

# A Proposal for Equitable Flooding Solutions in Northeast Houston

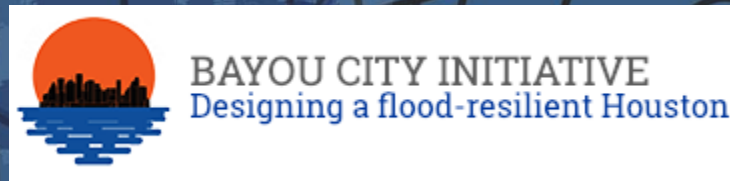
## Figures and Tables

By Jim Blackburn, Camille Chenevert, Jace Hodder, Sarah Swackhamer,  
Emily Fucile-Sanchez and Luey Garcia  
of Sustainable Planning and Design, LLC

November 12, 2021



Prepared For Bayou City Initiative and Northeast Super Neighborhoods United



For full report and citations visit  
[www.bcinitiative.org/northeast-houston-flooding](http://www.bcinitiative.org/northeast-houston-flooding)



City Limits, Unincorporated Areas, MUDs, TIRZ and Watersheds

09-28-2021

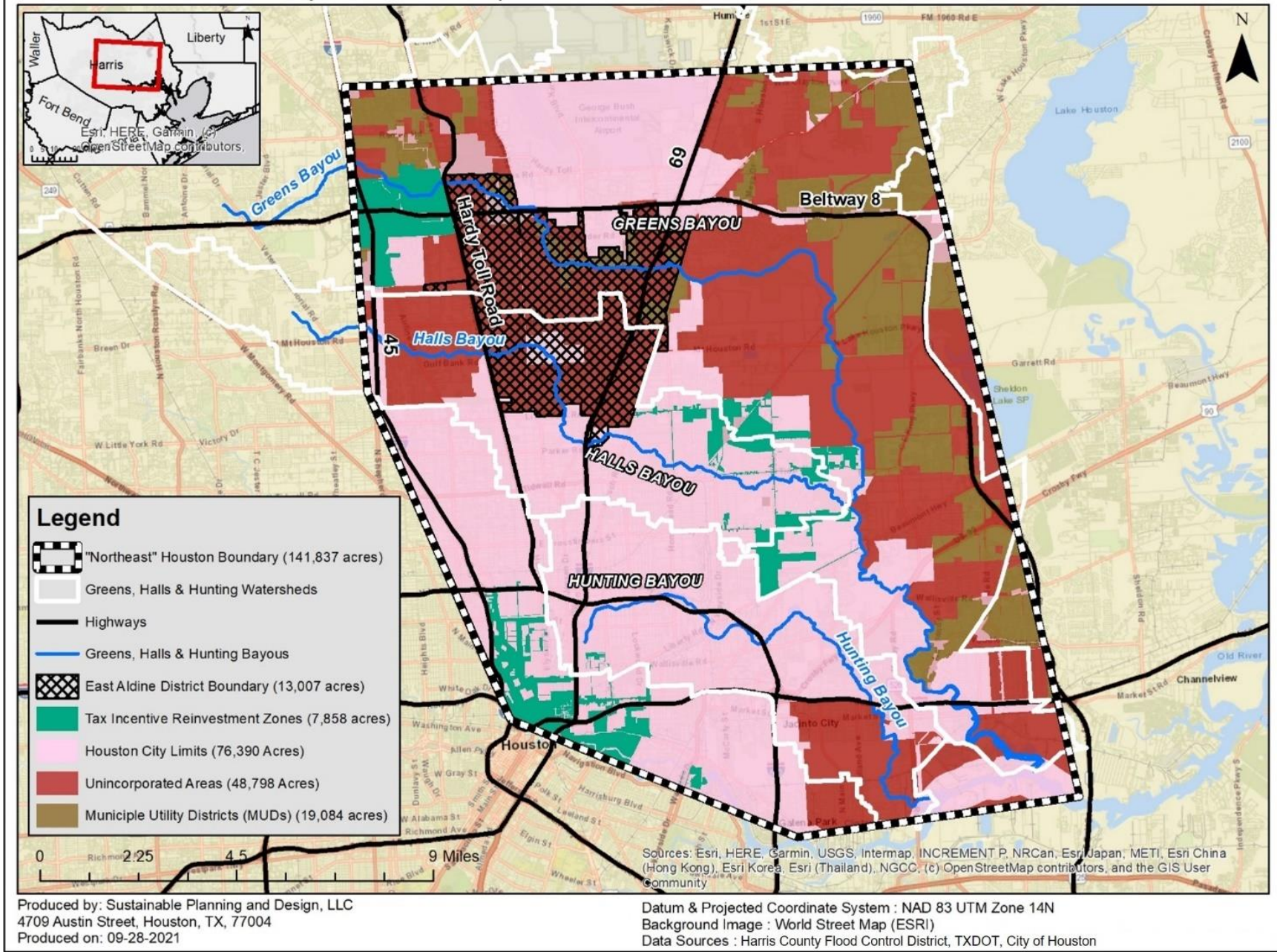
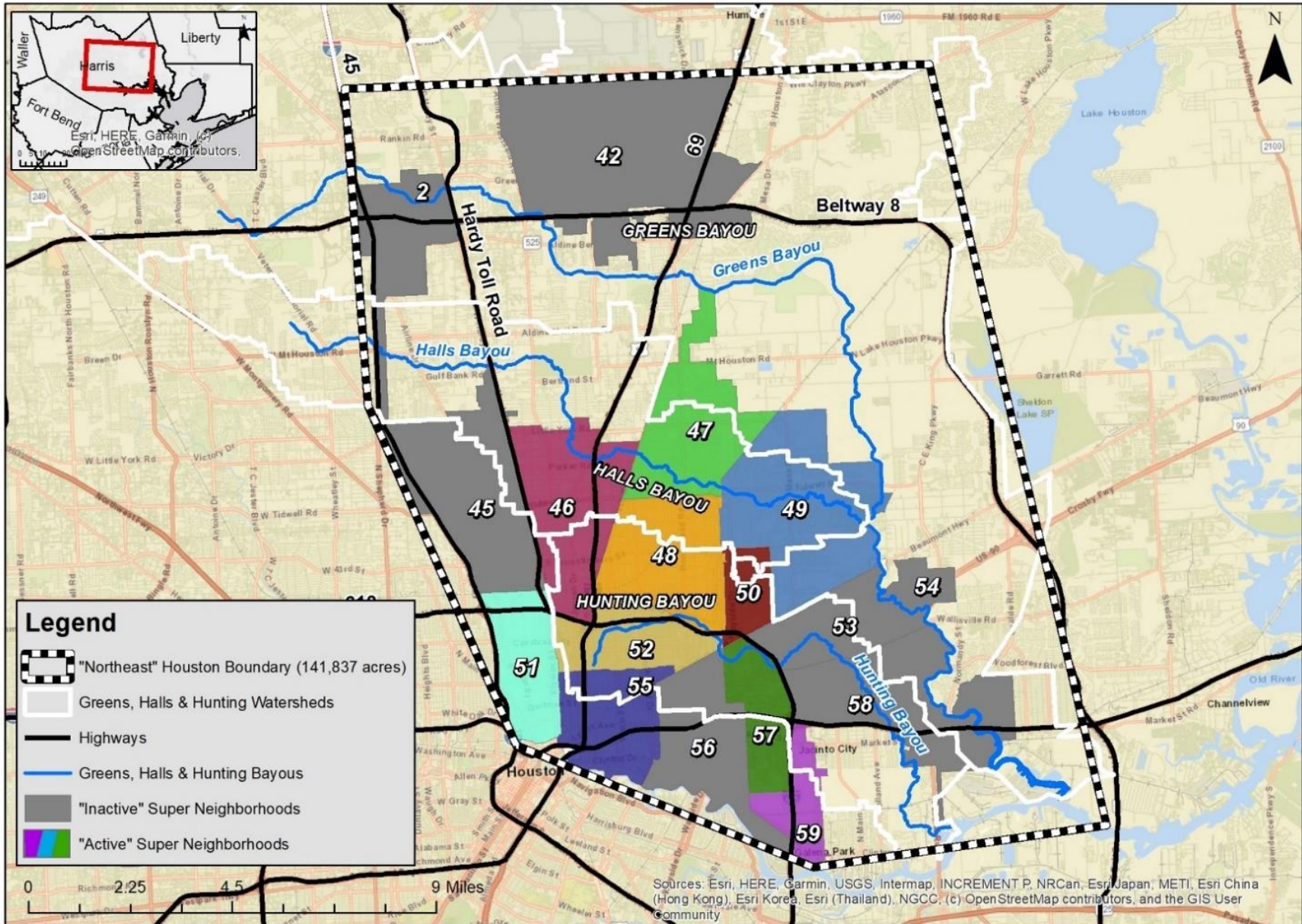


Figure 1. Map of the Northeast Community including bayous, city limits, unincorporated areas, MUDs, TIRZ, and the East Aldine District boundary.



# Super Neighborhoods and Watersheds

09-28-2021



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Figure 2. The location of Super Neighborhoods in the Northeast with bayous, watershed boundaries, and highways.



# NE Area 2019 Demographics

8/4/2021

Total Poulation:598,370

**Legend** 1 Dot = 1 person

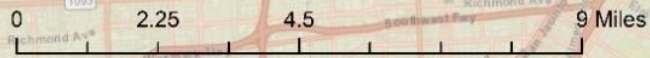
- White (8.6%)
- Black or African American (24.6%)
- Asian (1%)
- Hispanic or Latinx (64.9%)
- Other (0.8%)

North East Boundary

City of Houston

MUDs

Unincorporated



Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

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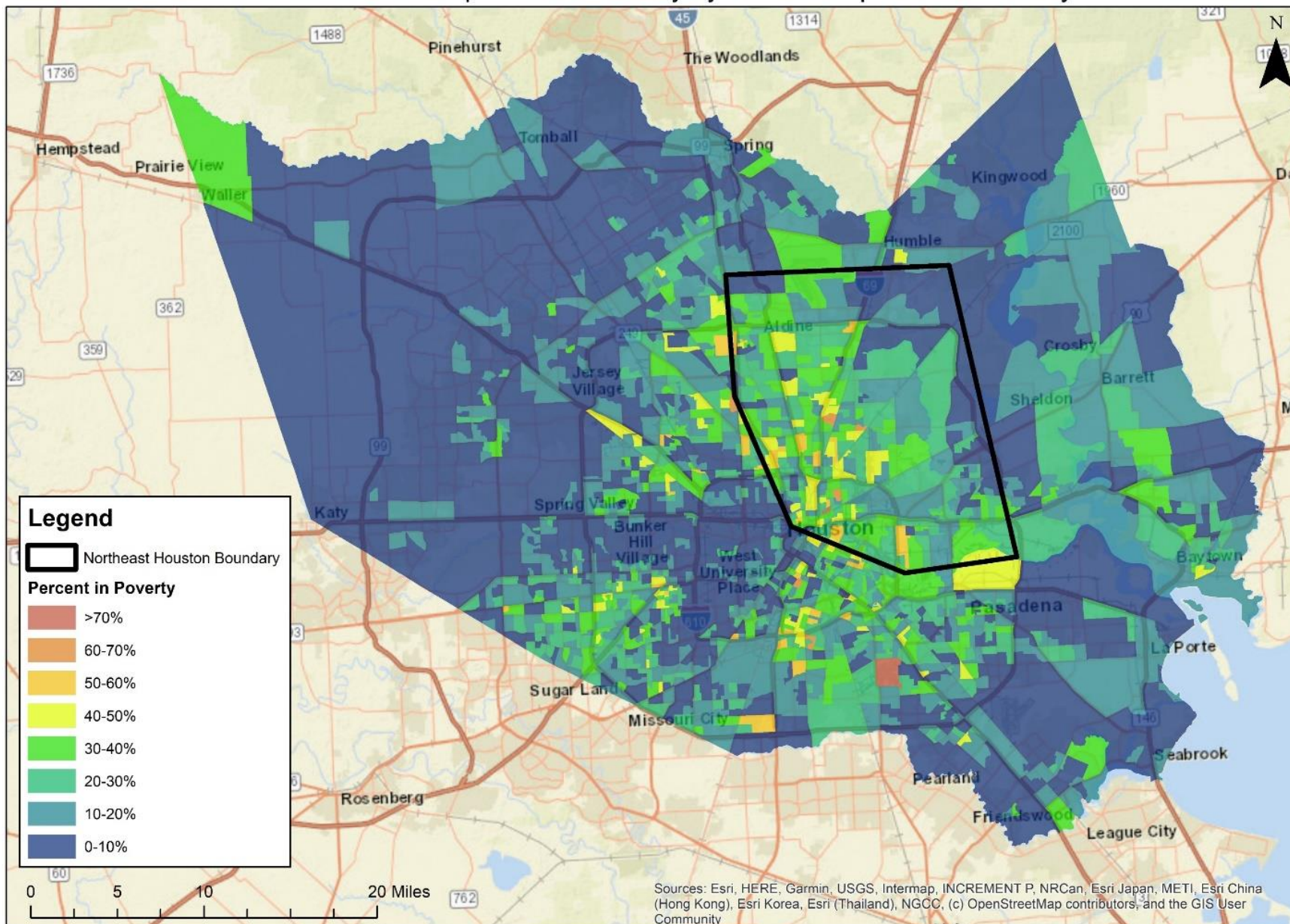
Datum & Projected Coordinate System : NAD 1983 UTM Zone 14N  
Data Sources : 2019 American Community Survey,  
2019 Census Tigerline

Figure 3. Racial and ethnic data for the Northeast Houston area with City and MUD boundaries.



# 2019 Percent of Population in Poverty by Block Group in Harris County

8/6/2021



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 Produced on: 8/6/2021

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Datum & Projected Coordinate System : NAD1983 UTM zone 14N  
 Data Sources : 2019 American Community Survey,  
 2019 US Census Tigerline

Figure 4. Percent of households in poverty throughout Harris County.



# City Council Districts and Watersheds

09-28-2021

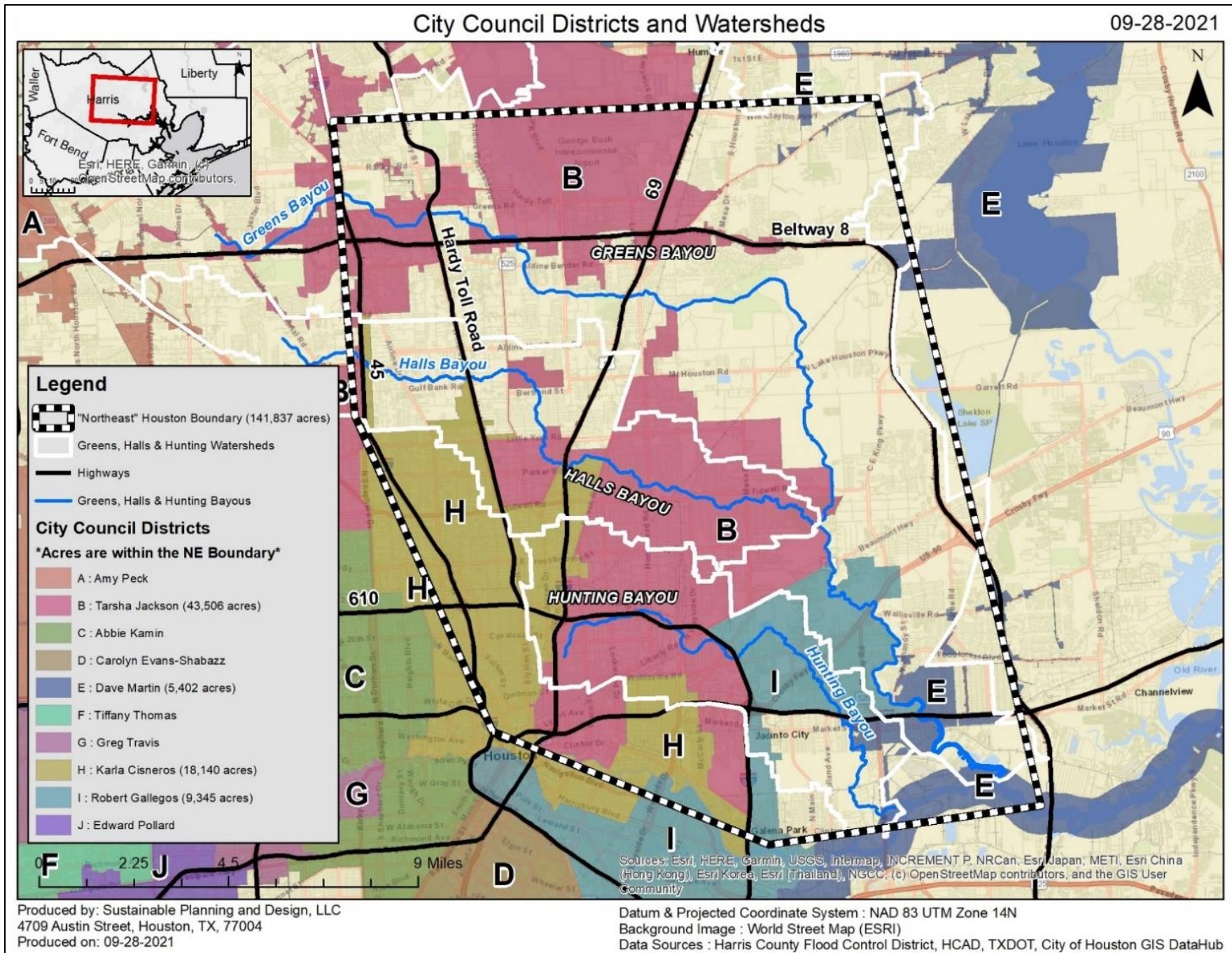
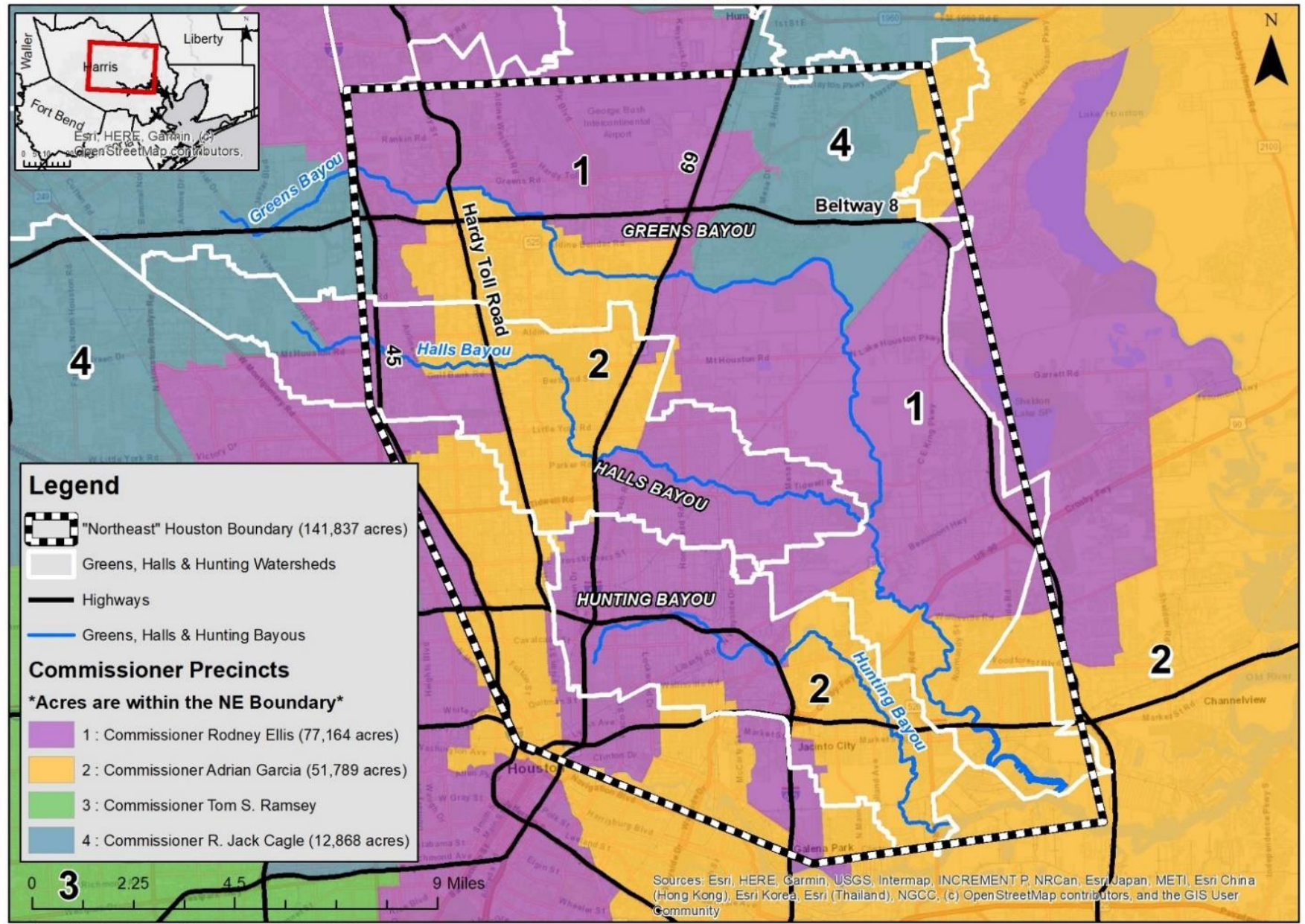


Figure 5. City Council Districts in Northeast Houston with bayous, watersheds, and highways.



# Commissioner Precincts and Watersheds

09-28-2021



**Legend**

- "Northeast" Houston Boundary (141,837 acres)
- Greens, Halls & Hunting Watersheds
- Highways
- Greens, Halls & Hunting Bayous

**Commissioner Precincts**

**\*Acres are within the NE Boundary\***

- 1: Commissioner Rodney Ellis (77,164 acres)
- 2: Commissioner Adrian Garcia (51,789 acres)
- 3: Commissioner Tom S. Ramsey
- 4: Commissioner R. Jack Cagle (12,868 acres)

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 Produced on: 09-28-2021

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Datum & Projected Coordinate System : NAD 83 UTM Zone 14N  
 Background Image : World Street Map (ESRI)  
 Data Sources : Harris County Flood Control District, TXDOT, City of Houston

Figure 6. Harris County Commissioner Precincts in Northeast Houston with bayous, watersheds, and highways.



# Congressional Districts and Watersheds

09-28-2021

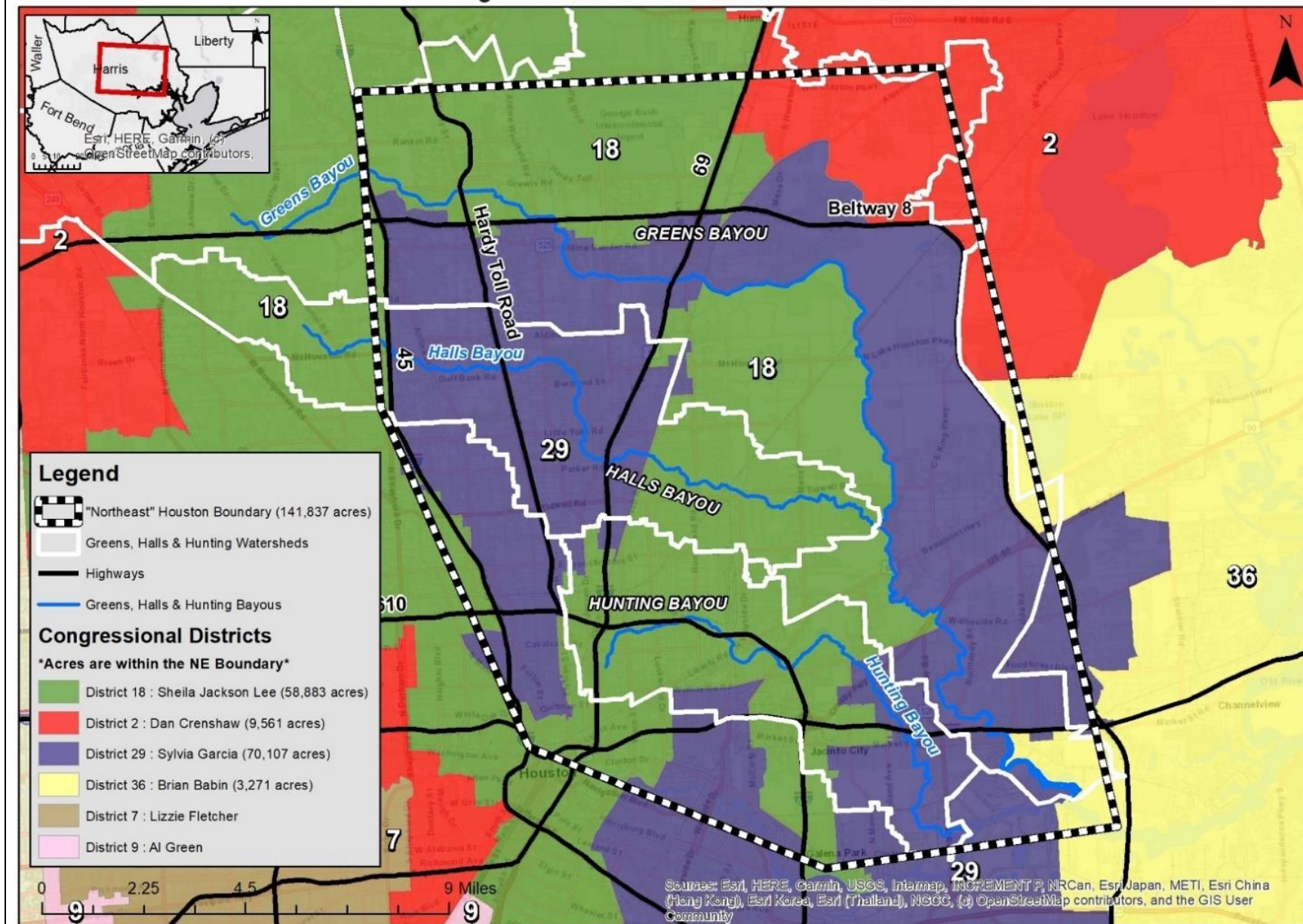
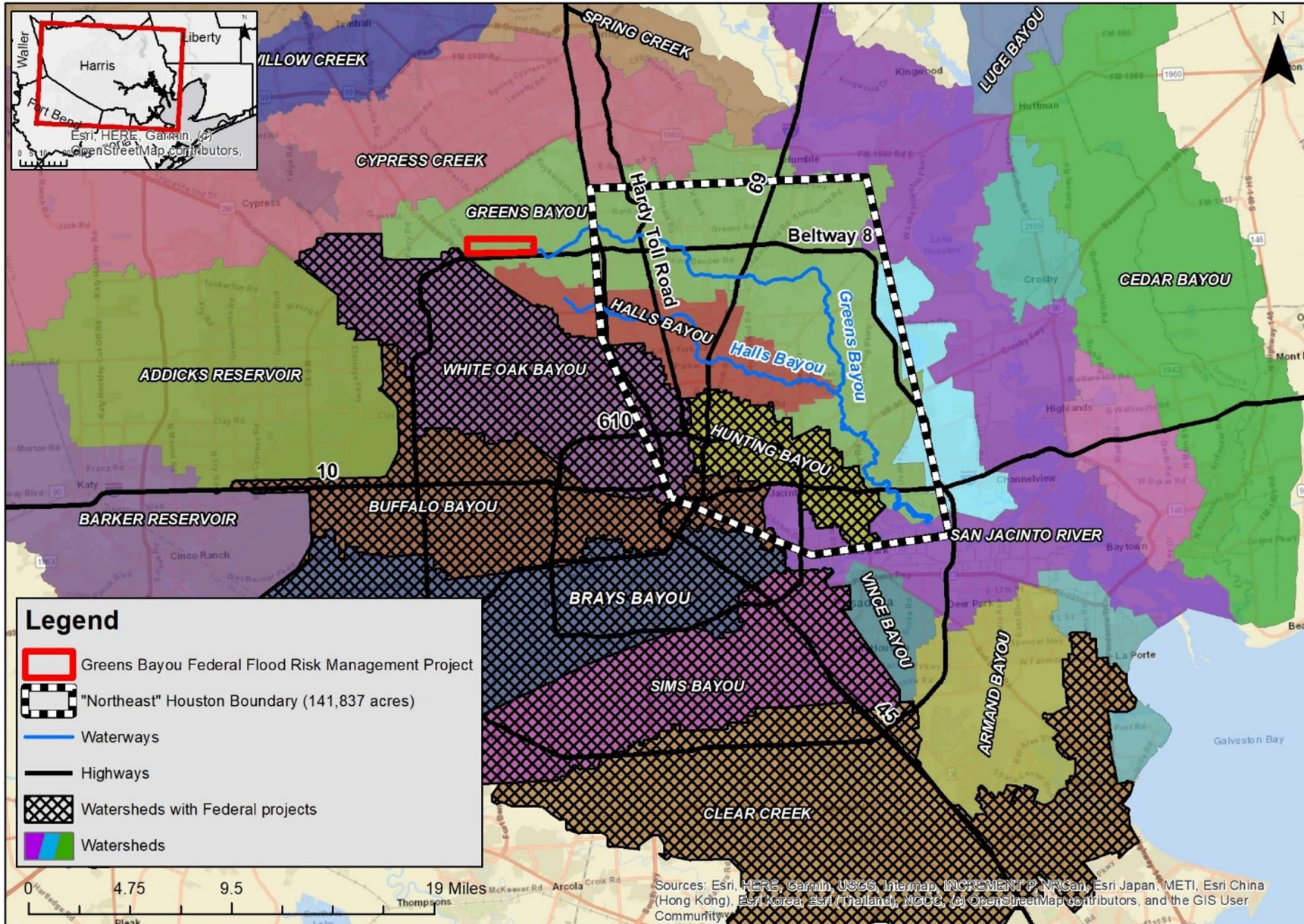


Figure 7. House Congressional Districts in Northeast Houston with bayous, watersheds, and highways.



# Watersheds

09-13-2021



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 Produced on: 09-13-2021

Datum & Projected Coordinate System : NAD 83 UTM Zone 14N  
 Background Image : Satellite Aerial Photo (ESRI)  
 Data Sources : Harris County Flood Control District, TXDOT, City of Houston

Figure 8. Harris County watersheds with waterways and highways.



# Floodplains, Railways and Watersheds

09-28-2021

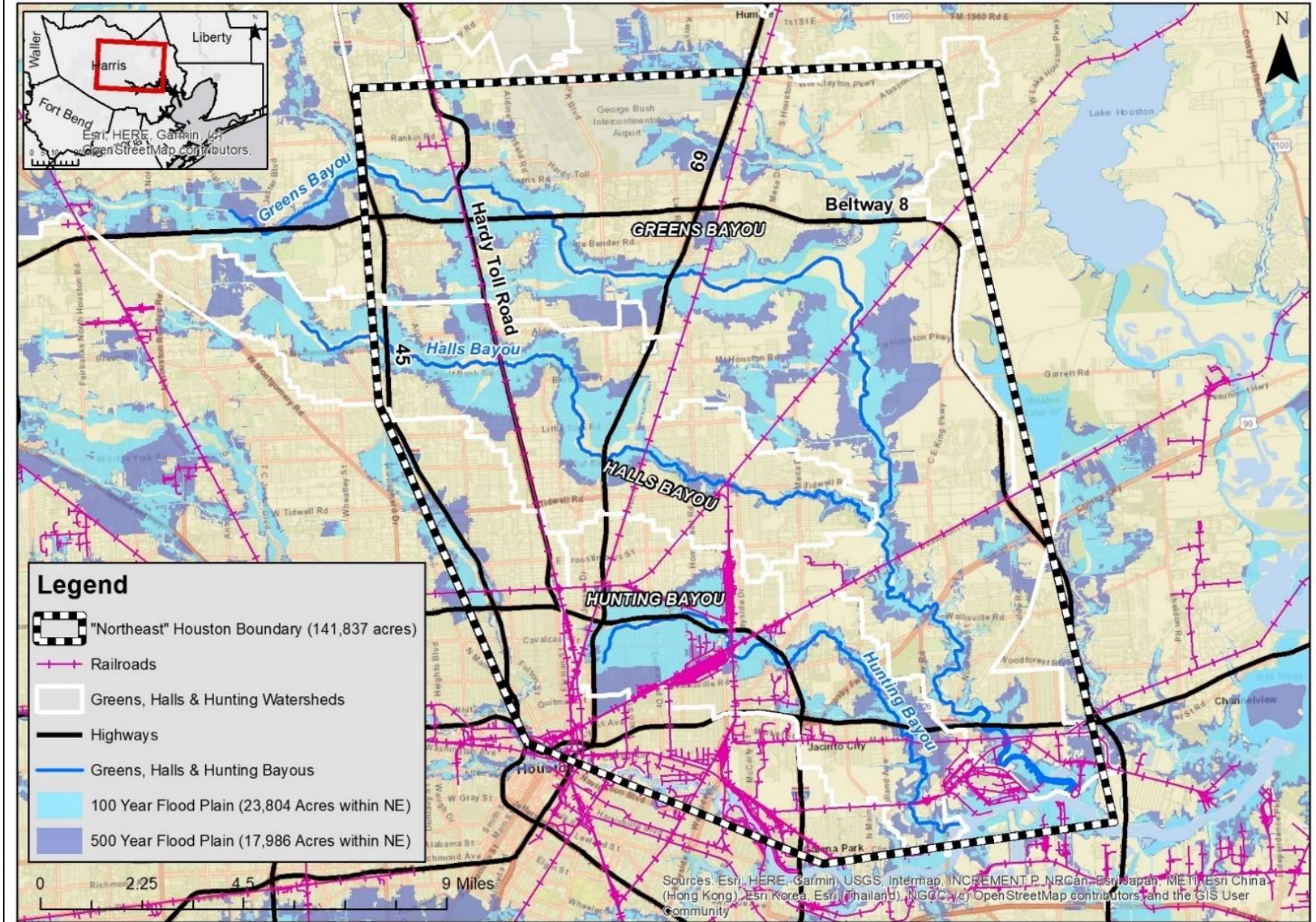


Figure 9. FEMA 100-year and 500-year floodplains in Northeast Houston with railroads, bayous, watershed boundaries, and highways.



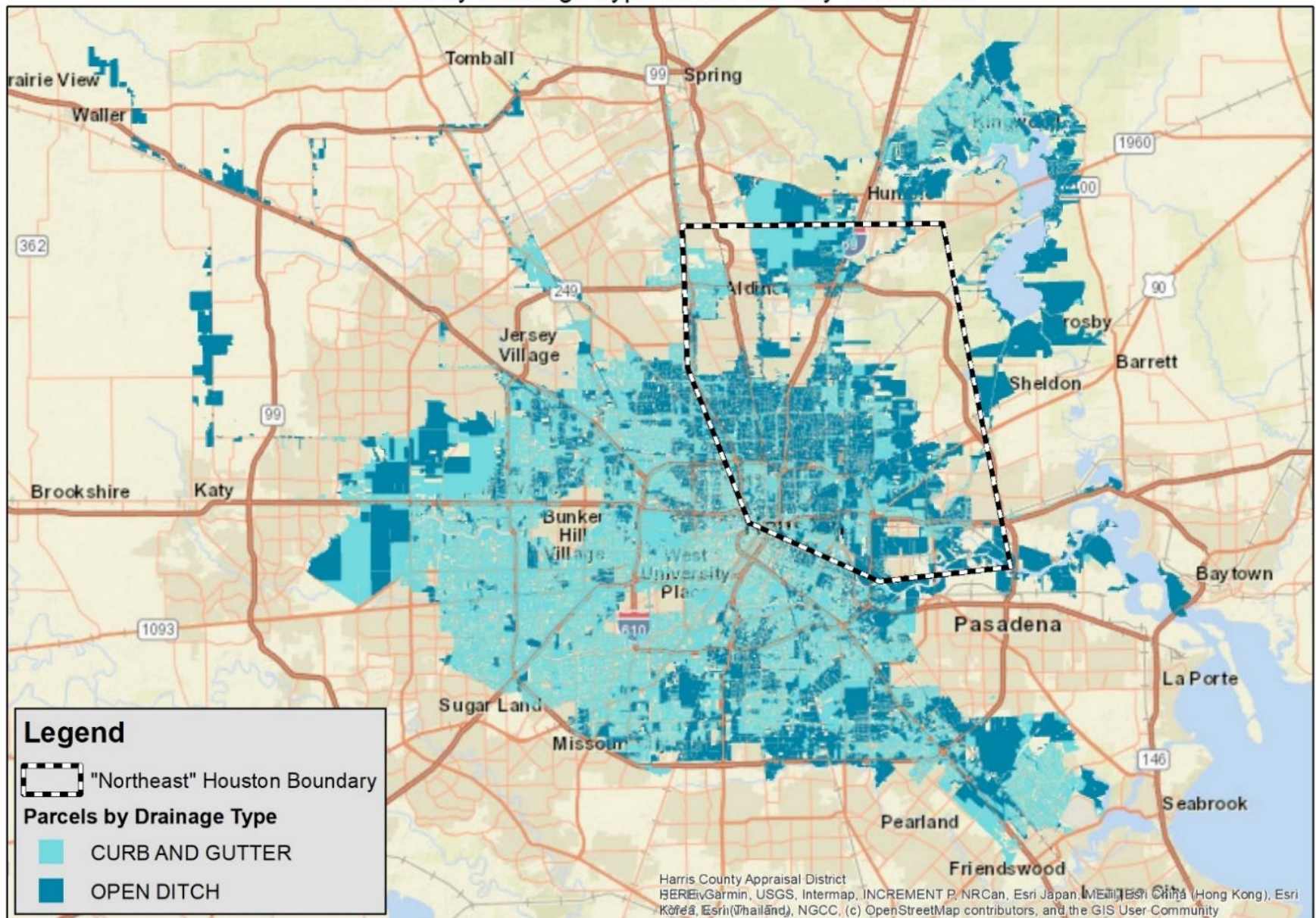


Figure 10. HEC-RAS modeling of flooding in the Northeast during Tropical Storm Harvey when 25,000+ homes flooded in Greens Bayou Watershed.



# Parcels by Drainage Type Within the City of Houston

08-23-2021



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4709 Austin Street, Houston, TX, 77004  
Produced on: 08-23-2021

Datum & Projected Coordinate System : NAD 83 UTM Zone 14N  
Background Image : World Street Map (ESRI)  
Data Sources : Uneven Runoff, Rice University Spatial Studies Lab, derived from Houston Public Works.

Figure 11. Map showing distribution of open ditch drainage system by parcel throughout the City of Houston.





*Figure 12. Picture of open drainage ditch in Northeast Houston with culvert non-functional.*





*Figure 13. Picture of open drainage ditch in Northeast Houston with culvert non-functional.*



# Flooding Survey Results and Council Members' Priority SWAT Projects

9-29-2021

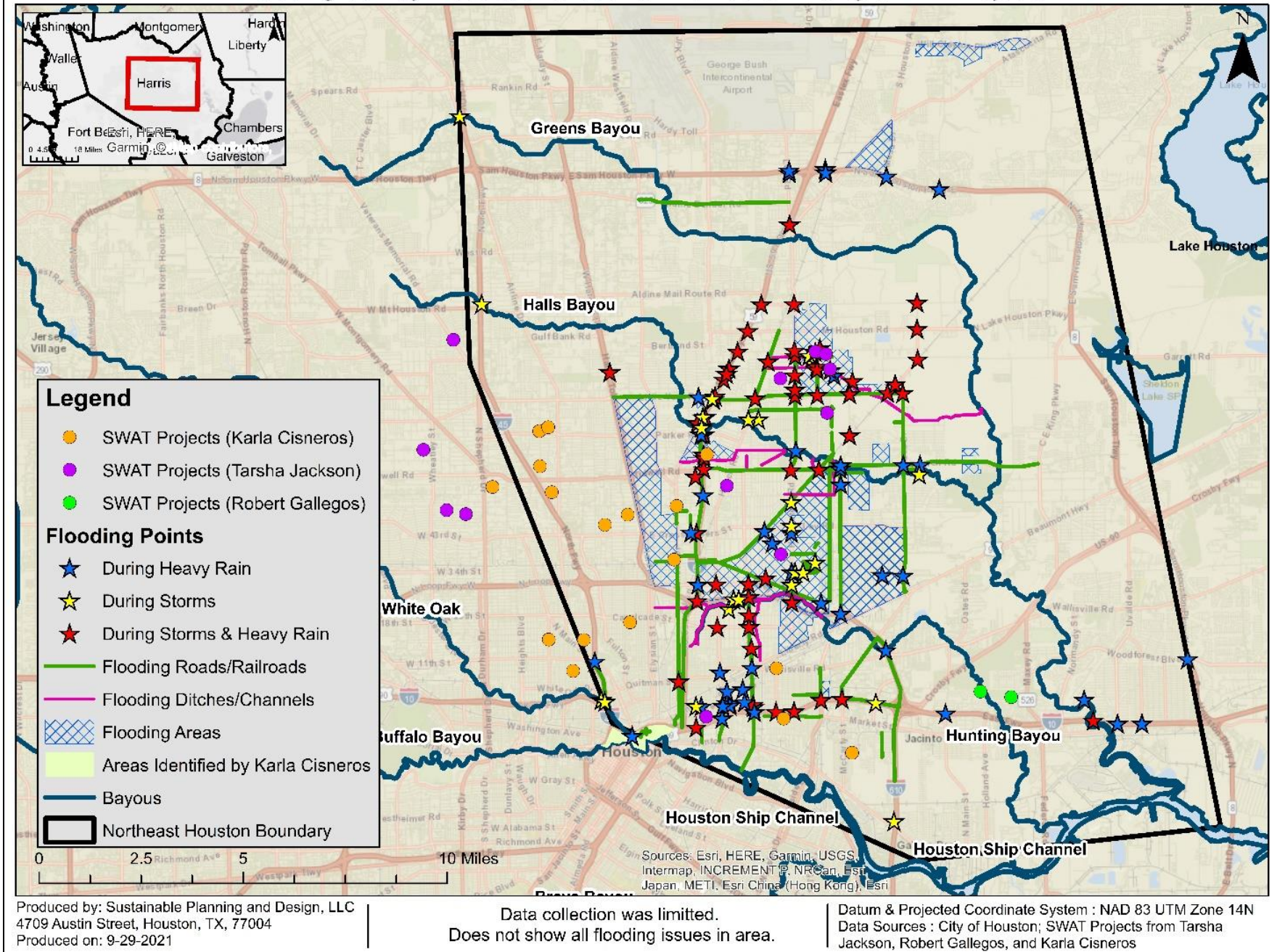
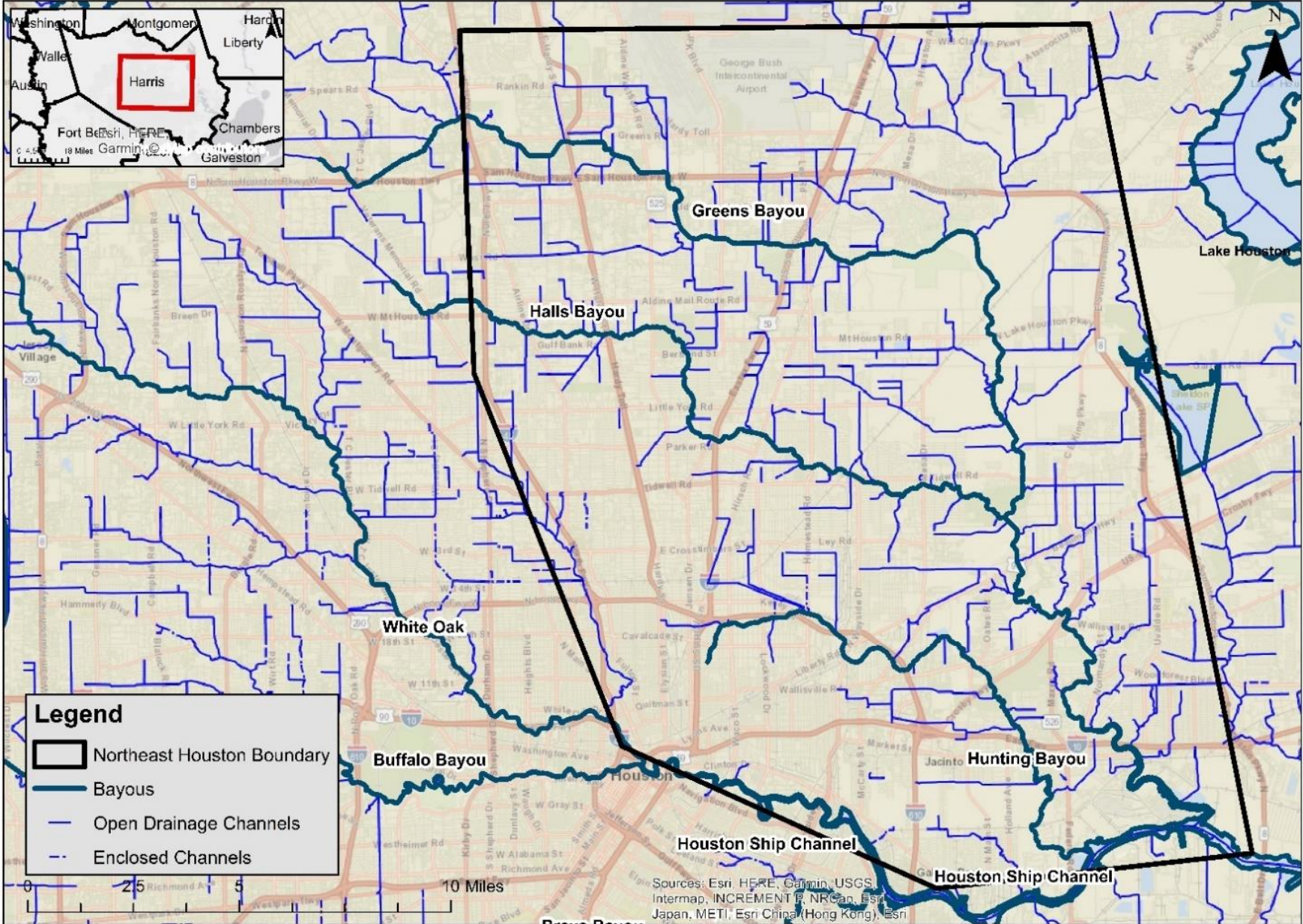


Figure 14. Map showing persistent flooding issues in Northeast Houston according to a survey of residents and Super Neighborhood leaders.



Harris County Drainage Channels

8/24/2021



Produced by: Sustainable Planning and Design, LLC  
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 Produced on: 8/24/2020

Datum & Projected Coordinate System : NAD 83 UTM Zone 14N  
 Data Sources : COH Waterways, HCFCD TSARP Channels

Figure 15. Harris County drainage ditch network and bayous.





*Figure 16. Open drainage ditch in Northwood Manor with trash piling up and obstructing drainage.*





*Figure 17. Tires in the Harris County P125 drainage ditch.*





*Figure 18. Inlets of the Harris County P125 drainage ditch.*





*Figure 19. A drainage inlet on an uninhabited property in Northwood Manor which is almost completely covered by overgrown plants and debris.*





*Figure 20. A drainage inlet in the old section of Northwood Manor (top) vs. a drainage inlet in a new development of Northwood Manor (bottom).*





*Figure 21. The Union Pacific railroad at the intersection of Little York Rd. and Hirsch Rd.*



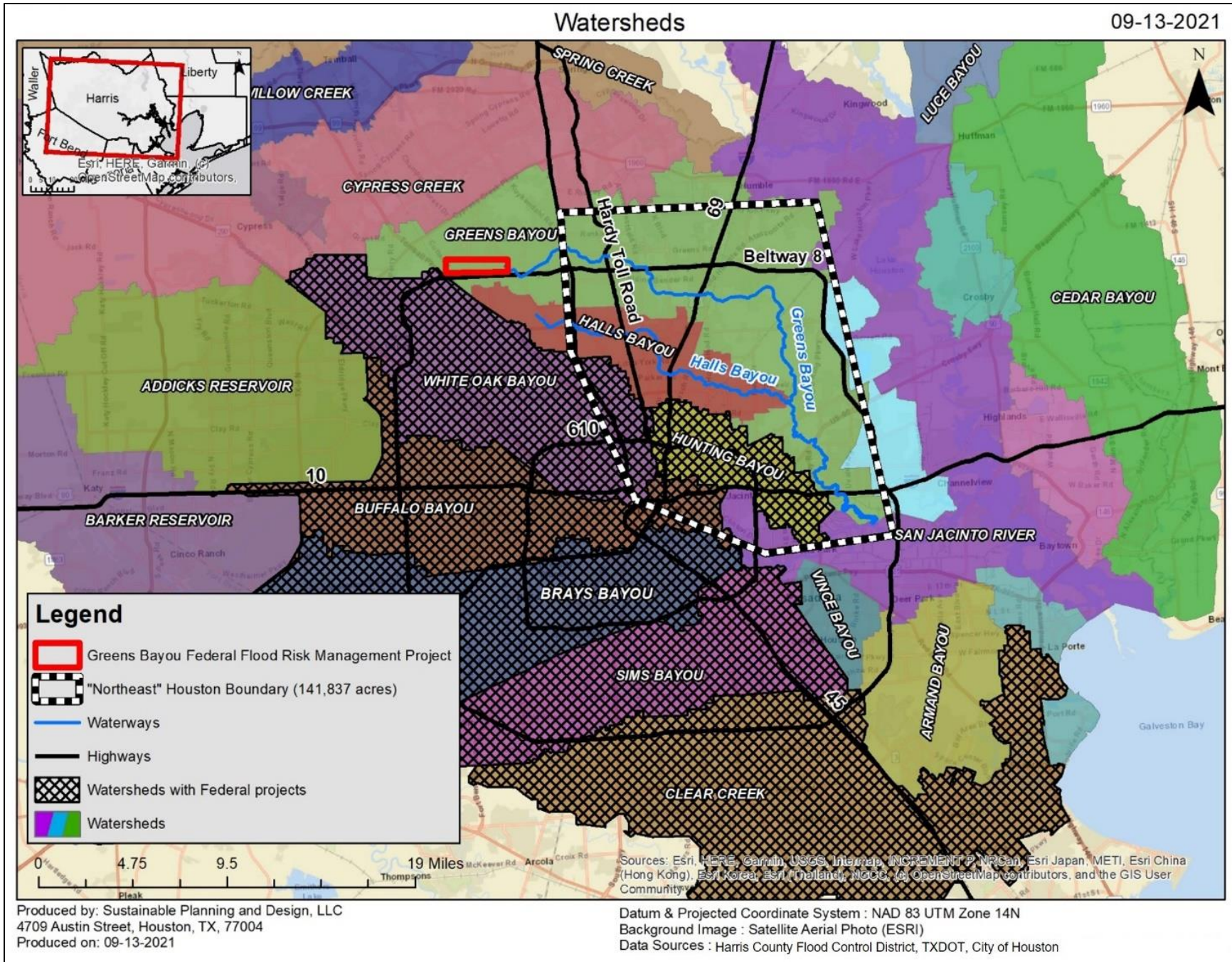


Figure 22. Harris County watersheds with and without major federally funded projects completed or in planning, and Halls and Greens Bayous.



### 2018 Bond Program: Funding Allocation by Watershed

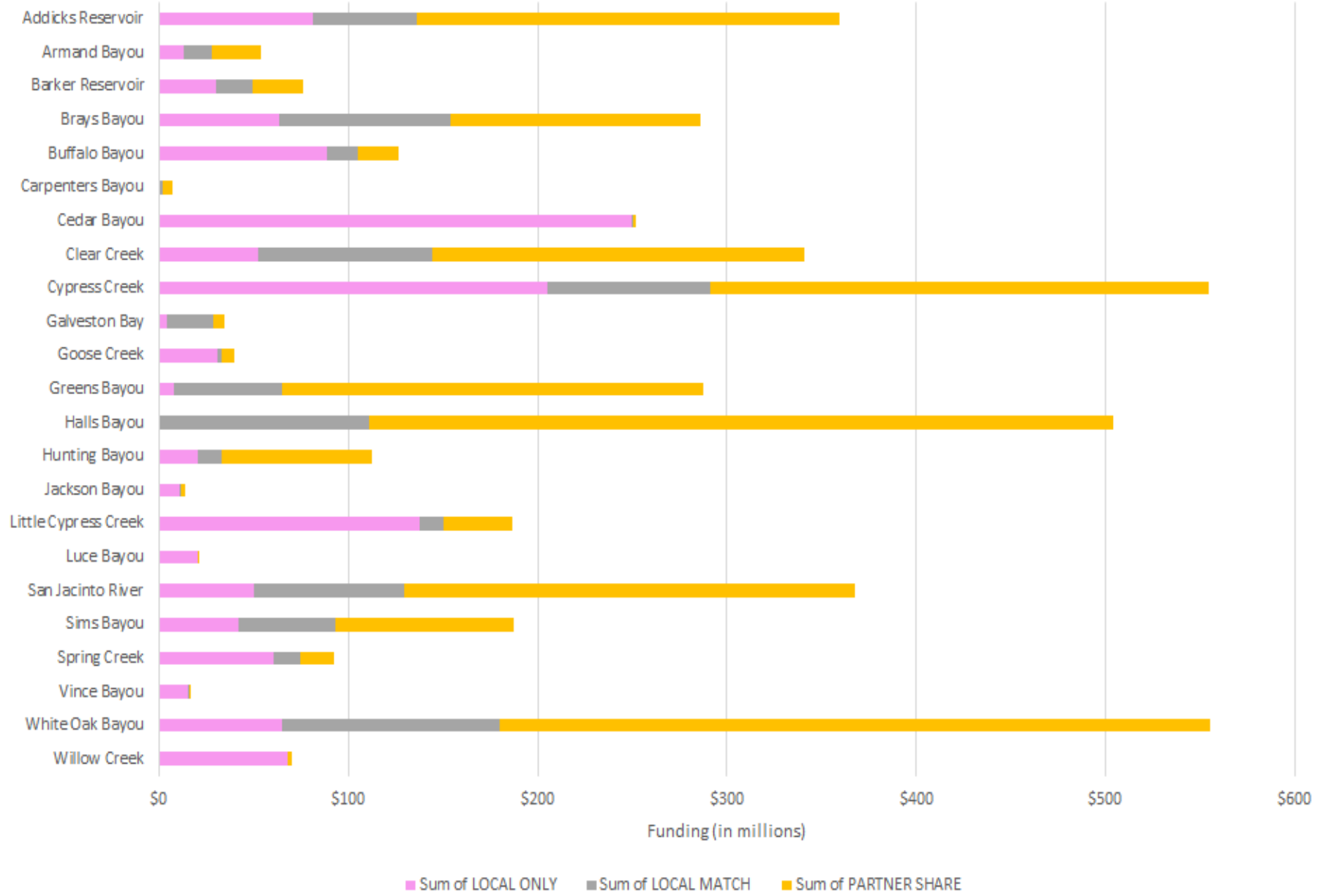
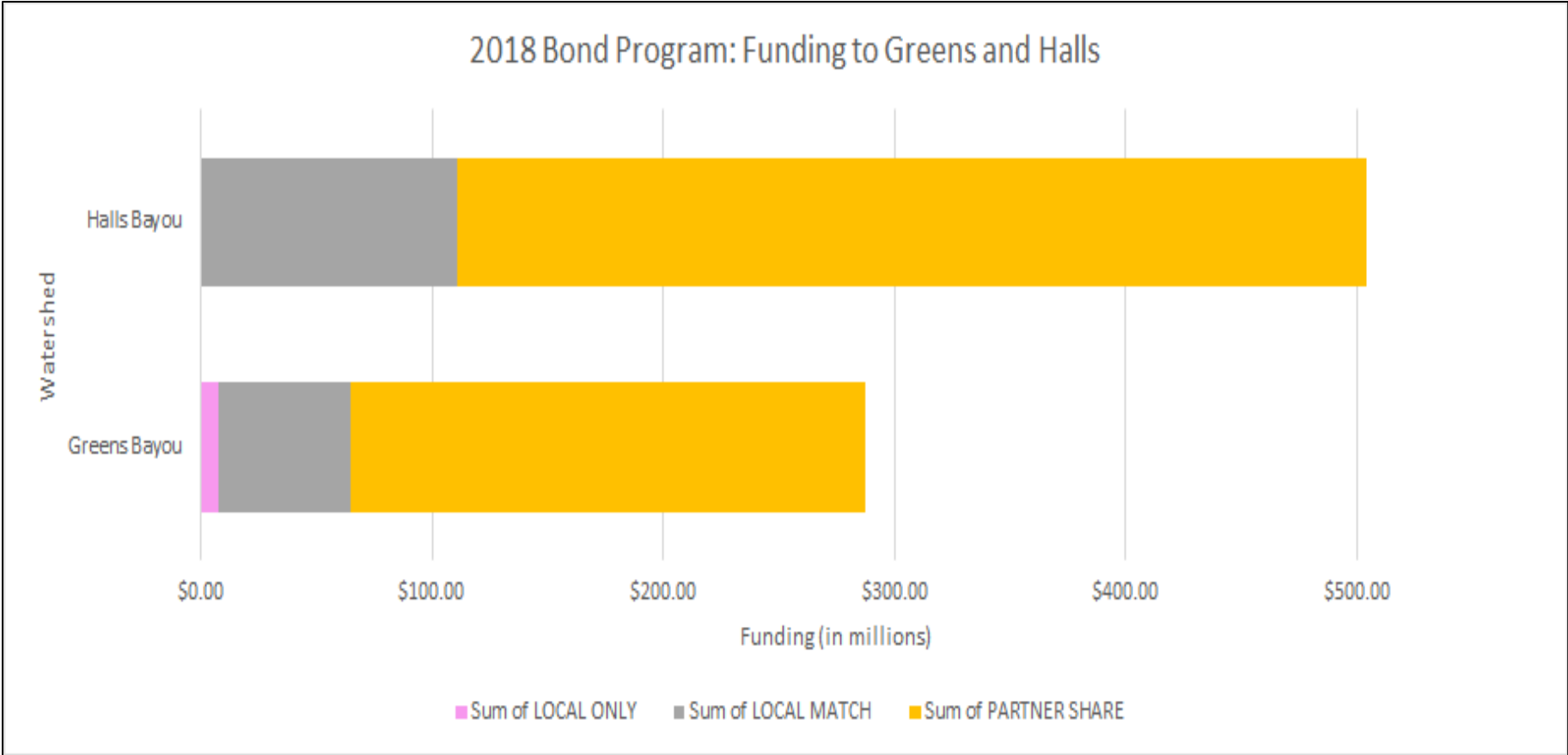


Figure 23. The allocation of local, local match, and partner share funding for the 2018 Bond Project.





*Figure 24. Funding allocation to Greens and Halls Bayous.*



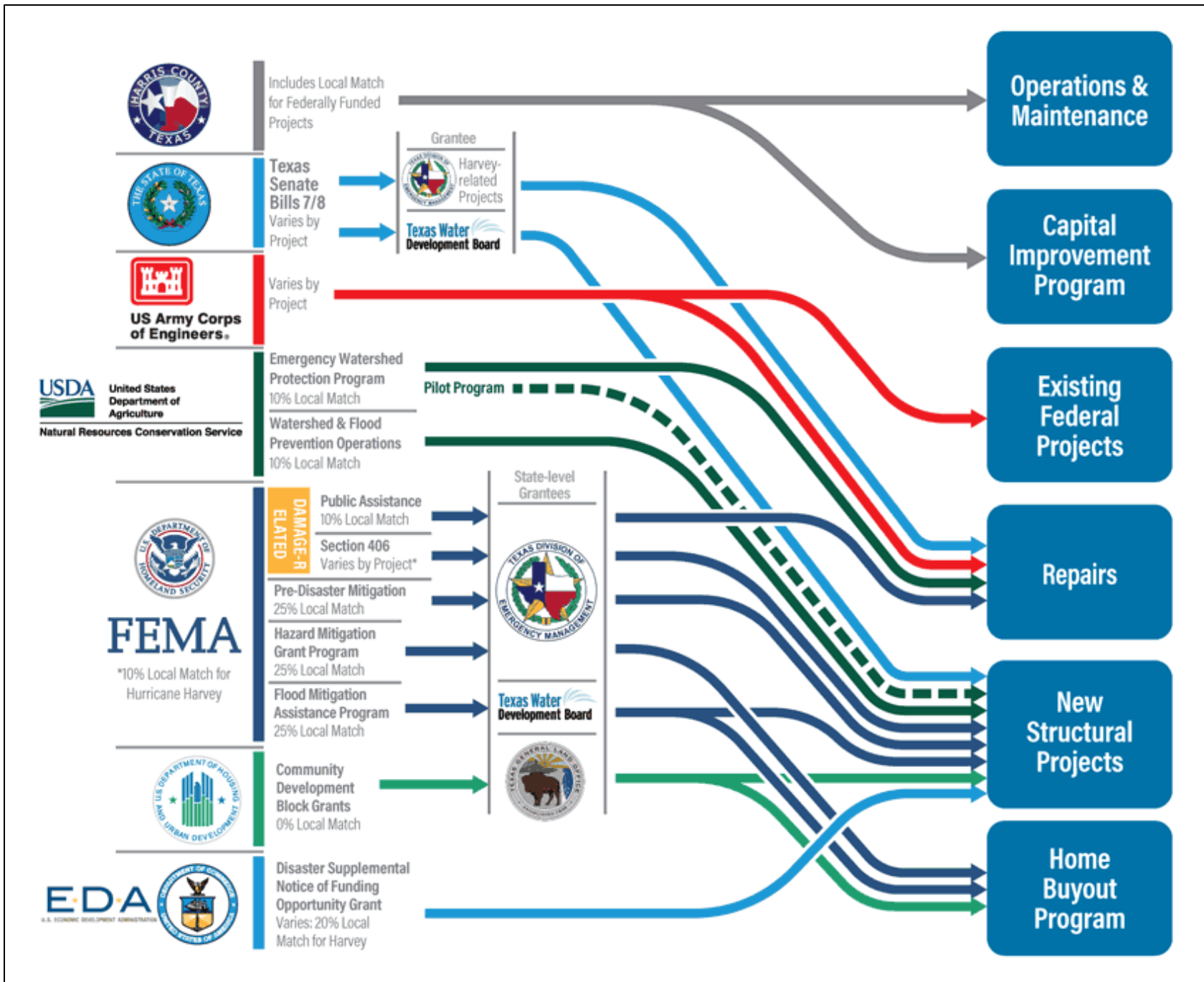


Figure 25. Graphic from Harris County Flood Control District shows the flow of various partner funds and their unique requirements of local match.



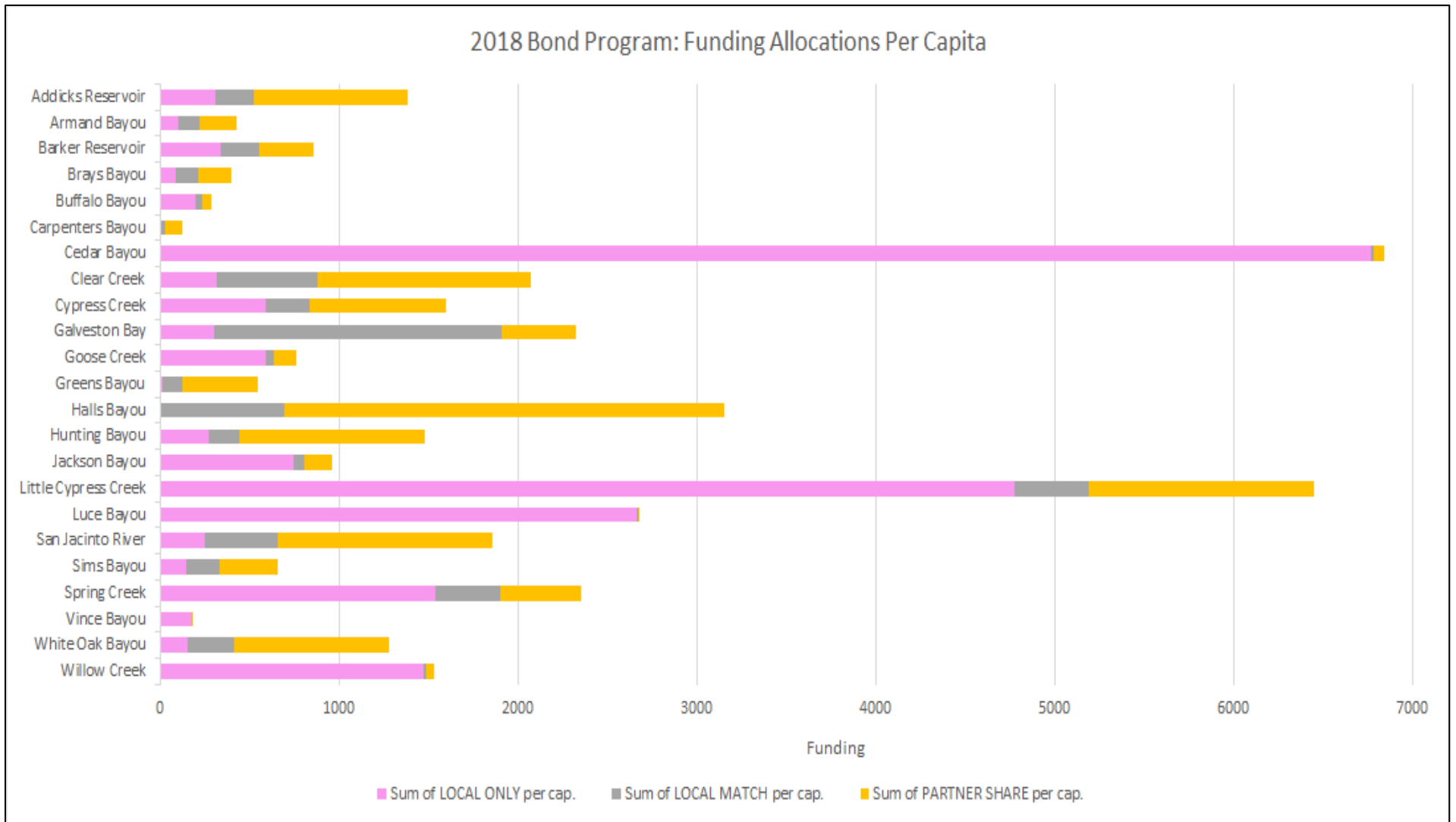


Figure 26. Harris County 2018 bond allocation per capita over watersheds.



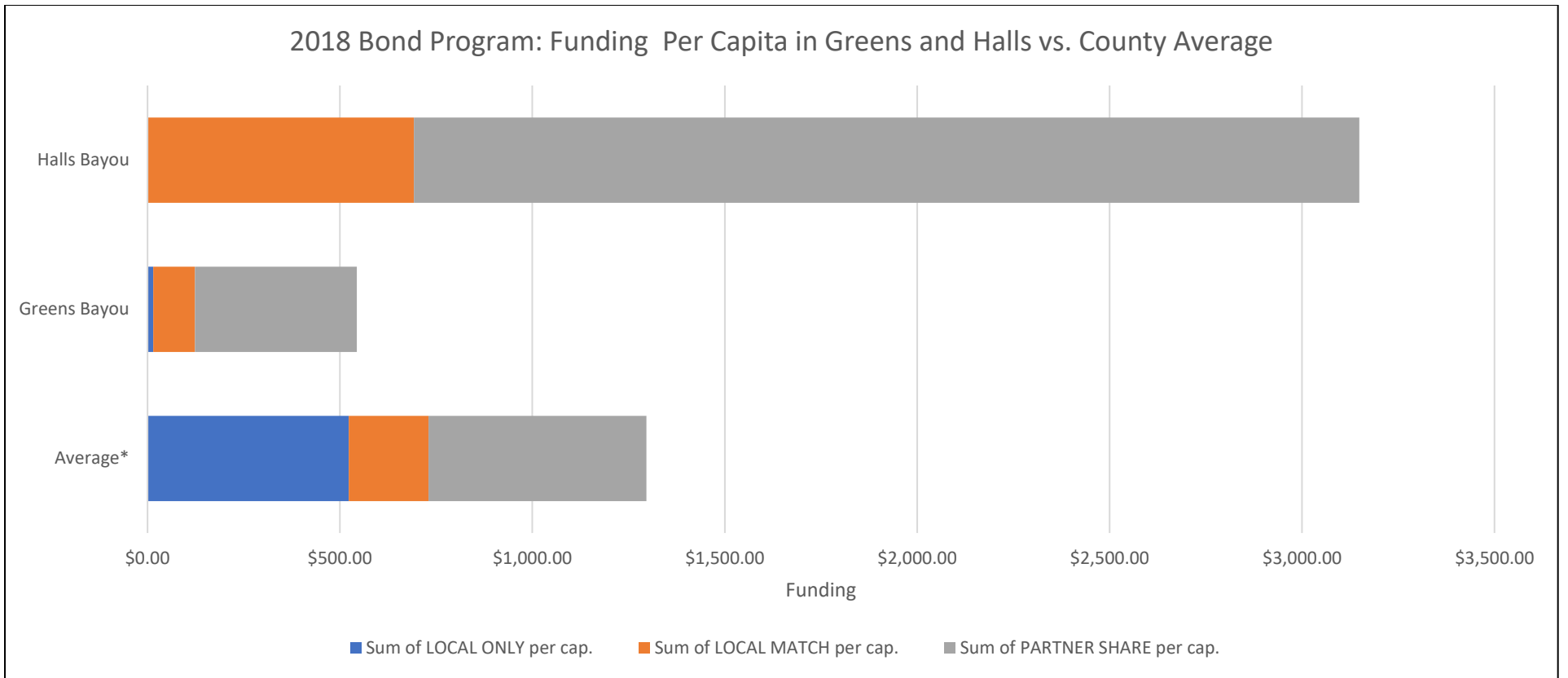
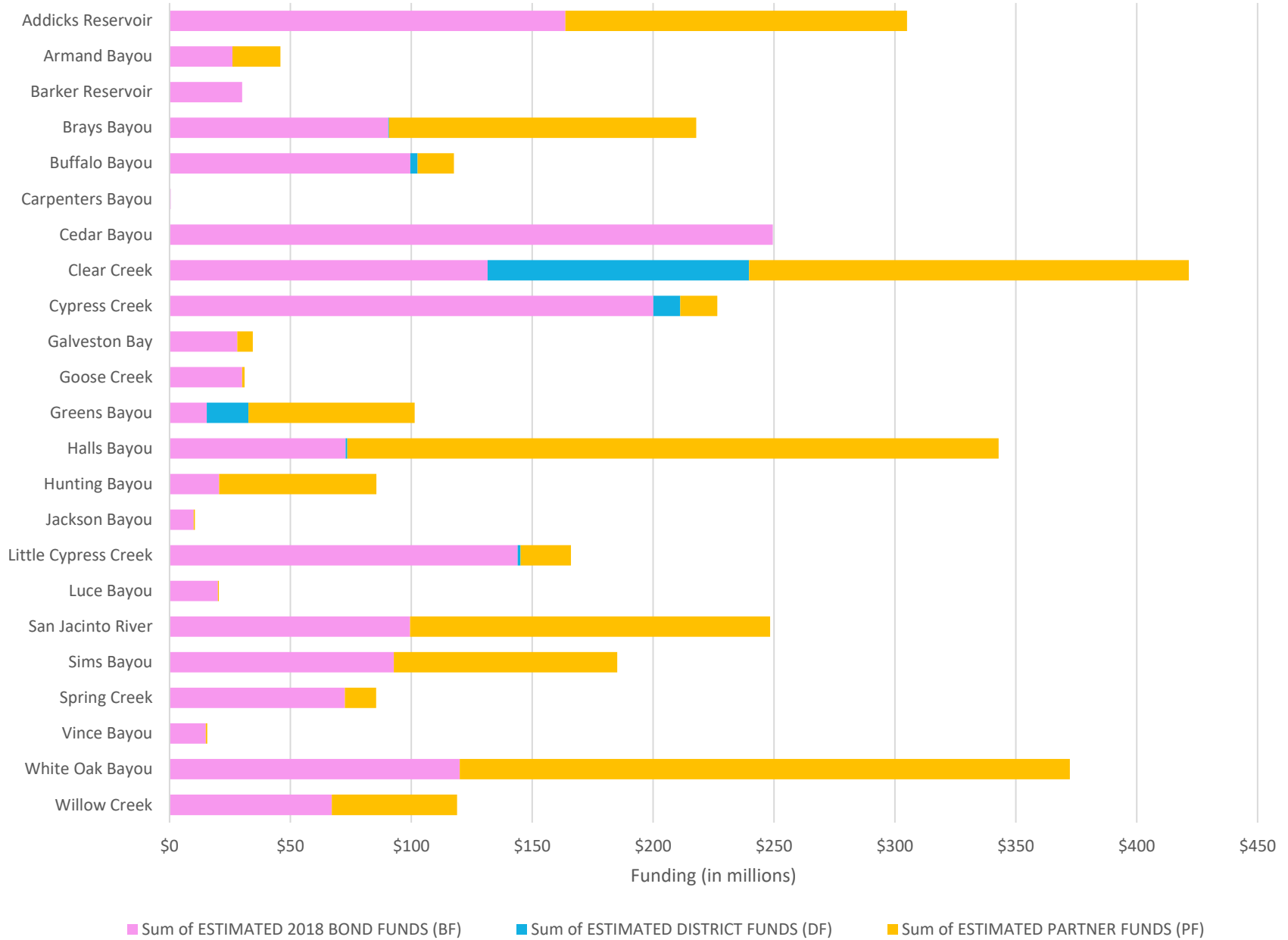


Figure 27. Harris County 2018 bond allocation per capita in Halls and Greens Bayous versus the County average.

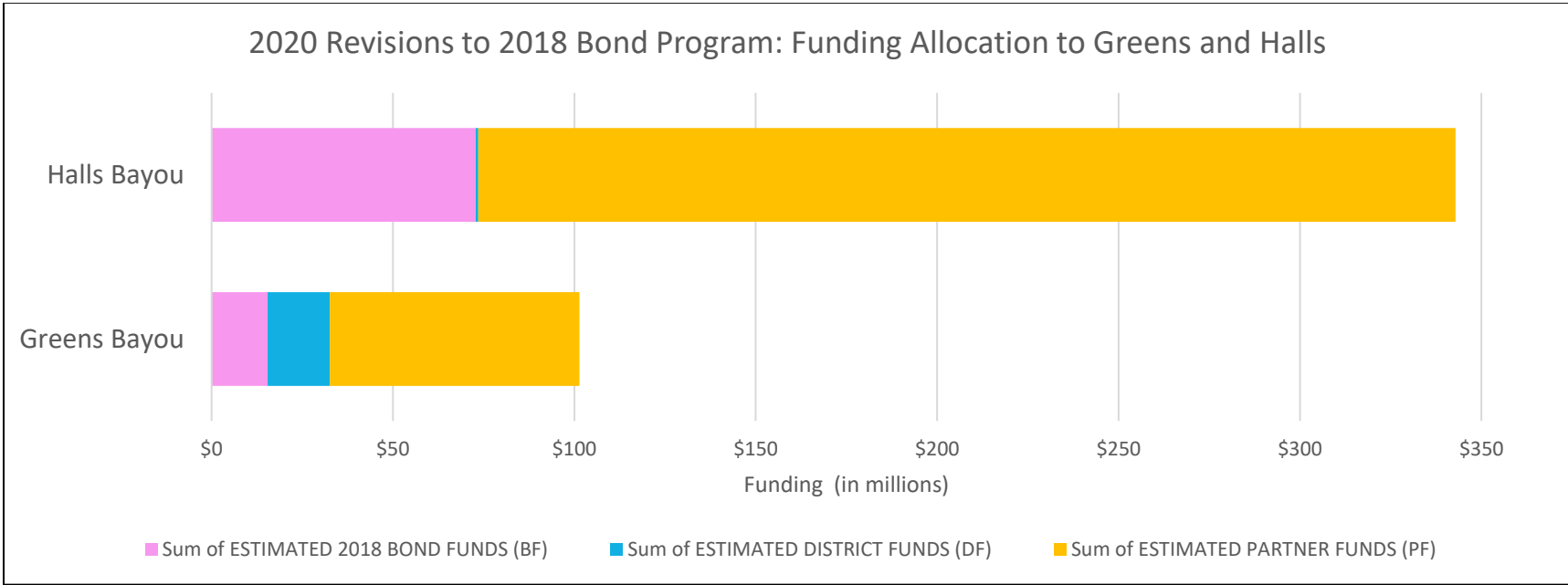


## 2020 Revisions to 2018 Bond Program: Funding Allocation by Watershed



*Figure 28. 2020 revised Bond funding allocation by watershed.*





*Figure 29. 2020 revised Bond funding allocation for Greens and Halls Bayous.*



## Equality



The assumption is that **everyone benefits from the same supports**. This is equal treatment.

## Equity



**Everyone gets the supports they need** (this is the concept of "affirmative action"), thus producing equity.

## Justice



All 3 can see the game without supports or accommodations because **the cause(s) of the inequity was addressed**. The systemic barrier has been removed.

Figure 30. Diagram showing the difference between equality, equity, and justice.



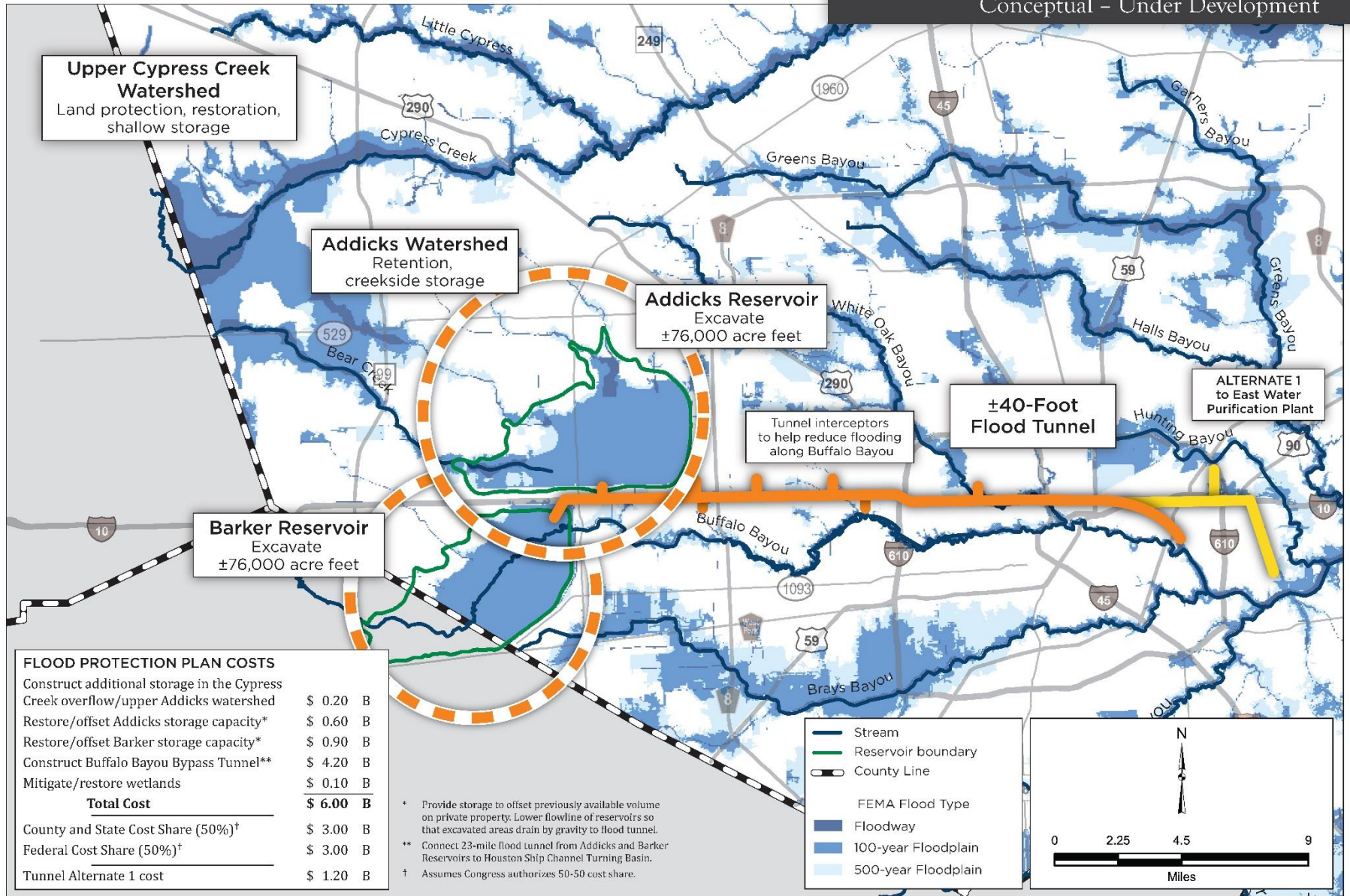


Figure 31. Private sector action plan for the Addicks and Barker Reservoir area developed by Houston Stronger, a private sector organization.



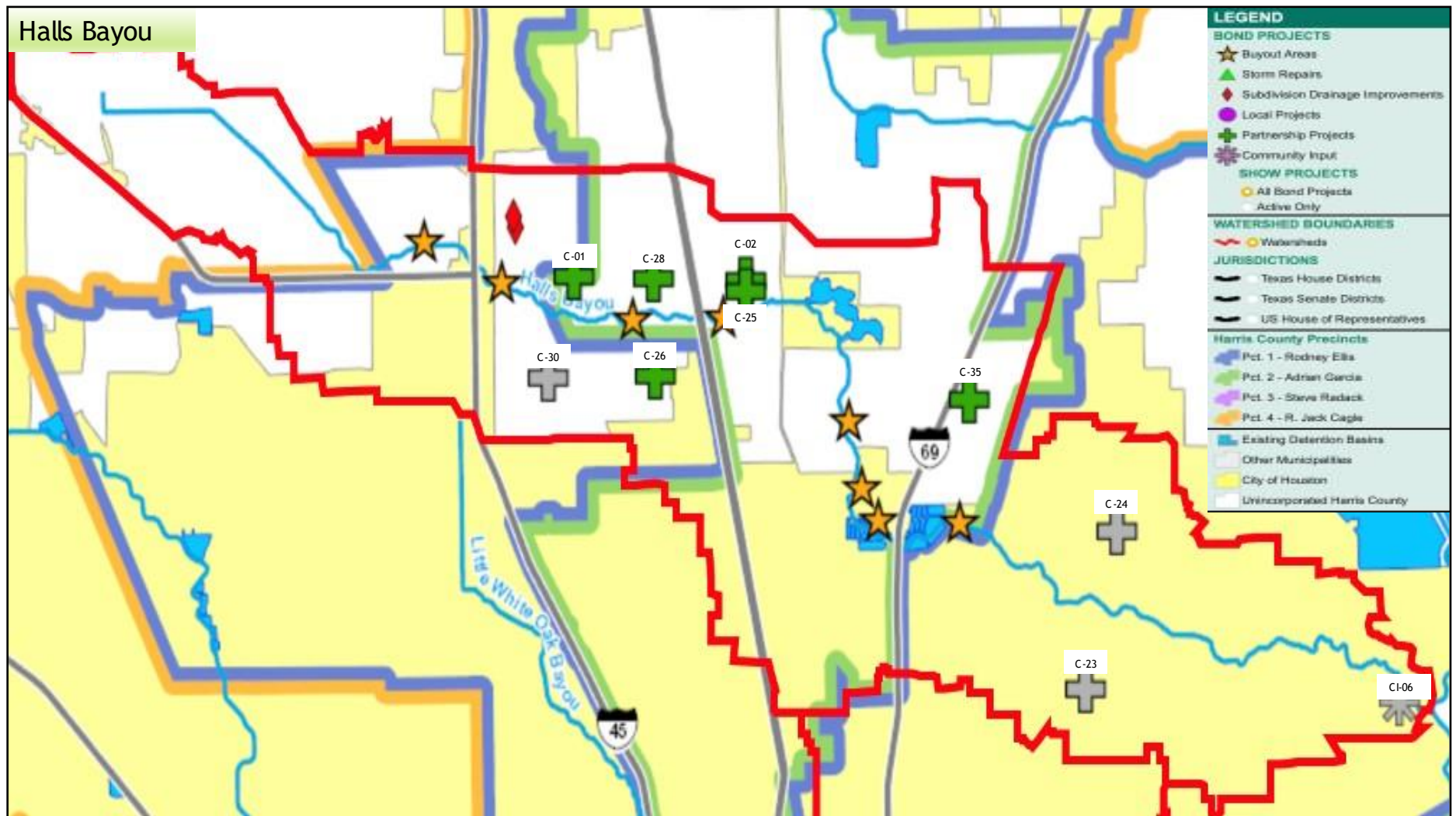


Figure A1. HCFC projects in Halls Bayou Watershed.







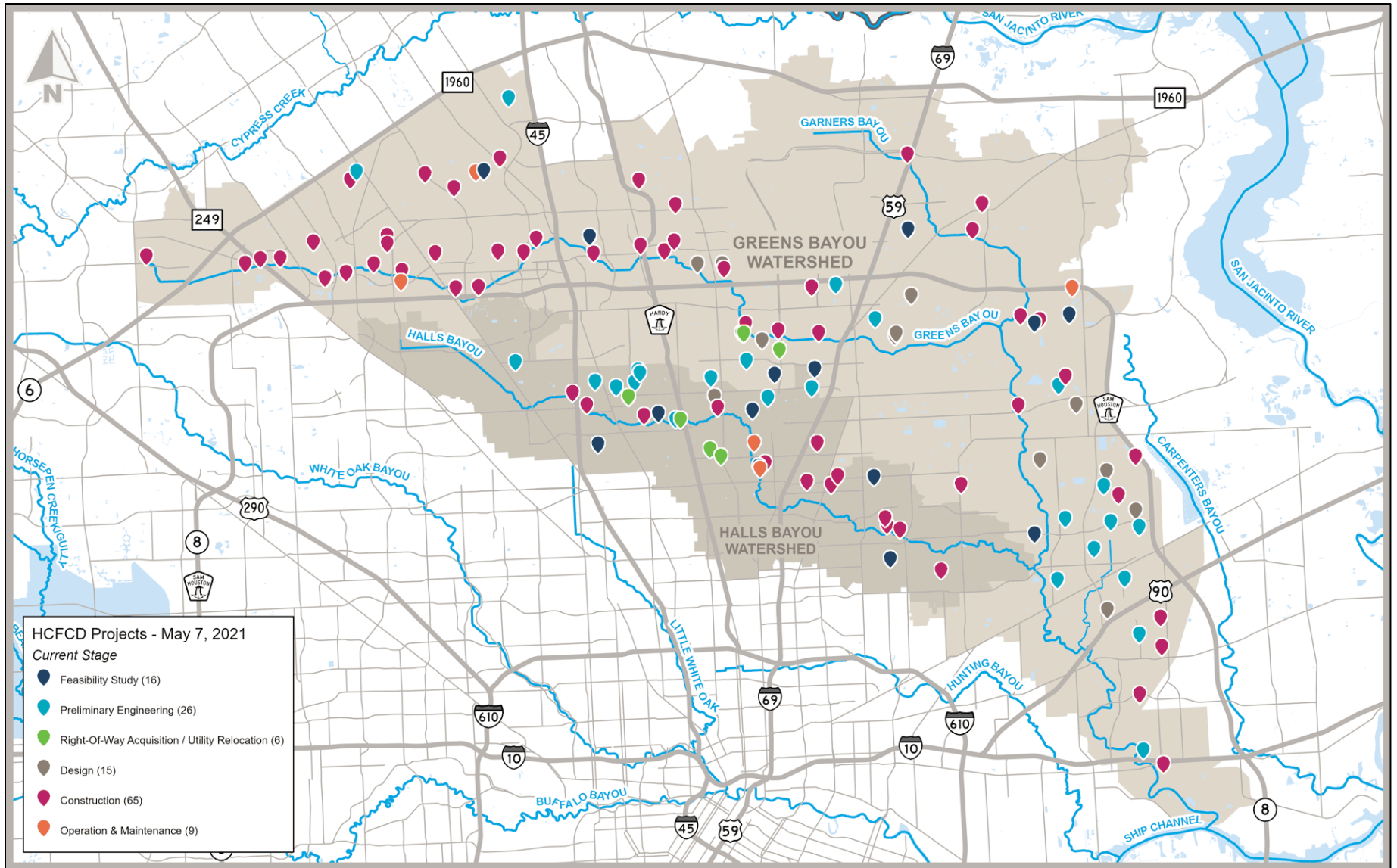


Figure A2. Projects in Halls Bayou Watershed.



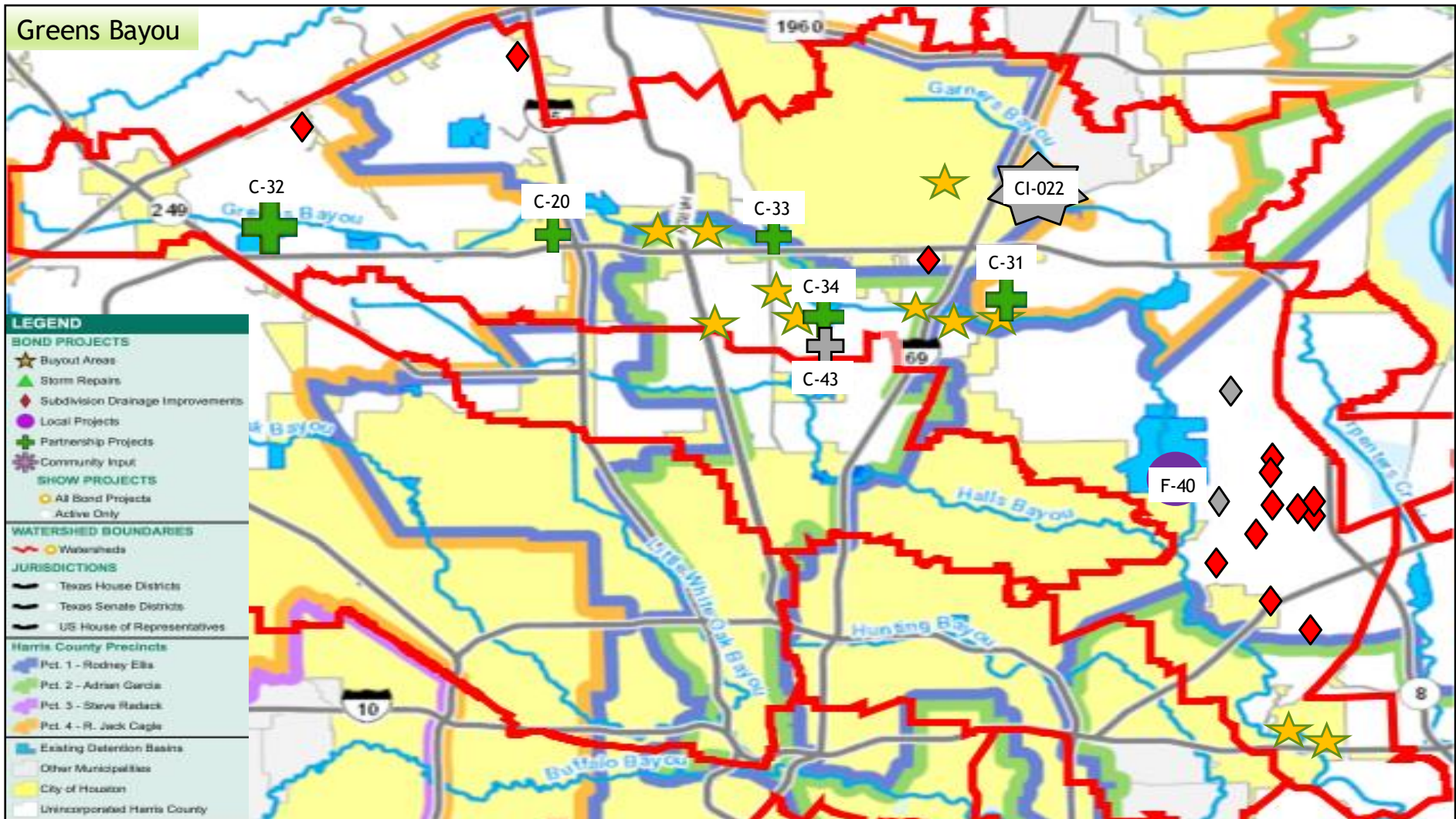


Figure A3. HCFCO projects in Greens Bayou Watershed.



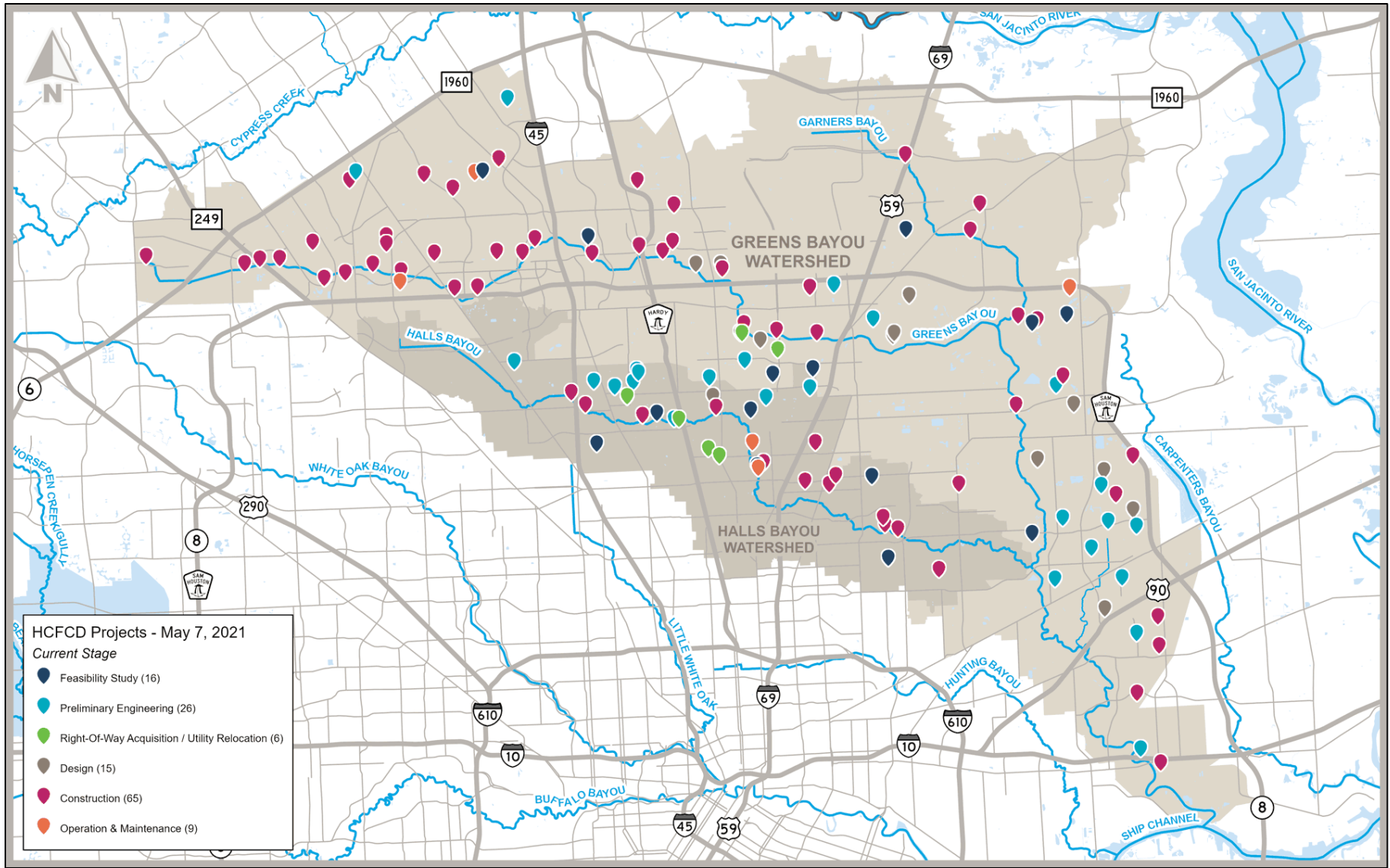


Figure A4. Projects in Greens Bayou Watershed.



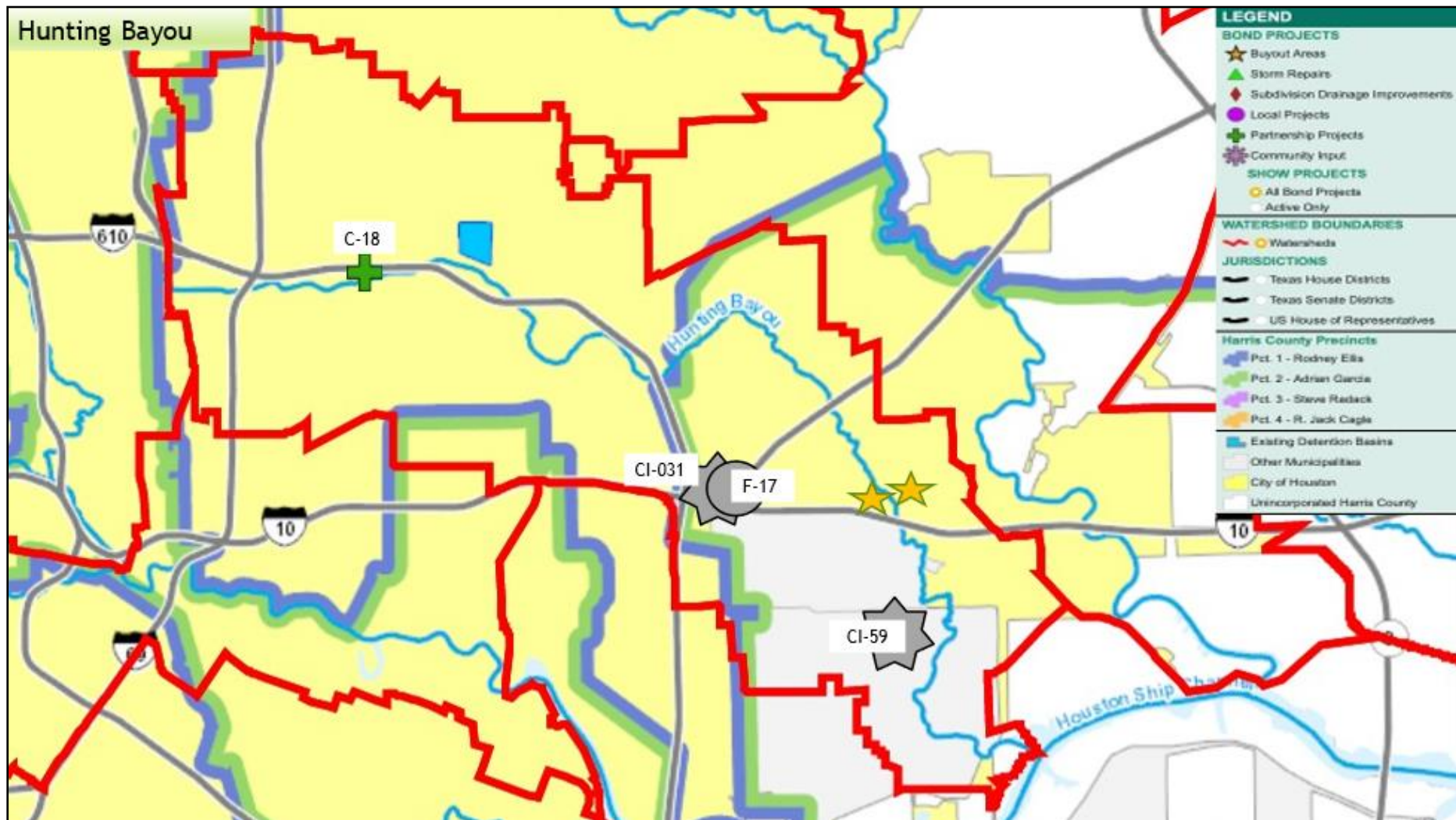


Figure A5. HCFCDCD projects in Hunting Bayou Watershed.



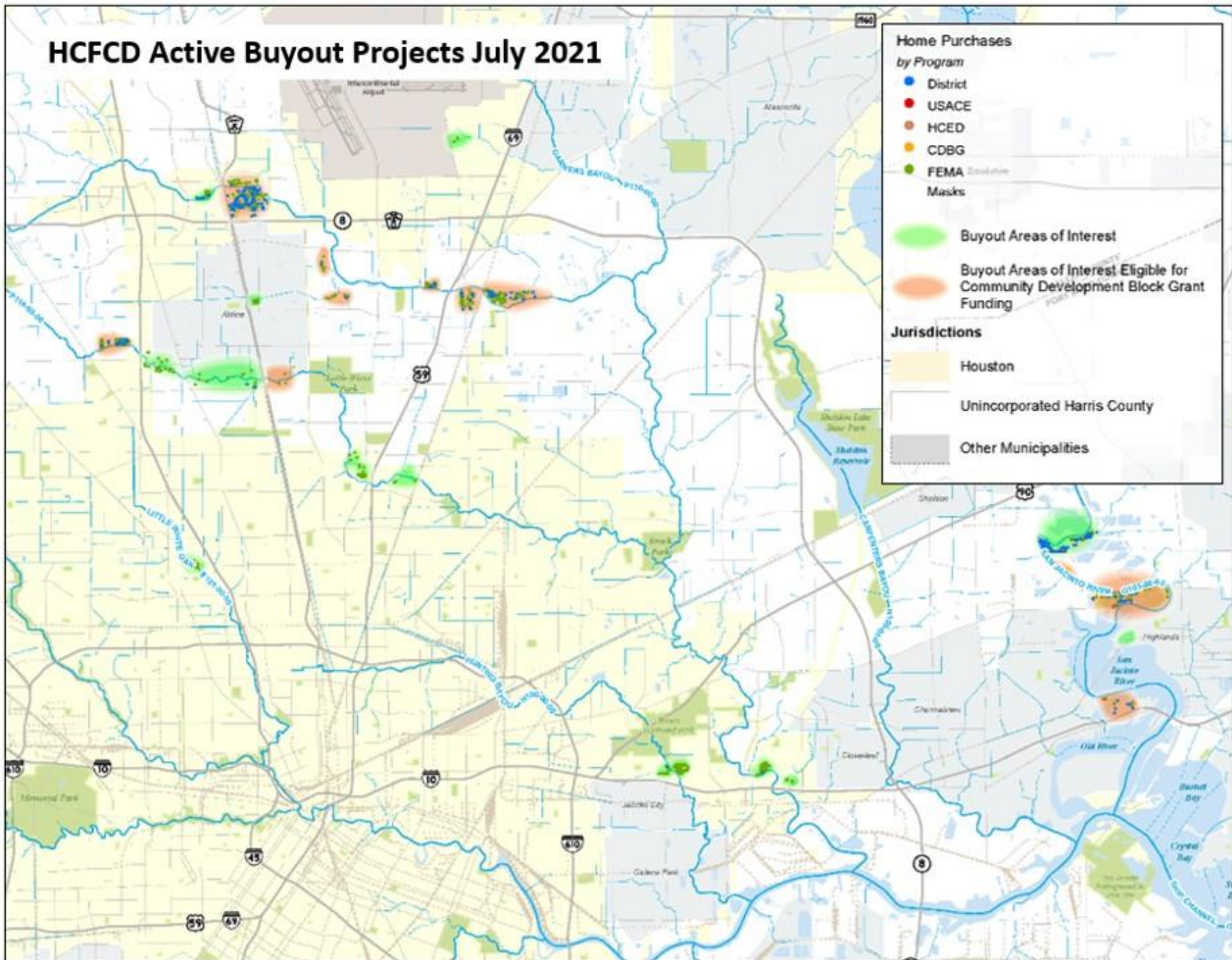


Figure A6. HCFC Active Buyout Projects map.



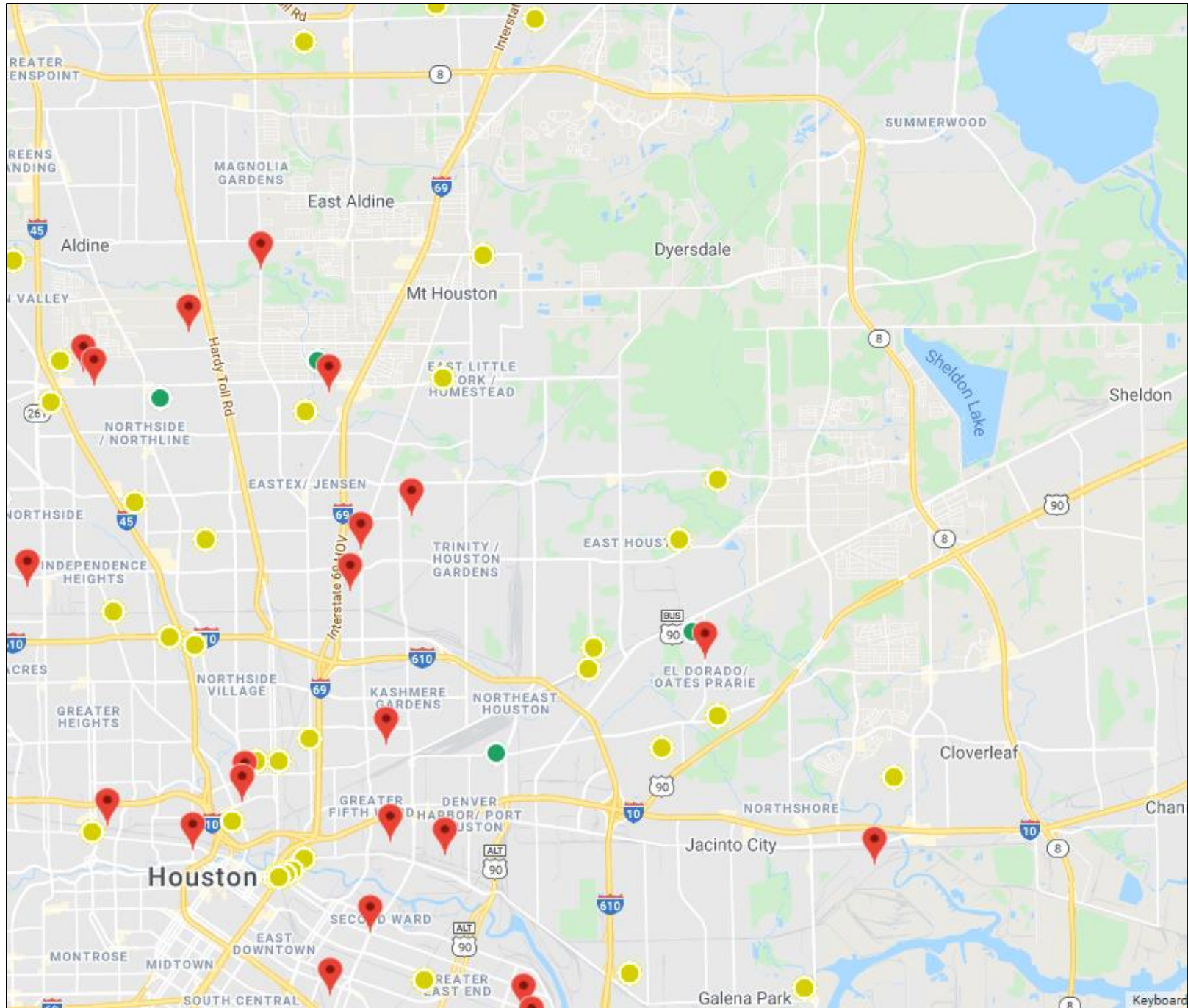


Figure A7. Active and Planned drainage and street rehabilitation and reconstruction projects in districts B, E, H, and I shown on the Build Houston Forward site.



# Council Members' Priority SWAT Projects

9-20-2021

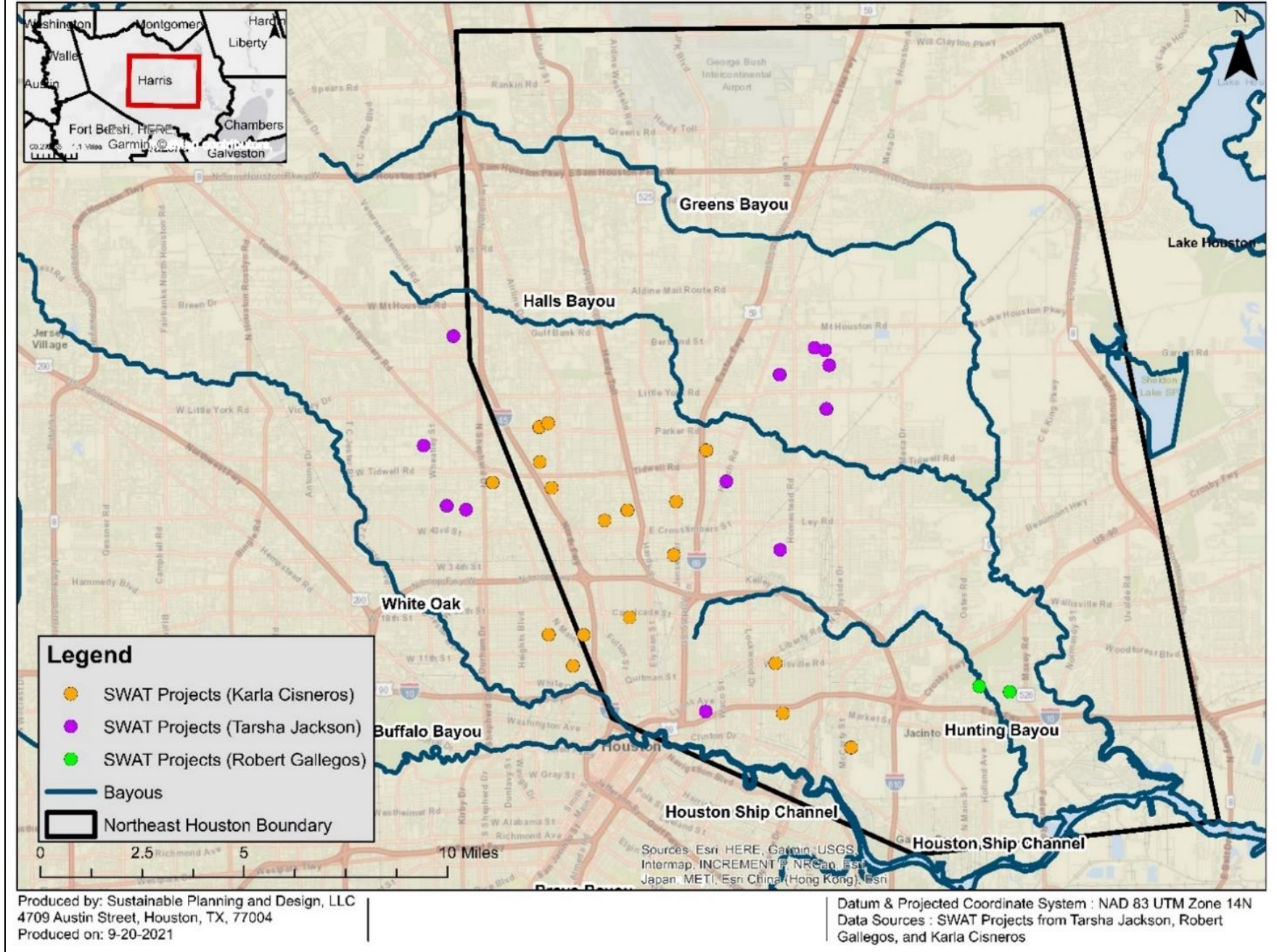
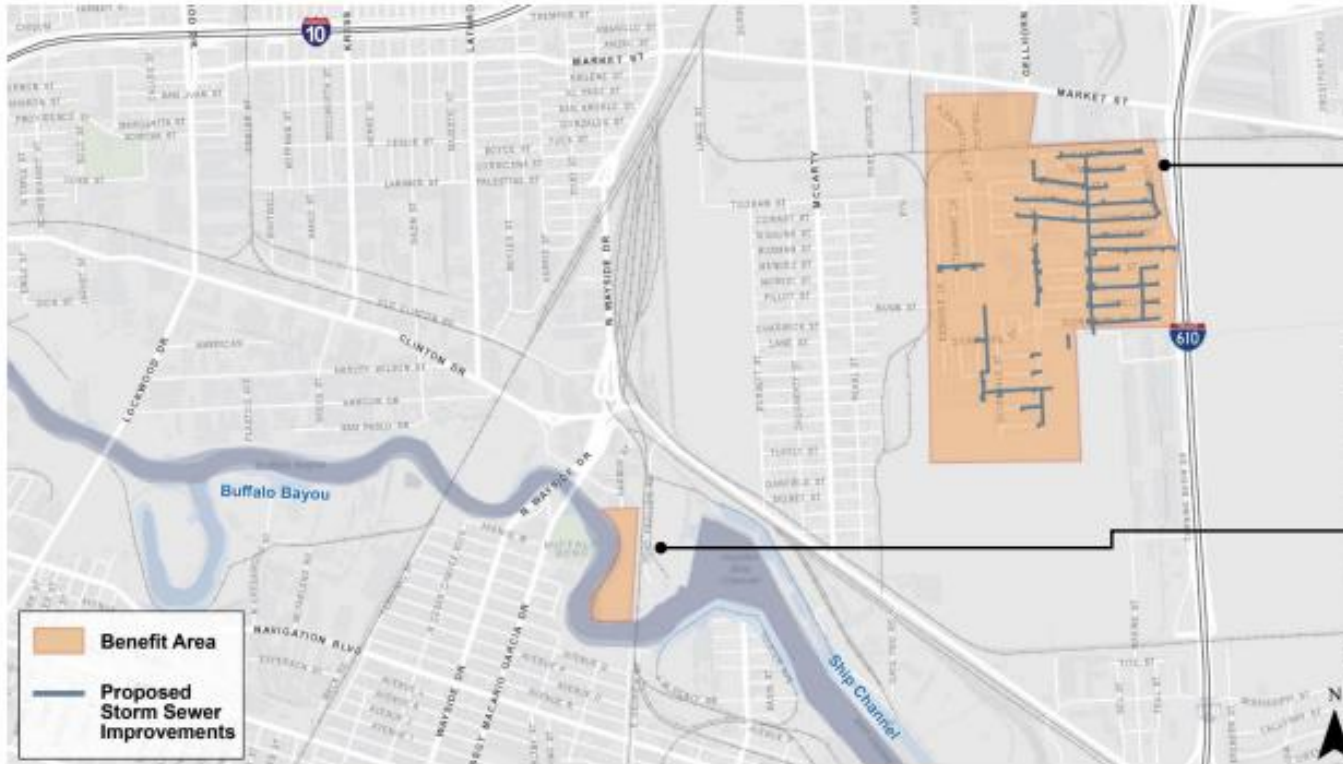


Figure A8. SWAT Projects in the Northeast area provided by Council Members Tarsha Jackson, Robert Gallegos, and Karla Cisneros with Bayous.



# PORT AREA

## 2017/HARVEY PROPOSED PARTNERSHIP PROJECT (2 OF 3)



- \$99M estimated total project cost

### PLEASANTVILLE

- storm line improvements on several streets
- detention basin

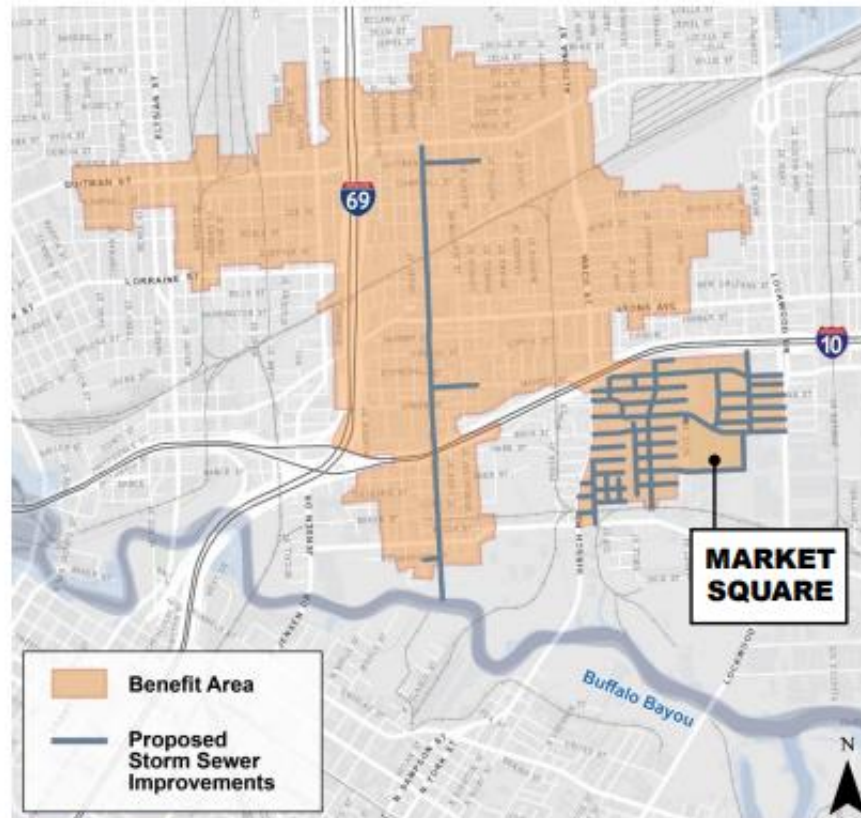
### HARBOR STREET LILY PAD

- community center
- pedestrian bridge

Figure A9. Slide on proposed Port Area project from HPW public meeting presentation on the City's application for CBGD-MIT funds from Texas GLO.



# FIFTH WARD AREA 2017/HARVEY PROJECT



HOUSTON  
PUBLIC WORKS



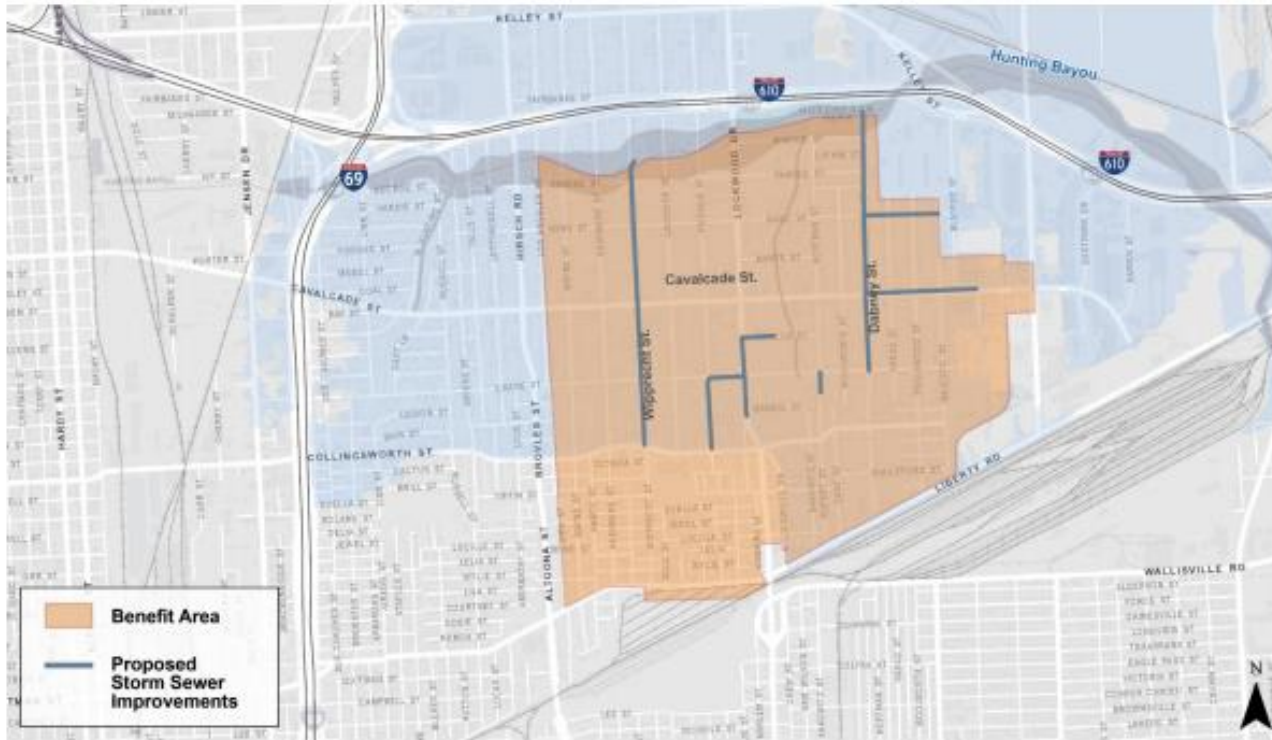
- \$115M estimated project cost
- 1.5-mile drainage trunk system on Gregg Street from Liberty to Buffalo Bayou
- Upgraded trunk system on Buck Street, Schweikhardt Street and Coke Street
- New 3 x 108-inch trunk system to Japhet Creek

Figure A10. Slide on proposed Fifth Ward Area project from HPW public meeting presentation on the City's application for CBGD-MIT funds from Texas GLO.



# KASHMERE GARDENS AREA

## 2017/HARVEY PROJECT



- \$94.8M estimated project cost
- new storm lines on several streets
- detention basins with pedestrian trails & amenities

Figure A11. Slide on proposed Kashmere Gardens Area project from HPW public meeting on the City's application for CBGD-MIT funds from Texas GLO.



Table 1. Super Neighborhoods and their numerical code.

SN #	Super Neighborhood
2	GREATER GREENSPOINT (inactive)
42	IAH / AIRPORT AREA (inactive)
45	NORTHSIDE/NORTHLINE (inactive)
46	EASTEX - JENSEN AREA
47	EAST LITTLE YORK / HOMESTEAD
48	TRINITY / HOUSTON GARDENS
49	EAST HOUSTON
50	SETTEGAST
51	NEAR NORTHSIDE

SN #	Super Neighborhood
52	KASHMERE GARDENS
53	EL DORADO / OATES PRAIRIE (inactive)
54	HUNTERWOOD (inactive)
55	GREATER FIFTH WARD
56	DENVER HARBOR / PORT HOUSTON (inactive)
57	PLEASANTVILLE AREA
58	NORTHSHORE (inactive)
59	CLINTON PARK TRI-COMMUNITY
65	HARRISBURG / MANCHESTER (inactive)



Table 2. Racial and ethnic breakdown of population within Harris County, the Northeast community, the Northeast community living within Houston City limits, The Northeast community living in MUDs outside of City limits, and the Northeast community living in the unincorporated area. Data compiled by Emily Fucile for Sustainable Planning and Design using 2019 Census data on race and ethnicity from the 2019 community survey (U.S. Census Bureau, 2019a).

Population by Race and Ethnicity for Harris County and the Northeast Area Based on 2019 Estimates						
Boundary	Total Population	White Population	Black or African American Population	Asian Population	Hispanic or LatinX	Other Population
All of Harris County	4,646,630	1,374,905 (30%)	863,044 (19%)	321,392 (7%)	1,995,115 (43%)	92,174 (2%)
Northeast Boundary	598,370	51,724 (9%)	147,422 (25%)	6,125 (1%)	388,090 (65%)	4673 (1%)
City of Houston in NE Boundary	340,646	20,795 (6%)	93,518 (27%)	2,118 (1%)	221,736 (65%)	2,476 (1%)
MUD inside NE Boundary	88,424	14,256 (16%)	28,378 (32%)	2,137 (2%)	42,497 (48%)	1,155 (1%)
Unincorporated in NE Boundary	181,309	17,865 (10%)	30,136 (17%)	2,044 (1%)	129,760 (72%)	1,502 (1%)

*Table 3. Percentage of families living in poverty within Harris County and within the Northeast community based on 2019 Census data (U.S. Census Bureau, 2019a). Emily Fucile for Sustainable Planning and Design.*

<b>Count of Households in Poverty in Harris County and the Northeast Area (2019 Estimate)</b>			
<b>Boundary</b>	<b>Total Number of Households</b>	<b>Count of Families in Poverty</b>	<b>Percentage of Families in Poverty</b>
<b>All of Harris County</b>	1,605,368	229,518	14%
<b>Northeast Boundary</b>	181,785	43,790	24%

*Table 4. Homes flooded in Northeast Houston during Imelda, Harvey, and Allison. Data compiled by Sarah Swackhamer for Sustainable Planning and Design using information from HCFCD flood reports following major storms (HCFCD 2019; HCFCD 2018a; HCFCD 2001).*

<b>Watershed</b>	<b>Imelda</b>	<b>Harvey</b>	<b>Allison</b>
<b>Greens Bayou</b>	310	12,900	15,000
<b>Halls Bayou</b>	775	11,830	13,000
<b>Hunting Bayou</b>	35	7,420	8,000



Table 5. Comparison of the “current” FEMA 100-year and 500-year rainfall by time period as well as the NOAA Atlas 14 “new” 100-year and 500-year rainfall and five recent storm events. It is important to note that the Northeast has been impacted by at least two storms – Harvey and Allison – that were larger than the “new” 500-year rainfall. Table created by Camille Chenevert for Sustainable Planning and Design, based in part on data from Jeff Lindner of Harris County Flood Control District and NOAA Atlas 14 Point Precipitation Frequency Estimates for Houston WB City (79-0056) station (NOAA, 2017).

Duration	Precipitation Depth (Inches)								
	Current FEMA 100-Year	Current FEMA 500-Year	NOAA Atlas 14 100-Year	NOAA Atlas 14 500-Year	Imelda Sept. 2019	Harvey Aug. 2017	Tax Day April 2016	Allison June 2001	October 1994
1-hr	4.3	5.5	4.9	6.4	6.4	6.8	4.7	5.7	3.7
2-hr	5.7	7.6	7.0	9.8	9.2	11.9	7.3	9.9	4.7
3-hr	6.7	9.2	8.6	12.4	10.9	14.8	8.3	13.5	5.3
6-hr	8.9	12.8	11.4	17.0	14.3	18.9	13.9	21.2	7.2
12-hr	10.8	15.5	14.1	21.2	17.9	20.9	16.7	28.3	12.0
24-hr	13.2	18.9	17.0	25.5	21.1	25.6	17.4	28.4	20.9
2 days	14.5	20.0	20.6	30.0	29.1	35.2	17.5	28.5	23.1
4 days	15.9	21.1	23.2	32.9	29.7	47.7	N/A	38.5	28.9

Table A1. Halls Bayou HCFCD bond project details. Table adapted from 2020 update of 2018 Bond Project List (HCFCD, 2020). Project statuses from project details found on HCFCD website (HCFCD, 2021g).

TITLE	TYPE	BOND ID	UNIT ID	STATUS	ESTIMATED 2018 BOND FUNDS (BF)	ESTIMATED PARTNER FUNDS (PF)	ESTIMATED DISTRICT FUNDS (DF)	TOTAL (BF+PF+DF)	DESCRIPTION OF BENEFITS / NOTES
Construction of P518-26 Stormwater Detention Basin	Partnership	C-01	P518-26-00	Construction	-	\$ 975,853	\$ 56,229	\$ 1,032,082	When complete with future funding, this project could reduce the risk of flooding for more than 230 structures and could reduce the 1% floodplain for over 100 acres as part of the Halls Ahead Bond Implementation Program.
CDBG-DR (2016) - Aldine Westfield Stormwater Detention Basin and Channel	Partnership	C-02	P518-00-00	Consolidated into countywide project in 2020	-	-	-	-	Project consolidated with C-25 to match ongoing project management as a single project.
Local Cost Share for Corps of Engineers Halls Bayou Study	Partnership	C-21	P118-00-00	Consolidated into countywide project in 2020	-	-	-	-	Project consolidated with C-41 as the project did not receive funding from the Corps of Engineers. District Funding consolidated with C-41.
Right-Of-Way, Design, and Construction of Channel Conveyance Improvements on P118-08-00	Partnership	C-23	P118-08-00	Preliminary Engineering	\$ 2,500,000	\$ 22,500,000	-	\$ 25,000,000	This project could reduce the risk of flooding for over 210 structures and could reduce the 1% floodplain for over 170 acres as part of the Halls Ahead Bond Implementation Program.
Right-Of-Way, Design, and Construction of Channel Conveyance Improvements on P118-09-00	Partnership	C-24	P118-09-00	Preliminary Engineering	\$ 1,200,000	\$ 10,800,000	-	\$ 12,000,000	This project could reduce the risk of flooding for over 200 structures in the pre-Atlas 14 1% AEP (100-year) floodplain and could reduce that floodplain by more than 160 acres as part of the Halls Ahead Bond Implementation Program.
Right-Of-Way, Design, and Construction of Channel Conveyance Improvements on P118-21-00	Partnership	C-25	P118-21-00	Construction	\$ 5,400,000	\$ 14,636,050	-	\$ 20,036,050	This project could reduce the risk of flooding for over 140 structures in the pre-Atlas 14 1% AEP (100-year) floodplain and could reduce that floodplain by more than 100 acres as part of the Halls Ahead Bond Implementation Program.
Right-Of-Way, Design, and Construction of Channel Conveyance Improvements on P118-23-00 and P118-23-02	Partnership	C-26	P118-23-00	Preliminary Engineering	\$ 2,800,000	\$ 25,200,000	-	\$ 28,000,000	This project could reduce the risk of flooding for more than 380 structures in the pre-Atlas 14 1% AEP (100-year) floodplain and could reduce that floodplain by more than 430 acres as part of the Halls Ahead Bond Implementation Program.
Right-Of-Way, Design, and Construction of Channel Conveyance Improvements on P118-23-02	Partnership	C-27	P118-23-02	Consolidated with C-26 in 2020	-	-	-	-	Project consolidated with C-26 to match ongoing project management as a single project.



TITLE	TYPE	BOND ID	UNIT ID	STATUS	ESTIMATED 2018 BOND FUNDS (BF)	ESTIMATED PARTNER FUNDS (PF)	ESTIMATED DISTRICT FUNDS (DF)	TOTAL (BF+PF+DF)	DESCRIPTION OF BENEFITS / NOTES
Right-Of-Way, Design, and Construction of Channel Conveyance Improvements on P118-25-00 & P118-25-01	Partnership	C-28	P118-25-00	Preliminary Engineering	\$ 2,400,000	\$ 21,600,000	-	\$ 24,000,000	This project could reduce the risk of flooding for more than 600 structures in the pre-Atlas 14 1% AEP (100-year) floodplain and could reduce that floodplain by more than 200 acres as part of the Halls Ahead Bond Implementation Program.
Right-Of-Way, Design, and Construction of Channel Conveyance Improvements on P118-25-01	Partnership	C-29	P118-25-01	Consolidated with C-28 in 2020	-	-	-	-	Project consolidated with C-28 to match ongoing project management as a single project.
Right-Of-Way, Design, and Construction of Channel Conveyance Improvements on P118-27-00	Partnership	C-30	P118-27-00	Preliminary Engineering	\$ 1,200,000	\$ 10,800,000	-	\$ 12,000,000	This project could reduce the risk of flooding for over 140 structures in the pre-Atlas 14 1% AEP (100-year) floodplain and could reduce that floodplain by more than 200 acres as part of the Halls Ahead Bond Implementation Program.
Design and Construction of Stormwater Detention Basin and Associated Channel Improvements	Partnership	C-35	P518-10-00	Completed	\$ 800,000	\$ 6,384,960	\$ 623,207	\$ 7,808,167	This project removes the Atlas 14 1% AEP (100-year) floodplain from more than 150 structures and reduces the risk of flooding for more than 300 other structures as part of the Halls Ahead Bond Implementation Program.
Planning, Right-Of-Way, Design and Construction of Halls Bayou Flood Risk Management Project	Partnership	C-41	P118-00-00	Alternatives Analysis phase of Preliminary Engineering	\$ 3,460,000	\$151,500,000	-	\$154,960,000	This project could reduce the risk of flooding for over 2,800 structures in the 1% floodplain as part of the Halls Ahead Bond Implementation Program.
Design and Construction of a Stormwater Detention Basin in Brock Park	Community Input	CI-006	P118-00-00	Unspecified	\$ 5,000,000	\$ 5,000,000	-	\$ 10,000,000	Provides additional stormwater detention in support of flood damage reduction as part of the Halls Ahead Bond Implementation Program. The project will be a partnership with the City of Houston.
Halls Bayou Subdivision Drainage Improvements	Subdivision Drainage Improvement	E-11	P118-00-00	Consolidated into countywide project in 2020	-	-	-	-	Sixteen (16) subdivision drainage improvement projects are consolidated into one Bond ID assigned for countywide subdivision drainage improvement labeled Z-SubDiv. Program ID, project title, precinct, project funding and description of benefits updated to reflect the consolidation and grant amendments.
<b>Bond implementation Management (BIM) of the Right-of-Way Acquisition, Design and Construction in Halls Bayou Watershed</b>	<b>Local</b>	<b>F-122</b>	<b>P118-00-00</b>	<b>Unspecified</b>	<b>\$ 48,040,000</b>	<b>-</b>	<b>-</b>	<b>\$ 48,040,000</b>	<b>Bond implementation Management (BIM) of Halls Ahead Program could reduce the risk of flooding along Halls Bayou for over 2,800 structures in the pre-Atlas 14 1% AEP (100-year) floodplain.</b>

TITLE	TYPE	BOND ID	UNIT ID	STATUS	ESTIMATED 2018 BOND FUNDS (BF)	ESTIMATED PARTNER FUNDS (PF)	ESTIMATED DISTRICT FUNDS (DF)	TOTAL (BF+PF+DF)	DESCRIPTION OF BENEFITS / NOTES
Federal Grant-Funded Volunteer Home Buyouts	Buyout		P118-00-00	Consolidated into countywide project in 2020	-	-	-	-	Seventeen (17) buyout projects are consolidated into one Bond ID assigned for countywide buyout, labeled Z-Buyout. Program ID, project title, precinct, project funding and description of benefits updated to reflect the consolidation. Funding amounts were not changed and only aggregated into one Program ID
Storm Repairs in Halls Bayou Watershed	Storm Repair		P118-00-00	Consolidated into countywide project in 2020	-	-	-	-	Twenty (20) storm repair projects are consolidated into one Bond ID assigned for countywide storm repair labeled Z-StormRep. Program ID, project title, precinct, project funding and description of benefits updated to reflect the consolidation and grant amendments.



Table A2. Greens Bayou HCFCD bond project details. Table adapted from 2020 update of 2018 Bond Project List (HCFCD, 2020). Project statuses from project details found on HCFCD website (HCFCD, 2021c).

TITLE	PROJECT TYPE	BOND ID	UNIT ID	STATUS	ESTIMATED 2018 BOND FUNDS (BF)	ESTIMATED PARTNER FUNDS (PF)	ESTIMATED DISTRICT FUNDS (DF)	TOTAL (BF+PF+DF)	DESCRIPTION OF BENEFITS / NOTES
Mid-Reach Greens Bayou Project - Design and Construction of Channel Conveyance Improvements along Greens Bayou	Partnership	C-20	P100-00-00	Preliminary Engineering	\$2,000,000	\$18,000,000	-	\$ 20,000,000	This project is one of Greens Bayou Mid Reach Project that will reduce the risk of flooding for 4,500 structures in the Atlas 14 1% AEP (100-year) floodplain.
Design and Construction of the Smith Road Channel Diversion	Partnership	C-31	P133-00-00	Design	\$ 800,000	\$ 7,200,000	-	\$ 8,000,000	This project could reduce the risk of flooding for over 70 structures during the 10% AEP (10-year) event along P133-00-00 and secondary benefits could include reduced erosion.
Design and Construction of the Cutten Road Stormwater Detention Basin Improvements	Local	C-32	P500-02-00	Construction	\$1,500,000	-	\$15,500,000	\$ 17,000,000	This project is a component of the Greens Bayou Mid Reach Project that will reduce the risk of flooding for 4,500 structures in the Atlas 14 1% AEP (100-year) floodplain.
Design and Construction of Aldine-Westfield Stormwater Detention Basin Improvements	Partnership	C-33	P500-04-00	Phase I is Complete, Phase II in Design	\$1,510,000	\$13,590,000	\$ 1,700,000	\$ 16,800,000	This project is a component of the Greens Bayou Mid Reach Project that will reduce the risk of flooding for 4,500 structures in the Atlas 14 1% AEP (100-year) floodplain.
Design and Construction of Lauder Stormwater Detention Basin Improvements	Partnership	C-34	P500-06-00	Phase I in Construction, Phase II in Design	\$1,600,000	\$25,000,000	-	\$26,600,000	This project is a component of the Greens Bayou Mid Reach Project that will reduce the risk of flooding for 4,500 structures in the Atlas 14 1% AEP (100-year) floodplain.
Planning, Right-of-Way Acquisition, Design and Construction of Channel Conveyance Improvements along P138-01-01	Partnership	C-43	P138-01-01	Feasibility Study	-	\$5,000,000	-	\$5,000,000	Potential federal funded project, the risk of flooding could be reduced for approximately 100 structures in the pre-Atlas 14 1% AEP (100-year) floodplain.
ROW, Design, and Construction of Stormwater Detention Basin Near P130-05	Community Input	CI-022	P130-05-01	Feasibility Study	\$3,000,000	-	-	\$3,000,000	Project could reduce the risk of flooding for structures near P130-05-01
Greens Bayou Subdivision Drainage Improvements	Subdivision Drainage Improvement	E-09	P100-00-00	Consolidated into countywide project in 2020	-	-	-	-	Sixteen (16) subdivision drainage improvement projects are consolidated into one Bond ID assigned for countywide subdivision drainage improvement labeled Z-SubDiv. Program ID, project title, precinct, project funding and description of benefits updated to reflect the consolidation and grant amendments.
Repairs and Enhancements to the	Local	F-40	P500-01-00	Unspecified	\$5,000,000	-	-	\$5,000,000	Major maintenance of existing detention facilities in Lower Greens Bayou.

TITLE	PROJECT TYPE	BOND ID	UNIT ID	STATUS	ESTIMATED 2018 BOND FUNDS (BF)	ESTIMATED PARTNER FUNDS (PF)	ESTIMATED DISTRICT FUNDS (DF)	TOTAL (BF+PF+DF)	DESCRIPTION OF BENEFITS / NOTES
Lower Greens Bayou Regional Detention Embankment and Control Structure									
Federal Grant-Funded Volunteer Home Buyouts	Buyout		P100-00-00	Consolidated into countywide project in 2020	-	-	-	-	Seventeen (17) buyout projects are consolidated into one Bond ID assigned for countywide buyout, labeled Z-Buyout. Program ID, project title, precinct, project funding and description of benefits updated to reflect the consolidation. Funding amounts were not changed and only aggregated into one Program ID
Storm Repairs in Greens Bayou Watershed	Storm Repair		P100-00-00	Consolidated into countywide project in 2020	-	-	-	-	Twenty (20) storm repair projects are consolidated into one Bond ID assigned for countywide storm repair labeled Z-StormRep. Program ID, project title, precinct, project funding and description of benefits updated to reflect the consolidation and grant amendments.



Table A3. Hunting Bayou HCFCD bond project details. Table adapted from 2020 update of 2018 Bond Project List (HCFCD, 2020). Project statuses from project details found on HCFCD website (HCFCD, 2021e). Gray row indicates a project in the 4<sup>th</sup> quartile.

TITLE	TYPE	BOND ID	UNIT ID	STATUS	ESTIMATED 2018 BOND FUNDS (BF)	ESTIMATED PARTNER FUNDS (PF)	ESTIMATED DISTRICT FUNDS (DF)	TOTAL(BF+P F+DF)	DESCRIPTION OF BENEFITS / NOTES
Design and Construction of Corps of Engineers Hunting Bayou, Section 211(f) Project	Partnership	C-18	H100-00-00	Segment 104 and 107 in Construction; Segment 105 in Design	-	\$65,000,000	-	\$65,000,000	The pre-Atlas 14 1% AEP (100-year) floodplain will be removed from up to 4,450 structures as part of the federal project.
District Cost Share of Study with the City of Houston on Wallisville Outfall	Community Input	CI-031	H103-00-00	Feasibility Study	\$500,000	-	-	\$500,000	Study will investigate flooding problems and identify potential solutions along the H103-00-00 channel. Project will be coordinated with City of Houston.
Planning, Right-Of-Way, Design and Construction of a Diversion Channel from H102-00-00 to H100-00-00 through Galena Park	Community Input	CI-59	H102-00-00	Initiated	\$10,000,000	-	-	\$10,000,000	Specific benefits will be established when the project is initiated in the 4th quartile.
Right-Of-Way Acquisition, Design and Construction of Wallisville Outfall	Local	F-17	H103-00-00	Feasibility Study	\$10,000,000	-	-	\$10,000,000	The project could reduce the risk of flooding for over 140 structures in the pre-Atlas 14 1% AEP (100-year) floodplain.