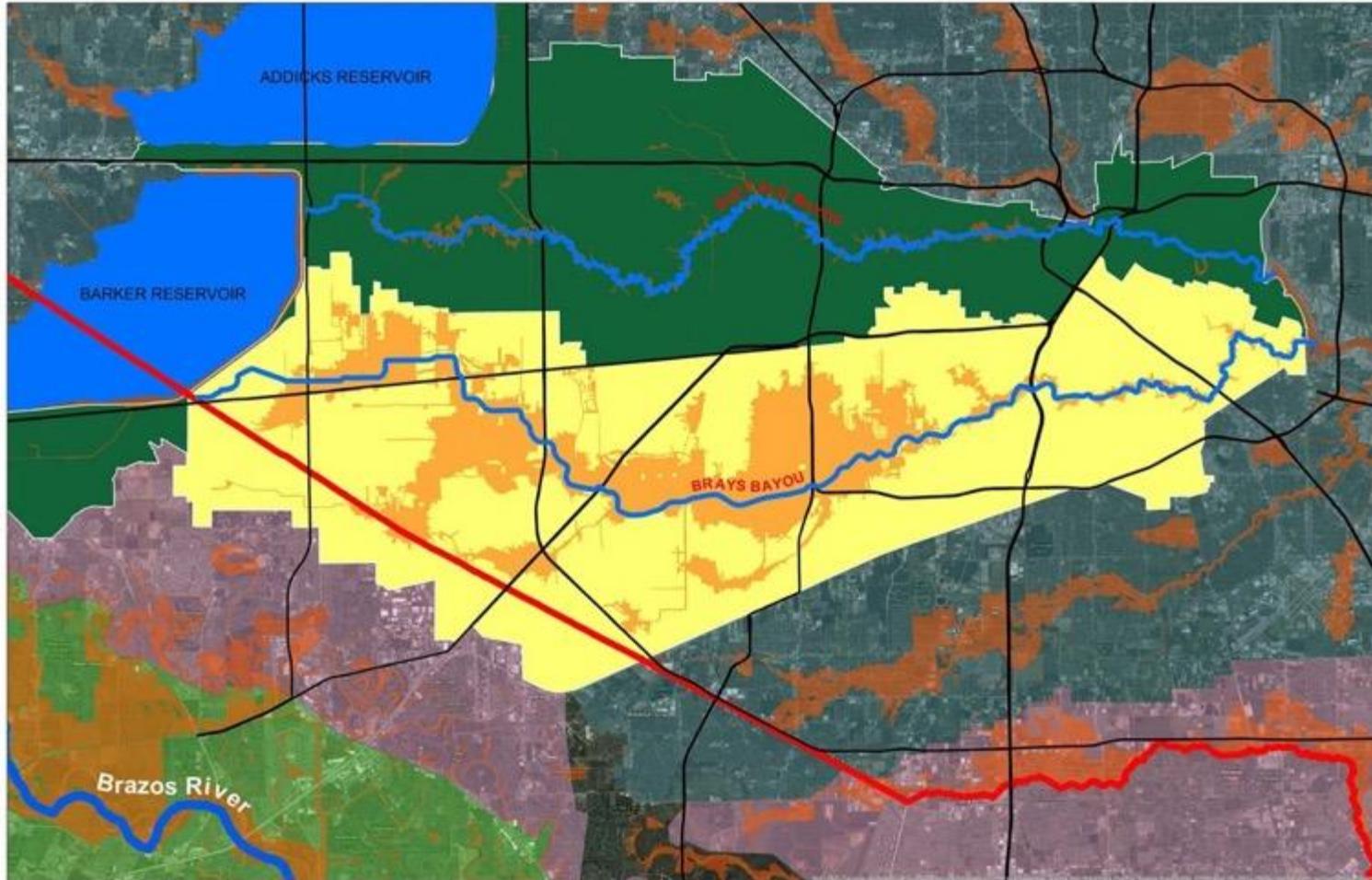


Source: Harris County Flood Control District. Map created by Lester King, PhD.

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Brays Bayou & Buffalo Bayou 100-Yr Floodplain



Brays Bayou & Buffalo Bayou 100-Yr Floodplain

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5. SUSTAINABILITY ASSESSMENT: BUFFALO VS BRAYS

SUSTAINABLE DEVELOPMENT



A COMPARATIVE ANALYSIS OF BRAYS BAYOU AND BUFFALO BAYOU

Social/ Economic	Buffalo Bayou & 100 Yr Floodplain	Brays Bayou & 100 Yr Floodplain
Public Access	Very Limited	Yes
Home & Business Proximity to channel	Adjacent	Separated by Roads
Residential Activity	Yes	Yes
Recreational Activities	Kayaking, Canoeing	Hike & Bike

1. Both Bayous and their 100 Yr Floodplains have a substantial degree of human activity.
2. Buffalo Bayou channel has more recreational use.
3. Brays Bayou has higher public accessibility

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Environmental	Buffalo Bayou & 100 Yr Floodplain	Brays Bayou & 100 Yr Floodplain
Natural Flood & Erosion	Reduce Flood Velocities, Stabilize Soils	No
Surface Water Quality	Reduce sediment, Filtration system	No
Groundwater Supply & Quality	Infiltration & Aquifer recharge	No
Flora	Biological Diversity	No
Fish & Wildlife Habitat	Breeding & Feeding grounds	Limited
Scientific Study	Ecological & Archaeological Studies	Very Limited

1. Buffalo Bayou channel is a highly functional ecological asset.
2. Brays Bayou channel is no longer a natural ecological asset, there is very limited ecologically beneficial use for protecting this channel.
3. **Since Brays Bayou no longer functions in its natural capacity, the floodplain is not a natural asset. Therefore the sustainability approach would be to reduce the area of the 100 Yr. Floodplain to prevent loss of human life, property damage, and disruption of existing communities.**

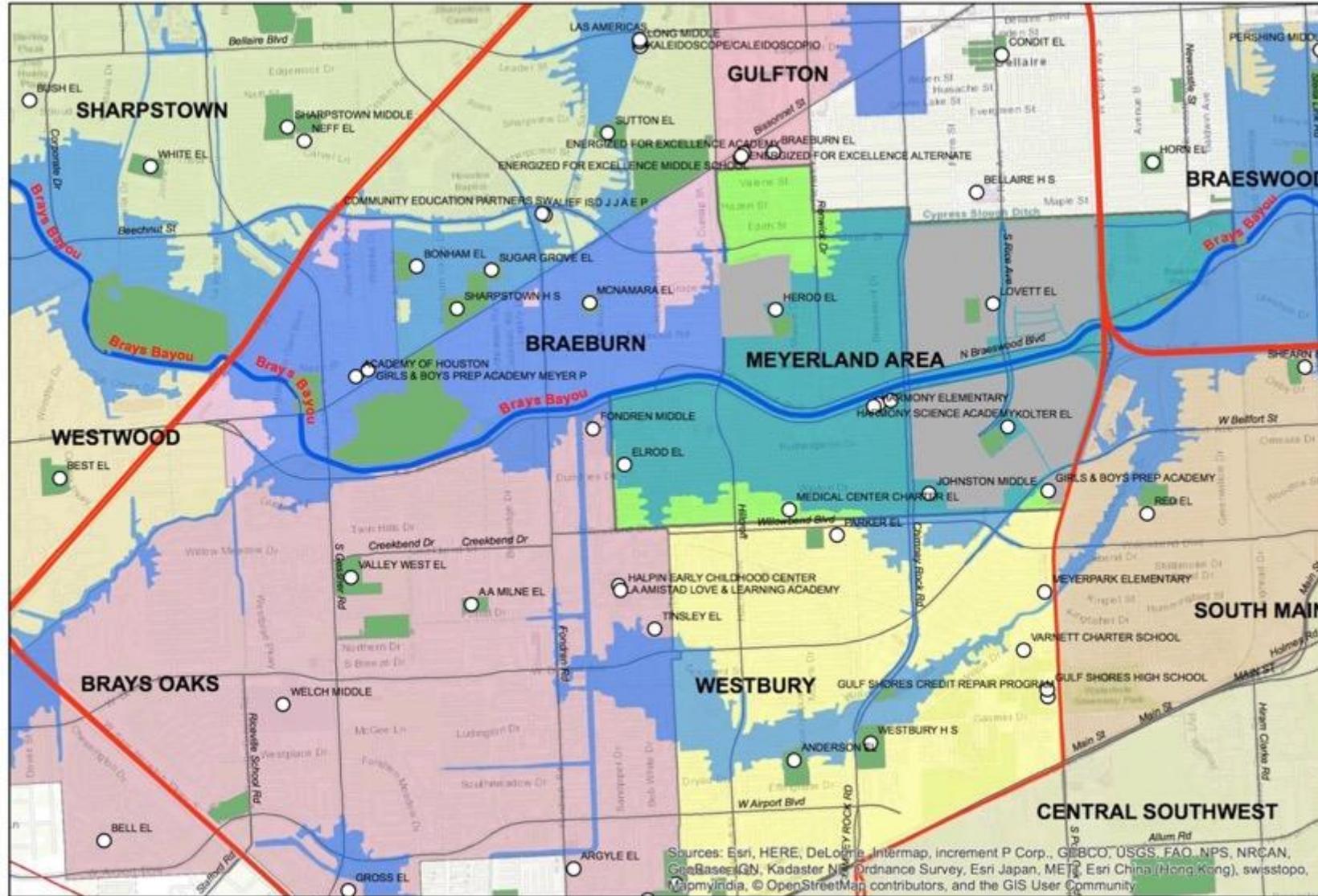
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6. SUSTAINABILITY PLANNING FOR RESILIENCE OF MID - BRAYS BAYOU COMMUNITIES

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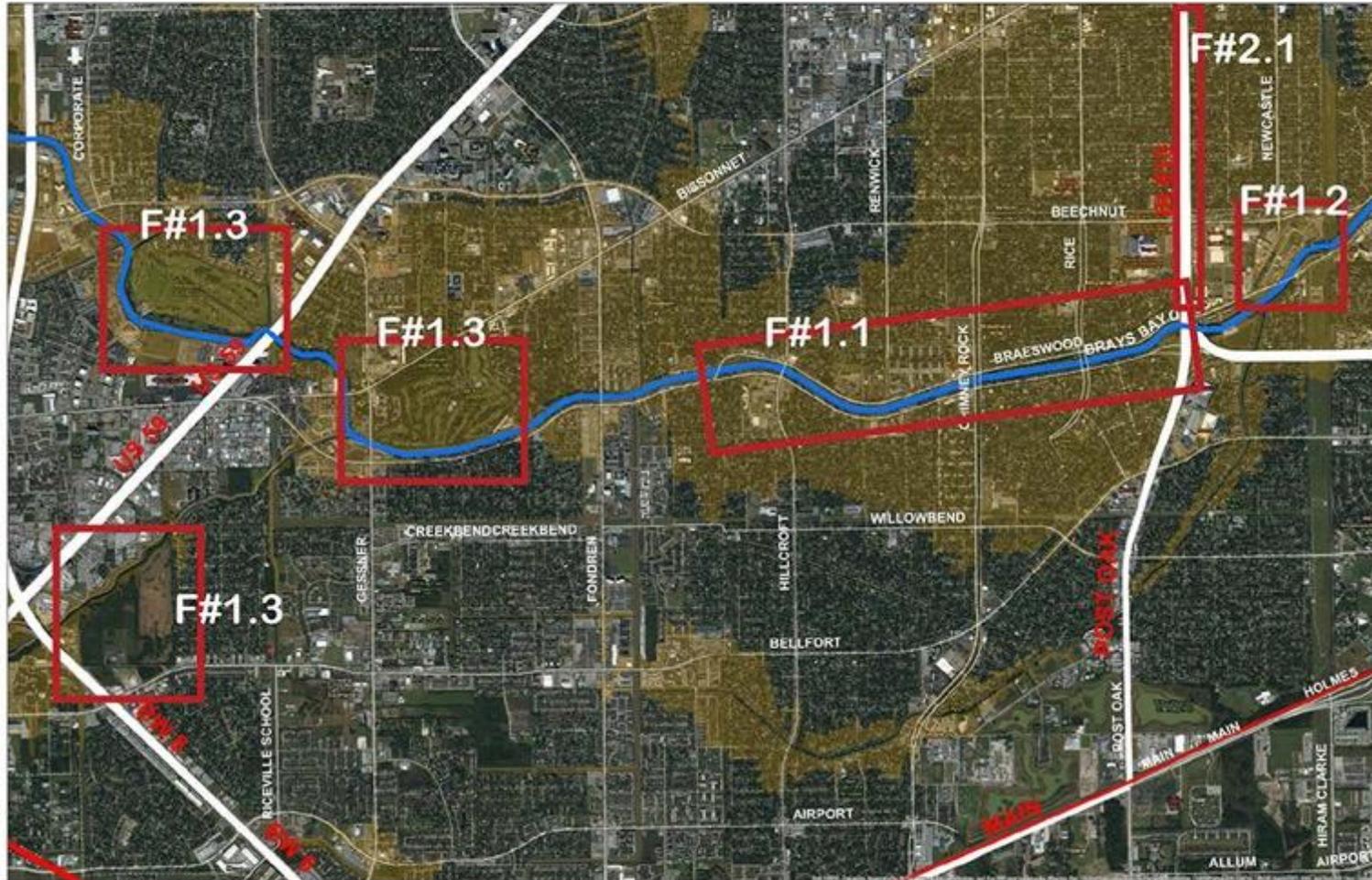


- San Jacinto Basin
- Brays Bayou Watershed
- Mid-Brays Communities
- SN: Greater Meyerland
- SN: Near Southwest
- SN: Westbury
- SN: Brays Oaks
- SN: Braeburn

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A COMPARATIVE ANALYSIS OF BRAYS BAYOU AND BUFFALO BAYOU

Mid - Brays Bayou Communities DRAFT Strategies



Mid - Brays Bayou Communities DRAFT Strategies

Three Strategic Focus Areas for Brays Bayou Sustainability Planning

FOCUS AREA #1:

Business As Usual - Capacity and Additional Detention sites

FOCUS AREA #2:

Smart Infrastructure and Mitigation

FOCUS AREA #3:

Neighborhood/ Community level Mitigation and Adaptation (HOAs, SNs)

FLOOD ADAPTABLE GREATER MEYERLAND

WATERSHED & STORM PATH MAP

FEHA FLOOD & LAND USE MAP

MASTERSHIP

MEYERLAND SQUARE

MEYERLAND VILLAGE

MEYERLAND ISLAND

EMBRACING THE BAYOU CITY IDENTITY

BRAYS BAYOU PARK & MEYERLAND SQUARE

MEYERLAND SQUARE

MEYERLAND VILLAGE

MEYERLAND ISLAND

MASTERSHIP

MEYERLAND SQUARE

MEYERLAND VILLAGE

MEYERLAND ISLAND

THE VILLAGES OF MEYERLAND

MEYERLAND SQUARE

MEYERLAND VILLAGE

MEYERLAND ISLAND

MASTERSHIP

MEYERLAND SQUARE

MEYERLAND VILLAGE

MEYERLAND ISLAND

NEW LIFE AT MEYERLAND VILLAGE

BIRDS EYE VIEW

CONTEXT PLAN

MASTERSHIP

MEYERLAND SQUARE

MEYERLAND VILLAGE

MEYERLAND ISLAND



BRAYS BAYOU RECREATIONAL PARK

MASTERSHIP

ARCHITECTURAL RENDERINGS

ENERGY INNOVATION RESEARCH CENTER

A SOCIAL WORKING ENVIRONMENT

MASTERSHIP

ARCHITECTURAL RENDERINGS

SEVEN ACRES SENIOR GARDEN CENTER

MASTERSHIP

ARCHITECTURAL RENDERINGS

Shady Meadows Village, A Community on the Bayou

MASTERSHIP

ARCHITECTURAL RENDERINGS



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