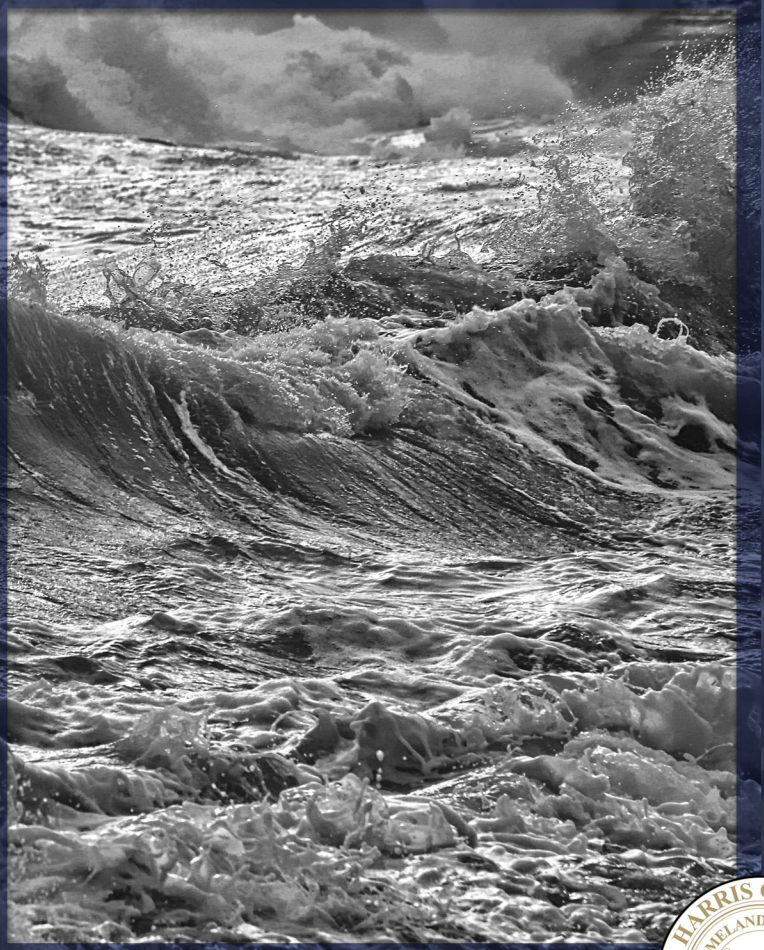
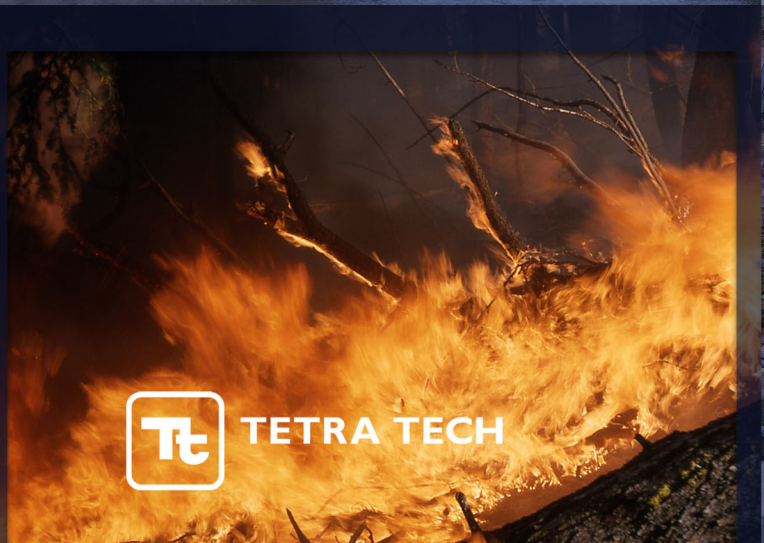


Harris County
Multi-Hazard Mitigation Action Plan
Volume 2—Planning Partner Annexes

April 2020



Harris County Multi-Hazard Mitigation Action Plan

Volume 2 — Planning Partner Annexes

April 2020

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Appendices

Appendix A. Planning Partner Expectations
Appendix B. Procedures for Linking to Hazard Mitigation Plan
Appendix C. Annex Instructions and Templates

INTRODUCTION

BACKGROUND

The Federal Emergency Management Agency (FEMA) encourages multi-jurisdictional planning for hazard mitigation. All participating jurisdictions must meet the requirements of Chapter 44 of the Code of Federal Regulations (44 CFR):

> "Multi-jurisdictional plans (e.g. watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process and has officially adopted the plan." (Section 201.6(a)(4)).

For the Harris County Multi-Hazard Mitigation Action Plan, a planning partnership was formed to leverage resources and to meet requirements of the federal Disaster Mitigation Act for as many eligible local governments as possible. The Disaster Mitigation Act defines a local government as follows:

> "Any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency or instrumentality of a local government; any Indian tribe or authorized tribal organization, or Alaska Native village or organization; and any rural community, unincorporated town or village, or other public entity."

Two types of planning partners participated in this process for the Harris County Multi-Hazard Mitigation Action Plan, with distinct needs and capabilities:

- Incorporated municipalities (Cities and the County)
- Special purpose districts who have junior taxing authority

Each participating planning partner prepared a jurisdiction-specific annex to this plan. These annexes, as well as information on the process by which they were created, are contained in this volume.

THE PLANNING PARTNERSHIP

Initial Solicitation and Letters of Intent

The planning team solicited the participation of all eligible municipalities and special purpose districts at the outset of this project. A kickoff meeting was held on September 18, 2018 to identify potential stakeholders and planning partners for this process. The purpose of the meeting was to introduce the planning process to jurisdictions in the County that could have a stake in the outcome of the planning effort. All eligible local governments in the planning area — 54 in total including prior and potential planning partners — were invited to attend. The goals of the meeting were as follows:

- Provide an overview of the Disaster Mitigation Act
- Review the Harris County Hazard Mitigation Plan and planning partnership

- Outline the work plan for this hazard mitigation plan
- Describe the benefits of multi-jurisdictional planning
- Outline planning partner expectations
- Solicit planning partners
- Solicit volunteers/recommendations for the steering committee

Local governments wishing to join the planning effort were asked to provide the planning team with a "letter of intent to participate" that agreed to the planning partner expectations (see Appendix A) and designated a point of contact for their jurisdiction. In all, the core planning team (CPT) received formal commitment from 42 planning partners including the County. Eleven of the letters were from new planning partners not covered under the County's previous hazard mitigation plan, approved in 2015:

- City of Friendswood
- Cypress Fairbanks Independent School District
- Houston Independent School District
- Huffman Independent School District
- Pasadena Independent School District
- Texas Southern University
- Lone Star College
- Texas Medical Center/Texas Children's Hospital
- Houston Community College
- Harris County ESD 12
- University of Houston

Maps for each fully participating city are provided in the individual annex for that city in this volume. Maps showing the location of participating special purpose districts by district type are provided at the end of this introduction.

Planning Partner Expectations

The planning team developed the following list of planning partner expectations, which were provided and discussed at the kickoff meeting (see Appendix A for details):

- Complete a "letter of intent to participate."
- Designate a lead point of contact for this effort.
- Support and participate in the selection and function of the Steering Committee.
- Provide support required to implement the public involvement strategy.
- Participate in the process through opportunities such as:
    - Steering Committee meetings
    - Public meetings or open houses
    - Workshops and planning partner specific training sessions
    - Public review and comment periods prior to adoption.
- Attend the mandatory jurisdictional annex workshop.
- Complete the jurisdictional annex.
- Perform a "consistency review" of all technical studies, plans and ordinances specific to hazards.
- Review the risk assessment and identify hazards and vulnerabilities specific to the jurisdiction.
- Review and determine if the mitigation recommendations chosen in Volume 1 will meet the needs of the jurisdiction.

- Create an action plan that identifies each project, who will oversee the task, how it will be financed, and when it is estimated to occur.
- Formally adopt the hazard mitigation plan.

By adopting this plan, each planning partner also agrees to the plan implementation and maintenance protocol established in Volume 1. Failure to meet these criteria may result in a partner being dropped from the partnership by the Steering Committee, and thus losing eligibility under the scope of this plan.

Linkage Procedures

Eligible local jurisdictions that did not participate in development of this multi-jurisdictional plan may comply with Disaster Mitigation Act requirements by linking to this plan following procedures outlined in Appendix B.

ANNEX-PREPARATION PROCESS

Templates

Templates were created to help the planning partners prepare their jurisdiction-specific annexes. Separate templates were created for both types of jurisdictions participating in this plan, municipalities and districts. The templates were created so that all criteria of Section 201.6 of 44 CFR would be, based on the partners' capabilities and mode of operation. Separate templates were available for partners updating a previous hazard mitigation plan and those developing a first-time hazard mitigation plan. These templates were deployed in three phases during the course of this plan update process. These phases are described as follows:

- **Phase 1** — Profile, Trends, Previous Plan Status, and Information Sources
  - Deploy: November 26, 2018
  - Due: December 31, 2018
- **Phase 2** — Capability Assessment and Information Sources
  - Deployed: Mid-January 2019
  - Due: End of February 2019
- **Phase 3** — Risk Ranking, Action Plan, and Information Sources
  - Deployed: Mandatory Phase 3 Workshops, July 16-18, 2019
  - Due: August 9, 2019

The templates were set up to lead all partner through steps to generate Disaster Mitigation Act-required elements specific to their jurisdictions. The templates and their instructions are included in Appendix C of this volume.

Tool Kit

Each planning partner was provided with a tool kit to assist in completing the annex template and developing an action plan. The tool kits contained the following:

- 2015 Plan
- Action Plan
  - Mitigation Best Practices Catalog
  - Mission Statement, Goals and Objectives

  - Action identification resources

- Grant Information

  - General HMA Guidance
  - Climate Resilient Guidance

- Hazard Maps
- Hazard Event History
- Phase 3 Annexes, including templates and instructions
- Plan Integration Guidance from FEMA
- Risk Assessment Results

  - Loss estimate matrix — includes hazard risk assessment information broken down by jurisdiction and hazard type, with risk ranking results.

- Survey Results
- Workshop Presentation

Phase 3 Workshop

All partners were required to participate in a technical assistance workshop, where key elements of the template were discussed, and the templates were subsequently completed by a designated point of contact for each partner and a member of the planning team. Six workshops were held during the week of July 16-18, 2019. Attendance to at least one of these workshops by each planning partners was mandatory, to meet "participation" as defined by this planning process. These workshops addressed the following topics:

- The templates and the tool kit
- Natural events history
- Jurisdiction-specific issues
- Risk ranking
- Status of prior actions
- Developing your action plan
- Cost/benefit review
- Prioritization protocol
- Next steps.

MITIGATION ACTION PLAN DEVELOPMENT

Risk Ranking

In the risk-ranking exercise, each planning partner was asked to review the ranked risk specifically for its jurisdiction, based on the impact on its population and/or facilities. Municipalities based this ranking on probability of occurrence and the potential impact on people, property and the economy. Special purpose districts based this ranking on probability of occurrence and the potential impact on their constituency, their vital facilities and the facilities' functionality after an event. The methodology followed that used for the countywide risk ranking presented in Volume 1. The objectives of this exercise were to familiarize the partnership with how to use the risk assessment as a tool to support other planning and hazard mitigation processes and to help prioritize types of mitigation actions that should be considered. Hazards that were ranked as "high" and "medium" for each

jurisdiction as a result of this exercise were considered to be priorities for identifying mitigation actions, although jurisdictions also identified actions to mitigate "low" ranked hazards, as appropriate.

Information Reviewed to Develop Action Plan

The tool kits were used during the workshops and in follow-up work conducted by the planning partners. A large portion of the workshop focused on how the tool kit should be used to develop the mitigation action plan. Planning partners were specifically asked to review the following to assist in the identification of actions:

- **The Jurisdiction's Capability Assessment —** reviewed to identify capabilities that the jurisdiction does not currently have but should consider pursuing or capabilities that should be revisited and updated to include best available information; also reviewed to determine how existing capabilities can be leveraged to increase or improve hazard mitigation in the jurisdiction.
- **The Jurisdiction's National Flood Insurance Program Compliance Table** — reviewed to identify opportunities to increase floodplain management capabilities.
- **The Jurisdiction's Review of Its Adaptive Capacity for Climate Change** — reviewed to identify ways to leverage or continue to improve existing capacities and to improve understanding of other capacities.
- **The Jurisdiction's Identified Opportunities for Future Integration** — reviewed to identify specific integration actions to be included in the mitigation strategy.
- **Jurisdiction-Specific Vulnerabilities —** reviewed to identify actions that will help reduce known vulnerabilities.
- **The Mitigation Best Practices Catalog** — reviewed to identify actions that the jurisdiction should consider including in its action plan.
- **Public Input** — reviewed to identify potential actions and community priorities.

Selection of Recommended Actions

The Planning Partners reviewed the catalogs of hazard mitigation alternatives presented in Volume 1 and selected actions to be included in a hazard mitigation action plan. The selection of actions was based on the risk assessment of identified hazards of concern and the defined hazard mitigation goals and objectives. Each annex lists the recommended hazard mitigation actions that make up the action plan. The timeframe indicated in the tables is defined as follows:

- Short Term = to be completed in 1 to 5 years
- Long Term = to be completed in greater than 5 years
- Ongoing = currently being funded and implemented under existing programs.

Prioritization

44 CFR requires actions identified in the action plan to be prioritized (Sections 201.6(c)(3)(iii)). The planning team and steering committee developed a methodology for prioritizing the action plans that meets the needs of the partnership and the requirements of 44 CFR. All identified actions were prioritized in two categories — implementation and grant pursuit — as defined by the following criteria:

- Implementation priority
  - **High Priority** — an action that meets multiple objectives, has benefits that exceed costs, and has a secured source of funding. Action can be completed in the short term (1 to 5 years).
  - **Medium Priority** — an action that meets multiple objectives, has benefits that exceed costs, and is eligible for funding though no funding has yet been secured for it. Action can be completed in the

short term (1 to 5 years), once funding is secured. Medium-priority actions become high-priority actions once funding is secured.
  - **Low Priority** — an action that will mitigate the risk of a hazard, has benefits that do not exceed the costs or are difficult to quantify, has no secured source of funding, and is not eligible for any known grant funding. Action can be completed in the long term (1 to 10 years). Low-priority actions are generally "wish-list" actions. They may be eligible for grant funding from programs that have not yet been identified.

- Grant pursuit priority

  - **High Priority** — an action that meets identified grant eligibility requirements, has high benefits, and is listed as high or medium implementation priority; local funding options are unavailable or available local funds could be used instead for actions that are not eligible for grant funding.
  - **Medium Priority** — an action that meets identified grant eligibility requirements, has medium or low benefits, and is listed as medium or low implementation priority; local funding options are unavailable.
  - **Low Priority** — an action that has not been identified as meeting any grant eligibility requirements.

These priority definitions are dynamic and can change from one category to another based on changes to a parameter such as availability of funding. For example, a project might be assigned a medium priority because of the uncertainty of a funding source, but be changed to high priority once a funding source has been identified. The 2010 plan used the same method of prioritization for implementation priority as was used in this plan update. The grant pursuit priority is a newly added prioritization schedule. The prioritization schedule for this plan will be reviewed and updated as needed annually through the plan maintenance strategy.

Benefit/Cost Review

44 CFR requires the prioritization of the action plan to emphasize a benefit/cost analysis of the proposed actions. Because some actions may not be implemented for up to 10 years, benefit/cost analysis was qualitative and not of the detail required by FEMA for project grant eligibility under the Hazard Mitigation Assistance (HMA) grant program. A review of the apparent benefits versus the apparent cost of each project was performed. Parameters were established for assigning subjective ratings (high, medium, and low) to benefits and costs as follows:

- Benefit ratings:

  - **High —** the action will have an immediate impact on the reduction of risk exposure to life and property.
  - **Medium** — the action will have a long-term impact on the reduction of risk exposure to life and property or will provide an immediate reduction in the risk exposure to property.
  - **Low —** long-term benefits of the action are difficult to quantify in the short-term.

- Cost ratings:

  - **High —** existing funding levels are not adequate to cover the costs of the proposed action; implementation would require an increase in revenue through an alternative source (for example, bonds, grants, and fee increases).
  - **Medium —** the action could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the action would have to be spread over multiple years.
  - **Low —** the action could be funded under the existing budget. The action is part of or can be part of an existing, ongoing program.

Using this approach, projects with positive benefit versus cost ratios (such as high over high, high over medium, medium over low, etc.) are considered cost-beneficial and are prioritized accordingly.

For many of the strategies identified in this action plan, funding might be sought under FEMA's HMA program. This program requires detailed benefit/cost analysis as part of the application process. These analyses will be performed on projects at the time of application preparation. The FEMA benefit-cost model will be used to perform this review. For projects not seeking financial assistance from grant programs that require this sort of analysis, the Partners reserve the right to define "benefits" according to parameters that meet their needs and the goals and objectives of this plan.

Analysis of Mitigation Actions

All planning partners reviewed their recommended actions to classify each action based on the hazard it addresses and the type of mitigation it involves. Mitigation types used for this categorization are as follows:

- **Prevention** — government, administrative or regulatory actions that influence the way land and buildings are developed to reduce hazard losses. Includes planning and zoning, floodplain laws, capital improvement programs, open space preservation, and stormwater management regulations.
- **Property Protection** — modification of buildings or structures to protect them from a hazard or removal of structures from a hazard area. Includes acquisition, elevation, relocation, structural retrofit, storm shutters, and shatter-resistant glass.
- **Public Education and Awareness** — actions to inform citizens and elected officials about hazards and ways to mitigate them. Includes outreach projects, real estate disclosure, hazard information centers, and school-age and adult education.
- **Natural Resource Protection** — actions that minimize hazard loss and preserve or restore the functions of natural systems. Includes sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.
- **Emergency Services** — actions that protect people and property during and immediately after a hazard event. Includes warning systems, emergency response services, and the protection of essential facilities.
- **Structural Projects** — actions that involve the construction of structures to reduce the impact of a hazard. Includes dams, setback levees, floodwalls, retaining walls, and safe rooms.
- **Climate Resilient** — actions that incorporate methods to mitigate and/or adapt to the impacts of climate change. Includes aquifer storage and recovery activities, incorporating future-conditions projections in project design or planning, or actions that specifically address jurisdiction-specific climate change risks, such as sea level rise or urban heat island effect.
- **Community Capacity Building** — actions that increase or enhance local capabilities to adjust to potential damage, to take advantage of opportunities, or to respond to consequences. Includes staff training, memorandums of understanding, development of plans and studies, and monitoring programs.

These categories include categories identified in the Community Rating System (CRS) 2017 *CRS Coordinators Manual* (OMB No. 1660-0022, Figure 510-4). The CRS categories expand on the four categories in FEMA's 2013 *Local Mitigation Handbook*. They provide a more comprehensive range of options, thus increasing integration opportunities.

COMPATIBILITY WITH PREVIOUS APPROVED PLANS

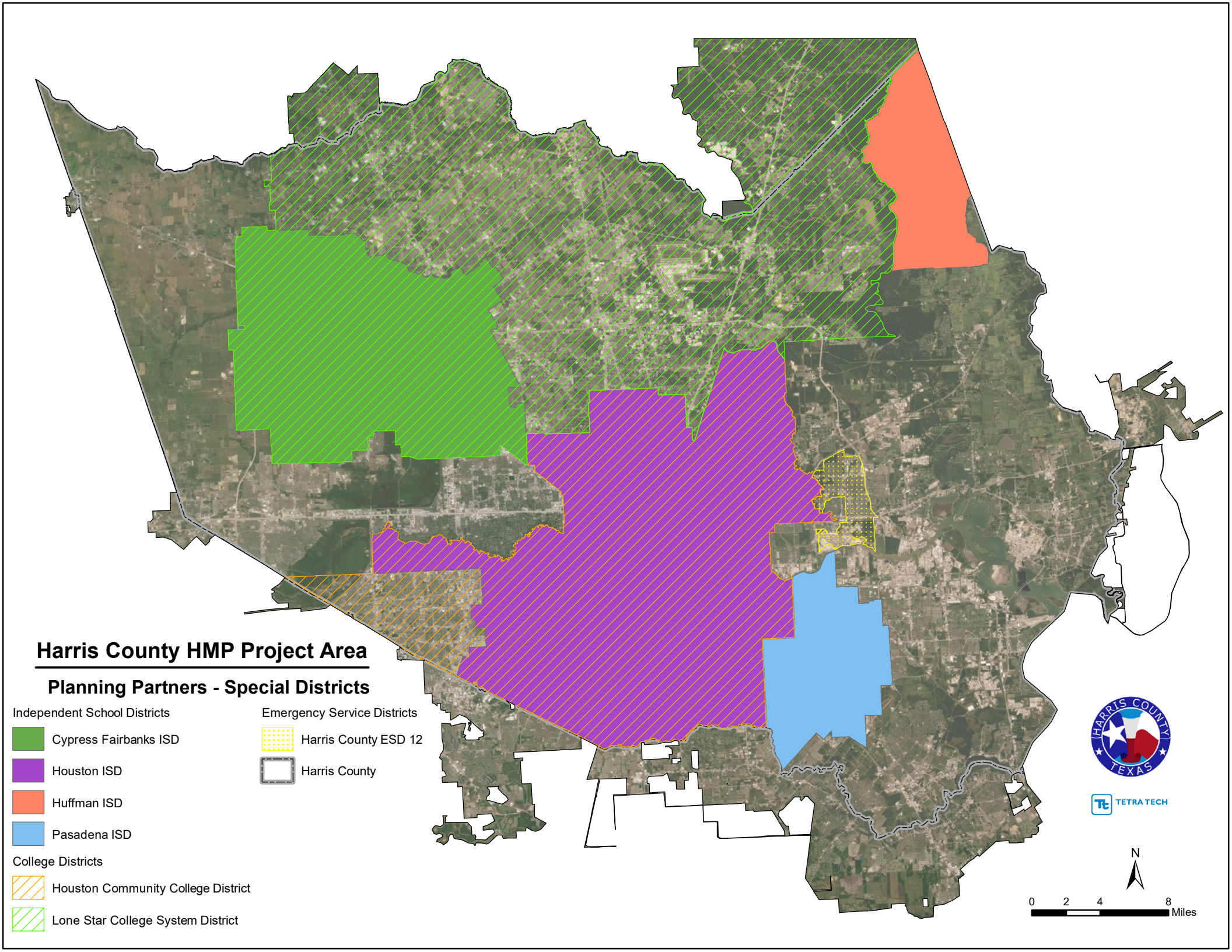
Thirty-three of the planning partners who participated in this plan were previously covered under the 2015 Harris County Multi-Hazard Mitigation Plan. Table 1 lists all the initial partners and the role this multi-jurisdictional plan will play in achieving compliance and the CRS status, if applicable.

Table 1. Prior Plan and Planning Partner Status

	Covered by 2015 Plan?	FEMA Approval Date	Letter of Intent Date	Attended Workshop?	Completed Template?	CRS Community (Yes or No)	Covered by this Hazard Mitigation Plan?
Harris County	Yes	7/26/2015	10/18/2018	Yes	Yes	Yes	Yes
City of Baytown	Yes	7/26/2015	9/21/2018	Yes	Yes	Yes	Yes
City of Bellaire	Yes	7/26/2015	10/18/2018	Yes	Yes	Yes	Yes
City of Bunker Hill Village	Yes	7/26/2015	10/18/2018	Yes	Yes	No	Yes
City of Deer Park	Yes	7/26/2015	10/18/2018	Yes	Yes	Yes	Yes
City of El Lago	Yes	7/26/2015	3/8/2019	Yes	Yes	No	Yes
City of Friendswood	No	N/A	9/14/2018	Yes	Yes	Yes	Yes
City of Galena Park	Yes	7/26/2015	10/18/2018	Yes	Yes	No	Yes
City of Hedwig Village	Yes	7/26/2015	10/18/2018	Yes	Yes	No	Yes
City of Hilshire Village	Yes	7/26/2015	10/18/2018	Yes	Yes	No	Yes
City of Humble	Yes	7/26/2015	9/6/2018	Yes	Yes	No	Yes
City of Hunters Creek Village	Yes	7/26/2015	10/18/2018	Yes	Yes	No	Yes
City of Jacinto City	***Yes***	***7/26/2015***	***10/18/2018***	***Yes***	***No***	***No***	***No***
City of Jersey Village	Yes	7/26/2015	10/16/2018	Yes	Yes	No	Yes
City of Katy	Yes	7/26/2015	10/18/2018	Yes	Yes	No	Yes
City of La Porte	Yes	7/26/2015	10/18/2018	Yes	Yes	Yes	Yes
City of Missouri City	Yes	7/26/2015	8/16/2018	Yes	Yes	Yes	Yes
City of Morgan's Point	Yes	7/26/2015	10/18/2018	Yes	Yes	No	Yes
City of Nassau Bay	Yes	7/26/2015	10/18/2018	Yes	Yes	Yes	Yes
City of Pasadena	Yes	7/26/2015	10/18/2018	Yes	Yes	Yes	Yes
City of Piney Point Village	Yes	7/26/2015	10/18/2018	Yes	Yes	No	Yes
City of Seabrook	Yes	7/26/2015	10/18/2018	Yes	Yes	Yes	Yes
City of Shoreacres	Yes	7/26/2015	10/17/2018	Yes	Yes	Yes	Yes
City of Southside Place	***Yes***	***7/26/2015***	***N/A***	***No***	***No***	***No***	***No***
City of Spring Valley	Yes	7/26/2015	10/18/2018	Yes	Yes	No	Yes
City of Stafford	Yes	7/26/2015	10/17/2018	Yes	Yes	No	Yes
City of Taylor Lake Village	Yes	7/26/2015	2/21/2019	Yes	Yes	Yes	Yes
City of Tomball	Yes	7/26/2015	10/18/2018	Yes	Yes	No	Yes
City of Webster	Yes	7/26/2015	10/18/2018	Yes	Yes	No	Yes
Cypress Fairbanks ISD	***No***	***N/A***	***9/26/2018***	***Yes***	***No***	***No***	***No***
City of West University Place	Yes	7/26/2015	9/29/2018	Yes	Yes	Yes	Yes
Harris County Flood Control District	Yes	7/26/2015	9/19/2018	Yes	Yes	No	Yes
Harris County ESD #12	No	N/A	9/20/2018	Yes	Yes	No	Yes
Harris County Hospital District dba Harris Health System	Yes	7/26/2015	10/9/2018	Yes	Yes	No	Yes
Houston Community College	No	N/A	11/6/2018	Yes	Yes	No	Yes
Houston ISD	No	N/A	10/9/2018	Yes	Yes	No	Yes
Huffman ISD	No	N/A	10/18/2018	Yes	Yes	No	Yes
Pasadena ISD	No	N/A	10/9/2018	Yes	Yes	No	Yes
Lone Star College	Yes	7/26/2015	10/17/2018	Yes	Yes	No	Yes
Texas Medical Center	No	N/A	10/19/2018	Yes	Yes	No	Yes
Texas Southern University	No	N/A	10/18/2018	Yes	Yes	No	Yes
University of Houston	No	N/A	10/18/2018	Yes	Yes	No	Yes

FINAL COVERAGE UNDER THE PLAN

Of the 42 local governments that submitted letters of intent to participate, 39 fully met the participation requirements specified by the Steering Committee. The principal requirement not met by the other partners was completion of the jurisdictional annex template following the workshops. Only the 39 partners that submitted completed templates are included in this volume and will seek DMA compliance under this plan. The remaining jurisdictions will need to follow the linkage procedures described in Appendix B of this volume. Table 1 lists the jurisdictions that submitted letters of intent and their ultimate status in this plan.


Harris County HMP Project Area
Planning Partners - Special Districts
Independent School Districts
Cypress Fairbanks ISD
Houston ISD
Huffman ISD
Pasadena ISD
College Districts
Houston Community College District
Lone Star College System District
Emergency Service Districts
Harris County ESD 12
Harris County
HARRIS COUNTY TEXAS
TETRA TECH
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0 2 4 8
Miles

ACRONYMS

The following acronyms are used throughout the annexes in this volume:

- BAWA — Baytown Area Water Authority
- BBFFDRP — Buffalo Bayou Flood Damage Reduction Project
- BFE — base flood elevation
- CDBG — Community Development Block Grant
- CFM — Certified Floodplain Manager
- CLOMR — Conditional Letter of Map Revision
- CRS — Community Rating System
- CWOP — Citizen Weather Observer Program
- CWPP — Community Wildfire Protection Plan
- EAS/iPAWS — Emergency Alert System/Integrated Public Alert and Warning System
- EHLS — Environmental Health and Life Safety
- EMC — Emergency Management Coordinator
- EMCID — East Montgomery County Improvement District
- ENG — Engineering Department
- EOC — emergency operations center
- EOP — emergency operations plan
- EPA — U.S. Environmental Protection Agency
- ETJ — extraterritorial jurisdiction
- FDC — fire department connection
- FDPO — flood damage prevention ordinance
- FDRP — flood damage reduction project
- FEMA — Federal Emergency Management Agency
- FF&E — furniture, fixtures and equipment
- FIRM — Flood Insurance Rate Map
- FIS — Flood Insurance Study
- FMA — Flood Mitigation Assistance Grant Program
- GCWA — Gulf Coast Water Authority
- HCED — Harris County Engineering Department
- HCFCD — Harris County Flood Control District
- HCP — Habitat Conservation Plan
- H-GAC — Houston-Galveston Area Council
- HGSD — Harris-Galveston Subsidence District
- HMA — Hazard Mitigation Assistance
- HMGP — Hazard Mitigation Grant Program
- HMP — hazard mitigation plan
- IBC — International Building Code
- IECC — International Energy Conservation Code
- ISD — independent school district
- IT — information technology department
- KBDI — Keetch-Byram Drought Index
- LEPC — local emergency planning committee
- LERRD — land, easements, rights-of-way, relocation, and disposal areas
- LiMWA — limit of moderate wave action
- LMI — low to moderate income

- LOMA — letter of map amendment
- LOMR — letter of map revision
- MEP — mechanical, engineering and plumbing
- MSDS — material safety data sheets
- MVPD — Memorial Villages Police Department
- NFIP — National Flood Insurance Program
- NOAA — National Oceanic and Atmospheric Administration
- O&M — operations and maintenance
- OHSEM — Office of Homeland Security and Emergency Management
- OHWM — ordinary high-water mark
- PA — Public Assistance
- PDM — Pre-Disaster Mitigation
- PHES — Harris County Public Health and Environmental Services
- PLNG — Planning Department
- PW — public works department
- RL — repetitive loss
- SBFDRP — Sims Bayou Flood Damage Reduction Project
- SDS — State Dam Safety
- SERLEPC — Southeast Regional Local Emergency Planning Committee
- SETRAC — Southeast Texas Regional Advisory Council
- SFHA — special flood hazard area
- SJRA — San Jacinto River Authority
- SMP — shoreline management plan
- SRL — severe repetitive loss
- SWQMP — surface water quality master plan
- TCEQ — Texas Commission on Environmental Quality
- TDECU — Texas Dow Employees Credit Union
- TDEM — Texas Division of Emergency Management
- THIRA — threat & hazard identification & risk
- TIRZ — tax increment reinvestment zone
- UASI — urban area security initiative
- ULDC — Unified Land Development Code
- WCID — water control and improvement district
- WTP — Water treatment plant
- WWTP — Wastewater treatment plant

1. HARRIS COUNTY

1.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Brian Murray, Public Information Officer
6922 Katy Road
Houston, TX 77024
Telephone: 713-881-3100
E-mail Address: brian.murray@oem.hctx.net

Alternate Point of Contact
Bill Wheeler, Deputy EMC
6922 Katy Road
Houston, TX 77024
Telephone: 713-881-3100
E-mail Address: bill.wheeler@oem.hctx.net

1.2 JURISDICTION PROFILE

1.2.1 Location

Harris County, which covers 1,703 square miles (U.S. Census Bureau, 2014), is located on the upper Gulf Coast in Southeast Texas. It is bordered by Waller County on the northwest side, Montgomery County on the north side, Liberty and Chambers Counties on the eastside, Galveston and Brazoria Counties on the south side, and Fort Bend County on the west side.

Harris County's southern half is level coastal prairie and the northern half touches the rolling East Texas timberlands. Central Harris County is 55 feet above sea level (The Handbook of Texas Online). The land rises gradually to higher than 200 feet on the northern border (The Handbook of Texas Online). Small bluffs around upper Galveston Bay descend to sea level. The soil is heavy black coastal clay in the south and sandy loam north of Buffalo Bayou (The Handbook of Texas Online). Native trees include pine and hardwoods such as oak, ash, and hickory (The Handbook of Texas Online). The average annual rainfall in Harris County is 48.19 inches (The Handbook of Texas Online), and the mean temperature is 69.1 Fahrenheit. (The Handbook of Texas Online).

1.2.2 History

According to the Handbook of Texas Online, Archeological sites in Harris County reveal the presence of human beings 6,000 years ago. The oldest contains a previously undisturbed deposit of bone remains and dart points dating from 4000 to 1000 B.C. A site on Clear Lake features a shell midden and cemetery with early ceramics dating between 1400 B.C. and A.D. 950.

The first Anglo-Americans to explore Harris County were members of the various filibustering expeditions launched from New Orleans between 1815 and 1820 to aid the Mexican Republicans rebelling against Spain. Using Galveston Island and Bolivar Peninsula as a base, the men belonging to the expeditions and encampments of Louis Michel Aury, Francisco Xavier Mina, Jean Laffite, and James Long looked around the San Jacinto estuary for future homesites, their expected reward for freeing Mexico from Spain. Some of these men were among the pioneer settlers arriving by boat from Louisiana in early 1822, just after the Mexican War of Independence.

Responding to Stephen F. Austin's advertisements, the families wrongly assumed that the San Jacinto estuary was part of his empresario grant. Some moved to the Brazos River in 1824, but merchants and boatmen remained to exploit what turned out to be the best transportation system in Texas and to petition successfully for inclusion in the Austin grant. Since Galveston Island and the Gulf shore were forbidden to Anglo settlement, Harris County was the southeastern border of the colony. The pioneers found no Indians living in the future Harris County. In July 1824 a state land commissioner, the Baron de Bastrop, arrived and spent two months issuing twenty-nine titles to settlers, even though surveys were incomplete. The pioneers, including Nathaniel Lynch, William Scott, and John R. Harris, chose sites along Buffalo Bayou, the San Jacinto River, and the San Jacinto estuary. Between 1828 and 1833, when Austin's colonization effort virtually ended, twenty-three more families secured titles elsewhere in the county, usually along watercourses. In 1826, John R. Harris laid out Harrisburg on his league where Brays Bayou joined Buffalo Bayou, the head of navigation.

Harrisburg County was formed by the First Congress on December 22, 1836. The lawmakers also named Andrew Briscoe chief justice and the infant city of Houston the county seat and national capital. The county encompassed the territory of the old municipality plus Galveston Island (the mainland was attached to Brazoria County) until May 1838, when its modern boundaries were established. In December 1839, Congress changed the name to Harris County, in honor of John R. Harris.

Between 1903 and 1907 oil was discovered on the eastern shore of the San Jacinto estuary at Goose Creek and Tabbs Bay. Migrant roughnecks and their families moved to the area and established a temporary boomtown amid the derricks between 1915 and 1917.

The development of Harris County as an industrial power began in 1911, when voters approved the formation of the Harris County Ship Channel Navigation District. In 1914 the United States Army Corps of Engineers finished deepening the existing fifty-mile-long channel to twenty-five feet from the Gulf through Galveston Bay and up the San Jacinto River and Buffalo Bayou to the district's turning basin at the Port of Houston. By 1918 petroleum refineries began locating along Buffalo Bayou and the San Jacinto River, as did various other industries. Since that time, the channel has been deepened to fifty feet and widened to accommodate larger vessels. Exports from the port include rice, wheat, grain sorghums, cotton, caustic soda, cement, and petroleum products. Imports include crude oil, iron ore, molasses, coffee, gypsum, and automobiles.

Though the area was increasingly urbanized, in 2002 the county had 2,452 farms and ranches covering 304,868 acres, 51 percent of which were devoted to pasture, 41 percent to crops, and six percent to woodlands.

1.2.3 Climate

The climate of Harris County is described as humid subtropical. The general temperature range, according to the National Oceanic and Atmospheric Agency is 84.6 F in August and 53.1 F in January. Annual rainfall averages 49.77 inches on 104 days. Accumulating snow events are unusual; freezing rain or sleet are more common in the winter months. The most common weather related threat is flooding but the Gulf Coast region is susceptible to tropical cyclones and tornadoes.

1.2.4 Governing Body Format

Texas cities of more than 5,000 citizens adopt home-rule charters and are governed by city councils and either city managers, city administrators, or mayors.

Cities having fewer than 5,000 residents, or "general law" cities, have powers and duties specifically granted by the Texas Constitution and state law. A city manager or city administrator plan can be adopted in any general law city. Some home rules cities now have fewer than 5,000 residents because their population has declined since they adopted their home rule charters.

Counties' powers and duties are specifically granted and limited by the Texas Constitution and state law. Each county has a commissioner's court, which consists of four commissioners, each elected from the Commissioner's Precinct, and the County Judge elected from the entire county. In smaller counties, the County Judge retains judicial responsibilities in probate and insanity cases. Special Districts are created to perform a specific function.

1.2.5 Local Mitigation Planning Team Members

This annex was developed over the course of several months with input from many county departments including the Office of Homeland Security and Emergency Management, County Engineer, Building Management, Budget Management, Public Health, and other county departments. All departments were asked to contribute to the annex development through reviewing and contributing to the capability assessment, reporting on the status of previously identified actions, and participating in action identification and prioritization. An action development meeting was held on February 20, 2019 and was attended by representatives from all previously listed departments. Once actions had been identified and compiled in the annex, a draft was internally circulated for comment.

1.3 CURRENT TRENDS

1.3.1 Population

According to U.S. Census Bureau 2017 Population Estimate, the population of Harris County was 4,652,980. Since 2010, the population has grown by 13.7 percent. It is the third largest county by population in the United States; the population exceeds that of 24 states.

1.3.2 Development

Table 1-1 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

1.4 CAPABILITY ASSESSMENT

Harris County performed an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities is presented in Table 1-2.
- Development and permitting capabilities are presented in Table 1-3.
- An assessment of fiscal capabilities is presented in Table 1-4.
- An assessment of administrative and technical capabilities is presented in Table 1-5.
- An assessment of education and outreach capabilities is presented in Table 1-6.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 1-7.
- Classifications under various community mitigation programs are presented in Table 1-8.
- The community's adaptive capacity for the impacts of climate change is presented in Table 1-9.

Findings of the capability assessment were reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table included in the action plan for this annex identifies these as community capacity building mitigation actions.

Table 1-1. Recent and Expected Future Development Trends

Criterion	Response
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan? • **If yes, give the estimated area annexed and estimated number of parcels or structures.**	No N/A
Is your jurisdiction expected to annex any areas during the performance period of this plan? • **If yes, describe land areas and dominant uses.** • **If yes, who currently has permitting authority over these areas?**	No N/A N/A
Are any areas targeted for development or major redevelopment in the next five years? • **If yes, briefly describe, including whether any of the areas are in known hazard risk areas**	No N/A
How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?	See nested table below
Provide the number of new-construction permits for each hazard area or provide a qualitative description of where development has occurred.	• Special Flood Hazard Areas: Approximately 6% of permits issued are in the SFHA • Landslide: N/A • High Liquefaction Areas: N/A • Tsunami Inundation Area: N/A • Wildfire Risk Areas: N/A
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	Unincorporated Harris County is growing rapidly with residential and commercial development, but there is still a large percentage of agricultural and undeveloped properties.

	2014	2015	2016	2017	2018
Single Family	12,090	10,571	10,235	10,430	10,710
Multi-Family	273	222	61	60	250
Other (commercial, mixed use, etc.)	1092	965	957	767	939
Total	**13,455**	**11,758**	**11,253**	**11,257**	**11,899**

Table 1-2. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code	No	No	No	No
Comment:				
Zoning Code	No	No	No	No
Comment:				
Subdivisions	Yes	Yes	Yes	Yes
Comment: Regulations of Harris County, Texas for the Approval and Acceptance of Infrastructure, July 9, 2019				
Stormwater Management	Yes	Yes	Yes	Yes
Comment: Regulations of Harris County, Texas for Stormwater Quality Management, September 1, 2016				
Post-Disaster Recovery	Yes	Yes	Yes	Yes
Comment: Annex J of the Harris County's Basic Plan, 2014				
Real Estate Disclosure	No	Yes	Yes	Yes
Comment:				
Growth Management	No	No	No	Yes
Comment:				
Site Plan Review	Yes	Yes	Yes	Yes
Comment: Regulations of Harris County, Texas for the Approval and Acceptance of Infrastructure, July 9, 2019				
Environmental Protection	Yes	Yes	Yes	Yes
Comment: Regulations of Harris County, Texas for Stormwater Quality Management, September 1, 2016				
Flood Damage Prevention	Yes	Yes	Yes	Yes
Comment: Regulations of Harris County, Texas for Floodplain Management, July 9, 2019				
Emergency Management	Yes	Yes	Yes	Yes
Comment: Texas Gov Code, Title 4. Chapter 418. Emergency Management, 1975				
Climate Change	No	No	No	Yes
Comment:				
Planning Documents				
General Plan	Yes	No	Yes	Yes
Comment: *Harris County Basic Plan, 2015*				
Capital Improvement Plan	Yes	No	Yes	Yes
How often is the plan updated? *each fiscal year*				
Comment: FY 2019 Interim Capital Improvements Program, February 26, 1019				
Disaster Debris Management Plan	Yes	Yes	Yes	Yes
Comment: *Annex K of the Harris County Basic Plan, 2015*				
Floodplain or Watershed Plan	Yes	Yes	Yes	Yes
Comment: *Policy, Criteria & Procedure Manual, July 9, 2019*				
Stormwater Plan	Yes	Yes	Yes	Yes
Comment: *Policy, Criteria & Procedure Manual, July 9, 2019*				
Urban Water Management Plan	No	No	No	Yes
Comment:				
Habitat Conservation Plan	No	No	No	Yes
Comment:				
Economic Development Plan	No	No	No	Yes
Comment:				
Shoreline Management Plan	No	Yes	No	Yes
Comment:				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Community Wildfire Protection Plan	Yes	Yes	Yes	Yes
Comment: Harris County Community Wildfire Protection Plan, August 2011				
Forest Management Plan	No	No	No	Yes
Comment:				
Climate Action Plan	No	Yes	No	Yes
Comment:				
Comprehensive Emergency Management Plan	Yes	Yes	Yes	Yes
Comment: *Harris County Basic Plan, 2015*				
Threat & Hazard Identification & Risk Assessment (THIRA)	Yes	Yes	Yes	Yes
Comment: *A regional THIRA is conducted on annually for UASI and HGAC.*				
Post-Disaster Recovery Plan	Yes	Yes	Yes	Yes
Comment: *Annex J of the Harris County Basic Plan, 2014, Also, Harris County Public Health (HCPH), Recovery Plan, Appendix 20.0, July 2019*				
Continuity of Operations Plan	Yes	Yes	Yes	Yes
Comment: *Continuity of Operations Plans are developed and maintained by county departments*				
Public Health Plan	Yes	Yes	Yes	Yes
Comment: *Annex H of the Harris County Basic Plan, 2018. Also, Harris County Public Health has completed Texas public health risk assessment which details the top hazards looking at health and medical affects.*				

Table 1-3. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • **If no, who does? If yes, which department?**	Yes Harris County Permits Office
Does your jurisdiction have the ability to track permits by hazard area?	Yes
Does your jurisdiction have a buildable lands inventory?	No

Table 1-4. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	No
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	No
Withhold Public Expenditures in Hazard-Prone Areas	No
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes

Table 1-5. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Harris County Engineering, and others
Engineers or professionals trained in building or infrastructure construction practices	Yes	Harris County Engineering, and others
Planners or engineers with an understanding of natural hazards	Yes	Multiple county departments
Staff with training in benefit/cost analysis	Yes	Multiple county departments
Surveyors	Yes	Harris County Engineering, and others
Personnel skilled or trained in GIS applications	Yes	Multiple county departments
Scientist familiar with natural hazards in local area	Yes	Multiple county departments
Emergency manager	Yes	Harris County OHSEM
Grant writers	Yes	Multiple county departments

Table 1-6. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • If yes, briefly describe.	Yes Current local hazard mitigation plan is online
Do you use social media for hazard mitigation education and outreach? • If yes, briefly describe.	Yes Publicizing previous plan; future dedicated website
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • If yes, briefly describe.	No
Do you have any other programs already in place that could be used to communicate hazard-related information? • If yes, briefly describe.	Yes Public outreach events, Ready Harris website
Do you have any established warning systems for hazard events? • If yes, briefly describe.	Yes EPI notification system

Table 1-7. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	HC Engineering Department
Who is your floodplain administrator? (department/position)	Jonathan Steiber / HCED, Floodplain Administrator
Are any certified floodplain managers on staff in your jurisdiction?	Yes
What is the date that your flood damage prevention ordinance was last amended?	January 1, 2018
Does your floodplain management program meet or exceed minimum requirements? • **If exceeds, in what ways?**	Exceeds Regulate 500-yr floodplain, exceed minimum freeboard
When was the most recent Community Assistance Visit or Community Assistance Contact?	2003
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • **If so, state what they are.**	No
Are any RiskMAP projects currently underway in your jurisdiction? • **If so, state what they are.**	Yes Preliminary Flood Maps
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • **If no, state why.**	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? • **If so, what type of assistance/training is needed?**	No
Does your jurisdiction participate in the Community Rating System (CRS)? • **If yes, is your jurisdiction interested in improving its CRS Classification?** • **If no, is your jurisdiction interested in joining the CRS program?**	Yes Yes – unlikely to occur
How many flood insurance policies are in force in your jurisdiction?[a] • **What is the insurance in force?** • **What is the premium in force?**	120,396 $36,024,666,100 $54,432,470
How many total loss claims have been filed in your jurisdiction?[a] • **How many claims are still open or were closed without payment?** • **What were the total payments for losses?**	46,830 7,151 $2,462,159,673

a. According to FEMA statistics as of March 31, 2019

Table 1-8. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	Yes	7	10/1/2017
Building Code Effectiveness Grading Schedule	No	N/A	N/A
Public Protection	No	N/A	Date
Storm Ready	Yes	N/A	2016
Firewise	Yes	N/A	Date

Table 1-9. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:***	Low
Jurisdiction-level monitoring of climate change impacts ***Comment:***	Low
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:***	Low
Participation in regional groups addressing climate risks ***Comment:***	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	Low
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	Low
Identified strategies for adaptation to impacts ***Comment:***	Low
Champions for climate action in local government departments ***Comment:***	Low
Political support for implementing climate change adaptation strategies ***Comment:***	Low
Financial resources devoted to climate change adaptation ***Comment:***	Low
Local authority over sectors likely to be negative impacted ***Comment:***	Low
Public Capacity	
Local residents knowledge of and understanding of climate risk ***Comment:***	Medium
Local residents support of adaptation efforts ***Comment:***	Low
Local residents' capacity to adapt to climate impacts ***Comment:***	Low
Local economy current capacity to adapt to climate impacts ***Comment:***	Low
Local ecosystems capacity to adapt to climate impacts ***Comment:***	Low

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

1.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning and capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

1.5.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- Disaster Recovery Plan
- Floodplain Management Plan
- Stormwater Management Plan
- Basic Plan and Annexes
- Continuity of Operations Plan
- Radiological Emergency Plan
- Transportation Plan
- Community Rating System
- Regional Planning

1.5.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- Capital Improvements Plan
- Historic Preservation Plan

1.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 1-11 lists past occurrences of natural hazards for which specific damage was recorded in Harris County. Other hazard events that broadly affected the entire planning area, including Harris County, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 1-11. Past Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Hurricane Harvey	4332 DR	**2017**	$3 Billion
Severe Storms and Flooding	4269 DR	**2016**	$35 Million
Severe Storms and Flooding	4272 DR	**2016**	$25 Million
Severe Storms, Tornadoes, Straight Line Winds and Flooding	4245 DR	**2015**	$12 Million
Severe Storms, Tornadoes, Straight Line Winds and Flooding	4223 DR	**2015**	$5 Million

1.7 HAZARD RISK RANKING

Table 1-12 presents a local ranking for Harris County of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 1-12. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
5	Coastal Erosion	6	Low
5	Dam Failure	6	Low
5	Drought	6	Low
4	Earthquake	16	Medium
2	Flooding	36	High
5	Mass Movement	6	Low
1	Severe Weather	51	High
1	Hurricane	51	High
5	Tsunami	6	Low
3	Wildfire	24	Medium

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

1.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. This section provides information on a few key vulnerabilities for the jurisdiction. Available jurisdiction-specific risk maps of the hazards are provided at the end of this annex.

1.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: 5,316
- Number of FEMA-identified Severe-Repetitive-Loss Properties: 702
- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated: 1,102

1.8.2 Other Noted Vulnerabilities

No additional vulnerabilities specific to this jurisdiction have been identified.

1.9 STATUS OF PREVIOUS PLAN ACTIONS

Table 1-12 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

Table 1-13. Status of Previous Plan Actions

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
Install generators for critical county facilities in order to sustain essential services and critical operations during and after a disaster.			x	HC-1
Comment: *Not Started*				
Harden critical County Facilities and Offices with hurricane shutters.			x	HC-2
Comment: *Not started*				
Install landscaping with drought resistant plants and trees for shading around County facilities to reduce exposure from extreme heat.			x	HC-3
Comment: *Not Started*				
Implement a Clear cut dead brush and tree limbs program around county facilities that could be a burn agent to wildfires.			x	HC-4
Comment: *Not started*				
Develop, improve and implement an enhanced mass public warning and alert system (iPAWS) within the Harris County Joint Information Center to provide warning capability throughout unincorporated Harris County to mitigate the risk of natural hazards and disasters impacting critical infrastructure and residents.	x			
Comment: *Not started*				
Install enhanced and improved lightning and surge protection devices/systems in the Harris County Emergency Operations Center	x			
Comment: *Not started*				
Develop a mitigation strategy to acquire personnel and funding to revise the Harris County Multi-jurisdictional Local Mitigation Plan.	x			
Comment: *Not started*				
Develop/construct shelter for critical vehicles/equipment to minimize damage			x	HC-5
Comment: *Not started*				
Identify new studies and improved assessment methods for analysis of High Risk dams and assess possible risk of other low or moderate risk dams/levees.			x	HC-6
Comment: *Not started*				
Develop, enhance and implement mitigation strategies with Emergency Service Districts and local jurisdictions to limit the adverse impact of Toxic Releases/HAZMAT and Energy Pipeline Failures. (Fire Marshall)			x	HC-7
Comment: *Not started*				
Enhance the total CRS rating/score for the next three years through various CRS activities, such as flood risk reduction and drainage improvements.	x			
Comment: *Complete*				

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
Develop a mitigation strategy to install and implement a Wildfire/Drought Warning System to determine KBDI and provide the County and residents with advance warning of severe drought conditions and wildfire hazards. (Fire Marshall) ***Comment:*** **Initialed studies in a portion of these Subdivision.**			x	HC-8
Modify or replace critical County buildings prone to flooding with resilient technologies ***Comment:*** **FEMA Mitigation (Sec 406) is currently being pursued for some County buildings** ***Comment: Not started***			x	HC-9
Study for future Evacuation Routes for various areas in Harris County ***Comment: Not started***			x	HC-10

1.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 1-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 1-15 identifies the priority for each action. Table 1-16 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 1-14. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action HC-1 — Install generators for critical county facilities in order to sustain essential services and critical operations during and after a disaster.						
Hazards Mitigated: Coastal erosion, Dam/levee failure, Drought, Earthquakes, Flooding, Hurricanes and coastal storms, Mass movement, Severe weather, Tsunami and Wildfire						
New and Existing	1, 3, 10, 11, 12, 13, 14, 15	Emergency Management	Engineering	Medium	HMGP, PDM	Short-term
Action HC-2 — Harden critical county facilities and offices with hurricane shutters.						
Hazards Mitigated: Sever Weather, Hurricane						
New and Existing	1, 3, 6, 8, 10, 13, 15	Emergency Management	Engineering	Low	Staff Time, General Funds	Short-term
Action HC-3 — Install landscaping with drought resistant plants and trees for shading around County facilities to reduce exposure from extreme heat.						
Hazards Mitigated: Drought, Wildfire						
New and Existing	2, 3, 5, 6, 8, 11	Engineering	Fire Marshall	Low	Staff Time, General Funds	Short-term
Action HC-4 — Implement a clear cut dead brush and tree limbs program around county facilities that could be a burn agent to wildfires.						
Hazards Mitigated: Drought, Wildfire						
New and Existing	2, 3, 5, 6, 8, 11	Engineering	Fire Marshall	Low	Staff Time, General Funds	Short-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action HC-5 — Develop/construct shelter for critical vehicles/equipment to minimize damage						
Hazards Mitigated: Coastal erosion, Dam/levee failure, Drought, Earthquakes, Flooding, Hurricanes and coastal storms, Mass movement, Severe weather, Tsunami and Wildfire						
New	3, 6, 9, 11, 12, 13, 15	Engineering	Emergency Management	Medium	HMGP, PDM, FMA	Short-term
Action HC-6 — Identify new studies and improved assessment methods for analysis of High Risk dams and assess possible risk of other low or moderate risk dams/levees.						
Hazards Mitigated: Dam Failure, Flooding, Severe Weather, Hurricane						
New	1, 3, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15	Emergency Management	As Required	Medium	HMGP	Short-term
Action HC-7 — Develop, enhance and implement mitigation strategies with Emergency Service Districts and local jurisdictions to limit the adverse impact of Toxic Releases/HAZMAT and Energy Pipeline Failures.						
Hazards Mitigated: Earthquake, Flooding, Mass Movement, Hurricane, Severe Weather						
New	1, 3, 5, 6, 7, 8, 9	Fire Marshall	Emergency Management	Low	Staff Time, General Funds	Short-term
Action HC-8 — Develop a mitigation strategy to install and implement a Wildfire/Drought Warning System to determine KBDI and provide the County and residents with advance warning of severe drought conditions and wildfire hazards.						
Hazards Mitigated: Drought, Wildfire						
Existing	1, 2, 3, 4, 6, 7, 9, 10, 11, 12	Fire Marshall	Emergency Management	Medium	HMGP, PDM, FMA	Short-term
Action HC-9 — Modify or replace critical County buildings prone to flooding with resilient technologies						
Hazards Mitigated: Flooding, Severe Weather, Hurricane						
New and Existing	3, 6, 8, 10, 11, 12, 15	Engineering	Emergency Management	Medium	HMGP, PDM, FMA	Short-term
Action HC-10 — Study for future Evacuation Routes for various areas in Harris County						
Hazards Mitigated: Coastal erosion, Dam/levee failure, Drought, Earthquakes, Flooding, Hurricanes and coastal storms, Mass movement, Severe weather, Tsunami and Wildfire						
New and Existing	3, 10	Emergency Management	As Required	Low	HMGP, PDM, FMA	Short-term
Action HC-11 — Develop and implement technological solutions to provide efficient emergency public information in up to six spoken languages and American Sign Language.						
Hazards Mitigated: Coastal erosion, Dam/levee failure, Drought, Earthquakes, Flooding, Hurricanes and coastal storms, Mass movement, Severe weather, Tsunami and Wildfire						
Existing	1, 3, 4, 11, 14	Emergency Management	As Required	Low	Staff Time, General Funds, or HMGP	Short-term
Action HC-12 — Obtain funding to hire a contractor to annually sustain the Harris County Local Hazard Mitigation Plan through the 2025 update.						
Hazards Mitigated: Coastal erosion, Dam/levee failure, Drought, Earthquakes, Flooding, Hurricanes and coastal storms, Mass movement, Severe weather, Tsunami and Wildfire						
Existing	2, 3, 4, 5, 7, 8, 9, 10, 11, 13, 14, 15	Emergency Management	As Required	Low	Staff Time, General Funds, or HMGP	Short-term
Action HC-13 — EOC Expansion						
Hazards Mitigated: Coastal erosion, Dam/levee failure, Drought, Earthquakes, Flooding, Hurricanes and coastal storms, Mass movement, Severe weather, Tsunami and Wildfire						
New and Existing	14	Emergency Management	As Required	Medium	General Funds, HMGP, PDM, FMA	Long-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action HC-14 — Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan. *Hazards Mitigated:* Coastal erosion, Dam/levee failure, Drought, Earthquakes, Flooding, Hurricanes and coastal storms, Mass movement, Severe weather, Tsunami and Wildfire						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	Harris County	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 1-15. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
HC-1	8	Medium	Medium	Yes	Yes	No	Medium	High
HC-2	7	Medium	Low	Yes	No	Yes	Medium	Low
HC-3	6	Low	Low	Yes	No	Yes	Medium	Low
HC-4	6	Medium	Low	Yes	No	Yes	Medium	Low
HC-5	7	High	Medium	Yes	Yes	No	Medium	Medium
HC-6	13	Medium	Medium	Yes	Yes	No	Medium	Medium
HC-7	7	Medium	Medium	Yes	No	Yes	Medium	Low
HC-8	10	Medium	Medium	Yes	Yes	No	Medium	Medium
HC-9	7	High	High	Yes	Yes	No	Medium	Medium
HC-10	2	Medium	Low	Yes	Yes	No	Medium	Medium
HC-11	5	High	Low	Yes	Yes	No	High	High
HC-12	12	Medium	Low	Yes	Yes	No	Medium	Medium
HC-13	1	Medium	Medium	Yes	Yes	No	Medium	Medium
HC-14	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 1-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Severe Weather	HC-5, HC-14	HC-2, HC-8	HC-5, HC-14		HC-1, HC-2, HC-6, HC-8, HC-10, HC-12, HC-14	HC-2, HC-6, HC-8, HC-12		HC-7, HC-13
Hurricane	HC-5, HC-9, HC-14	HC-2, HC-8, HC-9	HC-5, HC-14	HC-9	HC-1, HC-2, HC-6, HC-8, HC-12, HC-14	HC-2, HC-6, HC-8, HC-12		HC-7, HC-13

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
Flood	HC-5, HC-9, HC-12, HC-14	HC-9	HC-5, HC-14	HC-9	HC-1, HC-12, HC-14	HC-12		HC-7, HC-13
Medium-Risk Hazards								
Wildfire	HC-3, HC-4, HC-5, HC-14	HC-3, HC-4, HC-11	HC-5, HC-11, HC-14	HC-3, HC-4	HC-1, HC-11, HC-14		HC-3, HC-4	HC-7, HC-13
Low-Risk Hazards								
Earthquake	HC-5, HC-14		HC-5, HC-14		HC-1, CH-6, HC-10, HC-14			HC-7, HC-13, HC-14
Tsunami	HC-5, HC-14		HC-5, HC-14		HC-1, HC-14			HC-7, HC-13, HC-14
Drought	HC-3, HC-5, HC-14	HC-3, HC-11	HC-5, HC-11, HC-14		HC-1, HC-11, HC-14		HC-3	HC-7, HC-13, HC-14
Mass Movement	HC-5, HC-14		HC-5, HC-14		HC-1, HC-14			HC-7, HC-13, HC-14
Dam Failure	HC-5, HC-9, HC-14	HC-9	HC-5, HC-14	HC-9	HC-1, HC-14			HC-7, HC-13, HC-14

a. See the introduction to this volume for explanation of mitigation types.

1.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

The following technical reports, plans, and regulatory mechanisms were reviewed for this annex.

- Regulations of Harris County, Texas for Floodplain Management Flood Damage Prevention Ordinance — the flood damage prevention ordinance was reviewed for compliance with the National Flood Insurance Program.
- FEMA Flood Insurance Study for Harris County, TX (FEMA 2017). This outlined the principal flood problems and floodplains in Harris County
- Harris County Fire Code (March 2015). These regulations adopt the latest edition of the uniform fire code.
- Regulations of Harris County, Texas for the Approval and Acceptance of Infrastructure (January 2019). These regulations require stormwater and detention system design.
- Regulations of Harris County, Texas for Stormwater Quality Management (September 2016). These regulation require minimum standards for prevent pollution in stormwater discharge.
- Harris County Community Wildfire Protection Plan (August 2011). This plan provides recommendations for mitigating the threat to property from wildland fires.
- Harris County Flood Control District Policy Criteria & Procedure Manual for Approval and Acceptance of Infrastructure (October 2018). Provide policies and criteria for land development and infrastructure projects that are effective, consistent and practical.

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.
- State of Texas Hazard Mitigation Plan (October 2018) — This plan, prepared by the Texas Department of Public Safety, was used to ensure that the County's HMP was consistent with the State's Plan.

Hazard maps for Harris County are provided in Volume 1 of this hazard mitigation plan

2. CITY OF BAYTOWN

2.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Jamie Galloway, Emergency Management Coordinator
205 E. Wye Drive
Baytown, TX 77521
Telephone: 2810-422-1129
e-mail Address: Jamie.Galloway@baytown.org

Alternate Point of Contact
David Alamia, Deputy Emergency Management Coordinator
205 E. Wye Drive
Baytown, TX 77521
Telephone: 281-422-1168
e-mail Address: David.Alamia@baytown.org

2.2 JURISDICTION PROFILE

2.2.1 Location

The City of Baytown is located just 30 miles east of downtown Houston, Baytown is the third largest city in Harris County, and is easily accessible via Interstate 10, Highway 146, and the Grand Parkway (Hwy 99). Baytown is also located in both Harris County and partially in Chambers County.

The current boundaries generally extend along Interstate 10 from the mouth of the San Jacinto River to Cedar Bayou with Goose Creek running through the middle of the city. The city is roughly bordered along the north by Interstate 10. Baytown is also bordered by water on three sides. Along the south and west is Galveston Bay. On the east is Cedar Bayou. Portions of the city to the east of Cedar Bayou lie in Chambers County.

Baytown currently encompassing an area of approximately 34 square miles

2.2.2 History

Originally three separate towns, the City of Baytown combined Goose Creek (dating back to before 1850), and oil boom towns Pelly (established in the late 1910s), and East Baytown (early 1920s) when it incorporated in 1948.

The City of Baytown's strategic location has encouraged a successful and diverse blend of employment opportunities and recreational activities centered near the area's waterways. Located in the Texas Independence Trail region, Baytown is rich in history. General Sam Houston was an early resident, and the area played a significant role in the Battle of San Jacinto in 1836. The region was also home to the Karankawa Indians; their artifacts can still be found at the Baytown Nature Center. The following is a timeline of Baytown's history:

- 1822 — Nathaniel Lynch sets up the Lynch Ferry at the junction of the San Jacinto River with Buffalo Bayou.
- 1824 — William Scott receives land grant of over 9,000 acres covering much of what is now present day Baytown.

- 1847 — Ashbel Smith purchased a plantation, known as Evergreen, on Tabbs Bay (outbreak of Civil War, he organized the Bayland Guards for confederate service).
- 1864 — A shipyard established at the mouth of Goose Creek in the early 1850s by John and Thomas S. Chubb built one ship, the Bagdad, which was launched in 1864 and had to run a Yankee blockade at Galveston to escape.
- 1866 – 1867 — Ashbel Smith and several associates founded the Bayland Orphans' Home for Children of Confederate soldiers.
- June 2, 1908 — Successful oil strike near Tabbs bay by Goose Creek Production Company.
- August 23, 1916 — Opening of Goose Creek Oilfield when contractor Charles Mitchell brought in a 10,000-barrel gusher at 2,017 feet.
- 1917 — Humble Oil and Refining Company founded by Ross S. Sterling.
- August 17, 1917 — The largest well of the field was Sweet 16 of the Simms-Sinclair Company gushing 35,000 barrels a day from a depth of 3,050 feet. This well stayed out of control for three days before the crew could close it.
- January 1919 — Goose Creek residents vote to consolidate.
- 1919 — Construction beings of Humble Oil and Refining Company.
- 1920 — Pelly residents vote to consolidate.
- April 21, 1921 — Humble Oil and Refinery construction completed.
- 1923 — Humble laid out the streets, provided utilities and sold lots for the community development.
- December 1945 — Pelly annexes the area known as Baytown which had never incorporated.
- February 1946 — Pelly and Goose Creek vote to consolidate and choose the name "Baytown".
- January 24, 1948 — "Tri-Cities" Unite as Baytown (Baytown Goose Creek and Pelly) when a city charter is approved.

2.2.3 Climate

Baytown's climate is classified as humid subtropical. Prevailing winds from the south and southeast bring heat from the deserts of Mexico and moisture from the Gulf of Mexico.

Summer temperatures typically have highs near 90 °F (32 °C) though higher temperatures are not uncommon. The city's proximity to the bay and the winds that it generates moderate the area's temperatures and ease the effects of the humidity, creating a more pleasant climate than inland communities like Houston.

Winters in the area are temperate with typical January high of 61 °F (16 °C) and lows are near 42 °F (6 °C). Snowfall is rare. Annual rainfall averages exceed 49 inches (124 cm), with an annual average of 82 precipitation days.

The average elevation of Baytown is approximately 34 feet above sea level.

2.2.4 Governing Body Format

The City of Baytown is a Home Rule City operating under the Council-Manager form of government, with a City Council composed of a Mayor (elected at large) and six single district Council members. The City Council appoints a City Manager to act as the chief administrative and executive officer of the City.

The City Council assumes responsibility for the adoption of this plan; the Baytown Fire Department, Emergency Management Division will oversee its implementation. Development of this annex was carried out by the members of the City of Baytown Local Mitigation Planning Team, whose members are listed in Table 2-1.

Table 2-1. Local Mitigation Planning Team Members

Name	Title
Jamie Galloway	Emergency Management Coordinator
David Alamia	Deputy Emergency Management Coordinator
Ronald Roberts	Assistant Fire Chief – Planning
Ajay Shakyaver	Director Engineering / Floodplain Administrator
Tiffany Foster	Director, Planning
Russell Davidson	Chief Building Official
Frank Simoneaux	Director, Public Works
Dana Dalbey	Assistant Fire Chief – Administration
Tony Gray	Director, Health

2.3 CURRENT TRENDS

2.3.1 Population

According to Texas Home Town Locator, the population of Baytown as of July 2018 was 81,229. Since 2015, the population has grown at an average annual rate of 2.4 percent.

2.3.2 Development

The economic impact of continued expansion in the industrial, logistic, and wholesale distribution sectors in and around Baytown has translated into significant valuation growth in the City's tax roll. In spite of negative appraisals resultant from some 4,500 homes flooded by Hurricane Harvey, the Harris County Appraisal District's preliminary 2018 appraisal roll data indicate roll values have increased 6% over the prior year. Much of this is from residential home values, resultant from incremental appraised values recognized in the prior year but subject to a ten percent annual limit under State code restrictions.

Private sector investment within the City of Baytown has increased significantly over the past few years, with substantial investment in areas such as health care centers, grocery stores, restaurants, and other large scale retail developments, including the multi-million dollar redevelopment of the San Jacinto Mall. Additionally, the City of Baytown, in partnership with a private development company, is in the preliminary stages of developing a large-scale hotel/convention center on Bayland Island.

Major road projects recently completed or in progress include: ongoing construction of the 1.6 mile, four lane San Jacinto Boulevard; expansion of Hunt Road from two lanes to four lanes beyond the new H-E-B grocery super center, and extending it west to John Martin Road; extending Santavy Road both east and west; design and widening of Garth Road to six lanes from its current four lane configuration; entrance and exit ramp rebuilds at I-10 and Garth Road; the complete reconstruction of the two lane, 2.3 mile Evergreen Road; and the ongoing installation of sidewalks throughout the City.

One of the most noticeable effects of the ongoing expansions in the industrial, logistic and wholesale distribution enterprises in and around Baytown is the remarkable growth in residential, multi-family and commercial development. New residential and commercial permit activity continues to be strong year-over-year. Over 2,000 multi-family units in seven new complexes, and nearly 2,000 single- family homes included as part of four new neighborhoods is expected over the next two years. Population and associated ancillary economic expansion is anticipated to increase steadily for some time.

Table 2-2 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

Table 2-2. Recent and Expected Future Development Trends

Criterion	Response
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan? • **If yes, give the estimated area annexed and estimated number of parcels or structures.**	Yes 2,612 acres, 350 parcels
Is your jurisdiction expected to annex any areas during the performance period of this plan? • **If yes, describe land areas and dominant uses.** • **If yes, who currently has permitting authority over these areas?**	No NA NA
Are any areas targeted for development or major redevelopment in the next five years? • **If yes, briefly describe, including whether any of the areas are in known hazard risk areas**	Yes • San Jacinto Marketplace (~111 acres) — redeveloped commercial, not in hazard risk area • John Martin & I-10 (~45 acres) — new commercial and housing, not in hazard risk area • San Jacinto Boulevard (~400 acres) new commercial and housing, some in hazard risk area • Evergreen & Trinity Oaks (~200 acres) — new commercial and housing, some in hazard risk area • Chambers Commons (~146 acres) — new commercial, multifamily, some in hazard risk area
How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?	

	2014	2015	2016	2017	2018
Single Family	193	187	293	251	291
Multi-Family	1	1	1	0	0
Other (commercial, mixed use, etc.)	186	277	252	278	339
Total	380	465	546	529	630

Provide the number of new-construction permits for each hazard area or provide a qualitative description of where development has occurred.	• Special Flood Hazard Areas: Unable to accurately provide • Landslide: 0 • High Liquefaction Areas: 0 • Tsunami Inundation Area: 0 • Wildfire Risk Areas: 0
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	The city is a place with two identities — "Old Baytown" and "New Baytown". Thus, there is an aged building stock and a newer building stock. Within the city limits of Baytown, there is a medium density suburban development character with some large rural pockets. There are several commercial corridors developed with strips of retail that serve the many neighborhoods. The neighborhoods normally have lot sizes between 5,000 and 10,000 square feet. Additionally, Baytown has a significant industrial presence and those uses are on larger tracts of land with fewer addressed buildings. Although the data does not give an acreage assessment, there are approximately 34,800 out of 38,900 parcels with addresses have vertical development on them. A visual assessment indicates that there is significant building opportunity within the city limits of Baytown. Please Figure 2-1.

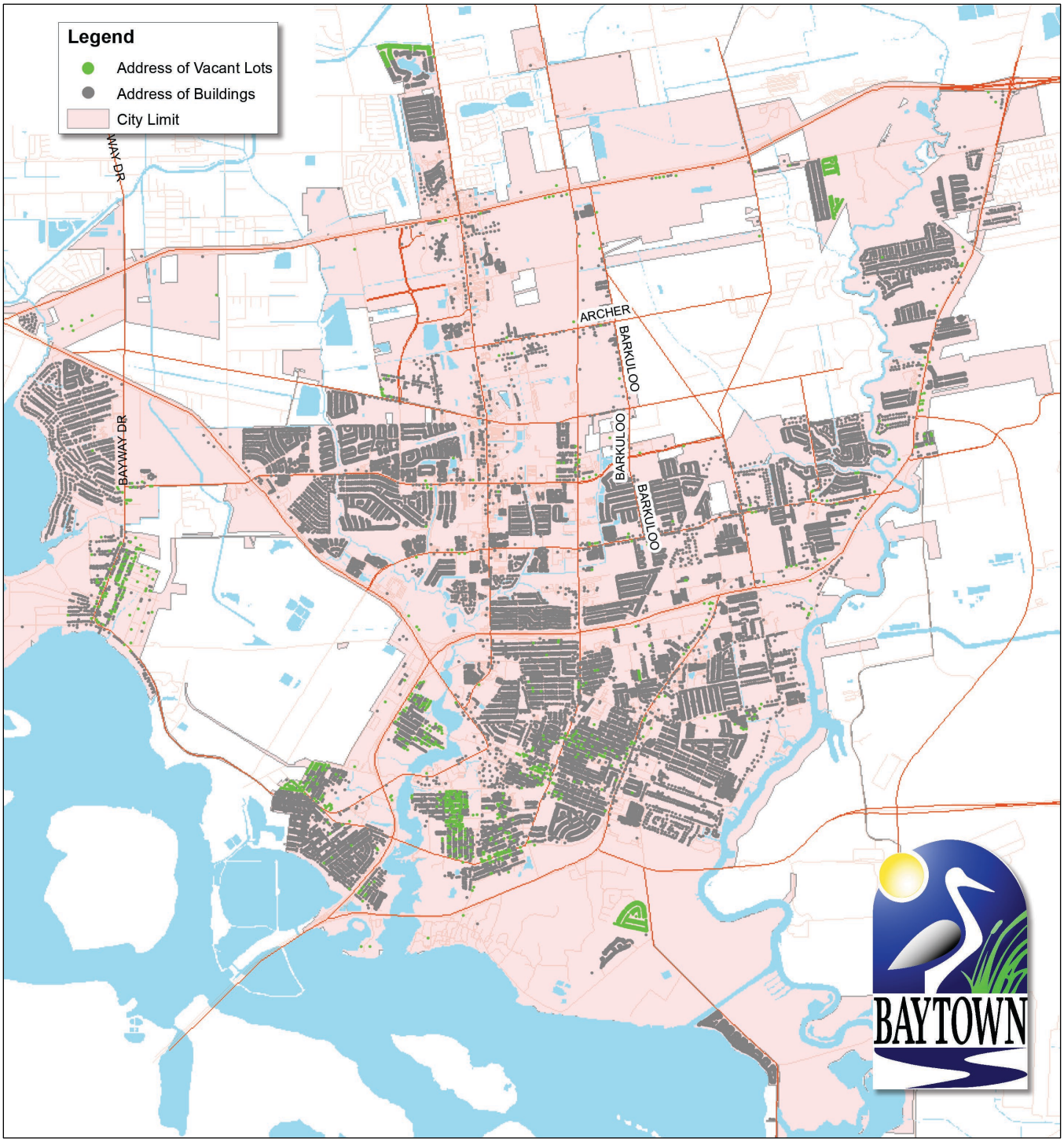


Figure 2-1. Developed and Vacant Lots

2.4 CAPABILITY ASSESSMENT

The City of Baytown performed an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities is presented in Table 2-3.
- Development and permitting capabilities are presented in Table 2-4.
- An assessment of fiscal capabilities is presented in Table 2-5.
- An assessment of administrative and technical capabilities is presented in Table 2-6.
- An assessment of education and outreach capabilities is presented in Table 2-7.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 2-8.
- Classifications under various community mitigation programs are presented in Table 2-9.
- The community's adaptive capacity for the impacts of climate change is presented in Table 2-10.

Findings of the capability assessment were reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table included in the action plan for this annex identifies these as community capacity building mitigation actions.

Table 2-3. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code	Yes	No	Yes	Yes
Comment: *Code of Ordinances, Chapter 18 Buildings and Building Regulations*				
Zoning Code	Yes	No	No	Yes
Comment: *Unified Land Development Code, Article II Use Districts, Division 2 Zoning Districts*				
Subdivisions	Yes	No	No	Yes
Comment: *Code of Ordinances, Subpart B Land Development Code, Chapter 126 Subdivisions*				
Stormwater Management	Yes	Yes	Yes	Yes
Comment: *Code of Ordinances, Chapter 98 Utilities, Article VI. Stormwater*				
Post-Disaster Recovery	Yes	Yes	No	Yes
Comment: *Annex J — Recovery and post-disaster permitting and code enforcement regulations.*				
Real Estate Disclosure	No	No	No	No
Comment:				
Growth Management	Yes	No	Yes	Yes
Comment: *Code of Ordinances Ch. 126 & ULDC*				
Site Plan Review	Yes	No	No	Yes
Comment: *Code Ch. 18 & ULDC*				
Environmental Protection	Yes	Yes	No	Yes
Comment: *Code of Ordinances, Chapter 34 — Environment*				
Flood Damage Prevention	Yes	No	Yes	Yes
Comment: *Code of Ordinances, Subpart B Land Development Code, Chapter 110 "Floods*				
Emergency Management	Yes	No	Yes	Yes
Comment: *Code of Ordinances, Chapter 22 — Civil Emergencies, Texas Government Code 418*				
Climate Change	No	Yes	No	Yes
Comment:				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Planning Documents				
General Plan	Yes	No	Yes	Yes
Comment: *Comprehensive Plan, May 2007*				
Capital Improvement Plan	Yes	No	No	Yes
How often is the plan updated? *Annual basis.*				
Comment:				
Disaster Debris Management Plan	Yes	Yes	No	Yes
Comment: *Contracts are reviewed on an annual basis and the plan is updated every five years.*				
Floodplain or Watershed Plan	Yes	Yes	No	Yes
Comment: *The City of Baytown adopted a Flood Mitigation Plan in 2005 meeting the CRS Floodplain Management Planning criteria.*				
Stormwater Plan	Yes	Yes	Yes	Yes
Comment: *Stormwater Management Plan prepared by the Baytown Health Department in 2014.*				
Drainage Plan	Yes	No	No	Yes
Comment: *The City of Baytown adopted a Master Drainage Plan in 2010.*				
Habitat Conservation Plan	No	Yes	No	Yes
Comment: *The City of Baytown does not have an HCP implemented. However, there is a Gulf-Houston Regional Conservation Plan that implements nature-based infrastructure projects and components of flood mitigation/resiliency.*				
Economic Development Plan	No	No	No	Yes
Comment: *The Baytown and West Chambers County Economic Development Foundation coordinates economic development.*				
Shoreline Management Plan	No	Yes	No	No
Comment: *SMPs are required for power generating entities operating under a FERC license and is not applicable to the City of Baytown.*				
Community Wildfire Protection Plan	Yes	Yes	No	Yes
Comment: *The City of Baytown does not have its own CWPP implemented. Harris County has completed a county-wide CWPP; which includes all incorporated jurisdictions within Harris County.*				
Forest Management Plan	No	Yes	No	No
Comment:				
Climate Action Plan	No	Yes	No	Yes
Comment:				
Emergency Operations Plan and Annexes	Yes	Yes	Yes	Yes
Comment: *Annex P — Hazard Mitigation and Hazard Summaries in Basic Plan.*				
Threat & Hazard Identification & Risk Assessment (THIRA)	No	Yes	Yes	Yes
Comment: *A regional THIRA is conducted on annually for UASI and HGAC. The City participates in the development of the THIRA.*				
Post-Disaster Recovery Plan	Yes	Yes	No	Yes
Comment: *Annex J — Recovery is required for local jurisdictions to address local recovery programs, damage assessments, Public Assistance and Individual Assistance programs. The City of Baytown is in the process of developing a Pre-Disaster Recovery Plan to assist in the transition from response to recovery for future incidents.*				
Continuity of Operations Plan	Yes	No	No	Yes
Comment: *Government Code 418 grants political subdivisions the option to adopt plans for continuity of functions but is not mandated. The City of Baytown does have department Continuity of Operations Plans.*				
Public Health Plan	Yes	Yes	Yes	Yes
Comment: *Annex H — Health and Medical is a component of the Emergency Operations Plan and addresses public health, environmental health, and medical response capabilities. The City does not maintain a standalone Public Health Plan.*				
Parks Plan	Yes	No	No	Yes
Comment: *Playbook 2020: The Strategic Parks and Recreation Master Plan was adopted in 2010. The plan creates a vision for the Parks over ten years by providing recommendations that encompass the many varied components of Baytown's park systems, from parks, athletic and aquatic facilities, to trails, nature facilities, and the preservation of open space.*				

Table 2-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • **If no, who does? If yes, which department?**	Yes Planning and Development
Does your jurisdiction have the ability to track permits by hazard area?	No
Does your jurisdiction have a buildable lands inventory?	No *(Can create)*

Table 2-5. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes – Water and Sewer
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes

Table 2-6. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Planning and Development
Engineers or professionals trained in building or infrastructure construction practices	Yes	Planning and Development
Planners or engineers with an understanding of natural hazards	Yes	Planning and Development
Staff with training in benefit/cost analysis	Yes	BFD-EMD/ EMC and Deputy EMC
Surveyors	No	City Engineering has staff that have the ability to conduct surveys, but are not licensed. These services are contracted.
Personnel skilled or trained in GIS applications	Yes	PW, ENG, PLNG, and IT
Scientist familiar with natural hazards in local area	Yes	Several local research institutes, colleges, and universities have research scientist available to the City as a resource.
Emergency Management Coordinator	Yes	EMC and Deputy EMC
Grant writers	Yes	CMO – Grant Coordinator

Table 2-7. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • **If yes, briefly describe.**	Yes Engineering Department is responsible for floodplain management and public outreach efforts regarding flooding hazards for CRS participation. The BFD-EM Division also provides public outreach regarding hazard information.
Do you use social media for hazard mitigation education and outreach? • **If yes, briefly describe.**	Yes BFD EM Division hosts Skywarn and Floodaware courses and shares events on social media. City also provides updates on weather information and hazard information facts.
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • **If yes, briefly describe.**	No n/a
Do you have any other programs already in place that could be used to communicate hazard-related information? • **If yes, briefly describe.**	Yes Community Rating System, utility bill pamphlets, Social Media accounts, and Engineering/Emergency Management websites. City Hall and Library can be a source of printed material on hazard mitigation and flooding.
Do you have any established warning systems for hazard events?	Yes
• **If yes, briefly describe.**	Outdoor Warning Sirens, Mass Notification System, Alertus Beacons, and AM Radio System.

Table 2-8. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Engineering Department
Who is your floodplain administrator? (department/position)	City Engineer
Are any certified floodplain managers on staff in your jurisdiction?	Yes *Engineering maintains a CFM on staff.*
What is the date that your flood damage prevention ordinance was last amended?	4/9/2015
Does your floodplain management program meet or exceed minimum requirements? • **If exceeds, in what ways?**	Meets and Exceeds FEMA minimum requirements. FDPO currently requires freeboard – 2 feet above BFE. City is exploring options to adopt similar standards required by Harris County; i.e. 2 feet above the 500 year.
When was the most recent Community Assistance Visit or Community Assistance Contact?	9-15-2015
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • **If so, state what they are.**	No

Criterion	Response
Are any RiskMAP projects currently underway in your jurisdiction? • **If so, state what they are.**	Yes Chambers County – Lower Trinity Flood Risk Report 2013. Harris County – Flood Insurance Study, revised preliminary November 13, 2018. Coastal flood mapping – TXCHART, Preliminary March 29, 2013.
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • **If no, state why.**	Yes Map revisions will be made based on the most recent precipitation frequencies in Texas through the NOAA Atlas 14 study.
Does your floodplain management staff need any assistance or training to support its floodplain management program? • **If so, what type of assistance/training is needed?**	No n/a
Does your jurisdiction participate in the Community Rating System (CRS)? • **If yes, is your jurisdiction interested in improving its CRS Classification?** • **If no, is your jurisdiction interested in joining the CRS program?**	Yes Yes N/A
How many flood insurance policies are in force in your jurisdiction?[a] • **What is the insurance in force?** • **What is the premium in force?**	4,683 $1,393,324,000 $2,364,402
How many total loss claims have been filed in your jurisdiction?[a] • **How many claims are still open or were closed without payment?** • **What were the total payments for losses?**	3,343 Opened Losses: 6 CWOP Losses: 705 $148,338,730.27

a. According to FEMA statistics as of September 30, 2018

Table 2-9. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	Yes	6	5/1/2006
Building Code Effectiveness Grading Schedule	Yes	Class 5 – Residential Class 4- Commercial	12/20/2017
Public Protection	Yes	Class 1	2018
Storm Ready	Yes	Storm Ready	2019
Firewise	No	N/A	N/A

Table 2-10. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts *Comment:*	Low
Jurisdiction-level monitoring of climate change impacts *Comment:*	Low
Technical resources to assess proposed strategies for feasibility and externalities *Comment:*	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory *Comment:*	Low
Capital planning and land use decisions informed by potential climate impacts *Comment:*	Low
Participation in regional groups addressing climate risks *Comment:*	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes *Comment:*	Low
Identified strategies for greenhouse gas mitigation efforts *Comment:*	Low
Identified strategies for adaptation to impacts *Comment:*	Low
Champions for climate action in local government departments *Comment:*	Low
Political support for implementing climate change adaptation strategies *Comment:*	Low
Financial resources devoted to climate change adaptation *Comment:*	Low
Local authority over sectors likely to be negative impacted *Comment:*	Low
Public Capacity	
Local residents knowledge of and understanding of climate risk *Comment:*	Low
Local residents support of adaptation efforts *Comment:*	Low
Local residents' capacity to adapt to climate impacts *Comment:*	Low
Local economy current capacity to adapt to climate impacts *Comment:*	Low
Local ecosystems capacity to adapt to climate impacts *Comment:*	Low

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

2.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning and capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

2.5.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- **Basic Plan —** The Basic Plan provides a summary on the hazards and threats in the community.
- **Annex P — Hazard Mitigation** is assigned to the Engineering Department and addresses the hazards and threats in the community. The Annex also identifies the various hazard mitigation related programs implemented in the City of Baytown and which agencies are responsible for administration.
- **Master Drainage Plan —** The City of Baytown developed a drainage plan in 2010 that identifies several drainage projects related to flood mitigation and the identified projects have been integrated into prior Hazard Mitigation Action Plans.
- **Flood Mitigation Plan** — The City of Baytown developed a flood mitigation plan in 2005 that followed the CRS floodplain management planning process and several of the identified projects have been integrated into prior Hazard Mitigation Action Plans.

2.5.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- **Capital Improvement Plan** — The City of Baytown updates the CIP on an annual basis and can integrate the goals, objectives, and projects identified in the Hazard Mitigation Action Plan into the CIP process.
- **Comprehensive Plan** — The Planning and Development Department will develop a new overall plan to document existing conditions and establish goals to replace the existing plan. In 2007, the City Council adopted the 2025 Comprehensive Plan which includes base studies, vision and goals, growth capacity, mobility, land use, economic opportunity, quality of life, and implementation strategies.
- **Downtown Master Plan —** The Downtown Master Plan was adopted by City Council on September 9, 2004, to capture the overall vision for Baytown's downtown area.
- **Mobility Plan —** The Baytown Mobility Plan was adopted by City Council on January 24, 2013 to capture the City's goals as expressed in the 2007 Comprehensive Plan and 2008 Vision Statement. This document contains infrastructure improvement projects, funding strategies and mechanisms, and mobility policies, plans and maps to help mold our future.
- **Master Parks Plan —** The parks plan creates a vision for the city's park system and makes recommendations for improvements and open-space preservation.

2.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 2-11 lists past occurrences of natural hazards for which specific damage was recorded in City of Baytown. Other hazard events that broadly affected the entire planning area, including City of Baytown, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 2-11. Past Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Thunderstorm Wind, Hail, Flood	N/A	May 9 – 11, 2019	$65,000.00
Hurricane Harvey	4332 DR	2017	$26,000,000.00
Flood	N/A	March 29, 2017	Not Available
Flood	N/A	January 19-20, 2017	Not Available
Severe Storm & Flooding	4272 DR	2016	Not Available
Severe Storm & Flooding	4269 DR	2016	Not Available
Flood	N/A	June 1, 2016	Not Available
Severe Storm & Flooding	4223 DR	2015	$35,000.00
Tornado	N/A	October 31, 2015	$20,000
Flood	N/A	July 14, 2015	Not Available
Hail	N/A	February 20, 2014	$1,000
Flood	N/A	October 31, 2013	Not Available
Flood	N/A	January 9, 2009	Not Available
Flood	N/A	April 18, 2009	Not Available
Hurricane Ike	1791 DR	September 2008	$ 50,800,000.00
Flood	N/A	June 17, 2008	Not Available
Funnel Cloud	N/A	June 16, 2007	Not Available
Flash Flood	N/A	October 26, 2006	$ 50,000
Funnel Cloud	N/A	May 4, 2006	Not Available
Tornado	N/A	April 30, 2006	Not Available
Hurricane Rita	1606 DR	2005	Not Available
Hail	N/A	July 6, 2005	$ 15,000
Thunderstorm Wind	N/A	November 23, 2004	$ 50,000
Thunderstorm Wind	N/A	April 10, 2004	$ 75,000
Tornado	N/A	November 17, 2003	$ 50,000
Funnel Cloud	N/A	June 26, 2003	Not Available
Hail	N/A	April 3, 2003	$ 5,000
Flood	N/A	September 7-8, 2002	Not Available
TS Allison	1379 DR	2001	Not Available
Hurricane Alicia	689 DR	1983	Not Available
Tornado	N/A	October 29, 1974	Not Available

2.7 HAZARD RISK RANKING

Table 2-12 presents a local ranking for City of Baytown of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 2-12. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Severe Weather	48	High
2	Hurricane	34 and 32	High
3	Flooding	12 and 28[a]	High
4	Wildfire	30[b]	Medium
5	Dam Failure	12	Low
6	Coastal Erosion	6	Low
6	Drought	6	Low
6	Mass Movement	N/A	Low
6	Earthquake	14[c]	N/A
6	Tsunami	N/A	N/A

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

a. flooding is the city's primary natural hazard and the methodology utilized does not adequately reflect actual risk outside the floodplain from sheet-flow, run-off, and limited drainage capacity caused from flash flooding and urban flooding.

b. Development within Baytown has eliminated many areas once highly vegetated and the wildland-urban interface has been reduced. In addition, Texas Forest Service TXWARP Fire Intensity Scale indicates most of the area in Baytown is considered to be in Class 1: Very Low and Class 2: Low range for small wildfires.

c. Minimal impacts and negligible level of risk from this hazard in the community

2.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. This section provides information on a few key vulnerabilities for the jurisdiction. Available jurisdiction-specific risk maps of the hazards are provided at the end of this annex.

2.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: None
- Number of FEMA-identified Severe-Repetitive-Loss Properties: None
- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated: None

2.8.2 Other Noted Vulnerabilities

The following jurisdiction-specific issues have been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- The City of Baytown is vulnerable to maritime threats and hazards since it is located along the Port of Houston and the Houston Ship Channel.
- The City of Baytown is vulnerable to hazardous material incidents and chemical accidents from surrounding petrochemical industries, chemical manufacturers, and chemical storage facilities.

Mitigation actions addressing these issues were prioritized for consideration in the action plan presented in this annex.

2.9 STATUS OF PREVIOUS PLAN ACTIONS

Table 2-13 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

Table 2-13. Status of Previous Plan Actions

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
2014BAYTWN001 — Create Regional 75 Stormwater Retention Ponds			X	BAY5
Comment: 2 regional ponds are in-process of being constructed within the city due to new development. Combine MAI 2010BAYTWN005.				
2014BAYTWN002 — Upgrade City Code Chapter 110 to Require Increased Freeboard (500-year + 2 feet) for Construction in Floodplain	X		X	BAY6
Comment: The City updated codes requiring a 2-foot freeboard for new construction and included higher standards, LOMA and LiMWA.				
2014BAYTWN003 — Elevate Electronic Controls for Sewer Lift Stations 24" above 500-year NFIP Floodplain			X	BAY7
Comment: This project is approximately 30% complete. The City has 87 lift stations, with 23 completed. Additional projects are currently ongoing during 2017.				
2014BAYTWN004 — Establish Single Family Home Wind Retrofit Assistance Grant Program		X		
Comment: Not Started and dependent upon future grant opportunities.				
2014BAYTWN005 — Establish low-to-moderate income Multi-family Home Wind Retrofit Assistance Grant Program		X		
Comment: Not Started and dependent upon future grant opportunities.				
2014BAYTWN006 — Public Education Program for Safe Room Determination and Awareness and appropriate actions to reduce residential property damages from high-wind impacts		X		
Comment: Not Started and dependent upon future grant opportunities.				
2014BAYTWN007 — Upgrade to City Code Requiring Community Safe Rooms to be Constructed in every New Recreational Vehicle Park.		X		
Comment: No update at this time. The action item is not feasible.				
2014BAYTWN008 — Update City Code of Ordinances to Require Emergency Generators at Local Gas Stations	X			
Comment: Action Item is Completed.				
2014BAYTWN009 — Install Early Warning lightning detection system for critical infrastructure (EOC, 911 Communications, and Pirates Bay Water Park).			X	BAY8
Comment: Action Item is in-process with EOC and 911 Communications Center weather stations. Pirates Bay Weather Station is installed.				
2014BAYTWN010 — Establish low-to-moderate income Single-family Home Cooling System Retrofit Assistance Grant Program		X		
Comment: Not Started and dependent upon future grant opportunities.				
2014BAYTWN011 — Modify Chapter 126 of City Code to encourage the use of Texas Native, Xeriscaping materials for Landscaping.		X		
Comment: City has adopted landscaping requirements, but not sure if Xeriscaping is included.				
2014BAYTWN012 — Improve Building Code to protect Buildings from hail damages		X		
Comment: Remove Action Item. No longer feasible. City already has a requirement addressing wind-borne debris protection.				

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
2014BAYTWN013 — Amend City Policy to require city carports and city vehicle shelters to be constructed of materials and processes to mitigate against hail damages to equipment currently parked in the open.			X	BAY9
Comment: Modify action item description to specify city carports and city vehicles. This action item is not intended to address residential structures.				
2014BAYTWN014 — Develop defensible space for protection around existing and future natural/man-made water bodies.		X		
Comment: No update at this time.				
2014BAYTWN015 — Develop a Community Urban Wildfire Prevention Program to educate citizens on how to reduce damages to residential property from wildfires.			X	BAY10
Comment: No update at this time.				
2014BAYTWN016 — Develop Community Warming Centers	X			
Comment: Combine with Cooling Center Action Item and complete with Library as location.				
2014BAYTWN017 — Establish low- to moderate-income Single family Home Heating Retrofit Assistance Grant Program		X		
Comment: Not Started and dependent upon future grant opportunities.				
2014BAYTWN018 — Conduct dam/levee failure flood inundation study and GIS mapping.		X		
Comment: REMOVE action item. This item is not feasible since the City is not directly at risk from dam/levee failures. Lake Houston and Trinity River structures and other levees are managed by SJRA or other entities.				
2014BAYTWN019 — Conduct a Hazardous Materials Commodity Flow Study	X			
Comment:				
2014BAYTWN020 — Determine the Need and Standards for a buffer zone around large scale Tier II Facilities	X			
Comment: At this time industry is regulated by Texas Rail Road Commission and industry already acquires lands to create buffers as a way to minimize risks and meet other regulatory standards. City Code does require structures in the Industrial Districts to meet certain setback requirements.				
2014BAYTWN021 — Conduct a Community Emergency Communications Survey to Determine Effectiveness of Haz Mat Release Emergency Warning Sirens.		X		
Comment: No update at this time.				
2014BAYTWN022 — Update City Code Chapter 62 to Require Transfer Pipes from Oil Wellheads to Storage Tanks to be buried at least three feet underground.	X			
Comment: Work on this project began 18 months ago, but the requirement to bury will need to be reviewed				
2014BAYTWN023 — Update City Haz Mat Underground Pipeline Regulations Ordinance		X		
Comment: Remove Action Item. No longer feasible and regulated by State and Federal agencies.				
2014BAYTWN024 — Harden 9-1-1 Communication Center	X			
Comment: Action Item is Complete. New 911 Dispatch Center was built and hardened.				
2014BAYTWN025 — Develop public education program for home owners on flood hazards and flood mitigation techniques to reduce flood damages to property.			X	BAY11
Comment: No update at this time. Dependent upon grant funding.				

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
2014BAYTWN026 — Improve Area Stormwater Retention Ponds to increase storage capacity.			X	BAY5
Comment: Area or individual retention ponds are developed as required. Regional and sub-regional ponds are practical, but expensive projects to implement. Combine with other Retention Pond projects.				
2014BAYTWN027 — Improve Underperforming Stormwater System Collection/Conveyance Components to ensure system functions in accordance with design to mitigate flooding.			X	BAY12
Comment: Several projects have been completed and are scheduled on an on-going basis. Installation of submersible pumps for facilities susceptible to flooding.				
2014BAYTWN027 — Acquisition of Repetitive Flood Loss Property identified in the Regional Stormwater Master Plan.			X	BAY13
Comment: City coordinates with HCFCD and Chambers County on acquisition of properties.				
2014BAYTWN029 — Install Emergency Power Generators for Pumping At All Sewer Lift Stations	X			
Comment: In-Process. Back generator power is installed during major repair to lift stations				
2014BAYTWN030 — Improve City of Baytown CRS Classification from Class 7 to Class 6 by end of 2018			X	BAY14
Comment: City is waiting for CRS score and findings from verification visit.				
2014BAYTWN031 — Develop a hardened Potable Water Treatment Plant to provide an alternate water source during drought conditions.			X	BAY15
Comment: Design is complete and being reviewed by TCEQ and should be online by 2018. Cost of project has increased to $40 million.				
2014BAYTWN032 — Convert Water Treatment Plant From Surface Water to Desalination Source			X	BAY16
Comment: WTP is set-up to convert to desalination, if necessary				
2010BAYTWN001 — Structural Mitigation Remove existing culverts and increase the size of the culverts to allow for more stormwater flow.	X			
Comment: Action Item is Complete.				
2010BAYTWN003 — Elevate Repetitive Flood Properties		X		
Comment: The Floodplain Administrator is working on reducing the numbers of SRL properties with approximately 47. REMOVE action item. Elevation is not a feasible mitigation measure for Baytown.				
2010BAYTWN005 — Develop 60 regional detention ponds as identified in the Community-Wide Master Drainage Plan			X	BAY5
Comment: Combine this action item with the action item # 2014BAYTWN001.				
2010BAYTWN006 — Expand Community Warning System (sirens, reverse 911, EAS/iPAWS, radio) to increase coverage to residents in flood-prone areas of the community.			X	BAY17
Comment: Siren Project near completion with approximately $200,000 of the project cost remaining. COMBINE into a single all-hazards warning and alert projects.				
2010BAYTWN007 — Hardening of critical public infrastructure against hurricane wind hazards.	X			
Comment: Action Item Completed. Shutters installed at critical facilities.				
2010BAYTWN009 — Installation of generators/power back-up systems on Critical Public Infrastructure			X	BAY18
Comment: Action Item Completed with generators installed at all critical facilities.				

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
2010BAYTWN011 — Expand Community Warning System (sirens, reverse 911, EAS/iPAWS, radio) to increase coverage of the community's population. [tornado]			X	BAY17
Comment: COMBINE into a single all-hazards warning and alert project.				
2010BAYTWN012 — Expand Community Warning System (sirens, reverse 911, EAS/iPAWS, radio) to increase coverage of the community's population. [thunderstorm]			X	BAY17
Comment: COMBINE into a single all-hazards warning and alert projects.				
2010BAYTWN013 — Install lightning and surge protection measures for critical infrastructure.			X	BAY19
Comment: Some city facilities, such as OEM, PW, and City Hall, have lightening arresting systems installed, but may not be certified due to expense of certifying. PW will add this as a project. Combine with other project.				
2010BAYTWN014 — Develop/implement Public Cooling Shelter program.	X			
Comment: Combine with Warning Center Action Item. Library acts as location.				
2010BAYTWN019 — Expand Community Warning System (sirens, reverse 911, EAS/iPAWS, radio) to increase coverage of the community's population. [hail]			X	BAY17
Comment: COMBINE into a single all-hazards warning and alert project.				
2010BAYTWN021 — Clean-up of heavy wildfire fuel areas (abandoned buildings, abandoned lands, etc.).			X	BAY20
Comment: 38 structures were demolished in 2015 and 57 in 2016.				
2010BAYTWN022 — Develop/implement home heating safety public education/outreach program to inform citizens on how to reduce damages from winter storms to residential property.			X	BAY21
Comment: No update at this time.				
2010BAYTWN023 — Expand Community Warning System (sirens, reverse 911, EAS/iPAWS, radio) to increase coverage of the community's population. [winter storm]			X	BAY17
Comment: COMBINE into a single all-hazards warning and alert project.				
2010BAYTWN025 — Expand Community Warning System (sirens, reverse 911, EAS/iPAWS, radio) to increase coverage to the community's population. [dam/levee failure]			X	BAY17
Comment: COMBINE into a single all-hazards warning and alert project.				
2010BAYTWN026 — Upgrade and test Hazmat emergency plan	X			
Comment: The action should remain on the list.				
2010BAYTWN027 — Expand Haz Mat Release Community Warning System (sirens, reverse 9-1-1, EAS/iPAWS, radio) to increase coverage to the community's population.			X	BAY17
Comment: COMBINE into a single all-hazards warning and alert project.				
2010BAYTWN028 — Establish/Expand GIS Mapping/Identification of Pipeline Risk Areas.			X	BAY22
Comment: The City has an ongoing process to update maps.				
2010BAYTWN029 — Expand Community Warning System (sirens, reverse 911, EAS/iPAWS, radio) to increase coverage to the community's population. [energy pipeline failure]			X	BAY17
Comment: COMBINE into a single all-hazards warning and alert project.				
2005BAYTWN001 — Increase hazards information at public library	X			
Comment: The City distributes information at public library and this is an on-going action item.				

2.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 2-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 2-15 identifies the priority for each action. Table 2-16 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 2-14. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action BAY1 — Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Flooding, Hurricane, Severe Weather, Dam Failure						
Existing	12, 13, 14, 15	ENG	EM, PLNG, PW	High	HMGP, PDM, FMA, CDBG-DR	Long-term
Action BAY2 — Integrate the hazard mitigation plan into other plans, ordinances and programs that dictate land use decisions in the community, including Capital Improvement Programs, Master Plans, and Strategic Plans.						
Hazards Mitigated: Coastal erosion, Dam/levee failure, Drought, Earthquakes, Flooding, Hurricanes and coastal storms, Mass movement, Severe weather, and Wildfire						
New and Existing	3, 5, 7, 9, 10	EM	ENG, PLNG, PW	Low	Staff Time, General Funds	Ongoing
Action BAY3 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: Coastal erosion, Dam/levee failure, Drought, Earthquakes, Flooding, Hurricanes and coastal storms, Mass movement, Severe weather, and Wildfire						
New and Existing	3, 5, 7, 9, 10	EM	ENG, PLNG, PW	Low	Staff Time, General Funds	Short-term
Action BAY4 — Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements: • Enforce the flood damage prevention ordinance. • Participate in floodplain identification and mapping updates. • Provide public assistance/information on floodplain requirements and impacts.						
Hazards Mitigated: Flooding, Hurricane, Severe Weather, Dam Failure						
New and Existing	2, 8, 9, 11, 14	ENG	EM, PLNG, PW	Low	Staff Time, General Funds	Ongoing
Action BAY5 — Create 75 Stormwater Retention Ponds to increase storage capacity as identified in Master Drainage Plan.						
Hazards Mitigated: Flooding, Hurricane, Severe Weather						
New and Existing	12, 13, 14, 15	ENG	PW, PLNG	Med	General Funds, Bonds, and HMA	Long-Term
Action BAY6 — Upgrade City Code Chapter 110 to Require Increased Freeboard (500-year + 2 feet) for Construction in Floodplain						
Hazards Mitigated: Flooding, Hurricane, Severe Weather, Dam Failure						
New and Existing	12, 13, 14, 15	ENG	PW, PLNG	Low	General Funds	Short-Term
Action BAY7 — Elevate Electronic Controls for Sewer Lift Stations 24" above 500-year NFIP Floodplain						
Hazards Mitigated: Flooding, Hurricane, Severe Weather						
New and Existing	13	PW	ENG	High	General Funds, Bonds, HMA, PA	Short-Term
Action BAY8 — Install Early Warning lightning detection system for critical infrastructure (EOC, 911 Communications, and Pirates Bay Water Park).						
Hazards Mitigated: Flooding, Hurricane, Severe Weather						
New and Existing	1, 13	City Departments	PW, ENG, FM	Med	General Funds	Long-Term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action BAY9 — Amend City Policy to require city carports and city vehicle shelters to be constructed of materials and processes to mitigate against hail damages to equipment currently parked in the open.						
Hazards Mitigated: Hurricane, Severe Weather						
New and Existing	13, 15	City Departments	PW, ENG, FM	Med	General Funds	Long-Term
Action BAY10 — Develop a Community Urban Wildfire Prevention Program to educate citizens on how to reduce damages to residential property from wildfires.						
Hazards Mitigated: Wildfire						
New and Existing	1, 3, 4, 6, 10	BFD	EM, PLNG	Low	General Funds, HMA	Short-Term
Action BAY11 – Develop public education program for home owners on flood hazards and flood mitigation techniques to reduce flood damages to property.						
Hazards Mitigated: Flooding, Hurricane, Severe Weather, Dam Failure						
New and Existing	1, 2, 3, 4, 10	EM and ENG	PLNG	Low	General Funds, HMA	Short-Term
Action BAY12 – Improve Underperforming Stormwater System Collection/Conveyance Components to ensure system functions in accordance with design to mitigate flooding; including installation of submersible pumps.						
Hazards Mitigated: Flooding, Hurricane, Severe Weather						
New and Existing	2, 13, 15					
Action BAY13 – Acquisition of Repetitive Flood Loss Property identified in the Regional Stormwater Master Plan.						
Hazards Mitigated: Flooding, Hurricane, Severe Weather						
New and Existing	12, 13, 14, 15	ENG	PLNG, EM	High	General Funds, Bonds, HMA, CDBG-DR	Long-Term
Action Bay 14 – Improve City of Baytown CRS Classification from Class 7 to Class 6						
Hazards Mitigated: Flooding, Hurricane, Severe Weather, Dam Failure						
New and Existing	12, 13, 14, 15	ENG	PLNG, EM, PW	Low	General Funds, HMA	Short-Term
Action BAY15 – Develop a hardened Potable Water Treatment Plant to provide an alternate water source during drought conditions.						
Hazards Mitigated: Drought, Mass Movement						
New and Existing	13	PW	ENG	High	General Funds, Bonds, HMA	Long-Term
Action BAY16 – Convert Water Treatment Plant from Surface Water to Desalination Source						
Hazards Mitigated: Drought, Mass Movement						
New and Existing	13	PW	ENG	High	General Funds, Bonds, HMA	Long-Term
Action BAY17 – Expand Community Warning System (sirens, reverse 911, Mass Notification, EAS, iPAWS, radio) to increase coverage to residents in hazard-prone areas of the community.						
Hazards Mitigated: Coastal erosion, Dam/levee failure, Drought, Earthquakes, Flooding, Hurricanes and coastal storms, Mass movement, Severe weather, and Wildfire						
New and Existing	1, 3, 4	EM	Communications, Information Technology Services	Med	General Funds	Short-Term
Action BAY18 – Installation of generators/power back-up systems on Critical Public Infrastructure						
Hazards Mitigated: Flooding, Hurricane, Severe Weather, Dam Failure						
New and Existing	11, 13, 15	City Departments	PW, FM	Med	General Funds, HMA	Short-Term
Action BAY19 – Install lightning and surge protection measures for critical infrastructure.						
Hazards Mitigated: Severe Weather						
New and Existing	11, 13, 15	City Departments	PW, FM	Med	General Funds	Short-Term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action BAY20 – Implement hazard fuel reduction and fire prevention measures such as clean-up and debris removal of abandoned buildings, abandoned lands, etc.						
Hazards Mitigated: Wildfire						
New and Existing	2, 13, 14, 15	BFD and PLNG	PW, ENG, EM	Low	General Funds, HMA	Short-Term
Action BAY21 – Develop/implement home heating safety public education/outreach program to inform residents on how to reduce damages from winter storms to residential property.						
Hazards Mitigated: Severe Weather						
New and Existing	1, 3, 4	EM	BFD	Low	General Funds	Short-Term
Action BAY22 – Create and establish a hazard risk profile database and GIS mapping of Pipeline Risk Areas.						
Hazards Mitigated: Pipeline Failure, HAZMAT						
New and Existing	1, 6, 13	EM	BFD	Low	General Funds, LEPC	Short-Term
Action BAY23 – Enhance air monitoring capabilities to mitigate chemical releases and exposures.						
Hazards Mitigated: Pipeline Failure, HAZMAT						
New and Existing	1, 6, 13	EM	BFD	Low	General Funds, LEPC	Short-Term
Action BAY24 – Develop an updated Commodity Flow Study and inventory of chemical facilities within the community to understand risk profile and implement appropriate mitigation measures.						
Hazards Mitigated: Pipeline Failure, HAZMAT						
New and Existing	1, 6, 13	EM	BFD	Low	General Funds, LEPC	Short-Term
Action BAY25 – Implement appropriate Water Conservation and Drought Contingency measures to mitigate drought and subsidence.						
Hazards Mitigated: Drought and Mass Movements						
New and Existing	7, 8, 9, 14	BAWA	PW, ENG, PLNG, EM	Low	General Funds	Short-Term
Action BAY26 – Implement drainage and infrastructure improvement projects to mitigate flooding and protect residential property through the CDBG-DR Program. (Julia Ann Villa, Lincoln Cedars, East WWTP, and South Main Street, etc.)						
Hazards Mitigated: Flooding, Hurricanes, Severe Weather.						
New and Existing	12, 13, 14, 15	PLNG	PW, ENG, EM	High	CDBG-DR, HMA, PA	Long-Term
Action BAY27 — Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
Hazards Mitigated: Coastal erosion, Dam/levee failure, Drought, Earthquakes, Flooding, Hurricanes and coastal storms, Mass movement, Severe weather, and Wildfire						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	Baytown	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

Acronyms: EM-Emergency Management, BAWA-Baytown Area Water Authority, PLNG-Planning, PW-Public Works, ENG-Engineering, BFD-Baytown Fire Dept., FM-Facilities Maintenance

Table 2-15. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
BAY1	4	High	High	Yes	Yes	No	Medium	High
BAY2	5	Medium	Low	Yes	Yes	Yes	Medium	Low
BAY3	5	Medium	Low	Yes	Yes	Yes	Medium	Low
BAY4	5	High	Medium	Yes	No	Yes	High	Low
BAY5	4	High	High	Yes	Yes	No	Medium	Medium
BAY6	4	High	Low	Yes	No	Yes	High	Low
BAY7	1	High	High	Yes	Yes	No	High	High
BAY8	2	Medium	Medium	Yes	Yes	No	High	High
BAY9	2	High	High	Yes	Yes	No	Low	Low
BAY10	5	Medium	Low	Yes	No	Yes	Low	Low
BAY11	5	Medium	Low	Yes	Yes	Yes	Medium	Low
BAY12	3	High	High	Yes	Yes	No	High	High
BAY13	4	High	High	Yes	Yes	No	Medium	Low
BAY14	4	Medium	Medium	Yes	No	Yes	Medium	Medium
BAY15	1	High	High	Yes	No	Yes	High	Low
BAY16	1	High	High	Yes	No	Yes	High	Low
BAY17	3	Medium	Medium	Yes	No	Yes	High	Low
BAY18	3	High	Medium	Yes	Yes	Yes	High	Medium
BAY19	3	Medium	Medium	Yes	No	Yes	Low	Low
BAY20	4	High	High	Yes	Yes	No	Low	Low
BAY21	3	Low	Low	Yes	No	Yes	Low	Low
BAY22	3	High	Low	Yes	No	Yes	Medium	Medium
BAY23	3	High	Medium	Yes	No	Yes	High	High
BAY24	3	High	Low	Yes	Yes	Yes	Medium	Low
BAY25	4	Medium	Low	Yes	No	Yes	Low	Low
BAY26	4	High	High	Yes	Yes	No	High	High
BAY27	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 2-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Flooding	BAY 2, 3, 4, 6, 11, 14, 27	BAY 1, 6, 13, 18	BAY 4, 11, 27	BAY 1	BAY 8, 17, 27	BAY 5, 7, 12, 26		BAY 2, 27
Hurricane	BAY 2, 3, 4, 6, 11, 14, 27	BAY 1, 6, 13, 18	BAY 4, 11, 27	BAY 1	BAY 8, 17, 27	BAY 5, 7, 9, 12, 26		BAY 2, 27
Severe Weather	BAY 2, 3, 4, 6, 11, 14, 27	BAY 1, 6, 13, 18, 19	BAY 4, 11, 21, 27	BAY 1	BAY 8, 17, 27	BAY 5, 7, 9, 12, 26		BAY 2, 27
Medium-Risk Hazards								
Wildfire	BAY 2, 3, 10, 14, 20, 27	BAY 20	BAY 10, 27		BAY 17, 27		BAY 10, 20	BAY 2, 27
Low-Risk Hazards								
Dam Failure	BAY 2, 3, 4, 11, 14, 27	BAY 1, 18	BAY 4, 11, 27	BAY 1	BAY 17, 27			BAY 2, 27
Drought	BAY 2, 3, 27		BAY27		BAY 17, 27	BAY 15, 16	BAY 15, 16, 25	BAY 2, 27
Earthquake	BAY 27	N/A	BAY27	N/A	BAY27	N/A	N/A	BAY27
Mass Movement	BAY 2, 3, 27		BAY27		BAY 17, 27	BAY 15, 16	BAY 15, 16, 25	BAY 2, 27
Tsunami	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

a. See the introduction to this volume for explanation of mitigation types.

2.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

2.11.1 Existing Reports, Plans, Regulatory Tools and Other Resources

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- **City of Baytown Code of Ordinances** — The municipal code was reviewed for the full capability assessment and for identifying opportunities for action plan integration.
- **City of Baytown Flood Damage Prevention Ordinance** — The flood damage prevention ordinance was reviewed for compliance with the National Flood Insurance Program.
- **Lower Trinity Flood Risk Report** — The FEMA RiskMAP program conducted several workshops and produced a technical report on key flood risk analysis data for the lower Trinity River area including a small portion of the City of Baytown.
- **TXCHART and Coastal Physical Map Revision —** Areas in Harris County impacted by coastal flooding were included in the Coastal Physical Map Revision update to the FIRM, which includes the City of Baytown.
- **Cedar Bayou Flood Risk Reduction Study –** The Harris County Flood Control District is conducting a report that will recommend flood risk reduction projects throughout the Cedar Bayou watershed and provide associated cost estimates for the recommended projects.

The following outside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.

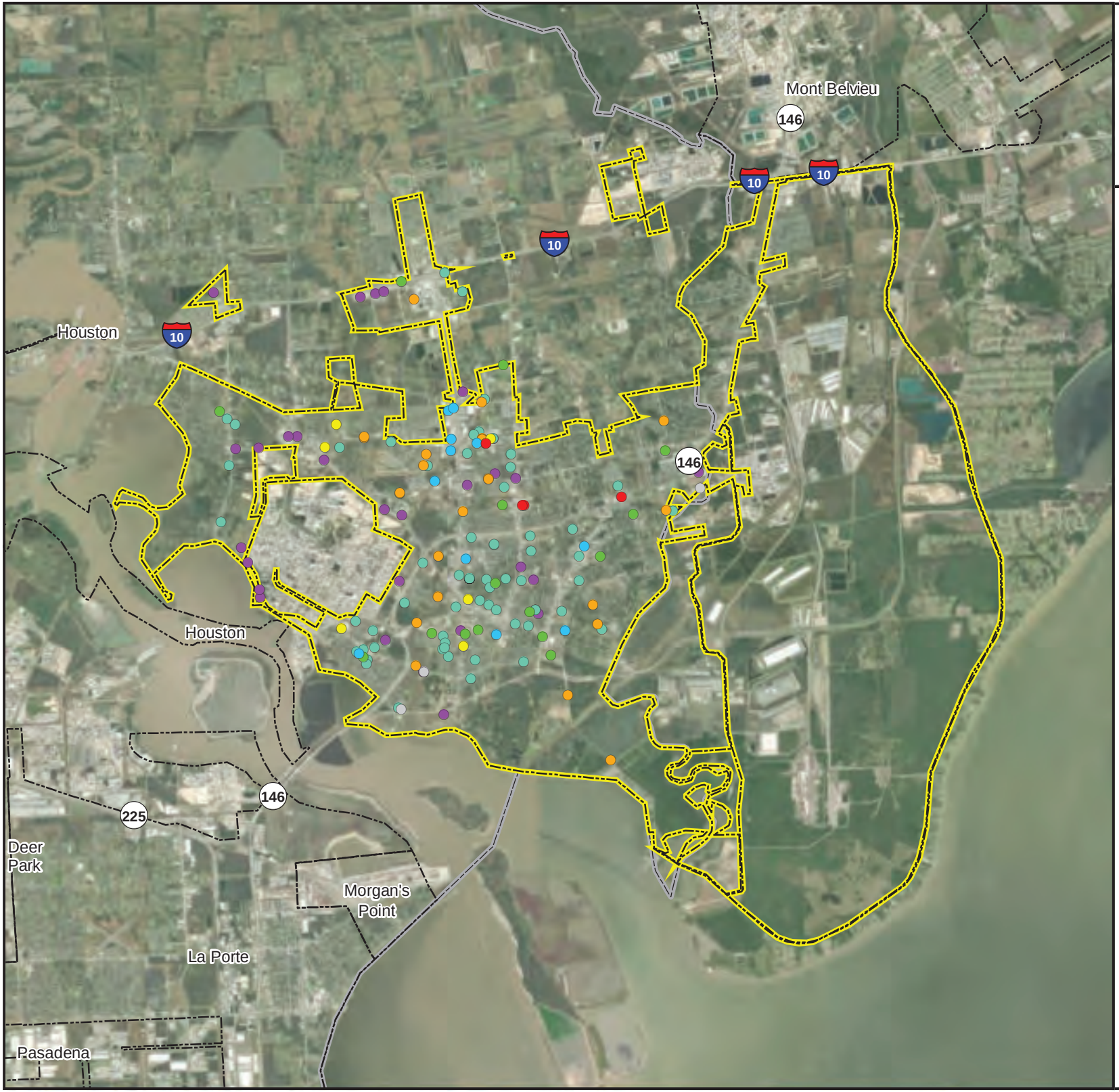
2.11.2 Staff and Local Stakeholder Involvement in Annex Development

This annex was developed over the course of several months with input from many city departments including Engineering, Emergency Management, Fire, Health, Planning and Development and Public Works. All departments were asked to contribute to the annex development through reviewing and contributing to the capability assessment, reporting on the status of previously identified actions, and participating in action identification and prioritization. An action development meeting was held on December 12, 2018 and March 12, 2019 and was attended by representatives from all previously listed department as well as the City Manager's office. Once actions had been identified and compiled in the annex, a draft was internally circulated for comment.

2.12 FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

The City of Baytown needs the following to better understand future risks and vulnerabilities from natural hazards and to better plan for the future:

- Updated and revised flood maps and flood hazard areas.
- Develop an updated Drainage Plan and Study to better understand local drainage issues, run-off, sheet-flow, and ponding.
- Develop an enhanced outreach program on flood insurance and wind insurance.
- Build capacity and strategies for resilience to cope with future impacts from natural hazards.
- Develop local community planning, development, and building design standards that address impacts from natural hazards to build a safer and stronger city.



Baytown

Critical Facilities

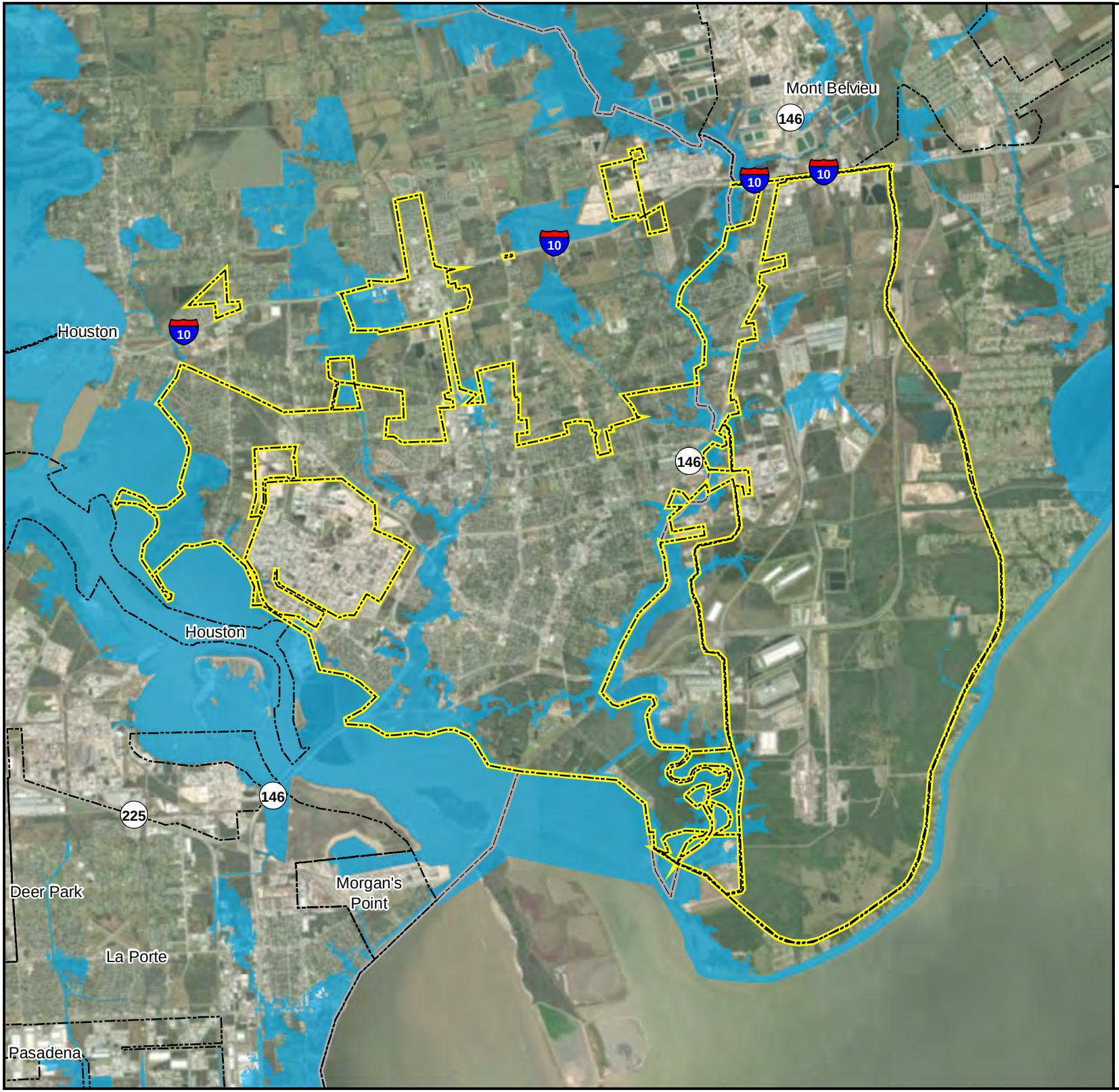
- Education Facilities
- Emergency Services
- Government Facilities
- Hazardous Material Sites
- Health and Medical Facilities
- Historical and Cultural Sites
- Transportation Systems
- Utility Systems
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.5 1 2 Miles



Baytown

FEMA Flood Hazard

1% Annual Chance Flood (100-yr)

Incorporated Cities

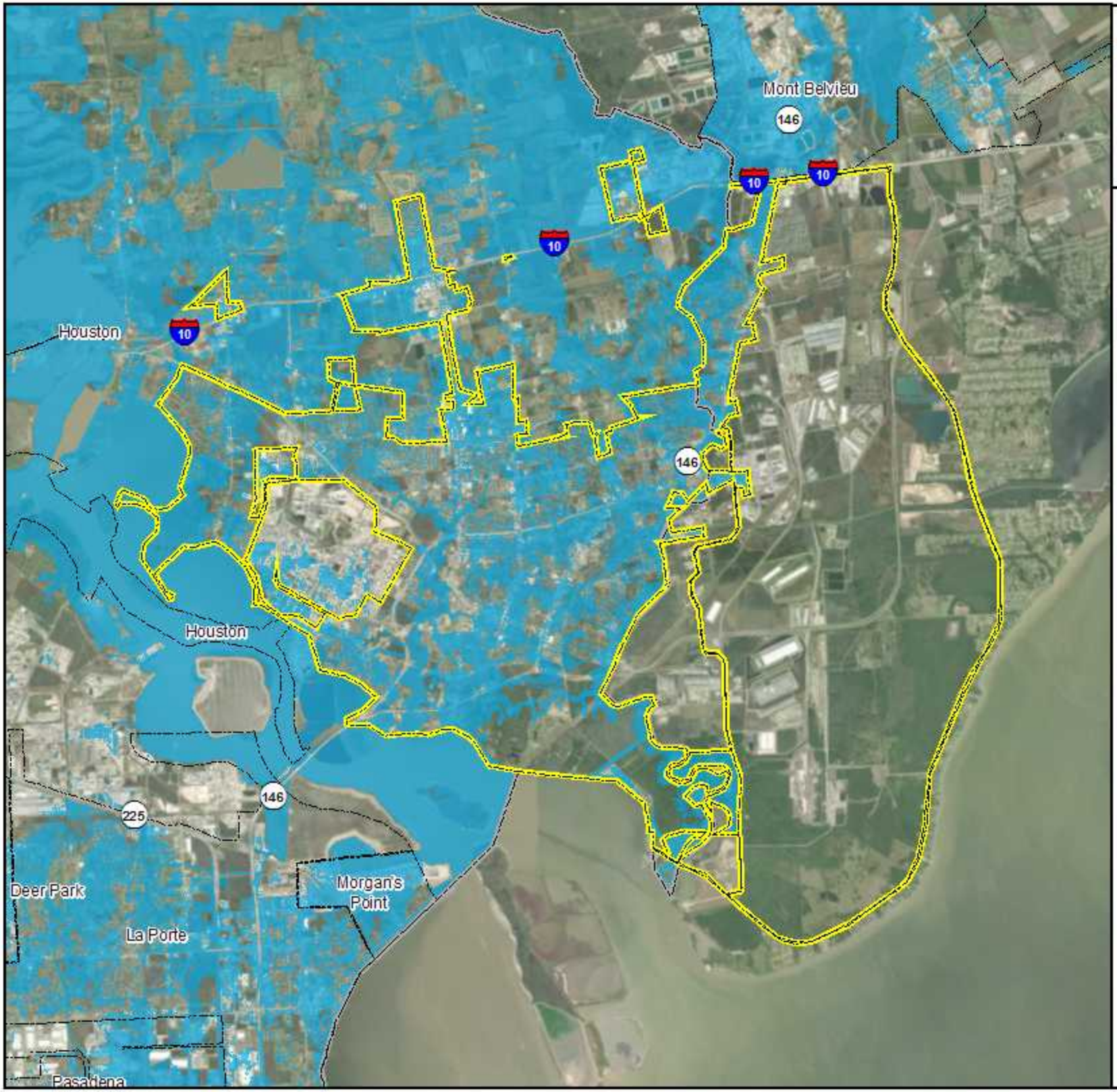
Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.5 1 2 Miles



Baytown

Flood Hazard Hurricane Harvey

Flooding Extent

Incorporated Cities

Harris County

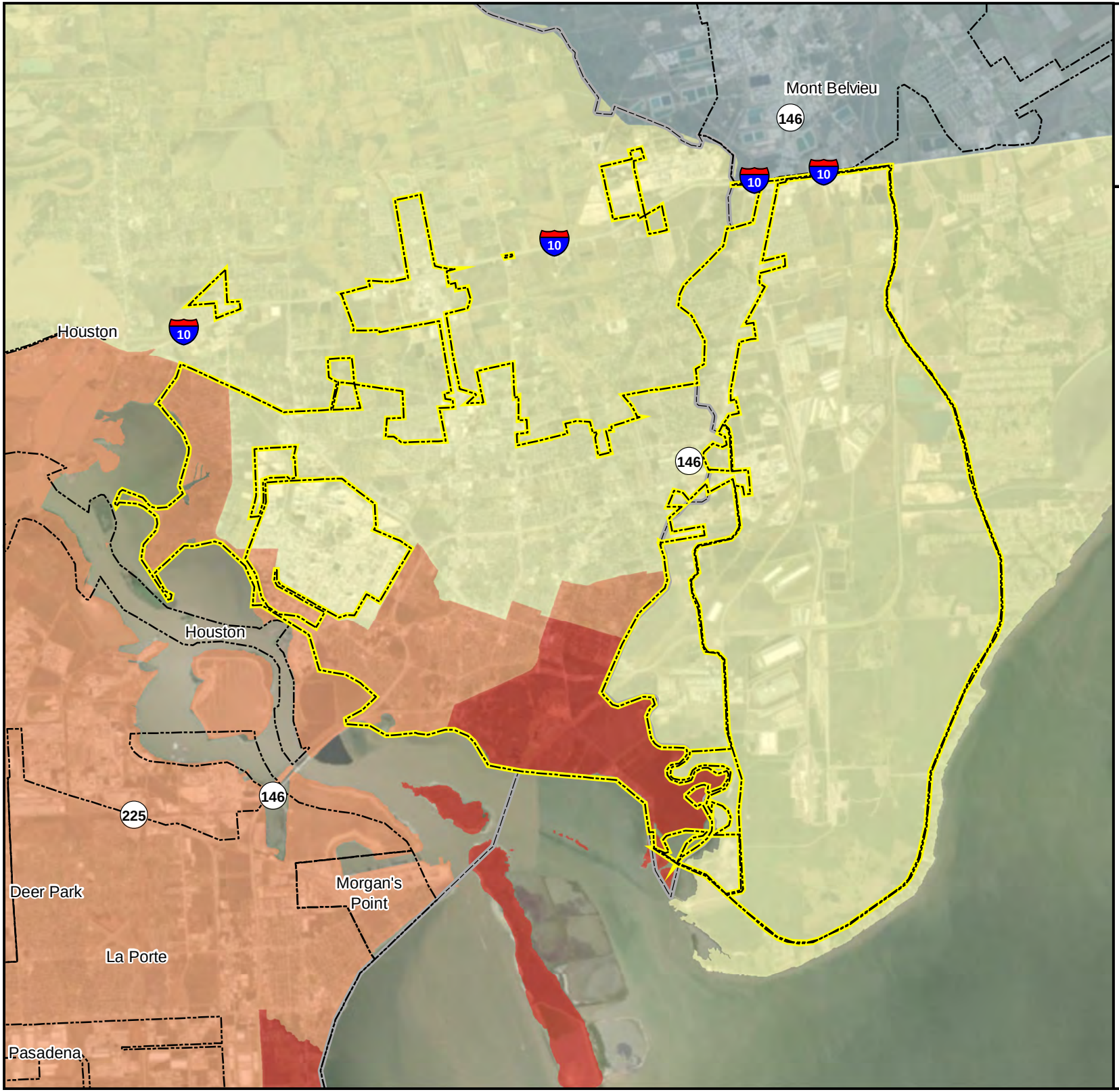
Note: Flooding extent shown for Hazard Mitigation Plan planning area only.

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.5 1 2 Miles



Baytown

Hurricane Alicia (1983)

Peak WInd Gust (mph)

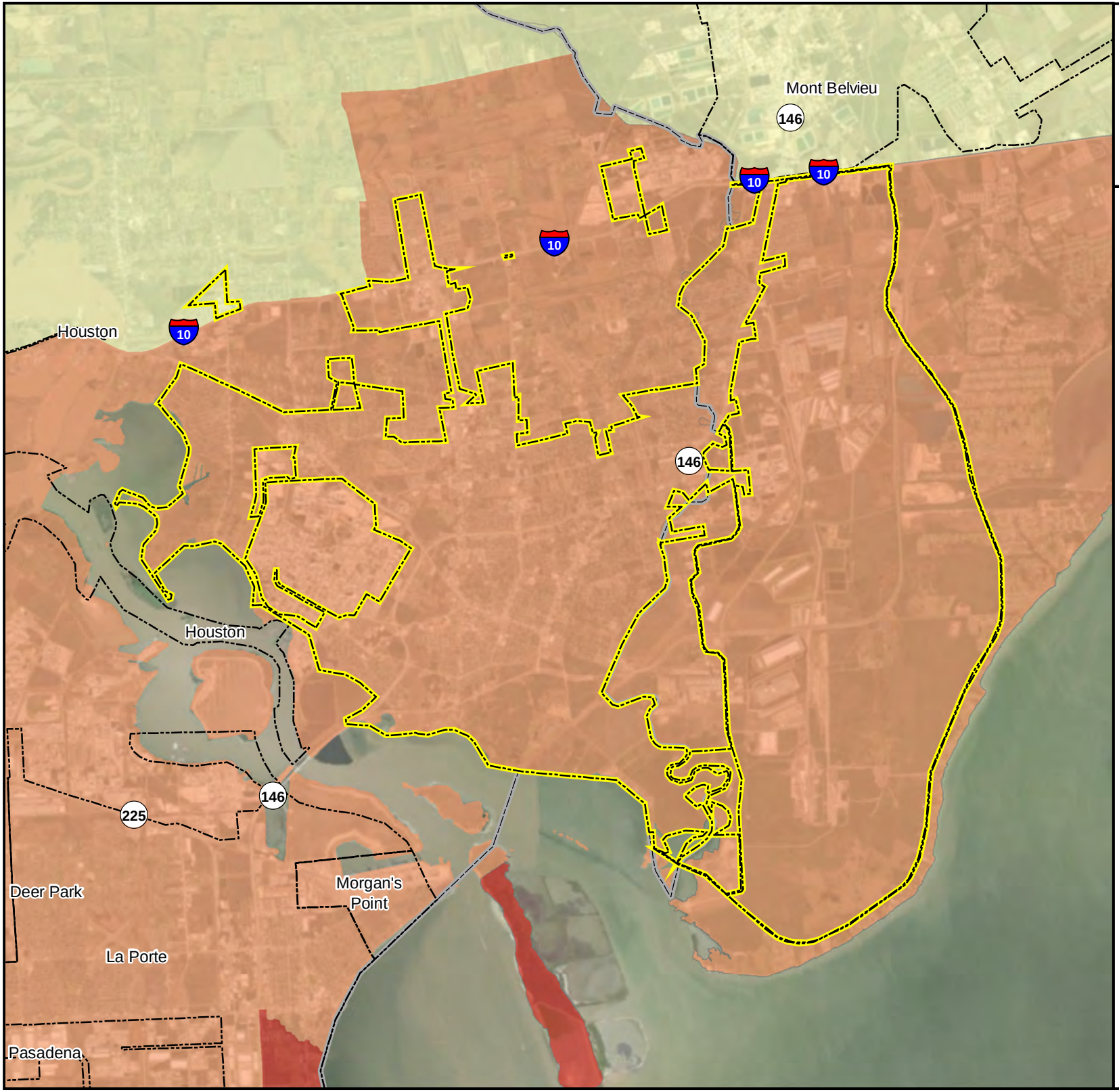
- 87 - 94
- 95 - 98
- 99 - 101
- 102 - 104
- 105 - 110
- Storm Track
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.5 1 2 Miles



Baytown

20-year Probabilistic Hurricane

Peak Wind Gust (mph)

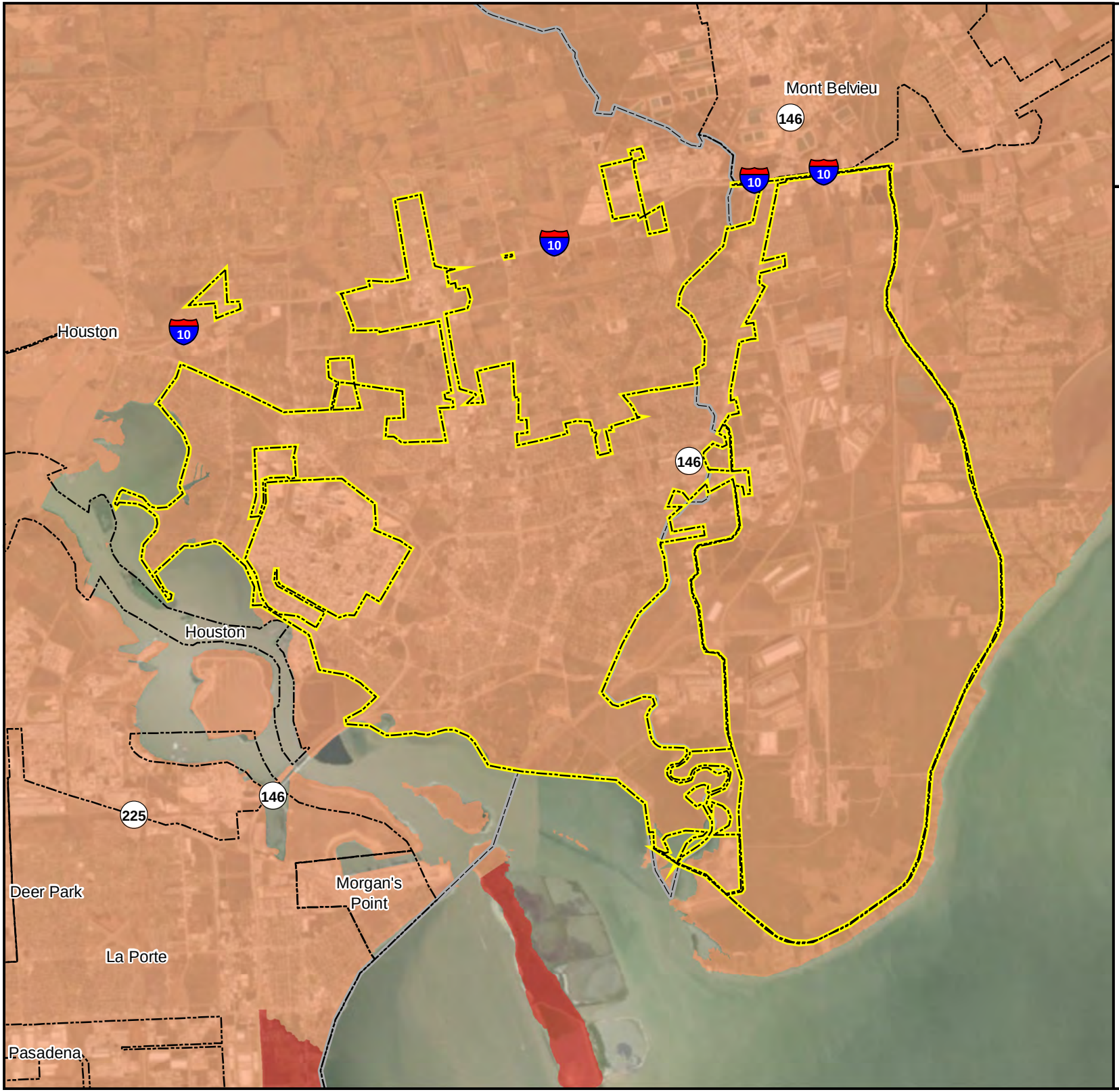
- 63 - 71
- 72 - 76
- 77 - 80
- 81 - 84
- 85 - 92
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.5 1 2 Miles



Baytown

100-year Probabilistic Hurricane

Peak Wind Gust (mph)

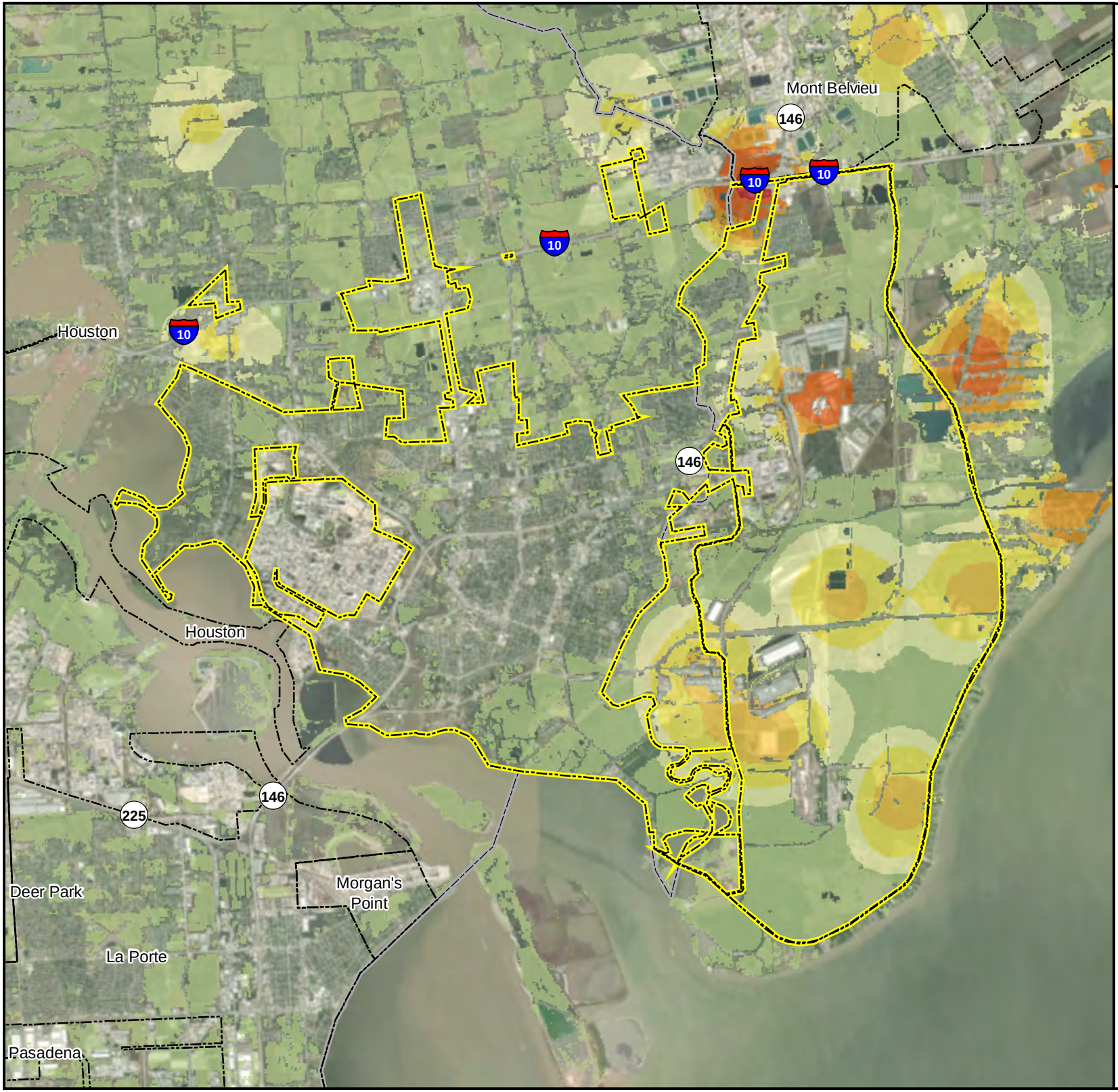
- 89 - 101
- 102 - 106
- 107 - 111
- 112 - 117
- 118 - 128
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.5 1 2 Miles



Baytown

Wildfire Ignition Density

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.5 1 2 Miles

Baytown

Wildfire Threat

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.5 1 2 Miles

3. CITY OF BELLAIRE

3.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Deacon Tittel, Fire Chief/EMC
7008 S. Rice
Bellaire, TX 77401
Telephone: 713-662-8201
e-mail Address: dtittel@bellairetx.gov

Alternate Point of Contact
ChaVonne Sampson
7008 S. Rice
Bellaire, TX 77401
Telephone: 713-662-8243
e-mail Address: csampson@bellairetx.gov

3.2 JURISDICTION PROFILE

3.2.1 Location

The City of Bellaire is located in the southwest portion of the Harris County, surrounded by the Cities of Houston, West University Place, and Southside Place. The city covers 3.6 square miles, with borders consisting of West Park to the north, Beechnut to the south, railroad tracks to the east and Chimney Rock to the west. I-610 runs directly through the middle of the City. Bellaire Boulevard and Bissonnet travel east and west through the City as well. Bellaire is primarily residential but has some commercial along with 17 mid- to high-rise structures.

3.2.2 History

Bellaire, on Interstate Loop 610, is surrounded by Houston, West University Place, and Southside Place in southwest Harris County. William Wright Baldwin, acting as president of the South End Land Company, founded Bellaire and Westmoreland Farms after purchasing the 9,449-acre Rice Ranch in 1908. Baldwin was a native of Iowa and nationally known as vice president of the Burlington Railroad. The development was six miles from Houston on the eastern edge of the Rice Ranch, so named for former owner William Marsh Rice. Promotional advertising in 1909 explained that Bellaire was named for the area's Gulf breezes, but Baldwin may have named it for Bellaire, Ohio, a town served by his railroad. By 1910 Baldwin had invested over $150,000 in capital improvements to turn the treeless prairie into an attractive location for residences and small truck farms. From the site to Main Street in Houston he constructed Bellaire Boulevard. He also incorporated the Westmoreland Railroad Company to build an electric streetcar line down the center of the boulevard. The streetcar, known as the "Toonerville Trolley," operated from December 12, 1910, until bus service replaced it on September 26, 1927. In 1910 horticulturist Edward Teas was induced to move his nursery from Missouri to Bellaire Boulevard to implement landscaping plans drawn by landscape architect Sid Hare. A Bellaire post office opened in 1911.

The South End Land Company advertised nationwide to attract Midwestern farmers and others who were eager to escape harsh winters. Bellaire was promoted as an exclusive residential neighborhood and agricultural trading center with the conveniences of city living and reliable access to Houston. On June 24, 1918, with a population of about 200, Bellaire obtained a general-law city charter. The population reached 1,124 by 1940. Houston's expansion after World War II transformed Bellaire into a popular suburb, but geographical growth was halted when Houston annexed the surrounding land on December 31, 1948. In April 1949 Bellaire adopted a home-rule

charter with a council-manager government. The city had 10,173 residents in 1950. The Swedish general consul's office opened in Bellaire in 1953. At one point, the city was also home to the consulate general of Honduras. However, both offices had relocated to Houston by 2009.

Bellaire is zoned for residential, commercial, and light industrial sections. High-rise office buildings are located along Loop 610, but Bellaire is largely known as a residential city. Zoning and land-use controversies, long the stuff of Bellaire politics, led to a recall of the mayor and three councilmen in 1977. A resurgence in new residential construction began in the late 1980s following a liberalization of the city's traditionally strict zoning policies. By 1968 Bellaire had fifteen churches and one synagogue. Leading community organizations included the Bellaire-Southwest Houston Chamber of Commerce (now part of the Houston Metropolitan Chamber of Commerce), the Bellaire Historical Society, Friends of the Bellaire Library, Friends of Bellaire Parks (now Patrons for Bellaire Parks), and the Bellaire Women's Civic Club. In 2017 there were three private schools and several public schools operated by the Houston Independent School District. Local publications included the Bellaire *Examiner*, the *Village & Southwest News*, and *Bellaire Buzz* magazine. City management is noted for its police and fire protection, library, public works, parks and recreation facilities, and an office for senior services. The population was 19,872 in 1960, 13,842 in 1990, and 16,855 in 2010. (by Jeffery Dunn)

3.2.3 Climate

The climate of the City of Bellaire is your typical Southeast Texas weather. Winters do not truly start until January when consist cold temperatures are normal. Snow and ice are hit or miss for the area. The spring brings beautiful weather but also strong thunderstorms. Summers are typically hot with high humidity. The area experiences humidity throughout the year. Autumn is nice, with average temperatures in the mid 60s. Tropical weather occurs, but not typically until September.

3.2.4 Governing Body Format

Bellaire is city charter and calls for a council-manager form of government. There is a seven-member City Council, which includes a Mayor. The City Managers is responsible for the daily operations of the City. The City consists of nine different departments – Fire, Police, Finance, Development Services, Human Resources, Public Works, Library, Parks, Recreation, Facilities, and Information Technology.

The City Council will assume responsibility for the adoption of this plan; The City Manager and the Fire Chief/Emergency Manager will oversee its implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 3-1.

Table 3-1. Local Mitigation Planning Team Members

Name	Title
Deacon Tittel	Fire Chief/EMC
ChaVonne Sampson	Director of Development Services
Paul Hofmann	City Manager
Paula Ryan	Assistant City Manager
Mike Leech	Director of Public Works
Terrence Beaman	Chief Financial Officer
William Davidson	Building Official
Karl Miller	Director of Parks and Recreation
Cheryl Bright	Community Relations Administrator

3.3 CURRENT TRENDS

3.3.1 Population

According to Census Bureau, the population of the City of Bellaire as of 2016 was 18,140 Since 2015, the population has grown at an average annual rate of 1.52 percent.

3.3.2 Development

The City of Bellaire continues to have new residential construction taking place. The majority of the residential construction consists of tearing down the old single story structures and replacing them with new 2 story single family dwellings. Some limited redevelopment in the commercial area mainly consists of renovations to existing structures.

Table 3-2 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

Table 3-2. Recent and Expected Future Development Trends

Criterion	Response					
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan?	**NO**					
• **If yes, give the estimated area annexed and estimated number of parcels or structures.**	N/A					
Is your jurisdiction expected to annex any areas during the performance period of this plan?	**NO**					
• **If yes, describe land areas and dominant uses.**	N/A					
• **If yes, who currently has permitting authority over these areas?**	N/A					
Are any areas targeted for development or major redevelopment in the next five years?	**NO**					
• **If yes, briefly describe, including whether any of the areas are in known hazard risk areas**	N/A					
How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?		**2014**	**2015**	**2016**	**2017**	**2018**
	Single Family	125	98	73	87	76
	Multi-Family	0	0	0	0	0
	Other (commercial, mixed use, etc.)	4	3	1	3	2
	Total	**129**	**101**	**74**	**90**	**78**
Provide the number of new-construction permits for each hazard area or provide a qualitative description of where development has occurred.	• Special Flood Hazard Areas: 472 • Landslide: 0 • High Liquefaction Areas: 0 • Tsunami Inundation Area: 0 • Wildfire Risk Areas: 0					
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	City of Bellaire is 100% built out					

3.4 CAPABILITY ASSESSMENT

The City of Bellaire performed an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities is presented in Table 3-3.
- Development and permitting capabilities are presented in Table 3-4.
- An assessment of fiscal capabilities is presented in Table 3-5.
- An assessment of administrative and technical capabilities is presented in Table 3-6.
- An assessment of education and outreach capabilities is presented in Table 3-7.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 3-8.
- Classifications under various community mitigation programs are presented in Table 3-9.
- The community's adaptive capacity for the impacts of climate change is presented in Table 3-10.

Findings of the capability assessment were reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table included in the action plan for this annex identifies these as community capacity building mitigation actions.

Table 3-3. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code	Yes	No	Yes	Yes
Comment: *Chapter 9, Article 2 adopts the current version of the IBC, 10/6/2014*				
Zoning Code	Yes	No	No	Yes
Comment: *Chapter 24, Article 1, Planning and Zoning, 11/16/2009*				
Subdivisions	Yes	No	Yes	Yes
Comment: *Chapter 25, Articles I, II and II, 10/8/2001*				
Stormwater Management	No	No	No	No
Comment:				
Post-Disaster Recovery	No	No	No	No
Comment:				
Real Estate Disclosure	No	No	Yes	No
Comment:				
Growth Management	No	No	No	No
Comment:				
Site Plan Review	Yes	No	No	Yes
Comment: *Chapter 23.5, Article II, 7/2/2012*				
Environmental Protection	No	No	Yes	No
Comment:				
Flood Damage Prevention	Yes	No	No	Yes
Comment: *Chapter 9, Article 2A, 10/6/2014*				
Emergency Management	Yes	Yes	Yes	Yes
Comment: *Chapter 11, 3/5/1984*				
Climate Change	No	No	No	No
Comment:				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Planning Documents				
General Plan	Yes	No	Yes	Yes
Comment: *Chapter 24, Article 1, section 24-104, 11/16/2019*				
Capital Improvement Plan	Yes	No	Yes	Yes
How often is the plan updated? *Yearly*				
Comment:				
Disaster Debris Management Plan	Yes	No	No	Yes
Comment:				
Floodplain or Watershed Plan	Yes	No	No	Yes
Comment: *The Flood Hazard Mitigation Plan was finalized and then approved by Council on March 19, 2018.*				
Stormwater Plan	Yes	Yes	No	Yes
Comment:				
Urban Water Management Plan	No	No	No	No
Comment:				
Habitat Conservation Plan	No	No	No	No
Comment:				
Economic Development Plan	No	No	No	No
Comment:				
Shoreline Management Plan	No	No	No	No
Comment: *We do not have any shorelines in our jurisdiction*				
Community Wildfire Protection Plan	No	No	No	No
Comment: *No areas in need of this type of plan*				
Forest Management Plan	No	No	No	No
Comment: *We have no forest in our jurisdiction*				
Climate Action Plan	No	No	No	No
Comment:				
Comprehensive Emergency Management Plan	Yes	No	Yes	Yes
Comment:				
Threat & Hazard Identification & Risk Assessment (THIRA)	Yes	No	Yes	Yes
Comment:				
Post-Disaster Recovery Plan	No	No	No	No
Comment:				
Continuity of Operations Plan	No	No	No	No
Comment:				
Public Health Plan	No	No	No	No
Comment:				
Other	No	No	No	No
Comment:				

Table 3-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • **If no, who does? If yes, which department?**	Yes Development Services
Does your jurisdiction have the ability to track permits by hazard area?	No
Does your jurisdiction have a buildable lands inventory?	No

Table 3-5. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants	No
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	No
User Fees for Water, Sewer, Gas or Electric Service	Yes
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	No
Incur Debt through Private Activity Bonds	No
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State-Sponsored Grant Programs	No
Development Impact Fees for Homebuyers or Developers	No
Other	No

Table 3-6. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Development Services
Engineers or professionals trained in building or infrastructure construction practices	No	Development Services
Planners or engineers with an understanding of natural hazards	Yes	Development Services
Staff with training in benefit/cost analysis	Yes	Development Services
Surveyors	No	N/A
Personnel skilled or trained in GIS applications	Yes	Development Services
Scientist familiar with natural hazards in local area	No	N/A
Emergency manager	Yes	Fire Department / Fire Chief
Grant writers	Yes	Development Services
Other	No	N/A

Table 3-7. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • If yes, briefly describe.	Yes Documents Center Page
Do you use social media for hazard mitigation education and outreach? • If yes, briefly describe.	Yes Updated Information as to what he City is doing
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • If yes, briefly describe.	Yes Flood Hazard Board
Do you have any other programs already in place that could be used to communicate hazard-related information? • If yes, briefly describe.	No N/A
Do you have any established warning systems for hazard events? • If yes, briefly describe.	Yes Everbridge

Table 3-8. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Development Services
Who is your floodplain administrator? (department/position)	Development Services Director
Are any certified floodplain managers on staff in your jurisdiction?	Yes
What is the date that your flood damage prevention ordinance was last amended?	3-18-2019
Does your floodplain management program meet or exceed minimum requirements? • **If exceeds, in what ways?**	Exceeds 1 foot above BFE
When was the most recent Community Assistance Visit or Community Assistance Contact?	12-15-19
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • **If so, state what they are.**	No N/A
Are any RiskMAP projects currently underway in your jurisdiction? • **If so, state what they are.**	No N/A
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • **If no, state why.**	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? • **If so, what type of assistance/training is needed?**	Yes Ongoing Training
Does your jurisdiction participate in the Community Rating System (CRS)? • **If yes, is your jurisdiction interested in improving its CRS Classification?** • **If no, is your jurisdiction interested in joining the CRS program?**	Yes Yes N/A
How many flood insurance policies are in force in your jurisdiction?[a] • **What is the insurance in force?** • **What is the premium in force?**	5,070 $ N/A $4,461,572.00
How many total loss claims have been filed in your jurisdiction?[a] • **How many claims are still open or were closed without payment?** • **What were the total payments for losses?**	3099 N/A $249,117,073.00

a. According to FEMA statistics as of July 19, 2018

Table 3-9. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	Yes	7	10-01-2014
Building Code Effectiveness Grading Schedule	Yes	4	1-31-2019
Public Protection	Yes	2	04/10/2017
Storm Ready	No		
Firewise	No		

Table 3-10. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:***	Low
Jurisdiction-level monitoring of climate change impacts ***Comment:***	Low
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:***	Low
Participation in regional groups addressing climate risks ***Comment:***	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	Low
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	Low
Identified strategies for adaptation to impacts ***Comment:***	Low
Champions for climate action in local government departments ***Comment:***	Low
Political support for implementing climate change adaptation strategies ***Comment:***	Low
Financial resources devoted to climate change adaptation ***Comment:***	Low
Local authority over sectors likely to be negative impacted ***Comment:***	Low
Public Capacity	
Local residents knowledge of and understanding of climate risk ***Comment:***	Low
Local residents support of adaptation efforts ***Comment:***	Low
Local residents' capacity to adapt to climate impacts ***Comment:***	Low
Local economy current capacity to adapt to climate impacts ***Comment:***	Low
Local ecosystems capacity to adapt to climate impacts ***Comment:***	Low

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

3.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning and capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

3.5.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- City of Bellaire Flood Mitigation Plan March 2018- A plan that outlines the implementation of activities that will efficiently use public and private resources to reduce flood losses and encourage support for hazard mitigation activities among the public.

3.5.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- **Comprehensive Plan —** The City of Bellaire is conducting a comprehensive plan update. The opportunity to incorporate additional mitigation and abatement measures will be contemplated for inclusion into the Code.

3.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 3-11 lists past occurrences of natural hazards for which specific damage was recorded in City of Bellaire. Other hazard events that broadly affected the entire planning area, including City of Bellaire, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 3-11. Past Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Hurricane Harvey	4332 DR	2017	N/A
Severe Storms and Flooding	4269 DR	2016	N/A
Severe Storms and Flooding	4272 DR	2016	N/A
Hurricane Ike	N/A	2008	N/A
Tropical Storm Allison	1379 DR	2001	N/A

3.7 HAZARD RISK RANKING

Table 3-12 presents a local ranking for City of Bellaire of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 3-12. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Flooding	51	High
2	Severe Weather	48	High
2	Hurricane	48	High
3	Earthquake	14	Low
4	Wildfire	11	Low
5	Drought	6	Low
5	Mass Movements	6	Low
6	Coastal Erosion	0 (No Exposure)	None
6	Tsunami	0 (No Exposure)	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

3.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. This section provides information on a few key vulnerabilities for the jurisdiction. Available jurisdiction-specific risk maps of the hazards are provided at the end of this annex.

3.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: 183
- Number of FEMA-identified Severe-Repetitive-Loss Properties: 9
- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated: 10

3.8.2 Other Noted Vulnerabilities

No additional vulnerabilities specific to this jurisdiction have been identified.

3.9 STATUS OF PREVIOUS PLAN ACTIONS

Table 3-13 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

3.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 3-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 3-15 identifies the priority for each action. Table 3-16 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 3-13. Status of Previous Plan Actions

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
2014BELARE001 — Tree Trimming Program			X	BEL5
Comment: Still a Work in progress				
2014BELARE002 — Hardening new City Hall and Police Department	X			
Comment: Will be completed in January of 2019				
2014BELARE003 — Develop new drainage ordinance to require on-site detention for future development and redevelopment	X			
Comment:				
2014BELARE004 — Adopting Community Canopy Action Plan (C-Cap) to reduce sick and diseased trees that impact roadways and vehicles under that canopy			X	BEL8
Comment: Investigating to see the status				
2014BELARE005 — Create and enforce ordinance to reduce fuel loads and ignition sources by unmaintained and delinquent private right of way.			X	BEL9
Comment: Investigating to see the status				
2014BELARE006 — Harden water supply piping with non-corrosive, drought resistant material to prevent loss of water due to breaks			X	BEL6
Comment: Investigating to see the status				
2014BELARE007 — Expand Mass Notification Warning System increase coverage and to communicate hazard potential with Citizens	X			
Comment:				
2014BELARE008 — Install a backup generator for the emergency cooling center in the event of loss of power			X	BEL10
Comment: Investigating to see the status				
2014BELARE009 — Create Ordinance to mandate safe zone around any new commercial site having reportable quantities of a Hazardous Material			X	BEL11
Comment: Energy Pipeline needs to be removed from previous action item verbiage				
2014BELARE010 — Implement a Public Education Program to educate residents on drought trigger-points that will cause water restrictions to be enforced and to reduce water shortages.			X	BEL7
Comment: Investigating to see the status				

Table 3-14. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action BEL1 — Where appropriate, support retrofitting, or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Dam Failure, Flooding, Hurricane and Severe Weather						
New	3, 10	City of Bellaire	TX Water Board / TDEM	High	HMGP, PDM, FMA	Short-term
Action BEL2 — Integrate the hazard mitigation plan into other plans, ordinances and programs that dictate land use decisions in the community, including comprehensive plan, and zoning ordinance.						
Hazards Mitigated: Drought, earthquake, flooding, severe weather, hurricanes,						
New	3, 6, 7, 9, 10, 11, 12, 13, 14, 15	City of Bellaire	TBD	Low	Staff Time, General Funds	Ongoing
Action BEL3 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: Flooding, Severe Weather, Hurricane, Earthquake, Wildfire, Drought and Mass Movements						
New	All Objectives	City of Bellaire	TBD	Low	Staff Time, General Funds	Ongoing
Action BEL4 — Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirement • Enforce the flood damage prevention ordinance. • Participate in floodplain identification and mapping updates. • Provide public assistance/information on floodplain requirements and impacts.						
Hazards Mitigated: Flooding, severe weather, and hurricanes						
New and Existing	1, 3, 7, 9, 10, 11, 12, 13, 14, 15	City of Bellaire	TBD	Low	Staff Time, General Funds	Ongoing
Action BEL5 — Tree Trimming Program						
Hazards Mitigated: Flooding, severe weather, hurricanes, and Drought						
Existing	8, 9, 11	City of Bellaire	TBD	Low	Staff Time, General Funds	Seasonal
Action BEL6 — Harden water supply piping with non-corrosive, drought resistant material to prevent loss of water due to breaks						
Hazards Mitigated: Drought						
Existing	3, 6, 7, 11	City of Bellaire	TBD	Medium	Staff Time, CIP Funds	Ongoing
Action BEL7 — Implement a Public Education Program to educate residents on flooding, severe weather, hurricanes, and drought trigger-points that will cause potential restrictions to be enforced and to reduce resource shortages						
Hazards Mitigated: Flooding, severe weather, hurricanes, and drought						
New and Existing	1, 3, 4, 9, 10	City of Bellaire	TBD	Low	Staff time, general Funds	Ongoing
Action BEL8 — Adopting Community Canopy Action Plan (C-Cap) to reduce sick and diseased trees that impact roadways and vehicles under that canopy						
Hazards Mitigated: Severe weather, hurricanes, wildfire and drought						
Existing	2, 8, 11	City of Bellaire	TBD	Medium	General and grant funds	Ongoing
Action BEL9 — Create and enforce ordinance to reduce fuel loads and ignition sources by unmaintained and delinquent private right of way.						
Hazards Mitigated: Wildfire						
Existing	2, 8, 11	City of Bellaire	TBD	Low	General funds	Ongoing
Action BEL10 — Install a backup generator for the emergency cooling center in the event of loss of power						
Hazards Mitigated: Severe weather, hurricanes, earthquake						
New	4, 10	City of Bellaire	TBD	Medium	Grant funds	Short term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action BEL11 — Create Ordinance to mandate safe zone around any new commercial site having reportable quantities of a Hazardous Material						
Hazards Mitigated: Flooding, severe weather, hurricane, wildfire						
New	6, 10, 11, 12, 13, 14, 15	City of Bellaire	TBD	Low	Staff time, general funds	Short term
Action BEL12— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
Hazards Mitigated: Flooding, Severe Weather, Hurricane, Earthquake, Wildfire, Drought and Mass Movements						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	Bellaire	HCOHSEM	Low	General Funds	Ongoing
Action BEL13 — Evaluate the conversion of Bellaire's wastewater treatment plant, dog park, and soccer fields along Edith into detention areas. Evaluate the conversion of the trash transfer station at Beltway 8 to a reservoir for Brays Bayou.						
Hazards Mitigated: Flooding, severe weather, hurricane						
New and Existing	3, 7, 9	City of Bellaire	City of Houston, Harris County Flood Control	High	Staff funds, CIP funds, and grant funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 3-15. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
BEL1	2	High	High	Yes	Yes	No	Medium	High
BEL2	10	High	Low	Yes	No	Yes	High	Low
BEL3	15	Medium	Low	Yes	No	Yes	Medium	Low
BEL4	10	High	Medium	Yes	No	Yes	High	Low
BEL5	3	Low	Low	Yes	No	No	Low	Low
BEL6	4	High	Medium	Yes	Yes	Yes	High	Medium
BEL7	5	High	Low	Yes	Yes	Yes	Medium	Low
BEL8	3	Medium	Low	Yes	No	Yes	Medium	Medium
BEL9	3	Medium	Low	Yes	No	Yes	Medium	Medium
BEL10	2	High	High	Yes	Yes	No	High	High
BEL11	7	Medium	Low	Yes	No	Yes	Medium	Medium
BEL12	8	Medium	Low	Yes	Yes	Yes	High	High
BEL13	3	High	High	Yes	Yes	No	High	High

a. See the introduction to this volume for explanation of priorities.

Table 3-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Flooding	BEL1, 2, 4, 5, 7, 11, 12, 13	BEL1, 5, 11, 13	BEL4, 7, 12	BEL4, 5, 8	BEL3, 4, 10, 12	BEL1	BEL1	BEL1, 2, 4, 10, 12
Severe Weather	BEL1, 2, 4, 5, 7, 11, 12, 13	BEL1, 4, 11, 13	BEL4, 7, 12	BEL4, 5, 8	BEL3, 4, 10, 12	BEL1	BEL 8	BEL1, 2, 4, 10, 12
Hurricane	BEL1, 2, 4, 5, 11, 12, 13	BEL1, 5, 11, 13	BEL4, 7, 12	BEL4, 5, 8	BEL3, 4, 10, 12	BEL1	BEL8	BEL1, 2, 4, 10, 12
Medium-Risk Hazards								
N/A								
Low-Risk Hazards								
Earthquake	BEL2, 11, 12	NO	BELK12	BEL5	BEL3, 12	NO	NO	BEL1, 2, 12
Wildfire	BEL1, 2, 5, 9, 11, 12	BEL5, 9	BEL9, 12	BEL5, 8, 9	BEL9, 12	NO	BEL8, 9	BEL1, 2, 12
Drought	BEL1, 2, 5, 6, 7, 12	BEL5, 6, 11	BEL7, 12	BEL5, 8	BEL3, 12	BEL6	BEL6, 8	BEL1, 2, 6, 12
Mass Movements	BEL12		BEL12		BEL12			BEL12

a. See the introduction to this volume for explanation of mitigation types.

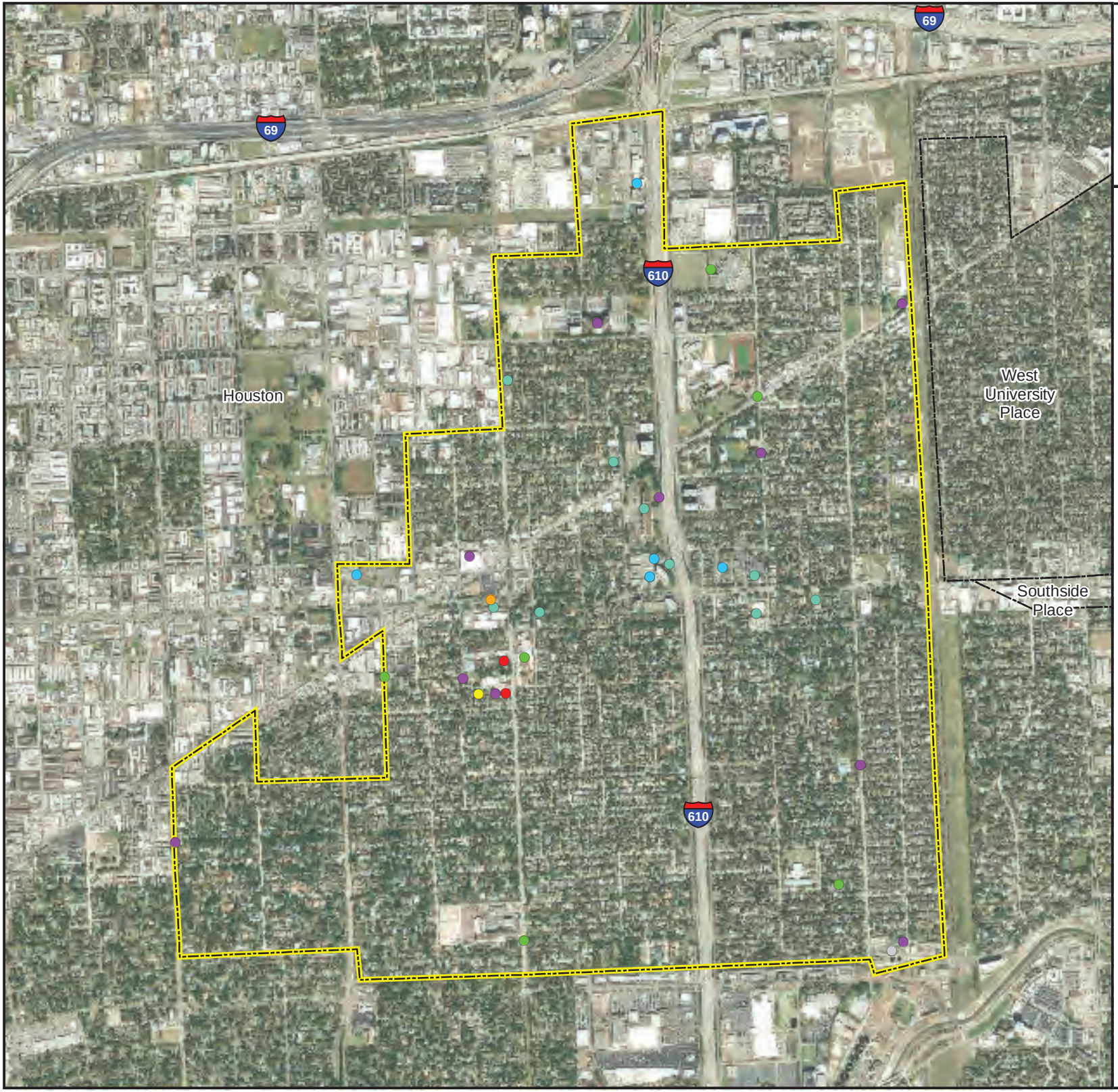
3.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- **City of Bellaire Municipal Code** — The municipal code was reviewed for the full capability assessment and for identifying opportunities for action plan integration.

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.



Bellaire

Critical Facilities

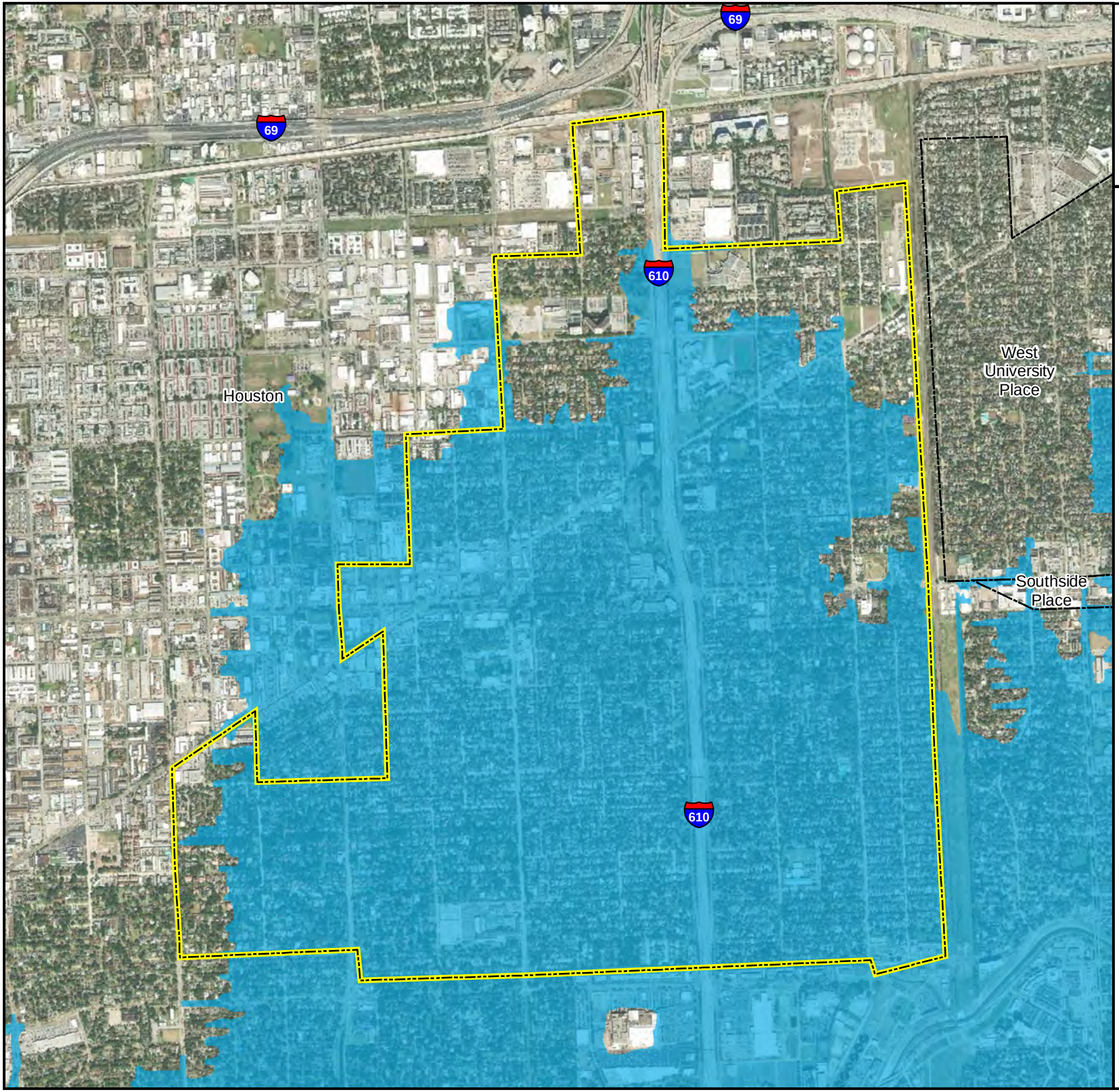
- Education Facilities
- Emergency Services
- Government Facilities
- Hazardous Material Sites
- Health and Medical Facilities
- Historical and Cultural Sites
- Transportation Systems
- Utility Systems
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.125 0.25 0.5 Miles



Bellaire

FEMA Flood Hazard

1% Annual Chance Flood (100-yr)

Incorporated Cities

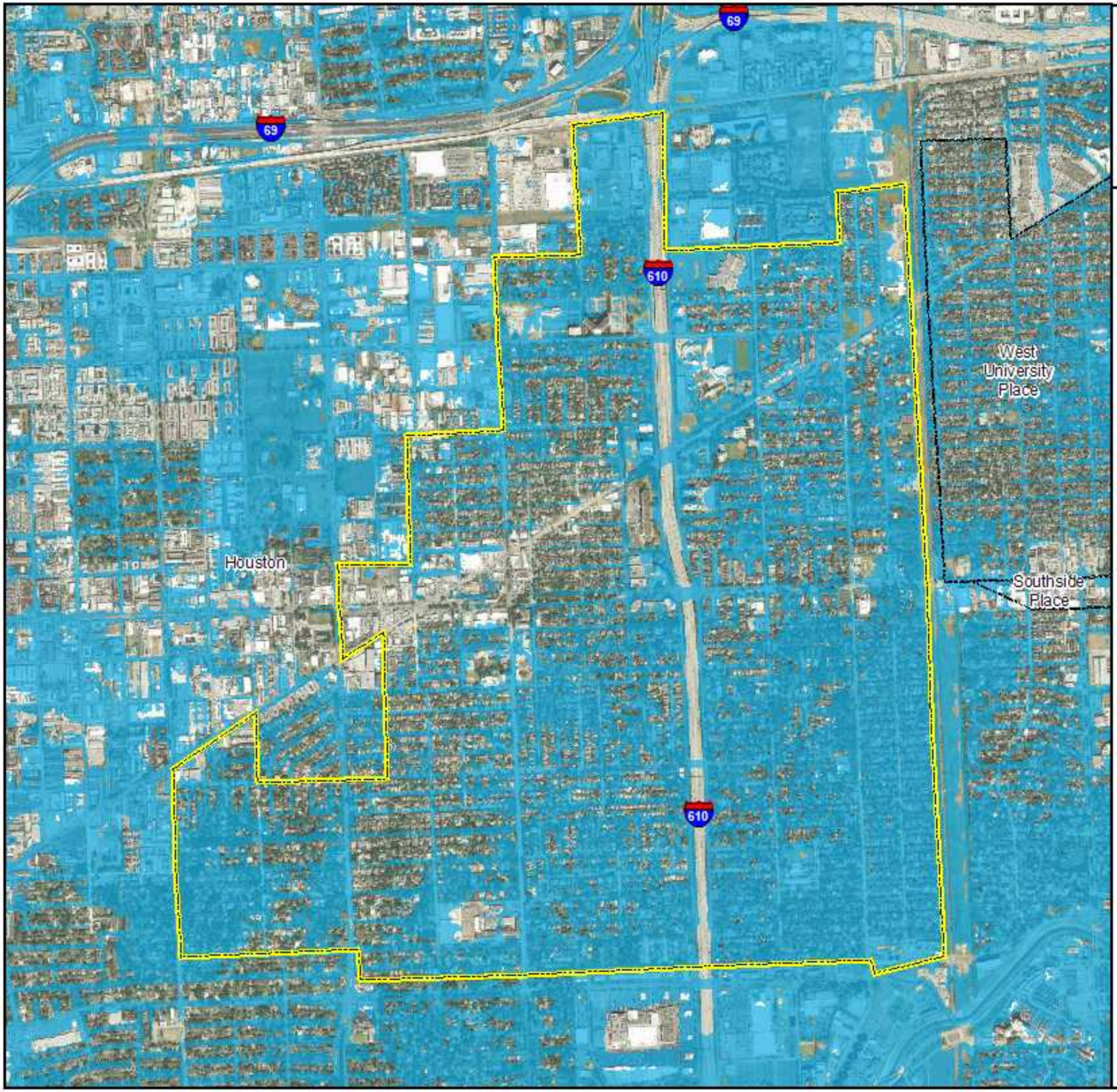
Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.125 0.25 0.5 Miles



Bellaire

Flood Hazard Hurricane Harvey

Flooding Extent

Incorporated Cities

Harris County

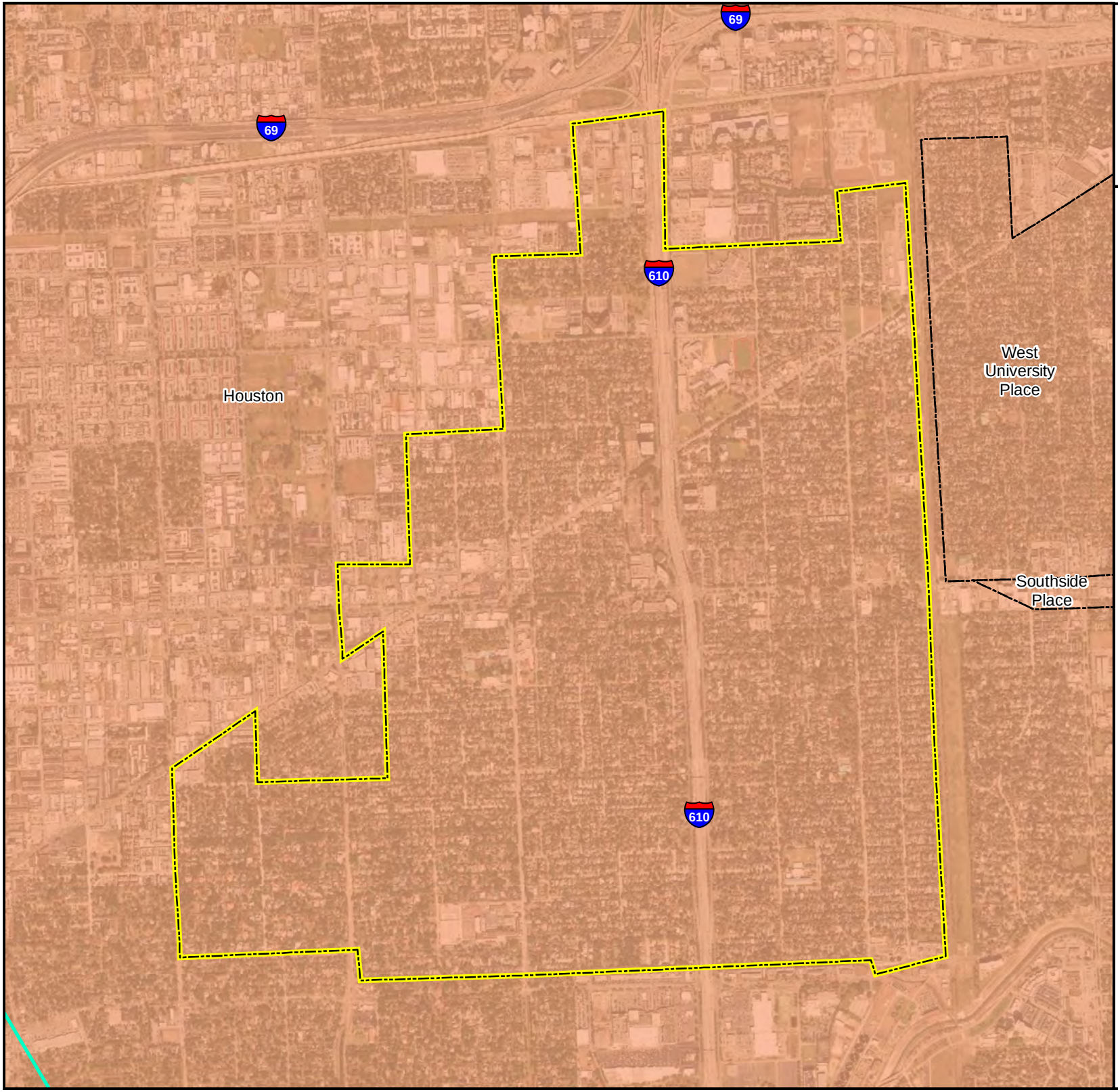
Note: Flooding extent shown for Hazard Mitigation Plan planning area only.

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.125 0.25 0.5 Miles



Bellaire

Hurricane Alicia (1983)

Peak WInd Gust (mph)

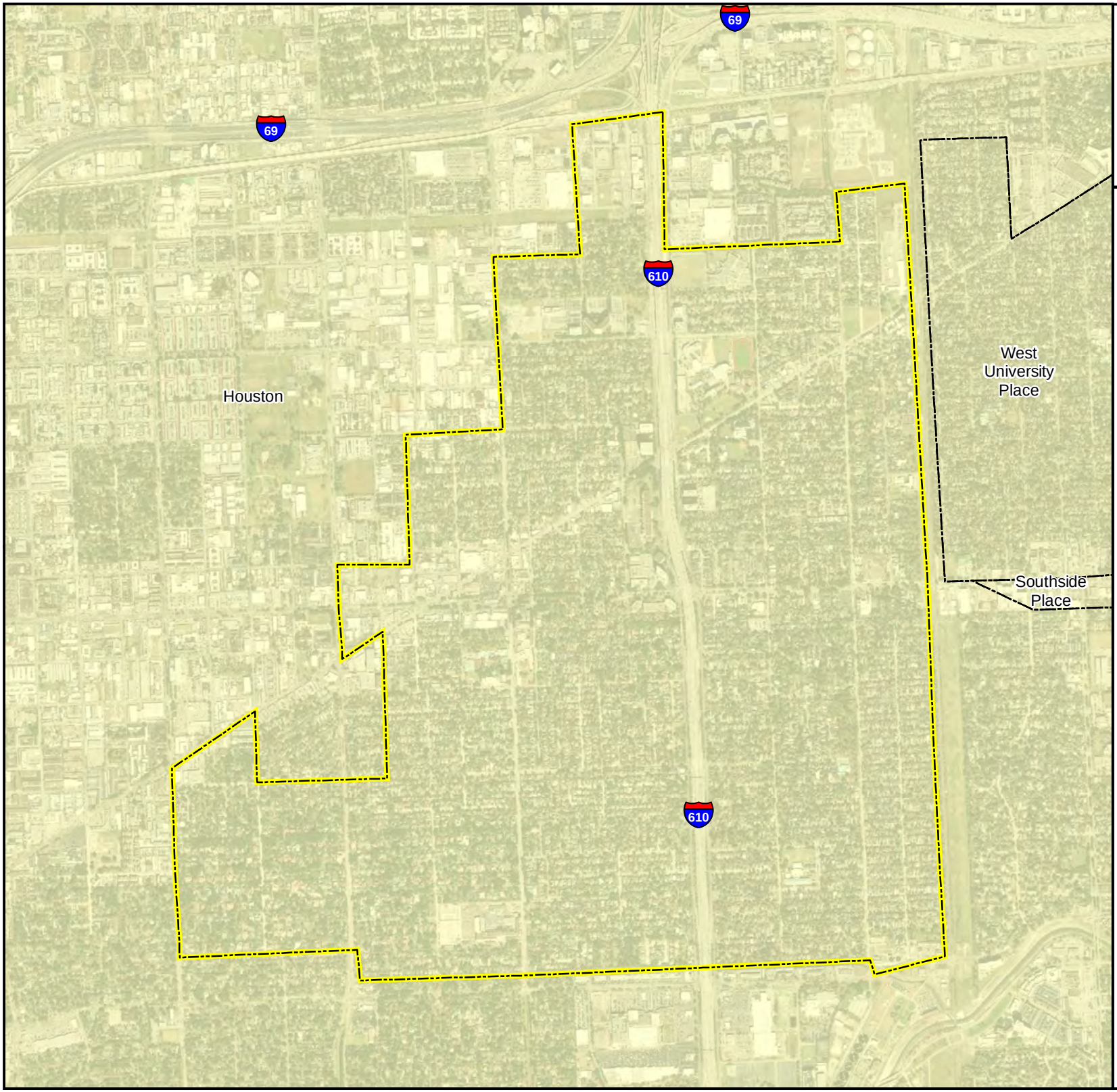
- 87 - 94
- 95 - 98
- 99 - 101
- 102 - 104
- 105 - 110
- Storm Track
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.125 0.25 0.5 Miles



Bellaire

20-year Probabilistic Hurricane

Peak Wind Gust (mph)

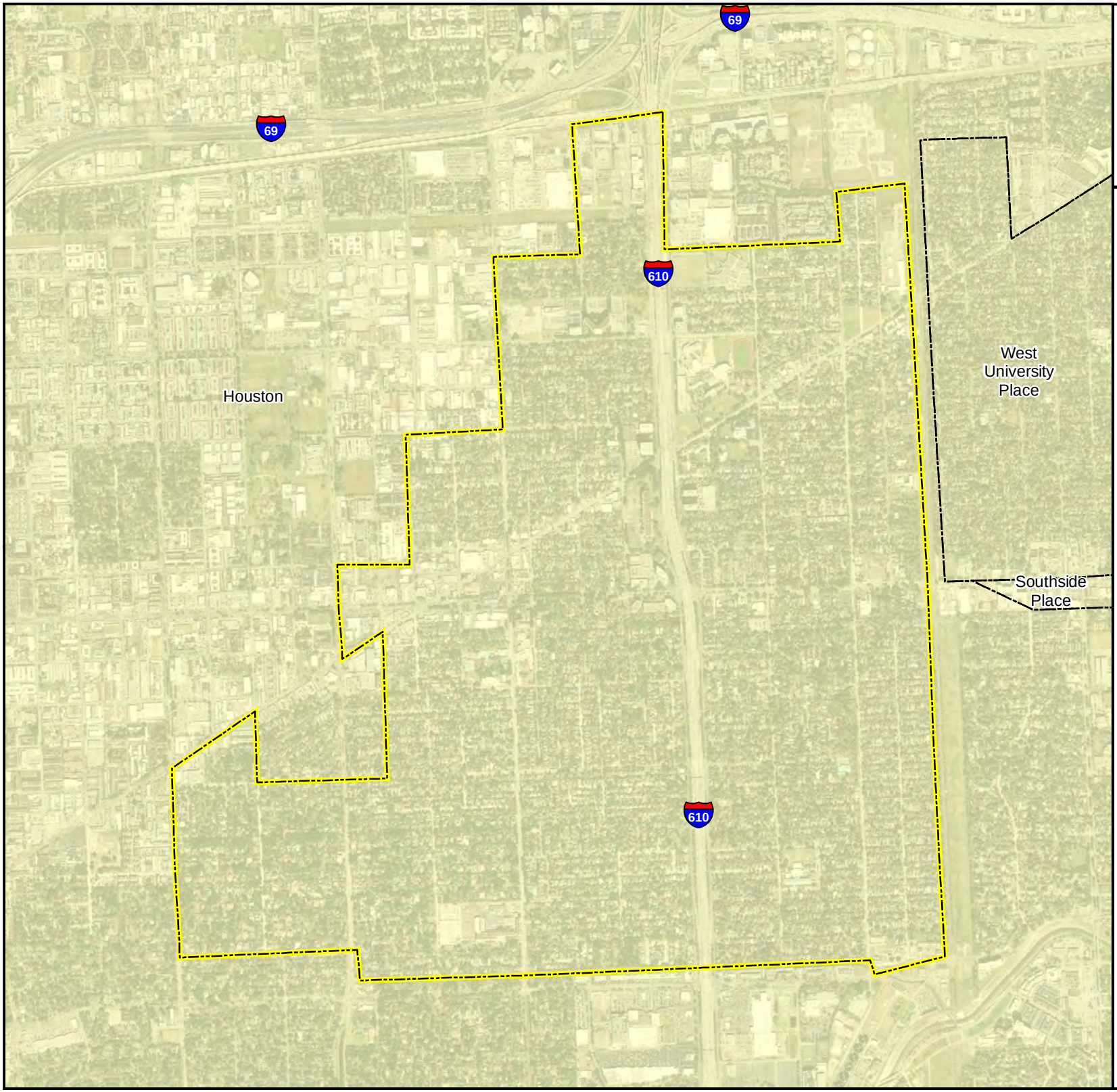
- 63 - 71
- 72 - 76
- 77 - 80
- 81 - 84
- 85 - 92
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.125 0.25 0.5 Miles



Bellaire

100-year Probabilistic Hurricane

Peak Wind Gust (mph)

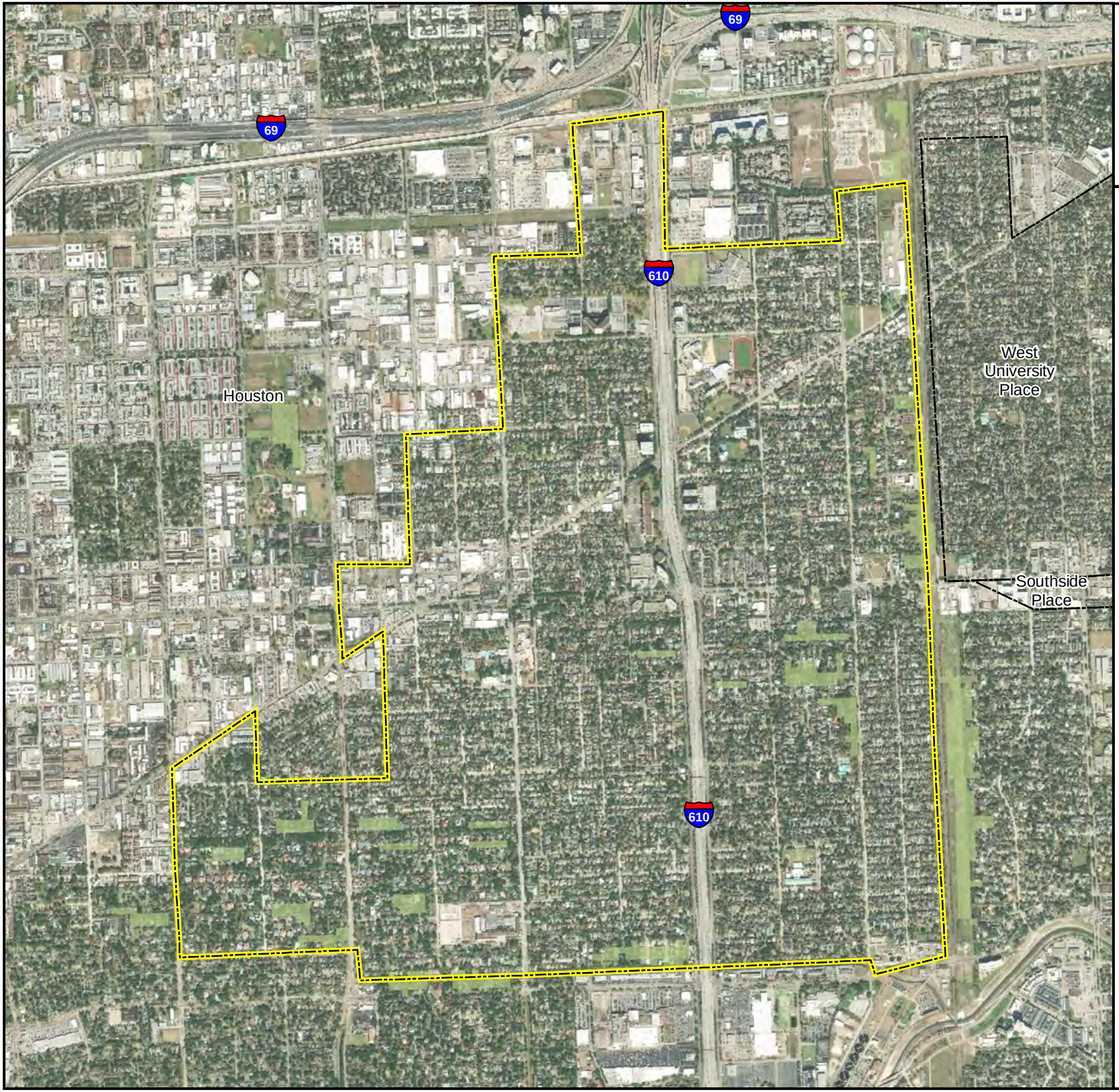
- 89 - 101
- 102 - 106
- 107 - 111
- 112 - 117
- 118 - 128
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.125 0.25 0.5 Miles



Bellaire

Wildfire Ignition Density

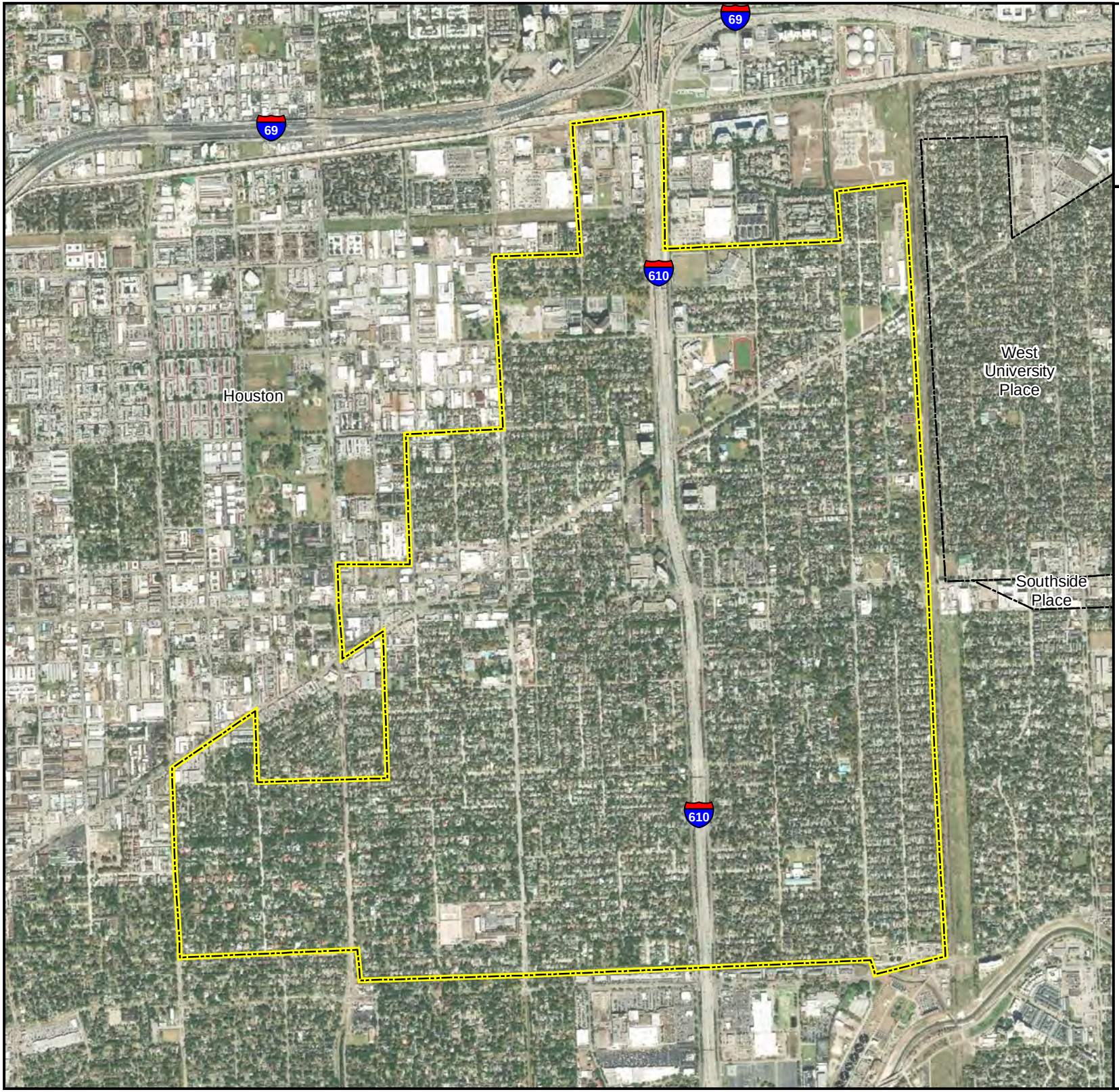
- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.125 0.25 0.5 Miles



Bellaire

Wildfire Threat

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.125 0.25 0.5 Miles

4. CITY OF BUNKER HILL VILLAGE

4.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Karen H. Glynn, P.E., City Administrator
11977 Memorial Drive
Houston, Texas 77024
Telephone: 713-467-9762
e-mail Address: kglynn@bunkerhilltx.gov

Alternate Point of Contact
Steve Smith, Director of Public Works
11977 Memorial Drive
Houston, Texas 77024
Telephone: 713-467-9762
e-mail Address: ssmith@bunkerhilltx.gov

4.2 JURISDICTION PROFILE

4.2.1 Location

The City of Bunker Hill Village is a municipality in southwestern Harris County. The current boundaries generally are Blalock Road on the east, Memorial Drive on the south, Taylorcrest Road on the north, and, on the west, a part of the Tealwood area west of Gessner Road. The City encompasses an area of 1.5 square miles.

4.2.2 History

The City of Bunker Hill Village was incorporated in 1954. The City consists of approximately 1,250 single-family dwellings; one privately owned recreational center, two elementary schools, four churches, and one retreat center. Through the years, the City has adopted ordinances establishing zoning regulations to preserve the characteristics of Bunker Hill Village and the five other surrounding "Memorial Villages." The six Memorial Villages are independent cities that operate autonomously of Houston. All are served by the Village Fire Department. The Memorial Villages Police Department serves Bunker Hill Village, Piney Point Village, and Hunters Creek; the other Memorial Villages have independent police agencies. The six villages have executed an inter-local agreement and developed an emergency management guide for emergency needs.

4.2.3 Climate

The climate of the City of Bunker Hill Village is characterized by relatively high temperatures and evenly distributed precipitation throughout the year with high humidity.

4.2.4 Governing Body Format

The City of Bunker Hill Village is a Type-A General Law City governed by a Mayor and five Council Members elected at large. A Type-A General Law City is one that had 600 or more inhabitants at the time of its incorporation. General Law Cities have a population less than 5,000 and are authorized to do only what the state constitution or Legislature has authorized.

The City Council assumes responsibility for the adoption of this plan; the City Administrator will oversee its implementation. Table 4-1 lists members of the joint local mitigation planning team. Howard Miller, emergency management coordinator for the Village Fire Department, also participated in planning for the six Memorial Villages.

Table 4-1. Local Mitigation Planning Team Members

Jurisdiction	Name / Title	Phone	Email
City of Bunker Hill Village	Karen Glynn, City Admin. Steve Smith, PW Director/Building Official	713-467-9762	KGlynn@bunkerhilltx.gov ssmith@bunkerhilltx.gov
City of Hedwig Village	Kelly Johnson, City Admin./Secretary	713-465-6009	kjohnson@hedwigtx.gov
City of Hilshire Village	Susan Blevins, City Admin/Secretary Efrain Him, City Engineer	713-973-1779	Susan.blevins@hilshirevillagetexas.com Efrain.him@hdrine.com
City of Hunters Creek Village	Tom Fullen, City Admin.	713-465-2150	tfullen@cityofhunterscreek.org
City of Piney Point Village	Roger Nelson, City Admin.	713-230-8703	cityadmin@pineypt.org
City of Spring Valley Village	Julie Robinson, City Admin. Arthur Faiello, PW Director	713-465-5306 832-910-8576	jrobinson@springvalleytx.com afaiello@springvalleytx.com
Memorial Villages Police Department	Ray Schultz, Chief of Police		Rschultz@mvpdtx.org
Village Fire Department	Howard Miller, Emergency Management Coordinator David Foster, Fire Chief		

4.3 CURRENT TRENDS

4.3.1 Population

According to the 2010 Census Data, the population of the City of Bunker Hill Village was 3,633. Since the 1990 Census, the population has been relatively stable.

4.3.2 Development

The City of Bunker Hill Village is continuing to experience residential redevelopment of new, larger homes. City of Bunker Hill is landlocked by other municipalities; therefore there is no growth opportunity.

Table 4-2 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

Table 4-2. Recent and Expected Future Development Trends

Criterion	Response
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan?	NO
• **If yes, give the estimated area annexed and estimated number of parcels or structures.**	N/A
Is your jurisdiction expected to annex any areas during the performance period of this plan?	NO
• **If yes, describe land areas and dominant uses.**	N/A
• **If yes, who currently has permitting authority over these areas?**	N/A

Criterion	Response					
Are any areas targeted for development or major redevelopment in the next five years? • **If yes, briefly describe, including whether any of the areas are in known hazard risk areas**	yes The City of Bunker Hill Village is continuing to experience residential redevelopment of new, larger homes.					
How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?		**2014**	**2015**	**2016**	**2017**	**2018**
	Single Family	20	12	27	19	21
	Multi-Family	N/A	N/A	N/A	N/A	N/A
	Other (commercial, mixed use, etc.)	N/A	N/A	N/A	N/A	N/A
	Total	**20**	**12**	**27**	**19**	**21**
Provide the number of new-construction permits for each hazard area or provide a qualitative description of where development has occurred.	• Special Flood Hazard Areas: #N/A • Landslide: # N/A • High Liquefaction Areas: # N/A • Tsunami Inundation Area: # N/A • Wildfire Risk Areas: # N/A					
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	Bunker Hill Village continues to experience redevelopment of their residential lots; older homes are demolished and new homes constructed.					

4.4 CAPABILITY ASSESSMENT

The City of Bunker Hill Village performed an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities is presented in Table 4-3.
- Development and permitting capabilities are presented in Table 4-4.
- An assessment of fiscal capabilities is presented in Table 4-5.
- An assessment of administrative and technical capabilities is presented in Table 4-6.
- An assessment of education and outreach capabilities is presented in Table 4-7.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 4-8.
- Classifications under various community mitigation programs are presented in Table 4-9.
- The community's adaptive capacity for the impacts of climate change is presented in Table 4-10.

Findings of the capability assessment were reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table included in the action plan for this annex identifies these as community capacity building mitigation actions.

Table 4-3. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code	Yes	No	Yes	Yes
Comment: Chapter 4 Development, Building and Construction				
Zoning Code	Yes	No	Yes	Yes
Comment: Appendix A – Zoning				
Subdivisions	Yes	No	Yes	Yes
Comment: Chapter 14 – Subdivision				
Stormwater Management	Yes	No	Yes	Yes
Comment: Chapter 4 Development, Building and Construction; TCEQ				
Post-Disaster Recovery	Yes	Yes	Yes	No
Comment: Harris County; FEMA				
Real Estate Disclosure	No	No	No	No
Comment:				
Growth Management	Yes	Yes	Yes	Yes
Comment: Harris Co. Flood Control				
Site Plan Review	Yes	Yes	Yes	No
Comment: Chapter 4 Development, Building and Construction; Village Fire Dept – Fire Marshall				
Environmental Protection	No	Yes	Yes	No
Comment: TCEQ; EPA				
Flood Damage Prevention	Yes	No	Yes	Yes
Comment: Chapter 4 Development, Building and Construction				
Emergency Management	Yes	Yes	Yes	No
Comment: Harris Co; Village FD; Memorial Villages PD				
Climate Change	No	No	No	No
Comment:				
Other	No	No	No	No
Comment:				
Planning Documents				
General Plan – City's Zoning Ordinance	Yes	No	Yes	Yes
Comment: *N/A*				
Capital Improvement Plan	Yes	No	No	Yes
How often is the plan updated? **Annually**				
Comment: The City maintains a rolling 5 year CIP (Water, Wastewater, Water Production, Streets and Drainage Updated annually)				
Disaster Debris Management Plan	Yes	Yes	No	No
Comment: By Contract with Harris County				
Floodplain or Watershed Plan	No	Yes	No	No
Comment: Harris Co Flood Control				
Stormwater Plan	Yes	Yes	Yes	Yes
Comment: TCEQ – MS4 Permit				
Urban Water Management Plan	Yes	Yes	Yes	No
Comment: Harris – Galveston Subsidence District – Ground Water Reduction Plan				
Habitat Conservation Plan	No	Yes	No	No
Comment: TX Parks & Wildlife; TCEQ; EPA				
Economic Development Plan	Yes	No	Yes	No
Comment: The City is 100% Zoned Residential				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Shoreline Management Plan	No	No	No	No
Comment:				
Community Wildfire Protection Plan	No	No	No	No
Comment:				
Forest Management Plan	No	No	No	No
Comment:				
Climate Action Plan	No	No	No	No
Comment:				
Comprehensive Emergency Management Plan	Yes	Yes	Yes	No
Comment: Harris County				
Threat & Hazard Identification & Risk Assessment (THIRA)	Yes	Yes	Yes	No
Comment: Harris County Hazard Mitigation Plan				
Post-Disaster Recovery Plan	Yes	Yes	Yes	No
Comment: Harris County Emergency Management Plan				
Continuity of Operations Plan	No	No	No	No
Comment:				
Public Health Plan	No	No	No	No
Comment: Harris Co. Public Health				
Other	No	No	No	No
Comment:				

Table 4-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • **If no, who does? If yes, which department?**	Yes City's Building Official
Does your jurisdiction have the ability to track permits by hazard area?	No
Does your jurisdiction have a buildable lands inventory?	No

Table 4-5. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants	No
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes -- Water and Sewer
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	No
Other	N/A

Table 4-6. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	City Admin; Building Official; By Contract
Engineers or professionals trained in building or infrastructure construction practices	Yes	City Admin; Building Official; Contract Inspectors; Fire Marshall
Planners or engineers with an understanding of natural hazards	Yes	By Contract
Staff with training in benefit/cost analysis	Yes	By Contract
Surveyors	Yes	By Contract
Personnel skilled or trained in GIS applications	Yes	By Contract
Scientist familiar with natural hazards in local area	No	
Emergency manager	Yes	Village Fire Dept; Memorial Villages PD
Grant writers	Yes	By Contract
Other	N/A	

Table 4-7. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • If yes, briefly describe.	No
Do you use social media for hazard mitigation education and outreach? • If yes, briefly describe.	No
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • If yes, briefly describe.	Yes City's Drainage Committee
Do you have any other programs already in place that could be used to communicate hazard-related information? • If yes, briefly describe.	Yes Email notification system (vlinc)
Do you have any established warning systems for hazard events? • If yes, briefly describe.	Yes Email notification system (vlinc)

Table 4-8. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	City's Building Official
Who is your floodplain administrator? (department/position)	City's Building Official
Are any certified floodplain managers on staff in your jurisdiction?	No – By Contract
What is the date that your flood damage prevention ordinance was last amended?	2017
Does your floodplain management program meet or exceed minimum requirements? • If exceeds, in what ways?	Exceeds Added minimum foundation elevation based on sanitary sewer and calculate hydraulic grade line for 100 year event
When was the most recent Community Assistance Visit or Community Assistance Contact?	2017

Criterion	Response
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • **If so, state what they are.**	No
Are any RiskMAP projects currently underway in your jurisdiction? • **If so, state what they are.**	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • **If no, state why.**	N/A
Does your floodplain management staff need any assistance or training to support its floodplain management program? • **If so, what type of assistance/training is needed?**	No
Does your jurisdiction participate in the Community Rating System (CRS)? • **If yes, is your jurisdiction interested in improving its CRS Classification?** • **If no, is your jurisdiction interested in joining the CRS program?**	No No No
How many flood insurance policies are in force in your jurisdiction?[a] • **What is the insurance in force?** • **What is the premium in force?**	756 $ 257,767,500 $ 312,000
How many total loss claims have been filed in your jurisdiction?[a] • **How many claims are still open or were closed without payment?** • **What were the total payments for losses?**	276 58 $8,115,100.66

a. According to FEMA statistics as of December 2018

Table 4-9. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	No		Date
Building Code Effectiveness Grading Schedule (ISO)	Yes	4	2019
Public Protection Village Fire Dept (ISO)	Yes	1	2015
Storm Ready	No		Date
Firewise	No		Date

Table 4-10. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:***	Low
Jurisdiction-level monitoring of climate change impacts ***Comment:***	Low
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:***	Low
Participation in regional groups addressing climate risks ***Comment:***	Low

Criterion	Jurisdiction Rating[a]
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	Low
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	Low
Identified strategies for adaptation to impacts ***Comment:***	Low
Champions for climate action in local government departments ***Comment:***	Low
Political support for implementing climate change adaptation strategies ***Comment:***	Low
Financial resources devoted to climate change adaptation ***Comment:***	Low
Local authority over sectors likely to be negative impacted ***Comment:***	Low
Public Capacity	
Local residents knowledge of and understanding of climate risk ***Comment:***	Low
Local residents support of adaptation efforts ***Comment:***	Low
Local residents' capacity to adapt to climate impacts ***Comment:***	Low
Local economy current capacity to adapt to climate impacts ***Comment:***	Low
Local ecosystems capacity to adapt to climate impacts ***Comment:***	Low

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

4.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning and capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

4.5.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- City of Bunker Hill Village Stormwater Management Plan
- City of Bunker Hill Finance and Infrastructure Management Plan
- City of Bunker Hill Code of Ordinances – Building Codes, Drainage Ordinance, etc.

- Bunker Hill Village Code of Ordinances Chapter 4 – Development, Building, and Construction (City's Drainage Ordinance)
- City of Bunker Hill Village – Drainage Master Plan Update 2017
- Harris County Hazard Mitigation Plan

4.5.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

4.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 4-11 lists past occurrences of natural hazards for which specific damage was recorded in Bunker Hill Village. Other hazard events that broadly affected the entire planning area, including Bunker Hill Village, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 4-11. Past Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Severe Weather /Flooding	N/A	2009	N/A
Hurricane Ike	EM3294	September 2008	N/A
Severe Weather/Memorial Day Flood	DR4223	May 2015	N/A
Severe Weather/Tax Day Flood	DR4269	April 2016	N/A
Hurricane Harvey	DR4332	August 2017	N/A

4.7 HAZARD RISK RANKING

Table 4-12 presents a local ranking for Bunker Hill Village of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 4-12. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Severe Weather	48	High
2	Hurricane	32	High
3	Earthquake	14	Low
4	Drought	6	Low
4	Flooding	6	Low
4	Wildfires	6	Low
5	Dam Failure	0 (No Exposure)	None
5	Mass Movement	0 (No Exposure)	None
5	Coastal Erosion	0 (No Exposure)	None
5	Tsunami	0 (No Exposure)	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

4.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. This section provides information on a few key vulnerabilities for the jurisdiction. Available jurisdiction-specific risk maps of the hazards are provided at the end of this annex.

4.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: 53
- Number of FEMA-identified Severe-Repetitive-Loss Properties: 3
- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated: 4

4.8.2 Other Noted Vulnerabilities

The following jurisdiction-specific issue has been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- Local Flooding – Homes and Streets

Mitigation actions addressing this issue were prioritized for consideration in the action plan in this annex.

4.9 STATUS OF PREVIOUS PLAN ACTIONS

Table 4-13 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

4.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 4-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 4-15 identifies the priority for each action. Table 4-16 summarizes the mitigation actions by hazard of concern and mitigation type.

4.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

The following technical reports, plans, and regulatory mechanisms were reviewed for this annex.

- **City of Bunker Hill Village Code of Ordinances —** The municipal code was reviewed for the full capability assessment and for identifying opportunities for action plan integration.
- **City of Bunker Hill Village Building Code and Flood Damage Prevention Ordinance** — The flood damage prevention ordinance was reviewed for compliance with the National Flood Insurance Program.
- **City of Bunker Hill Village Master Drainage Plan**

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.
- **Memorial Villages Emergency Manage Plan and Mayors Guide**

Table 4-13. Status of Previous Plan Actions

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
Expand Early Warning/Alert System – Collaborative Community Communication & Mass Notification for Warning/Information sharing with residential and non-residential areas – Phase 1 and Phase 2	Phase 1		Phase 2	BNK5
Comment: Phase 1 has been completed; Phase 2 to continue – plans for text messaging and social media. Continued effort to reach 100 % of residents				
Develop Tree Management Program to better manage and keep clear the public right-of-way; to promote stronger, healthier trees and to reduce the impact of debris			Yes	BNK9
Comment: The City has been budgeting funds for trimming trees along major thoroughfares; however, This needs to be developed into a formal program				
Approval of Drainage Ordinance for New Development and Re-development to require new development to put in drainage systems to reduce flooding.	2015 Updated 2017			
Comment:				
Implement a regional program to build a tertiary water source to ensure and address public water supply during drought conditions.			Yes	BNK7
Comment:				
Develop a Dam/Levee failure flood inundation study to determine risk area within Bunker Hill Village		Remove		
Comment:				
Implement an Extreme Heat Public Education/Outreach Program to inform residents of extreme heat hazards and actions to take to minimize health impacts and property damage from extreme heat.		Remove – part of notification project		
Comment:				
Implement a Clean-up Program of heavy wildfire fuel areas (abandoned buildings, abandoned lands, etc.)			Yes	BNK6
Comment: The City Council has directed staff to develop a vacant house ordinance; This is planned for 2019. This description should be reworded.				
Develop relationship with local LEPC			Yes	BNK10
Comment:				
Implementation of the City of Bunker Hill Village – Drainage Master Plan Update (Approved 2017)			Yes	BNK8
Comment: This action was added during the planning timeframe and should be carried over.				

Table 4-14. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action BNK1 — Where appropriate, support retrofitting or reconstruction of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding						
Existing	1, 2, 5	City	TBD	High	HMGP, PDM, FMA	Short-term
Action BNK2 — Integrate the hazard mitigation plan into other plans, ordinances and programs that dictate land use decisions in the community, including the Drainage Ordinance for New Development and Re-development; the City's Building Codes in accordance with ISO Recommendations; the City of Bunker Hill Village – Drainage Master Plan Update (Approved 2017)						
Hazards Mitigated: Severe Weather, Drought, Huuricane, Erathquake and Flooding and Wildfire						
New and Existing	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	City	TBD	Low	Staff Time, General Funds	Ongoing
Action BNK3 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: Severe Weather, Drought, Huuricane, Erathquake and Flooding, and Wildfire						
New and Existing	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	City	TBD	Low	Staff Time, General Funds	Short-term
Action BNK4 — Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements: • Enforce the flood damage prevention ordinance. • Participate in floodplain identification and mapping updates. • Provide public assistance/information on floodplain requirements and impacts.						
Hazards Mitigated: Dam failure, flooding, severe weather,						
New and Existing	1, 3, 5, 7, 8, 10	City	TBD	Low	Staff Time, General Funds	Ongoing
Action BNK5 — Expand Early Warning/Alert System – Collaborative Community Communication & Notification for Warning/Information sharing with residential and non-residential (with Memorial Villages Police Department)						
Hazards Mitigated: Severe Weather, Drought, Huuricane, Erathquake and Flooding and wildfire						
	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	City	TBD	Low	Staff Time, General Funds for Memorial Villages Police Dept.	Ongoing
Action BNK6 — Implement the City's Vacant Property Ordinance to Identify and Monitor Properties for potential hazards such as fire, flooding, nuisance, etc. (abandoned buildings, empty lots, etc.)						
Hazards Mitigated: Severe Weather, Drought, Wildfires						
	1, 4, 6	City	TBD	Low	Staff Time	Short-term
Action BNK7 — Implementation of the City's Infrastructure Management Plan for replacement of the City's aging water system including a plan (with other agencies) to ensure and address public water supply during drought conditions.						
Hazards Mitigated: Severe Weather, Hurricane, Drought, Wildfires						
	1, 2, 4, 6	City	TBD	High	Staff Time, City's Capital Improvement Plan	Short-term
Action BNK8 — Implementation of the City of Bunker Hill Village – Drainage Master Plan Update (Approved 2017)						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Tsunami						
	1, 2, 5, 10	City	TBD	High	Staff Time, City's Capital Improvement Plan	Long-Term
Action BNK9 — Develop a Tree Management Program to better manage and keep clear the public rights-of-way; to promote stronger, healthier trees and to reduce the impact of debris						
Hazards Mitigated: Severe Weather, Hurricane, Earthquake, Drought, Flooding, Wildfires, Coastal Erosion, Tsunami						
	1, 2, 3, 4, 5, 6, 9, 10	City	TBD	Low	Staff Time, City's General Fund	Short-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action BNK10 — Develop relationship with local LEPC						
Hazards Mitigated: Severe Weather, Drought, Huuricane, Erathquake and Flooding and wildfire						
New and Existing	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	City	LEPC	Low	Staff Time	Ongoing
Action BNK11— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
Hazards Mitigated: Severe Weather, Drought, Huuricane, Erathquake and Flooding and wildfire						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	Bunker Hill Village	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 4-15. Mitigation Action Priority

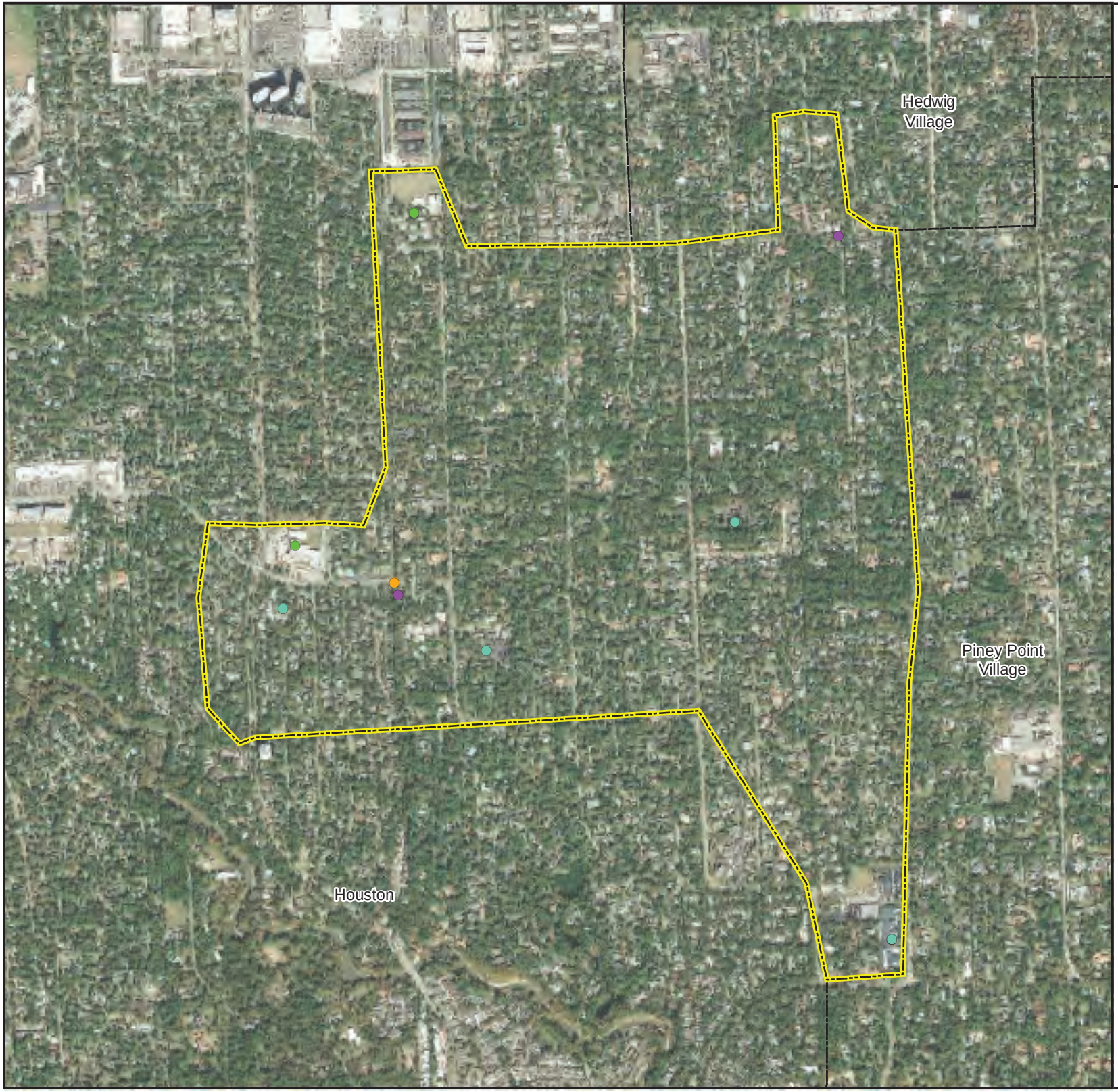
Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
BNK1	3	High	High	Yes	Yes	No	Medium	High
BNK2	10	High	Low	Yes	No	Yes	High	Low
BNK3	10	High	Low	Yes	No	Yes	High	Low
BNK4	6	High	Low	Yes	No	Yes	High	Low
BNK5	10	High	Low	Yes	N/A	Yes	Medium	Low
BNK6	3	Medium	Low	Yes	N/A	Yes	High	Low
BNK7	4	High	High	Yes	Yes	In Long Range Plan	High	High
BNK8	4	High	High	Yes	Yes	In Long Range Plan	High	High
BNK9	8	Medium	Low	Yes	N/A	Yes	Medium	Low
BNK10	10	Medium	Low	Yes	No	Yes	High	Low
BNK11	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 4-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Severe Weather	1, 2, 3, 4, 5, 6, 7, 8, 9, 11	1, 2, 3, 4, 5, 6, 7, 8, 9	2, 5, 6, 7, 8, 9, 11	6, 9	2, 5, 7, 8, 9, 10, 11	1, 2		11
Hurricane	1, 2, 3, 4, 5, 6, 7, 8, 9, 11	1, 2, 3, 4, 5, 6, 7, 8, 9	2, 5, 6, 7, 8, 9, 11	6, 9	2, 5, 7, 8, 9, 10, 11	1, 2		11
Earthquake	1, 2, 3, 4, 5, 6, 7, 8, 9, 11	1, 2, 3, 4, 5, 6, 7, 8, 9	2, 5, 6, 7, 8, 9, 11	6, 9	2, 5, 7, 8, 9, 10, 11	1, 2		11
Drought	1, 2, 3, 4, 5, 6, 7, 8, 9, 11	1, 2, 3, 4, 5, 6, 7, 8, 9	2, 5, 6, 7, 8, 9, 11	6, 9	2, 5, 7, 8, 9, 10, 11	1, 2		11
Medium-Risk Hazards								
N/A								
Low-Risk Hazards								
Flooding	1, 2, 3, 4, 5, 6, 7, 8, 9, 11	1, 2, 3, 4, 5, 6, 7, 8, 9	2, 5, 6, 7, 8, 9, 11	6, 9	2, 5, 7, 8, 9, 10, 11	1, 2		11
Wildfires	1, 2, 3, 4, 5, 6, 7, 8, 9, 11	1, 2, 3, 4, 5, 6, 7, 8, 9	2, 5, 6, 7, 8, 9, 11	6, 9	2, 5, 7, 8, 9, 10, 11	1, 2		11

a. See the introduction to this volume for explanation of mitigation types.



Bunker Hill Village

Critical Facilities

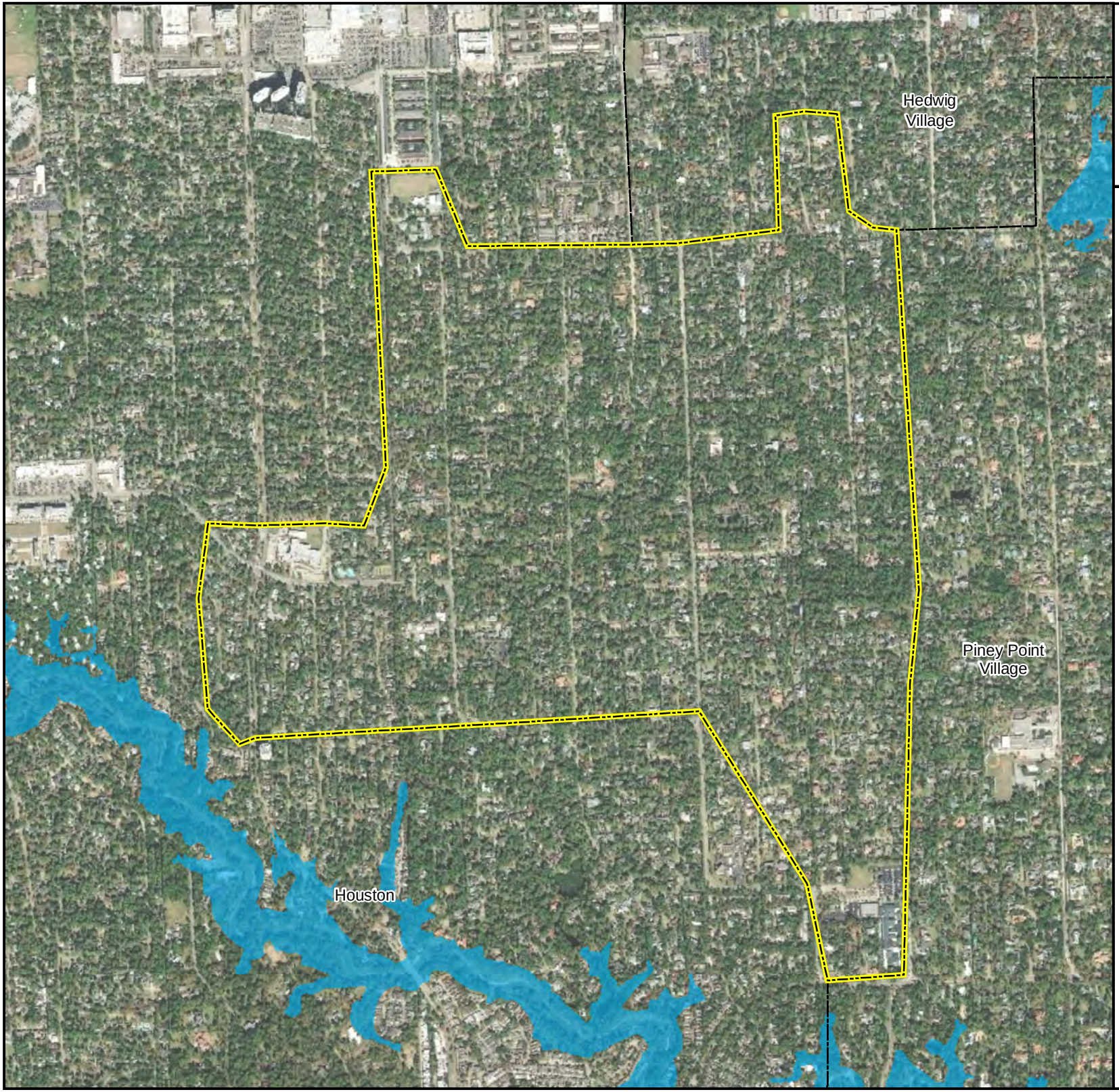
- Education Facilities
- Emergency Services
- Government Facilities
- Hazardous Material Sites
- Health and Medical Facilities
- Historical and Cultural Sites
- Transportation Systems
- Utility Systems
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3 Miles



Bunker Hill Village

FEMA Flood Hazard

1% Annual Chance Flood (100-yr)

Incorporated Cities

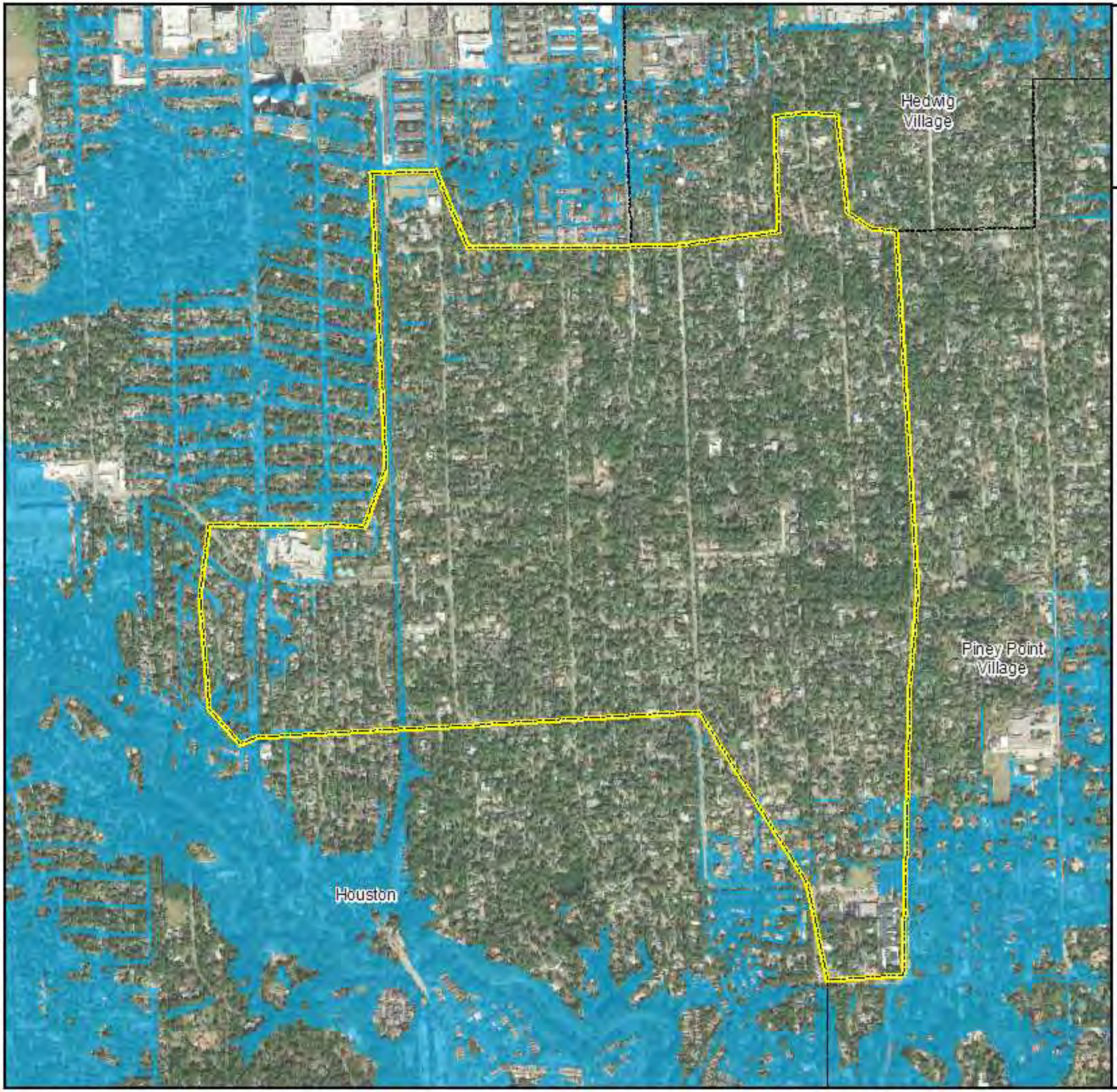
Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3 Miles



Bunker Hill Village

Flood Hazard
Hurricane Harvey

Flooding Extent

Incorporated Cities

Harris County

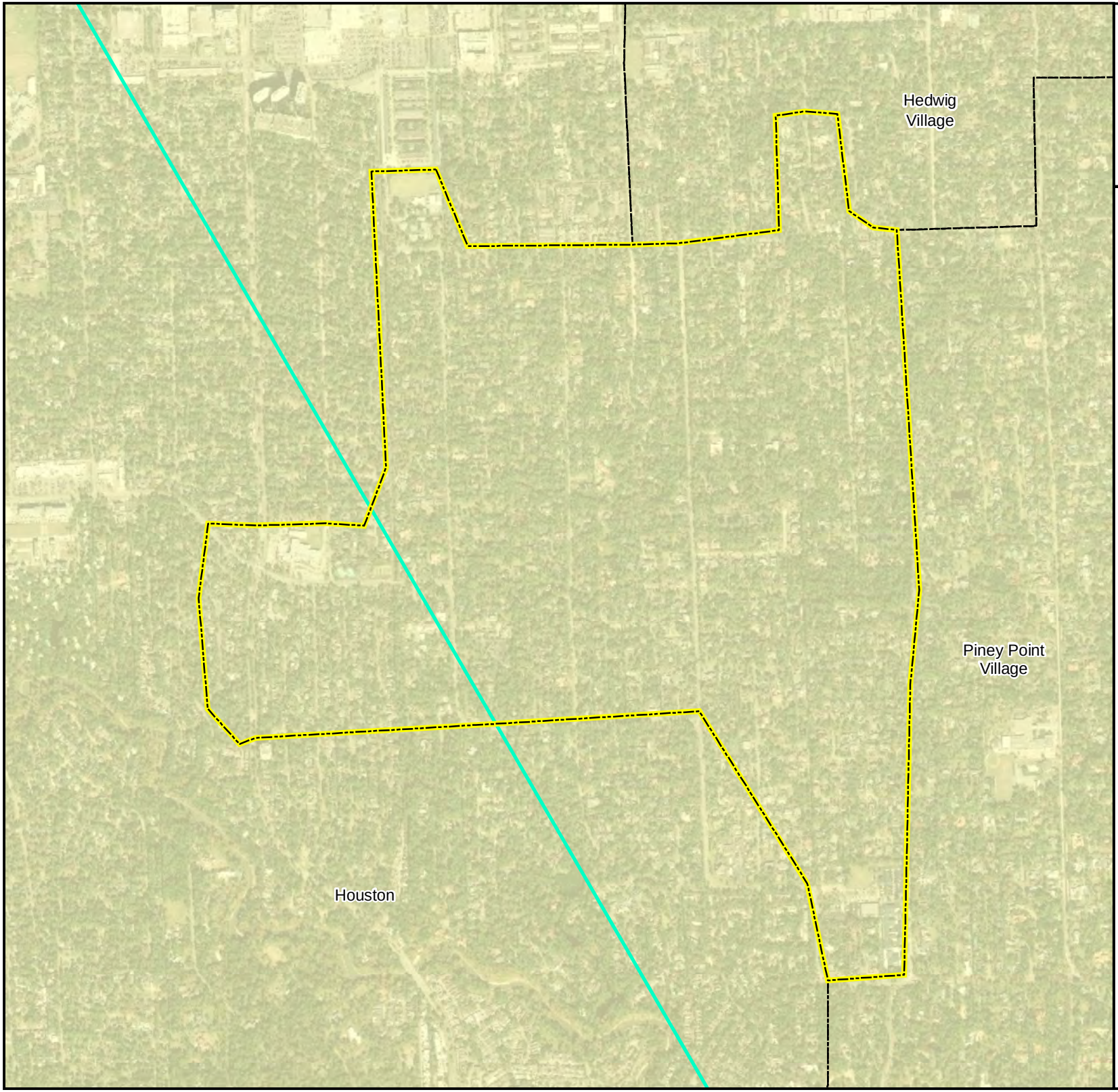
Note: Flooding extent shown for Hazard Mitigation Plan planning area only.

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3 Miles



Bunker Hill Village

Hurricane Alicia (1983)

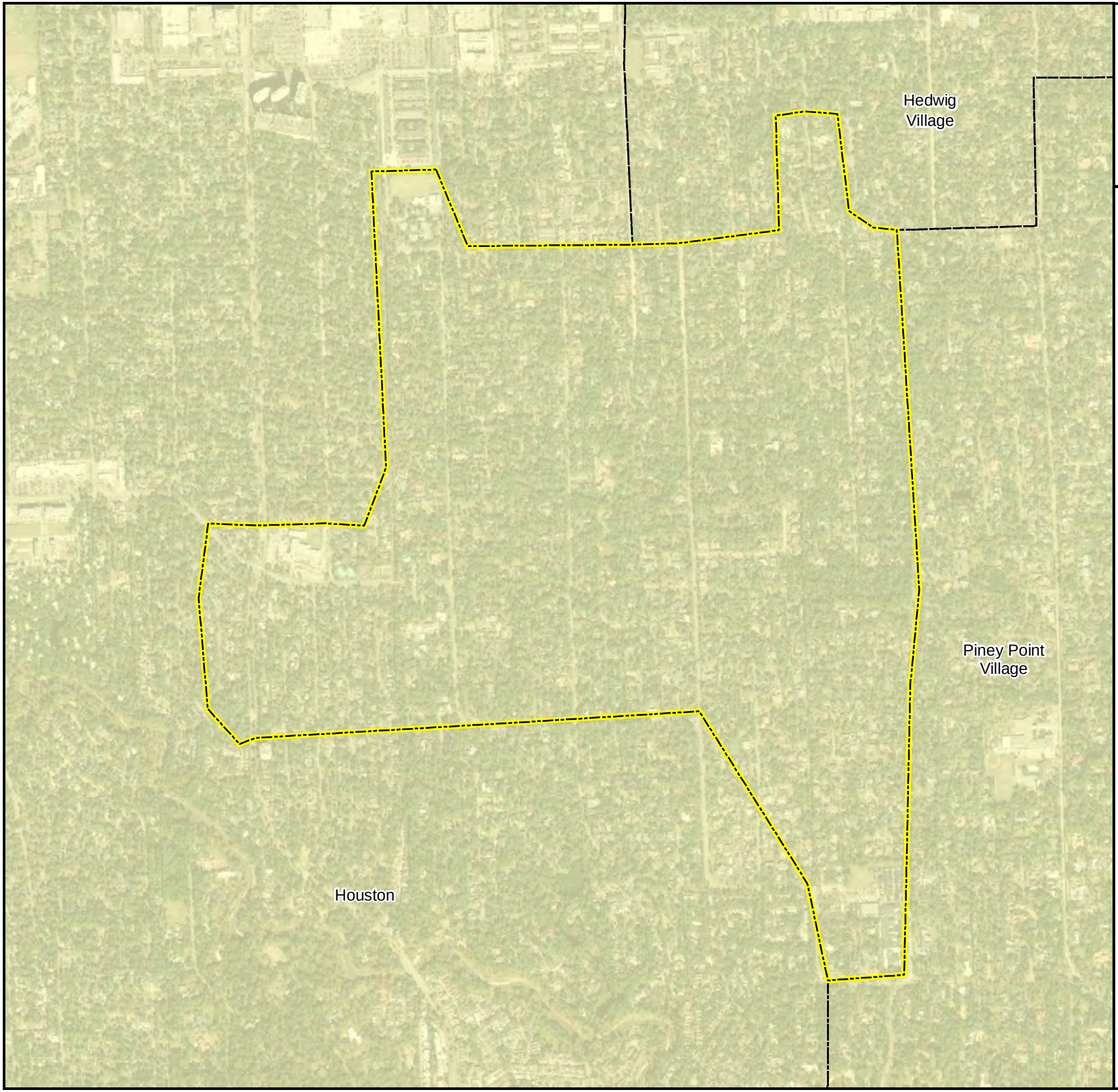
Peak WInd Gust (mph)

- 87 - 94
- 95 - 98
- 99 - 101
- 102 - 104
- 105 - 110
- Storm Track
- Incorporated Cities
- Harris County

TETRA TECH

N

0 0.075 0.15 0.3 Miles



Bunker Hill Village

20-year Probabilistic Hurricane

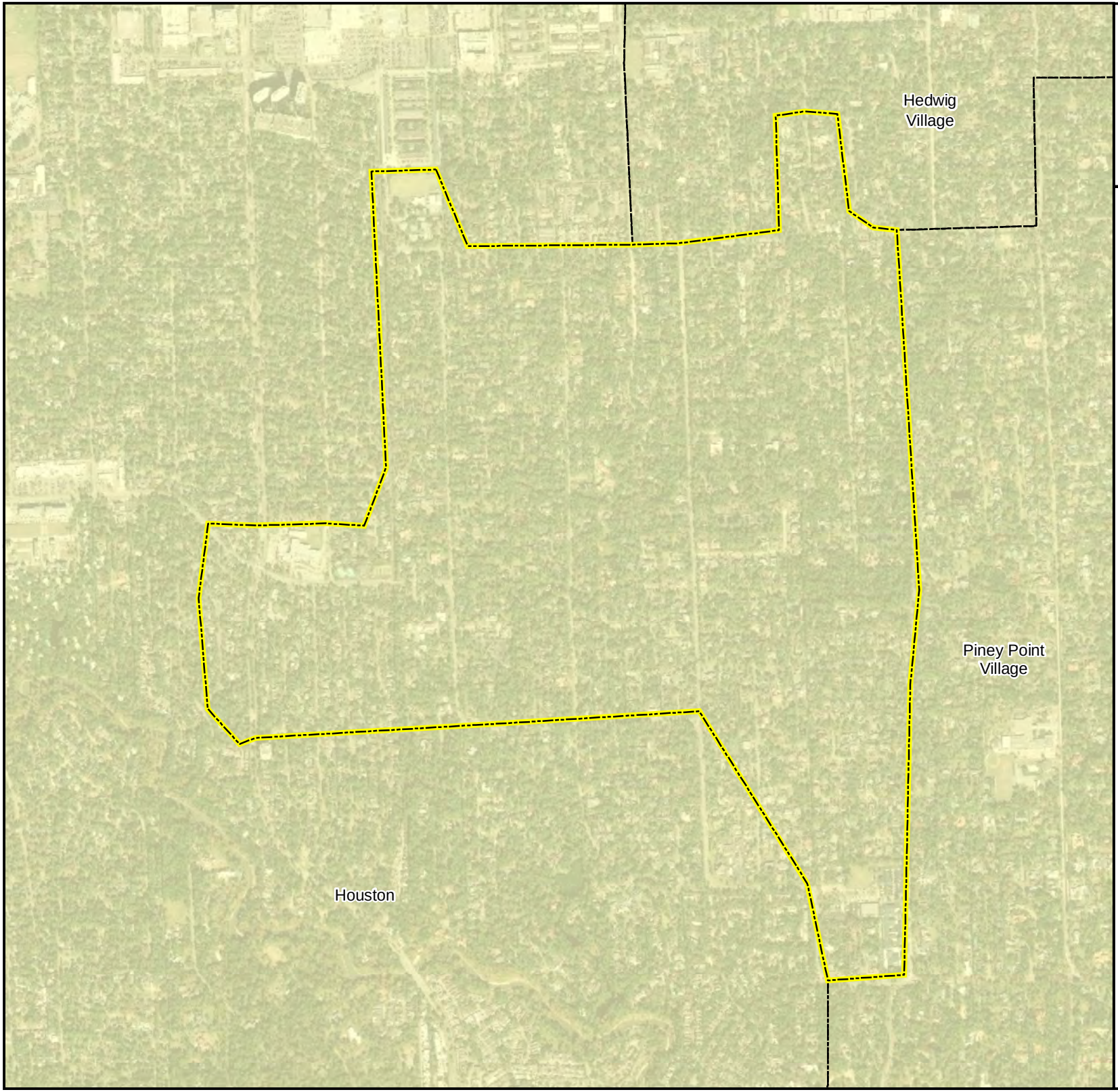
Peak Wind Gust (mph)

- 63 - 71
- 72 - 76
- 77 - 80
- 81 - 84
- 85 - 92
- Incorporated Cities
- Harris County

TETRA TECH

N

0 0.075 0.15 0.3 Miles



Bunker Hill Village

100-year Probabilistic Hurricane

Peak Wind Gust (mph)

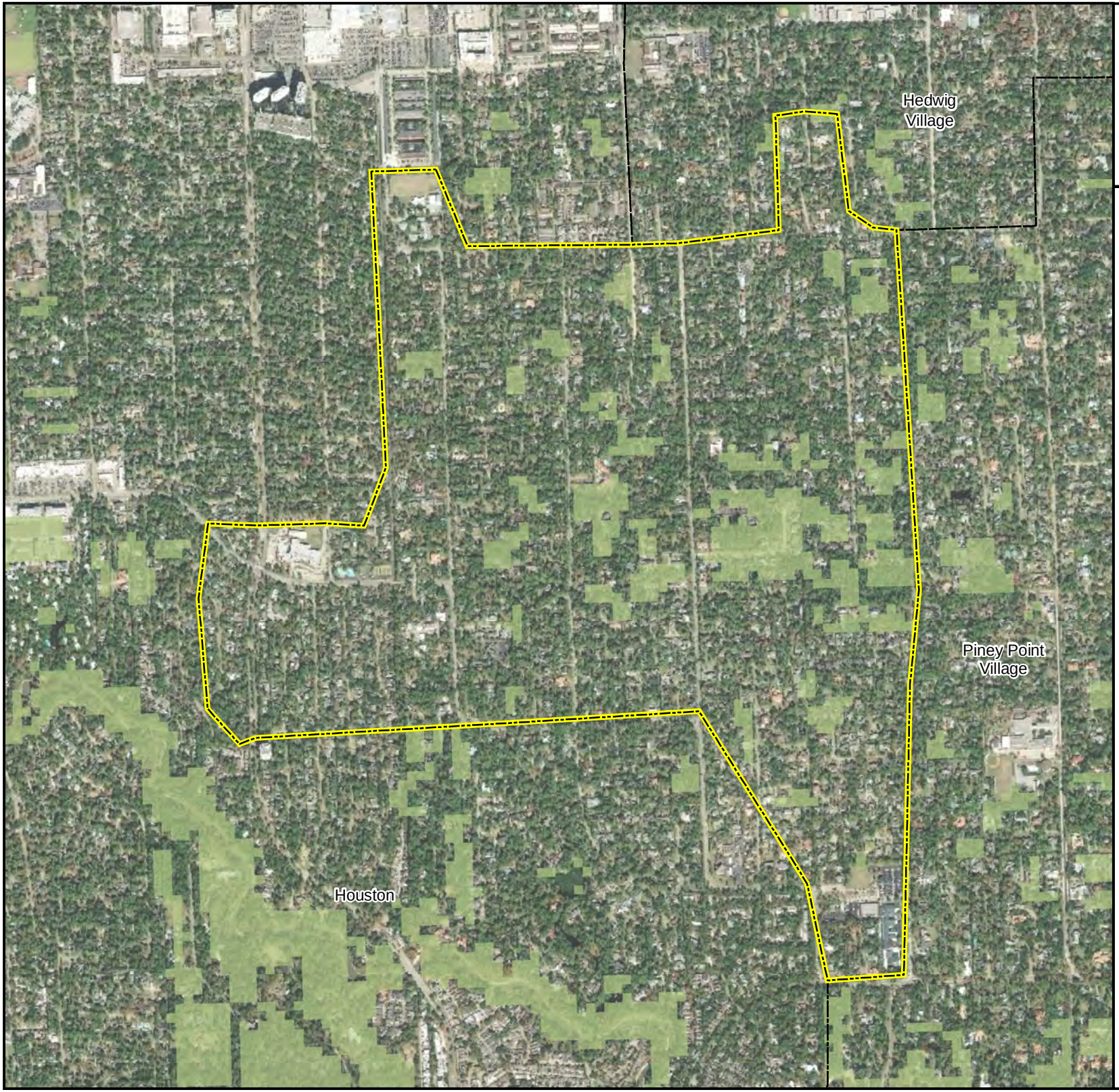
- 89 - 101
- 102 - 106
- 107 - 111
- 112 - 117
- 118 - 128
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3 Miles



Bunker Hill Village

Wildfire Ignition Density

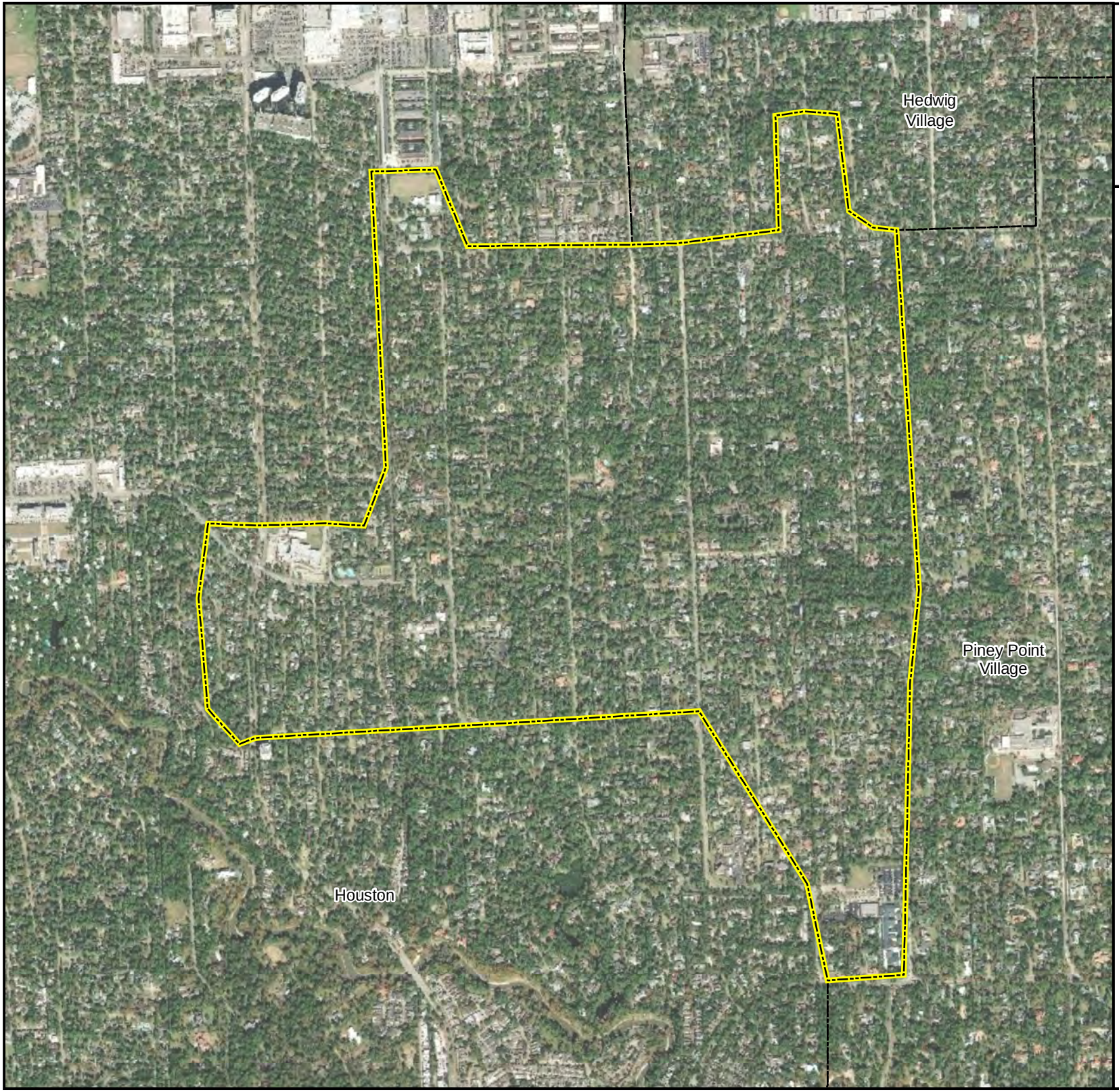
- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3 Miles



Bunker Hill Village

Wildfire Threat

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3 Miles

5. CITY OF DEER PARK

5.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Robert Hemminger, Director of Emergency Services
2211 East X Street
Deer Park, TX 77536
Telephone: 281-478-7284
e-mail Address: rhemminger@deerparktx.org

Alternate Point of Contact
Buddy Rice, Fire Marshal
2211 East X Street
Deer Park, TX 77536
Telephone: 281-478-7291
e-mail Address: brice@deerparktx.org

5.2 JURISDICTION PROFILE

5.2.1 Location

The city of Deer Park, Texas is located in southeastern Harris County and is in the highly industrialized ship channel area of the county. It is approximately 22 miles east of downtown Houston.

The current boundaries generally extend by the city of Pasadena, Texas to the south and west, by the city of La Porte, Texas to the south and east and by the Houston Ship Channel (dredged out Buffalo Bayou) to the north.

5.2.2 History

The City was founded by Simeon West in 1892 and was incorporated December 12, 1948 when the population was 700. As of the 2010 U.S. Census, the population of Deer Park, Texas was 32,010.

5.2.3 Climate

Deer Park's climate is classified as humid subtropical and is characterized by hot, humid summers and generally mild to cool winters.

5.2.4 Governing Body Format

The City of Deer Park, Texas is a Home Rule City adopted in December 1960 which provides for a Mayor-Council from of government. The Mayor and six (6) members of Council are elected at large and establish goals and priorities that are executed and implemented through the appointed City Manager.

The City Council assumes responsibility for the adoption of this plan; the Office of Emergency Management will oversee its implementation. Development of this annex was carried out by the members of the City of Deer Park Local Mitigation Planning Team, whose members are listed in Table 5-1.

Table 5-1. Local Mitigation Planning Team Members

Name	Title
Robert Hemminger	Emergency Services Director
Buddy Rice	Fire Marshal
Bill Pedersen	Public Works Director
James Stokes	City Manager
Gary Jackson	Assistant City Manager
Kathy Holcomb	Operations Coordinator / Floodplain Manager
Adam Ballasteros	City Engineer
Larry Brotherton	Chief Building Official

5.3 CURRENT TRENDS

5.3.1 Population

According to 2010 U.S. Census, the population of Deer Park, Texas was 32,010. According to the Texas Home Town Locator the population of Deer Park, Texas was 35,139 as of July 1, 2018. Since 2010, the population has grown at an average annual rate of 1.14%.

5.3.2 Development

Table 5-2 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

Table 5-2. Recent and Expected Future Development Trends

Criterion	Response					
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan? • **If yes, give the estimated area annexed and estimated number of parcels or structures.**	No N/A					
Is your jurisdiction expected to annex any areas during the performance period of this plan? • **If yes, describe land areas and dominant uses.** • **If yes, who currently has permitting authority over these areas?**	No N/A N/A					
Are any areas targeted for development or major redevelopment in the next five years? • **If yes, briefly describe, including whether any of the areas are in known hazard risk areas**	Yes The city of Deer Park has annexed 32 acres for commercial development					
How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?		**2014**	**2015**	**2016**	**2017**	**2018**
	Single Family	59	94	55	51	8
	Multi-Family	0	0	0	0	0
	Other (commercial, mixed use, etc.)	15	10	19	15	13
	Total	**74**	**104**	**74**	**56**	**21**

Criterion	Response
Provide the number of new-construction permits for each hazard area or provide a qualitative description of where development has occurred.	• Special Flood Hazard Areas: 26 commercial properties built within a flood hazard area between 2014 and June 2019 • Landslide: -0- • High Liquefaction Areas: -0- • Tsunami Inundation Area: -0- • Wildfire Risk Areas: -0-
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	As of July 2019, the estimate is the city of Deer Park, Texas is approximately 90% built out.

5.4 CAPABILITY ASSESSMENT

The City of Deer Park performed an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities is presented in Table 5-3.
- Development and permitting capabilities are presented in Table 5-4.
- An assessment of fiscal capabilities is presented in Table 5-5.
- An assessment of administrative and technical capabilities is presented in Table 5-6.
- An assessment of education and outreach capabilities is presented in Table 5-7.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 5-8.
- Classifications under various community mitigation programs are presented in Table 5-9.
- The community's adaptive capacity for the impacts of climate change is presented in Table 5-10.

Findings of the capability assessment were reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table included in the action plan for this annex identifies these as community capacity building mitigation actions.

Table 5-3. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code	Yes	No	Yes	Yes
Comment: *Code of Ordinances, Chapter 18 Buildings and Building Regulations*				
Zoning Code	Yes	No	No	Yes
Comment: *Code of Ordinances, Appendix A Zoning*				
Subdivisions	Yes	No	No	Yes
Comment: *Code of Ordinances, Chapter 98 Subdivisions*				
Stormwater Management	Yes	Yes	Yes	Yes
Comment: *Code of Ordinances, Chapter 106 Utilities*				
Post-Disaster Recovery	Yes	No	No	Yes
Comment: *Code of Ordinances, Chapter 18 Buildings and Building Regulations Division 3 Disaster Recovery Contractors*				
Real Estate Disclosure	No	No	No	No
Comment:				
Growth Management	Yes	No	Yes	Yes
Comment: *Code of Ordinances, Chapter 98 Subdivisions and Chapter 102 Taxation*				
Site Plan Review	Yes	No	No	Yes
Comment: *Code of Ordinances, Chapter 106 Utilities, Chapter 98 Subdivisions and Appendix A Zoning*				
Environmental Protection	Yes	Yes	No	Yes
Comment: *Code of Ordinances, Chapter 106 Utilities, Chapter 18 Buildings and Building Requirements and Appendix A Zoning*				
Flood Damage Prevention	Yes	No	Yes	Yes
Comment: *Code of Ordinances, Chapter 46 Floods, Chapter 98 Subdivisions and Chapter 18 Buildings and Building Regulations*				
Emergency Management	Yes	No	Yes	Yes
Comment: *Code of Ordinances, Chapter 26 Civil Emergencies*				
Climate Change	No	Yes	No	Yes
Comment:				
Planning Documents				
General Plan	Yes	No	Yes	Yes
Comment: *Comprehensive Plan*				
Capital Improvement Plan	Yes	No	No	Yes
How often is the plan updated? *Annual during the budget process*				
Comment:				
Disaster Debris Management Plan	Yes	Yes	No	Yes
Comment: *Contracts are reviewed annually and the contracts are renewed every five (5) years*				
Floodplain or Watershed Plan	Yes	Yes	No	Yes
Comment: *Code of Ordinances, Chapter 46 Floods*				
Stormwater Plan	Yes	Yes	Yes	Yes
Comment: *Code of Ordinances, Chapter 106 Utilities*				
Urban Water Management Plan	No	No	No	No
Comment:				
Habitat Conservation Plan	No	Yes	No	Yes
Comment: *The City of Deer Park does not have an HCP but habitat impact is addressed in Code of Ordinances, Chapter 106 Utilities and Chapter 98 Subdivisions*				
Economic Development Plan	No	No	No	No
Comment: *City of Deer Park does have an Economic Development Coordinator*				
Shoreline Management Plan	No	Yes	No	No
Comment: *City of Deer Park is not required to have an SMP*				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Community Wildfire Protection Plan	No	Yes	No	Yes
Comment: *City of Deer Park is included in Harris County CWPP*				
Forest Management Plan	No	Yes	No	No
Comment:				
Climate Action Plan	No	Yes	No	Yes
Comment:				
Comprehensive Emergency Management Plan	Yes	Yes	Yes	Yes
Comment: *Annex P – Hazard Mitigation of the Emergency Operations Plan*				
Threat & Hazard Identification & Risk Assessment (THIRA)	No	Yes	Yes	Yes
Comment:				
Post-Disaster Recovery Plan	Yes	Yes	No	Yes
Comment: *Annex J – Disaster Recovery Plan of the Emergency Operations Plan*				
Continuity of Operations Plan	Yes	No	No	Yes
Comment:				
Public Health Plan	Yes	Yes	Yes	Yes
Comment: *Annex H – Health and Medical of the Emergency Operations Plan*				

Table 5-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • **If no, who does? If yes, which department?**	Yes Public Works/Planning and Development
Does your jurisdiction have the ability to track permits by hazard area?	No
Does your jurisdiction have a buildable lands inventory?	No

Table 5-5. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes – Water and Sewer
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	No
Withhold Public Expenditures in Hazard-Prone Areas	No
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	No

Table 5-6. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Planning and Development
Engineers or professionals trained in building or infrastructure construction practices	Yes	Planning and Development
Planners or engineers with an understanding of natural hazards	Yes	Planning and Development
Staff with training in benefit/cost analysis	Yes	Finance and OEM Directors
Surveyors	Yes	Planning & Development
Personnel skilled or trained in GIS applications	Yes	Planning & Development and IT
Scientist familiar with natural hazards in local area	Yes	Local research institutes, colleges and universities
Emergency manager	Yes	OEM Director and EOC Manager
Grant writers	Yes	OEM Director and City Manager's Office

Table 5-7. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • **If yes, briefly describe.**	Yes Public Works disseminates the information
Do you use social media for hazard mitigation education and outreach? • **If yes, briefly describe.**	Yes Website, Instagram, Facebook and Twitter
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • **If yes, briefly describe.**	No N/A
Do you have any other programs already in place that could be used to communicate hazard-related information? • **If yes, briefly describe.**	Yes Printed material handouts at all city facilities, social media and utility billing insert
Do you have any established warning systems for hazard events? • **If yes, briefly describe.**	Yes Code Red, Outdoor Warning Sirens (Whelen), social media outlets, Alertus, Municipal TV Station

Table 5-8. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Public Works
Who is your floodplain administrator? (department/position)	Public Works Project Coordinator
Are any certified floodplain managers on staff in your jurisdiction?	Yes
What is the date that your flood damage prevention ordinance was last amended?	January 2017
Does your floodplain management program meet or exceed minimum requirements? • **If exceeds, in what ways?**	Meets N/A
When was the most recent Community Assistance Visit or Community Assistance Contact?	Insert appropriate information
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • **If so, state what they are.**	No N/A
Are any RiskMAP projects currently underway in your jurisdiction? • **If so, state what they are.**	No N/A
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • **If no, state why.**	Yes N/A
Does your floodplain management staff need any assistance or training to support its floodplain management program? • **If so, what type of assistance/training is needed?**	No N/A
Does your jurisdiction participate in the Community Rating System (CRS)? • **If yes, is your jurisdiction interested in improving its CRS Classification?** • **If no, is your jurisdiction interested in joining the CRS program?**	Yes Yes N/A
How many flood insurance policies are in force in your jurisdiction?[a] • **What is the insurance in force?** • **What is the premium in force?**	4,285 $1,283,462,500 Unknown
How many total loss claims have been filed in your jurisdiction?[a] • **How many claims are still open or were closed without payment?** • **What were the total payments for losses?**	306 Unknown $7,759,475.49

a. According to FEMA statistics as of February 2017

Table 5-9. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	Yes	7	05/01/2017
Building Code Effectiveness Grading Schedule	Yes	4	02/24/2010
Public Protection	Yes	ISO 2	2016
Storm Ready	No	N/A	N/A
Firewise	No	N/A	N/A

Table 5-10. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:***	Low
Jurisdiction-level monitoring of climate change impacts ***Comment:***	Low
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:***	Low
Participation in regional groups addressing climate risks ***Comment:***	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	Low
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	Low
Identified strategies for adaptation to impacts ***Comment:***	Low
Champions for climate action in local government departments ***Comment:***	Low
Political support for implementing climate change adaptation strategies ***Comment:***	Low
Financial resources devoted to climate change adaptation ***Comment:***	Low
Local authority over sectors likely to be negative impacted ***Comment:***	Low
Public Capacity	
Local residents knowledge of and understanding of climate risk ***Comment:***	Low
Local residents support of adaptation efforts ***Comment:***	Low
Local residents' capacity to adapt to climate impacts ***Comment:***	Low
Local economy current capacity to adapt to climate impacts ***Comment:***	Low
Local ecosystems capacity to adapt to climate impacts ***Comment:***	Low

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

5.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning and capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

5.5.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- **Basic Plan –** The Basic Plan provides a summary on the hazards and threats in the community.
- **Annex P – Hazard Mitigation** is assigned to the Public Works Department and addresses the hazards and threats in the community. The Annex also identifies the various hazard mitigation related programs implemented in the City of Deer Park and which agencies are responsible for administration.

5.5.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- **Master Drainage Plan –** The City of Deer Park may incorporate a Master Drainage Plan and identify projects to include in the Hazard Mitigation Action Plans.
- **Flood Mitigation Plan** – The City of Deer Park may consider a Flood Mitigation Plan to specifically identify flood mitigation projects for the Mitigation Action Plan.
- **Capital Improvement Plan** – The City of Deer Park updates the CIP on an annual basis and can integrate the goals, objectives, and projects identified in the Hazard Mitigation Action Plan into the CIP process.

5.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 5-11 lists past occurrences of natural hazards for which specific damage was recorded in the City of Deer Park. Other hazard events that broadly affected the entire planning area, including City of Deer Park, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

5.7 HAZARD RISK RANKING

Table 5-12 presents a local ranking for City of Deer Park of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 5-11. Past Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Hurricane Harvey	DR-1791	2017	Ongoing
Severe Storms, Tornadoes, Straight Line Winds and Flooding	DR-4223	2015	$850,000
Hurricane Ike	DR-1791	2008	N/A
Hurricane Ike	EM-3294	2008	N/A
Tropical Storm Erin	DR-1730	2007	N/A
Hurricane Rita	DR-1606	2005	N/A
Hurricane Rita	EM-3261	2005	N/A
Hurricane Katrina Evacuation	EM-3216	2005	N/A
Severe Storms, Tornadoes and Flooding	DR-1439	2002	N/A
Tropical Storm Allison	DR-1379	2001	N/A
Extreme Fire Hazards	EM-3142	1999	N/A
Flooding	DR-1257	1998	N/A
Tropical Storm Frances	DR-1245	1998	N/A
Severe Thunderstorms and Flooding	DR-1041	1994	N/A
Severe Thunderstorms and Flooding	DR-970	1992	N/A
Severe Thunderstorms and Flooding	DR-937	1992	N/A
Tropical Storm Allison	DR-836	1989	N/A
Severe Storms, Tornadoes and Flooding	DR-828	1989	N/A
Severe Storms and Flooding	DR-727	1984	N/A
Hurricane Alicia	DR-689	1983	N/A
Severe Storms, Tornadoes and Flooding	DR-580	1979	N/A
Severe Storms and Flooding	DR-603	1979	N/A
Severe Storms and Flooding	DR-510	1976	N/A
Severe Storms and Flooding	DR-398	1973	N/A

Table 5-12. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Severe Weather	48	High
1	Hurricane and Coastal Storms	48	High
2	Wildfire	13	High
3	Flooding	24	Medium
4	Toxic Chemical Release	NA	Medium
5	Earthquake	14	Low
6	Drought	6	Low
6	Dam Failure	6	Low
6	Mass Movement	6	Low
6	Energy Pipeline Failures	6	Low
7	Tsunami	0 (No Exposure)	None
7	Coastal Erosion	0 (No Exposure)	None
7	Tsunami	0 (No Exposure)	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

5.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. This section provides information on a few key vulnerabilities for the jurisdiction. Available jurisdiction-specific risk maps of the hazards are provided at the end of this annex.

5.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: None
- Number of FEMA-identified Severe-Repetitive-Loss Properties: None
- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated: None

5.8.2 Other Noted Vulnerabilities

The following jurisdiction-specific issue has been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- Due to the City's proximity to the chemical plants and refineries along the Ship Channel, Deer Park has a high risk to environmental and hazardous materials incidents due to impacts caused by natural and human caused hazards

Mitigation actions addressing this issue were prioritized for consideration in the action plan in this annex.

5.9 STATUS OF PREVIOUS PLAN ACTIONS

Table 5-13 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

Table 5-13. Status of Previous Plan Actions

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
2014DERPRK001-Adopt a City Ordinance to require emergency power generation for fueling stations during new construction			X	
Comment:				
2014DERPRK002-Retrofit critical infrastructure/public buildings/facilities with generator power systems			X	
Comment:				
2014DERPRK003-Install Alertus (mass notification) early warning systems for public buildings			X	
Comment: *Partially completed, adding to additional buildings*				
2014DERPRK004-Install new lightning warning systems at outdoor sporting venues			X	
Comment:				

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
2014DERPRK005-Update drainage ordinance to require detention future development and redevelopment for detention and within the AO (sheet flow) zones			X	
Comment:				
2014DERPRK006-Widening and deepening all drainage channels within the city limits			X	
Comment:				
2014DERPRK007- Buyout flood prone properties and create detention ponds			X	
Comment:				
2014DERPRK008-Retrofit and harden critical infrastructure and/or shelters with impact and wind resistant glass and shutter systems to withstand effects of hurricanes, hail and high-winds			X	
Comment:				
2014DERPRK009-Protect VHF Radio System and other emergency communications infrastructure components through hardening and protective structures			X	
Comment:				
2014DERPRK010-Retrofit and improve gravel roofing to limit loose debris and high wind damage			X	
Comment:				
2014DERPRK011-Center Street Revitalization Project – Utility Relocation			X	
Comment:				
2014DERPRK012-Construct protective shelters for critical equipment and vehicles			X	
Comment:				
2014DERPRK013-Improve/Retrofit air filtration systems for critical infrastructure/public buildings/school facilities with improved filtration and air purifying capacity to minimize health risks associated with low air quality and to minimize equipment damage due to smoke			X	
Comment: *Higher quality system, improved filtration, higher capacity air purification, etc.*				
2014DERPRK014-Improve code/ordinance to require removal of dead vegetation/dry fuel sources in high risk areas			X	
Comment:				
2014DERPRK015-Harden water piping lines and systems to prevent loss of water due to breaks and to mitigate drought			X	
Comment:				
2014DERPRK016-Develop a Public Education/Outreach Program to inform the public on water conservation mitigation measures			X	
Comment:				
2014DERPRK017- Install emergency power at cooling center			X	
Comment:				
2014DERPRK018-Improve existing site to be utilized as a cooling zone (Community Center, Library, sporting fields) with enhanced cooling capabilities, to include misting systems and additional HVAC cooling capacity			X	
Comment:				

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
2014DERPRK019-Install generator to provide adequate heating for use as a warming center			X	
Comment:				
2014DERPRK020-Upgrade public facility heating systems to allow utilization of warming centers through improved insulation and energy efficient heating systems, and educate public on actions to mitigate property losses from the hazards of winter storms			X	
Comment:				
2014DERPRK021-Install detection systems to monitor and warn of chemical releases			X	
Comment:				
2014DERPRK022-Improve code/ordinance for pipeline signage			X	
Comment:				
2014DERPRK023-Mapping/identification of inundation risk area for high risk dams/levees			X	
Comment:				
2014DERPRK024-Install automated public alert warning system, such as outdoor sirens or automated messaging/telephone notification systems, to provide advance warning for dam failure flood			X	
Comment:				
2010DERPRK004-Storm Sewer enlargement and storm sewer additions in different parts of city as part of the Master Drainage Plan that was developed			*X*	
Comment: *These projects will be placed on future Council agendas and follow the process for engineering and bidding of the projects. Design is 90% complete. Enlargement of existing infrastructure would be determined at time of funded project and would be calculated to be the most cost effective size at the time*				
2010DERPRK005-Widening and deepening of HC Flood Control Channel B112-02-00			X	
Comment: *This would be a joint venture between the City and HC Flood Control District with the exact size and scope of the project still being evaluated and engineered by HCFCD.*				
2010DERPRK019-Develop/implement tree management program and mitigation measures to reduce high wind damages			X	
Comment: *Due to issues of trees in yards being on private property the City must do an awareness program to encourage homeowners to trim their trees around their house*				
2010DERPRK024-Establish/Expand GIS Mapping/Identification of Pipeline Risk Areas in flood areas			X	
Comment: *This project is updated annually with new pipelines or new owners or products*				
2010DERPRK025-Develop/implement pipeline safety program			X	
Comment:				

5.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 5-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 5-15 identifies the priority for each action. Table 5-16 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 5-14. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action DP1 — Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Earthquake, flooding, landslide, tsunami, wildfire						
Existing	3, 4, 10	City Administration	TBD	High	HMGP, PDM, FMA	Short-term
Action DP2 — Integrate the hazard mitigation plan into other plans, ordinances and programs that dictate land use decisions in the community, including the City of Deer Park						
Hazards Mitigated: Dam failure, drought, earthquake, flooding, landslide, tsunami, wildfire						
New and Existing	1, 3, 4, 5, 7, 8, 10	City Administration	TBD	Low	Staff Time, General Funds	Ongoing
Action DP3 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: Severe Weather, Hurricane and Coastal Storms, Flooding, Earthquake, Wildfire, Drought, Dam Failure, Mass Movement, Energy Pipeline Failures, Toxic Chemical Release						
New and Existing	1, 5, 8	City Administration	TBD	Low	Staff Time, General Funds	Short-term
Action DP4 — Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements: • Enforce the flood damage prevention ordinance. • Participate in floodplain identification and mapping updates. • Provide public assistance/information on floodplain requirements and impacts.						
Hazards Mitigated: Flooding						
New and Existing	1, 3, 5, 7, 8, 10	City Administration	TBD	Low	Staff Time, General Funds	Ongoing
Action DP5 — Adopt a City Ordinance to require emergency power generation for fueling stations during new construction						
Hazards Mitigated: Severe Weather; Flooding; Hurricanes						
Existing	11, 12, 14	Public Works	TBD	Low	General Fund	Short term
Action DP6 — Retrofit critical infrastructure/public buildings/facilities with generator power systems						
Hazards Mitigated: Severe Weather; Flooding; Hurricanes						
Existing	10, 11	Public Works	TBD	High	Grant Funds	Short term
Action DP7 — Install Alertus (mass notification) early warning systems for public buildings						
Hazards Mitigated: Severe Weather-Tornadoes						
New	1, 4, 11	Information Technology	TBD	Medium	General or Grant Funds	Short term
Action DP8 — Install new lightning warning systems at outdoor sporting venues						
Hazards Mitigated: Severe Weather						
New	1, 10, 11	Parks	TBD	Low	General and Grant Funds	Short term
Action DP9 — Update drainage ordinance to require detention future development and redevelopment for detention and within the AO (sheet flow) zones						
Hazards Mitigated: Flooding; Hurricanes, Dam Failure						
New	8, 9, 11, 12, 14, 15	Public Works	TBD	Low	Staff time	Short term
Action DP10 — Widening and deepening all drainage channels within the city limits						
Hazards Mitigated: Flooding; Dam/Levee Failure						
Existing	7, 8, 10, 11, 12, 15	Public Works	TBD	High	General and Grant Funds	Short term
Action DP11 — Buyout flood prone properties and create detention ponds						
Hazards Mitigated: Flooding						
Existing	6, 7, 8, 9, 10, 11	Public Works	TBD	High	Grant Funds	Long term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action DP12 — Retrofit and harden critical infrastructure and/or shelters with impact and wind resistant glass and shutter systems to withstand effects of hurricanes, hail and high-winds						
Hazards Mitigated: Hurricanes; Tornadoes; Severe Weather						
Existing	9, 10, 11, 13, 15	Public Works	TBD	High	General and grant funds	Long term
Action DP13 — Protect VHF Radio System and other emergency communications infrastructure components through hardening and protective structures						
Hazards Mitigated: Hurricanes; Tornadoes; Severe Weather; Flooding; Wildfires						
Existing	1, 10, 11, 13	Information Technology	TBD	Medium	General and grant funds	Long term
Action DP14 — Retrofit and improve gravel roofing to limit loose debris and high wind damage						
Hazards Mitigated: Hurricanes; Severe Weather						
Existing	10, 11, 13, 15	Public Works	TBD	High	General and grant funds	Short term
Action DP15 — Center Street Revitalization Project – Utility Relocation						
Hazards Mitigated: Hurricanes; Severe Weather						
Existing	6, 9, 10, 11, 13	Public Works	TBD	Medium	General and grant funds	Short term
Action DP16 — Construct protective shelters for critical equipment and vehicles						
Hazards Mitigated: Severe Weather						
New	9, 10, 11, 13	Public Works	TBD	Medium	General and grant funds	Short term
Action DP17 — Improve/Retrofit air filtration systems for critical infrastructure/public buildings/school facilities with improved filtration and air purifying capacity to minimize health risks associated with low air quality and to minimize equipment damage due to smoke						
Hazards Mitigated: Wildfire; Hazmat; Pipeline Failure						
Existing	4, 9, 10, 11, 13,14	Public Works	TBD	Medium	General and grant funds	Short term
Action DP18 — Improve code/ordinance to require removal of dead vegetation/dry fuel sources in high risk areas						
Hazards Mitigated: Wildfire						
Existing	2, 6, 7, 8, 9, 10, 11, 14	Public Works	TBD	Low	General and grant funds	Short term
Action DP19 — Harden water piping lines and systems to prevent loss of water due to breaks and to mitigate drought						
Hazards Mitigated: Drought						
Existing	9, 10, 11, 13,15	Public Works	TBD	Medium	General and grant funds	Short term
Action DP20 — Develop a Public Education/Outreach Program to inform the public on water conservation mitigation measures						
Hazards Mitigated: Drought						
Existing	7, 8, 10, 11	Public Works	TBD	Low	General funds	Short term
Action DP21 — Install emergency power at cooling center						
Hazards Mitigated: Severe weather – extreme heat						
New	4, 9, 10, 11	Public Works	TBD	Medium	General and grant funds	Short term
Action DP22 — Improve existing site to be utilized as a cooling zone (Community Center, Library, sporting fields) with enhanced cooling capabilities, to include misting systems and additional HVAC cooling capacity						
Hazards Mitigated: Severe weather – extreme heat						
Existing	4, 9, 10, 11	Public Works	TBD	Medium	General and grant funds	Short term
Action DP23 — Install generator to provide adequate heating for use as a warming center						
Hazards Mitigated: Severe weather – winter storms						
New	4, 9, 10, 11	Public Works	TBD	Medium	General and grant funds	Short term
Action DP24 — Upgrade public facility heating systems to allow utilization of warming centers through improved insulation and energy efficient heating systems, and educate public on actions to mitigate property losses from the hazards of winter storms						
Hazards Mitigated: Severe weather – winter storms						
Existing	4, 9, 10, 11	Public Works	TBD	Medium	General and grant funds	Short term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action DP25 — Install detection systems to monitor and warn of chemical releases *Hazards Mitigated:* Hazmat; Pipeline Failure						
Existing	1, 3, 8, 9, 10, 11	Information Technology	TBD	Medium	General and grant funds	Short term
Action DP26 — Improve code/ordinance for pipeline signage *Hazards Mitigated:* Energy Pipeline Failures						
Existing	1, 3, 6, 9, 10, 11	Emergency Management	TBD	Low	General funds	Short term
Action DP27 — Mapping/identification of inundation risk area for high risk dams/levees *Hazards Mitigated:* Dam/Levee Failure; Flooding						
Existing	3, 10	Information Technology	TBD	Medium	General and grant funds	Short term
Action DP28 — Install automated public alert warning system, such as outdoor sirens or automated messaging/telephone notification systems, to provide advance warning for dam failure or flood *Hazards Mitigated:* Dam/Levee Failure; Flooding						
Existing	1, 3, 6, 9, 10, 11	Information Technology	TBD	Medium	General and grant funds	Short term
Action DP29 — Storm Sewer enlargement and storm sewer additions in different parts of city as part of the Master Drainage Plan that was developed *Hazards Mitigated:* Flooding						
New	7, 9, 10, 11, 13	Public Works	TBD	High	General and grant funds	Long term
Action DP30 — Widening and deepening of HC Flood Control Channel B112-02-00 *Hazards Mitigated:* Flooding						
Existing	7, 9, 10, 11, 13	Engineering	TBD	High	General and grant funds	Long term
Action DP31 — Develop/implement tree management program and mitigation measures to reduce high wind damages *Hazards Mitigated:* Hurricane and Severe Weather						
Existing	2, 6, 7, 8, 9, 10, 11, 14	Public Works	TBD	Medium	General funds	Short term
Action DP32 — Establish/Expand GIS Mapping/Identification of Pipeline Risk Areas in flood areas *Hazards Mitigated:* Energy Pipeline Failures; Flooding						
Existing	3, 7, 8, 9, 10, 11,13	Emergency Management	TBD	Low	General funds	Short term
Action DP33 — Develop/implement pipeline safety program *Hazards Mitigated:* Energy Pipeline Failure						
Existing	3, 7, 8, 9, 10, 11,13	Emergency Management	TBD	Low	General funds	Short term
Action DP34— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan. *Hazards Mitigated*: Severe Weather, Hurricane and Coastal Storms, Flooding, Earthquake, Wildfire, Drought, Dam Failure, Mass Movement,						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	Deer Park	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 5-15. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
DP1	3	High	High	Yes	Yes	No	Medium	High
DP2	7	Medium	Low	Yes	No	Yes	High	Low
DP3	3	Low	Low	Yes	No	Yes	High	Low
DP4	6	Medium	Low	Yes	No	Yes	High	Low
DP5	3	High	Low	Yes	No	Yes	High	Low
DP6	2	High	High	Yes	Yes	No	High	High
DP7	3	Medium	Medium	Yes	Yes	No	Medium	High
DP8	3	High	Low	Yes	Yes	No	Medium	Medium
DP9	6	Medium	Low	Yes	No	Yes	High	Low
DP10	6	High	High	Yes	Yes	No	Medium	High
DP11	6	High	High	Yes	Yes	No	High	High
DP12	5	High	High	Yes	Yes	No	Medium	Medium
DP13	4	Medium	Medium	Yes	Yes	No	Medium	Medium
DP14	4	High	High	Yes	Yes	No	Medium	Medium
DP15	5	Medium	Medium	Yes	Yes	No	Medium	Medium
DP16	4	High	Medium	Yes	Yes	No	Medium	Medium
DP17	6	Medium	Medium	Yes	Yes	No	Medium	Medium
DP18	8	Medium	Low	Yes	No	Yes	High	Low
DP19	5	High	High	Yes	Yes	Yes	Medium	Medium
DP20	4	Medium	Low	Yes	No	Yes	Medium	Low
DP21	4	High	Medium	Yes	Yes	No	High	High
DP22	4	High	Medium	Yes	Yes	No	High	High
DP23	4	High	Medium	Yes	Yes	No	High	High
DP24	4	High	Medium	Yes	Yes	No	High	High
DP25	6	High	Medium	Yes	Yes	No	High	High
DP26	6	Medium	Low	Yes	No	Yes	Medium	Low
DP27	2	Medium	Low	Yes	No	Yes	Medium	Low
DP28	6	High	Medium	Yes	Yes	No	Medium	Medium
DP29	5	High	High	Yes	Yes	No	High	High
DP30	5	High	High	Yes	Yes	No	High	High
DP31	8	Medium	Low	Yes	No	Yes	Medium	Low
DP32	7	High	Low	Yes	No	Yes	Medium	Low
DP33	7	High	Low	Yes	No	Yes	Medium	Low
DP34	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 5-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Severe Weather	DP1, 12 , 8, 14, 15, 16, 28, 22, 24, 34	DP1, 12, 16	DP7, 8, 34		DP5, 6, 13, 34	DP1, 12, 14, 16	DP21, 24	DP3, 5, 6, 12, 15, 21, 34
Hurricane	DP9, 12, 14, 15, 34	DP9, 12	DP34		DP5, 6, 13, 34	DP9, 12, 14	DP9	DP2, 3, 5, 6, 9, 12, 15, 34
Medium-Risk Hazards								
Flooding	DP1, 4, 9, 10, 27, 28, 29, 3031, 32, 34	DP1, 4, 9, 10, 11, 27, 29, 30, 31, 32	DP4, 28, 34	DP10, 27	DP5, 6, 13, 27, 34	DP1, 9, 29, 31	DP9	DP3, 4, 5, 6, 9, 15, 29, 30, 31, 34
Low-Risk Hazards								
Earthquake	DP1, 34	DP1	DP34		DP34	DP1		DP2, 3, 34
Wildfire	DP1, 17, 18, 34	DP1	DP34	DP18	DP13, 34	DP1, 17	DP18	DP2, 3, 18, 34
Drought	DP19, 21, 22, 23, 34	DP19	DP20, 34		DP34	DP21, 22	DP19, 21, 22, 23	DP2, 3, 22, 23, 34
Dam Failure	DP9, 10, 27, 34	DP9, 10	DP34		DP27, 34	DP9, 10		DP2, 3, 9, 27, 34
Mass Movement	DP34		DP34		DP34			DP34
Energy Pipeline Failure	DP17, 25, 26, 32	DP32	DP25, 26, 33			DP17		DP3, 25
Toxic Chemical Release	DP17, 25		DP25			DP17		DP3, 25

a. See the introduction to this volume for explanation of mitigation types.

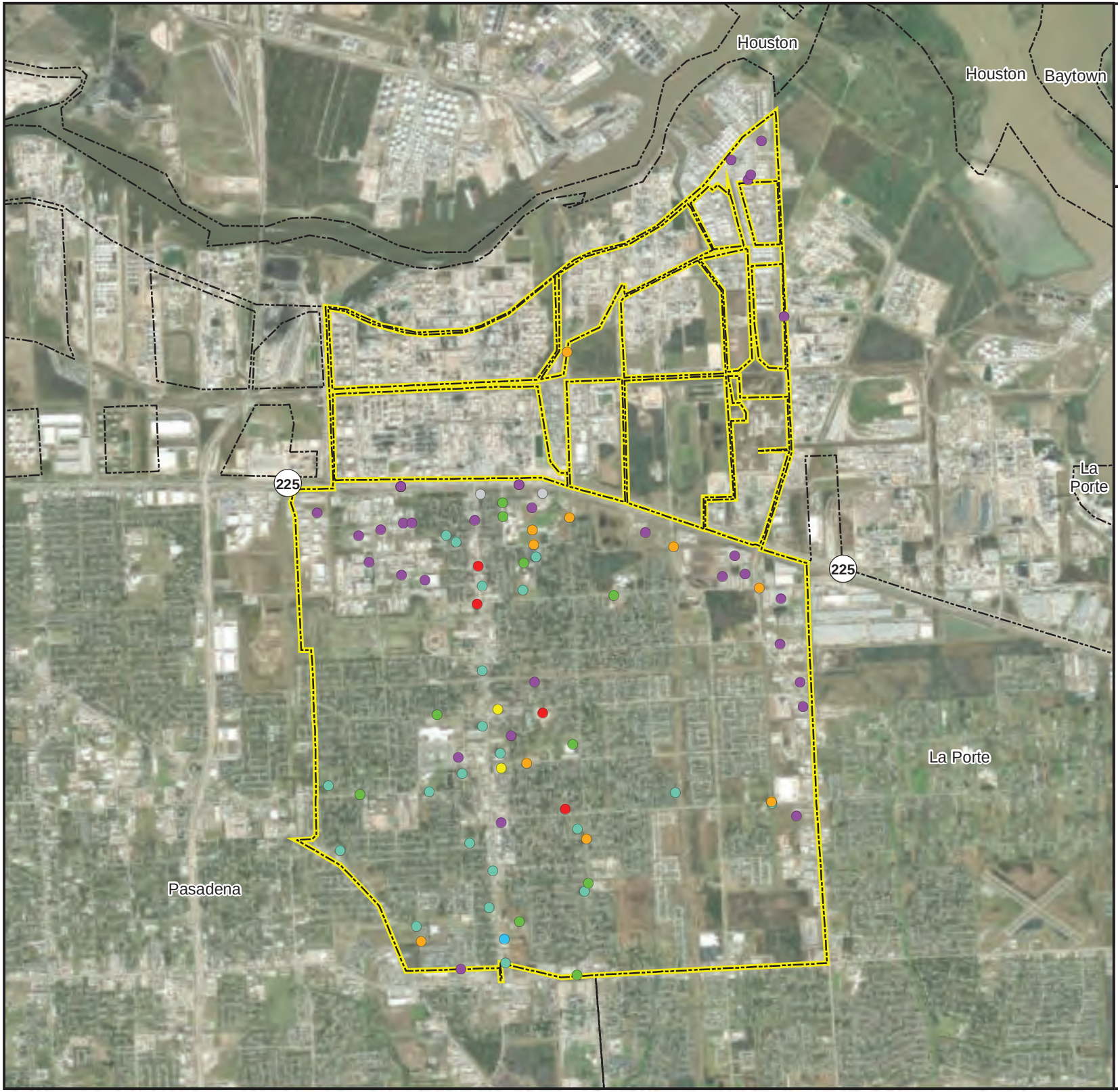
5.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- **City of Deer Park Code of Ordinances —** The municipal code was reviewed for the full capability assessment and for identifying opportunities for action plan integration.

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.



Deer Park

Critical Facilities

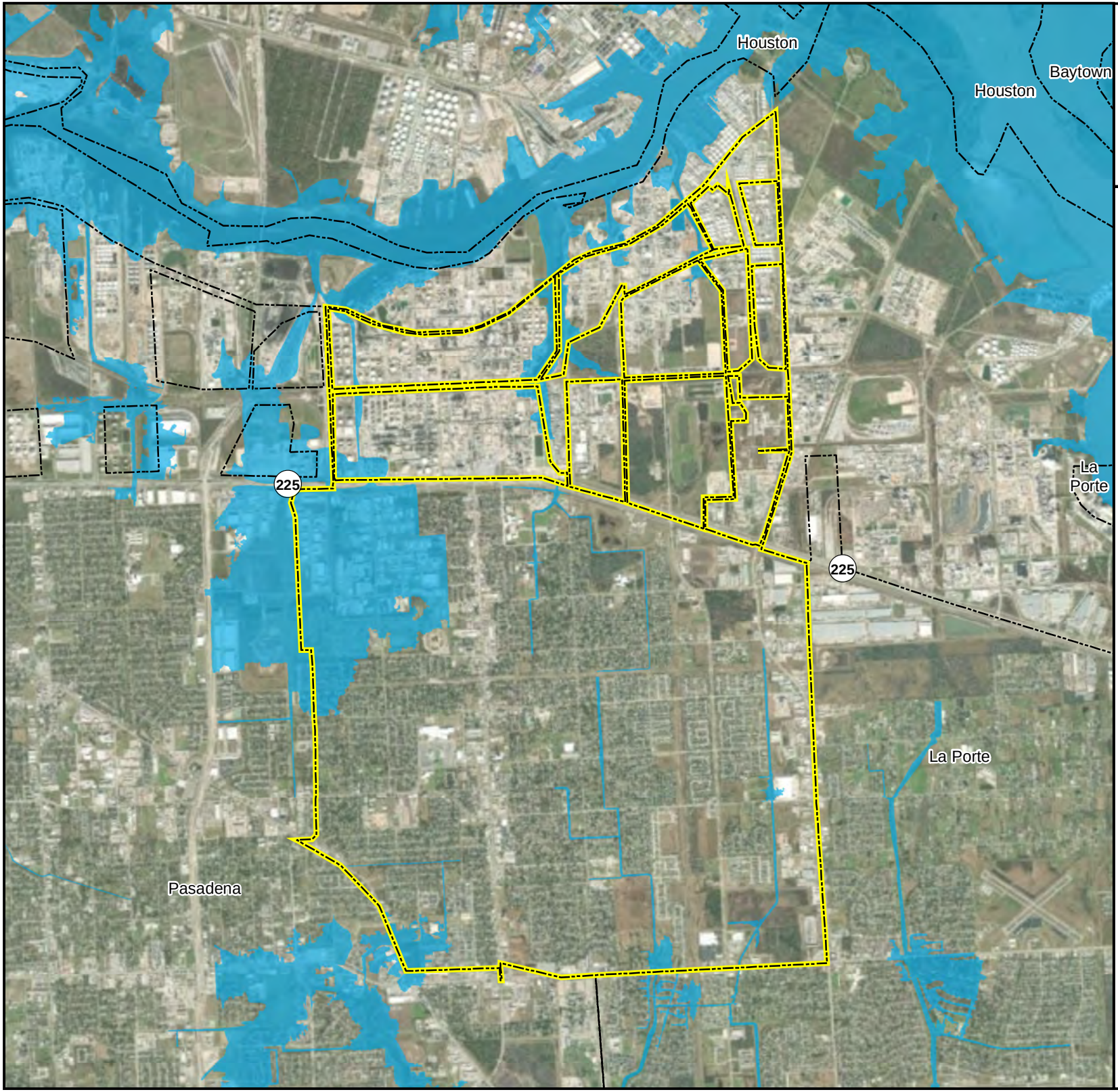
- Education Facilities
- Emergency Services
- Government Facilities
- Hazardous Material Sites
- Health and Medical Facilities
- Historical and Cultural Sites
- Transportation Systems
- Utility Systems
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.275 0.55 1.1 Miles



Deer Park

FEMA Flood Hazard

1% Annual Chance Flood (100-yr)

Incorporated Cities

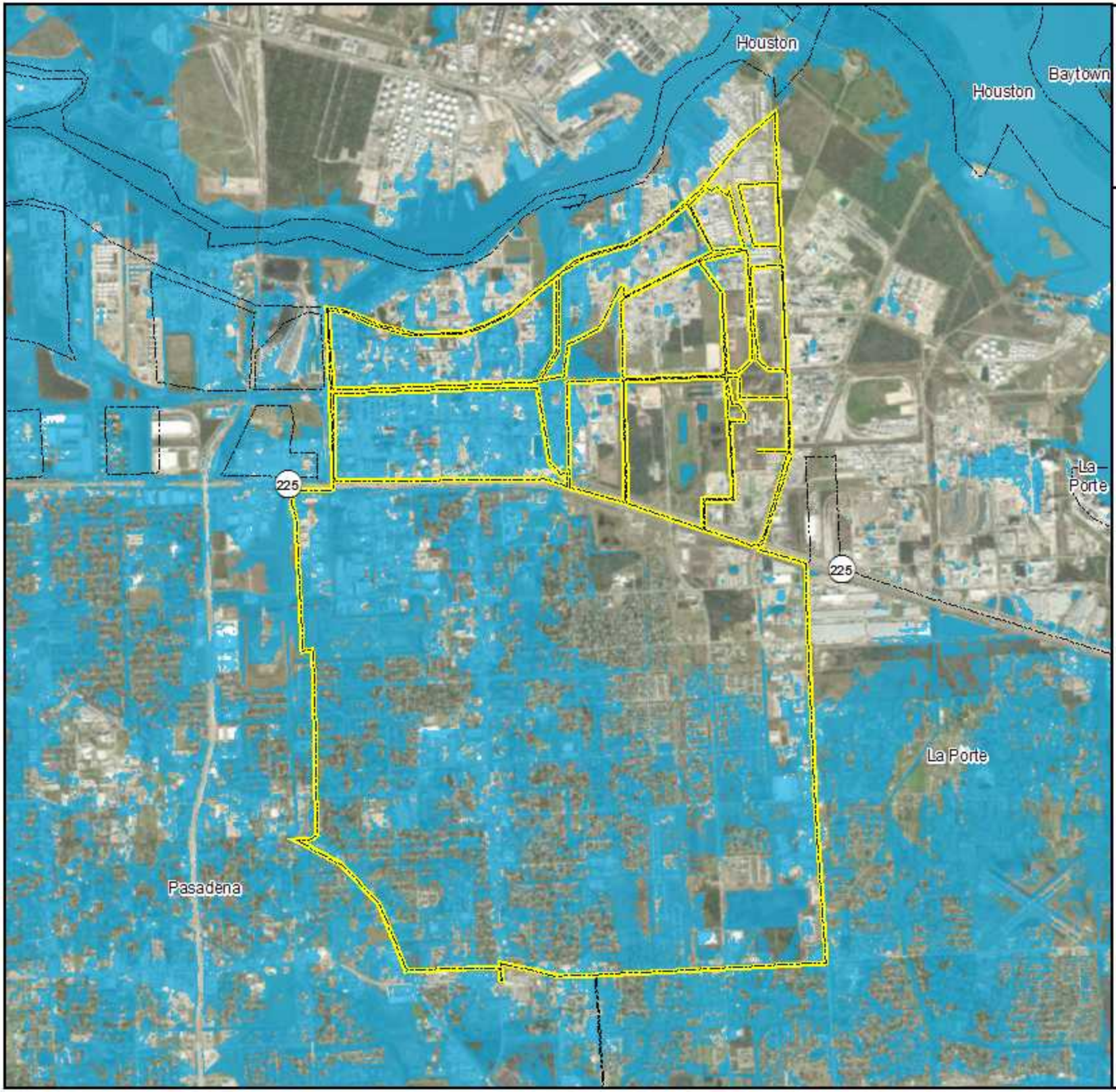
Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.275 0.55 1.1 Miles



Deer Park

Flood Hazard
Hurricane Harvey

Flooding Extent

Incorporated Cities

Harris County

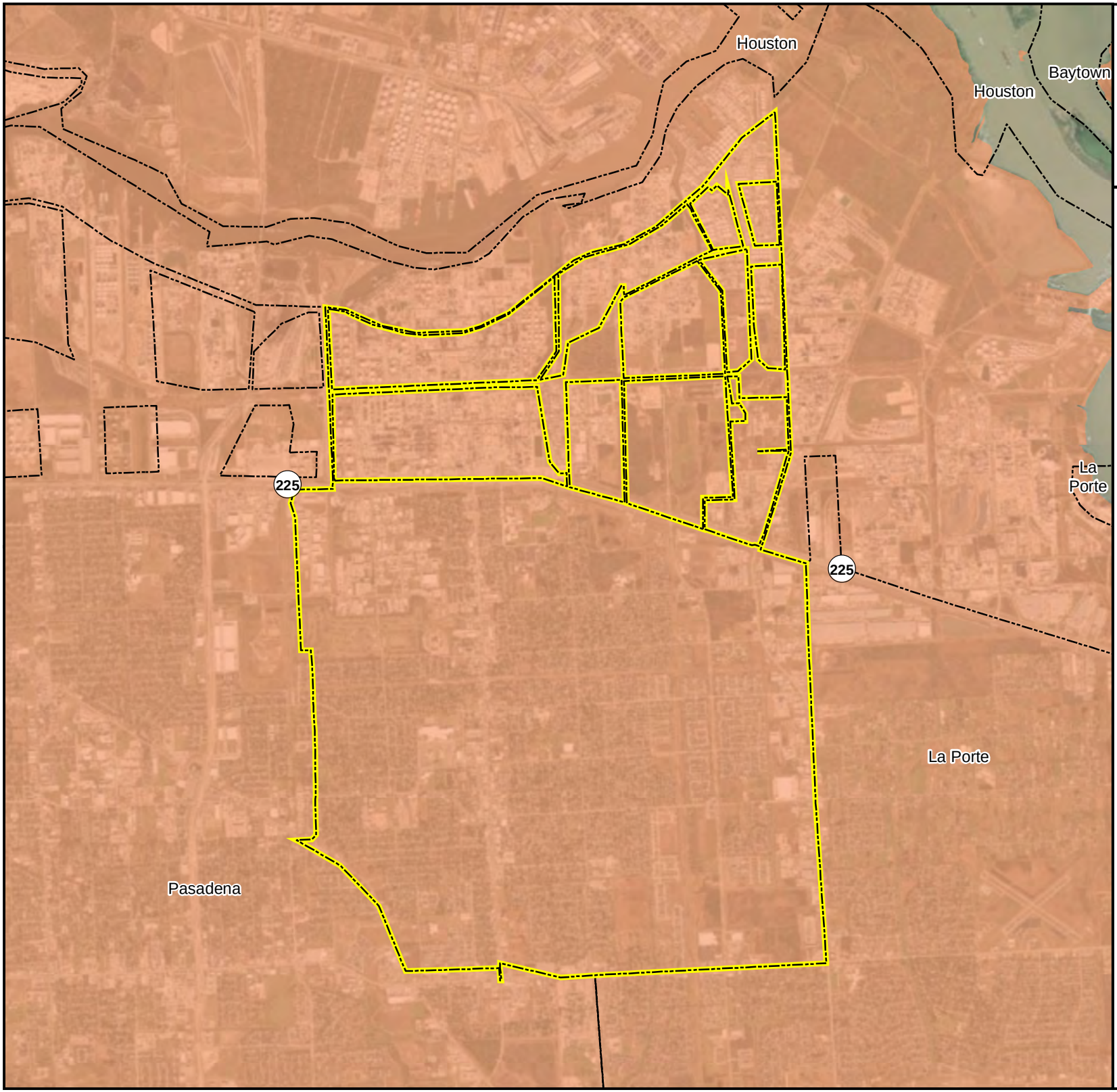
Note: Flooding extent shown for Hazard Mitigation Plan planning area only.

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.275 0.55 1.1 Miles



Deer Park

Hurricane Alicia (1983)

Peak WInd Gust (mph)

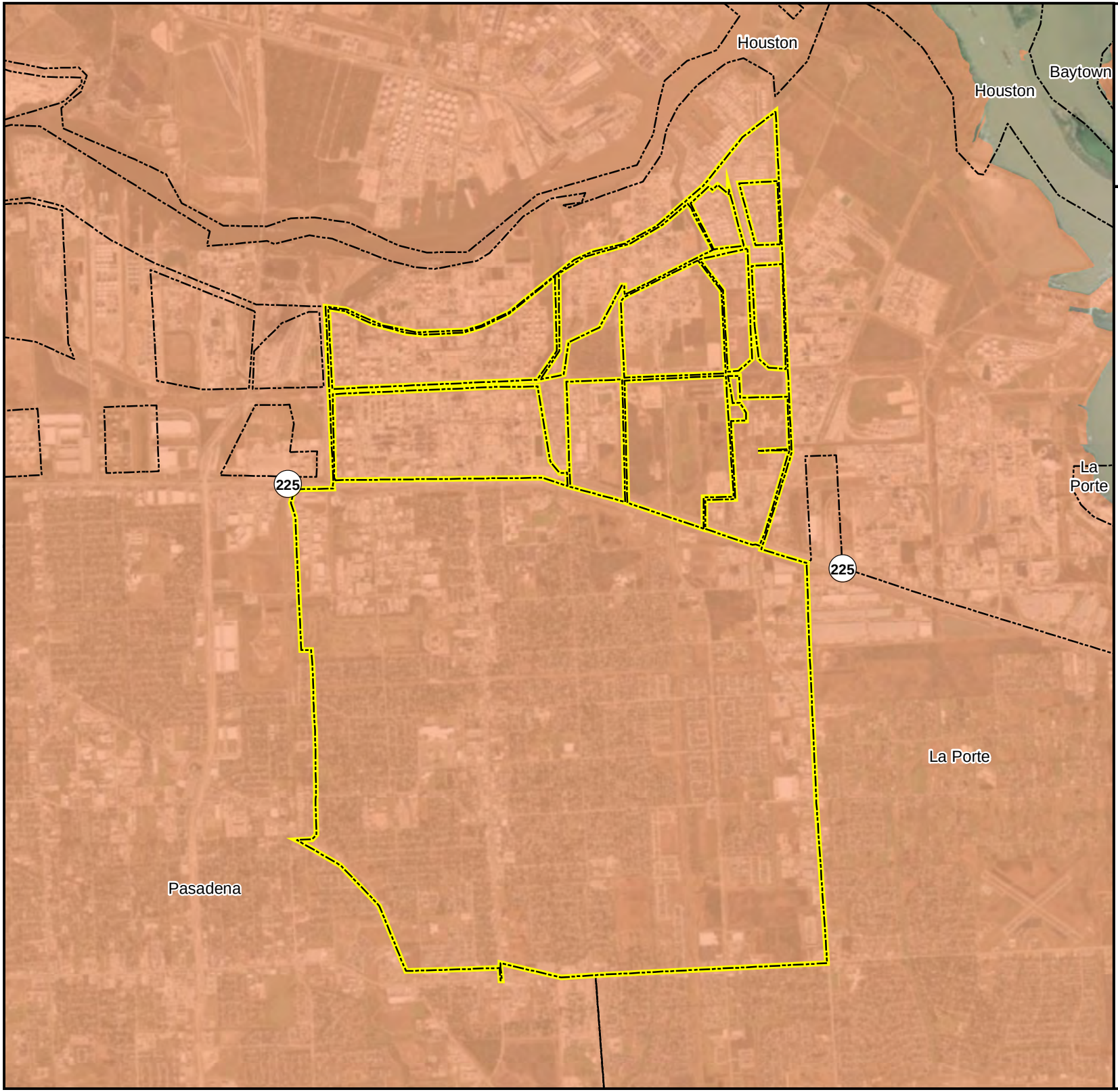
- 87 - 94
- 95 - 98
- 99 - 101
- 102 - 104
- 105 - 110
- Storm Track
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.275 0.55 1.1 Miles



Deer Park

20-year Probabilistic Hurricane

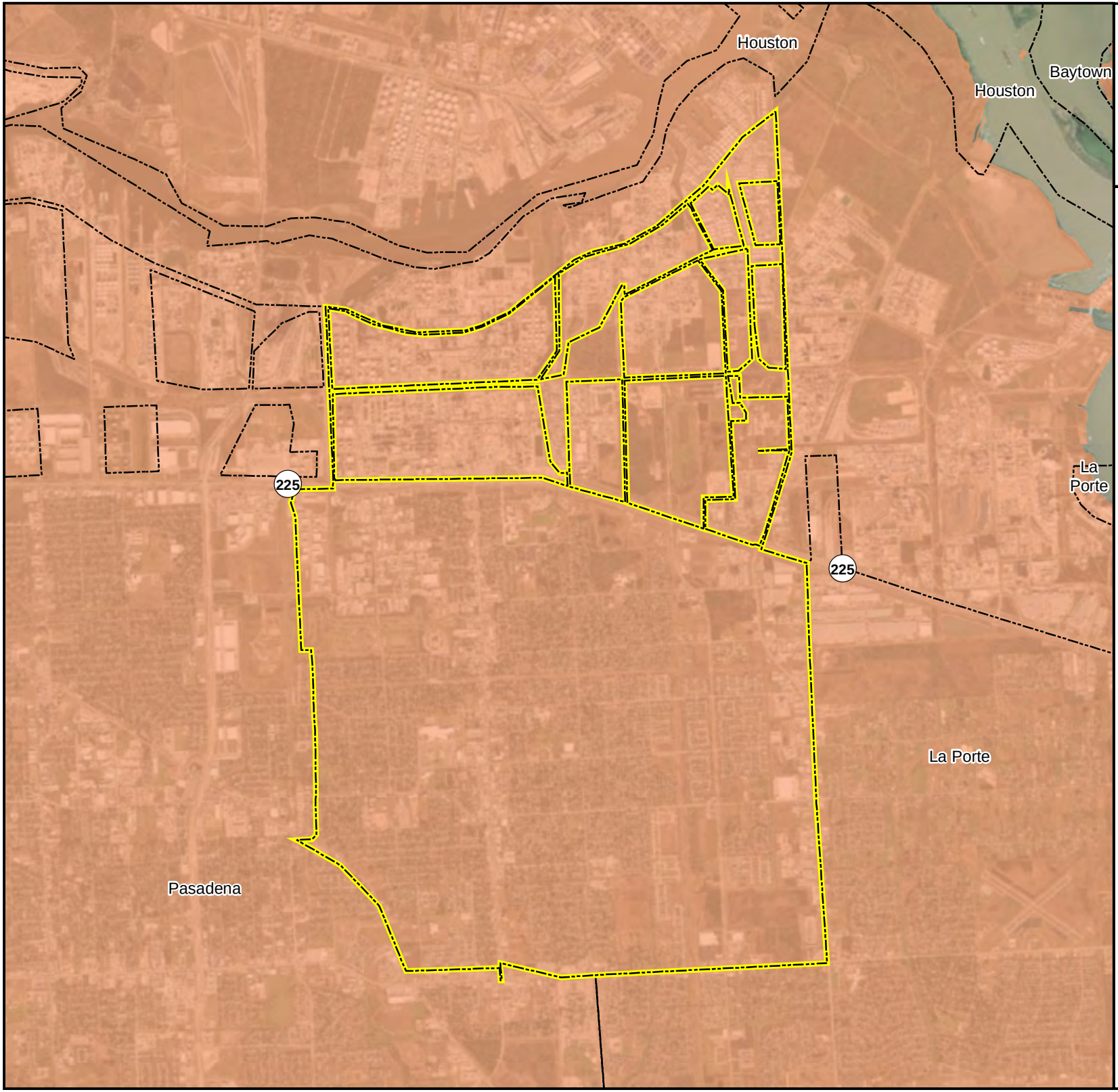
Peak Wind Gust (mph)

- 63 - 71
- 72 - 76
- 77 - 80
- 81 - 84
- 85 - 92
- Incorporated Cities
- Harris County

TETRA TECH

N

0 0.275 0.55 1.1 Miles



Deer Park

100-year Probabilistic Hurricane

Peak Wind Gust (mph)

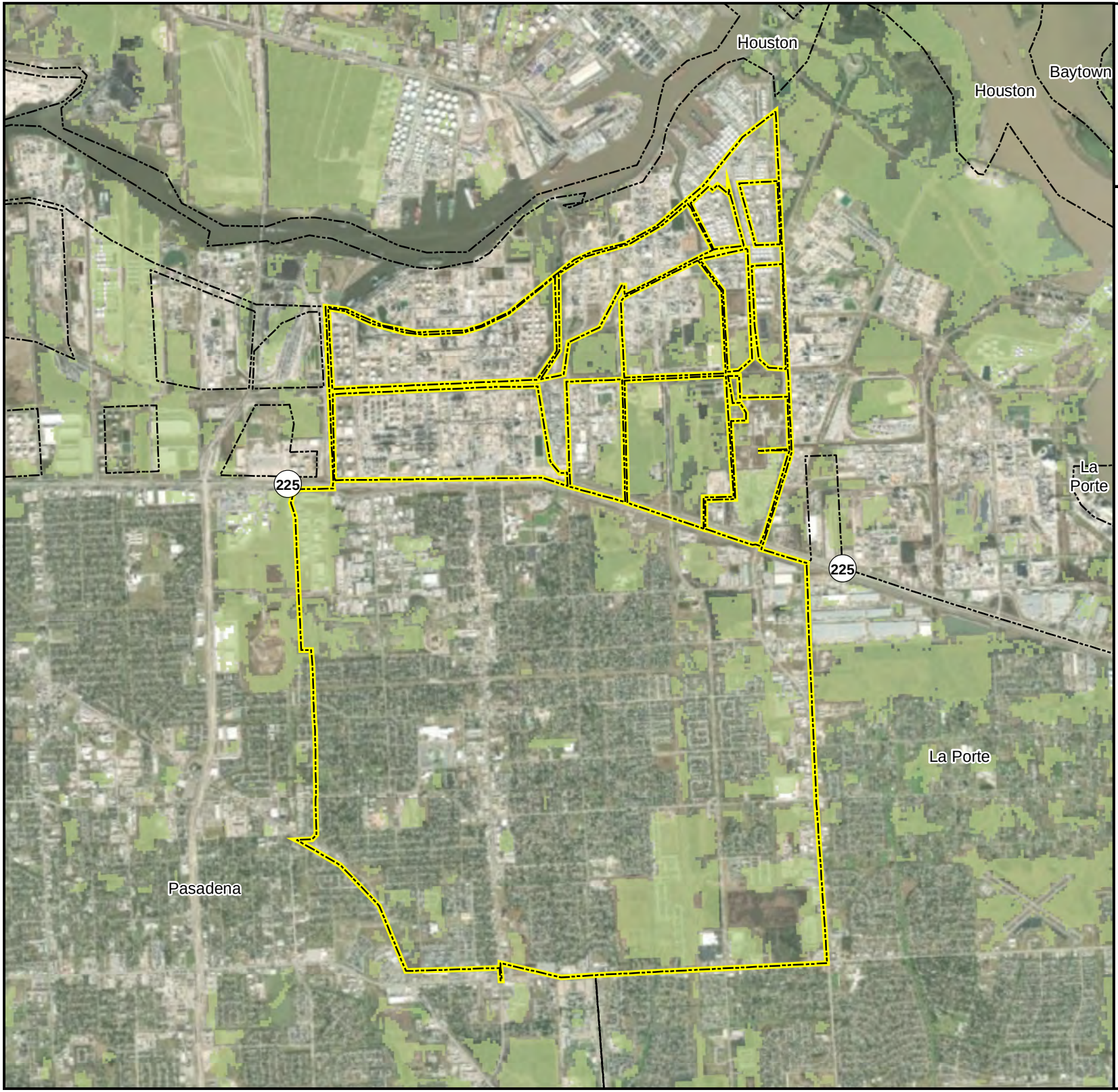
- 89 - 101
- 102 - 106
- 107 - 111
- 112 - 117
- 118 - 128
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.275 0.55 1.1 Miles



Deer Park

Wildfire Ignition Density

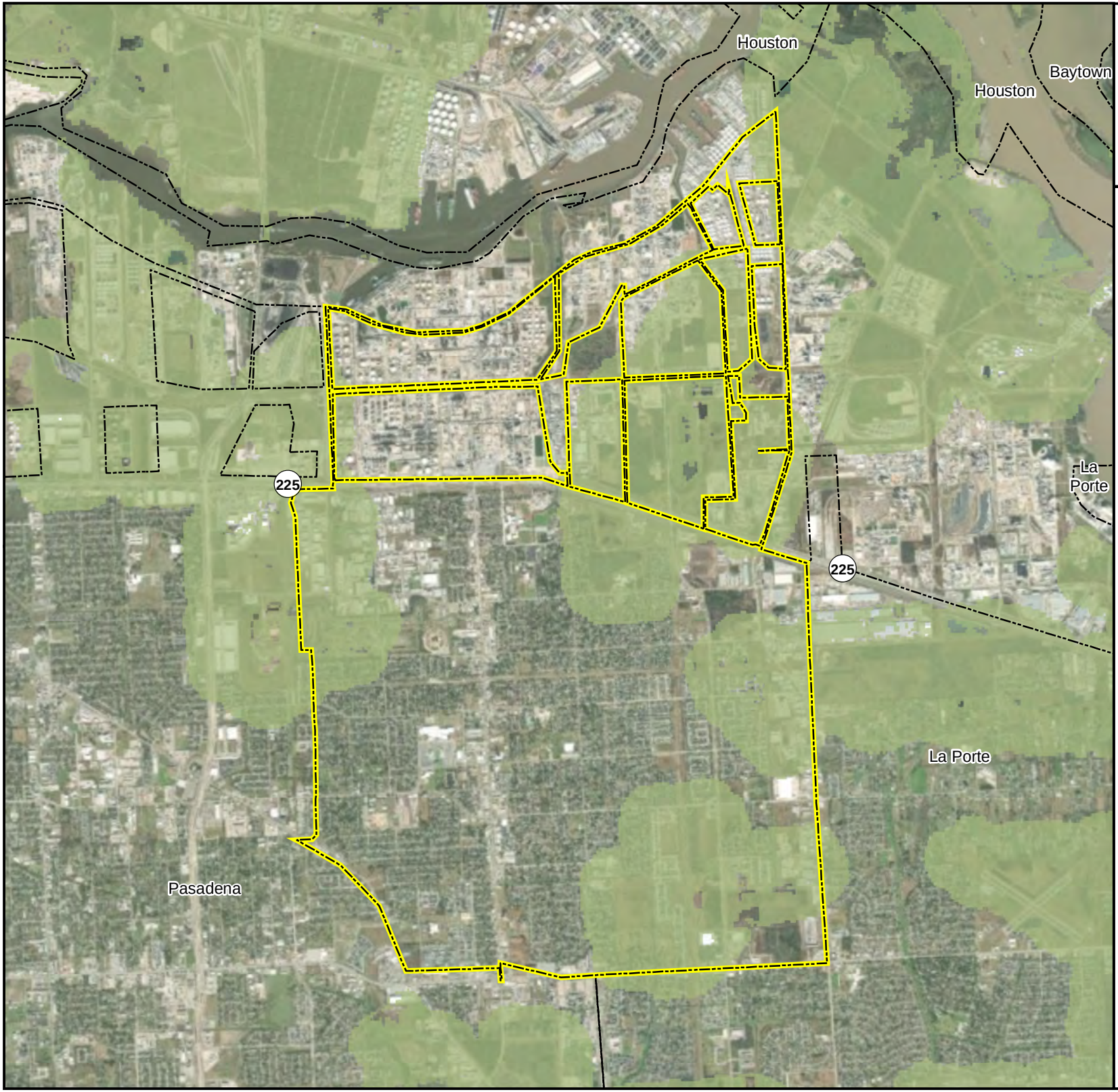
- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.275 0.55 1.1 Miles



Deer Park

Wildfire Threat

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.275 0.55 1.1 Miles

6. CITY OF EL LAGO

6.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Thomas Merchant, EMC
315 Oak View Circle
El Lago, Texas 77586
Telephone: 281-682-3670
e-mail Address: tmerchant2@comcast.net

Alternate Point of Contact
Art Richard, Assistant EMC
622 Bayview
El Lago, Texas 77586
Telephone: 281-326-3348
e-mail Address: zartadd@aol.com

6.2 JURISDICTION PROFILE

6.2.1 Location

The City of El Lago, Texas is in the southeast part of Harris County. The current boundaries generally extend from Taylor Lake on the west to the City of Seabrook on the east, and from Clear Lake on the south to Seabrook on the north. According to the United States Census Bureau, the city encompasses an area of 0.7 square miles (0.6 square miles of land and 0.1 square miles of water).

City emergency services are provided under contract by the Lakeview Police Department, Seabrook Volunteer Fire Department and the Nassau Bay Emergency Medical Service. Water and sewer services are provided by Water Control and Improvement District #50 (WCID 50).

6.2.2 History

The City of El Lago was incorporated in March of 1961 as a Type-A-General Law city operation under a Mayor-City Council form of government. Residential growth was largely due to the aerospace industry, where many astronauts resided. The growth occurred in four sections and now includes an estimated population of 2700, with approximately 1100 single family dwellings, some duplexes and apartment buildings. Within the city limits there are several small businesses mostly retail and food, one boat yard, two elementary schools and one assisted living center.

6.2.3 Climate

The climate of the City of El Lago is typical of southeast Texas, hot humid summers with cool and wet winters. Freezing weather can occur. Average annual rain fall is 45”. Prevailing winds are from the southeast.

6.2.4 Governing Body Format

The City of El Lago is governed by a Mayor and five-member City Council (all of which are part time volunteers). City employees include a City Secretary, City Clerk, Court Administrator, and Maintenance Director and an additional maintenance employee.

The Mayor and City Council assumes responsibility for the adoption of this plan; The Mayor and City Council also will oversee its implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 6-1.

Table 6-1. Local Mitigation Planning Team Members

Name	Title
Darin Clark	Member City council
Bob Kosar	Flood Plain Administrator
Jarret LaRochelle	Planning Team Member
Doris DeVries	Planning Team Member

6.3 CURRENT TRENDS

6.3.1 Population

According to the U.S. Census Bureau, the population of the city of El Lago as of December of 2016 was 2,751. Since 1970, the population has grown at an average annual rate of 1.7%. Between those years the population in 1980 had grown by 35.6%, in 1990 an additional 4.5% with declines of 5.9% in 2000 and 12.0% 2010. This last decline can be attributed to the demolition of the Landing Condos, which were heavily damaged by Hurricane Ike.

6.3.2 Development

There is minimal anticipated residential development due to the City's residential space being 99+% already built out. A low to moderate increase in commercial development is expected with a few commercial properties available for new construction. Table 6-2 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

6.4 CAPABILITY ASSESSMENT

The City of El Lago, Texas has performed an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities is presented in Table 6-3.
- Development and permitting capabilities are presented in Table 6-4.
- An assessment of fiscal capabilities is presented in Table 6-5.
- An assessment of administrative and technical capabilities is presented in Table 6-6.
- An assessment of education and outreach capabilities is presented in Table 6-7.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 6-8.
- Classifications under various community mitigation programs are presented in Table 6-9.
- The community's adaptive capacity for the impacts of climate change is presented in Table 6-10.

Findings of the capability assessment were reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table included in the action plan for this annex identifies these as community capacity building mitigation actions.

Table 6-2. Recent and Expected Future Development Trends

Criterion	Response
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan? • **If yes, give the estimated area annexed and estimated number of parcels or structures.**	No
Is your jurisdiction expected to annex any areas during the performance period of this plan? • **If yes, describe land areas and dominant uses.** • **If yes, who currently has permitting authority over these areas?**	No
Are any areas targeted for development or major redevelopment in the next five years? • **If yes, briefly describe, including whether any of the areas are in known hazard risk areas**	Yes The following are in known hazard risk areas: • Condominium development previously called The Landing • Northwest corner of Bayou View/Nasa 1 (currently vacant) • Five-to ten homes to be elevated in the repetitive loss category
How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?	

	2014	2015	2016	2017	2018
Single Family	2	1	1	4	2
Multi-Family					
Other (commercial, mixed use, etc.)				1	
Total	**2**	**1**	**1**	**5**	**2**

Provide the number of new-construction permits for each hazard area or provide a qualitative description of where development has occurred.	Approximately half of the new construction permits were in a special flood hazard area.
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	Buildout most occurred on residential properties and one occurred on a commercial property.

Table 6-3. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code	Yes	No	No	No
Comment: *Building Ordinance of the City of El Lago Ordinance # 146 adopted 8/21/78 with sections modified through 6/5/2013*				
Zoning Code	Yes	No	No	No
Comment: *City ordinances Appendix A with references to multiple ordinances dealing with residential and commercial zones with multiple adoption dates*				
Subdivisions	Yes	No	No	No
Comment: *Appendix B, Ordinance 131 adopted 11/1/76. The city is also divided into several homeowner associations, each with their individual covenants and bylaws.*				
Stormwater Management	Yes	Yes	No	No
Comment: *WCID 50 controlled. MS4 permit renewed every 5 years.*				
Post-Disaster Recovery	Yes	Yes	Yes	No
Comment: *Post disaster recovery activities are outlined in the City's Emergency Management Procedures. Currently being reviewed.*				
Real Estate Disclosure	No	No	No	No
Comment:				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Growth Management	No	No	No	No
Comment:				
Site Plan Review	Yes	No	No	No
Comment: *Building code and Ordinance #425*				
Environmental Protection	Yes	Yes	No	No
Comment: *Sanitary and stormwater is under the jurisdiction of WCID 50. Recognized as a renewable energy city. Drought water rationing plans and year-round water conservation plan..*				
Flood Damage Prevention	Yes	No	No	No
Comment: *Flood Damage Prevention Ordinance # 425 adopted 2/20/15*				
Emergency Management	Yes	Yes	Yes	Yes
Comment: *Ordinance # 327 adopted 1/8/2001 and Ordinance # 378 adopted 11/21/2009*				
Climate Change	No	No	No	No
Comment:				
Planning Documents				
General Plan	No	No	No	No
Comment:				
Capital Improvement Plan	No	No	No	No
How often is the plan updated?				
Comment:				
Disaster Debris Management Plan	Yes	No	No	No
Comment: *Contracted*				
Floodplain or Watershed Plan	No	No	No	No
Comment:				
Stormwater Plan	No	Yes	No	No
Comment: *WCID 50 Stormwater drainage improvement plan*				
Urban Water Management Plan	No	Yes	No	No
Comment: *WCID 50 with TWDB 50 year water plan*				
Habitat Conservation Plan	Yes	No	No	No
Comment: *The city is a bird sanctuary community with several butterfly habitats.*				
Economic Development Plan	No	No	No	No
Comment:				
Shoreline Management Plan	No	Yes	Yes	No
Comment: *Texas GLO*				
Community Wildfire Protection Plan	No	No	No	No
Comment:				
Forest Management Plan	No	No	No	No
Comment:				
Climate Action Plan	No	No	No	No
Comment:				
Comprehensive Emergency Management Plan	Yes	Yes	Yes	No
Comment: *Ordinance # 327 adopted 1/8/2001 and Ordinance # 378 adopted 11/21/2009*				
Threat & Hazard Identification & Risk Assessment (THIRA)	Yes	Yes	Yes	No
Comment: *Ordinance # 327 adopted 1/8/2001 and Ordinance # 378 adopted 11/21/2009*				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Post-Disaster Recovery Plan	Yes	Yes	Yes	No
Comment: *Post disaster recovery activities are outlined in the City's Emergency Management Procedures, Currently being reviewed.*				
Continuity of Operations Plan	Yes	Yes	No	No
Comment: *Essential records are backed up to the cloud plus Standard Operating Procedures / interlocal agreements,*				
Public Health Plan	Yes	Yes	No	No
Comment: *Health and Sanitation Ordinance # 272 adopted 5/4/92*				

Table 6-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • **If no, who does? If yes, which department?**	Yes Building Inspector and Floodplain Administrator
Does your jurisdiction have the ability to track permits by hazard area?	No
Does your jurisdiction have a buildable lands inventory?	No

Table 6-5. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	No
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes
Other	No

Table 6-6. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	No	
Engineers or professionals trained in building or infrastructure construction practices	No	
Planners or engineers with an understanding of natural hazards	No	
Staff with training in benefit/cost analysis	No	
Surveyors	No	
Personnel skilled or trained in GIS applications	No	
Scientist familiar with natural hazards in local area	No	
Emergency manager	Yes	Voluntary Emergency Management Coordinator
Grant writers	Yes	City Secretary
Other	No	

Table 6-7. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes, the mayor is the PIO
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • **If yes, briefly describe.**	Yes Hazard Mitigation Plan
Do you use social media for hazard mitigation education and outreach? • **If yes, briefly describe.**	Yes NextDoor and Facebook
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • **If yes, briefly describe.**	Yes The local Mitigation Planning Team and the city Emergency Management Committee
Do you have any other programs already in place that could be used to communicate hazard-related information? • **If yes, briefly describe.**	Yes Blackboard CTY Connect and LaVentana News Publication
Do you have any established warning systems for hazard events?	Yes
• **If yes, briefly describe.**	Blackboard CTY Connect

Table 6-8. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Floodplain Administrator
Who is your floodplain administrator? (department/position)	Bob Kosar
Are any certified floodplain managers on staff in your jurisdiction?	No
What is the date that your flood damage prevention ordinance was last amended?	February 20, 2015
Does your floodplain management program meet or exceed minimum requirements? • **If exceeds, in what ways?**	Meets
When was the most recent Community Assistance Visit or Community Assistance Contact?	May 24, 2019
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • **If so, state what they are.**	No
Are any RiskMAP projects currently underway in your jurisdiction? • **If so, state what they are.**	Yes HCFCD MAAPNext Project
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • **If no, state why.**	No Does not include risk due to drainage system capacity
Does your floodplain management staff need any assistance or training to support its floodplain management program? • **If so, what type of assistance/training is needed?**	Yes Texas Floodplain Management Association-sponsored training and conferences
Does your jurisdiction participate in the Community Rating System (CRS)? • **If yes, is your jurisdiction interested in improving its CRS Classification?** • **If no, is your jurisdiction interested in joining the CRS program?**	No N/A Yes
How many flood insurance policies are in force in your jurisdiction?[a] • **What is the insurance in force?** • **What is the premium in force?**	884 $246,562,600.00 $513,571.00
How many total loss claims have been filed in your jurisdiction?[a] • **How many claims are still open or were closed without payment?** • **What were the total payments for losses?**	397 0 $15,317,515.04

a. According to FEMA statistics as of April 26, 2019

Table 6-9. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	No	N/A	N/A
Building Code Effectiveness Grading Schedule	No	N/A	N/A
Public Protection	No	N/A	N/A
Storm Ready	No	N/A	N/A
Firewise	No	N/A	N/A

Table 6-10. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts *Comment:*	Low
Jurisdiction-level monitoring of climate change impacts *Comment:*	Low
Technical resources to assess proposed strategies for feasibility and externalities *Comment:*	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory *Comment:*	Low
Capital planning and land use decisions informed by potential climate impacts *Comment:*	Low
Participation in regional groups addressing climate risks *Comment:*	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes *Comment:*	Low
Identified strategies for greenhouse gas mitigation efforts *Comment:*	Low
Identified strategies for adaptation to impacts *Comment:*	Low
Champions for climate action in local government departments *Comment:*	Low
Political support for implementing climate change adaptation strategies *Comment:*	Low
Financial resources devoted to climate change adaptation *Comment:*	Low
Local authority over sectors likely to be negative impacted *Comment:*	Low
Public Capacity	
Local residents knowledge of and understanding of climate risk *Comment:*	Low
Local residents support of adaptation efforts *Comment:*	Low
Local residents' capacity to adapt to climate impacts *Comment:*	Low

Criterion	Jurisdiction Rating[a]
Local economy current capacity to adapt to climate impacts ***Comment:***	Low
Local ecosystems capacity to adapt to climate impacts ***Comment:***	Low

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

6.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning and capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

6.5.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- There is no existing integration.

6.5.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- The city has not addressed future integration plans.

6.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 6-11 lists past occurrences of natural hazards for which specific damage was recorded in the City of El Lago. Other hazard events that broadly affected the entire planning area, including the City of El Lago, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 6-11. Past Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Heavy Rain	N/A	5/9/2019	4.2" of rain in two hours flooded Loch Lake, Bayview and Whitecap Streets with 18+ inches of water
Heavy Rain	N/A	12/8/2018	Nearly 5" of rain over 9 hours left 6-10" of water on many streets throughout the city
Heavy Rain	N/A	1/27/2018	2.5" of rain in two hours flooded Loch Lake and Whitecap Streets with 12-18 inches of water
Hurricane Harvey	4332 DR	8/23/2017 – 9/15/2017	$7,755,415
Severe weather, Flooding	4272 DR	5/22/2016 – 6/24/2016	$16,113
Severe weather, Tornadoes, Flooding	4245 DR	10/22/2015 – 10/31/2015	$18,789

Type of Event	FEMA Disaster #	Date	Damage Assessment
Severe weather, Flooding	N/A	4/17/2015	$4,192
Severe weather	N/A	4/24/2009	$3,619
Severe weather, Hail	N/A	4/15/2009 – 4/18/2009	$151,584
Hurricane Ike	1791 DR	9/7/2008 – 10/2/2008	$5,620,010
Coastal Flooding	N/A	10/16/2006	$104,419
Flash Flooding	N/A	6/13/2004 – 6/16/2004	$5,103
Hurricane Claudette	N/A	7/15/2003	$102,759
Tropical Storm Allison	1379 DR	6/5/2001 – 6/20/2001	$274,404
Hurricane Georges	1245 DR	9/9/1998 – 10/5/1998	$216,597
Severe weather, Flooding	1041 DR	10/14/1994 – 11/8/1994	$3,010
Tropical Storm Allison	836 DR	6/25/1989 – 7/7/1989	$13,608

6.7 HAZARD RISK RANKING

Table 6-12 presents a local ranking for the City of El Lago of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 6-12. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Flooding	54	High
2	Severe Weather	48	High
2	Hurricane	48	High
3	Earthquake	14	Low
4	Drought	6	Low
4	Wildfire	6[a]	Low
4	Mass Movement	6	Low
5	Dam Failure	2[b]	Low
6	Tsunami	0 (No exposure)	None
6	Coastal Erosion	0 (No Exposure	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

a. Wildfire incidents in the area have occurred within the past 5 years and the adjacent cities of La Porte and Pasadena.

b. Proximity to the surface water storage reservoir that would flow down Armand Bayou and to Clear Lake upon failure.

6.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. This section provides information on a few key vulnerabilities for the jurisdiction. Available jurisdiction-specific risk maps of the hazards are provided at the end of this annex.

6.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: 43
- Number of FEMA-identified Severe-Repetitive-Loss Properties: 21
- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated: 13

6.8.2 Other Noted Vulnerabilities

The following jurisdiction-specific issues have been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- Sea level rise.
- Subsidence.
- School access: All ingress/egress to the public and charter schools is cut-off by significant street flooding during any heavy rains.

Mitigation actions addressing these issues were prioritized for consideration in the action plan presented in this annex.

6.9 STATUS OF PREVIOUS PLAN ACTIONS

Table 6-13 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

Table 6-13. Status of Previous Plan Actions

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
Improve code/ordinances to require vegetation management and install drought resistant landscape	Yes			
Comment: ID #2014ELLAGO001 Completed in 2017				
Harden water piping lines and systems to prevent loss of water due to breaks in coordination with Water Control and Improvement District #50 (WCID 50)			Yes	LAG5
Comment: ID #2014ELLAGO002				
Improve code/ordinances to require minimum burial depth below 6 feet.		Yes		
Comment: ID #2014ELLAGO003 No longer relevant; the City is 98% built out.				
Establish code/ordinance to require shutoff valves at entry and exit point of city limits for new construction.		Yes		
Comment: ID #2014ELLAGO004 No longer relevant; no new pipelines will be constructed in the City				
Install new emergency generator at city hall			Yes	LAG6
Comment: ID #2014ELLAGO005				
Expand mass communication warning system to include notifications and alerts for all-hazards to provide automated landline and cellular calling, email notification as well as automatic posting to the city website.	Yes			
Comment: ID #2014ELLAGO006 Completed over a period of years				
Acquisition of flood prone properties	Yes		Yes	LAG1
Comment: ID #2014ELLAGO007 Some property has been acquired; Additional acquisitions anticipated				
Expand city warning system to include flood stage warning			Yes	LAG7
Comment: ID #2014ELLAGO008				

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
Harden protective structures to minimize damage to critical structures			Yes	LAG8
Comment: ID #2014ELLAGO009 Improvements for 98 Lakeshore, current courthouse & LPD headquarters				
Harden existing city building to mitigate damages by installing protective barriers and shatter resistant glass			Yes	LAG9
Comment: ID #2014ELLAGO010 Improvements to current City Hall				
Improve detection systems for monitoring alerts	Yes			
Comment: ID #2014ELLAGO011 Completed in 2016				
Elevate new public safety building above base flood elevation and harden to withstand high-winds and flooding.			Yes	LAG10
Comment: ID #2014ELLAGO012				
Provide electrical surge protection for electrical systems in critical facilities			Yes	LAG11
Comment: ID2014ELLAGO013				
Establish buffer zones/defensible space around critical infrastructure	Yes			
Comment: 2014ELLAGO014 Completed 2016				
Develop ordinance requiring underground utilities on new structures or replacement of existing utilities.			Yes	LAG12
Comment: ID #2014ELLAGO015				
Inflow prevention utilizing a back-flow preventer			Yes	LAG13
Comment ID #2010ELLAGO001 Also investigating physical barriers				
Weather Head Reduction Partial Reimbursement Program adopting ordinance requiring all power service lines to residences and businesses be routed underground and cooperative effort to re-route existing power services.			Yes	LAG12
Comment: ID #2010ELLAGO006				
Harden city infrastructure to protect against damages caused by lightning and power surges			Yes	LAG11
Comment ID #2010ELLAGO009				
Implement program to relocate and shelter vulnerable populations during extreme heat events at designated facilities.		Yes		
Comment: ID #2010ELLAGO011 Handled by CERT and other agencies.				
Develop and establish community wide water smart program	Yes			
Comment ID#2010ELLAGO014 WCID 50 maintains a water conservation system during draughts				
Ordinances for burning restrictions and storage/disposal of flammable materials.	Yes			
Comment: ID #2010ELLAGO015 Ordinances 184 & 263				
Construct shelter for critical city vehicles and equipment	Yes			
Comment ID #2010ELLAGO025 Critical vehicles and equipment can be relocated to a safe location				

6.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 6-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 6-15 identifies the priority for each action. Table 6-16 summarizes the actions by hazard and mitigation type.

Table 6-14. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action LAG1 — Where appropriate, support elevating, flood proofing (retrofitting), purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Hurricanes, flooding, severe weather						
Existing	3, 4, 5, 7, 10, 12	City	N/A	High	HMGP, PDM, FMA	Short-term
Action LAG2 — Integrate the hazard mitigation plan into other plans, ordinances and programs that dictate land use decisions in the community, including emergency air evacuation and response from McNair Park						
Hazards Mitigated: Hurricanes, flooding, severe weather, earthquake, draught, wildfire						
New and Existing	1, 3, 4, 5, 7, 8, 10	City	N/A	Medium	Staff Time, General Funds	Ongoing
Action LAG3 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: Hurricanes, flooding, severe weather, earthquake, drought, wildfire						
New and Existing	1, 5, 8	City	N/A	Medium	Staff Time, General Funds	Short-term
Action LAG4 — Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements: • Enforce the flood damage prevention ordinance. • Participate in floodplain identification and mapping updates. • Provide public assistance/information on floodplain requirements and impacts.						
Hazards Mitigated: Flooding, severe weather, hurricanes, Dam Failuer						
New and Existing	3, 4, 7, 9, 10	City	HCFCD	Medium	Staff Time, General Funds	Ongoing
Action LAG5 — Harden water piping lines and systems to prevent loss of water due to breaks in coordination with Water Control and Improvement District #50 (WCID 50) (formerly ID #2014ELLAGO002)						
Hazards Mitigated: Drought, Wildfires						
Existing	3, 4, 8, 9, 11	WCID 50	City	High	HMGP, WCID 50 Bonds, WCID 50 General Funds	Long-term
Action LAG6 — Install new emergency generator at city hall (formerly ID #2014ELLAGO005)						
Hazards Mitigated: Severe weather, hurricanes, flooding, drought, earthquakes, wildfires						
New	1, 11, 13	City	N/A	High	PDM, HMGP, Staff time, General Funds	Short-term
Action LAG7 — Expand city warning system to include flood stage warning – signs or water level indicators at three boat launches, Boondoggles restaurant and boat repair yard (formerly ID #2014ELLAGO008)						
Hazards Mitigated: Flooding, severe weather, hurricanes, dam failure, Mass movement (subsidence), Dam Failure						
New	1, 3, 4, 9, 10, 11, 15	City	N/A	Medium	PDM, HMGP, Staff time, General Funds	Short-term
Action LAG8 — Harden courthouse/LVPD headquarters structure to minimize damage to a critical structure – (formerly ID#2014ELLAGO009)						
Hazards Mitigated: Severe weather, hurricanes						
Existing	1, 6, 11, 13	City	LVPD	High	PDM, HMGP, Staff time, General Funds	Short-term
Action LAG9 — Harden existing City Hall building to mitigate damages by installing protective barriers and shatter resistant glass (formerly ID #2014ELLAGO010)						
Hazards Mitigated: Severe weather, hurricanes						
Existing	1, 6, 11, 13	City	N/A	High	PDM, HMGP, Staff time, General Funds	Short-term
Action LAG10 — Replace courthouse/LVPD headquarters structure with a new emergency operations facility designed to withstand multiple hazards and electrical outages. (formerly ID #2014ELLAGO012)						
Hazards Mitigated: Flooding, hurricanes, severe weather, earthquakes, dam failure, Mass movement (subsidence), Dam Failure						
New	10, 11, 13, 14	City	LVPD	High	PDM, HMGP, Staff time, General Funds	Long-term
Action LAG11 — Provide electrical surge protection and lightning rods for electrical systems in critical facilities (formerly ID2014ELLAGO013) including harden city infrastructure to protect against damages caused by lightning and power surges (formerly ID #2010ELLAGO009)						
Hazards Mitigated: Hurricanes, severe weather						
Existing	1, 6, 11, 13	City	N/A	High	PDM, HMGP, Staff time, General Funds	Short-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action LAG12 — Develop ordinance requiring underground utilities on new structures or replacement of existing utilities. (formerly ID #2014ELLAGO015) and Weather Head Reduction Partial Reimbursement Program adopting ordinance requiring all power service lines to residences and businesses be routed underground and cooperative effort to re-route existing power services. (formerly ID #2010ELLAGO006)						
Hazards Mitigated: Hurricanes, severe weather, wildfires						
New and Existing	6, 9, 10, 11	City	N/A	Medium	Staff time, General Funds	Short-term
Action LAG13 — Inflow prevention utilizing back-flow preventers and/or physical barriers (formerly ID #2010ELLAGO001)						
Hazards Mitigated: Hurricanes, flooding, severe weather, dam failure, , Mass Movement (subsidence)						
Existing	6, 7, 8, 9, 10, 11, 15	City	WCID 50	High	PDM, HMGP, Bonds, General Funds	Long-term
Action LAG14 — Investigate and install active pumped storm drainage systems.						
Hazards Mitigated: Hurricanes, flooding, severe weather, school access, Mass movement (subsidence)						
New	3, 4, 7, 8, 10, 11	City	WCID 50	High	PDM, FMA, HMGP, Bonds, General Funds	Long-term
Action LAG15 — Increase fire water system capacity; piping, pumps, hydrants etc. to provide increased water flow in emergencies.						
Hazards Mitigated: Wildfires, drought						
Existing	3, 4, 8, 9, 11	WCID 50	City	High	HMGP, WCID 50 Bonds, WCID 50 General Funds	Long-term
Action LAG16 — Review and update as needed, city ordinances and building codes to ensure compliance with current Federal, State and local regulatory agencies.						
Hazards Mitigated: Flooding, severe weather, hurricanes, wildfires, drought						
Existing	1, 3, 4, 7, 8, 9, 15	City	N/A	Medium	Staff time, General Funds	Short-term
Action LAG17 — Complete WCID 50 project to improve storm water drainage capabilities involving many south side lines and the main headers on Whitecap and Crestwood.						
Hazards Mitigated: Hurricanes, flooding, severe weather, school access						
Existing	3, 4, 7, 8, 10, 11, 12	WCID 50	HCFCD	High	HCFCD Bonds, WCID 50 Bonds, WCID 50 General Funds	Long-term
Action LAG18 — Track natural hazard events and the damage caused, including substantially damaged properties.						
Hazards Mitigated: Hurricanes, flooding, severe weather, wildfires						
Existing	3, 4, 9, 11	City	N/A	Medium	Staff time, General Funds	Short-term
Action LAG19 — Remediate home owner's sanitary sewer lines to prevent storm water from entering the system.						
Hazards Mitigated: Flooding, hurricanes, severe weather						
Existing	3, 4, 9, 11	WCID 50	Home owners	High	HMGP, General Funds	Short-term
Action LAG20— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
Hazards Mitigated: Severe Weather, Hurricane and Coastal Storms, Flooding, Earthquake, Wildfire, Drought, Dam Failure, Mass Movement,						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	El Lago	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 6-15. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
LAG1	6	High	High	Yes	Yes	No	Medium	High
LAG2	7	Medium	Medium	Yes	No	No	Low	Low
LAG3	3	Medium	Medium	Yes	No	No	High	Low
LAG4	5	Medium	Medium	Yes	No	No	High	Low
LAG5	5	Low	High	Yes	Yes	No	Medium	Low
LAG6	3	High	High	Yes	Yes	No	Medium	High
LAG7	7	High	Medium	Yes	Yes	No	Medium	Medium
LAG8	4	High	High	Yes	Yes	No	Medium	High
LAG9	4	High	High	Yes	Yes	No	Medium	High
LAG10	4	Low	High	Yes	Yes	No	Low	Low
LAG11	4	High	High	Yes	Yes	No	Medium	High
LAG12	4	Low	Medium	Yes	No	No	Low	Low
LAG13	7	High	High	Yes	Yes	No	Medium	High
LAG14	6	High	High	Yes	Yes	No	Medium	High
LAG15	5	Low	High	Yes	Yes	No	Low	Medium
LAG16	7	Medium	Medium	Yes	No	No	Medium	Low
LAG17	7	High	High	Yes	No	No	High	High
LAG18	4	Low	Medium	Yes	No	No	Low	Low
LAG19	4	High	High	Yes	Yes	No	Medium	Low
LAG20	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 6-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Severe Weather	LAG2, 4, 12, 16, 18, 20	LAG1, 8, 9, 10, 11	LAG18, 20	LAG19	LAG6, 7, 20	LAG13	LAG14, 17	LAG3, 20
Flooding	LAG2, 4, 16, 18, 20	LAG1, 10	LAG18, 20	LAG19	LAG6, 7, 20	LAG13	LAG14, 17	LAG3, 20
Hurricane	LAG2, 4, 12, 16, 18, 20	LAG1, 8, 9, 10, 11	LAG18, 20	LAG19	LAG6, 7, 20	LAG13	LAG14, 17	LAG3, 20
Medium-Risk Hazards								
School Access							LAG14, 17	
Mass Movement	LAG20	LAG10	LAG20		LAG7, 20	LAG13	LAG14	LAG20

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
Low-Risk Hazards								
Earthquake	LAG2, 20	LAG10	LAG20		LAG6, 20			LAG3, 20
Drought	LAG2, 16, 20		LAG20	LAG5, 15	LAG6, 15, 20			LAG3, 20
Wildfire	LAG2, 12, 16, 18, 20		LAG18, 20	LAG5, 15	LAG6, 15, 20			LAG3, 20
Dam Failure	LAG20	LAG10	LAG20		LAG7, 20	LAG13		LAG20

a. See the introduction to this volume for explanation of mitigation types.

6.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

6.11.1 Existing Reports, Plans, Regulatory Tools and Other Resources

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- **The City of El Lago, Texas Municipal Code** — The municipal code was reviewed for the full capability assessment and for identifying opportunities for action plan integration.
- **The City of El Lago, Flood Damage Prevention Ordinance** — The flood damage prevention ordinance was reviewed for compliance with the National Flood Insurance Program.

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.

6.11.2 Staff and Local Stakeholder Involvement in Annex Development

This annex was developed over the course of several months with input from the city's Emergency Management Committee, City Secretary, City Council representative, Floodplain Administrator, CERT Team Coordinator, Special Needs Coordinator and local Mitigation Planning Team members. All persons were asked to contribute to the annex development through reviewing and contributing to the capability assessment, reporting on the status of previously identified actions, and participating in action identification and prioritization. An action development meeting was held on multiple dates from February through August 2019 and was attended by representatives from previously listed groups. Once actions had been identified and compiled in the annex, a draft was internally circulated for comment.

El Lago

Critical Facilities

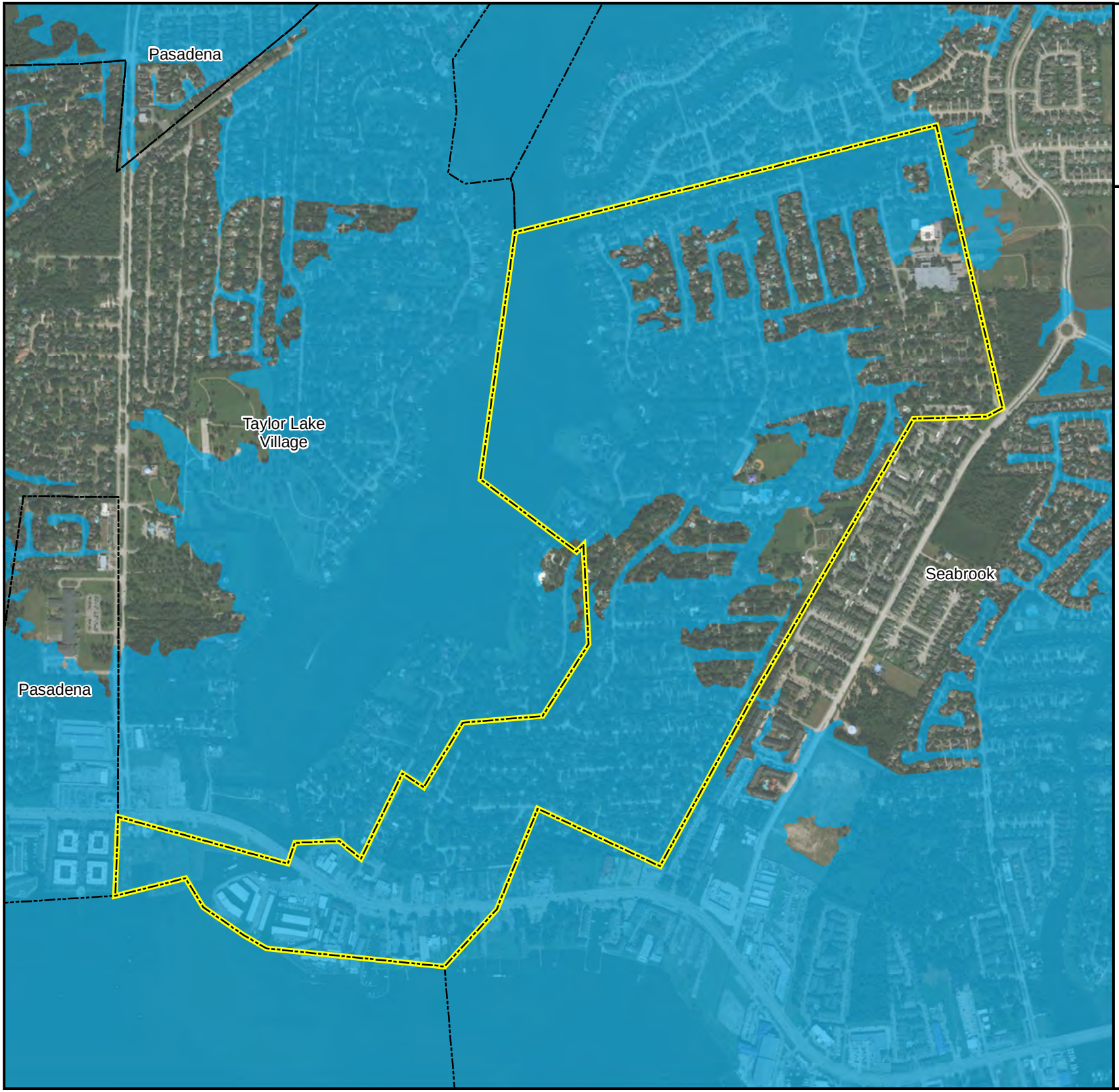
- Education Facilities
- Emergency Services
- Government Facilities
- Hazardous Material Sites
- Health and Medical Facilities
- Historical and Cultural Sites
- Transportation Systems
- Utility Systems
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.05 0.1 0.2 Miles



El Lago

FEMA Flood Hazard

1% Annual Chance Flood (100-yr)

Incorporated Cities

Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.05 0.1 0.2 Miles

El Lago

Flood Hazard
Hurricane Harvey

Flooding Extent

Incorporated Cities

Harris County

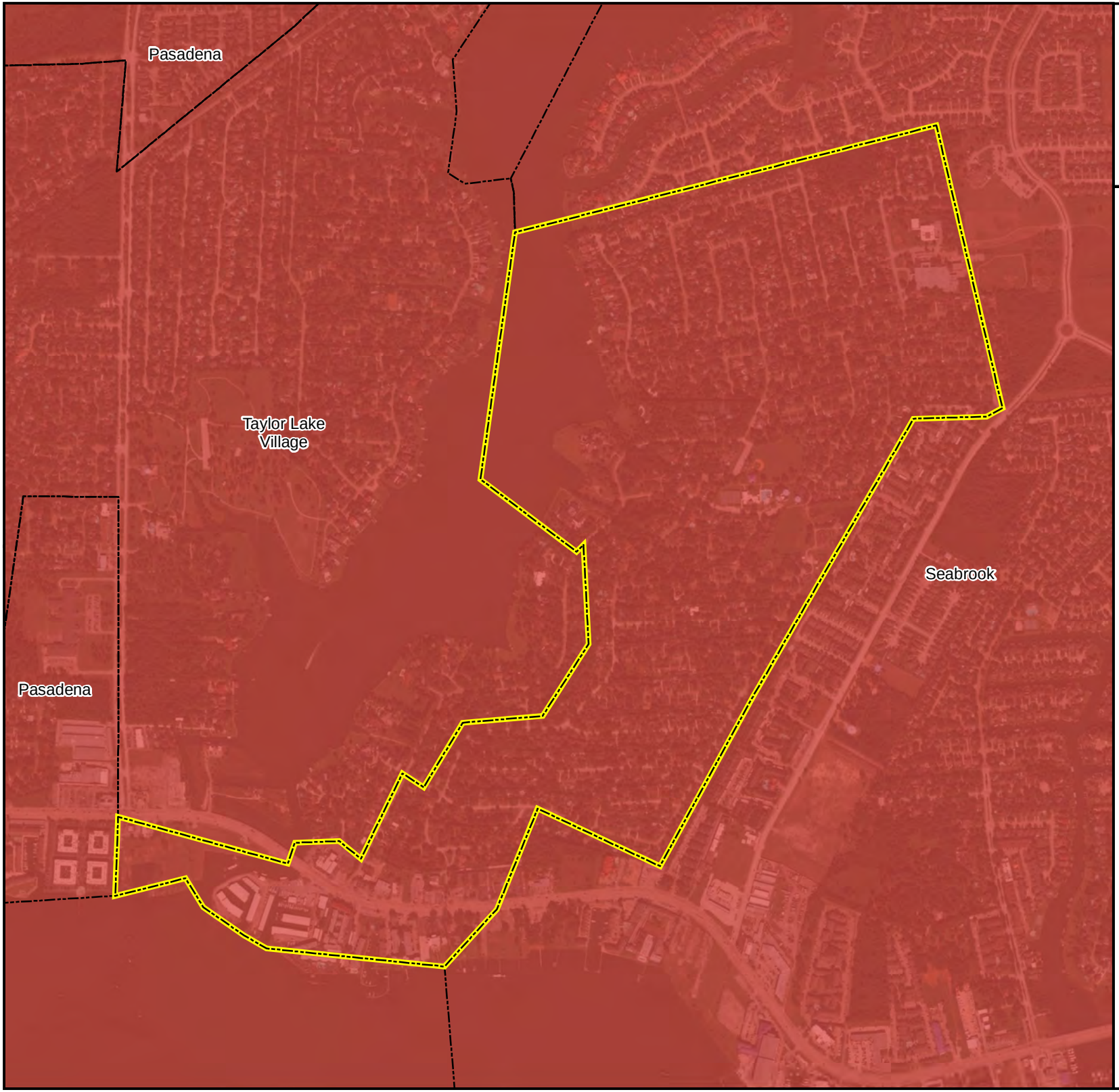
Note: Flooding extent shown for Hazard Mitigation Plan planning area only.

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.05 0.1 0.2 Miles



El Lago

Hurricane Alicia (1983)

Peak WInd Gust (mph)

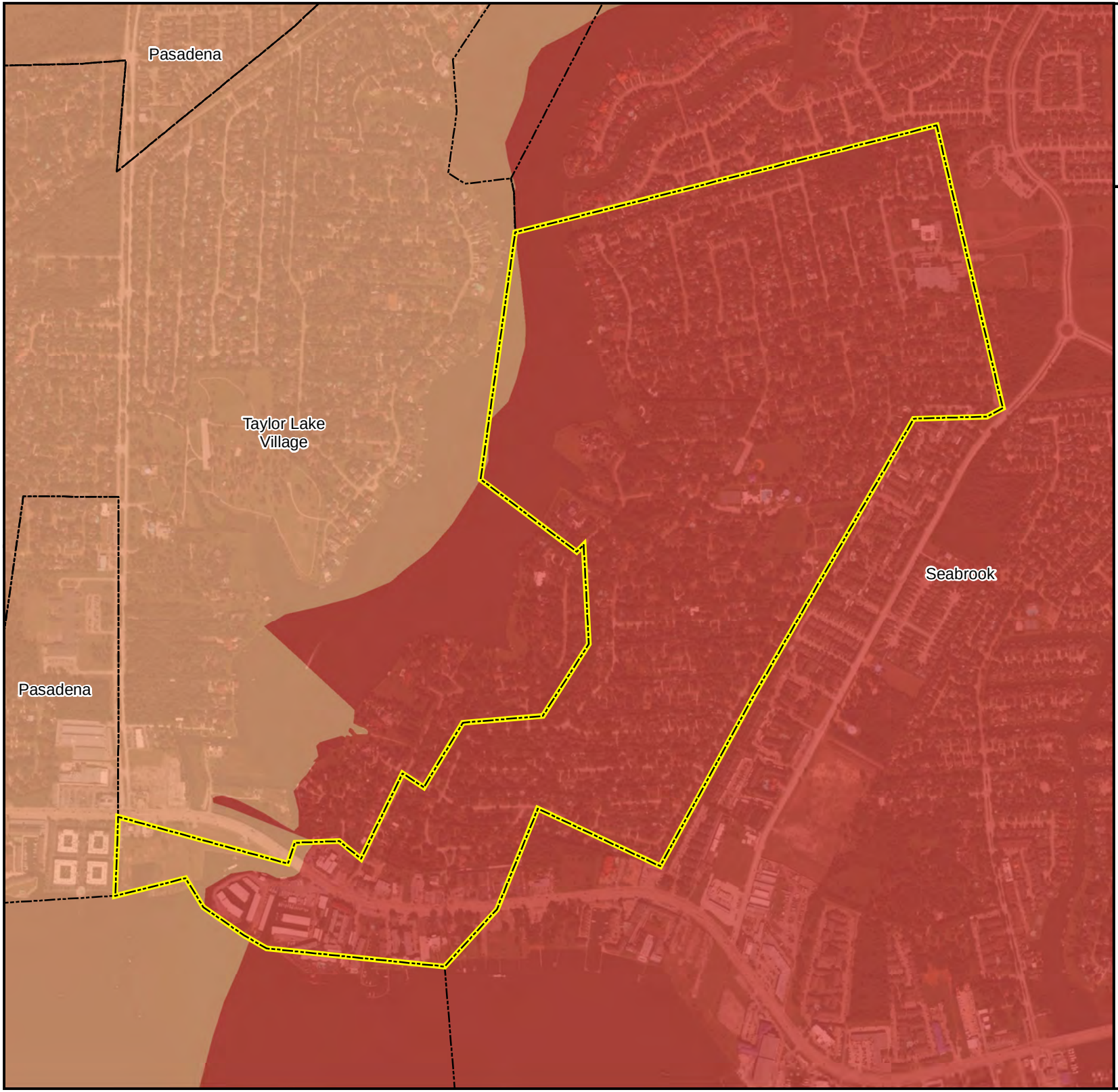
- 87 - 94
- 95 - 98
- 99 - 101
- 102 - 104
- 105 - 110
- Storm Track
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.05 0.1 0.2 Miles



El Lago

20-year Probabilistic Hurricane

Peak Wind Gust (mph)

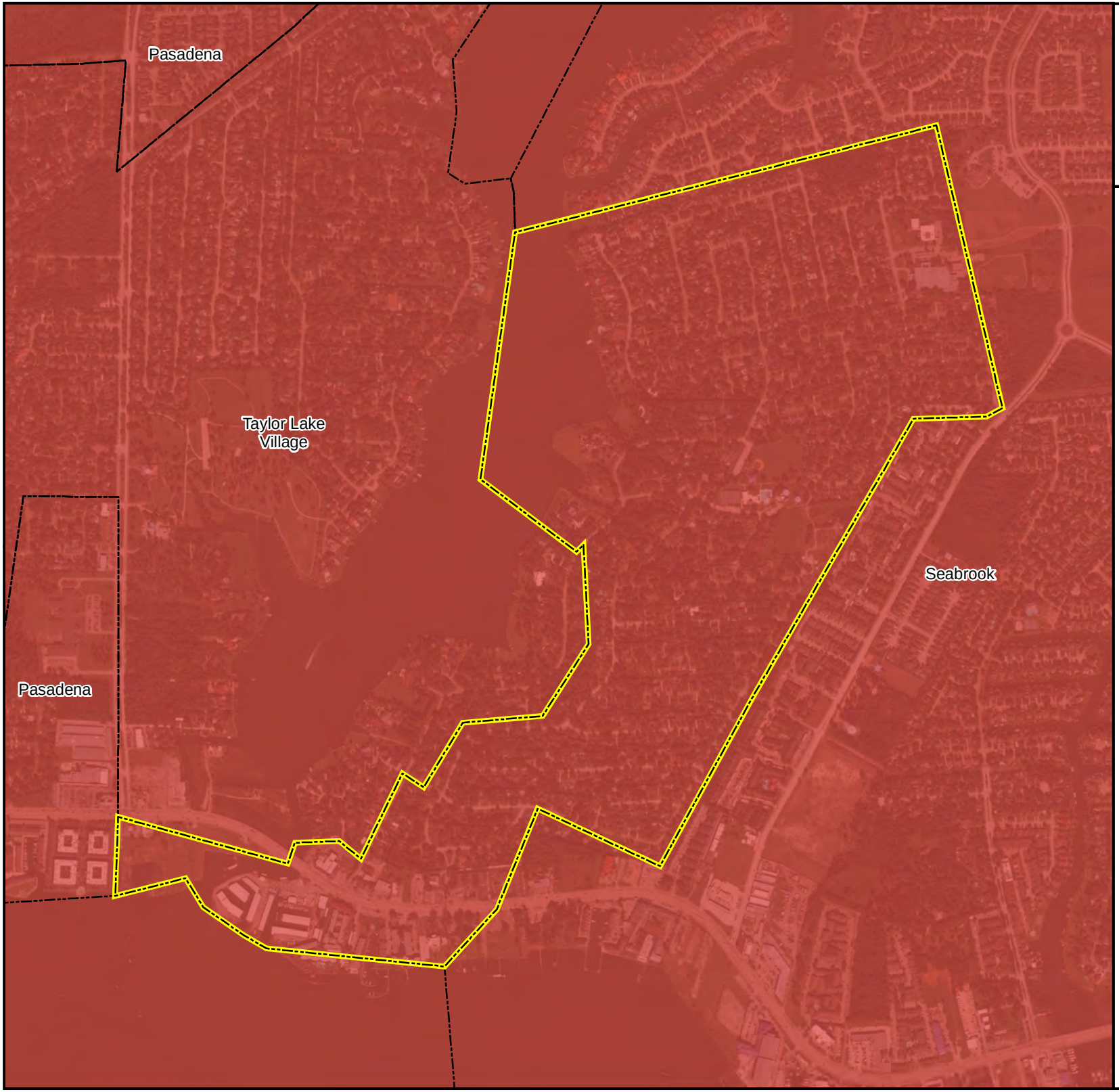
- 63 - 71
- 72 - 76
- 77 - 80
- 81 - 84
- 85 - 92
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.05 0.1 0.2 Miles



El Lago

100-year Probabilistic Hurricane

Peak Wind Gust (mph)

- 89 - 101
- 102 - 106
- 107 - 111
- 112 - 117
- 118 - 128
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.05 0.1 0.2 Miles

El Lago

Wildfire Ignition Density

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.05 0.1 0.2 Miles

El Lago

Wildfire Threat

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.05 0.1 0.2 Miles

7. CITY OF FRIENDSWOOD

7.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Brian Mansfield, Fire Marshal/EMC
910 S. Friendswood Drive
Friendswood, TX 77546
Telephone: 281-996-3335
e-mail Address: tybrd@friendswood.com

Alternate Point of Contact
Steven Simmons, Deputy Fire Marshal
910 S. Friendswood Drive
Friendswood, TX 77546
Telephone: 281-996-3335
e-mail Address: bmansfield@friendswood.com

7.2 JURISDICTION PROFILE

7.2.1 Location

The City of Friendswood in northwest Galveston County and a portion lies in southeast Harris County, divided by Clear Creek. Friendswood lies in an area described on the Physiographic Map of Texas the "Gulf Coastal Plan". The city is located three miles west of IH-45, halfway between Houston and Galveston. It is bordered on the northwest by the City of Houston, the west by Brazoria County and City of Pearland, southwest by the City of Alvin, on the east by the City of League City. The city' encompasses 20.9 square miles, of which 20.7 square miles is land area and 0.15 square miles is water.

7.2.2 History

Friendswood was founded in 1895 by members of the Religious Society of Friends (Quakers). The colony was originally a farming community of fig and Satsuma orange orchards, and rice fields. Starting Quaker colonies was a common practice of the religious sect called Quakers or Friends, as they were part of the westward movement across the nation in the middle to late 1800s. After the colony survived the Galveston Storm of 1900 with no loss of life, they used their sawmill to convert the swaths of trees felled by the storm into lumber for the construction of a two story building they called the Academy. It served them as church, school, and community meeting place until it was replaced by the present stone church building in 1949. The Academy (high school) operated by the Quakers offered a classical curriculum through 1928, and attracted students, in its earliest years, from surrounding towns that had no high school.

From 1895 to 1915, most of the newcomers were Quakers who came to be a part of the Quaker colony. Through 1920, the population was swollen by an influx of farmers, lured by Houston developers who advertised the Gulf Coast as a Garden of Eden where figs, oranges, and rice grew practically wild. By the early 1920s, there were 17,000 to 18,000 acres of figs from Winnie to San Leon, and 17 fig preserving plants. Two of those plants were in Friendswood. Support personnel for the farms brought more people to Friendswood, and the early 1930s brought families dispossessed by the Depression looking for a new chance in life. Late in the decade, the newly developing oil fields east and west of the community provided jobs for more newcomers. The war slowed the growth in the 1940s, but the decade still saw the beginning of a trend of wealthy business and professional people from Houston buying up property along the creeks.

The city was officially incorporated in 1960. Major employers in the city are Friendswood ISD, H.E. Butt Grocery Company and Kroger Texas, LP.

Today the once small agricultural community is part of the greater Houston Metropolitan area.

7.2.3 Climate

The climate of the area is sub-tropical. Mild winters and warm summers best characterize the climate. The average summer temperature ranges from a high of 90 ºF to a low of 74 °F. The average winter temperature ranges from a high of 62 °F to a low of 42 °F. The area receives an average of two hundred seventy-five (275) days per year of sunshine. Average rainfall per year is thirty-eight (38”) inches. Rainfall is abundant and evenly distributed throughout the year. Hurricane season, spanning from June through November, usually produces the heaviest rainfall events.

7.2.4 Governing Body Format

The City of Friendswood is governed by a Mayor and six (6) member city council. The Mayor and council members are elected from the city at large to serve three-year terms, with a limit of four terms. The Mayor and council members are volunteers who serve without compensation.

The city consists of the following positions and departments: City Manager, Assistant City Manager, City Secretary, Administrative Services, Parks and Recreation, Library, Community Development, Public Works, Police Department, Fire Marshal/Emergency Management. All departmental directors report to either the City Manager or Assistant City Manager depending on the department. The City Manager, City Secretary and City Attorney report to the Mayor and City Council. The city contracts fire and EMS services.

The City Council assumes responsibility for the adoption of this plan; the City Manager will oversee its implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 7-1.

Table 7-1. Local Mitigation Planning Team Members

Name	Title
Brian Mansfield	Fire Marshal/Emergency Management Coordinator
Steven Simmons	Deputy Fire Marshal
Morad Kabiri	City Manager
Steve Rhea	Assistant City Manager
Aubrey Harbin	Community Development Director/Planner
Brian Rouane	Chief Building Official/Floodplain Manager
Rene Ibarra	Director of Public Works
James Toney	Director of Parks and Recreation

7.3 CURRENT TRENDS

7.3.1 Population

According to the City of Friendswood’s Community Development Department, the estimated October 2018 population is 41,020. U.S. Census for 2000 showed the city’s population at 29,037 and the city’s 2010 population at 35,805 which is a 23.3% increase. The percentage of increase between the 2010 U.S. Census and the October 2018 estimated population is 14.6%. However, the percentage of increase between the 2000 U.S. Census and the October 2018 estimate shows a 41.3% increase, which averages 665.7 annual population increase.

7.3.2 Development

Table 7-2 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

Table 7-2. Recent and Expected Future Development Trends

Criterion	Response
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan? • **If yes, give the estimated area annexed and estimated number of parcels or structures.**	No N/A
Is your jurisdiction expected to annex any areas during the performance period of this plan? • **If yes, describe land areas and dominant uses.** • **If yes, who currently has permitting authority over these areas?**	No N/A N/A
Are any areas targeted for development or major redevelopment in the next five years? • **If yes, briefly describe, including whether any of the areas are in known hazard risk areas**	Yes **Georgetown Subdivision** – Southernmost southeast corner of city limits; 352 Acres with 573 single family residential lots; borders with City of Alvin and City of League City; not in known hazard risk area **Avalon at Friendswood Lakes** – Southeastern portion of the south and West of West Ranch; borders with City of League City; 114 Acres with 203 Residential Lots; will connect League City Parkway with Friendswood Lakes Blvd.; not in known hazard risk area
How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?	See nested table below
Provide the number of new-construction permits for each hazard area or provide a qualitative description of where development has occurred.	Special Flood Hazard Areas: 4 SF Residential; SHX 8 SF Residential; AE Flood Zone 1 Commercial; Not in SFHA Landslide: N/A High Liquefaction Areas: N/A Tsunami Inundation Area: N/A Wildfire Risk Areas: N/A
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	Total acreage within the City is 11,777 (excludes property owned by school districts, city parks, drainage district and government entities). As of October 2013 8,485 acres were developed, with 3,292 undeveloped acres. Residential structures comprise 6,375 acres with commercial comprising 1,416 acres, and industrial comprising 530 acres. Buildout is expected in 2020 with proposed population totaling 57,400.

	2014	2015	2016	2017	2018
Single Family	189	141	173	182	122
Multi-Family	0	0	0	20	0
Other (commercial, mixed use, etc.)	4	8	15	13	6*
Total	***193***	***149***	***188***	***215***	***128***

7.4 CAPABILITY ASSESSMENT

The City of Friendswood performed an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities is presented in Table 7-3.
- Development and permitting capabilities are presented in Table 7-4.
- An assessment of fiscal capabilities is presented in Table 7-5.
- An assessment of administrative and technical capabilities is presented in Table 7-6.
- An assessment of education and outreach capabilities is presented in Table 7-7.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 7-8.
- Classifications under various community mitigation programs are presented in Table 7-9.
- The community's adaptive capacity for the impacts of climate change is presented in Table 7-10.

Findings of the capability assessment were reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table included in the action plan for this annex identifies these as community capacity building mitigation actions.

Table 7-3. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code	Yes	No	Yes	Yes
Comment: *Code of Ordinances, Chapter 14 – Buildings and Building Regulations*				
Zoning Code	Yes	No	No	Yes
Comment: *Code of Ordinances, Appendix C – Zoning*				
Subdivisions	Yes	No	No	Yes
Comment: *Code of Ordinances, Appendix B – Subdivisions*				
Storm Water Management	Yes	Yes	Yes	Yes
Comment: *Code of Ordinances, Chapter 34 – Floods, Article II. – Flood Damage Prevention, Section 34-34 Stormwater Management; Chapter 86 – Utilities, Article V. – Regulation of Stormwater Runoff; Design Criteria Manual, March 2019;*				
Post-Disaster Recovery	Yes	Yes	No	Yes
Comment: *Emergency Operations Plan, Annex J – Recovery*				
Real Estate Disclosure	No	No	No	No
Comment:				
Growth Management	Yes	No	Yes	Yes
Comment: *Code of Ordinances, Appendix B – Subdivisions & Appendix C – Zoning*				
Site Plan Review	Yes	No	No	Yes
Comment: *Code of Ordinances, Chapter 30 – Fire Protection & Prevention & Appendix C – Zoning*				
Environmental Protection	Yes	Yes	No	Yes
Comment: *Code of Ordnances, Chapter 26 – Environment*				
Flood Damage Prevention	Yes	No	Yes	Yes
Comment: *Code of Ordinances, Chapter 34 – Floods, Article II. – Flood Damage Prevention*				
Emergency Management	Yes	No	Yes	Yes
Comment: *Code of Ordinances, Chapter 22 – Civil Emergencies, Texas Government Code – Chapters 418 & 433*				
Climate Change	No	Yes	No	Yes
Comment:				
Planning Documents				
General Plan	Yes	No	Yes	Yes
Comment: *Comprehensive Plan, July 1998; with updates: Future Land Use Map (2008); Major Thoroughfare Plan (2018), Parks Master Plan (2010)*				
Capital Improvement Plan	Yes	No	No	Yes
How often is the plan updated? *Periodically; Historically every 2-4 years.*				
Comment: *Capital Improvement Plan, 2017.*				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Disaster Debris Management Plan	Yes	Yes	No	Yes
Comment: *Disaster Debris Management Plan, 2014; Contracts are reviewed on an annual basis.*				
Floodplain or Watershed Plan	Yes	No	No	Yes
Comment: *Code of Ordinances, Chapter 34 – Floods, Article II. – Flood Damage Prevention, Division II. Flood Hazard Reduction*				
Storm Water Plan	Yes	Yes	Yes	Yes
Comment: *Storm Water Management Program; Master Drainage Plan – Phase II, 2007*				
Urban Water Management Plan	No	No	No	No
Comment:				
Habitat Conservation Plan	No	No	No	No
Comment: *The City of Friendswood does not have an HCP implemented. However, there is a Gulf-Houston Regional Conservation Plan that implements nature-based infrastructure projects and components of flood mitigation/resiliency.*				
Economic Development Plan	No	No	No	Yes
Comment: *Vision 2020; Downtown Improvement Plan; Policy of Economic Development*				
Shoreline Management Plan	No	Yes	No	No
Comment: *SMPs are required for power generating entities operating under a FERC license and is not applicable to the City of Friendswood.*				
Community Wildfire Protection Plan	No	Yes	No	Yes
Comment: *The City of Friendswood does not have its own CWPP implemented. Harris County has completed a county-wide CWPP; which includes all incorporated jurisdictions within Harris County.*				
Forest Management Plan	No	Yes	No	No
Comment:				
Climate Action Plan	No	Yes	No	Yes
Comment:				
Comprehensive Emergency Management Plan	Yes	Yes	Yes	Yes
Comment:				
Threat & Hazard Identification & Risk Assessment (THIRA)	No	Yes	Yes	Yes
Comment: *A regional THIRA is conducted on an annual basis for UASI and HGAC. The City participates in the development of the THIRA.*				
Post-Disaster Recovery Plan	Yes	Yes	No	Yes
Comment: *Annex J – Recovery is required for local jurisdictions to address local recovery programs, damage assessments, Public Assistance and Individual Assistance programs.*				
Continuity of Operations Plan	Yes	No	No	Yes
Comment:				
Public Health Plan	Yes	Yes	Yes	Yes
Comment: *Annex H – Health and Medical is a component of the Emergency Operations Plan and addresses public health, environmental health, and medical response capabilities. The City does not maintain a standalone Public Health Plan.*				
Drought Contingency Plan	Yes	Yes	Yes	Yes
Comment:				

Table 7-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • **If no, who does? If yes, which department?**	Yes
Does your jurisdiction have the ability to track permits by hazard area?	Yes
Does your jurisdiction have a buildable lands inventory?	Yes

Table 7-5. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	No
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes

Table 7-6. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Community Development / Projects and Engineering
Engineers or professionals trained in building or infrastructure construction practices	Yes	Community Development / Projects and Engineering
Planners or engineers with an understanding of natural hazards	Yes	Community Development / Projects and Engineering / Office of Emergency Management
Staff with training in benefit/cost analysis	No	NA
Surveyors	No	NA
Personnel skilled or trained in GIS applications	Yes	Community Development
Scientist familiar with natural hazards in local area	No	NA
Emergency manager	Yes	Office of Emergency Management
Grant writers	Yes	Office of Emergency Management

Table 7-7. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • If yes, briefly describe.	Yes The City's Hazard Mitigation Plan is posted online
Do you use social media for hazard mitigation education and outreach? • If yes, briefly describe.	Yes Facebook and Twitter are used by the City to communicate with residents.
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • If yes, briefly describe.	Yes Committee examining flooding issues within the City
Do you have any other programs already in place that could be used to communicate hazard-related information? • If yes, briefly describe.	Yes City website, email, and mass notification system
Do you have any established warning systems for hazard events? • If yes, briefly describe.	Yes Mass notification, siren system, social media, website, am radio.

Table 7-8. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Projects and Engineering
Who is your floodplain administrator? (department/position)	Projects and Engineering / Flood Plain Manager
Are any certified floodplain managers on staff in your jurisdiction?	Yes
What is the date that your flood damage prevention ordinance was last amended?	September 10, 2018
Does your floodplain management program meet or exceed minimum requirements? • **If exceeds, in what ways?**	Exceeds City requires 24 inches of Freeboard above Base Flood Elevation
When was the most recent Community Assistance Visit or Community Assistance Contact?	April 2018
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • **If so, state what they are.**	No NA
Are any RiskMAP projects currently underway in your jurisdiction? • **If so, state what they are.**	Yes Galveston County – revised preliminary will become effective August 15, 2019.
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • **If no, state why.**	No Current Maps do not, but revised preliminary maps will become effective August 15, 2019 for Galveston County, which includes the Harris County portion of Friendswood.
Does your floodplain management staff need any assistance or training to support its floodplain management program? • **If so, what type of assistance/training is needed?**	Yes Assistance with public notification and education of the new maps that will affect insurance rates and possible new insurance requirements from their mortgage companies.
Does your jurisdiction participate in the Community Rating System (CRS)? • **If yes, is your jurisdiction interested in improving its CRS Classification?** • **If no, is your jurisdiction interested in joining the CRS program?**	Yes Yes NA
How many flood insurance policies are in force in your jurisdiction?[a] • **What is the insurance in force?** • **What is the premium in force?**	8,352 $ 2,643,916,500 $ 3,439,799
How many total loss claims have been filed in your jurisdiction?[a] • **How many claims are still open or were closed without payment?** • **What were the total payments for losses?**	Unknown

a. According to FEMA statistics as of September 30, 2018

Table 7-9. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	Yes	7	May 1, 2015
Building Code Effectiveness Grading Schedule	Yes	Class 5- Residential Class 4- Commercial	February 10, 2017
Public Protection	Yes	Class- 3/3Y	2012
Storm Ready	Yes	NA	2018
Firewise	No	NA	NA

Table 7-10. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:***	Low
Jurisdiction-level monitoring of climate change impacts ***Comment:***	Low
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:***	Low
Participation in regional groups addressing climate risks ***Comment:***	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	Low
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	Low
Identified strategies for adaptation to impacts ***Comment:***	Low
Champions for climate action in local government departments ***Comment:***	Low
Political support for implementing climate change adaptation strategies ***Comment:***	Low
Financial resources devoted to climate change adaptation ***Comment:***	Low
Local authority over sectors likely to be negative impacted ***Comment:***	Low
Public Capacity	
Local residents knowledge of and understanding of climate risk ***Comment:***	Medium
Local residents support of adaptation efforts ***Comment:***	Low
Local residents' capacity to adapt to climate impacts ***Comment:***	High
Local economy current capacity to adapt to climate impacts ***Comment:***	Medium
Local ecosystems capacity to adapt to climate impacts ***Comment:***	High

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

7.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning and capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

7.5.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- **City of Friendswood Basic Plan**. The Basic Plan provides a summary on the hazards and threats in the community.
- **City of Friendswood Annex P – Hazard Mitigation** is assigned to the Community Development department. It addresses the hazards and threats in the community.
- **City of Friendswood Capital Improvements Plan (CIP), 2017 Update.** The CIP is utilized to document the status of current and proposed improvements to city facilities and infrastructure to emphasize protection measures designed to alleviate the effects of future hazards.
- **City of Friendswood Drought Contingency Plan.** This plan details strategies to ensure continued water access and preservation.
- **City of Friendswood Master Drainage Plan – Phase II, 2007.** The Master Drainage Plan details the protection measures to be put into place to alleviate flooding hazards during minor and major weather events.
- **City of Friendswood Mitigation Plan, 2018 Update.**
- **Galveston County Multi-Jurisdiction Mitigation Plan, 2017.**
- **Galveston County Consolidated Drainage District Hazard Mitigation Plan**, September 24, 2013. (Galveston County Consolidated Drainage District is a partnering agency with the city assisting with drainage projects and mitigation efforts.
- **State of Texas, Hazard Mitigation Plan, 2018 Update.** This document was used as a reference to ensure that the city's mitigation planning process was compliant with the state example.

7.5.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- **City of Friendswood Park & Open Space Master Plan —** The parks plan creates a vision for the city's park system and makes recommendations for improvements and open-space preservation.
- **Library Long-Range Strategic Plan**
- **Utility Master Plan, 2008 Update —** Provides service maps of the City's water and sewer systems.

7.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 7-11 lists past occurrences of natural hazards for which specific damage was recorded in City of Friendswood. Other hazard events that broadly affected the entire planning area, City of Friendswood, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 7-11. Past Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Hurricane Harvey	4332 DR	2017	N/A
Severe Storms, Tornadoes, Straight Line Winds and Flooding	4245 DR	2015	N/A
Severe Storms, Tornadoes, Straight Line Winds and Flooding	4223 DR	2015	N/A

7.7 HAZARD RISK RANKING

Table 7-12 presents a local ranking for City of Friendswood of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 7-12. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Severe weather	48	High
1	Hurricane	48	High
2	Flooding	18	Medium
3	Wildfire	17	Medium
4	Earthquake	14	Low
5	Drought	6	Low
6	Mass Movement	0 (No exposure)	None
6	Tsunami	0 (No exposure)	None
6	Coastal Erosion	0 (No Exposure)	None
6	Dam Failure	0 (No exposure)	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

7.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. This section provides information on a few key vulnerabilities for the jurisdiction. Available jurisdiction-specific risk maps of the hazards are provided at the end of this annex.

7.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: 327
- Number of FEMA-identified Severe-Repetitive-Loss Properties: 93
- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated: 119

7.8.2 Other Noted Vulnerabilities

No additional vulnerabilities specific to this jurisdiction have been identified.

7.9 STATUS OF PREVIOUS PLAN ACTIONS

This is the City of Friendswood's initial participation for inclusion in the Harris County Mitigation Plan. However, the City previously developed its own hazard mitigation plan, which expires in 2020, and is a participant in the Galveston County Mitigation Plan, which expires in 2022. Table 7-13 summarizes the actions that were recommended in those plans and their implementation status at the time this update was prepared.

Table 7-13. Status of Previous Plan Actions

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
Severe Thunderstorms/Hail/Lightning #1: Develop A Public Education Campaign With Information Regarding Property & People Protection		X		
Severe Thunderstorms/Hail/Lightning #2: Develop And Initiate A Public Information Campaign Regarding The Location Of Trees In Relation To Power Lines & Utility Easements		X		
Severe Thunderstorms/Hail/Lightning #3: Thunderstorm & Lightning Sensors For City Parks			X	FRD5
Flood Events #1: Develop A Comprehensive Flood Mitigation Plan			X	FRD6
Flood Events #2: Database Development & Maintenance For RI/SRL Properties; Database Development For Elevation, Relocation And Acquisition		X		
Flood Events #3: Drainage Projects			X	FRD7
Comment: *This Item Is Under Revision To Include Additional Projects, (E.G. Clear Creek, Frenchman's Creek, And Deepwood) And Remove Completed Projects (e.g., Tributary 2 Drainage/Outfall Improvements).*				
Flood Events #4: Tiger Dam; Protection Of Critical Infrastructure		X		
Hurricane – Wind #1: Public Information Education Program		X		
Hurricane – Wind #2: Protect Power Lines			X	FRD8
Hurricane – Storm Surge #1: Adopt The 2012 International Building Code (IBC) To Include Asce-24-10	X			
Hurricane – Storm Surge #2: UPGRADE & RENOVATE CURRENT PUBLIC WORKS BUILDING			X	FRD9
Comment: *This Item Will Be Modified To Remove Reference To Deepwood Location That Was Destroyed During Harvey.*				
Hurricane – Storm Surge #3: Update City Storm Surge Maps To Reflect The National Weather Service Predictions		X		
Tornado #1: Develop Construction Standards And Techniques		X		
Tornado #2: Develop & Conduct Tornado Awareness Activities		X		
Drought #1: Monitor Drought Conditions		X		
Drought #2: Water Conservation		X		
Winter Storms #1: Establish A Warming Center At The Public Library For The General Public		X		
Winter Storms #2: Establish A Warming Station At The Senior Activity Center For Senior Citizens		X		
Subsidence #1: Adopt The 2012 International Building Code (IBC) To Include Asce-24-10	X			
Subsidence #2: Develop And Conduct Public Education Programs To Inform The Public Of The Effects Of Subsidence		X		
Hazardous Materials #1: Cooperate In Maintaining The Pipeline Integrity Management Resource Reporting In High Consequence Areas		X		

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
Hazardous Materials #2: Develop A Commodity Flow Study Of All Hazardous Materials Transportation Routes		X		
Additional Mitigation Action Items #: Hurricane Severe Thunderstorms/Hail/Lightning		X		
Additional Mitigation Action Item #6: Develop A Research Program To Study The Effects Of Climate Change		X		
Comment: *This Item Will Be Modified To Effect Flood-Proofing Of The Lift Station.*				
Supplemental Action Items #19: Flood/Hurricane/Hurricane Storm Surge/Flood Events			X	FRD10
Comment: *This Item Will Be Modified To Effect Flood-Proofing of the Lift Station.*				
Supplemental Action Items #23: Flood/Hurricane/Hurricane Storm Surge/Flood Events		X		
Supplemental Action Items #24: Flood/Hurricane/Hurricane Storm Surge/Flood Events		X		
Supplemental Action Items #25: Flood/Hurricane/Hurricane Storm Surge/Flood Events		X		

7.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 7-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 7-15 identifies the priority for each action. Table 7-16 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 7-14. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action FRD1 — Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Earthquake, flooding, landslide, tsunami, wildfire						
Existing	3, 4, 10	City Administration	TBD	High	HMGP, PDM, FMA	Short-term
Action FRD2 — Integrate the hazard mitigation plan into other plans, ordinances and programs that dictate land use decisions in the community						
Hazards Mitigated: Dam failure, drought, earthquake, flooding, landslide, tsunami, wildfire						
New and Existing	1, 3, 4, 5, 7, 8, 10	City Administration	TBD	Low	Staff Time, General Funds	Ongoing
Action FRD3 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: Severe weather, Hurricane and Coastal Storms, Flooding, Wildfire, Earthquake and Drought						
New and Existing	1, 5, 8	City Administration	TBD	Low	Staff Time, General Funds	Short-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action FRD4 — Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements: • Enforce the flood damage prevention ordinance. • Participate in floodplain identification and mapping updates. • Provide public assistance/information on floodplain requirements and impacts. *Hazards Mitigated:* Dam failure, flooding, severe weather, tsunami, sea level rise						
New and Existing	1, 3, 5, 7, 8, 10	City Administration	TBD	Low	Staff Time, General Funds	Ongoing
Action FRD5 — Severe Thunderstorms/Hail/Lightning #3: Thunderstorm & Lightning Sensors For City Parks *Hazards Mitigated:* Severe Weather						
New and Existing	1,3,14	COF		High	General Fund, Grants	Short Term
Action FRD6 — Develop A Comprehensive Flood Mitigation Plan *Hazards Mitigated:* Flood, Hurricane, Severe Weather						
New and Existing	3,7,8,9,10,11,12	COF		High	General Fund, Grants	Short Term
Action FRD7 — Drainage Improvement projects. This Item Is Under Revision To Include Additional Projects, (E.G. Clear Creek, Frenchman's Creek, And Deepwood) And Remove Completed Projects (e.g., Tributary 2 Drainage/Outfall Improvements). *Hazards Mitigated:* Severe Weather, Flood						
New and Existing	11,12,15	COF		High	CIP, Grant Funding	Short Term
Action FRD8 — Protect Power Lines from wind sensitive exposures such as trees, bush and overhead obstacles. *Hazards Mitigated:* Severe Weather, Hurricane						
Existing	9,11,13,15	COF		High	General Fund, CIP, Grant Funding	Short Term
Action FRD9 — UPGRADE & retrofit CURRENT PUBLIC WORKS BUILDING *Hazards Mitigated:* Hurricane, Coast Storms						
Existing	9,11,13,15	COF		High	General Fund, CIP, Grant Funding	Short Term
Action FRD10 — Flood-Proof vulnerable lift Stations within the City *Hazards Mitigated:* Flood Severe Weather						
Existing	11,12,15	COF		High	General Fund, CIP, Grant Funding	Short Term
Action FRD11— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan. *Hazards Mitigated*: Severe Weather, Hurricane and Coastal Storms, Flooding, Earthquake, Wildfire, Drought, Dam Failure, Mass Movement,						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	COF	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 7-15. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
FRD1	3	High	High	Yes	Yes	No	Medium	High
FRD2	7	Medium	Low	Yes	No	Yes	High	Low
FRD3	3	Low	Low	Yes	No	Yes	High	Low
FRD4	6	Medium	Low	Yes	No	Yes	High	Low
FRD5	3	High	High	Yes	Yes	No	Medium	High
FRD6	7	High	High	Yes	Yes	No	Medium	High
FRD7	3	High	High	Yes	Yes	No	Medium	High
FRD8	4	High	High	Yes	Yes	No	Medium	High
FRD9	4	High	High	Yes	Yes	No	Medium	High
FRD10	3	High	High	Yes	Yes	No	Medium	High
FRD11	8	Medium	Low	Yes	Yes	Yes	Hiagh	High

a. See the introduction to this volume for explanation of priorities.

Table 7-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Severe Weather	2,3,6, 11	1,8,10	11		5, 11	7		11
Hurricane	2,3, 11	1,8,9	11		11			11
Medium-Risk Hazards								
Flood	2,3,4,6, 11	1,4,10	4, 11	4	4, 11	4,7	4	4, 11
Wildfire	2,3, 11	1	11		11			11
Low-Risk Hazards								
Earthquake	2,3, 11	1	11		11			11
Drought	2,3, 11		11		11			11

a. See the introduction to this volume for explanation of mitigation types.

7.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

7.11.1 Existing Reports, Plans, Regulatory Tools and Other Resources

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

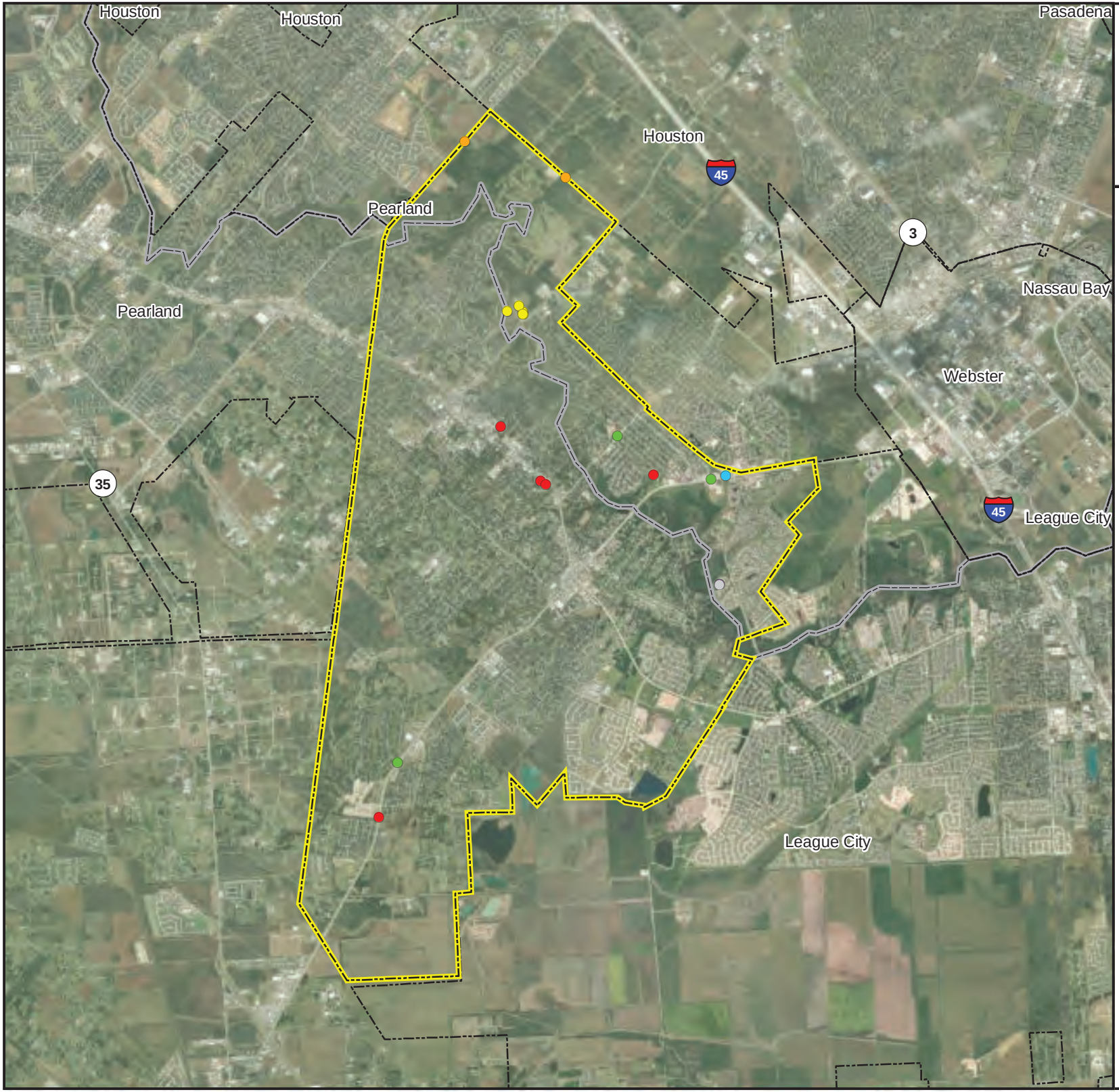
- **City of Friendswood Municipal Code** — The municipal code was reviewed for the full capability assessment and for identifying opportunities for action plan integration.
- **City of Friendswood Flood Damage Prevention Ordinance** — The flood damage prevention ordinance was reviewed for compliance with the National Flood Insurance Program.

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.

7.11.2 Staff and Local Stakeholder Involvement in Annex Development

This annex was developed over the course of several months with input from many city departments including Administrative Services, Community Development, Fire Marshal's Office and Office of Emergency Management, Parks and Recreation, and Public Works. All departments were asked to contribute to the annex development through reviewing and contributing to the capability assessment, reporting on the status of previously identified actions, and participating in action identification and prioritization. An action development meeting was held on December 12, 2018 and March 12, 2019 and was attended by representatives from all previously listed department as well as the City Manager's office. Once actions had been identified and compiled in the annex, a draft was internally circulated for comment.



Friendswood

Critical Facilities

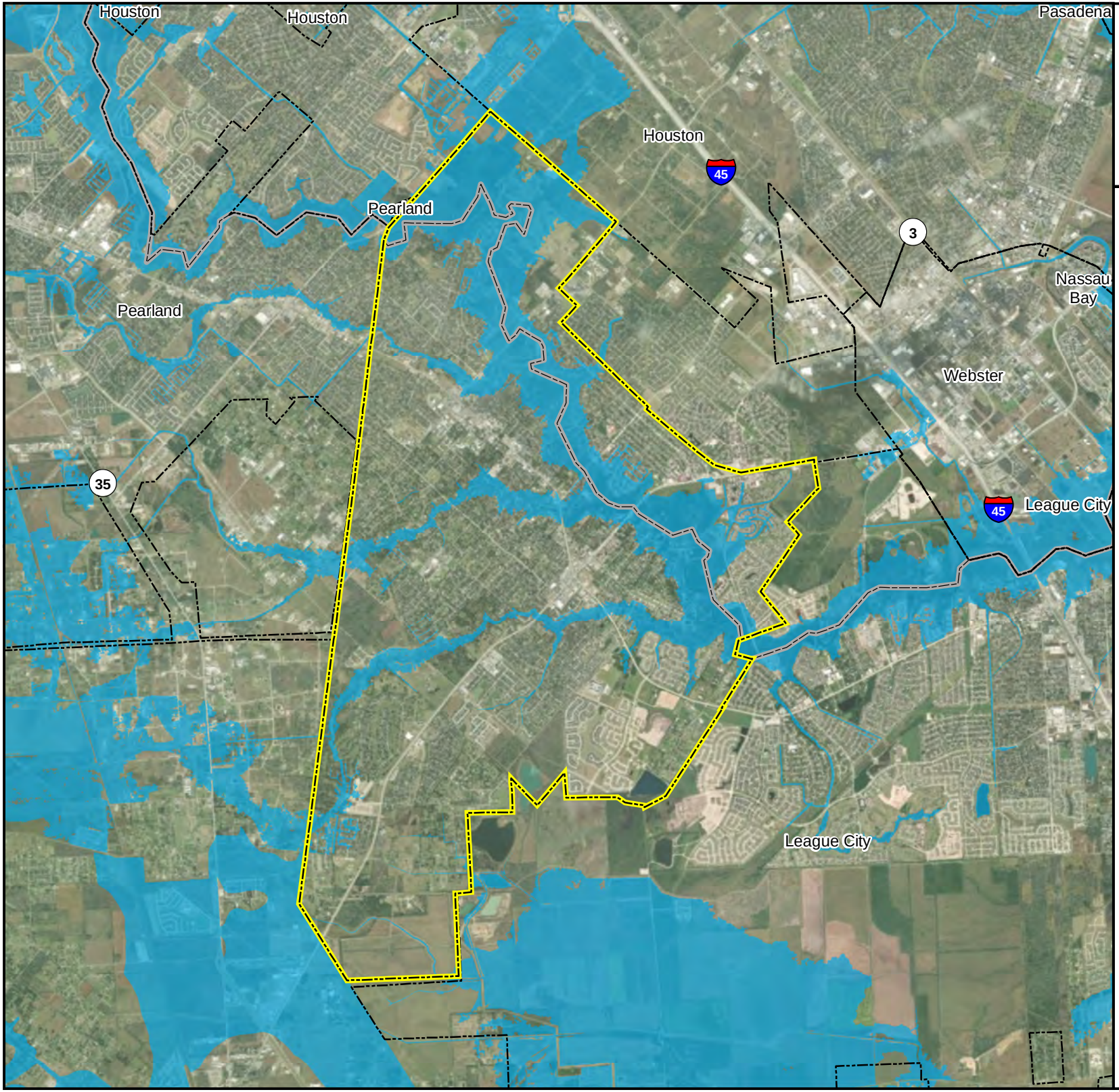
- Education Facilities
- Emergency Services
- Government Facilities
- Hazardous Material Sites
- Health and Medical Facilities
- Historical and Cultural Sites
- Transportation Systems
- Utility Systems
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.4 0.8 1.6 Miles



Friendswood

FEMA Flood Hazard

1% Annual Chance Flood (100-yr)

Incorporated Cities

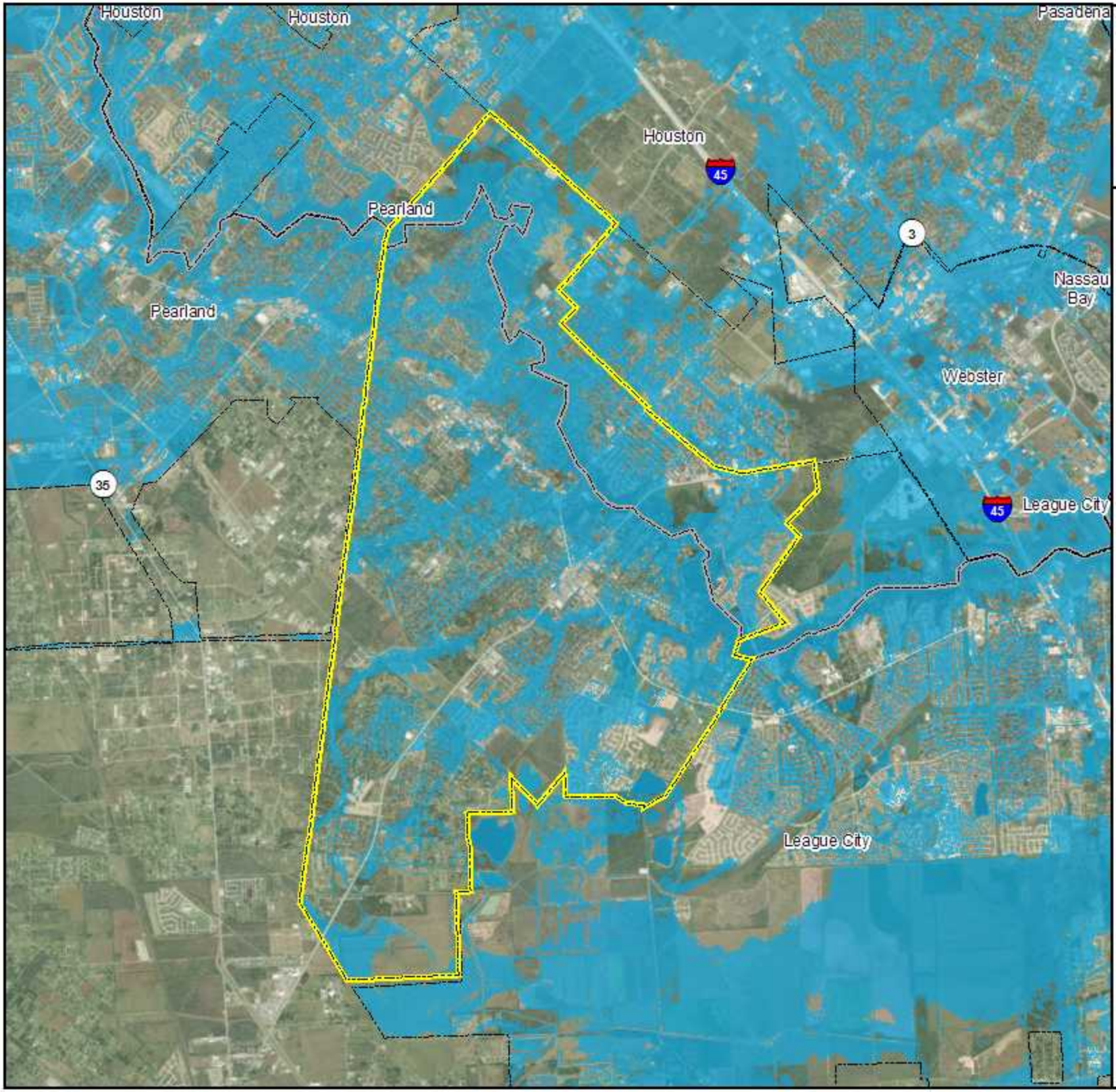
Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.4 0.8 1.6 Miles



Friendswood

Flood Hazard
Hurricane Harvey

Flooding Extent

Incorporated Cities

Harris County

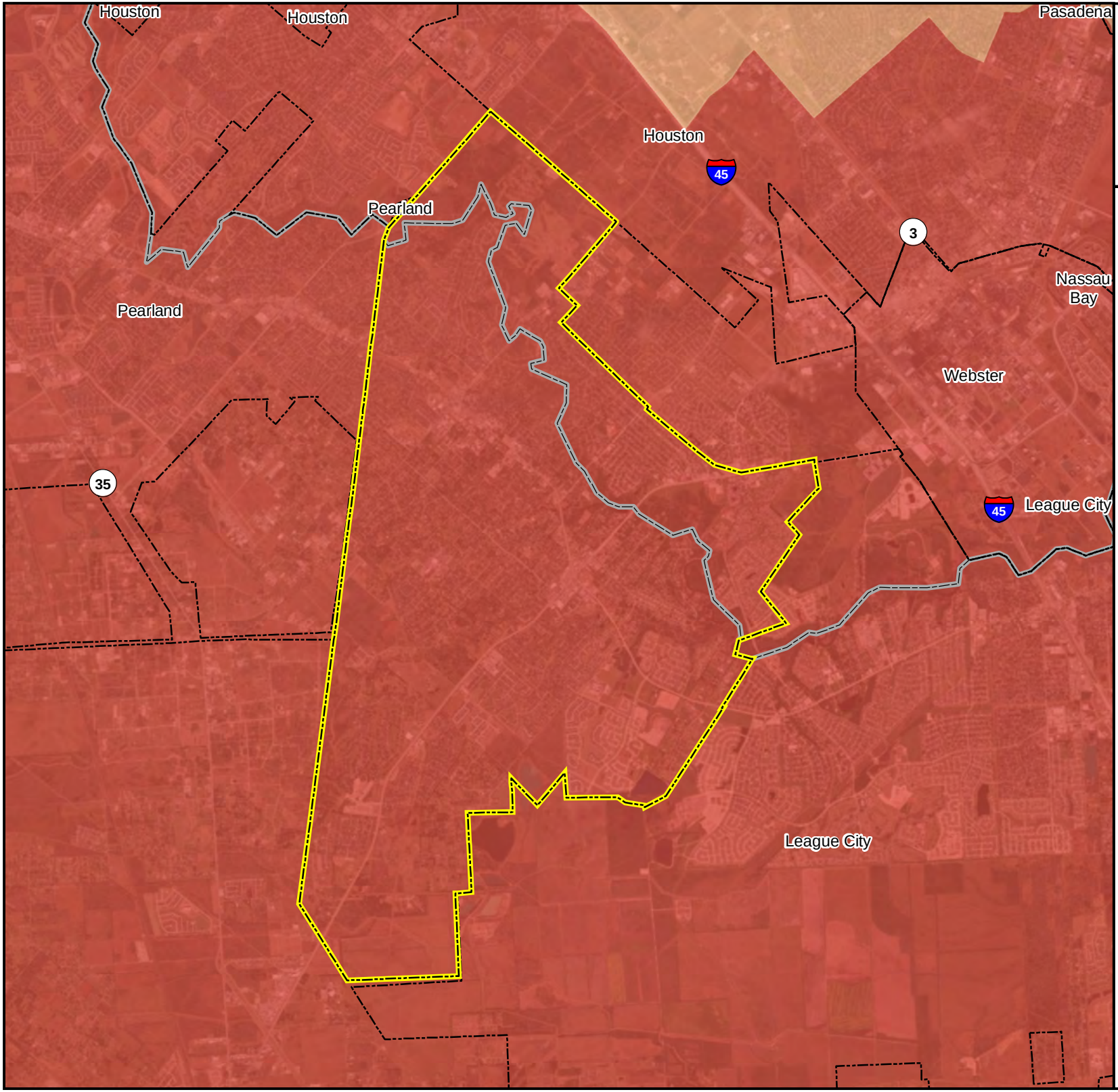
Note: Flooding extent shown for Hazard Mitigation Plan planning area only.

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.4 0.8 1.6 Miles



Friendswood

Hurricane Alicia (1983)

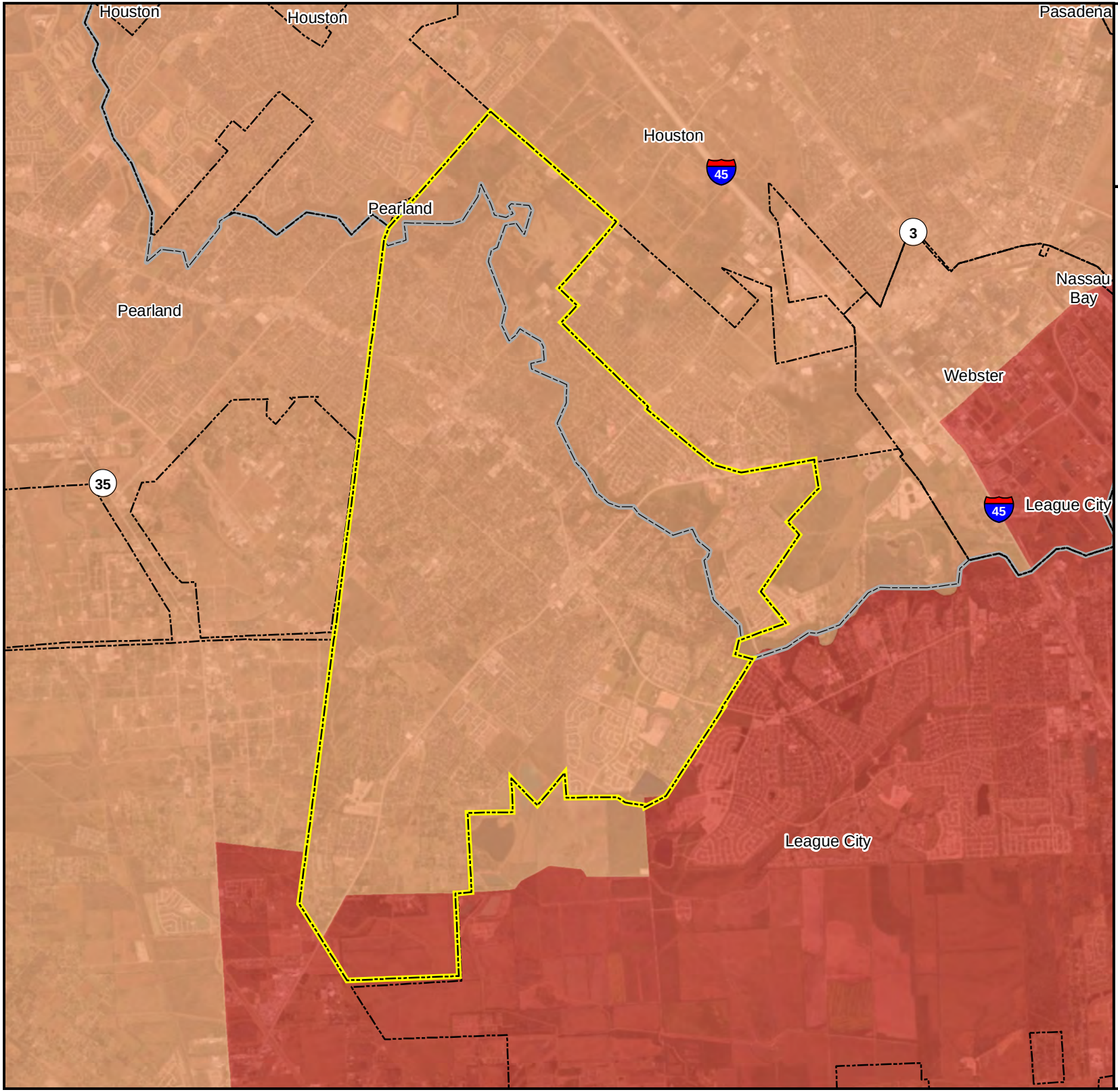
Peak WInd Gust (mph)

- 87 - 94
- 95 - 98
- 99 - 101
- 102 - 104
- 105 - 110
- Storm Track
- Incorporated Cities
- Harris County

TETRA TECH

N

0 0.4 0.8 1.6 Miles



Friendswood

20-year Probabilistic Hurricane

Peak Wind Gust (mph)

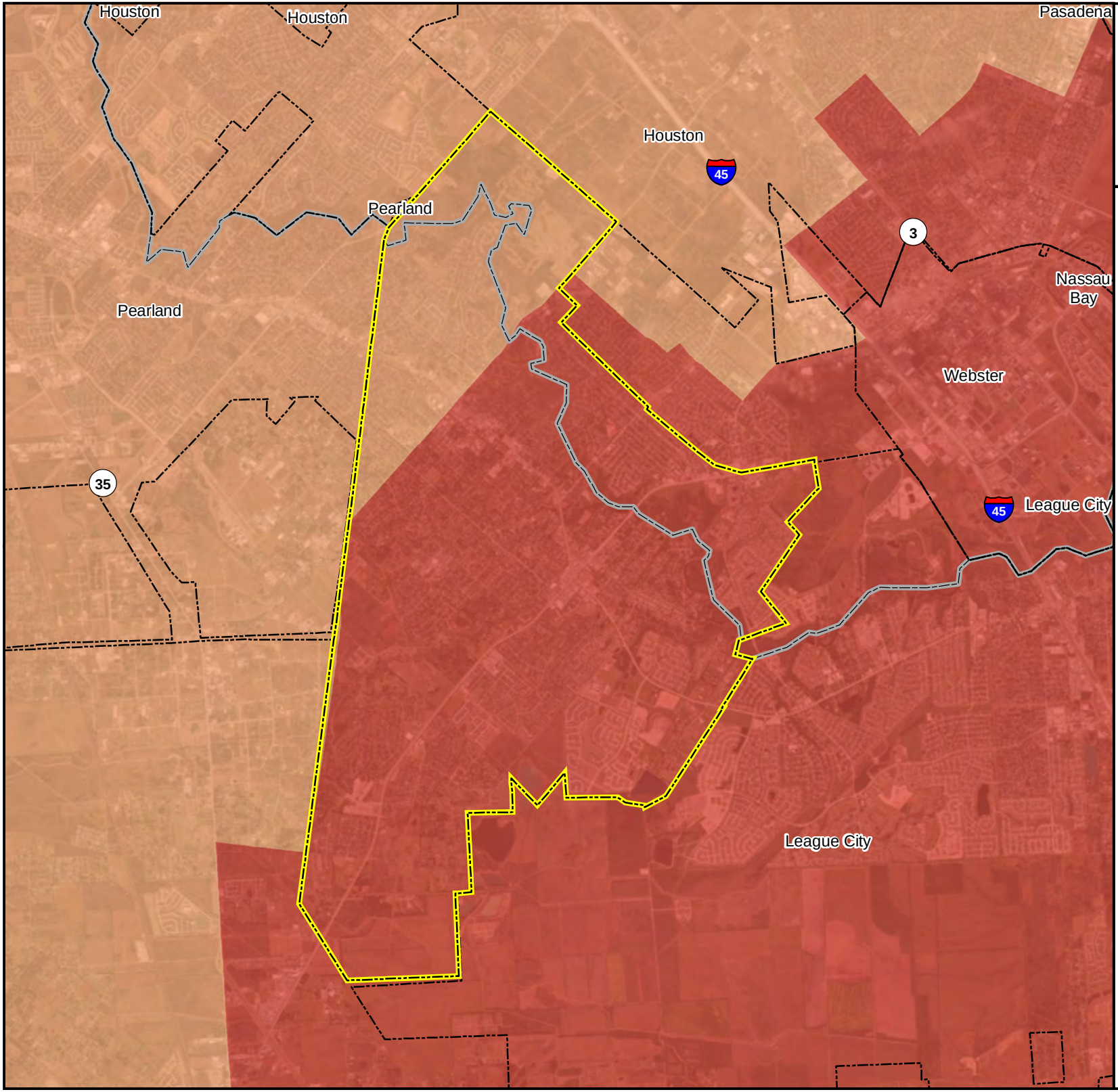
- 63 - 71
- 72 - 76
- 77 - 80
- 81 - 84
- 85 - 92
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.4 0.8 1.6 Miles



Friendswood

100-year Probabilistic Hurricane

Peak Wind Gust (mph)

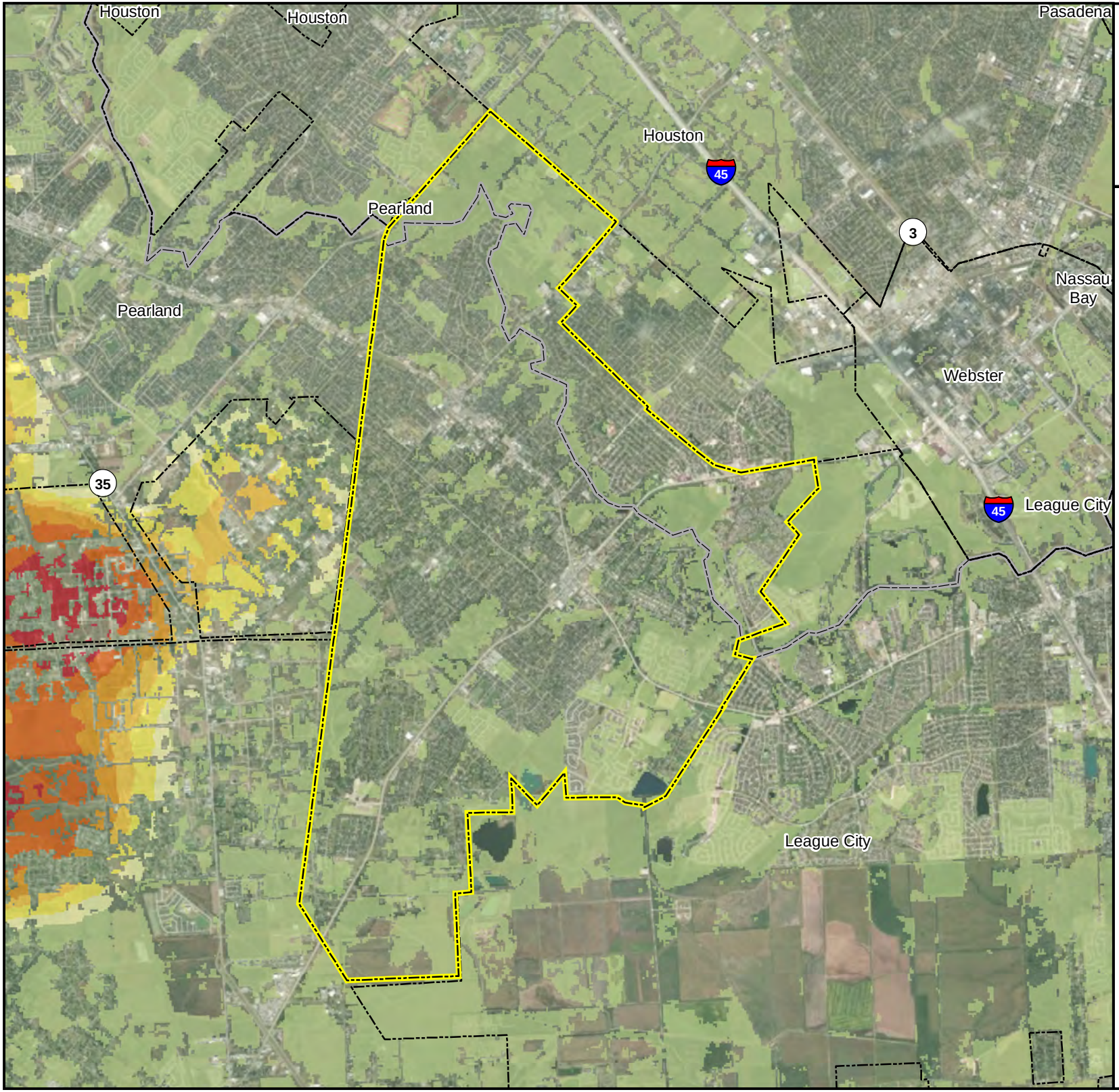
- 89 - 101
- 102 - 106
- 107 - 111
- 112 - 117
- 118 - 128
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.4 0.8 1.6 Miles



Friendswood

Wildfire Ignition Density

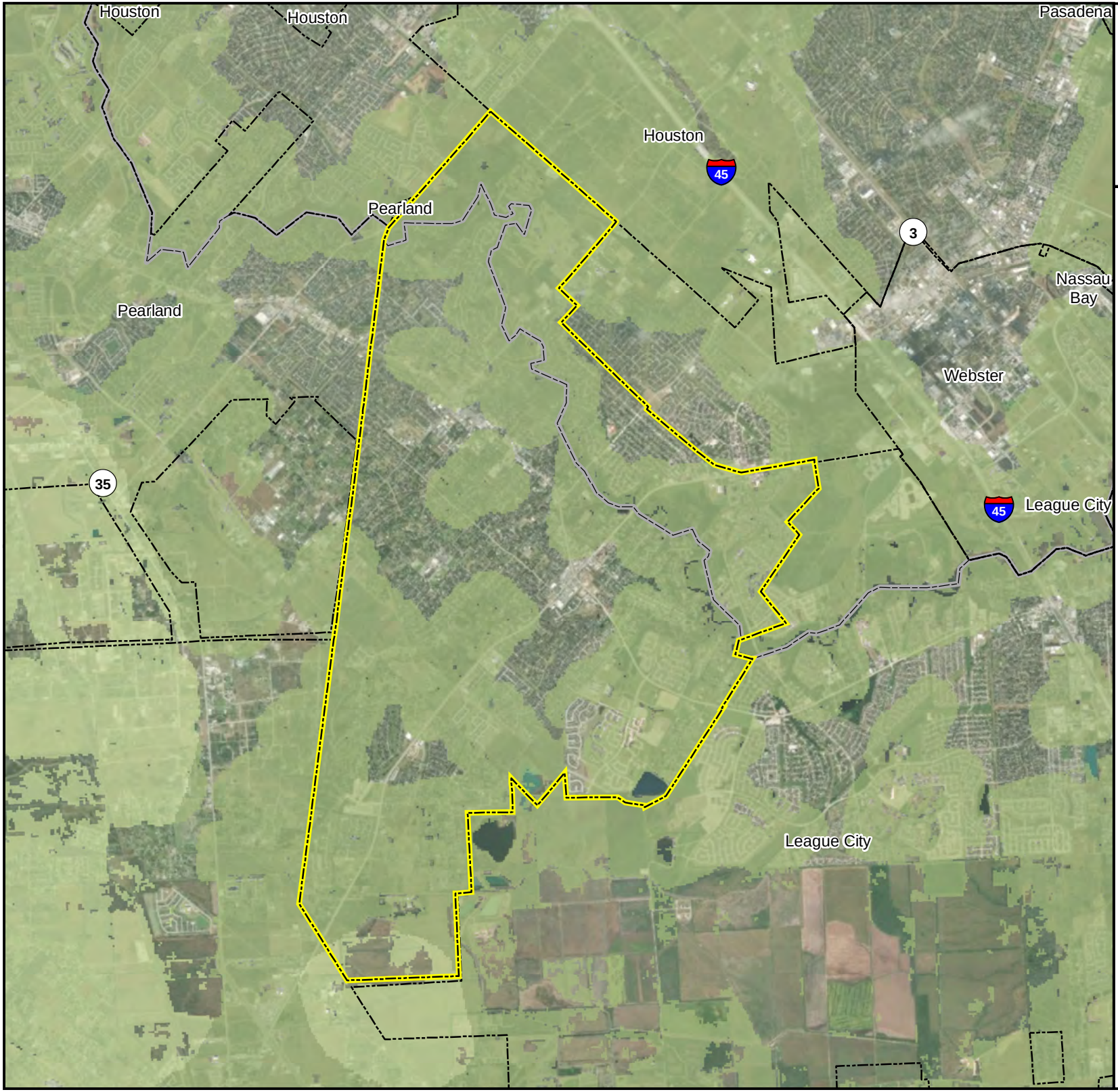
- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.4 0.8 1.6 Miles



Friendswood

Wildfire Threat

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.4 0.8 1.6 Miles

8. CITY OF GALENA PARK

8.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Jorge Flores, Emergency Management Coordinator
2000 Clinton Drive
Galena Park, TX 77547
Telephone: 7136722556
e-mail Address: Jorge.flores@cityofgalenapark-tx.gov

Alternate Point of Contact
Tom Ehlers, Fire Chief
1713 2nd Street
Galena Park, TX 77547
Telephone: 832-755-0181
e-mail Address: tehlers@cityofgalenapark-tx.gov

8.2 JURISDICTION PROFILE

8.2.1 Location

City of Galena Park is in Harris County, TX. The current boundaries generally extend from just east of Federal Road south to 2,500 feet north of the Houston Ship Channel, west to the city limits of Houston near Fidelity Road, north to the Southern Limit of Jacinto City and east to Federal Road, encompassing an area of 5 square miles.

8.2.2 History

City of Galena Park was incorporated in 1935. The City of Galena Park was incorporated on September 21, 1935 and is located in Harris County on the north bank of the Houston Ship Channel (formerly Buffalo Bayou) just east of the Houston City limits. The City is located in the Ezekiel Thomas Survey and has a population of 10,592. The first settler in the area was Ezekiel Thomas of South Carolina, who received a grant on one league of land from the Mexican government in 1824 as one of Stephen F. Austin's colonists. In 1833, Isaac Batterson and his family settled in the area and named the settlement "Clinton." Batterson subsequently purchased 1 000 acres from the Ezekiel Thomas estate, a tract located in the center of present day Galena Park. For almost 100 years, the settlement was known as Clinton, and in 1928, when the U.S. Post Office Department refused to grant the town a post office because another post office bearing the name Clinton already existed in Texas, the name of the town was changed to Galena Park, after the Galena-Signal Oil Company, the town's leading industry at the time.

8.2.3 Climate

The climate of City of Galena Park is classified as humid subtropical (*Cfa* in the Köppen climate classification system), typical of the Southern United States. The city experiences hot, long, and humid summers, and mild winters. While not located in Tornado Alley, like much of northern Texas, spring supercell thunderstorms sometimes bring tornadoes to the area.

Prevailing winds are from the south and southeast during most of the year, which bring heat and moisture from the nearby Gulf of Mexico and Galveston Bay.

During the summer, temperatures in Galena Park commonly reach over 90 °F. The city reaches or surpasses this temperature on an average of 106.5 days per year, including a majority of days from June to September; additionally, an average of 4.6 days per year reach or exceed 100 °F. Galena Park's characteristic subtropical humidity often results in a higher apparent temperature, and summer mornings average over 90% relative humidity.

Galena Park has mild winters. In January, the normal mean temperature at George Bush Intercontinental Airport is 53.1 °F, with an average of 13 days per year with a low at or below 32 °F, occurring on average between December 3 and February 20, allowing for a growing season of 286 days.

Galena Park generally receives ample rainfall, averaging about 49.8 inches annually based on records between 1981 and 2010. Many parts of the city have a high risk of localized flooding due to flat topography, ubiquitous low-permeability clay-silt prairie soils, and inadequate infrastructure. During the mid-2010s, Greater Houston experienced consecutive major flood events in 2015 ("Memorial Day"), 2016 ("Tax Day"), and 2017 (Hurricane Harvey)

8.2.4 Governing Body Format

The city operates under a Mayor/Council type government with the city's Mayor acting as the Chief Executive.

The City Council assumes responsibility for the adoption of this plan; The City of Galena Park Office of Emergency Management will oversee its implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 8-1.

Table 8-1. Local Mitigation Planning Team Members

Name	Title
Jorge Flores	Emergency Management Coordinator
Tom Ehlers	Fire Chief
Mayra Gonzales	City Secretary

8.3 CURRENT TRENDS

8.3.1 Population

According to the United States Census Bureau, the population of City of Galena Park as of 2010 was 10,887. Since 2010 the population has remained all most stagnant.

8.3.2 Development

The City of Galena Park has not seen major development since the 1960s. The city is nearly built out with only a 36-acre tract remaining undeveloped. Table 8-2 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

Table 8-2. Recent and Expected Future Development Trends

Criterion	Response			
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan? • **If yes, give the estimated area annexed and estimated number of parcels or structures.**	No			
Is your jurisdiction expected to annex any areas during the performance period of this plan? • **If yes, describe land areas and dominant uses.** • **If yes, who currently has permitting authority over these areas?**	No			
Are any areas targeted for development or major redevelopment in the next five years? • **If yes, briefly describe, including whether any of the areas are in known hazard risk areas**	No			
How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?		**2016**	**2017**	**2018**
	Single Family	2	1	2
	Multi-Family	2	3	2
	Other (commercial, mixed use, etc.)	0	0	0
	Total	**4**	**4**	**4**
Provide the number of new-construction permits for each hazard area or provide a qualitative description of where development has occurred.	• Special Flood Hazard Areas: 0 • Landslide: 0 • High Liquefaction Areas: 0 • Tsunami Inundation Area: 0 • Wildfire Risk Areas: 0			
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	The city is mostly built out with a tract of 36 acres near Hunting Bayou that is not developed.			

8.4 CAPABILITY ASSESSMENT

City of Galena Park performed an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities is presented in Table 8-3.
- Development and permitting capabilities are presented in Table 8-4.
- An assessment of fiscal capabilities is presented in Table 8-5.
- An assessment of administrative and technical capabilities is presented in Table 8-6.
- An assessment of education and outreach capabilities is presented in Table 8-7.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 8-8.
- Classifications under various community mitigation programs are presented in Table 8-9.
- The community's adaptive capacity for the impacts of climate change is presented in Table 8-10.

Findings of the capability assessment were reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table in Section 8.10 identifies these as community capacity building mitigation actions.

Table 8-3. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code ***Comment:*** *Chapter 10 City Code 2012*	yes	no	yes	yes
Zoning Code ***Comment:*** *Chapter 10 2018 City Ordinance*	yes	no	no	no
Subdivisions ***Comment:*** *Chapter 10 1996 City Ordinance*	yes	no	no	no
Stormwater Management ***Comment:*** *Clean Water Act*	yes	yes	yes	yes
Post-Disaster Recovery ***Comment:*** *Chapter 18 City Code 1996*	yes	yes	yes	yes
Real Estate Disclosure ***Comment:*** *Federal law*	no	no	no	no
Growth Management ***Comment:*** *City Plan reviewed every 5 years*	yes	no	no	no
Site Plan Review ***Comment:*** *Chapter 10 City Code 2012*	yes	no	no	no
Environmental Protection ***Comment:***	yes	yes	yes	yes
Flood Damage Prevention ***Comment:*** *Chapter 18 City Code 1996*	yes	yes	no	yes
Emergency Management ***Comment:*** *Chapter 18 City Code 1996*	yes	yes	yes	yes
Climate Change ***Comment:*** *None*	no	yes	yes	yes
Planning Documents				
General Plan ***Comment:*** *Reviewed yearly*	yes	yes	yes	yes
Capital Improvement Plan ***How often is the plan updated?*** *3 years* ***Comment:***	yes	no	no	yes
Disaster Debris Management Plan ***Comment:*** *Reviewed every year*	yes	no	no	yes
Floodplain or Watershed Plan ***Comment:*** *Reviewed every 3 years*	yes	yes	yes	yes
Stormwater Plan ***Comment:*** *Reviewed every 3 years*	yes	yes	yes	yes
Urban Water Management Plan ***Comment:*** *N/A*	no	no	no	yes
Habitat Conservation Plan ***Comment:*** *N/A*	no	no	no	yes
Economic Development Plan ***Comment:*** *Reviewed yearly*	yes	no	no	yes
Shoreline Management Plan ***Comment:***	no	no	no	no

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Community Wildfire Protection Plan ***Comment:***	no	no	no	no
Forest Management Plan ***Comment:***	no	no	no	no
Climate Action Plan ***Comment:***	no	no	no	no
Comprehensive Emergency Management Plan ***Comment:*** *Reviewed Yearly*	yes	yes	yes	yes
Threat & Hazard Identification & Risk Assessment (THIRA) ***Comment:*** *Reviewed January 2018*	yes	yes	yes	yes
Post-Disaster Recovery Plan ***Comment:*** *Reviewed yearly*	yes	yes	yes	yes
Continuity of Operations Plan ***Comment:*** *Reviewed every 5 years*	yes	yes	yes	yes
Public Health Plan ***Comment:*** *Reviewed every 3 years*	yes	yes	yes	yes
Other ***Comment:***	N/A	N/A	N/A	N/A

Table 8-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • **If no, who does? If yes, which department?**	Yes Building Department
Does your jurisdiction have the ability to track permits by hazard area?	No
Does your jurisdiction have a buildable lands inventory?	Yes

Table 8-5. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	yes
User Fees for Water, Sewer, Gas or Electric Service	Yes Water and Sewer
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	yes
Incur Debt through Private Activity Bonds	No
Withhold Public Expenditures in Hazard-Prone Areas	yes
State-Sponsored Grant Programs	yes
Development Impact Fees for Homebuyers or Developers	no
Other	N/A

Table 8-6. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	yes	Building
Engineers or professionals trained in building or infrastructure construction practices	yes	Building and Fire Department
Planners or engineers with an understanding of natural hazards	yes	Building
Staff with training in benefit/cost analysis	yes	Accounting
Surveyors	No	N/A
Personnel skilled or trained in GIS applications	No	N/A
Scientist familiar with natural hazards in local area	no	N/A
Emergency manager	Yes	OEM
Grant writers	yes	OEM, Fire, Police
Other	N/A	N/A

Table 8-7. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • If yes, briefly describe.	No
Do you use social media for hazard mitigation education and outreach? • If yes, briefly describe.	Yes Notifications on Facebook and Twitter
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • If yes, briefly describe.	Yes Dangerous Buildings and Zoning
Do you have any other programs already in place that could be used to communicate hazard-related information? • If yes, briefly describe.	No
Do you have any established warning systems for hazard events?	Yes
• If yes, briefly describe.	Swift 911 Notification and Social Media

Table 8-8. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Fire Department
Who is your floodplain administrator? (department/position)	Tom Ehlers Fire Chief
Are any certified floodplain managers on staff in your jurisdiction?	No
What is the date that your flood damage prevention ordinance was last amended?	5/2019
Does your floodplain management program meet or exceed minimum requirements? • **If exceeds, in what ways?**	Meets
When was the most recent Community Assistance Visit or Community Assistance Contact?	Insert appropriate information
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • **If so, state what they are.**	No Insert appropriate information
Are any RiskMAP projects currently underway in your jurisdiction? • **If so, state what they are.**	No Insert appropriate information
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • **If no, state why.**	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? • **If so, what type of assistance/training is needed?**	Yes Any training is appreciated
Does your jurisdiction participate in the Community Rating System (CRS)? • **If yes, is your jurisdiction interested in improving its CRS Classification?** • **If no, is your jurisdiction interested in joining the CRS program?**	No N/A Yes
How many flood insurance policies are in force in your jurisdiction?[a] • **What is the insurance in force?** • **What is the premium in force?**	276 $67,926,100 $149,503
How many total loss claims have been filed in your jurisdiction?[a] • **How many claims are still open or were closed without payment?** • **What were the total payments for losses?**	

a. According to FEMA statistics as of September 30, 2018

Table 8-9. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	No	N/A	N/A
Building Code Effectiveness Grading Schedule	No	N/A	N/A
Public Protection	No	N/A	N/A
Storm Ready	No	N/A	N/A
Firewise	No	N/A	N/A

Table 8-10. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:***	Medium
Jurisdiction-level monitoring of climate change impacts ***Comment:***	Medium
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:***	Low
Participation in regional groups addressing climate risks ***Comment:***	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	Low
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	Low
Identified strategies for adaptation to impacts ***Comment:***	Medium
Champions for climate action in local government departments ***Comment:***	Medium
Political support for implementing climate change adaptation strategies ***Comment:***	Medium
Financial resources devoted to climate change adaptation ***Comment:***	Low
Local authority over sectors likely to be negative impacted ***Comment:***	Low
Public Capacity	
Local residents knowledge of and understanding of climate risk ***Comment:***	Low
Local residents support of adaptation efforts ***Comment:***	Medium
Local residents' capacity to adapt to climate impacts ***Comment:***	Low
Local economy current capacity to adapt to climate impacts ***Comment:***	Medium
Local ecosystems capacity to adapt to climate impacts ***Comment:***	low

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

8.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning and capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed at the end of this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

8.5.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- Building Codes
- The National Flood Insurance Program
- The City's Emergency Plan
- Harris County's Basic Plan
- Storm water management
- State and federal regulations.

8.5.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- Real Estate Disclosure
- Environmental Protection
- Climate Change.

8.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 8-11 lists past occurrences of natural hazards for which specific damage was recorded in Galena Park, TX. Other hazard events that broadly affected the entire planning area, including Harris County, TX, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 8-11. Past Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Hurricane Harvey	DR4332	8/23/2017	$1,000.000
Hurricane Ike	DR1791	9/7/2008	Unknown
Hurricane Rita	DR1606	10/14/2005	Unknown

8.7 HAZARD RISK RANKING

Table 8-12 presents a local ranking for Galena Park, TX of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 8-12. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Severe Weather	48	High
1	Hurricane	48	High
2	Flooding	18	Medium
3	Earthquake	14	Low
3	Wildfire	14	Low
4	Drought	6	Low
4	Dam Failure	6	Low
4	Mass Movement	6	Low
5	Tsunami	0 (No exposure)	None
5	Coastal Erosion	0 (No exposure)	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

8.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides risk assessments for each hazard of concern. This section describes key vulnerabilities for the City. Jurisdiction-specific risk maps are provided at the end of this annex.

8.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: 12
- Number of FEMA-identified Severe-Repetitive-Loss Properties: 2
- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated: 0

8.8.2 Other Noted Vulnerabilities

The following jurisdiction-specific issues have been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- Houses near Panther Creek located in flood plain
- Age of bridges in city over Panther Creek
- Large number of underground pipelines and Chemical Storage tanks
- Woodland Acres Police Substation located in flood plain

Mitigation actions addressing these issues were prioritized for consideration in the action plan for this annex.

8.9 STATUS OF PREVIOUS PLAN ACTIONS

Table 8-13 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

8.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 8-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 8-15 identifies the priority for each action. Table 8-16 summarizes the actions by hazard and mitigation type.

Table 8-13. Status of Previous Plan Actions

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
Retrofit critical infrastructure facilities with lightning and surge protection measures.	No		X	GP2019-5
Comment: *Police Station needs additional lightning protection*				
Retrofit public facilities and radio communication systems with lightning protection rods.	No			
Comment: *Police Station Dispatch Center needs updates lightning protection*				
Implement a Flooding Public Education/Outreach Program to inform residents of flooding hazards and actions to take to minimize health impacts and property damage from flooding.	No		X	GP2019-6
Comment:				
Develop City warning mass notification system to include alerts for flood risk areas.	yes			
Comment: *Swift 911*				
Install/ Improve roofing of public buildings to industry accepted high-wind guidelines.	yes			
Comment: *Complete*				
Retrofit critical infrastructure and/ or shelters with shutter systems.		Removed		
Comment: *Cost prohibitive*				
Adopt higher-standard/latest edition building codes for critical facilities to withstand high-wind damage from severe thunderstorms, hurricanes, and hail.			X	GP2019-7
Comment: *Building Codes currently under review for update*				
Harden public shelters or public buildings that provide inadequate protection.	yes			
Comment:				
Construct shelters for critical equipment and vehicles.	yes			
Comment:				
Install protective structure to minimize damage to critical assets and equipment.	yes			
Comment:				
Adopt code/ ordinance to require removal of dead vegetation/ dry fuel sources in risk areas.	yes			
Comment:				
Join Firewise to implement a Public Education/Outreach program for wildfire hazards and actions for residents to minimize fire/smoke damage to property.		Removed		
Comment: *Wildfire threat is minimal in city*				
Expand warning system to provide drought warnings and alerts to increase coverage of community population. (mass notification, outdoor warning systems, etc.).	yes			
Comment: *Swift 911 system*				
Implement a regional drought contingency program to provide an alternate emergency water source during severe drought to minimize water shortage.			X	GP2019-8
Comment:				

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
Implement/ establish grant program to provide cooling systems for Low to Moderate income populations.		Not feasible		
Comment: *Installed generators at cooling centers*				
Install public facility emergency power generators to provide adequate cooling for use as a cooling center.	yes			
Comment:				
Implement/ establish grant program to provide heating systems to LMI populations.		Not feasible		
Comment: *Warming Centers available*				
Install public facility emergency power generators to provide adequate heating for use as a heating center.	yes			
Comment:				
Implement or establish code/ ordinance to require hazards materials transportation corridor.	No		X	GP2019-9
Comment: *HM routes needs to be established*				
Identify exposed/ above ground pipelines in flood hazard area.	yes			
Comment: *Area near Panther Creek and Hunting Bayou*				
Improve fire protection infrastructure locations.	yes			
Comment:				

Table 8-14. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action GP2019-1 — Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Earthquake, flooding, landslide, Severe Weather, , wildfire, Mass Movement, Dam Failure						
Existing	3, 4, 10	City Administration	TBD	High	HMGP, PDM, FMA	Short-term
Action GP2019-2 — Integrate the hazard mitigation plan into other plans, ordinances and programs that dictate land use decisions in the community, including Flood Plain Management, Zoning, City Ordinances and Building Codes.						
Hazards Mitigated: Dam failure, drought, earthquake, flooding, tsunami, wildfire						
New and Existing	1, 3, 4, 5, 7, 8, 10	City Administration	TBD	Low	Staff Time, General Funds	Ongoing
Action GP2019-3 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Earthquake, Wildfire, Drought, Dam Failure, Mass Movement						
New and Existing	1, 5, 8	City Administration	TBD	Low	Staff Time, General Funds	Short-term
Action GP2019-4 — Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements: • Enforce the flood damage prevention ordinance. • Participate in floodplain identification and mapping updates. • Provide public assistance/information on floodplain requirements and impacts.						
Hazards Mitigated: Dam failure, flooding, severe weather, tsunami, sea level rise						
New and Existing	1, 3, 5, 7, 8, 10	City Administration	TBD	Low	Staff Time, General Funds	Ongoing

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action GP2019-5 — Retrofit critical infrastructure facilities with lightning and surge protection measures.						
Hazards Mitigated: Severe Weather, Hurricane						
Existing	10,11,13	City Administration	TBD	Medium	General and grant funds,	Short term
Action GP2019-6 — Implement a Flooding Public Education/Outreach Program to inform residents of flooding hazards and actions to take to minimize health impacts and property damage from flooding.						
Hazards Mitigated: Flooding						
Existing	3,10,11	City Administration	TBD	Low	Staff Time	Short term
Action GP2019-7 — Adopt higher-standard/latest edition building codes for critical facilities to withstand high-wind damage from severe thunderstorms, hurricanes, and hail.						
Hazards Mitigated: Severe Weather, Hurricane						
New	9,10,11,14,15	City Administration	TBD	Low	Staff Time	Short term
Action GP2019-8 — Implement a regional drought contingency program to provide an alternate emergency water source during severe drought to minimize water shortage.						
Hazards Mitigated: Drought						
Existing	7,9,10,11	City Administration	TBD	Low	Staff Time	Short term
Action GP2019-9 — Implement or establish code/ ordinance to require hazardous materials transportation corridor.						
Hazards Mitigated: Hazardous Materials Incidents						
Existing	3,6,8,9,10,11,14	City Administration	TBD	Low	Staff Time	Short term
Action GP2019-10— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Earthquake, Wildfire, Drought, Dam Failure, Mass Movement						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	Galena Park	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 8-15. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
GP2019-1	3	High	High	Yes	Yes	No	High	High
GP2019-2	7	Medium	Low	Yes	No	Yes	High	Low
GP2019-3	3	Low	Low	Yes	No	Yes	High	Low
GP2019-4	6	Medium	Low	Yes	No	Yes	High	Low
GP2019-5	3	Medium	Medium	Yes	Yes	No	Medium	Medium
GP2019-6	3	Medium	Low	Yes	No	Yes	Medium	Low
GP2019-7	5	High	Low	Yes	No	Yes	High	Low
GP2019-8	4	High	Low	Yes	No	Yes	Medium	Low
GP2019-9	7	Medium	Low	Yes	No	Yes	Medium	Low
GP2019-10	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 8-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Severe Weather	GP2019-1, 3, 7, 10	GP2019-1	GP2019-10		GP2019-10	GP2019-1, 5, 7		GP2019-4, 10
Hurricane	GP2019-3, 7, 10	GP2019-1	GP2019-10		GP2019-10	GP2019-5, 7		GP2019-10
Flooding	GP2019-3, 10	GP2019-1	GP2019-6, 10	GP2019-2	GP2019-10	GP2019-1		GP2019-2, 4, 10
Medium-Risk Hazards								
Earthquake	GP2019-3, 10	GP2019-1	GP2019-10	GP2019-2	GP2019-10	GP2019-1		GP2019-2, 10
Wildfire	GP2019-3, 10	GP2019-1	GP2019-10	GP2019-2	GP2019-10	GP2019-1		GP2019-2, 10
Drought	GP2019-3, 10		GP2019-10	GP2019-2	GP2019-10		GP2019-8	GP2019-2, 8, 10
Low-Risk Hazards								
Dam Failure	GP2019-3, 10		GP2019-10	GP2019-2	GP2019-10			GP2019-2, 4, 10
Mass Movement	GP2019-3, 10	GP2019-1	GP2019-10		GP2019-10	GP2019-1		GP2019-2, 10
Hazardous Materials	GP2019-9				GP2019-9			

a. See the introduction to this volume for explanation of mitigation types.

8.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- **Galena Park Municipal Code** — The municipal code was reviewed for the full capability assessment and for identifying opportunities for action plan integration.
- **Galena Park Flood Damage Prevention Ordinance** — The flood damage prevention ordinance was reviewed for compliance with the National Flood Insurance Program.

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.
- **2017 Houston UASI THIRA Stakeholder Preparedness Review Regional Stake Holder Report January 2018 –** The report was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.

8.12 FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

A study is needed to better understand the potential for a chemical spill related to flooding rains. The use of above ground tanks for chemical storage in diked areas that hold water during flooding events may cause the tanks to float, potentially leading to a large scale chemical spill as experienced during Hurricane Harvey at a tank farm on American Petroleum Road. It resulted in 100,000 of gallons of gasoline to be released into the ship channel.

Galena Park

Critical Facilities

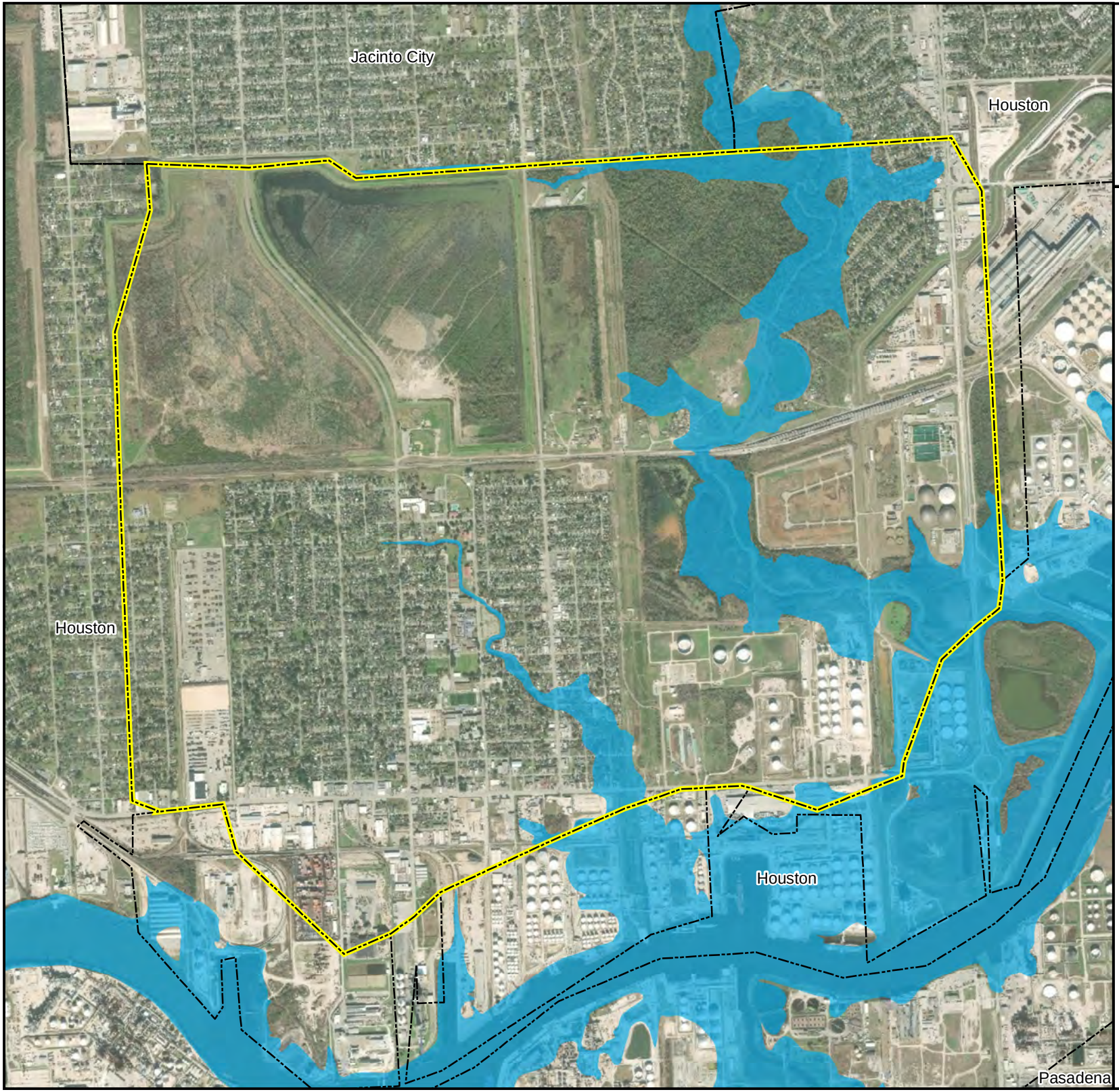
- Education Facilities
- Emergency Services
- Government Facilities
- Hazardous Material Sites
- Health and Medical Facilities
- Historical and Cultural Sites
- Transportation Systems
- Utility Systems
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.125 0.25 0.5 Miles



Galena Park

FEMA Flood Hazard

1% Annual Chance Flood (100-yr)

Incorporated Cities

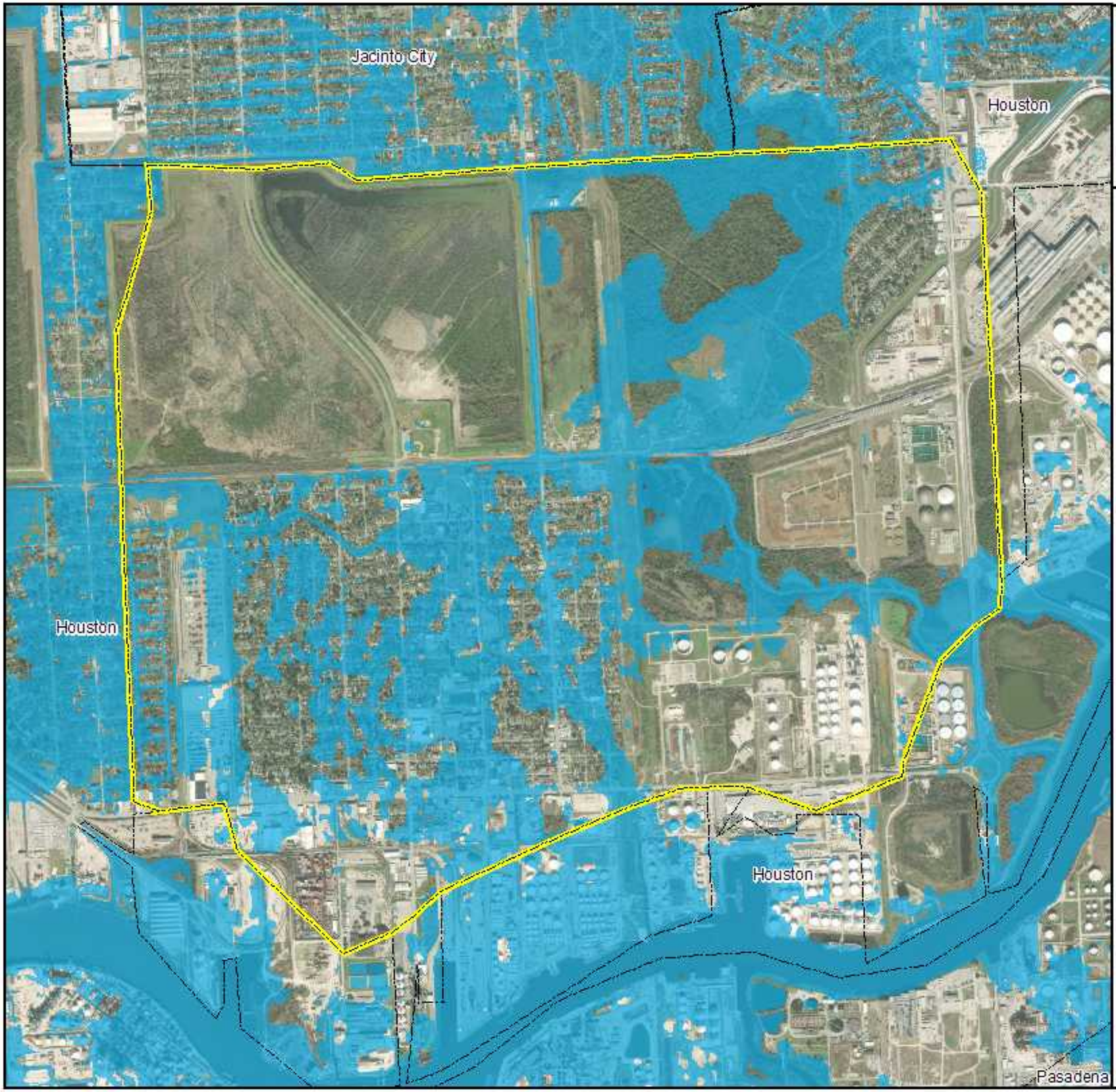
Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.125 0.25 0.5 Miles



Galena Park

Flood Hazard
Hurricane Harvey

Flooding Extent

Incorporated Cities

Harris County

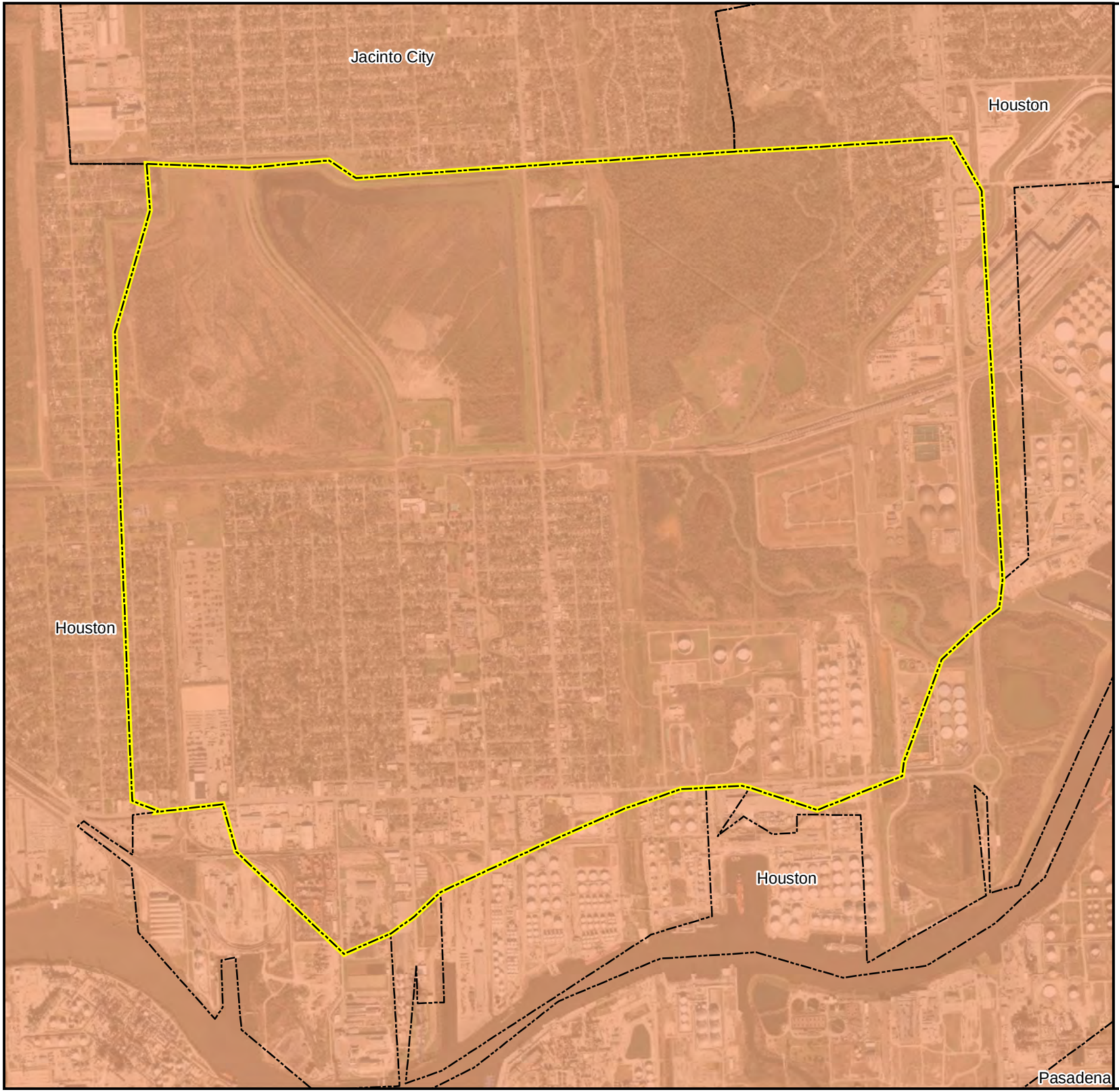
Note: Flooding extent shown for Hazard Mitigation Plan planning area only.

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.125 0.25 0.5 Miles



Galena Park

Hurricane Alicia (1983)

Peak WInd Gust (mph)

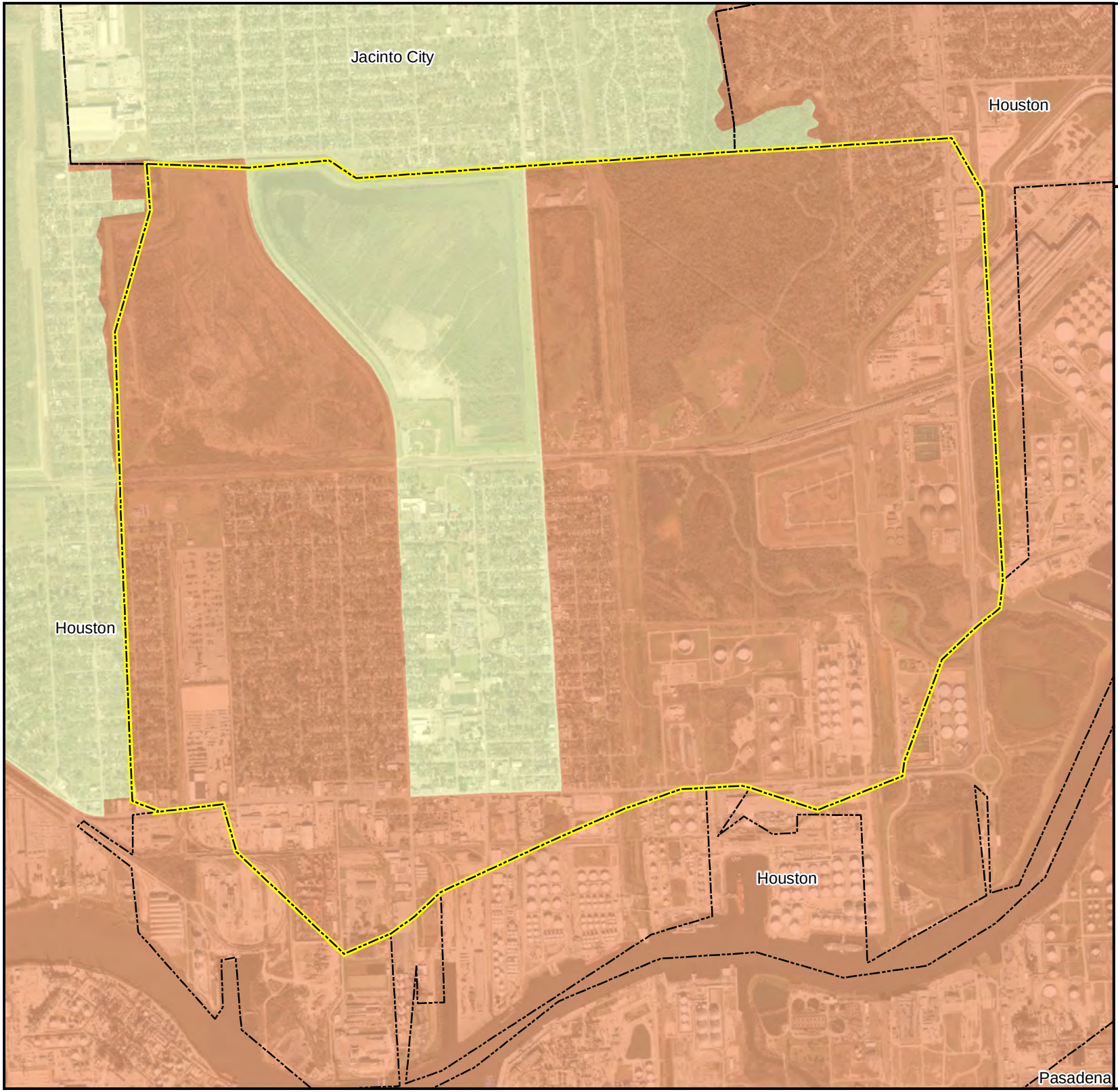
- 87 - 94
- 95 - 98
- 99 - 101
- 102 - 104
- 105 - 110
- Storm Track
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.125 0.25 0.5 Miles



Galena Park

20-year Probabilistic Hurricane

Peak Wind Gust (mph)

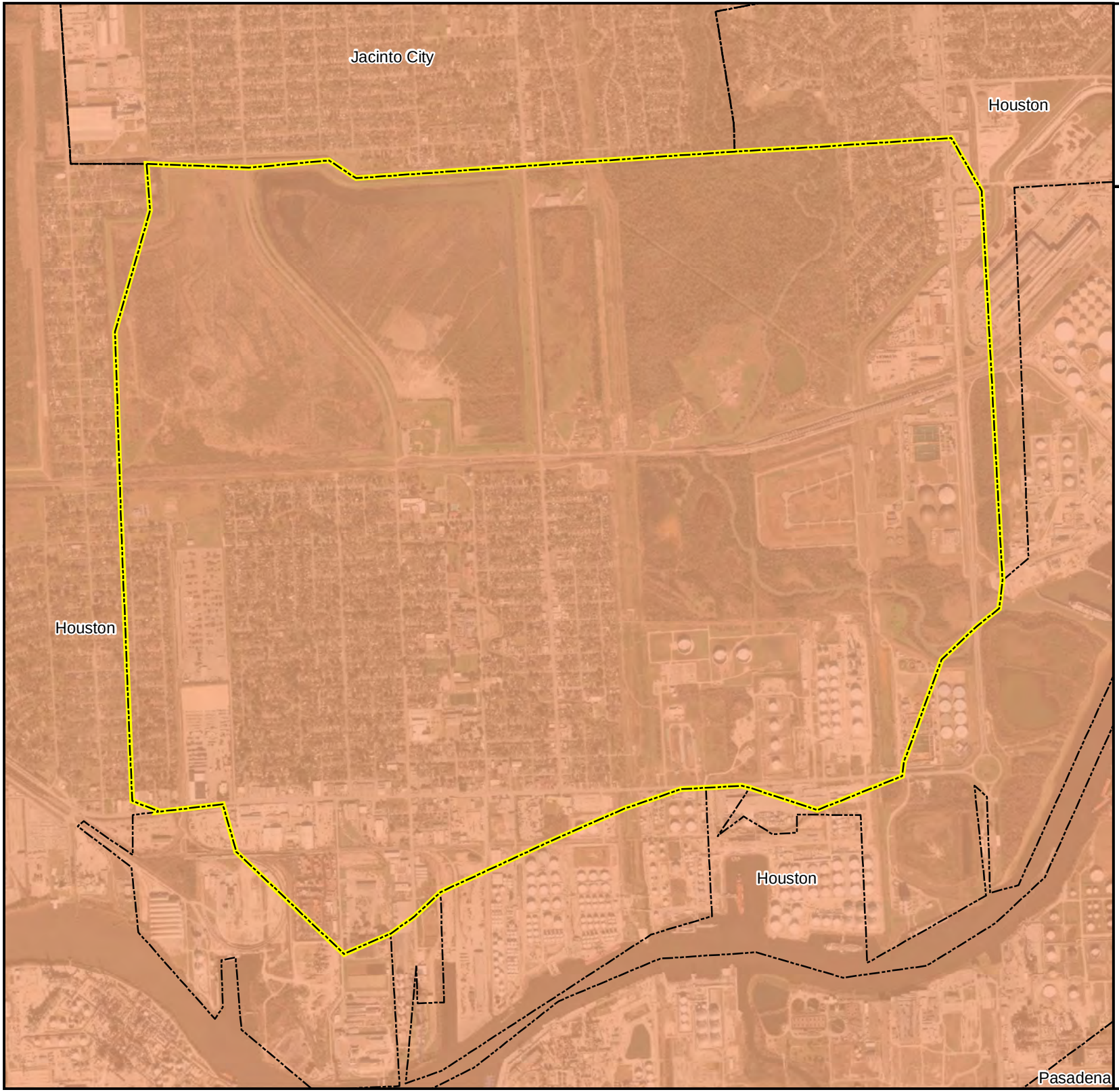
- 63 - 71
- 72 - 76
- 77 - 80
- 81 - 84
- 85 - 92
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.125 0.25 0.5 Miles



Galena Park

100-year Probabilistic Hurricane

Peak Wind Gust (mph)

- 89 - 101
- 102 - 106
- 107 - 111
- 112 - 117
- 118 - 128
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.125 0.25 0.5 Miles

Galena Park

Wildfire Ignition Density

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.125 0.25 0.5 Miles

Galena Park

Wildfire Threat

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.125 0.25 0.5 Miles

9. CITY OF HEDWIG VILLAGE

9.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Kelly Johnson, City Administrator
955 Piney Point Road
Houston, TX 77024
Telephone: 713-465-6009
e-mail Address: KJohnson@hedwigtx.gov

Alternate Point of Contact
Brian T. Muecke
955 Piney Point Road
Houston, TX 77024
Telephone: 713-465-6009
e-mail Address: BMuecke@hedwigtx.gov

9.2 JURISDICTION PROFILE

9.2.1 Location

The City of Hedwig Village is located in Harris County and is bound on the east by the City of Hunters Creek Village, the south by the City of Piney Point Village and the City of Bunker Hill Village, the north by the City of Houston and the City of Spring Valley Village, and the west by the City of Houston. The City of Hedwig Village is approximately 0.9 square miles or 544 acres.

9.2.2 History

The City of Hedwig Village, a Type-A General Law City, was incorporated in 1954. The City of Hedwig Village consists of approximately 572 single family homes, 244 condominium units, two apartment complexes, two public schools, two churches, and many restaurants and retail stores. The City of Hedwig Village provides police protection through their own police department and fire and emergency services through the Village Fire Department. The Village Fire Department, through an interlocal agreement, provides services to the "Memorial Villages" which include the City of Bunker Hill Village, the City of Hedwig Village, the City of Hilshire Village, the City of Hunters Creek Village, the City of Piney Point Village, and the City of Spring Valley Village.

9.2.3 Climate

The City of Hedwig Village has a year-round average high temperature around 80 ºF, year-round average low temperature around 60 ºF, and average annual precipitation of about 50 inches.

9.2.4 Governing Body Format

The City of Hedwig Village is considered a Type-A General Law City and is governed by a Mayor and five Council Members elected at large. A Type-A General Law City is one that had at the time of its incorporation 600 or more inhabitants. General Law Cities have a population less than 5,000 and are authorized to do only what the State Constitution or Legislature has authorized.

The City Council assumes responsibility for the adoption of this plan; the City Administrator will oversee its implementation.

Table 9-1 lists members of the jurisdiction's joint local mitigation planning team. Howard Miller, emergency management coordinator for the Village Fire Department, also participated in planning for the six Memorial Villages.

Table 9-1. Local Mitigation Planning Team Members

Jurisdiction	Name / Title	Phone	Email
City of Bunker Hill Village	Karen Glynn, City Admin.	713-467-9762	KGlynn@bunkerhilltx.gov
City of Hedwig Village	Kelly Johnson, City Admin./Secretary	713-465-6009	KJohnson@hedwigtx.gov
City of Hilshire Village	Susan Blevins, City Admin/Secretary Efrain Him	713-973-1779	Susan.blevins@hilshirevillagetexas.com Efrain.him@hdrinc.com
City of Hunters Creek Village	Tom Fullen, City Admin.	713-465-2150	tfullen@cityofhunterscreek.org
City of Piney Point Village	Roger Nelson, City Admin.	713-230-8703	cityadmin@pineypt.org
City of Spring Valley Village	Julie Robinson, City Admin. Arthur Faiello, PW Director	713-465-5306 832-910-8576	jrobinson@springvalleytx.com afaiello@springvalleytx.com

9.3 CURRENT TRENDS

9.3.1 Population

According to the 2010 Census, the population of the City of Hedwig Village was 2,557. Hedwig Village's population has remained consistent for many years.

9.3.2 Development

The City of Hedwig Village is continuing to experience residential redevelopment of new, larger homes. The City is also seeing the redevelopment of commercial property along the I-10 corridor. The City of Hedwig Village is landlocked by other municipalities; therefore there is no growth opportunity.

Table 9-2 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

9.4 CAPABILITY ASSESSMENT

The City of Hedwig Village performed an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities is presented in Table 9-3.
- Development and permitting capabilities are presented in Table 9-4.
- An assessment of fiscal capabilities is presented in Table 9-5.
- An assessment of administrative and technical capabilities is presented in Table 9-6.
- An assessment of education and outreach capabilities is presented in Table 9-7.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 9-8.
- Classifications under various community mitigation programs are presented in Table 9-9.
- The community's adaptive capacity for the impacts of climate change is presented in Table 9-10.

Findings of the capability assessment were reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table included in the action plan for this annex identifies these as community capacity building mitigation actions.

Table 9-2. Recent and Expected Future Development Trends

Criterion	Response
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan? • If yes, give the estimated area annexed and estimated number of parcels or structures.	**NO** **N/A**
Is your jurisdiction expected to annex any areas during the performance period of this plan? • If yes, describe land areas and dominant uses. • If yes, who currently has permitting authority over these areas?	**NO** **N/A** **N/A**
Are any areas targeted for development or major redevelopment in the next five years? • If yes, briefly describe, including whether any of the areas are in known hazard risk areas	**YES** The City of Hedwig Village is starting to see the redevelopment of their commercial areas along I-10 and the continued redevelopment of their residential homes with new, larger homes.
How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?	
Provide the number of new-construction permits for each hazard area or provide a qualitative description of where development has occurred.	• Special Flood Hazard Areas: # N/A • Landslide: # N/A • High Liquefaction Areas: # N/A • Tsunami Inundation Area: # N/A • Wildfire Risk Areas: # N/A
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	Hedwig Village continues to experience redevelopment of older residential homes being demolished and new homes constructed. Hedwig Village is also slowly seeing redevelopment of their commercial area's along I-10.

	2014	2015	2016	2017	2018
Single Family	11	6	7	5	4
Multi-Family	N/A	N/A	N/A	N/A	N/A
Other (commercial, mixed use, etc.)	2	1	0	1	4
Total	**13**	**7**	**7**	**6**	**8**

Table 9-3. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code	Yes	Yes	Yes	Yes
Comment: *Chapter 14 of City Code of Ordinances, 1991*				
Zoning Code	Yes	Yes	Yes	Yes
Comment: *Appendix A of City Code of Ordinances, 1961*				
Subdivisions	Yes	Yes	Yes	Yes
Comment: *Chapter 74 of City Code of Ordinances, 2001*				
Stormwater Management	Yes	Yes	Yes	Yes
Comment: *Chapter 14 of City Code of Ordinances, (1991) and TCEQ*				
Post-Disaster Recovery	Yes	Yes	Yes	No
Comment: *TDEM, Harris County Interlocal Mutual Aid Agreement, FEMA*				
Real Estate Disclosure	No	No	No	No
Comment:				
Growth Management	Yes	Yes	Yes	Yes
Comment: *Through Harris County Flood Control District (HCFCD)*				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Site Plan Review	Yes	Yes	Yes	No
Comment: *Village Fire Department (VFD), City Ordinances, and Harris County Flood Control*				
Environmental Protection	No	Yes	Yes	No
Comment: *Texas Commission on Environmental Quality (TCEQ) & EPA*				
Flood Damage Prevention	Yes	No	Yes	Yes
Comment: *Floodplain Ordinance*				
Emergency Management	Yes	Yes	Yes	No
Comment: *VFD, Harris County Emergency Management*				
Climate Change	No	No	No	No
Comment:				
Planning Documents				
General Plan	Yes	No	Yes	Yes
Comment: *Zoning Ordinance*				
Capital Improvement Plan	Yes	No	No	Yes
How often is the plan updated? *Annually w/Budget*				
Comment:				
Disaster Debris Management Plan	Yes	Yes	No	No
Comment: *Interlocal with Harris County for Debris removal and Ceres Environmental Services*				
Floodplain or Watershed Plan	No	Yes	No	No
Comment: *HCFCD*				
Stormwater Plan	Yes	Yes	No	Yes
Comment: *TCEQ*				
Urban Water Management Plan	No	No	No	No
Comment:				
Habitat Conservation Plan	No	Yes	No	No
Comment: TCEQ and EPA				
Economic Development Plan	Yes	No	Yes	No
Comment: City has the ability				
Shoreline Management Plan	No	No	No	No
Comment:				
Community Wildfire Protection Plan	No	No	No	No
Comment:				
Forest Management Plan	No	No	No	No
Comment:				
Climate Action Plan	No	No	No	No
Comment:				
Comprehensive Emergency Management Plan	Yes	Yes	Yes	No
Comment: Harris County Emergency Management				
Threat & Hazard Identification & Risk Assessment (THIRA)	Yes	Yes	Yes	No
Comment: Harris County Hazard Mitigation Plan				
Post-Disaster Recovery Plan	Yes	Yes	Yes	No
Comment: Harris County Emergency Management				
Continuity of Operations Plan	No	No	No	No
Comment:				
Public Health Plan	No	Yes	No	No
Comment: *Harris County Public Health*				

Table 9-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • If no, who does? If yes, which department?	Yes Permit Department
Does your jurisdiction have the ability to track permits by hazard area?	No
Does your jurisdiction have a buildable lands inventory?	No

Table 9-5. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants – low income	No
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	No
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	No
Other	No

Table 9-6. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	BBG Contract Building Official
Engineers or professionals trained in building or infrastructure construction practices	Yes	Contract Building Official, Contract City Engineer, and VFD Marshall
Planners or engineers with an understanding of natural hazards	Yes	Contract Building Official and Contract City Engineer
Staff with training in benefit/cost analysis	Yes	City Treasurer
Surveyors	Yes	Contract
Personnel skilled or trained in GIS applications	Yes	Contract
Scientist familiar with natural hazards in local area	Yes	Contract
Emergency manager	Yes	Mayor and VFD
Grant writers	Yes	Contract
Other	No	

Table 9-7. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • If yes, briefly describe.	No
Do you use social media for hazard mitigation education and outreach? • If yes, briefly describe.	No
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • If yes, briefly describe.	No
Do you have any other programs already in place that could be used to communicate hazard-related information? • If yes, briefly describe.	Yes Reverse 911/website/ENotification
Do you have any established warning systems for hazard events? • If yes, briefly describe.	Yes Reverse 911/website/ENotification

Table 9-8. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Permit Dept.
Who is your floodplain administrator? (department/position)	City Secretary
Are any certified floodplain managers on staff in your jurisdiction?	No
What is the date that your flood damage prevention ordinance was last amended?	Dec 2004
Does your floodplain management program meet or exceed minimum requirements? • If exceeds, in what ways?	Meets
When was the most recent Community Assistance Visit or Community Assistance Contact?	May 2019
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • If so, state what they are.	No
Are any RiskMAP projects currently underway in your jurisdiction? • If so, state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • Areas have flooded that are not within a flood risk area.	No
Does your floodplain management staff need any assistance or training to support its floodplain management program? • If so, what type of assistance/training is needed?	No
Does your jurisdiction participate in the Community Rating System (CRS)? • If yes, is your jurisdiction interested in improving its CRS Classification? • If no, is your jurisdiction interested in joining the CRS program?	No No
How many flood insurance policies are in force in your jurisdiction?[a] • What is the insurance in force? • What is the premium in force?	385 $130,960,000 $195,280
How many total loss claims have been filed in your jurisdiction?[a] • How many claims are still open or were closed without payment? • What were the total payments for losses?	121 18 $3,457,558.39

a. According to FEMA statistics as of March 28, 2019

Table 9-9. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	No		
Building Code Effectiveness Grading Schedule	No		
Public Protection	Yes	ISO	2015
Storm Ready	No		
Firewise	No		

Table 9-10. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:***	Low
Jurisdiction-level monitoring of climate change impacts ***Comment:***	Low
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:***	Low
Participation in regional groups addressing climate risks ***Comment:***	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	Low
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	Low
Identified strategies for adaptation to impacts ***Comment:***	Low
Champions for climate action in local government departments ***Comment:***	Low
Political support for implementing climate change adaptation strategies ***Comment:***	Low
Financial resources devoted to climate change adaptation ***Comment:***	Low
Local authority over sectors likely to be negative impacted ***Comment:***	Low

Criterion	Jurisdiction Rating[a]
Public Capacity	
Local residents knowledge of and understanding of climate risk ***Comment:***	Low
Local residents support of adaptation efforts ***Comment:***	Low
Local residents' capacity to adapt to climate impacts ***Comment:***	Low
Local economy current capacity to adapt to climate impacts ***Comment:***	Low
Local ecosystems capacity to adapt to climate impacts ***Comment:***	Low

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

9.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning and capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

9.5.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- MS4 Storm Water Plan — Storm Water Protection Plan as required by TCEQ.
- All Hazard Mitigation Plan with Harris County

9.5.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- MS4 Storm Water Plan — Storm Water Protection Plan as required by TCEQ.
- All Hazard Mitigation Plan with Harris County

9.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 9-11 lists past occurrences of natural hazards for which specific damage was recorded in City of Hedwig Village. Other hazard events that broadly affected the entire planning area, including City of Hedwig Village, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 9-11. Past Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Hurricane Harvey	4332 DR	2017	$ 18,945,021
Weather Event (rain)	------	4/18/2016	Unknown
Weather Event (rain)	------	5/25/2015	Unknown
Weather Event (rain)	------	4/28/2009	Unknown
Weather Event (hail) & Flash Flood	32615 & 32616	5/30/2007	$0
Hurricane Alicia	689 DR	1983	$12,130,470

9.7 HAZARD RISK RANKING

Table 9-12 presents a local ranking for City of Hedwig Village of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 9-12. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Severe Weather	48	High
2	Hurricane	32	High
3	Earthquake	14	Low
4	Drought	6	Low
4	Fire	6	Low
4	Mass Movement	6	Low
5	Flooding	0	None
5	Dam Failure	0 (no exposure)	None
5	Coastal Erosion	0 (No exposure)	None
5	Tsunami	0 (No exposure)	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

9.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. This section provides information on a few key vulnerabilities for the jurisdiction. Available jurisdiction-specific risk maps of the hazards are provided at the end of this annex.

9.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: 22
- Number of FEMA-identified Severe-Repetitive-Loss Properties: 4
- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated: 1

9.8.2 Other Noted Vulnerabilities

The following jurisdiction-specific issues have been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- Aging infrastructure (sink holes)
- Above ground power lines

Mitigation actions addressing these issues were prioritized for consideration in the action plan for this annex.

9.9 STATUS OF PREVIOUS PLAN ACTIONS

Table 9-13 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

Table 9-13. Status of Previous Plan Actions

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
Install drought-resistant landscaping around facilities as part of water conservation plan	Ongoing		Yes	**HED 8**
Comment: *Carry Over*				
Improve codes/ordinances allowing xeriscape.	Not-Started		Yes	**HED 11**
Comment: *Carry Over*				
Expand warning system using City-wide Emergency Notification System to enhance coverage of the community's population.	Ongoing		Yes	**HED 5**
Comment: *The City designed and implemented a new website in 2016 which enables residents to sign up to receive up-to-date emergency notices. This was used during Hurricane Harvey. Completed in Phase I.*				
Establish codes/ordinances for buffer zones		Yes		
Comment: *Remove/Delete*				
Harden air handling and air conditioning systems.	Yes			
Comment: *Both city hall and the police station have been updates with control systems. Completed in Phase I.*				
Install protective structures for city vehicles	Yes			
Comment: *Carport installed at police station. Completed in Phase I.*				
Implement a tree management program to limit debris damage to critical infrastructure, public facilities from falling tree canopy.	Ongoing		Yes	**HED 6**
Comment: *This is an ongoing activity to maintain canopy. The City does have a debris contract for major tree damages.*				
Retrofit Maintenance Building with lightning and surge protection measures.	Yes			
Comment: *The City completed the implementation with the police station was complete in 2017. Completed in Phase I.*				
Retrofit backup generator at Police Department with new automatic switching equipment.	Yes			
Comment: *Both city hall and the police station generators have an automated transfer switch. Completed in Phase I.*				
Retrofit Police Department facility to withstand high-wind damages from severe thunderstorms, hurricanes and hail.	Yes			
Comment: *Completed with the new police station in 2017. Completed in Phase I.*				
Install cover and freeze insulation protection of above ground public irrigation equipment and FDC connections	Yes			
Comment: *Completed in Phase I.*				
Insulate exposed fire protection equipment/system components	Yes			
Comment: *Completed in Phase I.*				

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
Develop/implement outreach/public awareness/warning programs and meet with local providers on how they will handle extreme power demands.	Not-Started		Yes	**HED 7**
Comment: *Carry Over*				
Strengthen Building Codes/Ordinances relative to job site (Construction) debris management and removal of dead trees.	Yes			
Comment: Updated the Building Codes the last few years. *Completed in Phase I.*				
Install and improve Storm Sewer System by increasing drainage to mitigate flooding.	Ongoing		Yes	**HED 9**
Comment: *The City has spent close to $500K in a master drainage plan with the anticipation to go to voters in late 2019 or sometime in 2020 in a bond election to decide if residents want to pay to improve streets and drainage.*				
Develop community outreach program to educate the public on flooding risk and actions they can take to protect their homes from flooding.	Ongoing		Yes	**HED 10**
Comment: *Some outreach has been done through the City's website.*				
Hardening of critical infrastructure facilities.	Yes			
Comment: *Completed in Phase I.*				
Update and strengthen ordinances on burning restrictions with local Fire Marshal.	Yes			
Comment: *No outside burning is allowed in Hedwig Village. Completed in Phase I.*				

9.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 9-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 9-15 identifies the priority for each action. Table 9-16 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 9-14. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action HED1 — Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, WildFire, Mass Movement, Earthquake						
Existing	3, 4, 10	City Administration	TBD	High	Hazard Mitigation Grant Program, Pre-Disaster Mitigation, Flood Mitigation Assistance	Short-term
Action HED 2 — Integrate the hazard mitigation plan into other plans, ordinances and programs that dictate land use decisions in the community, including development and drainage.						
Hazards Mitigated: drought, earthquake, flooding, landslide, tsunami, wildfire						
New and Existing	1, 3, 4, 5, 7, 8, 10	City Administration	TBD	Low	Staff Time, General Funds	Ongoing
Action HED 3 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, WildFire, Mass Movement, Earthquake, Drought						
New and Existing	1, 5, 8	City Administration	TBD	Low	Staff Time, General Funds	Short-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action HED 4 — Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements: • Enforce the flood damage prevention ordinance. • Participate in floodplain identification and mapping updates. • Provide public assistance/information on floodplain requirements and impacts. *Hazards Mitigated:* Dam failure, flooding, severe weather, tsunami, sea level rise						
New and Existing	1, 3, 5, 7, 8, 10	City Administration	TBD	Low	Staff Time, General Funds	Ongoing
Action HED 5 — Expand warning system using City-wide Emergency Notification System to enhance coverage of the community's population. *Hazards Mitigated:*						
New and Existing	1, 3	Public works	TBD	Low	Staff Time, General Funds	Ongoing
Action HED 6 — Implement a tree management program to limit debris damage to critical infrastructure, public facilities from falling tree canopy. *Hazards Mitigated:* Severe weather, flooding, wildfire						
Existing	8, 10, 12	Public Works	TBD	Low	Staff Time, General Funds,	Ongoing
Action HED 7 — Develop/implement outreach/public awareness/warning programs and meet with local providers on how they will handle extreme power demands *Hazards Mitigated:* Drought, severe weather						
New	1, 3	Administration	Center-point Energy	Low	Staff Time, General Funds	Ongoing
Action HED 8 — Install drought-resistant landscaping around facilities as part of water conservation plan *Hazards Mitigated:* Drought						
Existing	11	Public Works	TBD	Low	Staff time, general funds	Short-term
Action HED 9 — Install and improve Storm Sewer System by increasing drainage to mitigate flooding. *Hazards Mitigated:* Severe weather, hurricane, flooding						
Existing and New	7, 11, 12	Public Works	TBD	High	Staff time, bond election, Hazard Mitigation Grant Program, Pre-Disaster Mitigation, Flood Mitigation Assistance	Ongoing
Action HED 10 — Develop community outreach program to educate the public on flooding risk and actions they can take to protect their homes from flooding. *Hazards Mitigated:* Severe weather, hurricane, flooding						
Existing	1, 3	Administration	Harris County, State, Federal	Low	Staff time, general fund	Short
Action HED 11 — Improve codes/ordinances allowing xeriscape. *Hazards Mitigated:* Drought						
Existing	11	Building Department	TBD	Low	Staff time, general fund	Short
Action HED12— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan. *Hazards Mitigated*: Severe Weather, Hurricane, Flooding, Earthquake, Wildfire, Drought, Mass Movement						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	Galena Park	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 9-15. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
HED 1	3	High	High	Yes	Yes	No	Medium	High
HED 2	7	Medium	Low	Yes	No	Yes	High	Low
HED 3	3	Low	Low	Yes	No	Yes	High	Low
HED 4	6	Medium	Low	Yes	No	Yes	High	Low
HED 5	2	High	Low	Yes	No	Yes	High	High
HED 6	3	High	Medium	Yes	No	No	High	Medium
HED 7	2	High	Low	Yes	No	Yes	High	Low
HED 8	1	Low	High	No	Yes	No	Low	Low
HED 9	3	High	High	Yes	Yes	NO	High	High
HED 10	2	Medium	Low	Yes	No	Yes	Medium	Medium
HED 11	1	Low	Low	Yes	No	Yes	Low	Low
HED12	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 9-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Severe Weather	HED 3, 12	HED 1, 6	HED 5, 7, 10, 12	HED 6	HED 5, 10, 12	HED 1, 9		HED 3, 9, 12
Hurricane	HED 3, 12	HED 1, 6	HED 5, 7, 10, 12	HED 6	HED 5, 10, 12	HED 1, 9		HED 3, 9, 12
Medium-Risk Hazards								
Flooding	HED 2, 3, 4, 6, 12	HED 1, 4, 6	HED 5, 7, 10, 12	HED 6	HED 5, 10, 12	HED 1, 9	HIL 4	HED 3, 9, 12
Low-Risk Hazards								
Drought	HED 3, 11, 8, 12	HED 1, 6	HED 11, 12	HED 8, 11	HED 5, 12		HED 8, 11	HED 7, 12
Fire	HED 2, 3, 12	HED 1, 6	HED12	HED 6	HED 5, 12			HED 3, 12
Mass Movement	HED 2, 3, 12	HED 1, 6	HED12		HED 5, 12	HED 9		HED 3, 12
Earthquake	HED 2, 3, 12	HED 1, 6	HED12		HED 5, 12			HED 3, 12

a. See the introduction to this volume for explanation of mitigation types.

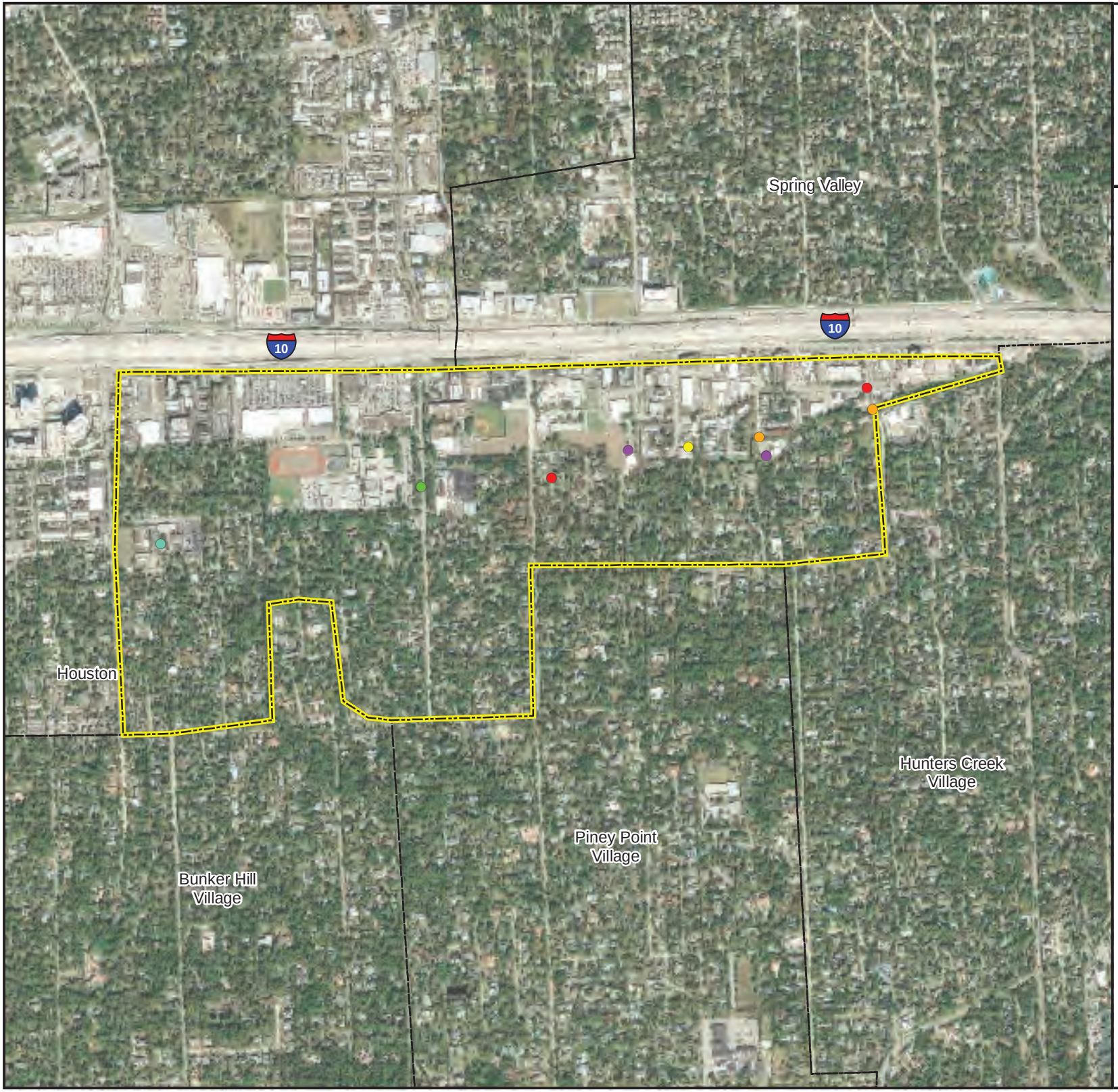
9.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- **The City of Hedwig Village Municipal Code** — The municipal code was reviewed for the full capability assessment and for identifying opportunities for action plan integration.
- **The City of Hedwig Village Flood Damage Prevention Ordinance** — The flood damage prevention ordinance was reviewed for compliance with the National Flood Insurance Program.
- **The City of Hedwig Village MS4 Storm Water Plan--** The MS4 Storm Water Plan was reviewed by TCEQ and is compliance.

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.



Hedwig Village

Critical Facilities

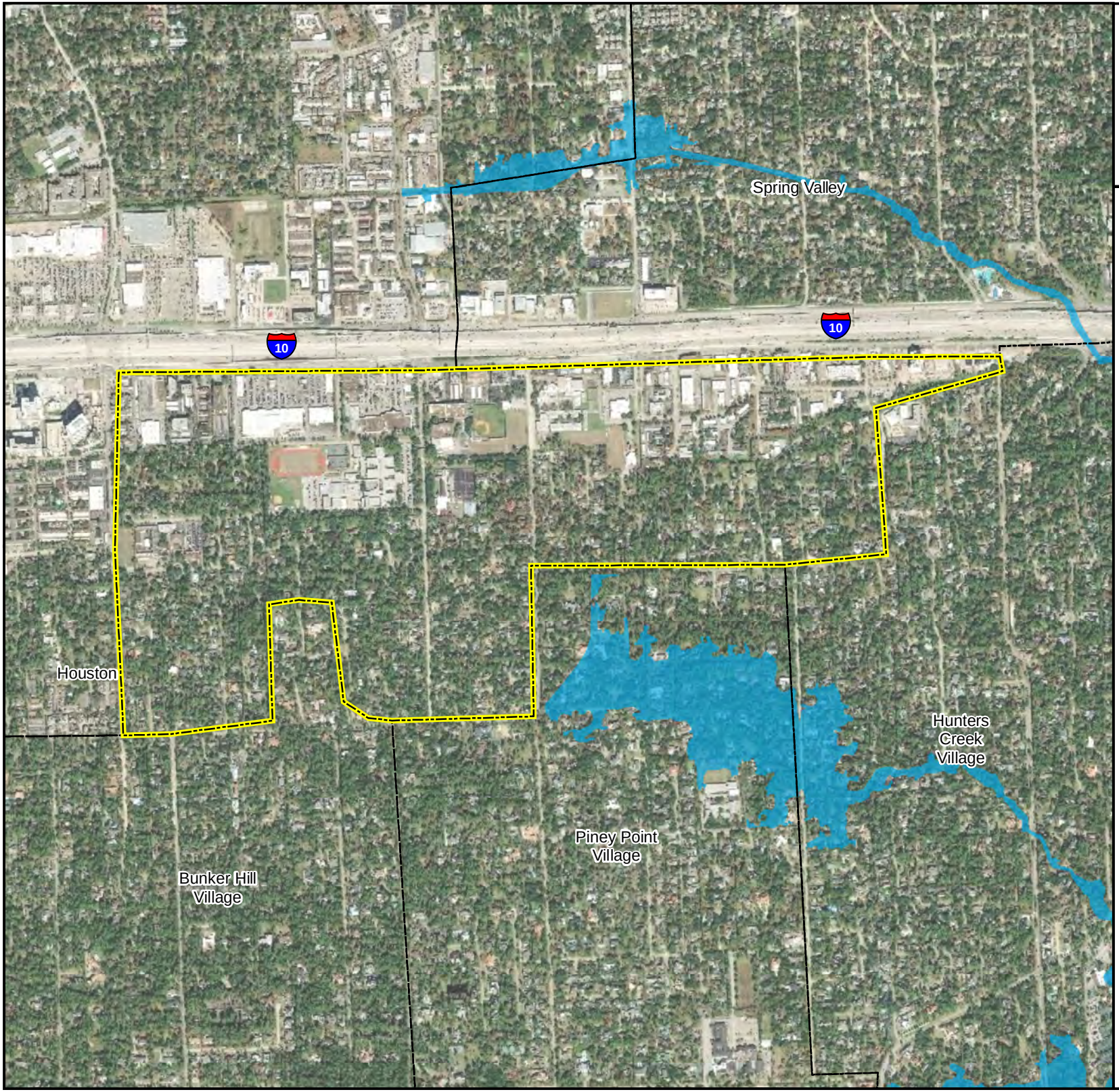
- Education Facilities
- Emergency Services
- Government Facilities
- Hazardous Material Sites
- Health and Medical Facilities
- Historical and Cultural Sites
- Transportation Systems
- Utility Systems
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3 Miles



Hedwig Village

FEMA Flood Hazard

1% Annual Chance Flood (100-yr)

Incorporated Cities

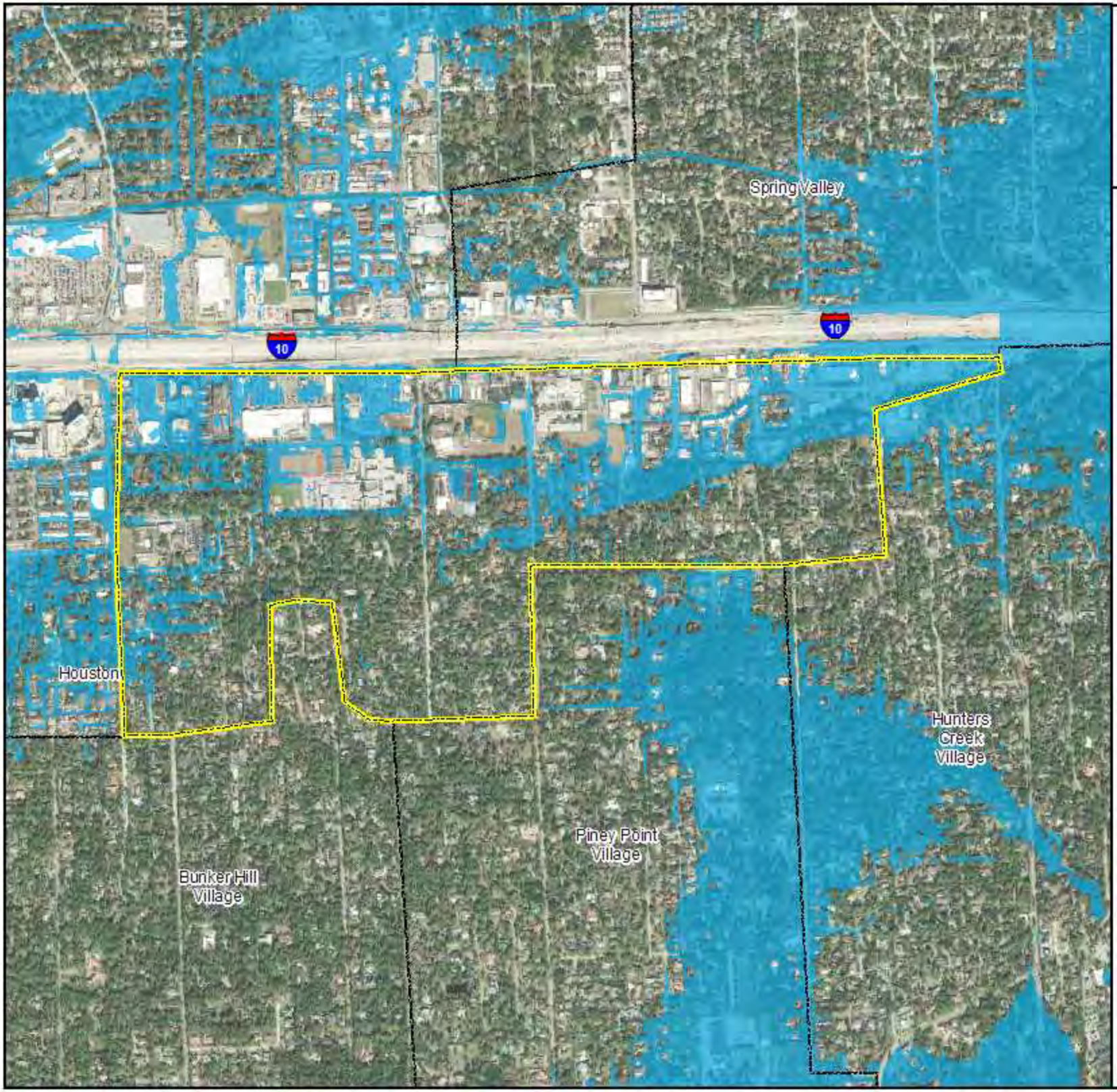
Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3 Miles



Hedwig Village

Flood Hazard Hurricane Harvey

Flooding Extent

Incorporated Cities

Harris County

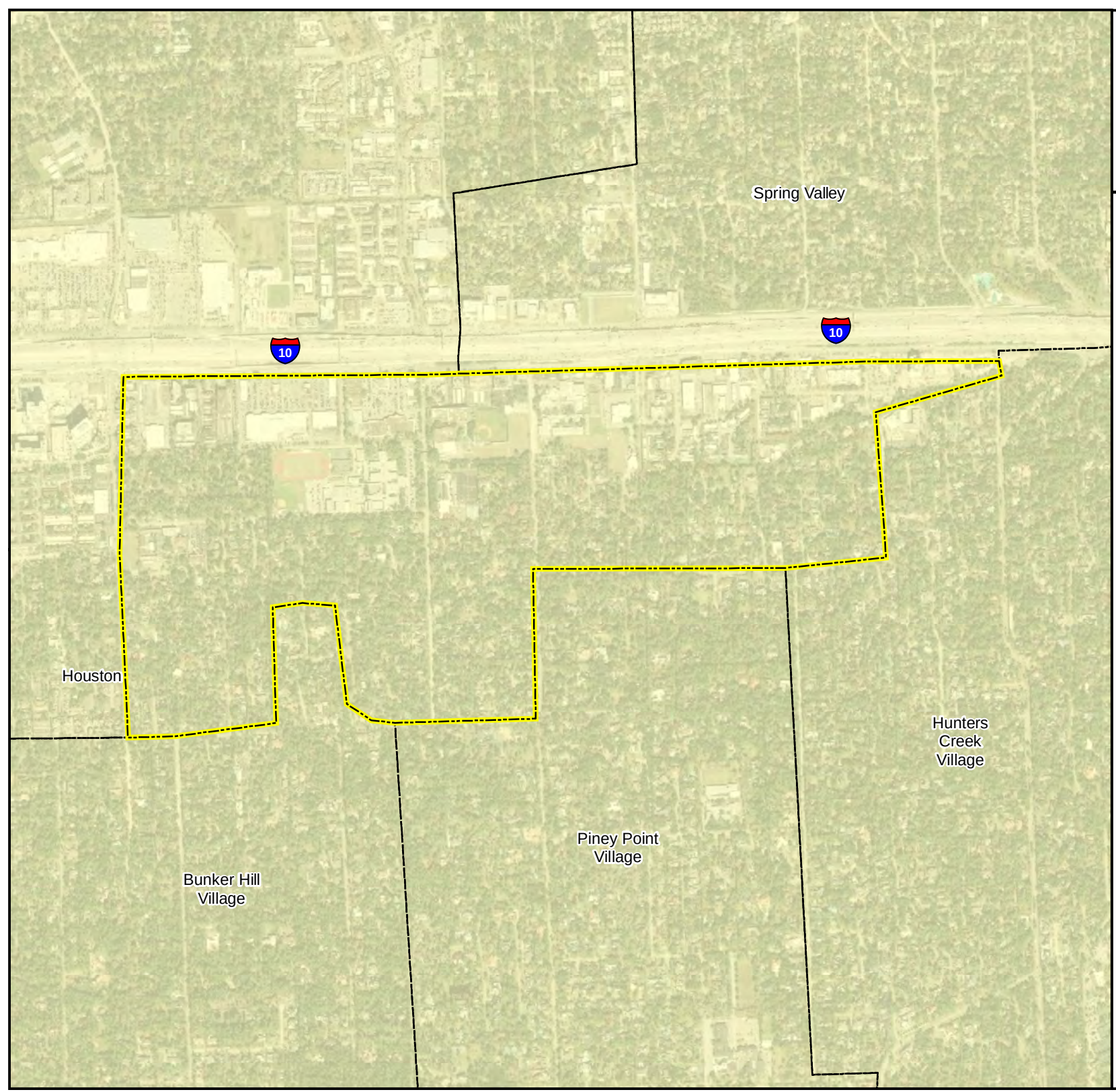
Note: Flooding extent shown for Hazard Mitigation Plan planning area only.

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3 Miles



Hedwig Village

Hurricane Alicia (1983)

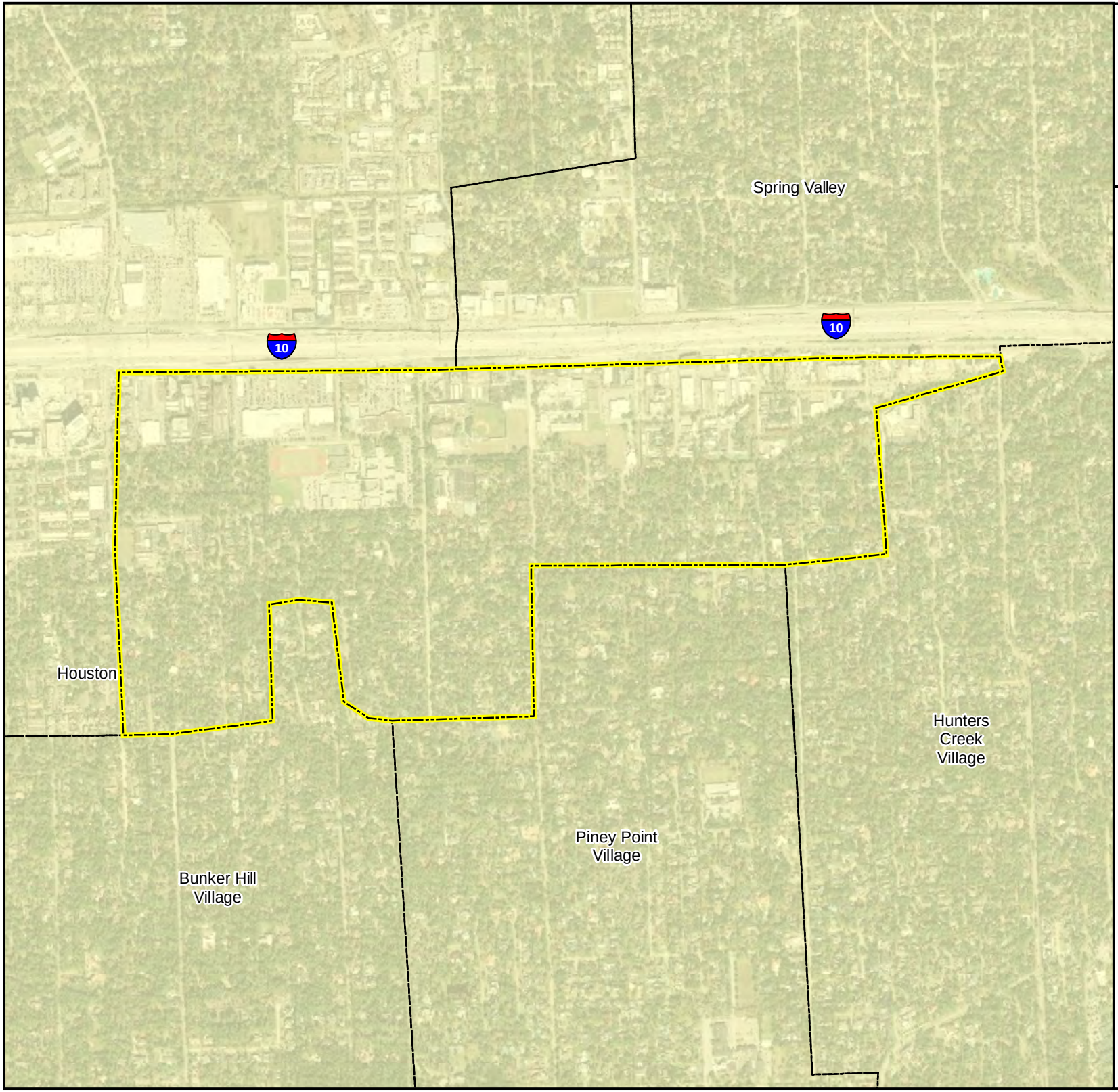
Peak WInd Gust (mph)

- 87 - 94
- 95 - 98
- 99 - 101
- 102 - 104
- 105 - 110
- Storm Track
- Incorporated Cities
- Harris County

TETRA TECH

N

0 0.075 0.15 0.3 Miles



Hedwig Village

20-year Probabilistic Hurricane

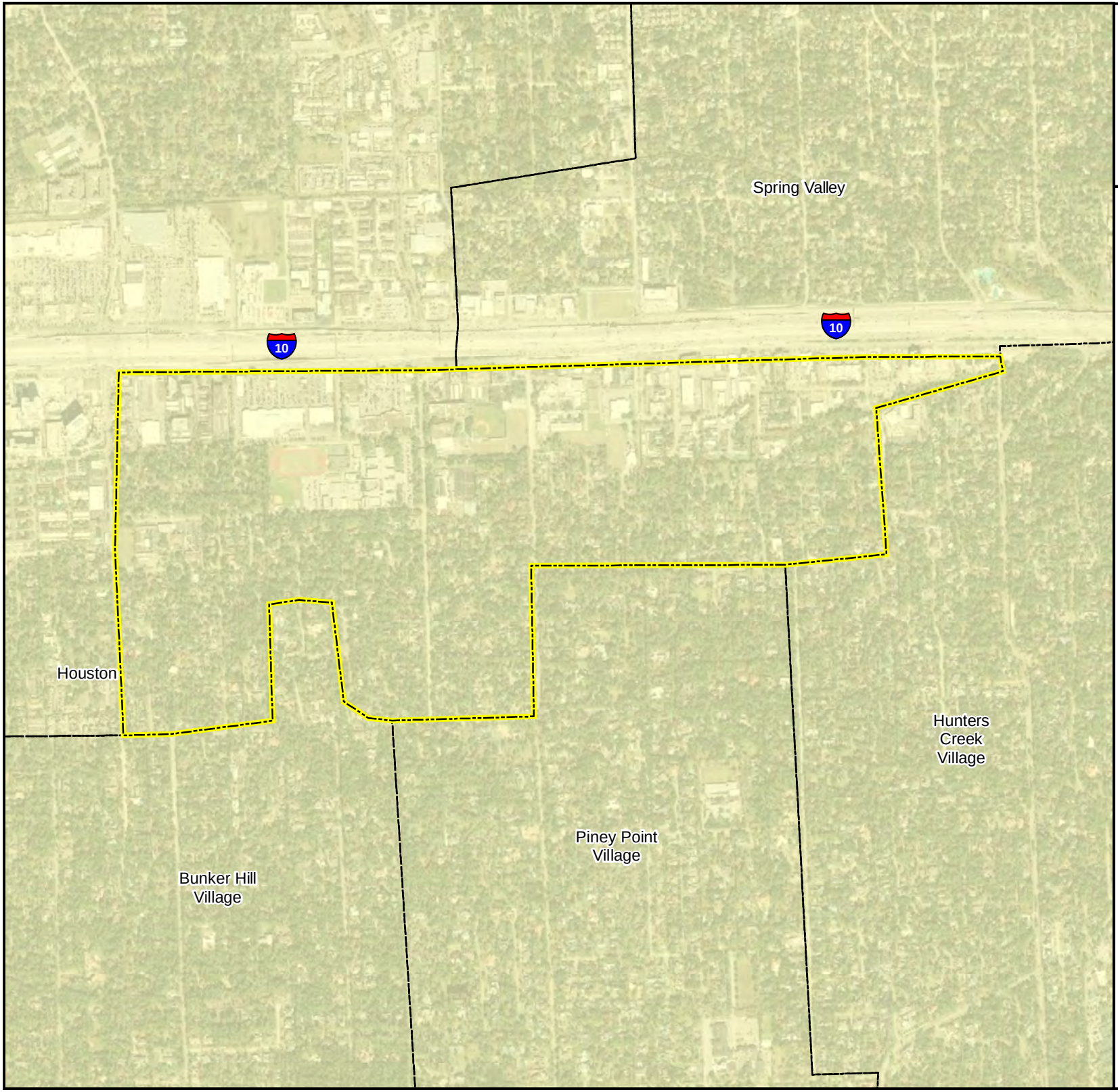
Peak Wind Gust (mph)

- 63 - 71
- 72 - 76
- 77 - 80
- 81 - 84
- 85 - 92
- Incorporated Cities
- Harris County

TETRA TECH

N

0 0.075 0.15 0.3 Miles



Hedwig Village

100-year Probabilistic Hurricane

Peak Wind Gust (mph)

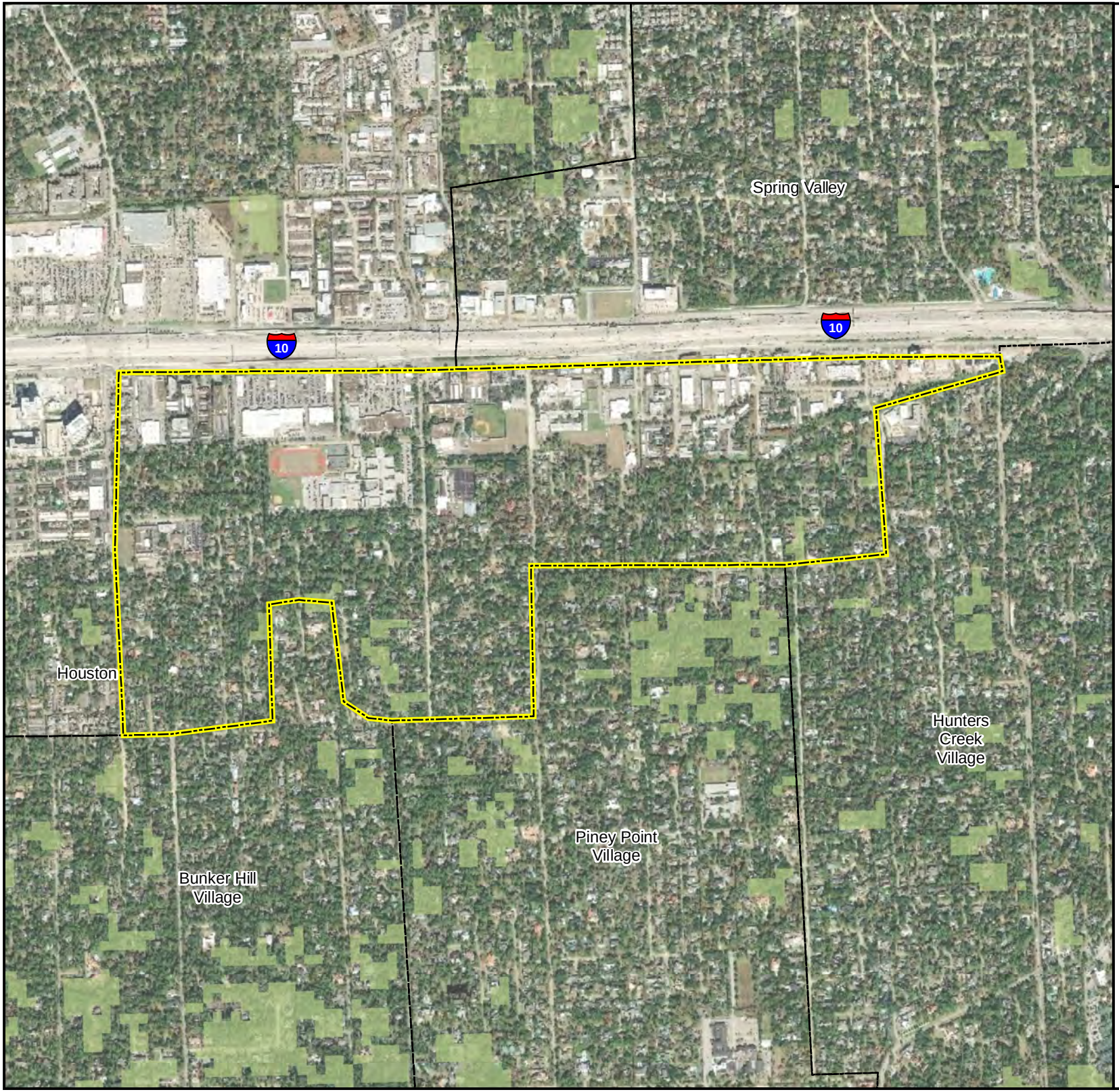
- 89 - 101
- 102 - 106
- 107 - 111
- 112 - 117
- 118 - 128
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3 Miles



Hedwig Village

Wildfire Ignition Density

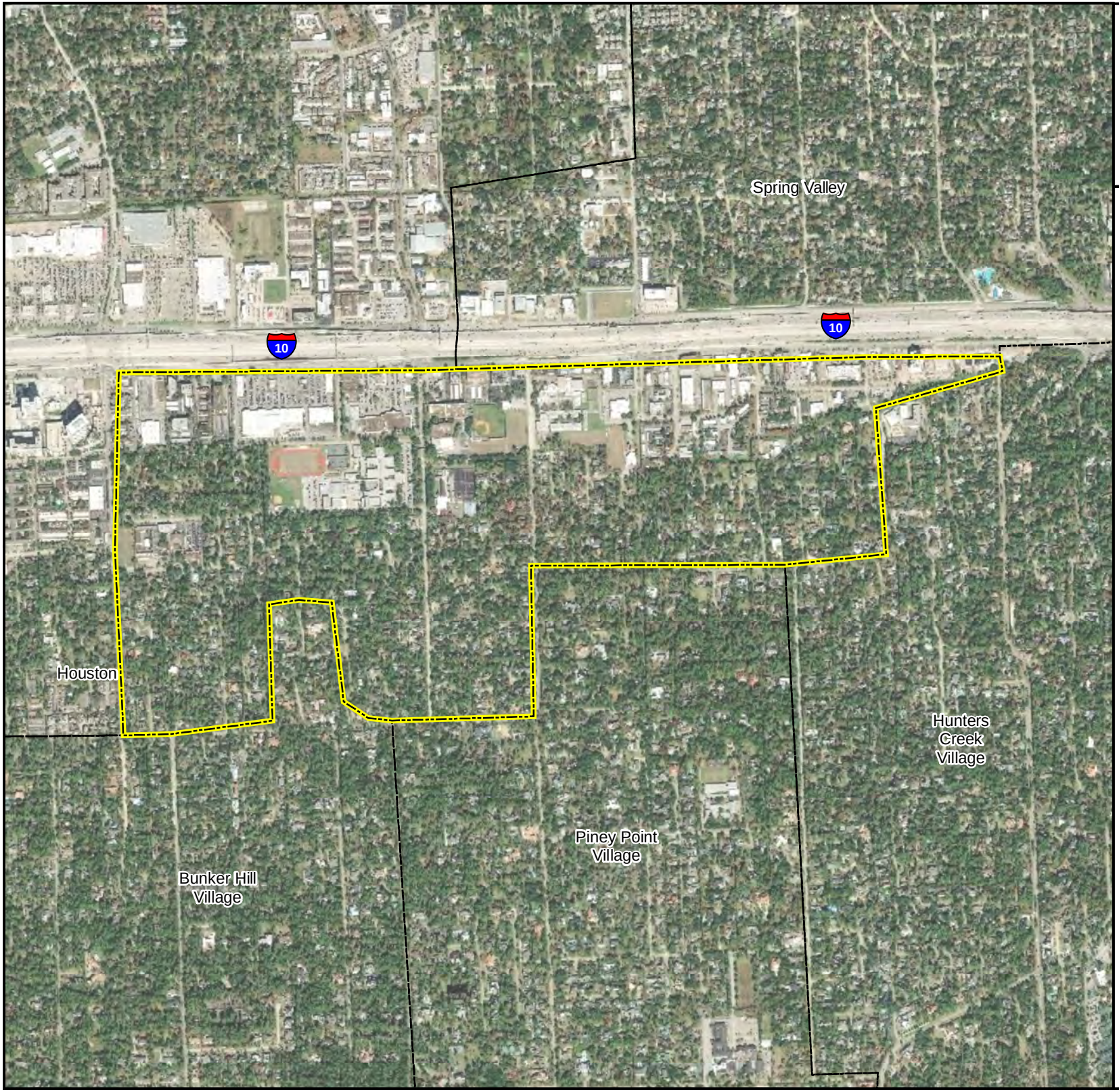
- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3 Miles



Hedwig Village

Wildfire Threat

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3 Miles

10. CITY OF HILSHIRE VILLAGE

10.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Name, Title: Susan Blevins, City Administrator
Street Address: 8301 Westview
City, State ZIP: Houston, Texas 77055
Telephone: 713-973-1779
e-mail Address: susan.blevins@hilshirevillagetexas.com

Alternate Point of Contact
Name, Title: Efrain Him, City Engineer
Street Address: 4828 Loop Central Drive, Ste. 800
City, State ZIP: Houston, Texas 77081
Telephone: 713-622-9264
e-mail Address: efrain.him@hdrinc.com

10.2 JURISDICTION PROFILE

10.2.1 Location

The City of Hilshire Village is located in the southwestern area of Harris County. The current boundaries generally extend from Westview Drive on the north to I-10 on the south, and from Wirt Road on the east to the City of Spring Valley on the west. The City encompasses an area of one-third of a square mile.

10.2.2 History

The City of Hilshire Village was incorporated in 1955. The City today consists of 312 single-family dwellings; two private schools, one preschool/after-school facility, four churches, one small Harris County pocket park, and a small commercial area. Through the years, the City has adopted ordinances establishing zoning regulations to preserve the character of the "Memorial Villages." The six Memorial Villages are independent cities that operate autonomously of Houston. All six are served by the Village Fire Department. Spring Valley Police Department serves the City of Hilshire Village along with the City of Spring Valley. The six villages have executed an inter-local agreement and developed an emergency management guide for emergency needs.

10.2.3 Climate

The climate of the City of Hilshire Village is characterized by relatively high temperatures and evenly distributed precipitation throughout the year with high humidity.

10.2.4 Governing Body Format

The City of Hilshire Village is considered a Type-A General Law City and is governed by a Mayor and five Council Members elected at large. A Type-A General Law City is one that had at the time of its incorporation 600 or more inhabitants. General Law Cities have a population less than 5,000 and are authorized to do only what the State Constitution or Legislature has authorized.

The City Council assumes responsibility for the adoption of this plan; the City Administrator will oversee its implementation.

Table 10-1 lists members of the jurisdiction's joint local mitigation planning team. Howard Miller, emergency management coordinator for the Village Fire Department, also participated in planning for the six Memorial Villages.

Table 10-1. Local Mitigation Planning Team Members

Jurisdiction	Name / Title	Phone	Email
City of Bunker Hill Village	Karen Glynn, City Admin.	713-467-9762	KGlynn@bunkerhilltx.gov
City of Hedwig Village	Kelly Johnson, City Admin./Secretary	713-465-6009	kjohnson@hedwigtx.gov
City of Hilshire Village	Susan Blevins, City Admin/Secretary. Efrain Him	713-973-1779	Susan.blevins@hilshirevillagetexas.com Efrain.him@hdrinc.com
City of Hunters Creek Village	Tom Fullen, City Admin.	713-465-2150	tfullen@cityofhunterscreek.org
City of Piney Point Village	Roger Nelson, City Admin.	713-230-8703	cityadmin@pineypt.org
City of Spring Valley Village	Julie Robinson, City Admin. Arthur Faiello, PW Director	713-465-5306 832-910-8576	jrobinson@springvalleytx.com afaiello@springvalleytx.com

10.3 CURRENT TRENDS

10.3.1 Population

According to the 2010 Census Data, the population of the City of Hilshire Village was 310. Since the 1990 Census, the population has slightly increased.

10.3.2 Development

The City of Hilshire Village is continuing to experience residential redevelopment of new, larger homes. The city is landlocked by other municipalities; therefore there is no growth opportunity. Table 10-2 summarizes development trends in the period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

10.4 CAPABILITY ASSESSMENT

The City of Hilshire Village performed an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities is presented in Table 10-3.
- Development and permitting capabilities are presented in Table 10-4.
- An assessment of fiscal capabilities is presented in Table 10-5.
- An assessment of administrative and technical capabilities is presented in Table 10-6.
- An assessment of education and outreach capabilities is presented in Table 10-7.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 10-8.
- Classifications under various community mitigation programs are presented in Table 10-9.
- The community's adaptive capacity for the impacts of climate change is presented in Table 10-10.

Findings of the capability assessment were reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table included in the action plan for this annex identifies these as community capacity building mitigation actions.

Table 10-2. Recent and Expected Future Development Trends

Criterion	Response
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan? • **If yes, give the estimated area annexed and estimated number of parcels or structures.**	NO N/A
Is your jurisdiction expected to annex any areas during the performance period of this plan? • **If yes, describe land areas and dominant uses.** • **If yes, who currently has permitting authority over these areas?**	NO N/A N/A
Are any areas targeted for development or major redevelopment in the next five years? • **If yes, briefly describe, including whether any of the areas are in known hazard risk areas**	yes The City of Hilshire Village is continuing to experience residential redevelopment of new, larger homes. A developer recently subdivided a track of land into 10 lots.
How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?	

	2014	2015	2016	2017	2018
Single Family	8	4	3	7	3
Multi-Family	N/A	N/A	N/A	N/A	N/A
Other (commercial, mixed use, etc.)	N/A	N/A	1	2	N/A
Total	**10**	**4**	**4**	**9**	**3**

Provide the number of new-construction permits for each hazard area or provide a qualitative description of where development has occurred.	• Special Flood Hazard Areas: #N/A • Landslide: # N/A • High Liquefaction Areas: # N/A • Tsunami Inundation Area: # N/A • Wildfire Risk Areas: # N/A
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	City of Hilshire Village continues to experience redevelopment of their residential lots; older homes are demolished and new homes constructed.

Table 10-3. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code ***Comment:*** *Ord # 719*	Yes	Yes	Yes	Yes
Zoning Code ***Comment:*** *Chapter 12 code of ordinances*	Yes	Yes	Yes	Yes
Subdivisions ***Comment:*** *Chapter 9, Article 9.100, 6/28/2016*	Yes	Yes	Yes	Yes
Stormwater Management ***Comment:*** *Ordinance and TCEQ*	Yes	Yes	Yes	Yes
Post-Disaster Recovery ***Comment:*** *Mutual Aid Agreement with Harris County , FEMA, TDEM*	Yes	Yes	Yes	No

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Real Estate Disclosure	No	No	No	No
Comment:				
Growth Management	Yes	Yes	Yes	Yes
Comment:				
Site Plan Review	Yes	Yes	Yes	No
Comment: *Building Official, City Engineer, Village Fire Department and HCFCD*				
Environmental Protection	No	Yes	Yes	No
Comment: *TCEQ, EPA*				
Flood Damage Prevention	Yes	No	Yes/	/No
Comment:				
Emergency Management	Yes	Yes	Yes	Yes
Comment: *Harris County Emergency Management, Village Fire Department*				
Climate Change	No	No	No	/No
Comment: *N/a*				
Planning Documents				
General Plan	Yes	/No	Yes	Yes
Comment: *Zoning Ordinance*				
Capital Improvement Plan	Yes	No	No	Yes
How often is the plan updated?				
Comment: *We have a 5 year plan but we review yearly during the budget process*				
Disaster Debris Management Plan	Yes	Yes	Yes	No
Comment: *Interlocal with Harris County*				
Floodplain or Watershed Plan	No	Yes	No	No
Comment: *Harris County Flood Control Agreement*				
Stormwater Plan	Yes	Yes	No	Yes
Comment: *TCEQ*				
Urban Water Management Plan	No	Yes	Yes	No
Comment: *City of Houston*				
Habitat Conservation Plan	No	Yes/	No	No
Comment: *Wild Life Protection Services*				
Economic Development Plan	Yes	No	Yes	No
Comment: *Do not have a plan*				
Shoreline Management Plan	No	No	No	No
Comment:				
Community Wildfire Protection Plan	No	No	No	No
Comment:				
Forest Management Plan	No	No	No	No
Comment:				
Climate Action Plan	No	No	No	No
Comment:				
Comprehensive Emergency Management Plan	Yes	Yes	Yes	No
Comment: *Harris County Emergency Management*				
Threat & Hazard Identification & Risk Assessment (THIRA)	No	No	No	No
Comment: *Harris County Hazard Mitigation Plan*				
Post-Disaster Recovery Plan	Yes	Yes	Yes	No
Comment: *Harris County Emergency Management*				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Continuity of Operations Plan	No	No	No	No
Comment:				
Public Health Plan	No	Yes	No	No
Comment: *Interlocal with Harris County*				

Table 10-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • If no, who does? If yes, which department?	Yes
Does your jurisdiction have the ability to track permits by hazard area?	No
Does your jurisdiction have a buildable lands inventory?	No

Table 10-5. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants	No
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer,	Yes
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	No
Other Infrastructure is required before City assumes the ownership	No

Table 10-6. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	City Engineer – Under contract
Engineers or professionals trained in building or infrastructure construction practices	Yes	City Engineer and Building Official under contract – Also Fire Marshal
Planners or engineers with an understanding of natural hazards	Yes	City Engineer – Under contract
Staff with training in benefit/cost analysis	Yes	City Engineer – Under contract
Surveyors	Yes	City Engineer – Under contract
Personnel skilled or trained in GIS applications	Yes	City Engineering Firm – Under contract
Scientist familiar with natural hazards in local area	Yes	City Engineering Firm – Under contract
Emergency manager	Yes	Village Fire Department
Grant writers	Yes	City Engineering Firm – Under contract
Other	Yes/No	

Table 10-7. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes the Mayor
Do you have personnel skilled or trained in website development?	Yes – under contract
Do you have hazard mitigation information available on your website? • If yes, briefly describe.	No
Do you use social media for hazard mitigation education and outreach? • If yes, briefly describe.	No
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • If yes, briefly describe.	No
Do you have any other programs already in place that could be used to communicate hazard-related information? • If yes, briefly describe.	Yes Website, email and reverse 911
Do you have any established warning systems for hazard events? • If yes, briefly describe.	Yes Website, email and reverse 911

Table 10-8. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	City Engineering Under contract
Who is your floodplain administrator? (department/position)	Mayor who then assigns to City Engineer
Are any certified floodplain managers on staff in your jurisdiction?	City Engineering Under contract
What is the date that your flood damage prevention ordinance was last amended?	March 18, 2014
Does your floodplain management program meet or exceed minimum requirements? • If exceeds, in what ways?	Meets
When was the most recent Community Assistance Visit or Community Assistance Contact?	
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • If so, state what they are.	No
Are any RiskMAP projects currently underway in your jurisdiction? • If so, state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • If no, state why.	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? • If so, what type of assistance/training is needed?	No City Engineer is contracted
Does your jurisdiction participate in the Community Rating System (CRS)? • If yes, is your jurisdiction interested in improving its CRS Classification? • If no, is your jurisdiction interested in joining the CRS program?	Yes No Yes/No
How many flood insurance policies are in force in your jurisdiction?[a] • What is the insurance in force? • What is the premium in force?	143 $48,642,200 $58,006
How many total loss claims have been filed in your jurisdiction? *Total closed paid policies 33* • How many claims are still open or were closed without payment? • What were the total payments for losses?	Insert appropriate information Insert appropriate information $1,223,649

a. According to FEMA statistics as of MONTH XX, 201X

Table 10-9. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	No		Date
Building Code Effectiveness Grading Schedule	Yes	Personal Class 5 and Commercial Class 5	8/2015
Public Protection	Yes	1	2015
Storm Ready	No		
Firewise	No		

Table 10-10. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts *Comment:*	Low
Jurisdiction-level monitoring of climate change impacts *Comment:*	Low
Technical resources to assess proposed strategies for feasibility and externalities *Comment:*	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory *Comment:*	Low
Capital planning and land use decisions informed by potential climate impacts *Comment:*	Low
Participation in regional groups addressing climate risks *Comment:*	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes *Comment:*	Low
Identified strategies for greenhouse gas mitigation efforts *Comment:*	Low
Identified strategies for adaptation to impacts *Comment:*	Low
Champions for climate action in local government departments *Comment:*	Low
Political support for implementing climate change adaptation strategies *Comment:*	Low
Financial resources devoted to climate change adaptation *Comment:*	Low
Local authority over sectors likely to be negative impacted *Comment:*	Low
Public Capacity	
Local residents knowledge of and understanding of climate risk *Comment:*	Low
Local residents support of adaptation efforts *Comment:*	Low
Local residents' capacity to adapt to climate impacts *Comment:*	Low

Criterion	Jurisdiction Rating[a]
Local economy current capacity to adapt to climate impacts *Comment:*	Low
Local ecosystems capacity to adapt to climate impacts *Comment:*	Low

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

10.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning and capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

10.5.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- MS4 Stormwater Plan in Progress
- All Hazard Mitigation Plan

10.5.2 Opportunities for Future Integration

The capability assessment presented in this annex identified no plans or programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future.

10.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 10-11 lists past occurrences of natural hazards for which specific damage was recorded in City of Hilshire Village. Other hazard events that broadly affected the entire planning area, including City of Hilshire Village are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 10-11. Past Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Hurricane Alicia	689 DR	1983	$2,299,792
Severe Weather (Wind)	36254	6/5/2011	$15,000
Hurricane Harvey	4332 DR	2017	$36,938,741

10.7 HAZARD RISK RANKING

Table 10-12 presents a local ranking for City of Hilshire Village of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 10-12. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Severe Weather	48	High
2	Hurricane	32	High
3	Flooding	18	Medium
4	Earthquake	14	Low
5	Wild Fire	6	Low
5	Drought	6	Low
5	Hazardous materials	6	Low
6	Coastal Erosion	0 (No Exposure)	None
6	Tsunami	0 (No Exposure)	None
6	Mass Movements	0 (No exposure)	None
6	Dam Failure	0 (No Exposure)	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

10.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. This section provides information on a few key vulnerabilities for the jurisdiction. Available jurisdiction-specific risk maps of the hazards are provided at the end of this annex.

10.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: 1
- Number of FEMA-identified Severe-Repetitive-Loss Properties: 1
- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated: 0

10.8.2 Other Noted Vulnerabilities

The following jurisdiction-specific issue has been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- Age and type of the tree canopy.

Mitigation actions addressing this issue were prioritized for consideration in the action plan in this annex.

10.9 STATUS OF PREVIOUS PLAN ACTIONS

Table 10-13 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

10.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 10-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 10-15 identifies the priority for each action. Table 10-16 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 10-13. Status of Previous Plan Actions

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
2014HILVIL001 — Revise drainage ordinance to require detention for future development and redevelopment	yes			
Comment: The City has a new development coming in off Westview. They are installing underground detention and will tie into the City of Houston's drainage system. City has adopted an ordinance that states the maximum coverage of any lot with any non-constructed surface shall not exceed 55 percent of the lot area located behind the required front building line and shall not exceed 50 percent of the lot area located in front of the required front building line. Also, the City amended its drainage guidelines to not allow rain gutter downspouts to be tied into existing or proposed underground storm sewer lines that drain directly into the City's ditches on the front and/or side of the owner's property, nor shall they be extended to tie directly into the City's ditches. Rain gutter downspouts, however, may be tied into: (a) on-site (below ground) retention features that would allow storm water to percolate into the ground; or (b) on-site (below ground) retention features to re-use storm water runoff for "green" applications such as irrigation.				
2014HILVIL002 — Update and adopt higher standards to enhance floodplain management and incorporate into the local FDPO.	yes			
Comment: The City recently approved an ordinance that requires the maximum coverage of any lot with any non-constructed surface shall not exceed 55 percent of the lot area located behind the required front building line and shall not exceed 50 percent of the lot area located in front of the required front building line. Also, the City amended its drainage guidelines to not allow rain gutter downspouts to be tied into existing or proposed underground storm sewer lines that drain directly into the City's ditches on the front and/or side of the owner's property, nor shall they be extended to tie directly into the City's ditches. Rain gutter downspouts, however, may be tied into: (a) on-site (below ground) retention features that would allow storm water to percolate into the ground; or (b) on-site (below ground) retention features to re-use storm water runoff for "green" applications such as irrigation.				
2014HILVIL003 — Retrofit critical infrastructure (City Hall – Emergency Command Center) with impact and wind resistant glass	no		Yes	**HIL5**
Comment: Project started – Did research on building. The roof is rated for 110 mph Class B. Need to have windows and building inspected				
2014HILVIL004 — Retrofit and harden roofing of critical infrastructure (City Hall – Emergency Command Center) to industry accepted high-wind building standards.	yes			
Comment: Inspected roof to make sure it was met Hurricane standards and was in good shape – It was.				
2014HILVIL005 — Develop/Implement tree management program and mitigation measures	Yes			
Comment: The City is pro-active with notifying residence of dead trees and asking them to remove. CenterPoint comes through the City and trims trees that might cause damage to their infrastructure. The City has signed an Inter-Local Agreement with Harris County for debris mitigation after a disaster				
2014HILVIL006 — Expand early warning alarm system (Code Red Mass Notification System) to increase coverage of the Community's population.	Yes			
Comment: The City utilizes the Nixle Mass Notification System provided by the Police Department. The Nixle system is established and reaches the City's community. The Police Department also has the capability to use Harris County Reverse 911 for Hilshire Village				
2014HILVIL007 — Join FireWise to educate community on wildfire risks and provide actions to take to protect property and equipment from wildfire damages.	No		Yes	**HIL8**
Comment: Started – Working with the Fire Department on ordering material and scheduling a safety awareness meeting. Fire Department has had several awareness meeting and the City is scheduling to have a City Hall after material arrives				
2014HILVIL008 — Install drought-resistant landscaping (xeriscaping) in common and public areas as part of the water conservation program	No		Yes	**HIL9**
Comment: Started – Working on replacing landscaping in common areas that are drought resistant. The City has also adopted a Draught Contingency Plan				

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
2014HILVIL009 — Installation of a rainwater collection system for irrigation/sprinkler systems to mitigate drought conditions at City Hall	No		Yes	**HIL10**
Comment: Have not started				
2014HILVIL010 — Install/Improve lighter color roofing of critical infrastructure (City Hall – Emergency Command Center)	No	Removed, not feasible		
Comment: Have not started				
2014HILVIL011 — Install cover and freeze insulation protection of above ground public irrigation systems/equipment to mitigate damage from freezing temperatures.	No		Yes	**HIL12**
Comment: started				
2014HILVIL012 — Installation of signs prohibiting/banning the commercial transportation of hazardous materials through the City	No		Yes	HIL13
Comment: Started Added no thru truck signs in several locations – ordered signs for additional locations				
2014HILVIL013 — Identify exposed/above ground energy pipelines in flood hazard area	yes			
Comment: Completed – The City has no pipelines running through the City				
2010HILVIL001 — Expand early Warning Community Notification system (Code Red Mass Notification System) to provide coverage to residents that would be impacted by flooding.	yes			
Comment: The City utilizes the Nixle Mass Notification System provided by the Police Department. The Nixle system is established and reaches the City's community. The Police Department also has the capability to use Harris County Reverse 911 for Hilshire Village				
2010HILVIL003 — Non Structural Mitigation Measure – Buried power lines, and generators Install generators at critical facilities to sustain critical operations from power outages due to damages from hazards.	No		Yes	**HIL7**
Comment: CenterPoint will not bury power lines because this is cost prohibitive and there is limited access due to the area being wooded. The City Hall has a generator installed, but the City still needs a generator at its Lift Station.				
2010HILVIL004 — Develop a Residential debris and tree management program to reduce damages from high-winds	No		Yes	**HIL14**
Comment: This is an ongoing activity. The City maintains ravines and gullies to minimize flooding. The City will implement this activity every other year and is before City Council in 2016. The City is proactive in managing tree/wooded areas of the community. CenterPoint also maintains tree line to prevent damage to over-head power lines.				
2010HILVIL005 — Implement Non Structural Mitigation Measures by burying power lines to reduce damages to electrical lines from high-winds.	No	Yes		
Comment: CenterPoint will not bury power lines because this is cost prohibitive and there is limited access due to the area being wooded.				
2010HILVIL006 — Develop a Residential debris and tree management program to reduce damages from high-winds	No		Yes	**HIL14**
Comment: This is an ongoing activity. The City maintains ravines and gullies to minimize flooding. The City will implement this activity every other year and is before City Council in 2016. The City is proactive in managing tree/wooded areas of the community. CenterPoint also maintains tree line to prevent damage to over-head power lines.				
2010HILVIL007 — Install/expand community early warning system (Code Red Mass Notification System) to increase coverage to the community's population	yes			
Comment: The City utilizes the Nixle Mass Notification System provided by the Police Department. The Nixle system is established and reaches the City's community.				

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
2010HILVIL008 — Install lightning and surge protection measures for critical infrastructure	yes			
Comment: Lift Station and City Hall has surge protection.				
2010HILVIL012 — Develop/implement groundwater contingency planning/measures for Critical Infrastructure and Fire Protection		deleted		
Comment: Not Started. This action is no longer feasible. TCEQ requires cities to install pressure boosters for fire protection. However, the City does not have a water facility and received a waiver and exemption. The Project Cost was estimated in the millions and was considered an undue hardship.				
2010HILVIL0014 — Install/Expand a Community early warning system (Code Red Mass Notification System) to increase coverage to the community's population	yes			
Comment: The City utilizes the Nixle Mass Notification System provided by the Police Department. The Nixle system is established and reaches the City's community.				
2010HILVIL016 — Clean-up of heavy wildfire fuel areas (abandoned buildings, abandoned lands, etc.).	yes			
Comment: Renovated and cleaned up. The commercial area has been cleaned up				
2010HILVIL018 — Develop/implement tree management planning and mitigation measures. Bury Power lines	yes			
Comment: Completed – New ordinance approved and it has become an ongoing policy now to keep trees trimmed in the right of way. CenterPoint will not bury transmission power lines. However, some residents have self-funded their service lines being buried				
2010HILVIL020 — Develop relationship with local LEPC.	yes			
Comment: The six Memorial Villages in conjunction with the Village Fire Department have developed a plan to pull resources and have a unified EOC. The plan has been tested and will be an ongoing development.				
2010HILVIL022 — Develop relationship with local LEPC	yes			
Comment: Started Added no thru truck signs in several locations – ordered signs for additional locations				

Table 10-14. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action HIL1 — Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Severe weather, drought, earthquake, flooding, wildfire, flooding, hurricane						
Existing	3, 4, 10	Public Works	TBD	High	HMGP, PDM, FMA	Short-term
Action HIL2 — Integrate the hazard mitigation plan into other plans, ordinances and programs that dictate land use decisions in the community, including development and drainage.						
Hazards Mitigated: Severe weather, drought, earthquake, flooding, wildfire, flooding, hurricane						
New and Existing	1, 3, 4, 5, 7, 8, 10	Building	Harris County, Houston-Galveston Council of Governments	Low	Staff Time, General Funds	Ongoing
Action HIL3 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: Severe weather, hurricane, flooding, wild fire, drought, earthquake						
New and Existing	1, 5, 8	Public Works	Harris County	Low	Staff Time, General Funds	Short-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action HIL4 — Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements: • Enforce the flood damage prevention ordinance. • Participate in floodplain identification and mapping updates. • Provide public assistance/information on floodplain requirements and impacts. *Hazards Mitigated:* flooding, severe weather, tsunami, sea level rise						
New and Existing	1, 3, 5, 7, 8, 10	Public Works	Building Department, Harris County, Houston Galveston Council of Governments	Low	Staff Time, General Funds	Ongoing
Action HIL5 — Retrofit critical infrastructure (City Hall – Emergency Command Center) with impact and wind resistant glass *Hazards Mitigated:* Severe weather, Hurricane						
Existing	10, 11, 13, 15	Public Works	TBD	Medium	Staff time, General Funds, Hazard Mitigation Grant Program, Pre-Disaster Mitigation, Flood Mitigation Assistance, other grant opportunities	Short Term
Action HIL6 — The City maintains ravines and gullies to minimize flooding. The City will implement this activity every other year. The City is proactive in managing tree/wooded areas of the community. CenterPoint also maintains tree line to prevent damage to over-head power lines. *Hazards Mitigated:* Severe weather, hurricane, flooding.						
Existing	2, 8, 11, 13, 15	Public Works	TBD	Medium	Staff time, general fund, Hazard Mitigation Grant Program, Pre-Disaster Mitigation, Flood Mitigation Assistance, other grant opportunities	Ongoing
Action HIL7 — Install generators at critical facilities to sustain critical operations from power outages due to damages from hazards. *Hazards Mitigated:* Severe weather, hurricane, flooding						
Existing	2, 11, 13, 15	Public Works	TBD	$100,000	Staff time, general fund, Hazard Mitigation Grant Program, Pre-Disaster Mitigation, other grant opportunities	Short Term
Action HIL8 — Join FireWise to educate community on wildfire risks and provide actions to take to protect property and equipment from wildfire damages. *Hazards Mitigated:* Wild fire						
Existing	1, 2	Administration	Harris County, Houston Galveston Area Council of Governments	Low	Staff time, general fund	Short Term
Action HIL9 — Install drought-resistant landscaping (xeriscaping) in common and public areas as part of the water conservation program *Hazards Mitigated:* Drought						
Existing	2, 8, 11, 15	Public Works	Harris County, Houston Galveston Area Council of Governments	Medium	Staff time, general fund.	Long Term
Action HIL10 — Installation of a rainwater collection system for irrigation/sprinkler systems to mitigate drought conditions at City Hall *Hazards Mitigated:* Drought						
New	7, 8, 10	Public Works	TBD	Medium	Staff time, general fund, grant opportunities	Ongoing

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action HIL11 — Maintenance and improvement of the Harris County drainage channel #W 140-04-00, to mitigate severe weather hazards.						
Hazards Mitigated: Severe weather, flooding, hurricane						
Existing	2, 8, 11	Public Works	Harris County Flood Control, Harris County, Galveston Area Council of Governments	Medium	general fund, Hazard Mitigation Grant Program, Pre-Disaster Mitigation	Long Term
Action HIL12 — Install cover and freeze insulation protection of above ground public irrigation systems/equipment to mitigate damage from freezing temperatures.						
Hazards Mitigated: Severe weather						
Existing	11, 13	Public Works	TBD	Medium	Staff time, general fund	Short Term
Action HIL13 — Installation of signs prohibiting/banning the commercial transportation of hazardous materials through the City						
Hazards Mitigated: Hazardous material						
Existing	6, 11	Public Works		Low	Staff time, General Fund	Short Term
Action HIL14 — Develop a Residential debris and tree management program to reduce damages from high-winds						
Hazards Mitigated: Severe weather, hurricane						
Existing	4, 8, 11, 15	Public Works	CenterPoint Energy, Building Department Harris County	Medium	Staff time, general fund, Hazard Mitigation Grant Program.	Ongoing
Action HIL15— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Wild Fire, Drought, Earthquake						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	Hilshire Village	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 10-15. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
HIL1	3	High	High	Yes	Yes	No	Medium	High
HIL2	7	Medium	Low	Yes	No	Yes	High	Low
HIL3	3	Low	Low	Yes	No	Yes	High	Low
HIL4	6	Medium	Low	Yes	No	Yes	High	Low
HIL5	4	Medium	Medium	Yes	Yes	No	Medium	High
HIL6	5	High	Medium	Yes	Yes	Yes	High	Medium
HIL7	4	High	Medium	Yes	Yes	No	High	High
HIL8	2	Low	Low	Yes	No	Yes	Low	Low
HIL9	4	Low	Medium	Yes	No	No	Low	Low
HIL10	3	Low	Medium	Yes	Yes	Yes	Low	Low

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
HIL11	3	Medium	Medium	Yes	Yes	No	Medium	Medium
HIL12	2	Medium	Medium	Yes	No	No	Medium	Low
HIL13	2	High	Low	Yes	No	Yes	High	Low
HIL14	4	High	Medium	Yes	Yes	No	Medium	Medium
HIL15	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 10-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Severe Weather	HIL 2, 3, 4, 15	HIL 1, 6	HIL 4, 15	HIL 3, 6, 11	HIL 7, 14, 15	HIL 5, 12		HIL 3, 15
Hurricane	HIL 2, 3, 4, 15	HIL 1, 6	HIL 4, 15	HIL 3, 6, 11	HIL 7, 14, 15	HIL 5		HIL 3, 15
Medium-Risk Hazards								
Flooding	HIL 2, 3, 4, 15		HIL 4, 15	HIL 3, 6, 11	HIL 7, 14, 15	HIL 5	HIL 4	HIL 3, 15
Low-Risk Hazards								
Wild Fire	HIL 2, 3, 15	HIL 1, 6	HIL 8, 14, 15	HIL 3, 14	HIL 7, 14, 15			HIL 3, 15
Drought	HIL 2, 3, 15	HIL 1	HIL15	HIL 3	HIL15	HIL 10	HIL 9, 10	HIL 3, 15
Earthquake	HIL 2, 3, 15	HIL 1	HII15	HIL 3	HIL15			HIL 3, 15
Hazardous Materials	HIL 2, 3, 15	HIL 1	HIL 13, 15	HIL 3	HIL15			HIL 3, 15

a. See the introduction to this volume for explanation of mitigation types.

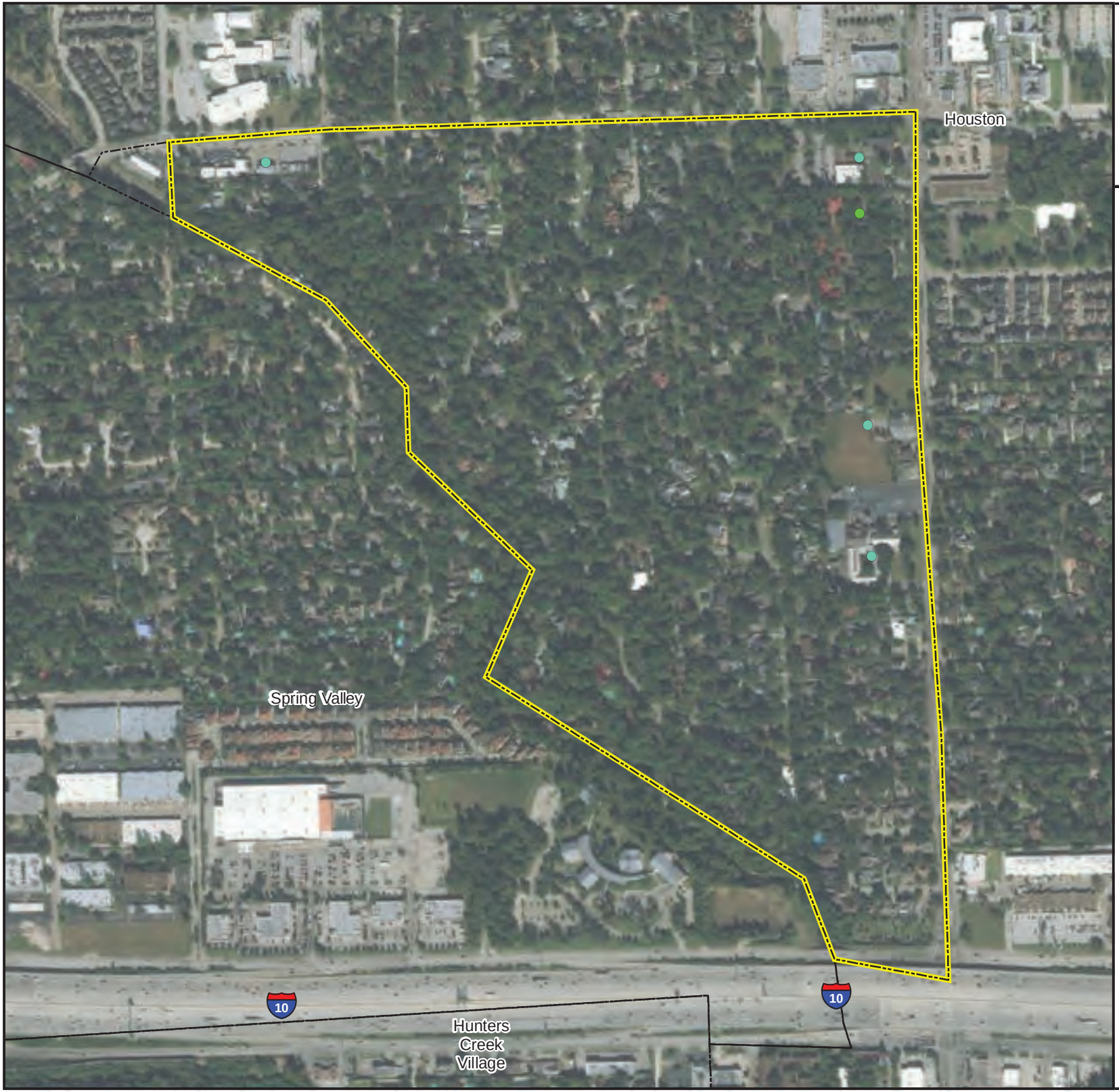
10.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

The following technical reports, plans, and regulatory mechanisms were reviewed for this annex.

- **Municipal Code** — The municipal code was reviewed for the full capability assessment and for identifying opportunities for action plan integration.
- **Flood Damage Prevention Ordinance** — The flood damage prevention ordinance was reviewed for compliance with the National Flood Insurance Program.

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.



Hilshire Village

Critical Facilities

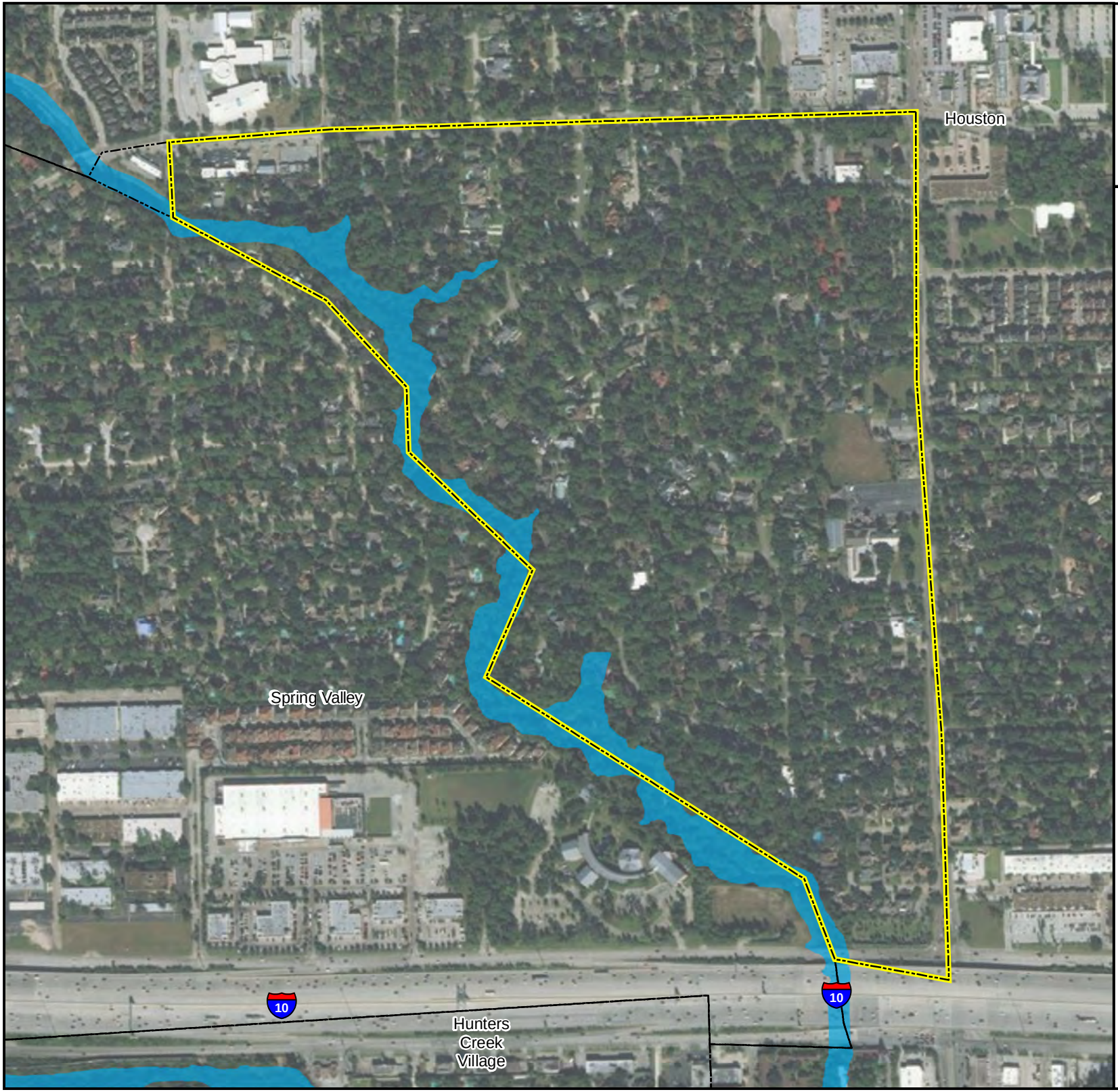
- Education Facilities
- Emergency Services
- Government Facilities
- Hazardous Material Sites
- Health and Medical Facilities
- Historical and Cultural Sites
- Transportation Systems
- Utility Systems
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.035 0.07 0.14 Miles



Hilshire Village

FEMA Flood Hazard

1% Annual Chance Flood (100-yr)

Incorporated Cities

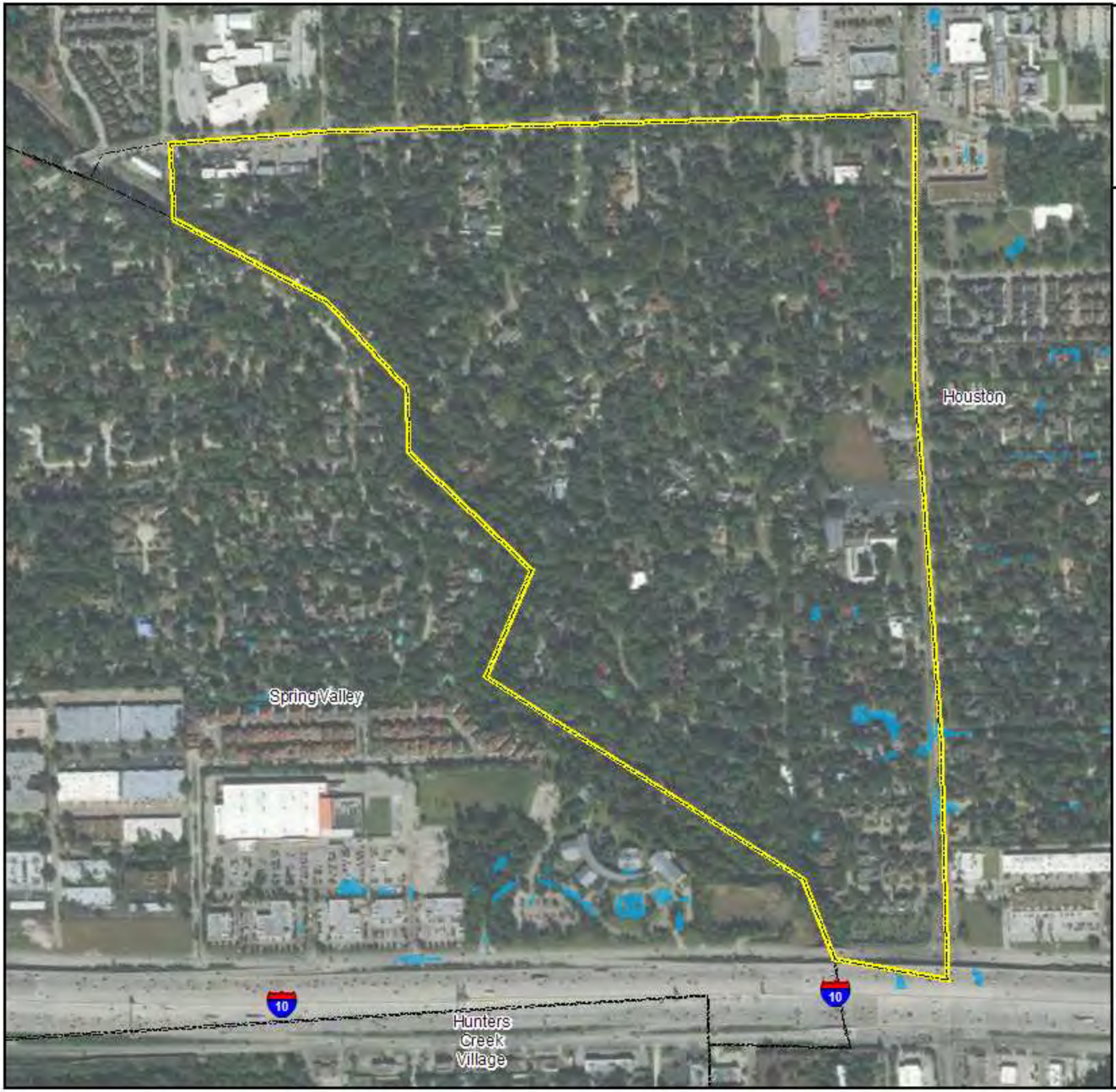
Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.035 0.07 0.14 Miles



Hilshire Village

Flood Hazard
Hurricane Harvey

Flooding Extent

Incorporated Cities

Harris County

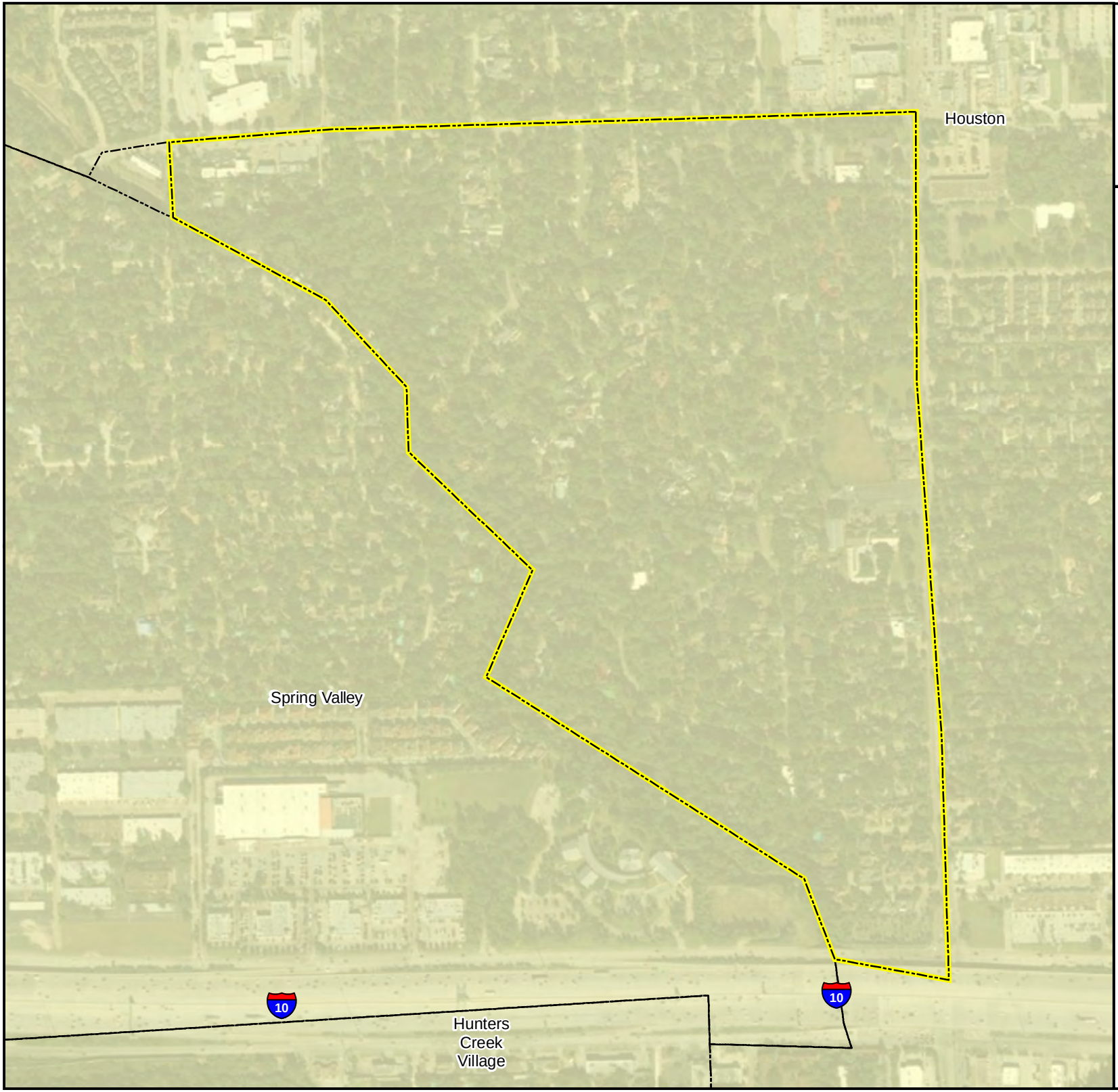
Note: Flooding extent shown for Hazard Mitigation Plan planning area only.

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.035 0.07 0.14 Miles



Hilshire Village

Hurricane Alicia (1983)

Peak WInd Gust (mph)

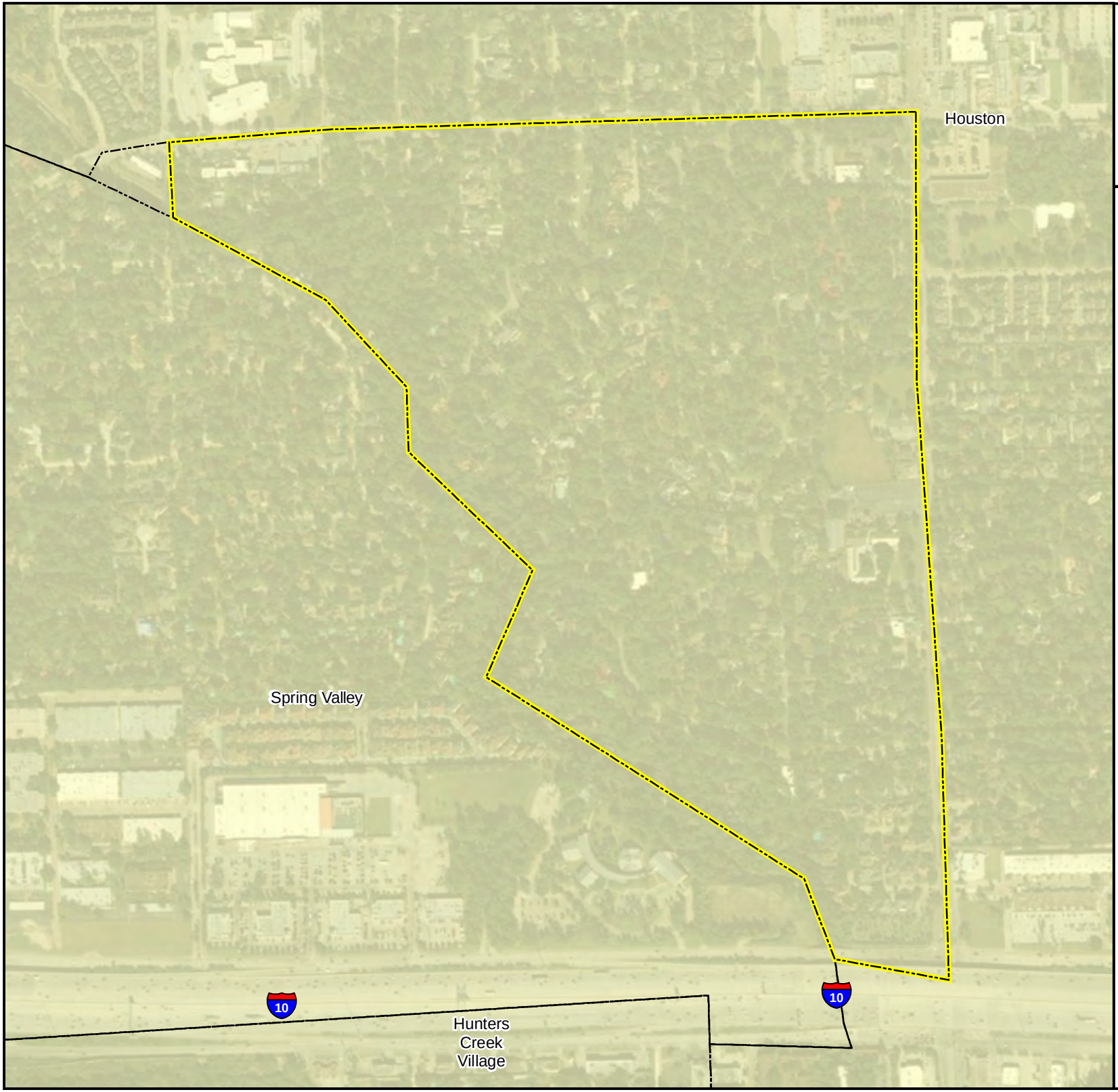
- 87 - 94
- 95 - 98
- 99 - 101
- 102 - 104
- 105 - 110
- Storm Track
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.035 0.07 0.14 Miles



Hilshire Village

20-year Probabilistic Hurricane

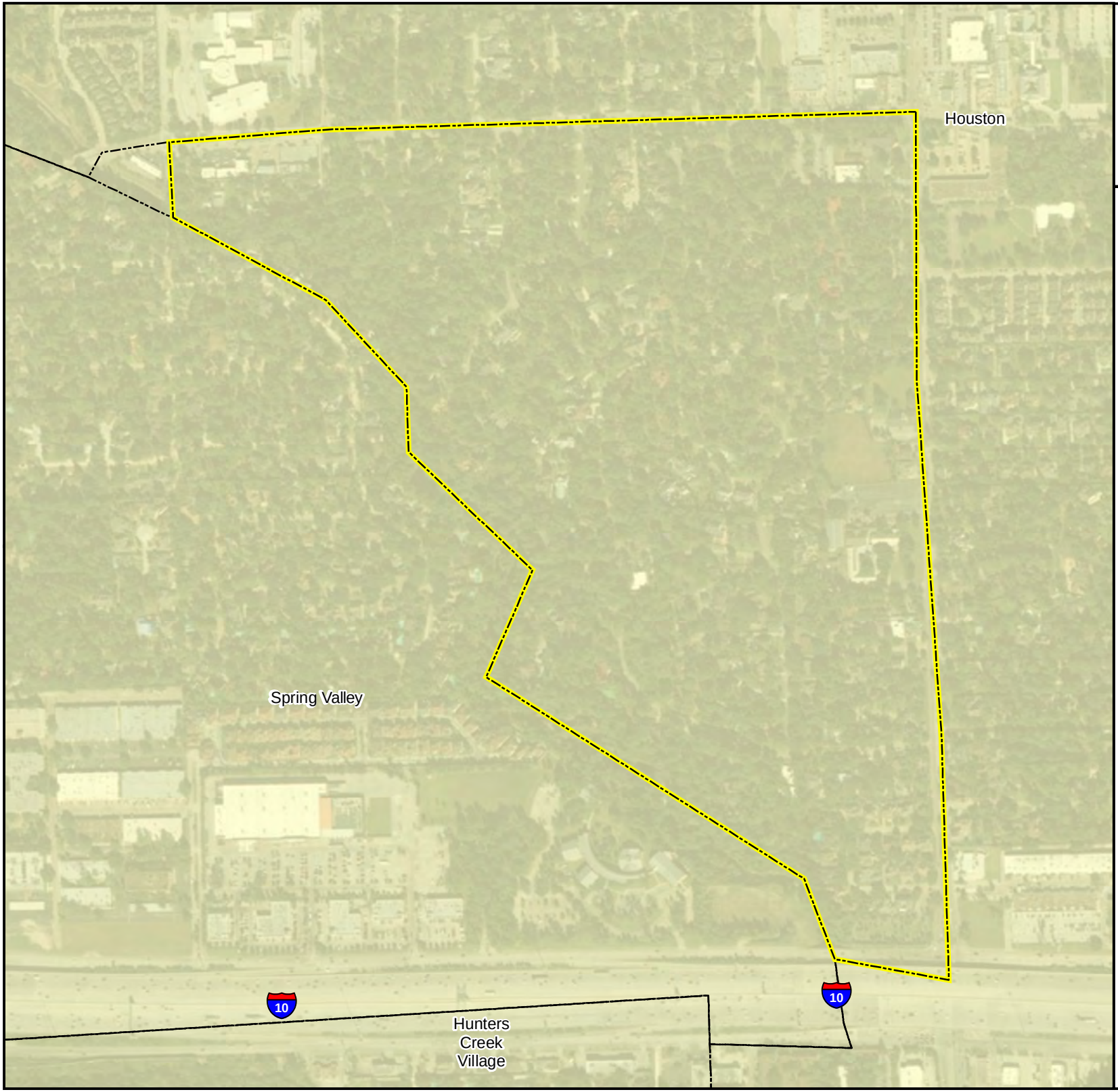
Peak Wind Gust (mph)

- 63 - 71
- 72 - 76
- 77 - 80
- 81 - 84
- 85 - 92
- Incorporated Cities
- Harris County

TETRA TECH

N

0 0.035 0.07 0.14 Miles



Hilshire Village

100-year Probabilistic Hurricane

Peak Wind Gust (mph)

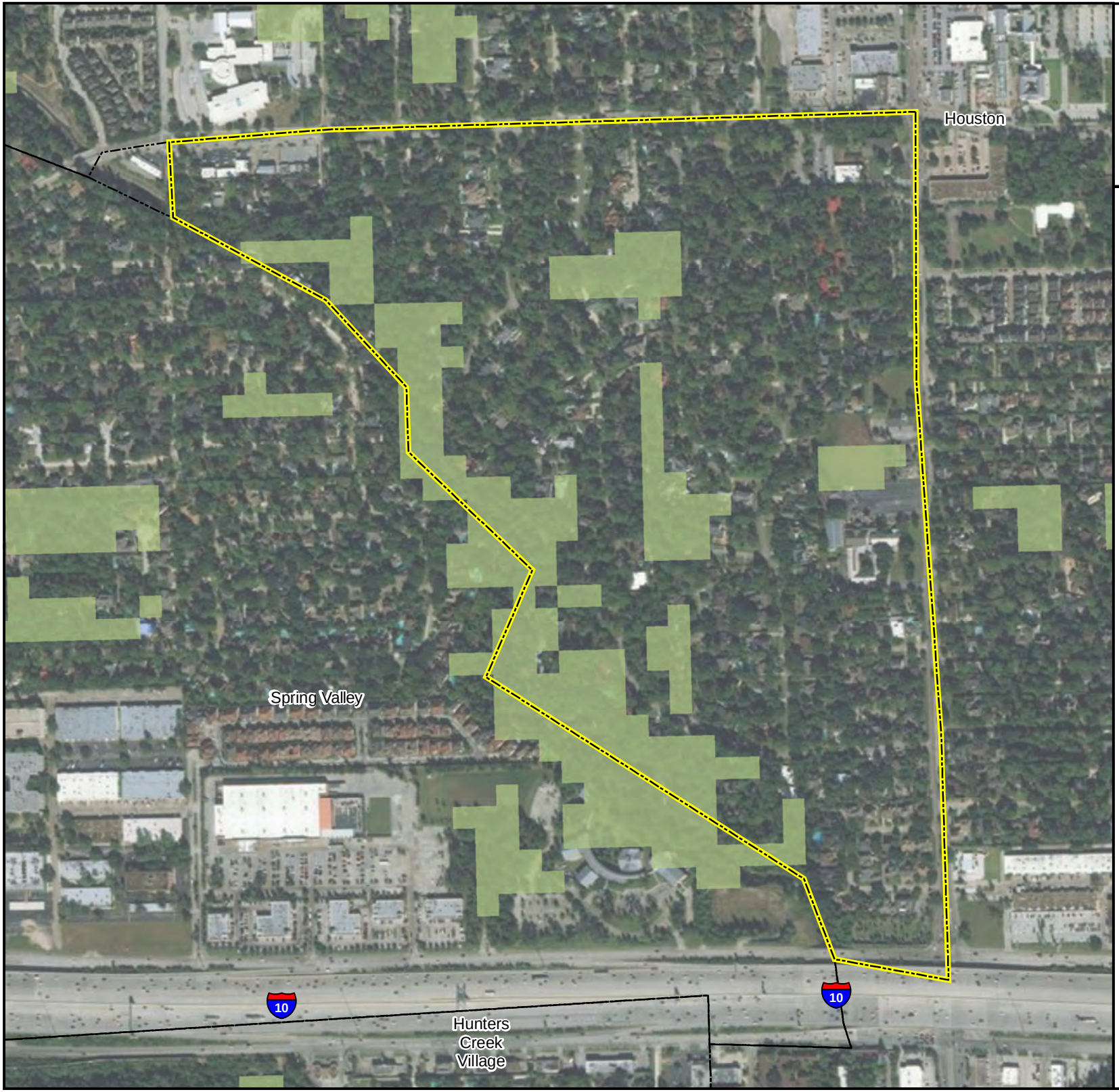
- 89 - 101
- 102 - 106
- 107 - 111
- 112 - 117
- 118 - 128
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.035 0.07 0.14 Miles



Hilshire Village

Wildfire Ignition Density

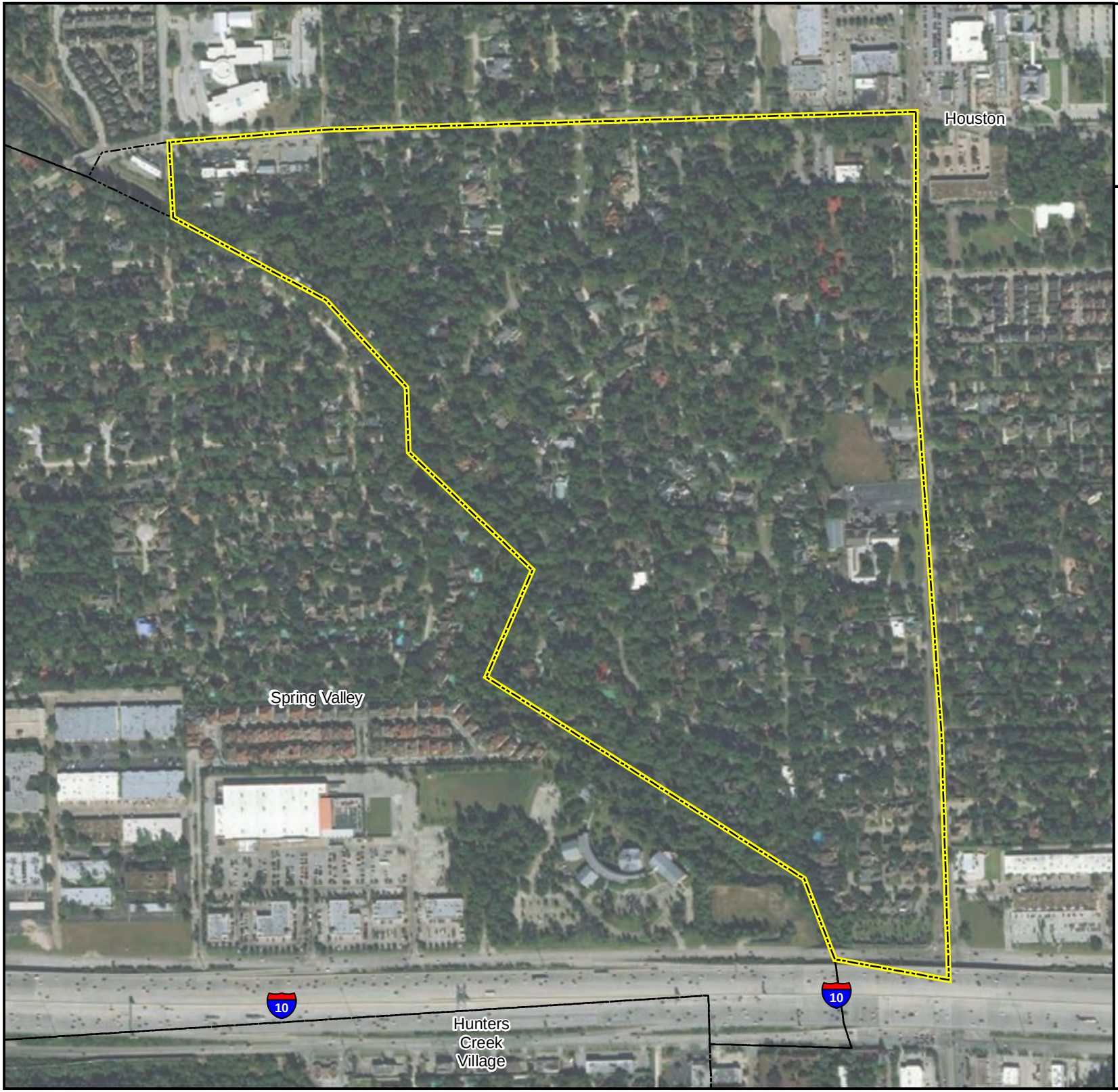
- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.035 0.07 0.14 Miles



Hilshire Village

Wildfire Threat

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.035 0.07 0.14 Miles

11. CITY OF HUMBLE

11.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
James Nykaza, Emergency Management Coordinator
110 W. Main Street
Humble, Texas, 77338
Telephone: 281-446-4928
e-mail Address: jnykaza@cityofhumble.net

Alternate Point of Contact
Stephen Forbes
110 W. Main Street
Humble, Texas, 77338
Telephone: 281-446-4928
e-mail Address: sforbes@cityofhumble.net

11.2 JURISDICTION PROFILE

11.2.1 Location

The City of Humble is in Harris County, Texas. It is located within the Houston metropolitan area. The current boundaries generally extend from San Jacinto River to north of Greens Road, encompassing an area of 10 square miles.

11.2.2 History

Humble became an oil boomtown in the early 20th century after oil was discovered there in 1903. By 1905 the Humble oilfield was the largest producing oilfield in Texas. Humble was home of Humble Oil, a predecessor of Exxon. The City of Humble was incorporated in 1933.

11.2.3 Climate

The climate of City of Humble is characterized by hot, humid summers and generally mild to cool winters.

11.2.4 Governing Body Format

The City government is a council-manager form. It consists of a mayor, five council members and a city manager. The City of Humble assumes responsibility for the adoption of this plan; Harris County will oversee its implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 11-1.

Table 11-1. Local Mitigation Planning Team Members

Name	Title
James Nykaza	EMC
Stephen Forbes	Asst. EMC
Mark Smith	Deputy Building Official
Mark Arnold	Asst. Director Public Works

11.3 CURRENT TRENDS

11.3.1 Population

According to United States Census Bureau, the population of City of Humble as of April 2010 was 15,133. Since 2010, the population has grown at an average annual rate of 5.8 percent.

11.3.2 Development

The anticipated development of the City of Humble is moderate to high. The City of Humble has seen a high growth in commercial development and a low growth in residential development. The City of Humble is adopting a Strategic Plan in January 2019 and will focus on the growth and development of the City of Humble.

Table 11-2 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

Table 11-2. Recent and Expected Future Development Trends

Criterion	Response					
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan? • **If yes, give the estimated area annexed and estimated number of parcels or structures.**	No					
Is your jurisdiction expected to annex any areas during the performance period of this plan? • **If yes, describe land areas and dominant uses.** • **If yes, who currently has permitting authority over these areas?**	No					
Are any areas targeted for development or major redevelopment in the next five years? • **If yes, briefly describe, including whether any of the areas are in known hazard risk areas**	Yes Townsen Blvd area west of US 59. This area is in the 100 -500 year flood plain.					
How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?		**2014**	**2015**	**2016**	**2017**	**2018**
	Single Family	16	23	22	25	15
	Multi-Family	0	0	1	1	0
	Other (commercial, mixed use, etc.)	13	12	15	19	23
	Total	29	35	37	44	38
Provide the number of new-construction permits for each hazard area or provide a qualitative description of where development has occurred.	• Special Flood Hazard Areas: 0 • Landslide: 0 • High Liquefaction Areas: 0 • Tsunami Inundation Area: 0 • Wildfire Risk Areas: 0					
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	The buildout of the City of Humble is at 75%.					

11.4 CAPABILITY ASSESSMENT

City of Humble performed an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities is presented in Table 11-3.
- Development and permitting capabilities are presented in Table 11-4.
- An assessment of fiscal capabilities is presented in Table 11-5.
- An assessment of administrative and technical capabilities is presented in Table 11-6.
- An assessment of education and outreach capabilities is presented in Table 11-7.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 11-8.
- Classifications under various community mitigation programs are presented in Table 11-9.
- The community's adaptive capacity for the impacts of climate change is presented in Table 11-10.

Findings of the capability assessment were reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table included in the action plan for this annex identifies these as community capacity building mitigation actions.

Table 11-3. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code	Yes	No	No	No
Comment: *Ord. 19-836, Adopted 2/14/2019, ICC 2018*				
Zoning Code	No	No	No	No
Comment:				
Subdivisions	No	No	No	No
Comment:				
Stormwater Management	Yes	No	Yes	No
Comment:				
Post-Disaster Recovery	Yes	No	Yes	No
Comment:				
Real Estate Disclosure	No	No	No	No
Comment:				
Growth Management	No	No	No	No
Comment:				
Site Plan Review	Yes	No	No	No
Comment: *Ord. 18-816, Adopted 2/22/2018*				
Environmental Protection	No	Yes	No	Yes
Comment:				
Flood Damage Prevention	Yes	No	No	No
Comment: *Ord. 18-816, Adopted 2/18/2018*				
Emergency Management	Yes	No	No	No
Comment: *Ord. 19-841, Adopted rev.- 04/11/2019*				
Climate Change	No	Yes	No	Yes
Comment:				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Planning Documents				
General Plan ***Comment:***	Yes	No	Yes	No
Capital Improvement Plan ***How often is the plan updated?*** *Yearly* ***Comment:*** *Water, sewer and roads*	Yes	No	Yes	No
Disaster Debris Management Plan ***Comment:*** *FEMA approved July 2019*	Yes	No	Yes	Yes
Floodplain or Watershed Plan ***Comment:***	Yes	No	Yes	Yes
Stormwater Plan ***Comment:***	Yes	No	Yes	No
Urban Water Management Plan ***Comment:***	Yes	No	Yes	No
Habitat Conservation Plan ***Comment:***	No	Yes	No	No
Economic Development Plan ***Comment:***	Yes	Yes	No	No
Shoreline Management Plan ***Comment:***	No	Yes	No	No
Community Wildfire Protection Plan ***Comment:***	No	Yes	No	No
Forest Management Plan ***Comment:***	No	Yes	No	No
Climate Action Plan ***Comment:***	No	Yes	No	No
Comprehensive Emergency Management Plan ***Comment:*** *Partner with Harris County*	Yes	No	Yes	Yes
Threat & Hazard Identification & Risk Assessment (THIRA) ***Comment:***	Yes	No	Yes	Yes
Post-Disaster Recovery Plan ***Comment:***	Yes	No	Yes	Yes
Continuity of Operations Plan ***Comment:***	Yes	No	Yes	Yes
Public Health Plan ***Comment:***	No	Yes	Yes	No
Other ***Comment:***	No	No	No	No

Table 11-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • **If no, who does? If yes, which department?**	Yes Building Dept.
Does your jurisdiction have the ability to track permits by hazard area?	Yes
Does your jurisdiction have a buildable lands inventory?	Yes

Table 11-5. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes
Incur Debt through General Obligation Bonds	No
Incur Debt through Special Tax Bonds	No
Incur Debt through Private Activity Bonds	No
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes
Other	No

Table 11-6. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Public Works and Building Department
Engineers or professionals trained in building or infrastructure construction practices	Yes	Public Works
Planners or engineers with an understanding of natural hazards	Yes	Public Works
Staff with training in benefit/cost analysis	Yes	Emergency Management
Surveyors	Yes	Can Contract
Personnel skilled or trained in GIS applications	Yes	Public Works
Scientist familiar with natural hazards in local area	Yes	Can Contract
Emergency manager	Yes	Emergency Management
Grant writers	Yes	Can Contract
Other	No	

Table 11-7. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	No
Do you have hazard mitigation information available on your website? • If yes, briefly describe.	Yes Emergency Management website
Do you use social media for hazard mitigation education and outreach? • If yes, briefly describe.	No
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • If yes, briefly describe.	No
Do you have any other programs already in place that could be used to communicate hazard-related information? • If yes, briefly describe.	Yes Swift 911
Do you have any established warning systems for hazard events?	Yes
• If yes, briefly describe.	Swift 911

Table 11-8. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Humble Building Department
Who is your floodplain administrator? (department/position)	Building Official
Are any certified floodplain managers on staff in your jurisdiction?	Yes
What is the date that your flood damage prevention ordinance was last amended?	January 2019
Does your floodplain management program meet or exceed minimum requirements? • **If exceeds, in what ways?**	Meets
When was the most recent Community Assistance Visit or Community Assistance Contact?	Unknown
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • **If so, state what they are.**	No
Are any RiskMAP projects currently underway in your jurisdiction? • **If so, state what they are.**	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • **If no, state why.**	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? • **If so, what type of assistance/training is needed?**	Yes Training
Does your jurisdiction participate in the Community Rating System (CRS)? • **If yes, is your jurisdiction interested in improving its CRS Classification?** • **If no, is your jurisdiction interested in joining the CRS program?**	No Yes
How many flood insurance policies are in force in your jurisdiction?[a] • **What is the insurance in force?** • **What is the premium in force?**	927 $275183900 $604760
How many total loss claims have been filed in your jurisdiction?[a] • **How many claims are still open or were closed without payment?** • **What were the total payments for losses?**	829 92 $55176554.06

a. According to FEMA statistics as of September 30, 2018

Table 11-9. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	No	N/A	Date
Building Code Effectiveness Grading Schedule	Yes	7	Jan 23, 2019
Public Protection	Yes	2	2014
Storm Ready	No	N/A	Date
Firewise	No	N/A	Date

Table 11-10. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:*** *Due to numerous years of flooding*	High
Jurisdiction-level monitoring of climate change impacts ***Comment:***	Medium
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:***	Low
Participation in regional groups addressing climate risks ***Comment:***	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	Medium
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	Low
Identified strategies for adaptation to impacts ***Comment:***	Low
Champions for climate action in local government departments ***Comment:***	Unsure
Political support for implementing climate change adaptation strategies ***Comment:***	Low
Financial resources devoted to climate change adaptation ***Comment:***	Low
Local authority over sectors likely to be negative impacted ***Comment:***	Low
Public Capacity	
Local residents knowledge of and understanding of climate risk ***Comment:***	Low
Local residents support of adaptation efforts ***Comment:***	Low
Local residents' capacity to adapt to climate impacts ***Comment:***	Low
Local economy current capacity to adapt to climate impacts ***Comment:***	Low
Local ecosystems capacity to adapt to climate impacts ***Comment:***	Low

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

11.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning and capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

11.5.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- Harris County All Hazards Mitigation Plan

11.5.2 Opportunities for Future Integration

The capability assessment presented in this annex identified no plans or programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future.

11.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 11-11 lists past occurrences of natural hazards for which specific damage was recorded in City of Humble. Other hazard events that broadly affected the entire planning area, including City of Humble, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 11-11. Past Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Hurricane Harvey	DR4332	2017	N/A
Flooding	DR 4269	2016	N/A
Flooding	DR 4272	2016	N/A
Hurricane Ike	1791 DR	2008	N/A
Hurricane Rita	1606 DR	2005	N/A
Tropical Storm Allison	1379 DR	2001	N/A

11.7 HAZARD RISK RANKING

Table 11-12 presents a local ranking for City of Humble of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 11-12. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Severe Weather	48	High
1	Hurricane	48	High
2	Dam Failure	26	Medium
3	Flood	18	Medium
4	Wildfire	17	Medium
5	Earthquake	14	Low
6	Drought	6	Low
7	Mass Movement	0 (No Exposure)	None
7	Tsunami	0 (No Exposure)	None
7	Coastal Erosion	0 (No Exposure	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

11.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. This section provides information on a few key vulnerabilities for the jurisdiction. Available jurisdiction-specific risk maps of the hazards are provided at the end of this annex.

11.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: 48
- Number of FEMA-identified Severe-Repetitive-Loss Properties: 4
- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated: 1

11.8.2 Other Noted Vulnerabilities

No jurisdiction-specific issues were identified through review of the results of the risk assessment, public involvement strategy, and other available resources.

11.9 STATUS OF PREVIOUS PLAN ACTIONS

Table 11-13 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

11.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 11-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 11-15 identifies the priority for each action. Table 11-16 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 11-13. Status of Previous Plan Actions

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
Retrofit and harden critical infrastructure facilities to withstand severe thunderstorms, hurricane winds and hail			X	HUM9
Comment: Not Started				
Harden and retrofit communications tower to withstand high winds.		X		
Comment: Removed due to changing radio systems				
Develop a public education/outreach program to educate the public on thunderstorms and wildfire hazards and the appropriate actions to take to protect property and equipment.			X	HUM10
Comment:				
Develop a public education/outreach program to inform the public on wildfire/drought/extreme heat hazards and appropriate actions to take to protect personal property and equipment during wildfire/drought/extreme heat conditions.		X		
Comment: Remove no longer needed				
Adopt latest and higher Development/Modification of building standard building codes for, zoning/ city/storm water ordinances for mitigation of Riverine flood hazards to manage development in flood areas and reduce property damage.	X			
Comment: Not Started				
Development/Modification of Adopt latest and higher standard building codes / ordinances for to harden and retrofit city buildings to withstand mitigation of hurricane wind hazards. High-wind damages.	X			
Comment: Phase 1 Consisted of working with administration to improve code/ordinance. A proposal was submitted to adopt 2012 building codes. Complete Phase 2: Adopt buildings codes for all city buildings. Research new standard and impact upon building affordability, insurability and compliance with such existing requirements as accessibility under ADA, etc.				
Increase Expand early warning system- Mass Notification alert capabilities for to increase coverage of community's public/private schools and colleges		X		
Comment:				
Develop/expand community early warning system Mass Notification to enhance coverage to the community's population/general public.	X			
Comment: Purchase the use of a communications software for notification. Swift911				
Develop/implement tree management planning and mitigation measures.	X			
Comment: Phase 1 – In May 2012, Public Works utilized contractors to remove all dead or damaged trees and foliage on City maintained property (utilizing existing funds). Phase 2 – Implement and improve tree management program to limit debris damage to critical infrastructure and public facilities from falling tree canopy.				

Table 11-14. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action HUM1 — Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Earthquake, flooding, wildfire, Hurricane, Severe Weather						
New	3, 4, 10	City Administration	TBD	High	HMGP, PDM, FMA	Short-term
Action HUM2 — Integrate the hazard mitigation plan into other plans, ordinances and programs that dictate land use decisions in the community, including all new construction.						
Hazards Mitigated: Dam failure, drought, earthquake, flooding, wildfire						
New and Existing	1, 2, 3, 4, 5, 6, 7	City Administration	TBD	Low	Staff Time, General Funds	Ongoing
Action HUM3 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: Severe Weather, Hurricane, Dam Failure, Flood, Wildfire, Earthquake, Drought						
New and Existing	3,7,9,10	City Administration	TBD	Low	Staff Time, General Funds	Short-term
Action HUM4 — Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements: • Enforce the flood damage prevention ordinance. • Participate in floodplain identification and mapping updates. • Provide public assistance/information on floodplain requirements and impacts.						
Hazards Mitigated: Dam failure, flooding, severe weather						
New and Existing	3,7,10	City Administration	TBD	Low	Staff Time, General Funds	Ongoing
Action HUM5 — Implement Non-Structural Mitigation Measures by burying power lines to reduce damages to electrical lines from high-winds.						
Hazards Mitigated: Severe Weather, Hurricane						
New	6,11	City Administration	TBD	low	HMGP, PDM, FMA	Short-term
Action HUM6 — Install Backup power system generators to enable critical facilities to continue basic services, which can be used by critical facilities to ensure security and protect refrigerated goods.						
Hazards Mitigated: Severe Weather, Hurricane, Dam Failure, Flood, Wildfire, Earthquake, Drought						
New and Existing	11	City Administration	TBD	Low	HMGP, PDM	Short-term
Action HUM7 — Improve drainage channels to increase flow rate and increased retention areas.						
Hazards Mitigated: Flooding, Severe Weather, Hurricane						
New and Existing	7,8,9,10,11,	City Administration	TBD	Moderate	HMGP, PDM	Long-term
Action HUM8- Harden 911 Communications Center						
Hazards Mitigated: Severe Weather, Hurricane, Dam Failure, Flood, Wildfire, Earthquake, Drought						
New and Existing	10,11	City Administration	TBD	Low	PDM, HMGP	Short-term
Action HUM9 — Retrofit and harden critical infrastructure facilities to withstand severe thunderstorms, hurricane winds and hail						
Hazards Mitigated: Severe Weather, Hurricane						
New and Existing	10,11,13	City Administration	TBD	High	Grant funds	Long-term
Action HUM10 — Develop a public education/outreach program to educate the public on thunderstorms and wildfire hazards and the appropriate actions to take to protect property and equipment.						
Hazards Mitigated: Severe Weather, Wildfire						
Existing	1	City Administration	TBD	Low	Staff time, General funds	Short term
Action HUM11— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
Hazards Mitigated: Severe Weather, Hurricane, Dam Failure, Flood, Wildfire, Earthquake, Drought						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	Humble	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 11-15. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
HUM1	3	Low	Medium	Yes	Yes	No	Medium	Low
HUM2	7	Medium	Low	Yes	No	Yes	High	Low
HUM3	4	Low	Low	Yes	No	Yes	High	Low
HUM4	3	Medium	Low	Yes	No	Yes	High	Low
HUM5	2	High	High	Yes	Yes	No	Medium	Low
HUM6	1	Low	Low	Yes	Yes	Yes	Low	High
HUM7	5	High	Medium	Yes	Yes	No	High	High
HUM8	2	Medium	Low	Yes	Yes	Yes	Medium	High
HUM9	3	High	High	Yes	Yes	No	High	High
HUM10	1	Medium	Low	Yes	No	Yes	Medium	Low
HUM11	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 11-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Severe Weather	1,5,9, 11	1,9	10, 11	7	8, 11	1,6,7,8,9	7	3, 11
Hurricane	1, 5, 9, 11	1, 9	11	7	8, 11	1,6,7,8,9	7	3, 11
Medium-Risk Hazards								
Dam Failure	2,4,9, 11	2,4,9	11		8, 11	2,6,8,8	7	2,3,4, 11
Flooding	1,2,4,5,9, 11	1,2,4,9	11	7	8, 11	1,2,6,7,8,9	7	2,3,4, 11
Wildfires	1,2,5,9, 11	1,2,9	10, 11		8, 11	1,2,6,8,9		2,3, 11
Low-Risk Hazards								
Earthquake	2,5,9, 11	2,9	11		8, 11	2,6,8,9		2,3, 11
Drought	2,5,9, 11	2,9	11		11	2,9		2,3, 11

a. See the introduction to this volume for explanation of mitigation types.

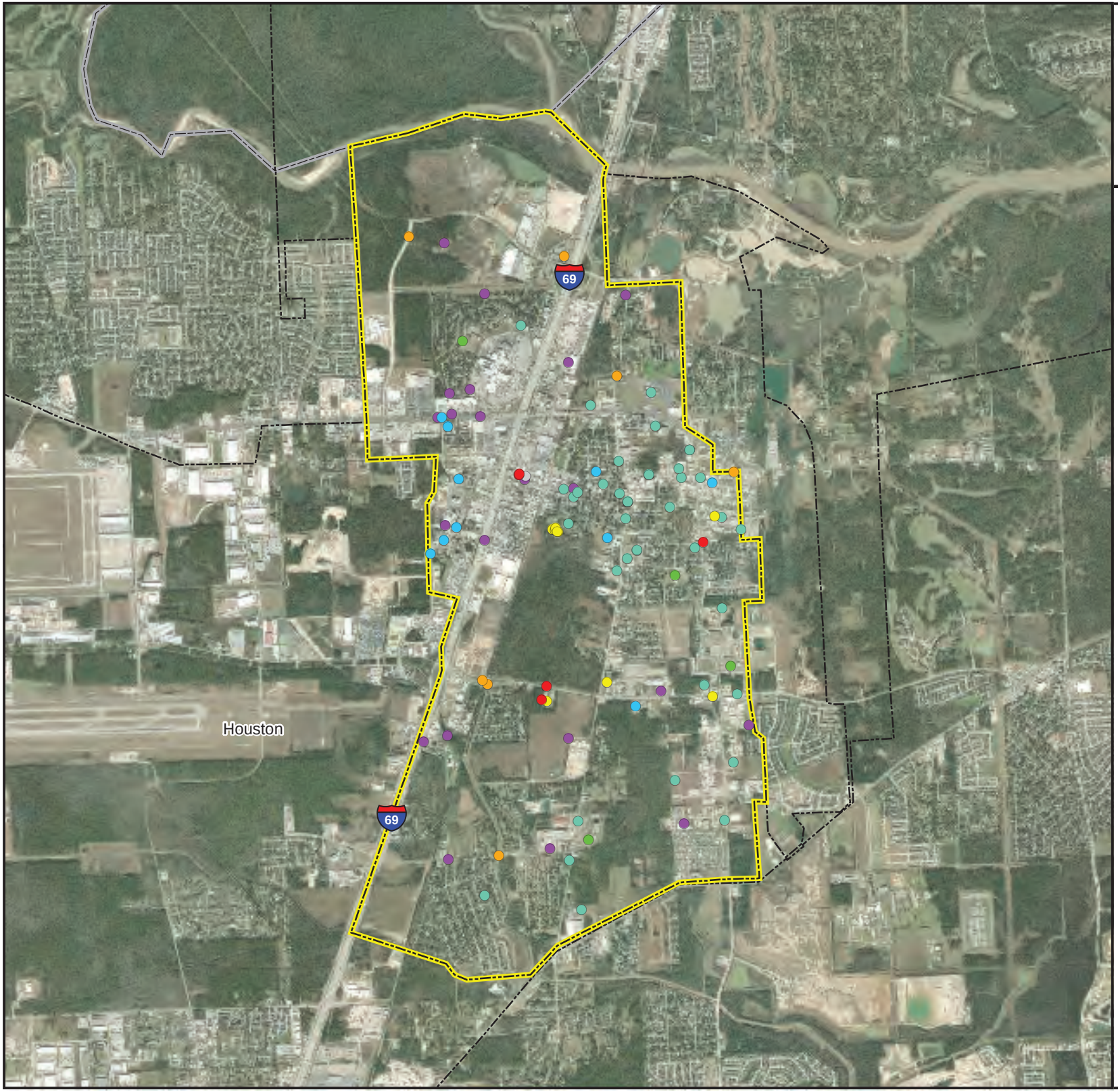
11.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

The following technical reports, plans, and regulatory mechanisms were reviewed for this annex.

- **City of Humble Municipal Code** — The municipal code was reviewed for the full capability assessment and for identifying opportunities for action plan integration.
- **City of Humble Flood Damage Prevention Ordinance** — The flood damage prevention ordinance was reviewed for compliance with the National Flood Insurance Program.

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.



Humble

Critical Facilities

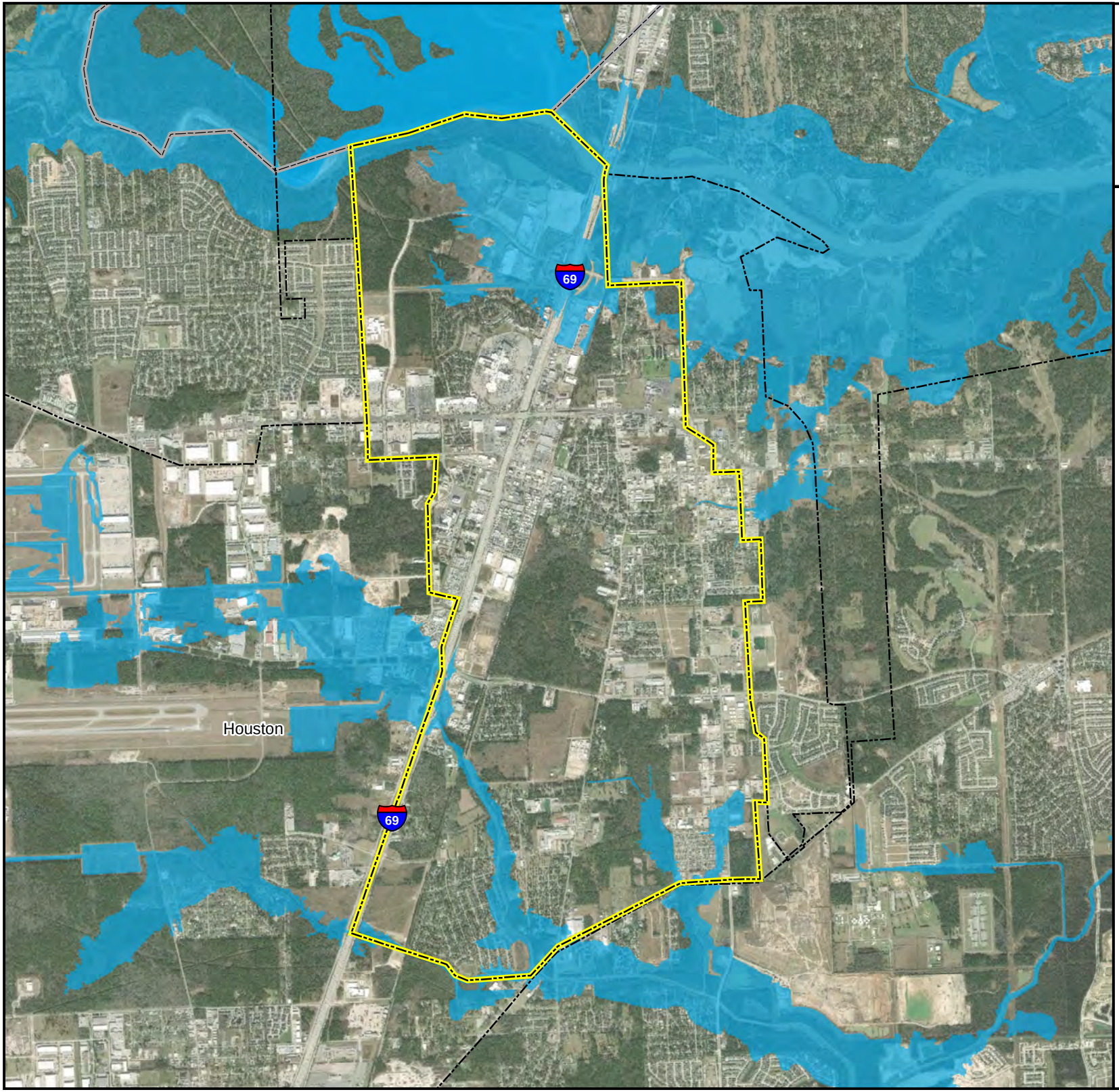
- Education Facilities
- Emergency Services
- Government Facilities
- Hazardous Material Sites
- Health and Medical Facilities
- Historical and Cultural Sites
- Transportation Systems
- Utility Systems
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.25 0.5 1 Miles



Humble

FEMA Flood Hazard

1% Annual Chance Flood (100-yr)

Incorporated Cities

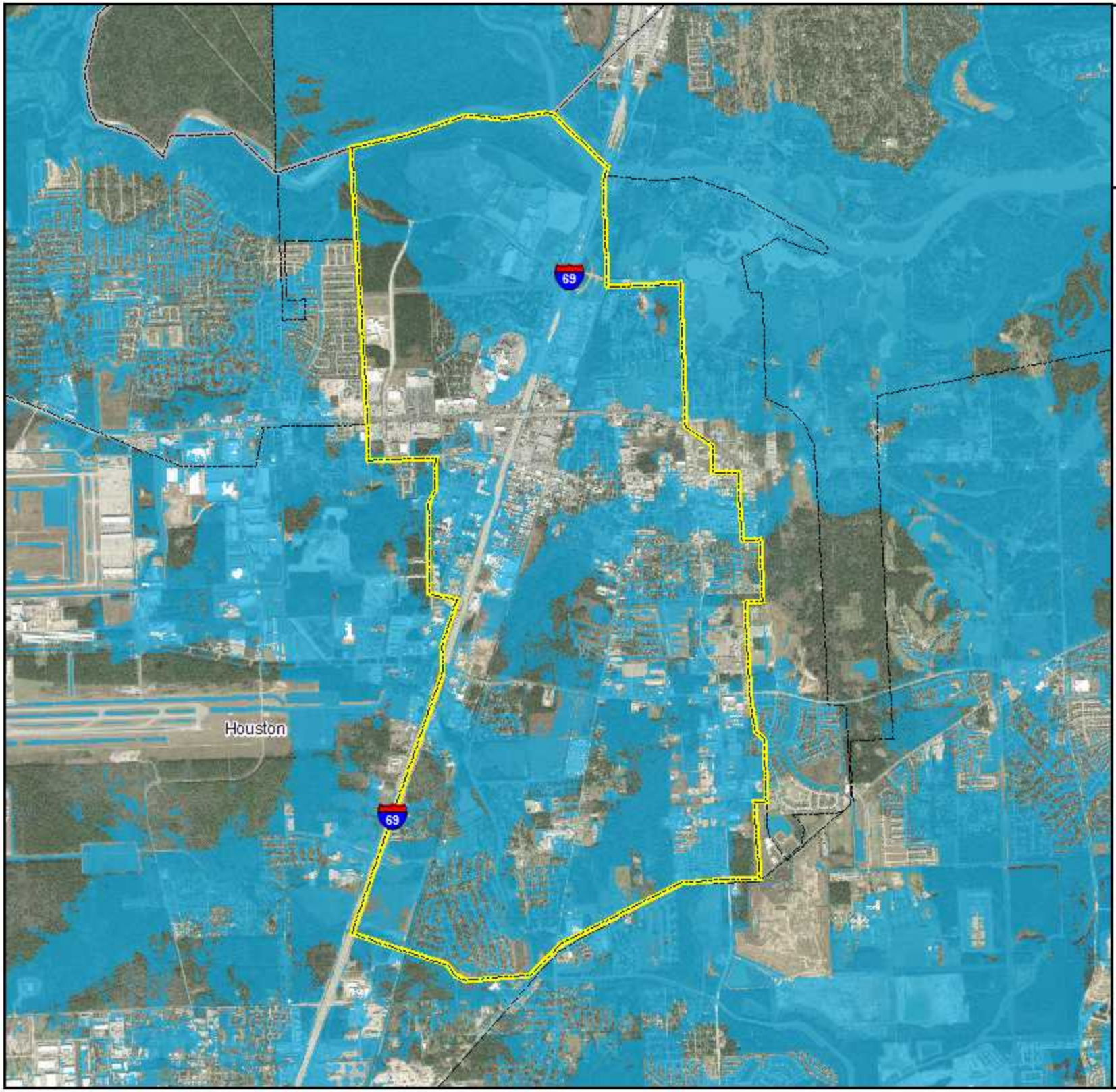
Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.25 0.5 1 Miles



Humble

Flood Hazard
Hurricane Harvey

Flooding Extent

Incorporated Cities

Harris County

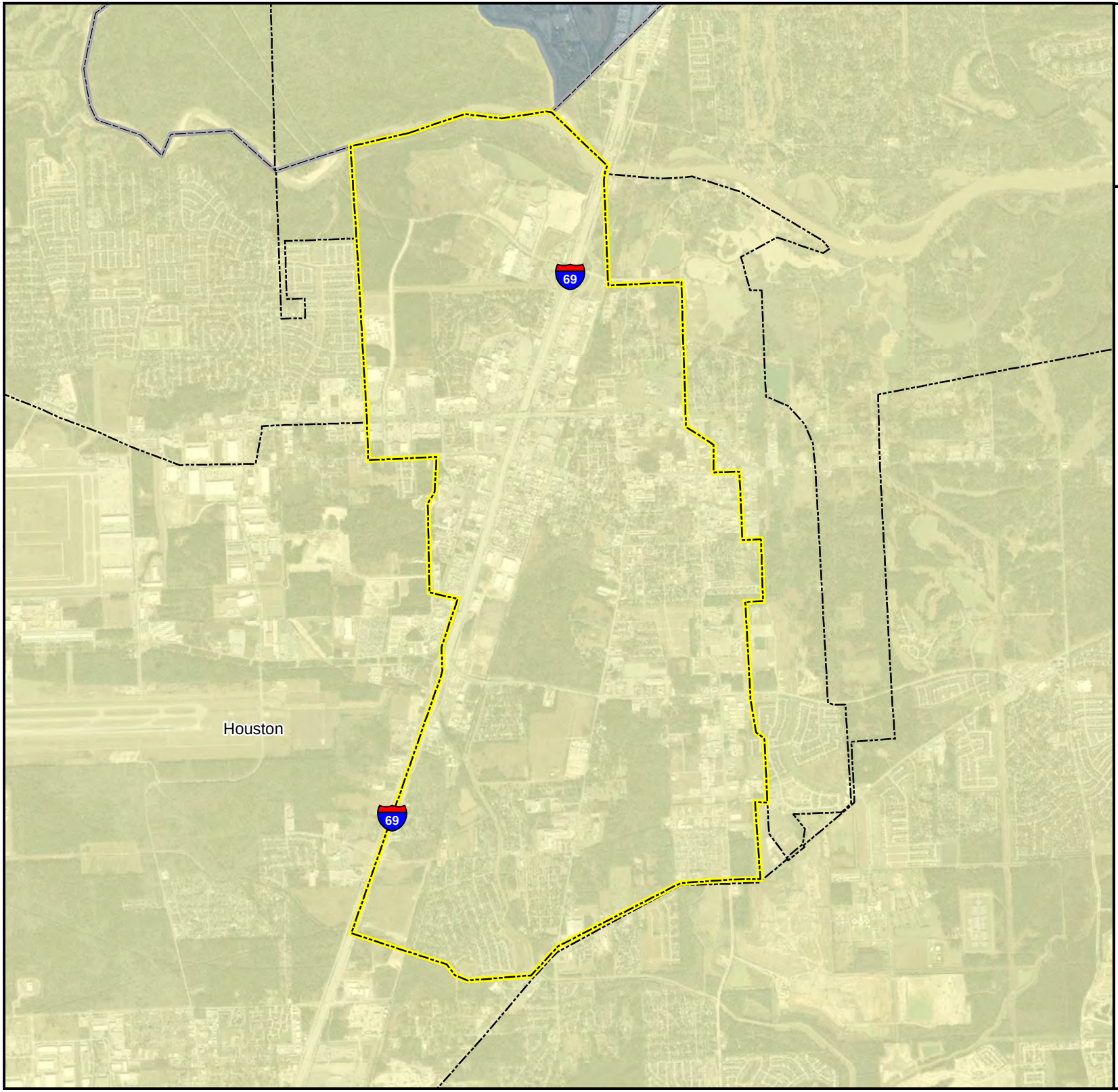
Note: Flooding extent shown for Hazard Mitigation Plan planning area only.

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.25 0.5 1 Miles



Humble

Hurricane Alicia (1983)

Peak WInd Gust (mph)

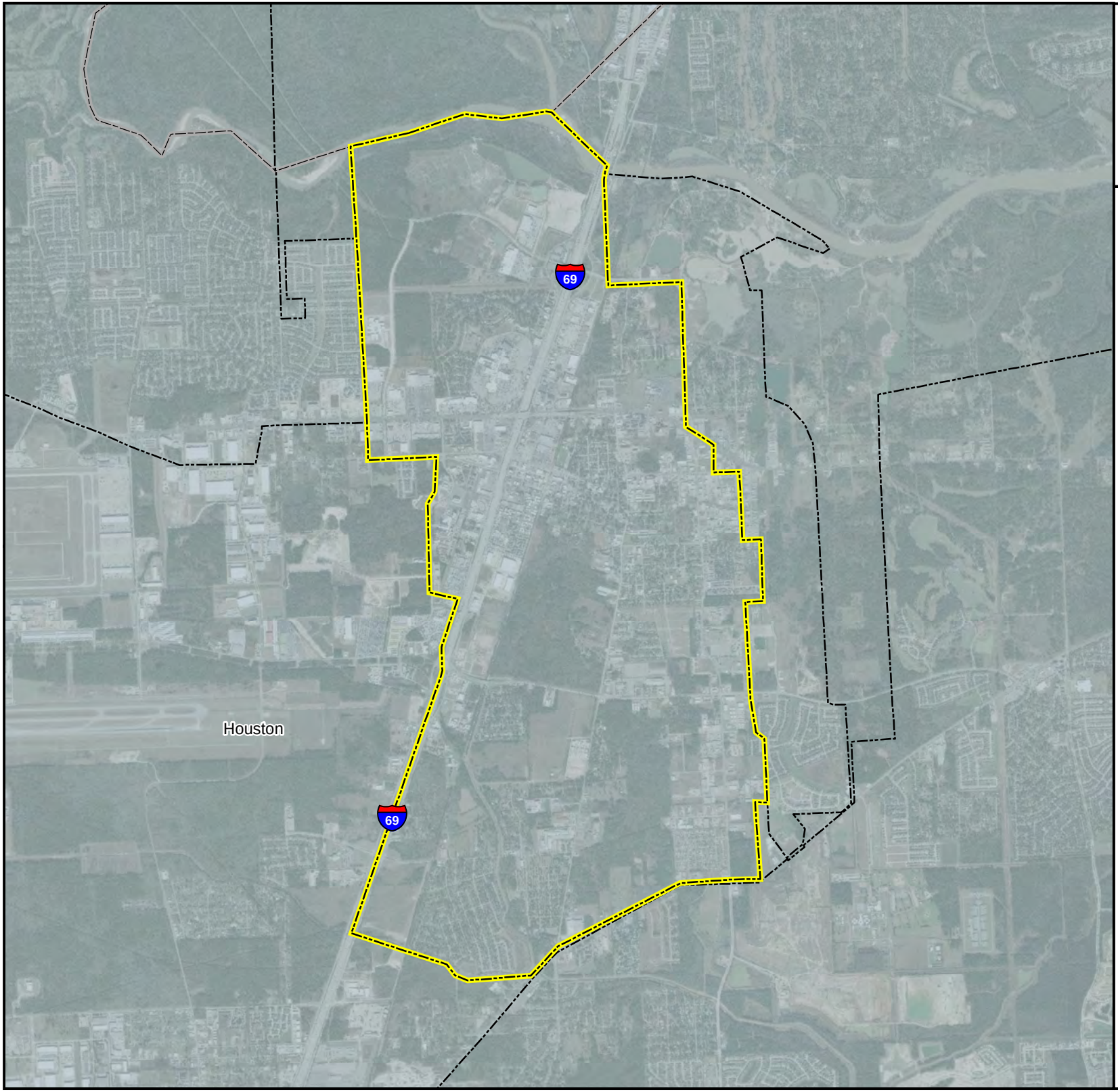
- 87 - 94
- 95 - 98
- 99 - 101
- 102 - 104
- 105 - 110
- Storm Track
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.25 0.5 1 Miles



Humble

20-year Probabilistic Hurricane

Peak Wind Gust (mph)

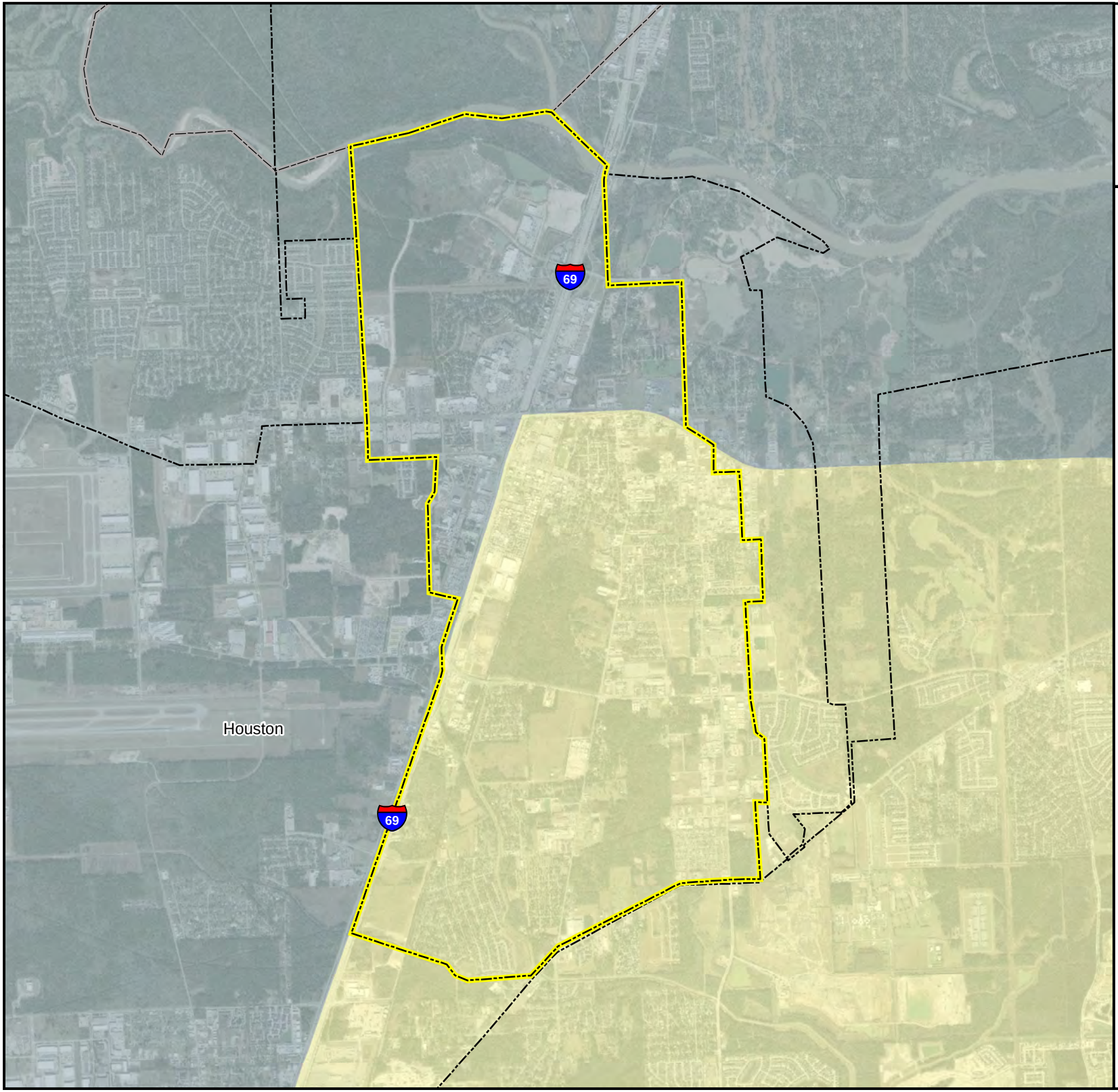
- 63 - 71
- 72 - 76
- 77 - 80
- 81 - 84
- 85 - 92
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.25 0.5 1 Miles



Humble

100-year Probabilistic Hurricane

Peak Wind Gust (mph)

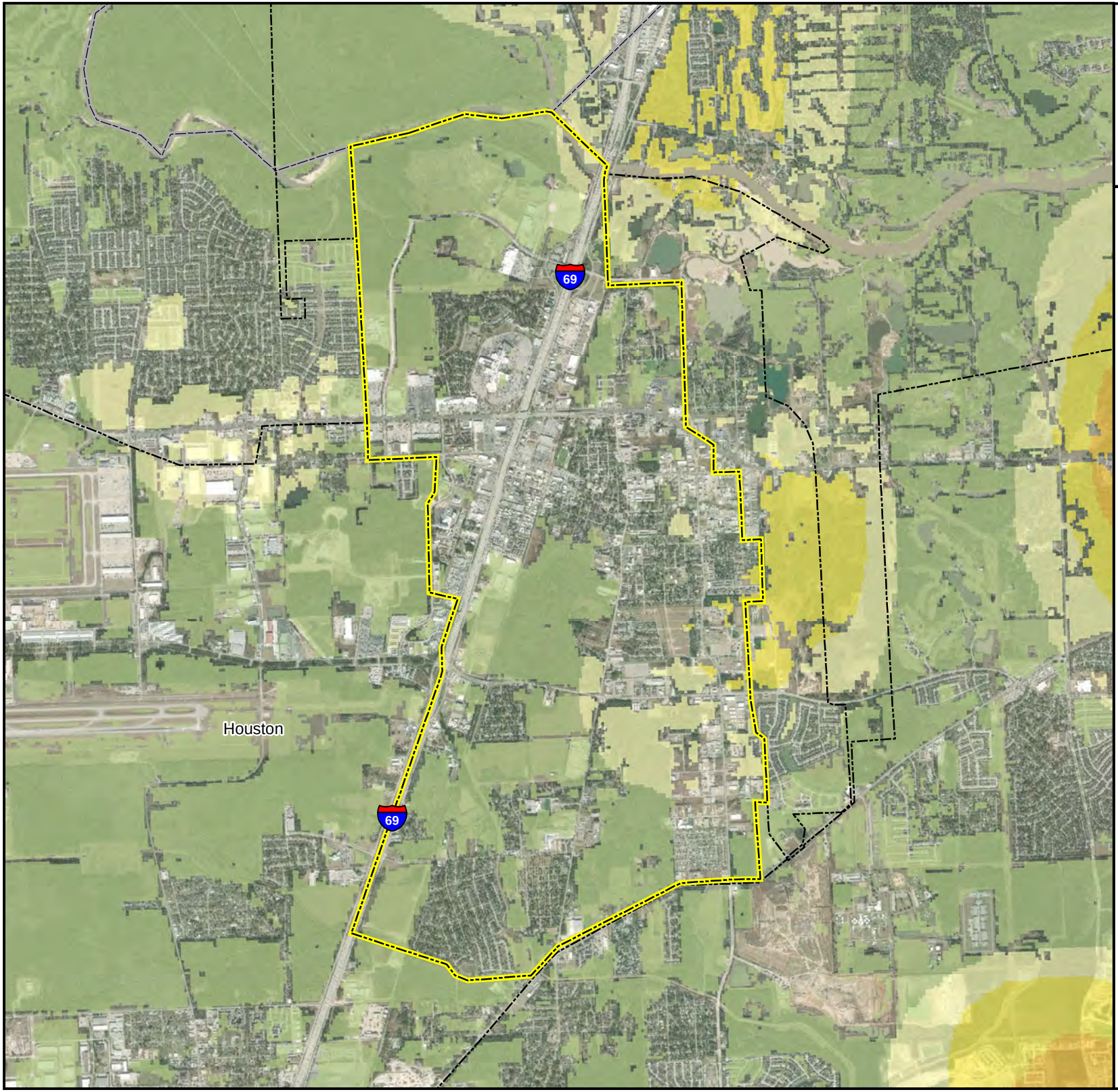
- 89 - 101
- 102 - 106
- 107 - 111
- 112 - 117
- 118 - 128
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.25 0.5 1 Miles



Humble

Wildfire Ignition Density

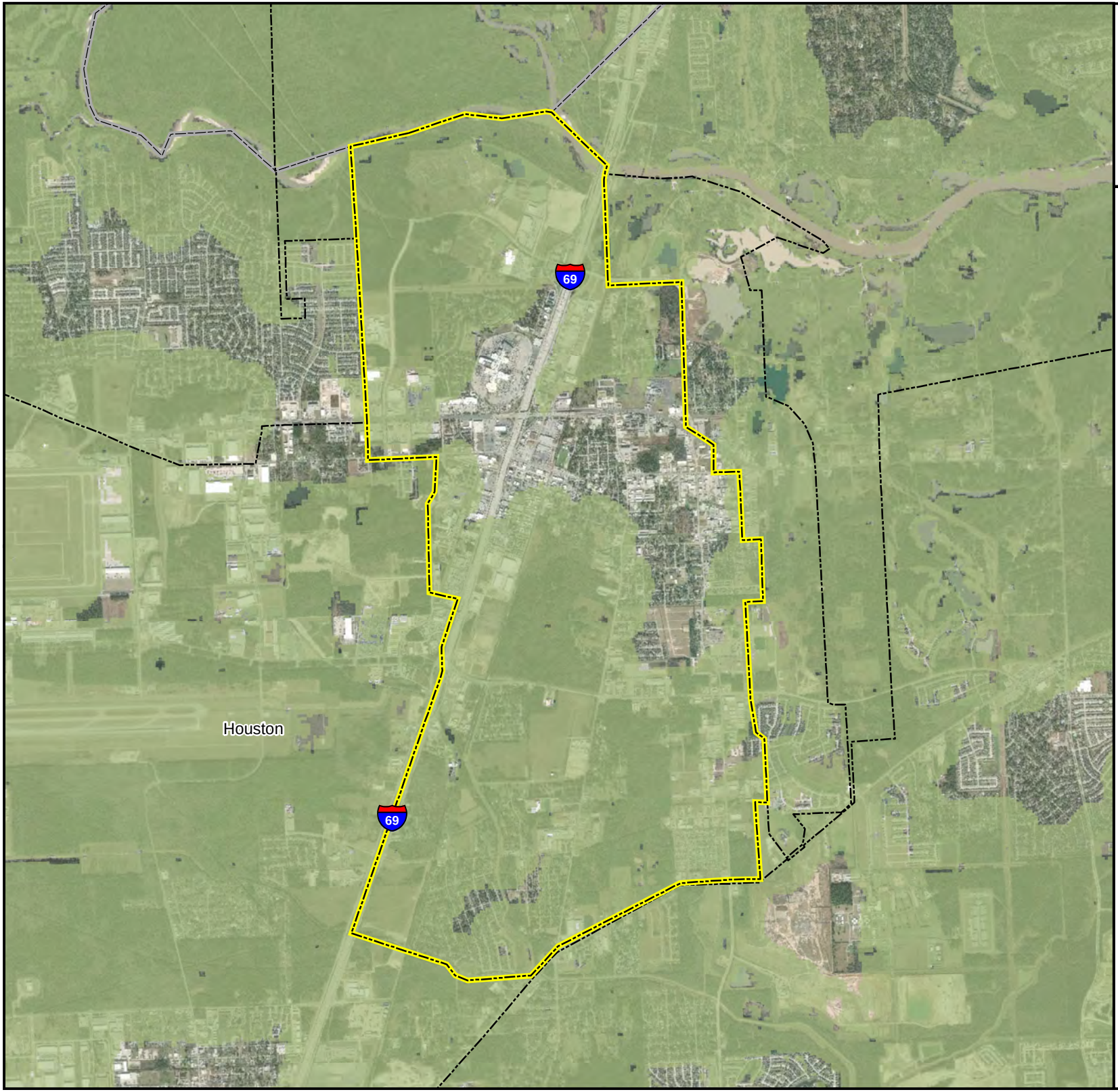
- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.25 0.5 1 Miles



Humble

Wildfire Threat

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.25 0.5 1 Miles

12. CITY OF HUNTERS CREEK VILLAGE

12.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Tom Fullen, City Administrator
1 Hunters Creek Place
Houston, TX 77024
(713) 465-2150
tfullen@cityofhunterscreek.org

Alternate Point of Contact
James Stewart, Building Official / Director of Public Works.
1 Hunters Creek Place
Houston, TX 77024
(713) 465-2150
jstewart@cityofhunterscreek.org

12.2 JURISDICTION PROFILE

12.2.1 Location

The City of Hunters Creek Village is a municipality in the southwestern area of Harris County. The current boundaries are generally Lindenwood Drive on the east, Buffalo Bayou and Voss Road on the south, I-10 on the north, and Hedwig Road on the west. The City encompasses an area of 1.9 square miles.

12.2.2 History

The City of Hunters Creek Village was incorporated in 1954 as a Type-A General Law City. The City of Hunters Creek Village consists of approximately 1,500 single-family dwellings; one privately owned and members only social, recreational, and fitness club, one elementary school, two churches, one gas station, one funeral home, one medical imaging center, and other lots with a variety of independently operated businesses. Through the years the City has adopted ordinances establishing zoning regulations that have very effectively preserved the characteristics that are so well known as "the Memorial Villages." The six Memorial Villages are independent cities that operate autonomously of Houston. All six of the villages are served by the Village Fire Department. The Memorial Villages Police Department serves provided Hunters Creek Village, Piney Point Village, and Bunker Hill Village. The other Villages are served independently. The six villages have executed an inter-local agreement and developed an emergency management guide for emergency needs.

12.2.3 Climate

The climate of the City of Hunters Creek Village is characterized by relatively high temperatures and evenly distributed precipitation throughout the year with legendary humidity.

12.2.4 Governing Body Format

The City of Hunters Creek Village is considered a Type-A General Law City and is governed by a Mayor and five Council Members elected at large. A Type-A General Law City is one that had at the time of its incorporation 600 or more inhabitants. General Law Cities have a population less than 5,000 and are authorized to do only what the State Constitution or Legislature has authorized.

The City Council assumes responsibility for the adoption of this plan; the City Administrator will oversee its implementation. Table 12-1 lists members of the jurisdiction's joint local mitigation planning team. Howard Miller, emergency management coordinator for the Village Fire Department, also participated in planning for the six Memorial Villages.

Table 12-1. Local Mitigation Planning Team Members

Jurisdiction	Name / Title	Phone	Email
City of Hunters Creek Village	Tom Fullen, City Admin.	713-465-2150	tfullen@cityofhunterscreek.org
City of Bunker Hill Village	Karen Glynn, City Admin.	713-467-9762	KGlynn@bunkerhilltx.gov
City of Hedwig Village	Kelly Johnson, City Admin./Secretary	713-465-6009	kjohnson@hedwigtx.gov
City of Hilshire Village	Susan Blevins, City Admin/Secretary. Efrain Him	713-973-1779	Susan.blevins@hilshirevillagetexas.com Efrain.him@hdrinc.com
City of Piney Point Village	Roger Nelson, City Admin.	713-230-8703	cityadmin@pineypt.org
City of Spring Valley Village	Julie Robinson, City Admin. Arthur Faiello, PW Director	713-465-5306 832-910-8576	jrobinson@springvalleytx.com afaiello@springvalleytx.com

12.3 CURRENT TRENDS

12.3.1 Population

According to the 2010 Census Data, the population of the City of Hunters Creek Village was 4,367. Since the 1990 Census, the population has been relatively stable.

12.3.2 Development

The City of Hunters Creek Village is continuing to experience residential redevelopment of new, larger homes. City of Hunters Creek Village is landlocked by other municipalities; therefore there is no growth opportunity.

Table 12-2 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

12.4 CAPABILITY ASSESSMENT

The City of Hunters Creek Village performed an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities is presented in Table 12-3.
- Development and permitting capabilities are presented in Table 12-4.
- An assessment of fiscal capabilities is presented in Table 12-5.
- An assessment of administrative and technical capabilities is presented in Table 12-6.
- An assessment of education and outreach capabilities is presented in Table 12-7.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 12-8.
- Classifications under various community mitigation programs are presented in Table 12-9.
- The community's adaptive capacity for the impacts of climate change is presented in Table 12-10.

Findings of the capability assessment were reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table included in the action plan for this annex identifies these as community capacity building mitigation actions.

Table 12-2. Recent and Expected Future Development Trends

Criterion	Response
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan? • **If yes, give the estimated area annexed and estimated number of parcels or structures.**	No N/A
Is your jurisdiction expected to annex any areas during the performance period of this plan? • **If yes, describe land areas and dominant uses.** • **If yes, who currently has permitting authority over these areas?**	No N/A N/A
Are any areas targeted for development or major redevelopment in the next five years? • **If yes, briefly describe, including whether any of the areas are in known hazard risk areas**	Yes The City of Hunters Creek Village is continuing to experience residential redevelopment of new, larger homes.

How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?

	2014	2015	2016	2017	2018
Single Family	29	24	10	20	26
Multi-Family	N/A	N/A	N/A	N/A	N/A
Other (commercial, mixed use, etc.)	N/A	N/A	N/A	N/A	N/A
Total	**29**	**24**	**10**	**20**	**26**

Provide the number of new-construction permits for each hazard area or provide a qualitative description of where development has occurred.	• Special Flood Hazard Areas: #N/A • Landslide: # N/A • High Liquefaction Areas: # N/A • Tsunami Inundation Area: # N/A • Wildfire Risk Areas: # N/A
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	The City Hunters Creek Village continues to experience redevelopment of their residential lots; older homes are demolished and new homes constructed.

Table 12-3. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code	Yes	Yes	Yes	No
Comment: *International Bldg. Codes / Residential Codes are a State mandate*				
Zoning Code	Yes	Yes	Yes	No
Comment: *General Law City*				
Subdivisions	Yes	Yes	Yes	No
Comment: *Zoning Ordinance*				
Stormwater Management	Yes	Yes	Yes	No
Comment: *TCEQ*				
Post-Disaster Recovery	Yes	Yes	Yes	No
Comment:				
Real Estate Disclosure	No	No	No	No
Comment:				
Growth Management	Yes	No	No	No
Comment: *Zoning Ordinance*				
Site Plan Review	Yes	Yes	NO	No
Comment: *Harris County Flood Control District*				
Environmental Protection	Yes	Yes	Yes	Yes
Comment: *TCEQ and EPA*				
Flood Damage Prevention	Yes	Yes	No	No
Comment: *Harris County Flood Control District*				
Emergency Management	Yes	Yes	No	No
Comment: *Village Fire Department / Harris County*				
Climate Change	No	No	No	No
Comment:				
Planning Documents				
General Plan	NA	NA	NA	NA
Comment:				
Capital Improvement Plan	Yes	No	No	Yes
How often is the plan updated? Annually				
Comment:				
Disaster Debris Management Plan	Yes	Yes	No	Yes
Comment: *Harris County*				
Floodplain or Watershed Plan	Yes	Yes	No	Yes
Comment: *Harris County Flood Control District*				
Stormwater Plan	Yes	Yes	Yes	Yes
Comment: *Harris County Flood Control District*				
Urban Water Management Plan	Yes	No	No	No
Comment: *Harris County Flood Control District*				
Habitat Conservation Plan	No	Yes	Yes	No
Comment: *TCEQ and EPA*				
Economic Development Plan	No	No	No	No
Comment:				
Shoreline Management Plan	No	No	No	No
Comment:				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Community Wildfire Protection Plan ***Comment:*** *Village Fire Department*	Yes	No	No	Yes
Forest Management Plan ***Comment:*** *City Ordinance*	Yes	No	No	Yes
Climate Action Plan ***Comment:***	No	No	No	No
Comprehensive Emergency Management Plan ***Comment:*** *Village Fire Department*	Yes	Yes	No	Yes
Threat & Hazard Identification & Risk Assessment (THIRA) ***Comment:*** *Village Fire Department*	Yes	Yes	No	Yes
Post-Disaster Recovery Plan ***Comment:*** *Harris County*	Yes	Yes	No	Yes
Continuity of Operations Plan ***Comment:***	No	No	No	No
Public Health Plan ***Comment:*** *City Ordinance and Texas Department of Health*	Yes	Yes	Yes	Yes

Table 12-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • **If no, who does? If yes, which department?**	Yes Building Department
Does your jurisdiction have the ability to track permits by hazard area?	Yes
Does your jurisdiction have a buildable lands inventory?	Yes

Table 12-5. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants	No
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	No
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	No

Table 12-6. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	CobbFendley Associates
Engineers or professionals trained in building or infrastructure construction practices	Yes	Building Official
Planners or engineers with an understanding of natural hazards	Yes	CobbFendley Associates
Staff with training in benefit/cost analysis	Yes	City Administrator
Surveyors	Yes	CobbFendley Associates
Personnel skilled or trained in GIS applications	Yes	CobbFendley Associates
Scientist familiar with natural hazards in local area	No	n/a
Emergency manager	Yes	City Administrator
Grant writers	Yes	CobbFendley Associates

Table 12-7. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • If yes, briefly describe.	Yes Links to County Agencies
Do you use social media for hazard mitigation education and outreach? • If yes, briefly describe.	Yes Email / Text Alerts
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • If yes, briefly describe.	No N/A
Do you have any other programs already in place that could be used to communicate hazard-related information? • If yes, briefly describe.	Yes Mayor / Council
Do you have any established warning systems for hazard events? • If yes, briefly describe.	Yes Vlinc Email / Text Alerts

Table 12-8. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Building Depart / City Engineer
Who is your floodplain administrator? (department/position)	City Engineer
Are any certified floodplain managers on staff in your jurisdiction?	Yes
What is the date that your flood damage prevention ordinance was last amended?	2001
Does your floodplain management program meet or exceed minimum requirements? • **If exceeds, in what ways?**	Meets N/A
When was the most recent Community Assistance Visit or Community Assistance Contact?	N/A
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • **If so, state what they are.**	No N/A
Are any RiskMAP projects currently underway in your jurisdiction? • **If so, state what they are.**	Yes Outfall Rehabilitation
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • **If no, state why.**	Yes N/A
Does your floodplain management staff need any assistance or training to support its floodplain management program? • **If so, what type of assistance/training is needed?**	Yes CFM
Does your jurisdiction participate in the Community Rating System (CRS)? • **If yes, is your jurisdiction interested in improving its CRS Classification?** • **If no, is your jurisdiction interested in joining the CRS program?**	No N/A Yes
How many flood insurance policies are in force in your jurisdiction?[a] • **What is the insurance in force?** • **What is the premium in force?**	788 $270,932,500 $336,552
How many total loss claims have been filed in your jurisdiction?[a] • **How many claims are still open or were closed without payment?** • **What were the total payments for losses?**	Unknown Unknown $17,794,549

a. According to FEMA statistics as of March 28, 2019

Table 12-9. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	No	N/A	N/A
Building Code Effectiveness Grading Schedule	Yes	5	2017
Public Protection	No	N/A	N/A
Storm Ready	No	N/A	N/A
Firewise	Yes	1	2017

Table 12-10. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:***	Low
Jurisdiction-level monitoring of climate change impacts ***Comment:***	Low
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:***	Low
Participation in regional groups addressing climate risks ***Comment:***	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	Low
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	Low
Identified strategies for adaptation to impacts ***Comment:***	Low
Champions for climate action in local government departments ***Comment:***	Low
Political support for implementing climate change adaptation strategies ***Comment:***	Low
Financial resources devoted to climate change adaptation ***Comment:***	Low
Local authority over sectors likely to be negative impacted ***Comment:***	High
Public Capacity	
Local residents knowledge of and understanding of climate risk ***Comment:***	Unknown
Local residents support of adaptation efforts ***Comment:***	Unknown
Local residents' capacity to adapt to climate impacts ***Comment:***	Unknown
Local economy current capacity to adapt to climate impacts ***Comment:***	Unknown
Local ecosystems capacity to adapt to climate impacts ***Comment:***	Unknown

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

12.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning and capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

12.5.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- **Capital Improvement Plan –** Studies existing infrastructure and allows planning of activities and projects to improve that infrastructure to mitigate identified hazards.
- **Disaster Debris Management Plan –** Outlines actions to quickly remove hazards associated with disaster debris.
- **Floodplain or Watershed Plan –** Ensures compliance with Federal Guidelines and Building Codes to eliminate potential hazards associated with flooding.
- **Storm Water Plan –** Identification and repair of potential hazards associated with Storm water Infrastructure

12.5.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- **Building and Zoning Codes –** Allows the review and mitigation of potential hazards during the planning and construction process.
- **Site Plan Review –** Gives the City the ability to review potential hazards and have them corrected before permitting.
- **Flood Damage Prevention –** Review and update the City's Flood Damage Prevention Ordinance to include more stringent guidelines to reduce flood losses.

12.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 12-11 lists past occurrences of natural hazards for which specific damage was recorded in the City of Hunters Creek Village. Other hazard events that broadly affected the entire planning area, including the City of Hunters Creek Village, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 12-11. Past Natural Hazard Events

		Date	Damage Assessment
Hurricane Harvey	DR4332	2017	N/A
Flooding	DR 4269	2016	N/A
Flooding	DR 4272	2016	N/A
Hurricane Ike	1791 DR	2008	N/A
Hurricane Rita	1606 DR	2005	N/A
Tropical Storm Allison	1379 DR	2001	N/A

12.7 HAZARD RISK RANKING

Table 12-12 presents a local ranking for the City of Hunters Creek Village of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 12-12. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Hurricane/Coastal Storm	48	High
1	Severe Weather	48	High
2	Flooding	18	Medium
3	Earthquake	14	Low
4	Drought	6	Low
4	Dam/Levee Failure	6	Low
4	Mass Movements	6	Low
5	Wildfire	0 (No Exposure)	None
5	Coastal Erosion	0 (No Exposure)	None
5	Tsunami	0 (No Exposure)	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

12.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. This section provides information on a few key vulnerabilities for the jurisdiction. Available jurisdiction-specific risk maps of the hazards are provided at the end of this annex.

12.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: 30
- Number of FEMA-identified Severe-Repetitive-Loss Properties: 1
- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated: 3

12.8.2 Other Noted Vulnerabilities

The following jurisdiction-specific issues have been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- Flooding potential from close proximity to Buffalo Bayou
- Severe tree damage potential from Hurricanes/Tornadoes

Mitigation actions addressing these issues were prioritized for consideration in the action plan for this annex.

12.9 STATUS OF PREVIOUS PLAN ACTIONS

Table 12-13 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

Table 12-13. Status of Previous Plan Actions

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
2014HNTCRK001 Implement a Public Outreach Program on Flooding to Educate residents on actions to reduce residential property damage.	No			
2014HNTCRK002 Develop new drainage ordinance to require detention for future development and redevelopment for detention.	No			
2014HNTCRK003 Strengthen Building Codes/Ordinances relative to job site (construction), debris removal management & removal of dead trees.	No			
2014HNTCRK004 Develop a tree management program to limit debris damage to critical infrastructure, public facilities from falling tree canopy due to high winds.			Yes	HNT9
2014HNTCRK005 Harden and retrofit critical infrastructure facilities to withstand high wind damages.	No			
2014HNTCRK006 Improve and enhance regulations with higher-standards/attest building codes for facilities to withstand severe thunderstorms, high winds and hail.	No			
2014 HNTCRK007 Retrofit City Hall and Public Works Maintenance Building with lightning and surge protection measures.			Yes	HNT8
2014HNTCRK014 Enhance use if upgraded warning system CodeRED using citywide mass notification system to enhance coverage of the community's population.	No			
2014HNTCRK015 Install cover and freeze insulation protection of above ground irrigation and FDC connections in public facilities.	Yes			
2014HNTCRK020 Develop and adopt higher-standard/latest edition construction codes and ordinances to protect structures from severe wind damage.			Yes	HNT5
2014HNTCRK009 Implement a Public Education/Outreach Program on Extreme Heat to educate residents on actions to reduce property damage and health impacts within the community.	NO			
2014HNTCRK010 Improve public facility emergency power (by installing generators) to provide adequate cooling for use as a cooling center.	No			

12.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 12-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 12-15 identifies the priority for each action. Table 12-16 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 12-14. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action HNT1 — Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Earthquake, flooding, landslide, tsunami, wildfire						
Existing	3, 4, 10	Hunters Creek	FEMA	High	HMGP, PDM, FMA	Short-term
Action HNT2 — Integrate the hazard mitigation plan into other plans, ordinances and programs that dictate land use decisions in the community, including Capital Improvements Plan, Zoning Ordinances						
Hazards Mitigated: Dam failure, drought, earthquake, flooding, landslide, tsunami, wildfire						
New and Existing	1, 3, 4, 5, 7, 8, 10	Hunters Creek	Harris County	Low	Staff Time, General Funds	Ongoing
Action HNT3 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: Hurricane/Coastal Storm, Severe Weather, Flooding, Earthquake, Drought, Dam/Levee Failure, Mass Movements						
New and Existing	1, 5, 8	Harris County	Hunters Creek	Low	Staff Time, General Funds	Short-term
Action HNT4 — Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements: • Enforce the flood damage prevention ordinance. • Participate in floodplain identification and mapping updates. • Provide public assistance/information on floodplain requirements and impacts.						
Hazards Mitigated: Dam failure, flooding, severe weather, tsunami, sea level rise						
New and Existing	1, 3, 5, 7, 8, 10	Hunters Creek	FEMA	Low	Staff Time, General Funds	Ongoing
Action HNT5 — Strengthen existing Building Codes and Ordinances by adoption of updated/current Model Codes						
Hazards Mitigated: Hurricane/Coastal Storm, Earthquake, Flood, Wildfire						
New and Existing	4, 12, 14, 15	Hunters Creek		Low	Staff Time/General Funds	Short-term
Action HNT6 — Video inspection of City's Storm Sewer System to identify and correct potential hazards.						
Hazards Mitigated: Flooding, Coastal Erosion, Mass Movements						
Existing	8, 10, 11	Hunters Creek		Medium	Staff Time/General Funds	Ongoing
Action HNT7 — Enhance the dissemination of Public Information with the use of the City's V Link program.						
Hazards Mitigated: Hurricane/Coastal Storm, Severe Weather, Flooding, Earthquake, Drought, Dam/Levee Failure, Mass MovementsAll hazards						
New and Existing	1, 3, 9	Hunters Creek	Police Department	Low	Staff Time/General Funds	Ongoing
Action HNT8 — Retrofit Public Works Maintenance Building with Back-Up Power Generator						
Hazards Mitigated: Hurricane/Coastal Storm, Earthquake, Flood						
New	1, 9, 11, 13	Hunters Creek		Medium	General Funds	Short-term
Action HNT9 — Development of a Tree Management Program to limit potential damage to critical infrastructure from falling trees or limbs.						
Hazards Mitigated: Hurricane/Coastal Storm, Earthquake, Wildfire						
New	5, 6, 7, 8	Hunters Creek		Low	Staff Time	Short-term
Action HNT10— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
Hazards Mitigated: Hurricane/Coastal Storm, Severe Weather, Flooding, Earthquake, Drought, Dam/Levee Failure, Mass Movements						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	Hunters Creek	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 12-15. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
HNT1	3	High	High	Yes	Yes	No	Medium	High
HNT2	7	Medium	Low	Yes	No	Yes	High	Low
HNT3	3	Low	Low	Yes	No	Yes	High	Low
HNT4	6	Medium	Low	Yes	No	Yes	High	Low
HNT5	4	High	Low	Yes	No	Yes	High	Low
HNT6	3	High	High	Yes	Yes	Yes	High	Low
HNT7	3	High	Low	Yes	No	Yes	High	Low
HNT8	4	Medium	Medium	Yes	No	Yes	Medium	Low
HNT9	4	Medium	Low	Yes	No	Yes	Medium	Low
HNT10	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 12-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Hurricane/ Coastal Storm	HNT1, HNT3, HNT4, HNT5, HNT9, HNT10	HNT1, HNT3, HNT4, HNT5, HNT8, HNT9	HNT3, HNT4, HNT7, HNT10	HNT1, HNT3, HNT4, HNT5, HNT9	HNT3, HNT7, HNT8, HNT10	HNT1, HNT3, HNT5, HNT8	HNT3	HNT3, HNT7, HNT10
Severe Weather	HNT1, HNT3, HNT4, HNT5, HNT9, HNT10	HNT1, HNT3, HNT4, HNT5, HNT8, HNT9	HNT3, HNT4, HNT7, HNT10	HNT1, HNT3, HNT4, HNT5, HNT9	HNT3, HNT7, HNT8, HNT10	HNT1, HNT3, HNT5, HNT8	HNT3	HNT3, HNT7, HNT10
Medium Risk Hazards								
Flooding	HNT1, HNT2, HNT3, HNT4, HNT5, HNT6, HNT10	HNT1, HNT2, HNT3, HNT4, HNT5, HNT6, HNT8	HNT3, HNT4, HNT7, HNT10	HNT1, HNT2, HNT3, HNT4, HNT5, HNT6	HNT 3, HNT7, HNT8 HNT10,	HNT1, HNT2, HNT3, HNT5, HNT6, HNT8	HNT3	HNT3, HNT7, HNT10
Low-Risk Hazards								
Mass Movements	HNT1, HNT2, HNT3, HNT6, HNT10	HNT1, HNT2, HNT3, HNT6	HNT3, HNT7, HNT10	HNT1, HNT2, HNT3, HNT6	HNT3, HNT7, HNT10	HNT1, HNT2, HNT3, HNT6	HNT3	HNT3, HNT7, HNT10
Earthquake	HNT1, HNT2, HNT3, HNT5, HNT9, HNT10	HNT1, HNT2, HNT3, HNT5, HNT8, HNT9	HNT3, HNT7, HNT10	HNT1, HNT2, HNT3, HNT5, HNT9	HNT3, HNT7, HNT8, HNT10	HNT1, HNT2, HNT3, HNT5, HNT8	HNT3	HNT3, HNT7, HNT10
Drought	HNT2, HNT3, HNT10	HNT2, HNT3	HNT3, HNT7, HNT10	HNT2, HNT3	HNT3, HNT7, HNT10	HNT2, HNT3	HNT3	HNT3, HNT7, HNT10
Dam/Levee Failure	HNT2, HNT3, HNT10	HNT2, HNT3	HNT3, HNT7, HNT10	HNT2, HNT3	HNT3, HNT7, HNT10	HNT2, HNT3	HNT3	HNT3, HNT7, HNT10

a. See the introduction to this volume for explanation of mitigation types.

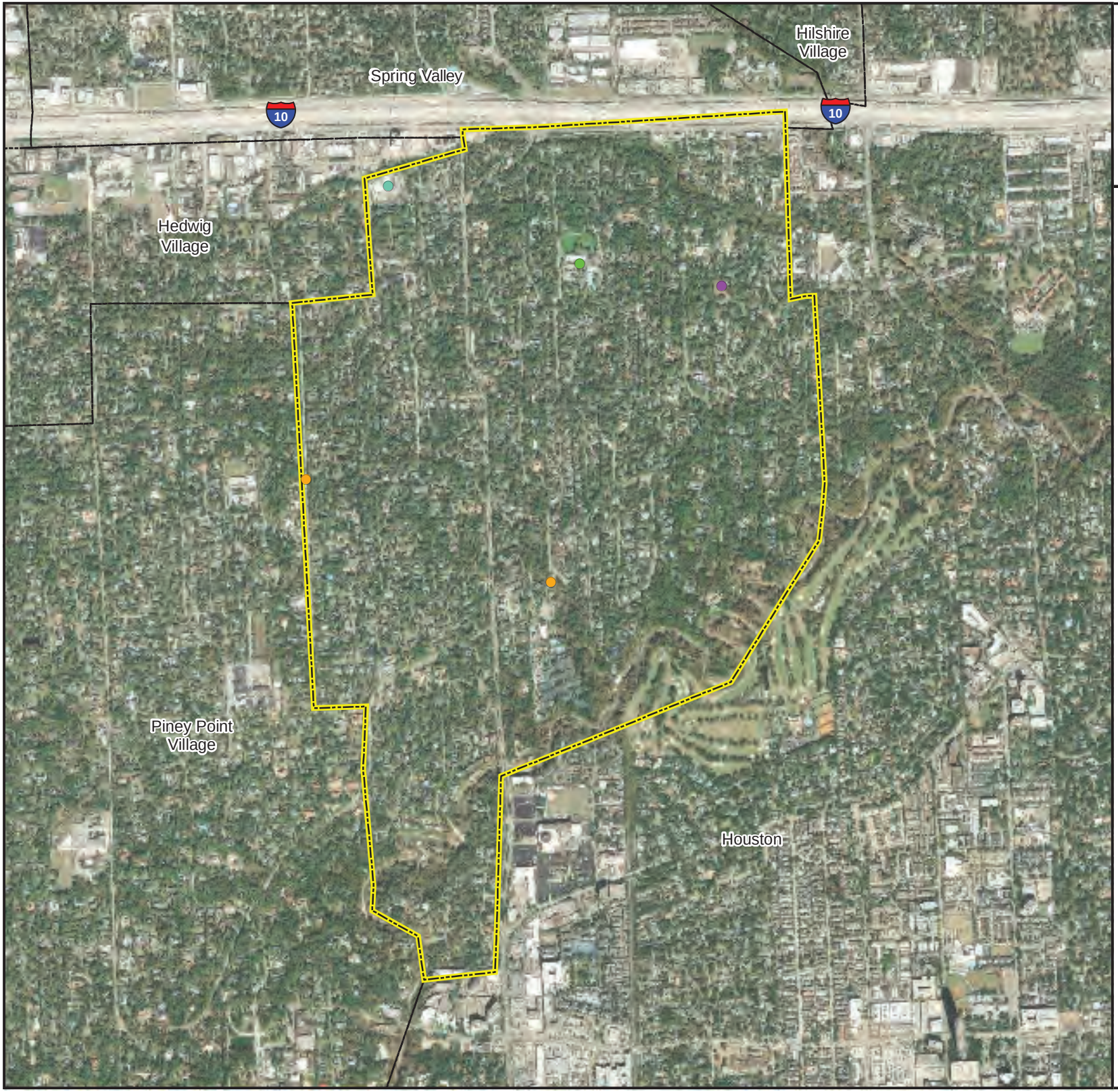
12.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- **The City of Hunters Creek Village Municipal Code** — The municipal code was reviewed for the full capability assessment and for identifying opportunities for action plan integration.
- **The City of Hunters Creek Village Flood Damage Prevention Ordinance** — The flood damage prevention ordinance was reviewed for compliance with the National Flood Insurance Program.

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.



Hunters Creek Village

Critical Facilities

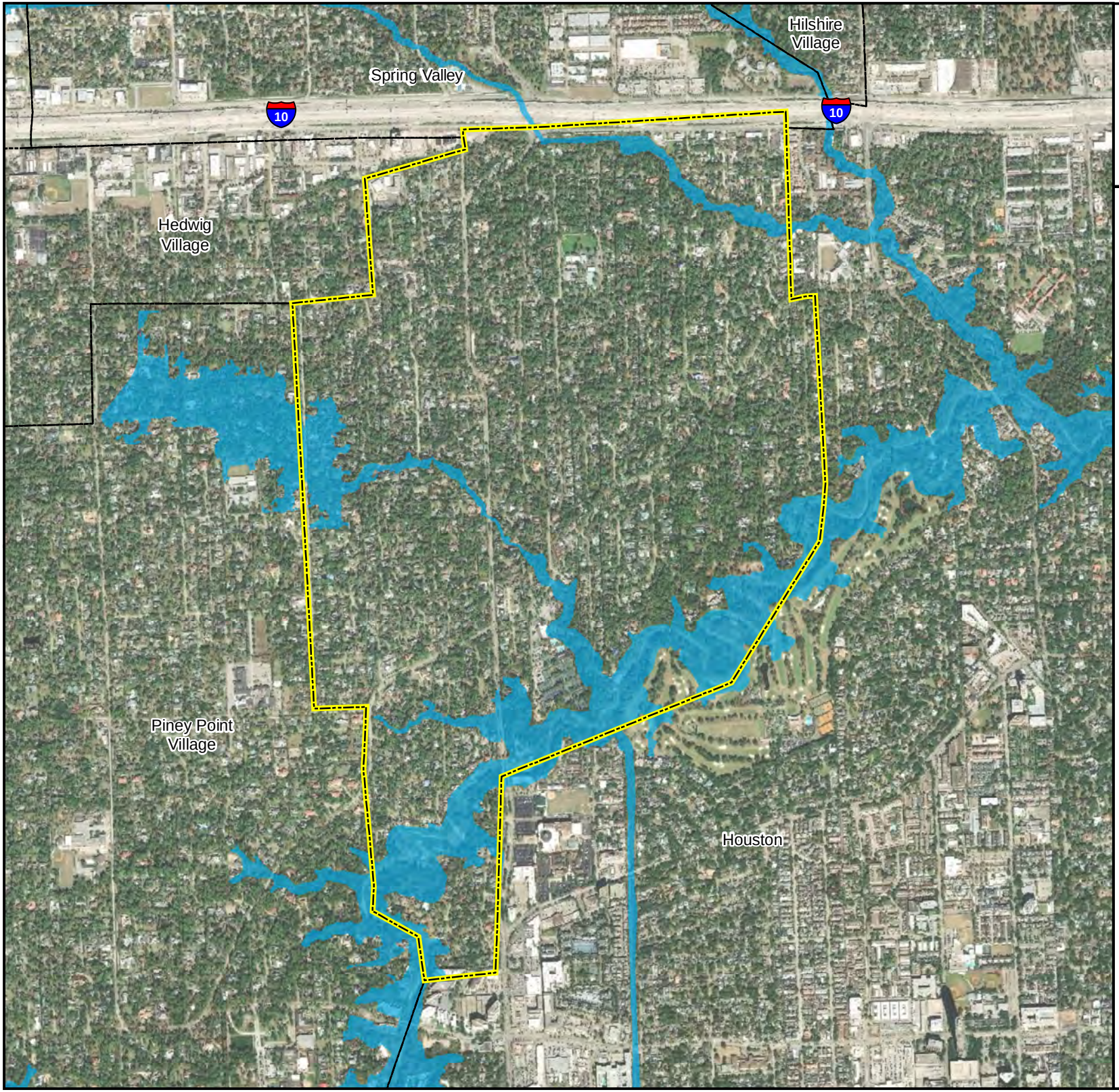
- Education Facilities
- Emergency Services
- Government Facilities
- Hazardous Material Sites
- Health and Medical Facilities
- Historical and Cultural Sites
- Transportation Systems
- Utility Systems
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles



Hunters Creek Village

FEMA Flood Hazard

1% Annual Chance Flood (100-yr)

Incorporated Cities

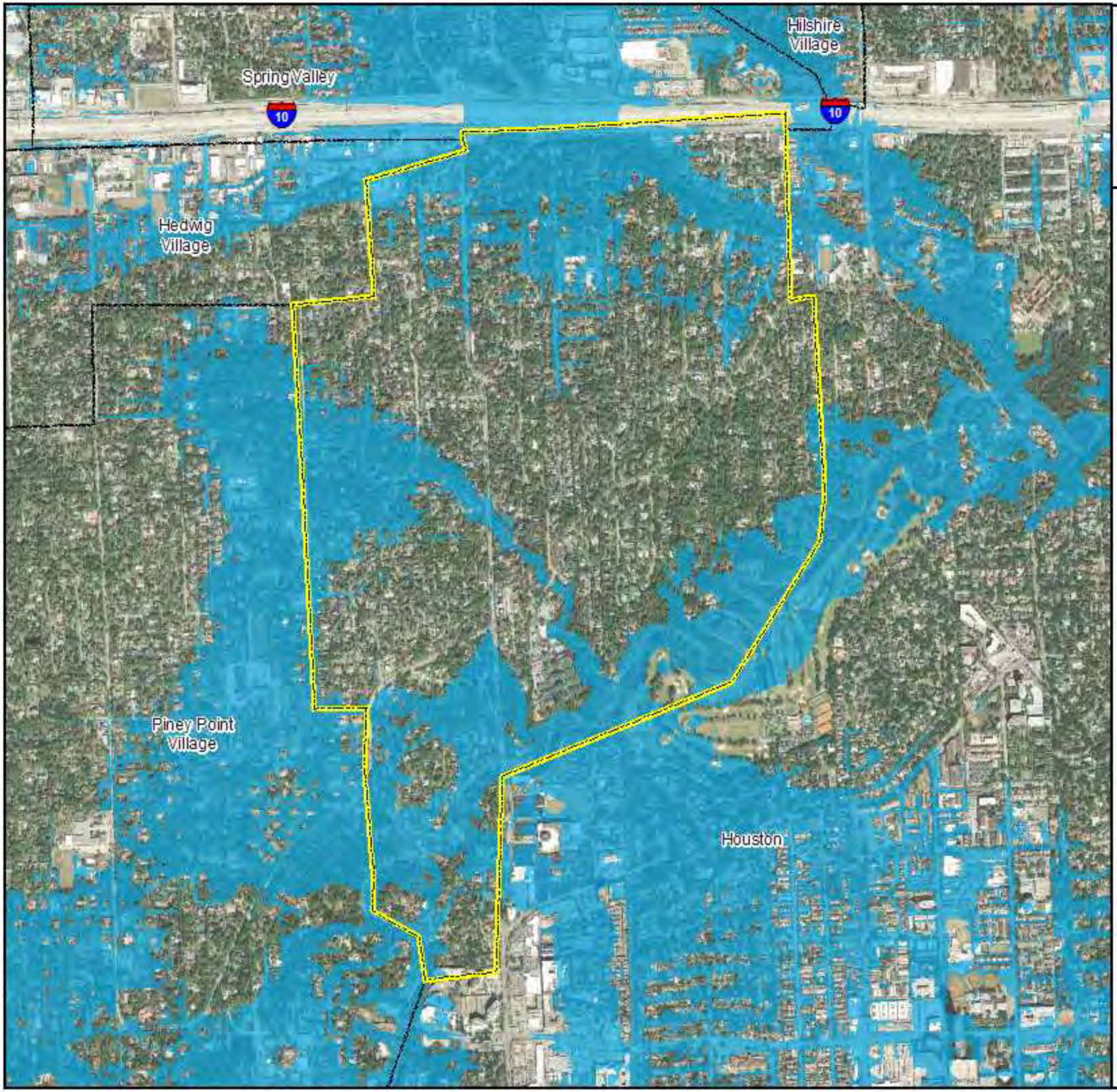
Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles



Hunters Creek Village

Flood Hazard
Hurricane Harvey

Flooding Extent

Incorporated Cities

Harris County

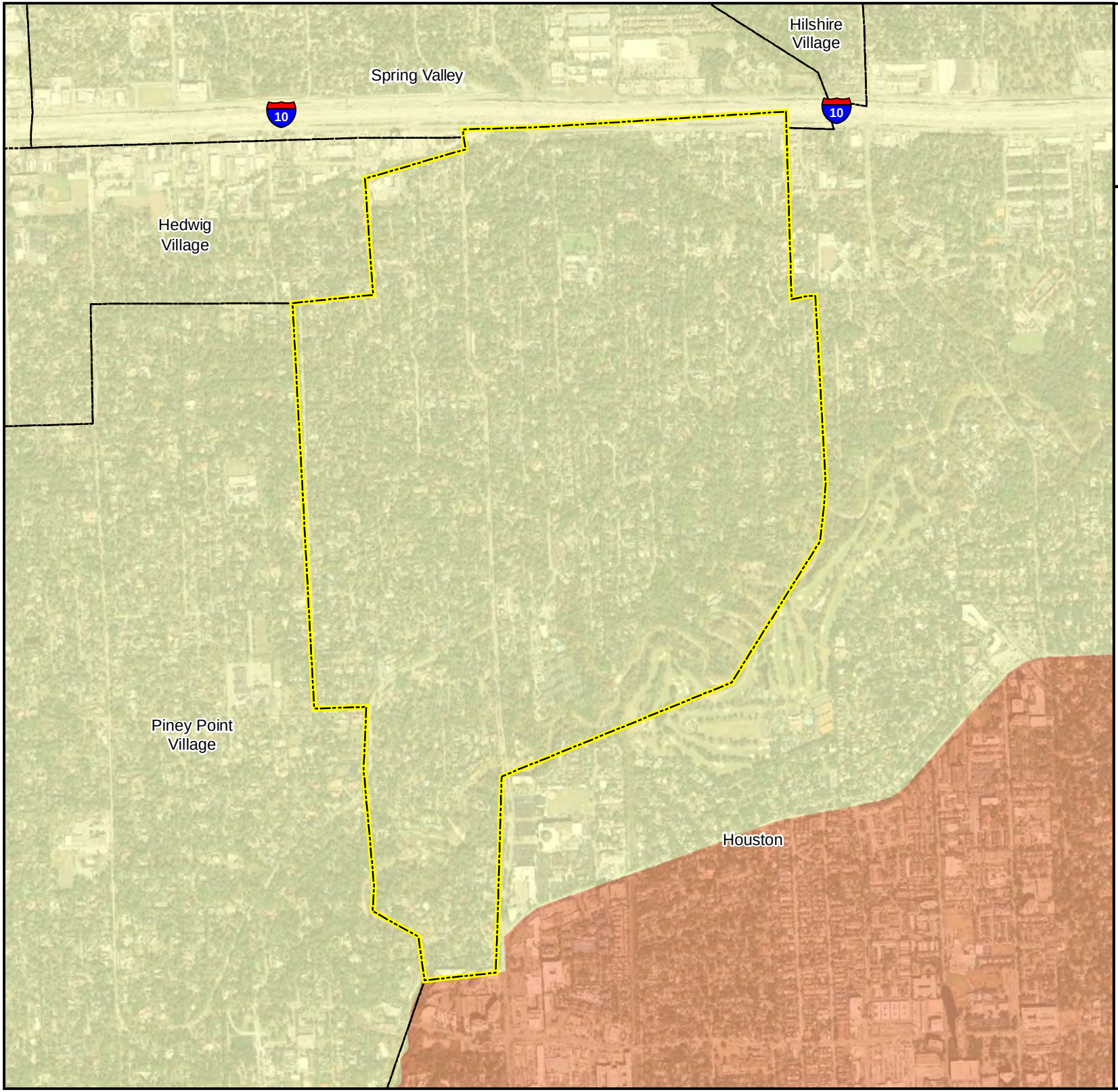
Note: Flooding extent shown for Hazard Mitigation Plan planning area only.

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles



Hunters Creek Village

Hurricane Alicia (1983)

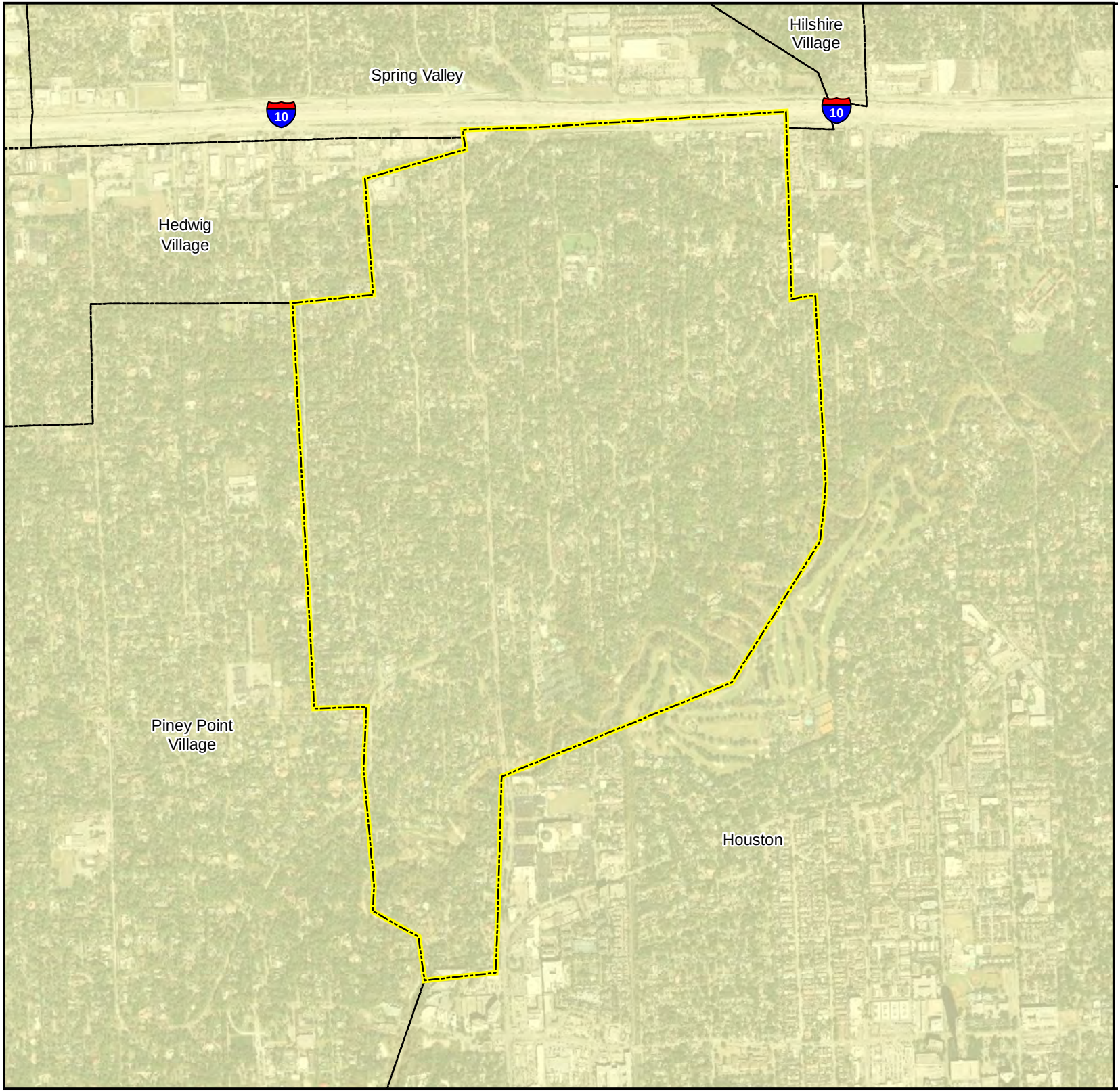
Peak WInd Gust (mph)

- 87 - 94
- 95 - 98
- 99 - 101
- 102 - 104
- 105 - 110
- Storm Track
- Incorporated Cities
- Harris County

TETRA TECH

N

0 0.1 0.2 0.4 Miles



Hunters Creek Village

20-year Probabilistic Hurricane

Peak Wind Gust (mph)

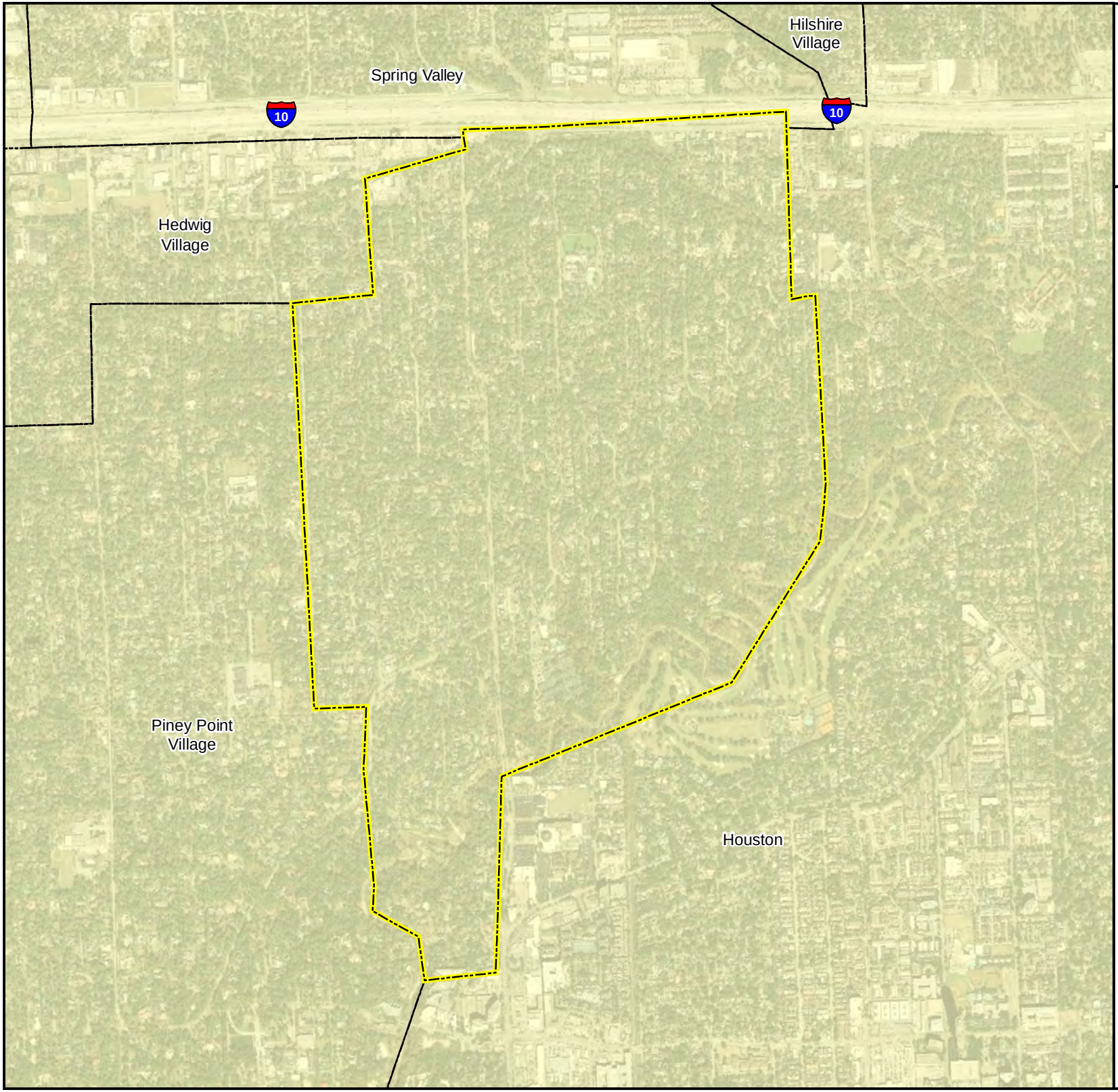
- 63 - 71
- 72 - 76
- 77 - 80
- 81 - 84
- 85 - 92
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles



Hunters Creek Village

100-year Probabilistic Hurricane

Peak Wind Gust (mph)

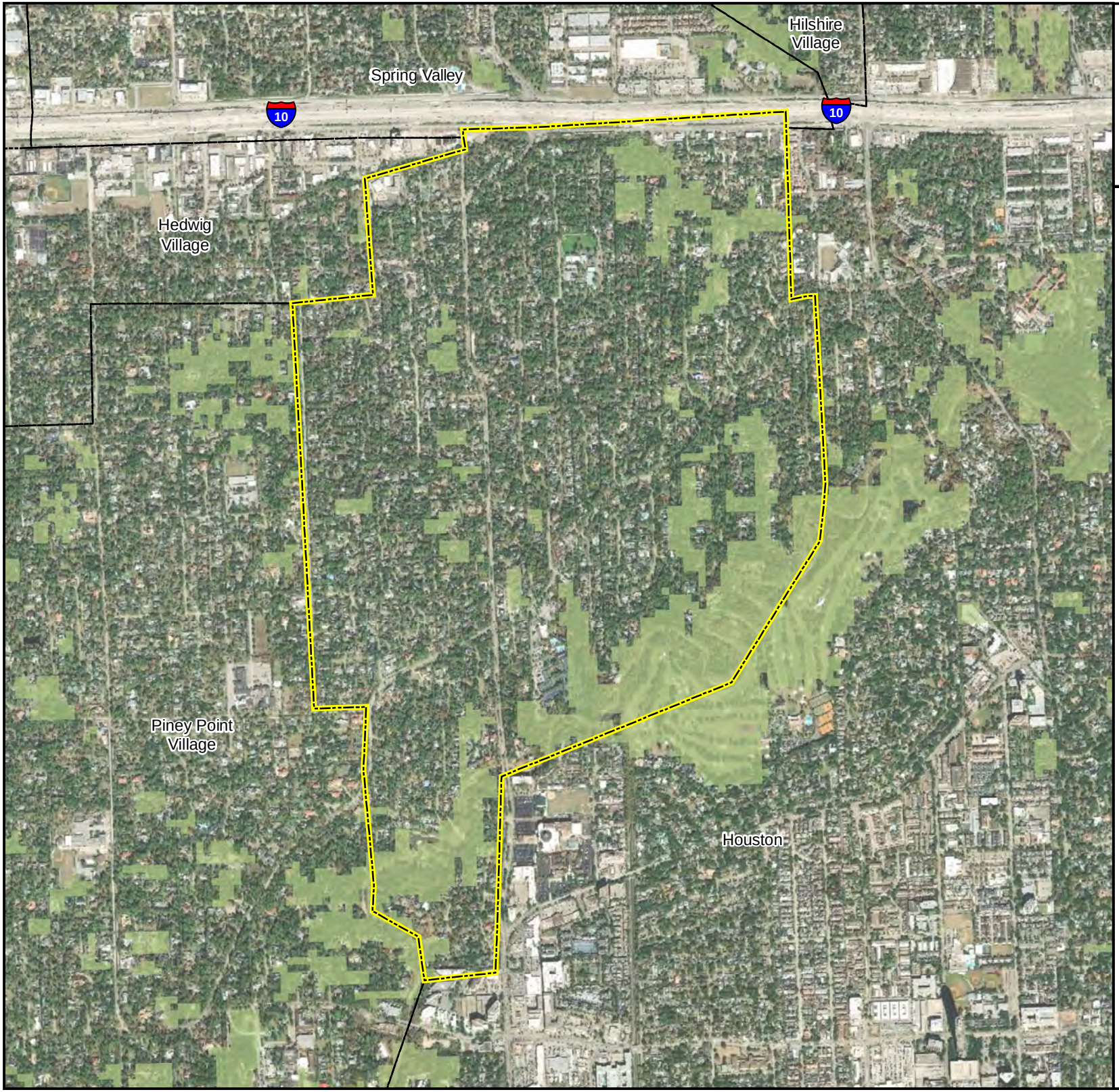
- 89 - 101
- 102 - 106
- 107 - 111
- 112 - 117
- 118 - 128
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles



Hunters Creek Village

Wildfire Ignition Density

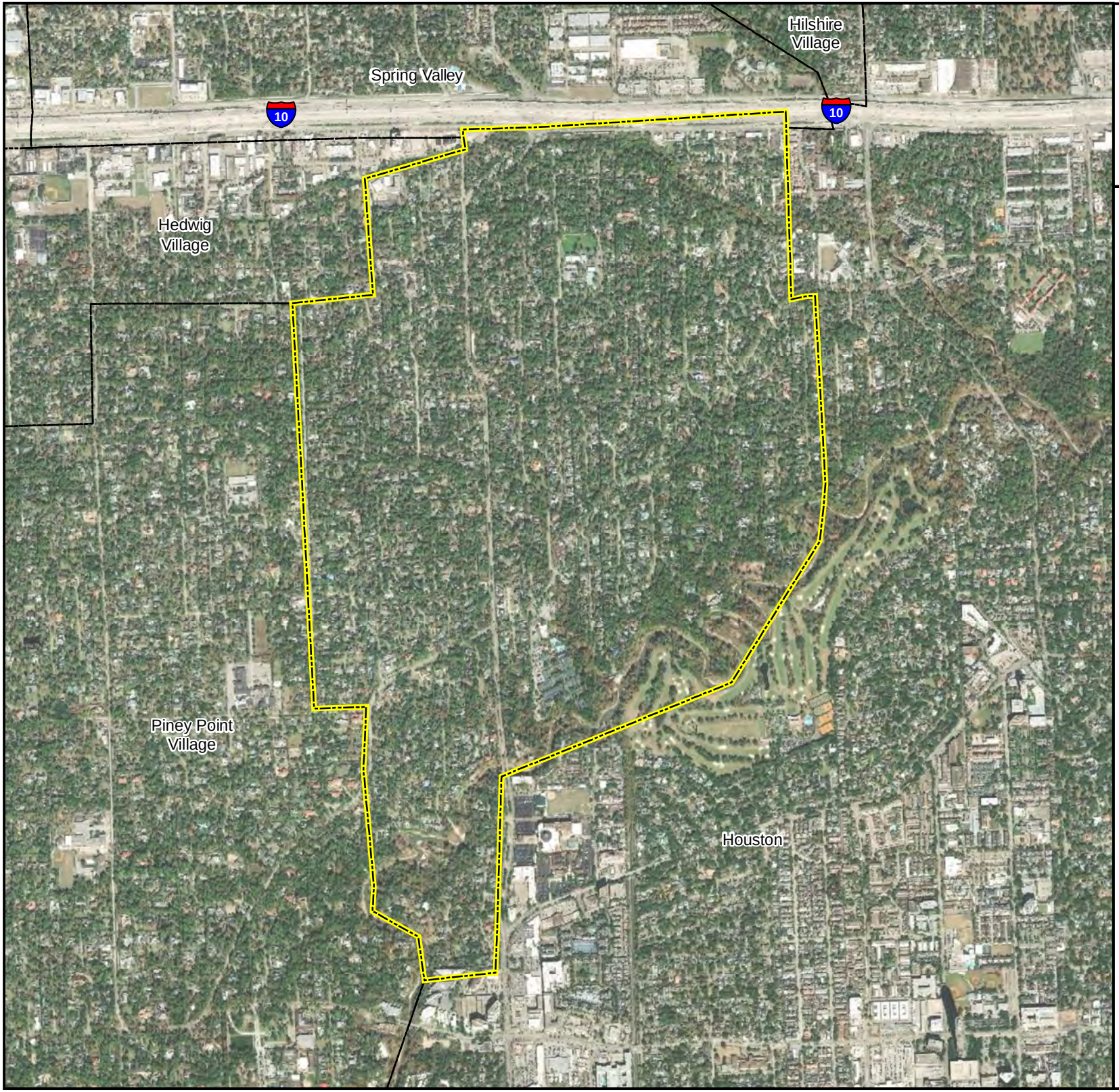
- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles



Hunters Creek Village

Wildfire Threat

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles

13. CITY OF JERSEY VILLAGE

13.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Mark Bitz, Fire Chief / EMC
16501 Jersey Drive
Jersey Village, Texas 77040
Telephone: 713-466-2130
e-mail Address: mbitz@jerseyvillagetx.com

Alternate Point of Contact
Austin Bleess, City Manager
16501 Jersey Drive
Jersey Village, TX 77040
Telephone: 713-466-2109
e-mail Address: Ableess@jerseyvillagetx.com

13.2 JURISDICTION PROFILE

13.2.1 Location

Jersey Village is in Northwest Harris County. The current boundaries generally extend from Highway 290 at Sam Houston Tollway West to Eldridge Parkway from FM 529 North up Jones Road to the 8800 block, from the Sam Houston Tollway to Eldridge Parkway, encompassing an area of 3.5 square miles.

13.2.2 History

City of Jersey Village was incorporated in April 16, 1956. The 1936 Harris County highway map indicated several residences in the area. Clark W. Henry owned 1,236 acres of land on which he operated F&M Dairy and raised Jersey cattle. Henry discontinued his dairy when his health declined, and he gave the land up so a residential community could be built in 1953. Henry and LeRoy Kennedy, members of the Garden Oaks Baptist Church, began developing the community in February 1954. At first the city had 5 miles of streets and drainage, gas, sewage, and water services. Several houses were established along Jersey Drive. The first family moved to the subdivision in late October 1954. The community developed a school, a park, and an 18-hole golf course. When Jersey Village incorporated on April 16, 1956, all 58 votes were in favor of incorporation and a volunteer police force. Because of the incorporation, Houston did not incorporate Jersey Village's territory into its city limits.

13.2.3 Climate

The climate of Jersey Village is humid subtropical.

13.2.4 Governing Body Format

Jersey Village has a home rule charter and a council manager form of government. The city manager acts as the city's chief executive officer. The council, consisting of the mayor and five elected members, serves as the city's legislative body and votes on matters related to city government. The mayor and each council member have two year terms. Each member is limited to four terms as mayor, council member, or both. The mayor votes if the city council has a tie vote. The city manager has no voice in the city council; the city manager attends all council

meetings and provides advice. The city manager manages all city affairs assigned to the city manager by the charter, implements city council directives, and ordinances. The city manager also manages and directs the city organization and employees.

The City of Jersey Village assumes responsibility for the adoption of this plan; City of Jersey Village will oversee its implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 13-1.

Table 13-1. Local Mitigation Planning Team Members

Name	Title
Mark Bitz	Fire Chief / EMC
Austin Bleess	City Manager
Eric Foerster	Police Chief / Deputy EMC
Jason Alfaro	Parks and Recreation Director
Isabel Kato	Finance Director

13.3 CURRENT TRENDS

13.3.1 Population

According to United States Census Bureau the population of The City of Jersey Village as of January 2010 was 7620. Since 2010, the population has grown at an average annual rate of 11 percent. The population was 7,620 at the 2010 Census. The 2018 Population Estimate is 7,962.

1.3.2 Development

The City of Jersey Village has become more aggressive in the last few years to diversify the local economy. By utilizing tax incentives the city has attracted two new employers to the community that have diversified and expanded our local tax base. This has helped to shift some of the burden away from property taxes.

Over the last few years the residential property tax base has increased at an average rate of 5% since 2016. We have seen a marked decrease in industrial personal property value. Back in 2016 the city lost a major manufacturing operation which removed nearly $200,000,000 in valuation from our community.

In 2017 the City created a Tax Increment Reinvestment Zone to help spur new development in an underdeveloped area. This development is just taking root and will be two years before the city sees the benefits from this.

Overall the city is on an upward trajectory and is positioning itself well for an increase in economic development in the coming years.

Table 13-2 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

Table 13-2. Recent and Expected Future Development Trends

Criterion	Response					
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan? • **If yes, give the estimated area annexed and estimated number of parcels or structures.**	No					
Is your jurisdiction expected to annex any areas during the performance period of this plan? • **If yes, describe land areas and dominant uses.** • **If yes, who currently has permitting authority over these areas?**	No					
Are any areas targeted for development or major redevelopment in the next five years? • **If yes, briefly describe, including whether any of the areas are in known hazard risk areas**	Yes Jones Road area south of 290					
How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?		**2014**	**2015**	**2016**	**2017**	**2018**
	Single Family	4	32	30	29	11
	Multi-Family	0	0	0	0	0
	Other (commercial, mixed use, etc.)	4 – Com	2-com	1-com	7-com	1-com
	Total	8	34	31	36	12
Provide the number of new-construction permits for each hazard area or provide a qualitative description of where development has occurred.	• Special Flood Hazard Areas: 43 • Landslide: 0 • High Liquefaction Areas: 0 • Tsunami Inundation Area: 0 • Wildfire Risk Areas: 0					
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	93%					

13.4 CAPABILITY ASSESSMENT

The City of Jersey Village performed an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities is presented in Table 13-3.
- Development and permitting capabilities are presented in Table 13-4.
- An assessment of fiscal capabilities is presented in Table 13-5.
- An assessment of administrative and technical capabilities is presented in Table 13-6.
- An assessment of education and outreach capabilities is presented in Table 13-7.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 13-8.
- Classifications under various community mitigation programs are presented in Table 13-9.
- The community's adaptive capacity for the impacts of climate change is presented in Table 13-10.

Findings of the capability assessment were reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table included in the action plan for this annex identifies these as community capacity building mitigation actions.

Table 13-3. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code	Yes	No	Yes	Yes
Comment: *International Building Code, Code of Ordinances Chapter 14 Article VIII*				
Zoning Code	Yes	No	Yes	Yes
Comment: *Code of Ordinances – Chapter 14 Article IV*				
Subdivisions	Yes	Yes	Yes	Yes
Comment: *Chapter 14 Article III and Article IX*				
Stormwater Management	Yes	Yes	Yes	Yes
Comment: *Code of Ordinances Chapter 14 Article XXI*				
Post-Disaster Recovery	Yes	Yes	Yes	Yes
Comment: *Annex J – Harris County Basic Plan – Recovery and post-disaster permitting and code enforcement regulations.*				
Real Estate Disclosure	N/A	N/A	N/A	N/A
Comment:				
Growth Management	Yes	Yes	No	Yes
Comment: *Code of Ordinances Chapter 14 Article I Section 14-3*				
Site Plan Review	Yes	Yes	No	Yes
Comment: *Code of Ordinances Chapter 14 Article 1 Section 14-6*				
Environmental Protection	Yes	Yes	Yes	Yes
Comment: *Chapter 14 Article IX*				
Flood Damage Prevention	Yes	Yes	Yes	Yes
Comment: *Code of Ordinances Chapter 14 Article IX*				
Emergency Management	Yes	Yes	Yes	Yes
Comment: *Code of Ordinances Chapter 22 Article II*				
Climate Change	N/A	N/A	N/A	N/A
Comment:				
Planning Documents				
General Plan	Yes	Yes	No	Yes
Comment: *Comprehensive Plan adopted February 15, 2016*				
Capital Improvement Plan	Yes	Yes	No	Yes
How often is the plan updated? *Annual Basis*				
Comment:				
Disaster Debris Management Plan	Yes	Yes	No	Yes
Comment: *Contracts and memorandums of understanding are reviewed on an annual basis*				
Floodplain or Watershed Plan	Yes	Yes	No	Yes
Comment: *Chapter 14 Article IX*				
Stormwater Plan	Yes	Yes	No	Yes
Comment: *Chapter 14 Article IX and Article XXI*				
Urban Water Management Plan	Yes	Yes	No	Yes
Comment: *Chapter 14 Article XXI*				
Economic Development Plan	Yes	Yes	No	Yes
Comment: *TIRZ – June 2017*				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Shoreline Management Plan	N/A	N/A	N/A	N/A
Comment:				
Community Wildfire Protection Plan	No	Yes	No	Yes
Comment: *The City of Jersey Village does not have its own CWPP implemented. Harris County has completed a county-wide CWPP; which includes all incorporated jurisdictions within Harris County.*				
Forest Management Plan	N/A	N/A	N/A	N/A
Comment:				
Climate Action Plan	No	No	No	No
Comment:				
Comprehensive Emergency Management Plan	Yes	Yes	No	Yes
Comment: *Annex P – Hazard Mitigation and Hazard Summaries in Basic Plan.*				
Threat & Hazard Identification & Risk Assessment (THIRA)	No	Yes	Yes	Yes
Comment: *A regional THIRA is conducted on an annual basis for UASI and HGAC.*				
Post-Disaster Recovery Plan	Yes	No	No	Yes
Comment: *Annex J – Recovery is required for local jurisdictions to address local recovery programs, damage assessments, Public Assistance and Individual Assistance programs.*				
Continuity of Operations Plan	Yes	No	No	Yes
Comment: *Government Code 418 grants political subdivisions the option to adopt plans for continuity of functions but is not mandated. The City of Jersey Village does have department Continuity of Operations Plans.*				
Public Health Plan	Yes	Yes	Yes	Yes
Comment: *Annex H – Health and Medical is a component of the Emergency Operations Plan and addresses public health, environmental health, and medical response capabilities. The City does not maintain a standalone Public Health Plan.*				

Table 13-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • **If no, who does? If yes, which department?**	Yes Community Development / Public Works
Does your jurisdiction have the ability to track permits by hazard area?	No
Does your jurisdiction have a buildable lands inventory?	Yes

Table 13-5. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants	No
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes Water and Sewer
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	No
Incur Debt through Private Activity Bonds	No
Withhold Public Expenditures in Hazard-Prone Areas	No
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes

Table 13-6. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Community Development / Public Works
Engineers or professionals trained in building or infrastructure construction practices	Yes	Permits and Inspections / Community Development / Public Works
Planners or engineers with an understanding of natural hazards	Yes	Community Development / Public Works
Staff with training in benefit/cost analysis	Yes	City Manager's Office / Public Works / Finance
Surveyors	No	
Personnel skilled or trained in GIS applications	No	
Scientist familiar with natural hazards in local area	No	
Emergency manager	Yes	Emergency Manager's Office
Grant writers	Yes	Multiple Departments

Table 13-7. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • **If yes, briefly describe.**	Yes The website provides links to all of our plans including flood plan and comprehensive plan just to name two.
Do you use social media for hazard mitigation education and outreach? • **If yes, briefly describe.**	Yes We posted recently the Hazard Mitigation Process for public remarks on Facebook and Twitter
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • **If yes, briefly describe.**	No
Do you have any other programs already in place that could be used to communicate hazard-related information? • **If yes, briefly describe.**	Yes Website and Social Media
Do you have any established warning systems for hazard events? • **If yes, briefly describe.**	Yes Social Media and Storm Siren

Table 13-8. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Permits / Inspections / Public Works / Community Development
Who is your floodplain administrator? (department/position)	Administration and Public Works City Manager and Public Works Director
Are any certified floodplain managers on staff in your jurisdiction?	Yes
What is the date that your flood damage prevention ordinance was last amended?	February 2019
Does your floodplain management program meet or exceed minimum requirements? • **If exceeds, in what ways?**	Exceeds Higher than base flood requirements / 18" higher than base.
When was the most recent Community Assistance Visit or Community Assistance Contact?	March 2019
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • **If so, state what they are.**	No
Are any RiskMAP projects currently underway in your jurisdiction? • **If so, state what they are.**	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • **If no, state why.**	No FEMA has not updated the maps in years
Does your floodplain management staff need any assistance or training to support its floodplain management program? • **If so, what type of assistance/training is needed?**	Yes Communication to start. No one will return calls for assistance
Does your jurisdiction participate in the Community Rating System (CRS)? • **If yes, is your jurisdiction interested in improving its CRS Classification?** • **If no, is your jurisdiction interested in joining the CRS program?**	No Yes
How many flood insurance policies are in force in your jurisdiction? • **What is the insurance in force?** • **What is the premium in force?**	1352 $414,351,300 $1,094,188
How many total loss claims have been filed in your jurisdiction?[a] • **How many claims are still open or were closed without payment?** • **What were the total payments for losses?**	856 82 $46,383,754

Table 13-9. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	No		
Building Code Effectiveness Grading Schedule	Yes	4	October 23, 2018
Public Protection	Yes	2	November 2015
Storm Ready	No		
Firewise	No		

Table 13-10. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:***	Low
Jurisdiction-level monitoring of climate change impacts ***Comment:***	Low
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:***	Low
Participation in regional groups addressing climate risks ***Comment:***	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	Low
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	Low
Identified strategies for adaptation to impacts ***Comment:***	Low
Champions for climate action in local government departments ***Comment:***	Low
Political support for implementing climate change adaptation strategies ***Comment:***	Low
Financial resources devoted to climate change adaptation ***Comment:***	Low
Local authority over sectors likely to be negative impacted ***Comment:***	Low
Public Capacity	
Local residents knowledge of and understanding of climate risk ***Comment:***	Low
Local residents support of adaptation efforts ***Comment:***	Low
Local residents' capacity to adapt to climate impacts ***Comment:***	Low
Local economy current capacity to adapt to climate impacts ***Comment:***	Low
Local ecosystems capacity to adapt to climate impacts ***Comment:***	Low

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

13.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning and capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

13.5.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- We have started flood mitigation efforts in our city by working to install a BERM around portions of our golf course to prevent water runoff into the storm system.
- We are working to improve storm sewer upgrades to one main street in our city as part of the flood mitigation.
- We have received Federal Funding to elevate 18 homes in our city. RFP's have been received from potential contractors and three contractors have been chosen to oversee this project. Residence have been chosen to have their homes elevated. They now have the option of choosing one of the three selected contractors to begin the work.

13.5.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- We plan to apply for more federal funding on an annual basis to elevate homes and for other related flood mitigation projects.

13.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 13-11 lists past occurrences of natural hazards for which specific damage was recorded in City of Jersey Village. Other hazard events that broadly affected the entire planning area, including City of Jersey Village are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 13-11. Past Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Hurricane Alicia	DR-689	March 18-20 Declared August 19, 1983	N/A
Major Storm	DR-937	March 4-30 – Declared March 20, 1992	N/A
Major Storm	DR – 1041	October 17, 1994	N/A
Tropical Storm Frances	DR – 1245	September 22, 1998	N/A
Tropical Storm Allison	DR – 1379	June 5-20 Declared June 9, 2001	N/A
Hurricane Ike	EM – 3294 / DR – 1791	September 9, 2008 / September 12, 2008	$3,159,150
Tax Day Floods	R – 4269	April 17-30 Declared April 25, 2016	N/A

13.7 HAZARD RISK RANKING

Table 13-12 presents a local ranking for City of Jersey Village of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 13-12. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Severe Weather	48	High
1	Hurricane	48	High
2	Flooding	42	High
3	Earthquake	14	Low
4	Drought	6	Low
4	Wildfire	6	Low
5	Mass Movement	0 (No Exposure)	None
5	Tsunami	0 (No Exposure)	None
5	Dam Failure	0 (No Exposure)	None
5	Coastal Erosion	0 (No Exposure)	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

13.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. This section provides information on a few key vulnerabilities for the jurisdiction. Available jurisdiction-specific risk maps of the hazards are provided at the end of this annex.

13.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: 155
- Number of FEMA-identified Severe-Repetitive-Loss Properties: 10
- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated: 4

13.8.2 Other Noted Vulnerabilities

The following jurisdiction-specific issues have been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- Homes in flood prone areas are vulnerable to repetitive flooding. We are working to elevate multiple homes
- Homes in flood prone areas have also had repetitive flooding. Homes with repetitive flooding are being review now to potentially buy out and then rebuild to our current flood plain management plan to elevate new hones when built.

Mitigation actions addressing these issues were prioritized for consideration in the action plan presented in this annex.

13.9 STATUS OF PREVIOUS PLAN ACTIONS

Table 13-13 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

Table 13-13. Status of Previous Plan Actions

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
Retrofit Critical Infrastructure with Backup Generation	X			
Comment: Two Water Plants require backup generators				
Electric Surge Protection on Public Infrastructure	X			
Comment: City Facilities and Critical Infrastructure should be protected from severe storms that produce lightning				
Community Rating System Participation	X			
Comment: We are actively working on this item.				
Golf Course Water Detention Upgrade	X			
Comment:				
Add Impact Glazing to the International Electrical Conservation Code	X			
Comment:				
Implement a Tree Management Program	X			
Comment: This program will help during times of Hurricanes to prevent trees from falling in city streets				
Add an Ordinance to add Safe Rooms in Homes	X			
Comment: The addition of safe rooms in homes would be an ideal way to protect residents from unexpected occurrence of Tornadic Activity				
Review Current City Infrastructure for Tornadic Impact	X			
Comment: Review Current city facilities to determine if they can handle impact from a Tornado				
Identify and Protect vulnerable city assets from Hail	X			
Comment: This mostly would be vehicles an equipment outside and not under protective covers. Vehicles etc.				
Installation of water supply to area without current water	X			
Comment: The area south of our city in our ETJ and an area we could eventually annex, has 85% of the area without city water.				
Install Wind Monitoring Equipment		X		
Comment: In an effort to monitor wind conditions conducive to wildfires, we would look to install wind monitoring stations throughout the city.				
Implement waste water reuse program to water golf course	X			
Comment: We are actively working on this item				
Improve water lines	X			
Comment: This ongoing project will review current water lines and replace them as we replace other infrastructure like streets and sewer				
Heat Index on Website	X			
Comment: After updating the city website, we will look at ways to like National Weather Service and other easy links to help the community during storm conditions. We have this on our flood information page: https://www.jerseyvillagetx.com/page/city.flood_control				
Install Cooling area during times of power loss	X			
Comment: We will look at current city facilities to identify areas where we could implement cooling areas during power loss				
Develop a Winter Storm Protocol for response during winter storms	X			
Comment: This would be to work with other agencies to develop a common protocol of response during winter emergencies.				

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
Purchase a trailer with road barricades and cones for traffic control	X			
Comment: During Icy conditions, it is very difficult to block roadways. This trailer would help to implement safety zones on freeways and roadways and keep vehicles out of the path of moving traffic during icy conditions.				
Develop Ordinance for Hazardous Material Storage on Residential Property	X			
Comment: This would provide direction to residents on how they should store Gasoline and other chemicals used around the home to prevent Hazardous or toxic release.				
Upgrade and move all business pre-plans to computer	X			
Comment: Business Pre-plans are currently in paper form. The goal is to move all these to computer.				
Develop a Detailed Pipeline Risk Map	X			
Comment: To have a better understanding of all pipelines running through the city and what hazards they are. We have GIS data for all of the pipeline easements through JV.				
Develop a yearly inspection of pipelines	X			
Comment: To work with pipeline companies to develop an inspection program which will help us to monitor the pipelines running through our city.				

13.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 13-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 13-15 identifies the priority for each action. Table 13-16 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 13-14. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action JRV1 — Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Severe Weather, Hurricane, flooding						
Existing	9, 10,11, 12, 15	City Administration	TBD	High	HMGP, PDM, FMA	Short-term
Action JRV2 — Integrate the hazard mitigation plan into other plans, ordinances and programs that dictate land use decisions in the community						
Hazards Mitigated: Severe Weather, Hurricane, drought, earthquake, flooding, wildfire						
New and Existing	10	City Administration	TBD	Low	Staff Time, General Funds	Ongoing
Action JRV3 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Earthquake, Drought, Wildfire						
New and Existing	1, 5, 8	City Administration	TBD	Low	Staff Time, General Funds	Short-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action JRV4 — Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements: • Enforce the flood damage prevention ordinance. • Participate in floodplain identification and mapping updates. • Provide public assistance/information on floodplain requirements and impacts. *Hazards Mitigated:* Severe Weather, Hurricane, Flooding						
New and Existing	1, 3, 5, 7, 8, 10	City Administration	TBD	Low	Staff Time, General Funds	Ongoing
Action JRV5 — Elevation of Pre-Existing Homes that are prone to repetitive flooding Pre-Disaster Mitigation, Hazard Mitigation Grant Program, Flood Mitigation Assistance Program National Flood Insurance Program (Increased Cost of Compliance), Housing and Urban Development – Disaster Recovery Initiative Project Schedule/Completion Timeframe: 10 Years *Hazards Mitigated:* Flooding, Severe Weather, Hurricane						
New	11, 12	Jersey Village	TBD	High	Grant Funding	10 years
Action JRV6 — Demolition of existing homes that are prone to repetitive flooding. Pre-Disaster Mitigation, Hazard Mitigation Grant Program, Flood Mitigation Assistance Program National Flood Insurance Program (Increased Cost of Compliance), Housing and Urban Development – Disaster Recovery Initiative Project Schedule/Completion Timeframe: 10 years *Hazards Mitigated:* Flooding, Severe Weather, Hurricane						
New	11, 12	Jersey Village	TBD	High	Grant Funding	10 years
Action JRV7 – Retrofit Critical Infrastructure with Backup Generation *Hazards Mitigated:* Severe Weather, Hurricane, Earthquake						
Existing	10,11,13	Jersey Village	TBD	High	Grant funding	Long term
Action JRV8 – Electric Surge Protection on Public Infrastructure *Hazards Mitigated:* Severe Weather						
Existing	10,11,13	Jersey Village	TBD	Medium	Grant funding	Short term
Action JRV9 – Community Rating System Participation *Hazards Mitigated:* Flooding						
Existing	9,14	Jersey Village	TBD	Staff time	General funds	Short term
Action JRV10 – Golf Course Water Detention Upgrade *Hazards Mitigated:* Drought						
Existing	7,8,10,11	Jersey Village	TBD	Medium	General and grant funding	Short term
Action JRV11 – Add Impact Glazing to the International Electrical Conservation Code *Hazards Mitigated:* Severe Weather, Hurricane						
New and Existing	3,9,12,13	Jersey Village	TBD	Low	General funds	Short term
Action JRV12 – Implement a Tree Management Program *Hazards Mitigated:* Severe Weather, Hurricane, Wildfire						
New and Existing	2,7	Jersey Village	TBD	Low	General funds	Short term
Action JRV13 – Add an Ordinance to add Safe Rooms in Homes *Hazards Mitigated:* Severe Weather, Hurricane, Earthquake						
New and existing	4, 9, 10, 11,12, 15	Jersey Village	TBD	Low	General funds	Short term
Action JRV14 – Identify and Protect vulnerable city assets from Hail *Hazards Mitigated:* Severe Weather						
Existing	13	Jersey Village	TBD	Medium	General and grant funds	Long term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action JRV15 – Installation of water supply to area without current water						
Hazards Mitigated: Drought						
Existing	2,7	Jersey Village	TBD	High	General funds	Long term
Action JRV16 – Install Wind Monitoring Equipment						
Hazards Mitigated: Severe Weather, Hurricane						
Existing	9, 11	Jersey Village	TBD	Medium	General	Short term
Action JRV17 – Implement waste water reuse program to water golf course						
Hazards Mitigated: Drought						
Existing	2, 5, 7	Jersey Village	TBD	Medium	General and grant funds	Short term
Action JRV18 – Heat Index on Website						
Hazards Mitigated: Severe Weather						
Existing	1,4, 11	Jersey Village	TBD	Low	Staff time	Short term
Action JRV19 – Install Cooling area during times of power loss						
Hazards Mitigated: Severe Weather, Hurricane						
Existing	4, 10	Jersey Village	TBD	Medium	General and grant funds	Short term
Action JRV20 – Develop a Winter Storm Protocol for response during winter storms						
Hazards Mitigated: Severe Weather						
Existing	3, 4, 9	Jersey Village	TBD	Low	Staff time	Short term
Action JRV21 – Purchase a trailer with road barricades and cones for traffic control						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Earthquake, Wildfire						
New	6, 9	Jersey Village	TBD	Medium	General or grant funds	Short term
Action JRV22 – Develop Ordinance for Hazardous Material Storage on Residential Property						
Hazards Mitigated: Hazardous material incidences, flooding						
Existing	2, 3, 7,8	Jersey Village	TBD	Low	Staff time	Short term
Action JRV23 – Upgrade and move all business pre-plans to computer						
Hazards Mitigated: Severe Weather, Hurricane, Earthquake						
Existing	10	Jersey Village	TBD	Low	Staff time	Short term
Action JRV24 – Develop a Detailed Pipeline Risk Map						
Hazards Mitigated: Pipeline incident						
Existing	3, 9 10, 11	Jersey Village	TBD	Low	General funds	Short term
Action JRV25 – Develop a yearly inspection of pipelines						
Hazards Mitigated: Pipeline incident						
Existing	3, 9 10, 11	Jersey Village	TBD	Low	General funds	Short term
Action JRV26— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Earthquake, Drought, Wildfire						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	Jersey Village	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 13-15. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
JRV1	5	High	High	Yes	Yes	No	Medium	High
JRV2	1	Medium	Low	Yes	No	Yes	High	Low
JRV3	3	Low	Low	Yes	No	Yes	High	Low
JRV4	3	Medium	Low	Yes	No	Yes	High	Low
JRV5	2	High	High	Yes	Yes	No	High	High
JRV6	2	High	High	Yes	Yes	No	High	High
JRV7	3	High	High	Yes	Yes	No	High	High
JRV8	3	High	Medium	Yes	Yes	No	High	High
JRV9	2	Medium	Low	Yes	No	Yes	Medium	Low
JRV10	4	Medium	Medium	Yes	No	Yes	Low	Low
JRV11	4	Medium	Low	Yes	No	Yes	Medium	Low
JRV12	2	Medium	Low	Yes	No	Yes	Medium	Low
JRV13	6	Medium	Low	Yes	No	Yes	Low	Low
JRV14	1	Medium	Medium	Yes	Yes	Yes	Medium	Medium
JRV15	2	High	High	Yes	Yes	Yes	High	High
JRV16	2	Medium	Medium	Yes	Yes	No	Medium	Medium
JRV17	3	Medium	Medium	Yes	No	Yes	Medium	Low
JRV18	3	Medium	Low	Yes	No	Yes	Medium	Low
JRV19	2	Medium	Medium	Yes	Yes	No	Medium	Medium
JRV20	3	Medium	Low	Yes	No	Yes	Medium	Low
JRV21	2	Medium	Medium	Yes	Yes	No	Medium	Medium
JRV22	4	Medium	Low	Yes	No	Yes	Medium	Low
JRV23	1	High	Low	Yes	No	Yes	High	Low
JRV24	4	High	Low	Yes	No	Yes	High	Low
JRV25	4	High	Low	Yes	No	Yes	High	Low
JRV26	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 13-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Severe Weather	JV5, 6, 7, 8, 12, 14, 16, 18, 19, 20, 22, 26	JV1, 4, 5, 6, 14	JV16, 18, 26		JV14, 16, 20, 21, 26	JV1, 5, 6, 7, 8	JV7, 13, 19	JV2, 3, 14, 20, 23, 26
Hurricane	JV5, 6, 7, 8, 16, 19, 26	JV1, 4, 5, 6	JV16, 26		JV21, 26	JV1, 5, 6, 7, 8	JV7, 19	JV2, 3, 23, 26
Flooding	JV5, 6, 7, 26	JV1, 4, 5, 6	JV26	JV10, 22	JV21, 26	JV1, 5, 6, 7, 8, 10	JV7, 9, 10	JV2, 3, 9, 26
Low-Risk Hazards								
Earthquake	JV7, 8, 26		JV26		JV21, 26			JV2, 3, 23, 26
Drought	JV26		JV26	JV15, 17	JV26	JV15	JV15	JV2, 3, 26
Wildfire	JV12, 26		JV26	JV12	JV1, 26	JV1	JV12	JV2, 3, 26

ta. See the introduction to this volume for explanation of mitigation types.

13.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

13.11.1 Existing Reports, Plans, Regulatory Tools and Other Resources

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- **Jersey Village Municipal Code of Ordinances** — The municipal code was reviewed for the full capability assessment and for identifying opportunities for action plan integration.
- **Jersey Village Flood Damage Prevention Ordinance** — The flood damage prevention ordinance was reviewed for compliance with the National Flood Insurance Program.
- **Jersey Village International Building, Electrical, Fire, Mechanical, Residential codes –** The city adopted codes were used to identify specific regulatory capabilities.

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.
- The **Internet** was used for fact gathering n specific city information for this report. Specifically for population, census, area of city etc.

Staff and Local Stakeholder Involvement in Annex Development

Jersey Village has been in discussion with Harris County and Tetra Tech since mid 2018 in preparation of the updated all Hazard Mitigation Plan. We have attended several planning meetings. We have worked together with Harris County to review our existing 2015 plan and determine what action items listed were completed or still ongoing. We have met all deadlines for Harris County to review the plan and are confident it meets or exceeds the requirements outlined.

Jersey Village

Critical Facilities

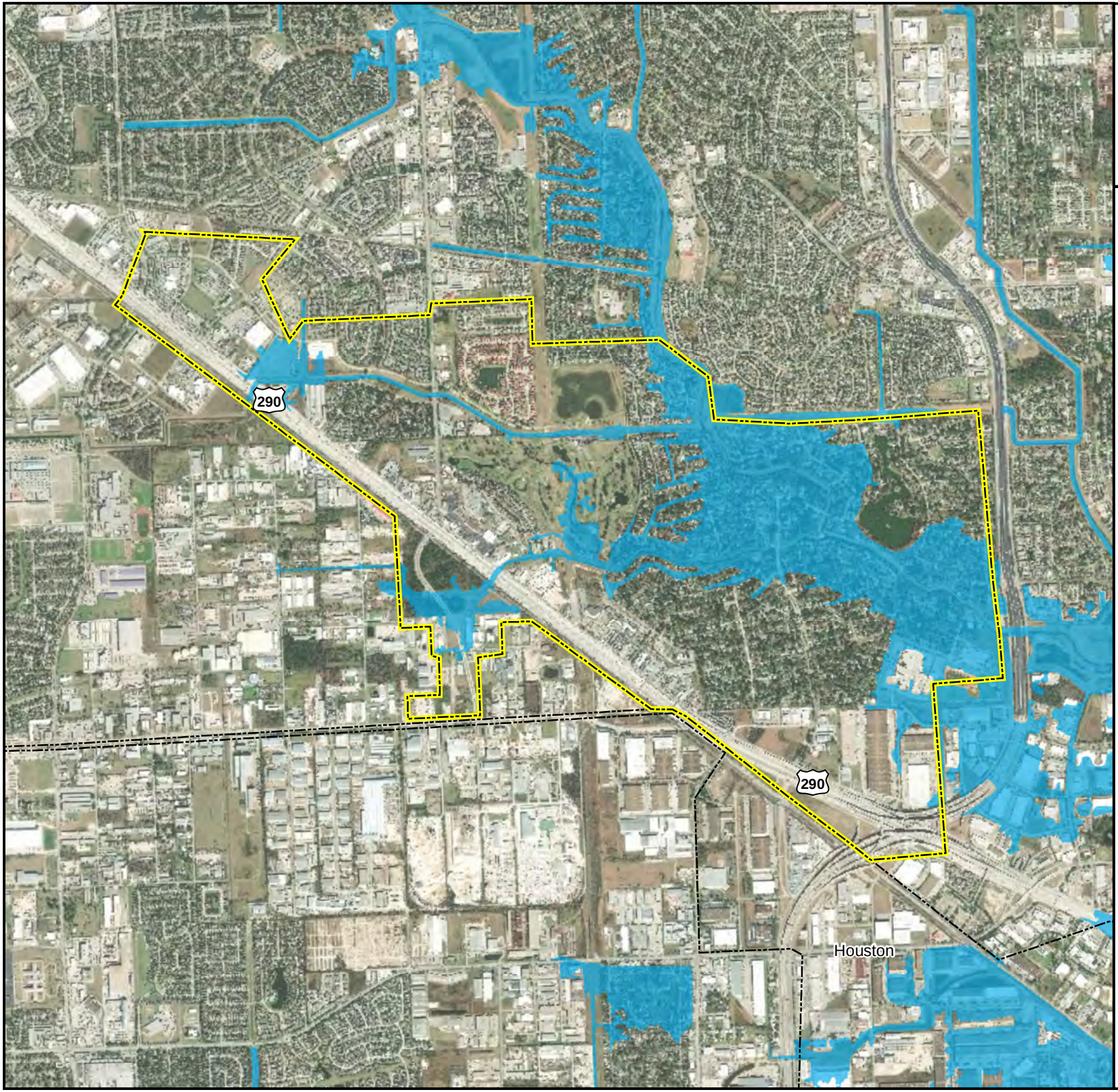
- Education Facilities
- Emergency Services
- Government Facilities
- Hazardous Material Sites
- Health and Medical Facilities
- Historical and Cultural Sites
- Transportation Systems
- Utility Systems
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.15 0.3 0.6 Miles



Jersey Village

FEMA Flood Hazard

1% Annual Chance Flood (100-yr)

Incorporated Cities

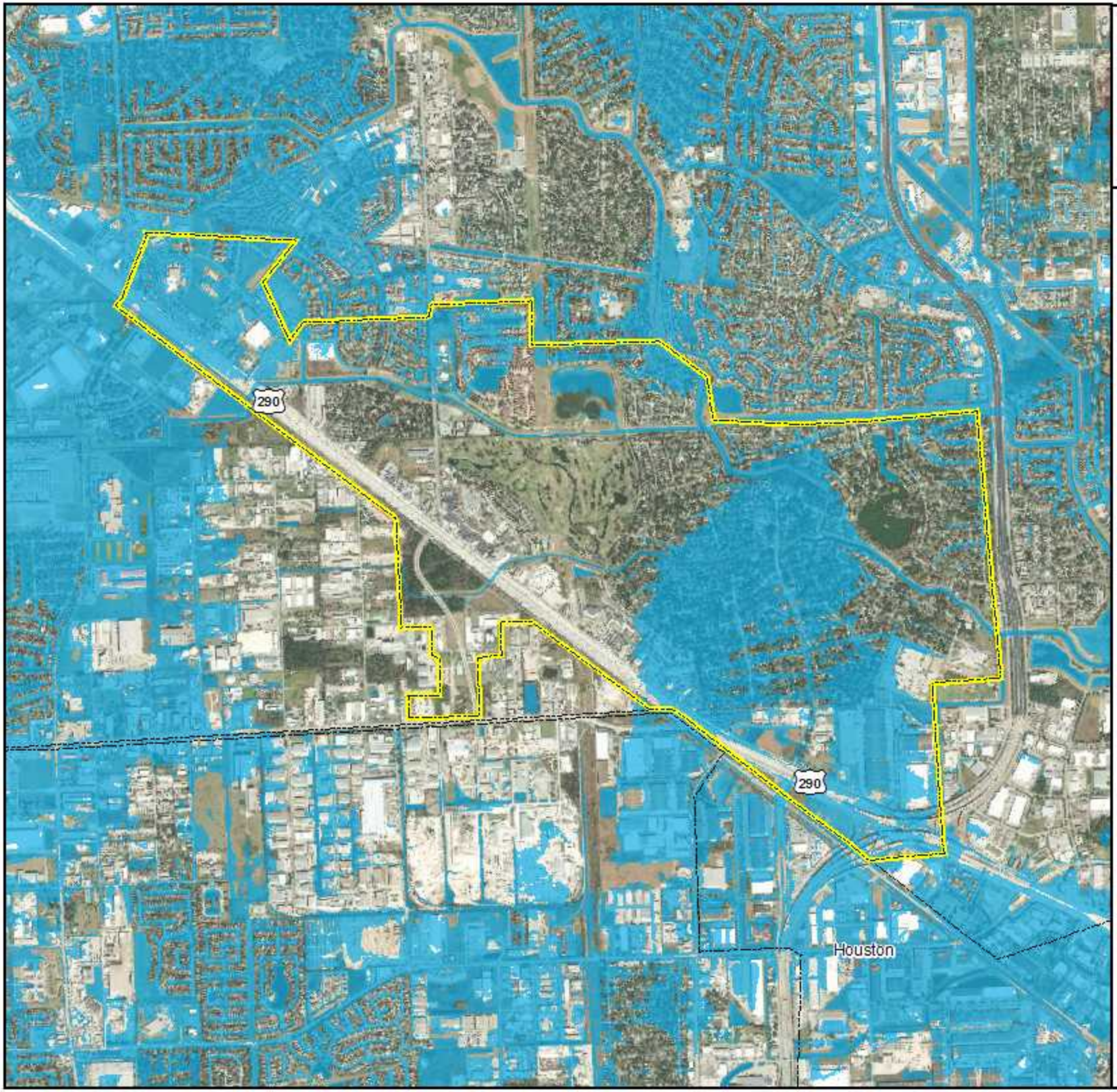
Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.15 0.3 0.6 Miles



Jersey Village

Flood Hazard
Hurricane Harvey

Flooding Extent

Incorporated Cities

Harris County

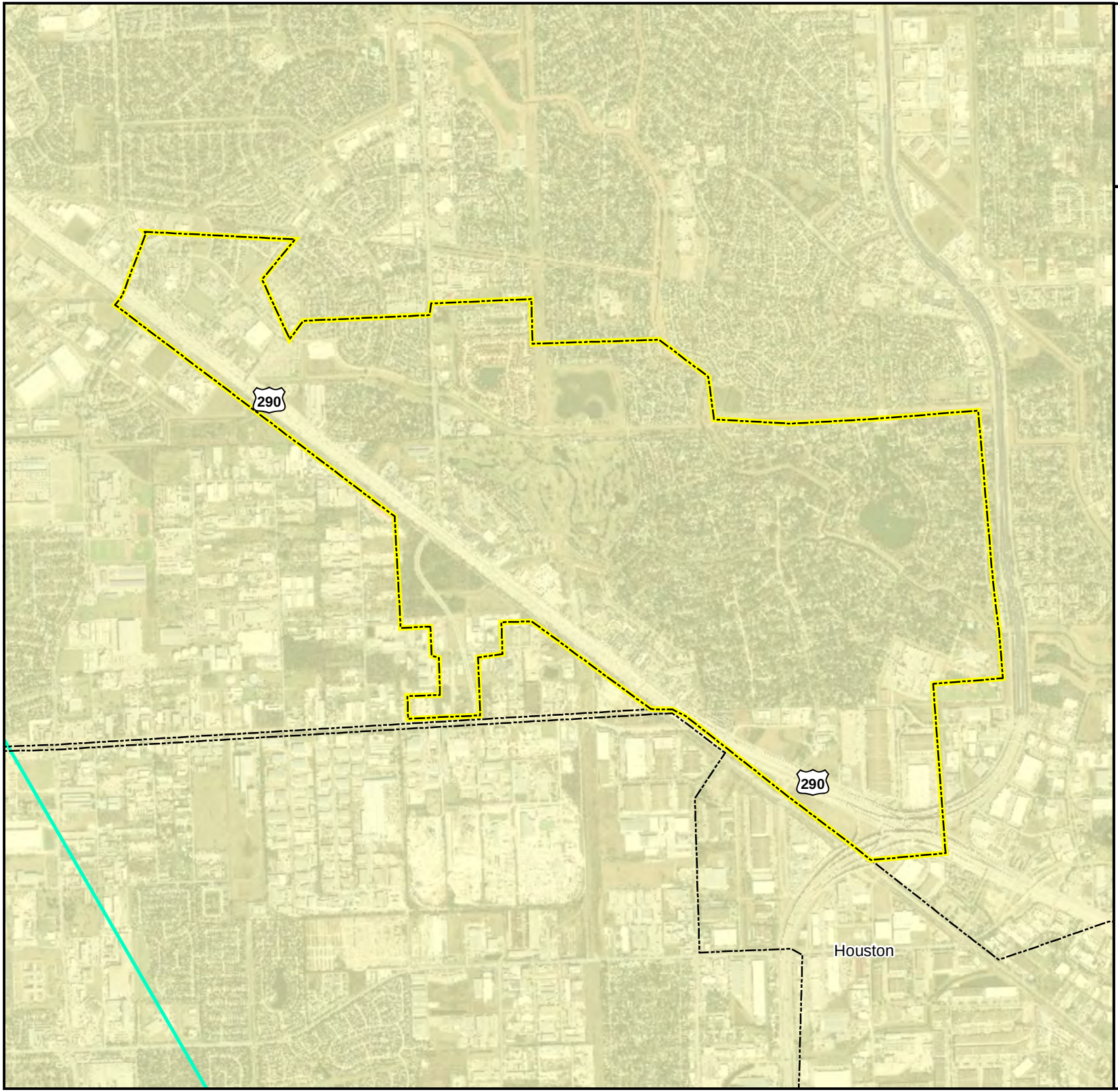
Note: Flooding extent shown for Hazard Mitigation Plan planning area only.

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.15 0.3 0.6 Miles



Jersey Village

Hurricane Alicia (1983)

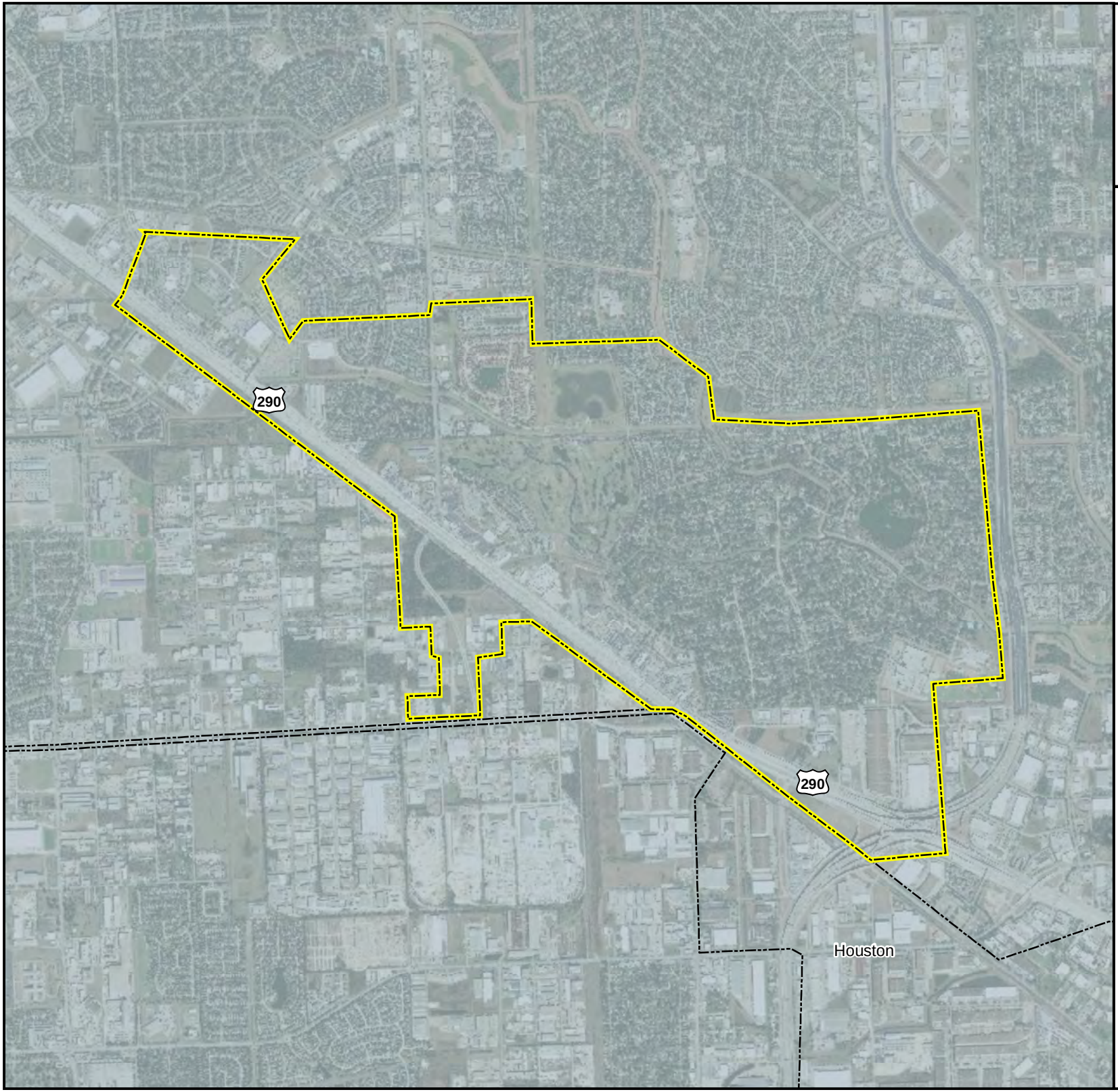
Peak WInd Gust (mph)

- 87 - 94
- 95 - 98
- 99 - 101
- 102 - 104
- 105 - 110
- Storm Track
- Incorporated Cities
- Harris County

TETRA TECH

N

0 0.15 0.3 0.6 Miles



Jersey Village

20-year Probabilistic Hurricane

Peak Wind Gust (mph)

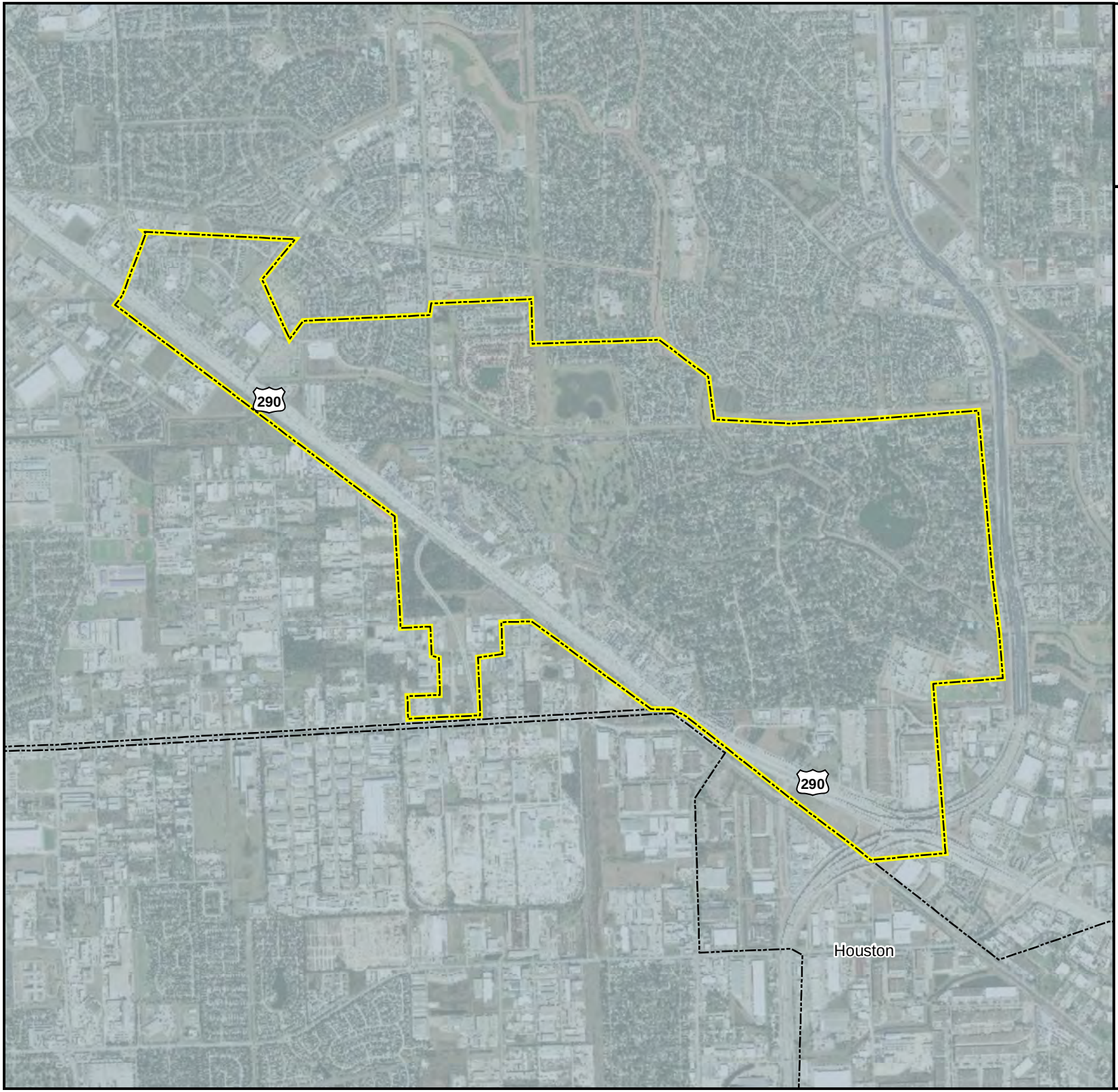
- 63 - 71
- 72 - 76
- 77 - 80
- 81 - 84
- 85 - 92
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.15 0.3 0.6 Miles



Jersey Village

100-year Probabilistic Hurricane

Peak Wind Gust (mph)

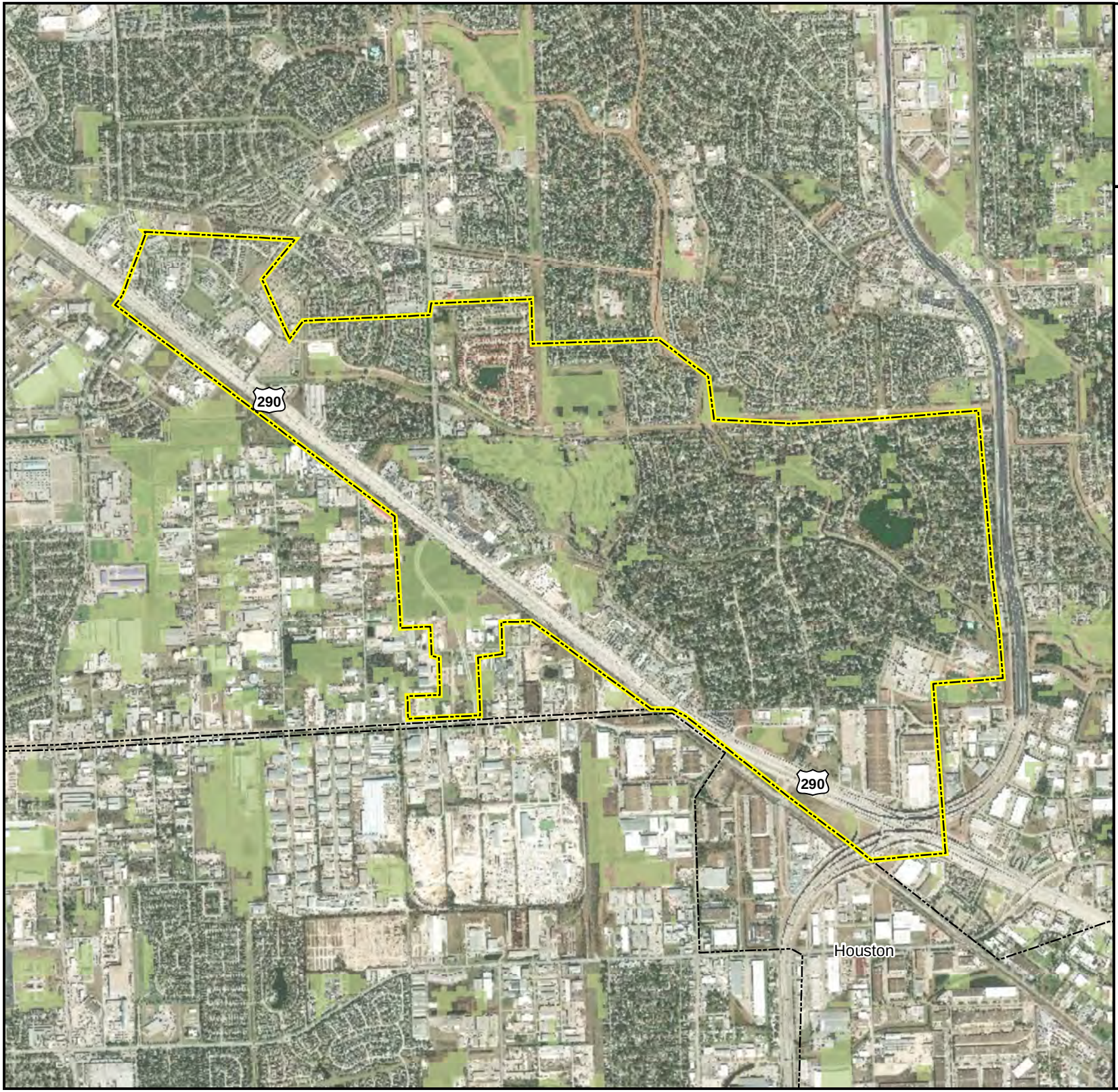
- 89 - 101
- 102 - 106
- 107 - 111
- 112 - 117
- 118 - 128
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.15 0.3 0.6 Miles



Jersey Village

Wildfire Ignition Density

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.15 0.3 0.6 Miles

Jersey Village

Wildfire Threat

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.15 0.3 0.6 Miles

14. CITY OF KATY

14.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Greg Goedecker, Emergency Management Coordinator
Street Address
Katy, TX 77493
Telephone: 281-574-8633
e-mail Address: ggoedecker@cityofkaty.com

Alternate Point of Contact
Jason Rivera Asst. Public Works Director
Street Address
Katy, TX 77493
Telephone: 281-391-4796
e-mail Address: jrivera@cityofkaty.com

14.2 JURISDICTION PROFILE

14.2.1 Location

The City of Katy is the Hub City of Three Counties. Katy lies in the western portion of Harris County, the far southeastern portion of Waller County, and the northern most portion of Fort Bend County.

The actual city limits of Katy are north and south of Interstate 10, and roughly between Katy Fort Bend Road on the east and Pederson Road on the west. The historic downtown area is north of Highway 90, near the landmark grain elevators. This is the original Katy from before the 1970s when Houston's Energy Corridor (and the development that came with it) made its way west on I-10. The city's total area is 15.1 square miles.

14.2.2 History

Katy was incorporated in 1945. In the beginning Katy was only a wide open prairie, the hunting ground of the Karankawa Indian tribes, the winter feeding grounds of great herds of buffalo and large flocks of wild ducks, geese, sandhill and whooping cranes, and numerous other game birds, and home to longhorn cattle, deer, and wolves.

Earliest settlement of the community known as Cane Island, for Cane Island Creek that runs through it, was in 1872. The townsite of Katy was laid out and platted by J. O. Thomas, L. C. Luckel, and R. M. Cash in 1895, supposedly named for the M-K-T Railroad that runs through it. Katy has always been a traditional family style community; however, it also played a major role as a rail hub, a rice farming and agricultural center, and one of the largest gas fields in this part of Texas.

14.2.3 Climate

The climate of Katy is warm and temperate. The rainfall in Katy is significant, with precipitation even during the driest month. The average annual temperature is 68 °F in Katy. The average annual rainfall is 42.28 inches. July is the warmest month of the year. The temperature in July averages 83.1 °F. At 50.4 °F on average, January is the coldest month of the year.

14.2.4 Governing Body Format

The City of Katy is a home rule city with a mayor-councilmember-administrator type of government. City Council consists of five City Councilmembers. The City consists of 20 departments: Administration, Municipal Court, City Secretary, Finance, Social Services, Human Resources, Police, Fire, Animal Control, Library, Parks, Streets, Public Works, Sanitation, Permits-Inspections, Building Maintenance, Marketing & Tourism, Water, Sewer and Utility Billing. The City has 12 boards and commissions, which are appointed by City Council.

The City Council assumes responsibility for the adoption of this plan; the City Administrator will oversee its implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 14-1.

Table 14-1. Local Mitigation Planning Team Members

Name	Title
Greg Goedecker	Emergency Management Coordinator
Jason Rivera	Asst. Public Works Director
Elaine Lutringer	Public Works Director
Cindy Kuykendall	Code Enforcement Officer
Anas Garfaoui	City Planner
David Leyendecker	City Engineer

14.3 CURRENT TRENDS

14.3.1 Population

According to U.S. Census Bureau, the population of Katy as of July 2017 was 18,282. Since 2010, the population has grown at an average annual rate of 4.2 percent.

14.3.2 Development

Since 2015, there has been an increase in single-family residential housing in the City of Katy. The city has also experienced an increase in commercial development, primarily in large scale office/warehouse/distribution projects between US Highway 90 and Interstate 10.

Table 14-2 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

Table 14-2. Recent and Expected Future Development Trends

Criterion	Response					
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan? • **If yes, give the estimated area annexed and estimated number of parcels or structures.**	Yes/No 953 Acres 14 Parcels					
Is your jurisdiction expected to annex any areas during the performance period of this plan? • **If yes, describe land areas and dominant uses.** • **If yes, who currently has permitting authority over these areas?**	Yes Commercial/Industrial County (Waller, Harris, Fort Bend					
Are any areas targeted for development or major redevelopment in the next five years? • **If yes, briefly describe, including whether any of the areas are in known hazard risk areas**	Yes Area between US HWY 90 and I-10 (No known hazard risk areas)					
How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?		**2014**	**2015**	**2016**	**2017**	**2018**
	Single Family	186	343	370	418	607
	Multi-Family	0	0	0	0	0
	Other (commercial, mixed use, etc.)	37	60	57	13	58
	Total	**223**	**403**	**427**	**431**	**665**
Provide the number of new-construction permits for each hazard area or provide a qualitative description of where development has occurred.	• Special Flood Hazard Areas: 11 AE Zones • Landslide: 0 • High Liquefaction Areas: 0 • Tsunami Inundation Area: 0 • Wildfire Risk Areas: 0					
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	Approximate City of Katy size: 15.1 Sq. Miles or 9,664 acres Approximate City of Katy available land: 2.05 Sq. Miles or 1,312 acres Approximately 86% buildout as of January 2019					

14.4 CAPABILITY ASSESSMENT

The City of Katy performed an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities is presented in Table 14-3.
- Development and permitting capabilities are presented in Table 14-4.
- An assessment of fiscal capabilities is presented in Table 14-5.
- An assessment of administrative and technical capabilities is presented in Table 14-6.
- An assessment of education and outreach capabilities is presented in Table 14-7.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 14-8.
- Classifications under various community mitigation programs are presented in Table 14-9.
- The community's adaptive capacity for the impacts of climate change is presented in Table 14-10.

Findings of the capability assessment were reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table included in the action plan for this annex identifies these as community capacity building mitigation actions.

Table 14-3. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code	Yes	No	No	No
Comment: *2874 IBC 2015, City Ordinance. 2874; sect. 3.02.053; 10-22-18*				
Zoning Code	Yes	No	No	No
Comment: *City Ordinance. 621; sect. 14.02.001; 3-24-18*				
Subdivisions	Yes	No	No	No
Comment: *City Ordinance. 2595 & 2595a; Chapter 10; 10-28-13*				
Stormwater Management	Yes	Yes	Yes	Yes
Comment: *TCEQ, City Ordinance. 2893; 3.11.003 & 3.11.004; 1-28-19*				
Post-Disaster Recovery	Yes	Yes	No	Yes
Comment: *City of Katy EOP Annex J – Recovery and post-disaster permitting and code enforcement regulations. 9-28-16*				
Real Estate Disclosure	No	No	No	No
Comment:				
Growth Management	No	No	Yes	Yes
Comment:				
Site Plan Review	Yes	No	No	Yes
Comment: *City Ordinance. 2874; sect. 3.08.003 ;10-22-18*				
Environmental Protection	Yes	No	No	Yes
Comment: *TCEQ, EPA*				
Flood Damage Prevention	Yes	No	Yes	Yes
Comment: *City Ordinance 2417 Sect. 3.04 1-26-09*				
Emergency Management	Yes	No	No	Yes
Comment: *City Ordinance 0695 1-20-19, Texas Government Code 418*				
Climate Change	No	No	No	Yes
Comment:				
Planning Documents				
General Plan	Yes	No	Yes	Yes
Comment: *Comprehensive Plan 6-11-2001*				
Capital Improvement Plan	No	Bo	No	Yes
How often is the plan updated? N/A				
Comment:				
Disaster Debris Management Plan	No	No	No	Yes
Comment:				
Floodplain or Watershed Plan	Yes	Yes	No	Yes
Comment: *Harris Co Flood Con Dist. Res 430, City Ordinance 2626; sect. 3.04.041 & 3.04.042 or 3.01.007, 3.04.042; 3-10-14*				
Stormwater Plan	Yes	Yes	Yes	Yes
Comment: *City Ordinance. 2893; section 3.11.003 & 3.11.004; 1-28-19*				
Urban Water Management Plan	No	No	No	No
Comment:				
Habitat Conservation Plan	No	No	No	No
Comment:				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Economic Development Plan	No	No	No	No
Comment:				
Shoreline Management Plan	No	No	No	No
Comment:				
Community Wildfire Protection Plan	No	No	No	No
Comment: *The City of Katy does not have its own CWPP implemented. Harris County has completed a county-wide CWPP; which includes all incorporated jurisdictions within Harris County.*				
Forest Management Plan	No	No	No	Yes
Comment:				
Climate Action Plan	No	No	No	Yes
Comment:				
Comprehensive Emergency Management Plan	Yes	No	No	Yes
Comment: *City Ordinance 0695 2-8-16*				
Threat & Hazard Identification & Risk Assessment (THIRA)	No	No	Yes	Yes
Comment:				
Post-Disaster Recovery Plan	Yes	Yes	No	Yes
Comment: *City of Katy EOP Annex J – Recovery is required for local jurisdictions to address local recovery programs, damage assessments, Public Assistance and Individual Assistance programs. The City of Katy is in the process of developing a Pre-Disaster Recovery Plan to assist in the transition from response to recovery for future incidents. 9-28-16*				
Continuity of Operations Plan	Yes	No	No	Yes
Comment: *Government Code 418 grants political subdivisions the option to adopt plans for continuity of functions but is not mandated. The City of Katy does have department Continuity of Operations Plans.*				
Public Health Plan	Yes	Yes	Yes	Yes
Comment: *City of Katy EOP Annex H – Health and Medical is a component of the Emergency Operations Plan and addresses public health, environmental health, and medical response capabilities. The City does not maintain a standalone Public Health Plan. 10-27-16*				

Table 14-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • **If no, who does? If yes, which department?**	Yes Building Department
Does your jurisdiction have the ability to track permits by hazard area?	Yes
Does your jurisdiction have a buildable lands inventory?	Yes

Table 14-5. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	No
Other	No

Table 14-6. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Public Works
Engineers or professionals trained in building or infrastructure construction practices	Yes	City Engineer
Planners or engineers with an understanding of natural hazards	Yes	Public Works, City Engineer
Staff with training in benefit/cost analysis	Yes	Public Works, City Engineer
Surveyors	Yes	City Engineer
Personnel skilled or trained in GIS applications	Yes	N/A
Scientist familiar with natural hazards in local area	No	N/A
Emergency manager	Yes	Fire Dept.
Grant writers	No	N/A
Other	No	N/A

Table 14-7. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • If yes, briefly describe.	No
Do you use social media for hazard mitigation education and outreach? • If yes, briefly describe.	Yes Post educational material on Facebook and Twitter
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • If yes, briefly describe.	No
Do you have any other programs already in place that could be used to communicate hazard-related information? • If yes, briefly describe.	No
Do you have any established warning systems for hazard events? • If yes, briefly describe.	Yes Everbridge Mass Notification System – KTALERT

Table 14-8. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Building Dept
Who is your floodplain administrator? (department/position)	Floodplain Manager
Are any certified floodplain managers on staff in your jurisdiction?	Yes
What is the date that your flood damage prevention ordinance was last amended?	Check
Does your floodplain management program meet or exceed minimum requirements? • If exceeds, in what ways?	Meet N/A
When was the most recent Community Assistance Visit or Community Assistance Contact?	June 19, 2007
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • If so, state what they are.	No N/A
Are any RiskMAP projects currently underway in your jurisdiction? • If so, state what they are.	No N/A
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • If no, state why.	Yes N/A
Does your floodplain management staff need any assistance or training to support its floodplain management program? • If so, what type of assistance/training is needed?	No
Does your jurisdiction participate in the Community Rating System (CRS)? • If yes, is your jurisdiction interested in improving its CRS Classification? • If no, is your jurisdiction interested in joining the CRS program?	No No Yes
How many flood insurance policies are in force in your jurisdiction?[a] • What is the insurance in force? • What is the premium in force?	2149 $664,828,300 $1,017,481
How many total loss claims have been filed in your jurisdiction?[a] • How many claims are still open or were closed without payment? • What were the total payments for losses?	466 Unknown $38,432,381

a. According to FEMA statistics as of July 31, 2019

Table 14-9. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	No	N/A	N/A
Building Code Effectiveness Grading Schedule	Yes	4	
Public Protection	Yes	ISO 1	10/1/2019
Storm Ready	Yes	Storm Ready Community	8/1/2016
Firewise	No	N/A	N/A

Table 14-10. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:***	Medium
Jurisdiction-level monitoring of climate change impacts ***Comment:***	Low
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:***	Medium
Participation in regional groups addressing climate risks ***Comment:***	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	Low
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	Unsure
Identified strategies for adaptation to impacts ***Comment:***	Unsure
Champions for climate action in local government departments ***Comment:***	Unsure
Political support for implementing climate change adaptation strategies ***Comment:***	Unsure
Financial resources devoted to climate change adaptation ***Comment:***	Unsure
Local authority over sectors likely to be negative impacted ***Comment:***	Unsure
Public Capacity	
Local residents knowledge of and understanding of climate risk ***Comment:***	Unsure
Local residents support of adaptation efforts ***Comment:***	Unsure
Local residents' capacity to adapt to climate impacts ***Comment:***	Unsure
Local economy current capacity to adapt to climate impacts ***Comment:***	Unsure
Local ecosystems capacity to adapt to climate impacts ***Comment:***	Unsure

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

14.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning and capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

14.5.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- **City of Katy Emergency Operations Basic Plan** — The Basic Plan provides a summary on the hazards and threats in the community.
- **City of Katy Water Conservation and Drought Contingency Plan.** This plan details strategies to ensure continued water access and preservation.
- **City of Katy Flood Damage Prevention Plan.** The Flood Damage Prevention Plan details the protection measures to be put into place to alleviate flooding hazards during minor and major weather events.

14.5.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- **Post-Disaster Recovery Plan** — The City does not have a post disaster recovery plan and intends to develop one as a mitigation planning action during the next five years. The plan will build on the goals and objectives identified in the hazard mitigation plan.
- **Stormwater Management** — The City currently integrates hazard mitigation information into Stormwater Management but, this plan provides opportunities and information to upgrade the plan. The additional mitigation information and measures will be considered for inclusion into the plan.
- **Emergency Operations Plan** — The City currently integrates hazard mitigation information into the Emergency Operations plan but, this plan provides opportunities and information to upgrade the plan. The additional mitigation information and measures will be considered for inclusion into the plan.
- **Flood Damage Prevention** — Flood Damage Prevention project proposals may take into consideration hazard mitigation potential as a means of evaluating project prioritization.
- **Debris Management Plan** — The City does not have a Debris Management plan and intends to develop one as a mitigation planning action during the next five years. The plan will build on the goals and objectives identified in the hazard mitigation plan.
- **Floodplain Plan** — The City currently integrates hazard mitigation information into Floodplain Management but, this plan provides opportunities and information to upgrade the plan. The additional mitigation information and measures will be considered for inclusion into the plan.
- **Public Health Plan** — The City does not have a Public Health plan and intends to develop one as a mitigation planning action during the next five years. The plan will build on the goals and objectives identified in the hazard mitigation plan.

14.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 14-11 lists past occurrences of natural hazards for which specific damage was recorded in the City of Katy Other hazard events that broadly affected the entire planning area, including the City of Katy, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 14-11. Past Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Severe Weather, Tornado		January 14, 1991	$ 40,000
Severe Weather, Tornado	970 DR	November 21, 1992	$ 350,525,000
Severe Weather, Tornado		1993	$ N/A
Severe Weather, Hail		1993	$ N/A
Severe Weather, Hail		1995	$ N/A
Severe Weather, Hail		1996	$ N/A
Severe Weather, Hail		1998	$ N/A
Severe Weather, Hail		February 2, 2003	$ 5,000
Severe Weather, Hail		April 24, 2003	$ 6,000
Severe Weather, Tornado		August 16, 2003	$ N/A
Severe Weather, Tornado		September 1, 2003	$ N/A
Severe Weather, Tornado & Hail		April 10, 2004	$80,000
Severe Weather, Hail		December 21, 2006	$ 4,000
Severe Weather, Hail		March 13, 2007	$ 3,000
Severe Weather, Hail		May 30, 2007	$ N/A
Severe Weather, Tornado		August 4, 2007	$ N/A
Wildfire		January 1, 2008	$ N/A
Wildfire		January 9, 2008	$ N/A
Wildfire		July 30, 2008	$ N/A
Severe Weather, Wind		July 10, 2012	$ 5,000
Severe Weather, Heavy Rain		July 7, 2014	$ N/A
Severe Weather, Wind		August 25, 2015	$ N/A
Flooding	4245 DR	October 24, 2015	$ N/A

14.7 HAZARD RISK RANKING

Table 14-12 presents a local ranking for the City of Katy of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 14-12. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Severe Weather	48	High
1	Hurricane	48	High
2	Flooding	32	High
3	Wildfire	16	Medium
4	Mass Movement	15	Medium
5	Earthquake	14	Low
6	Drought	6	Low
6	Dam Failure	6	Low
7	Tsunami	0 (No Exposure)	None
7	Coastal Erosion	0 (No Exposure)	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

14.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. This section provides information on a few key vulnerabilities for the jurisdiction. Available jurisdiction-specific risk maps of the hazards are provided at the end of this annex.

14.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: 80
- Number of FEMA-identified Severe-Repetitive-Loss Properties: 0
- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated: 0

14.8.2 Other Noted Vulnerabilities

The following jurisdiction-specific issues have been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- Land Development- considering the City and adjacent development which directly impact impervious surface/stormwater run-off. In addition, the stormwater conveyance has significant impact to the downstream and associated waterway and drainage structures
- New construction standards and storm water design criteria challenge or conflicts with aged infrastructure design and capacity for stormwater and flood protection.

Mitigation actions addressing these issues were prioritized for consideration in the action plan presented in this annex.

14.9 STATUS OF PREVIOUS PLAN ACTIONS

Table 14-13 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

Table 14-13. Status of Previous Plan Actions

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
Improve and adopt higher-standard/latest edition manufactured homes standards/codes to include tie-downs or anchorage	2015			
Comment: Existing Ordinance address manufactured homes standards codes/ and tie-downs or anchorage				
Electric surge protection and shielding for electronic systems in public facilities or critical infrastructure	2015			
Comment: All 5 Water Plants have surge protection installed				
Elevate generator above freeboard to mitigate flooding risk		✓		
Comment: No specific generator was ever targeted for this action. Public Works Officials were never informed of this action item.				
Develop and adopt a drainage ordinance to require detention for future development and redevelopment for detention	2018			
Comment: City Council adopted Harris County Flood Control development plans, which is more restrictive				
Improve critical infrastructure/public buildings to harden against hurricane related effect	2018			
Comment: Water Plant #6 27515 Hwy Blvd., Upgraded Roof to reinforced concrete.				
Implement a tree management program to limit debris damage to critical infrastructure, public facilities from falling tree canopy due to high-winds, freezing conditions, and burning debris.	2015			
Comment: Implemented a "Best Management Practices" for tree management.				
Improve and enhance requirements for critical facilities to withstand severe thunderstorms, hurricane winds and hail	2018			
Comment: Wastewater Plant, 25839 I-10 Freeway – Elevated transfer switch, and soft starts electronic components; and replaced 2 pumps to dry-submersible pumps				
Construct protective structure/shelter for critical equipment and vehicles to minimize damage from high-winds and freezing conditions.	2016			
Comment: Addition to Fleet Maintenance – Added roof extension for storage of equipment and material. Built to withstand 140 mph wind load.				
Implement a Public Education/Outreach Program on Hail-hazards to inform residents on actions to reduce hail damage to property and equipment.			✓	KTY5
Comment: No program was ever implemented.				
Improve code/ordinance to require removal of dead vegetation/dry fuel sources in risk areas		✓		
Comment: No ordinance was ever developed or brought to City Council to approve.				
Implement and join FireWise Program to educate residents and businesses on actions to reduce property loss and damages from wildfire.			✓	KTY7
Comment: The City never joined or looked into the program				
Expand warning system, to a mass notification system, to provide hazard awareness and alerts to mitigate all-hazards and to increase coverage of the community utilizing mobile/cellular devices.	2015			
Comment: A mass notification system was implemented, but the City of Katy chose not to renew its contract for it. A new web based mass notification system was purchased in 2018.				
Install drought resistant landscaping as part of a water conservations program			✓	KTY6
Comment: Continuing on working on this through the City's Water Conservation Plan				

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
Improve public facility emergency power by installing generators/alternate power sources to provide adequate cooling for use as cooling center		✓		
Comment: Generators will be or only installed on critical infrastructure. There was no plan developed to add alternate power sources to other City owned public facilities.				
Implement a Public Education/Outreach Program on extreme heat to educate residents and businesses on actions to reduce health impacts and property losses.			✓	KTY5
Comment: No program was ever implemented.				
Insulate exposed/above ground domestic water components		✓		
Comment: This practice was already occurring at the time the plan was written				
Improve chemical storage and waste disposal facilities		✓		
Comment: The City eliminated the Oil Recycle Center off of East Avenue				
Establish/improve code/ordinance to require secondary containment structures for all above ground storage tanks for new construction		✓		
Comment: No ordinance was ever developed or brought to City Council to approve.				
Identify exposed/above ground pipelines in flood hazard area		✓		
Comment: No plans or procedures were ever developed to capture this data.				

14.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 14-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 14-15 identifies the priority for each action. Table 14-16 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 14-14. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action KTY1 — Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Earthquake, flooding, mass movement, wildfire						
Existing	3, 4, 10	Public Works	OEM	High	HMGP, PDM, FMA	Short-term
Action KTY2 — Integrate the hazard mitigation plan into other plans, ordinances and programs that dictate land use decisions in the community, including the City of Katy						
Hazards Mitigated: Drought, earthquake, flooding, mass movement, wildfire						
New and Existing	1, 3, 4, 5, 7, 8, 10	Planning	Public Works, OEM	Low	Staff Time, General Funds	Ongoing
Action KTY3 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Wildfire, Mass Movement, Earthquake, Drought, Dam Failure						
New and Existing	1, 5, 8	OEM	Public Works	Low	Staff Time, General Funds	Short-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action KTY4 — Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements: • Enforce the flood damage prevention ordinance. • Participate in floodplain identification and mapping updates. • Provide public assistance/information on floodplain requirements and impacts. *Hazards Mitigated:* Flooding, severe weather						
New and Existing	1, 3, 5, 7, 8, 10	Public Works	OEM	Low	Staff Time, General Funds	Ongoing
Action KTY5 — Implement a Public Education/Outreach Program on all-hazards to inform residents on actions to reduce severe weather damage to property and equipment. *Hazards Mitigated:* Severe Weather, Hurricane, Flooding, Wildfire, Mass Movement, Earthquake, Drought, Dam Failure						
New and Existing	3, 4, 10, 15	OEM	National Weather Service, HCFCD	Low	Staff Time, General Funds	Ongoing
Action KTY6 — Incorporate drought tolerant or xeriscape practices into landscape ordinances to reduce dependence on irrigation around city facilities *Hazards Mitigated:* Drought, Mass Movement						
New and Existing	7, 8, 15	City Administration	Public Works	Medium	General Funds	Ongoing
Action KTY7 — Implement and join FireWise Program to educate residents and businesses on actions to reduce property loss and damages from wildfire. *Hazards Mitigated:* Wildfire						
New and Existing	2, 3	Fire	OEM	High		Short-term
Action KTY8 — Install a new emergency generator and elevate it above flood 500 year flood level at Kingsland Water Plant. Kingsland Water Plant is a critical facility *Hazards Mitigated:* Flooding, severe weather, hurricane						
Existing	10, 11, 13	OEM	Public Works	High	HMGP, PDM, General Funds	Short-term
Action KTY9 — Install a new emergency generator and elevate it above flood 500 year flood level at Fire Station 1 Fire Station 1 is a critical facility *Hazards Mitigated:* Flooding, severe weather, hurricane						
Existing	10, 11, 13	OEM	Fire	High	HMGP, PDM, General Funds	Short-term
Action KTY10 — Install a new emergency generator at Fire Station 3. Fire Station 3 is a critical facility *Hazards Mitigated:* Flooding, severe weather, hurricane						
Existing	10, 11, 13	OEM	Fire	High	HMGP, PDM, General Funds	Short-term
Action KTY11 — Add quick emergency generator quick connect capabilities to all city owned critical facilities *Hazards Mitigated:* Flooding, severe weather, hurricane						
New and Existing	10, 11, 13	OEM	Public Works	Medium	HMGP, PDM, General Funds	Long-term
Action KTY12 — Provide incentives to private industry and contractors, for using permeable driveways and surfaces to reduce runoff and promote groundwater recharge. *Hazards Mitigated:* Drought, Mass Movement						
New and Existing	7, 8, 15	City Administration	Public Works	Low	General Funds	Ongoing

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action KTY13 — Implement a Fuels Management Program to reduce hazardous vegetative fuels on public lands, near critical infrastructure						
Hazards Mitigated: Wildfire						
New and Existing	2, 13	OEM	Fire	Low	General Funds	Ongoing
Action KTY14 — Using GIS to map areas that are at risk to the wind hazard associated with different hurricane and severe weather wind conditions and to identify concentrations of at-risk structures and populations..						
Hazards Mitigated: Severe weather, hurricane						
New and Existing	1, 2, 4, 12	OEM	IT, Harris County OHSEM	Low	General Funds	Short-Term
Action KTY15 — Create defensible space around all City of Katy critical infrastructure						
Hazards Mitigated: Wildfire						
New and Existing	2, 6	Public Works	Fire, OEM	Low	General Funds	Ongoing
Action KTY16 — Implement a Tree Management Program/Ordinance						
Hazards Mitigated: Severe weather, hurricane						
New and Existing	6, 11	Public Works	OEM	Low	General Funds	Ongoing
Action KTY17 — Install a new emergency generator and elevate it above flood 500 year flood level at the Katy Wastewater Plant. Katy Wastewater Plant is a critical facility						
Hazards Mitigated: Flooding, severe weather, hurricane						
Existing	10, 11, 13	Public Works	OEM	High	HMGP, PDM, General Funds	Short-term
Action KTY18 — Construct a berm around the Katy Wastewater Treatment Plant to prevent flooding						
Hazards Mitigated: Flooding, severe weather						
New and Existing	10, 11, 13	Public Works	OEM	High	HMGP, PDM, General Funds	Long-term
Action KTY19 — • Patna/Fortuna/Rexora public roadway projects- to address flood prone neighborhood- the roadway elevation and stormwater conveyance system will be redesigned to manage stormwater and property protection for the area.						
Hazards Mitigated: Flooding, severe weather						
New and Existing	10, 11, 13	City Administration	Public Works	High	City Sourced Funding	Short-term
Action KTY20 — Pitts Rd detention pond expansion- this is a significant detention pond improvement implement a 14 acres addition to stormwater detention and flood protection for the City.						
Hazards Mitigated: Flooding, severe weather						
New and Existing	10, 11, 13	City Administration	Public Works	High	City Sourced Funding	Short-term
Action KTY21— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Wildfire, Mass Movement, Earthquake, Drought, Dam Failure						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	City Administration	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 14-15. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
KTY1	3	High	High	Yes	Yes	No	Medium	High
KTY2	7	Medium	Low	Yes	No	Yes	High	Low
KTY3	3	Low	Low	Yes	No	Yes	High	Low
KTY4	6	Medium	Low	Yes	No	Yes	High	Low
KTY5	4	High	Low	Yes	No	Yes	High	Low
KTY6	3	Medium	Medium	Yes	Yes	No	Medium	Low
KTY7	2	Low	Low	Yes	No	Yes	High	Low
KTY8	2	High	High	Yes	Yes	No	Medium	High
KTY9	3	High	High	Yes	Yes	No	Medium	High
KTY10	3	High	High	Yes	Yes	No	Medium	High
KTY11	3	Medium	Medium	Yes	Yes	No	Medium	Medium
KTY12	3	Low	Low	Yes	No	Yes	High	Low
KTY13	2	Low	Low	Yes	No	Yes	High	Low
KTY14	4	Low	Low	Yes	No	Yes	High	Low
KTY15	2	Low	Low	Yes	No	Yes	High	Low
KTY16	2	Low	Low	Yes	No	Yes	High	Low
KTY17	3	High	High	Yes	Yes	No	Medium	High
KTY18	3	High	High	Yes	Yes	No	Low	Low
KTY19	3	High	Low	Yes	Yes	Yes	High	Low
KTY20	3	High	Low	Yes	Yes	Yes	High	Low
KTY21	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 14-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Severe Weather	KTY-1, 2, 4, 21	KTY-1, 2, 4, 8, 9, 10, 11, 16, 18	KTY-4, 5, 21	KTY-2	KTY-8, 9, 10, 11, 15, 16, 17, 21	KTY-1, 18, 19	KTY-2	KTY-2, 3, 14, 16, 21
Hurricane	KTY-16, 21	KTY-8, 9, 10, 11, 16, 17	KTY-5, 16, 21		KTY-8, 9, 10, 11, 15, 16, 17, 21			KTY-3, 14, 16, 21
Flooding	KTY-2,4, 21	KTY-4, 8, 9, 10, 11, 17, 18	KTY-4, 5, 21		KTY-8, 9, 10, 11, 17, 21	KTY-18, 19		KTY-3, 21
Medium-Risk Hazards								
Wildfire	KTY-1,2,7, 21	KTY-1, 2, 7, 13	KTY-5, 7, 21		KTY-7, 13, 15, 21			KTY-3, 21
Mass Movement	KTY-1,2, 21	KTY-1, 2	KTY-5, 21	KTY-6, 12	KTY21		KTY-6, 12	KTY-3, 21
Low-Risk Hazards								
Earthquake	KTY-1,2, 21		KTY-5, 21		KTY21			KTY-3, 21
Drought	KTY-1,2, 21		KTY-5, 21	KTY-6, 12	KTY21		KTY-6, 12	KTY-3, 21
Dam Failure	KTY21		KTY21		KTY21			KTY21

a. See the introduction to this volume for explanation of mitigation types.

14.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

14.11.1 Existing Reports, Plans, Regulatory Tools and Other Resources

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- **City of Katy Code of Ordinances** — The municipal code was reviewed for the full capability assessment and for identifying opportunities for action plan integration.
- **City of Katy Flood Damage Prevention Ordinance** — The flood damage prevention ordinance was reviewed for compliance with the National Flood Insurance Program.
- **City of Katy Stormwater Management Ordinance** — The municipal code was reviewed for the full capability assessment and for identifying opportunities for action plan integration.

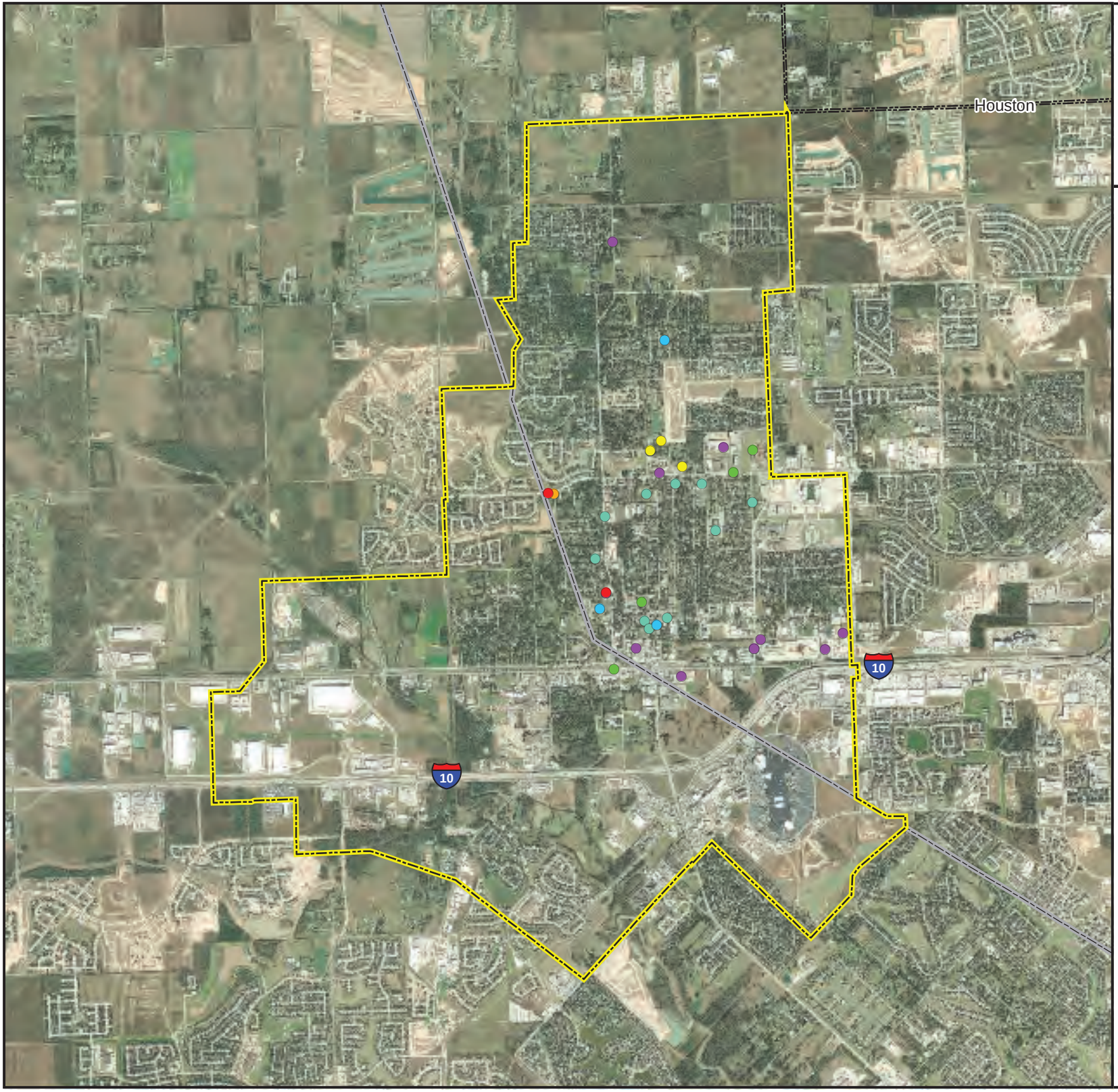
The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.

14.11.2 Staff and Local Stakeholder Involvement in Annex Development

This annex was developed over the course of several months with input from many city departments including Public Works, Fire, Police, Finance, and City Secretary office. All departments were asked to contribute to the

annex development through reviewing and contributing to the capability assessment, reporting on the status of previously identified actions, and participating in action identification and prioritization. An action development meeting was held on March 5, 2019 and was attended by representatives from all previously listed department as well as the City Administrator's office. Once actions had been identified and compiled in the annex, a draft was internally circulated for comment.



Katy

Critical Facilities

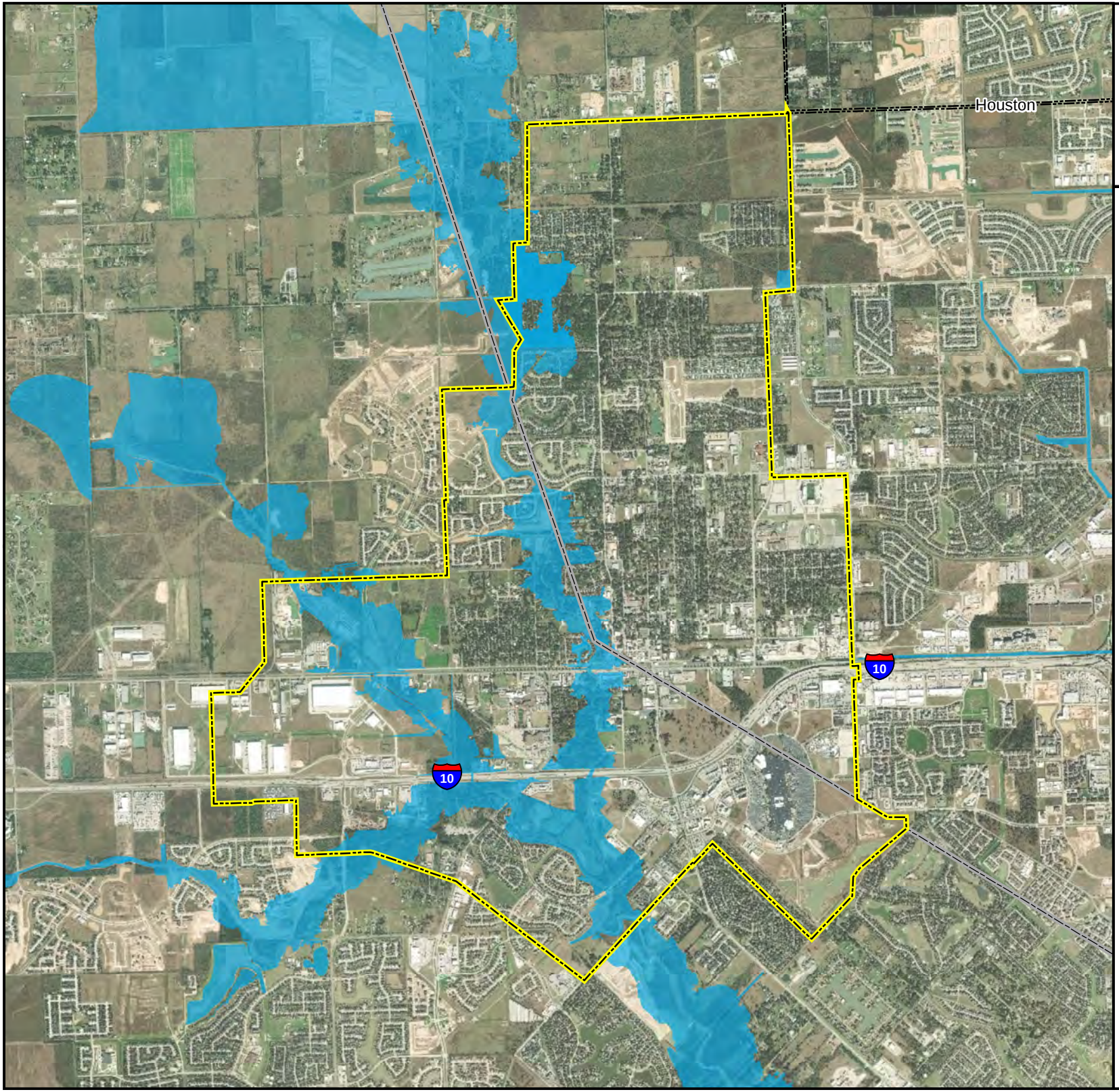
- Education Facilities
- Emergency Services
- Government Facilities
- Hazardous Material Sites
- Health and Medical Facilities
- Historical and Cultural Sites
- Transportation Systems
- Utility Systems
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.225 0.45 0.9 Miles



Katy

FEMA Flood Hazard

1% Annual Chance Flood (100-yr)

Incorporated Cities

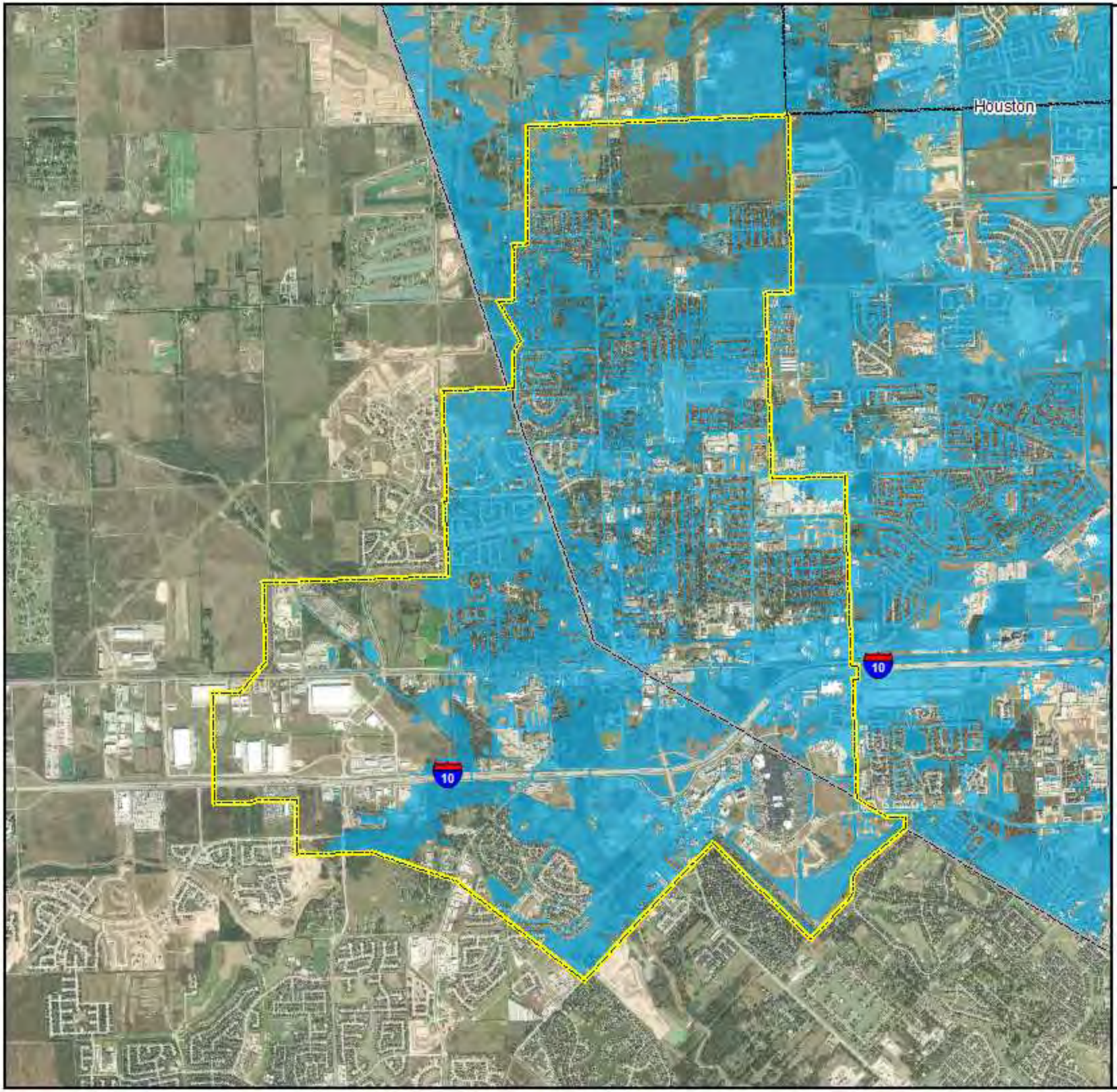
Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.225 0.45 0.9 Miles



Katy

Flood Hazard
Hurricane Harvey

Flooding Extent

Incorporated Cities

Harris County

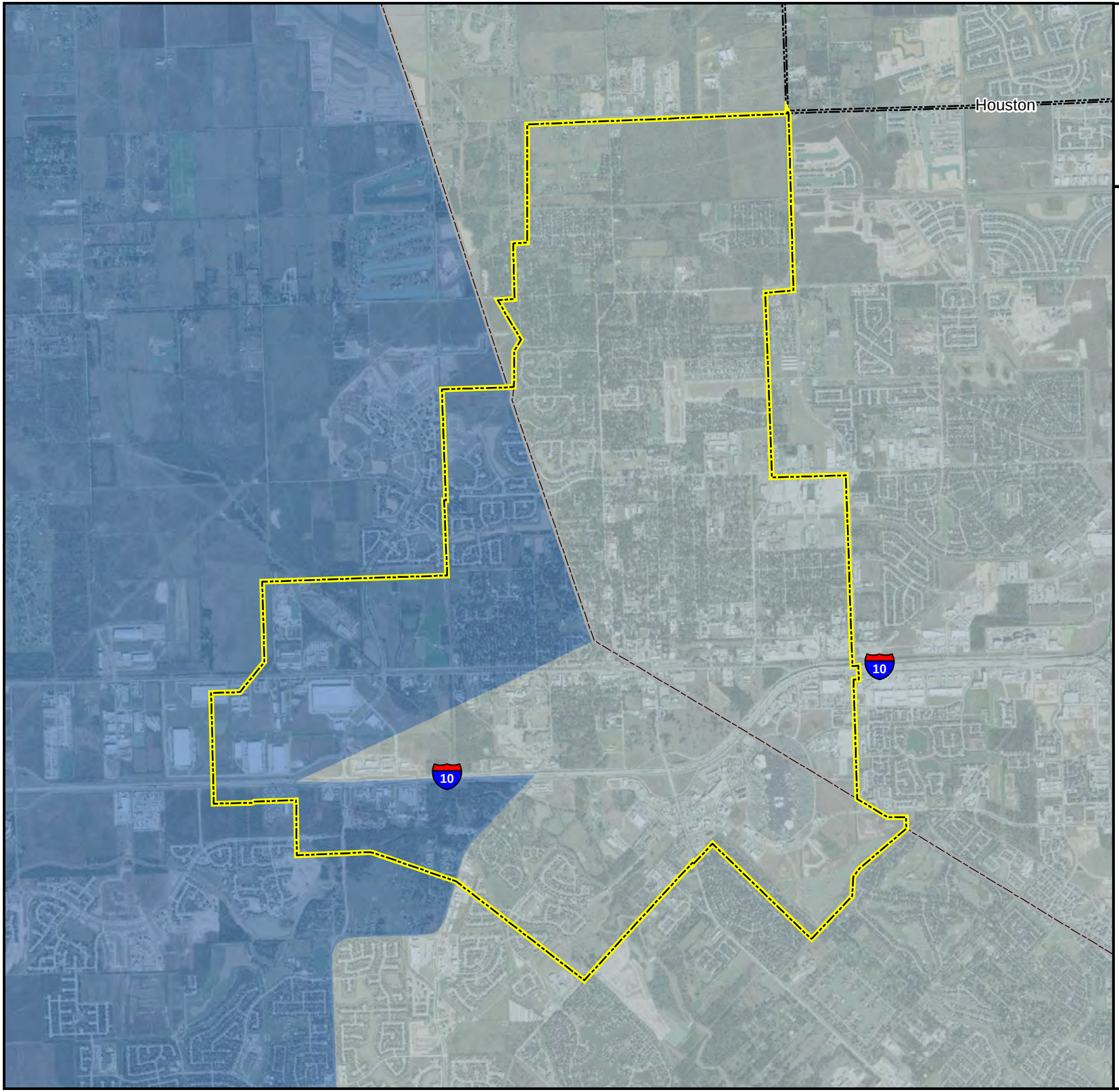
Note: Flooding extent shown for Hazard Mitigation Plan planning area only.

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.225 0.45 0.9 Miles



Katy

Hurricane Alicia (1983)

Peak WInd Gust (mph)

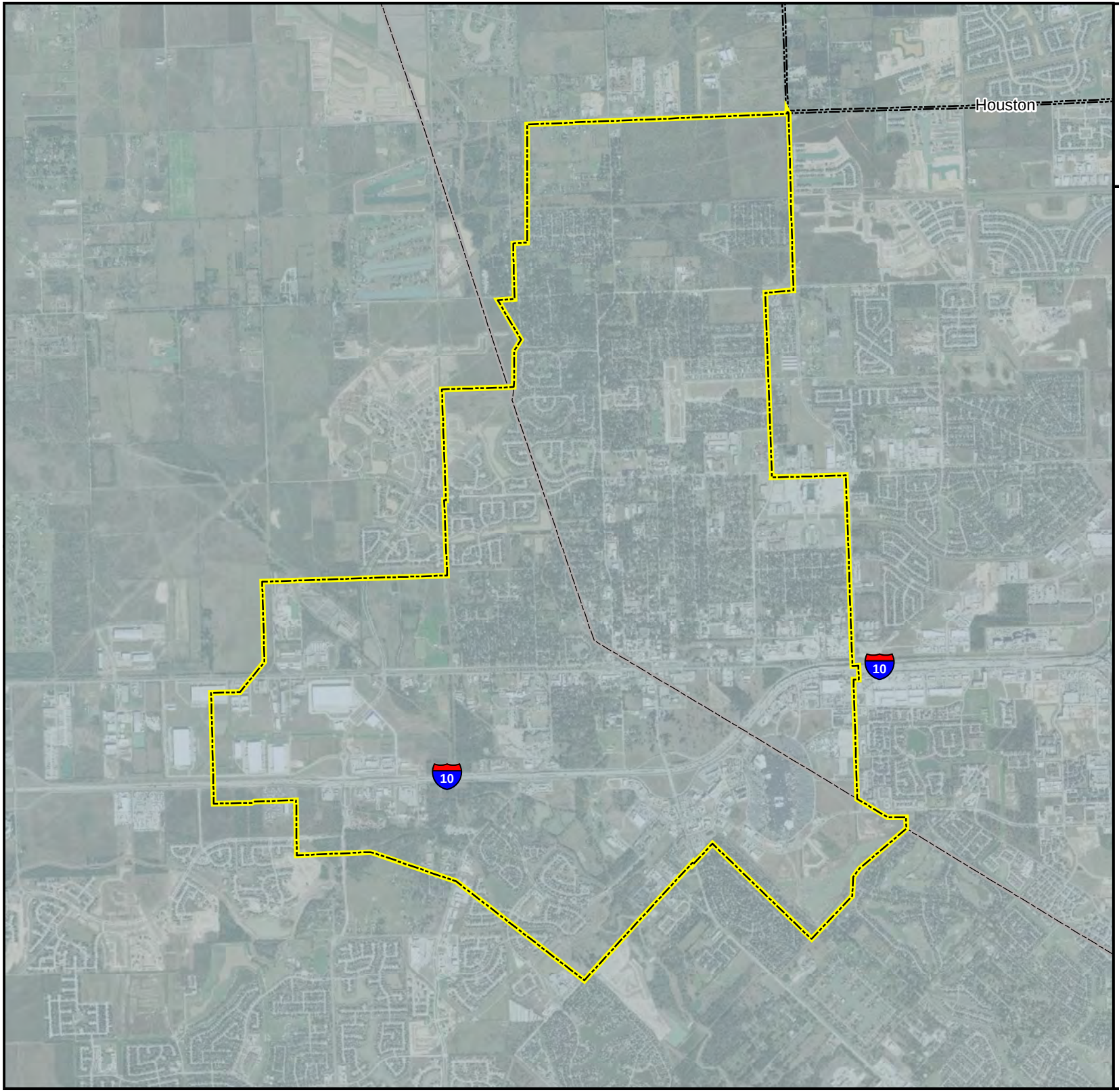
- 87 - 94
- 95 - 98
- 99 - 101
- 102 - 104
- 105 - 110
- Storm Track
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.225 0.45 0.9 Miles



Katy

20-year Probabilistic Hurricane

Peak Wind Gust (mph)

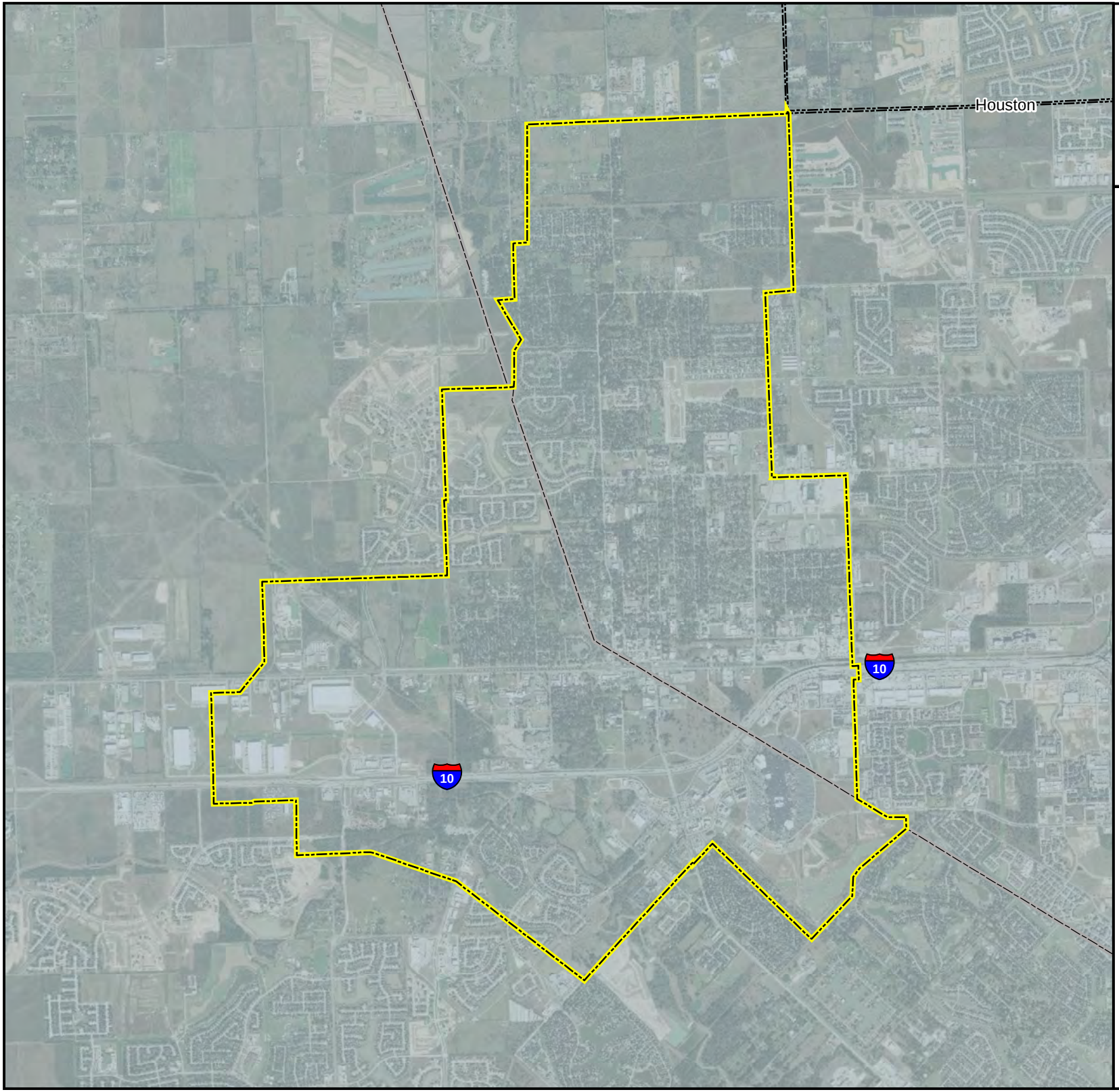
- 63 - 71
- 72 - 76
- 77 - 80
- 81 - 84
- 85 - 92
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.225 0.45 0.9 Miles



Katy

100-year Probabilistic Hurricane

Peak Wind Gust (mph)

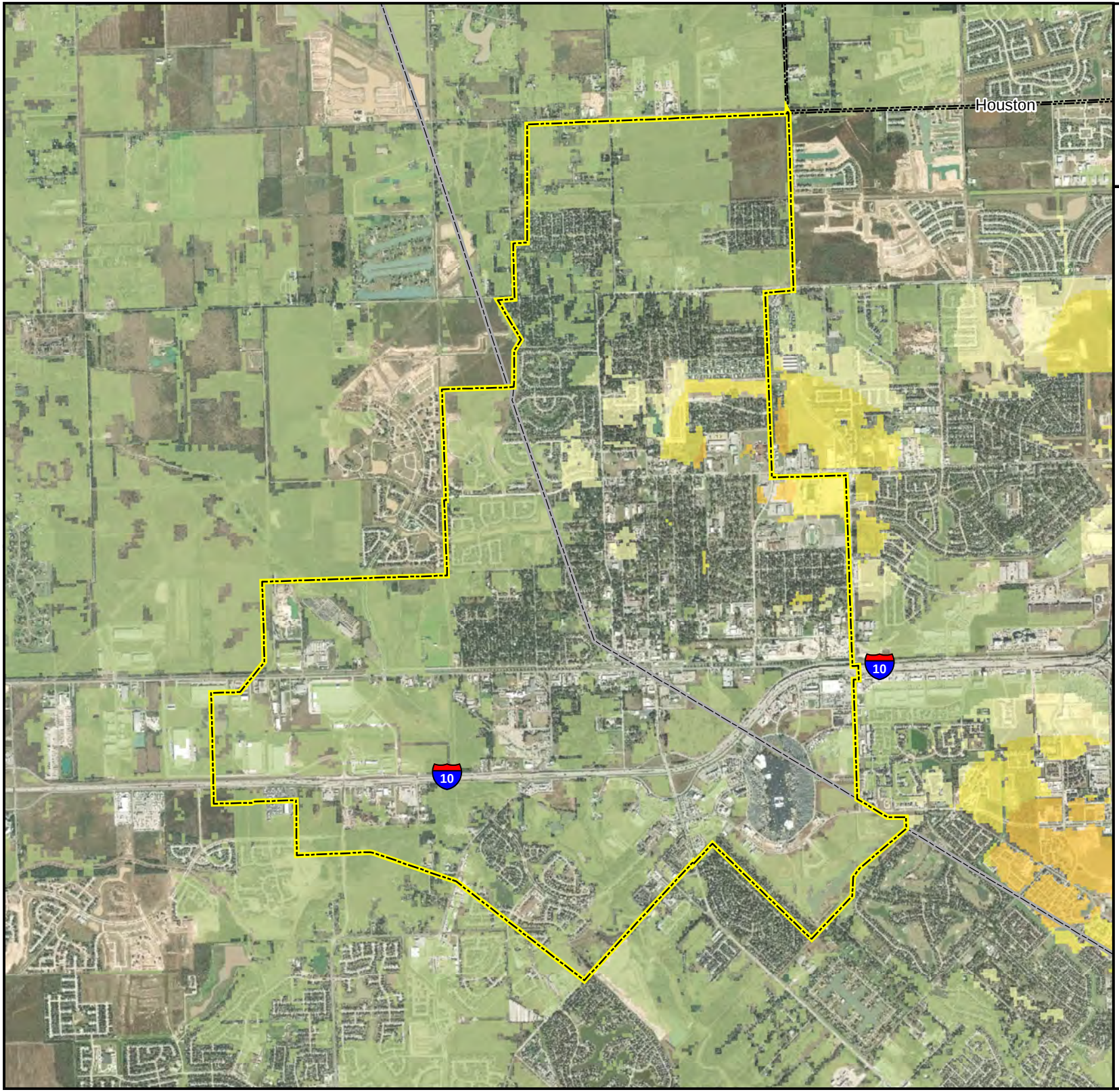
- 89 - 101
- 102 - 106
- 107 - 111
- 112 - 117
- 118 - 128
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.225 0.45 0.9 Miles



Katy

Wildfire Ignition Density

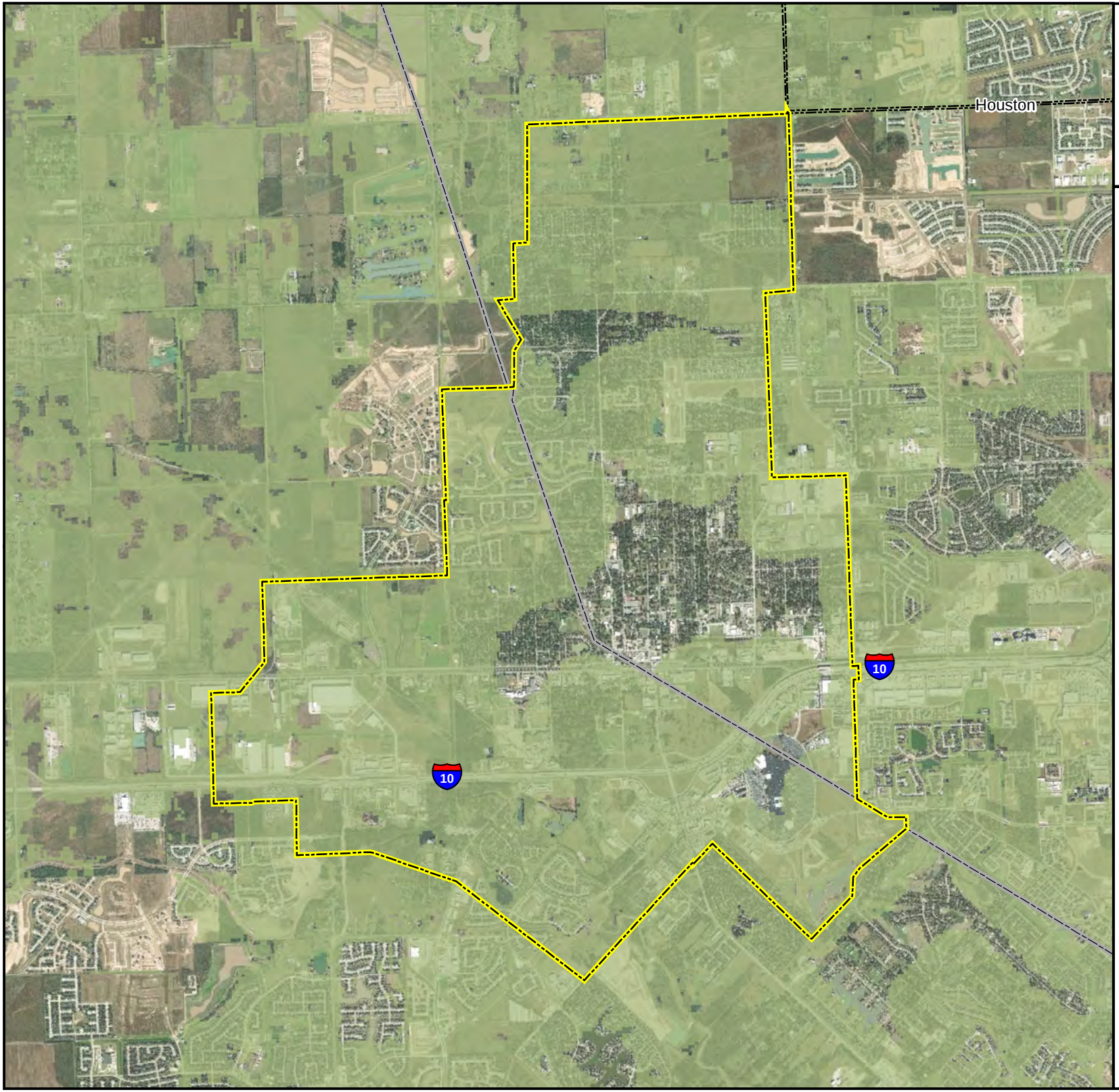
- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.225 0.45 0.9 Miles



Katy

Wildfire Threat

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.225 0.45 0.9 Miles

15. CITY OF LA PORTE

15.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Kristin Gauthier, Emergency Management Coordinator
3001 N. 23rd St.
La Porte, TX 77571
Telephone: 281-470-0009
e-mail Address: gauthierk@laportetx.gov

Alternate Point of Contact
Johnny Morales, Assistant EMC
3001 N. 23rd St.
La Porte, TX 77571
Telephone: 281-470-0011
e-mail Address: moralesj@laportetx.gov

15.2 JURISDICTION PROFILE

15.2.1 Location

The City of La Porte is located in southeast Harris County, about 30 minutes southeast of Houston. It is accessible by State Highways 225 and 146. La Porte is located at the entrance to the Houston Ship Channel, and is home to two major Port Houston terminals: Barbours Cut and Bayport. La Porte's location along the Houston Ship Channel makes it home to numerous petrochemical facilities.

The current boundaries generally extend from the city boundaries of Deer Park and Pasadena to the west, Galveston Bay to the east, State Highway 225 to the north, and the Port of Houston Bayport Terminal to the south. The city encompasses an area of approximately 18.6 square miles.

15.2.2 History

The City of La Porte was incorporated in 1892. In the early 1900s, La Porte was a popular tourist destination due to its location on Galveston Bay. Originally named Sylvan Grove Park, Sylvan Beach became a nationally recognized tourist destination, and remains one of La Porte's biggest attractions. Several hurricanes impacted La Porte in the early part of the 20th century, causing tourism in the area to diminish. Following World War II, shipyards and industrial plants began to be developed in the region, resulting in the large petrochemical presence that still exists to this day.

15.2.3 Climate

La Porte's climate is classified as humid subtropical. Prevailing winds from the south and southeast bring heat from the deserts of Mexico and moisture from the Gulf of Mexico.

Summer temperatures typically have highs near 90 °F (32 °C), though higher temperatures are not uncommon. The city's proximity to the bay, and winds that it generates, moderate the area's temperatures and ease the effects of the humidity, creating a more pleasant climate than inland communities like Houston.

Winters in the area are temperate with typical January high of 61 °F (16 °C) and lows are near 42 °F (6 °C). Snowfall is rare.

Annual rainfall averages exceed 50 inches, with an annual average of 91 precipitation days. The average elevation of La Porte is approximately 20 feet above sea level.

15.2.4 Governing Body Format

The City of La Porte is a Home Rule City, operating under the Council-Manager form of government, with a City Council composed of a Mayor and eight Council members. The Mayor and 2 councilpersons-at-large are elected by a majority vote of the qualified voters of the city at large. The city is divided into 6 districts, Districts 1, 2, 3, 4, 5, and 6; and 1 councilperson is elected from each district by majority vote of the resident voters of such district. The City Council appoints a City Manager to act as the chief administrative and executive officer of the City.

The La Porte City Council assumes responsibility for the adoption of this plan; the La Porte Office of Emergency Management will oversee its implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 15-1.

Table 15-1. Local Mitigation Planning Team Members

Name	Title
Kristin Gauthier	Emergency Management Coordinator
Jason Weeks	Assistant City Manager
Teresa Evans	Director of Planning
Lorenzo Wingate	City Engineer
Alfonso Acosta	Deputy Building Official
Richard Glass	Plans Examiner
Ian Clowes	City Planner
Abrin Brooks	GIS Manager

15.3 CURRENT TRENDS

15.3.1 Population

According to the U.S. Census, the population of the City of La Porte as of July 2017 was 35,371. Since April 2010, the population has grown by 4.6 percent.

15.3.2 Development

Anticipated development levels for La Porte are moderate, consisting primarily of single family and multi-family development with complementary commercial construction. Additional industrial and warehousing construction are also expected.

Table 15-2 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

Table 15-2. Recent and Expected Future Development Trends

Criterion	Response
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan? • **If yes, give the estimated area annexed and estimated number of parcels or structures.**	No N/A
Is your jurisdiction expected to annex any areas during the performance period of this plan? • **If yes, describe land areas and dominant uses.** • **If yes, who currently has permitting authority over these areas?**	No N/A N/A
Are any areas targeted for development or major redevelopment in the next five years? • **If yes, briefly describe, including whether any of the areas are in known hazard risk areas**	Yes 1) New construction of 640 single-family homes and 350 multi-family units being built in the Morgan's Landing Subdivision located along Bay Area Blvd., between Spencer Hwy. and Fairmont Pkwy. A portion of this development is located within the floodplain. 2) New construction of 82 single-family homes and 350 multi-family units being built in the Artesia Village/Hawthorne La Porte development located along the east side of SH 146, between Wharton Weems and Fairmont Pkwy. This development is located within the floodplain. 3) Preliminary proposal for Creekhaven Estates, a development consisting of 45 single – family residential homes located along McCabe Rd., between SH 146 and S. Broadway. This proposed development is located within the floodplain.
How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?	See nested table below
Provide the number of new-construction permits for each hazard area or provide a qualitative description of where development has occurred.	• Special Flood Hazard Areas: 87 (Total for 2014 – 2018) • Landslide: N/A • High Liquefaction Areas: N/A • Tsunami Inundation Area: N/A • Wildfire Risk Areas: N/A
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	Based on aerial imagery combined with current zoning and knowledge of upcoming projects, it is estimated that approximately 75-80% of buildable land is currently developed. A large portion of our northern city limits is designated as single family large lot. The majority of these lots are developed but the overall density is much less than that of traditional single family subdivisions.

	2014	2015	2016	2017	2018
Single Family					
All Permits	68	87	88	54	76
Special Flood Hazard Area Permits	16	9	13	12	15
Multi-Family					
All Permits	0	4	1	0	0
Special Flood Hazard Area Permits	1	0	0	0	0
Other (commercial, mixed use, etc.)					
All Permits	13	24	25	29	22
Special Flood Hazard Area Permits	3	2	3	5	8
Total					
All Permits	**81**	**115**	**114**	**83**	**98**
Special Flood Hazard Area Permits	**20**	**11**	**16**	**17**	**23**

15.4 CAPABILITY ASSESSMENT

The City of La Porte performed an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities is presented in Table 15-3.
- Development and permitting capabilities are presented in Table 15-4.
- An assessment of fiscal capabilities is presented in Table 15-5.
- An assessment of administrative and technical capabilities is presented in Table 15-6.
- An assessment of education and outreach capabilities is presented in Table 15-7.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 15-8.
- Classifications under various community mitigation programs are presented in Table 15-9.
- The community's adaptive capacity for the impacts of climate change is presented in Table 15-10.

Findings of the capability assessment were reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table included in the action plan for this annex identifies these as community capacity building mitigation actions.

Table 15-3. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code	Yes	Yes	Yes	Yes
Comment: *Code of Ordinances, Subpart B, Chapter 82 – Buildings and Building Regulations; Adoption: 2012 International Residential Code and International Business Code*				
Zoning Code	Yes	No	No	Yes
Comment: *Code of Ordinances, Subpart B, Chapter 106 – Zoning*				
Subdivisions	Yes	No	No	No
Comment: *Code of Ordinances, Subpart B, Chapter 86 – General Plans, Sec. 86-15 – General standards for subdivision & developments*				
Stormwater Management	Yes	Yes	Yes	Yes
Comment: *Code of Ordinances, Subpart A, Chapter 34 – Environment, Article VI – Stormwater Discharges*				
Post-Disaster Recovery	Yes	Yes	No	Yes
Comment: *Annex J – Recovery and post-disaster permitting and code enforcement regulations.*				
Real Estate Disclosure	No	No	Yes	No
Comment:				
Growth Management	No	No	No	Yes
Comment:				
Site Plan Review	Yes	Yes	No	Yes
Comment: *Code of Ordinances, Chapter 86, Sec. 86-7*				
Environmental Protection	Yes	Yes	Yes	Yes
Comment: *Code of Ordinances, Subpart A, Chapter 34 – Environment*				
Flood Damage Prevention	Yes	Yes	Yes	Yes
Comment: *Code of Ordinances, Subpart B, Chapter 94 – Floods*				
Emergency Management	Yes	No	Yes	Yes
Comment: *Code of Ordinances, Subpart A, Chapter 26 – Emergency Management; Local Ordinance No. 1498-A*				
Climate Change	No	Yes	No	Yes
Comment:				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Planning Documents				
General Plan	Yes	No	No	Yes
Comment: *La Porte Comprehensive Plan; Adopted on December 10, 2012; 5-year updated adopted on June 11, 2018*				
Capital Improvement Plan	No	No	No	Yes
How often is the plan updated?				
Comment:				
Disaster Debris Management Plan	Yes	No	No	No
Comment: *Last updated on June 26, 2014, and Approved by FEMA on August 6, 2014*				
Floodplain or Watershed Plan	No	No	No	Yes
Comment:				
Stormwater Plan	Yes	No	Yes	Yes
Comment: *Last adopted in 2014*				
Urban Water Management Plan	No	No	No	No
Comment:				
Habitat Conservation Plan	No	Yes	Yes	No
Comment:				
Economic Development Plan	Yes	No	No	No
Comment: *Chapter 5 of the Comprehensive Plan*				
Shoreline Management Plan	No	Yes	No	No
Comment:				
Community Wildfire Protection Plan	No	Yes	No	Yes
Comment: *The City of La Porte does not have its own CWPP implemented. Harris County has completed a county-wide CWPP; which includes all incorporated jurisdictions within Harris County.*				
Forest Management Plan	No	Yes	No	No
Comment:				
Climate Action Plan	No	Yes	No	Yes
Comment:				
Comprehensive Emergency Management Plan	Yes	No	Yes	Yes
Comment: *Emergency Operations Plan; all annexes last reviewed and approved by the State in June – August 2016*				
Threat & Hazard Identification & Risk Assessment (THIRA)	No	Yes	Yes	Yes
Comment: *A regional THIRA is conducted on an annual basis for UASI and HGAC. The City participates in the development of the THIRA.*				
Post-Disaster Recovery Plan	Yes	Yes	No	Yes
Comment: *Annex J – Recovery to the City's Emergency Operations Plan; approved by the State on July 18, 2016*				
Continuity of Operations Plan	Yes	No	No	Yes
Comment: *Basic Plan and all department plans updated in April – June 2019*				
Public Health Plan	Yes	Yes	Yes	Yes
Comment: *Annex H – Health and Medical is a component of the City's Emergency Operations Plan and addresses public health, environmental health, and medical response capabilities. The City does not maintain a standalone Public Health Plan.*				
Pandemic Plan	Yes	No	No	Yes
Comment: *Pandemic Influenza Plan last revised on August 7, 2012*				

Table 15-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • **If no, who does? If yes, which department?**	Yes Planning
Does your jurisdiction have the ability to track permits by hazard area?	Yes
Does your jurisdiction have a buildable lands inventory?	No

Table 15-5. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes – Water and Sewer
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes

Table 15-6. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Planning/Public Works
Engineers or professionals trained in building or infrastructure construction practices	Yes	Public Works
Planners or engineers with an understanding of natural hazards	Yes	Planning/Public Works
Staff with training in benefit/cost analysis	Yes	City Manager's Office/Finance
Surveyors	Yes	Can contract for service
Personnel skilled or trained in GIS applications	Yes	Planning GIS Division
Scientist familiar with natural hazards in local area	Yes	Can contract for service
Emergency manager	Yes	Emergency Management
Grant writers	Yes	Can contract for service

Table 15-7. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • If yes, briefly describe.	Yes Floodplain information managed by Public Works/Mapping managed by GIS/Preparedness info managed by Emergency Management
Do you use social media for hazard mitigation education and outreach? • If yes, briefly describe.	Yes La Porte Emergency Management page used to promote preparedness information and events
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • If yes, briefly describe.	Yes Planning & Zoning Commission, Drainage & Flooding Committee
Do you have any other programs already in place that could be used to communicate hazard-related information? • If yes, briefly describe.	Yes Phone notification system, sirens, social media, Ready LP app, community events
Do you have any established warning systems for hazard events? • If yes, briefly describe.	Yes Phone notification system, sirens, alerts, Ready LP App

Table 15-8. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Public Works
Who is your floodplain administrator? (department/position)	Public Works/City Engineer
Are any certified floodplain managers on staff in your jurisdiction?	Yes
What is the date that your flood damage prevention ordinance was last amended?	April 26, 2010
Does your floodplain management program meet or exceed minimum requirements? • **If exceeds, in what ways?**	Exceeds Various
When was the most recent Community Assistance Visit or Community Assistance Contact?	May 31, 2018
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • **If so, state what they are.**	No
Are any RiskMAP projects currently underway in your jurisdiction? • **If so, state what they are.**	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • **If no, state why.**	No Do not address impacts of flash flooding
Does your floodplain management staff need any assistance or training to support its floodplain management program? • **If so, what type of assistance/training is needed?**	Yes Floodplain Development Inspections Training
Does your jurisdiction participate in the Community Rating System (CRS)? • **If yes, is your jurisdiction interested in improving its CRS Classification?** • **If no, is your jurisdiction interested in joining the CRS program?**	Yes Yes
How many flood insurance policies are in force in your jurisdiction?[a] • **What is the insurance in force?** • **What is the premium in force?**	4,961 $1,371,066,800 $2,946,020
How many total loss claims have been filed in your jurisdiction?[a] • **How many claims are still open or were closed without payment?** • **What were the total payments for losses?**	3,086 583 $94,819,110.60

a. According to FEMA statistics as of September 30, 2018

Table 15-9. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	Yes	7	10/1/2017
Building Code Effectiveness Grading Schedule	Yes	Residential – 5 Commercial – 5	May 26, 2014
Public Protection	Yes	2	2018
Storm Ready	Yes		12/27/2017
Firewise	No	N/A	N/A

Table 15-10. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:***	Low
Jurisdiction-level monitoring of climate change impacts ***Comment:***	Low
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:***	Low
Participation in regional groups addressing climate risks ***Comment:***	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	Low
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	Low
Identified strategies for adaptation to impacts ***Comment:***	Low
Champions for climate action in local government departments ***Comment:***	Low
Political support for implementing climate change adaptation strategies ***Comment:***	Low
Financial resources devoted to climate change adaptation ***Comment:***	Low
Local authority over sectors likely to be negative impacted ***Comment:***	Low
Public Capacity	
Local residents knowledge of and understanding of climate risk ***Comment:***	Low
Local residents support of adaptation efforts ***Comment:***	Low
Local residents' capacity to adapt to climate impacts ***Comment:***	Low
Local economy current capacity to adapt to climate impacts ***Comment:***	Low
Local ecosystems capacity to adapt to climate impacts ***Comment:***	Low

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

15.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning and capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

15.5.1 Existing Integration

This was not a metric in the 2015 Plan. Therefore, integration with other plans and programs was not measured.

15.5.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- **Comprehensive Plan –** The City's Comprehensive Plan is the most forward thinking plan the City has in place to identify opportunities for the future. It guides future policy decisions relating to the physical and economic development of the city. Better incorporating mitigation activities into this plan is one of the greatest opportunities for future integration.
- **Building and Zoning Codes –** There is an opportunity for the City to review building and zoning codes, and identify mitigation measures as a priority for existing and future codes.
- **Capital Improvement Plan –** There are opportunities to better structure the City's Capital Improvement Plan to allow the City to identify and plan for future mitigation projects.
- **Comprehensive Emergency Management Plan –** Annex P to the City's Emergency Management Plan provides a broad overview of hazard mitigation and structure for conducting mitigation planning activities. During the next review, the City will assess the same 10 hazards that are identified in the Hazard Mitigation Plan.
- **Citywide Drainage Plan –** The Plan looks at the current integrity of the City's drainage system and provides recommendations for improvement that will be considered in the future. During the next review, the City will review both plans to ensure consistency and inclusion of each identified action item from the Hazard Mitigation Plan.

15.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 15-11 lists past occurrences of natural hazards for which specific damage was recorded in the City of La Porte. Other hazard events that broadly affected the entire planning area, including the City of La Porte are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

15.7 HAZARD RISK RANKING

Table 15-12 presents a local ranking for the City of La Porte of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 15-11. Past Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Winter Storm	0	1/16/2018	Not Available
Flash Flood	0	1/20/2017	Not Available
Tornado	0	3/29/2017	Not Available
Tropical Storm	4332 DR	8/26/2017	$25,000,000.00
Tornado	4245 DR	10/31/2015	$4,000,000.00
Flash Flood	0	4/17/2015	Not Available
Thunderstorm/Wind	0	5/27/2014	Not Available
Flash Flood	0	10/22/2009	Not Available
Thunderstorm/Wind	0	4/24/2009	Not Available
Winter Storm	0	12/10/2008	Not Available
Hurricane	1791 DR	9/12/2008	$50,000,000.00
Tropical Storm	1730 DR	8/16/2007	$5,000,000.00
Flash Flood	0	10/16/2006	Not Available
Hurricane	1606 DR	9/23/2005	$5,000,000.00
Thunderstorm/Wind	0	7/6/2005	Not Available
Tornado	0	10/9/2003	Not Available
Tornado	0	3/30/2002	Not Available
Tornado	0	10/11/2001	Not Available
Tropical Storm	1379 DR	6/11/2001	$21,000,000.00
Tornado	0	9/11/1998	Not Available
Tornado	0	4/20/1995	Not Available

Table 15-12. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Severe Weather	48	High
1	Hurricane	48	High
2	Flooding	18	High
3	Wildfire	16	Low
4	Earthquake	14	Low
5	Dam Failure	6	Low
5	Drought	6	Low
5	Mass Movement	6	Low
5	Coastal Erosion	6	Low
6	Tsunami	0 (No Exposure)	None

Notes

The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

Based on local knowledge and substantiated data and documentation of previous flooding in La Porte, we believe this category should be ranked as “High”.

Based on local knowledge and substantiated data and documentation of previous wildfires in La Porte, we believe this category should be ranked as “Low”.

15.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. This section provides information on a few key vulnerabilities for the jurisdiction. Available jurisdiction-specific risk maps of the hazards are provided at the end of this annex.

15.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: 307
- Number of FEMA-identified Severe-Repetitive-Loss Properties: 70
- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated: 57

15.8.2 Other Noted Vulnerabilities

The following jurisdiction-specific issue has been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- The jurisdiction has a high risk of severe weather, flooding, and hurricanes. This includes the threat of strong winds, hail, tornadoes, and storm surge. Based on the jurisdiction's natural event history, these hazards account for the greatest amount of historical damage in La Porte. Due to the geography of La Porte, the population is most at risk of these three hazard categories.

Mitigation actions addressing this issue were prioritized for consideration in the action plan in this annex.

15.9 STATUS OF PREVIOUS PLAN ACTIONS

Table 15-13 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

Table 15-13. Status of Previous Plan Actions

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
Installation of a large trunked drainage system within the 3rd Street right-of-way **Comment:** Project Complete	Yes			
Construct Gladwyne Detention Pond **Comment:**	No		X	LPT5
Implement a Winter Storm Public Education Program to focus on home heating methods and reduction of fire/structure damage or loss and appropriate insulation techniques. **Comment:**	No	X		
Implement/establish grant program to provide heating systems to LMI populations **Comment:**	No	X		
Improve Air Filtration Systems for CI/public/healthcare/school facilities by increasing capacity or quality to remove more particulates in order to minimize health risks associated with low air quality and to minimize equipment damage due to smoke **Comment:**	No	X		

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
Improve or develop a fire buffer zone around critical infrastructure	No	X		
Comment:				
Improve existing site to be utilized as a cooling zone (i.e. – tennis court, shading with mist cooling systems)	No	X		
Comment:				
Install generators/emergency power systems to provide cooling at critical/healthcare facilities	No	X		
Comment:				
Mapping/identification of inundation risk area for high-risk dams/levees	No	X		
Comment:				
Install additional Flood Alert Gauges	No		X	LPT13
Comment: In Progress				
Acquisition/Buyout program	No		X	LPT14
Comment: In Progress				
Channel Improvement & Inline Detention Pond (F216-00-00)	No		X	LPT15
Comment: In Progress				
One Regional Detention Pond for Pinegrove Valley & residents along L St. and P St. (F101-06-00)	No		X	LPT16
Comment: In Progress				
Backup power for public buildings and utilities currently without generators	No	X		
Comment:				
Install wind load proof window coverings on city buildings	Yes			
Comment: Project Complete				
Implement Debris Management Program	No		X	LPT18
Comment:				
Construct safe rooms in vulnerable public areas (ex: parks & various public buildings)	No		X	LPT19
Comment:				
Install a Weather/Lightning alert system to minimize damage and risk to local athletic facilities and other public events.	Yes			
Comment: A lightning warning system has been added to our weather subscription				
Install a covered parking area (protective structure) at Public Works and/or the Police Department for City vehicles and equipment in order to decrease the potential for damage as a result of hail.	No		X	LPT20
Comment:				
Conduct a Risk Management Program to examine the potential hazards, as well as the various sources of these hazards within the city.	No	X		
Comment: In Progress – a fixed industrial facility study was completed for La Porte and can serve as a component of this project				
Enhance and expand the City's current outdoor warning sirens to provide coverage to areas not in audible range at this time.	No		X	LPT22
Comment: In Progress – all sirens have been upgraded to add solar panels. No additional sirens have been added.				
Develop a Pipeline Response and Safety Program	No	X		
Comment:				
Development/modification of ordinances for mitigation of drought related hazards by restricting or limiting water use during drought conditions and water shortages.	No		X	LPT24

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
Comment:				
Develop/implement water smart program to educate the public on how to conserve water, especially during drought conditions.	No		X	LPT25
Comment:				
Install a Mass Notification system that can warn the public of impending flooding due to dam failure.	No	X		
Comment: There are County notification systems, so this project is no longer needed.				

15.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 15-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 15-15 identifies the priority for each action. Table 15-16 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 15-14. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action LPT1 — Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Flooding, Hurricane						
Existing	3, 4, 10	Public Works	Planning	High	HMGP, PDM, FMA	Short-term
Action LPT2 — Integrate the hazard mitigation plan into other plans, ordinances and programs that dictate land use decisions in the community, including the Comprehensive Plan, Building and Zoning Codes, Capital Improvement Plan, Citywide Drainage Plan, etc.						
Hazards Mitigated: Dam Failure, Drought, Earthquake, Flooding, Mass Movement, Severe Weather, Hurricane, Wildfire, Coastal Erosion						
New and Existing	3, 6, 9, 10, 11, 12, 15	OEM	Planning/Public Works	Low	Staff Time, General Funds	Ongoing
Action LPT3 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: All hazards						
New and Existing	3, 9, 10, 11	OEM	Planning	Low	Staff Time, General Funds	Short-term
Action LPT4 — Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements: • Enforce the flood damage prevention ordinance. • Participate in floodplain identification and mapping updates. • Provide public assistance/information on floodplain requirements and impacts.						
Hazards Mitigated: Flooding, Severe Weather						
New and Existing	1, 3, 5, 7, 8, 10	Public Works	Planning	Low	Staff Time, General Funds	Ongoing
Action LPT5 — Construct Gladwyne Detention Pond						
Hazards Mitigated: Flooding						
New and Existing	4, 8, 10, 11, 12	Public Works	Planning	High	General Funds, HMGP, PDM, FMA	Short-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action LPT6 — Purchase generators for critical facilities and infrastructure that lack adequate back-up power.						
Hazards Mitigated: Severe Weather, Hurricane						
New and Existing	4, 10, 13	Public Works	Parks and Recreation	Medium	General Funds, HMGP, PDM, FMA	Short-term
Action LPT7 — Brookglen Flooding Mitigation Analysis						
Hazards Mitigated: Flooding						
New and Existing	4, 8, 10, 11, 12	Public Works	Planning	Medium	Staff Time, General Funds, Water Development Grant	Short-term
Action LPT8 — Bayside Terrace Drainage Improvements						
Hazards Mitigated: Flooding, Hurricane						
New and Existing	4, 8, 10, 11, 12	Public Works	Planning	High	General Funds, HMGP, PDM, FMA	Short-term
Action LPT9 — Lomax/F101-06-00 – Drainage Channel Improvements						
Hazards Mitigated: Flooding						
New and Existing	4, 8, 10, 11, 12	Public Works	Planning	Medium	General Funds, HMGP, PDM, FMA	Short-term
Action LPT10 — Little Cedar Bayou/F216 Phase III Improvements						
Hazards Mitigated: Flooding						
New and Existing	4, 8, 10, 11, 12	Public Works	Planning	High	General Funds, HMGP, PDM, FMA	Short-term
Action LPT11- 6th Street (Madison to Main) Paving and Drainage						
Hazards Mitigated: Flooding						
New and Existing	4, 8, 10, 11, 12	Public Works	Planning	High	General Funds, HMGP, PDM, FMA, CDBG	Short-term
Action LPT12 – 8th St and D St Storm Water and Conveyance Improvements						
Hazards Mitigated: Flooding						
New and Existing	4, 8, 10, 11, 12	Public Works	Planning	High	General Funds, HMGP, PDM, FMA	Short-term
Action LPT13 – Install additional Flood Alert Gauges						
Hazards Mitigated: Flooding						
New and Existing	1, 4, 8, 10, 11, 12	OEM	Public Works	Low	General Funds, HMGP, PDM, FMA	Short-term
Action LPT14 – Acquisition/Buyout Program						
Hazards Mitigated: Flooding, Hurricane						
Existing	4, 10, 11, 12	Planning	Public Works	High	HMGP, PDM, FMA	Ongoing
Action LPT15 – Channel Improvement & Inline Detention Pond (F216-00-00)						
Hazards Mitigated: Flooding						
New and Existing	4, 8, 10, 11, 12	Public Works	Planning	High	General Funds, HMGP, PDM, FMA	Short-term
Action LPT16 – One Regional Detention Pond for Pinegrove Valley & residents along L St. and P St. (F101-06-00)						
Hazards Mitigated: Flooding						
New and Existing	4, 8, 10, 11, 12	Public Works	Planning	High	General Funds, HMGP, PDM, FMA	Short-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action LPT17 – Construct new Public Works facility						
Hazards Mitigated: Severe Weather, Hurricane						
Existing	10, 11, 13, 15	Public Works	Parks and Recreation	High	General Funds, HMGP, PDM, FMA	Short-term
Action LPT18 – Implement Debris Management Program						
Hazards Mitigated: Earthquake, Flooding, Severe Weather, Hurricane, Tsunami, Wildfire						
Existing	7, 9, 10, 13	Public Works	OEM	Low	Staff Time, General Funds	Ongoing
Action LPT19 – Construct safe rooms in vulnerable public areas (Ex: parks and various public buildings)						
Hazards Mitigated: Severe Weather						
New and Existing	3, 10, 11, 13	Parks and Recreation	OEM	High	General Funds, HMGP, PDM	Short-term
Action LPT20 – Install a covered parking area (protective structure) at Public Works and/or the Police Department for City vehicles and equipment in order to decrease the potential for damage as a result of hail.						
Hazards Mitigated: Severe Weather, Hurricane						
Existing	11, 12, 13	Police Department	OEM	Low	General Funds, HMGP, PDM, FMA	Short-term
Action LPT21 – Bob's Gully Drainage Improvements						
Hazards Mitigated: Flooding						
New and Existing	4, 8, 10, 11, 12	Public Works	Planning	High	General Funds, HMGP, PDM, FMA	Short-term
Action LPT22 – Enhance and expand the City's current outdoor warning sirens to provide coverage to areas not in audible range at this time.						
Hazards Mitigated: Severe Weather						
New	1, 10	OEM	Police Department	Low	General Funds	Ongoing
Action LPT23 – Battleground Estates Phase II Drainage Improvements						
Hazards Mitigated: Flooding						
New and Existing	4, 8, 10, 11, 12	Public Works	Planning	Medium	General Funds, HMGP, PDM, FMA	Short-term
Action LPT24 – Development/modification of ordinances for mitigation of drought related hazards by restricting or limiting water use during drought conditions and water shortages.						
Hazards Mitigated: Drought						
New and Existing	8, 9, 10, 11, 14	Public Works	Finance	Low	Staff Time	Short-term
Action LPT25 – Develop/implement water smart program to educate the public on how to conserve water, especially during drought conditions.						
Hazards Mitigated: Drought						
New and Existing	8, 9, 10, 11, 14	Public Works	Finance	Low	Staff Time, General Funds	Ongoing
Action LPT26— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
Hazards Mitigated: Dam Failure, Drought, Earthquake, Flooding, Mass Movement, Severe Weather, Hurricane, Wildfire, Coastal Erosion						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	City Administration	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 15-15. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
LPT1	3	High	High	Yes	Yes	No	Medium	High
LPT2	7	Medium	Low	Yes	No	Yes	High	Low
LPT3	4	Low	Low	Yes	No	Yes	High	Low
LPT4	6	Medium	Low	Yes	No	Yes	High	Low
LPT5	5	Medium	High	No	Yes	No	High	High
LPT6	3	High	Medium	Yes	Yes	No	Medium	Medium
LPT7	5	High	Medium	Yes	Yes	No	High	High
LPT8	5	Medium	High	No	Yes	No	High	Medium
LPT9	5	Medium	Medium	Yes	Yes	No	High	Medium
LPT10	5	High	High	Yes	Yes	No	High	High
LPT11	5	High	High	Yes	Yes	Yes	High	High
LPT12	5	High	High,	Yes	Yes	No	High	High
LPT13	6	High	Low	Yes	Yes	No	Low	Low
LPT14	4	High	High	Yes	Yes	No	Low	Low
LPT15	5	High	High	Yes	Yes	Yes	High	High
LPT16	5	High	High	Yes	Yes	No	Medium	Medium
LPT17	4	High	High	Yes	Yes	No	Low	Low
LPT18	4	Low	Low	Yes	No	Yes	Low	Low
LPT19	4	Low	High	No	Yes	No	Low	Low
LPT20	3	Medium	Low	Yes	Yes	No	Medium	Medium
LPT21	5	Medium	High	No	Yes	No	High	Medium
LPT22	2	Low	Low	Yes	No	No	Low	Low
LPT23	5	Medium	Medium	Yes	Yes	No	Medium	Medium
LPT24	5	Low	Low	Yes	No	Yes	Low	Low
LPT25	5	Low	Low	Yes	No	Yes	Low	Low
LPT26	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 15-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Severe Weather	LPT-2, 4, 18, 26	LPT-6, 17, 19, 20	LPT4, 18, 26		LPT-6, 20, 22, 26	LPT-17, 19, 20		LPT-2, 3, 4, 22, 18, 26
Hurricane	LPT-1, 2, 14, 18, 26	LPT-1, 6, 14, 17, 20	LPT-18, 26		LPT-6, 20, 26	LPT-8, 17, 20		LPT-2, 3, 18, 26
Flooding	LPT-1, 2, 4, 7, 14, 18, 26	LPT-1, 14	LPT-4, 13, 18, 26		LPT-13, 26	LPT-5, 8, 9, 10, 11, 15, 16, 21, 23		LPT-2, 3, 4, 7, 18, 26
Low-Risk Hazards								
Dam Failure	LPT-2, 26		LP{T26		LPT26			LPT-2, 3, 26
Drought	LPT-2, 24, 25, 26		LPT-25, 26		LPT26			LPT-2, 3, 24, 25, 26
Earthquake	LPT-2, 18, 26		LPT-18, 26		LPT26			LPT-2, 3, 18, 26
Mass Movement	LPT-2, 26		LPT26		LPT26			LPT-2, 3, 26
Tsunami	LPT-2, 18, 26		LPT-18, 26		LPT26			LPT-2, 3, 18, 26
Wildfire	LPT-2, 18, 26		LPT-18, 26		LPT26			LPT-2, 3, 18, 26

a. See the introduction to this volume for explanation of mitigation types.

15.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- **La Porte Municipal Code** — The municipal code/code of ordinances was reviewed for the full capability assessment and for identifying opportunities for action plan integration.
- **La Porte Flood Damage Prevention Ordinance** — The flood damage prevention ordinance was reviewed for compliance with the National Flood Insurance Program.
- **La Porte Comprehensive Plan** – The comprehensive plan was used to answer various questions related to future growth in the city, building and zoning practices, and existing plans related to mitigation activities.

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.

La Porte

Critical Facilities

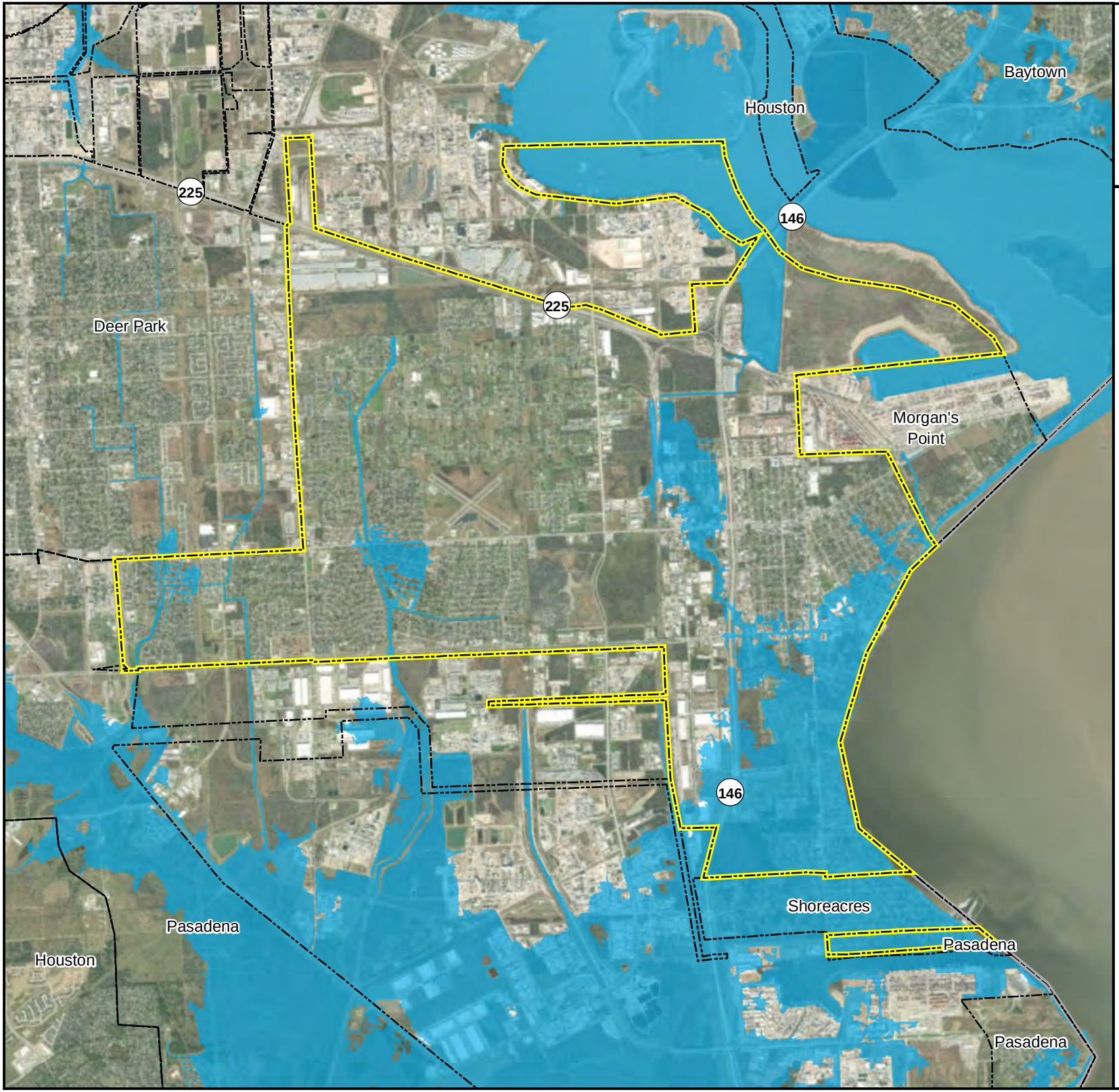
- Education Facilities
- Emergency Services
- Government Facilities
- Hazardous Material Sites
- Health and Medical Facilities
- Historical and Cultural Sites
- Transportation Systems
- Utility Systems
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.35 0.7 1.4 Miles



La Porte

FEMA Flood Hazard

1% Annual Chance Flood (100-yr)

Incorporated Cities

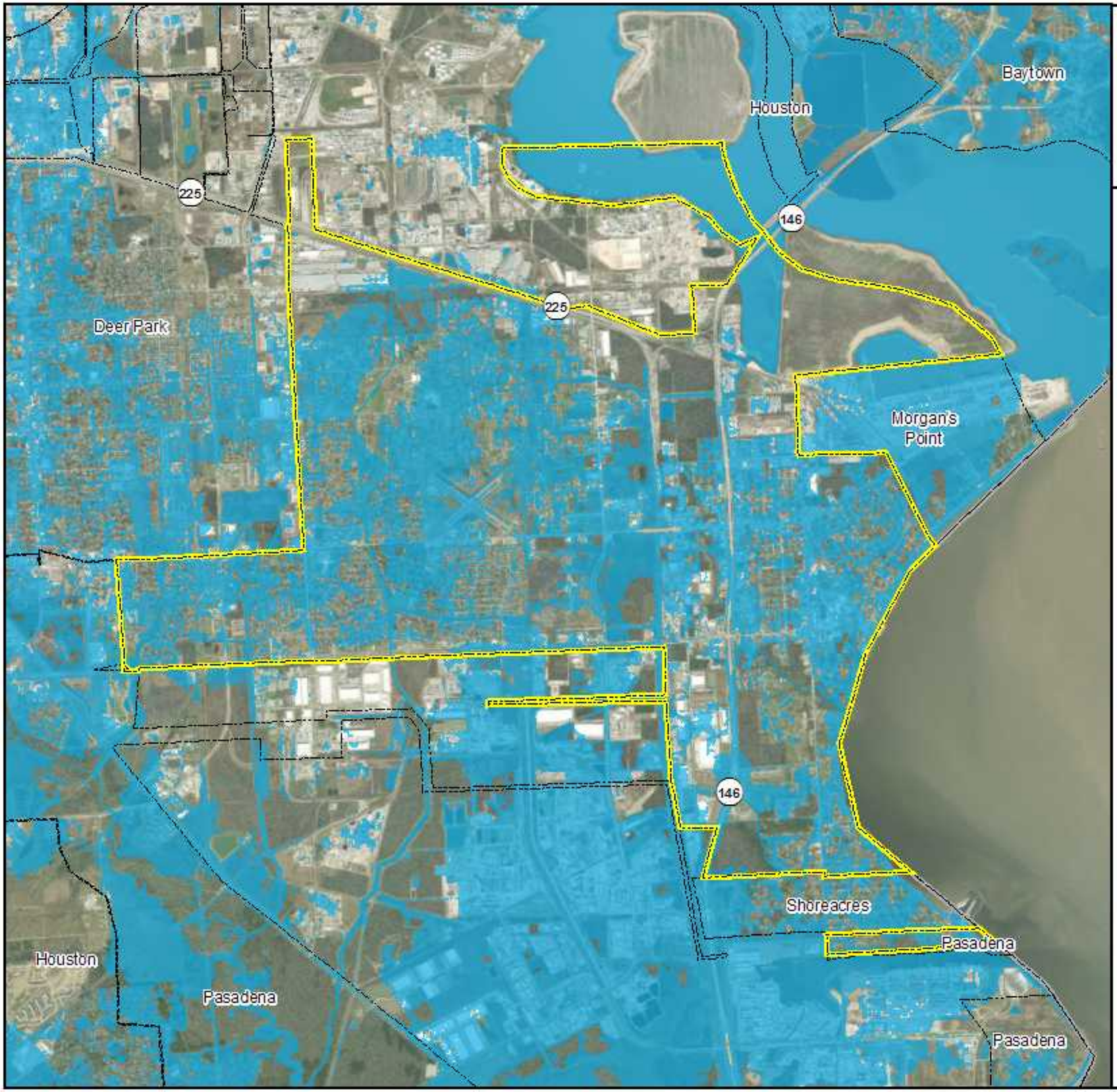
Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.35 0.7 1.4 Miles



La Porte

Flood Hazard
Hurricane Harvey

Flooding Extent

Incorporated Cities

Harris County

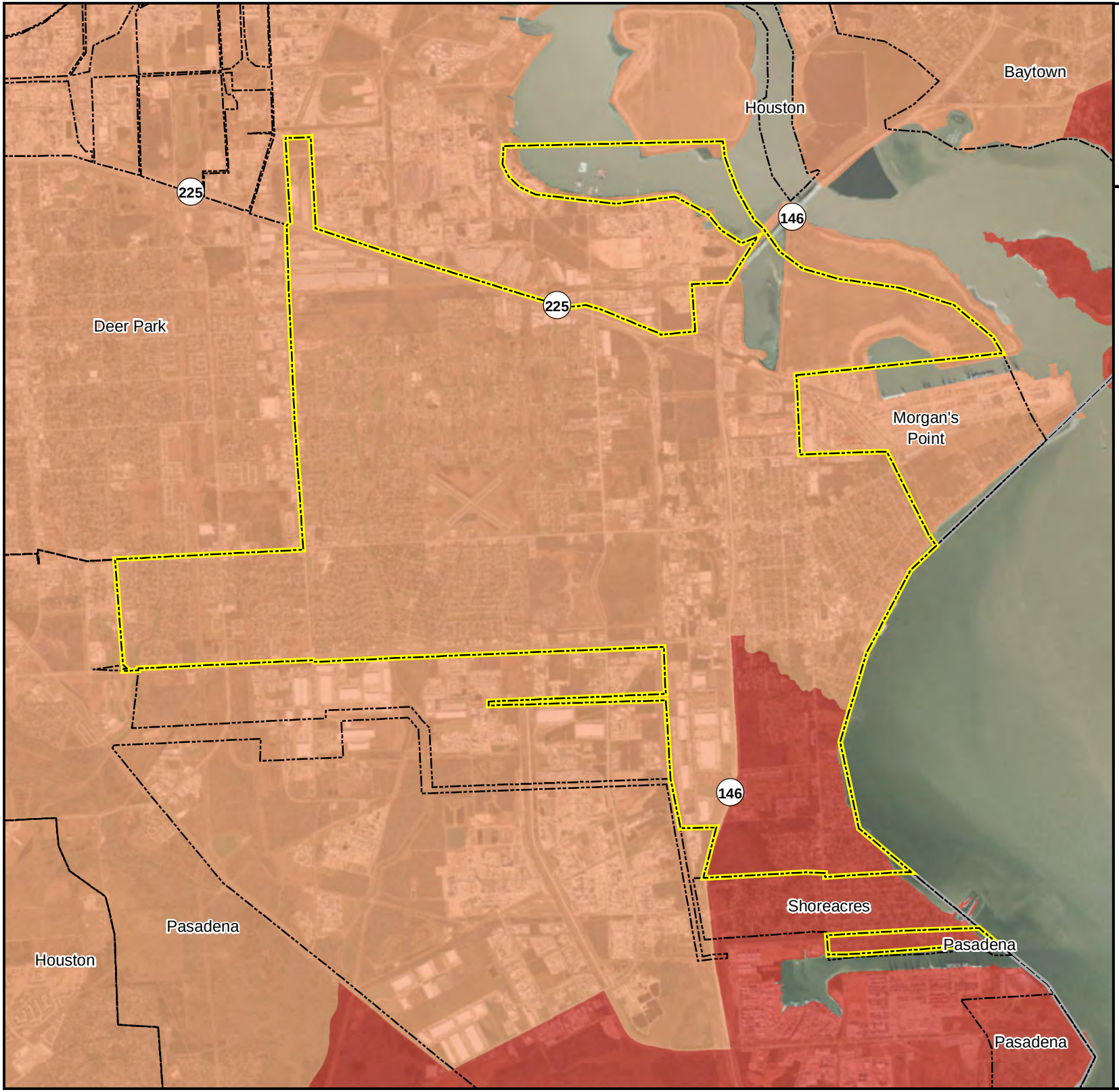
Note: Flooding extent shown for Hazard Mitigation Plan planning area only.

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.35 0.7 1.4 Miles



La Porte

Hurricane Alicia (1983)

Peak WInd Gust (mph)

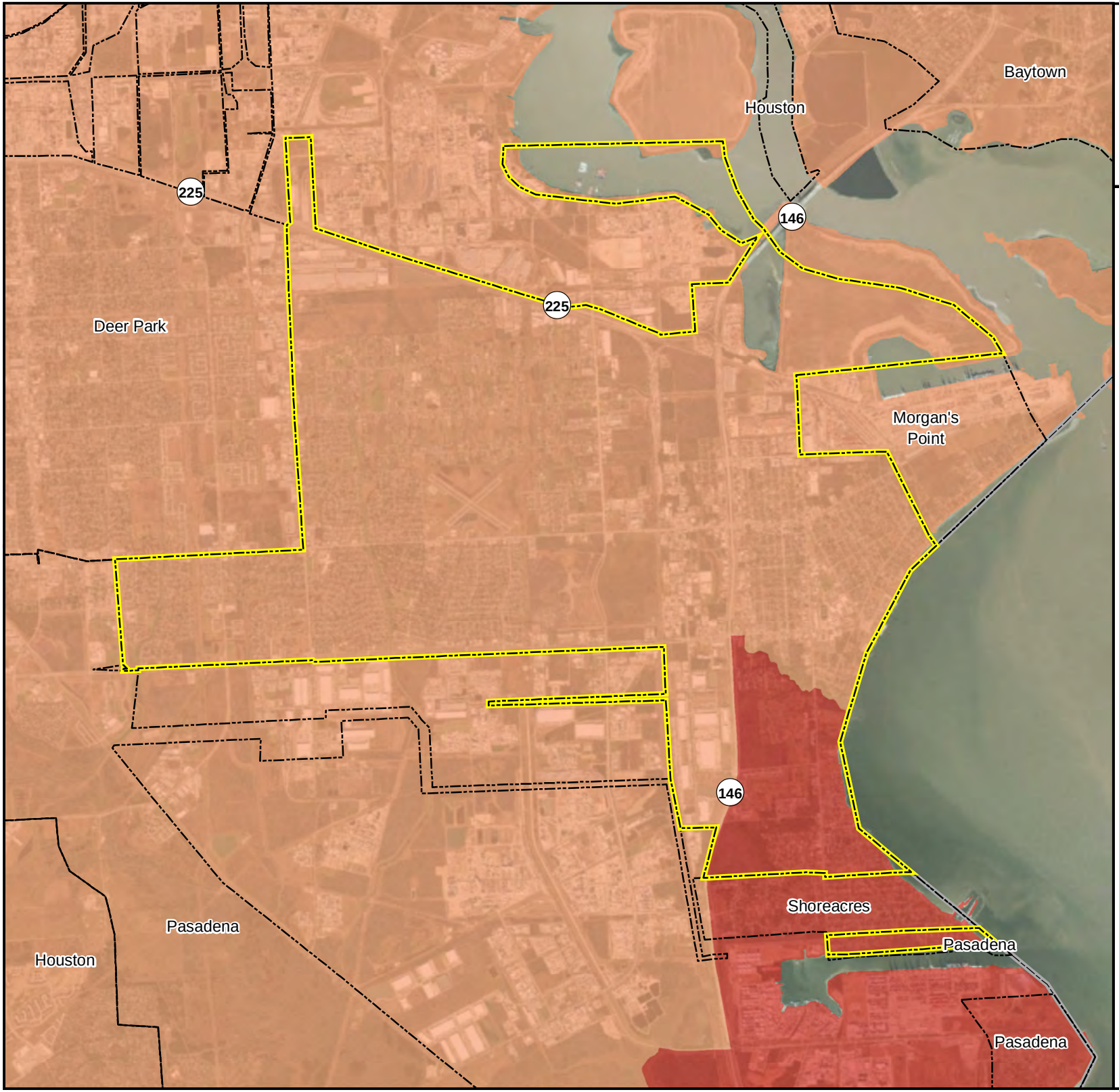
- 87 - 94
- 95 - 98
- 99 - 101
- 102 - 104
- 105 - 110
- Storm Track
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.35 0.7 1.4 Miles



La Porte

20-year Probabilistic Hurricane

Peak Wind Gust (mph)

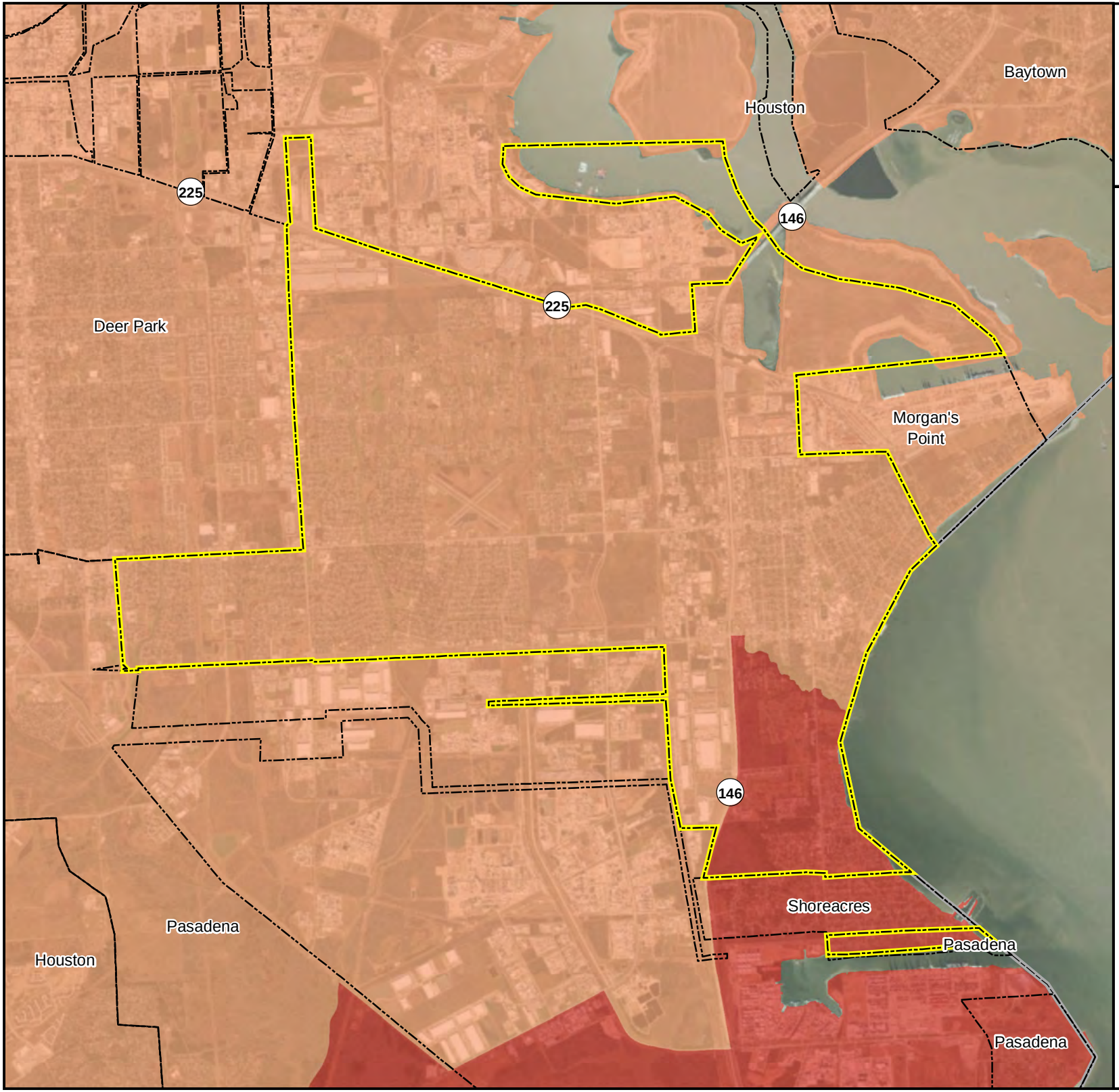
- 63 - 71
- 72 - 76
- 77 - 80
- 81 - 84
- 85 - 92
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.35 0.7 1.4 Miles



La Porte

100-year Probabilistic Hurricane

Peak Wind Gust (mph)

- 89 - 101
- 102 - 106
- 107 - 111
- 112 - 117
- 118 - 128
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.35 0.7 1.4 Miles

La Porte

Wildfire Ignition Density

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.35 0.7 1.4 Miles

La Porte

Wildfire Threat

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.35 0.7 1.4 Miles

16. CITY OF MISSOURI CITY

16.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Trameka Jewett, Emergency Management Coordinator
3849 Cartwright Road
Missouri City, Texas 77459
Telephone: 281-403-4370
email address:trameka.jewett@missouricitytx.gov

Alternate Point of Contact
Matt Rios, Assistant Chief- Fire Marshal
3849 Cartwright Road
Missouri City, Texas 77459
Telephone: 281-403-4309
email address:mrios@missouricitytx.gov

16.2 JURISDICTION PROFILE

16.2.1 Location

The City of Missouri City is located on the east side of Fort Bend County, and a small portion of the city is located within the southern portion of Harris County. The total square miles located within the city limits is 30.3. The City of Missouri City's Fire and Rescue Services also responds to a portion of our Extra-Territorial Jurisdiction, located within Fort Bend County, which is the city's unincorporated limits.

The current boundaries generally extend west of the eastern City of Sugar Land's city limits along Hwy 6 to the western city limit of Arcola. The City of Missouri City's northern borders abut the southern edges of the City of Stafford and portions of Harris County. The southern portion of our city limits currently abuts the Fort Bend County limits encompassing an area of approximately 30 square miles.

16.2.2 History

The City of Missouri City was incorporated in February of 1956 and had an approximate city population of 75,000 as of 2017. In October of 1894, Missouri City was officially registered in the records of Harris County clerk and September of 1895 in Fort Bend County, thus marking the first beginnings of Missouri City. Since this time, Missouri City has grown, not only in its small 600 citizen population at the time of registration but also in its land use. Long gone are the days of farmers and ranchers that settled the land in the early 1800s, the city now boasts 488 miles of streets and roads, 35 parks and undeveloped areas that cover almost 920 acres, as well as an above the state average for median household income.

16.2.3 Climate

The climate in the City of Missouri City typically have summers that are long, hot, and oppressive; the winters are short, cold, and windy; and it is wet and partly cloudy year-round. Over the year, the temperature typically varies from 45°F to 93°F and is rarely below 33°F or above 98°F.

16.2.4 Governing Body Format

The City of Missouri City is governed as a general law city with a Mayor, Mayor Pro-Tem, and five City Council Members. These elected officials are supported by a City Manager, Assistant City Managers, City Secretary, Fire and Police Chiefs, Human Resources Director, Municipal Court Director, and Public Works Director.

The City Council assumes responsibility for the adoption of this plan; City Manager will oversee its implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 1-1.

Table 16-1. Local Mitigation Planning Team Members

Name	Title
Eugene Campbell, Jr.	Fire Chief
Shashi Kumar	Public Works Director
Matt Rios	Assistant Chief- Fire Marshal

16.3 CURRENT TRENDS

16.3.1 Population

According to the U.S. Census, the population of the City of Missouri City as of July 2017 was 74,497. Since April 2010, the population has grown at an average annual rate of 11.7 percent.

1.3.2 Development

Table 16-2 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

Table 16-2. Recent and Expected Future Development Trends

Criterion	Response
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan? • **If yes, give the estimated area annexed and estimated number of parcels or structures.**	NO
Is your jurisdiction expected to annex any areas during the performance period of this plan? • **If yes, describe land areas and dominant uses.** • **If yes, who currently has permitting authority over these areas?**	NO
Are any areas targeted for development or major redevelopment in the next five years? • **If yes, briefly describe, including whether any of the areas are in known hazard risk areas**	Yes The Texas Parkway corridor is undergoing revitalization efforts and is not in any known hazard risk areas

Criterion	Response					
How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?		**2014**	**2015**	**2016**	**2017**	**2018**
	Single Family	333	303	251	331	501
	Multi-Family	312	29	215	0	0
	Other (commercial, mixed use, etc.)	307	448	315	385	692
	Total	**952**	**753**	**781**	**716**	**1193**
Provide the number of new-construction permits for each hazard area or provide a qualitative description of where development has occurred.	• Special Flood Hazard Areas: # 0 • Landslide: # 0 • High Liquefaction Areas: # 0 • Tsunami Inundation Area: # 0 • Wildfire Risk Areas: # 0					
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	Currently, there several areas of land that are being developed for commercial use as well as residential construction. The Hwy 90A and Beltway 8 area are scheduled to build an estimated 1.5 to 3 million square feet of warehouse/ office building in the next two years alone. Hwy 6 south is also developing additional commercial retail areas with the majority of the new construction near the Fort Bend Toll road area. Along the Fort Bend Toll Road area, a large amount of new residential construction is developing along with a new 270,000 sf power center and mixture of commercial small retail shops intermingled within the new subdivisions and commercial space..					

16.4 CAPABILITY ASSESSMENT

The City of Missouri City performed an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities is presented in Table 16-3.
- Development and permitting capabilities are presented in Table 16-4.
- An assessment of fiscal capabilities is presented in Table 16-5.
- An assessment of administrative and technical capabilities is presented in Table 16-6.
- An assessment of education and outreach capabilities is presented in Table 16-7.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 16-8.
- Classifications under various community mitigation programs are presented in Table 16-9.
- The community's adaptive capacity for the impacts of climate change is presented in Table 16-10.

Findings of the capability assessment were reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table included in the action plan for this annex identifies these as community capacity building mitigation actions.

Table 16-3. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code	Yes	No	No	No
Comment: *International Building Code (03-02-2015, Ordinance O-15-08)*				
Zoning Code	Yes	No	Yes	No
Comment: *Zoning Ordinance (01-19-1981, Ordinance O-81-1)*				
Subdivisions	Yes	No	Yes	Yes
Comment: *Subdivision Ordinance (03-18-1974, Ordinance No. 158)*				
Stormwater Management	Yes	Yes	Yes	Yes
Comment: *Updated May 2014*				
Post-Disaster Recovery	No	No	No	No
Comment:				
Real Estate Disclosure	No	No	No	No
Comment:				
Growth Management	Yes	Yes	No	Yes
Comment:				
Site Plan Review	Yes	Yes	Yes	Yes
Comment: *See Building Code, Zoning Ordinance, Subdivision Ordinance above*				
Environmental Protection	No	No	No	No
Comment:				
Flood Damage Prevention	Yes	Yes	Yes	Yes
Comment:				
Emergency Management	Yes	Yes	Yes	Yes
Comment:				
Climate Change	No	No	No	No
Comment:				
Planning Documents				
General Plan	Yes	No	Yes	Yes
Comment: *2017 Missouri City Comprehensive Plan (06-19-2017, Ordinance O-17-16)*				
Capital Improvement Plan	Yes	No	No	Yes
How often is the plan updated? *Annually*				
Comment:				
Disaster Debris Management Plan	No	No	No	No
Comment:				
Floodplain or Watershed Plan	Yes	Yes	No	Yes
Comment:				
Stormwater Plan	Yes	Yes	Yes	Yes
Comment:				
Urban Water Management Plan	No	No	No	No
Comment:				
Habitat Conservation Plan	No	No	No	No
Comment:				
Economic Development Plan	Yes	No	No	No
Comment:				
City plan				
Shoreline Management Plan	No	No	No	No
Comment:				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Community Wildfire Protection Plan	Yes	Yes	No	No
Comment:				
Forest Management Plan	No	No	No	No
Comment:				
Climate Action Plan	No	No	No	No
Comment:				
Comprehensive Emergency Management Plan	Yes	Yes	No	No
Comment: *Annex in Fort Bend Co. Plan*				
Threat & Hazard Identification & Risk Assessment (THIRA)	Yes	Yes	No	No
Comment:				
Post-Disaster Recovery Plan	Yes	Yes	No	No
Comment: ***Fort Bend Co. Annex***				
Continuity of Operations Plan	Yes	Yes	No	No
Comment:				
Public Health Plan	Yes	Yes	No	No
Comment: *Fort Bend Co. Annex*				

Table 16-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • **If no, who does? If yes, which department?**	Yes Development Services
Does your jurisdiction have the ability to track permits by hazard area?	No
Does your jurisdiction have a buildable lands inventory?	Yes

Table 16-5. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes (water and sewer)
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	No
Incur Debt through Private Activity Bonds	No
Withhold Public Expenditures in Hazard-Prone Areas	No
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes

Table 16-6. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Development Services; Public Works/City of Missouri City/Director, Assistant Director, Manager
Engineers or professionals trained in building or infrastructure construction practices	Yes	Public Works Director and Building Officials office
Planners or engineers with an understanding of natural hazards	No	
Staff with training in benefit/cost analysis	Yes	Finance Director/ Department
Surveyors	No	Contracted out
Personnel skilled or trained in GIS applications	Yes	Public Works/City of Missouri City/GIS Division
Scientist familiar with natural hazards in local area	No	
Emergency manager	Yes	Fire Department/ EMC
Grant writers	No	

Table 16-7. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • **If yes, briefly describe.**	Yes The Fort Bend County Hazard mitigation plan that our city has an annex in is available on the city's website.
Do you use social media for hazard mitigation education and outreach? • **If yes, briefly describe.**	Yes Through messages and information on our, City maintained website
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • **If yes, briefly describe.**	No
Do you have any other programs already in place that could be used to communicate hazard-related information? • **If yes, briefly describe.**	Yes We have a "Missouri City Ready" website, specifically for Emergency Management communications.
Do you have any established warning systems for hazard events?	Yes
• **If yes, briefly describe.**	Alert Center through City website through email and cell phone options.

Table 16-8. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Public Works
Who is your floodplain administrator? (department/position)	Public Works/ Director
Are any certified floodplain managers on staff in your jurisdiction?	Public Works/ City Engineer
What is the date that your flood damage prevention ordinance was last amended?	March 3rd, 2014
Does your floodplain management program meet or exceed minimum requirements? • **If exceeds, in what ways?**	Exceeds the requirement that lowest finished flows be elevated 12 inches above base flood elevation
When was the most recent Community Assistance Visit or Community Assistance Contact?	Scheduled August 15th, 2019
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • **If so, state what they are.**	No
Are any RiskMAP projects currently underway in your jurisdiction? • **If so, state what they are.**	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • **If no, state why.**	Yes However, backwater impacts are not mapped
Does your floodplain management staff need any assistance or training to support its floodplain management program? • **If so, what type of assistance/training is needed?**	Yes Financial Assistance
Does your jurisdiction participate in the Community Rating System (CRS)? • **If yes, is your jurisdiction interested in improving its CRS Classification?** • **If no, is your jurisdiction interested in joining the CRS program?**	Yes Yes
How many flood insurance policies are in force in your jurisdiction?[a] • **What is the insurance in force?** • **What is the premium in force?**	Approximately 4,000 $Unknown $Unknown
How many total loss claims have been filed in your jurisdiction?[a] • **How many claims are still open or were closed without payment?** • **What were the total payments for losses?**	120 116 $1,992,728

a. According to FEMA statistics as of December 2018

Table 16-9. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	Yes	7	October 1st, 2017
Building Code Effectiveness Grading Schedule	Yes	ISO 1	August 1st, 2016
Public Protection	No	N/A	
Storm Ready	No	N/A	
Firewise	No	N/A	

Table 16-10. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:***	Low
Jurisdiction-level monitoring of climate change impacts ***Comment:***	Low
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:***	Low
Participation in regional groups addressing climate risks ***Comment:***	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	Low
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	Low
Identified strategies for adaptation to impacts ***Comment:***	Low
Champions for climate action in local government departments ***Comment:***	Low
Political support for implementing climate change adaptation strategies ***Comment:***	Low
Financial resources devoted to climate change adaptation ***Comment:***	Low
Local authority over sectors likely to be negative impacted ***Comment:***	Low
Public Capacity	
Local residents knowledge of and understanding of climate risk ***Comment:***	Low
Local residents support of adaptation efforts ***Comment:***	Low
Local residents' capacity to adapt to climate impacts ***Comment:***	Low
Local economy current capacity to adapt to climate impacts ***Comment:***	Low
Local ecosystems capacity to adapt to climate impacts ***Comment:***	Low

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

16.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning and capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

16.5.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- Fort Bend County Hazard Mitigation Plan

16.5.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- **City of Missouri City Comprehensive Plan:** As the City continues to grow, issues such as an aging infrastructure, the preservation of neighborhoods, encouraging economic development and strategic investments continue to emerge as challenges which the community must address. This Plan is provided to assist all members of the community in responding to these challenges ahead and to build upon the City's reputation as an inclusive, beautiful, safe, enjoyable and overall great place to live.
- **City of Missouri City Subdivision Ordinance:** All subdivisions in the city and in its extraterritorial jurisdiction shall be platted in conformance with the comprehensive plan of the city.

16.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 16-11 lists past occurrences of natural hazards for which specific damage was recorded in Missouri City. Other hazard events that broadly affected the entire planning area, including Missouri City, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

16.7 HAZARD RISK RANKING

Table 16-12 presents a local ranking for Missouri City of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

16.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. This section provides information on a few key vulnerabilities for the jurisdiction. Available jurisdiction-specific risk maps of the hazards are provided at the end of this annex.

Table 16-11. Past Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Rain event/ flooding	N/A	5-7-19	Unknown, street flooding in multiple areas
Hurricane Harvey	DR-4332	8/23/17	$Unknown
Rain/ Flooding event	DR-4269	4/18/16	$Unknown
Wind/ Thunderstorm	DR-4272	5/29/15	$2,000
Wind/ Thunderstorm	N/A	5/18/15	$50,000
Rain/ Flooding	N/A	4/28/09	Unknown
Wildfire	N/A	5/26/06	303 Acres burned
Hail	N/A	4/11/04	$15,000
Hail	N/A	4/7/03	$5,000
Hail	N/A	3/30/02	$Unknown
Rain/ Tropical Storm	N/A	6/7/01	$Unknown
Hail	N/A	4/16/01	$2,000,000
Hail	N/A	7/17/98	$5,000
Rain/ Tropical Storm	N/A	7/29/95	Unknown
Tornado	N/A	4/7/93	$50,000

Table 16-12. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Severe Weather	48	High
2	Hurricane	35	High
3	Flood	32	High
4	Dam/Levee Failure	18	Medium
5	Drought	15	Medium
6	Earthquake	14	Low
7	Wildfire	6	Low
7	Mass Movements	6	Low
8	Coastal Erosion	0 (No Exposure)	None
8	Tsunami	0 (No Exposure)	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

16.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: 48
- Number of FEMA-identified Severe-Repetitive-Loss Properties: 5
- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated: 2

16.8.2 Other Noted Vulnerabilities

No jurisdiction-specific issues were identified from a review of the results of the risk assessment and other available resources.

16.9 STATUS OF PREVIOUS PLAN ACTIONS

Table 16-13 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

Table 16-13. Status of Previous Plan Actions

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
1. Detention Area Outfall and Levee Improvements	No		x	MSS16
Comment: *At Kitty Hollow Lake, Vicksburg Diversion Channel, Weir Enlargement, and channel improvements for the Vicksburg Diversion Channel*				
2. Channel Improvements	No		x	MSS17
Comment: *Along Mustang Bayou Diversion Channel from the confluence with the old channel to Kitty Hollow Lake Detention area*				
3. Replace Culvert	No		x	MSS18
Comment: *Replacement of the Watts-Plantation Road Culvert with appropriately sized box culverts*				
4. Channel Improvements	Ongoing		x	MSS19
Comment: *Mustang Bayou Channel from the GCWA Canal thru Thunderbird North Subdivision including the reconstruction of the bridge at Turtle Creek Dr.*				
5. Channel Improvements	Yes		x	MSS20
Comment: *Along Mustang Bayou from the Thunderbird North Subdivision to the confluence with old channel; including pipeline relocations and a sheet pile structure.*				
6. Extend Canal Flume	No		x	MSS21
Comment: *Extend Briscoe Canal Flume over Lower Oyster Creek*				
7. Channel Improvements	No		x	MSS22
Comment: *Along Long Point Creek Overflow Channel upstream of the Brisco Canal Flume*				
8. Promote Flood Insurance	Ongoing		x	MSS23
Comment: *Providing information about the National Flood Insurance Program*				
9. Improve NFIP CRS Rating	Ongoing		x	MSS24
Comment: *Evaluate ways to improve the City's Community Rating System (CRS) to reduce the Flood Insurance Premium*				
10. Understanding Dam/Levee Failure Risks	No		x	MSS25
Comment: *Engage with County and State Floodplain Managers, Engineers and Emergency Managers to ensure that local officials have a detailed understanding of potential risks to the community from dam and/or levee failures*				
11. Evacuation Plans	Ongoing		x	MSS26
Comment: *Engage with County and State Floodplain Managers, Engineers and Emergency Managers to ensure that local officials have a detailed understanding of potential risks to the community from dam and/or levee failures. This will allow for a more comprehensive evacuation plan, routes, and at-risk areas that will need to be focused on in the event of an evacuation notice.*				
12. Upgrades to At-Risk Public Structures	No		x	MSS27
Comment: *Initiate upgrades to at-risk public facilities that includes structurally fortifying facilities, impact resistant film or glass, surge protection systems, mandate freeboard for new development, etc. Mitigates specific risks to structures, people, and operations.*				

16.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 16-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 16-15 identifies the priority for each action. Table 16-16 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 16-14. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action MSS1 — Integrate the hazard mitigation plan into other plans, ordinances and programs that dictate land use decisions within the community of Missouri City.						
Hazards Mitigated: Levee failure, drought, flooding, wildfire						
New	9, 10, 11,14	City Administration	TBD	Low	Staff Time, General Funds	Ongoing
Action MSS2 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: Severe Weather, Hurricane, Flood, Dam/Levee Failure, Drought, Earthquake, Wildfire, Mass Movements						
New and Existing	9, 10, 11,14	City Administration	TBD	Low	Staff Time, General Funds	Short-term
Action MSS3 — Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements: • Enforce the flood damage prevention ordinance. • Participate in floodplain identification and mapping updates. • Provide public assistance/information on floodplain requirements and impacts.						
Hazards Mitigated: Levee failure, flooding, severe weather, hurricane						
New and Existing	3, 10, 11,14	City Administration	TBD	Low	Staff Time, General Funds	Ongoing
Action MSS4 — Detention Area Outfall and Levee Improvements (At Kitty Hollow Lake, Vicksburg Diversion Channel, Weir Enlargement, and channel improvements for the Vicksburg Diversion Channel)						
Hazards Mitigated: Flooding, Severe Weather, Hurricane						
Existing	7,11	City Administration	TBD	High	General and/or Grant funds	Long term
Action MSS5 — Channel Improvements along Mustang Bayou Diversion Channel from the confluence with the old channel to Kitty Hollow Lake Detention area						
Hazards Mitigated: Flooding, Severe Weather, Hurricane						
Existing	7,11	City Administration	TBD	High	General and/or Grant funds	Long term
Action MSS6 — Replacement of the Watts-Plantation Road Culvert with appropriately sized box culverts						
Hazards Mitigated: Flooding, Severe Weather, Hurricane						
New	7,11	City Administration	TBD	High	General and/or Grant funds	Long term
Action MSS7 — Channel improvements along Mustang Bayou Channel from the GCWA Canal thru Thunderbird North Subdivision including the reconstruction of the bridge at Turtle Creek Dr.						
Hazards Mitigated: Flooding, Severe Weather, Hurricane						
New and Existing	7,11	City Administration	TBD	High	General and/or Grant funds	Long term
Action MSS8 — Channel improvements along Mustang Bayou from the Thunderbird North Subdivision to the confluence with old channel; including pipeline relocations and a sheet pile structure.						
Hazards Mitigated: Flooding, Severe Weather, Hurricane						
New and Existing	7,11	City Administration	TBD	High	General and/or Grant funds	Long term
Action MSS9 — Extend Briscoe Canal Flume over Lower Oyster Creek						
Hazards Mitigated: Flooding, Severe Weather, Hurricane						
New and Existing	7,11	City Administration	TBD	High	General and/or Grant funds	Long term
Action MSS10 — Channel improvements along Long Point Creek Overflow Channel upstream of the Briscoe Canal Flume						
Hazards Mitigated: Flooding, Severe Weather, Hurricane						
New and Existing	7,11	City Administration	TBD	High	General and/or Grant funds	Long term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action MSS11 — Promote Flood Insurance *Hazards Mitigated:* Flooding						
New and Existing	9	City Administration	TBD	Low	Staff Time, General Funds	Short term
Action MSS12 — Improve NFIP CRS Rating *Hazards Mitigated:* Flooding						
New and Existing	9	City Administration	TBD	Low	Staff Time, General Funds	Short term
Action MSS13 — Engage with County and State Floodplain Managers, Engineers and Emergency Managers to ensure that local officials have a detailed understanding of potential risks to the community from dam and/or levee failures *Hazards Mitigated:* Dam and Levee Failure						
Existing	3,7,9,11	City Administration	High	Low	Staff Time, General Funds	Short term
Action MSS14 — Develop evacuation plans in the event of dam and/or levee failures *Hazards Mitigated:* Dam and Levee Failure						
Existing	9,10	City Administration	TBD	Low	Staff Time, General Funds	Short term
Action MSS15 — Initiate upgrades to at-risk public facilities that includes structurally fortifying facilities, impact resistant film or glass, surge protection systems, mandate freeboard for new development, etc. Mitigates specific risks to structures, people, and operations *Hazards Mitigated:* Severe Weather, Hurricane, Flooding, Earthquake, Wildfire						
Existing	11,13	City Administration	TBD	High	General and/or Grant funds	Long term
Action MSS16 — Detention Area Outfall and Levee Improvements. At Kitty Hollow Lake, Vicksburg Diversion Channel, Weir Enlargement, and channel improvements for the Vicksburg Diversion Channel Hazards Mitigated: Flood, Severe Weather						
Existing	11,13,15	City Administration	TBD	High	General and/or Grant funds	Short Term
Action MSS17 — Channel Improvements. Along Mustang Bayou Diversion Channel from the confluence with the old channel to Kitty Hollow Lake Detention area Hazards Mitigated: Flood, Severe Weather						
Existing	11,13,15	City Administration	TBD	High	General and/or Grant funds	Short Term
Action MSS18 — Culvert Replacement. Replacement of the Watts-Plantation Road Culvert with appropriately sized box culverts Hazards Mitigated: Flood, Severe Weather						
Existing	11,13,15	City Administration	TBD	High	General and/or Grant funds	Short Term
Action MSS19 — Channel Improvements. Mustang Bayou Channel from the GCWA Canal thru Thunderbird North Subdivision including the reconstruction of the bridge at Turtle Creek Dr. Hazards Mitigated: Flood, Severe Weather						
Existing	11,13,15	City Administration	TBD	High	General and/or Grant funds	Short Term
Action MSS20 — Channel improvements. Along Mustang Bayou from the Thunderbird North Subdivision to the confluence with old channel; including pipeline relocations and a sheet pile structure. Hazards Mitigated: Flood Severe weather						
Existing	11,13,15	City Administration	TBD	High	General and/or Grant funds	Short Term
Action MSS21 — Extend Briscoe Canal Flume over Lower Oyster Creek Hazards Mitigated: Flood, Severe Weather						
New	11,13,15	City Administration	TBD	High	General and/or Grant funds	Short Term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action MSS22 — Channel Improvements. Along Long Point Creek Overflow Channel upstream of the Brisco Canal Flume Hazards Mitigated: Flood, Severe Weather						
Existing	11,13,15	City Administration	TBD	High	General and/or Grant funds	Short Term
Action MSS23 — Promote Flood Insurance. Providing information about the National Flood Insurance Program Hazards Mitigated: Flood, Severe Weather						
New and Existing	3,9,10	Public Works	HCFCD	Low	General Fund	Ongoing
Action MSS24 — Improve CRS rating. Evaluate ways to improve the City's Community Rating System (CRS) to reduce the Flood Insurance Premium Hazards Mitigated: Flood, Severe Weather						
New and Existing	3,9,10	Public Works	TBD	Low	General Fund	)n-going
Action MSS25 — Engage with County and State Floodplain Managers, Engineers and Emergency Managers to ensure that local officials have a detailed understanding of potential risks to the community from dam and/or levee failures Hazards Mitigated: Dam/Levee failure Flood , Severe Weather						
Existing	11,13,15	Public Works	HCFCD	High	General and/or Grant funds	Short Term
Action MSS26 — Engage with County and State Floodplain Managers, Engineers and Emergency Managers to ensure that local officials have a detailed understanding of potential risks to the community from dam and/or levee failures. This will allow for a more comprehensive evacuation plan, routes, and at-risk areas that will need to be focused on in the event of an evacuation notice. Hazards Mitigated: Dam/Levee failure Flood , Severe Weather						
New and Existing	1,3,7,9,10,15	Emergency Management	Public Works	High	General and/or Grant funds	Short Term
Action MSS27 — Initiate upgrades to at-risk public facilities that includes structurally fortifying facilities, impact resistant film or glass, surge protection systems, mandate freeboard for new development, etc. Mitigates specific risks to structures, people, and operations Hazards Mitigated: Hurricane, Severe Weather, Flood						
Existing	13,15	City Administration	TBD	High	General and/or Grant funds	Short Term
Action MSS28— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan. *Hazards Mitigated*: Severe Weather, Hurricane, Flood, Dam/Levee Failure, Drought, Earthquake, Wildfire, Mass Movements						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	City Administration	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 16-15. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
MSS1	4	High	Low	Yes	No	Yes	High	Low
MSS2	4	Medium	Low	Yes	No	Yes	High	Low
MSS3	4	Low	Low	Yes	No	Yes	High	Low
MSS4	2	High	High	Yes	Yes	No	High	High
MSS5	2	High	High	Yes	Yes	No	High	High
MSS6	2	High	High	Yes	Yes	No	High	High
MSS7	2	High	High	Yes	Yes	No	High	High
MSS8	2	High	High	Yes	Yes	No	High	High
MSS9	2	High	High	Yes	Yes	No	High	High
MSS10	2	High	High	Yes	Yes	No	High	High
MSS11	1	Medium	Low	Yes	No	Yes	Medium	Low
MSS12	1	Medium	Low	Yes	No	Yes	Medium	Low
MSS13	4	Medium	Low	Yes	No	Yes	Medium	Low
MSS14	2	Medium	Low	Yes	No	Yes	Medium	Low
MSS15	2	High	High	Yes	Yes	No	High	High
MSS16	3	High	High	Yes	Yes	No	Medium	High
MSS17	3	High	High	Yes	Yes	No	Medium	High
MSS18	3	High	High	Yes	Yes	No	Medium	High
MSS19	3	High	High	Yes	Yes	No	Medium	High
MSS20	3	High	High	Yes	Yes	No	Medium	High
MSS21	3	High	High	Yes	Yes	No	Medium	High
MSS22	3	High	High	Yes	Yes	No	Medium	High
MSS23	3	Medium	Low	Yes	No	Yes	High	None
MSS24	3	Medium	Low	Yes	No	Yes	High	None
MSS25	3	High	High	Yes	Yes	No	Medium	High
MSS26	6	High	High	Yes	Yes	No	Medium	High
MSS27	2	High	High	Yes	Yes	No	Medium	High
MSS28	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 16-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Hurricanes/ Coastal Storms	MSS4,5,6,7,8,9,15, 28	MSS3,15,27	MSS28		MSS25, 28	MSS4,5,6,7, 8,9,10,15		MSS2,3,25, 28
Flood	MSS1,4,5,6,7,8,9,10,15,24, 28	MSS3,15,23, 24,27	MSS11,23,24, 28	MSS1,24	MSS24,25, 28	MSS4,5,6,7, 8,9,10,15,16, 17,18,19,20, 21,22,24	MSS11,24	MSS1,2,3,11,12,24,25, 28
Severe Weather	MSS4,5,6,7,8,9,10,15, 28	MSS3,15,27	MSS28		MSS25, 28	MSS4,5,6,7, 8,9,10,15,16, 17,18,19,20, 21,22		MSS2,3,25, 28
Medium-Risk Hazards								
Dam/ Levee Failure	MSS1,13,14, 238	MSS3	MSS13, 28	MSS1	MSS28			MSS1,2,3,13,14, 28
Drought	MSS1, 28		MSS28	MSS1	MSS28			MSS1,2, 289
Low-Risk Hazards								
Wildfire	MSS1,15, 28	MSS15	MSS28	MSS1	MSS28	MSS15		MSS1,2, 28
Mass Movements	MSS28		MSS28		MSS28			MSS2, 28
Earthquake	MSS15, 28	MSS15	MSS28			MSS15		MSS2, 28

a. See the introduction to this volume for explanation of mitigation types.

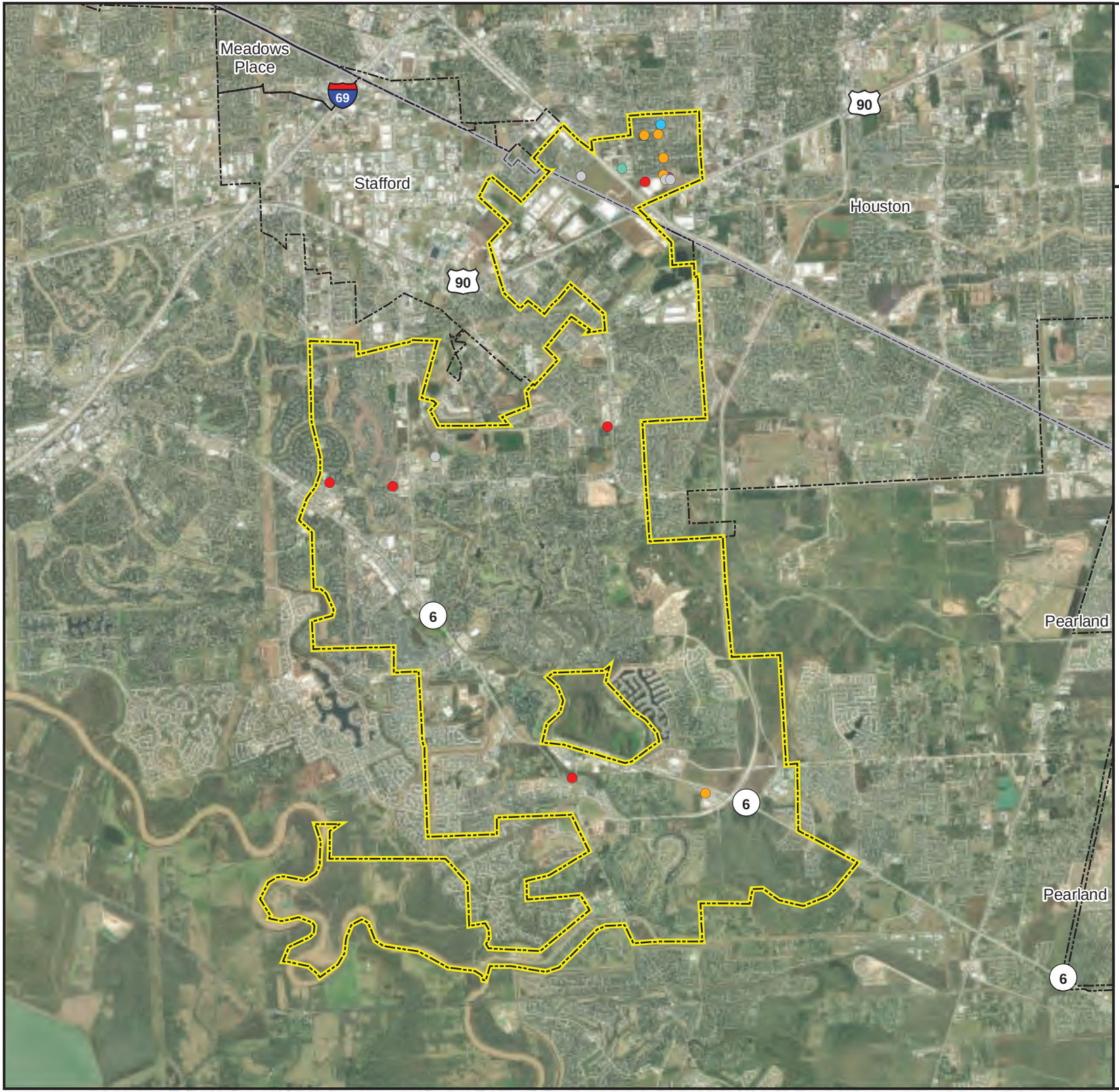
16.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- **Municipal Code** — The municipal code was reviewed for the full capability assessment and for identifying opportunities for action plan integration.
- **Flood Damage Prevention Ordinance** — The flood damage prevention ordinance was reviewed for compliance with the National Flood Insurance Program.
- **Fort Bend County Hazard Mitigation Plan**- Reviewed Missouri City's Annex for data to complete Phase 2 document

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.



Missouri City

Critical Facilities

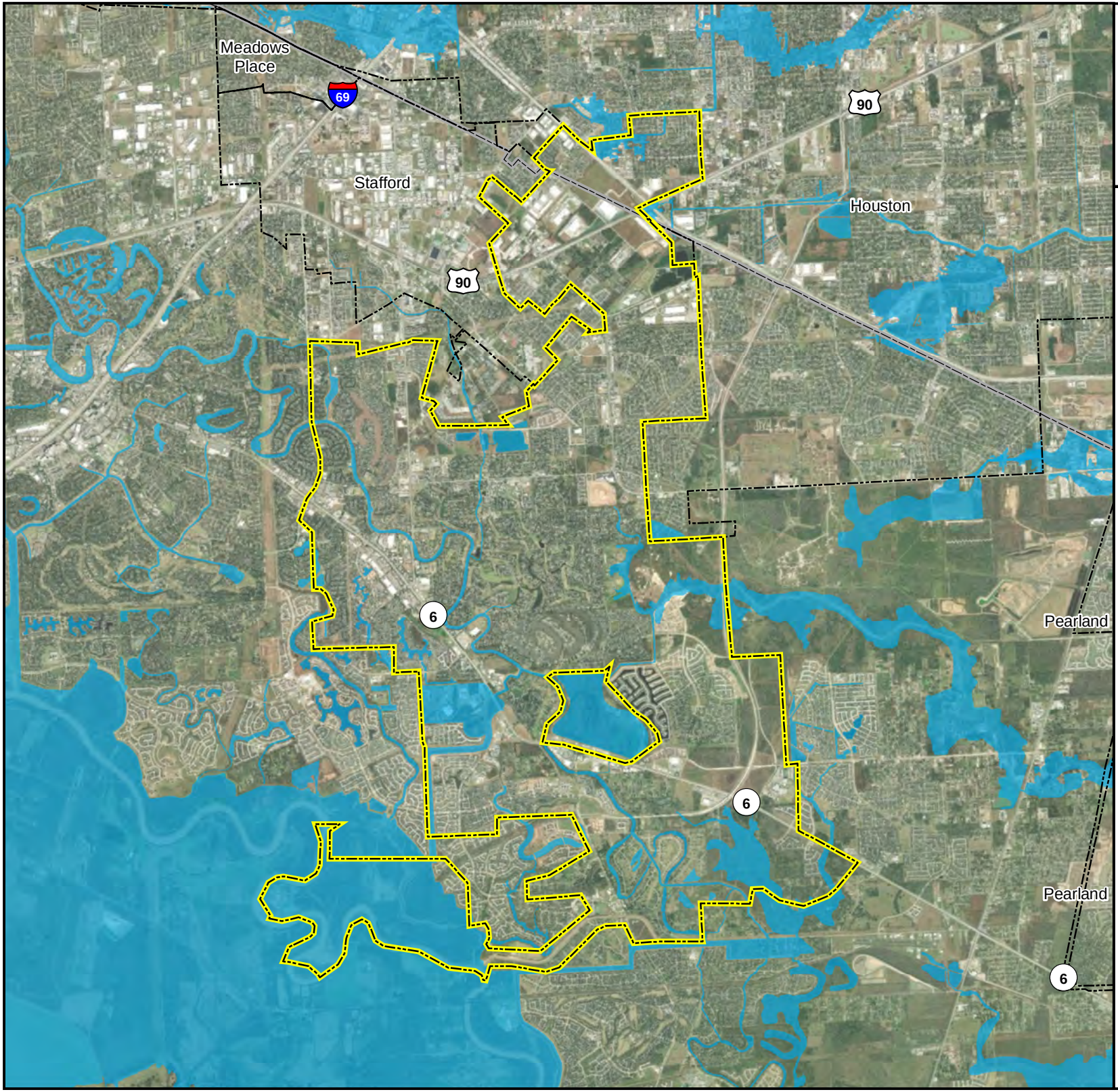
- Education Facilities
- Emergency Services
- Government Facilities
- Hazardous Material Sites
- Health and Medical Facilities
- Historical and Cultural Sites
- Transportation Systems
- Utility Systems
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.475 0.95 1.9 Miles



Missouri City

FEMA Flood Hazard

1% Annual Chance Flood (100-yr)

Incorporated Cities

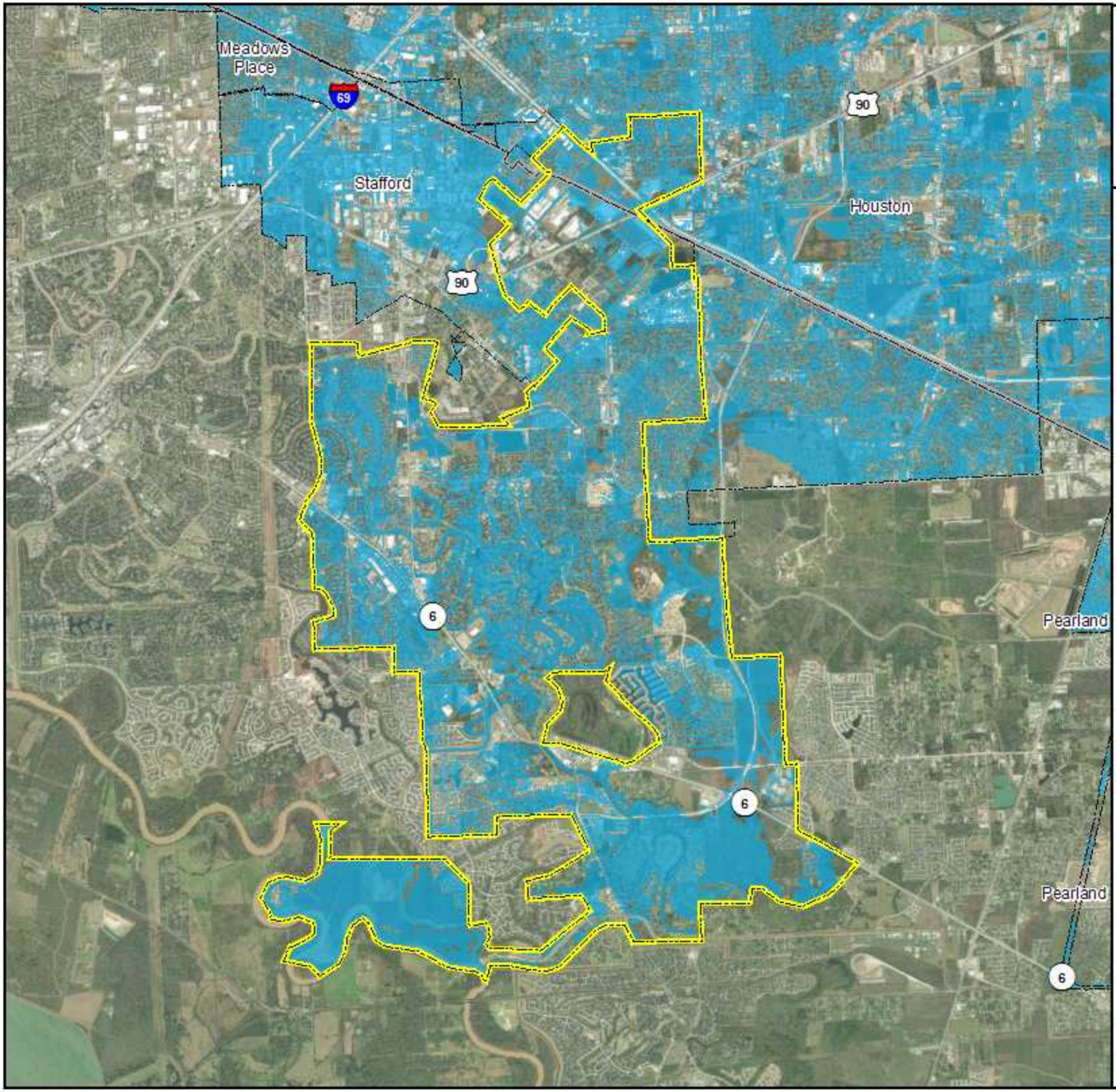
Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.475 0.95 1.9 Miles



Missouri City

Flood Hazard
Hurricane Harvey

Flooding Extent

Incorporated Cities

Harris County

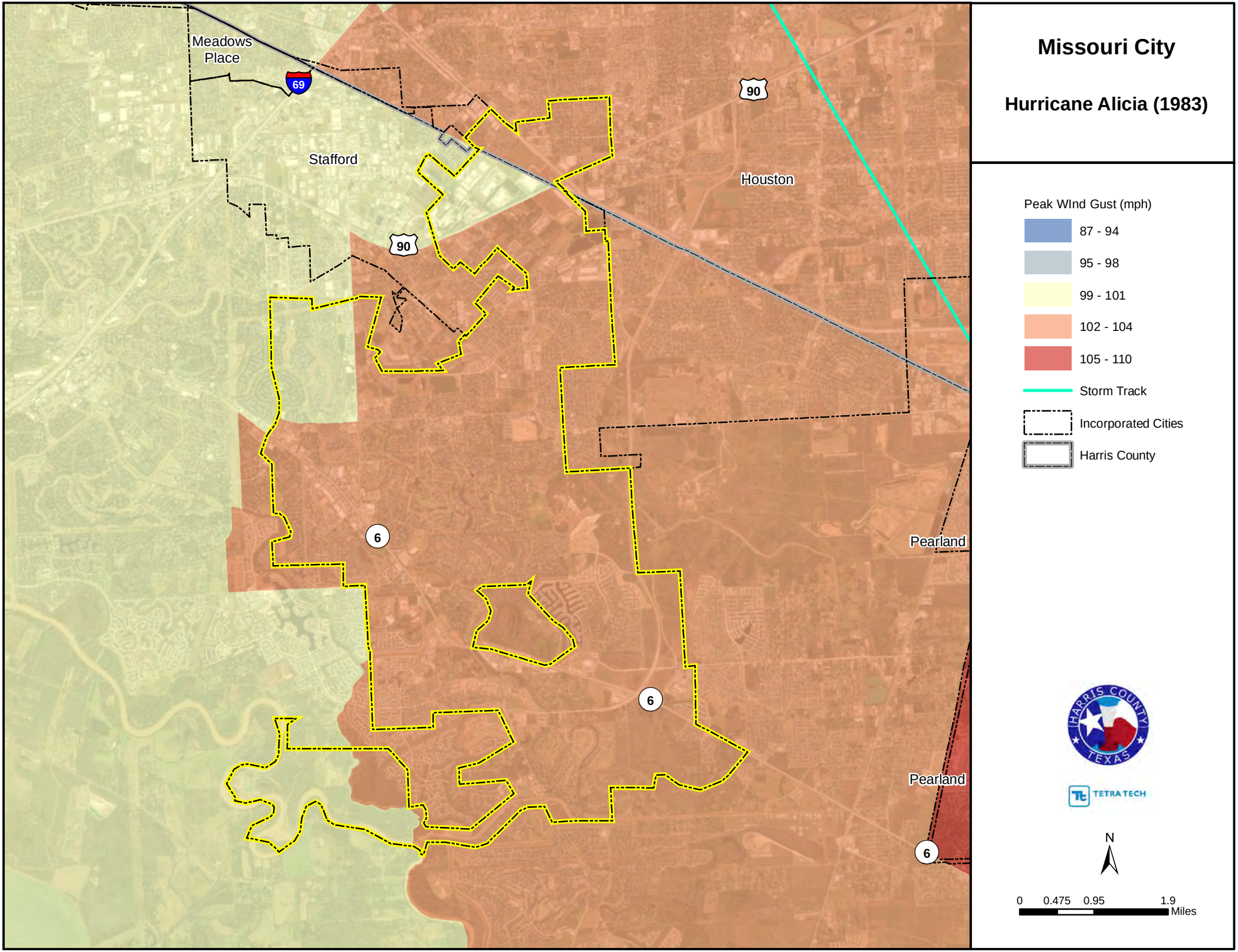
Note: Flooding extent shown for Hazard Mitigation Plan planning area only.

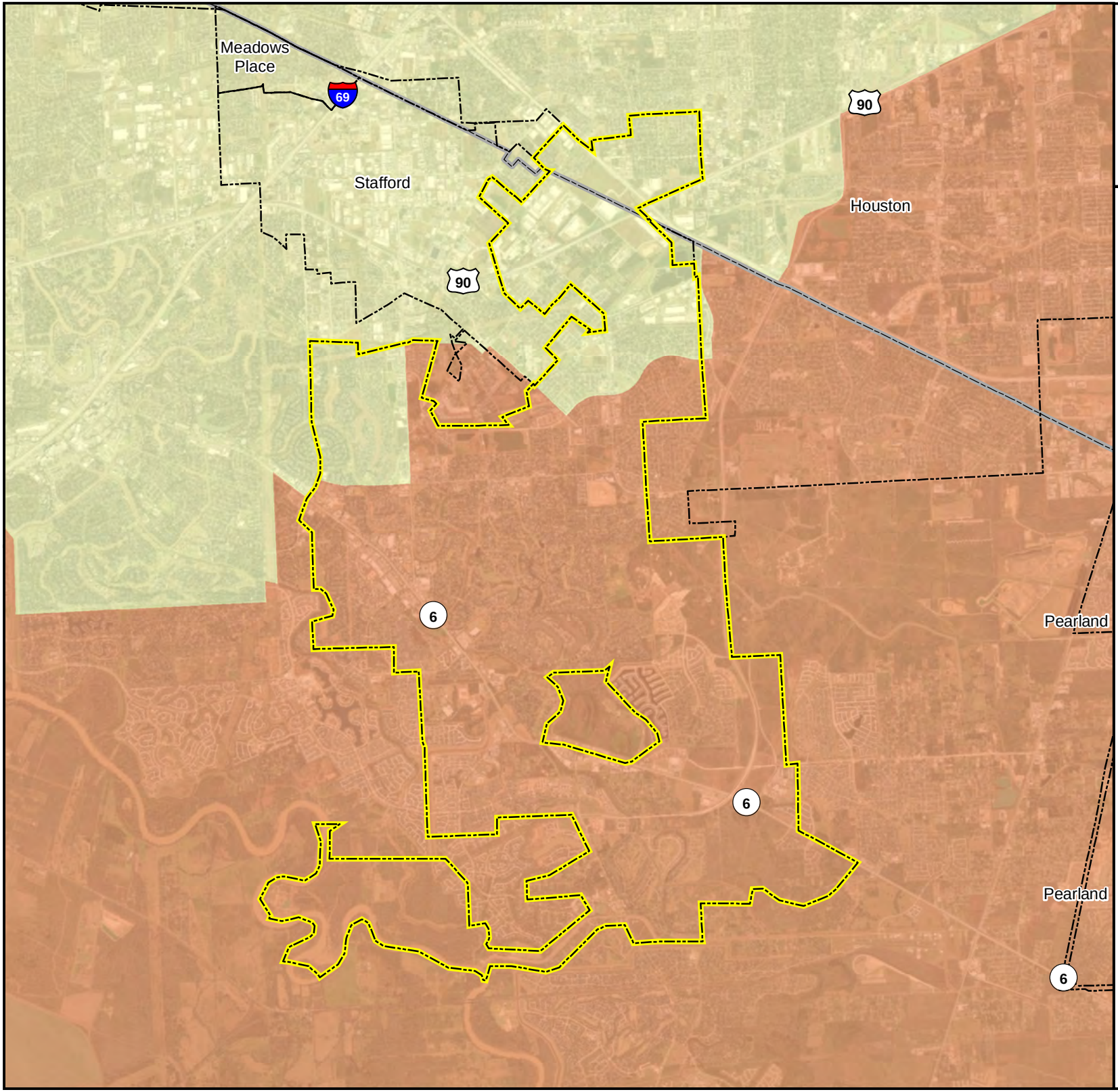
HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.475 0.95 1.9
Miles


Meadows Place
69
Stafford
90
Houston
90
6
Pearland
6
Pearland
6
Missouri City
Hurricane Alicia (1983)
Peak WInd Gust (mph)
87 - 94
95 - 98
99 - 101
102 - 104
105 - 110
Storm Track
Incorporated Cities
Harris County
HARRIS COUNTY TEXAS
TETRA TECH
N
0 0.475 0.95 1.9
Miles



Missouri City

20-year Probabilistic Hurricane

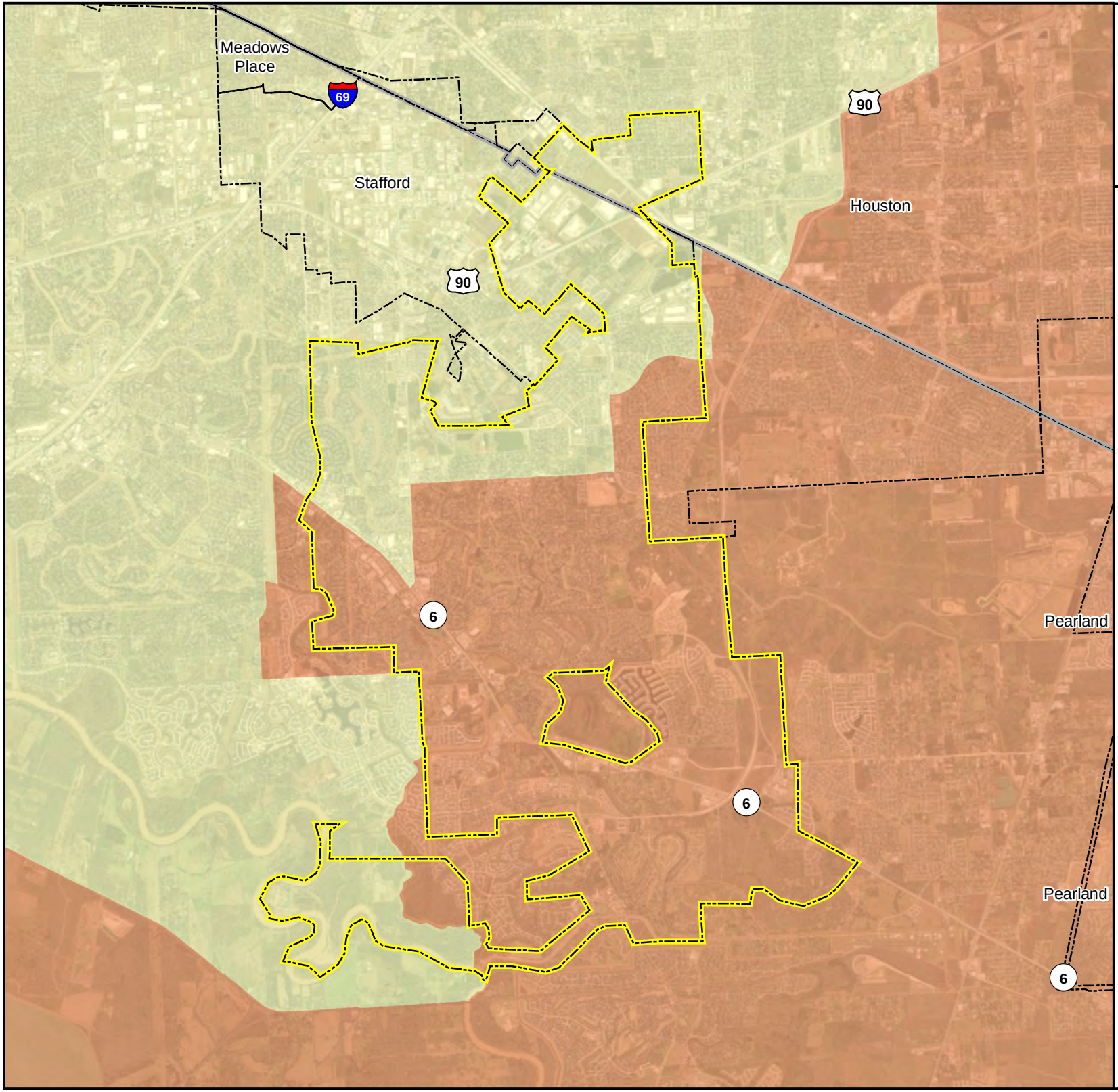
Peak Wind Gust (mph)

- 63 - 71
- 72 - 76
- 77 - 80
- 81 - 84
- 85 - 92
- Incorporated Cities
- Harris County

TETRA TECH

N

0 0.475 0.95 1.9 Miles



Missouri City

100-year Probabilistic Hurricane

Peak Wind Gust (mph)

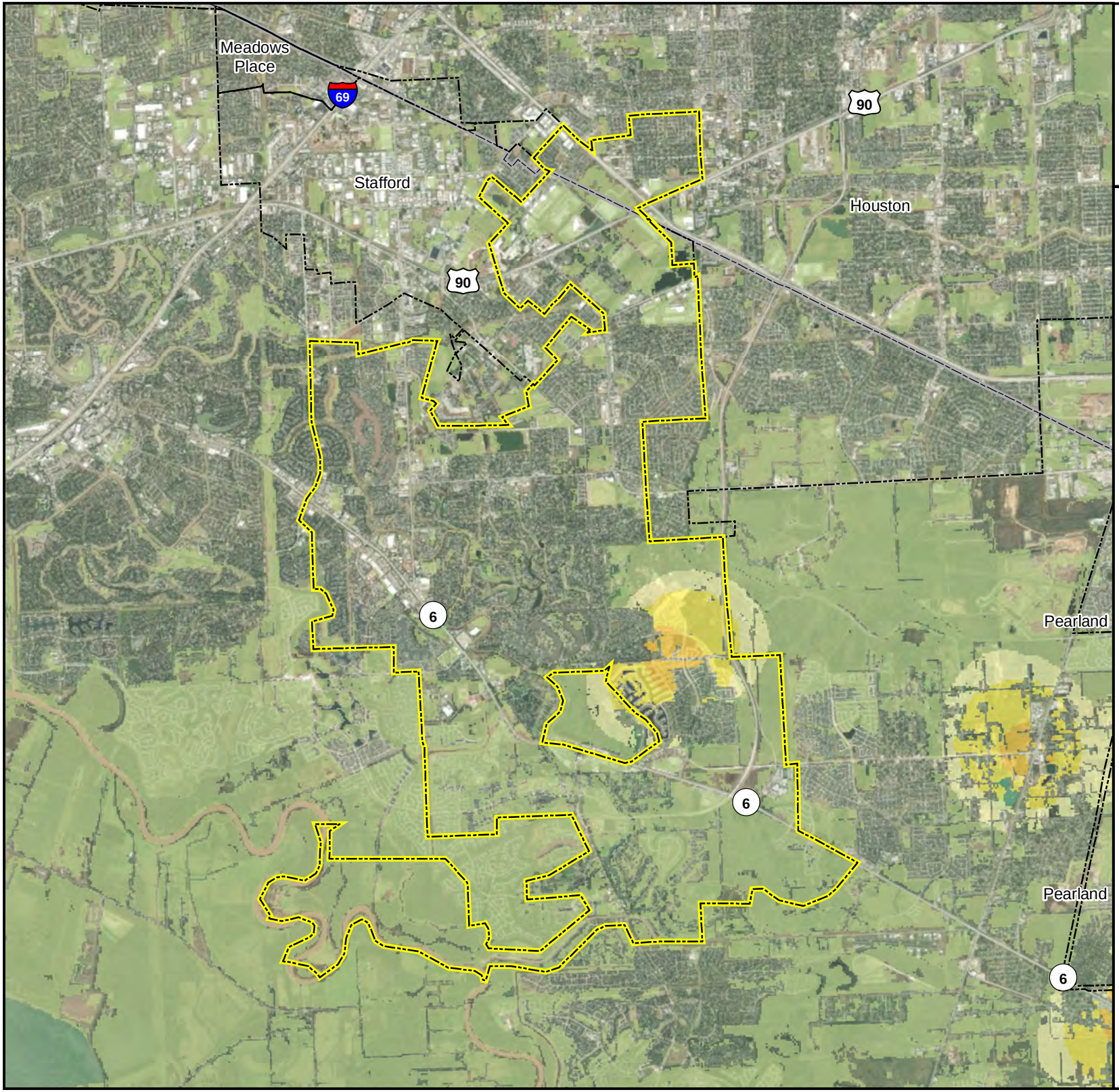
- 89 - 101
- 102 - 106
- 107 - 111
- 112 - 117
- 118 - 128
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.475 0.95 1.9 Miles



Missouri City

Wildfire Ignition Density

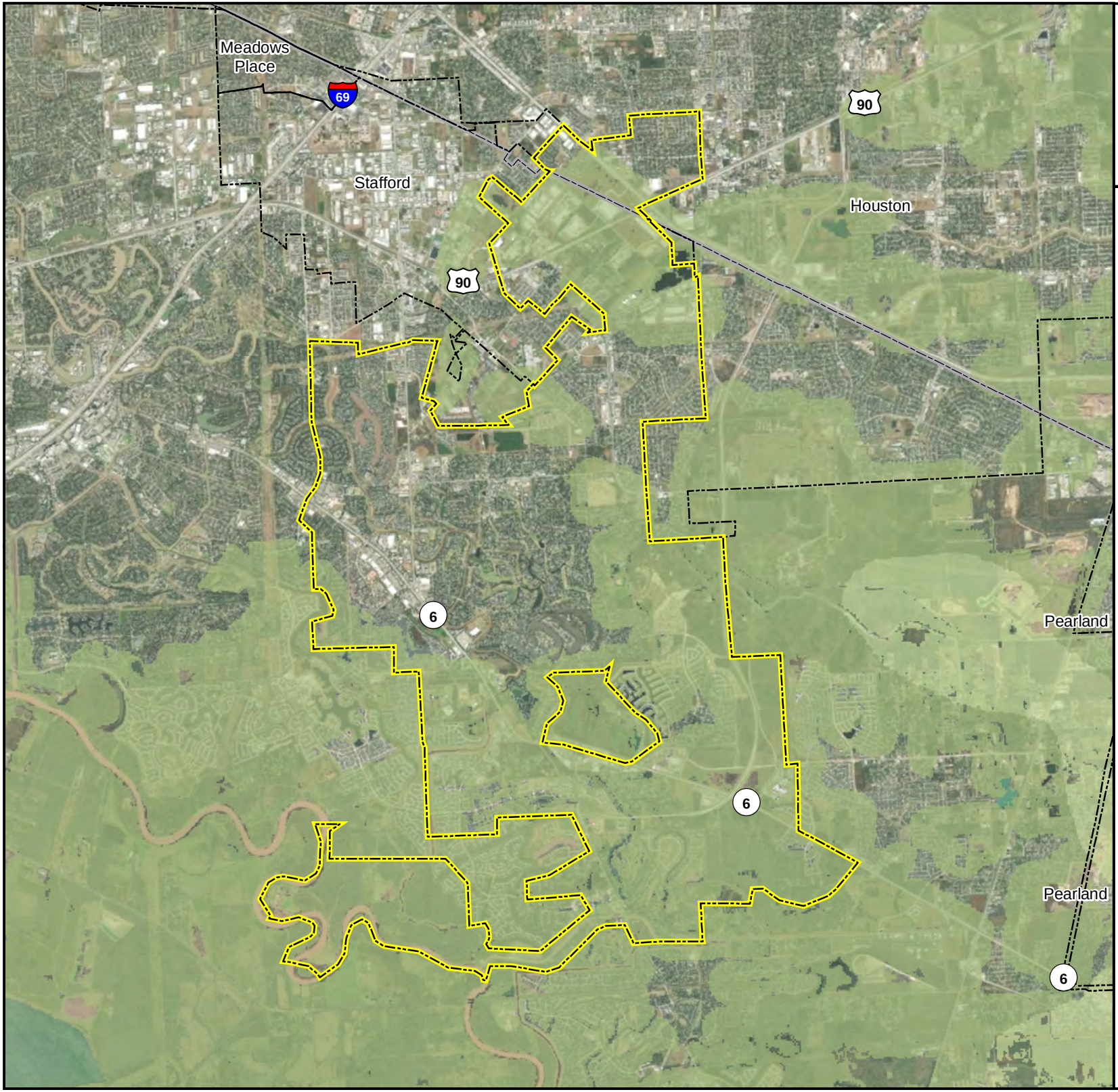
- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.475 0.95 1.9 Miles



Missouri City

Wildfire Threat

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.475 0.95 1.9 Miles

17. CITY OF MORGAN'S POINT

17.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Chief Sherri Ditrich
510 Bayridge
Morgan's Point, TX. 77571
281-471-2171
sditrich@morganspoint-tx.com

Alternate Point of Contact
Brian Schneider
510 Bayridge
Morgan's Point, TX. 77571
281-471-2171
bschneider@morganspoint-tx.com

17.2 JURISDICTION PROFILE

17.2.1 Location

City of Morgan's Point is located 30 miles east of Houston in Harris County adjacent to Galveston Bay at the inlet to the Houston Ship Channel.

17.2.2 History

Located at the junction of Buffalo Bayou and San Jacinto Bay, the townsite of New Washington was settled by Col. James Morgan (1786-1866), who bought 1600 acres of land in the area in 1835. A native of Philadelphia, Morgan had come to Texas in 1830 and served at various times and places as merchant, civic leader, and land agent. While away from his home, serving as a colonel during the Texas Revolution, Mexican troops burned the town of New Washington. After the war, Morgan and others rebuilt New Washington, and the townsite began to flourish. Morgan realized, however, that it could never compete with the growth of nearby Houston, and during the 1850s he began to promote plans for a channel along Buffalo Bayou that would increase the region's trade potential. That dream was completed in 1876 with the dredging of the Houston Ship Channel by steamship tycoon Charles Morgan. As Houston continued to grow, New Washington was recognized only as a major bend for the ship traffic along the bayou. Now known as Morgan's Point, the townsite was incorporated in 1949 and stands as a reminder of the early commercial history of Harris County.

The peninsula on Galveston Bay known as Morgan's Point was named for early landowner Colonel James Morgan. Later the area became a favorite summer retreat for wealthy Houston residents who sought refuge from the oppressive heat and humidity of the city. The bluff attracted Gulf breezes and boasted spectacular views and recreational potential. In 1893, twelve prominent Houston families formed the Bay Ridge Park Association and acquired 40 acres of land on which they constructed a resort community for summer residency. To allow each family beachfront property the land was platted into long narrow lots chosen by ballots. The first houses built were modest one-and two-story frame dwellings with verandas; most featured Eastlake and Queen Anne style detailing. Homes built in the early 20th century were designed by renowned architects and reflected various styles including Mediterranean revival, colonial revival, and prairie school. Among the many grand houses is one patterned after the White House built for Texas Governor Ross Sterling and his wife Maude. Listed on the National register of Historic Places, the area is one of Texas' most significant seaside residential developments.

17.2.3 Climate

The climate of City of Morgan's Point is warm with mild winters.

17.2.4 Governing Body Format

City of Morgan's Point is a Type-B General Law, Council form of government. The City assumes responsibility for the adoption of this plan; Harris County will oversee its implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 17-1.

Table 17-1. Local Mitigation Planning Team Members

Name	Title
Sherri Ditrich	Chief of Police/EMC
Brian Schneider	City Administrator

17.3 CURRENT TRENDS

17.3.1 Population

According to United States Census Bureau, the population of the City of Morgan's Point, as of 2010, was 339. Since 2010, the population has grown at an average annual rate of 0 percent.

17.3.2 Development

The City of Morgan's Point commercial and industrial zoned land is built out. There is approximately seventy acres available for residential development. On average, one home is built every five years.

Table 17-2 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

17.4 CAPABILITY ASSESSMENT

The City of Morgan's Point performed an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities is presented in Table 17-3.
- Development and permitting capabilities are presented in Table 17-4.
- An assessment of fiscal capabilities is presented in Table 17-5.
- An assessment of administrative and technical capabilities is presented in Table 17-6.
- An assessment of education and outreach capabilities is presented in Table 17-7.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 17-8.
- Classifications under various community mitigation programs are presented in Table 17-9.
- The community's adaptive capacity for the impacts of climate change is presented in Table 17-10.

Findings of the capability assessment were reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table included in the action plan for this annex identifies these as community capacity building mitigation actions.

Table 17-2. Recent and Expected Future Development Trends

Criterion	Response					
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan? • **If yes, give the estimated area annexed and estimated number of parcels or structures.**	No					
Is your jurisdiction expected to annex any areas during the performance period of this plan? • **If yes, describe land areas and dominant uses.** • **If yes, who currently has permitting authority over these areas?**	No					
Are any areas targeted for development or major redevelopment in the next five years? • **If yes, briefly describe, including whether any of the areas are in known hazard risk areas**	No					
How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?		**2014**	**2015**	**2016**	**2017**	**2018**
	Single Family	0	0	0	0	1
	Multi-Family	0	0	0	0	0
	Other (commercial, mixed use, etc.)	0	0	0	0	0
	Total	0	0	0	0	1
Provide the number of new-construction permits for each hazard area or provide a qualitative description of where development has occurred.	• Special Flood Hazard Areas: 0 • Landslide: 0 • High Liquefaction Areas: 0 • Tsunami Inundation Area: 0 • Wildfire Risk Areas: 0					
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	60%					

Table 17-3. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code	Yes	No	Yes	Yes
Comment: *Adopted the 218 IBC in 02/2012, Ord# 19-762*				
Zoning Code	Yes	No	No	Yes
Comment: *Adopted 08/2000, Ord#00-432*				
Subdivisions	Yes	No	No	Yes
Comment: *Adopted 08/2000, Ord#00-432*				
Stormwater Management	Yes	Yes	No	Yes
Comment: *Adopted 08/2000, Ord#00-432,*				
Post-Disaster Recovery	Yes	Yes	No	No
Comment: *Ord #13-641, Harris County Annex J*				
Real Estate Disclosure	No	No	No	No
Comment:				
Growth Management	Yes	No	No	Yes
Comment: *Adopted 05/2018, Ord# 18-749*				
Site Plan Review	Yes	No	No	No
Comment: *Adopted 08/2000, Ord#00-432*				
Environmental Protection	Yes	No	No	Yes
Comment: *Adopted 08/2000, Ord#00-432*				
Flood Damage Prevention	Yes	No	Yes	Yes
Comment: *Updated 09/2016, Ord#16-722*				
Emergency Management	Yes	Yes	No	Yes
Comment: *Updated 07/2015, Rod# 15-681, Harris County Annex N*				
Climate Change	No	No	No	No
Comment:				
Planning Documents				
General Plan	Yes	No	No	Yes
Comment: *Comprehensive Plan*				
Capital Improvement Plan	Yes	No	No	Yes
How often is the plan updated?				
Comment: *As needed*				
Disaster Debris Management Plan	Yes	No	No	Yes
Comment: *Contract approved 12/2017; Monitoring Contract approved 09/2016; Contracts are reviewed on an annual basis and the plans are updated every four & five years*				
Floodplain or Watershed Plan	No	Yes	No	Yes
Comment: *HARRIS COUNTY FLOOD CONTROL*				
Storm water Plan	No	Yes	No	Yes
Comment: *HARRIS COUNTY FLOOD CONTROL*				
Urban Water Management Plan	No	No	No	No
Comment:				
Habitat Conservation Plan	No	No	No	No
Comment:				
Economic Development Plan	Yes	No	No	Yes
Comment: *Resolution 1059, 03/2010*				
Shoreline Management Plan	No	No	No	No
Comment:				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Community Wildfire Protection Plan	No	Yes	No	No
Comment: *The City of Morgan's Point does not have its own CWPP implemented. Harris County has completed a county-wide CWPP; which includes all incorporated jurisdictions within Harris County.*				
Forest Management Plan	No	No	No	No
Comment:				
Climate Action Plan	No	No	No	No
Comment:				
Comprehensive Emergency Management Plan	No	Yes	No	Yes
Comment: *Harris County Annex P*				
Threat & Hazard Identification & Risk Assessment (THIRA)	No	No	No	No
Comment:				
Post-Disaster Recovery Plan	Yes	Yes	No	Yes
Comment: *Ord #13-641* *Harris County Annex J*				
Continuity of Operations Plan	No	No	No	No
Comment:				
Public Health Plan	No	Yes	Yes	Yes
Comment: *Annex H — Health and Medical is a component of the Emergency Operations Plan and addresses public health, environmental health, and medical response capabilities. The City does not maintain a standalone Public Health Plan.*				

Table 17-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • **If no, who does? If yes, which department?**	Yes Administrative
Does your jurisdiction have the ability to track permits by hazard area?	No
Does your jurisdiction have a buildable lands inventory?	No

Table 17-5. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants	Yes/Through Harris County
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	No
User Fees for Water, Sewer, Gas or Electric Service	Yes Water & Waste Water
Incur Debt through General Obligation Bonds	No
Incur Debt through Special Tax Bonds	No
Incur Debt through Private Activity Bonds	No
Withhold Public Expenditures in Hazard-Prone Areas	No
State-Sponsored Grant Programs	No
Development Impact Fees for Homebuyers or Developers	No

Table 17-6. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Contracted/Administration
Engineers or professionals trained in building or infrastructure construction practices	Yes	Contracted/Administration
Planners or engineers with an understanding of natural hazards	Yes	Contracted/Administration
Staff with training in benefit/cost analysis	Yes	City Administrator
Surveyors	No	
Personnel skilled or trained in GIS applications	No	
Scientist familiar with natural hazards in local area	No	
Emergency manager	Yes	Chief of Police
Grant writers	Yes	City Administrator

Table 17-7. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	No
Do you have hazard mitigation information available on your website? • If yes, briefly describe.	Yes
Do you use social media for hazard mitigation education and outreach? • If yes, briefly describe.	Yes We use our City website and Facebook
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • If yes, briefly describe.	No
Do you have any other programs already in place that could be used to communicate hazard-related information? • If yes, briefly describe.	Yes We have a CTY/Blackboard Messaging services. We have two (2) digital messaging boards at the entrances to the city displaying messages if needed.
Do you have any established warning systems for hazard events? • If yes, briefly describe.	Yes Whelan Warning System

Table 17-8. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Administration
Who is your floodplain administrator? (department/position)	KSA Engineering
Are any certified floodplain managers on staff in your jurisdiction?	No
What is the date that your flood damage prevention ordinance was last amended?	9/13/2016
Does your floodplain management program meet or exceed minimum requirements? • If exceeds, in what ways?	Meets
When was the most recent Community Assistance Visit or Community Assistance Contact?	N/A
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • If so, state what they are.	No
Are any Risk MAP projects currently underway in your jurisdiction? • If so, state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • If no, state why.	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? • If so, what type of assistance/training is needed?	No
Does your jurisdiction participate in the Community Rating System (CRS)? • If yes, is your jurisdiction interested in improving its CRS Classification? • If no, is your jurisdiction interested in joining the CRS program?	No No Yes
How many flood insurance policies are in force in your jurisdiction? • What is the insurance in force? • What is the premium in force?	Unknown Unknown Unknown
How many total loss claims have been filed in your jurisdiction? • How many claims are still open or were closed without payment? • What were the total payments for losses?	Unknown Unknown Unknown

Table 17-9. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	No		Date
Building Code Effectiveness Grading Schedule	Yes	2	08/14/2014
Public Protection	No		Date
Storm Ready	No		Date
Fire wise	No		Date

Table 17-10. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:***	Low
Jurisdiction-level monitoring of climate change impacts ***Comment:***	Low
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:***	Low
Participation in regional groups addressing climate risks ***Comment:***	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	Low
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	Low
Identified strategies for adaptation to impacts ***Comment:***	Low
Champions for climate action in local government departments ***Comment:***	Low
Political support for implementing climate change adaptation strategies ***Comment:***	Low
Financial resources devoted to climate change adaptation ***Comment:***	Low
Local authority over sectors likely to be negative impacted ***Comment:***	Low
Public Capacity	
Local residents' knowledge of and understanding of climate risk ***Comment:***	Low
Local residents support of adaptation efforts ***Comment:***	Low
Local residents' capacity to adapt to climate impacts ***Comment:***	Low
Local economy current capacity to adapt to climate impacts ***Comment:***	Low
Local ecosystems capacity to adapt to climate impacts ***Comment:***	Low

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

17.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

The information on hazards, risk, vulnerability and mitigation contained in this hazard mitigation plan is based on the best available data. Plan integration is the incorporation of this information into other relevant planning mechanisms, such as general planning and capital facilities planning. It includes the integration of natural hazard information and mitigation policies, principles and actions into local planning mechanisms and vice versa. Additionally, plan integration is achieved though the involvement of key staff and community officials in collaboratively planning for hazard mitigation.

17.5.1 Existing Integration

In the performance period since adoption of the previous hazard mitigation plan, made progress on integrating hazard mitigation goals, objectives and actions into other planning initiatives. The following plans and programs currently integrate components of the hazard mitigation strategy:

- The City of Morgan's Point adopted a new section (10.41) amending the Building Code with the desire to adopt regulations for the health, safety, and general welfare of the City.
- Basic Plan — The Basic Plan provides a summary on the hazards and threats in the community.
- Revised and Updated our Comprehensive Plan in 2018, to include Land Use/Growth Management, Environmental Quality.

Resources listed in this annex were used to provide information for this annex on integration of hazard mitigation information into other jurisdiction plans or programs.

17.5.2 Opportunities for Future Integration

As this hazard mitigation plan is implemented, City of Morgan's Point will use information from the plan as the best available science and data on natural hazards. The capability assessment presented in this annex identifies codes, plans and programs that provide opportunities for integration. The progress reporting process described in Volume 1 will outline the progress of area-wide and local hazard mitigation actions related to plan integration. The annual progress report also will identify new opportunities for integration. The capability assessment identified the following plans and programs that do not currently integrate goals or recommendations of the hazard mitigation plan but provide opportunities to do so in the future:

- **Capital Improvement Plan** — The City of Morgan's Point can develop a five-year CIP and review it on a yearly basis as well as integrate the goals, objectives, and projects identified in the Hazard Mitigation Action Plan into the CIP process.
- **Building and Zoning Codes –** There is an opportunity for the City to review building and zoning codes and identify mitigation measures as a priority for existing and future codes.
- Thorough GIS mapping of the City in order to understand the different types of geographical data currently within the City, then incorporate that information into future hazard mitigation opportunities.
- Completing a stormwater drainage study for known problem areas.

17.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 17-11 lists past occurrences of natural hazards for which specific damage was recorded in the City of Morgan's Point. Other hazard events that broadly affected the entire planning area, including City of Morgan's Point, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 17-11. Past Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Hurricane Harvey	4332 DR	**2017**	$ Not available/flooding, streets closed, residents without electricity and displaced, down trees and power lines
Tornado	N/A	**2017**	$ Not available/flooding, streets closed, residents without electricity and displaced, down trees and power lines
Hurricane Ike	1791 DR	**2008**	$ Not available/flooding, streets closed, residents without electricity and displaced, down trees and power lines
Tropical Storm Allison	1379 DR	**2001**	$ Not available/flooding, streets closed, residents without electricity and displaced, down trees and power lines
Hurricane Alicia	689 DR	**1983**	$ Not available/flooding, streets closed, residents without electricity and displaced, down trees and power lines

17.7 HAZARD RISK RANKING

Table 17-12 presents a local ranking for the City of Morgan's Point of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 17-12. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Severe Weather	48	High
1	Hurricane	48	High
2	Flooding	27	Medium
3	Earthquake	14	Low
4	Drought	6	Low
4	Mass Movement	6	Low
4	Dam Failure	6	Low
4	Wild Fire	6	Low
4	Coastal Erosion	6	Low
5	Tsunami	0 (no Exposure)	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

17.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. This section provides information on a few key vulnerabilities for the jurisdiction. Available jurisdiction-specific risk maps of the hazards are provided at the end of this annex.

17.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: 1
- Number of FEMA-identified Severe-Repetitive-Loss Properties: 0

- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated: 0

17.8.2 Other Noted Vulnerabilities

The following jurisdiction-specific issues have been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- Flooding from heavy rains/severe storms. Performing a comprehensive stormwater drainage study would assist in locating any deficiencies in drainage in the City after a severe rain storm or hurricane.
- It is noted that the City has not completed a GIS mapping of the City. This would be beneficial to obtain hazard data and to map risk for various hazards.
- The City does not currently have an emergency generator for our community center to serve as a short-term shelter after a natural disaster or heat event.
- The City currently has one (1) Whelan siren system in the city which is erected on the very north part of the city. In order to assure the residents on the south/east/west sides of the City can hear the siren in case of an emergency, the City would need to have another one more centrally located towards the south of the City.

Mitigation actions addressing these issues were prioritized for consideration in the action plan for this annex.

17.9 STATUS OF PREVIOUS PLAN ACTIONS

Table 17-13 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

Table 17-13. Status of Previous Plan Actions

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
MRG5 — Expand outdoor siren warning system to increase coverage within the community's population where the existing sirens are currently difficult to hear.			X	MRG5
2014MORGPT002 — Protective Covering for Three Generators			X	MRG10
2014MORGPT003 — Implement a tree management program to limit debris damage to critical infrastructure and public facilities from falling tree canopy due to hail, high-winds, freezing/icing, and crown fires.			X	MRG11
MRG9 **— Install a New Generator for Cooling and Heating Center at Community Center**			X	MRG9
2014MORGPT005 — Implement waste water reuse system for non-potable water at City Park			X	MRG12
2014MORGPT006 — Establish rainwater collection/capture systems for city infrastructure to provide alternative water supplies limiting effects of water shortages caused by drought or other hazards.			X	MRG13
2014MORGPT007 — Mapping of all hazardous material facilities that may be an increased risk for flood event			X	MRG14
2014MORGPT008 — Extension of fire protection infrastructure locations			X	MRG15
2010MORGPT009 — Install wind load proof window coverings on City buildings			X	MRG16
2010MORGPT014 — Drainage improvements – Increase drainage channel flow rate on South Oak Street	YES			

17.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 17-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 17-15 identifies the priority for each action. Table 17-16 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 17-14. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action MRG1 — Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Earthquake, flooding, landslide, tsunami, hurricane, Coastal Erosion						
Existing	3, 4, 10, 13	City Administration	TBD	High	HMGP, PDM, FMA	Short-term
Action MRG2 — Integrate the hazard mitigation plan into other plans, ordinances and programs that dictate land use decisions in the community, including City of Morgan's Point.						
Hazards Mitigated: Drought, earthquake, flooding, tsunami, hurricane, Coastal Erosion						
New and Existing	1, 3, 4, 5, 7, 8, 10	City Administration	TBD	Low	Staff Time, General Funds	Ongoing
Action MRG3 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: Flooding, severe weather, tsunami, sea level rise, hurricane, Coastal Erosion						
New and Existing	1, 5, 8	City Administration	TBD	Low	Staff Time, General Funds	Short-term
Action MRG4 — Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements: • Enforce the flood damage prevention ordinance. • Participate in floodplain identification and mapping updates. • Provide public assistance/information on floodplain requirements and impacts.						
Hazards Mitigated: Flooding, severe weather, tsunami, , hurricane, Coastal Erosion						
New and Existing	1, 3, 5, 7, 8, 10	City Administration	TBD	Low	Staff Time, General Funds	Ongoing
Action MRG5 — Expand outdoor siren warning system to increase coverage within the community's population where the existing sirens are currently difficult to hear.						
Hazards Mitigated: Flooding, severe weather, tsunami, , drought, hurricane, Coastal Erosion						
New and Existing	1, 3, 4,	City Administration	TBD		Staff Time, General Funds	Short-term
Action MRG6 — Map Community Risk by Developing a coordinated GIS Department. Find out who uses GIS, determine how it is used, and identify other potential uses. • Incorporating a GIS system/management plan for tracking permitting, land use patterns, etc. • Obtaining hazard data and using GIS to map risk for various hazards						
Hazards Mitigated: Flooding, severe weather, tsunami, , drought, Coastal Erosion						
Existing	1, 3, 5, 7, 8, 10, 11	City Administration	TBD	Low	Staff Time, General Funds	Ongoing
Action MRG7 — Conduct Regular Maintenance for Drainage Systems and Flood Control Structures by Performing regular drainage system maintenance, such as sediment and debris clearance, as well as detection and prevention of discharges into stormwater and sewer systems from home footing drains, downspouts, or sewer pumps. • Implementing an inspection, maintenance, and enforcement program to help ensure continued structural integrity of dams and levees. • Routinely cleaning debris from support bracing underneath low-lying bridges. • Routinely cleaning and repairing stormwater drains. • Regularly clearing sediment build-up on riverbanks near aerial lines. • Inspecting bridges and identifying if any repairs or retrofits are needed to prevent scour.						
Hazards Mitigated: Flooding, severe weather, tsunami, , hurricane, Coastal Erosion						
Existing	3, 4, 6, 8, 10, 11	City Administration	TBD	Medium	Staff Time, General Funds	Ongoing

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action MRG8 — Improve Stormwater Management Planning by Completing a stormwater drainage study for known problem areas. • Preparing and adopting a stormwater drainage plan and ordinance. • Preparing and adopting a community-wide stormwater management master plan. • Regulating development in upland areas in order to reduce stormwater run-off through a stormwater ordinance. • Linking flood hazard mitigation objectives with EPA Stormwater Phase II initiatives. • Developing engineering guidelines for drainage from new development. • Requiring a drainage study with new development • Encouraging the use of Low Impact Development techniques *Hazards Mitigated:* Flooding, severe weather, tsunami, , hurricane						
Existing	3, 4, 6, 8, 10, 11	City Administration	TBD	Low	Staff Time, General Funds	Ongoing
Action MRG9 Install a New Generator for Cooling, Heating Center, temporary emergency center after natural disaster at Community Center *Hazards Mitigated:* Flooding, severe weather, tsunami, , , hurricane, Coastal Erosion						
Existing	3, 4, 8, 10, 11	City Administration	TBD	High	HMGP, PDM	Short Term
Action MRG10 — Protective Covering for Three Generators *Hazards Mitigated:* Severe weather, hurricane						
New	11	City Administration	TBD	Medium	Grant funds	Short term
Action MRG11 — Implement a tree management program to limit debris damage to critical infrastructure and public facilities from falling tree canopy due to hail, high-winds, freezing/icing, and crown fires. *Hazards Mitigated:* Severe weather, hurricane, wildfire						
Existing	2, 8, 11	City Administration	TBD	Low	Staff Time, General Funds	Short term
Action MRG12 — Implement waste water reuse system for non-potable water at City Park *Hazards Mitigated:* Drought						
Existing	7, 8	City Administration	TBD	Low	Staff Time, General Funds	Short term
Action MRG13 — Establish rainwater collection/capture systems for city infrastructure to provide alternative water supplies limiting effects of water shortages caused by drought or other hazards. *Hazards Mitigated:* Drought						
Existing	7, 8	City Administration	TBD	Low	Staff Time, General Funds	Short term
Action MRG14 — Mapping of all hazardous material facilities that may be an increased risk for flood event *Hazards Mitigated:* Flooding						
Existing	3, 8	City Administration	TBD	Low	Staff Time, General Funds	Short term
Action MRG15 — Extension of fire protection infrastructure locations *Hazards Mitigated:* Wildfire						
Existing	13, 14	City Administration	TBD	Medium	General and/or grant funds	Short term
Action MRG16 — Install wind load proof window coverings on City buildings *Hazards Mitigated:* Severe weather, hurricane						
Existing	11, 13	City Administration	TBD	High	Grant funds	Short term
Action MRG17— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan. *Hazards Mitigated*: Severe Weather, Hurricane, Flood, Dam/Levee Failure, Drought, Earthquake, Wildfire, Mass Movements						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	City Administration	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 17-15. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
MRG1	4	High	High	Yes	Yes	No	Medium	High
MRG 2	7	Medium	High	Yes	No	No	High	Low
MRG 3	3	Low	High	No	No	No	High	Low
MRG 4	6	Medium	High	Yes	No	No	High	Low
MRG 5	3	Medium	High	Yes	No	No	Low	Low
MRG 6	7	Medium	High	Yes	No	No	Low	Low
MRG 7	6	High	High	Yes	No	No	Low	Low
MRG 8	6	Low	High	No	No	No	Low	Low
MRG 9	5	Medium	High	Yes	Yes	No	Medium	High
MRG10	1	High	Medium	Yes	No	No	Medium	Medium
MRG11	3	Medium	Low	Yes	No	No	Low	Low
MRG12	2	Medium	Low	Yes	No	No	Low	Low
MRG13	2	Medium	Low	Yes	No	No	Low	Low
MRG14	2	Medium	Low	Yes	No	No	Low	Low
MRG15	2	Medium	Medium	Yes	No	No	Medium	Medium
MRG16	2	High	High	Yes	Yes	No	High	High
MRG17	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 17-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Severe Weather	MRG 1, 2, 3, 4, 6, 7, 8, 11, 16, 17	MRG 1, 10, 11, 16	MRG 1, 2, 3, 4, 5, 9, 17	MRG 6, 7, 8, 11	MRG 5, 9, 17	MRG 10, 16		MRG 1, 2, 3, 4, 5, 6, 7, 8, 9, 17
Hurricane	MRG 1, 4, 7, 8, 11, 16,17	MRG 1, 4, 7, 10, 11, 16	MRG 5. 17	MRG 11	MRG17	MRG 1, 7, 8, 10, 16	MRG 8	MRG 2,3, 17
Medium-Risk Hazards								
Flooding	MRG 1, 2, 3, 4, 6, 7, 8, 14, 17	MRG 1, 14	MRG 1, 2, 3, 4, 5, 9, 17	MRG 6, 7, 8	MRG 5, 9, 14, 17			MRG 1, 2, 3, 4, 5, 6, 7, 8, 9, 14, 17
Low-Ranked Hazards								
Earthquake	MRG 17		MRG17		MRG17			MRG17
Drought	MRG 3, 5, 6, 9, 17		MRG 1, 2, 3, 5, 9, 17	MRG 12, 13	MRG 5, 9, 17	MRG 12,13	MRG 12,13	MRG 1, 2, 3, 4, 5, 6, 7, 8, 9, 17
Mass Movement	MRG17		MRG17		MRG17			MRG17
Dam Failure	MRG17		MRG17		MRG17			MRG17
Coastal Erosion	MRG 1, 2, 3, 4, 6, 7, 8, 17	MRG 1,	MRG 1, 2, 3, 4, 5, 9, 17	MRG 6, 7, 8	MRG 5, 9, 17			MRG 1, 2, 3, 4, 5, 6, 7, 8, 9, 17
Wildfire	MRG 11, 15,17	MRG 11, 15	MRG17	MRG 11	MRG17	MRG 15		MRG17

a. See the introduction to this volume for explanation of mitigation types.

17.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

17.11.1 Existing Reports, Plans, Regulatory Tools and Other Resources

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- **City of Morgan's Point Municipal Code** — The municipal code was reviewed for the full capability assessment and for identifying opportunities for action plan integration.
- **City of Morgan's Point Flood Damage Prevention Ordinance** — The flood damage prevention ordinance was reviewed for compliance with the National Flood Insurance Program.
- **City of Morgan's Comprehensive Plan —** The Comprehensive Plan was reviewed for the full capability assessment and for identifying opportunities for action plan integration.

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.
- **FEMA —** *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards* to obtain a better understanding of potential unthought-of actions/mitigations that could be used to reduce or eliminate long term risk to people and property from natural disasters in the City of Morgan's Point.

Morgan's Point

Critical Facilities

- Education Facilities
- Emergency Services
- Government Facilities
- Hazardous Material Sites
- Health and Medical Facilities
- Historical and Cultural Sites
- Transportation Systems
- Utility Systems
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3 Miles

Morgan's Point

FEMA Flood Hazard

1% Annual Chance Flood (100-yr)

Incorporated Cities

Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3

Miles

Morgan's Point

Flood Hazard
Hurricane Harvey

Flooding Extent

Incorporated Cities

Harris County

Note: Flooding extent shown for Hazard Mitigation Plan planning area only.

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3 Miles

Morgan's Point

Hurricane Alicia (1983)

Peak WInd Gust (mph)

- 87 - 94
- 95 - 98
- 99 - 101
- 102 - 104
- 105 - 110
- Storm Track
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3 Miles

Morgan's Point

20-year Probabilistic Hurricane

Peak Wind Gust (mph)

- 63 - 71
- 72 - 76
- 77 - 80
- 81 - 84
- 85 - 92
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3 Miles

Morgan's Point

100-year Probabilistic Hurricane

Peak Wind Gust (mph)

- 89 - 101
- 102 - 106
- 107 - 111
- 112 - 117
- 118 - 128
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3 Miles

Morgan's Point

Wildfire Ignition Density

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3 Miles

Morgan's Point

Wildfire Threat

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3 Miles

18. CITY OF NASSAU BAY

18.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Dena Mahan/EMC
1800 Space Park Drive, Ste. 200
Nassau Bay, TX 77058
Telephone: 281-333-7373
e-mail Address: dena.mahan@nassaubay.com

Alternate Point of Contact
Tom George, Fire Chief/Deputy EMC
18295 Upper Bay Road
Nassau Bay, TX 77058
Telephone: 281-336-6295
e-mail Address: tom.george@nassaubay.com

18.2 JURISDICTION PROFILE

18.2.1 Location

The City of Nassau Bay is in the Clear Lake region of southeast Harris County, along Clear Creek and the western portion of Clear Lake. It is located across the street from Johnson Space Center; a peninsula encompassing 1.7 square miles.

The current boundaries generally extend from NASA Johnson Space Center to the north, Clear Lake to the east, the injunction of Clear Creek and Clear Lake to the south, and Cow Bayou to the west. The City of Webster is to the west, League City to the south, Houston to the north, and Clear Lake to the east.

18.2.2 History

The City of Nassau Bay was incorporated in 1978. The Nassau Bay community was originally developed to provide housing opportunities for NASA employees. Being across the street from NASA Lyndon B. Johnson Space Center, it continues to maintain a strong relationship with the space industry. Additionally, the City's economy is directly impacted by Houston Methodist St. John Hospital, which is located inside the City, as well as tourism and recreation activities along the Texas coast. Nassau Bay is a triangular peninsula that juts into Clear Lake and is surrounded by water on its west, south and east boundaries. It is a charming and intimate community with a population of approximately 4,099 residents who enjoy the water front possibilities and lush green spaces the City offers.

18.2.3 Climate

The climate of Nassau Bay is typical of the upper Texas Gulf Coast, with hot and humid summers, and mild winters. There are approximately 207 sunny days per year, with the dry season consuming eight months, the wet season four. The annual rainfall in Nassau Bay is above average with 56 inches per year. The summer high is about 91 degrees and the winter low is close to 44. The dominant wind is from the south, with wind speeds varying throughout the year.

18.2.4 Governing Body Format

The City of Nassau Bay is a Texas Home Rule City which operates in a Council-Manager form of government. The board is led by the mayor and six councilmembers. There are eight departments in the City: Community Development & Planning, Police, Fire, Emergency Management, Public Works, Finance, Tourism, Human Resources and the City Manager's Office.

The City Council assumes responsibility for the adoption of this plan; the City Manager will oversee its implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 18-1.

Table 18-1. Local Mitigation Planning Team Members

Name	Title
Jason E. Reynolds	City Manager
Tom George	Fire Chief/Deputy EMC
Dena Mahan	EMC
Paul Lopez	Public Works Director
Mark Stelly	Floodplain Administrator/Building Official

18.3 CURRENT TRENDS

18.3.1 Population

According to US Census the population of Nassau Bay as of July 2017 was 4,052. Since 2010, the population has remained constant.

18.3.2 Development

Nassau Bay is experiencing a renaissance of commercial development due to the growth in the Clear Lake region, the success of the space industry, and the insurgence of a medical hub along the I-45/Gulf Freeway. The development is comprised of infill and rehabilitation, with a moderate outlook for future commercial infill. Residential expansion is low in the City, but the demand for additional multi-family housing opportunities continues to grow.

The City is updating its comprehensive plan in 2019 and 2020. The plan will refocus the vision of the community with the changing environment while staying true to the needs of the community. In addition, the plan will address land use allocations, zoning, redevelopment, waterways, tourism, and capital improvements. Future growth and development in the City will be managed as identified in the comprehensive plan.

Table 18-2 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

Table 18-2. Recent and Expected Future Development Trends

Criterion	Response
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan? • **If yes, give the estimated area annexed and estimated number of parcels or structures.**	No N/A
Is your jurisdiction expected to annex any areas during the performance period of this plan? • **If yes, describe land areas and dominant uses.** • **If yes, who currently has permitting authority over these areas?**	No N/A N/A
Are any areas targeted for development or major redevelopment in the next five years? • **If yes, briefly describe, including whether any of the areas are in known hazard risk areas**	Yes There is a multi-family/business complex scheduled to be built on a waterfront lot that is susceptible to storm surge during high wind events.

How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?

	2014	2015	2016	2017	2018
Single Family	2	1	1	1	3
Multi-Family	0	0	0	0	0
Other (commercial, mixed use, etc.)	3	0	0	3	2
Total	**5**	**1**	**1**	**3**	**4**

Provide the number of new-construction permits for each hazard area or provide a qualitative description of where development has occurred.	• Special Flood Hazard Areas: 0 • Landslide: 0 • High Liquefaction Areas: 0 • Tsunami Inundation Area: 0 • Wildfire Risk Areas: 0
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	The City is on the verge of a complete buildout; only three lots are available to build on in the commercial corridor. One of those lots are highly susceptible to flooding and surge, which deters from future buildout. There are 20 residential lots available for construction, but are vacant because of repetitive flooding which is a negative consideration for new home builds.

18.4 CAPABILITY ASSESSMENT

The City of Nassau Bay performed an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities is presented in Table 18-3.
- Development and permitting capabilities are presented in Table 18-4.
- An assessment of fiscal capabilities is presented in Table 18-5.
- An assessment of administrative and technical capabilities is presented in Table 18-6.
- An assessment of education and outreach capabilities is presented in Table 18-7.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 18-8.
- Classifications under various community mitigation programs are presented in Table 18-9.
- The community's adaptive capacity for the impacts of climate change is presented in Table 18-10.

Findings of the capability assessment were reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table in Section 18.10 identifies these as community capacity building mitigation actions.

Table 18-3. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code	Yes	No	No	No
Comment: *Ord. No. O2013-708, §§ 1, 2 2012 International Building Codes adopted 06/10/13*				
Zoning Code	Yes	No	No	No
Comment: *Ord. No. 94-435, adopted 09-12-94 Amended 8-12-13*				
Subdivisions	Yes	No	No	No
Comment: *Ord. No. 83-298, Art. I, § 1, adopted 04-11-83 The Land Subdivision Regulations of the City of Nassau Bay, State of Texas*				
Stormwater Management	No	No	No	No
Comment:				
Post-Disaster Recovery	No	No	No	No
Comment:				
Real Estate Disclosure	No	No	No	No
Comment:				
Growth Management	No	No	No	No
Comment:				
Site Plan Review	Yes	No	No	No
Comment: *Ord. No. O2013-712, Exhibit B, adopted 8-12-13 Article 5 Administrative Procedures*				
Environmental Protection	No	No	No	No
Comment:				
Flood Damage Prevention	Yes	Yes	No	Yes
Comment: *Ord. No. 2000-511, Art. I, § A, adopted 05-08-2000; State of Texas Water Code section 16.318*				
Emergency Management	Yes	Yes	Yes	Yes
Comment: *Ord. No. 2010-660, § 1, 1-11-10 Civil Defense and Emergency Management; Texas Gov. Code Title 4 Chapter 418*				
Climate Change	No	No	No	No
Comment:				
Energy Conservation	Yes	Yes	No	No
Comment: *International Energy Conservation Code 2015*				
Planning Documents				
General Plan	Yes	No	No	Yes
Comment: *Comprehensive Plan is currently being updated. Expected adoption date is early 2020. Current plan is dated 2015.*				
Capital Improvement Plan	Yes	No	No	No
How often is the plan updated? *Annually*				
Comment: *Current plan date: September 17, 2018*				
Disaster Debris Management Plan	Yes	No	No	No
Comment: *Debris Management Plan, June 14, 2018*				
Floodplain or Watershed Plan	No	No	No	No
Comment:				
Stormwater Plan	Yes	Yes	No	Yes
Comment: *Storm Water Management Plan date – February 2008 (revised March 2009)*				
Urban Water Management Plan	No	No	No	No
Comment:				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Habitat Conservation Plan	No	No	No	No
Comment:				
Economic Development Plan	No	No	No	No
Comment:				
Shoreline Management Plan	No	No	No	No
Comment:				
Community Wildfire Protection Plan	No	No	No	No
Comment:				
Forest Management Plan	No	No	No	No
Comment:				
Climate Action Plan	No	No	No	No
Comment:				
Comprehensive Emergency Management Plan	Yes	No	No	Yes
Comment: *Emergency Operations Plan, 12/2015*				
Threat & Hazard Identification & Risk Assessment (THIRA)	No	Yes	Yes	Yes
Comment: *A regional THIRA is conducted on an annual basis for UASI and HGAC. The City participates in the development of the THIRA.*				
Post-Disaster Recovery Plan	Yes	Yes	No	Yes
Comment: *Annex J – Recovery to the City's Emergency Operations Plan*				
Continuity of Operations Plan	No	No	No	No
Comment:				
Public Health Plan	No	No	No	No
Comment:				

Table 18-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • **If no, who does? If yes, which department?**	Yes Building Department
Does your jurisdiction have the ability to track permits by hazard area?	Yes
Does your jurisdiction have a buildable lands inventory?	No

Table 18-5. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants	No
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	N/A

Table 18-6. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Community Development & Planning
Engineers or professionals trained in building or infrastructure construction practices	Yes	Building Official & City Engineer
Planners or engineers with an understanding of natural hazards	Yes	Community Development & Planning
Staff with training in benefit/cost analysis	Yes	OEM
Surveyors	Yes	Can contract for this service
Personnel skilled or trained in GIS applications	Yes	Water, Building Official
Scientist familiar with natural hazards in local area	Yes	Fire Chief & FPA/Building Official
Emergency manager	Yes	OEM EMC/Deputy EMC
Grant writers	Yes	EMC and can contract for this service

Table 18-7. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • If yes, briefly describe.	Yes Emergency Preparedness
Do you use social media for hazard mitigation education and outreach? • If yes, briefly describe.	Yes The City's Facebook page is used to promote preparedness information and events
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • If yes, briefly describe.	Yes Nassau Bay Planning Commission
Do you have any other programs already in place that could be used to communicate hazard-related information? • If yes, briefly describe.	Yes Nextdoor.com/Facebook/Swift911
Do you have any established warning systems for hazard events? • If yes, briefly describe.	Yes Swift 911

Table 18-8. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Building Official/FPA
Who is your floodplain administrator? (department/position)	CD&P/Building Official/FPA
Are any certified floodplain managers on staff in your jurisdiction?	Yes
What is the date that your flood damage prevention ordinance was last amended?	5/8/2000
Does your floodplain management program meet or exceed minimum requirements? • **If exceeds, in what ways?**	Exceeds Various
When was the most recent Community Assistance Visit or Community Assistance Contact?	2018
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • **If so, state what they are.**	No
Are any RiskMAP projects currently underway in your jurisdiction? • **If so, state what they are.**	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • **If no, state why.**	No Do not address impacts of flash flooding
Does your floodplain management staff need any assistance or training to support its floodplain management program? • **If so, what type of assistance/training is needed?**	No
Does your jurisdiction participate in the Community Rating System (CRS)? • **If yes, is your jurisdiction interested in improving its CRS Classification?** • **If no, is your jurisdiction interested in joining the CRS program?**	Yes Yes
How many flood insurance policies are in force in your jurisdiction?[a] • **What is the insurance in force?** • **What is the premium in force?**	1389 $412,242,800 $1,148,385
How many total loss claims have been filed in your jurisdiction?[a] • **How many claims are still open or were closed without payment?** • **What were the total payments for losses?**	1544 370 $57,671,386.09

a. According to FEMA statistics as of September 30, 2018

Table 18-9. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	Yes	7	05/01/2009
Building Code Effectiveness Grading Schedule	Yes	4	Unknown
Public Protection	Yes	2	Unknown
Storm Ready	Yes	N/A	01/2017
Firewise	No		

Table 18-10. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts *Comment:*	Low
Jurisdiction-level monitoring of climate change impacts *Comment:*	Low
Technical resources to assess proposed strategies for feasibility and externalities *Comment:*	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory *Comment:*	Low
Capital planning and land use decisions informed by potential climate impacts *Comment:*	Low
Participation in regional groups addressing climate risks *Comment:*	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes *Comment:*	Low
Identified strategies for greenhouse gas mitigation efforts *Comment:*	Low
Identified strategies for adaptation to impacts *Comment:*	Low
Champions for climate action in local government departments *Comment:*	Low
Political support for implementing climate change adaptation strategies *Comment:*	Low
Financial resources devoted to climate change adaptation *Comment:*	Low
Local authority over sectors likely to be negative impacted *Comment:*	Low
Public Capacity	
Local residents knowledge of and understanding of climate risk *Comment:*	Low
Local residents support of adaptation efforts *Comment:*	Low
Local residents' capacity to adapt to climate impacts *Comment:*	Low
Local economy current capacity to adapt to climate impacts *Comment:*	Low
Local ecosystems capacity to adapt to climate impacts *Comment:*	Low

18.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning and capital facilities planning, and that relevant information from

those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

18.5.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- **City of Nassau Bay Emergency Operations Plan/Emergency Management Ordinance —** The Emergency Operations Plan addresses the City's responsibilities in emergencies associated with natural disaster, human-caused emergencies and technological incidents. It provides a framework for coordination of response and recovery efforts within the City in coordination and with local, State, and federal agencies. The Plan establishes an emergency organization to direct and control operations during a period of emergency by assigning responsibilities to specific personnel. Information from the hazard mitigation plan is incorporated as appropriate.
- **Capital Improvements Plan** — The capital improvement plan includes projects can help mitigate potential hazards. The city will act to ensure consistency between the hazard mitigation plan and the current and future capital improvement plans. The hazard mitigation plan may identify new possible funding sources for capital improvement projects and may result in modifications to proposed projects based on results of the risk assessment.
- **Nassau Bay Volunteer Fire Department Emergency Operations Plan** — The NBVFD Emergency Operations Plan addresses the Fire Department's responsibilities in emergencies associated with natural disaster, human-caused emergencies and technological incidents. It provides a framework for coordination of response and recovery efforts within the City of Nassau Bay in coordination and with local, State, and federal agencies.
- **Functional and Access Needs Plans —** The city addresses the needs of individuals with disabilities and the elderly during an emergency or disaster situation, and provides safe, sanitary, secure shelter and care for all residents including those residents with functional needs.
- **Flood Damage Prevention Ordinance –** The city's Flood Damage Prevention ordinance covers the entire community, includes numerous methods of reducing flood losses, defines floodplain administration for the city, and outlines standards for development. Because the ordinance was last updated in 2000, it does need to be updated. With that update, additional integration opportunities may be available.
- **Threat & Hazard Identification & Risk Assessment –** Nassau Bay is a participant in the development of Harris County's THIRA, and findings of this assessment have been and will continue to be integrated into mitigation and emergency management plans.

18.5.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- **Comprehensive Plan –** Comprehensive Plans provide a framework for the physical design and development of a city over a long-term planning horizon. They address social, economic, and environmental issues by the manner in which they guide overall growth and development. The vision, goals, and policies of the comprehensive plan are routinely implemented through other local planning instruments such as zoning ordinances, subdivision regulations, and capital improvement programs. Integrating hazard mitigation into the local comprehensive plan thereby establishes resilience as an

overarching value of a community and provides the opportunity to continuously manage development in a way that does not lead to increased hazard vulnerability

- **Post-Disaster Recovery Plan** – The City of Nassau Bay will be developing a standalone Post-Disaster Recovery Plan to expand on what is currently in the Recovery Annex of the Emergency Operations Plan. Incorporating mitigation actions into disaster recovery can be an extremely cost-effective means of mitigation future damage.
- **Stormwater Management Plan and Ordinance –** The City of Nassau Bay will update its stormwater management plan and consider low impact development techniques to manage storm water by incorporating techniques such as bio-retention areas, dry wells, infiltration trenches, filter/buffer strips, vegetated swales, rain barrels, and cisterns. This could reduce the impact of flooding in flood-prone areas within the community.

18.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 18-11 lists past occurrences of natural hazards for which specific damage was recorded in Nassau Bay. Other hazard events that broadly affected the entire planning area, including Nassau Bay, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 18-11. Past Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Hurricane Harvey	4332	2017	$10,000,000
Severe Storms and Flooding	4272	2016	Unknown
Severe Storms and Flooding	4269	2016	Unknown
Hurricane Ike	1791	2008	$24,000,000
Hurricane Rita	1606	2005	$375,000
Tropical Storm Allison	1379	2001	Unknown

18.7 HAZARD RISK RANKING

Table 18-12 presents a local ranking for Nassau Bay of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 18-12. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Severe Weather	48	High
2	Flooding	36	High
2	Hurricane	36	High
3	Mass Movement	N/A	Medium
4	Earthquake	14	Low
5	Wildfire	12	Low
6	Drought	6	Low
6	Coastal Erosion	6	Low
7	Dam Failure	0	None
7	Tsunami	0	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

18.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. This section provides information on a few key vulnerabilities for the jurisdiction. Available jurisdiction-specific risk maps of the hazards are provided at the end of this annex.

18.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: 160
- Number of FEMA-identified Severe-Repetitive-Loss Properties: 37
- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated: 17

18.8.2 Other Noted Vulnerabilities

The following jurisdiction-specific issues have been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- The majority of city properties are in the 1% annual chance flood hazard area, and the rest are within the 0.2 percent chance flood hazard area
- The City of Nassau Bay is in close proximity to NASA's Johnson Space Center
- The City of Nassau Bay is located near the Houston Ship Channel and numerous chemical and oil refining facilities
- Houston Methodist Hospital Clear Lake resides in the City of Nassau Bay

Mitigation actions addressing these issues were prioritized for consideration in the action plan presented in this annex.

18.9 STATUS OF PREVIOUS PLAN ACTIONS

Table 18-13 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

Table 18-13. Status of Previous Plan Actions

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
Adopt new and updated coastal flood mapping once available.	Ongoing		Yes	NAS8
Comment: Adopted January 2017; ongoing effort as new maps are produced				
Implement acquisition, elevation and flood proofing for SRL and/or RL structures by elevating existing structures to 2' above BFE.	No		Yes	NAS1
Comment: Continue to work on this project as the SRL/RL list contains 10% of the housing stock				
Adopt latest and higher standard floodplain regulations to minimize damage to residential/critical infrastructure properties located within storm surge areas and LIMWA areas.	No		Yes	NAS6
Comment: Nothing recent but a continued action item for the City				
Improve and enhance requirements for critical facilities to withstand severe thunderstorms, hurricane winds and hail.	No		Yes	NAS7
Comment: Completed work for the Fire & EMS Station, Emergency Operation Center, and further strengthen the WWWTP facilities.				

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
Construct Protective Structures to minimize damage to critical assets & equipment.	No		Yes	NAS7
Comment: Elevated generator and the grit king at WWWTP. Constructed Fire Station at Cat 5 storm rating. Moved Public Works to new facility in wind rated facility. Continue to plan and implement small.				
Review & update existing city codes to require installation of materials to harden residential & commercial structures to lessen the effects of hail & tornadoes.	No		Yes	NAS8
Comment: Continue to adopt the latest codes & operate by the spirit of the objective. Planning and operations continue to be geared around this.				
Improve code/ordinance to require removal of dead vegetation/dry fuel sources in fire risk areas.	No		Yes	NAS9
Comment: .				
Improve/Retrofit Air Filtration Systems with higher capacity and higher quality filtration/purification system to remove particulates for CI/Public/Healthcare facilities to minimize health risks associated with low air quality and to minimize equipment damage due to smoke.	No		Yes	NAS10
Comment: Work with Hospital as they renovate the facility.				
Mapping of all hazardous material facilities that may be an increased risk within the city limits.	No		Yes	NAS11
Comment: Continue to work on.				
Identify & map exposed/aboveground pipelines in the city limits.	Yes		Yes	NAS9
Comment:				
Establish/improve code/ordinance to require shutoff valves at entry and exit points of city limits for new pipeline construction.	No	X		
Comment: This project is no longer feasible				
Insulate exposed/aboveground domestic water system components, water pipes, irrigation systems and sprinkler systems on municipal facilities.	Ongoing		Yes	NAS12
Comment: Ongoing effort that is completed each year.				
Develop and implement a Winter Storm Public Education/Outreach Program to educate residents on winter hazards and actions to reduce damage to property from cold/freezing winter weather conditions.	No		Yes	NAS13
Comment: Change to social media/public outreach instead of class.				
Expand warning system (Mass Notification) to provide hazard awareness and alerts by increasing coverage of the community's population to mitigate drought and extreme heat. (SMS, iPAWS, and mass notification).	Yes		No	
Comment: The city is now using a reverse 911 system, social media, website and other means to provide warnings to residents.				
Harden nonflexible water supply piping during line replacement projects with drought resistant piping materials.	Ongoing		Yes	NAS14
Comment: City is replacing all water and sewer lines over the next 15 years with polyvinyl chloride pipe.				
Establish a cooling center at identified site to limit the effects of extreme heat upon vulnerable populations.	Yes		Yes	NAS15
Comment:				
Flood remediation – Raise concrete walls around present sand filter unit.	No		Yes	NAS10
Comment: Applied for grant through FEMA after Hurricane Harvey to complete.				

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
Install new chemical feed disinfection and de-chlorination system at the City's wastewater treatment plant.	No		Yes	NAS12
Comment: Applied for grant through FEMA after Hurricane Harvey to complete.				
Replace the Chlorine storage and supply system and bring facility up to current codes.	No		Yes	NAS20
Comment: Applied for grant through FEMA after Hurricane Harvey to complete.				
Reduce street and residential flooding by installing new storm sewers. [Saxony Ln and Nassau Bay Drive]	No		Yes	NAS16
Comment: Ongoing effort on the planned capital improvement list.				

18.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 18-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 18-15 identifies the priority for each action. Table 18-16 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 18-14. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action NAS1 — Where appropriate, support elevation, retrofitting, purchase, or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Flooding						
Existing	3, 4, 10	Nassau Bay		High	HMGP, PDM, FMA	Short-term
Action NAS2 — Integrate the hazard mitigation plan into other plans, ordinances, and programs that dictate land use decisions in the community.						
Hazards Mitigated: Dam failure, drought, earthquake, flooding, mass movement, tsunami, wildfire						
New and Existing	1, 3, 4, 5, 7, 8, 10	Nassau Bay		Low	Staff Time, General Funds	Ongoing
Action NAS3 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: All hazards						
New and Existing	1, 8, 10	Nassau Bay		Low	Staff Time, General Funds	Short-term
Action NAS4 — Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements: • Enforce the flood damage prevention ordinance. • Participate in floodplain identification and mapping updates. • Provide public assistance/information on floodplain requirements and impacts.						
Hazards Mitigated: Dam failure, flooding, severe weather, tsunami						
New and Existing	12, 14, 15	Nassau Bay		Low	Staff Time, General Funds	Ongoing
Action NAS5 — Develop a post-disaster recovery plan that includes methods of integrating mitigation measures into recovery.						
Hazards Mitigated: All hazards						
New and Existing	3, 8, 9, 11	Nassau Bay		Medium	Staff Time, General Funds	Short-term
Action NAS6 — Adopt latest and higher standard floodplain regulations to minimize damage to residential/critical infrastructure properties located within storm surge areas and LIMWA areas						
Hazards Mitigated: Flooding						
New and Existing	9, 12, 13, 15	Nassau Bay		Low	Staff Time	Ongoing

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action NAS7 — Improve existing city-owned structures and enhance requirements for new critical facilities, assets, and equipment to withstand severe thunderstorms, hurricane winds, and hail.						
Hazards Mitigated: Severe weather, hurricane						
New and Existing	11, 12, 13	Nassau Bay		High	HMGP, PDM, General Funds	Long-term
Action NAS8 — Adopt new and updated flood maps as they become available.						
Hazards Mitigated: Flooding						
New and Existing	3, 9	Nassau Bay		Low	Staff Time	Ongoing
Action NAS9 — Identify and map exposed/above ground pipeline infrastructure within the city limits.						
Hazards Mitigated: Human-caused/technological, Severe Weather, Hurricane						
Existing	3	Nassau Bay		Medium	Staff Time, Contractor/GIS	Short-term
Action NAS10 — Raise concrete walls around the sand filter at the wastewater treatment plant.						
Hazards Mitigated: Flooding, hurricane, severe weather						
Existing	11, 13	Nassau Bay		High	406 Mitigation Funds, HMGP, FMA, PDM	Short-term
Action NAS11- Elevate water and wastewater pumps, motors, and electrical controls.						
Hazards Mitigated: Flooding						
Existing	13	Nassau Bay		Medium	406 Mitigation Funds, HMGP, FMA, PDM, CIP	Short-term
Action NAS12 – Install new chemical feed disinfection and de-chlorination system at the wastewater treatment plant.						
Hazards Mitigated: Flooding, Technological						
Existing	8, 13	Nassau Bay		Medium	General Funds, CIP	Long-term
Action NAS13 – Install structured covers for existing generators to protect them from severe weather hazards.						
Hazards Mitigated: Severe weather, hurricane						
Existing	6, 13	Nassau Bay		High	Bonds, Fee Increases, HMGP, PDM	Long-term
Action NAS14 – Harden nonflexible water supply piping during line replacement projects with drought resistant piping materials.						
Hazards Mitigated: Drought						
Existing	13	Nassau Bay		Medium	General Funds/CIP, HMGP, PDM	Ongoing
Action NAS15 – Establish a cooling center at identified site to limit the effects of extreme heat upon vulnerable populations.						
Hazards Mitigated: Drought/Extreme Heat						
New and Existing	4	Nassau Bay		Low	Staff Time, General Funds	Short-term
Action NAS16 – Reduce street and residential flooding by installing new storm sewers. [Saxony Ln and Nassau Bay Drive]						
Hazards Mitigated: Flooding						
New and Existing	13	Nassau Bay		Medium	General Funds/CIP, HMGP, FMA, PDM	Short-term
Action NAS17 – Conduct geological mapping of the area to determine risk areas for subsidence or sinkholes.						
Hazards Mitigated: Mass Movement						
New and Existing	3	Nassau Bay	Contract Engineer/ Firm	Medium	General Funds, CIP	Long-term
Action NAS18 – Develop a new stormwater management plan (to include a hydrological study of the Nassau Bay area).						
Hazards Mitigated: Flooding						
New and Existing	9, 10	Nassau Bay	Contract Firm	Medium	HMGP, FMA, PDM	Short-term
Action NAS19 – Develop a Continuity of Operations/Government Plan for the City of Nassau Bay.						
Hazards Mitigated: All hazards						
New and Existing	9, 10	Nassau Bay		Low	Staff Time, Grants	Short-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action NAS20 – . Elevate and/or replace the chlorine and sulfur dioxide storage and supply system at the wastewater treatment plant, and bring it up to current code.						
Hazards Mitigated: Flooding, hurricane, severe weather, tsunami						
Existing	13	Nassau Bay		Medium	406 Mitigation funds, HMGP, FMA, PDM	Short-term
Action NAS21 – Install backup power systems for public buildings, utilities, and critical infrastructure currently without generators or with undersized generators						
Hazards Mitigated: Flooding, severe weather, hurricane						
Existing	13	Nassau Bay		High	HMGP, FMA, PDM	Short-term
Action NAS22 – Install additional Flood Alert Gauges and a velocity meter in sections of Clear Creek near/within Nassau Bay.						
Hazards Mitigated: Flooding						
New and Existing	1, 3	Harris County Flood Control	Nassau Bay	Medium	HMGP, FMA, PDM	Short-term
Action NAS23 – Bring water treatment plant facility up to homeland security standards for drinking water.						
Hazards Mitigated: Flooding, terrorism						
Existing	4, 13	Nassau Bay		High	UASI Grant,	Long-term
Action NAS24 – Install wind load proof window coverings on city buildings						
Hazards Mitigated: Hurricane, severe weather						
Existing	13	Nassau Bay		Medium	HMGP, PDM, General Fund/CIP	Short-term
Action NAS25 – Develop/implement water smart program to educate the public on how to conserve water, especially during drought conditions.						
Hazards Mitigated: Drought						
New and Existing	3	Nassau Bay		Low	Staff Time	Short-term
Action NAS26 – Develop and implement a program to capture perishable data after significant events/incidents (e.g. high water marks, preliminary damage estimates, damage photos) to support future mitigation efforts including the implementation and maintenance of the hazard mitigation plan.						
Hazards Mitigated: Flooding, Severe Weather, Hurricane, Mass Movement, Earthquake, Wildfire, Drought, Coastal Erosion						
New and Existing	3	Nassau Bay		Low	Staff Time	Ongoing
Action NAS27 – Install a Weather/Lightning alert system to minimize damage and risk to local athletic facilities and other public events and purchase a loudspeaker to warn public of severe weather.						
Hazards Mitigated: Severe Weather						
New and Existing	1	Nassau Bay		Med		
Action NAS28 – Develop a Shoreline Management Plan.						
Hazards Mitigated: Coastal Erosion, Mass Movement, Flooding, Tsunami						
New and Existing	10	Nassau Bay		Medium	HMGP, FMA, PDM, CIP	Short-term
Action NAS29 – Elevate Upper Bay Road to alleviate significant street flooding and high-velocity flows.						
Hazards Mitigated: Flooding						
New and Existing	11, 13	Nassau Bay		High	HMGP, FMA, PDM	Long-term
Action NAS30— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
Hazards Mitigated: Flooding, Severe Weather, Hurricane, Mass Movement, Earthquake, Wildfire, Drought, Coastal Erosion						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	Nassau Bay	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 18-15. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
NAS1	3	High	High	Yes	Yes	No	Medium	High
NAS2	7	Medium	Low	Yes	No	Yes	High	Low
NAS 3	3	Low	Low	Yes	No	Yes	High	Low
NAS4	3	Medium	Low	Yes	No	Yes	High	Low
NAS5	4	Medium	Medium	Yes	Yes	Yes	High	High
NAS6	4	Medium	Low	Yes	No	Yes	High	Low
NAS7	3	High	High	Yes	Yes	No	Medium	High
NAS8	2	Medium	Low	Yes	No	Yes	High	Low
NAS9	1	Low	Medium	No	No	No	Low	Low
NAS10	2	High	High	Yes	Yes	No	Medium	High
NAS11	1	High	Medium	Yes	Yes	No	Medium	High
NAS12	2	Medium	Medium	Yes	No	No	Low	Low
NAS13	2	High	High	Yes	Yes	No	Medium	High
NAS14	1	Medium	Medium	Yes	Yes	No	Medium	Medium
NAS15	1	High	Low	Yes	No	No	Medium	Low
NAS16	1	High	Medium	Yes	Yes	No	Medium	High
NAS17	1	Low	Medium	No	No	No	Low	Low
NAS18	2	Medium	Medium	Yes	Yes	No	Medium	High
NAS19	2	Low	Low	Yes	Yes	Yes	High	Medium
NAS20	1	High	Medium	Yes	Yes	No	Medium	High
NAS21	1	High	High	Yes	Yes	No	Medium	High
NAS22	2	High	Medium	Yes	Yes	No	Medium	High
NAS23	2	High	High	Yes	Yes	No	Medium	High
NAS24	1	High	Medium	Yes	Yes	No	Medium	High
NAS25	1	Low	Low	Yes	No	Yes	High	Low
NAS26	1	Medium	Low	Yes	No	Yes	High	Low
NAS27	1	High	Medium	Yes	No	No	Medium	Low
NAS28	1	Medium	Medium	Yes	Yes	No	Medium	High
NAS29	2	High	High	Yes	Yes	No	Medium	High
NAS30	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 18-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Severe Weather	NAS4, 30	NAS7, 10, 13, 20, 24	NAS22, 30	NAS10	NAS21, 27, 30	NAS13		NAS3, 5, 9, 19, 22, 26, 30
Flooding	NAS2, 4, 6, 8, 30	NAS1, 10, 11, 12, 20, 23	NAS30	NAS10	NAS21, 30	NAS10, 16, 29		NAS3, 5, 18, 19, 26, 28, 30
Hurricane	NAS2, 30	NAS7, 10, 13, 20, 24	NAS30	NAS10	NAS21, 30	NAS13		NAS3, 5, 9, 19, 26, 30
Medium-Risk Hazards								
Mass Movement	NAS30		NAS30		NAS30			NAS3, 5, 17, 19, 26, 28, 30
Low-Risk Hazards								
Earthquake	NAS2, 30		NAS30		NAS30			NAS3, 5, 19, 26, 30
Wildfire	NAS2, 30		NAS30		NAS30			NAS3, 5, 19, 26, 30
Drought	NAS2, 30	NAS14	NAS25		NAS15			NAS3, 5, 19, 26, 30
Coastal Erosion	NAS30		NAS30		NAS30			NAS3, 5, 19, 26, 28, 30

a. See the introduction to this volume for explanation of mitigation types.

18.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- **Nassau Bay Municipal Code** — The municipal code was reviewed for the full capability assessment and for identifying opportunities for action plan integration.
- **Nassau Bay Flood Damage Prevention Ordinance** — The flood damage prevention ordinance was reviewed for compliance with the National Flood Insurance Program.
- **Texas Water Development Board –** Repetitive Loss property report

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.

Nassau Bay

Critical Facilities

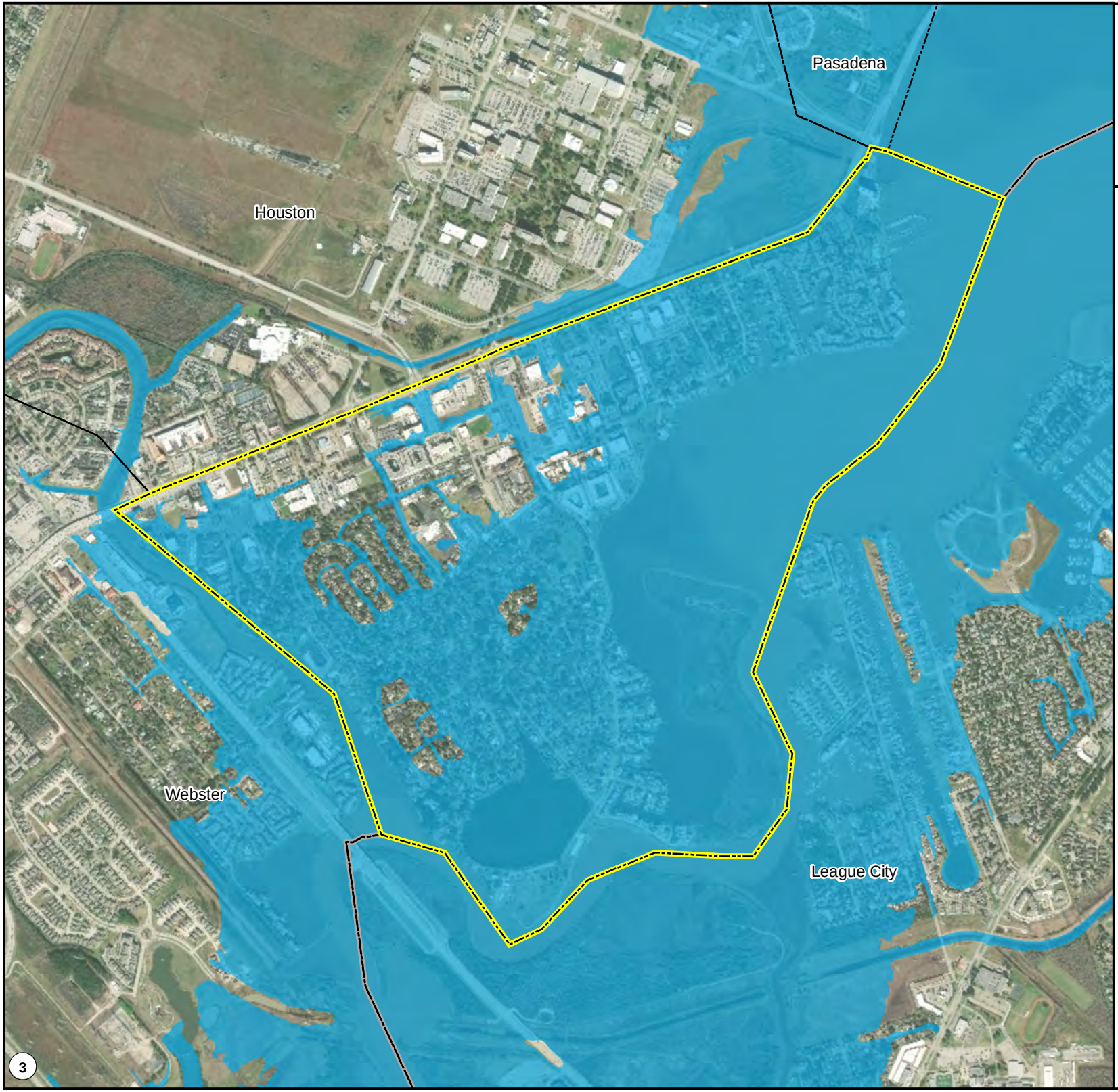
- Education Facilities
- Emergency Services
- Government Facilities
- Hazardous Material Sites
- Health and Medical Facilities
- Historical and Cultural Sites
- Transportation Systems
- Utility Systems
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles



Nassau Bay

FEMA Flood Hazard

1% Annual Chance Flood (100-yr)

Incorporated Cities

Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles

Nassau Bay

Flood Hazard
Hurricane Harvey

Flooding Extent

Incorporated Cities

Harris County

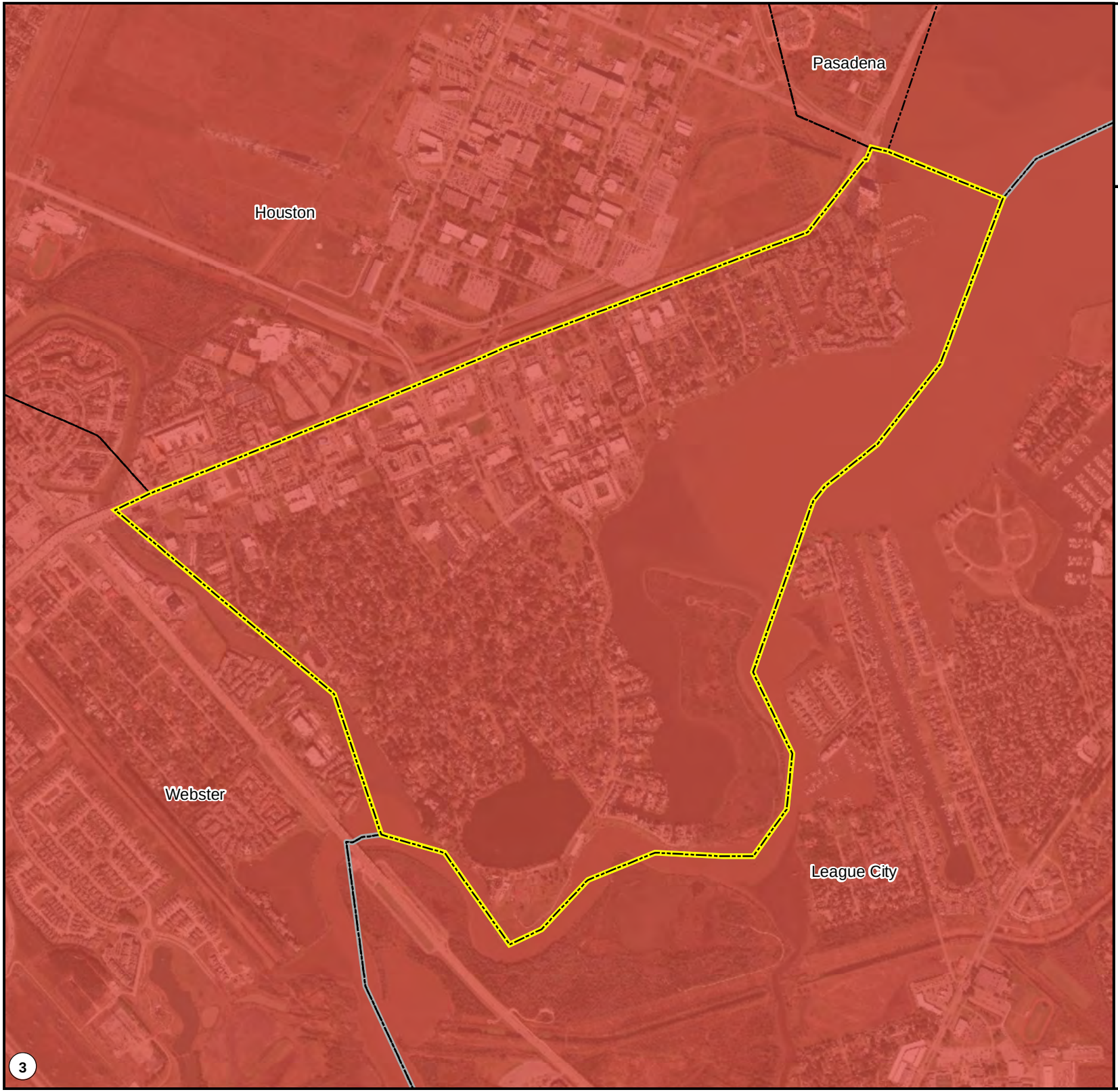
Note: Flooding extent shown for Hazard Mitigation Plan planning area only.

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles



Nassau Bay

Hurricane Alicia (1983)

Peak WInd Gust (mph)

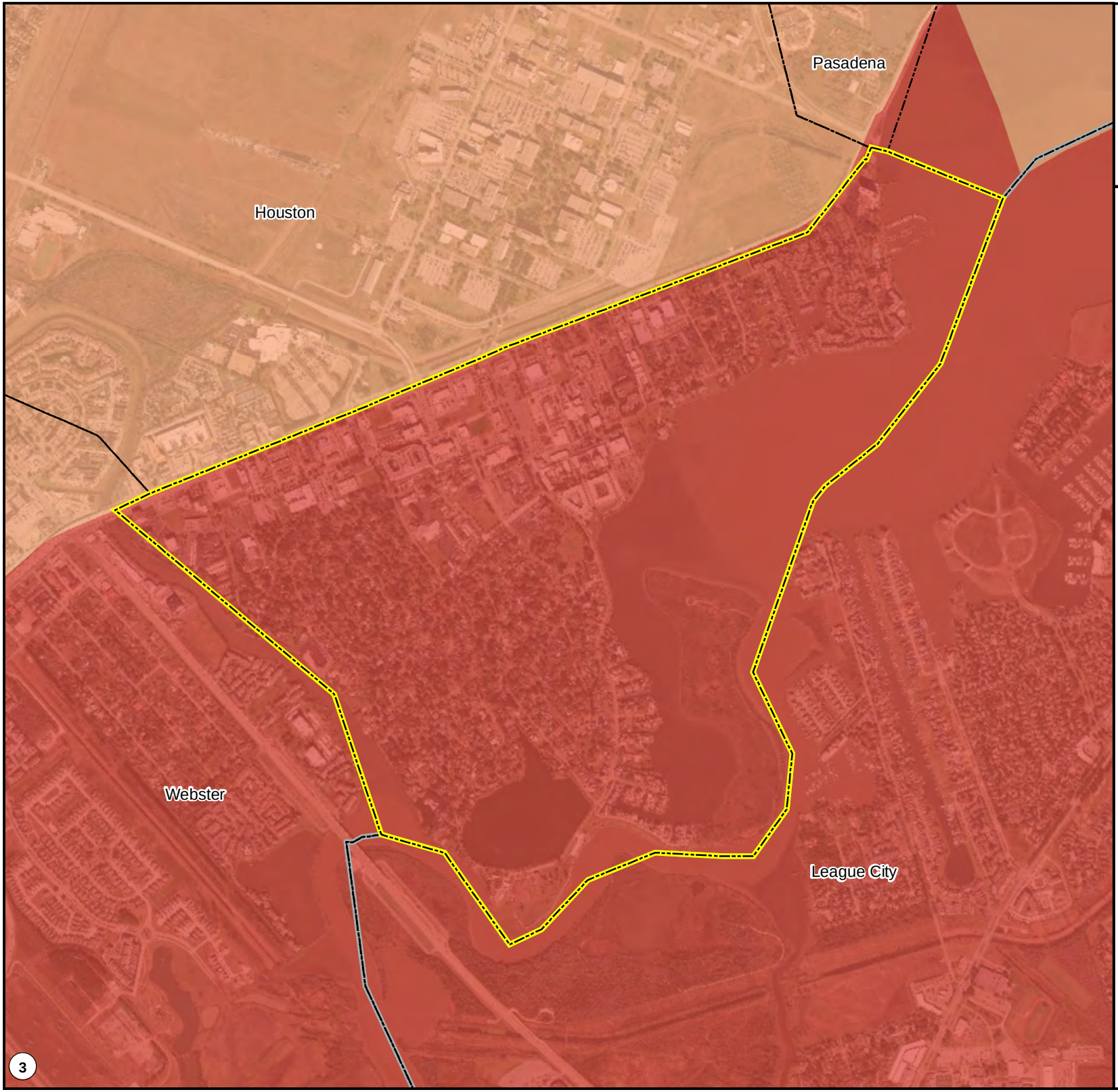
- 87 - 94
- 95 - 98
- 99 - 101
- 102 - 104
- 105 - 110
- Storm Track
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles



Nassau Bay

20-year Probabilistic Hurricane

Peak Wind Gust (mph)

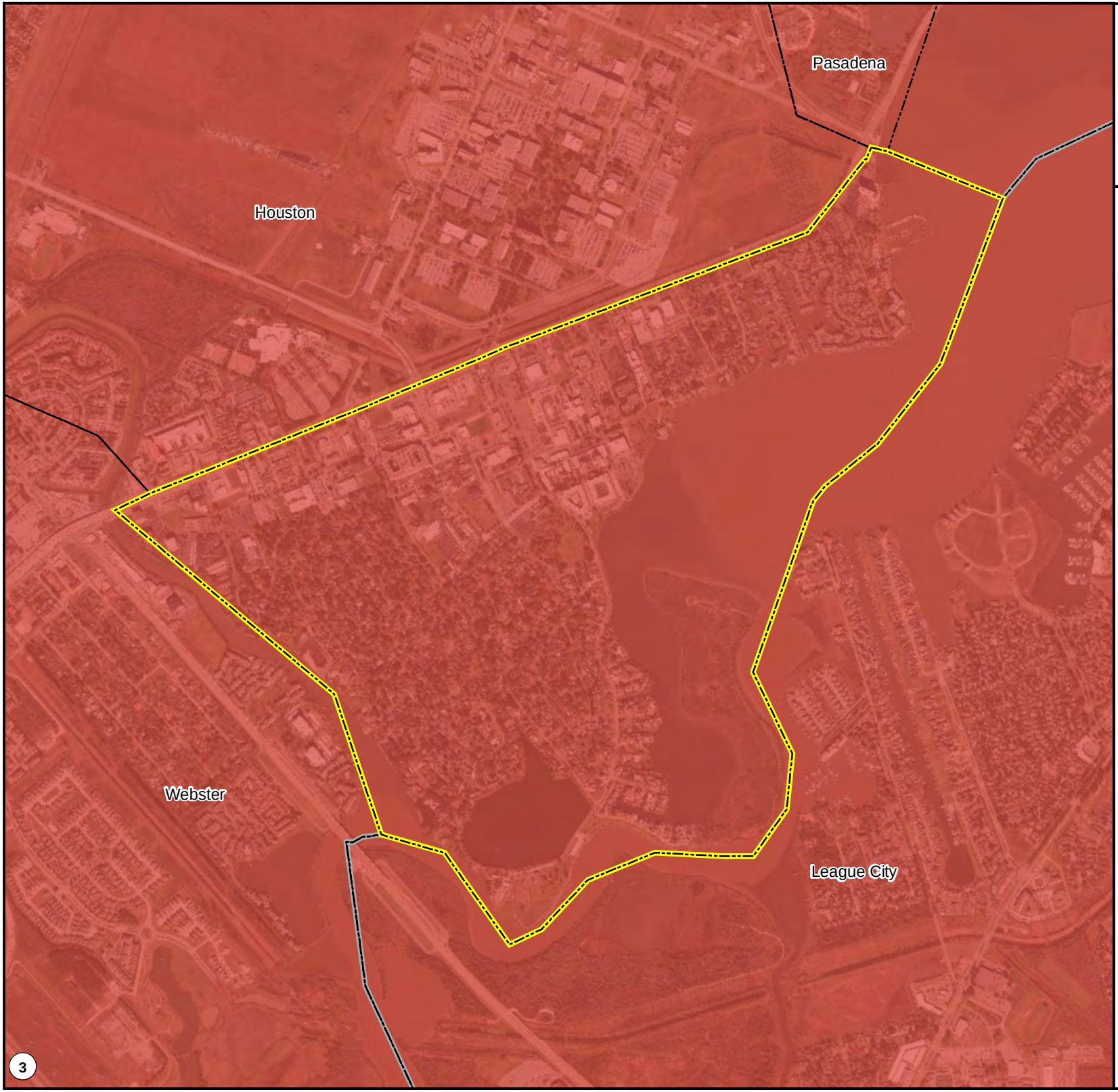
- 63 - 71
- 72 - 76
- 77 - 80
- 81 - 84
- 85 - 92
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles



Nassau Bay

100-year Probabilistic Hurricane

Peak Wind Gust (mph)

- 89 - 101
- 102 - 106
- 107 - 111
- 112 - 117
- 118 - 128
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles

Nassau Bay

Wildfire Ignition Density

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles

Nassau Bay

Wildfire Threat

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles

19. CITY OF PASADENA

19.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
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Pasadena, Texas 77506
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19.2 JURISDICTION PROFILE

19.2.1 Location

The City of Pasadena is located in southeast Harris County and has a population of 153,520, making it the second-largest city in the region. The City encompasses an area of 55 square miles.

19.2.2 History

Pasadena was founded in 1893 by John H. Burnett of Galveston, who named the area after Pasadena, California, because of the perceived lush vegetation. The La Porte, Houston and Northern Railroad was built through the town site in 1894 and opened the area for development as a farming community. Transition from a farming economy to an industrial one did not occur until the late 1930s, when the war in Europe spurred a major increase in the ship-channel industries.

19.2.3 Climate

The climate of the City of Pasadena is characterized by hot, humid summers and mild to cool winters.

19.2.4 Governing Body Format

The City of Pasadena operates under a Strong Mayor-Council form of government with a mayor and eight council members. The City of Pasadena assumes responsibility for the adoption of this plan; the Office of Emergency Management will oversee its implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 19-1.

Table 19-1. Local Mitigation Planning Team Members

Name	Title
Frank Bengochea	Emergency Management Coordinator
Azell Carter	Deputy Emergency Management Coordinator
Erik Sweet	Emergency Management Planner
Sarah Benavidez	Sr Assistant City Engineer
Deanna Schmidt	Director of Planning
Michelle Janise	Building Official

19.3 CURRENT TRENDS

19.3.1 Population

According to US Census July 1, 2017, (V2017), the population of Pasadena as of July 1, 2017 was 153,520. Since April 1, 2010, the population has grown at an average annual rate of 2.8 percent.

19.3.2 Development

Pasadena has experienced significant growth along Sam Houston Parkway in the last decade. Growth in new development is expected to slow as Pasadena nears buildout. The remaining large parcels are located in the Industrial Districts. These parcels will likely develop as port-related warehousing. Future economic growth will be driven by redevelopment of older neighborhoods and commercial centers.

Table 19-2 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

19.4 CAPABILITY ASSESSMENT

The City of Pasadena performed an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities is presented in Table 19-3.
- Development and permitting capabilities are presented in Table 19-4.
- An assessment of fiscal capabilities is presented in Table 19-5.
- An assessment of administrative and technical capabilities is presented in Table 19-6.
- An assessment of education and outreach capabilities is presented in Table 19-7.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 19-8.
- Classifications under various community mitigation programs are presented in Table 19-9.
- The community's adaptive capacity for the impacts of climate change is presented in Table 19-10.

Findings of the capability assessment were reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table included in the action plan for this annex identifies these as community capacity building mitigation actions.

Table 19-2. Recent and Expected Future Development Trends

Criterion	Response
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan? • **If yes, give the estimated area annexed and estimated number of parcels or structures.**	Yes 270 acres
Is your jurisdiction expected to annex any areas during the performance period of this plan? • **If yes, describe land areas and dominant uses.** • **If yes, who currently has permitting authority over these areas?**	Yes 107 acres – commercial development Harris County
Are any areas targeted for development or major redevelopment in the next five years? • **If yes, briefly describe, including whether any of the areas are in known hazard risk areas**	Yes (1) Areas recently and planned to be annexed are with the 100-year flood plain. These areas will be developed as large industrial warehousing. (2) Approximately, 100-acres targeted for redevelopment in Historic Pasadena near City Hall Is not in a known hazard risk area. (3) Approximately 200 acres are targeted for redevelopment near the Convention Center. Approximately one-half of the area to be developed is in the 500-year flood plain.

How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?

	2014	2015	2016	2017	2018
Single Family	77	119	99	54	129
Multi-Family	0	0	0	0	0
Other (commercial, mixed use, etc.)	69	75	89	71	57
Total	**146**	**194**	**188**	**125**	**186**

Provide the number of new-construction permits for each hazard area or provide a qualitative description of where development has occurred.	• Special Flood Hazard Areas: Single family: 80 (2014-2018), Multi-family: 29 (2014-2018), Other: 46 (2014-2018) • Landslide: N/A • High Liquefaction Areas: N/A • Tsunami Inundation Area: N/A • Wildfire Risk Areas: N/A
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	The City does not maintain a buildable lands inventory. Parcels available for development are dispersed throughout the City and most are less than 10 acres in size and of outside of the Industrial Districts. Within the Industrial Districts, larger parcels will likely develop as port- or petrochemical related industry.

Table 19-3. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code	Yes	No	No	No
Comment: Pasadena Code of Ordinances – Chapter 9 – Buildings and General Building				
Zoning Code	No	No	No	No
Comment: The City of Pasadena does not have zoning but regulates some land uses				
Subdivisions	Yes	No	Yes	No
Comment: State of Texas/Subdivision regulations conform to Texas State law				
Stormwater Management	Yes	No	Yes	No
Comment: State of Texas and FEMA/All storm water management city ordinances meet or exceed local, state, and federal requirements				
Post-Disaster Recovery	No	No	No	No
Comment:				
Real Estate Disclosure	No	No	No	No
Comment:				
Growth Management	No	No	No	No
Comment:				
Site Plan Review	Yes	No	No	No
Comment: The review is limited to being a part of the building permit process				
Environmental Protection	Yes	Yes	Yes	No
Comment: Local ordinances, TCEQ, and EPA				
Flood Damage Prevention	Yes	Yes	Yes	No
Comment: Local flood damage prevention ordinance, Texas water Development Board, and FEMA				
Emergency Management	Yes	Yes	Yes	No
Comment: Texas Local Government Code 418				
Climate Change	No	No	No	No
Comment:				
Other	No	No	No	No
Comment:				
Planning Documents				
General Plan	No	No	No	No
Comment: N/A				
Capital Improvement Plan	Yes	No	No	No
How often is the plan updated? Annually ***Comment:*** This is a 5-year plan				
Disaster Debris Management Plan	Yes	No	No	No
Comment: *Contracts are reviewed on an annual basis and the plan is updated every five years, last Updated 5/13/2018*				
Floodplain or Watershed Plan	Yes	Yes	No	No
Comment: FEMA. The city has a floodplain management which is updated as necessary				
Stormwater Plan	Yes	No	No	No
Comment: *Pasadena Code of Ordinances – Chapter 37*				
Urban Water Management Plan	No	No	No	No
Comment:				
Habitat Conservation Plan	No	No	No	No
Comment:				
Economic Development Plan	Yes	No	No	No
Comment: *The Pasadena Economic Development Corporation coordinates economic development.*				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Shoreline Management Plan	No	No	No	No
Comment:				
Community Wildfire Protection Plan	No	No	No	No
Comment:				
Forest Management Plan	No	No	No	No
Comment:				
Climate Action Plan	No	No	No	No
Comment:				
Comprehensive Emergency Management Plan	Yes	No	Yes	No
Comment: The State of Texas and The Department of Homeland Security. The city has a THIRA. It is mandated that the city has a THIRA since we accept UASI and Homeland Security grant funds.				
Threat & Hazard Identification & Risk Assessment (THIRA)	Yes	Yes	Yes	No
Comment: Department of Homeland Security. The city has a THIRA. It is mandated that the city has a THIRA since we accept UASI and Homeland Security grant funds.				
Post-Disaster Recovery Plan	No	No	No	No
Comment:				
Continuity of Operations Plan	Yes	Yes	Yes	No
Comment: Department of Homeland Security. The city has a THIRA. It is mandated that the city has a THIRA since we accept UASI and Homeland Security grant funds.				
Public Health Plan	Yes	Yes	Yes	No
Comment: Harris County Public Health Department. The state of Texas mandates that the city has a public Health Plan.				

Table 19-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • **If no, who does? If yes, which department?**	Yes Permit Department
Does your jurisdiction have the ability to track permits by hazard area?	Yes
Does your jurisdiction have a buildable lands inventory?	No

Table 19-5. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes – (If yes, specify) Water and Sewer: Connection and Usage fees. Gas and Electric: private utility company (N/A)
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	No
Incur Debt through Private Activity Bonds	No
Withhold Public Expenditures in Hazard-Prone Areas	No
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	No

Table 19-6. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Public Works /Engineering
Engineers or professionals trained in building or infrastructure construction practices	Yes	Public Works /Engineering
Planners or engineers with an understanding of natural hazards	Yes	Public Works /Engineering
Staff with training in benefit/cost analysis	Yes	Public Works /Engineering
Surveyors	No	N/A
Personnel skilled or trained in GIS applications	Yes	Public Works /Engineering
Scientist familiar with natural hazards in local area	No	N/A
Emergency manager	Yes	Office of Emergency Management
Grant writers	Yes	Multiple City Debarments
Other	No	N/A

Table 19-7. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • If yes, briefly describe.	Yes https://www.pasadenatx.gov/185/Emergency-Management
Do you use social media for hazard mitigation education and outreach? • If yes, briefly describe.	No The OEM has a social media account that is used for outreach but is not used for education.
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • If yes, briefly describe.	No N/A
Do you have any other programs already in place that could be used to communicate hazard-related information? • If yes, briefly describe.	Yes The city annually host a Hurricane Workshop for the citizens of Pasadena.
Do you have any established warning systems for hazard events? • If yes, briefly describe.	Yes The city has 15 sirens that will be activated if a hazard event/incident occurs or is detected.

Table 19-8. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Public Works/Engineering
Who is your floodplain administrator? (department/position)	Public Works Director
Are any certified floodplain managers on staff in your jurisdiction?	Yes
What is the date that your flood damage prevention ordinance was last amended?	2017
Does your floodplain management program meet or exceed minimum requirements? • **If exceeds, in what ways?**	Exceeds 1ft free board requirement
When was the most recent Community Assistance Visit or Community Assistance Contact?	2017
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • **If so, state what they are.**	No N/A
Are any RiskMAP projects currently underway in your jurisdiction? • **If so, state what they are.**	No N/A
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • **If no, state why.**	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? • **If so, what type of assistance/training is needed?**	No
Does your jurisdiction participate in the Community Rating System (CRS)? • **If yes, is your jurisdiction interested in improving its CRS Classification?** • **If no, is your jurisdiction interested in joining the CRS program?**	Yes Yes N/A
How many flood insurance policies are in force in your jurisdiction?[a] • **What is the insurance in force?** • **What is the premium in force?**	9,819 $2,836,961,900 Varies
How many total loss claims have been filed in your jurisdiction?[a] • **How many claims are still open or were closed without payment?** • **What were the total payments for losses?**	7,122 1,597 $190,750,863.00

a. According to FEMA statistics as of September 2018

Table 19-9. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	Yes	Class 5	10/1/14
Building Code Effectiveness Grading Schedule	Yes	9	2016
Public Protection	Yes	Class 1	1/1/19
Storm Ready	Yes	Storm Ready	12/22/05
Firewise	No	N/A	N/A

Table 19-10. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:***	Low
Jurisdiction-level monitoring of climate change impacts ***Comment:***	Low
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:***	Low
Participation in regional groups addressing climate risks ***Comment:***	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	Low
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	Low
Identified strategies for adaptation to impacts ***Comment:***	Low
Champions for climate action in local government departments ***Comment:***	Low
Political support for implementing climate change adaptation strategies ***Comment:***	Low
Financial resources devoted to climate change adaptation ***Comment:***	Low
Local authority over sectors likely to be negative impacted ***Comment:***	Low
Public Capacity	
Local residents knowledge of and understanding of climate risk ***Comment:***	Low
Local residents support of adaptation efforts ***Comment:***	Low
Local residents' capacity to adapt to climate impacts ***Comment:***	Low
Local economy current capacity to adapt to climate impacts ***Comment:***	Low
Local ecosystems capacity to adapt to climate impacts ***Comment:***	Low

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

19.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning and capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

19.5.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- **Basic Plan —** The Basic Plan provides a summary on the hazards and threats in the community.
- **Annex P — Hazard Mitigation** is assigned to the Engineering Department and addresses the hazards and threats in the community. The Annex also identifies the various hazard mitigation related programs implemented in the City of Pasadena and which agencies are responsible for administration.
- **Master Drainage Plan —** The City of Pasadena developed a drainage plan in 2018 that identifies several drainage projects related to flood mitigation and the identified projects have been integrated into the Hazard Mitigation Action Plan.
- **Flood Mitigation Plan** — The City of Pasadena developed a flood mitigation plan in 2016 that followed the CRS floodplain management planning process and several of the identified projects have been integrated into the Hazard Mitigation Action Plan.

19.5.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- **Capital Improvement Plan** — The City of Pasadena updates the CIP on an annual basis and can integrate the goals, objectives, and projects identified in the Hazard Mitigation Action Plan into the CIP process.
- **Comprehensive Plan** — The Pasadena Planning Department and the Pasadena Economic Development Corporation will develop a new overall plan to document existing conditions and establish goals for the future.
- **Master Parks Plan —** The parks plan creates a vision for the city's park system and makes recommendations for improvements and open-space preservation.

19.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 19-11 lists past occurrences of natural hazards for which specific damage was recorded in the City of Pasadena. Other hazard events that broadly affected the entire planning area, including the City of Pasadena, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 19-11. Past Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Severe Storms & Street Flooding	N/A	May 7-11. 2019	Not Available
Tornado (F1)	N/A	April 7, 2019	$500,000
Severe Storms & Street Flooding	N/A	January 3, 2019	Not Available

Type of Event	FEMA Disaster #	Date	Damage Assessment
Severe Storms & Street Flooding	N/A	December 6-7, 2018	Not Available
Severe Storms & Street Flooding	N/A	October 31,2018	Not Available
Severe Storms & Street Flooding	N/A	July 3, 2018	Not Available
Severe Storms & Street Flooding	N/A	March 28, 2018	Not Available
Ice and Snow Storm	N/A	January 16-17-2018	Not Available
Hurricane (Harvey)	4332 DR	August 22- September 4, 2017	$50,000,000
Heat	N/A	July 28, 2017	Not Available
Tornado (F2)	N/A	March 29 , 2017	$1,000,000
Severe Storms & Street Flooding	N/A	February 14, 2017	Not Available
Severe Storms & Street Flooding	N/A	June 2, 2016	Not Available
Severe Storms & Street Flooding	4272 DR	May 27, 2016	Not Available
Severe Storms & Street Flooding	4269 DR	April 18, 2016	Not Available
Hail	N/A	March 18, 2016	Not Available
Severe Storms & Street Flooding	N/A	March 8, 2016	Not Available
Tornado (F2)	4245 DR	October 31, 2015	$5,000,000
Severe Storms & Street Flooding	N/A	August 11, 2015	Not Available
Heat	N/A	August 7, 2015	Not Available
Severe Storms & Street Flooding	4223 DR	May 25-26, 2015	Not Available
Severe Storms & Street Flooding	4223 DR	May 12, 2015	Not Available
Severe Storms & Street Flooding	N/A	April 16-17, 2015	Not Available
Severe Storms & Street Flooding	N/A	September 16, 2014	Not Available
Severe Storms & Street Flooding	N/A	August 01, 2014	$100,000
Severe Storms & Street Flooding	N/A	May 28, /2014	Not Available
Severe Storms & Street Flooding	N/A	October 31, 2013	Not Available
Severe Storms & Street Flooding	N/A	May 10, 2013	$5,000
Severe Storms & Street Flooding	N/A	April 27, 2013	Not Available
Severe Storms & Street Flooding	N/A	May 12, 2012	Not Available
Severe Storms & Street Flooding	N/A	January 25, 2012	Not Available
Severe Storms & Street Flooding	N/A	January 09, 2012	Not Available
Severe Storms & Street Flooding	N/A	July 02, 2010	Not Available
Severe Storms & Street Flooding	N/A	October 22, 2009	$4,000
Severe Storms & Street Flooding	N/A	April 28, 2009	$1,000,000
Severe Storms & Street Flooding	N/A	April 24, 2009	$1,000,000
Severe Storms & Street Flooding	N/A	April 18, 2009	$3,500,000
Hurricane (Ike)	1791 DR	September 12-14, 2008	$150,000,000
Hurricane (TS Erin)	N/A	August 16, 2007	$750,000
Severe Storms & Street Flooding	N/A	June 19, 2006	$3,300,000
Hurricane (Rita)	1606 DR	September 24-25, 2005	$5,000,000
Severe Storms & Street Flooding	N/A	December 14, 2005	$40,000
Severe Storms & Street Flooding	N/A	July 14, 2005	Not Available
Severe Storms & Street Flooding	N/A	November 17, 2003	$3,000,000
Severe Storms & Street Flooding	N/A	August 31, 2003	$3,000
Severe Storms & Street Flooding	N/A	October 28, 2002	$775,000
Severe Storms & Street Flooding	N/A	October 24, 2002	Not Available

Type of Event	FEMA Disaster #	Date	Damage Assessment
Severe Storms & Street Flooding	N/A	September 08, 2002	$15,000
Severe Storms & Street Flooding	N/A	August 15, 2002	Not Available
Severe Storms & Street Flooding	N/A	April 08, 2002	$70,000
Severe Storms & Street Flooding	N/A	August 28-31, 2001	Not Available
Hurricane (TS Allison)	N/A	June 06, 2001	$5,000,000
Severe Storms & Street Flooding	N/A	September 13, 2000	Not Available
Severe Storms & Street Flooding	N/A	October 04, 1998	$5,000
Severe Storms & Street Flooding	N/A	September 14, 1998	$5,000
Hurricane (TS Frances)	N/A	September 11, 1998	$5,000,000
Severe Storms & Street Flooding	N/A	January 04, 1998	$3,000
Severe Storms & Street Flooding	N/A	December 20, 1997	$20,000
Severe Storms & Street Flooding	N/A	May 30, 1997	Not Available
Severe Storms & Street Flooding	N/A	May 24, 1997	Not Available
Severe Storms & Street Flooding	N/A	April 04, 1997	Not Available
Severe Storms & Street Flooding	N/A	January 27, 1997	Not Available
Severe Storms & Street Flooding	N/A	September 27, 1996	Not Available
Severe Storms & Street Flooding	N/A	September 18, 1996	$1,500,000
Severe Storms & Street Flooding	1041 DR	October 16-18, 1994	$50,000,000
Severe Storms & Street Flooding	N/A	March 1992	Not Available

19.7 HAZARD RISK RANKING

Table 19-12 presents a local ranking for City of Pasadena of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 19-12. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Severe Weather	48	High
1	Flooding	48	High
2	Hurricane	34	High
3	Wildfire	29	Medium
3	Drought	29	Medium
4	Earthquake	14	Low
4	Tsunami	14	Low
5	Dam Failure	2	Low
5	Mass Movement	2	Low
6	Coastal Erosion	0 (No Exposure)	None
6	Tsunamio	0 (No Exposure)	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

19.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. This section provides information on a few key vulnerabilities for the jurisdiction. Available jurisdiction-specific risk maps of the hazards are provided at the end of this annex.

19.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: 402
- Number of FEMA-identified Severe-Repetitive-Loss Properties: 108
- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated: 94

19.8.2 Other Noted Vulnerabilities

The following jurisdiction-specific issues have been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- One of the City's wastewater treatment plants is located in an area that is likely to be inundated by a Hurricane Storm Surge and or flooding on Armand Bayou.
- Due to the City's proximity to chemical plants and refineries along the Ship Channel, Pasadena has a high risk to environmental and hazardous materials incidents due to impacts cause by natural and human-caused hazards.

Mitigation actions addressing these issues were prioritized for consideration in the action plan for this annex.

19.9 STATUS OF PREVIOUS PLAN ACTIONS

Table 19-13 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

Table 19-13. Status of Previous Plan Actions

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
2018PASDNA001 Right of Way Mitigation Projects			X	PAS8
Comments: Started in 2018 – Some projects are dependent upon future grant opportunities.				
2018 PASDNA002 Golden Acres Wastewater Treatment Plant Elimination			X	PAS8
Comments: Not Started and dependent upon future grant opportunities.				
2014PASDNA001 Improve critical infrastructure/public buildings and /or shelters to harden against hurricanes effects, retrofit with impact and wind resistant glass and shutter systems, surge protectors and lightening protection.			X	PAS5
Comments: Ongoing project – hardening of facilities will be combined into a single action item in the 2020 update.				
2014PASDNA002 Improve manufactured homes standards/codes to include tie-downs or anchorage.			X	PAS5
Comments: Ongoing project – dependent upon future grant opportunities				

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
2014PASDNA003 Develop a Wildfire Public Education/Outreach Program to educate residents on wildfire hazards and actions to minimize fire/smoke damage to property.			X	PAS9
Comments: Ongoing project – dependent upon future grant opportunities				
2014PASDNA004 Expand warning system (sirens, mass notification and reverse 911) to provide hazard awareness and alerts to mitigate all hazards and increase coverage of the community's population.			X	PAS6
Comment: Ongoing project – will combine into a single all - hazards warning and alert project in 2020 update.				
2014PASDNA005 Improve safe room shelters to meet wind specifications			X	PAS5
Comments: Not Started and dependent upon future grant opportunities.				
2014PASDNA006 Install retention ponds at selected facilities and geographic locations to collect non-potable water for irrigation and sprinkler system usage.			X	PAS10
Comments: Not Started and dependent upon future grant opportunities.				
2014PASDNA007 Improve public facility emergency power to provide adequate cooling for use as cooling centers.			X	PAS7
Comments: Ongoing project – will combine heating and cooling centers projects in 2020 update into a single action Item				
2014PASDNA008 Establish grant program to provide cooling equipment (fans, window A/C's, etc.) to low to- moderate income (LMI) population.			X	PAS7
Comments: Ongoing project – will combine heating and cooling centers projects in 2020 update into a single action Item				
2014PASDNA009 Upgrade heating systems and emergency power capacity at public facilities for use as warming centers.			X	PAS7
Comments: Ongoing project – will combine heating and cooling centers projects in 2020 update into a single action Item				
2014PASDNA010 Establish grant program to provide heating equipment to low-to-moderate income (LMI) population.			X	PAS7
Comments: Ongoing project – will combine heating and cooling centers projects in 2020 update into a single action Item				
2014PASDNA011 Expand community warning system to include direct notification to local business community during hazardous materials incidents.			X	PAS6
Comments: Ongoing project – will combine into a single all - hazards warning and alert project in 2020 update.				
2014PASDNA012 Retrofit critical infrastructure facilities with positive pressure ventilation systems and HVAC emergency shutdown mechanism for shelter-in-place capability.			X	PAS5
Comments: Ongoing project – dependent upon future grant opportunities				
2014PASDNA013 Establish ordinance to require shutoff valves at entry and exit points of city limits.		X		
Comment: Remove Action Item. No longer feasible and regulated by State and Federal agencies.				
2014PASDNA014 Improve ordinances requiring fortified spill containment and engineered anchoring systems on aboveground storage tanks (AST).			X	PAS10
Comments: Ongoing project – dependent upon future grant opportunities				
2014PASDNA015 Expand community warning system like mass notification, reverse 911, sirens, etc. to include coverage to warn flood-prone areas during dam/levee failure.			X	PAS6
Comments: Ongoing project – will combine into a single all - hazards warning and alert project in 2020 update.				
2014PASDNA016 Create mapping/identification of inundation risk areas from dam/levee failure.		X		PAS9
Comments: Remove Item Pasadena is not in a risk area for a Dam failure.				

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
2010PASDNA002 Improve drainage easements by expanding the slopes, banks and drainage structures.			X	PAS8
Comments: Ongoing project – *dependent upon future grant opportunities.*				
2010PASDNA004 Develop a Public Education Program on flood risk and Community Rating System (CRS) to educate public on action to minimize damage to human life and personal property from floods.			X	PAS4
Comments: Ongoing project – dependent upon future grant opportunities				
2010PASDNA005 Expand and protect current bayou environment associated with riverine flood to mitigate city's threat from flooding.			X	PAS8
Comments: Ongoing project – dependent upon future grant opportunities				
2010PASDNA006 Construction of floodwalls, detention and retention basins, spillways and other related Structures			X	PAS8
Comments: : Ongoing project – dependent upon future grant opportunities.				
2010PASDNA008 Burying power lines			X	
Comments: On going, dependent upon future grant opportunities				
2010PASDNA009 Construction of safe rooms				PAS5
Comments: Not Started and dependent upon future grant opportunities.				
2010PASDNA014 Heating and cooling requirements Implement and adopt city code to require housing landlords to ensure minimum and maximum temperatures be sustained for a minimum period of time to limit the effects of extreme heat and extreme cold.		X		
Comments: No Longer Feasible				
2010PASDNA015 Establish and harden Heating and cooling centers to reduce exposure and the effects of extreme heat and winter storms.			X	PAS7
Comments: Comments: Ongoing project – will combine heating and cooling centers projects in 2020 update into a single action Item				
2010PASDNA016 Develop Buffer Zones/defensible space by GIS Mapping of areas to reduce impact of wildfires.			X	PAS9
Comments: Ongoing project – dependent upon future grant opportunities				
2010PASDNA019 Establish facilities to serve as winter heating centers for animal/livestock.			X	PAS7
Comments: Comments: Ongoing project – will combine heating and cooling centers projects in 2020 update into a single action Item				
2010PASDNA020 Hazardous material disposal			X	PAS10
Comments: Ongoing project – dependent upon future grant opportunities				
2010PASDNA021 Security provisions and plans for man-made threats to facilities			X	PAS10
Comments: Ongoing project – dependent upon future grant opportunities				
2010PASDNA022 Develop and practice an emergency plan for handling transportation accidents involving radiological materials			X	PAS10
Comments: Ongoing project – dependent upon future grant opportunities				
2010PASDNA023 Procure and utilize responder personal protective equipment and detection instruments			X	PAS10
Comments: Ongoing project – dependent upon future grant opportunities				
2010PASDNA027 Digging Hotlines	X			
Comments: 811 Dig Lines is fully implemented in the City of Pasadena				
2010PASDNA028 Protective shelters for Response vehicles			X	PAS5
Comments: Ongoing project – hardening of city facilities will be combined into a single action item in the 2020 update.				

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
2010PASDNA029 Hardening roofs of vulnerable City buildings			X	PAS5
Comments: Ongoing project – hardening of facilities will be combined into a single action item in the 2020 update.				
2010PASDNA030 Install Backup power system generators to enable critical facilities to continue basic services, which can be used by critical facilities to ensure security and protect refrigerated goods.			X	PAS5
Comments: Ongoing project – hardening of facilities will be combined into a single action item in the 2020 update.				
2010PASDNA031 Fuel Facility Hardening – Harden and protect the City's fueling center against severe weather events and power outages			X	PAS5
Comments: Ongoing project – hardening of facilities will be combined into a single action item in the 2020 update.				
2010PASDNA032 Install generators for Major Intersections			X	PAS5
Comments: Ongoing project – dependent upon future grant opportunities				
2010PASDNA033 Hydrological routing			X	PAS8
Comments: On going, dependent upon future grant opportunities				
2005PASDN001 Improve and expand the community's Hurricane public education/outreach program, the annual hurricane workshop, to educate residents on appropriate actions to minimize damage from hurricanes and to reach more of the community over the next five years.			X	PAS11
Comments: On going				
2005PASDNA005 Adopt and enhance higher-standard windstorm building requirements to minimize property damage from high-winds			X	PAS5
Comments: On going, dependent upon future grant opportunities				
2005PASDNA011 Harden critical city facilities to lessen the impacts of natural and human-caused hazards.			X	PAS5
Comments: Ongoing project – hardening of facilities will be combined into a single action item in the 2020 update.				
2005PASDNA012 Implement Capital Improvement Projects to reduce flood-related impacts by installing back-up generators at key water and wastewater facilities.			X	PAS5
Comments: Ongoing, *dependent upon future grant opportunities*				

19.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 19-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 19-15 identifies the priority for each action. Table 19-16 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 19-14. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action PAS1 — Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Earthquake, flooding, landslide, tsunami, wildfire, hurricane, severe weather						
Existing	3, 4, 10	Public Works	Emergency Management	High	HMGP, PDM, FMA	Short-term
Action PAS2 — Integrate the hazard mitigation plan into other plans, ordinances and programs that dictate land use decisions in the community, including the City of Pasadena						
Hazards Mitigated: Dam failure, drought, earthquake, flooding, landslide, tsunami, wildfire						
New and Existing	1, 3, 4, 5, 7, 8, 10	Public Works	Planning	Low	Staff Time, General Funds	Ongoing
Action PAS3 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: Severe Weather, Flooding, Hurricane, Wildfire, Drought, Earthquake, Tsunami, Dam Failure, Mass Movement						
New and Existing	1, 5, 8	Emergency Management	Public Works	Low	Staff Time, General Funds	Short-term
Action PAS4 — Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements: • Enforce the flood damage prevention ordinance. • Participate in floodplain identification and mapping updates. • Provide public assistance/information on floodplain requirements and impacts.						
Hazards Mitigated: Dam failure, flooding, severe weather, tsunami, sea level rise						
New and Existing	1, 3, 5, 7, 8, 10	Public Works	Emergency Management	Low	Staff Time, General Funds	Ongoing
Action PAS5 — The hardening of critical infrastructure, public and private buildings and shelters in order to lessen the impacts of natural and human-caused hazards: • Improve critical infrastructure, public and private buildings and shelters to harden against the effects of natural and human-caused hazards including wind, flood lightning, earthquakes, fire, hazardous materials and environmental hazards. • Install backup power system generators at critical infrastructure sites including traffic intersections, water and wastewater facilities. • Improve manufactured homes standards/codes to include tie-downs or anchorage. • Critical response vehicle storage & fuel facility hardening – Build, harden and or protect the City's vehicle storage and fueling centers against severe weather events and power outages. • Improve safe room shelters to meet wind specifications. • Retrofit critical infrastructure facilities with positive pressure ventilation systems and HVAC emergency shutdown mechanism for shelter-in-place capability. • Adopt and enhance higher-standard windstorm building requirements to minimize property damage from high-winds						
Hazards Mitigated: Drought, Earthquake, Flooding, Mass Movement, Severe Weather, Hurricane, Tsunami, Wildfire						
New and Existing	1, 2, 3, 7, 8, 9, 10, 13	Public Works	Emergency Management	High	HMGP, PDM, FMA	Ongoing
Action PAS6 — Expand all hazards warning and alerting systems. • Expand warning system (sirens, mass notification and reverse 911) to provide hazard awareness and alerts to mitigate all hazards and increase coverage of the community's population. • Expand community warning system to include direct notification to local business community during hazardous materials incidents.						
Hazards Mitigated: Drought, Earthquake, Flooding, Mass Movement, Severe Weather, Hurricane, Tsunami, Wildfire						
New and Existing	1, 3, 10	Emergency Management	SERLEPC	Medium	HMGP, PDM, FMA, Local	Short Term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action PAS7 — Establish heating and cooling centers to reduce exposure and the effects of extreme heat and winter storms. • Improve public facility emergency power to provide adequate cooling for use as cooling centers. • Establish grant program to provide cooling and heating equipment to low- to moderate-income (LMI) population. • Upgrade heating systems and emergency power capacity at public facilities for use as warming centers. • Establish facilities to serve as winter heating centers for animal/livestock. *Hazards Mitigated:* Drought, Earthquake, Flooding, Mass Movement, Severe Weather, Hurricane, Tsunami, Wildfire						
New and Existing	3, 10, 15	Public Works	Emergency Management	High	HMGP, PDM	Long Term
Action PAS8 — Flood control and drainage improvements. • Improve drainage easements by expanding the slopes, banks and drainage structures. • Expand and protect current bayou environment associated with riverine flood to mitigate city's threat from flooding. • Construction of floodwalls, detention and retention basins, spillways and other related structures. • Hydrological routing • Right of Way Flood Mitigation • Projects *Golden Acres Wastewater Treatment Plant Elimination* *Hazards Mitigated:* Flooding, Severe Weather, Hurricane, Tsunami						
New and Existing	1, 2, 7, 8, 10, 12, 13	Public Works	Emergency Management	High	HMGP, PDM, FMA	Ongoing
Action PAS9 — Wildfire Prevention & Mitigation Projects by developing buffer zones/defensible space to reduce impact of wildfires. *Hazards Mitigated:* Drought, Wildfire						
New and Existing	2, 3, 6, 7, 10, 12	Planning	Emergency Management	Low	HMGP, PDM	Short Term
Action PAS10 — Man-Made and Technological Disasters Prevention and Mitigation • Security provisions and plans for man-made threats to facilities. • Develop and practice an emergency plan for handling transportation accidents involving radiological materials • Procure and utilize responder personal protective equipment and detection instruments • Improve ordinances requiring fortified spill containment and engineered anchoring systems on aboveground storage tanks (AST). • Install retention ponds at selected facilities and geographic locations to collect non-potable water for irrigation and sprinkler system usage *Hazards Mitigated:* Drought, Hazardous Materials						
New and Existing	1, 3 , 6, 10, 12	Police & Fire	Emergency Management	Medium	HMGP, PDM, FMA, Local	Short Term
Action PAS11 — Public Education and Outreach for natural and human-caused hazards. • Improve and expand the community's Hurricane public education/outreach program, the annual hurricane workshop, to educate residents on appropriate actions to minimize damage from hurricanes. • Develop a Wildfire Public Education/Outreach Program to educate residents on wildfire hazards and actions to minimize fire/smoke damage to property. • Drought, Earthquake, Flooding, Mass Movement, Severe Weather, Hurricane, Tsunami, Wildfire						
New and Existing	2, 3, 10, 12	Emergency Management	Fire	Low	HMGP, PDM, FMA, Local	Short Term
Action PAS12— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan. *Hazards Mitigated:* Severe Weather, Flooding, Hurricane, Wildfire, Drought, Earthquake, Tsunami, Dam Failure, Mass Movement						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	Pasadena	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 19-15. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
PAS1	3	High	High	Yes	Yes	No	Medium	High
PAS2	7	Medium	Low	Yes	No	Yes	High	Low
PAS3	3	Low	Low	Yes	No	Yes	High	Low
PAS4	6	Medium	Low	Yes	No	Yes	High	Low
PAS5	8	High	High	Yes	Yes	No	High	High
PAS6	3	Medium	Low	Yes	Yes	No	High	Medium
PAS7	3	High	High	Yes	Yes	No	High	High
PAS8	7	High	High	Yes	Yes	No	High	High
PAS9	6	Medium	Medium	Yes	Yes	No	Medium	Medium
PAS10	5	Medium	Medium	Yes	Yes	No	Medium	Medium
PAS11	4	Medium	Medium	Yes	Yes	No	Medium	Medium
PAS12	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 19-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Sever Weather	PAS2, 12	PAS1, PAS5	PAS4, PAS11, 12	PAS8	PAS6, 12	PAS5	PAS7	PAS3, 12
Flooding	PAS2, 12	PAS1, PAS5	PAS4, PAS11, 12	PAS8	PAS6, 12	PAS5	PAS7	PAS3, 12
Hurricane	PAS2, 12	PAS1, PAS5	PAS4, PAS11, 12	PAS8	PAS6, 12	PAS5	PAS7	PAS3, 12
Medium-Risk Hazards								
Wildfire	PAS2, 12	PAS1, PAS5	PAS4, PAS11, 12	PAS9	PAS6, 12		PAS7	PAS3, 12
Drought	PAS2, 12	PAS5	PAS4, PAS11, 12	PAS9	PAS6, PAS10, 12		PAS7	PAS3, 12
Low-Risk HazardsPAS11								
Earthquake	PAS2, 12	PAS1, PAS5	PAS11, 12		PAS6, 12	PAS5		PAS3, 12
Tsunami	PAS2, 12	PAS1, PAS5	PAS4, PAS11, 12	PAS8	PAS6, 12	PAS5	PAS7	PAS3, 12
Dam Failure	PAS2, 12	PAS5	PAS4, PAS11, 12		PAS6, 12	PAS5	PAS7	PAS3, 12
Mass Movement	PAS2, 12	PAS5	PAS11, 12		PAS6, 12	PAS5		PAS3, 12

a. See the introduction to this volume for explanation of mitigation types.

19.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

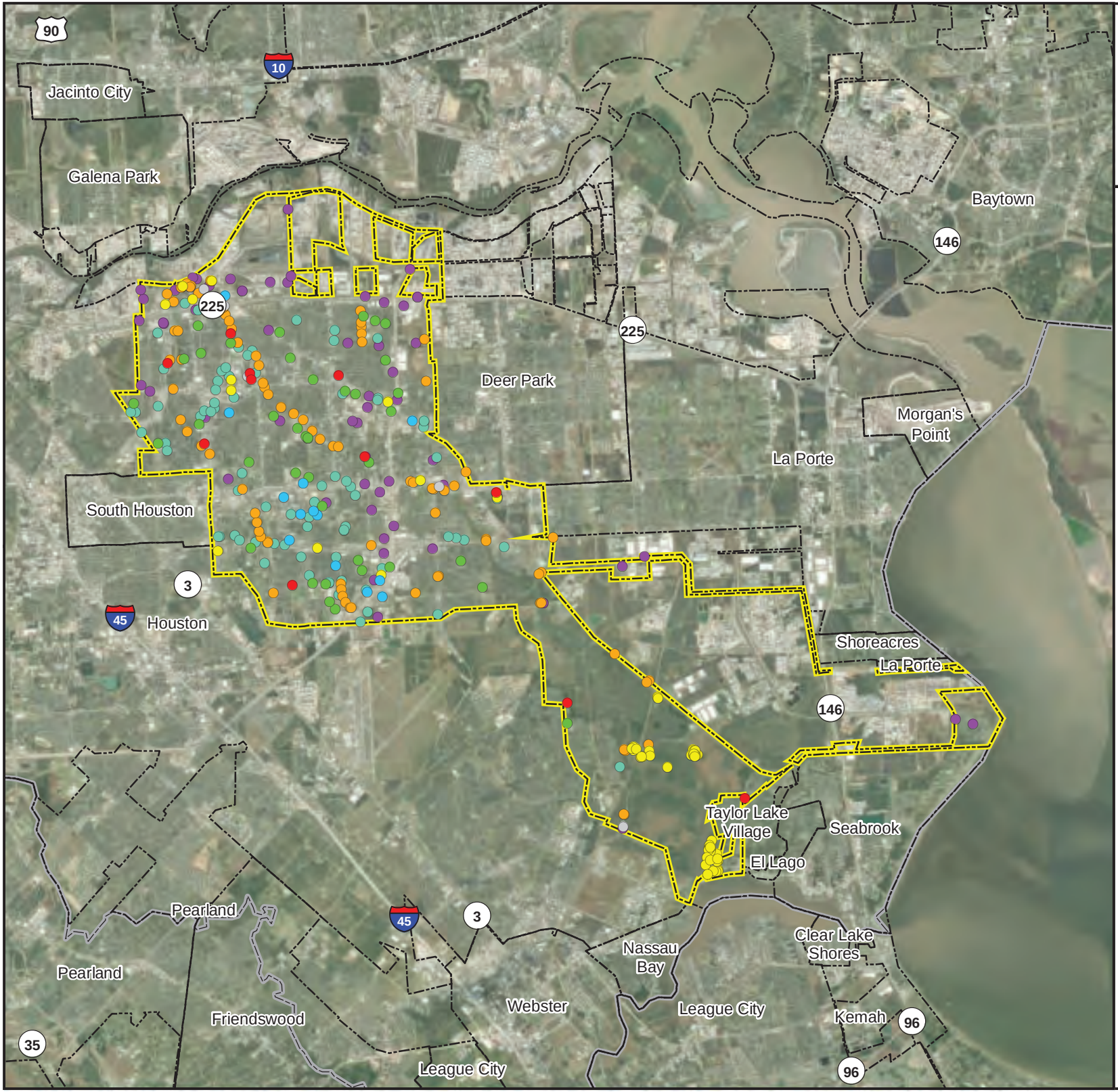
The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- **City of Pasadena Municipal Ordinance** — The municipal code was reviewed for the full capability assessment and for identifying opportunities for action plan integration.

- **City of Pasadena Flood Control & Drainage Ordinance** — The flood damage prevention ordinance was reviewed for compliance with the National Flood Insurance Program.

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.



Pasadena

Critical Facilities

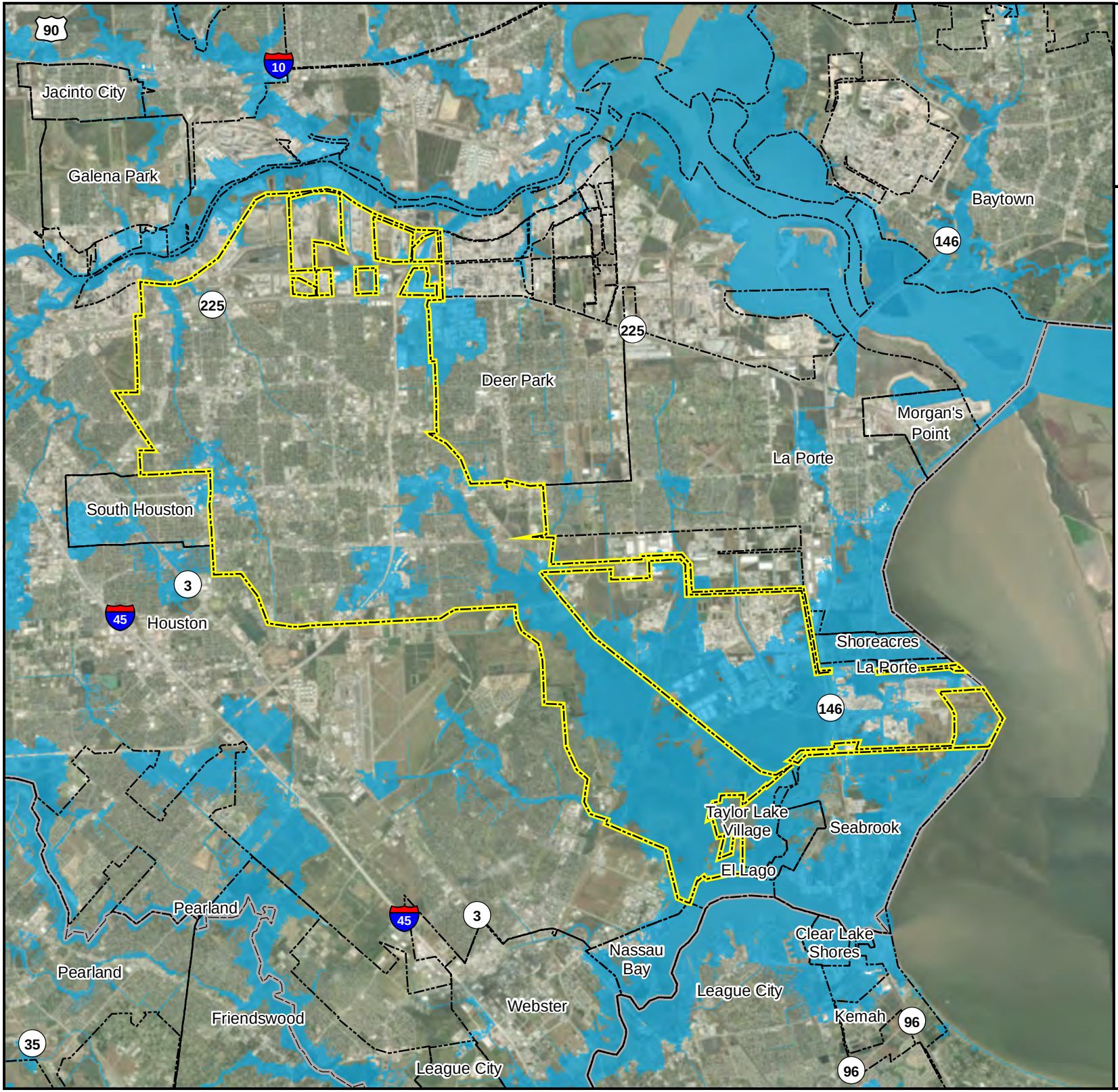
- Education Facilities
- Emergency Services
- Government Facilities
- Hazardous Material Sites
- Health and Medical Facilities
- Historical and Cultural Sites
- Transportation Systems
- Utility Systems
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.75 1.5 3 Miles



Pasadena

FEMA Flood Hazard

1% Annual Chance Flood (100-yr)

Incorporated Cities

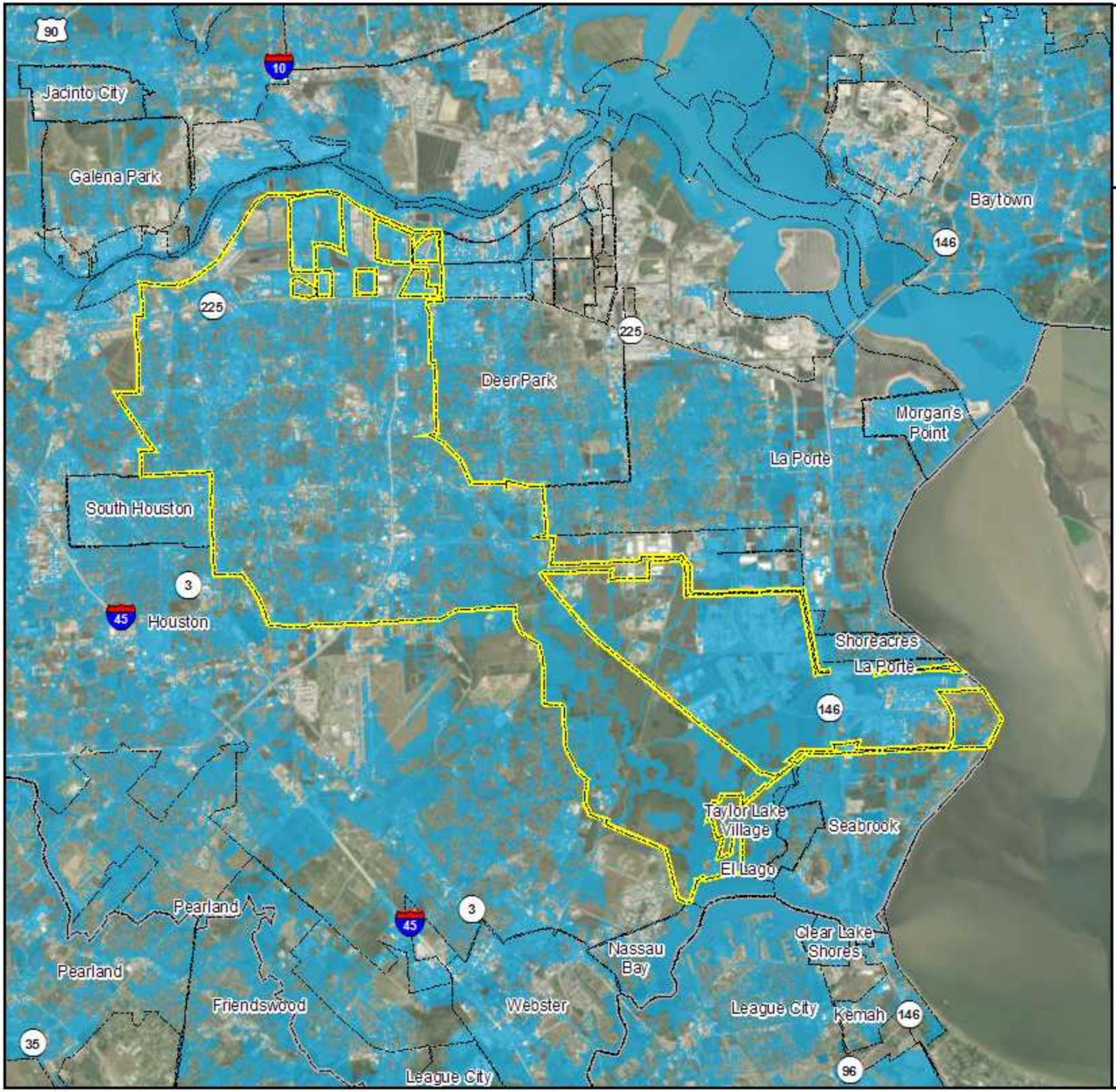
Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.75 1.5 3 Miles



Pasadena

Flood Hazard
Hurricane Harvey

Flooding Extent

Incorporated Cities

Harris County

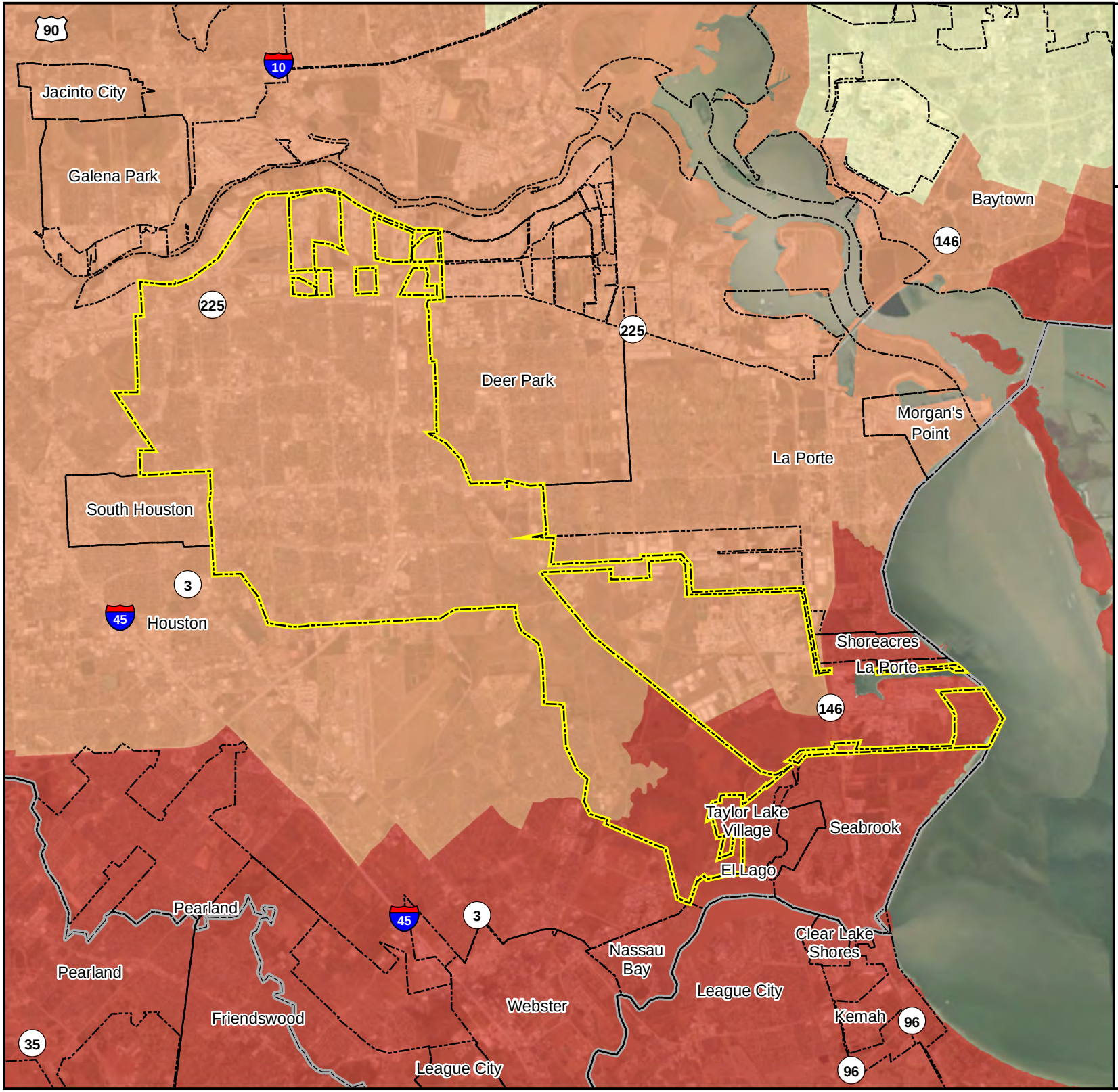
Note: Flooding extent shown for Hazard Mitigation Plan planning area only.

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.75 1.5 3 Miles



Pasadena

Hurricane Alicia (1983)

Peak WInd Gust (mph)

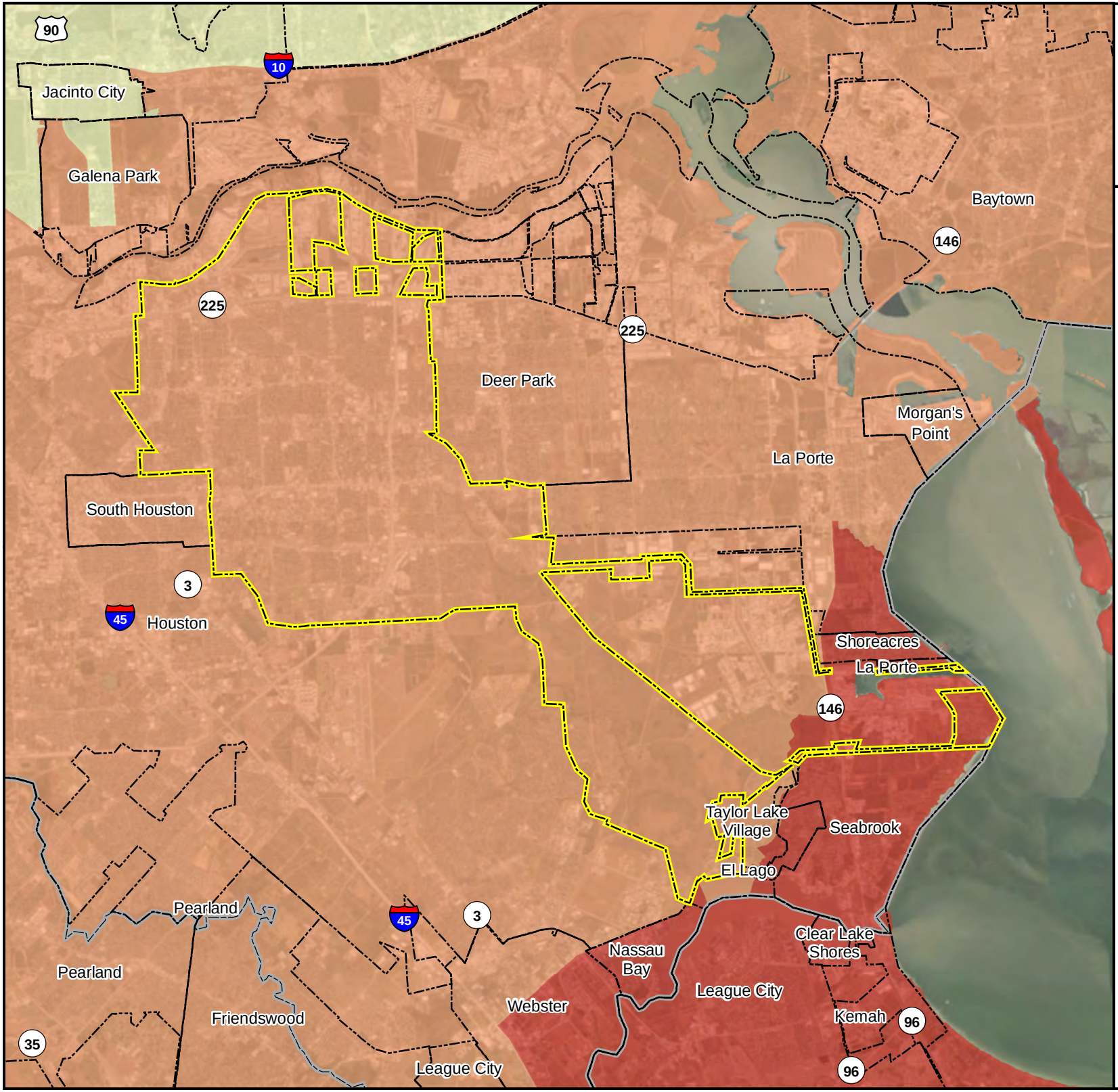
- 87 - 94
- 95 - 98
- 99 - 101
- 102 - 104
- 105 - 110
- Storm Track
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.75 1.5 3 Miles



Pasadena

20-year Probabilistic Hurricane

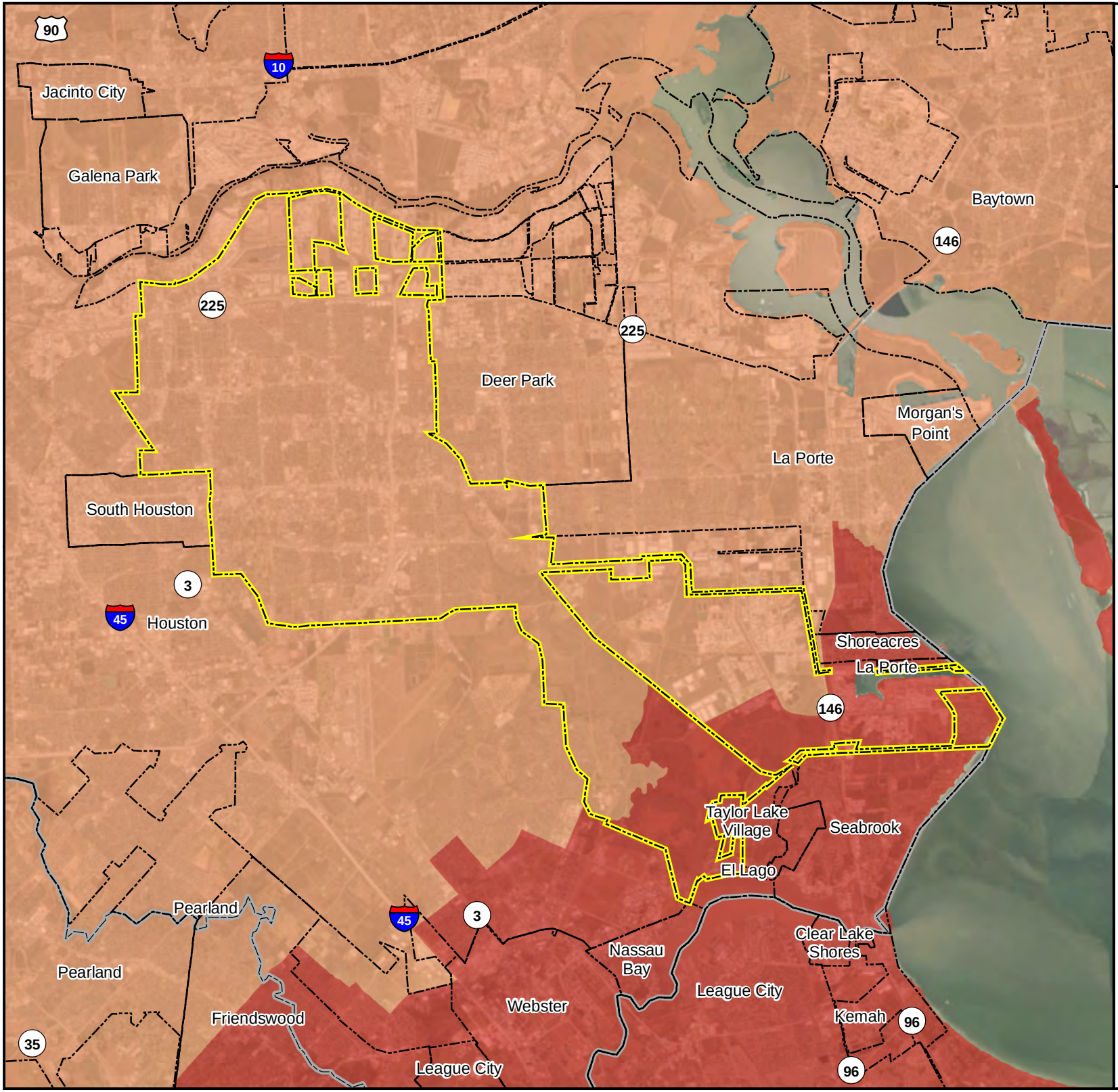
Peak Wind Gust (mph)

- 63 - 71
- 72 - 76
- 77 - 80
- 81 - 84
- 85 - 92
- Incorporated Cities
- Harris County

TETRA TECH

N

0 0.75 1.5 3 Miles



Pasadena

100-year Probabilistic Hurricane

Peak Wind Gust (mph)

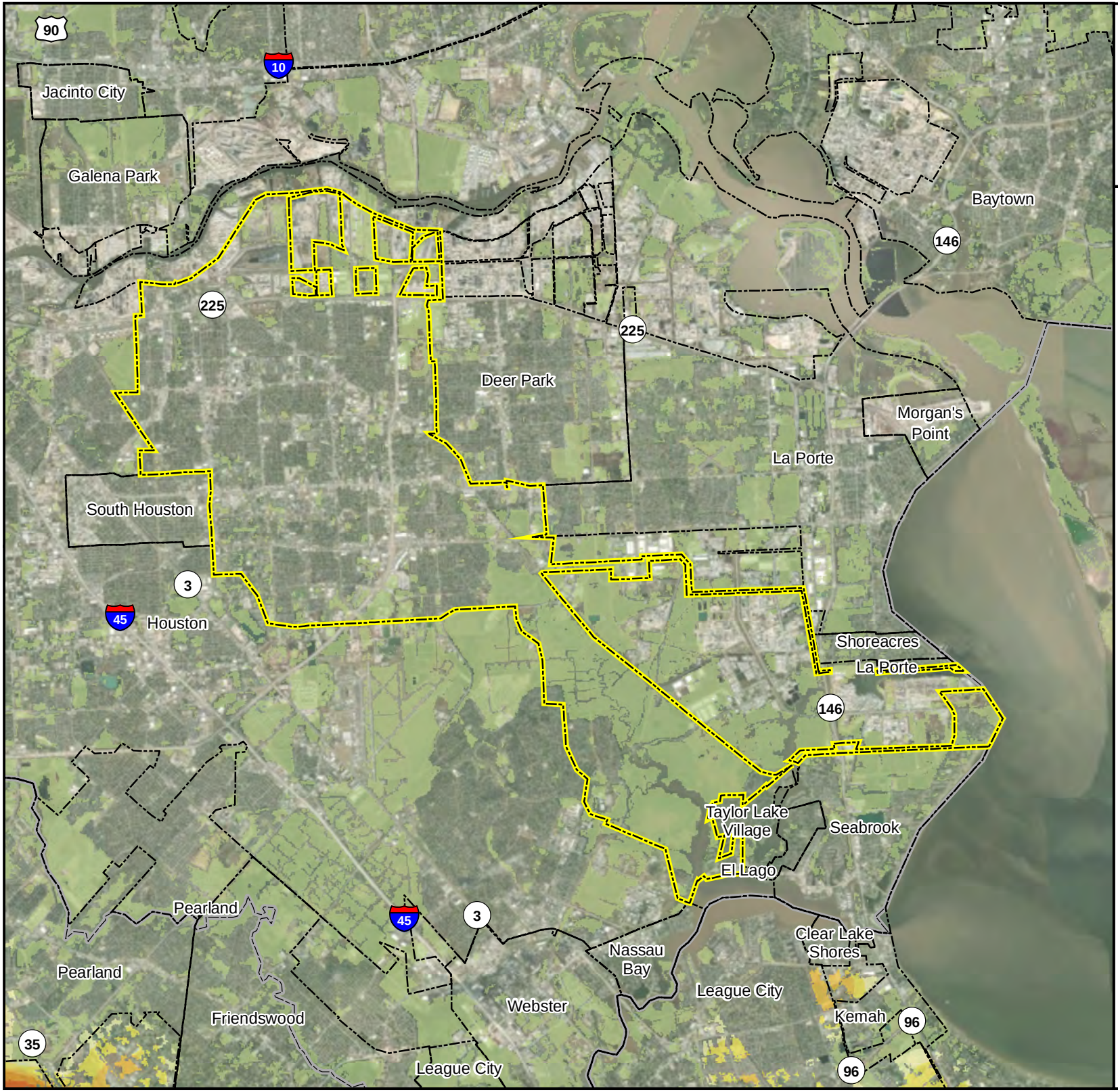
- 89 - 101
- 102 - 106
- 107 - 111
- 112 - 117
- 118 - 128
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.75 1.5 3 Miles



Pasadena

Wildfire Ignition Density

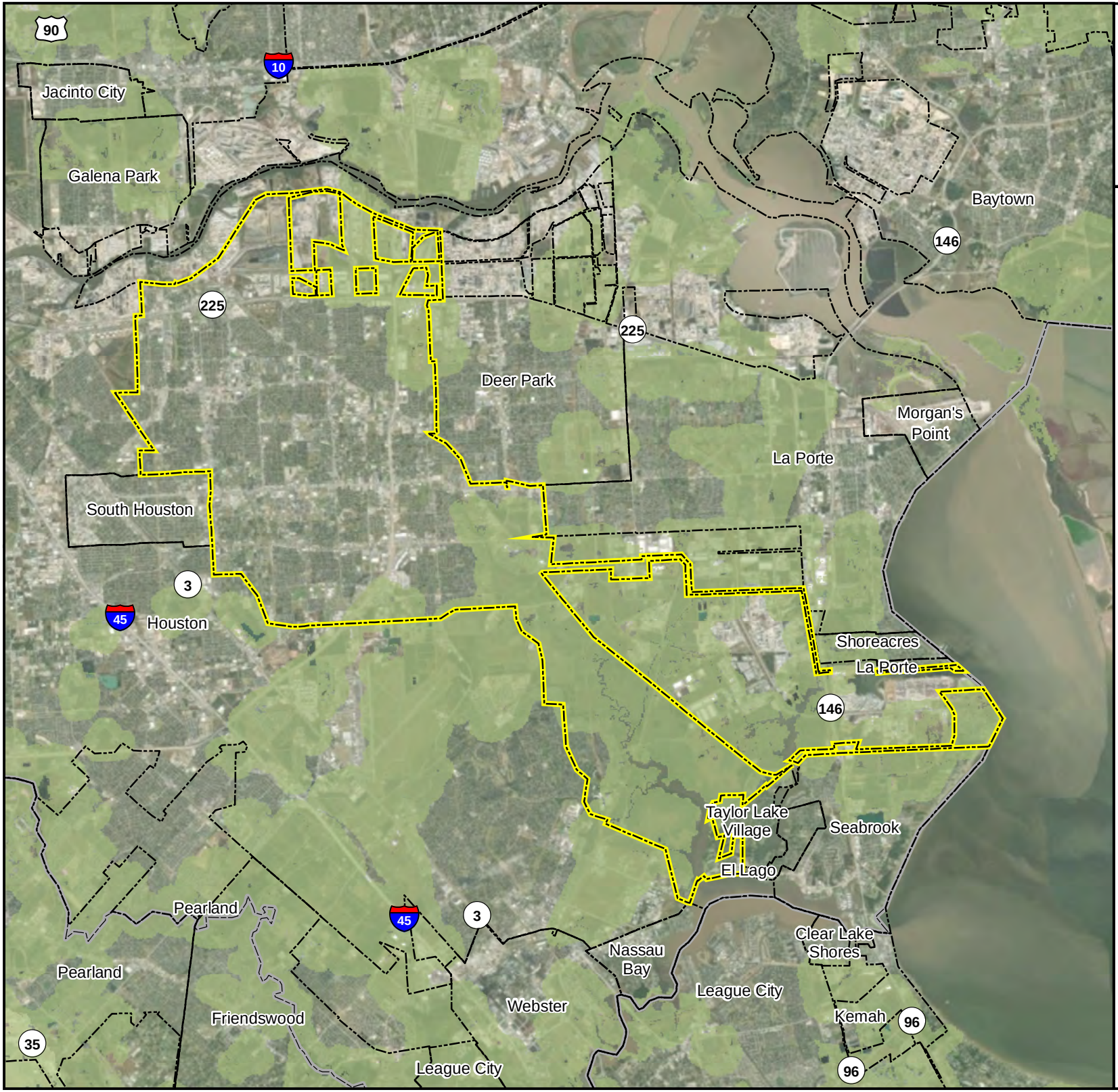
- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.75 1.5 3 Miles



Pasadena

Wildfire Threat

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.75 1.5 3 Miles

20. CITY OF PINEY POINT VILLAGE

20.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Roger Nelson, City Administrator
7676 Woodway Drive, Suite 300
Houston, Texas 77063
713-230-8703
e-mail: cityadmin@pineypt.org

Alternate Point of Contact
Annette Arriaga, Building Official
7676 Woodway Drive, Suite 300
Houston, Texas 77063
Telephone: 713-782-3178
e-mail: bldgofficial@pineypt.org

20.2 JURISDICTION PROFILE

20.2.1 Location

The City of Piney Point Village is a municipality in southwestern Harris County. Piney Point's boundary on the north is generally Beinhorn Taylorcrest. To the west, Blalock and Memorial Point. To the south Arrowwood Circle, Windemere Lane and Buffalo Bayou. The eastern boundary is Buffalo Bayou, Memorial Drive and Hedwig Road. The City encompasses an area of 2.1 square miles.

20.2.2 History

Piney Point Village was incorporated in 1954. There are 1,064 houses in Piney Point and 3,125 residents. There are three churches and four schools (one public elementary school, two church schools and one private school.

20.2.3 Climate

The climate of Piney Point is typically warm with significant annual rainfall.

20.2.4 Governing Body Format

The City of Piney Point Village is a Type-A General Law City and is governed by a Mayor and five Aldermen. All Council positions are elected at large for two year terms. The Piney Point Village City Council assumes responsibility for the adoption of this plan; Roger Nelson, City Administrator will oversee its implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 20-1.

Table 20-1. Local Mitigation Planning Team Members

Name	Title
Howard Miller	Emergency Management Coordinator – VFD
Roger Nelson	City Administrator – Piney Point Village
Annette Arriaga	Building Official – Piney Point Village
Karen Farris	City Secretary – Piney Point Village

20.3 CURRENT TRENDS

20.3.1 Population

According to 2010 Census, the population of Piney Point Village was 3,125. Since 2010, the population has remained the same.

20.3.2 Development

Table 20-2 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

Table 20-2. Recent and Expected Future Development Trends

Criterion	Response					
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan? • **If yes, give the estimated area annexed and estimated number of parcels or structures.**	No					
Is your jurisdiction expected to annex any areas during the performance period of this plan? • **If yes, describe land areas and dominant uses.** • **If yes, who currently has permitting authority over these areas?**	No					
Are any areas targeted for development or major redevelopment in the next five years? • **If yes, briefly describe, including whether any of the areas are in known hazard risk areas**	No The City of Piney Point Village continues to see redevelopment of existing houses. This development is occurring throughout the Village					
How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?		**2014**	**2015**	**2016**	**2017**	**2018**
	Single Family	16	11	8	4	10
	Multi-Family	0	0	0	0	0
	Other (commercial, mixed use, etc.)	0	0	0	0	0
	Total	16	11	8	4	10
Provide the number of new-construction permits for each hazard area or provide a qualitative description of where development has occurred.	• Special Flood Hazard Areas: 0 • Landslide: 0 • High Liquefaction Areas: 0 • Tsunami Inundation Area: 0 • Wildfire Risk Areas: 0					
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	The City of Piney Point Village continues to see redevelopment of existing houses. This development is occurring throughout the Village					

20.4 CAPABILITY ASSESSMENT

The City of Piney Point Village performed an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the

components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities is presented in Table 20-3.
- Development and permitting capabilities are presented in Table 20-4.
- An assessment of fiscal capabilities is presented in Table 20-5.
- An assessment of administrative and technical capabilities is presented in Table 20-6.
- An assessment of education and outreach capabilities is presented in Table 20-7.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 20-8.
- Classifications under various community mitigation programs are presented in Table 20-9.
- The community's adaptive capacity for the impacts of climate change is presented in Table 20-10.

Findings of the capability assessment were reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table included in the action plan for this annex identifies these as community capacity building mitigation actions.

Table 20-3. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code ***Comment:*** *PPV Development Services*	Yes	No	No	No
Zoning Code ***Comment:*** *PPV Development Services*	Yes	No	No	No
Subdivisions ***Comment:***	Yes	No	No	No
Stormwater Management ***Comment:*** *HCFCD*	Yes	Yes	Yes	Yes
Post-Disaster Recovery ***Comment:*** *Harris County*	Yes	Yes	No	Yes
Real Estate Disclosure ***Comment:***	No	No	No	No
Growth Management ***Comment:***	No	No	No	No
Site Plan Review ***Comment:***	Yes	No	No	No
Environmental Protection ***Comment:*** *HCFCD*	Yes	Yes	No	Yes
Flood Damage Prevention ***Comment:*** *HCFCD*	Yes	Yes	No	No
Emergency Management ***Comment:*** *Hedwig, Spring Valley, Hunters Creek, Hilshire, VFD*	Yes	Yes	No	Yes
Climate Change ***Comment:***	No	No	No	No

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Planning Documents				
General Plan ***Comment:***	Yes	No	No	No
Capital Improvement Plan ***How often is the plan updated?*** *N/A* ***Comment:***	No	No	No	No
Disaster Debris Management Plan ***Comment:*** *Harris County*	Yes	Yes	No	Yes
Floodplain or Watershed Plan ***Comment:*** *HCFCD*	Yes	Yes	No	Yes
Stormwater Plan ***Comment:*** *HCFCD*	Yes	Yes	No	Yes
Urban Water Management Plan ***Comment:***	No	No	No	No
Habitat Conservation Plan ***Comment:***	No	No	No	No
Economic Development Plan ***Comment:***	No	No	No	No
Shoreline Management Plan ***Comment:***	No	No	No	No
Community Wildfire Protection Plan ***Comment:***	No	No	No	No
Forest Management Plan ***Comment:***	No	No	No	No
Climate Action Plan ***Comment:***	No	No	No	No
Comprehensive Emergency Management Plan ***Comment:*** *VFD*	Yes	Yes	No	Yes
Threat & Hazard Identification & Risk Assessment (THIRA) ***Comment:*** *VFD*	Yes	Yes	No	Yes
Post-Disaster Recovery Plan ***Comment:*** *Harris County*	Yes	Yes	No	Yes/No
Continuity of Operations Plan ***Comment:***	Yes	No	No	No
Public Health Plan ***Comment:***	No	No	No	No
Other ***Comment:***	Yes/No	Yes/No	Yes/No	Yes/No

Table 20-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • **If no, who does? If yes, which department?**	Yes Development Services
Does your jurisdiction have the ability to track permits by hazard area?	Yes
Does your jurisdiction have a buildable lands inventory?	Yes

Table 20-5. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	No
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	No
Incur Debt through Private Activity Bonds	Yes
Withhold Public Expenditures in Hazard-Prone Areas	No
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes

Table 20-6. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Combination of City employees and the City's engineering firm – HDR
Engineers or professionals trained in building or infrastructure construction practices	Yes	City's engineering firm – HDR
Planners or engineers with an understanding of natural hazards	Yes	City's engineering firm – HDR
Staff with training in benefit/cost analysis	Yes	City Administrator
Surveyors	Yes	City's engineering firm – HDR
Personnel skilled or trained in GIS applications	No	City's engineering firm – HDR
Scientist familiar with natural hazards in local area	No	
Emergency manager	Yes	Emergency Management Coordinator – VFD
Grant writers	No	

Table 20-7. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	No
Do you have hazard mitigation information available on your website? • If yes, briefly describe.	No
Do you use social media for hazard mitigation education and outreach? • If yes, briefly describe.	No
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • If yes, briefly describe.	No
Do you have any other programs already in place that could be used to communicate hazard-related information? • If yes, briefly describe.	Yes We use the MVPD's "V-Link" system which is a community wide, internet based system
Do you have any established warning systems for hazard events? • If yes, briefly describe.	No

Table 20-8. National Flood Insurance Program Compliance

Criterion	
What local department is responsible for floodplain management?	Harris County Flood Control District
Who is your floodplain administrator? (department/position)	Annette Arriaga – Development Services
Are any certified floodplain managers on staff in your jurisdiction?	No
What is the date that your flood damage prevention ordinance was last amended?	March 26, 2019
Does your floodplain management program meet or exceed minimum requirements? • **If exceeds, in what ways?**	Yes
When was the most recent Community Assistance Visit or Community Assistance Contact?	2018
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • **If so, state what they are.**	No
Are any RiskMAP projects currently underway in your jurisdiction? • **If so, state what they are.**	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • **If no, state why.**	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? • **If so, what type of assistance/training is needed?**	No
Does your jurisdiction participate in the Community Rating System (CRS)? • **If yes, is your jurisdiction interested in improving its CRS Classification?** • **If no, is your jurisdiction interested in joining the CRS program?**	No Yes
How many flood insurance policies are in force in your jurisdiction?[a] • **What is the insurance in force?** • **What is the premium in force?**	620 $207,040,600 $347,337
How many total loss claims have been filed in your jurisdiction?[a] • **How many claims are still open or were closed without payment?** • **What were the total payments for losses?**	338 Unknown $20,537,774

a. According to FEMA statistics as of MONTH XX, 201X

Table 20-9. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	No		
Building Code Effectiveness Grading Schedule	No		
Public Protection	No		
Storm Ready	No		
Firewise	No		

Table 20-10. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:***	Low
Jurisdiction-level monitoring of climate change impacts ***Comment:***	Low
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:***	Low
Participation in regional groups addressing climate risks ***Comment:***	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	Low
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	Low
Identified strategies for adaptation to impacts ***Comment:***	Low
Champions for climate action in local government departments ***Comment:***	Low
Political support for implementing climate change adaptation strategies ***Comment:***	Low
Financial resources devoted to climate change adaptation ***Comment:***	Low
Local authority over sectors likely to be negative impacted ***Comment:***	Low
Public Capacity	
Local residents knowledge of and understanding of climate risk ***Comment:***	Low
Local residents support of adaptation efforts ***Comment:***	Low
Local residents' capacity to adapt to climate impacts ***Comment:***	Low
Local economy current capacity to adapt to climate impacts ***Comment:***	Low
Local ecosystems capacity to adapt to climate impacts ***Comment:***	Low

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

20.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning and capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in Section 20.11 were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

20.5.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- The Cities of Piney Point, Hedwig, Bunker Hill and Hunters Creek share engineering plans, specifically related to drainage projects so that we all know what the other is doing and how we are potentially impacting each other.
- The Cities of Piney Point, Bunker Hill and Hunters Creek share a Police Department
- The Cities of Piney Point, Bunker Hill, Hunters Creek, Hedwig, Spring Valley and Hilshire share a Fire Department. The Fire Department serves as the lead hazard mitigation entity.

20.5.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future: unknown

20.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 20-11 lists past occurrences of natural hazards for which specific damage was recorded in Piney Point Village. Other hazard events that broadly affected the entire planning area, including Piney Point Village, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 20-11. Past Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Hurricane Harvey	4332 DR	2017	$19,325,155
Memorial Day Flood	4269 DR	2016	Not Available
Tax Day Flood	4227DR	2016	Not Available
Hurricane Ike	1791 DR	2008	Not Available
Hurricane Rita	1606 DR	2005	Not Available
Hurricane Alicia	1379 DR	1983	Not Available

20.7 HAZARD RISK RANKING

Table 20-12 presents a local ranking for Piney Point Village of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 20-12. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Severe Weather	48	High
1	Hurricane	48	High
2	Flooding	18	Medium
3	Earthquake	14 (negligible level of risk from this hazard)	Low
4	Drought	6	Low
4	Mass Movement	6	Low
4	Wildfire	6	Low
5	Tsunami	0 (No exposure)	None
5	Dam Failure	0 (No exposure)	None
5	Coastal Erosion	0 (No exposure)	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

20.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. This section provides information on a few key vulnerabilities for the jurisdiction. Available jurisdiction-specific risk maps of the hazards are provided at the end of this annex.

20.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: 52
- Number of FEMA-identified Severe-Repetitive-Loss Properties: 3
- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated: 0

20.8.2 Other Noted Vulnerabilities

No additional vulnerabilities specific to this jurisdiction have been identified.

20.9 STATUS OF PREVIOUS PLAN ACTIONS

Table 20-13 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

20.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 20-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 20-15 identifies the priority for each action. Table 20-16 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 20-13. Status of Previous Plan Actions

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
Expand Early Warning/Alert System – Collaborative Community Alert & Notification (Code Red Mass Notification) for information sharing to increase mobile coverage of residential and non-residential areas			X	PPV5
Comment: *Under consideration in FY 2020 budget*				
Develop Tree Management Program to better manage and keep clear the public right-of-way; to promote stronger, healthier trees and to reduce the impact of debris	**X**			
Comment:				

Table 20-14. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action PPV1 — Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Severe weather, hurricane, flooding, earthquake						
Existing	11, 13	City Administration	TBD	High	HMGP, PDM, FMA	Short-term
Action PPV2 — Integrate the hazard mitigation plan into other plans, ordinances and programs that dictate land use decisions in the community						
Hazards Mitigated: Severe weather, hurricane, flooding, earthquake, drought						
New and Existing	9, 10, 11	City Administration	TBD	Low	Staff Time, General Funds	Ongoing
Action PPV3 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Earthquake, Drought, Mass Movement, Wildfire						
New and Existing	9, 10, 11	City Administration	TBD	Low	Staff Time, General Funds	Short-term
Action PPV4 — Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements: • Enforce the flood damage prevention ordinance. • Participate in floodplain identification and mapping updates. • Provide public assistance/information on floodplain requirements and impacts.						
Hazards Mitigated: Flooding, severe weather, hurricane						
New and Existing	1, 3, 5, 7, 8, 10, 14	City Administration	TBD	Low	Staff Time, General Funds	Ongoing
Action PPV5 — Expand Early Warning/Alert System – Collaborative Community Alert & Notification (Code Red Mass Notification) for information sharing to increase mobile coverage of residential and non-residential areas						
Hazards Mitigated: Al Hazards						
New and Existing	1,3,15	City Administration	TBD	Medium	General Fund. Grants	Ongoing
Action PPV6— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Earthquake, Drought, Mass Movement, Wildfire						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	City Admistration	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 20-15. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
PPV1	3	High	High	Yes	Yes	No	Medium	High
PPV2	7	Medium	Low	Yes	No	Yes	High	Low
PPV3	3	Low	Low	Yes	No	Yes	High	Low
PPV4	6	Medium	Low	Yes	No	Yes	High	Low
PPV5	3	Medium	Medium	Yes	Yes	Yes	High	Medium
PPV6	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 20-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Severe Weather	PPV1, 4, 6	PPV1, 4	PPV 4, 6		PPV6	PPV 1, PPV5		PPV 2, 3, 4, 6
Hurricane	PPV1, 4, 6	PPV1, 4	PPV 4, 6		PPV6	PPV 1, PPV5		PPV 2, 3, 4, 6
Medium-Risk Hazards								
Flooding	PPV1, 4, 6	PPV1, 4	PPV 4, 6		PPV6	PPV 1, PPV5		PPV 2, 3, 4, 6
Low-Risk Hazards								
Earthquake	PPV 1, 6	PPV 1	PPV6		PPV6	PPV 1, PPV5		PPV 2, 3, 4, 6
Drought	PPV6		PPV6		PPV6			PPV 2, 3, 4, 6
Mass Movement	PPV6		PPV6		PPV6			PPV 2, 3, 4, 6
Wildfire	PPV6		PPV6		PPV6			PPV 2, 3, 4, 6

a. See the introduction to this volume for explanation of mitigation types.

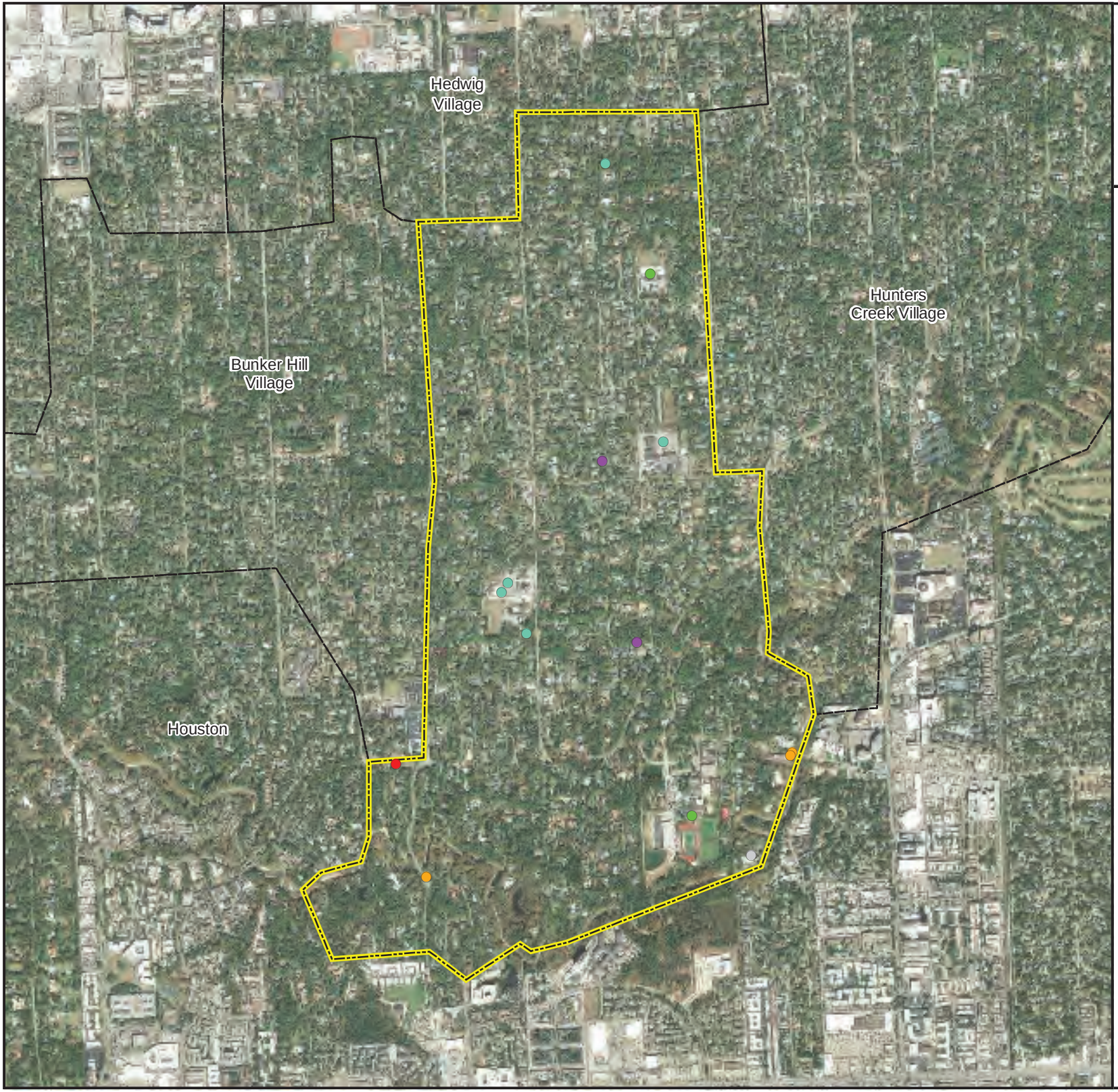
20.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- **City of Piney Point Village Municipal Code** — The municipal code was reviewed for the full capability assessment and for identifying opportunities for action plan integration.
- **City of Piney Point Village Flood Damage Prevention Ordinance** — The flood damage prevention ordinance was reviewed for compliance with the National Flood Insurance Program.

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.



Piney Point Village

Critical Facilities

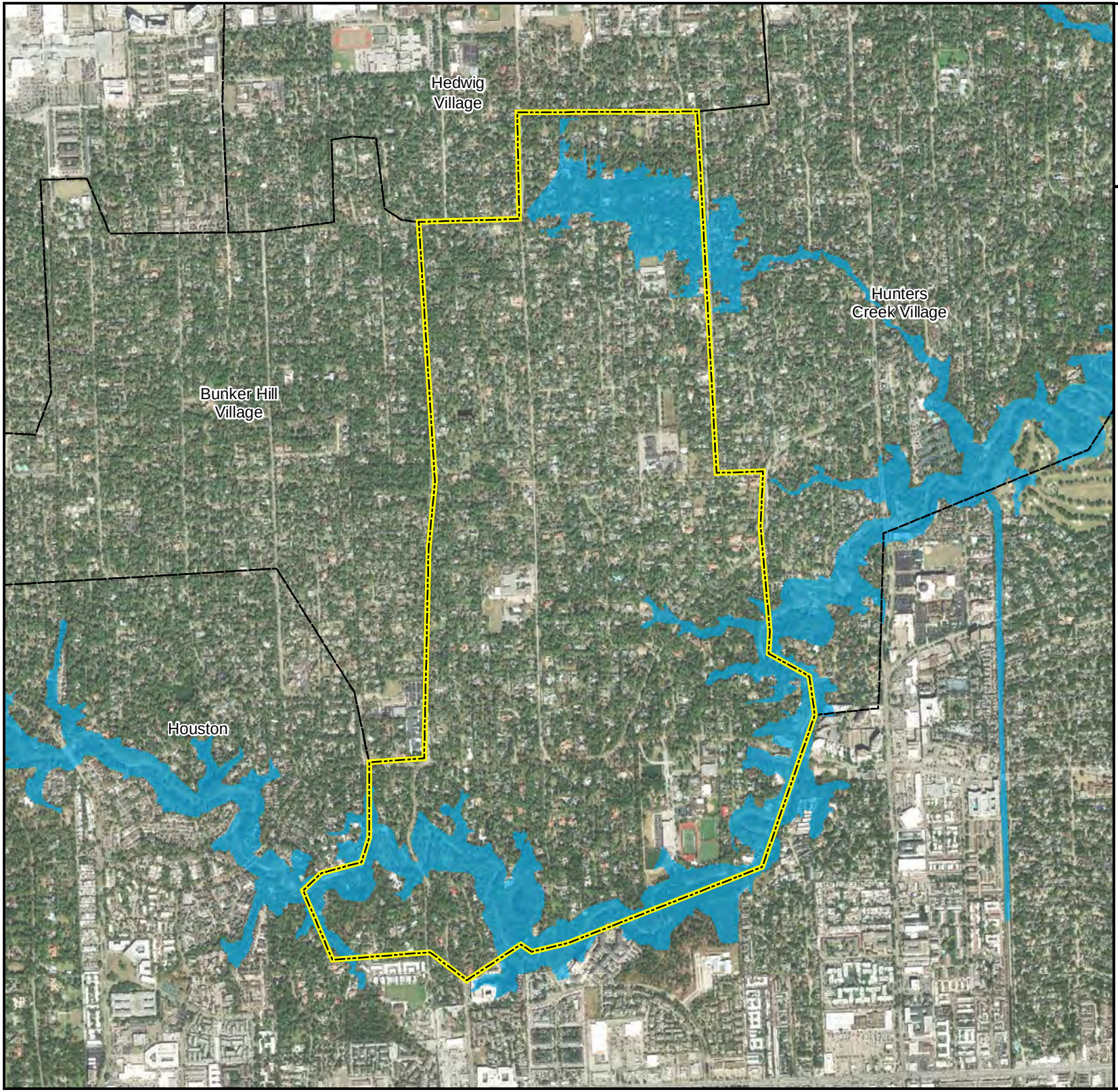
- Education Facilities
- Emergency Services
- Government Facilities
- Hazardous Material Sites
- Health and Medical Facilities
- Historical and Cultural Sites
- Transportation Systems
- Utility Systems
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles



Piney Point Village

FEMA Flood Hazard

1% Annual Chance Flood (100-yr)

Incorporated Cities

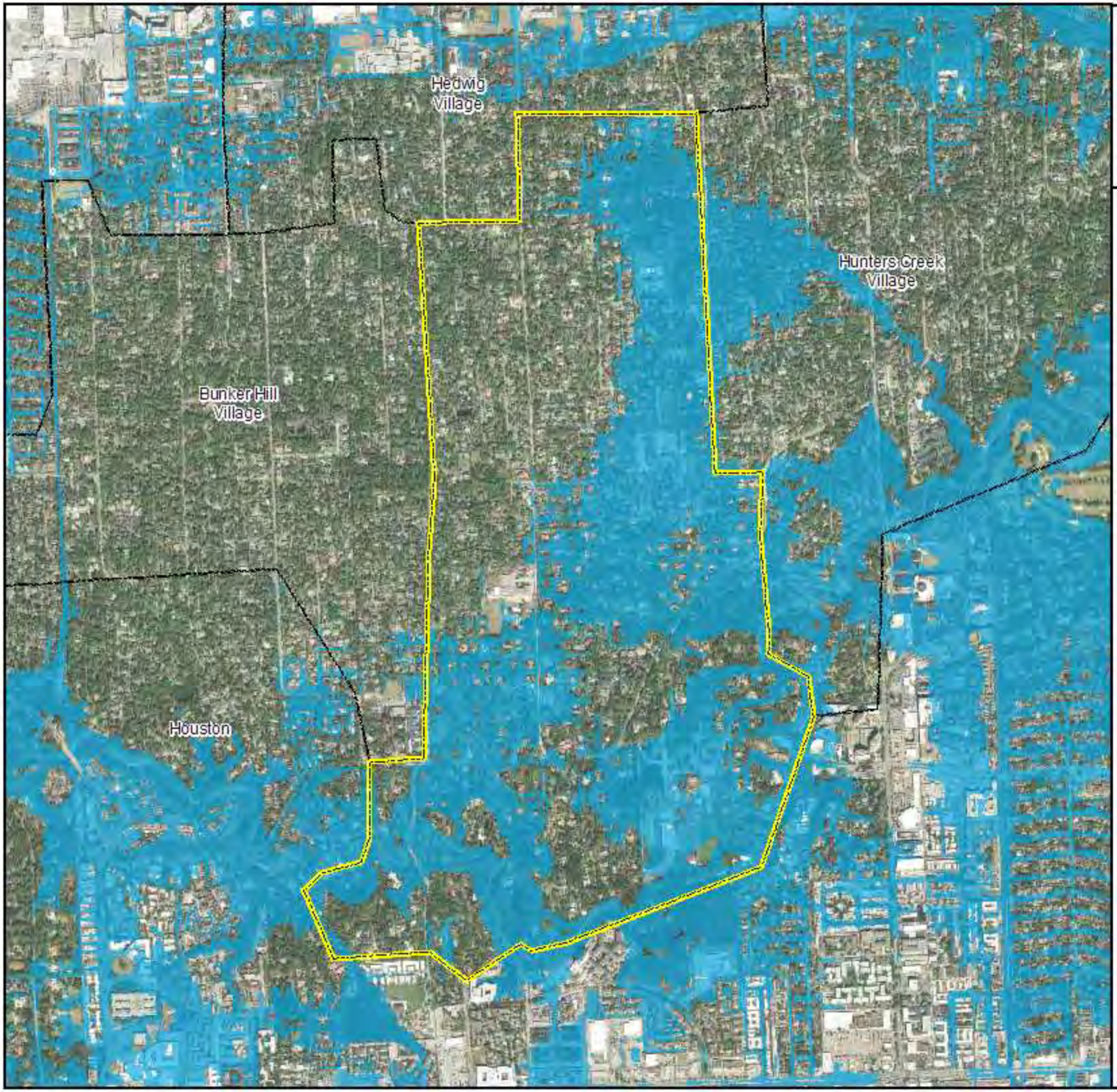
Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles



Piney Point Village

Flood Hazard
Hurricane Harvey

Flooding Extent

Incorporated Cities

Harris County

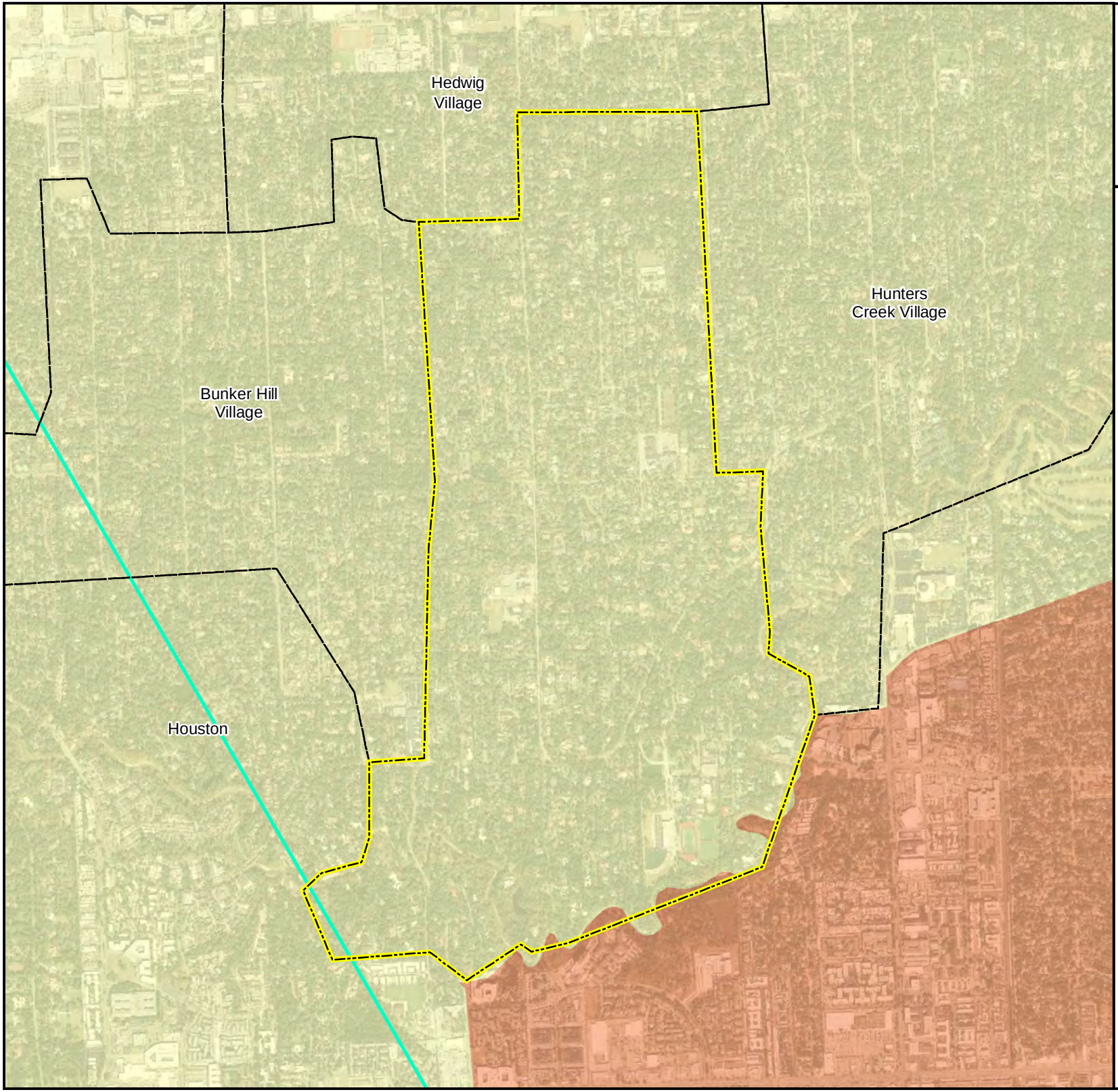
Note: Flooding extent shown for Hazard Mitigation Plan planning area only.

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles



Piney Point Village

Hurricane Alicia (1983)

Peak WInd Gust (mph)

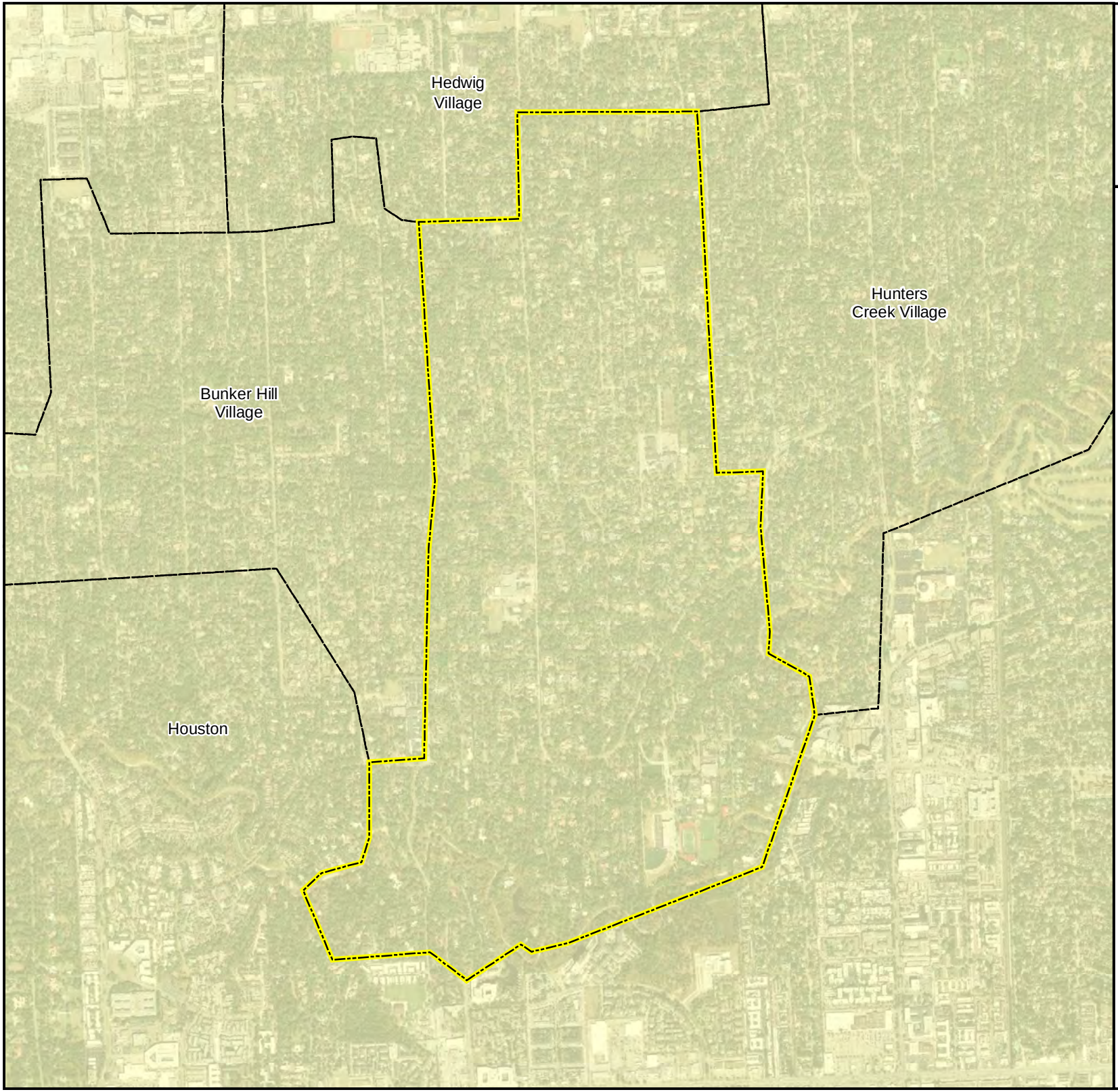
- 87 - 94
- 95 - 98
- 99 - 101
- 102 - 104
- 105 - 110
- Storm Track
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles



Piney Point Village

20-year Probabilistic Hurricane

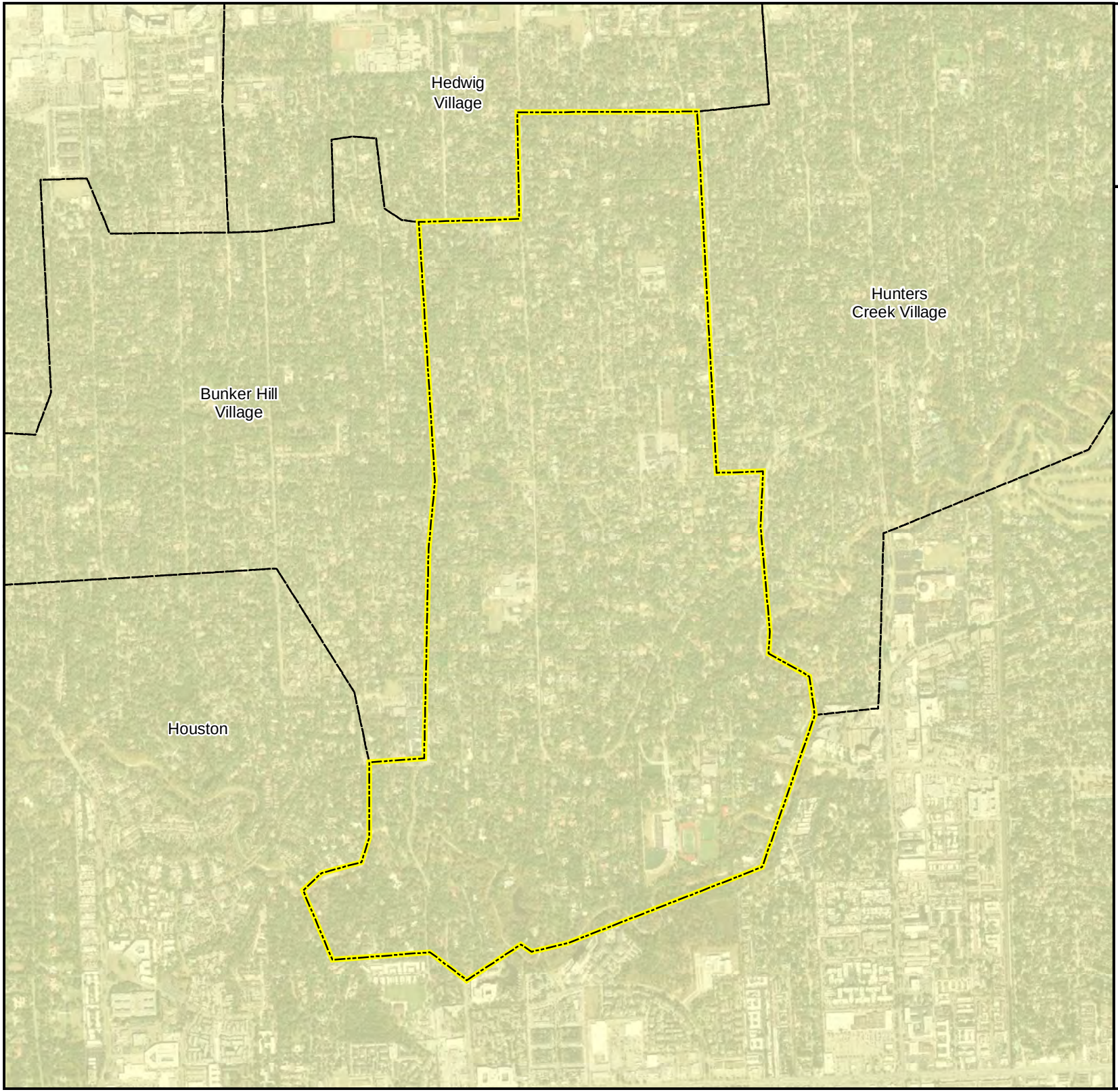
Peak Wind Gust (mph)

- 63 - 71
- 72 - 76
- 77 - 80
- 81 - 84
- 85 - 92
- Incorporated Cities
- Harris County

TETRA TECH

N

0 0.1 0.2 0.4 Miles



Piney Point Village

100-year Probabilistic Hurricane

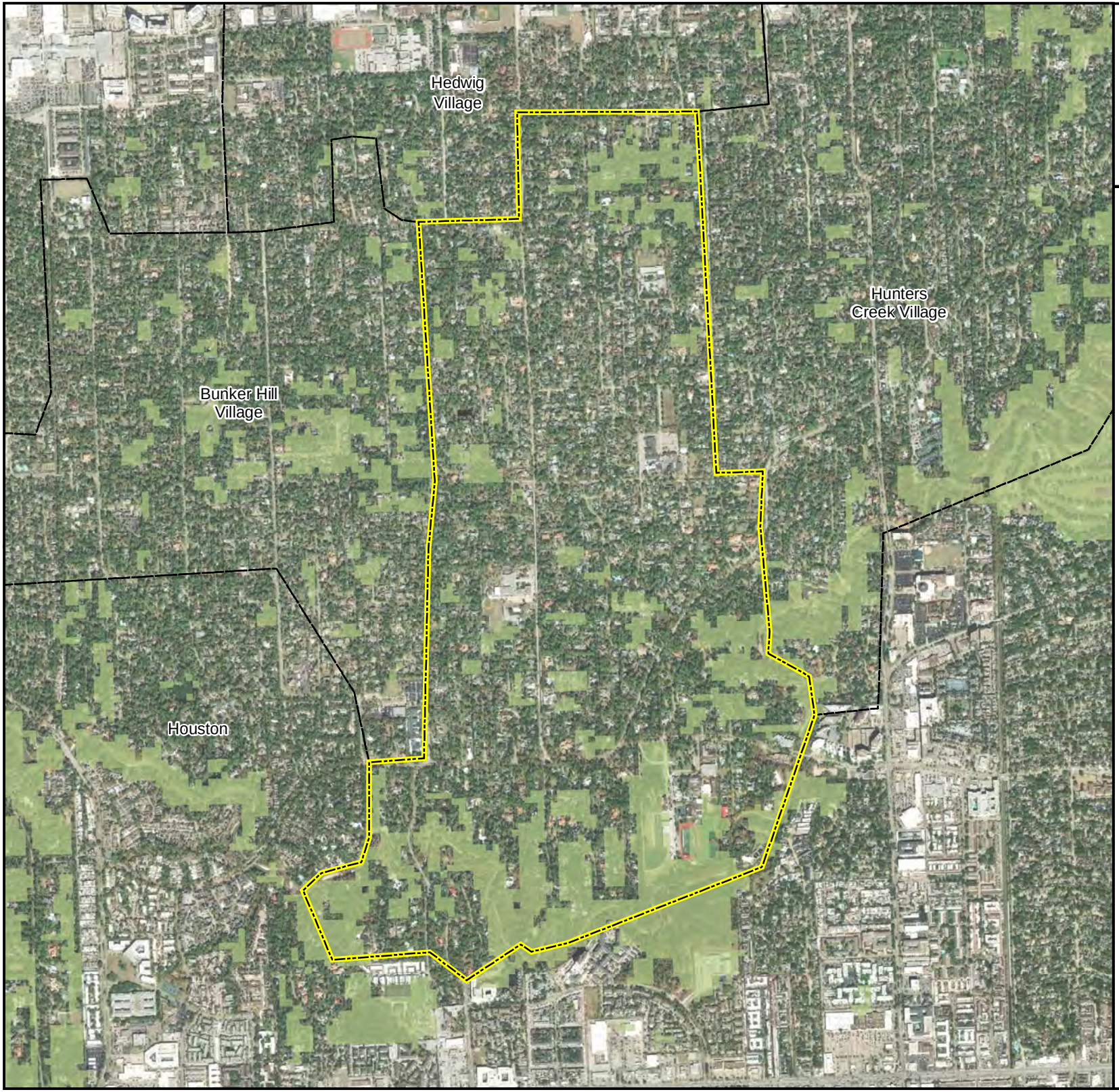
Peak Wind Gust (mph)

- 89 - 101
- 102 - 106
- 107 - 111
- 112 - 117
- 118 - 128
- Incorporated Cities
- Harris County

TETRA TECH

N

0 0.1 0.2 0.4 Miles



Piney Point Village

Wildfire Ignition Density

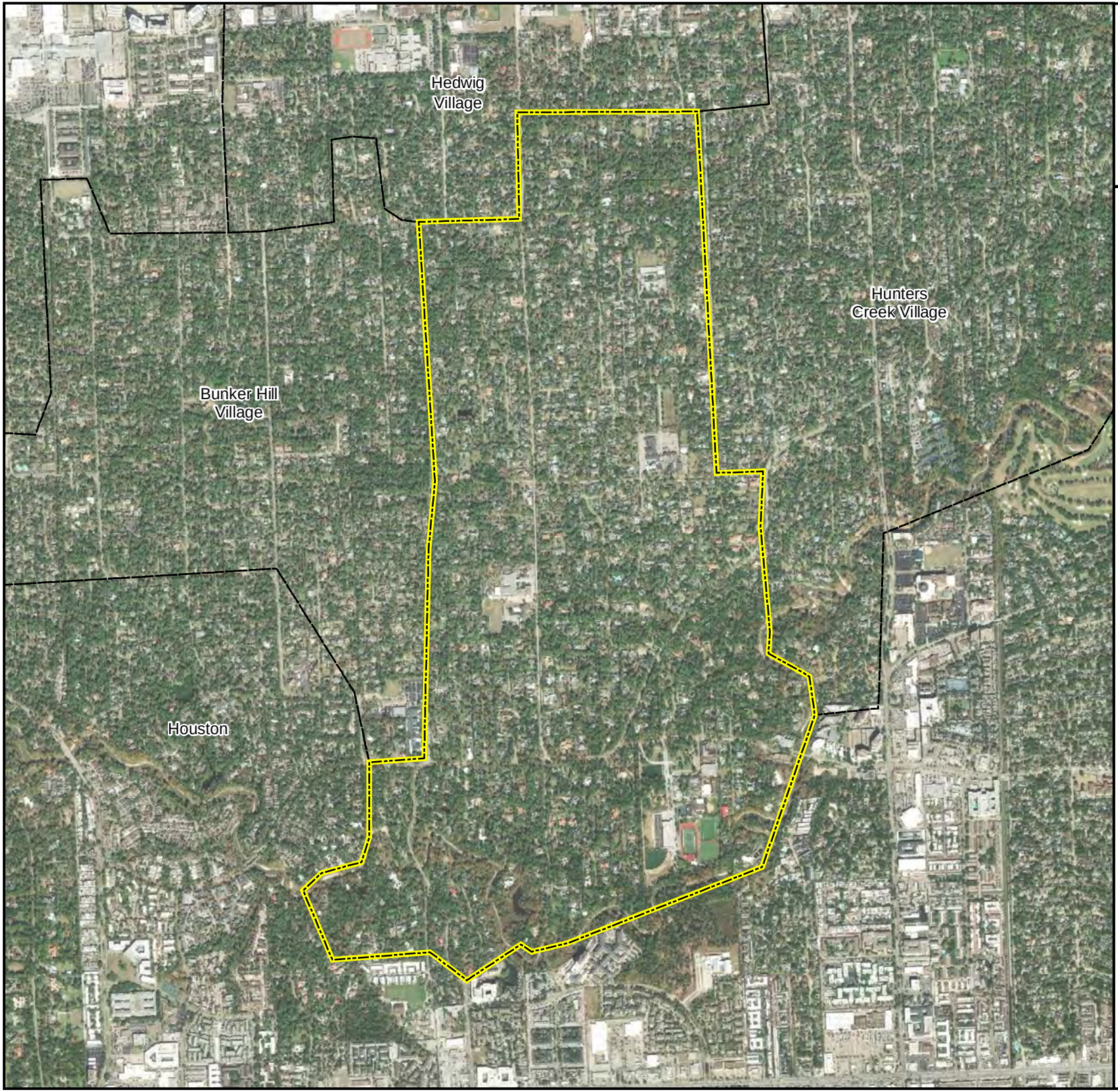
- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles



Piney Point Village

Wildfire Threat

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles

21. CITY OF SEABROOK

21.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Nick Kondejewski
1100 Red Bluff
Seabrook, Texas 77586
Telephone: 281-291-5638
e-mail Address: nickk@seabrooktx.gov

Alternate Point of Contact
Brian Craig
1100 Red Bluff
Seabrook, Texas 77586
Telephone: 281-291-5719
Email Address: bcraig@seabrooktx.gov

21.2 JURISDICTION PROFILE

21.2.1 Location

The City of Seabrook is located just 30 minutes south of downtown Houston, Seabrook is the southernmost city Harris County along State Highway 146. Located on Galveston Bay, Clear Lake, and Taylor Lake. Seabrook has water on Eastern Side, South western side and the North West side of the City.

State Highway 146 divides the City into two halves. To the south of Seabrook is Kemah, Texas which is connected by the Seabrook/Kemah Bridge, which cross the Clear Creek Channel. To the north of Seabrook is Pasadena and Port of Houston Bayport Terminal. To the west of Seabrook is El Lago. Seabrook with El Lago and a portion of Pasadena is actually an Island in the southernmost portion of Harris County.

Seabrook currently encompasses an area of approximately 5 square miles of land not including several square miles of Galveston Bay.

21.2.2 History

The City of Seabrook was incorporated in October 23, 1961. Historic records date back to 1832, when Ritson Morris, a native Virginian, obtained a league of land from the Mexican government. A portion of the land was purchased by Seabrook W. Sydnor in 1895 and a plat was filed with the Harris County Courthouse the following year.

In March 1903, the Seabrook Company of Houston filed a revised layout of the proposed Seabrook town site, which appealed to local farmers, fishermen and merchants. Some years later, in 1961, local leaders had the city incorporated.

In 1964, not long after the city became incorporated, a bridge was built between Kemah and Seabrook plus State Highway 146 was established as a four-lane highway. The bridge and highway allowed easy access to Seabrook along Galveston Bay and the small town began to grow considerably. A youth center named for astronaut Edward H. White II, America's first space walker, opened in 1971.

Through the years the City has gone through many growing pains as the widening of Nasa Parkway, State High 146 and again the current widening of State High 146. Other growing pains of Natural Disasters strike home with Hurricane Carla, Hurricane Alicia, Hurricane Ike and Hurricane Harvey.

21.2.3 Climate

Seabrook's climate is classified as humid subtropical. Prevailing winds from the south and southeast bring heat from the deserts of Mexico and moisture from the Gulf of Mexico.

Summer temperatures typically have highs near 91 °F though higher temperatures are not uncommon. The city's proximity to the bay and the winds that it generates moderate the area's temperatures and ease the effects of the humidity, creating a more pleasant climate than inland communities like Houston.

Winters in the area are temperate with typical January 61 °F and lows are near 45 °F. Snowfall is rare. Annual rainfall averages exceed 56 inches, with an annual average of 69 precipitation days.

The average elevation of Seabrook is approximately 11 ft. above sea level.

21.2.4 Governing Body Format

The City of Seabrook is a Home Rule City operating under the Council-Manager form of government, with a City Council composed of a Mayor (elected at large) and six at large Council members. The City Council appoints a City Manager to act as the chief administrative and executive officer of the City.

The City of Seabrook City Council assumes responsibility for the adoption of this plan; The Office of Emergency Management will oversee its implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 21-1.

Table 21-1. Local Mitigation Planning Team Members

Name	Title
Charles J. Galyean	OEM Director
Nick Kondejewski	Building Official, FPM
Sean Landis	Deputy City Manager
Kevin Padgett	Public Works Director
Brian Craig	Assistant Public Works Dir
Brad Goudie	Director of Emergency Services
Amanda Alvarado	Communication

21.3 CURRENT TRENDS

21.3.1 Population

According to U.S. Census, the population of City of Seabrook, as of July 1, 2017 was 13,693. Since 2010, the population has grown at an average annual rate of 3 percent. Over the last year the population growth has leveled off due to a lack of development and lack of buildable land space.

21.3.2 Development

The City of Seabrook is zoned community with large residential base with commercial throughout the major roadways in the city. Major construction by the State of Texas on a Roadway expansion project will and has had a

very large impact to the community. There were over 60 business that were affected by this expansion and many did not relocate within the city and some have chosen to not to reopen anywhere after the buyout by TxDOT.

With the multi-year long construction project by TxDOT development along this corridor is slow and slow city wide due to the impact of construction. During this time construction is primarily in fill in the residential areas of the city.

Table 21-2 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

Table 21-2. Recent and Expected Future Development Trends

Criterion	Response
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan? • **If yes, give the estimated area annexed and estimated number of parcels or structures.**	No N/A
Is your jurisdiction expected to annex any areas during the performance period of this plan? • **If yes, describe land areas and dominant uses.** • **If yes, who currently has permitting authority over these areas?**	No N/A N/A
Are any areas targeted for development or major redevelopment in the next five years? • **If yes, briefly describe, including whether any of the areas are in known hazard risk areas**	Yes The areas for development over the next 5 years are as follows: • S.H. 146 corridor -- This will be commercial development consisting on mainly retail. • Repsdorph and Lakeside (Town Center) -- will consist of commercial development that will mainly contain retail. • Water Front Drive – Will consist of commercial with retail, restaurant, entertainment. • North end of the City East of State Hwy 146 – Commercial, Light industrial and residential
How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?	

	2014	2015	2016	2017	2018
Single Family	19	20	23	27	30
Multi-Family	1	0	1	0	0
Other (commercial, mixed use, etc.)	4	1	4	5	2
Total	24	21	28	32	32

Provide the number of new-construction permits for each hazard area or provide a qualitative description of where development has occurred.	• Special Flood Hazard Areas: 110 • Landslide: 0 • High Liquefaction Areas: 0 • Tsunami Inundation Area: 0 • Wildfire Risk Areas: 0
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	Currently the City is about at 85% buildout with limited areas for development. Fill in areas with in the residential areas and fill in area through the Commercially Zoned areas.

21.4 CAPABILITY ASSESSMENT

The City of Seabrook performed an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities is presented in Table 21-3.
- Development and permitting capabilities are presented in Table 21-4.
- An assessment of fiscal capabilities is presented in Table 21-5.
- An assessment of administrative and technical capabilities is presented in Table 21-6.
- An assessment of education and outreach capabilities is presented in Table 21-7.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 21-8.
- Classifications under various community mitigation programs are presented in Table 21-9.
- The community's adaptive capacity for the impacts of climate change is presented in Table 21-10.

Findings of the capability assessment were reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table included in the action plan for this annex identifies these as community capacity building mitigation actions.

Table 21-3. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code	Yes	No	No	No
Comment: *Seabrook has adopted the 2015 ICC Code complement and the 20117 NEC*				
Zoning Code	Yes	No	No	No
Comment: *Seabrook, Texas Code of Ordinance, Chapter80*				
Subdivisions	Yes	No	No	No
Comment: *Seabrook, Texas Code of Ordinance, Chapter80*				
Stormwater Management	Yes	Yes	Yes	No
Comment: *Seabrook, Texas Charter Article II – Flood Damage Prevention*				
Post-Disaster Recovery	No	No	no	NO
Comment:				
Real Estate Disclosure	Yes	No	Yes	Yes
Comment:				
Growth Management	Yes	No	No	No
Comment:				
Site Plan Review	Yes	Yes	No	No
Comment: *Both the city and county review commercial development plans storm water requirements*				
Environmental Protection	Yes	Yes	Yes	Yes
Comment:				
Flood Damage Prevention	Yes	No	Yes	Yes
Comment: *Harris County*				
Emergency Management	Yes	Yes	Yes	Yes
Comment: *Emergency Operations Plan with Basic Plan with 22 Annexes updated every fifth year*				
Climate Change	No	No	No	No
Comment: *Seabrook Currently has no specific regulations related to change but may consider in the future.*				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Planning Documents				
General Plan ***Comment:*** *City of Seabrook Comprehensive Master Plan*	Yes	No	Yes	Yes
Capital Improvement Plan ***How often is the plan updated?*** *Annually* ***Comment:***	Yes	No	No	Yes
Disaster Debris Management Plan ***Comment:***	No	No	No	NO
Floodplain or Watershed Plan ***Comment:*** *Harris County Flood Control*	No	Yes	No	No
Stormwater Plan ***Comment:*** *MS4 permit and SWQMP*	Yes	No	Yes	No
Urban Water Management Plan ***Comment:***	No	No	No	No
Habitat Conservation Plan ***Comment:*** *Gulf / Houston regional conservation plan.*	No	Yes	No	No
Economic Development Plan ***Comment:***	No	No	No	No
Shoreline Management Plan ***Comment:*** *Gulf / Houston regional conservation plan.*	No	Yes	Yes	No
Community Wildfire Protection Plan ***Comment:*** *Gulf / Houston regional conservation plan.*	No	Yes	No	No
Forest Management Plan ***Comment:***	No	No	No	No
Climate Action Plan ***Comment:***	No	No	No	Yes
Emergency Management Plan ***Comment:*** Annex P — Hazard Mitigation and Hazard Summaries in Basic Plan	Yes	Yes	Yes	Yes
Threat & Hazard Identification & Risk Assessment (THIRA) ***Comment:*** ***State and Harris County***	No	Yes	yes	yes
Post-Disaster Recovery Plan ***Comment:*** *Currently in the works*	Yes	No	No	Yes
Continuity of Operations Plan ***Comment:*** *Currently in the works*	Yes	No	No	No
Public Health Plan ***Comment:***	No	Yes	No	NO
Park Plan ***Comment:*** *Park Trails Master Plan*	Yes	No	No	Yes

Table 21-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • **If no, who does? If yes, which department?**	Yes (Building Department)
Does your jurisdiction have the ability to track permits by hazard area?	Yes (Flood Only)
Does your jurisdiction have a buildable lands inventory?	No

Table 21-5. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes – Water and Sewer
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	Yes
Withhold Public Expenditures in Hazard-Prone Areas	No
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes

Table 21-6. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Public Work/Seabrook/City Engineer
Engineers or professionals trained in building or infrastructure construction practices	Yes	Public Work/Seabrook/City Engineer
Planners or engineers with an understanding of natural hazards	Yes	Public Work/Seabrook/City Engineer
Staff with training in benefit/cost analysis	Yes	Emergency Management
Surveyors	No	(Reliance on licensed consultant)
Personnel skilled or trained in GIS applications	Yes	Public Works/Seabrook/GIS Tech
Scientist familiar with natural hazards in local area	No	(Reliance on licensed professional)
Emergency manager	Yes	Emergency Management
Grant writers	No	Everyone No professional
Other	Yes/No	Insert appropriate information

Table 21-7. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • If yes, briefly describe.	Yes Links to the Harris County Plan Building Department is responsible for floodplain management and public outreach efforts regarding flooding hazards for CRS participation.
Do you use social media for hazard mitigation education and outreach? • If yes, briefly describe.	Yes Link to Harris County Sites
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • If yes, briefly describe.	No
Do you have any other programs already in place that could be used to communicate hazard-related information? • If yes, briefly describe.	Yes Community Rating System, Social Media accounts, and Emergency Management websites. City Hall and Library can be a source of printed material on hazard mitigation and flooding.
Do you have any established warning systems for hazard events? • If yes, briefly describe.	Yes Telephone Call down & TEXT, Email, Social Media

Table 21-8. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Building Department
Who is your floodplain administrator? (department/position)	Building Department/Building Official
Are any certified floodplain managers on staff in your jurisdiction?	Yes
What is the date that your flood damage prevention ordinance was last amended?	November 1, 2016
Does your floodplain management program meet or exceed minimum requirements? • **If exceeds, in what ways?**	Exceeds Higher regulatory standards enforced across the entire city (beyond the SFHA)
When was the most recent Community Assistance Visit or Community Assistance Contact?	Fall 2018
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • **If so, state what they are.**	No N/A
Are any RiskMAP projects currently underway in your jurisdiction? • **If so, state what they are.**	No Harris County – Flood Insurance Study, revised preliminary November 13, 2018. Coastal flood mapping – TXCHART, Preliminary March 29, 2013.
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • **If no, state why.**	Yes Map revisions will be made based on the most recent precipitation frequencies in Texas through the NOAA Atlas 14 study.
Does your floodplain management staff need any assistance or training to support its floodplain management program? • **If so, what type of assistance/training is needed?**	Yes Any and all training is never enough
Does your jurisdiction participate in the Community Rating System (CRS)? • **If yes, is your jurisdiction interested in improving its CRS Classification?** • **If no, is your jurisdiction interested in joining the CRS program?**	Yes Yes N/A
How many flood insurance policies are in force in your jurisdiction? • **What is the insurance in force?** • **What is the premium in force?**	3383[a] $1,004,594,000[a] $3,163,902[a]
How many total loss claims have been filed in your jurisdiction? • **How many claims are still open or were closed without payment?** • **What were the total payments for losses?**	2,505[a] 0[a] $119,384,447[a]

a. According to FEMA statistics as of March 3, 2019

Table 21-9. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	Yes	7	Oct. 1, 2011
Building Code Effectiveness Grading Schedule	Yes	4/4	Oct. 2, 2017
Public Protection	Yes	3	March 1, 2016
Storm Ready	No	N/A	N/A
Firewise	No	N/A	N/A

Table 21-10. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:***	Low
Jurisdiction-level monitoring of climate change impacts ***Comment:***	Low
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:***	Low
Participation in regional groups addressing climate risks ***Comment:***	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	Low
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	Low
Identified strategies for adaptation to impacts ***Comment:***	Low
Champions for climate action in local government departments ***Comment:***	Low
Political support for implementing climate change adaptation strategies ***Comment:***	Low
Financial resources devoted to climate change adaptation ***Comment:***	Low
Local authority over sectors likely to be negative impacted ***Comment:***	Low
Public Capacity	
Local residents knowledge of and understanding of climate risk ***Comment:***	Low
Local residents support of adaptation efforts ***Comment:***	Low
Local residents' capacity to adapt to climate impacts ***Comment:***	Low
Local economy current capacity to adapt to climate impacts ***Comment:***	Low
Local ecosystems capacity to adapt to climate impacts ***Comment:***	Low

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

21.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning and capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

21.5.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- **Capital Improvement Plan** — Looking to make sure improvements are made with the Mitigation Plan needs
- **Basic Plan —** The Basic Plan provides a summary on the hazards and threats in the community.
- **Annex P — Hazard Mitigation** is assigned to the Engineering Department and addresses the hazards and threats in the community. The Annex also identifies the various hazard mitigation related programs implemented in the City of Seabrook and which agencies are responsible for administration.

21.5.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

21.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 21-11 lists past occurrences of natural hazards for which specific damage was recorded in City of Seabrook. Other hazard events that broadly affected the entire planning area, including City of Seabrook, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 21-11. Past Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Hurricane Harvey	4332	2017	$1,000,000
Serve Storms and Flooding	4269	2016	Not Available
Serve Storms and Flooding	4272	2016	Not Available
Tropical Storm Bill	N/A	2015	Not Available
Hurricane IKE	1791	2008	$15,000,000
Thunder Strom	N/A	1/31/2008	$5,000
Tropical Storm Erin	1730	2007	Not Available
Hail	N/A	07/11/2003	$8000
Thunderstorm Wind	N/A	07/11/2003	$11000
Hail	N/A	04/07/2003	$2000
Tornado	N/A	12/30/2002	$5000
Tropical Storm Allison	1379	2001	$10,000
Hurricane Alicia	689	1983	$5,000,000

21.7 HAZARD RISK RANKING

Table 21-12 presents a local ranking for City of Seabrook, of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 21-12. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Flooding	51	High
2	Severe Weather	48	High
2	Hurricane	48	High
3	Earthquake	14	Low
3	Hazardous Materials	14	Low
3	Tsunami	14	Low
4	Wildfire	11	Low
5	Drought	6	Low
5	Mass Movement	6	Low
6	Dam Failure	0 (No exposure)	None
6	Coastal Erosion	0 (No exposure)	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

21.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. This section provides information on a few key vulnerabilities for the jurisdiction. Available jurisdiction-specific risk maps of the hazards are provided at the end of this annex.

21.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: 209
- Number of FEMA-identified Severe-Repetitive-Loss Properties: 26
- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated: 90

21.8.2 Other Noted Vulnerabilities

The following jurisdiction-specific issues have been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- The City of Seabrook is vulnerable to maritime threats and hazards since it is located along the Port of Houston and the Houston Ship Channel.
- The City of Seabrook is vulnerable to hazardous material incidents and chemical accidents from surrounding petrochemical industries, chemical manufacturers, and chemical storage facilities.

Mitigation actions addressing these issues were prioritized for consideration in the action plan presented in this annex.

21.9 STATUS OF PREVIOUS PLAN ACTIONS

Table 21-13 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

Table 21-13. Status of Previous Plan Actions

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
Install early warning systems for public buildings			X	SBK10
Comment: Currently the emergency notification is relied on by a telephone communication system. Providing alerting systems in Critical facilities will help contain hazardous incident when they arise.				
Buyout/acquisition/demobilization of Severe Repetitive Loss properties and Repetitive Loss properties			X	SBK1
Comment: Severe Repetitive Loss and Repetitive loss structures throughout the city can be reduced by taking care of these structures when the owners cannot.				
Install flood barrier systems, i.e. modular flood panels designed to withstand high velocity water loads and high impact forces to enhance flood protection at critical care and/or public infrastructure			X	SBK11
Comment: Currently the city has no protection in place for this time of the hazard. Facilities did receive water during a flooding event but funds were not in place to mitigate any further.				
Relocate critical infrastructure out of flood hazard area			X	SBK1, SBK5, SBK7
Comment: Improving the productivity of the city staff and city services by moving these structures out of the flood plain will be huge. Currently Waste water treatment and Public works facilities are out dated and reside in the flood prone areas.				
Implement a tree management program to limit debris damage to critical infrastructure, public facilities from falling tree canopy			X	SBK13
Comment: Currently the City of Seabrook has 20 parks with trails and trees. A clearing process is needed to harvest dead trees and protect the critical infrastructure of the city.				
Adopt higher standards/latest edition of 2015 IBC – Construction Standards, which provide high-wind requirements for critical facilities to withstand severe thunderstorms, hurricane winds, tornadoes and hail.	X			
Comment: Codes have changed since the structures were built and upgrades need to be made. Buildings are smaller and the staff has grown. Codes Have been updated				
Install protective structures to minimize damage to critical assets and equipment from hail, snow loads/freezing and high-winds.	X			
Comment: Assists obtained by the city need to be protected to insure a longer life of the assets. Completed with the Building of the New Public Works Facility				
Improve code/ordinance to require removal of dead vegetation/dry fuel sources in risk areas			X	SBK9
Comment: 20 parks and trail and tree systems provides for a large area of potential fire fuel. Keeping the area clean and free of dead trees can help prevent accidental fires which can lead to disaster.				
Harden water piping lines and systems with non-corrosive linings/coatings (drought resistant materials) to prevent loss of water due to breaks caused by dry ground conditions from drought			X	SBK12
Comment: This has been put into place with a new replacement system				

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
Establish emergency water supply lines and infrastructure to provide alternate emergency pathways during water breaks/shortages by installing more valves to shut-off or re-route water.			X	SBK8
Comment: Providing more valves to shut off water and reroute water in the event of a water breakage/shortages caused by drought.				
Improve or install lighter color roofing materials or cooler paving materials			X	SBK19
Comment: Enhancing the building and surrounding parking lots to make the buildings cooler and providing a more energy efficient building.				
Improve and enhance cover and freeze protection of above (insulate pipes above) ground water pipes, public irrigation systems and fire sprinkler systems, FDC connections	X			
Comment: New public awareness campaign kicked off and maintenance has improved on city equipment				
Implement or establish code/ordinance to require hazardous materials transportation corridor	X			
Comment: Traffic Plan was adopted by the City that reflects this item				
Establish/improve code/ordinance to require shutoff valves at entry and exit point of city limits for new construction	X			
Comment: Pipeline ordinance adopted and addressed this				
Identify exposed/above ground pipelines in flood hazard area			X	SBK20
Comment: This is an ongoing process				
Implement a GIS System to Create a map of Emergency Routes to be used by emergency vehicles in flooding conditions.	X			
Comment: GIS department has been established				
Add 2-foot freeboard requirement to Flood Damage Prevention Ordinance.	X			
Comment: The City agreed on 18 inch				
Replace the three existing water flow culverts with bridges; Second Street, Elmar and Meyer and Pine Gully			X	SBK21
Comment: The city has completed one of the Three				
Investigate the impact of the new Flood Hazard Recovery Data and how it effects the City and residents.	X			
Comment: New maps adopted				
Relocate the current Emergency operations Center (EOC) and Police Department to a higher elevation site within the City of Seabrook			X	SBK7
Comment: Still needing to be done. Relocating out of the flood hazard area				
Harden critical city facilities to lessen the impacts of natural and human-caused hazards.	X			
Comment: Ballistic Material added to the Lobby of City Hall				
Develop reliable fiber-optic communications network to maintain communications during disasters, and facilitate disaster preparedness and recovery for data network.			X	SBK6
Comment: In process				
Identify vulnerable populations to extreme heat hazards.			X	SBK22
Comment: Continued process through outreach				

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
Develop/implement cooling center program to educate the public on the hazards of extreme heat and actions they can take to limit the effects of extreme heat upon health and property.	X			
Comment: Worked with Harris County and use of Library				
Develop/implement groundwater contingency measures for Critical Infrastructure	X			
Comment: New above ground tank added for more capacity for the City				
Develop/implement water smart program to educate the public on drought hazards and actions to minimize the impacts of drought upon property	X			
Comment: Ongoing campaign of outreach				
Construct shelter for critical equipment and vehicles.	X			
Comment Completed with New Construction of Public Works Facility				
Investigate the impact of the new Flood Hazard Recovery Data and how it effects the City and residents.	X			
Comment: New maps adopted				
Clean-up of heavy wildfire fuel areas (abandoned buildings, abandoned lands, etc.).	X			
Comment: Ongoing with Code Enforcement				
Develop/implement a Winter Storm Public Education Program for home heating, to educate the public on winter hazards and personal actions to mitigate winter damages to property and to safely heat homes			X	SBK23
Comment: In Process; The City continues to distribute FLASH Materials on natural hazards at City Hall.				
Increase Haz-Mat training/equipment for local responders.			X	SBK14
Comment: Continue Training				
Develop/implement Haz-Mat Safety Program.	X			
Comment: Completed with Traffic Plan and out reach				
Send appropriate local officials to FEMA's Emergency Management Institute for continuing education and training			X	SBK24
Comment: Some have gone others need to go				
Develop/implement pipeline program.	X			
Comment: Information has been presented in open meetings and safety fairs on pipelines and pipeline safety. Also information has been placed in the City of Seabrook Website and local Television Channel. Staff has been to training with the Pipeline Group. Staff attending annual training.				
Relocate the current Waste Water Treatment facility from the location on Galveston Bay to a high location in the City			X	SBK5
Comment: In process, Have applied for grants with no luck so far part of CIP				
Re-level the City Benchmark System to the new FEMA datum to accurately correlate the new flood zone maps	X			
Comment: Part of CRS Annual Inspection				

21.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 21-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 21-15 identifies the priority for each action. Table 21-16 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 21-14. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action SBK 1 — Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Flooding, Hurricane, Severe Weather						
Existing	12, 13, 14, 15	Building Department	EM, Com Dev	High	HMGP, PDM, FMA	Long-term
Action SBK 2 — Integrate the hazard mitigation plan into other plans, ordinances and programs that dictate land use decisions in the community, including Capital Improvement Programs, Master Plans, and Strategic Plans						
Hazards Mitigated: Flooding, Severe Weather, Hurricane, Earthquake, Hazardous Materials, Wildfire, Drought, Tsunami , Mass Movement,						
New and Existing	3, 5, 7, 9, 10	EM	ENG, PLNG, PW	Low	Staff Time, General Funds	Ongoing
Action SBK 3 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: All hazards						
New and Existing	3, 5, 7, 9, 10	EM	ENG, PLNG, PW	Low	Staff Time, General Funds	Short-term
Action SBK 4 — Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements: • Enforce the flood damage prevention ordinance. • Participate in floodplain identification and mapping updates. • Provide public assistance/information on floodplain requirements and impacts.						
Hazards Mitigated: Flooding, Hurricane, Severe Weather						
New and Existing	2, 8, 9, 11, 14	EM	ENG, PLNG, PW	Low	Staff Time, General Funds	Ongoing
Action SBK 5 – Relocate the current Waste Water Treatment facility from the location on Galveston Bay to a high location in the City						
Hazards Mitigated: Flooding, Hurricane						
	3, 7, 9, 11, 13	PW	EM, ENG	High	HMGP	Short-term
Action SBK 6 — Develop reliable fiber-optic communications network to maintain communications during disasters, and facilitate disaster preparedness and recovery for data network.						
Hazards Mitigated: Severe Weather, Hurricanes						
New and Existing	6, 7, 10, 13	IT	EM, PW	High	Staff Time, General Funds	Short-term
Action SBK 7 — Relocate the current Emergency operations Center (EOC) and Police Department to a higher elevation site within the City of Seabrook						
Hazards Mitigated: Serve Weather, Flooding, Hurricanes						
New and Existing	1, 7, 9, 11, 12, 13, 15	PD	EM, ENG, COM DEV	High	HMGP, FMA	Long-term
Action SBK 8 — Establish emergency water supply lines and infrastructure to provide alternate emergency pathways during water breaks/shortages by installing more connections and valves to shut-off or re-route water.						
Hazards Mitigated: Drought						
New and Existing	3, 4, 7, 9, 11, 13	PW	ENG	High	Staff Time, General Funds	Ongoing
Action SBK 9 — Improve code/ordinance to require removal of dead vegetation/dry fuel sources in risk areas						
Hazards Mitigated: Wild Fires						
New and Existing	2, 2, 4, 6, 8, 15	COM DEV	EM, PW	Low	Staff Time, General Funds	Short-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action SBK 10 — Install early warning systems for public buildings						
Hazards Mitigated: Flooding, Severe Weather, Hurricane, Earthquake, Hazardous Materials, Wildfire, Drought, Tsunami , Mass Movement,						
New and Existing	1, 3, 4, 9	EM	PW	Low	Staff Time, General Funds	Short-term
Action SBK 11 — Install flood barrier systems, i.e. modular flood panels designed to withstand high velocity water loads and high impact forces to enhance flood protection at critical care and/or public infrastructure						
Hazards Mitigated: Flooding						
New and Existing	9, 10, 11, 12	EM	PW, COM DEV, ENG	High	HMGP, FMA	Long-term
Action SBK 12 — Harden water piping lines and systems with non-corrosive linings/coatings (drought resistant materials) to prevent loss of water due to breaks caused by dry ground conditions from drought						
Hazards Mitigated: Drought						
New and Existing	3, 4, 7, 9, 11, 13	PW	ENG	High	Staff Time, General Funds	Short-term
Action SBK 13 — Implement a tree management program to limit debris damage to critical infrastructure, public facilities from falling tree canopy						
Hazards Mitigated: Wild Fires						
New and Existing	2, 3, 4, 6, 8, 15	COM DEV	EM, PW	low	Staff Time, General Funds	Short-term
Action SBK 14 — Increase Haz-Mat training/equipment for local responders						
Hazards Mitigated: Hazardous Materials Incident						
New and Existing	3, 6, 9, 14	EM	PD, FD, PW	low	Staff Time, General Funds	Short-term
Action SBK 15 — Continue on building the relationships with local essential personnel throughout the neighboring communities and communications to the Public						
Hazards Mitigated: Flooding, Severe Weather, Hurricane, Earthquake, Hazardous Materials, Wildfire, Drought, Tsunami , Mass Movement,						
New and Existing	1, 3, 4, 9, 11	EM	Communications	Low	Staff Time, General Funds	Ongoing
Action SBK 16 — Harden waste water piping lines and systems with non-corrosive linings/coatings (drought resistant materials) to prevent loss of water due to breaks caused by dry ground conditions from drought						
Hazards Mitigated: Drought						
New and Existing	3, 4, 7, 9, 11, 13	PW	ENG	High	Staff Time, General Funds	Long-term
Action SBK 17 — Conform to NOAA ATLAS 14 standards in all Repetitive Loss areas impacted by 100-year storm event.						
Hazards Mitigated: Flooding, Severe Weather						
New and Existing	3, 4, 10, 11, 12, 13	ENG	COM DEV, PW	Low	Staff Time, General Funds	Ongoing
Action SBK 18 — Eliminate low lying areas that prohibit emergency access during flooding events. Remove to NOAA ATLAS 14 Guidelines						
Hazards Mitigated: Flooding, Serve Weather						
New and Existing	3, 4, 10, 11, 12, 13	ENG	PW, COM DEV	High	HMGP, CDBG, FMA	Long-term
Action SBK 19 — Improve or install lighter color roofing materials or cooler paving materials						
Hazards Mitigated: Severe Weather						
Existing	5, 7, 13	PW	ENG	Medium	Staff Time, General Funds	Long-term
Action SBK 20 — Identify exposed/above ground pipelines in flood hazard area						
Hazards Mitigated: Severe weather, flooding, hurricane						
Existing	3, 4, 7, 9, 11, 13	PW	ENG	Low	Staff Time, General Funds	Long-term
Action SBK 21 — Replace the three existing water flow culverts with bridges; Second Street, Elmar and Meyer and Pine Gully						
Hazards Mitigated: Flooding, Severe weather, hurricane						
	3, 4, 7, 9, 11, 13	PW	ENG	High	General and/or grant funds	Long-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action SBK 22 — Identify vulnerable populations to extreme heat hazards.						
Hazards Mitigated: Severe weather						
Existing	3, 4,	EM	COM DEV	Low	Staff Time, General Funds	Short term
Action SBK 23 — Develop/implement a Winter Storm Public Education Program for home heating, to educate the public on winter hazards and personal actions to mitigate winter damages to property and to safely heat homes						
Hazards Mitigated: Severe weather						
Existing	1, 4, 10, 11	EM	COMM	Low	Staff Time, General Funds	Short term
Action SBK24— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
Hazards Mitigated: Flooding, Severe Weather, Hurricane, Earthquake, Hazardous Materials, Wildfire, Drought, Tsunami , Mass Movement						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	City Admistration	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 21-15. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
SBK 1	4	High	High	Yes	Yes	No	Medium	High
SBK 2	5	Medium	Low	Yes	No	Yes	High	Low
SBK 3	5	Low	Low	Yes	No	Yes	High	Low
SBK 4	5	Medium	Low	Yes	No	Yes	High	Low
SBK 5	5	High	High	Yes	Yes	Yes	High	High
SBK 6	4	Medium	Medium	Yes	No	Yes	High	Low
SBK 7	7	High	High	Yes	No	No	Medium	High
SBK 8	6	High	High	Yes	Yes	Yes	High	Low
SBK 9	6	Medium	Low	Yes	No	No	Medium	Low
SBK 10	4	High	Low	Yes	Yes	No	Medium	Low
SBK 11	4	High	High	Yes	Yes	No	High	High
SBK 12	6	High	High	Yes	Yes	Yes	High	High
SBK 13	6	High	Low	Yes	No	Yes	High	Low
SBK 14	4	High	Low	Yes	No	No	High	Low
SBK 15	5	High	Low	Yes	No	Yes	High	Low
SBK 16	6	High	High	Yes	Yes	Yes	High	High
SBK 17	6	High	Low	Yes	Yes	Yes	Low	Low
SBK 18	6	High	High	Yes	Yes	No	High	High
SBK 19	3	Medium	Medium	Yes	No	Yes	Medium	Low
SBK 20	6	Medium	Low	Yes	No	Yes	Medium	Low
SBK 21	6	High	High	Yes	Yes	No	High	High

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
SBK 22	2	High	Low	Yes	No	Yes	High	Low
SBK 23	4	High	Low	Yes	No	Yes	High	Low
SBK24	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 21-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Flooding	SBK 2, 3, 4, 5, 10, 11, 15, 17, 18, 20, 21,24	SBK 1, 4, 5, 7, 11, 17, 18, 20, 21	SBK 4, 10, 15, 24	SBK 1	SBK 5, 7, 11, 15, 20, 24	SBK 5, 7, 11, 17, 18, 20, 21		SBK 2, 24
Severe Weather	SBK 2, 3, 6, 10, 15, 17, 18, 20, 21, 24	SBK 1, 5, 7, 17, 18, 20, 21	SBK 4, 10, 15, 23, 24	SBK 1	SBK 6, 7, 15, 20, 24	SBK 7, 17, 18, 19, 20, 21	SBK 22	SBK 2, 22, 24
Hurricane	SBK 2, 3, 5, 6, 10, 15, 20, 21, 24	SBK 1, 5, 7, 20, 21	SBK 4, 10, 15, 24	SBK 1	SBK 5, 6, 7, 15, 24	SBK 5, 7, 20, 21		SBK 2, 24
Low-Risk Hazards								
Earthquake	SBK24	N/A	SBK24	N/A	SBK24	N/A	N/A	SBK24
Hazardous Material	SBK 2, 3, 10, 15, 24	SBK 1	SBK 4, 10, 15, 24	SBK 1	SBK 14, 15, 24			SBK 2, 24
Wildfire	SBK 2, 3, 9, 10, 13, 15, 24	SBK 9, 13	SBK 9, 10, 13, 15, 24	SBK 1, 9, 13	SBK 15, 24		SBK 9, 13	SBK 2, 24
Drought	SBK 2, 3, 8, 10, 12, 15, 16, 24	SBK 8, 10, 12, 16	SBK 15, 24	SBK 8, 10, 12, 16	SBK 15, 24	SBK 8, 10	SBK 8, 10, 12, 16	SBK 2, 24
Tsunami	SBK24		SBK24		SBK24			SBK24
Mass Movement	SBK24		SBK24		SBK24			SBK24

a. See the introduction to this volume for explanation of mitigation types.

21.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- **City of Seabrook Municipal Code** — The municipal code was reviewed for the full capability assessment and for identifying opportunities for action plan integration.
- **City of Seabrook Flood Damage Prevention Ordinance Chapter 38 Article II Flood Damage Prevention** — The flood damage prevention ordinance was reviewed for compliance with the National Flood Insurance Program.

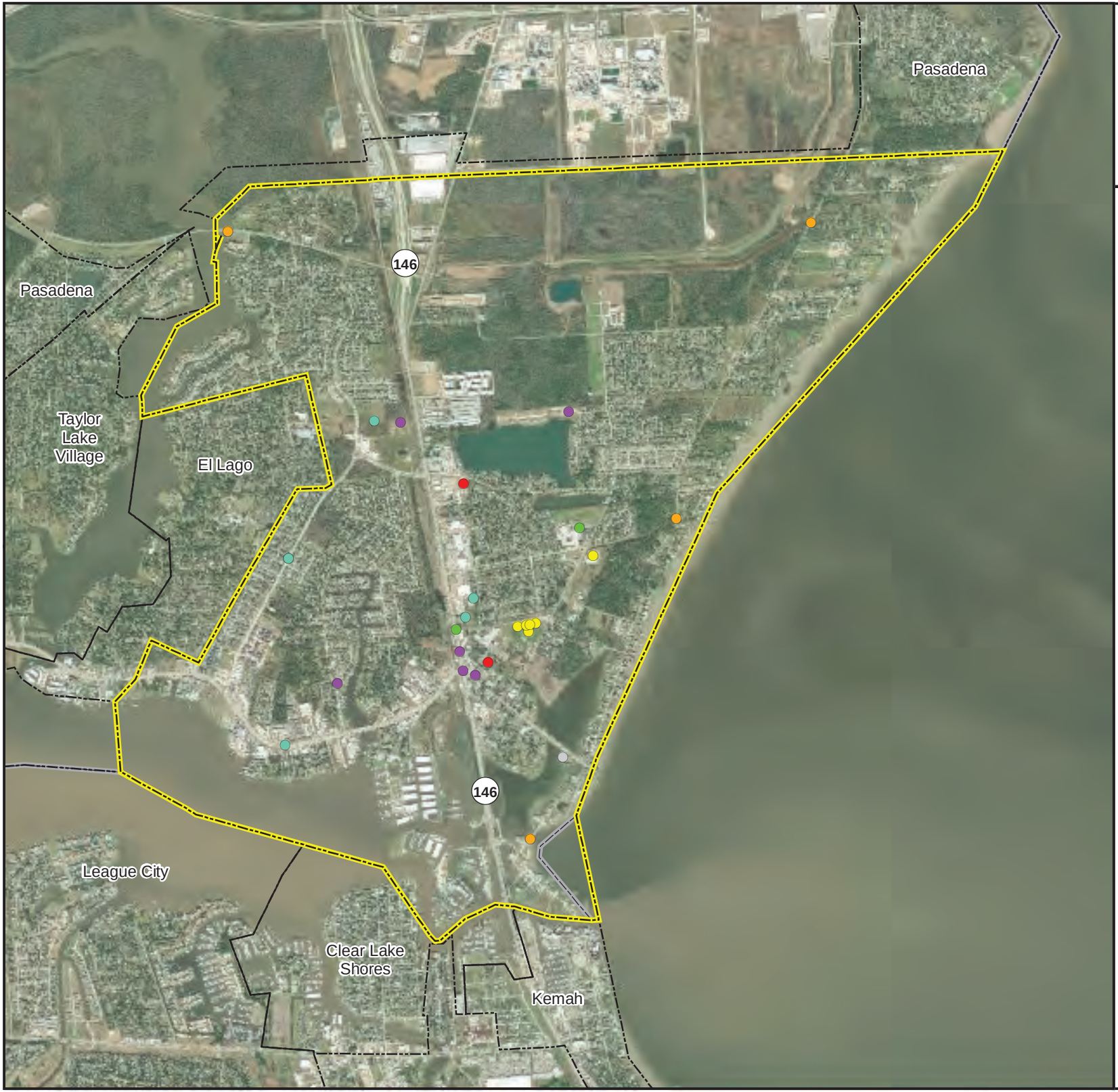
The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.
- **Capital Improvement Plan –** The CIP was used to in the development in Hazard Mitigation Action Items.

21.12 FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

The City of Seabrook needs the following to better understand future risks and vulnerabilities from natural hazards and to better plan for the future:

- Updated and revised flood maps and flood hazard areas.
- Develop an updated Drainage Plan and Study to better understand local drainage issues, run-off, sheet-flow, and ponding.
- Develop an enhanced outreach program on flood insurance and wind insurance.
- Build capacity and strategies for resilience to cope with future impacts from natural hazards.
- Develop local community planning, development, and building design standards that address impacts from natural hazards to build a safer and stronger city.



Seabrook

Critical Facilities

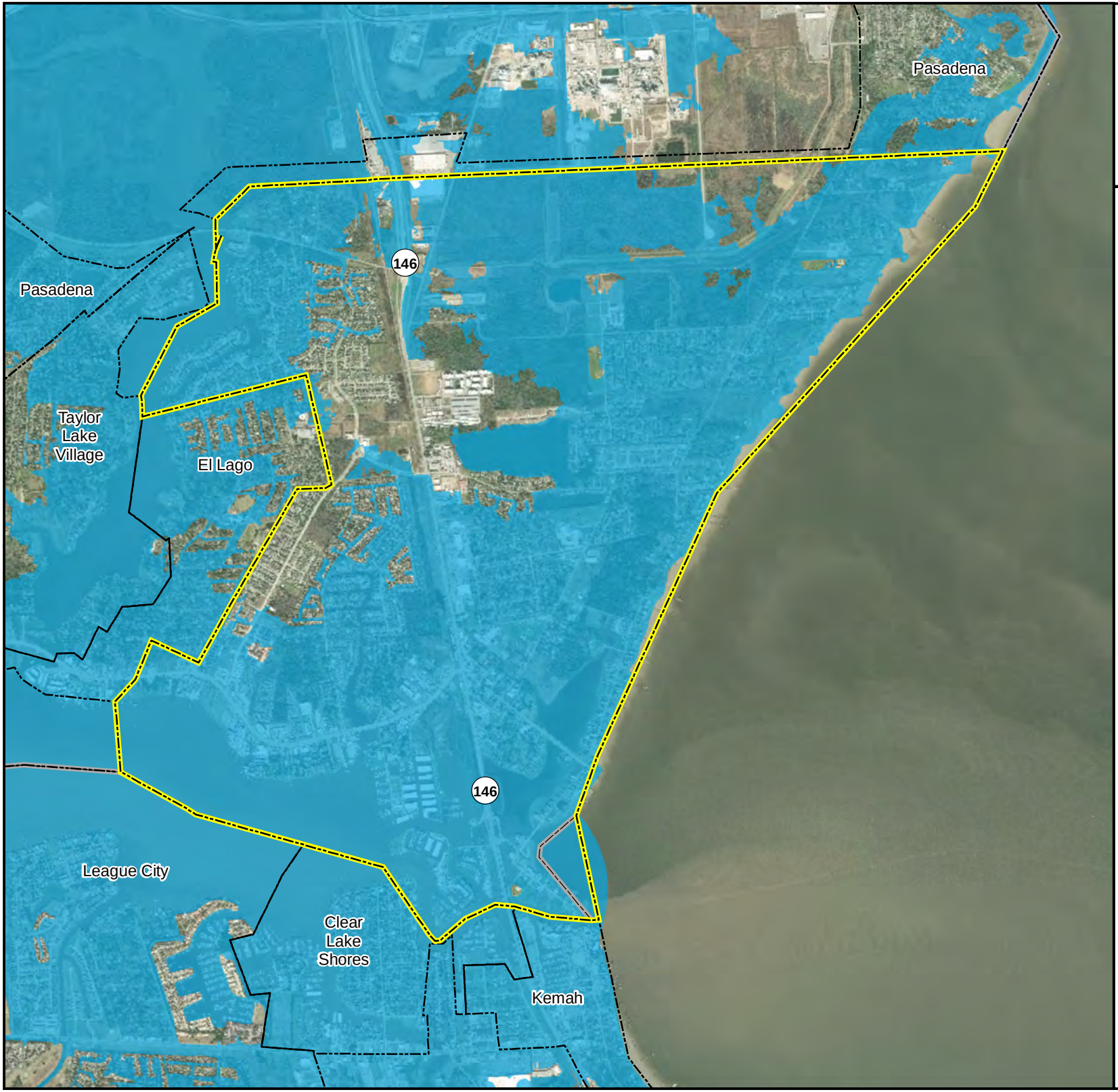
- Education Facilities
- Emergency Services
- Government Facilities
- Hazardous Material Sites
- Health and Medical Facilities
- Historical and Cultural Sites
- Transportation Systems
- Utility Systems
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.175 0.35 0.7 Miles



Seabrook

FEMA Flood Hazard

1% Annual Chance Flood (100-yr)

Incorporated Cities

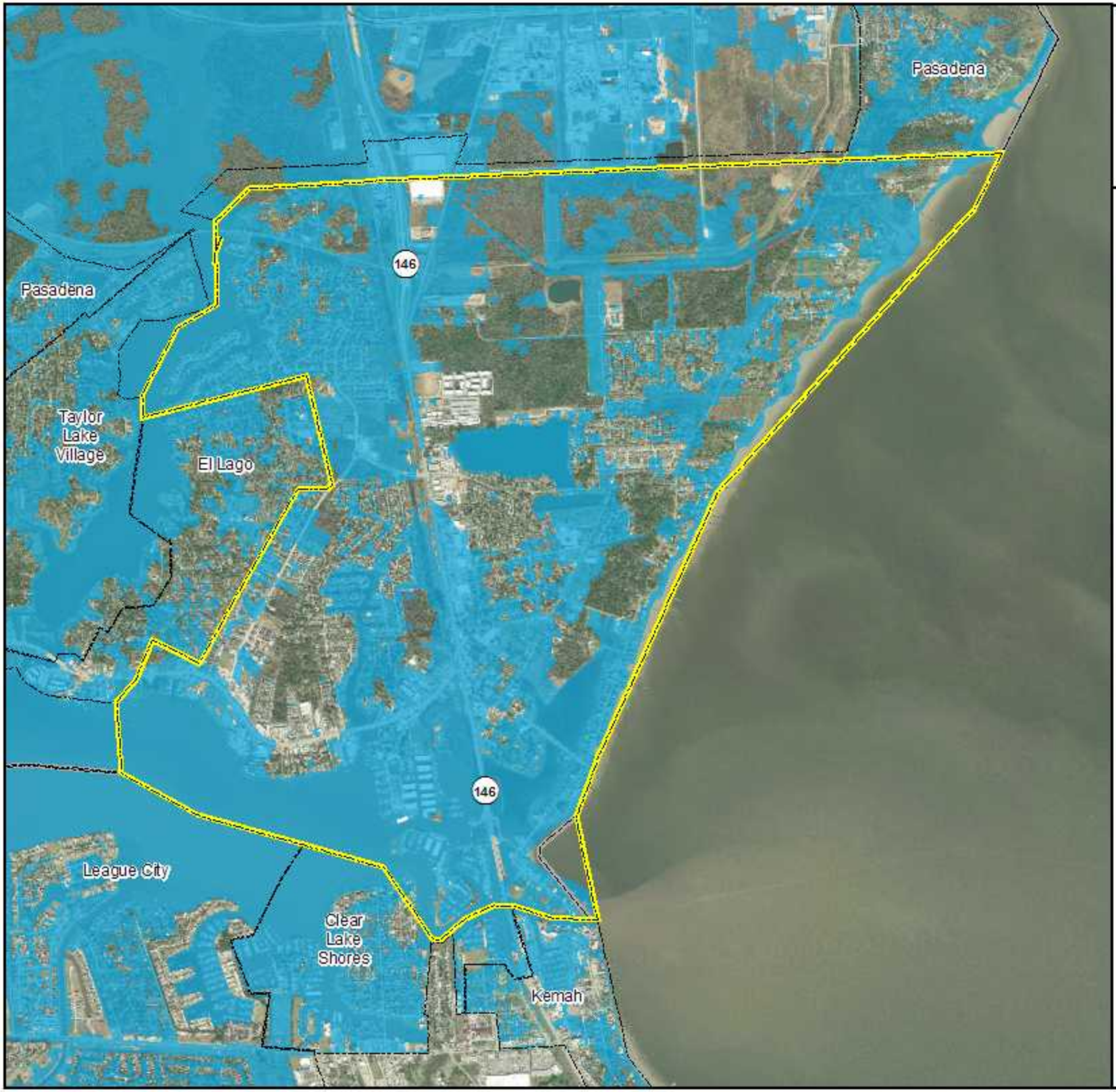
Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.175 0.35 0.7 Miles



Seabrook

Flood Hazard Hurricane Harvey

Flooding Extent

Incorporated Cities

Harris County

Note: Flooding extent shown for Hazard Mitigation Plan planning area only.

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.175 0.35 0.7 Miles

Seabrook

Hurricane Alicia (1983)

Peak WInd Gust (mph)

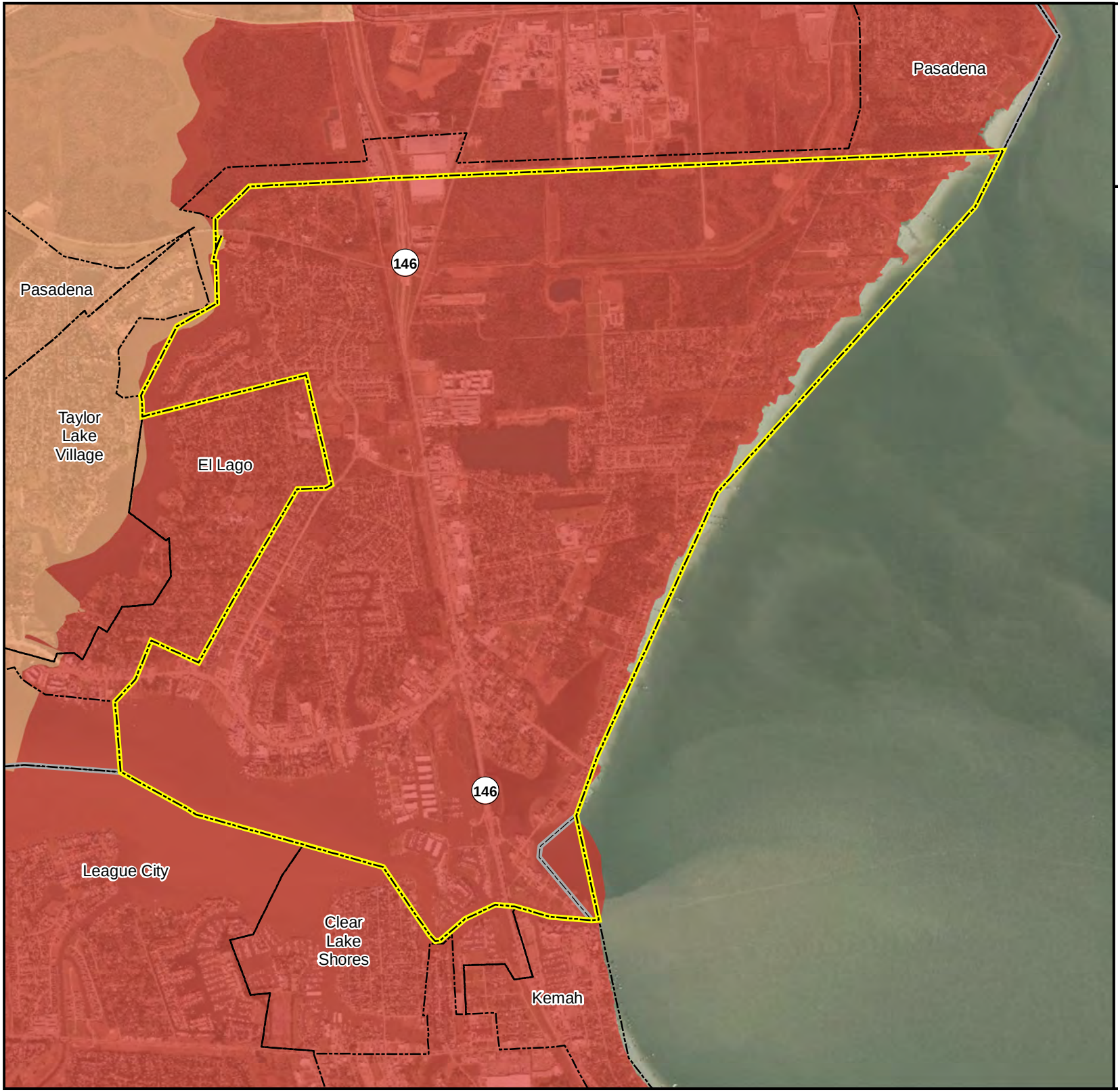
- 87 - 94
- 95 - 98
- 99 - 101
- 102 - 104
- 105 - 110
- Storm Track
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.175 0.35 0.7 Miles



Seabrook

20-year Probabilistic Hurricane

Peak Wind Gust (mph)

- 63 - 71
- 72 - 76
- 77 - 80
- 81 - 84
- 85 - 92
- Incorporated Cities
- Harris County

TETRA TECH

N

0 0.175 0.35 0.7 Miles

Seabrook

100-year Probabilistic Hurricane

Peak Wind Gust (mph)

- 89 - 101
- 102 - 106
- 107 - 111
- 112 - 117
- 118 - 128
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.175 0.35 0.7 Miles

Seabrook

Wildfire Ignition Density

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.175 0.35 0.7 Miles

Seabrook

Wildfire Threat

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.175 0.35 0.7 Miles

22. CITY OF SHOREACRES

22.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Troy D. Harrison/City Manager-Police Chief
601 Shore Acres Blvd.
Shoreacres, Texas 77571
Telephone: 281-307-1959
e-mail Address: THarrison@cityofshoreacres.us

Alternate Point of Contact
Ray Dodd/Public Works Director
601 Shore Acres Blvd.
City, State ZIP
Telephone:281-471-2244
e-mail Address: ldodd@cityofshoreacres.us

22.2 JURISDICTION PROFILE

22.2.1 Location

Shoreacres is located in Harris County, Texas alongside State Highway 146 and extends to Galveston Bay. The City encompasses less than 2 square miles.

22.2.2 History

The City of Shoreacres was incorporated in 1949.

22.2.3 Climate

The climate of Shoreacres is considered sub-tropical.

22.2.4 Governing Body Format

Shoreacres is governed by a five-member City Council under the city manager form of government as adopted under Ordinance No. 2017-266 that was approved by city council June 12, 2017. The current City Manager is Troy D. Harrison, Sr. The current Mayor is David Jennings (term ends 2020). Council consists of five at-large Alderpersons including Mayor Pro-Tempore Ricky Bowles (term ends 2020), Karen Harris (term ends 2019), Jerome McKown (term ends 2019), Neil Moyer (term ends 2020) and Felicia Ramos (term ends 2019). Council members serve staggered two-year terms.

The city provides police, recycling, parks, planning, zoning, floodplain management, and building code inspections among its services. The city provides fire, sanitation, and emergency medical services by contract.

The City of Shoreacres assumes responsibility for the adoption of this plan; the City of Shoreacres will oversee its implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 22-1.

Table 22-1. Local Mitigation Planning Team Members

Name	Title
Troy D. Harrison	City Manager-Chief of Police
Ray Dodd	Public Works Director

22.3 CURRENT TRENDS

22.3.1 Population

According to U.S. Census, the population of Shoreacres as of March 2010 was 1,493.

22.3.2 Development

Table 22-2 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

Table 22-2. Recent and Expected Future Development Trends

Criterion	Response					
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan? • If yes, give the estimated area annexed and estimated number of parcels or structures.	No N/A					
Is your jurisdiction expected to annex any areas during the performance period of this plan? • If yes, describe land areas and dominant uses. • If yes, who currently has permitting authority over these areas?	No N/A N/A					
Are any areas targeted for development or major redevelopment in the next five years? • If yes, briefly describe, including whether any of the areas are in known hazard risk areas	No					
How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?		2014	2015	2016	2017	2018
	Single Family	6	5	4	3	2
	Multi-Family	0	0	0	0	0
	Other (commercial, mixed use, etc.)	0	0	0	0	0
	Total	6	5	4	3	2
Provide the number of new-construction permits for each hazard area or provide a qualitative description of where development has occurred.	• Special Flood Hazard Areas: 20 • Landslide: 0 • High Liquefaction Areas: 0 • Tsunami Inundation Area: 0 • Wildfire Risk Areas: 0					
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	Very few empty lots remain					

22.4 CAPABILITY ASSESSMENT

The City of Shoreacres performed an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities is presented in Table 22-3.
- Development and permitting capabilities are presented in Table 22-4.
- An assessment of fiscal capabilities is presented in Table 22-5.
- An assessment of administrative and technical capabilities is presented in Table 22-6.
- An assessment of education and outreach capabilities is presented in Table 22-7.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 22-8.
- Classifications under various community mitigation programs are presented in Table 22-9.
- The community's adaptive capacity for the impacts of climate change is presented in Table 22-10.

Findings of the capability assessment were reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table included in the action plan for this annex identifies these as community capacity building mitigation actions.

Table 22-3. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code	Yes	No	No	No
Comment: *Chapter 10, Article III, adopts The International Building Code, 2015 Edition and amendments, 7/14/2014*				
Zoning Code	Yes	No	No	No
Comment: *Chapter 50, Article II, 10/13/2003*				
Subdivisions	Yes	No	No	No
Comment: *Chapter 74, Appendix A,*				
Stormwater Management	Yes	No	No	No
Comment: *Chapter 66, Article II,*				
Post-Disaster Recovery	No	No	No	No
Comment:				
Real Estate Disclosure	No	No	No	No
Comment:				
Growth Management	Yes	No	No	No
Comment:				
Site Plan Review	Yes	No	No	No
Comment:				
Environmental Protection	Yes	No	No	No
Comment:				
Flood Damage Prevention	Yes	No	No	No
Comment: *Chapter 30, 10/10/2016*				
Emergency Management	Yes	No	No	No
Comment: *Chapter 14, Article II, 11/9/2009*				
Climate Change	No	No	No	No
Comment:				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Planning Documents				
General Plan ***Comment:*** *N/A*	No	No	No	No
Capital Improvement Plan ***How often is the plan updated?*** *N/A* ***Comment:***	No	No	No	No
Disaster Debris Management Plan ***Comment:***	Yes	No	No	No
Floodplain or Watershed Plan ***Comment:*** *HCFCD*	No	Yes	No	No
Stormwater Plan ***Comment:*** *HCFCD*	Yes	Yes	No	No
Urban Water Management Plan ***Comment:***	No	No	No	No
Habitat Conservation Plan ***Comment:***	No	No	No	No
Economic Development Plan ***Comment:***	No	No	No	No
Shoreline Management Plan ***Comment:***	No	No	No	No
Community Wildfire Protection Plan ***Comment:***	No	No	No	No
Forest Management Plan ***Comment:***	No	No	No	No
Climate Action Plan ***Comment:***	No	No	No	No
Comprehensive EM Plan ***Comment:*** *Harris County*	No	Yes	No	No
Threat & Hazard Identification & Risk Assessment (THIRA) ***Comment:***	No	Yes	No	No
Post-Disaster Recovery Plan ***Comment:***	No	No	No	No
Continuity of Operations Plan ***Comment:***	No	No	No	No
Public Health Plan ***Comment:***	No	No	No	No

Table 22-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • **If no, who does? If yes, which department?**	Yes Administrative
Does your jurisdiction have the ability to track permits by hazard area?	No
Does your jurisdiction have a buildable lands inventory?	No

Table 22-5. Fiscal Capability

Financial Resource	
Community Development Block Grants	No
Capital Improvements Project Funding	No
Authority to Levy Taxes for Specific Purposes	Yes Water and Sewer
User Fees for Water, Sewer, Gas or Electric Service	Yes
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	No
Incur Debt through Private Activity Bonds	No
Withhold Public Expenditures in Hazard-Prone Areas	No
State-Sponsored Grant Programs	No
Development Impact Fees for Homebuyers or Developers	No

Table 22-6. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Contracted
Engineers or professionals trained in building or infrastructure construction practices	Yes	Contracted
Planners or engineers with an understanding of natural hazards	Yes	Contracted
Staff with training in benefit/cost analysis	Yes	Contracted
Surveyors	Yes	Contracted
Personnel skilled or trained in GIS applications	Yes	Contracted
Scientist familiar with natural hazards in local area	No	
Emergency manager	Yes	City EMC
Grant writers	No	

Table 22-7. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • If yes, briefly describe.	Yes Several links to information provided
Do you use social media for hazard mitigation education and outreach? • If yes, briefly describe.	No
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • If yes, briefly describe.	No
Do you have any other programs already in place that could be used to communicate hazard-related information? • If yes, briefly describe.	No
Do you have any established warning systems for hazard events?	Yes
• If yes, briefly describe.	Constant Contact/Alarms

Table 22-8. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Contracted
Who is your floodplain administrator? (department/position)	Contracted (Jerry Grainer)
Are any certified floodplain managers on staff in your jurisdiction?	No
What is the date that your flood damage prevention ordinance was last amended?	October 10, 2016
Does your floodplain management program meet or exceed minimum requirements? • **If exceeds, in what ways?**	Exceeds Stronger building codes
When was the most recent Community Assistance Visit or Community Assistance Contact?	November 2018
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • **If so, state what they are.**	No
Are any RiskMAP projects currently underway in your jurisdiction? • **If so, state what they are.**	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • **If no, state why.**	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? • **If so, what type of assistance/training is needed?**	No
Does your jurisdiction participate in the Community Rating System (CRS)? • **If yes, is your jurisdiction interested in improving its CRS Classification?** • **If no, is your jurisdiction interested in joining the CRS program?**	Yes Yes n/a
How many flood insurance policies are in force in your jurisdiction?[a] • **What is the insurance in force?** • **What is the premium in force?**	526 $139,390,900 $711,869
How many total loss claims have been filed in your jurisdiction?[a] • **How many claims are still open or were closed without payment?** • **What were the total payments for losses?**	1020 Unknown $57,079,468

Table 22-9. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	Yes	8	Ongoing
Building Code Effectiveness Grading Schedule	Yes		2016
Public Protection	No		Date
Storm Ready	No		Date
Firewise	No		Date

Table 22-10. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:***	Low
Jurisdiction-level monitoring of climate change impacts ***Comment:***	Low
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:***	Low
Participation in regional groups addressing climate risks ***Comment:***	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	Low
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	Low
Identified strategies for adaptation to impacts ***Comment:***	Low
Champions for climate action in local government departments ***Comment:***	Low
Political support for implementing climate change adaptation strategies ***Comment:***	Low
Financial resources devoted to climate change adaptation ***Comment:***	Low
Local authority over sectors likely to be negative impacted ***Comment:***	Low
Public Capacity	
Local residents knowledge of and understanding of climate risk ***Comment:***	Low
Local residents support of adaptation efforts ***Comment:***	Low
Local residents' capacity to adapt to climate impacts ***Comment:***	Low
Local economy current capacity to adapt to climate impacts ***Comment:***	Low
Local ecosystems capacity to adapt to climate impacts ***Comment:***	Low

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

22.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning and capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

22.5.1 Existing Integration

No integration has yet been established between local hazard mitigation planning and other local plans and programs.

22.5.2 Opportunities for Future Integration

The capability assessment presented in this annex identified no plans or programs that provide opportunities to integrate hazard mitigation information in the future.

22.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 22-11 lists past occurrences of natural hazards for which specific damage was recorded in the City of Shoreacres. Other hazard events that broadly affected the entire planning area, including the City of Shoreacres, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 22-11. Past Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Hurricane Harvey	4332 DR	2017	Monies not available, most damage was from down trees and other vegetation, failure of power lines and street and home flooding
Hurricane Ike	1791 DR	2008	Monies not available, street flooding, homes flooded, residents displaced, no electricity, downed trees and power lines
Tropical Storm Allison	1379 DR	2001	Monies not available, flooding in streets and homes, no electricity, down trees and power lines
Hurricane Alicia	689 DR	1983	Monies not available, street flooding, homes flooded, residents displaced, no electricity, downed trees and power lines, streets closed for extended period

22.7 HAZARD RISK RANKING

Table 22-12 presents a local ranking for the City of Shoreacres of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 22-12. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Flooding	54	High
2	Severe Weather	48	High
2	Hurricane	48	High
3	Wildfire	16	Medium
4	Earthquake	14	Low
4	Tsunami	14	Low
5	Drought	6	Low
5	Mass Movement	6	Low
6	Dam Failure	0 (No Exposure)	None
6	Coastal Erosion	0 (No Exposure)	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

22.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. This section provides information on a few key vulnerabilities for the jurisdiction. Available jurisdiction-specific risk maps of the hazards are provided at the end of this annex.

22.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: 117
- Number of FEMA-identified Severe-Repetitive-Loss Properties: 21
- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated: 47

22.8.2 Other Noted Vulnerabilities

The following jurisdiction-specific issues have been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- Flooding from heavy rains/severe storms. Performing a comprehensive storm-water drainage study would assist in locating any deficiencies in drainage in the City after a severe rain storm or hurricane.
- It is noted that the City has not completed a GIS mapping of the City, This would beneficial to obtain hazard data and to map risk for various hazards.
- The City does not currently have a building to serve as a short term shelter after a natural disaster or heat event.

Mitigation actions addressing these issues were prioritized for consideration in the action plan presented in this annex.

22.9 Status of Previous Plan Actions

Table 22-13 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

Table 22-13. Status of Previous Plan Actions

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
2014SHORAC001 Install new stand-by power (generator) for critical facilities: Police Station and Public Works Building	X			
Comment:				
2014SHORAC002 New public safe room / structure / shelter located at Circle Park.		X		
Comment:				
2014SHORAC003 Join FireWise Program.		X		
Comment:				
2014SHORAC004 New tower mounted FLIR PTZ video camera for detection and early warning of chemical releases from Bayport Ship Channel chemical industrial facilities, rail tank cars, ships and pipelines (to be installed on existing 40-foot tower located at EOC).		X		
Comment:				
2014SHORAC005 New tower mounted PTZ video camera for detection and early warning of chemical releases from Bayport Industrial district facilities, rail tank cars, pipelines and tank trucks (to be installed on new 40-foot tower located at city wastewater lift station #1 adjacent to railroad and State Highway 146).		X		
Comment:				
2014SHORAC006 Establish weather sensors (wind speed, wind direction, air temperature, and humidity) for enhanced warning of chemical release threat (plume determination) • **In central residential district adjacent to Bayport Ship Channel to be installed on existing 40-foot tower located at EOC).** • **In Bayport Industrial district (to be installed on new 40-foot tower located at city wastewater lift station #1).**		X		
Comment:				
2014SHORAC007 Establish a Cooling Center and install misting systems to limit the effects of extreme heat upon vulnerable populations. Locations: • **City Hall Meeting Center** • **Public Works Building**		X		
Comment:				
2010SHORAC001 Adoption of flood surge zone regulations to harden and increase stability of new structures.	X			
Comment:				
2010SHORAC002 Expand current flood warning system(s) by including an additional outdoor siren, digital signage, automated calling system, flood gauges, and loudspeaker warning announcement system to increase coverage within the community's population and improve automation.			X	SA19
Comment:				
2010SHORAC003 Conduct study for updating local inundation risk areas and mapping.			X	SA20
Comment:				
2010SHORAC004 Harden manhole access points to prevent entrance of flood water or hazardous fluids into sanitary sewer system. **Comment:**	X			

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
2010SHORAC005 Elevate utility equipment storage building. Comment:			X	SA21
2010SHORAC010 Construct revetment at shoreline of Galveston Bay Comment:		X		
2010SHORAC012 Development Adoption of latest edition/higher standard of building codes / ordinances for mitigation of hurricane wind hazards. Comment:			X	SA22
2010SHORAC014 Harden and retrofit records storage to withstand high-wind damage. Comment:			X	SA23
2010SHORAC018 Install lightning and surge protection systems to harden facility and equipment of public service buildings. Comment:			X	SA24
2010SHORAC022 Develop/implement water smart public education program to inform the public on actions that can be taken to conserve water and reduce the impact of drought. Comment:			X	SA25
2010SHORAC024 Proposed Mitigation Action (describe): Construct shelter for critical equipment and vehicles. Comment:		X		
2010SHORAC025 Develop/implement hail safety public education program to educate the public on hail hazards and actions to minimize hail damage to property and equipment. Comment:			X	SA26
2010SHORAC027 Clean-up of heavy wildfire fuel areas (abandoned buildings, abandoned lands, etc.). Comment:			X	SA27
2010SHORAC028 Develop/implement home heating public education program to address winter storm hazards and provide personal actions to minimize winter damages to property and equipment. Comment:			X	SA28
2010SHORAC029 Develop/implement tree management planning and mitigation measures. Comment:			X	SA29
2010SHORAC032 Develop/implement Haz-Mat Safety Program. Comment:			X	SA30
2010SHORAC033 Conduct HVAC assessment/study/mitigations to ventilation systems for Critical Infrastructure. Comment:			X	SA31
2010SHORAC035 Develop/update Risk Management Plan/mitigation measures for Haz-Mat transportation (road/water) within the Special Flood Hazard Area. Comment:			X	SA32
2010SHORAC037 Develop/implement pipeline safety program. Comment:	X			

22.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 22-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 22-15 identifies the priority for each action. Table 22-16 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 22-14. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action SA1 — Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Flooding, severe weather, hurricane, wildfire, Earthquake, flooding,						
Existing	3, 4, 10	City Administration	TBD	High	HMGP, PDM, FMA	Short-term
Action SA2 — Integrate the hazard mitigation plan into other plans, ordinances and programs that dictate land use decisions in the community, including the City of Shoreacres						
Hazards Mitigated: Dam failure, drought, earthquake, flooding, landslide, tsunami, wildfire						
New and Existing	1, 3, 4, 5, 7, 8, 10	City Administration	TBD	Low	Staff Time, General Funds	Ongoing
Action SA3 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: Flooding, Severe Weather, Hurricane, Wildfire, Earthquake, Drought, Tsunami, Mass Movement						
New and Existing	1, 5, 8	City Administration	TBD	Low	Staff Time, General Funds	Short-term
Action SA4 — Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements: • Enforce the flood damage prevention ordinance. • Participate in floodplain identification and mapping updates. • Provide public assistance/information on floodplain requirements and impacts.						
Hazards Mitigated: Dam failure, flooding, severe weather, tsunami,						
New and Existing	1, 3, 5, 7, 8, 10	City Administration	TBD	Low	Staff Time, General Funds	Ongoing
Action SA5 — Expand current flood warning system(s) by including an additional outdoor siren, digital signage, automated calling system, flood gauges, and loudspeaker warning announcement system to increase coverage within the community's population and improve automation						
Hazards Mitigated: Flooding, severe weather, hurricane						
New	1, 4, 10, 11	City Administration	TBD	Medium	General and/or grant fund	Short term
Action SA6 — Conduct study for updating local inundation risk areas and mapping.						
Hazards Mitigated: Flooding, severe weather, hurricane						
Existing	3, 7, 9, 11	City Administration	TBD	Low	General and/or grant fund	Short term
Action SA7 — Elevate utility equipment storage building						
Hazards Mitigated: Flooding, severe weather, hurricane						
Existing	11, 13	City Administration	TBD	Medium	General and/or grant fund	Short term
Action SA8 — Development Adoption of latest edition/higher standard of building codes / ordinances for mitigation of hurricane wind hazards						
Hazards Mitigated: Hurricane						
Existing	9, 14	City Administration	TBD	Low	General and/or grant fund	Short term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action SA9 — Harden and retrofit records storage to withstand high-wind damage						
Hazards Mitigated: Severe weather, hurricane						
Existing	13	City Administration	TBD	Medium	General and/or grant fund	Short term
Action SA10 — Install lightning and surge protection systems to harden facility and equipment of public service buildings						
Hazards Mitigated: Severe weather, hurricanes						
Existing	13	City Administration	TBD	Medium	General and/or grant fund	Short term
Action SA11 — Develop/implement water smart public education program to inform the public on actions that can be taken to conserve water and reduce the impact of drought.						
Hazards Mitigated: Drought						
Existing	7, 8, 10	City Administration	TBD	Low	Staff Time, General Funds	Short-term
Action SA12 — Develop/implement hail safety public education program to educate the public on hail hazards and actions to minimize hail damage to property and equipment						
Hazards Mitigated: Severe weather						
Existing	1,3	City Administration	TBD	Low	Staff Time, General Funds	Short-term
Action SA13 — Clean-up of heavy wildfire fuel areas (abandoned buildings, abandoned lands, etc.).						
Hazards Mitigated: Wildfire						
Existing	2, 6, 8	City Administration	TBD	Low	Staff Time, General Funds	Short-term
Action SA14 — Develop/implement home heating public education program to address winter storm hazards and provide personal actions to minimize winter damages to property and equipment						
Hazards Mitigated: Severe weather						
Existing	1, 4, 10	City Administration	TBD	Low	Staff Time, General Funds	Ongoing
Action SA15 — Develop/implement tree management planning and mitigation measures.						
Hazards Mitigated: Severe weather, hurricane, wildfire						
Existing	2, 6, 8	City Administration	TBD	Low	Staff Time, General Funds	Short-term
Action SA16 — Develop/implement Haz-Mat Safety Program						
Hazards Mitigated: Hazardous materials incidents						
Existing	3, 11	City Administration	TBD	Low	Staff Time, General Funds	Short-term
Action SA17 — Conduct HVAC assessment/study/mitigations to ventilation systems for Critical Infrastructure						
Hazards Mitigated: Wildfire, hazardous materials incidents						
Existing	3, 8, 11, 13	City Administration	TBD	Medium	General and/or grant fund	Short term
Action SA18 — Develop/update Risk Management Plan/mitigation measures for Haz-Mat transportation (road/water) within the Special Flood Hazard Area						
Hazards Mitigated: hazardous materials incidents						
Existing	3, 11	City Administration	TBD	Low	Staff Time, General Funds	Short-term
Action SA19 — Expand current flood warning system(s) by including an additional outdoor siren, digital signage, automated calling system, flood gauges, and loudspeaker warning announcement system to increase coverage within the community's population and improve automation.						
Hazards Mitigated: Flood, Severe Weather, Hurricane						
New and Existing	1,3,10,15	City Administration	TBD	High	General Fund, Grants	Short-term
Action SA20 — Conduct study for updating local inundation risk areas and mapping.						
Hazards Mitigated: Flood, Severe Weather						
New and Existing	3,10,15	City Administration	TBD	High	General Fund, RiskMAP	Short-term
Action SA21 — Elevate utility equipment storage building.						
Hazards Mitigated: Flood, severe weather						
Existing	13,15	City Administration	TBD	High	General Fund, Grants	Short-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action SA22 — Development Adoption of latest edition/higher standard of building codes / ordinances for mitigation of hurricane wind hazards.						
Hazards Mitigated: Flood, Severe weather, Hurricane						
New and Existing	3,9,12,15	Planning	City Council	Low	General Fund	Short-term
Action SA23 — Harden and retrofit records storage to withstand high-wind damage.						
Hazards Mitigated: Hurricane, Severe weather						
Existing	13,15	City Administration	TBD	High	General Fund, Grants	Short-term
Action SA24 — Install lightning and surge protection systems to harden facility and equipment of public service buildings.						
Hazards Mitigated: Severe Weather						
New and Existing	1,3,15	City Administration	RBD	High	General Fund, Grants	Short-term
Action SA25 — Develop/implement water smart public education program to inform the public on actions that can be taken to conserve water and reduce the impact of drought.						
Hazards Mitigated: Drought						
New and Existing	3,7,15	City Administration	TBD	High	General, Fund	Short-term
Action SA26 — Develop/implement hail safety public education program to educate the public on hail hazards and actions to minimize hail damage to property and equipment.						
Hazards Mitigated: Severe Weather						
New and Existing	3,9,10,15	City Administration	TBD	Low	General Fund	Short-term
Action SA27 — Clean-up of heavy wildfire fuel areas (abandoned buildings, abandoned lands, etc.).						
Hazards Mitigated: Wildfire						
New and Existing	13,15	City Administration	TBD	Low	General Fund	Ongoing
Action SA28 — Develop/implement home heating public education program to address winter storm hazards and provide personal actions to minimize winter damages to property and equipment.						
Hazards Mitigated: Severe weather						
New and Existing	3,7,15	City Administration	TBD	Low	General Fund	Short-term
Action SA29 — Develop/implement tree management planning and mitigation measures.						
Hazards Mitigated: Severe Weather						
New and Existing	13,15	City Administration	TBD	Low	General Fund	Short-term
Action SA30 — Develop/implement Haz-Mat Safety Program.						
Hazards Mitigated: Hazardous Materials						
New and Existing	3,7,15	City Administration	TBD	Medium	General Fund	Short-term
Action SA31 — Conduct HVAC assessment/study/mitigations to ventilation systems for Critical Infrastructure.						
Hazards Mitigated: All Hazards						
Existing	13,15	City Administration	TBD	High	General Fund, Grants	Short-term
Action SA32 — Develop/update Risk Management Plan/mitigation measures for Haz-Mat transportation (road/water) within the Special Flood Hazard Area.						
Hazards Mitigated: Hazardous Materials, Flood						
New and Existing	3,7,15	City Administration	TBD	High	General Fund	Short-term
Action SA33— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
Hazards Mitigated: Flooding, Severe Weather, Hurricane, Wildfire, Earthquake, Drought, Tsunami, Mass Movement						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	City Admistration	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 22-15. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
1	3	High	High	Yes	Yes	No	Medium	High
2	7	Medium	Low	Yes	No	Yes	High	Low
3	3	Low	Low	Yes	No	Yes	High	Low
4	6	Medium	Low	Yes	No	Yes	High	Low
5	5	High	Medium	Yes	Yes	No	High	High
6	4	Medium	Low	Yes	No	Yes	Medium	Medium
7	2	High	Medium	Yes	Yes	No	High	High
8	2	Medium	Low	Yes	No	Yes	Medium	Low
9	1	High	Medium	Yes	Yes	No	High	High
10	1	High	Medium	Yes	Yes	No	High	High
11	3	Medium	Low	Yes	No	Yes	Medium	Low
12	2	Medium	Low	Yes	No	Yes	Medium	Low
13	3	Medium	Low	Yes	No	Yes	Medium	Low
14	3	Medium	Low	Yes	No	Yes	Medium	Low
15	3	Medium	Low	Yes	No	Yes	Medium	Low
16	2	Medium	Low	Yes	No	Yes	Medium	Low
17	4	Medium	Medium	Yes	Yes	Yes	Medium	Medium
18	2	Medium	Low	Yes	No	Yes	Medium	Low
19	2	High	High	Yes	Yes	No	Medium	High
20	4	High	High	Yes	Yes	No	Medium	High
21	3	High	High	Yes	Yes	No	Medium	High
22	4	Medium	Low	Yes	No	Yes	High	Low
23	2	High	High	Yes	Yes	No	Medium	High
24	3	High	High	Yes	Yes	No	Medium	High
25	3	High	High	Yes	Yes	No	Medium	High
26	4	Medium	Low	Yes	No	Yes	High	Low
27	2	Medium	Low	Yes	No	Yes	High	Low
28	3	Medium	Low	Yes	No	Yes	High	Low
29	2	Medium	Low	Yes	No	Yes	High	Low
30	3	High	Medium	Yes	Yes	No	Medium	High
31	2	High	High	Yes	Yes	No	Medium	High
32	3	High	High	Yes	Yes	No	Medium	high
33	8	Medium	Low	Yes	Yess	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 22-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Flooding	1, 2, 3, 4, 5, 6, 7, 8, 20, 22, 33	1, 7, 21, 31	1, 2, 3, 4, 5, 9	6, 7, 8	5, 9, 19, 32	7	7	1, 2, 3, 4, 5, 6, 7, 8, 9
Severe Weather	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 15, 20, 22, 29, 33	1, 7 9, 10, 21, 23, 24, 31	1, 2, 3, 4, 5, 9, 12, 15, 26, 28	6.7.8	5, 9, 19	7, 9, 10		1, 2, 3, 4, 5, 6, 7, 8, 9
Hurricane	5, 6, 7, 8, 9, 22, 33	7, 8, 9, 23, 31	5		19	7, 9		
Medium-Risk Hazards								
Wildfire	13, 27, 33	13, 17, 31		13		17		
Low-Risk Hazards								
Earthquake	33	31						
Drought	3.5.6.9, 33	31	1, 2, 3, 5, 9, 11, 25		5.9		11	1, 2, 3, 4, 5, 6, 7, 8, 9
Tsunami	33							
Mass Movement	33							
Hazardous Materials		31	30		32			

a. See the introduction to this volume for explanation of mitigation types.

22.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- **The City of Shoreacres Municipal Code** — The municipal code was reviewed for the full capability assessment and for identifying opportunities for action plan integration.
- **The City of Shoreacres Flood Damage Prevention Ordinance** — The flood damage prevention ordinance was reviewed for compliance with the National Flood Insurance Program.

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.
- **FEMA-** Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards to obtain a better understanding of potential of actions/mitigations that have not been prepared for that could be used to reduce or eliminate long term risk to people and property from natural disasters in the City of Shoreacres.

Shoreacres

Critical Facilities

- Education Facilities
- Emergency Services
- Government Facilities
- Hazardous Material Sites
- Health and Medical Facilities
- Historical and Cultural Sites
- Transportation Systems
- Utility Systems
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles

Shoreacres

FEMA Flood Hazard

1% Annual Chance Flood (100-yr)

Incorporated Cities

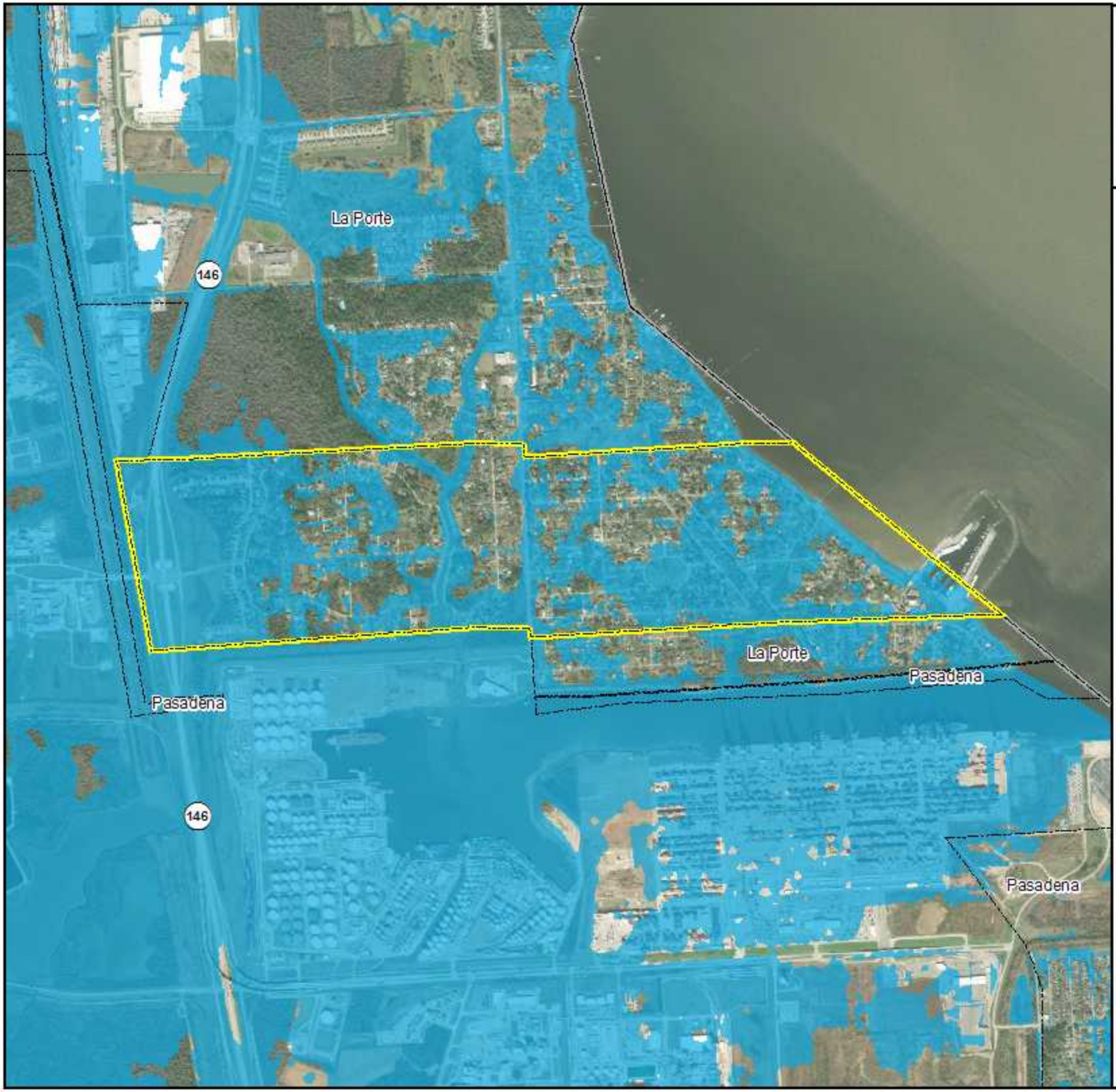
Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles



Shoreacres

Flood Hazard
Hurricane Harvey

Flooding Extent

Incorporated Cities

Harris County

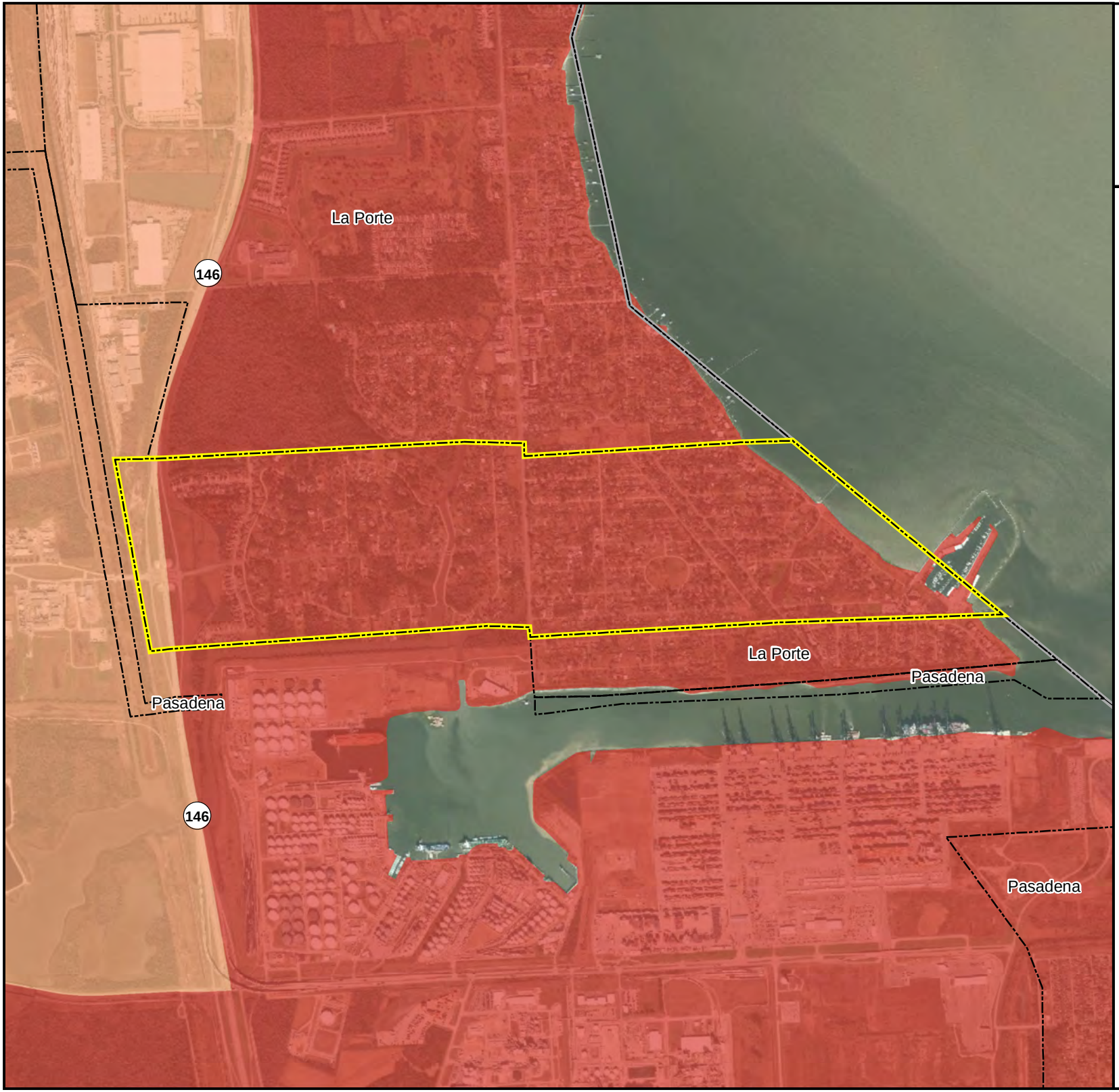
Note: Flooding extent shown for Hazard Mitigation Plan planning area only.

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles



Shoreacres

Hurricane Alicia (1983)

Peak WInd Gust (mph)

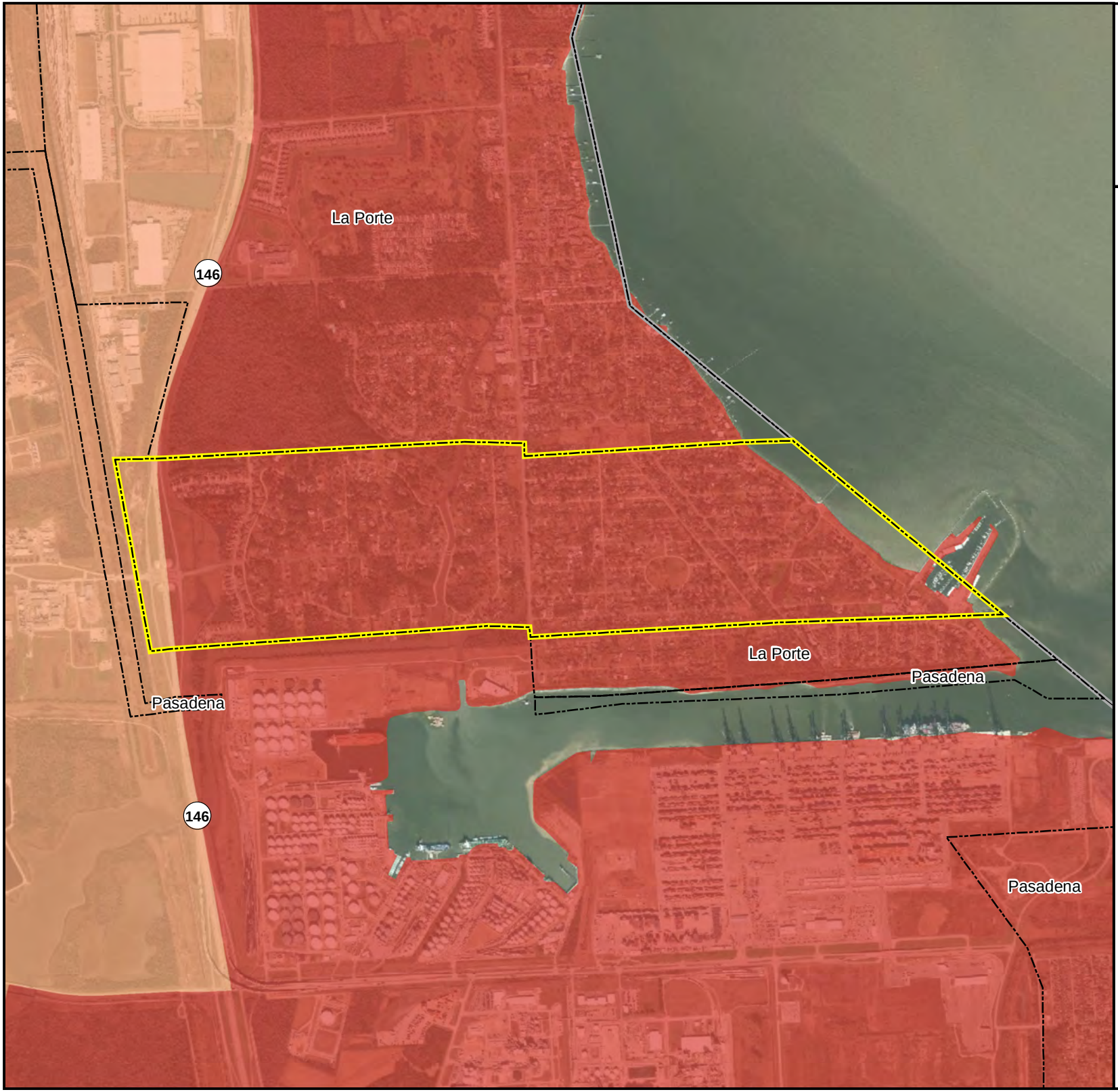
- 87 - 94
- 95 - 98
- 99 - 101
- 102 - 104
- 105 - 110
- Storm Track
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles



Shoreacres

20-year Probabilistic Hurricane

Peak Wind Gust (mph)

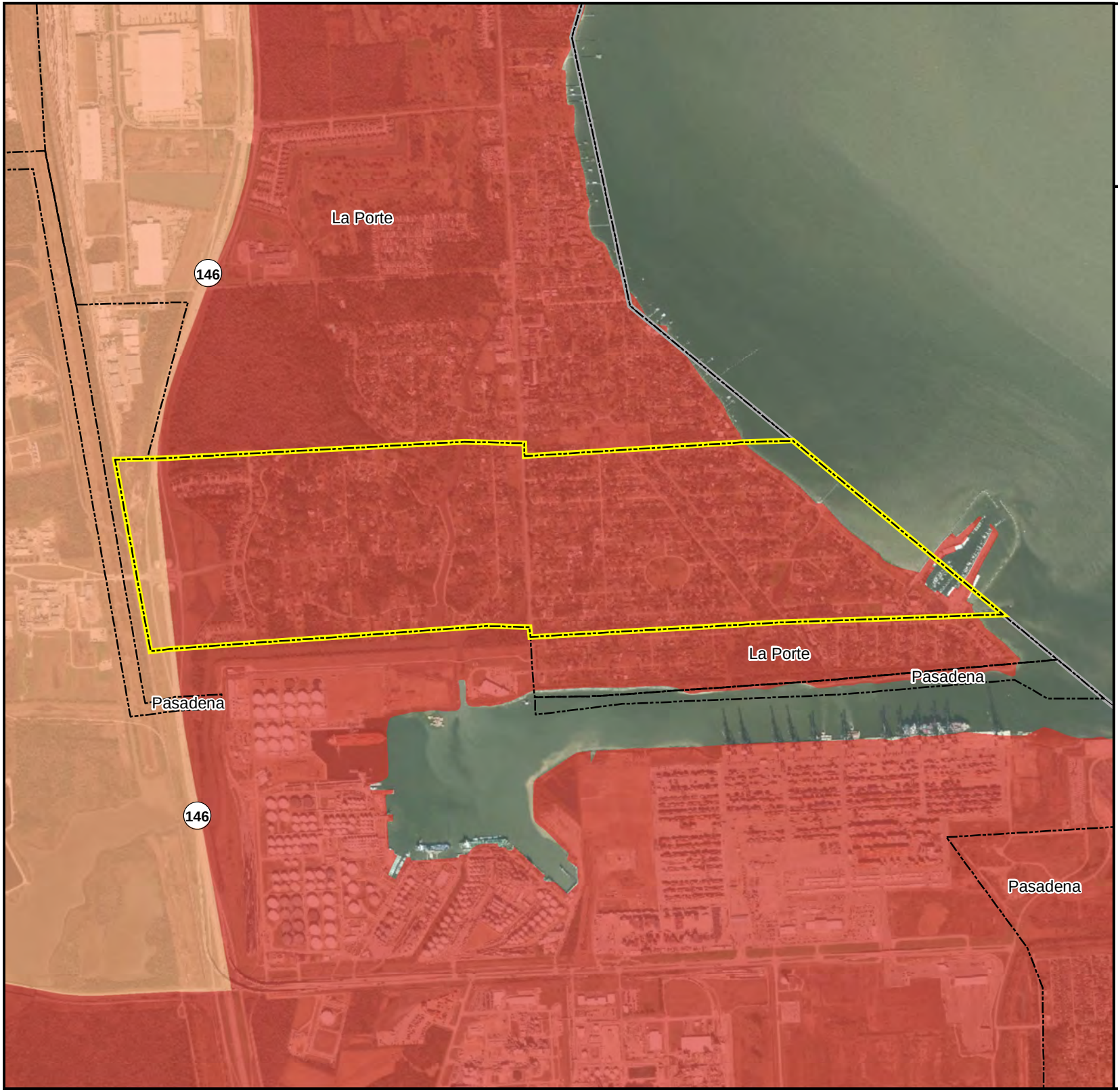
- 63 - 71
- 72 - 76
- 77 - 80
- 81 - 84
- 85 - 92
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles



Shoreacres

100-year Probabilistic Hurricane

Peak Wind Gust (mph)

- 89 - 101
- 102 - 106
- 107 - 111
- 112 - 117
- 118 - 128
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles

Shoreacres

Wildfire Ignition Density

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles

Shoreacres

Wildfire Threat

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles

23. CITY OF SPRING VALLEY VILLAGE

23.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Julie M. Robinson, City Administrator
1025 Campbell Road
Houston, TX 77055
Telephone: 713-465-5306
e-mail Address: jrobinson@springvalleytx.com

Alternate Point of Contact
Pat Riley, Public Works Director
1025 Campbell Road
Houston, TX 77055
Telephone: 713-465-5306
e-mail Address: priley@springvalleytx.com

23.2 JURISDICTION PROFILE

23.2.1 Location

The City of Spring Valley Village is a municipality in southwestern Harris County. The current boundaries generally extend from Spring Branch Creek on the east, Katy Freeway on the south, Spring Branch Creek on the north, and on the west by Adkins and Campbell Roads. The City encompasses a total area of approximately 1.3 square miles.

23.2.2 History

In 1936 state highway maps indicated a cemetery and a church. Initially the settlement consisted of one and one-half square miles. In the mid-1950s, effort to form a Spring Branch municipality (proposed to be called the city of Spring Branch in roughly the area known today as the Memorial Villages) failed. The city incorporated in 1955 as Spring Valley. There had been two elections for incorporation. The first result was against incorporation, and state law mandated that the next election for incorporation of the same boundary would have to be held at least one year later. Some advocates of incorporation convinced Robert R. Casey, then Harris county judge, to modify the boundary of the proposed area by removing the Campbell Place area and therefore many voters who opposed incorporating. The following election, held on April 9, 1955, was in favor of incorporation. Because of the 1955 incorporation, Houston did not incorporate Spring Valley's territory into its city limits, while Houston annexed surrounding areas that were unincorporated. In 2007, the name of the city was officially changed from Spring Valley to Spring Valley Village.

23.2.3 Climate

The City of Spring Valley Village's weather is typical of the Texas Gulf Coast – mainly humid subtropical climate, with tropical influences. August is normally the warmest month with a daily average temperature of 84.6 °F. January is typically the coldest month with a daily average temperature of 53.1 °F. The normal annual precipitation measures 49.77 inches.

23.2.4 Governing Body Format

The City of Spring Valley Village is a Type-A General Law City governed by a Mayor and five Council Members all of whom are elected at large. The City consists of 7 departments: Police, Public Works/Utilities, Building and Development, Municipal Court, Finance, the City Secretary's Office, and the City Administrator's Office. Fire and EMS Services are provided by the Village Fire Department, a separate entity created and funded by the six Memorial Villages.

The City Council assumes responsibility for the adoption of this plan, and the City Administrator will oversee its implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 1-1.

Table 23-1. Local Mitigation Planning Team Members

Jurisdiction	Name / Title	Phone	Email
City of Spring Valley Village	Julie Robinson, City Admin. Matthew Hitt, Assistant to City Admin.	713-465-5306 832-910-8586	jrobinson@springvalleytx.com mhitt@springvalleytx.com
City of Bunker Hill Village	Karen Glynn, City Admin.	713-467-9762	KGlynn@bunkerhilltx.gov
City of Hedwig Village	Kelly Johnson, City Admin./Secretary	713-465-6009	kjohnson@hedwigtx.gov
City of Hilshire Village	Susan Blevins, City Admin/Secretary. Efrain Him	713-973-1779	Susan.blevins@hilshirevillagetexas.com Efrain.him@hdrinc.com
City of Hunters Creek Village	Tom Fullen, City Admin.	713-465-2150	tfullen@cityofhunterscreek.org
City of Piney Point Village	Roger Nelson, City Admin.	713-230-8703	cityadmin@pineypt.org

23.3 CURRENT TRENDS

23.3.1 Population

According to the 2010 Census Data, the population of the City of Spring Valley Village was 3,715. The Census Bureau 2016 population estimate was 4,224. Since the 1990 Census, the population has increased by approximately 24.5%.

23.3.2 Development

While availability of undeveloped residential lots is limited, the City of Spring Valley Village continues to experience residential redevelopment of existing homes whereby smaller homes are demolished and new, larger homes are built. The City of Spring Valley Village is landlocked by other municipalities; however, there are several large undeveloped tracts of land that border I-10 and are available for commercial and/or mixed use development.

Table 23-2 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

Table 23-2. Recent and Expected Future Development Trends

Criterion	Response					
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan? • **If yes, give the estimated area annexed and estimated number of parcels or structures.**	NO N/A					
Is your jurisdiction expected to annex any areas during the performance period of this plan? • **If yes, describe land areas and dominant uses.** • **If yes, who currently has permitting authority over these areas?**	NO N/A N/A					
Are any areas targeted for development or major redevelopment in the next five years? • **If yes, briefly describe, including whether any of the areas are in known hazard risk areas**	YES There are several large undeveloped tracts of land that border I-10 and are available for commercial and/or mixed use development.					
How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?		**2014**	**2015**	**2016**	**2017**	**2018**
	Single Family	23	21	27	27	24
	Multi-Family	0	0	0	0	0
	Other (commercial, mixed use, etc.)	2	3	3	2	1
	Total	25	24	30	29	25
Provide the number of new-construction permits for each hazard area or provide a qualitative description of where development has occurred.	• Special Flood Hazard Areas: 0 • Landslide: 0 • High Liquefaction Areas: 0 • Tsunami Inundation Area: 0 • Wildfire Risk Areas: 0					
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	With the exception of a few large tracts along I-10 that may be developed for commercial and/or mixed use development, City of Spring Valley Village is essentially built out.					

23.4 CAPABILITY ASSESSMENT

The City of Spring Valley Village performed an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities is presented in Table 23-3.
- Development and permitting capabilities are presented in Table 23-4.
- An assessment of fiscal capabilities is presented in Table 23-5.
- An assessment of administrative and technical capabilities is presented in Table 23-6.
- An assessment of education and outreach capabilities is presented in Table 23-7.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 23-8.
- Classifications under various community mitigation programs are presented in Table 23-9.
- The community's adaptive capacity for the impacts of climate change is presented in Table 23-10.

Findings of the capability assessment were reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table included in the action plan for this annex identifies these as community capacity building mitigation actions.

Table 23-3. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code	Yes	No	Yes	Yes
Comment: *City adopted the International Building Code (IBC) 2015 Edition on February 24, 2015 by Ordinance No. 2015-03. This Ordinance has been codified in Chapter 3 of the City's Code of Ordinances.*				
Zoning Code	Yes	No	Yes	Yes
Comment: *The City adopted its original zoning regulations on December 15, 1981 by Ordinance No. 115, Book I, and it has been amended throughout the years. The current zoning regulations may be found in Chapter 12 of the City's Code of Ordinances.*				
Subdivisions	Yes	No	Yes	No
Comment: *The City adopted its original subdivision regulations on October 10, 1955, by Ordinance No. 5, Book 1, and it has been amended throughout the years. On November 25, 2008 by Ordinance No. 2008-23, the City repealed and reenacted the subdivision regulations in their entirety. The current subdivision regulations may be found in Chapter 9 of the City's Code of Ordinances.*				
Stormwater Management	Yes	Yes	Yes	Yes
Comment: *Texas Commission on Environmental Quality, SVV Storm Water Management Plan*				
Post-Disaster Recovery	Yes	Yes	Yes	No
Comment: *Harris County, Texas Department of Emergency Management, FEMA*				
Real Estate Disclosure	No	No	No	No
Comment:				
Growth Management	Yes	Yes	Yes	Yes
Comment: *Harris County Flood Control District*				
Site Plan Review	Yes	Yes	Yes	No
Comment: *Harris County Flood Control District, Village Fire Department, SVV Code of Ordinances Chapter 3*				
Environmental Protection	No	Yes	No	No
Comment: *Texas Commission on Environmental Quality, EPA, Harris County Public Health*				
Flood Damage Prevention	Yes	No	Yes	Yes
Comment: *The City adopted its current flood prevention regulations on May 22, 2007 by Ordinance No. 2007-12. The current flood damage prevention regulations may be found in Article 3.1600 of Chapter 3 of the City's Code of Ordinances.*				
Emergency Management	Yes	Yes	Yes	No
Comment: *Harris County, Village Fire Department*				
Climate Change	No	No	No	No
Comment:				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Planning Documents				
General Plan (Comprehensive Plan)	Yes	No	Yes	Yes
Comment: *The City's zoning regulations constitute its Comprehensive Plan*				
Capital Improvement Plan	Yes	No	No	Yes
How often is the plan updated? *Reviewed annually and updated as needed*				
Comment: *The City maintains a 5-year rolling CIP*				
Disaster Debris Management Plan	Yes	Yes	No	No
Comment: *The City participates in the Harris County Emergency Management Plan*				
Floodplain or Watershed Plan	No	Yes	No	No
Comment: *Harris County Flood Control District*				
Stormwater Plan	Yes	Yes	Yes	Yes
Comment: *The City was granted an MS4 permit from Texas Commission on Environmental Quality and files its annual reports with TCEQ as required by the permit.*				
Urban Water Management Plan	Yes	Yes	Yes	No
Comment: *Houston-Galveston Subsidence District Groundwater Reduction Plan, Drought Contingency Plan*				
Habitat Conservation Plan	No	Yes	No	No
Comment: *Texas Parks and Wildlife, Texas Commission on Environmental Quality, EPA*				
Economic Development Plan	Yes	No	Yes	No
Comment: *While the City has legal authority to develop an economic development plan, it currently does not have one*				
Shoreline Management Plan	No	No	No	No
Comment:				
Community Wildfire Protection Plan	No	No	No	No
Comment:				
Forest Management Plan	No	No	No	No
Comment:				
Climate Action Plan	No	No	No	No
Comment:				
Comprehensive Emergency Management Plan	Yes	Yes	Yes	No
Comment: *The City participates in the Harris County Emergency Management Plan*				
Threat & Hazard Identification & Risk Assessment (THIRA)	Yes	Yes	Yes	No
Comment: *The City participates in the Harris County Hazard Mitigation Plan*				
Post-Disaster Recovery Plan	Yes	Yes	Yes	No
Comment: *The City participates in the Harris County Emergency Management Plan*				
Continuity of Operations Plan	No	No	No	No
Comment:				
Public Health Plan	No	Yes	No	No
Comment: *Harris County Public Health Authority*				

Table 23-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • **If no, who does? If yes, which department?**	Yes
Does your jurisdiction have the ability to track permits by hazard area?	No
Does your jurisdiction have a buildable lands inventory?	No

Table 23-5. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants	No
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	No

Table 23-6. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	City Administrator, City of Spring Valley Village Building Official, City of Spring Valley Village Director of Public Works, City of Spring Valley Village Contract Engineering Firm Contract Planning Firm
Engineers or professionals trained in building or infrastructure construction practices	Yes	Building Official, City of Spring Valley Village Fire Marshal, Village Fire Department Director of Public Works, City of Spring Valley Village Contract Engineering Firm
Planners or engineers with an understanding of natural hazards	Yes	City Administrator, City of Spring Valley Village Building Official, City of Spring Valley Village Director of Public Works, City of Spring Valley Village Contract Engineering Firm
Staff with training in benefit/cost analysis	Yes	Contract Engineering Firm
Surveyors	Yes	Contract Surveying Firm
Personnel skilled or trained in GIS applications	No	
Scientist familiar with natural hazards in local area	No	
Emergency manager	Yes	Emergency Management Coordinator, Village Fire Department City Administrator, City of Spring Valley Village
Grant writers	Yes	Contract Grant Writer
Other		

Table 23-7. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	No
Do you have personnel skilled or trained in website development?	No
Do you have hazard mitigation information available on your website? • If yes, briefly describe.	No
Do you use social media for hazard mitigation education and outreach? • If yes, briefly describe.	Yes City Website and Social Media Alerts are posted
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • If yes, briefly describe.	No
Do you have any other programs already in place that could be used to communicate hazard-related information? • If yes, briefly describe.	Yes Constant Contact, City website, City social media platforms
Do you have any established warning systems for hazard events? • If yes, briefly describe.	Yes Constant Contact, City website, City social media platforms

Table 23-8. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Building Official – City Management
Who is your floodplain administrator? (department/position)	Building Official
Are any certified floodplain managers on staff in your jurisdiction?	Yes
What is the date that your flood damage prevention ordinance was last amended?	May 22, 2007
Does your floodplain management program meet or exceed minimum requirements? • If exceeds, in what ways?	Meets
When was the most recent Community Assistance Visit or Community Assistance Contact?	Unknown
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • If so, state what they are.	No
Are any RiskMAP projects currently underway in your jurisdiction? • If so, state what they are.	Unknown
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • If no, state why.	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? • If so, what type of assistance/training is needed?	No
Does your jurisdiction participate in the Community Rating System (CRS)? • If yes, is your jurisdiction interested in improving its CRS Classification? • If no, is your jurisdiction interested in joining the CRS program?	No No
How many flood insurance policies are in force in your jurisdiction?[a] • What is the insurance in force? • What is the premium in force?	797 $ 272,270,900.00 $313,168
How many total loss claims have been filed in your jurisdiction?[a] • How many claims are still open or were closed without payment? • What were the total payments for losses?	Unknown Total of closed paid losses: 82 $2,103,028

a. According to FEMA statistics as of March 26, 2019

Table 23-9. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	No		
Building Code Effectiveness Grading Schedule	Yes	4 for 1 and 2 family dwellings 3 for all other construction	01/27/2010
Public Protection	Yes	(ISO) 1	2015
Storm Ready	No		
Firewise	No		

Table 23-10. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:***	Low
Jurisdiction-level monitoring of climate change impacts ***Comment:***	Low
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:***	Low
Participation in regional groups addressing climate risks ***Comment:***	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	Low
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	Low
Identified strategies for adaptation to impacts ***Comment:***	Low
Champions for climate action in local government departments ***Comment:***	Low
Political support for implementing climate change adaptation strategies ***Comment:***	Low
Financial resources devoted to climate change adaptation ***Comment:***	Low
Local authority over sectors likely to be negative impacted ***Comment:***	Low

Criterion	Jurisdiction Rating[a]
Public Capacity	
Local residents knowledge of and understanding of climate risk ***Comment:***	Low
Local residents support of adaptation efforts ***Comment:***	Low
Local residents' capacity to adapt to climate impacts ***Comment:***	Low
Local economy current capacity to adapt to climate impacts ***Comment:***	Low
Local ecosystems capacity to adapt to climate impacts ***Comment:***	Low

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

23.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning and capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

23.5.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- City of Spring Valley Village's MS4 Permit
- City of Spring Valley Village's Flood Damage Prevention regulations
- City of Spring Valley Village's Adopted 5-Year Rolling Capital Improvement Program

23.5.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- Future updates to the adopted Building Codes
- Future revisions to the City's zoning regulations
- Future revisions to the City's flood damage prevention regulations

23.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 23-11 lists past occurrences of natural hazards for which specific damage was recorded in Spring Valley Village. Other hazard events that broadly affected the entire planning area, including Spring Valley Village, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 23-11. Past Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Hurricane Harvey	4332 DR	2017	NA
Severe Storms and Flooding	4269 DR	2016	NA
Severe Storms and Flooding	4272 DR	2016	NA
Severe Storms, Tornadoes, Straight Line Winds and Flooding	4245 DR	2015	NA
Severe Storms, Tornadoes, Straight Line Winds and Flooding	4223 DR	2015	NA
Forest Brook Fire	2924 FM	2011	NA
Hurricane Ike	1791 DR	2008	NA
Hurricane Ike	3294 EM	2008	NA
Hurricane Gustav	3290 EM	2008	NA
Hurricane Dean	3277 EM	2007	NA
Tropical Storm Erin	1730 DR	2007	NA
Extreme Wildfire Threat	1624 DR	2006	NA
Hurricane Rita	1606 DR	2005	NA
Hurricane Rita	3261 EM	2005	NA
Hurricane Katrina Evacuation	3216 EM	2005	NA
Severe Storms, Tornadoes and Flooding	1439 DR	2002	NA
Tropical Storm Allison	1379 DR	2001	NA
Extreme Fire Hazards	3142 EM	1999	NA
Flooding	1257 DR	1998	NA
Tropical Storm Charley	1239 DR	1998	NA
Hurricane Georges	1245 DR	1998	NA
Severe Thunderstorms and Flooding	1041 DR	1994	NA
Severe Thunderstorms and Tornadoes	970 DR	1992	NA
Severe Storms and Flooding	937 DR	1992	NA
Tropical Storm Allison	836 DR	1989	NA
Severe Storms, Tornadoes and Flooding	828 DR	1989	NA

23.7 HAZARD RISK RANKING

Table 23-12 presents a local ranking for Spring Valley Village of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 23-12. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Severe Weather	48	High
2	Hurricane	32	High
3	Earthquake	14	Low
4	Flooding	12	Low
5	Drought	6	Low
5	Mass Movement	6	Low
5	Wildfire	6	Low
6	Dam Failure	0 (No Exposure)	None
6	Tsunami	0 (No Exposure)	None
6	Coastal Erosion	0 (No Exposure)	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

23.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. This section provides information on a few key vulnerabilities for the jurisdiction. Available jurisdiction-specific risk maps of the hazards are provided at the end of this annex.

23.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: 7
- Number of FEMA-identified Severe-Repetitive-Loss Properties: None
- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated: 1

23.8.2 Other Noted Vulnerabilities

No jurisdiction-specific issues were identified from review of the results of the risk assessment and other available resources.

23.9 STATUS OF PREVIOUS PLAN ACTIONS

Table 23-13 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

Table 23-13. Status of Previous Plan Actions

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
Conduct HVAC Assessment/Mitigation to Ventilation Systems for Critical Infrastructure			X	SVV5
Comment: In progress. The City constructed a new City Hall and Police Building with a new ventilation system, and the new facility opened in May of 2017. The City has committed to renovating the Public Works Facility (also Critical Infrastructure) including its current ventilation system as part of its 5-Year Capital Improvement Program with the project to be undertaken in FY 2021				
Expand community early warning system, reverse 911 to enhance coverage within the community's population	X			
Comment: In 2012, the City implemented a reverse 911 system that notifies all telephone numbers in the City. During Hurricane Harvey, the City found that the reverse 911 system that was implemented went down. Consequently, the City is evaluating other reverse 911 options to implement. The City currently utilizes Constant Contact, its website, and different social media platforms to quickly notify residents and businesses about hazards that may affect the City. During Hurricane Harvey, it was clear that these forms of communication were more effective and efficient, and the City will continue to utilize and improve upon these forms of communication.				
Expand early warning system, reverse 911 alert capabilities to increase coverage to public/private schools.	x			
Comment: In 2012, the City implemented a reverse 911 system that notifies all telephone numbers, including public and private schools, in the City. During Hurricane Harvey, the City found that the reverse 911 system that was implemented went down. Consequently, the City is evaluating other reverse 911 options to implement. The City currently utilizes Constant Contact, its website, and different social media platforms to quickly notify residents and businesses about hazards that may affect the City. During Hurricane Harvey, it was clear that these forms of communication were more effective and efficient, and the City will continue to utilize and improve upon these forms of communication.				
Adoption of higher standard/latest edition of building codes for jobsite debris management to minimize damages from debris during high winds	X			
Comment: The City adopted the International Building Code (IBC) 2015 Edition on February 24, 2015.				
Briar Branch Bypass project and contrast a detention pond to mitigate flood-related impacts.			X	
Comment: Several years ago, the City met with Harris County Flood Control District (HCFCD) to discuss the installation of a real-time monitoring gauge on Briar Branch at Campbell Road to provide notification to the residents about potential flooding. The real-time flood gauge was installed by HCFCD on March 31, 2017. Due to the size of the rest of the original project and the number of governmental and non-governmental entities that would be involved, action is no longer considered feasible. The City has completed the only part it could complete.				
Develop/implement water smart program to educate the public on drought hazards and potential individual actions to minimize damages to property and equipment	X		X	SVV6
Comment: The City has water conservation and drought contingency regulations in place that include a goal of reducing water consumption by 10% through conservation measures and a graduated drought contingency plan. Additionally, the City's regulations include savings on water rates for customers who implement conservation measures such as retrofitting high-use fixtures with low-flow fixtures, low-flow design irrigation systems, and xeriscaping features. Information on water conservation measures is provided in the City's new resident welcome packet as well as on the City's website. The City would like to carry this measure forward and change the wording of the Action Item to: Develop and implement public outreach program to educate the public on drought hazards and water conservation measures that may be implemented by individuals to reduce water usage and minimize damages to property and equipment.				

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
Implement a Debris Removal Program to minimize flooding due to obstructions along channel to increase flow along Briar Branch and minimize damages to residential properties.	X		X	SVV7
Comment: Since Briar Branch is under the jurisdiction of Harris County Flood Control District (HCFCD), the extent of the Debris Removal Program has been to monitor Briar Branch continuously and notify HCFCD of the need for debris removal and/or de-snagging as needed. Throughout the City limits, the City monitors and removes possible obstructions such as trees, trash cans, debris washed into ditches and storm sewers prior to and during all storm incidents, and residents and businesses are notified via Constant Contact and all City social media platforms to continuously monitor and remove any possible obstructions. The City would like to carry this measure forward and change the wording of the Action Item to: Develop and implement a public outreach program designed to educate the public about debris removal and other ways to minimize damages to residential properties.				
Develop/implement tree management program to minimize damage from debris due to high winds and icing/freezing temperatures	X			
Comment: The City adopted tree preservation and management regulations in 2017 that include provisions for addressing diseased and/or dead trees, and the City enforces such regulations throughout the year. Additionally, in accordance with the tree preservation regulations, the City requires a permit for removal of trees. City staff also monitors trees on City property and in public rights-of-way and addresses trees that could cause damage.				
Develop/implement a home heating safety public education program to educate the public on winter storm hazards and action to minimize damage to residential property and equipment caused by winter hazards and home heating.	X		X	SVV12
Comment: This is an ongoing program. On behalf of the City, the Village Fire Department conducts a fire safety and prevention program throughout the year to different public and private schools, reaching approximately 1,500 students each year. Through public education, the City and VFD hope to reduce fire hazards caused by individuals. The City would like to carry this measure forward and change the wording of the Action Item to: Conduct a fire safety and prevention program in conjunction with the Village Fire Department.				
Bank re-stabilization with slope stabilization along portions of Briar Branch to increase flow to minimize flood damages.			X	
Comment: The portions of the bank of Briar Branch that would be good candidates for a re-stabilization project are privately owned property and areas that are not maintained by Harris County Flood Control District. Action is no longer feasible since the City has no control over these areas.				
Clean-up of heavy wildfire fuel areas (abandoned buildings, abandoned lands, etc.)	X		X	SVV9
Comment: The City monitors heavy wildfire fuel areas throughout the year and addresses any area of concern with the appropriate individual, entity or agency. The City removes dead trees and/or other vegetation and maintains underbrush on City property and public rights-of-way throughout the year. In September of 2017, the City adopted the 2015 International Property Maintenance Code which provides additional tools for the City to use in addressing residential properties that may become substandard and prevent such properties from developing into heavy wildfire fuel areas. The City would like to carry this measure forward and change the wording of the Action Item to: Continuously monitor and mitigate heavy wildfire fuel areas such as abandoned buildings, abandoned lands, etc.				
Establish local supplemental benchmark program		X		
Comment: The exact purpose of this particular Action Item is unknown and it does not appear to do anything to mitigate flood damage to structures. The City adopted flood damage prevention regulations in 2007 including a provision that new residential and non-residential construction must meet base flood elevation + 1 foot.				

23.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 23-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 23-15 identifies the priority for each action. Table 23-16 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 23-14. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action SVV1 — Where appropriate, support retrofitting of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Earthquake, flooding, landslide, tsunami, wildfire						
Existing	3, 4, 10	Spring Valley Village	Spring Valley Village – Public Works	High	HMGP, PDM, FMA	Long-term
Action SVV2 — Integrate the hazard mitigation plan into other plans, ordinances and programs that dictate land use decisions in the community, including Spring Valley Village						
Hazards Mitigated: Dam failure, drought, earthquake, flooding, landslide, tsunami, wildfire						
New and Existing	1, 3, 4, 5, 7, 8, 10	Spring Valley Village	Spring Valley Village – Public Works	Low	Staff Time, General Funds	Ongoing
Action SVV3 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: Severe Weather, Hurricane, Earthquake, Flooding, Drought, Mass Mopvement, Wildfire						
New and Existing	1, 5, 8	Spring Valley Village	The Memorial Villages	Low	Staff Time, General Funds	Short-term
Action SVV4 — Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements: • Enforce the flood damage prevention ordinance. • Participate in floodplain identification and mapping updates. • Provide public assistance/information on floodplain requirements and impacts.						
Hazards Mitigated: Dam failure, flooding, severe weather, tsunami, sea level rise						
New and Existing	1, 3, 5, 7, 8, 10	Spring Valley Village – Public Works and Building Official	TBD	Low	Staff Time, General Funds	Ongoing
Action SVV5 — Conduct HVAC Assessment/Mitigation to Ventilation Systems for Critical Infrastructure						
Hazards Mitigated: Toxic/Haz-Mat, Energy Pipeline Failures						
Existing	3, 7, 13	Spring Valley Village	TBD	Medium	CIP	Short-term
Action SVV6 — Develop and implement public outreach program to educate the public on drought hazards and water conservation measures that may be implemented by individuals to reduce water usage and minimize damages to property and equipment.						
Hazards Mitigated: Drought						
New and Existing	4, 6, 7, 8, 11	Spring Valley Village – Public Works	TCEQ, HGSD	Low	CIP, Utilities Fund, Fed Water SMART grant	Ongoing
ActionSVV7 — Develop and implement a public outreach program designed to educate the public about debris removal and other ways to minimize damage to residential properties..						
Hazards Mitigated: Flooding						
Existing	4, 7, 8	Spring Valley Village	Harris County Flood Control	Medium	General Fund	Ongoing

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
ActionSVV8 — Conduct a fire safety and prevention program in conjunction with the Village Fire Department.						
Hazards Mitigated: Wildfire						
Existing	2, 3, 4	Spring Valley Village	Villages Fire Department	Low	General Fund	Ongoing
ActionSVV9 — Continuously monitor and mitigate heavy wildfire fuel areas such as abandoned buildings, abandoned lands, etc.						
Hazards Mitigated: Wild Fire						
Existing	2, 3, 4	Spring Valley Village	Villages Fire Department	Low	General Fund	Ongoing
Action SVV10 — Improve storm drainage on street projects in accordance with 5 year CIP -						
Hazards Mitigated: Flooding						
New	4, 7, 9	Spring Valley Village	TBD	Medium	Bonds, CIP	Ongoing
Action SVV11 — Provide Public Education and outreach program to businesses, citizens, employees and the general public about hazards associated with illegal discharge and improper disposal of waste and the impacts storm water can have on the quality of water as described in the City's Storm Water Management Plan.						
Hazards Mitigated: Flooding						
New and Existing	3, 4, 6, 8, 11	Spring Valley Village	TBD	Low	General Fund	Ongoing
Action SVV12 — Briar Branch Bypass project and contrast a detention pond to mitigate flood-related impacts.						
Hazards Mitigated: Flooding						
New	4, 7, 9	Spring Valley Village	Harris County Flood Control, Other Memorial Villages	High	General Fund, Bonds, CIP, Grants	Long-Term
Action SVV13 — Bank re-stabilization with slope stabilization along portions of Briar Branch and Spring Branch to improve/increase flow and minimize flood damage.						
Hazards Mitigated: Flooding						
New	4, 7, 9	Spring Valley Village	Harris County Flood Control	High	General Fund, Bonds, CIP, Grants	Long-Term
ActionSVV14 — Replace bridges in Spring Valley Village with improved hardened bridges to withstand flooding and debris.						
Hazards Mitigated: Hurricane, Flooding						
New	4, 7, 9, 10	Spring Valley Village	Harris County Flood Control	High	General Fund, Bonds, CIP, Grants	Long-Term
ActionSVV15 — Develop and implement master drainage plan and drainage model, including analysis of existing drainage system.						
Hazards Mitigated: Flooding						
New	2, 3, 7, 9, 10	Spring Valley Village	Harris County Flood Control	Medium	General Fund	Short-Term
Action SVV16 — Develop Critical Infrastructure and Key Resources database						
Hazards Mitigated: Hurricane, Severe Weather, Flooding, Tornado, Drought, Earthquake, Wildfire, Tsunami, and Mass Movement						
New	2, 3, 7, 9, 10, 13	Spring Valley Village	TBD	Medium	General Fund, Grants	Short-Term
Action SVV17 — Implement updates for drought contingency plan						
Hazards Mitigated: Drought						
New and Existing	5, 7, 8, 9, 10	Spring Valley Village	TBD	Low	General Fund	Short-Term
Action SVV18 — Develop Partnership Projects with Harris County Flood Control District for the purpose of optimizing drainage systems in Spring Valley Village						
Hazards Mitigated: Flooding, Dam Failure						
New	7, 9	Spring Valley Village	Harris County Flood Control, Other Memorial Villages	High	Bonds, CIP, Grants	Long-Term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action SVV19 — Generators for water and wastewater infrastructure.						
Hazards Mitigated: Flooding, Sever Weather, Hurricane, Earthquake, Mass Movement, Wildfire,						
New	4, 7, 9	Spring Valley Village	TBD	Medium	CIP, Grants, General Fund	Short-Term
Action SVV20— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
Hazards Mitigated: Severe Weather, Hurricane, Earthquake, Flooding, Drought, Mass Mopvement, Wildfire						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	City Admistration	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 23-15. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
SVV1	3	Low	High	No	Yes	No	Low	Low
SVV2	7	Medium	Low	Yes	No	Yes	High	Low
SVV3	3	Low	Low	Yes	No	Yes	High	Low
SVV4	6	Medium	Low	Yes	No	Yes	High	Low
SVV5	3	Low	Medium	No	No	No	Low	Low
SVV6	5	High	Low	Yes	No	Yes	High	Low
SVV7	3	Medium	Low	Yes	Yes	No	Medium	Medium
SVV8	3	Medium	Low	Yes	Yes	No	Medium	Low
SVV9	3	Medium	Low	Yes	Yes	No	Medium	Low
SVV10	3	High	High	Yes	Yes	No	High	High
SVV11	5	Low	Low	Yes	No	Yes	Medium	Low
SVV12	3	High	High	Yes	Yes	No	Medium	High
SVV13	3	High	High	Yes	Yes	No	Medium	High
SVV14	4	Medium	High	No	Yes	No	Medium	Medium
SVV15	5	High	Medium	Yes	Yes	No	Medium	Medium
SVV16	6	High	Medium	Yes	Yes	No	Medium	Medium
SVV17	5	Medium	Low	Yes	Yes	Yes	High	Medium
SVV18	2	High	Medium	Yes	Yes	No	Medium	High
SVV19	3	Medium	Medium	Yes	Yes	No	Medium	Medium
SVV20	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 23-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Severe Weather	SVV-3, SVV-4, 20	SVV-4	SVV-4, SW-20					SVV-20
Hurricane	SVV-1, SVV-3, SVV-4, SVV-20	SVV-1, SVV-4	SVV-4, SW-20		SVV-14, SVV-16 SVV-19, SVV-20	SVV-1, SVV-14		SVV-20
Low-Risk Hazards								
Earthquake	SVV-1, SVV-3, SVV-20	SVV-1	SVV-20		SVV-16, SVV-19, SVV-20	SVV-1		SVV-2, SVV-20
Flooding	SVV-1, SVV-3, SVV-4, SVV-7, SVV-10, SVV-12, SVV-13, SVV-15, SVV-20	SVV-1, SVV-4, SVV-7, SVV-10, SVV-12, SVV-13 SVV-18	SVV-4, SVV-11, SWW-20	SVV-11	SVV-14, SVV-16, SVV-19, SVV-20	SVV-1, SVV-12, SVV-13, SVV-14 SVV-18		SVV-20
Drought	SVV-3, 20		SVV-6, SVV-17, SVV-20	SVV-6	SVV20		SVV-6, SVV-17	SVV-2, SVV-17, SVV20
Wildfire	SVV-1, SVV-3, SVV-9, SWW-20	SVV-1	SVV-8, SWW-20		SVV-16, SVV-19, SVV-20	SVV-1		SVV-2, SVV-20
Mass Movement	SVV-1, SVV-3, SVV-20	SVV-1	SVV-20		SVV-16, SVV-19, SVV-20	SVV-1		SVV-2, SVV-20

a. See the introduction to this volume for explanation of mitigation types.

23.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

23.11.1 Existing Reports, Plans, Regulatory Tools and Other Resources

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

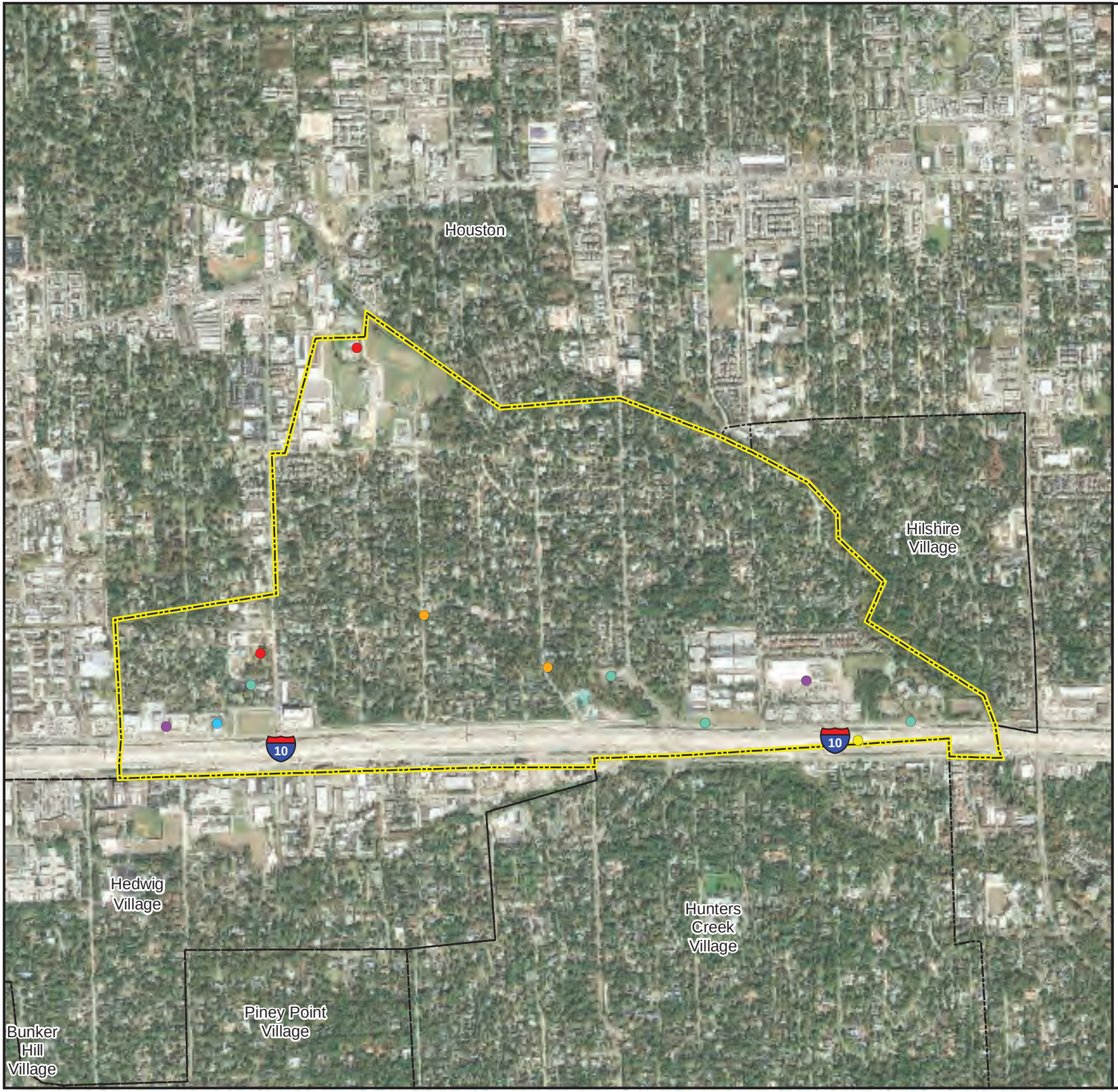
- **City of Spring Valley Village Municipal Code** — The municipal code was reviewed for the full capability assessment and for identifying opportunities for action plan integration.
- **City of Spring Valley Village Flood Damage Prevention Ordinance** — The flood damage prevention ordinance was reviewed for compliance with the National Flood Insurance Program.
- **City of Spring Valley Village MS4 Permit** – The MS4 Permit was review for determining existing integration of current action plan items and for identifying opportunities for future action plan integration.

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.
- **Texas Water Development Board Flood Outreach – Community Assistance Program** – Flood insurance and total loss claims information was obtained through this Program.

23.11.2 Staff and Local Stakeholder Involvement in Annex Development

This annex was developed over the course of one month with input from various City departments including Public Works, Community Development, Finance, and City Administration, as well as a representative from the Village Fire Department.



Spring Valley

Critical Facilities

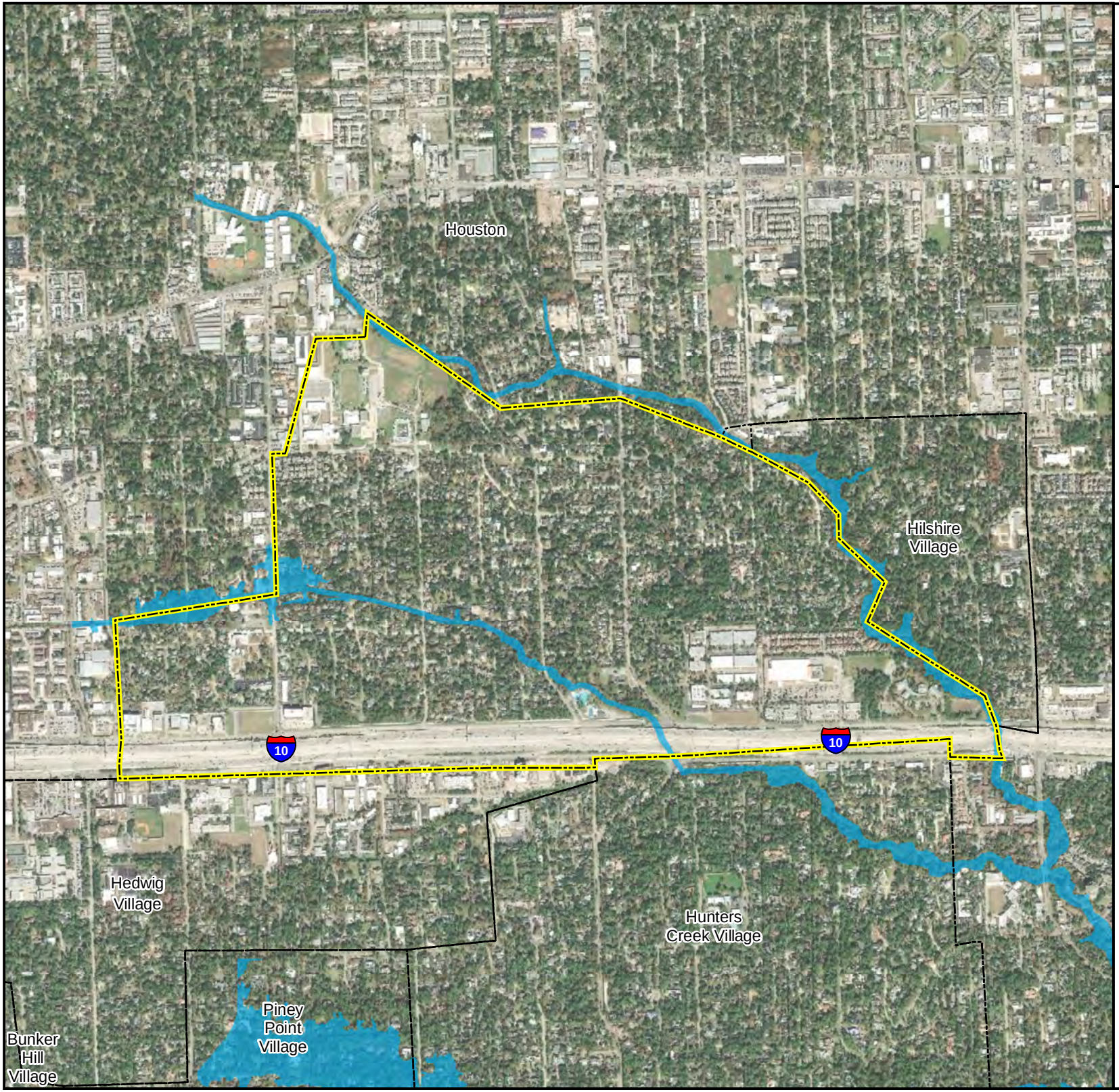
- Education Facilities
- Emergency Services
- Government Facilities
- Hazardous Material Sites
- Health and Medical Facilities
- Historical and Cultural Sites
- Transportation Systems
- Utility Systems
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles



Spring Valley

FEMA Flood Hazard

1% Annual Chance Flood (100-yr)

Incorporated Cities

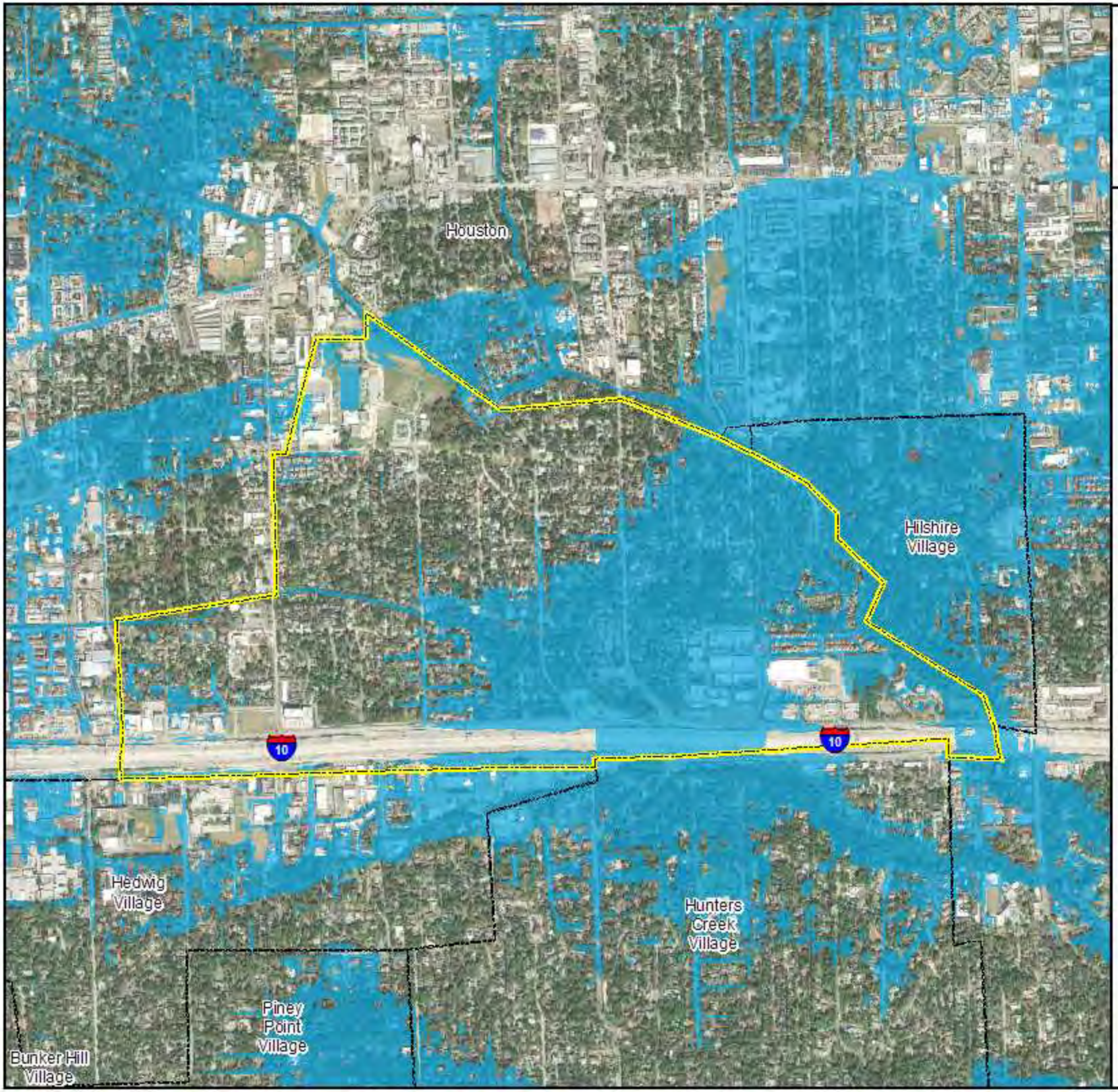
Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles



Spring Valley

Flood Hazard
Hurricane Harvey

Flooding Extent

Incorporated Cities

Harris County

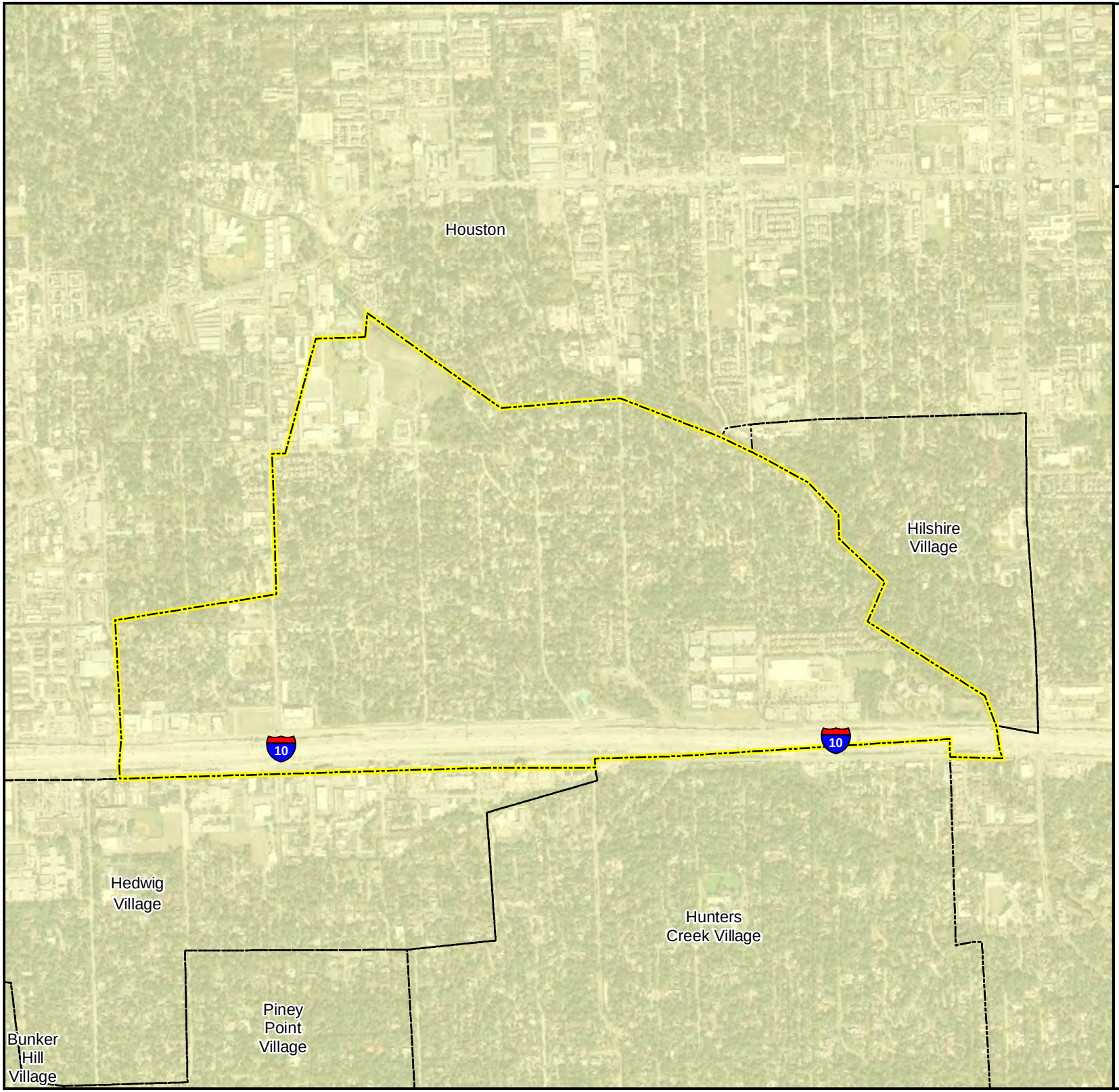
Note: Flooding extent shown for Hazard Mitigation Plan planning area only.

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles



Spring Valley

Hurricane Alicia (1983)

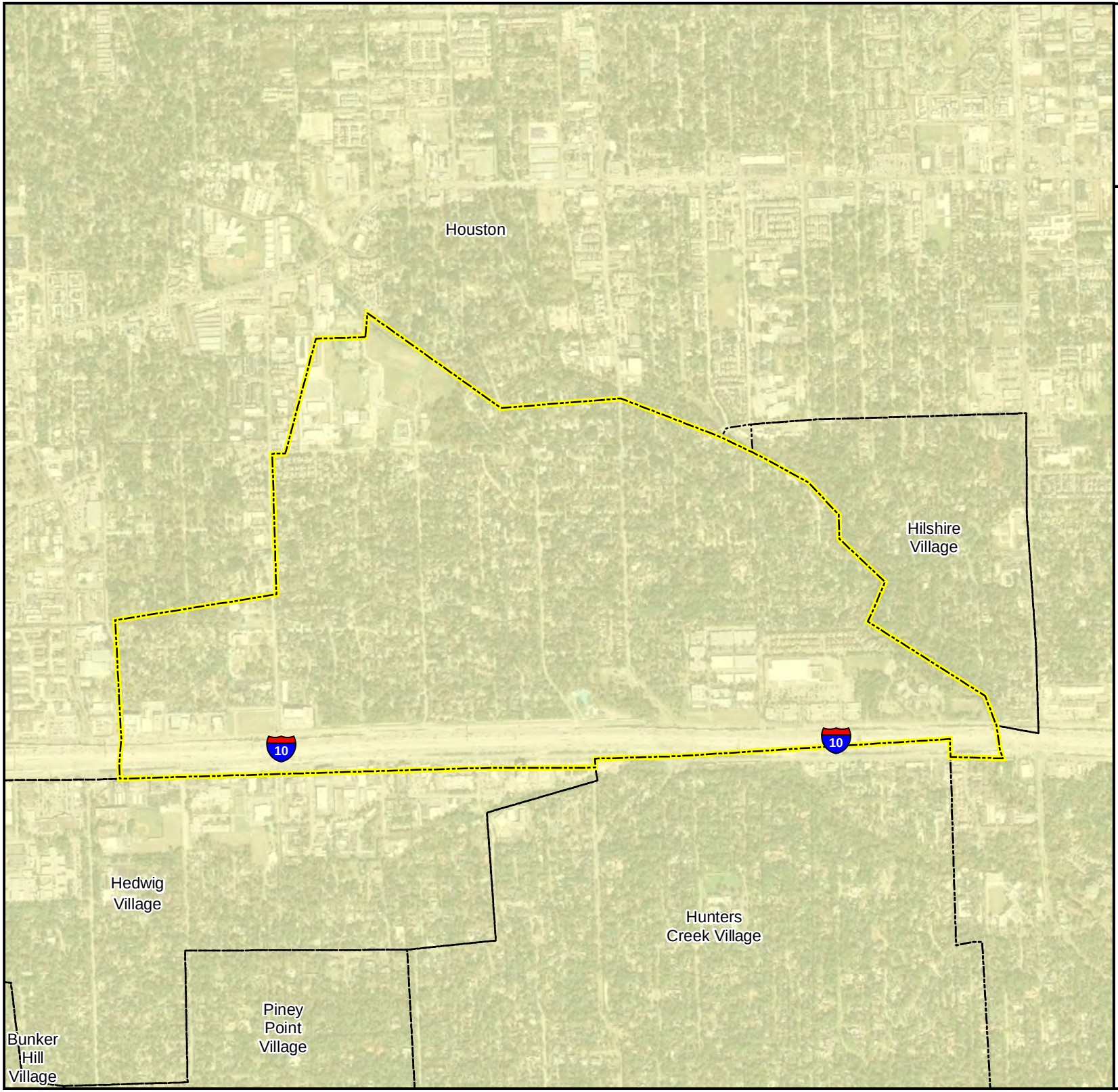
Peak WInd Gust (mph)

- 87 - 94
- 95 - 98
- 99 - 101
- 102 - 104
- 105 - 110
- Storm Track
- Incorporated Cities
- Harris County

TETRA TECH

N

0 0.1 0.2 0.4 Miles



Spring Valley

20-year Probabilistic Hurricane

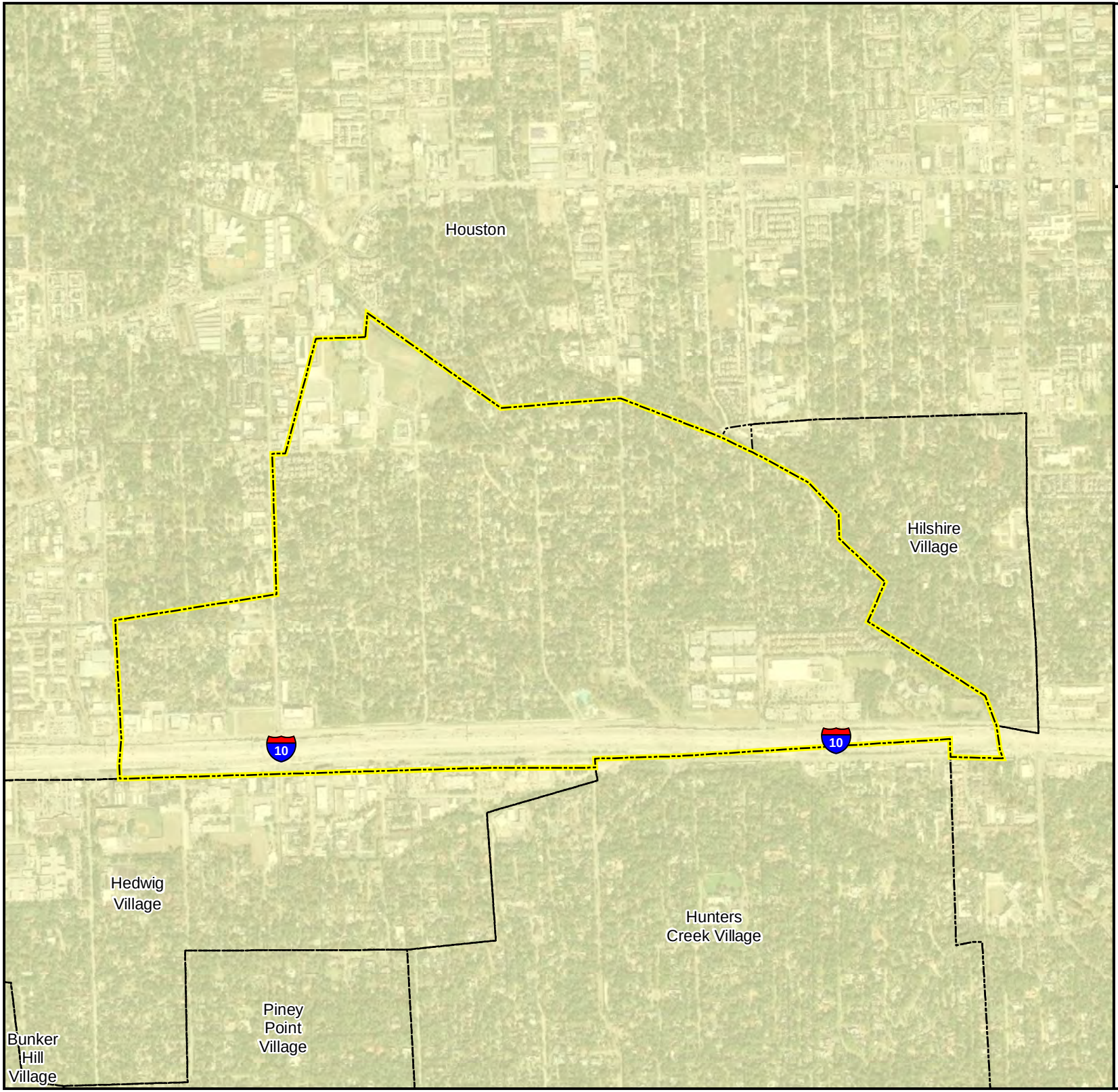
Peak Wind Gust (mph)

- 63 - 71
- 72 - 76
- 77 - 80
- 81 - 84
- 85 - 92
- Incorporated Cities
- Harris County

TETRA TECH

N

0 0.1 0.2 0.4 Miles



Spring Valley

100-year Probabilistic Hurricane

Peak Wind Gust (mph)

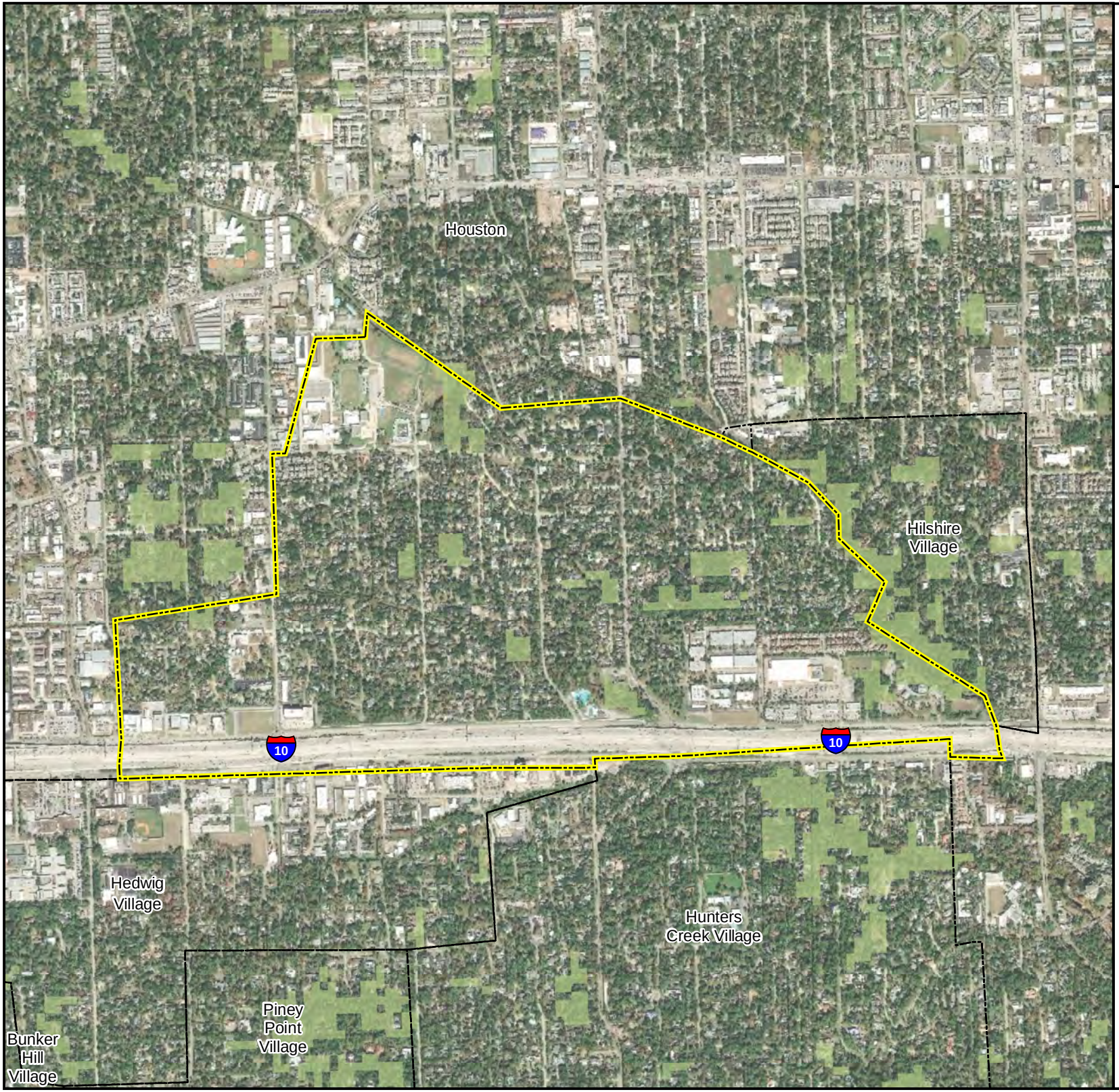
- 89 - 101
- 102 - 106
- 107 - 111
- 112 - 117
- 118 - 128
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles



Spring Valley

Wildfire Ignition Density

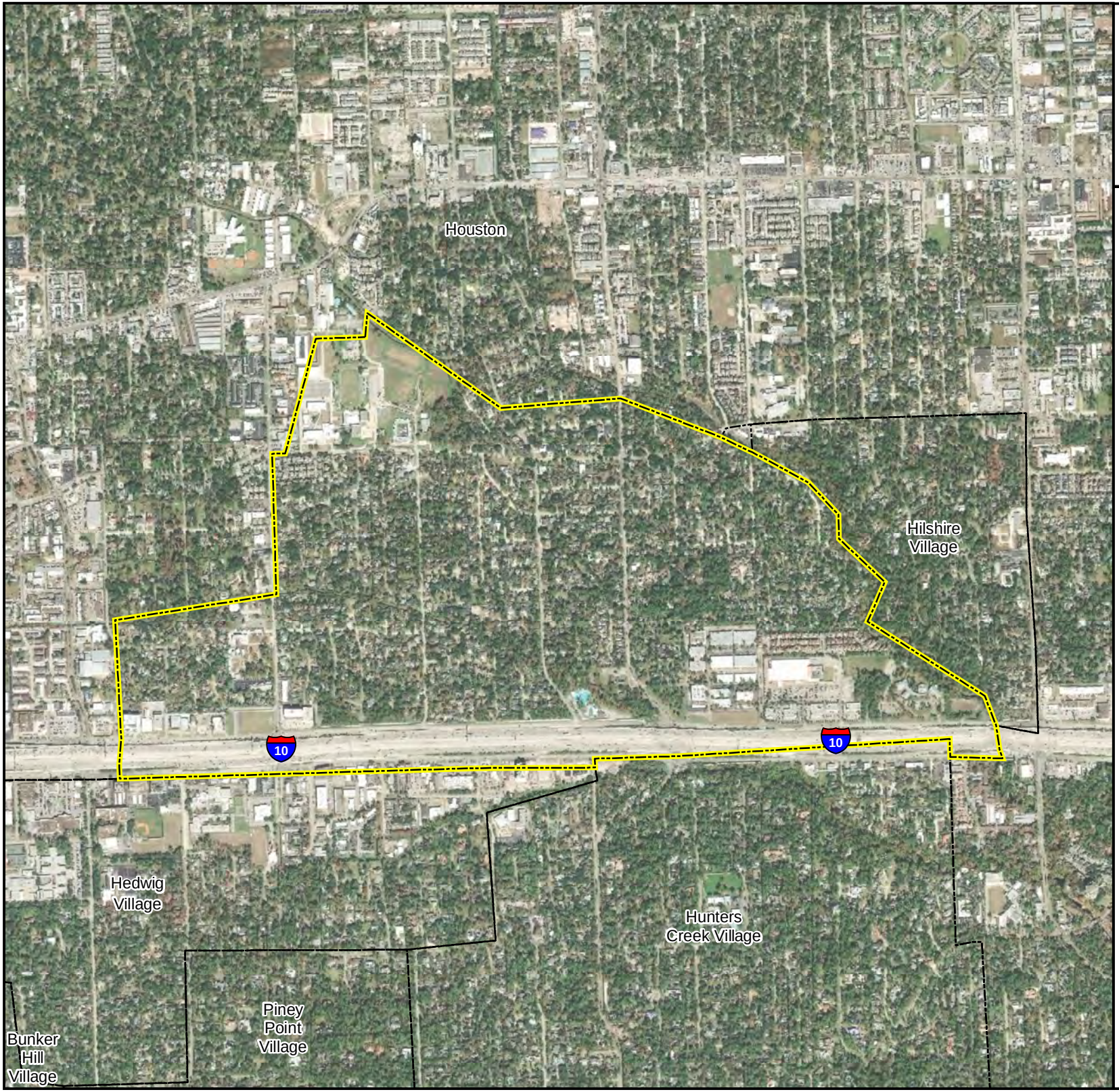
- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles



Spring Valley

Wildfire Threat

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.1 0.2 0.4 Miles

24. CITY OF STAFFORD

24.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Ashley Merchant, Grant Manager
2610 South Main St.
Stafford, TX 77477
Telephone: 281-261-3993
e-mail Address: AMerchant@staffordtx.gov

Alternate Point of Contact
Peter E. Alvarado, Emergency Management Coordinator
2610 South Main St.
Stafford, TX 77477
Telephone: 281-261-3947
e-mail Address: PAlvarado@staffordtx.gov

24.2 JURISDICTION PROFILE

24.2.1 Location

The City of Stafford is in the southwest portion of Harris County and the northeast portion of Fort Bend County. The City of Houston is to the north, the city of Meadows place to the northwest, the City of Sugar Land to the west, and Missouri City to the south and east. Stafford is located approximately 50 miles from the Gulf of Mexico in southeast Texas. The current boundaries generally extend from West Airport Blvd. to Highway 90 north-south and Texas Parkway to Dairy Ashford Rd. east-west, encompassing an area of approximately 7 square miles.

Stafford is home to Houston Community College-Stafford Campus, a UPS distribution center and the state's only municipal school district.

24.2.2 History

The City of Stafford was incorporated in 1956. In 1824, William J. Stafford was granted a league-and-a-half of land, which became known as Stafford's Point, and aided by a horse-powered cotton gin, began farming on his plantation and operating the gin to bale his and other farmers' crops in the area. It marked the business friendly climate that remains a trademark of Stafford today. In 1836, during the Texas Revolution, General Santa Ana and his troops stopped in Stafford's Point for the night on their way to San Jacinto. Before departing, they pillaged and burned the community. By 1840, settlers had returned to begin rebuilding, and their preferred economic product shifted from cotton to sugar cane as the primary source of income for revitalizing the community's economy. Attracted by this expanding community, Stafford's Point became the terminal point of the first railroad tracks built in Texas which became a robust system over the next century. Since Stafford's incorporation, it has stood out by promoting commerce instead of concentrating solely on residential development.

24.2.3 Climate

The climate of the City of Stafford is typical of the upper Texas coast, humid subtropical, with hot and humid summers and mild winters. The average annual temperature is around 69°F and average annual rainfall is approximately 50 inches.

24.2.4 Governing Body Format

As a home rule city, Stafford established a "mayor-council" form of municipal government. The city is governed by the mayor and six council members. The city consists of 10 departments: Fire, Police, Finance, Human Resources, Public Works, Municipal Court, Information Technology, Municipal Educational Television, Recreation and City Administration. The Stafford Economic Development Corporation is a nonprofit which pursues the economic development expansion of the city and reports to City Council.

The City Council assumes responsibility for the adoption of this plan; the Mayor will oversee its implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 24-1.

Table 24-1. Local Mitigation Planning Team Members

Name	Title
Peter Alvarado	Emergency Management Coordinator
Efrem Burns	Fire Marshal
Cassandra Fair	Administrative Assistant
Jeff Johnson	City Planner
Ashley Merchant	Grant Manager
Chris Riggs	Director of Public Works

24.3 CURRENT TRENDS

24.3.1 Population

According to the United States Census Bureau, the population of the City of Stafford as of April 2010 was 17,693. Since 2010, the population has grown at an average annual rate of 0.61 percent, though in 2017 it is estimated that the population decreased by 0.66 percent from 2016.

24.3.2 Development

Anticipated redevelopment/development levels are low to moderate, consisting primarily of commercial redevelopment. Approximately 93 percent of the City is built-out, with the most recent development being infill. Residentially, there has been a focus on increased density and compact urban uses through planned developments.

The City of Stafford updated its Comprehensive Plan in 2015. The plan focuses on issues of the greatest concern to the community. City actions, such as those relating to land use allocations, annexations, zoning, subdivision and design review, redevelopment and capital improvements, must be consistent with the plan. Future growth and development in the City will be managed as identified in the general plan.

Table 24-2 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

Table 24-2. Recent and Expected Future Development Trends

Criterion	Response
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan?	No
• **If yes, give the estimated area annexed and estimated number of parcels or structures.**	N/A

Criterion	Response
Is your jurisdiction expected to annex any areas during the performance period of this plan? • **If yes, describe land areas and dominant uses.** • **If yes, who currently has permitting authority over these areas?**	No N/A N/A
Are any areas targeted for development or major redevelopment in the next five years? • **If yes, briefly describe, including whether any of the areas are in known hazard risk areas**	Yes There is a Master Planned 200 acre mixed use (residential/commercial) project called the "Grid" at the northwest corner of the intersection of I-59 and Kirkwood Road that is under construction. There are no known hazard risks in this area.
How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?	
Provide the number of new-construction permits for each hazard area or provide a qualitative description of where development has occurred.	• Special Flood Hazard Areas: 0 • Landslide: 0 • High Liquefaction Areas: 0 • Tsunami Inundation Area: 0 • Wildfire Risk Areas: 0
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	• The City of Stafford has a current population of approximately 19,000. It is anticipated at the time of build out in 2030 that a minimum of 3,000 residential dwelling units will be added to the existing approximately 180 acres of vacant residential property. • Population of the City will be approximately 27,500 in 2030. With an increased demand in compact urban dwelling units, the population will continue to rise in the future. • There is approximately 150 acres of vacant commercial/industrial property. Buildout is anticipated by 2030. There will be an increased demand to mixed use developments (residential/commercial/industrial) in the future to make these developments viable.

	2014	2015	2016	2017	2018
Single Family	33	12	39	4	6
Multi-Family	0	0	0	0	7
Other (commercial, mixed use, etc.)	11	17	15	13	11
Total	44	29	54	17	24

24.4 CAPABILITY ASSESSMENT

The City of Stafford performed an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities is presented in Table 24-3.
- Development and permitting capabilities are presented in Table 24-4.
- An assessment of fiscal capabilities is presented in Table 24-5.
- An assessment of administrative and technical capabilities is presented in Table 24-6.
- An assessment of education and outreach capabilities is presented in Table 24-7.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 24-8.
- Classifications under various community mitigation programs are presented in Table 24-9.
- The community's adaptive capacity for the impacts of climate change is presented in Table 24-10.

Findings of the capability assessment were reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table included in the action plan for this annex identifies these as community capacity building mitigation actions.

Table 24-3. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code	Yes	No	No	Yes
Comment: International Building Code 2015				
Zoning Code	Yes	No	No	Yes
Comment: Comprehensive Zoning Ordinance 102				
Subdivisions	Yes	No	No	Yes
Comment: Subdivision Ordinance 82				
Stormwater Management	Yes	No	Yes	Yes
Comment: Stormwater Pollution Protection Ordinance: Subdivision Ordinance Chapter 35 Section 205-208; TCEQ				
Post-Disaster Recovery	Yes	Yes	Yes	Yes
Comment: Fort Bend County Plan				
Real Estate Disclosure	No	Yes	No	No
Comment: Fort Bend County				
Growth Management	Yes	No	No	Yes
Comment: Code of Ordinance Article III Section 62				
Site Plan Review	Yes	No	No	Yes
Comment: Comprehensive Zoning Ordinance 102				
Environmental Protection	No	Yes	Yes	No
Comment: TCEQ and EPA				
Flood Damage Prevention	Yes	No	No	Yes
Comment: Code of Ordinance Article IV Section 26				
Emergency Management	Yes	No	Yes	Yes
Comment: Code of Ordinance Article II Section 22				
Climate Change	No	No	No	No
Comment:				
Planning Documents				
General Plan	Yes	Yes	Yes	Yes
Comment: Fort Bend County				
Capital Improvement Plan	Yes	No	No	Yes
How often is the plan updated? 1 year				
Comment: City of Stafford Capital Improvement Plan Revised 2018				
Disaster Debris Management Plan	No	Yes	Yes	No
Comment: Fort Bend County Debris Management Plan				
Floodplain or Watershed Plan	Yes	Yes	No	Yes
Comment: Code of Ordinance Article IV Section 26				
Stormwater Plan	Yes	Yes	Yes	Yes
Comment: Stormwater Pollution Protection Ordinance: Subdivision Ordinance Chapter 35 Section 205-208; State Mandate via Texas Commission on Environmental Quality				
Urban Water Management Plan	No	Yes	No	No
Comment: Water Control Improvement District #2 (Fort Bend County)				
Habitat Conservation Plan	No	No	No	No
Comment:				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Economic Development Plan	Yes	No	No	No
Comment: City of Stafford Comprehensive Plan 2015				
Shoreline Management Plan	No	No	No	No
Comment:				
Community Wildfire Protection Plan	No	No	No	No
Comment:				
Forest Management Plan	No	No	No	No
Comment:				
Climate Action Plan	No	No	No	No
Comment:				
Comprehensive Emergency Management Plan	Yes	Yes	Yes	Yes
Comment: Fort Bend County Emergency Management Plan				
Threat & Hazard Identification & Risk Assessment (THIRA)	No	Yes	Yes	Yes
Comment: 2017 Houston Regional Threat and Hazard Identification and Risk Assessment				
Post-Disaster Recovery Plan	Yes	Yes	Yes	Yes
Comment: Fort Bend County Plan				
Continuity of Operations Plan	Yes	No	No	Yes
Comment: City of Stafford Continuity of Operations Plan				
Public Health Plan	Yes	Yes	No	Yes
Comment: Code Enforcement Health Inspection				

Table 24-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • **If no, who does? If yes, which department?**	Yes Public Works- Development Services
Does your jurisdiction have the ability to track permits by hazard area?	No
Does your jurisdiction have a buildable lands inventory?	No

Table 24-5. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	No
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes

Table 24-6. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Public Works- City Planner
Engineers or professionals trained in building or infrastructure construction practices	Yes	Contract Support
Planners or engineers with an understanding of natural hazards	Yes	Contract Support
Staff with training in benefit/cost analysis	No	N/A
Surveyors	No	N/A
Personnel skilled or trained in GIS applications	Yes	Public Works- GIS Applications Specialist
Scientist familiar with natural hazards in local area	No	N/A
Emergency manager	Yes	Fire Department- Emergency Management Coordinator
Grant writers	Yes	Grant Manager

Table 24-7. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • **If yes, briefly describe.**	Yes There is a link in the Emergency Management section and occasionally information will be posted on the flash screen of the home page.
Do you use social media for hazard mitigation education and outreach? • **If yes, briefly describe.**	Yes Information is posted through Facebook, Twitter and NextDoor.
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • **If yes, briefly describe.**	No N/A
Do you have any other programs already in place that could be used to communicate hazard-related information? • **If yes, briefly describe.**	Yes Stafford Municipal Educational Television
Do you have any established warning systems for hazard events? • **If yes, briefly describe.**	Yes Warnings are posted on electronic billboards in the city and broadcast over an AM radio station.

Table 24-8. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Public Works
Who is your floodplain administrator? (department/position)	Contract Support
Are any certified floodplain managers on staff in your jurisdiction?	No
What is the date that your flood damage prevention ordinance was last amended?	2/13/2008
Does your floodplain management program meet or exceed minimum requirements? • **If exceeds, in what ways?**	Meets N/A
When was the most recent Community Assistance Visit or Community Assistance Contact?	Insert appropriate information
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • **If so, state what they are.**	No N/A
Are any RiskMAP projects currently underway in your jurisdiction? • **If so, state what they are.**	No N/A
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • **If no, state why.**	Yes N/A
Does your floodplain management staff need any assistance or training to support its floodplain management program? • **If so, what type of assistance/training is needed?**	Yes Basic training.
Does your jurisdiction participate in the Community Rating System (CRS)? • **If yes, is your jurisdiction interested in improving its CRS Classification?** • **If no, is your jurisdiction interested in joining the CRS program?**	No N/A Yes
How many flood insurance policies are in force in your jurisdiction?[a] • **What is the insurance in force?** • **What is the premium in force?**	635 $201,754,900 $301,180
How many total loss claims have been filed in your jurisdiction?[a] • **How many claims are still open or were closed without payment?** • **What were the total payments for losses?**	106 31 $1,754,301

a. According to FEMA statistics as of OCTOBER 31, 2018

Table 24-9. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	No	N/A	N/A
Building Code Effectiveness Grading Schedule	No	N/A	N/A
Public Protection	No	N/A	N/A
Storm Ready	No	N/A	N/A
Firewise	No	N/A	N/A

Table 24-10. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:***	Low
Jurisdiction-level monitoring of climate change impacts ***Comment:***	Low
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:***	Low
Participation in regional groups addressing climate risks ***Comment:***	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	Low
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	Low
Identified strategies for adaptation to impacts ***Comment:***	Medium
Champions for climate action in local government departments ***Comment:***	Low
Political support for implementing climate change adaptation strategies ***Comment:***	Medium
Financial resources devoted to climate change adaptation ***Comment:***	Low
Local authority over sectors likely to be negative impacted ***Comment:***	Low
Public Capacity	
Local residents knowledge of and understanding of climate risk ***Comment:***	Low
Local residents support of adaptation efforts ***Comment:***	Medium
Local residents' capacity to adapt to climate impacts ***Comment:***	Low
Local economy current capacity to adapt to climate impacts ***Comment:***	Low
Local ecosystems capacity to adapt to climate impacts ***Comment:***	Low

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

24.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning and capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

24.5.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- **Municipal Codes and Ordinances** — The City's Municipal Codes were reviewed for the full capacity assessment and for identifying opportunities for action plan integration, including Section 26 – Drainage and Flood Control.
- **Capital Improvement Plan** — The Capital Improvement Plan includes projects that can help mitigate potential hazards. The City will act to ensure consistency between the hazard mitigation plan and the current and future capital improvement plans. The hazard mitigation plan may identify new possible funding sources for capital improvement projects may result in modifications to proposed projects based on results of the risk assessment
- **Building Code and Fire Code** — The City's adoption of the 2015 International Building and Fire Code incorporate local modifications to account for climatic, topographic and geographic conditions that exists in the City
- **Comprehensive Plan** — The City's 2015 Comprehensive Plan includes an "Infrastructure Assessment" element to protect the community from unreasonable risk by establishing policies and actions to avoid or minimize infrastructure hazards pertaining to flooding.

24.5.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- **Zoning Ordinance** — In the future, the City will be conducting a comprehensive update to the zoning ordinance. The opportunity to incorporate additional mitigation and abatement measures will be considered for inclusion into the ordinance
- **Capital Improvement Projects** — The City will continue to place a higher rank or score when evaluating capital projects that take into consideration hazard mitigation potential.
- **Economic Development Corporation** — The City will continue to work with the Economic Development Corporation to incorporate hazard mitigation planning in future development within the City.

24.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 24-11 lists past occurrences of natural hazards for which specific damage was recorded in [City of Stafford]. Other hazard events that broadly affected the entire planning area, including [City of Stafford], are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 24-11. Past Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Hurricane	DR-4332	8/23/2017-9/15/2017	$795,610.33
Flash Flood		8/26/2017	$0
Tornado		2/14/2017	$200,000
Severe Storms and Flooding	DR-4272	5/22/2016-6/24/2016	
Severe Storms and Flooding	DR-4269	4/17/2016-4/30/2016	
Severe Weather, Tornadoes, Straight Line Winds and Flooding	DR-4223	5/4/2015-6/22/2015	
Thunderstorm Winds		4/17/2015	$0
Flooding		2014	Portions of FM 1092 flooded.
Thunderstorm Winds		8/13/2009	$15,000
Hurricane Ike	DR-1791	9/7/2008-10/2/2008	$269,276.27
Hurricane Gustav	EM-3290	8/27/2008-9/7/2008	
Hurricane Dean	EM-3277	8/17/2008-9/5/2008	
Lightning		6/18/2008	$10,000
Extreme Wildfire Threat	DR-1624	11/27/2006-5/14/2006	
Lightning		7/18/2006	$4,000
Lightning		7/4/2006	$25,000
Hurricane Rita	DR-1606	9/23/2005-10/14/2005	
Hurricane Rita	EM-3261	9/20/2005-10/14/2005	
Hurricane Katrina Evacuation	EM-3216	8/29/2005-10/1/2005	
Hail		2/24/2005	$4,000
Tornado		11/17/2003	$300,000
Hail		10/28/2002	$5,000
Severe Storms, Tornadoes and Flooding	DR-1439	10/24/2002-11/15/2002	
Hail		5/30/2002	$2,000
Tropical Storm Allison	DR-1379	6/5/2001-6/20/2001	
Thunderstorm Winds		4/16/2001	$150,000
Extreme Fire Hazards	EM-3142	8/1/1999-12/10/1999	
Texas Tropical Storm Frances	DR-1245	9/9/1998-10/5/1998	
Lightning		6/3/1996	One fatality
Severe Thunderstorms and Flooding	DR-1041	10/14/1994-11/8/1994	
Texas Severe Storm, Thunderstorms	DR-930	12/20/1991-1/14/1992	
Tropical Storm Allison	DR-836	6/25/1989-7/7/1989	
Hurricane Alicia	DR-689	8/18/1983-8/20/1983	

24.7 HAZARD RISK RANKING

Table 24-12 presents a local ranking for [City of Stafford] of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 24-12. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Severe Weather	48	High
1	Hurricane	48	High
2	Earthquake	14	Low
3	Drought	6	Low
3	Wildfire	6	Low
3	Flooding	6	Low
4	Dam Failure	0 (No exposure)	None
4	Mass Movement	0 (No Exposure)	None
4	Tsunami	0 (No exposure)	None
4	Coastal Erosion	0 (No exposure)	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

24.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. This section provides information on a few key vulnerabilities for the jurisdiction. Available jurisdiction-specific risk maps of the hazards are provided at the end of this annex.

24.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: 11
- Number of FEMA-identified Severe-Repetitive-Loss Properties: None
- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated: None

24.8.2 Other Noted Vulnerabilities

The following jurisdiction-specific issues have been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- There are areas in the City with urban drainage issues that result in localized flooding during heavy rain.
- Fire Station 1, a critical facility which also houses Emergency Medical Service (EMS), has a generator in poor condition and in need of replacement.

Mitigation actions addressing these issues were prioritized for consideration in the action plan presented in this annex.

24.9 STATUS OF PREVIOUS PLAN ACTIONS

Table 24-13 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

Table 24-13. Status of Previous Plan Actions

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
Install generators/emergency power at the Stafford Centre and Civic Center.			X	STF5
Comment: Not started.				
Expand city's emergency warning system to increase coverage within the community's population.			X	STF6
Comment: Ongoing				
Install protective structures to minimize damage to critical assets and equipment.	X			
Comment: Shed covers were installed to cover equipment in 2015.				
Improve drainage channels to increase flow rate and increased retention areas.			X	STF7
Comment: In progress. Work began in 2017. One of three projects has been completed and the remaining two are underway.				
Improve storm sewer to lower hydraulic grade line in Sugar Creek subdivision.	X			
Comment: This project was completed on September 12, 2018.				
Implement drainage improvements in Missouri City Estates- replace open ditches by- installing storm sewers and level ground to reduce overland and sheet flow flooding within neighborhoods.			X	STF8
Comment: In progress. Drainage improvement is currently underway in Missouri City Estates, the project started on September 1, 2018. A new detention pond will be installed and there will be partial curb and gutter installed in the subdivision.				
Electric Surge protection and shielding for electronic systems in public facilities or critical infrastructure.	X			
Comment: Back-up systems approved in October of 2017.				
Harden air filtration system and critical infrastructure/public buildings to support high efficiency particulate air resistance filters in order to minimize health risks and property damage due to air particulate hazards and minimize equipment damage due to smoke.			X	STF9
Comment: Not started.				
Hardening of critical infrastructure facilities for hurricane wind hazards.			X	STF10
Comment: Not started.				
Development/Modification of building codes/ordinances for mitigation of hurricane wind hazards.	X			
Comment: 2015 International Building Codes adopted by Council on May 2, 2018.				

24.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 24-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 24-15 identifies the priority for each action. Table 24-16 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 24-14. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action STF1 — Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Earthquake, flooding, landslide, wildfire						
Existing	3, 4, 10	Public Works	Emergency Management	High	HMGP, PDM, FMA	Short-term
Action STF2 — Integrate the hazard mitigation plan into other plans, ordinances and programs that dictate land use decisions in the community, including Zoning Ordinance, Capital Improvement projects and Economic Development Corporation planning						
Hazards Mitigated: Dam failure, drought, earthquake, flooding, landslide, wildfire						
New and Existing	1, 3, 4, 5, 7, 8, 10	Planning and Zoning	Stafford Economic Development Corporation	Low	Staff Time, General Funds	Ongoing
Action STF3 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: Severe Weather, Hurricane, Earthquake, Drought, Wildfire, Flooding						
New and Existing	1, 5, 8	Emergency Management	Public Works	Low	Staff Time, General Funds	Short-term
Action STF4 — Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements: • Enforce the flood damage prevention ordinance. • Participate in floodplain identification and mapping updates. • Provide public assistance/information on floodplain requirements and impacts.						
Hazards Mitigated: Dam failure, flooding, severe weather,						
New and Existing	1, 3, 5, 7, 8, 10	Public Works	Emergency Management	Low	Staff Time, General Funds	Ongoing
Action STF5 — Install generators/emergency power at the Stafford Centre for use as an emergency shelter.						
Hazards Mitigated: Hurricane, severe weather, wind, flooding						
Existing	3, 4, 6, 10, 11	Economic Development Corporation	Emergency Management	Low	HMGP, PDM; EDC Funds	Short-Term
Action STF6 — Expand city's emergency warning system to increase coverage within the community's population.						
Hazards Mitigated: Hurricane, flooding, severe weather, wildfire, drought,						
New	1, 3, 11	Emergency Management	Police/Fire	Medium	Grant funding; General Funds	Ongoing
Action STF7 — Improve drainage channels to increase flow rate and increased retention areas.						
Hazards Mitigated: Hurricane, flooding, severe weather						
Existing	6, 8, 9, 11, 14, 15	Stafford Public Works	Fort Bend County Drainage/Stafford Economic Development Corporation	Medium	Staff Time, General Funds	Ongoing
Action STF8 — Implement drainage improvements in Missouri City Estates- replace open ditches by installing storm sewers and level ground to reduce overland and sheet flow flooding within neighborhoods.						
Hazards Mitigated: Hurricane, flooding, severe weather						
New and Existing	6, 8, 9, 11, 14, 15	Public Works		Low	Staff Time, General Funds	Short-Term
Action STF9 — Harden air infiltration system and critical infrastructure/public buildings to support high efficiency particulate air resistance filters in order to minimize health risks and property damage due to air particulate hazards and minimize equipment damage due to smoke.						
Hazards Mitigated: Severe weather, wind, hurricane, tornado, wildfire, non-natural						
Existing	11, 13	Public Works		Medium	HMGP, PDM, FMA; Staff Time, General Funds	Short-Term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action STF10 — Hardening of critical infrastructure facilities for hurricane wind hazards.						
Hazards Mitigated: Hurricane, wind, severe weather, tornado						
Existing	11, 13	Public Works	Emergency Management	Medium	HMGP, PDM, FMA; General Funds	Short-Term
Action STF11 — Purchase generator for Fire/EMS Station 1.						
Hazards Mitigated: Hurricane, severe weather, wind, flooding						
New	3, 4, 6, 10, 11	Public Works	Emergency Management	Low	Staff Time, General Funds	Short-Term
Action STF12 — Purchase/install generators at critical facilities and infrastructure that lack adequate back-up power or are in need of replacement.						
Hazards Mitigated: Hurricane, severe weather, wind, flooding						
New	3, 4, 6, 10, 11	Public Works	Emergency Management	Medium	HMGP, PDM; General Funds	Ongoing
Action STF13— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
Hazards Mitigated: Severe Weather, Hurricane, Earthquake, Drought, Wildfire, Flooding						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	City Admistration	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 24-15. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
1	3	High	High	Yes	Yes	No	Medium	High
2	7	Medium	Low	Yes	No	Yes	High	Low
3	3	Low	Low	Yes	No	Yes	High	Low
4	6	Medium	Low	Yes	No	Yes	High	Low
5	5	Medium	Low	Yes	Yes	No	Low	High
6	3	High	Medium	Yes	Maybe	No	Low	High
7	6	Medium	Medium	Yes	Yes	Yes	Medium	Low
8	6	Medium	Low	Yes	Yes	Yes	High	Low
9	2	Low	Medium	No	Yes	No	Low	Low
10	2	Low	Medium	No	Yes	No	Low	Low
11	5	High	Low	Yes	Yes	Yes	High	Low
12	5	High	Medium	Yes	Yes	No	Medium	Medium
13	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 24-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Severe Weather	STF-4, 13	STF-9, 10	STF-6, 13		STF-5, 6, 11, 12, 13	STF-7, 8		STF-3, 4, 13
Hurricane	STF13	STF-9, 10	STF-6, 13		STF-5, 6, 11, 12, 13	STF-7, 8		STF-3, 13
Low-Risk Hazards								
Earthquake	STF-2, 13		STF13		STF13	STF-1		STF-3, 13
Drought	STF-2, 13		STF-6, 13		STF-5, 6, 11, 12, 13			STF-3, 13
Wildfire	STF-2, 13	STF-9	STF-6, 13		STF-5, 6, 11, 12, 13	STF-1		STF-3, 13
Flooding	STF-2, 4, 13		STF-6, 13		STF-5, 6, 11, 12, 13	STF-1, 7, 8		STF-3, 4, 13

a. See the introduction to this volume for explanation of mitigation types.

24.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

24.11.1 Existing Reports, Plans, Regulatory Tools and Other Resources

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

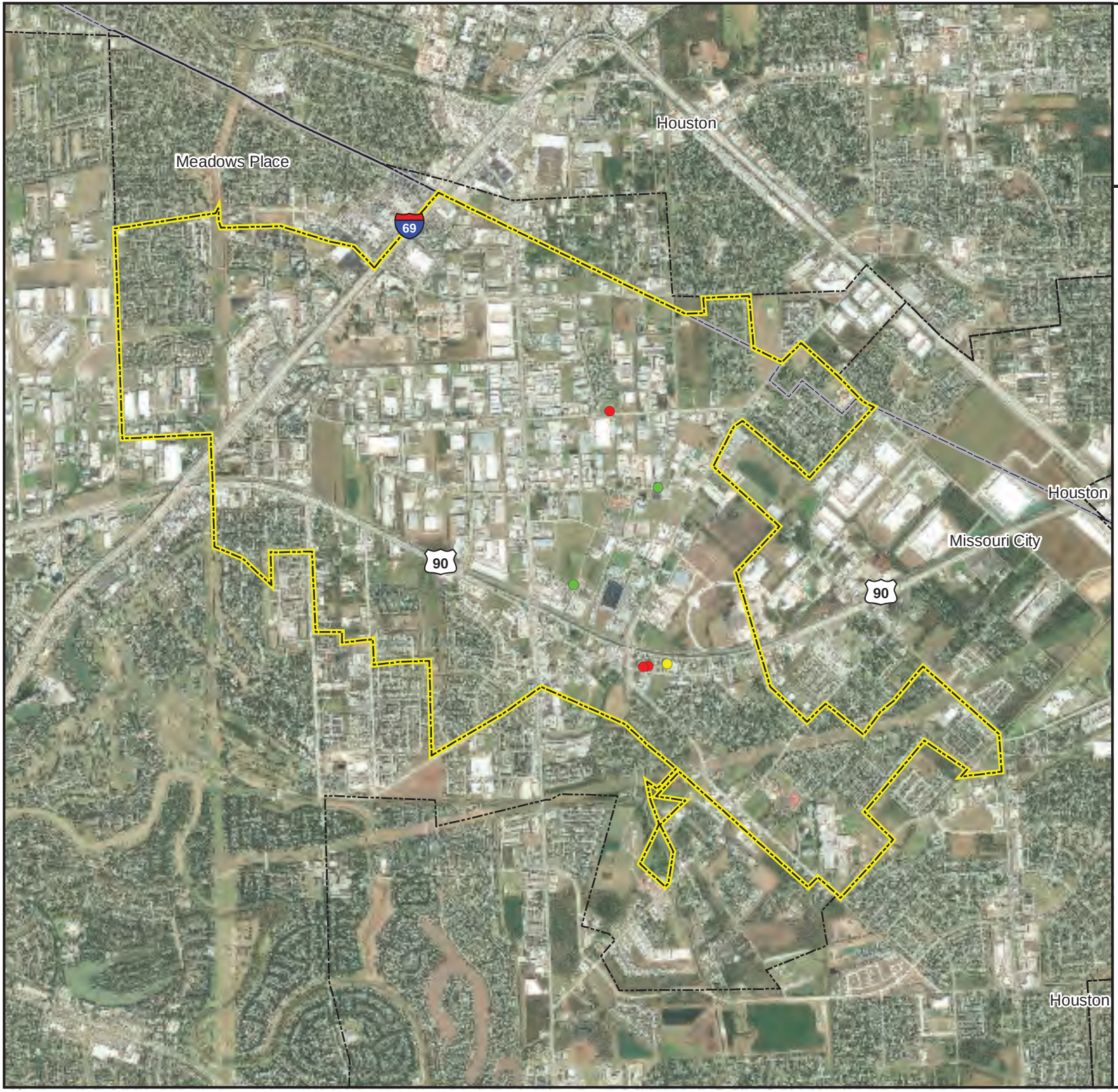
- **City of Stafford Municipal Code** — The municipal code was reviewed for the full capability assessment and for identifying opportunities for action plan integration.
- **City of Stafford Flood Damage Prevention Ordinance** — The flood damage prevention ordinance was reviewed for compliance with the National Flood Insurance Program.
- **City of Stafford Comprehensive Plan —** The City of Stafford Comprehensive Plan was reviewed for the full capability assessment and for identifying opportunities for action plan integration.
- **City of Stafford Capital Improvement Plan** — The City of Stafford's Capital Improvement Plan was reviewed for the full capability assessment and for identifying opportunities for action plan integration.
- **Fort Bend County Debris Management Plan** — The Fort Bend County Debris Management Plan was reviewed for the full capability assessment and for identifying opportunities for action plan integration.
- **City of Stafford Continuity of Operations Plan** — The City of Stafford's Continuity of Operations Plan was reviewed for the full capability assessment and for identifying opportunities for action plan integration.
- **2017 Houston Regional Threat and Hazard Identification Risk and Assessment** — The 2017 Houston Regional Threat and Hazard Identification Risk and Assessment was reviewed for the full capability assessment and for identifying opportunities for action plan integration.
- **Fort Bend County Emergency Management Plan** — The Fort Bend County Emergency Management Plan was reviewed for the full capability assessment and for identifying opportunities for action plan integration.

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.

24.11.2 Staff and Local Stakeholder Involvement in Annex Development

This annex was developed over the course of several months with input from many city departments including public works, planning, finance and emergency management. All departments were asked to contribute to the annex development through reviewing and contributing to the capability assessment, reporting on the status of previously identified actions, and participating in action identification and prioritization. An action development meeting was held on March 25, 2019 and was attended by representatives from the previously listed departments as well as the City Administrative office. Once action had been identified and compiled in Phase II of the annex, a draft was internally circulated for comment. Representatives from the Fire Marshal's Office, planning and emergency management department attended a mandatory workshop on July 17, 2019 covering Phase III of the annex development process. On July 31, 2019, an interdepartmental meeting covering Phase III of the City's annex was conducted with department representatives from emergency management, the Fire Marshal's Office, planning, and public works. A draft of the annex was internally circulated for comment and reviewed by the Mayor before a final draft was submitted to the Core Planning Team representing Harris County.



Stafford

Critical Facilities

- Education Facilities
- Emergency Services
- Government Facilities
- Hazardous Material Sites
- Health and Medical Facilities
- Historical and Cultural Sites
- Transportation Systems
- Utility Systems
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.2 0.4 0.8 Miles

Stafford

FEMA Flood Hazard

1% Annual Chance Flood (100-yr)

Incorporated Cities

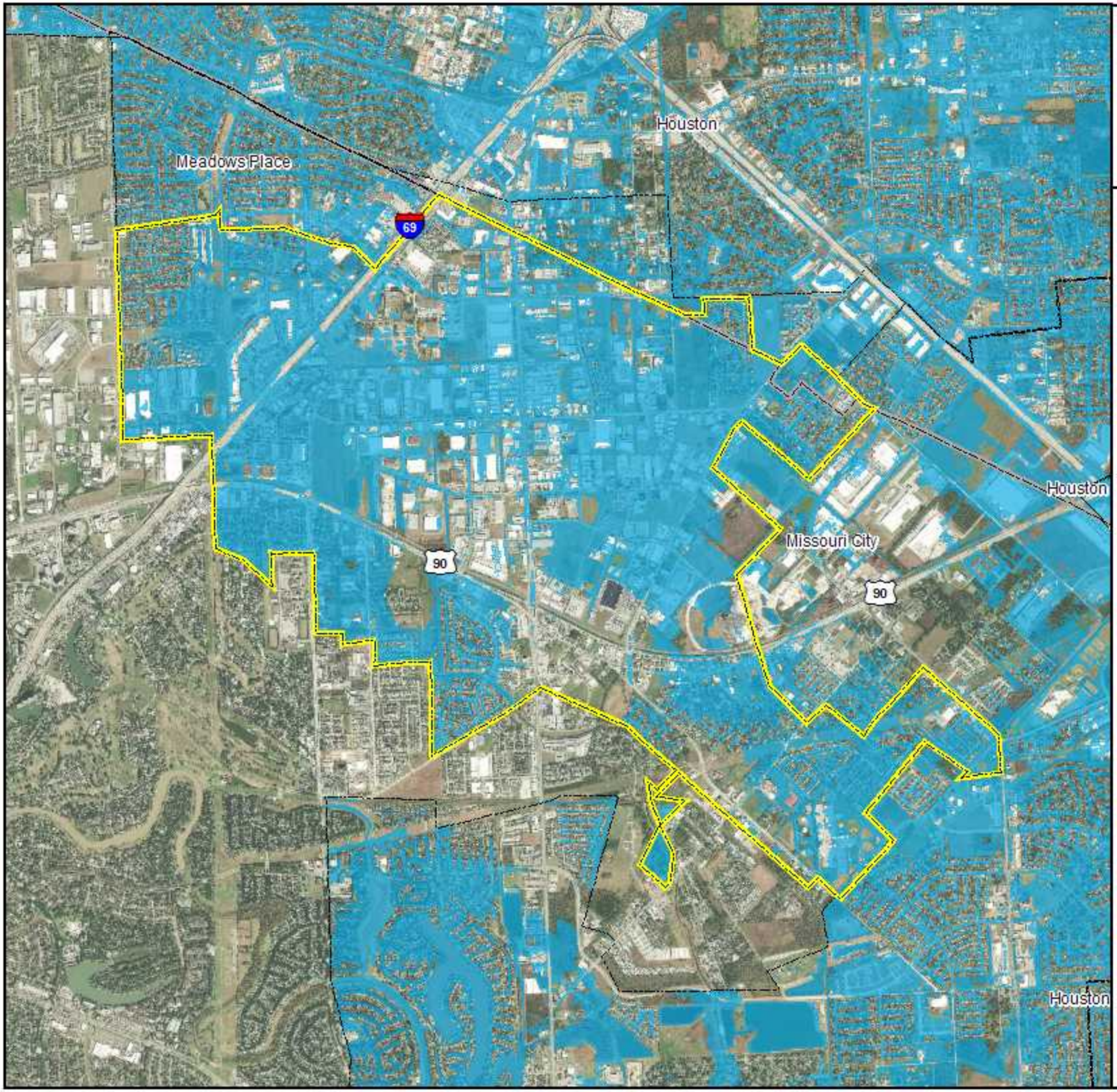
Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.2 0.4 0.8 Miles



Stafford

Flood Hazard
Hurricane Harvey

Flooding Extent

Incorporated Cities

Harris County

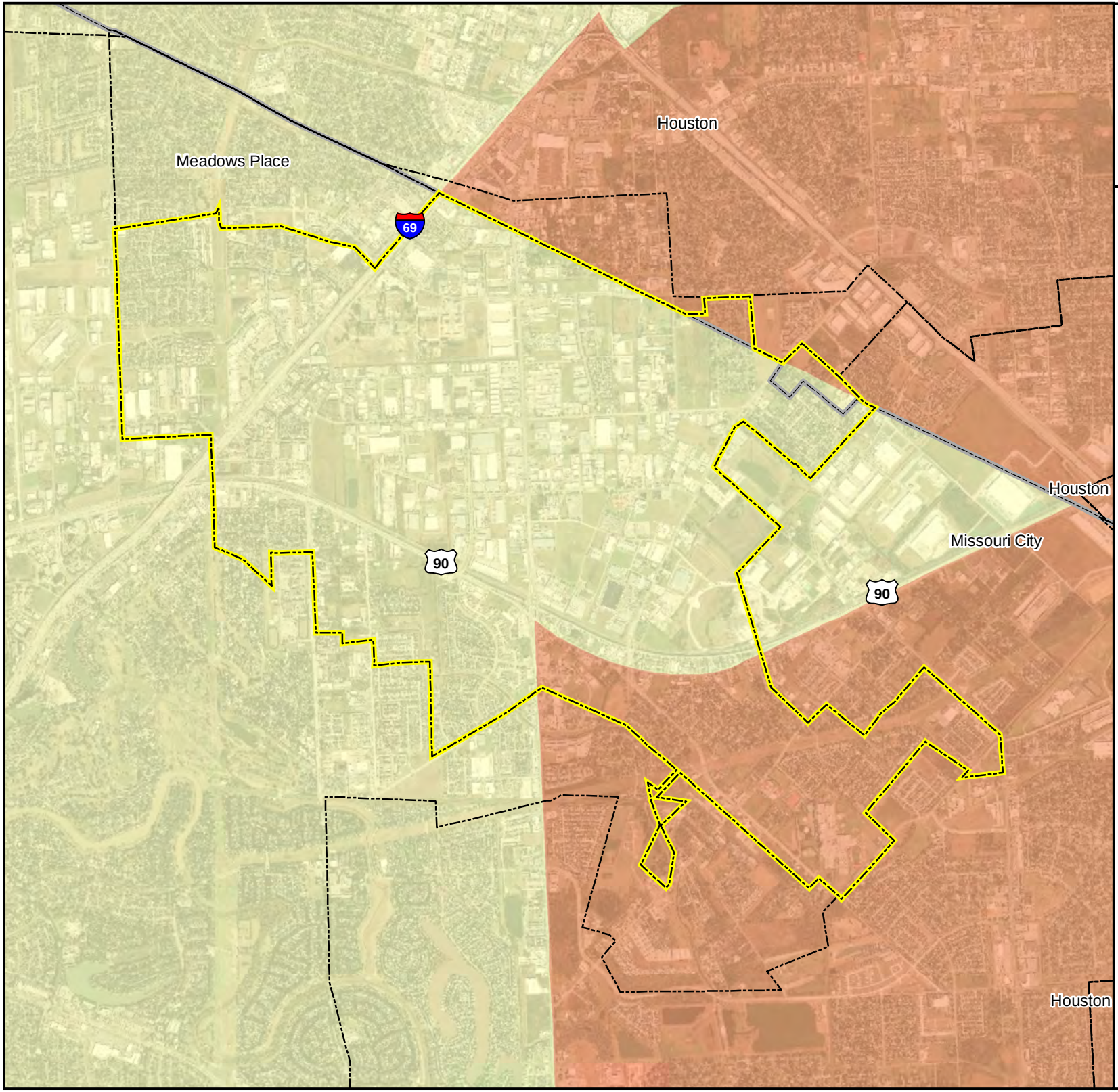
Note: Flooding extent shown for Hazard Mitigation Plan planning area only.

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.2 0.4 0.8 Miles



Stafford

Hurricane Alicia (1983)

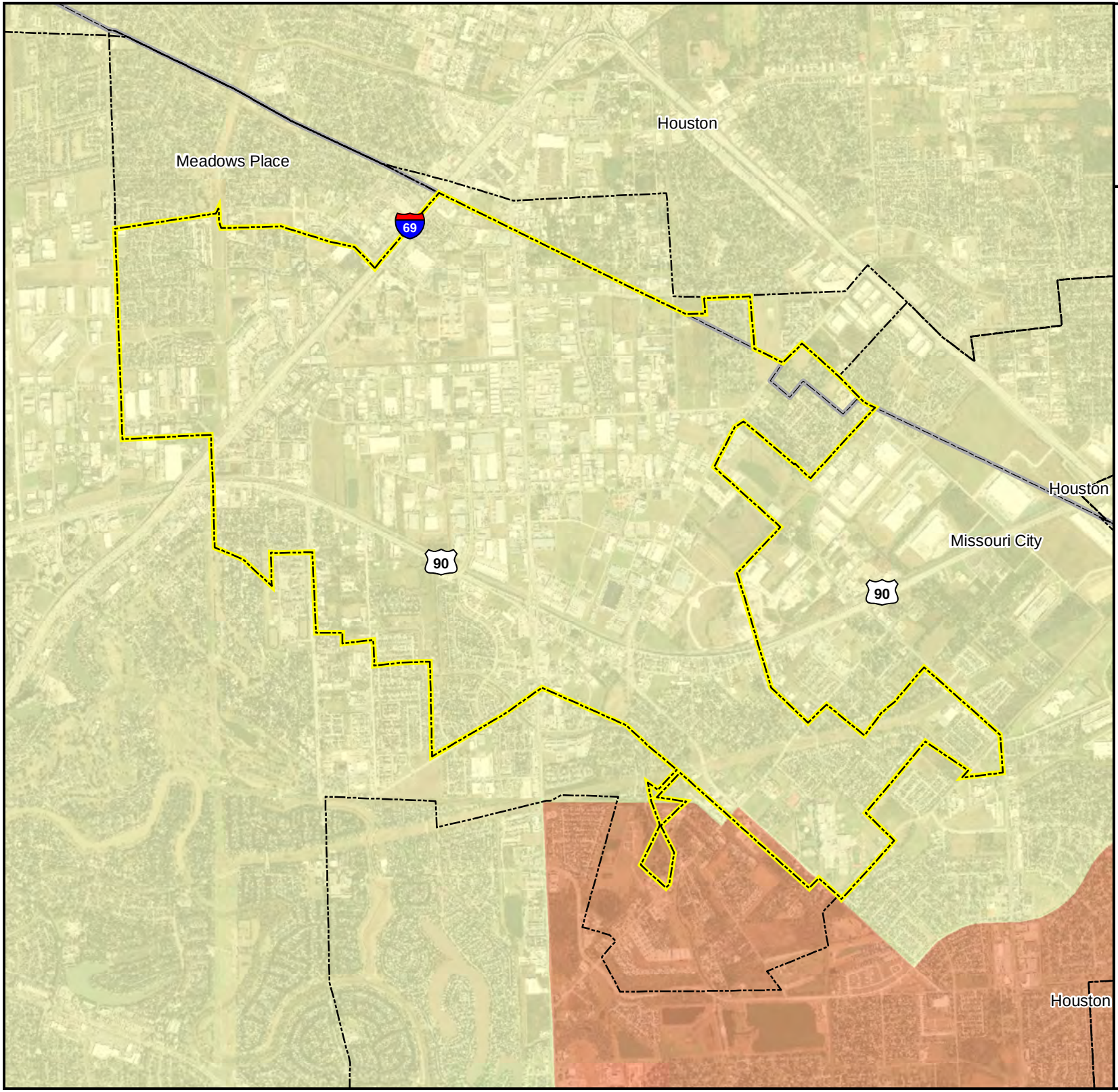
Peak WInd Gust (mph)

- 87 - 94
- 95 - 98
- 99 - 101
- 102 - 104
- 105 - 110
- Storm Track
- Incorporated Cities
- Harris County

TETRA TECH

N

0 0.2 0.4 0.8 Miles



Stafford

20-year Probabilistic Hurricane

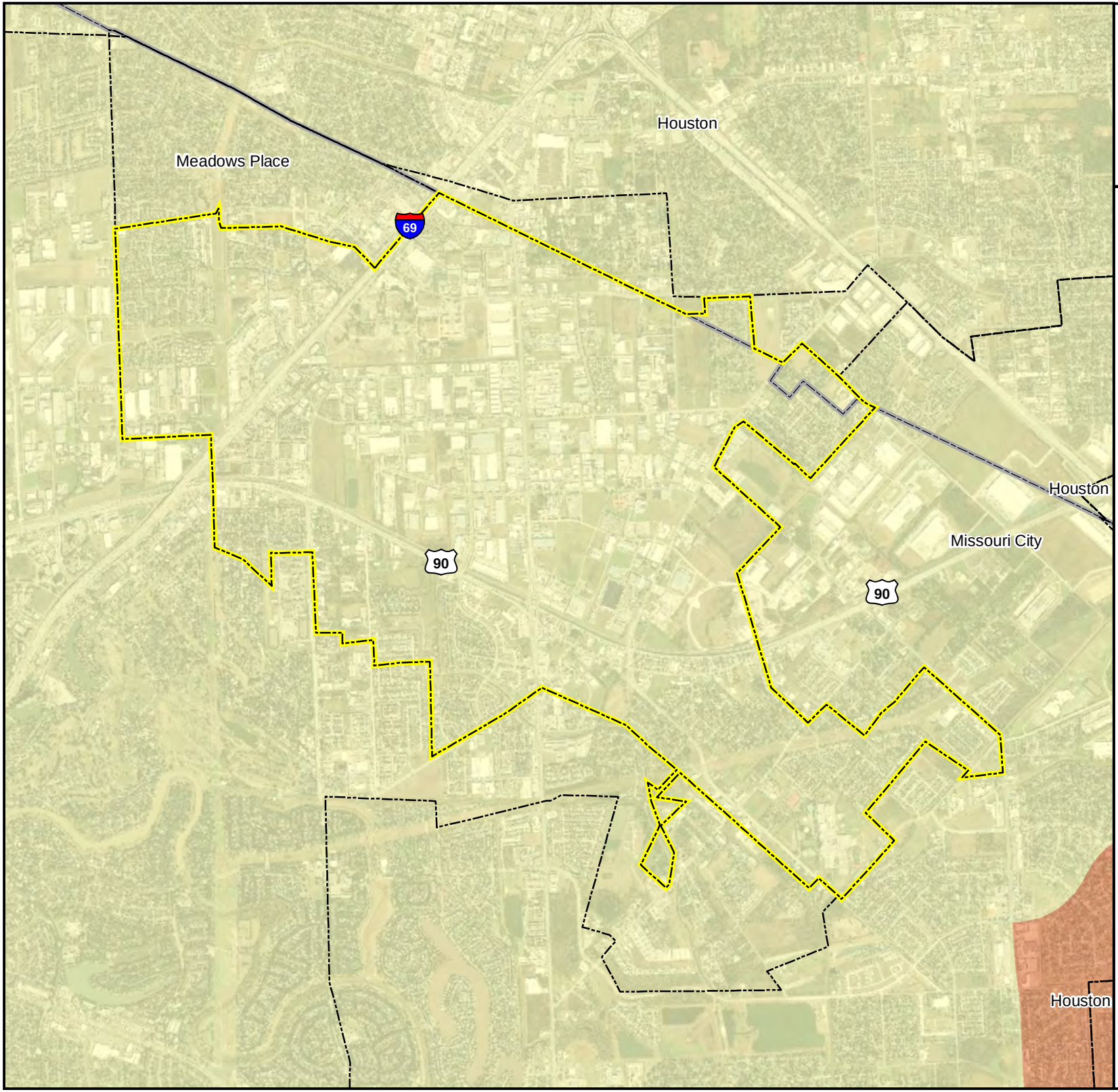
Peak Wind Gust (mph)

- 63 - 71
- 72 - 76
- 77 - 80
- 81 - 84
- 85 - 92
- Incorporated Cities
- Harris County

TETRA TECH

N

0 0.2 0.4 0.8 Miles



Stafford

100-year Probabilistic Hurricane

Peak Wind Gust (mph)

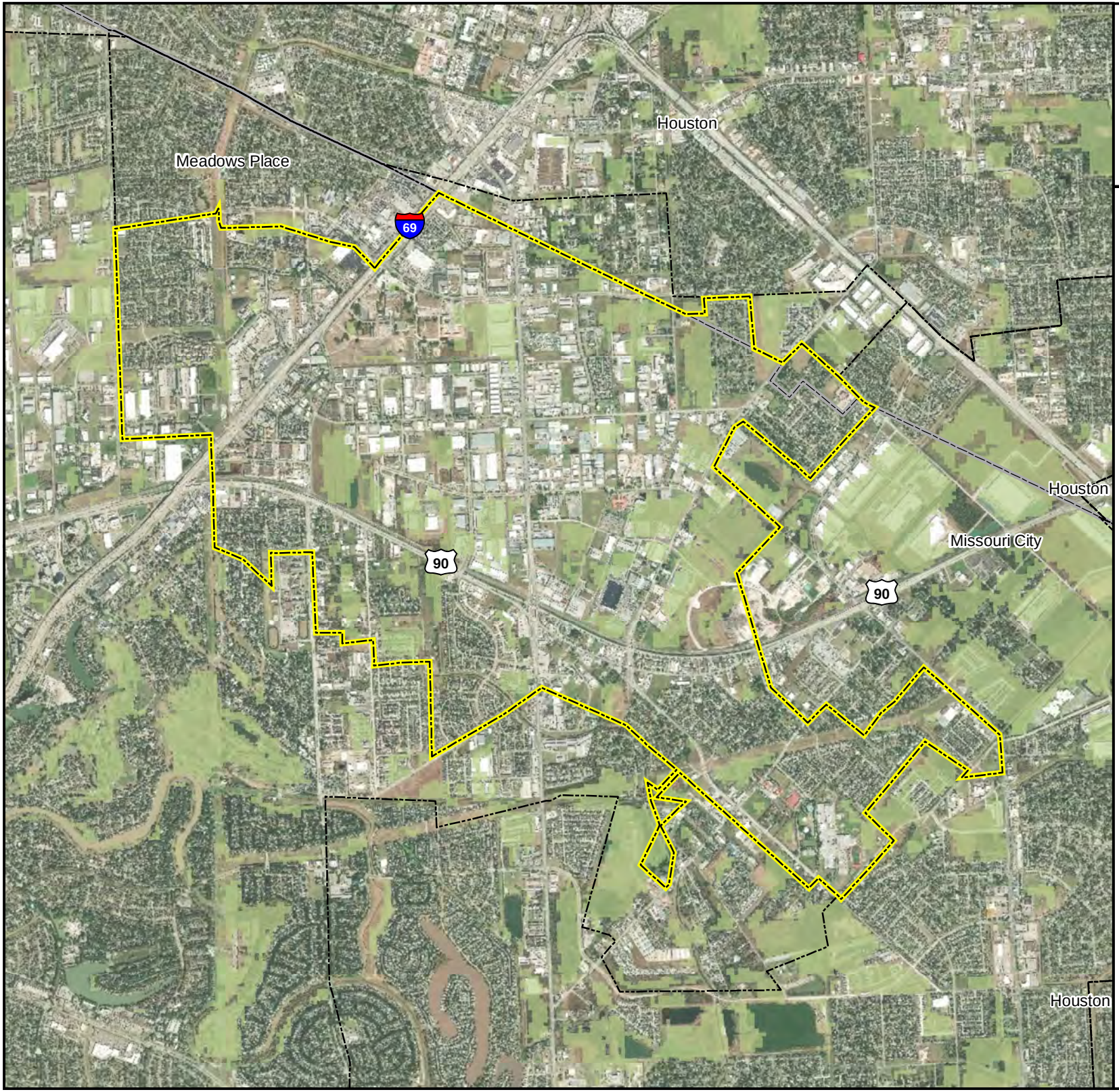
- 89 - 101
- 102 - 106
- 107 - 111
- 112 - 117
- 118 - 128
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.2 0.4 0.8 Miles



Stafford

Wildfire Ignition Density

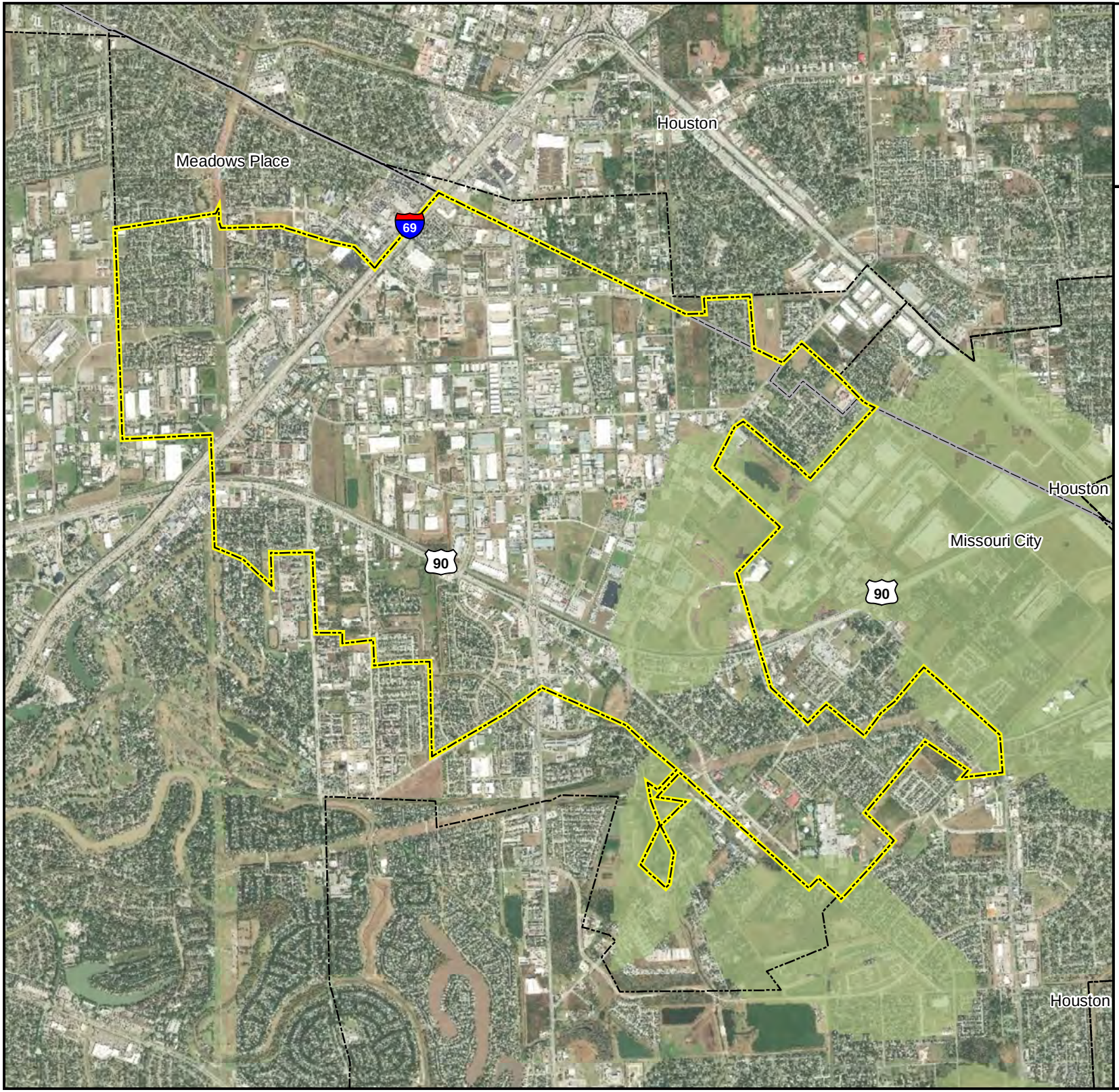
- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.2 0.4 0.8 Miles



Stafford

Wildfire Threat

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.2 0.4 0.8 Miles

25. CITY OF TAYLOR LAKE VILLAGE

25.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact

Jon Keeney, Mayor
500 Kirby
Taylor Lake Village, TX 77586
Telephone: 2813262843
email Address: mayor@tlv-tx.us

Alternate Point of Contact

Jon Powell, Councilman
500 Kirby
Taylor Lake Village, TX 77586
Telephone: 2813262843
email Address: jpowell@tlv-tx.us

25.2 JURISDICTION PROFILE

25.2.1 Location

City of Taylor Lake Village is in southeast Harris County just north of Clear Lake and between Lake Pasadena and Taylor Lake. The current boundaries generally extend from Pasadena to El Lago, encompassing an area of 1.3 square miles, of which 1.1 square miles is land and 0.19 square miles is water.

25.2.2 History

The City of Taylor Lake Village was incorporated in 1962. The City was home to four of the original seven NASA Mercury program astronauts. Many residents work for NASA, and a number of current and former astronauts still live here.

25.2.3 Climate

The climate of Taylor Lake Village is Texas Gulf Coastal.

25.2.4 Governing Body Format

Taylor Lake Village is a General Law Type-A city. It has a mayor and city council with each of the council members being elected at-large. The Taylor Lake Village City Council assumes responsibility for the adoption of this plan; the City Council will oversee its implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 25-1.

Table 25-1. Local Mitigation Planning Team Members

Name	Title
Jon Keeney	Mayor
Jon Powell	Coty Council Pos. 2
Jack Fryday	City Building Official
Jesse Ryholt	Emergency Management Coordinator

25.3 CURRENT TRENDS

25.3.1 Population

According to the United States Census Bureau, the population of Taylor Lake Village as of the 2010 census was 3,544. Since 1980, the population has remained fairly constant.

25.3.2 Development

Table 25-2 summarizes development trends in the period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

Table 25-2. Recent and Expected Future Development Trends

Criterion	Response					
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan? • **If yes, give the estimated area annexed and estimated number of parcels or structures.**	No					
Is your jurisdiction expected to annex any areas during the performance period of this plan? • **If yes, describe land areas and dominant uses.** • **If yes, who currently has permitting authority over these areas?**	No					
Are any areas targeted for development or major redevelopment in the next five years? • **If yes, briefly describe, including whether any of the areas are in known hazard risk areas**	Yes Located in flood hazard risk area					
How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?		**2014**	**2015**	**2016**	**2017**	**2018**
	Single Family	4	3	1	1	3
	Multi-Family	0	0	0	0	0
	Other (commercial, mixed use, etc.)	0	0	0	0	0
	Total	**4**	**3**	**1**	**1**	**3**
Provide the number of new-construction permits for each hazard area or provide a qualitative description of where development has occurred.	Special Flood Hazard Areas: Most of Taylor Lake Village is a flood hazard area • Landslide: 0 • High Liquefaction Areas: 0 • Tsunami Inundation Area: 0 • Wildfire Risk Areas: 0					
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	Kingston Harbor area of Taylor Lake Village was recently purchased by an entity that indicates that it plans to build single family homes. As this area is currently in the flood plain of Taylor Lake, the homes will have to be built with the lowest floor at the current elevation above Mean Flood Elevation level.					

25.4 CAPABILITY ASSESSMENT

The City of Taylor Lake Village is currently undertaking an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following interim findings of the assessment to date:

- An assessment of legal and regulatory capabilities is presented in Table 25-3.

- Development and permitting capabilities are presented in Table 25-4.
- An assessment of fiscal capabilities is presented in Table 25-5.
- An assessment of administrative and technical capabilities is presented in Table 25-6.
- An assessment of education and outreach capabilities is presented in Table 25-7.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 25-8.
- Classifications under various community mitigation programs are presented in Table 25-9.
- The community's adaptive capacity for the impacts of climate change is presented in Table 25-10.

Findings of the capability assessment will be reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities are identified and determined to be feasible, they will be included in the action plan. The "Analysis of Mitigation Actions" table included in the action plan for this annex identifies these as community capacity building mitigation actions.

Table 25-3. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code	Yes	No	Yes	Yes
Comment: *Chapter 10, Article II, section 10-31 of the TLVMC adopts the 2018 Edition of International Code Council Codes and the 2017 National Electrical Code, (Ord. No. 18-689, § 2, 5-30-18)*				
Zoning Code	Yes	No	No	Yes
Comment: *Appendix A of the TLVMC is known as and may be cited as "The City of Taylor Lake Village Zoning Ordinance (Ord. No. 10-600, § 1, 8-4-2010).*				
Subdivisions	Yes	Yes	No	Yes
Comment: *The City works closely with individual subdivision and the homeowner associations to ensure compliance. Chapter 66 of the TLVMC, (Ord. No. 84-226, § 1.04, 10-17-84)*				
Stormwater Management	Yes	Yes	Yes	Yes
Comment: *Chapter 66, Article III, section Sec. 66-115. – Drainage. (Ord. No. 84-226, § 3.21, 10-17-84)*				
Post-Disaster Recovery	Yes	Yes	No	Yes
Comment: *Historically worked with Harris County. Changes to county policy now prohibits. Would like to coordinate with county*				
Real Estate Disclosure	No	No	No	No
Comment:				
Growth Management	Yes	No	No	Yes
Comment: *Few opportunities for growth of land use, but will coordinate with county and other entities*				
Site Plan Review	Yes	No	No	Yes
Comment:				
Environmental Protection	No	Yes	Yes	Yes
Comment: *Rely on State and local regulatory authority*				
Flood Damage Prevention	Yes	Yes	Yes	Yes
Comment: *Chapter 34, Article II, TLVMC. (Ord. No. 17-683, § 1, 12-6-17)*				
Emergency Management	No	Yes	Yes	Yes
Comment: *Policing and emergency response is addressed by contract with nearby municipalities. Chapter 22, TLVMC (Ord. No. 09-579, § 10, 10-21-09)*				
Climate Change	No	Yes	No	Yes
Comment:				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Planning Documents				
General Plan	Yes	No	Yes	Yes
Comment: *Currently under review*				
Capital Improvement Plan	No	No	No	Yes
Comment:				
Disaster Debris Management Plan	No	No	No	Yes
Comment: *Historically worked with Harris County. Changes to county policy now prohibits. Would like to coordinate with county again*				
Floodplain or Watershed Plan	Yes	Yes	Yes	Yes
Comment: *https://www.taylorlakevillage.us/index.asp?SEC=EDE25814-2435-4435-8090-73EEF66EA51B&Type=B_BASIC*				
Stormwater Plan	Yes	Yes	Yes	Yes
Comment: *Currently under review for update*				
Urban Water Management Plan	No	No	No	Yes
Comment:				
Habitat Conservation Plan	No	No	No	Yes
Comment:				
Economic Development Plan	No	No	No	Yes
Comment:				
Shoreline Management Plan	Yes	Yes	Yes	Yes
Comment: *Complying with existing city, and state codes.*				
Community Wildfire Protection Plan	No	No	No	Yes
Comment:				
Forest Management Plan	No	No	No	Yes
Comment:				
Climate Action Plan	No	No	No	Yes
Comment:				
Comprehensive Emergency Management Plan	Yes	Yes	No	Yes
Comment: *Currently in development*				
Threat & Hazard Identification & Risk Assessment (THIRA)	No	No	No	Yes
Comment:				
Post-Disaster Recovery Plan	No	No	No	Yes
Comment:				
Continuity of Operations Plan	No	No	No	Yes
Comment:				
Public Health Plan	No	No	No	No
Comment:				

Table 25-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits?	Yes
If no, who does? If yes, which department?	City Building Department
Does your jurisdiction have the ability to track permits by hazard area?	Yes
Does your jurisdiction have a buildable lands inventory?	Yes

Table 25-5. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants	No
Capital Improvements Project Funding	Yes but limited
Authority to Levy Taxes for Specific Purposes	Yes, but subject to state and local requirements
User Fees for Water, Sewer, Gas or Electric Service	No, City does not supply utilities
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	No
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State-Sponsored Grant Programs	No
Development Impact Fees for Homebuyers or Developers	No

Table 25-6. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	No	Can Contract for this service
Engineers or professionals trained in building or infrastructure construction practices	Yes	Not on staff. Obtain as necessary
Planners or engineers with an understanding of natural hazards	Yes	Not on staff. Obtain as necessary
Staff with training in benefit/cost analysis	Yes	Elected officials, not staff
Surveyors	No	Can Contract for this service
Personnel skilled or trained in GIS applications	No	Can contract for this service
Scientist familiar with natural hazards in local area	Yes	Not on staff. Obtain as necessary
Emergency manager	Yes	Emergency Management Coordinator
Grant writers	Yes	Not on staff. Obtain as necessary
Other	Yes	City has had success relying on resident volunteers with specific knowledge

Table 25-7. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Elected officials and City Administrator function
Do you have personnel skilled or trained in website development?	Limited
Do you have hazard mitigation information available on your website? • If yes, briefly describe.	Yes Limited, but with links to information providers
Do you use social media for hazard mitigation education and outreach? • If yes, briefly describe.	Yes Information is posted on the TLV website, the TLV Facebook page, and other social media such as NextDoor.
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • If yes, briefly describe.	No
Do you have any other programs already in place that could be used to communicate hazard-related information? • If yes, briefly describe.	No
Do you have any established warning systems for hazard events? • If yes, briefly describe.	Yes Blackboard Connect, mass email, text system, and utilization of the TLV website and social media sites as best as possible.

Table 25-8. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Building Department
Who is your floodplain administrator? (department/position)	Mayor
Are any certified floodplain managers on staff in your jurisdiction?	No
What is the date that your flood damage prevention ordinance was last amended?	1996
Does your floodplain management program meet or exceed minimum requirements? • If exceeds, in what ways?	Meets
When was the most recent Community Assistance Visit or Community Assistance Contact?	Unknown
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • If so, state what they are.	No
Are any RiskMAP projects currently underway in your jurisdiction? • If so, state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • If no, state why.	Yes Rely on State and County maps
Does your floodplain management staff need any assistance or training to support its floodplain management program? • If so, what type of assistance/training is needed?	Yes Coordination with other local entities
Does your jurisdiction participate in the Community Rating System (CRS)? • If yes, is your jurisdiction interested in improving its CRS Classification? • If no, is your jurisdiction interested in joining the CRS program?	Yes Yes N/A
How many flood insurance policies are in force in your jurisdiction?[a]	1,091
What is the insurance in force?	$361,039,200
What is the premium in force?	$604,650
How many total loss claims have been filed in your jurisdiction?[a]	692
How many claims are still open or were closed without payment?	1
What were the total payments for losses?	$16,840,710

a. According to FEMA statistics as of September 30, 2018

Table 25-9. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	Yes	8	05/01/2014
Building Code Effectiveness Grading Schedule	Unknown		
Public Protection	Unknown		
Storm Ready	No	N/A	N/A
Firewise	No	N/A	N/A

Table 25-10. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:*** *Not addressed formally*	Medium
Jurisdiction-level monitoring of climate change impacts ***Comment:*** *Individual residents are available to provide input*	Low
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:*** *City is small, primarily residential and relies on estimates from County and State*	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:*** *Has not come up*	Low
Participation in regional groups addressing climate risks ***Comment:*** *Individual residents and elected officials participate as individuals and periodically report to the City*	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	Low
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	Low
Identified strategies for adaptation to impacts ***Comment:***	Unknown
Champions for climate action in local government departments ***Comment:***	Low
Political support for implementing climate change adaptation strategies ***Comment:***	Unknown
Financial resources devoted to climate change adaptation ***Comment:***	Low
Local authority over sectors likely to be negative impacted ***Comment:***	Medium
Public Capacity	
Local residents knowledge of and understanding of climate risk ***Comment:***	Unknown
Local residents support of adaptation efforts ***Comment:***	Unknown
Local residents' capacity to adapt to climate impacts ***Comment:***	Low
Local economy current capacity to adapt to climate impacts ***Comment:***	Low
Local ecosystems capacity to adapt to climate impacts ***Comment:***	Unknown

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

25.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning and capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in Section 1.11 were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

25.5.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- Participation in County and Precinct efforts

25.5.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- Participation in County and Precinct efforts

25.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 25-11 lists past occurrences of natural hazards for which specific damage was recorded in Taylor Lake Village. Other hazard events that broadly affected the entire planning area, including Taylor Lake Village, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 25-11. Past Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Hurricane Harvey	4332 DR	2017	$50,404.71
Severe Storms and Flooding	4269 DR	2016	$0.00
Severe Storms and Flooding	4272 DR	2016	$0.00
Severe Storms, Tornadoes, Straight Line Winds and Flooding	4245 DR	2015	$0.00
Severe Storms, Tornadoes, Straight Line Winds and Flooding	4223 DR	2015	$0.00
Hurricane Ike	1791 DR	2008	$750,254.91
Hurricane Ike	3294 EM	2008	$11,790.02
Hurricane Gustav	3290 EM	2008	$0.00
Hurricane Dean	3277 EM	2007	$0.00
Tropical Storm Erin	1730 DR	2007	$0.00
Hurricane Rita	1606 DR	2005	$66,348.69
Severe Storms, Tornadoes and Flooding	1439 DR	2002	$0.00
Tropical Storm Allison	1379 DR	2001	No data available
Flooding	1257 DR	1998	No data available
Hurricane Georges	1245 DR	1998	No data available

25.7 HAZARD RISK RANKING

Table 25-12 presents a local ranking for Taylor Lake Village of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 25-12. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Flooding	51	High
2	Severe Weather	48	High
2	Hurricane	48	High
3	Wildfire	16	Medium
4	Earthquake	14	Low
5	Drought	6	Low
5	Mas Movement	6	Low
6	Dam Failure	0 (No Exposure)	None
6	Tsunami	0 (No exposure)	None
6	Coastal Erosion	0 (No Exposure	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

25.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. This section provides information on a few key vulnerabilities for the jurisdiction. Available jurisdiction-specific risk maps of the hazards are provided at the end of this annex.

25.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: 55
- Number of FEMA-identified Severe-Repetitive-Loss Properties: None
- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated: 26

25.8.2 Other Noted Vulnerabilities

The following jurisdiction-specific issue has been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- The city is vulnerable on almost all sides as barges that carry chemicals traverse the bay, and countless numbers of tankers travers the local roads transporting all kinds of materials. We are an almost all volunteer city with limited resources and limited capability for receiving and passing timely information. The volume of traffic the transports chemicals around our immediate area makes us very vulnerable.

Mitigation actions addressing this issue were prioritized for consideration in the action plan in this annex.

25.9 STATUS OF PREVIOUS PLAN ACTIONS

Table 25-13 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

Table 25-13. Status of Previous Plan Actions

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
Developed emergency action education program and plan	x			
Comment: *Plan requires updating. Need to continue public information program*				
Joined Community Rating System	x			
Comment: *City continues to have building requirements to be +3 feet above base flood elevation*				
Continue flood and storm hazard mitigation program	Ongoing		x	TLV6
Comment:				
Develop awareness and communication with industry for emergency prep	Ongoing		x	TLV7
Comment: *Participate in community advisory panels and report to residents*				
Establish city warning signage program to notify community residents of Clear Lake Water Authority drought water restrictions – warnings to be posted on primary city egress routes.	Yes			
Comment: *City continues to be able to accomplish this action item with relative ease.*				
Install generators with fuel capacity at city hall	Yes			
Comment:				
Expand siren warning system to increase coverage within the community's population where the siren(s) are currently difficult to hear.	Yes			
Comment: *System was upgraded and is maintained to be able to meet peek performance if/when need be.*				
Install lightening and surge protective measures on City Hall.	Yes			
Comment:				
Harden and retrofit City Hall facilities to withstand high winds, thunderstorms, tornadoes, hurricanes and hail.	No	x		
Comment:				

25.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 25-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 25-15 identifies the priority for each action. Table 25-16 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 25-14. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action TLV1 — Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Flooding, hurricane, severe weather						
Existing	3, 4, 10	City of TLV	Harris County, Available Resources	High	HMGP, PDM, FMA	Short-term
Action TLV2 — Integrate the hazard mitigation plan into other plans, ordinances and programs that dictate land use decisions in the community, including any opportunity to include in city ordinances as authorize/applicable.						
Hazards Mitigated: Dam failure, drought, earthquake, flooding, landslide, tsunami, wildfire						
New and Existing	1, 3, 4, 5, 7, 8, 10	City of TLV	Harris County, Available Resources	Low	Staff Time, General Funds	Ongoing
Action TLV3 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan**.**						
Hazards Mitigated: Flooding, Severe Weather, Hurricane, Wildfire, Earthquake, Drought, Mas Movement						
New and Existing	1, 5, 8	City of TLV	Harris County, Available Resources	Low	Staff Time, General Funds	Short-term
Action TLV4 — Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements: • Enforce the flood damage prevention ordinance. • Participate in floodplain identification and mapping updates. • Provide public assistance/information on floodplain requirements and impacts.						
Hazards Mitigated: Flooding, severe weather, hurricane, sea level rise						
New and Existing	1, 3, 5, 7, 8, 10	City of TLV	Harris County, Available Resources	Low	Staff Time, General Funds	Ongoing
Action TLV5 — Continue to advocate and coordinate for local outreach programs to include town hall meetings and other social gatherings with the city and local and surrounding city's residents. The objective of this outreach program will be to: • Bring together subject matter experts in weather, law enforcement, emergency management, and city leadership to speak on their respective subjects to local residents • Provide an interactive environment where local residents can initiate dialogue and ask questions to the subject matter experts • Ensure these events address concerns whether on a seasonal basis (i.e. hurricane season), or based on a need that is understood by the city • Posting visual aids and sending mass notifications for information on events, resources, and immediate inputs						
Hazards Mitigated: Flooding, severe weather, hurricane, sea level rise						
New and Existing	3, 4, 10	City of TLV	Harris County, Available Resources	Low	Staff Time, General Funds	Ongoing
Action TLV6 — Flood and storm hazard mitigation program						
Hazards Mitigated: Flood. Severe weather						
Existing	3,7,8,9,15	City of TLV	Harris County, Available Resources	Low	Staff Time, General Funds	Ongoing
Action TLV7 — Develop awareness and communication with industry for emergency preparation. Participate in community advisory panels and report to residents						
Hazards Mitigated: Flooding, Severe Weather, Hurricane, Wildfire, Earthquake, Drought, Mas Movement						
New and Existing	3,10,15	City of TLV	Harris County, Available Resources	Low	Staff Time, General Funds	Ongoing
Action TLV8— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
***Hazards Mitigated*:** Severe Weather, Hurricane, Earthquake, Drought, Wildfire, Flooding						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	City of TLV	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 25-15. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
TLV1	3	High	High	Yes	Yes	No	Medium	High
TLV2	7	Medium	Low	Yes	No	Yes	High	Low
TLV3	3	Low	Low	Yes	No	Yes	High	Low
TLV4	6	Medium	Low	Yes	No	Yes	High	Low
TLV5	3	High	Low	Yes	No	No	High	Low
TLV6	5	Medium	Low	Yes	No	Yes	High	Low
TLV7	3	Medium	Low	Yes	No	Yes	High	Low
TLV8	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 25-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Severe Weather	TLV5, TLV6, TLV8	TLV2, TLV6	TLV5, TLLV6, TLV7, TLV8	TLV2	TLV5, TLV6, TLV8	TLV1, TLV6		TLV1, TLV6, TLV8
Hurricane	TLV5, TLV8	TLV2	TLV5, TLV7,TLV8	TLV2	TLV5, TLV8	TLV1		TLV1, TLV8
Flooding	TLV5, TLV6, TLV8	TLV2, TLV6	TLV5, TLV6, TLV7, TLV8	TLV2	TLV5, TLV, TLV86	TLV1, TLV6		TLV1, TLV6, TLV8
Medium-Risk Hazards								
Wildfire	TLV8		TLV5, TLV7, TLV8		TLV8			TLV8
Low-Risk Hazards								
Earthquake	TLV8		TLV7, TLV8		TLV8			TLV8
Drought	TLV8		TLV5, TLV7, TLV8		TLV8			TLV8

a. See the introduction to this volume for explanation of mitigation types.

25.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- **City of Taylor Lake Village Municipal Code** — The municipal code is undergoing review for the full capability assessment and for identifying opportunities for action plan integration.

- **City of Taylor Lake Village Flood Damage Prevention Ordinance** — The flood damage prevention ordinance is undergoing review for compliance with changes to the National Flood Insurance Program implemented since the ordinance was adopted.

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit is being used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the updates to a mitigation action plan.

Taylor Lake Village

Critical Facilities

- Education Facilities
- Emergency Services
- Government Facilities
- Hazardous Material Sites
- Health and Medical Facilities
- Historical and Cultural Sites
- Transportation Systems
- Utility Systems
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3 Miles

Taylor Lake Village

FEMA Flood Hazard

1% Annual Chance Flood (100-yr)

Incorporated Cities

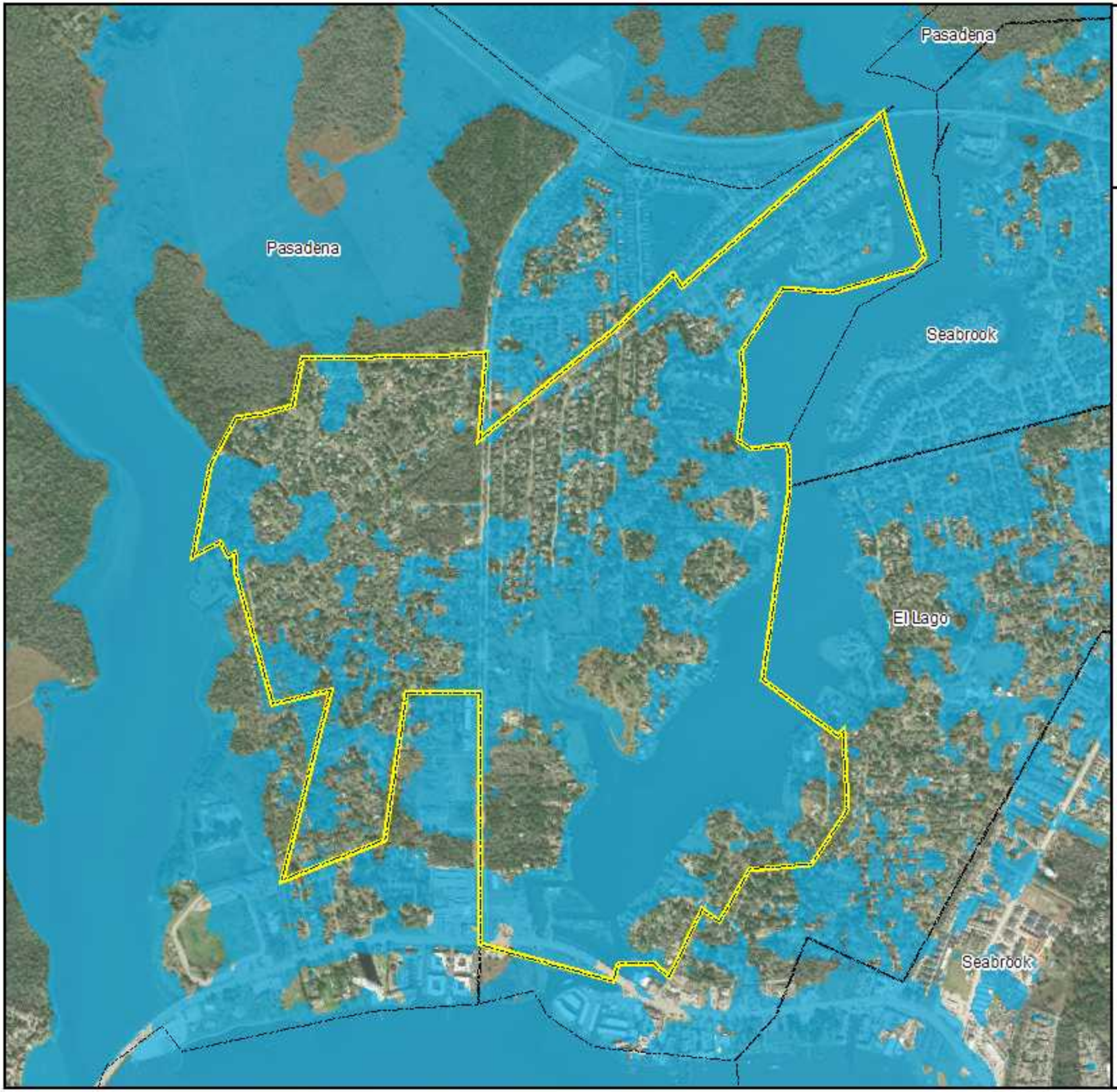
Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3 Miles



Taylor Lake Village

Flood Hazard
Hurricane Harvey

Flooding Extent

Incorporated Cities

Harris County

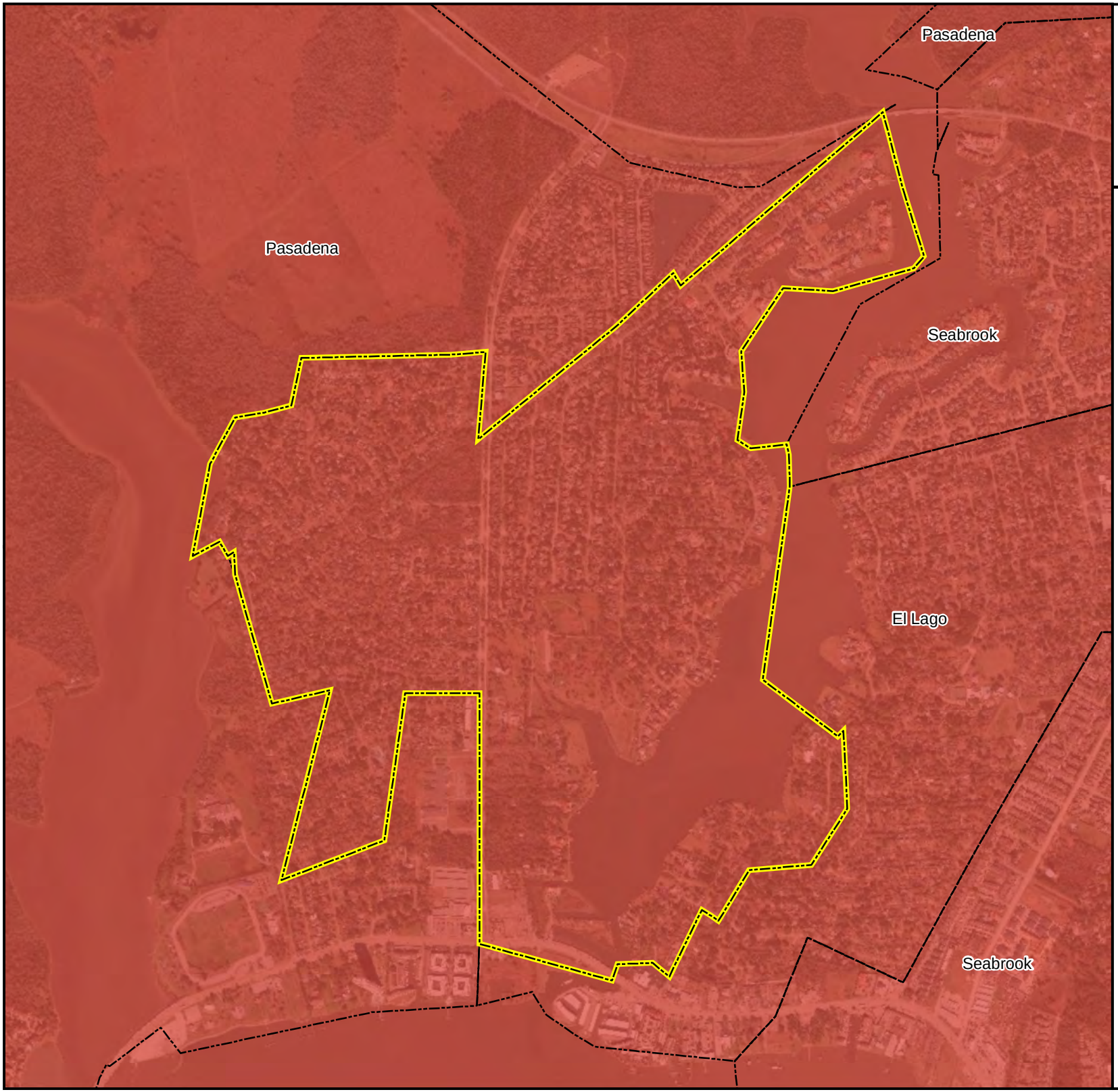
Note: Flooding extent shown for Hazard Mitigation Plan planning area only.

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3 Miles



Taylor Lake Village

Hurricane Alicia (1983)

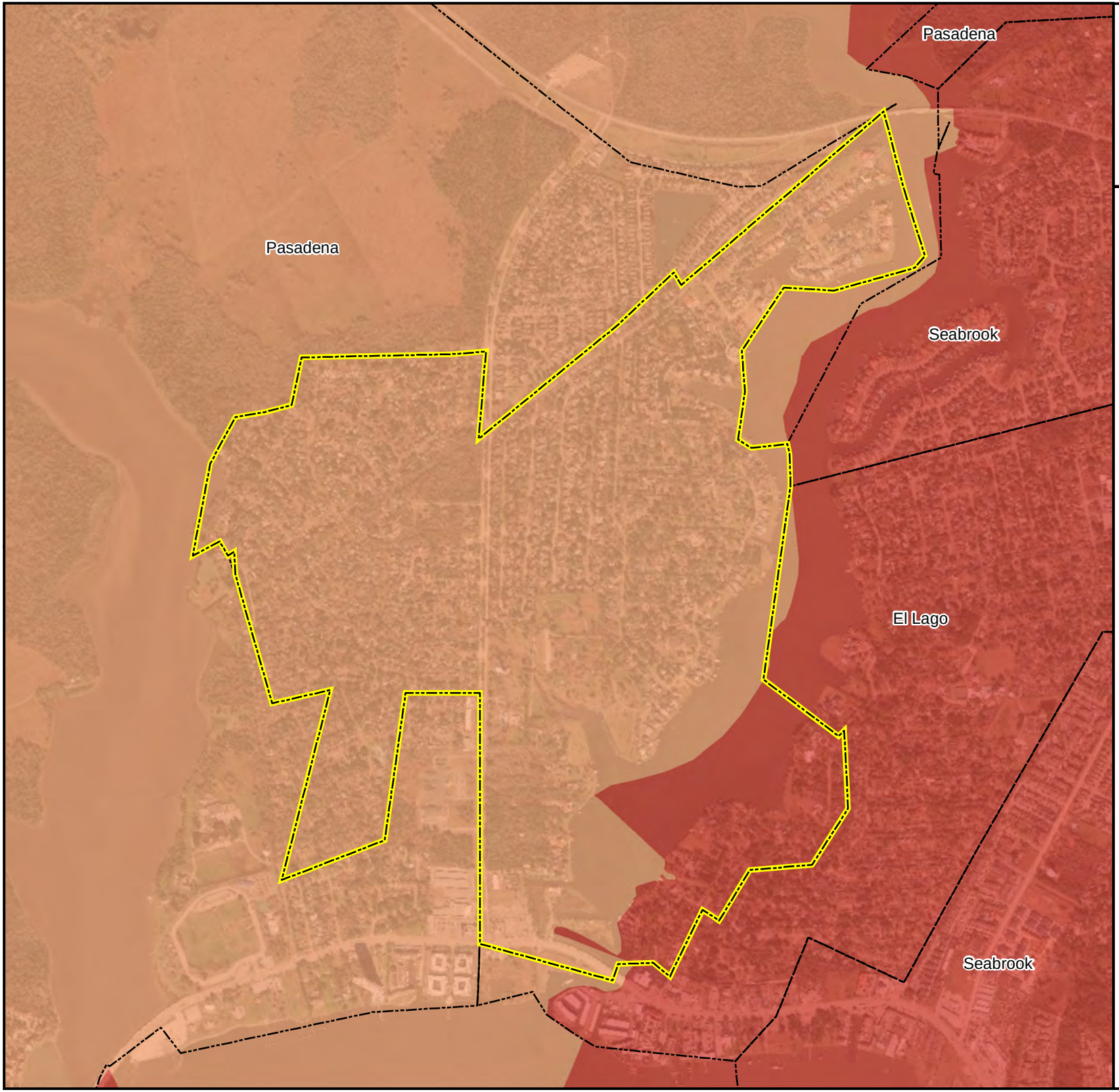
Peak WInd Gust (mph)

- 87 - 94
- 95 - 98
- 99 - 101
- 102 - 104
- 105 - 110
- Storm Track
- Incorporated Cities
- Harris County

TETRA TECH

N

0 0.075 0.15 0.3 Miles



Taylor Lake Village

20-year Probabilistic Hurricane

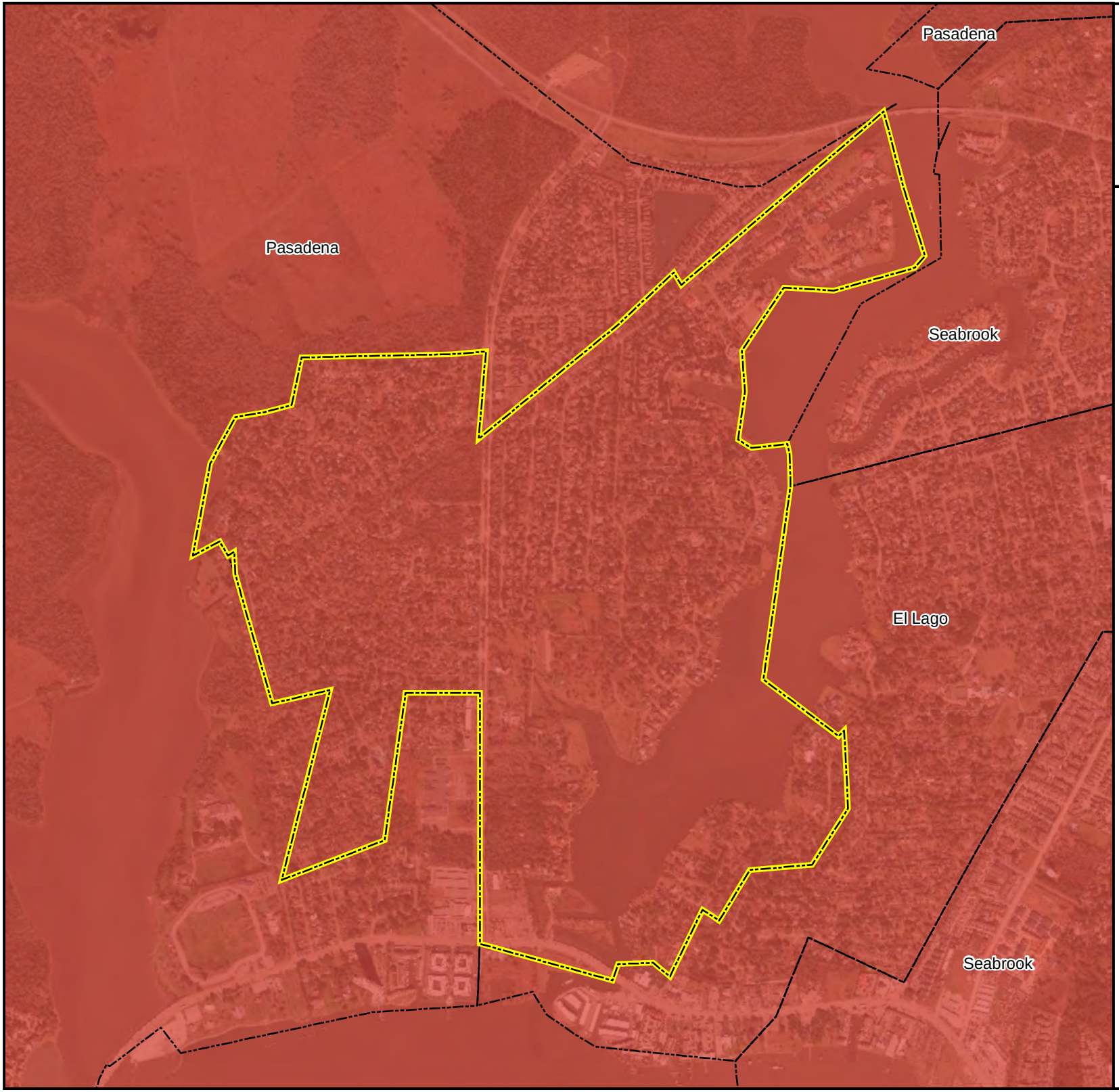
Peak Wind Gust (mph)

- 63 - 71
- 72 - 76
- 77 - 80
- 81 - 84
- 85 - 92
- Incorporated Cities
- Harris County

TETRA TECH

N

0 0.075 0.15 0.3 Miles



Taylor Lake Village

100-year Probabilistic Hurricane

Peak Wind Gust (mph)

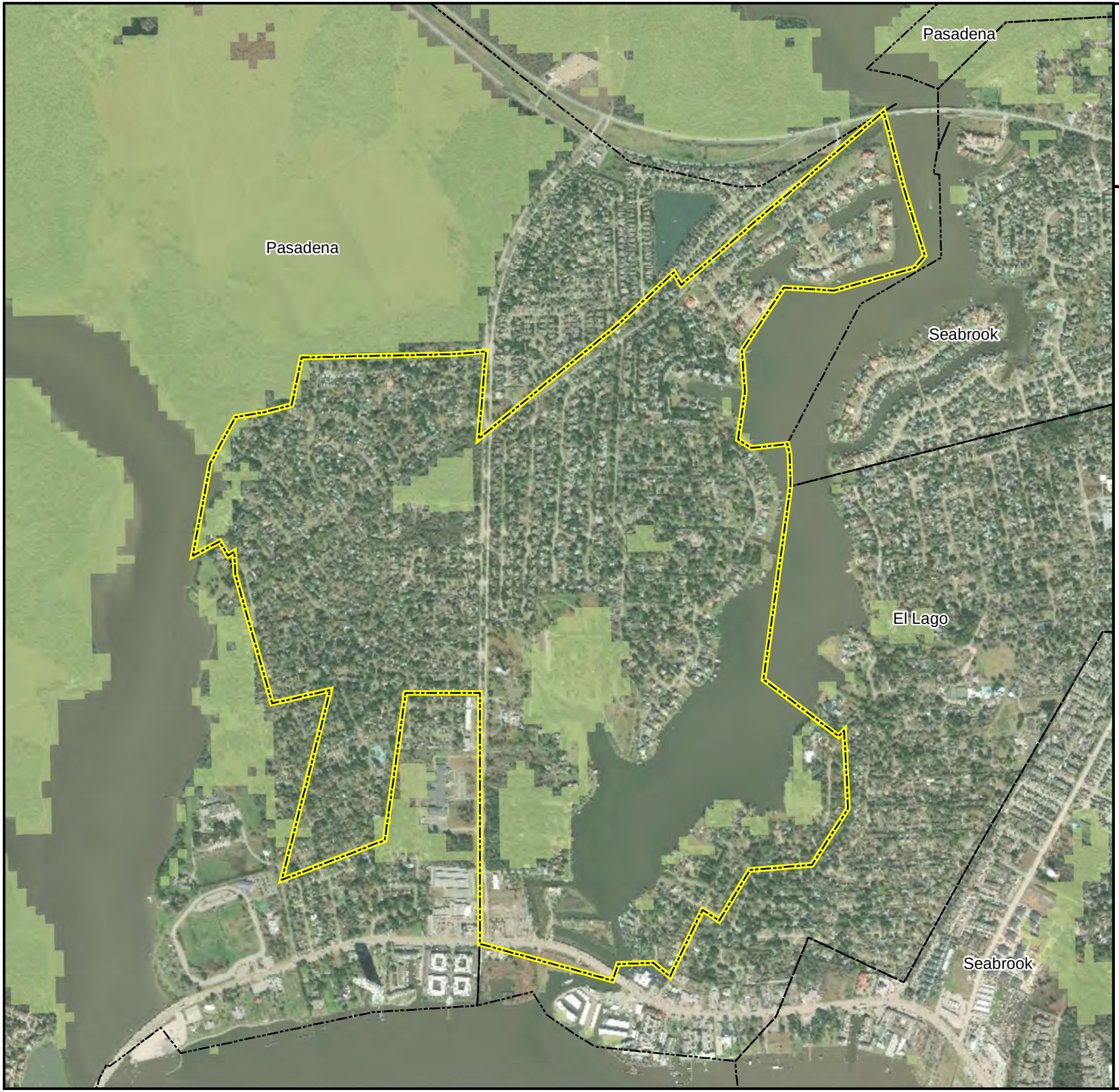
- 89 - 101
- 102 - 106
- 107 - 111
- 112 - 117
- 118 - 128
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3 Miles



Taylor Lake Village

Wildfire Ignition Density

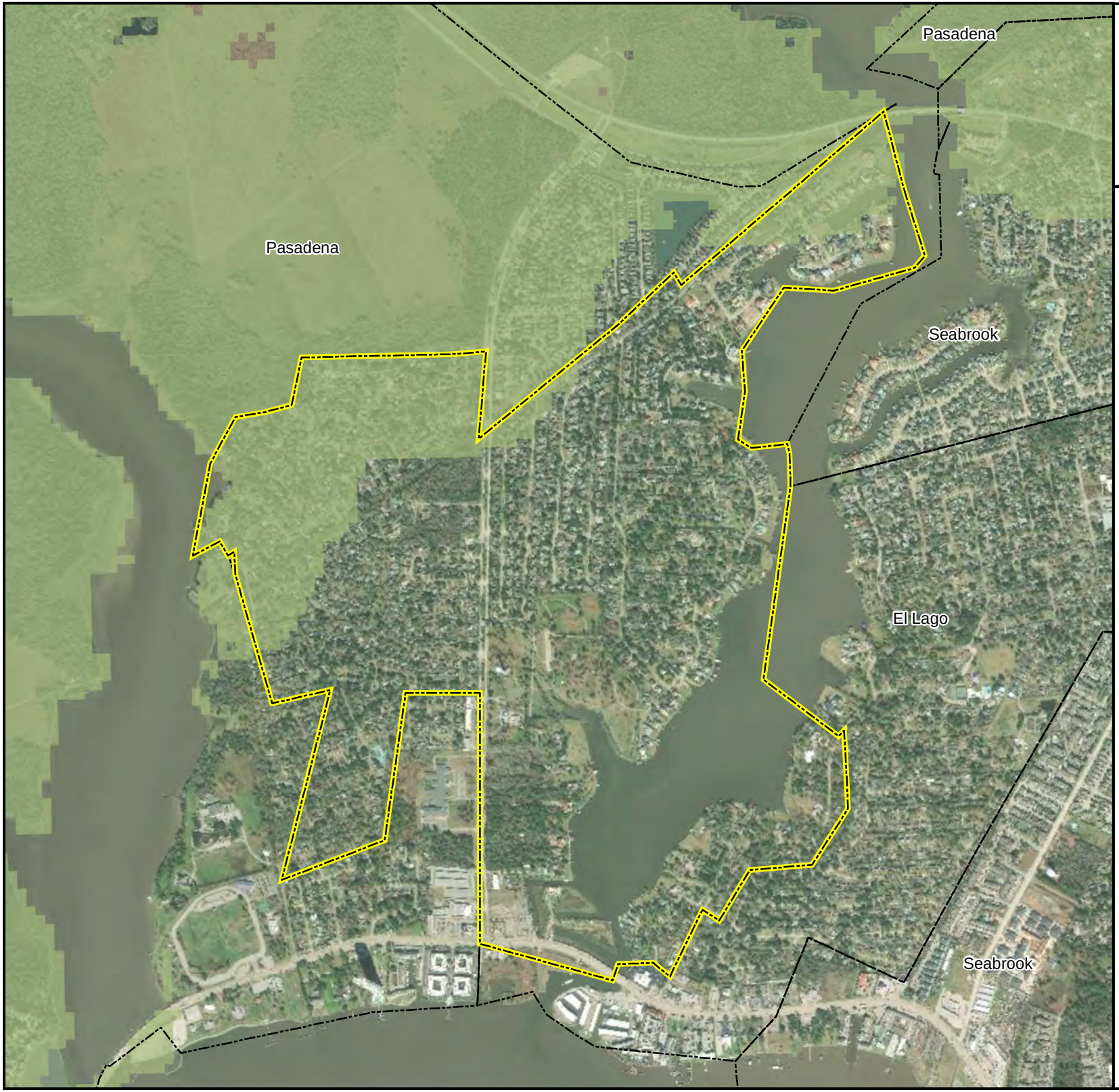
- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3 Miles



Taylor Lake Village

Wildfire Threat

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3 Miles

26. CITY OF TOMBALL

26.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
David Esquivel, PE
Assistant City Manager
City of Tomball
501 James St.
Tomball, Texas 77375
Telephone: 281-290-1415
e-mail Address: desquivel@tomballtx.gov

Alternate Point of Contact
Joe Sykora, FSCEO FEMT
Fire Marshal / Deputy EMC
City of Tomball
1200 Rudel Rd
Tomball, Texas 77375
Telephone: 281-290-1440
e-mail Address: jsykora@tomballtx.gov

26.2 JURISDICTION PROFILE

26.2.1 Location and Description

The City of Tomball is located in northwest Harris County, Texas, approximately 28 miles from downtown Houston. The city is approximately 12 square miles with an additional 5 square miles of extraterritorial jurisdiction. Tomball is one of 24 municipalities within Harris County and the only municipality located in northwestern Harris County. Located just south of the Montgomery County Line, the City has a dynamic and expanding economy and functions as a commercial center for the area. Tomball boasts a wide variety commercial developments including, Baker Hughes, Wal-Mart, Packers Plus, Suez and more. The City has seen a number of new residential subdivisions developed since 2014 with a wide-range of prices. With a population of over 11,500 residents, & daily visitor traffic of 30,000, Tomball does not consider itself “merely a suburb”, rather a destination.

26.2.2 Brief History

Tomball is a historic city that honors the past & embraces its future. First known as Peck, an agricultural community, the city was renamed after Thomas Henry Ball, a member of the U.S. House of Representatives. Ball’s leadership in 1907 established Tomball as a major railroad center for the transport of agricultural products. The City of Tomball assumed its name on December 2, 1907, however it was not until 1933 that the city was officially incorporated. In the 1930s, the City became known as “Oil Town USA” as Humble Oil discovered a major oil and gas field beneath the city.

26.2.3 Climate

The City of Tomball is located 92.7 miles inland from the Gulf Coast in Southeastern Texas. The principal characteristics of the local climate are hot and humid summers with cool and relatively rainy winters. The average annual temperature is 78.6ºF and the annual average rainfall is 48 inches.

26.2.4 Governing Body Format

The City of Tomball is a "Home Rule" municipality, as established by the City of Tomball's Charter and operates a "Council-Manager" form of government. All powers of the City and the determination of all matters of policy are vested in the Council, subject to the provisions of the Charter and Constitution of the State of Texas. As regards to the Tomball Annex to the Harris County Local Hazard Mitigation Plan dated 2018, City Council assumes responsibility for adoption of the Plan, and the City Manager will oversee its implementation.

The members of the local mitigation planning team, whose members are listed in Table 26-1, developed this annex.

Table 26-1. Local Mitigation Planning Team Members

Name	Title
David Esquivel	Assistant City Manager
Beth Jones	Director of Public Works
Randall Parr	Fire Chief/EMC
Joe Sykora	Fire Marshal/Deputy EMC
Craig Meyers	Director of Community Development

26.3 CURRENT TRENDS

26.3.1 Population

As of the 2010, United States Census Tomball's population was 10,753. The overall population has increased 8.8 percent between January 1, 2010 (10,753) and January 1, 2017 (11,707).

26.3.2 Development

Development in Tomball has steadily increased in the 2000's. Between October 2008 and September 2017, Tomball issued building permits for construction of 356 new housing units and 163 new commercial buildings. The Tomball Comprehensive Plan, Vision 2030, (the "Plan") estimates that City of Tomball's population will grow to nearly 20,000 by the year 2030. The Plan also outlines 13 land use and development goals, including the need to preserve the Downtown area as a "sense of place" and promote high quality, safe, cohesive and attractive developments that meet the needs of present and future residents of Tomball.

Table 26-2 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

Table 26-2. Recent and Expected Future Development Trends

Criterion	Response
Has your jurisdiction annexed any land since the development of the previous hazard mitigation plan? **If yes, give the estimated area annexed and estimated number of parcels or structures.**	Yes Approximately 70 acres, including right-of-way Retail development tract at SH 249/SH 99 Caterpillar facility on Holderrieth Road and a multiple building complex on Brown Road
Is your jurisdiction expected to annex any areas during the performance period of this plan? • **If yes, please describe land areas and dominant uses.** • **If yes, who currently has permitting authority over these areas?**	Yes The City of Tomball will consider annexation of properties in the unincorporated areas adjacent to the City. The City of Tomball does not annex properties without the request of the property owner. This will limit the number of properties and land area annexed over the timeframe of the hazard mitigation plan. Harris County
Are any areas targeted for development or major redevelopment in the next five years? • **If yes, please briefly describe, including whether any of the areas are in known hazard risk areas**	Yes Development and redevelopment projects could be located in areas prone to flooding. However, all City Codes will need to be met in regards to elevating new and substantially improved structures above determined flood inundation elevations.
How many building permits were issued in your jurisdiction since the development of the previous hazard mitigation plan?	

	2013	2014	2015	2016	2017
Single Family	73	99	59	25	45
Commercial (other)	19	11	36	14	10

Please provide the number of permits for each hazard area or provide a qualitative description of where development has occurred.	Permits for construction in flood hazard areas are required to be elevated above determined flood inundation elevations.
Please describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	A buildable lands inventory does not exist, however much of the City remains undeveloped.

26.4 CAPABILITY ASSESSMENT

The City of Tomball performed an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities is presented in Table 26-3.
- Development and permitting capabilities are presented in Table 26-4.
- An assessment of fiscal capabilities is presented in Table 26-5.
- An assessment of administrative and technical capabilities is presented in Table 26-6.
- An assessment of education and outreach capabilities is presented in Table 26-7.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 26-8.
- Classifications under various community mitigation programs are presented in Table 26-9.
- The community's adaptive capacity for the impacts of climate change is presented in Table 26-10.

Findings of the capability assessment were reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table included in the action plan for this annex identifies these as community capacity building mitigation actions.

Table 26-3. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code	Yes	No	Yes	No
Comment: *2012 International Residential Code, 2012 International Building Code, 2012 International Mechanical Code, 2012 International Plumbing Code, 2011 National Electrical Code, 2015 International Energy Conservation Code, 2012 International Fire Code*				
Zoning Code	Yes	No	No	No
Comment: *Municipal Code, Chapter 50*				
Subdivisions	Yes	No	No	No
Comment: *Municipal Code, Chapter 40*				
Storm water Management	Yes	No	Yes	Yes
Comment: *Municipal Code, Chapter 18*				
Post-Disaster Recovery	No	No	No	Yes
Comment:				
Real Estate Disclosure	No	No	No	No
Comment:				
Growth Management	No	No	No	No
Comment:				
Site Plan Review	Yes	No	No	No
Comment: *Municipal Code, Chapter 10, 18, 40 and 50*				
Environmental Protection	Yes	No	Yes	No
Comment: *Municipal Code, Chapter 18*				
Flood Damage Prevention	Yes	Yes	No	No
Comment: *Municipal Code, Chapter 10*				
Emergency Management	Yes	No	No	Yes
Comment: *Municipal Code, Chapter 14*				
Climate Change	No	No	No	No
Comment:				
Planning Documents				
General Plan	Yes	No	No	No
Comment: *Comprehensive Plan, Vision 2030, Strategic Plan*				
Capital Improvement Plan	Yes	No	No	Yes
How often is the plan updated? *Annually* ***Comment:***				
Disaster Debris Management Plan	Yes	No	No	Yes
Comment:				
Floodplain or Watershed Plan	Yes	No	No	Yes
Comment:				
Storm water Plan	Yes	No	No	Yes
Comment: *Master Drainage Plan 2012-2020*				
Water Master Plan	Yes	No	No	Yes
Comment: *Tomball Water Master Plan – 2018*				
Habitat Conservation Plan	Yes	No	No	No
Comment:				
Economic Development Plan	No	No	No	Yes
Comment: *Tomball Economic Development Corporation Strategic Plan*				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Shoreline Management Plan	No	No	No	No
Comment:				
Community Wildfire Protection Plan	Yes	No	No	Yes
Comment: *In process*				
Forest Management Plan	No	No	No	No
Comment:				
Climate Action Plan	No	No	No	Yes
Comment:				
Comprehensive Emergency Management Plan	Yes	Yes	No	Yes
Comment: *Tomball is a signatory to the Harris County Plan*				
Threat & Hazard Identification & Risk Assessment (THIRA)	No	No	No	Yes
Comment: *None located*				
Post-Disaster Recovery Plan	No	No	No	Yes
Comment: *None located*				
Continuity of Operations Plan	Yes	No	No	No
Comment: *In process*				
Public Health Plan	No	Yes	No	Yes
Comment: *The City utilizes the services of Harris County PHES*				

Table 26-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • **If no, who does? If yes, which department?**	Yes Community Development Department
Does your jurisdiction have the ability to track permits by hazard area?	Yes
Does your jurisdiction have a buildable lands inventory?	No

Table 26-5. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes (water and sanitary sewer)
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes
Other	Yes

Table 26-6. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Community Development Department
Engineers or professionals trained in building or infrastructure construction practices	Yes	Community Development Department
Planners or engineers with an understanding of natural hazards	Yes	Community Development Department
Staff with training in benefit/cost analysis	Yes	Multiple City departments
Surveyors	Yes	Available through on-call
Personnel skilled or trained in GIS applications	Yes	Community Development Department, IT Department, Public Works Department, Fire Department
Scientist familiar with natural hazards in local area	Yes	Multiple City departments
Emergency manager	Yes	The Mayor is the Director of Emergency Management but appoints the Emergency Management Coordinator
Grant writers	Yes	Multiple City departments

Table 26-7. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • **If yes, briefly describe.**	No
Do you use social media for hazard mitigation education and outreach? • **If yes, briefly describe. The City uses its "Constant Contact" program to provide relevant information to the community.**	Yes
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • **If yes, briefly describe.**	Yes Tomball Area Local Emergency Planning Committee
Do you have any other programs already in place that could be used to communicate hazard-related information? • **If yes, briefly describe.**	Yes Tomball Fire Department operates a low power FM radio station that has been used to broadcast local conditions related to wide-spread. Additionally information is provided via CivicReady (Text/Email) and Social Media
Do you have any established warning systems for hazard events?	Yes
• **If yes, briefly describe.**	KTTF-FM (low power FM radio) and Civic Ready community contact system

Table 26-8. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Community Development
Who is your floodplain administrator? (department/position)	Craig T. Meyers, PE, CFM, Community Development Director
Are any certified floodplain managers on staff in your jurisdiction?	Yes
What is the date that your flood damage prevention ordinance was last amended?	11/19/2007
Does your floodplain management program meet or exceed minimum requirements? • **If exceeds, in what ways?**	Exceeds NFIP minimum standards
When was the most recent Community Assistance Visit or Community Assistance Contact?	Post Hurricane Harvey
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • **If so, state what they are.**	No
Are any RiskMAP projects currently underway in your jurisdiction? • **If so, state what they are.**	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • **If no, state why.**	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? • **If so, what type of assistance/training is needed?**	No
Does your jurisdiction participate in the Community Rating System (CRS)? • **If yes, is your jurisdiction interested in improving its CRS Classification?** • **If no, is your jurisdiction interested in joining the CRS program?**	No No
How many flood insurance policies are in force in your jurisdiction?[a] • **What is the insurance in force?** • **What is the premium in force?**	Unknown
How many total loss claims have been filed in your jurisdiction?[a] • **How many claims are still open or were closed without payment?** • **What were the total payments for losses?**	Unknown

Table 26-9. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	No		
Building Code Effectiveness Grading Schedule	Yes	4	5/29/2014
Public Protection	Yes	1	7/1/2003
Storm Ready	No		
Fire Wise	No		

Table 26-10. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:***	Medium
Jurisdiction-level monitoring of climate change impacts ***Comment:***	Medium
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:***	Low
Participation in regional groups addressing climate risks ***Comment:***	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	Medium
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	Low
Identified strategies for adaptation to impacts ***Comment:***	Low
Champions for climate action in local government departments ***Comment:***	Low
Political support for implementing climate change adaptation strategies ***Comment:***	Low
Financial resources devoted to climate change adaptation ***Comment:***	Low
Local authority over sectors likely to be negative impacted ***Comment:***	Medium
Public Capacity	
Local residents knowledge of and understanding of climate risk ***Comment:***	Low
Local residents support of adaptation efforts ***Comment:***	Low
Local residents' capacity to adapt to climate impacts ***Comment:***	Low
Local economy current capacity to adapt to climate impacts ***Comment:***	Medium
Local ecosystems capacity to adapt to climate impacts ***Comment:***	Low

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

26.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning and capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

26.5.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- Tomball Comprehensive Plan – Vision 2030 – Land use and development goals
- Major Thoroughfare Plan – Mobility Planning
- Municipal Code – includes flood damage prevention requirements
- Tomball Economic Development Corporation Strategic Plan – Job creating economic development guidelines for new business development
- City of Tomball Building and Fire Codes
- City Facilities Needs Assessment – current and future facilities recommendations
- City of Tomball Infrastructure, Water, Wastewater and Drainage Master Plans – citywide infrastructure development plans
- City of Tomball Strategic Plan – goals and objectives related to growth and providing services to meet the growth of the city

26.5.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- Community Rating System
- Storm Ready
- Fire Wise

26.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 26-11 lists past occurrences of natural hazards for which specific damage was recorded in The City of Tomball. Other hazard events that broadly affected the entire planning area, including The City of Tomball, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 26-11. Past Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Hurricane Harvey	4332DR	2017	N/A
Severe storms and flooding (tax day)	4269 DR	2016	N/A
Severe storms and flooding (Memorial Day)	4272 DR	2016	N/A
Wildfire (Riley Road)	FMAG 2964-FM	2011	N/A
Hurricane Ike	1791 DR	2008	N/A
Hurricane Rita	1606 DR	2005	N/A
Hurricane Katrina Evacuation	3216 EM	2005	N/A
Wildfire (Local impacts)	N/A	2011	N/A

26.7 HAZARD RISK RANKING

Table 26-12 presents a local ranking for The City of Tomball of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 26-12. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Severe Weather	48	High
1	Hurricane	48	High
2	Flooding	18	Medium
3	Wildfire	17	Medium
4	Earthquake	14	Low
5	Drought	6	Low
6	Dam Failure	0 (No Exposure)	None
6	Mass Movement	0 (No exposure)	None
6	Tsunami	0 (No exposure)	None
6	Coastal Erosion	0 (No Exposure)	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

26.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. This section provides information on a few key vulnerabilities for the jurisdiction. Available jurisdiction-specific risk maps of the hazards are provided at the end of this annex.

26.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: 14
- Number of FEMA-identified Severe-Repetitive-Loss Properties: None
- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated: 2

26.8.2 Other Noted Vulnerabilities

The following jurisdiction-specific issues have been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- Several areas of the city suffer from an urban drainage issue that results in localized flooding from minimal rain incidents.
- The City Hall and Police Station share a generator that is not properly sized to support all operations of both facilities.
- Several Neighborhoods may potentially experience little to no ingress/egress as a result of severe weather accompanied by a significant rain incident

Mitigation actions addressing these issues were prioritized for consideration in the action plan presented in this annex:

- Continue to seek grant opportunities to design, acquire right-of-way and construct expanded drainage facilities
- Develop specifications and seek funding for a replacement generator
- Continue to seek grant opportunities to design, acquire right-of-way and construct expanded drainage facilities. Continue to partner with Harris County on flood control projects

26.9 STATUS OF PREVIOUS PLAN ACTIONS

Table 26-13 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

26.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 26-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 26-15 identifies the priority for each action. Table 26-16 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 26-13. Status of Previous Plan Actions

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
Implement a Community Fire Wise Program to educate people about the threat of wildfire; develop defensible space/buffer zones; remove fuel sources.			X	TOM1
Comment:				
Expand City Warning System, (Civic Ready Emergency Notification System), to include Alerts for the community's population located within Flood Risk Areas; citizens will be able to sign into the system and include cell phone numbers and other methods of contact	X			
Comment:				
Install flood-proofing to mitigate flood risk to critical infrastructure and public facilities.		X		
Comment:				
Establish a site to be utilized as a Cooling Zone (Center).	X			
Comment: *City of Tomball Community Center*				
Retrofit/Improve critical infrastructure facilities with positive ventilation systems		X		
Comment:				
Protection of City Facilities windows and doors	X			
Comment: *Pre-cut plywood*				
Expand early warning system, (Civic Plus Emergency Notification System), to increase alert capabilities and coverage for the public; the residents may enter their alternate contact information into the system to be alerted when away from home/businesses.	X			
Comment:				
Develop/implement tree management program to minimize damages from potential debris			X	TOM5
Comment:				
Establish/Expand GIS Mapping/Identification of Pipeline Risk Areas in flood area.			X	TOM6
Comment:				

Table 26-14. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action TOM1 — Implement a Community Fire Wise Program to educate people about the threat of wildfire in the Tomball area, develop defensible space/buffer zones; remove fuel sources.						
Hazards Mitigated: Wildfire						
Existing	9	Fire Department	Public Works	Low	Staff Time, General Funds	Short-term
Action TOM2 — Complete the City's Storm Water Drainage Plan to minimize the impact of future events by identifying efficient pathways to transport storm water away from the areas prone to flooding.						
Hazards Mitigated: Severe weather, Hurricane, Flood, Dam failure						
New and Existing	1, 4, 6, 7	Community Development	Public Works	High	HMGP, CDBG, Staff Time, General Funds	Ongoing
Action TOM3 — Acquire rights-of-way necessary to construct the drainage channels identified in Action TOM2.						
Hazards Mitigated: Severe weather, Hurricane, Flood, Dam failure						
New and Existing	1, 4, 6, 7	Public Works	Community Development	High	HMGP, CDBG, Staff Time, General Funds	Ongoing
Action TOM4 — Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements: • Enforce the flood damage prevention ordinance. • Participate in floodplain identification and mapping updates. • Provide public assistance/information on floodplain requirements and impacts.						
Hazards Mitigated: Severe weather, Hurricane, Flood, Dam failure						
New and Existing	1, 4, 6, 7	Community Development	Public Works	Low	Staff Time, General Funds, HMGP	Ongoing
Action TOM5 — Develop/implement tree management program to minimize damages from potential debris. Tree trimming in public right-of-way to keep streets clear; coordinate with utility companies to remove tree limbs/trees from potential contact with power lines.						
Hazards Mitigated: Severe weather, Hurricane, Wildfire						
New and existing	6, 7, 9	Public Works	Community Development	Moderate	Staff time, General Funds, HMGP	Ongoing
Action TOM6 — Expand the city's GIS capabilities and mapping capacity to provide information from which to make better, more informed decisions. This would apply to flood hazard mapping and wildland urban interface projects.						
Hazards Mitigated: Severe weather, wildfire, hurricane, flooding						
New and Existing	4, 6, 7, 9	IT	Public Works	Low	Staff time, general funds, HMGP	Ongoing
Action TOM7— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Wildfire, Earthquake, Drought						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	City of Tomball	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 26-15. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
TOM1	1	High	Low	Yes	Yes	Yes	Low	Medium
TOM2	4	Medium	High	Yes	Yes	No	Medium	High
TOM3	4	Medium	High	Yes	Yes	No	High	High
TOM4	4	High	Low	Yes	Yes	Yes	High	Low
TOM5	3	High	Medium	Yes	Yes	No	Medium	Medium
TOM6	4	High	Medium	Yes	Yes	Yes	High	High
TOM7	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 26-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Severe Weather	TOM1, 2, 3, 4, 5, 6, 7	TOM1,	TOM1, 2, 3, 4, 5, 6, 7	TOM1, 2, 3, 4, 5, 6	TOM1, 2, 3, 4, 5, 6, 7	TOM1, 2, 3, 4		TOM1, 2, 3, 4, 5, 6, 7
Hurricane	TOM1, 2, 3, 4, 5, 6, 7	TOM1,	TOM1, 2, 3, 4, 5, 6, 7	TOM1, 2, 3, 4, 5, 6	TOM1, 2, 3, 4, 5, 6, 7	TOM1, 2, 3, 4		TOM1, 2, 3, 4, 5, 6, 7
Medium-Risk Hazards								
Flooding	TOM1, 2, 3, 4, 5, 6, 7	TOM1,	TOM1, 2, 3, 4, 5, 6, 7	TOM1, 2, 3, 4, 5, 6	TOM1, 2, 3, 4, 5, 6, 7	TOM1, 2, 3, 4		TOM1, 2, 3, 4, 5, 6, 7
Wildfire	TOM1, 6, 7	TOM1	TOM1, 6, 7	TOM1, 6	TOM1, 6, 7			TOM1, 6, 7
Low-Risk Hazards								
Drought	TOM7	TOM1	TOM1, 7	TOM1	TOM1, 7			TOM1, 7
Earthquake	TOM7		TOM1, 7		TOM1, 7			TOM1, 7

a. See the introduction to this volume for explanation of mitigation types.

26.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

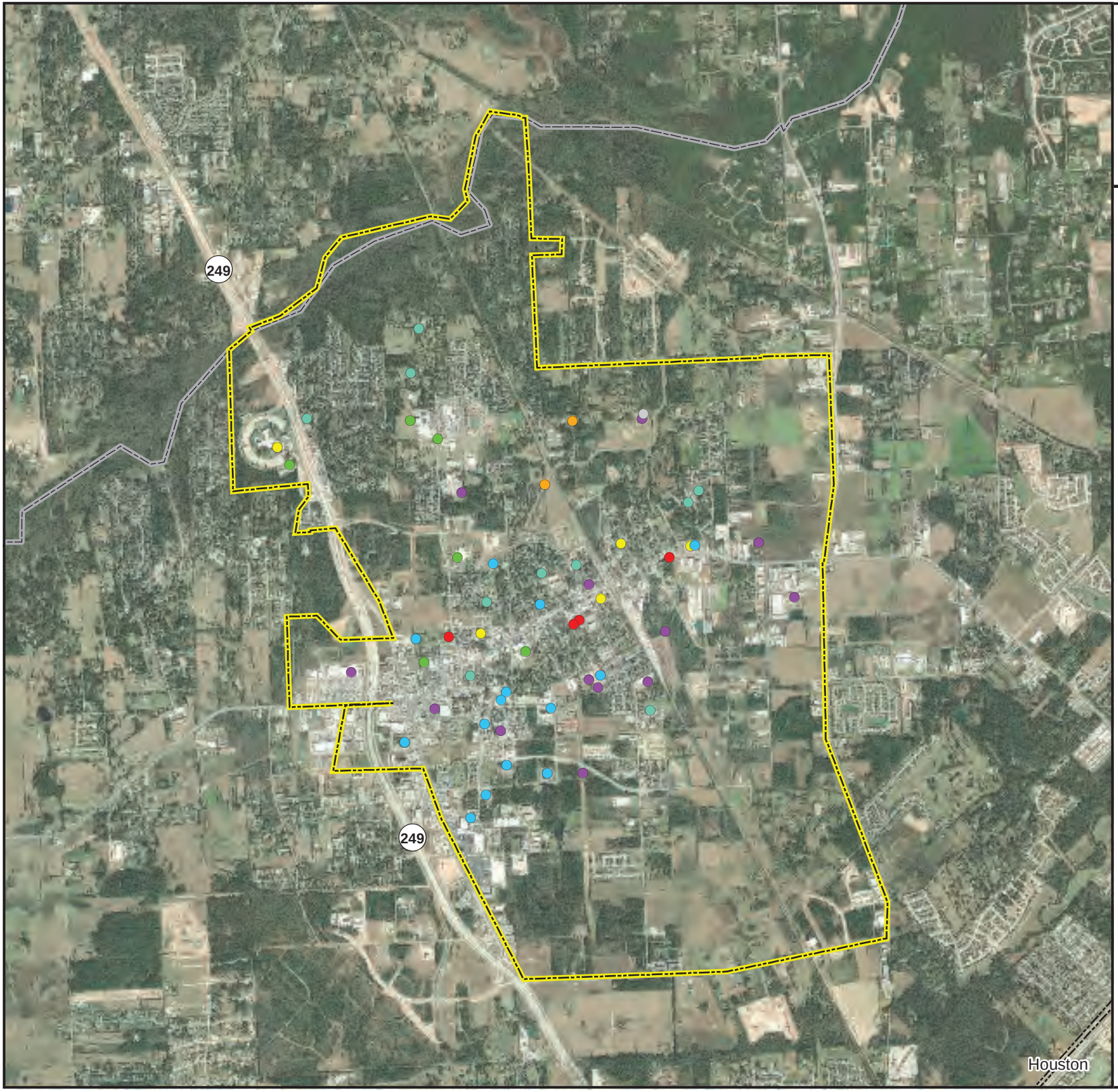
The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for inclusion into the 2017 Multi-Jurisdiction Hazard Mitigation Plan. All of the below items were additionally reviewed as part of the full capability assessment for the City of Tomball.

- Comprehensive Plan, Vision 2030
- Major Thoroughfare Plan
- Municipal Code-includes flood damage prevention requirements
- Capital Improvements Plan
- Infrastructure Master Plan 2012-2022
- Water Master Plan

- Wastewater Master Plan
- Master Drainage Plan 2012-2030
- FEMA FIRM
- City of Tomball Strategic Plan

26.12 FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

An active fault line crosses through the city on an east/west pathway north of Main Street (FM 2920). This geological anomaly has previously resulted in roadway and building damage. While not a priority, the potential of this phenomenon should be further explored to better understand the City and its resident's exposure.



Tomball

Critical Facilities

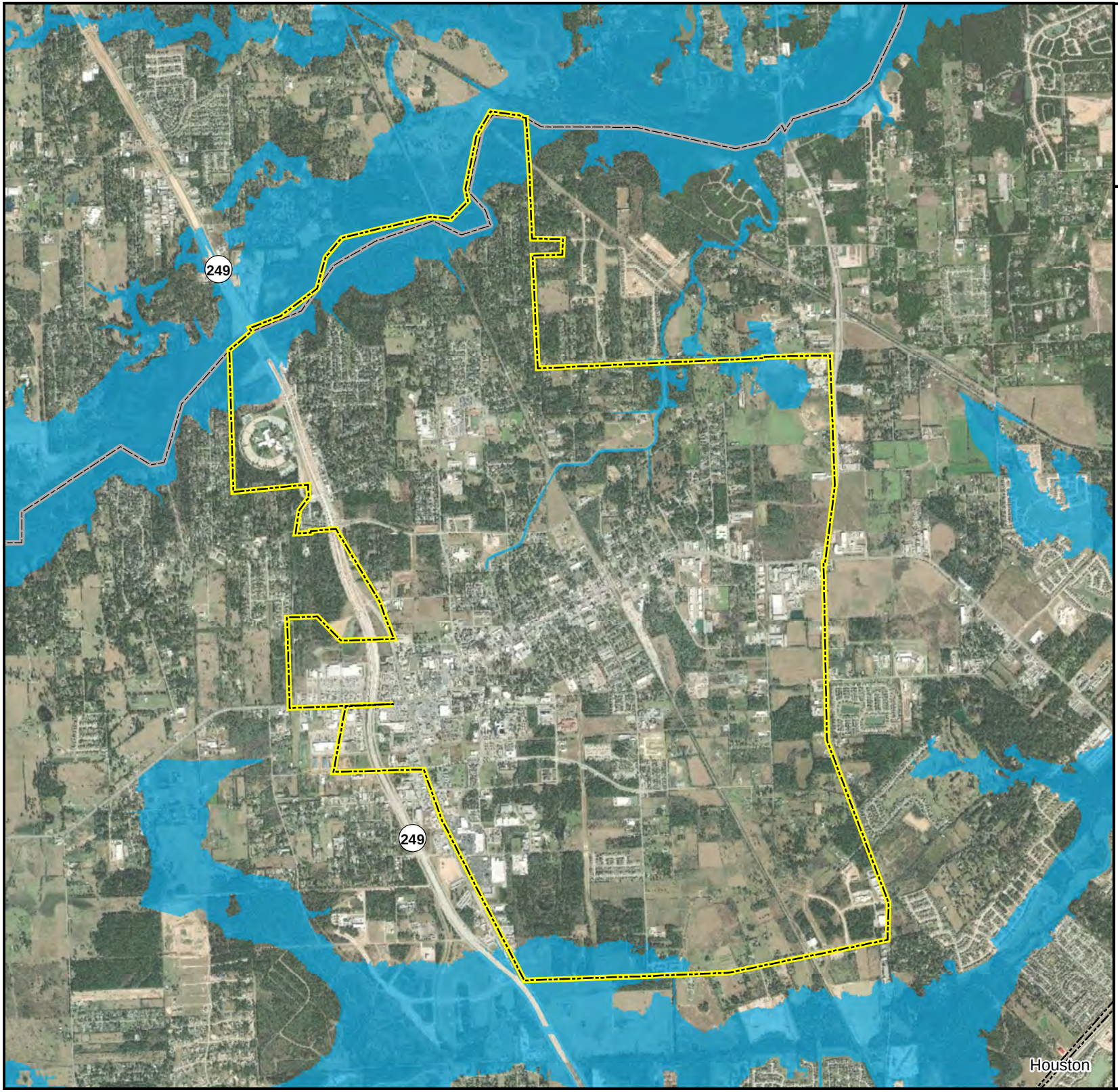
- Education Facilities
- Emergency Services
- Government Facilities
- Hazardous Material Sites
- Health and Medical Facilities
- Historical and Cultural Sites
- Transportation Systems
- Utility Systems
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.225 0.45 0.9 Miles



Tomball

FEMA Flood Hazard

1% Annual Chance Flood (100-yr)

Incorporated Cities

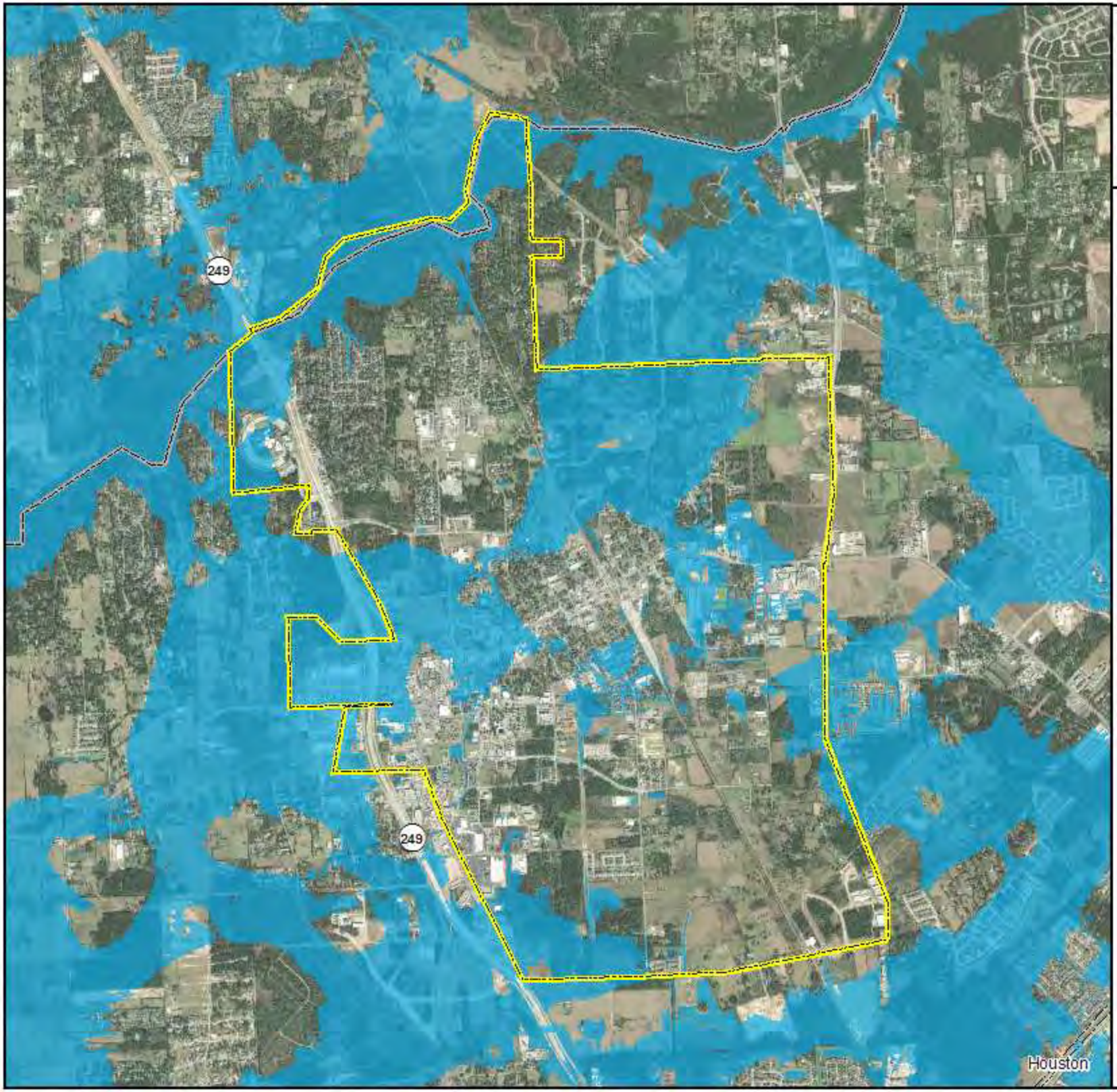
Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.225 0.45 0.9 Miles



Tomball

Flood Hazard
Hurricane Harvey

Flooding Extent

Incorporated Cities

Harris County

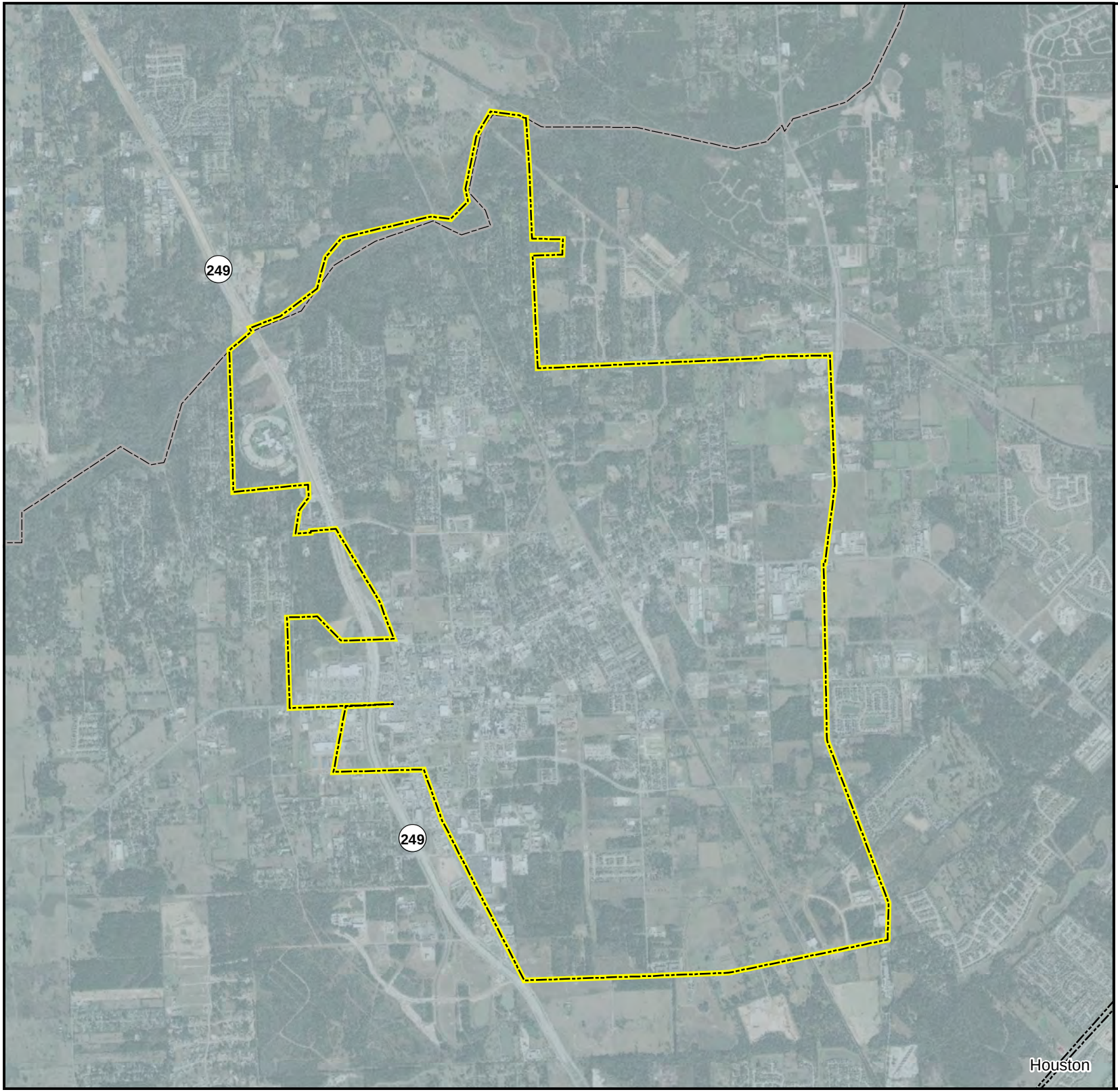
Note: Flooding extent shown for Hazard Mitigation Plan planning area only.

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.225 0.45 0.9 Miles



Tomball

Hurricane Alicia (1983)

Peak WInd Gust (mph)

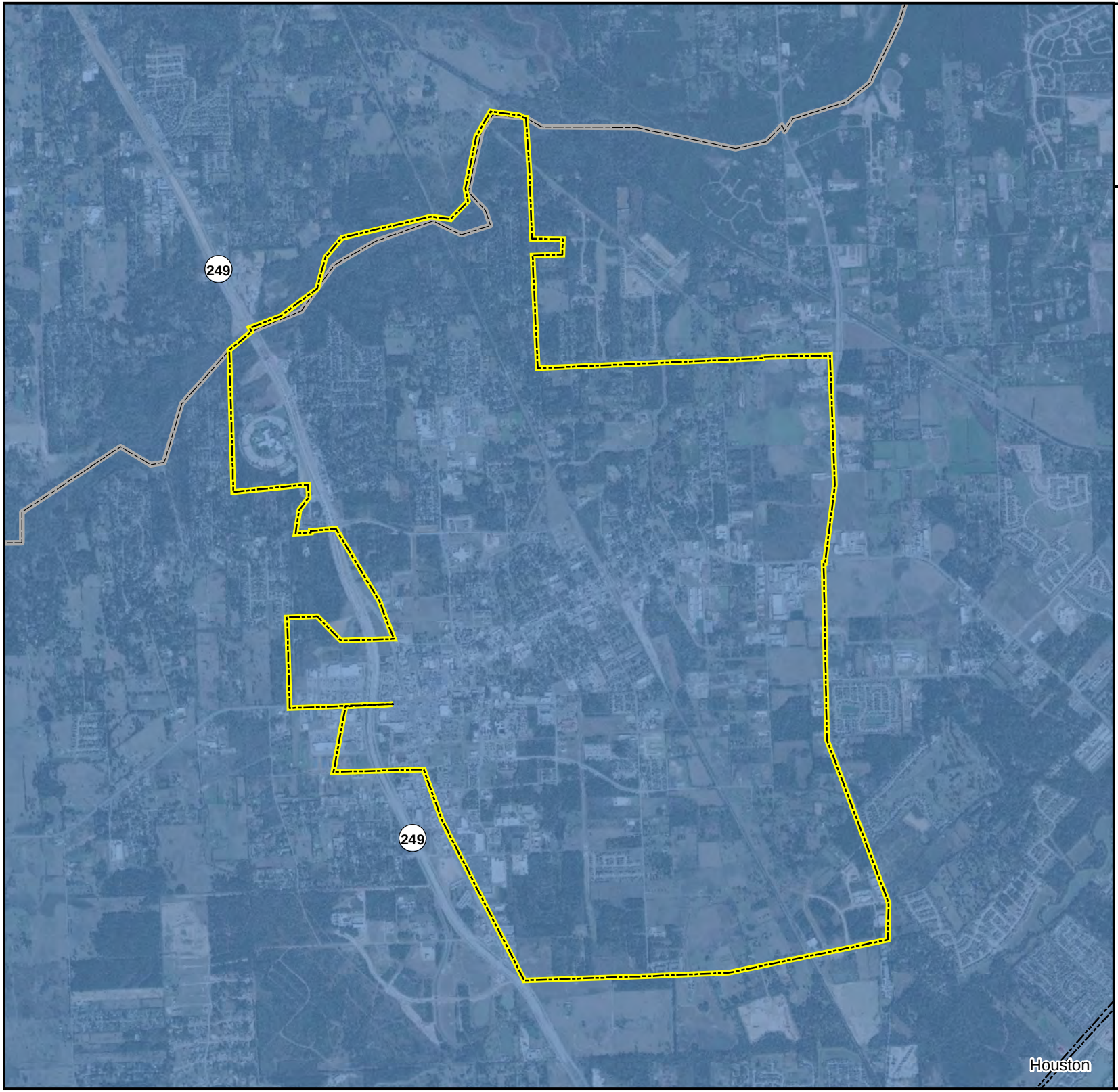
- 87 - 94
- 95 - 98
- 99 - 101
- 102 - 104
- 105 - 110
- Storm Track
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.225 0.45 0.9 Miles



Tomball

20-year Probabilistic Hurricane

Peak Wind Gust (mph)

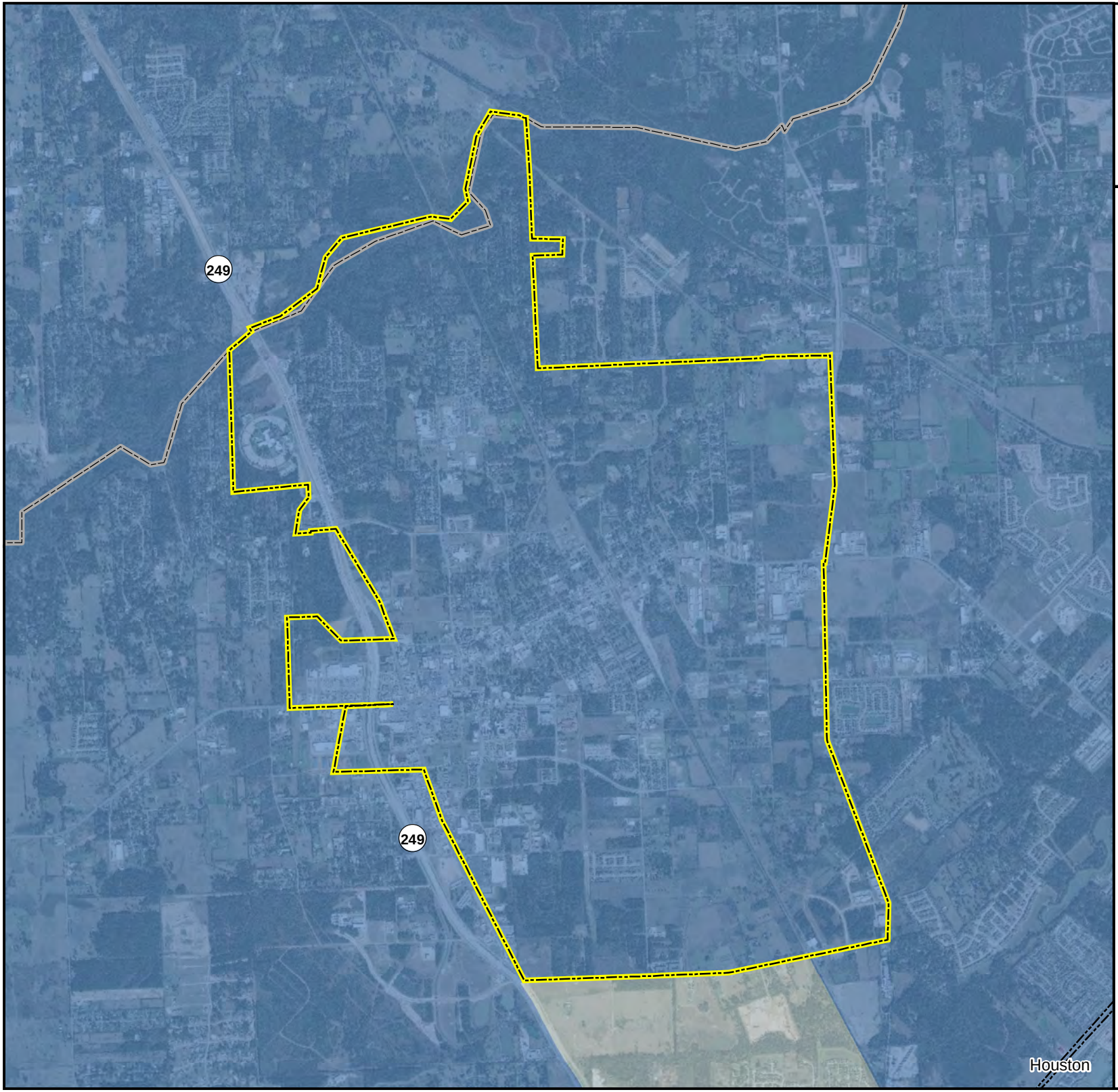
- 63 - 71
- 72 - 76
- 77 - 80
- 81 - 84
- 85 - 92
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.225 0.45 0.9 Miles



Tomball

100-year Probabilistic Hurricane

Peak Wind Gust (mph)

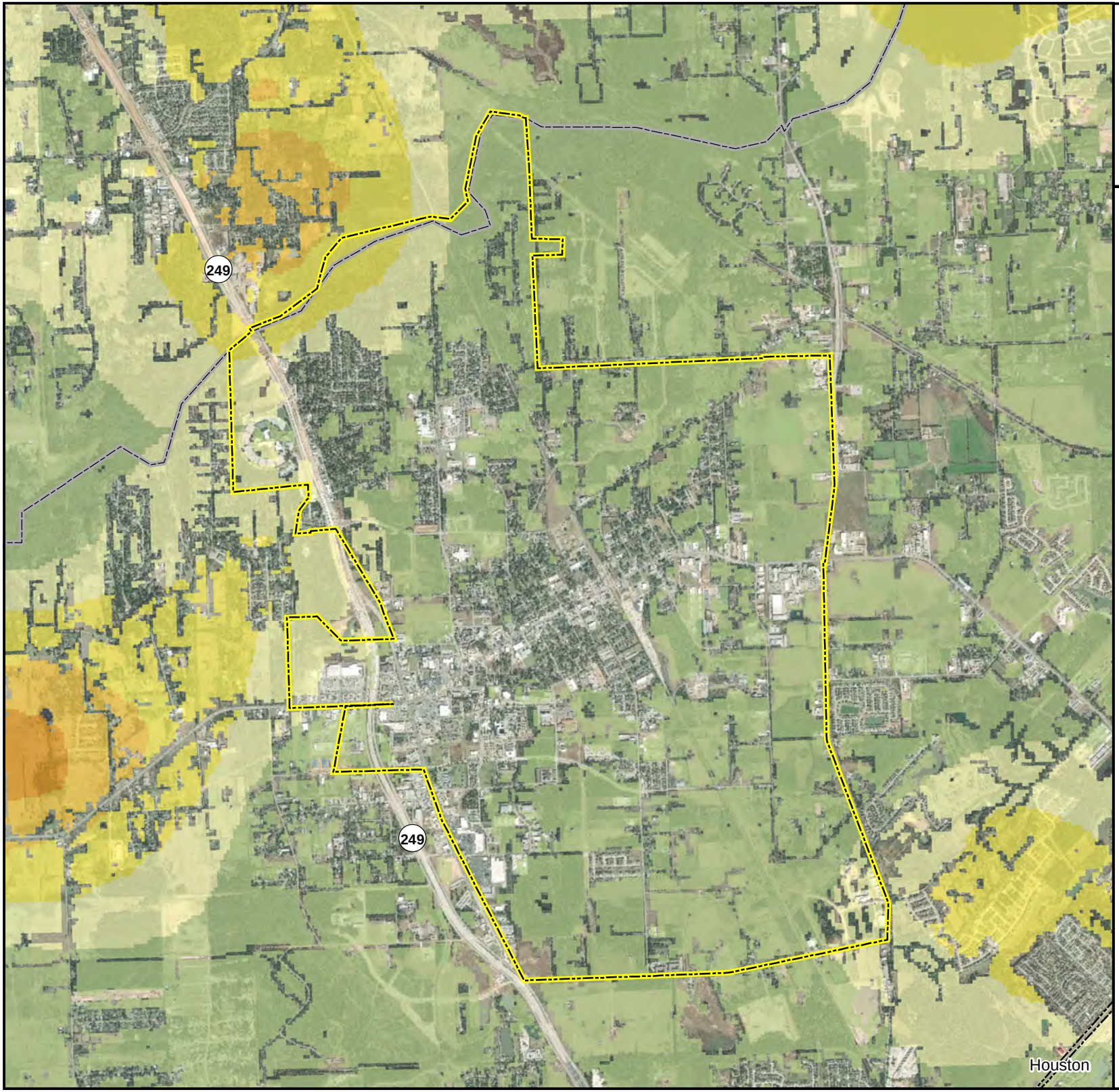
- 89 - 101
- 102 - 106
- 107 - 111
- 112 - 117
- 118 - 128
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.225 0.45 0.9 Miles



Tomball

Wildfire Ignition Density

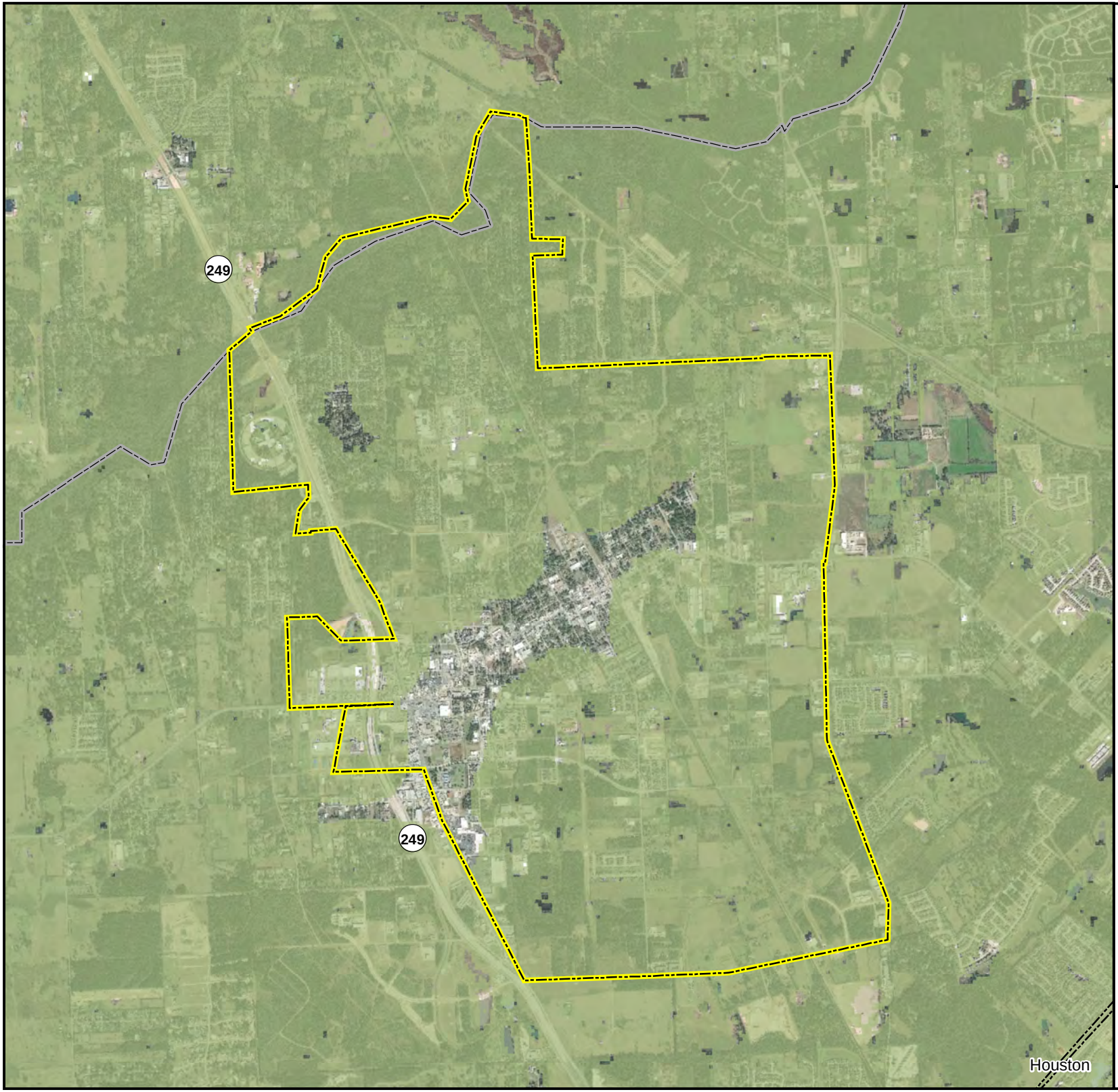
- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.225 0.45 0.9 Miles



Tomball

Wildfire Threat

1 (Low)
2
3 (Moderate)
4
5 (High)
6
7 (Very High)
Incorporated Cities
Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.225 0.45 0.9 Miles

27. CITY OF WEBSTER

27.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Dean Spencer, Acting Fire Chief/EMC
18300 Highway 3
Webster, Texas 77598
Telephone: 281-316-3744
E-mail Address: dspencer@websterfd.com

Alternate Point of Contact
Jason Myers, Shift Commander/ Deputy EMC
18300 Highway 3
Webster, Texas 77598
Telephone: 281-316-3751
e-mail Address: jmyers@websterfd.com

27.2 JURISDICTION PROFILE

27.2.1 Location

Webster, a small city in terms of its square miles – just 6.7, but mighty in terms of commercial vibrancy – home to more than 2,200 businesses. Webster is positioned midway between downtown Houston and Galveston, and the last city in Harris County on the south end.

27.2.2 History

In the early 1900s, a small farming community comprised of Japanese immigrants established rice farming as a key crop for the region. In addition to rice and fruit, dairies and livestock ranches abounded. In the 1930s, petroleum was discovered at the Webster-Friendswood Oilfield. Webster was incorporated in 1958, shortly before NASA (National Aeronautics and Space Administration) announced that it would build the Johnson Space Center (formerly called the Manned Space Center) in 1961. Naturally, NASA served as a catalyst to grow the City of Webster and the region. Webster has been home to many aerospace companies, including Ad Astra Rocket Company and Lockheed Martin's Exploration Development Laboratory. Two of Webster's growth industries have always been aerospace and medical. Webster became the "medical center of the south" with Houston as the "medical center of the north" beginning in 1972 with Clear Lake Regional Medical Center. Webster's medical center accommodates a service area population exceeding more than 1,800,000 patients annually. With the opening of Bay Area Regional Medical Center in 2014, that number is anticipated to continually escalate.

27.2.3 Climate

The climate of The City of Webster is classified as humid subtropical. Prevailing winds from the south and southeast bring heat from the deserts of Mexico and moisture from the Gulf of Mexico.

Summer temperatures typically have highs near 90 °F (32 °C) though higher temperatures are not uncommon. The city's proximity to the bay and the winds that it generates moderate the area's temperatures and ease the effects of the humidity, creating a more pleasant climate than inland communities like Houston.

Winters in the area are temperate with typical January high of 61 °F (16 °C) and lows near 42 °F (6 °C). Snowfall is rare. Annual rainfall averages exceed 49 inches (124 cm), with an annual average of 82 precipitation days.

27.2.4 Governing Body Format

The City of Webster is governed by a seven-member city council. The City consists of 4 departments: Administration, Public Safety, Public Works, and Community Development.

The City Council assumes responsibility for the adoption of this plan; the City Manager will oversee its implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 27-1.

Table 27-1. Local Mitigation Planning Team Members

Name	Title
Dean Spencer	Acting Fire Chief – EMC
Jason Myers	Shift Commander – Deputy EMC
Donna Rogers	Mayor
Danny Presley	City Manager
Shannon Hicks	Public Works Director
Derhyl Hebert	Community Development Director

27.3 CURRENT TRENDS

27.3.1 Population

According to the U.S. Census, the population of Webster as of 2017 was 11,123. Since 2010, the population has grown at an average annual rate of 1.2 percent, though that rate is declining, with an annual average of only 0.8 percent since 2015.

27.3.2 Development

Significant new development within Webster's 6.7 square miles is transpiring within Project Genesis, the City's northwest quadrant (Costco, Odyssey Park, Baybrook Commons), Project Destination Development, the City's southeast quadrant (Academy, Top Golf, American Furniture Warehouse), and Edgewater (new commercial development that will begin in late 2019 amid 30 acres).

Significant road projects include new arteries in Destination Development, along with Myrtle, Old Galveston Road, and the NASA One Bypass Extension.

Webster features over 150 restaurants and entertainment venues — new entertainment and recreation venues that will open shortly include Urban Air Adventure Park, D-Bat, The Game Preserve — and underway in late 2019, AVA and Point Blank.

Webster's medical center and aerospace sectors are flourishing, as is the hospitality sector with the City's 20th hotel poised to open in late 2109.

Table 27-2 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

Table 27-2. Recent and Expected Future Development Trends

Criterion	Response					
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan? • **If yes, give the estimated area annexed and estimated number of parcels or structures.**	No					
Is your jurisdiction expected to annex any areas during the performance period of this plan? • **If yes, describe land areas and dominant uses.** • **If yes, who currently has permitting authority over these areas?**	No					
Are any areas targeted for development or major redevelopment in the next five years? • **If yes, briefly describe, including whether any of the areas are in known hazard risk areas**	Yes Destination development					
How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?		**2014**	**2015**	**2016**	**2017**	**2018**
	Single Family	21	19	38	53	70
	Multi-Family	0	1	0	1	1
	Other (commercial, mixed use, etc.)	22	30	39	36	49
	Total	43	50	77	90	120
Provide the number of new-construction permits for each hazard area or provide a qualitative description of where development has occurred.	• Special Flood Hazard Areas: # 0 • Landslide: # 0 • High Liquefaction Areas: # 0 • Tsunami Inundation Area: # 0 • Wildfire Risk Areas: # 0					
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	Commercial					

27.4 CAPABILITY ASSESSMENT

The City of Webster performed an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities is presented in Table 27-3.
- Development and permitting capabilities are presented in Table 27-4.
- An assessment of fiscal capabilities is presented in Table 27-5.
- An assessment of administrative and technical capabilities is presented in Table 27-6.
- An assessment of education and outreach capabilities is presented in Table 27-7.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 27-8.
- Classifications under various community mitigation programs are presented in Table 27-9.
- The community's adaptive capacity for the impacts of climate change is presented in Table 27-10.

Findings of the capability assessment were reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table in Section 27.10 identifies these as community capacity building mitigation actions.

Table 27-3. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code	Yes	No	Yes	Yes
Comment: *Code of Ordinances, Ch. 18 Buildings and Building regulations.*				
Zoning Code	Yes	No	No	Yes
Comment: *Code of Ordinances, Ch. 98 Zoning*				
Subdivisions	Yes	No	No	Yes
Comment: *Code of Ordinances, Ch. 78 Subdivisions*				
Stormwater Management	Yes	Yes	Yes	Yes
Comment: *Code of Ordinances, Ch. 18 Div. 4 Storm water*				
Post-Disaster Recovery	Yes	Yes	No	Yes
Comment: *Annex J – Recovery and post disaster permitting and code enforcement regulations.*				
Real Estate Disclosure	No	No	No	No
Comment:				
Growth Management	Yes	No	Yes	Yes
Comment:				
Site Plan Review	Yes	No	No	Yes
Comment: *Code of Ordinances, Ch. Sec. 98-123. – Site plans requirements*				
Environmental Protection	Yes	Yes	No	Yes
Comment: *Code of Ordinances, Ch.34 Environment*				
Flood Damage Prevention	Yes	No	Yes	Yes
Comment: *Code of Ordinances, Ch. 42 – Floods article II*				
Emergency Management	Yes	No	Yes	Yes
Comment: *Code of Ordinances, Ch. 2 Div. 10 – Civil Emergencies, Texas Government Code 418*				
Climate Change	No	Yes	No	Yes
Comment:				
Planning Documents				
General Plan	Yes	No	Yes	Yes
Comment: *Comprehensive Plan 2015*				
Capital Improvement Plan	Yes	No	No	Yes
How often is the plan updated?				
Comment: *Annual*				
Disaster Debris Management Plan	Yes	Yes	No	Yes
Comment: *Contract are review on an annual basis and the plan is reviewed every 5 years.*				
Floodplain or Watershed Plan	Yes	Yes	No	Yes
Comment: *Code of Ordinances, Ch. 42 Div. 2*				
Stormwater Plan	Yes	Yes	Yes	Yes
Comment:				
Habitat Conservation Plan	No	Yes	No	Yes
Comment:				
Economic Development Plan	Yes	No	No	No
Comment: *Webster Economic Development Committee*				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Shoreline Management Plan ***Comment:***	No	Yes	No	No
Community Wildfire Protection Plan ***Comment:***	No	Yes	No	No
Forest Management Plan ***Comment:***	No	Yes	No	Yes
Climate Action Plan ***Comment:***	No	No	Yes	No
Comprehensive Emergency Management Plan ***Comment:***	Yes	Yes	No	Yes
Threat & Hazard Identification & Risk Assessment (THIRA) ***Comment:*** *Annex P*	Yes	Yes	Yes	Yes
Post-Disaster Recovery Plan ***Comment:***	No	Yes	Yes	Yes
Continuity of Operations Plan ***Comment:***	No	No	Yes	Yes
Public Health Plan ***Comment:***	Yes	No	No	Yes

Table 27-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • **If no, who does? If yes, which department?**	Yes Building Department
Does your jurisdiction have the ability to track permits by hazard area?	Yes
Does your jurisdiction have a buildable lands inventory?	No

Table 27-5. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants	No
Capital Improvements Project Funding	No
Authority to Levy Taxes for Specific Purposes	No
User Fees for Water, Sewer, Gas or Electric Service	Yes
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	No
Incur Debt through Private Activity Bonds	No
Withhold Public Expenditures in Hazard-Prone Areas	No
State-Sponsored Grant Programs	No
Development Impact Fees for Homebuyers or Developers	Yes

Table 27-6. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Community Development/City Planner
Engineers or professionals trained in building or infrastructure construction practices	Yes	Public Works
Planners or engineers with an understanding of natural hazards	Yes	Public Works
Staff with training in benefit/cost analysis	Yes	Finance Department
Surveyors	No	City contracts this out
Personnel skilled or trained in GIS applications	Yes	Community Development/GIS
Scientist familiar with natural hazards in local area	No	
Emergency manager	Yes	Fire Dept./ OEM
Grant writers	No	

Table 27-7. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • If yes, briefly describe.	Not at this time
Do you use social media for hazard mitigation education and outreach? • If yes, briefly describe.	Yes, We have an active Social media account managed by the PIO
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • If yes, briefly describe.	No
Do you have any other programs already in place that could be used to communicate hazard-related information? • If yes, briefly describe.	Yes Social media, Swift 911
Do you have any established warning systems for hazard events? • If yes, briefly describe.	Yes Swift 911

Table 27-8. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Building Department
Who is your floodplain administrator? (department/position)	Erich Penn/Building Official
Are any certified floodplain managers on staff in your jurisdiction?	Yes 2
What is the date that your flood damage prevention ordinance was last amended?	2007
Does your floodplain management program meet or exceed minimum requirements? • **If exceeds, in what ways?**	Exceeds 1' Freeboard Residential & Commercial 1' above BFE
When was the most recent Community Assistance Visit or Community Assistance Contact?	2017
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • **If so, state what they are.**	No
Are any RiskMAP projects currently underway in your jurisdiction? • **If so, state what they are.**	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • **If no, state why.**	No
Does your floodplain management staff need any assistance or training to support its floodplain management program? • **If so, what type of assistance/training is needed?**	Yes/No Insert appropriate information
Does your jurisdiction participate in the Community Rating System (CRS)? • **If yes, is your jurisdiction interested in improving its CRS Classification?** • **If no, is your jurisdiction interested in joining the CRS program?**	No No Yes
How many flood insurance policies are in force in your jurisdiction?[a] • **What is the insurance in force?** • **What is the premium in force?**	1227 $605,836 $494 (average)
How many total loss claims have been filed in your jurisdiction?[a] • **How many claims are still open or were closed without payment?** • **What were the total payments for losses?**	 $0

a. According to FEMA statistics as of September 25, 2018

Table 27-9. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	No		
Building Code Effectiveness Grading Schedule	Yes	4	1/19
Public Protection	Yes	ISO1	2017
Storm Ready	Yes		2017
Firewise	No		

Table 27-10. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:***	Low
Jurisdiction-level monitoring of climate change impacts ***Comment:***	Low
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:***	Low
Participation in regional groups addressing climate risks ***Comment:***	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	Low
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	Low
Identified strategies for adaptation to impacts ***Comment:***	Low
Champions for climate action in local government departments ***Comment:***	Low
Political support for implementing climate change adaptation strategies ***Comment:***	Low
Financial resources devoted to climate change adaptation ***Comment:***	Low
Local authority over sectors likely to be negative impacted ***Comment:***	Low
Public Capacity	
Local residents knowledge of and understanding of climate risk ***Comment:***	Low
Local residents support of adaptation efforts ***Comment:***	Low
Local residents' capacity to adapt to climate impacts ***Comment:***	Low
Local economy current capacity to adapt to climate impacts ***Comment:***	Low
Local ecosystems capacity to adapt to climate impacts ***Comment:***	Low

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

27.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning and capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

27.5.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- **Basic Plan –** The Basic Plan provides a summary on the hazards and threats in the community.
- **Annex P – Hazard Mitigation** is assigned to the Community Development Department and addresses the hazards and threats in the community. The Annex also identifies the various hazard mitigation related programs implemented in the City of Webster and which agencies are responsible for administration.

27.5.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- **Capital Improvement Plan** – The City of Webster updates the CIP on an annual basis and can integrate the goals, objectives, and projects identified in the Hazard Mitigation Action Plan into the CIP process.
- **Comprehensive Plan** — The Planning and Development Department will develop a new overall plan to document existing conditions and establish goals to replace the existing plan.
- **Downtown Revitalization Plan –** The NASA Parkway Revitalization Plan provides a vision and a series of recommendations that are consistent with the principles of the updated Comprehensive Plan. The recommendations focus on amendments to the City's development ordinances, but also include potential incentives that can be built into a revised code, and a list of City-initiated action items. Together, these tools provide a well-rounded approach to facilitate continued economic growth, aesthetic enhancement, and civic pride in the NASA Parkway corridor.

27.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 27-11 lists past occurrences of natural hazards for which specific damage was recorded in The City of Webster. Other hazard events that broadly affected the entire planning area, including The City of Webster, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 27-11. Past Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Hurricane Harvey	4332 DR	2017	$2,326,000.00
Hurricane Ike	1791 DR	2008	$12,000,000.00

27.7 HAZARD RISK RANKING

Table 27-12 presents a local ranking for The City of Webster of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this

jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 27-12. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Severe Weather	48	High
1	Hurricane	48	High
2	Flooding	36	High
3	Wildfire	14	Low
3	Earthquake	14	Low
4	Drought	6	Low
4	Mass Movement	6	Low
5	Dam Failure	0 (No exposure)	None
5	Tsunami	0 (No exposure)	None
5	Coastal Erosion	0 (No exposurte)	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

27.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. This section provides information on a few key vulnerabilities for the jurisdiction. Available jurisdiction-specific risk maps of the hazards are provided at the end of this annex.

27.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: 25
- Number of FEMA-identified Severe-Repetitive-Loss Properties: 1
- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated:1

27.9 STATUS OF PREVIOUS PLAN ACTIONS

Table 27-13 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

27.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 27-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 27-15 identifies the priority for each action. Table 27-16 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 27-13. Status of Previous Plan Actions

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
2010WEBSTR001. Adoption of higher standards/latest edition of building codes, zoning/city/storm water ordinances to limit development in flood area for mitigation of flood hazards.			X	WB005
Comment: *In Process*				
2010WEBSTR002. Expand current flood warning system(s), Blackboard Connect CTY Mass Notification, to provide coverage to the community's population located in flood areas.			X	WB06
Comment: *Phase I Complete Phase II in progress*				
2010WEBSTR004. Adoption of higher standards/latest edition of building codes, zoning/city/storm water ordinances for mitigation of Coastal flood hazards.	X			
Comment: *Complete*				
2010WEBSTR005. Harden critical infrastructure facilities to withstand high wind and hail damage.			X	WB07
Comment: *Phase I complete, moved EOC to new fire station, Phase II in progress*				
2010WEBSTR006. Implement tree management program to limit debris damage to critical infrastructure, public facilities from falling tree canopy.	X			
Comment: *Complete*				
2010WEBSTR007. Installation of generators / power back-up systems at critical facilities.	X			
Comment: *Complete*				
2010WEBSTR008. Adoption of higher standard/latest edition building codes to require tie-downs for manufactured homes to reduce damages to mobile homes	X			
Comment:				
2010WEBSTR009. Expand early warning system alert capabilities, Blackboard Connect CTY Mass Notification System, to include IPAWS and expand coverage to public/private schools and colleges.	X			
Comment: Adopted new mass communication system, Swift911. No longer use Blackboard Connect CTY. IPAWS is included in Swift911.				
2010WEBSTR010. Expand community early warning system, Connect CTY Mass Notification System, to integrate IPAWS and increase coverage to the general public.	X			
Comment: Adopted new mass communication system, Swift911. No longer use Blackboard Connect CTY. Swift911 includes IPAWS.				
2010WEBSTR011. Install lightning and surge protection systems for critical infrastructure.	X			
Comment: *Complete*				
2010WEBSTR012	X			
Comment: *In Process*				
2010WEBSTR013	X			
Comment: *Complete – The city civic center will serve as cooling center with backup power*				

Table 27-14. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action WB01 — Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: flooding, severe weather, hurricane						
Existing	3, 4, 10	EM	Planning	High	HMGP, PDM, FMA	Short-term
Action WB02 — Integrate the hazard mitigation plan into other plans, ordinances and programs that dictate land use decisions in the community, including the surrounding areas						
Hazards Mitigated: flooding, hurricane, severe weather						
New and Existing	1, 3, 4, 5, 7, 8, 10	Planning	EM	Low	Staff Time, General Funds	Ongoing
Action WB03 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Wildfire, Earthquake, Drought, Mass Movement						
New and Existing	1, 5, 8	EM	Head of Departments	Low	Staff Time, General Funds	Short-term
Action WB04 — Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements: • Enforce the flood damage prevention ordinance. • Participate in floodplain identification and mapping updates. • Provide public assistance/information on floodplain requirements and impacts.						
Hazards Mitigated: flooding, severe weather, hurricane						
New and Existing	1, 3, 5, 7, 8, 10	EM	Planning	Low	Staff Time, General Funds	Ongoing
Action WB05 — Adoption of higher standards/latest edition of building codes, zoning/city/storm water ordinances to limit development in flood area for mitigation of flood hazards.						
Hazards Mitigated: Flooding						
Existing	12,14	Planning	EM	Low	Staff Time, General Funds	Short term
Action WB06 — Expand current flood warning system(s), Blackboard Connect CTY Mass Notification, to provide coverage to the community's population located in flood areas.						
Hazards Mitigated: Flooding, Hurricane, Severe weather						
Existing	1	EM	TBD	Low	Staff Time, General Funds	Short term
Action WB07 — Harden critical infrastructure facilities to withstand high wind and hail damage.						
Hazards Mitigated: Severe weather, hurricane						
Existing	6, 11, 13	PW	EM	High	General and Grant Funds	Long term
Action WB08— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Wildfire, Earthquake, Drought, Mass Movement						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	City of Tomball	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 27-15. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
WB01	3	High	High	Yes	Yes	No	Medium	High
WB02	7	Medium	Low	Yes	No	Yes	High	Low
WB03	3	Low	Low	Yes	No	Yes	High	Low
WB04	6	Medium	Low	Yes	No	Yes	High	Low
WB05	2	Medium	Low	Yes	No	Yes	Medium	Low
WB06	1	High	Low	Yes	No	Yes	High	Low
WB07	3	High	High	Yes	Yes	No	High	High
WB08	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 27-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Severe weather	WB1, 8	WB1	WB4, 6, 8		WB08	WB1,7		WB2, 3, 4, 8
Hurricane	WB1, 8	WB1	WB4, 6, 8		WB08	WB1,7		WB2, 3, 4, 8
Flooding	WB1,5, 8	WB1,5	WB4, 6, 8		WB08	WB1,5		WB2, 3, 4, 5, 8
Low-Risk Hazards								
Wildfire	WB08		WB08		WB08			WB 3, 8
Earthquake	WB08		WB08		WB08			WB 3, 8
Drought	WB08		WB08		WB08			WB 3, 8
Mass Movement	WB08		WB08		WB08			WB 3, 8

a. See the introduction to this volume for explanation of mitigation types.

27.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

27.11.1 Existing Reports, Plans, Regulatory Tools and Other Resources

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

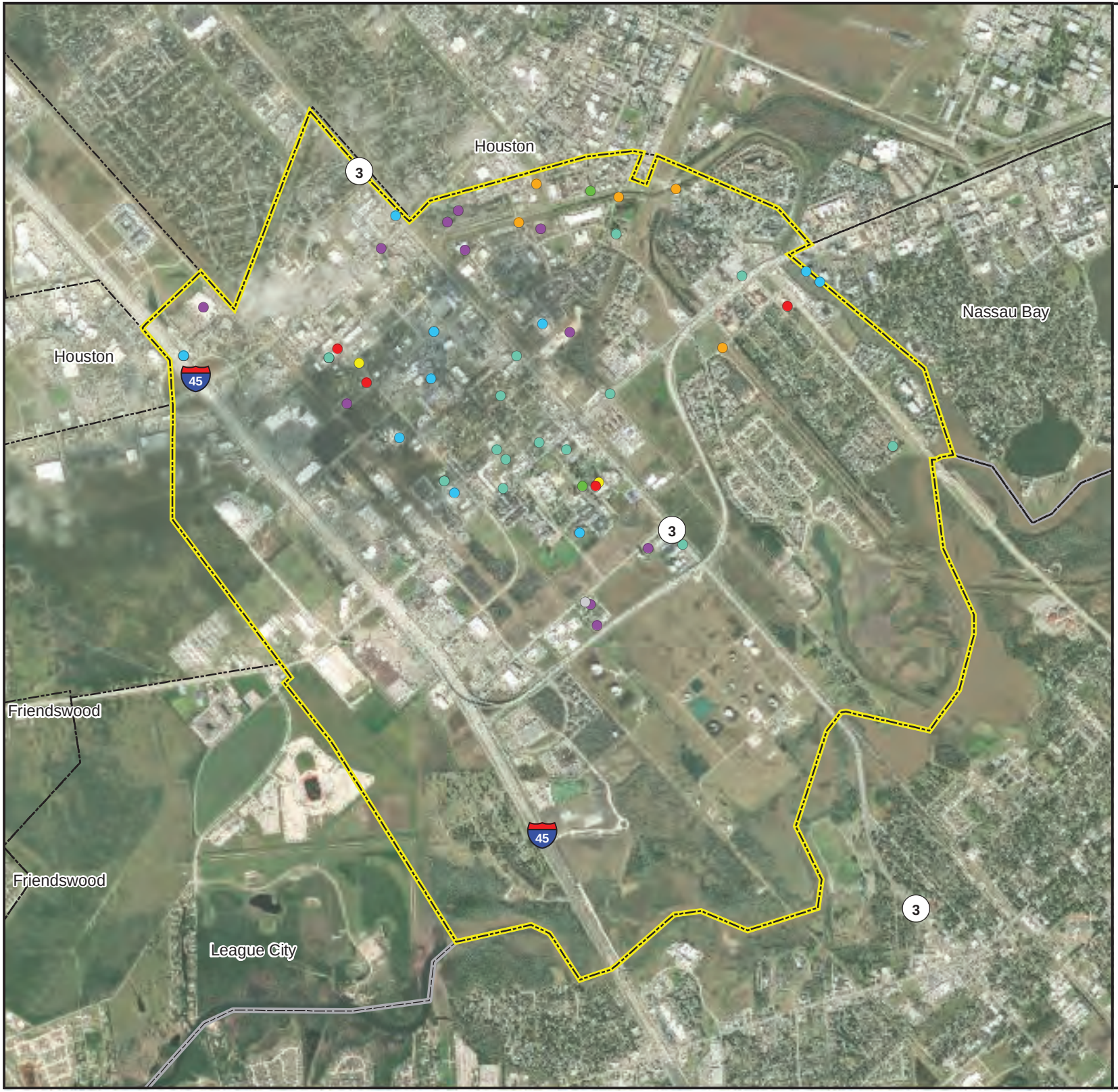
- **The City of Webster Municipal Code** — The municipal code was reviewed for the full capability assessment and for identifying opportunities for action plan integration.
- **The City of Webster Flood Damage Prevention Ordinance** — The flood damage prevention ordinance was reviewed for compliance with the National Flood Insurance Program.
- City of Webster Code of Ordinances Chapter 42

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.

27.11.2 Staff and Local Stakeholder Involvement in Annex Development

This annex was developed over the course of several months with input from many city departments including Public Works, Community Development, Emergency Management, Fire, and Finance. All departments were asked to contribute to the annex development through reviewing and contributing to the capability assessment, reporting on the status of previously identified actions, and participating in action identification and prioritization. Additional Comments



Webster

Critical Facilities

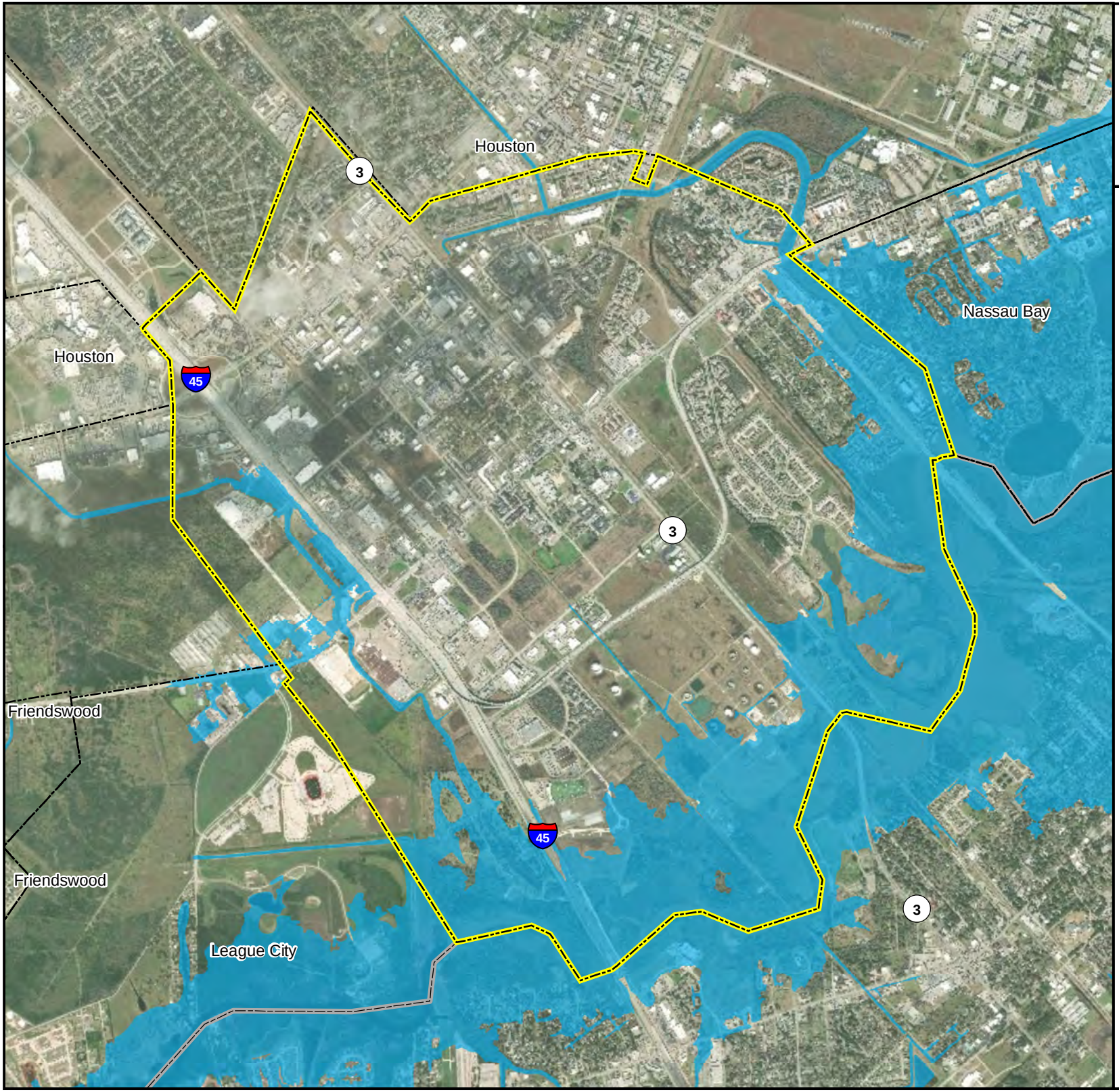
- Education Facilities
- Emergency Services
- Government Facilities
- Hazardous Material Sites
- Health and Medical Facilities
- Historical and Cultural Sites
- Transportation Systems
- Utility Systems
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.15 0.3 0.6 Miles



Webster

FEMA Flood Hazard

1% Annual Chance Flood (100-yr)

Incorporated Cities

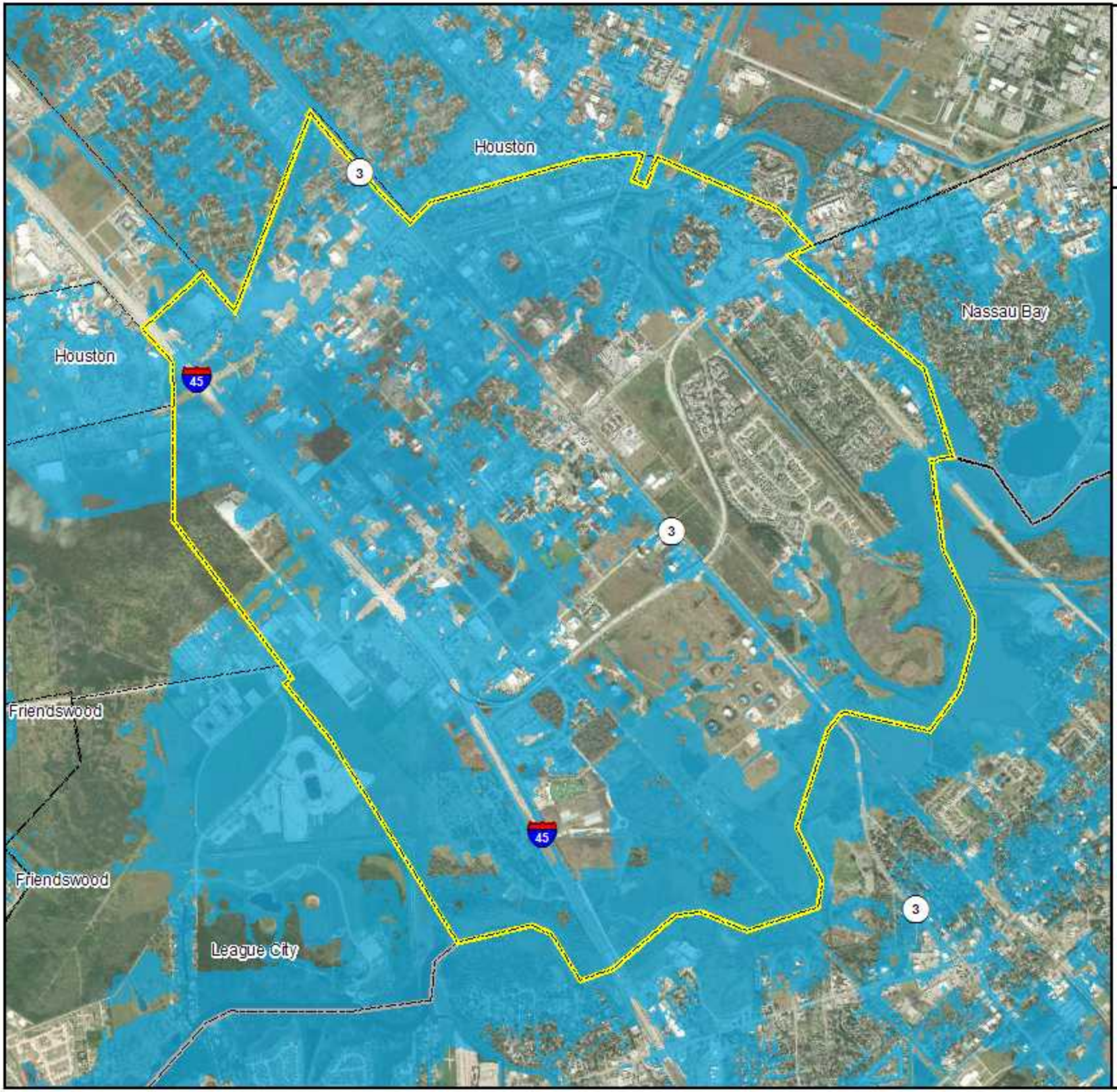
Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.15 0.3 0.6 Miles



Webster

Flood Hazard
Hurricane Harvey

Flooding Extent

Incorporated Cities

Harris County

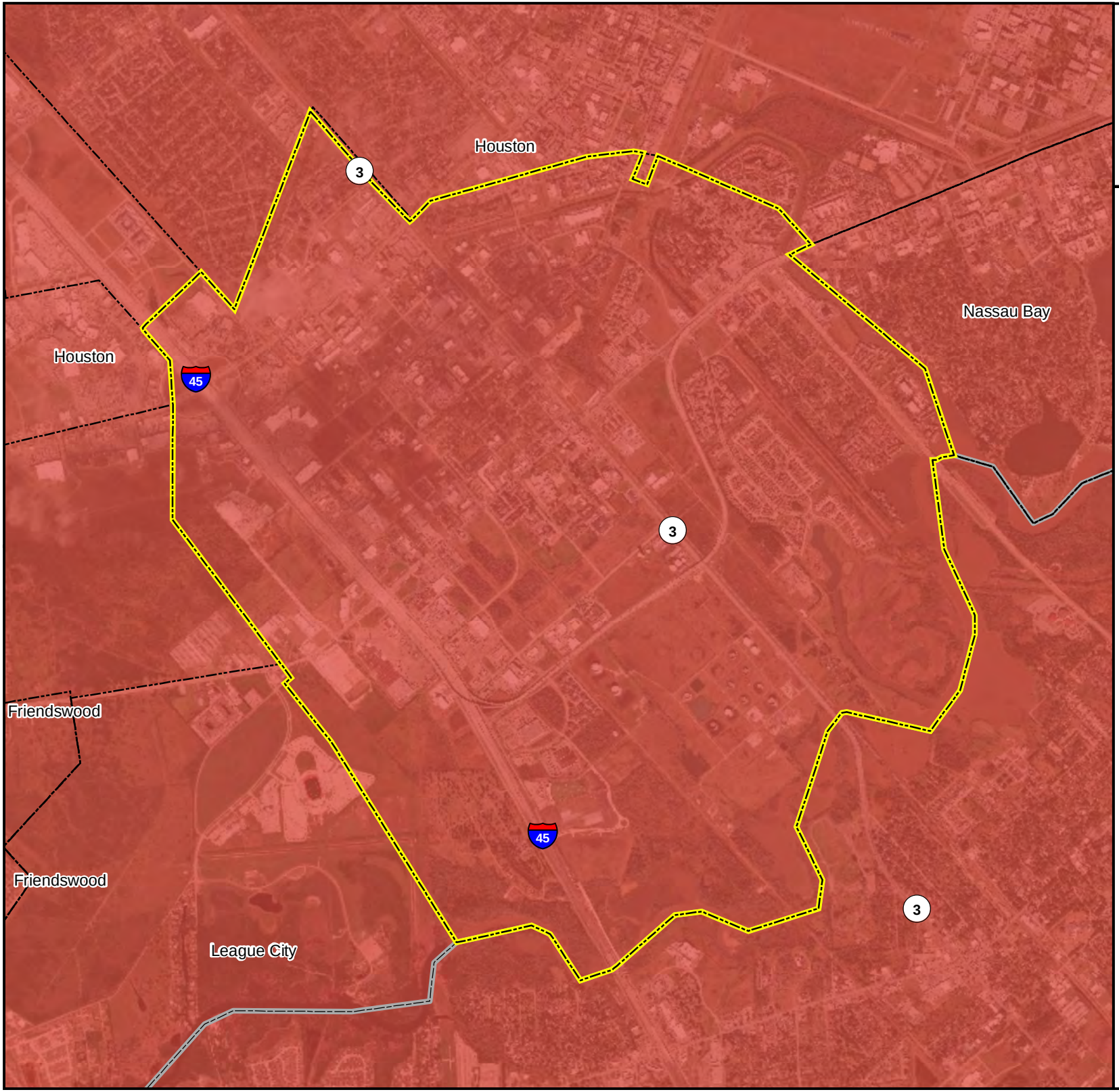
Note: Flooding extent shown for Hazard Mitigation Plan planning area only.

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.15 0.3 0.6 Miles



Webster

Hurricane Alicia (1983)

Peak WInd Gust (mph)

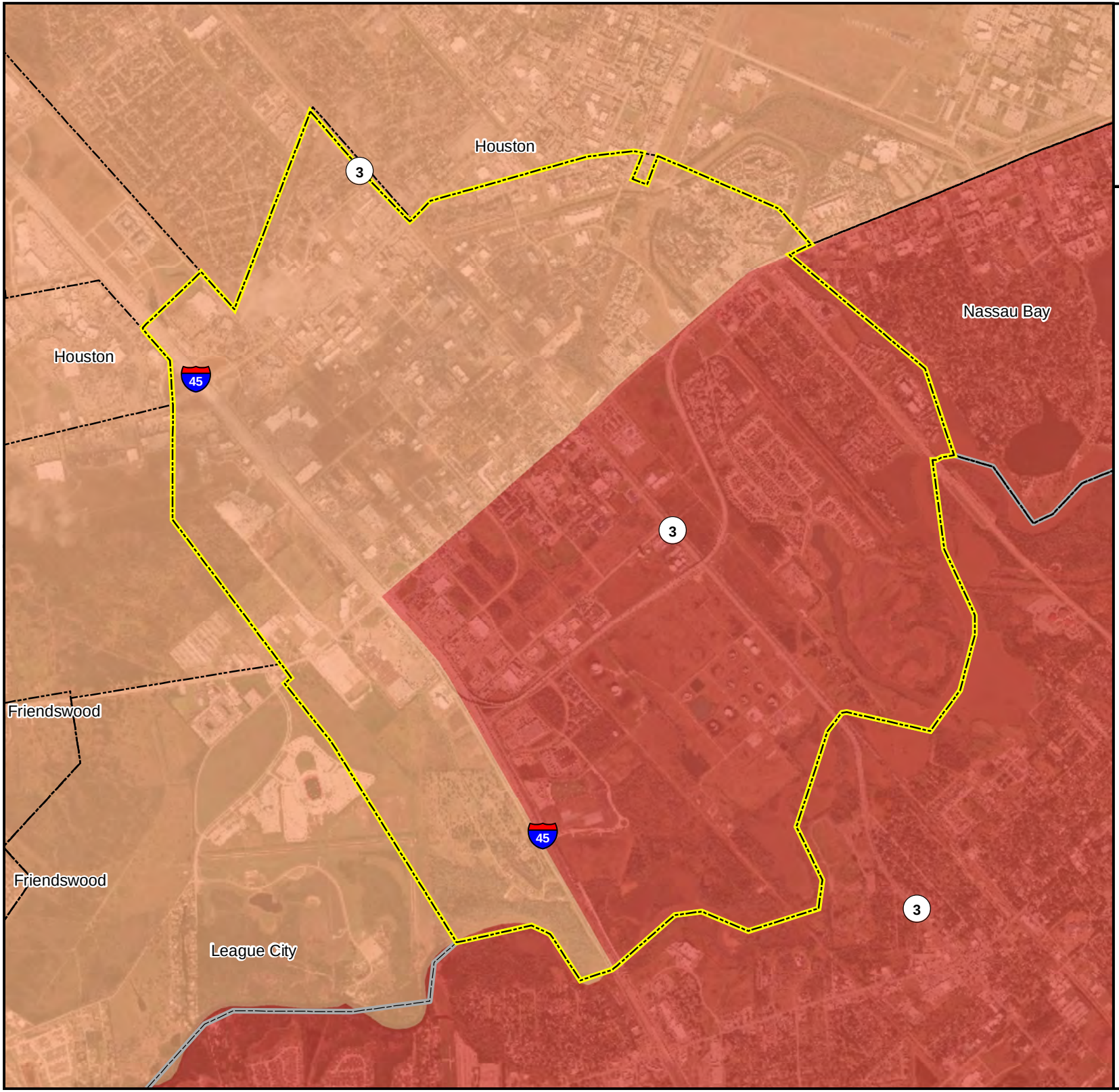
- 87 - 94
- 95 - 98
- 99 - 101
- 102 - 104
- 105 - 110
- Storm Track
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.15 0.3 0.6 Miles



Webster

20-year Probabilistic Hurricane

Peak Wind Gust (mph)

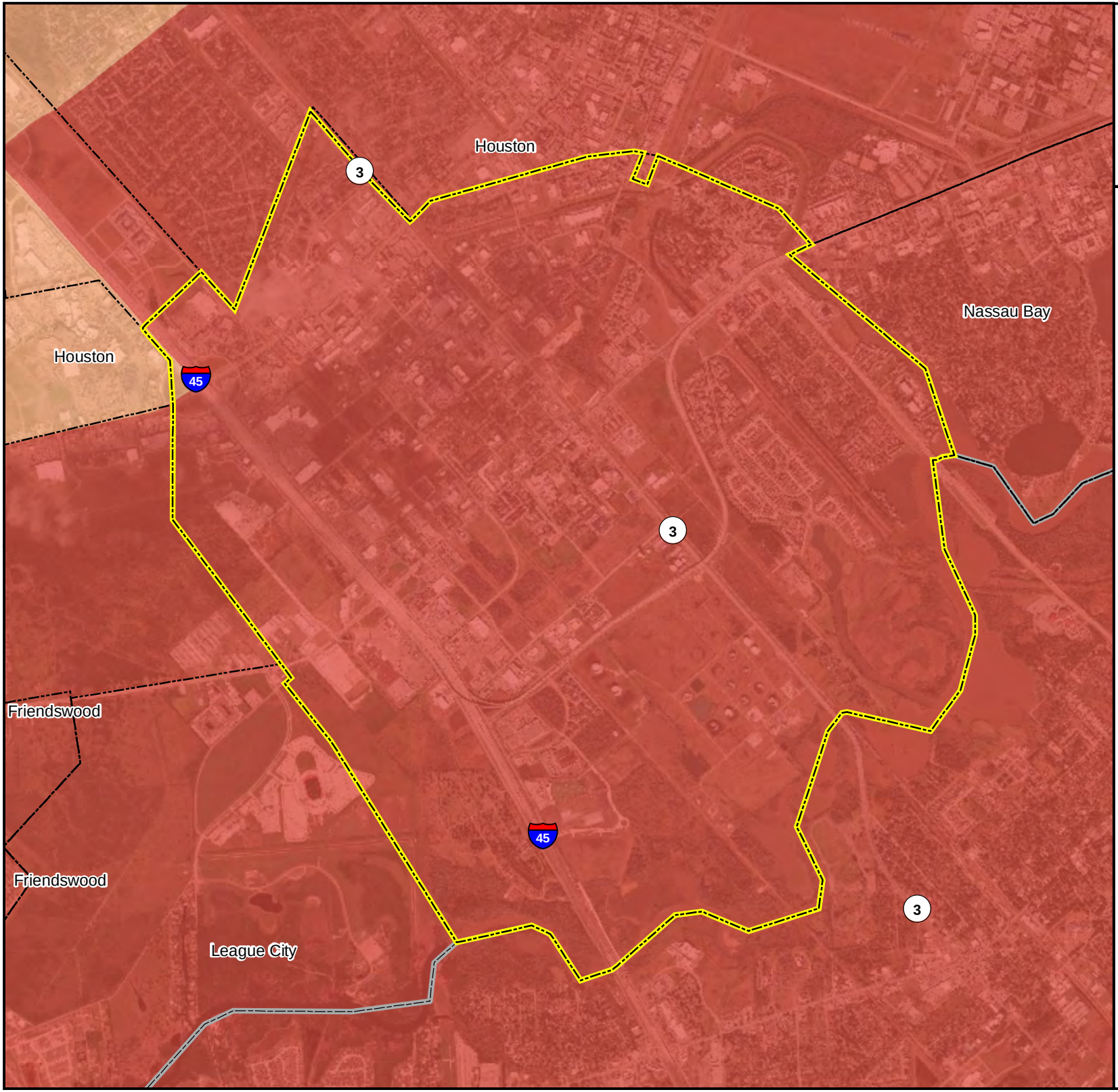
- 63 - 71
- 72 - 76
- 77 - 80
- 81 - 84
- 85 - 92
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.15 0.3 0.6 Miles



Webster

100-year Probabilistic Hurricane

Peak Wind Gust (mph)

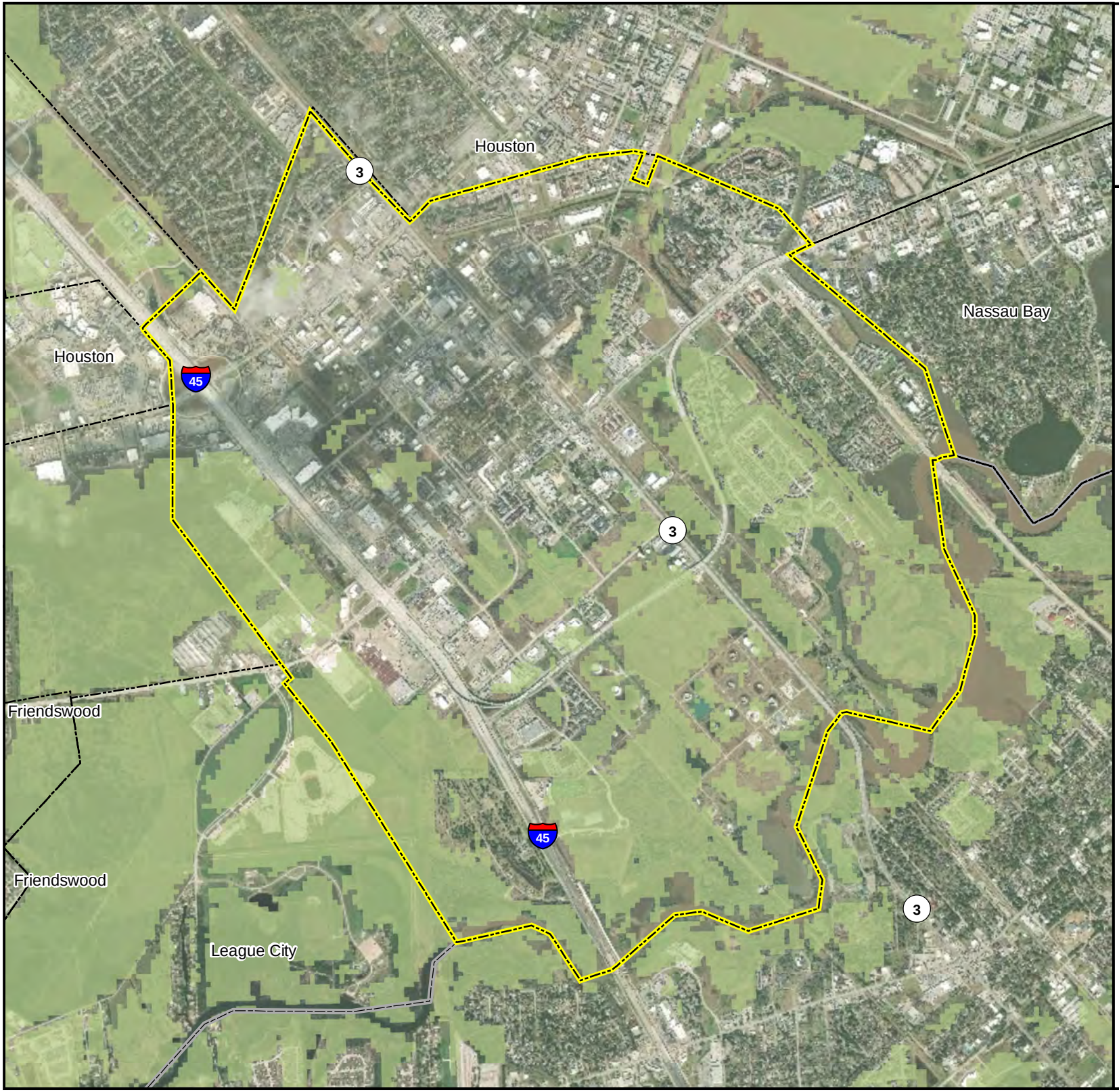
- 89 - 101
- 102 - 106
- 107 - 111
- 112 - 117
- 118 - 128
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.15 0.3 0.6 Miles



Webster

Wildfire Ignition Density

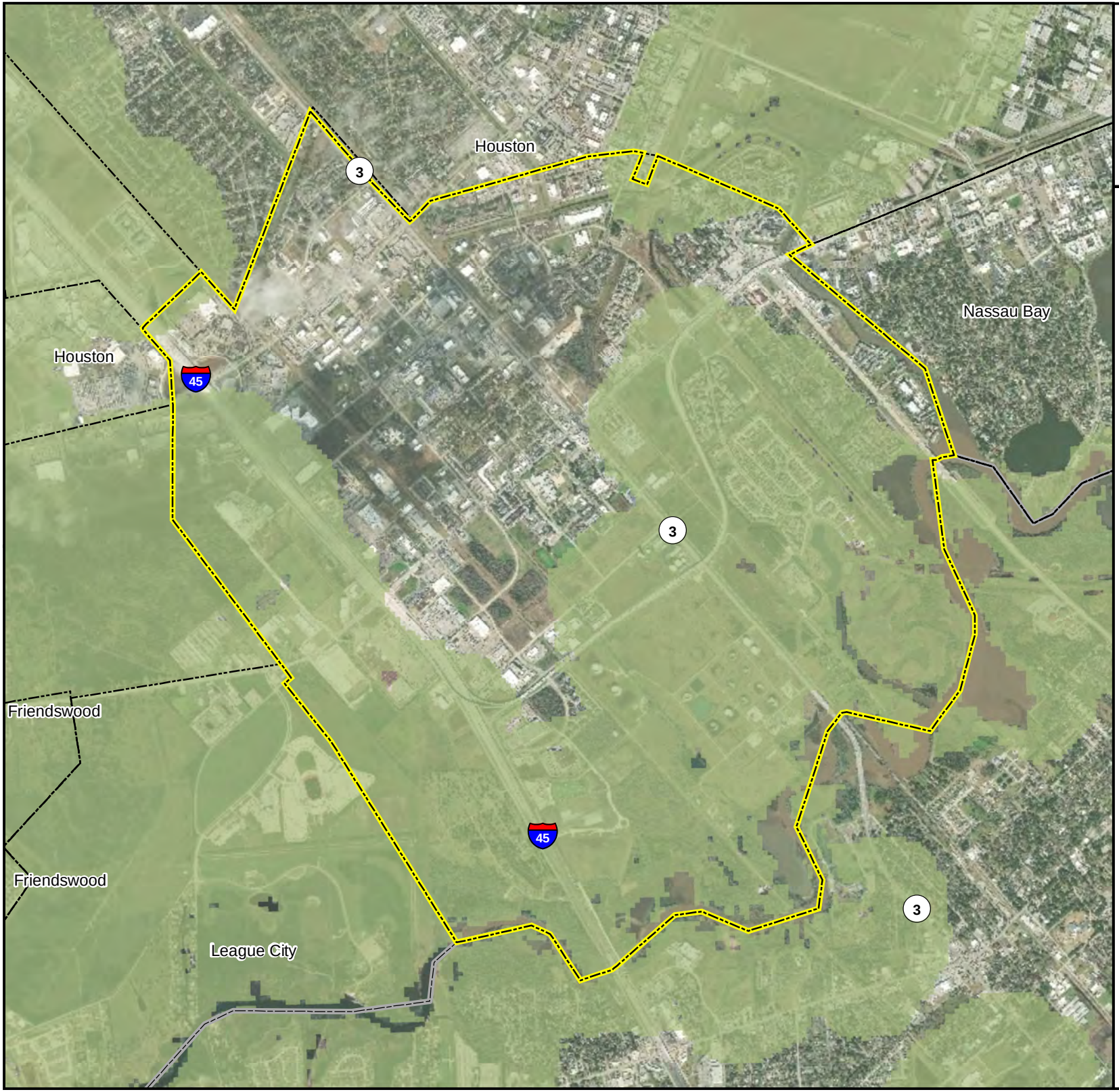
- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.15 0.3 0.6 Miles



Webster

Wildfire Threat

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.15 0.3 0.6 Miles

28. CITY OF WEST UNIVERSITY PLACE

28.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Aaron Taylor, Fire Chief/ EMC
3800 University Blvd.
West University Pl., TX 77005
Telephone: 713-662-5836
e-mail Address: ataylor@westutx.gov

Alternate Point of Contact
James Novak, Fire Marshal
3800 University Blvd.
West University Pl., TX 77005
Telephone: 713-662-5837
e-mail Address: jnovak@westutx.gov

28.2 JURISDICTION PROFILE

28.2.1 Location

West University Place is located in Harris County, Texas within the Houston metropolitan area. The City of West University Borders the City of Houston, The City of Bellaire and The City of Southside Place. The City boundaries generally extend from Bellaire Blvd./ W. Holcombe north to Bissonnet and from Kirby Drive west to Community Dr. encompassing an area of 2.2 Sq. Miles.

28.2.2 History

City of West University Place was incorporated in 1924.

Origins

The idea for a community of country homes in the area that is now West University Place was conceived in 1910 by Ben W. Hooper, then Governor of Tennessee. That year, Governor Hooper bought a tract of land southwest of Houston out of an old Spanish land grant, which had been surveyed by A.C. Reynolds.

Lots for Sale

The Houston West End Realty Company, A.D. Foreman, President, developed today's West University Place 1st addition and put the 1st lots up for sale on April 1, 1917.

Naming the Area

The area's proximity to Rice University led to the name West University Place.

Early Problems

Utilities

When the City of Houston decided not to invest in utility lines to service the tiny community with an uncertain future, Foreman spent $100,000 of his own earnings to bring electrical, water and telephone service to West University Place. Still, in 1923 there were only 40 families living in the muddy, poorly drained swamp.

Housing Costs

In those early days, a 100 foot by 200 foot lot cost $1,000 and houses were required to cost a minimum of $2,500. Homes facing Buffalo Speedway and Bellaire Boulevard were required to cost $4,000 and $5,000 respectively.

Infrastructure Improvements

Residents dissatisfied with muddy streets, poor drainage, and the absence of schools and fire protection joined in a series of town meetings, resulting in the incorporation of the City in 1924. For 6 years, city fathers put the creation of an infrastructure above all other conveniences by building streets and providing various services such as:

- Garbage collection
- Natural gas supply
- Police and fire protection
- Postal delivery
- Sewage disposal
- Water supply

Wier Park

The pragmatism of the city's early residents resulted in the development of our 1st park, Wier Park, at Belmont and Sunset, in 1930. With most of our park land donated to the city by early residents and developers, West U continues to take pride in the greenery and open recreational space offered at 6 developed parks in existence today. Expansion of our largest park, Colonial Park, continues with the acquisition of surrounding lots.

City Charter

In 1939, the City exhibited confidence in its own political maturity and the character of its citizens by refusing to consolidate with its larger, powerful neighbor, the City of Houston. The confidence was solidified in adoption of the 1st City Charter in 1940.

Progress

Over the years, the City has progressed steadily toward its present position as one of the area's most desirable neighborhoods. Civic-minded citizens and small-town government, combined with a proximity to major business, educational, cultural, and scientific centers, have contributed to a steady increase in property values.

28.2.3 Climate

West University Place, Texas gets 52 inches of rain, on average, per year. The US average is 39 inches of rain per year. West University Place averages 0 inches of snow per year. The US average is 26 inches of snow per year. On average, there are 205 sunny days per year in West University Place. The US average is 205 sunny days.

- Summer High: the July high is around 92 degrees
- Winter Low: the January low is 45

Sperling's Comfort Index for West University Place is a 76 out of 100. A higher score indicates a more comfortable year-round climate. The US average for the comfort index is 54. Our index is based on the total number of days annually within the comfort range of 70-80 degrees, and we also applied a penalty for days of excessive humidity.

West University Place gets some kind of precipitation, on average, 66 days per year.

28.2.4 Governing Body Format

The City of West University Place is a home rule City with a Council-Manager form of government. The City Council consist of a Mayor and four council members. The City Council appoints a City Manager to oversee the daily operations of the City. The City consist of 6 departments: Administration, Finance, Fire, Police, Public Works, Parks and Recreation. The City Council assumes responsibility for the adoption of this plan; the City Manager will oversee its implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 28-1. Appropriate staff members were instructed to fill out the sections that applied to them.

Table 28-1. Local Mitigation Planning Team Members

Name	Title
Aaron Taylor	Fire Chief/ EMC
James Novak	Fire Marshal/ Asst. Chief
Dave Beach	Public Works Director/ ACM
Clay Chew	Chief Building Official

28.3 CURRENT TRENDS

28.3.1 Population

According to The U.S. Census Bureau, the population of West University Place, Texas as of July 1, 2017 was 15,608. Since 2010, the population has grown at an average annual rate of 7.2% percent.

28.3.2 Development

Anticipated development levels for West University Place are low to moderate, consisting of primarily residential development. The vast majority of recent development has been infill. Residentially, there has been a focus on upscale housing units with large increases in square footage. The number of residential new construction permits are:

- November 2018 YTD: 59
- 2017 Totals: 47
- 2016 Totals: 38
- 2015 Totals: 58
- 2014 Totals: 67
- 2013 Totals: 63

Table 28-2 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

Table 28-2. Recent and Expected Future Development Trends

Criterion	Response					
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan? • **If yes, give the estimated area annexed and estimated number of parcels or structures.**	No					
Is your jurisdiction expected to annex any areas during the performance period of this plan? • **If yes, describe land areas and dominant uses.** • **If yes, who currently has permitting authority over these areas?**	No					
Are any areas targeted for development or major redevelopment in the next five years? • **If yes, briefly describe, including whether any of the areas are in known hazard risk areas**	No					
How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?		**2014**	**2015**	**2016**	**2017**	**2018**
	Single Family	67	58	38	47	59
	Multi-Family	0	0	0	0	0
	Other (commercial, mixed use, etc.)	1	1	0	0	0
	Total	**68**	**59**	**38**	**47**	**59**
Provide the number of new-construction permits for each hazard area or provide a qualitative description of where development has occurred.	• Special Flood Hazard Areas: 33 • Landslide: 0 • High Liquefaction Areas: 0 • Tsunami Inundation Area: 0 • Wildfire Risk Areas: 0					
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	West University Place is fully developed					

28.4 CAPABILITY ASSESSMENT

The City of West University Place performed an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities is presented in Table 28-3.
- Development and permitting capabilities are presented in Table 28-4.
- An assessment of fiscal capabilities is presented in Table 28-5.
- An assessment of administrative and technical capabilities is presented in Table 28-6.
- An assessment of education and outreach capabilities is presented in Table 28-7.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 28-8.
- Classifications under various community mitigation programs are presented in Table 28-9.
- The community's adaptive capacity for the impacts of climate change is presented in Table 28-10.

Findings of the capability assessment were reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table in Section 28.10 identifies these as community capacity building mitigation actions.

Table 28-3. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code	Yes	No	Yes	Yes
Comment: *Appendix C of the Code of Ordinances*				
Zoning Code	Yes	No	No	Yes
Comment: *Appendix A of the Code of Ordinances*				
Subdivisions	Yes	No	No	Yes
Comment: *Chapter 74 of the Code of Ordinances*				
Stormwater Management	Yes	Yes	Yes	Yes
Comment: *Stormwater Management Plan is completed every 5 year and submitted to the TCEQ.*				
Post-Disaster Recovery	Yes	No	Yes	No
Comment: *Debris Hauling and Debris Monitoring contracts are in place.*				
Real Estate Disclosure	No	No	Yes	No
Comment: *Don't have a local requirement for it but the state does and that affects the realtors here.*				
Growth Management	No	No	No	No
Comment: *No Growth in West U*				
Site Plan Review	Yes	No	No	No
Comment: *Chapter 18 of the Code of Ordinances*				
Environmental Protection	No	Yes	Yes	No
Comment: *Harris County Public Health*				
Flood Damage Prevention	Yes	Yes	Yes	Yes
Comment: *Integration opportunity with HCFCD*				
Emergency Management	Yes	No	Yes	Yes
Comment: *(Ord. No. 1850, § 6, 8-13-07) Signatory city under the Harris County EM Plan*				
Climate Change	No	No	No	No
Comment:				
Planning Documents				
General Plan	No	No	No	No
Comment:				
Capital Improvement Plan	Yes	No	No	Yes
How often is the plan updated?				
Comment: *Annually*				
Disaster Debris Management Plan	Yes	No	No	No
Comment: *Contract is in place to handle debris*				
Floodplain or Watershed Plan	No	Yes	Yes	Yes
Comment: *Braes Bayou Watershed managed by HCFCD*				
Stormwater Plan	Yes	Yes	Yes	Yes
Comment: *Stormwater Management Plan and SWPPP*				
Urban Water Management Plan	No	No	Yes	No
Comment:				
Habitat Conservation Plan	No	No	No	No
Comment:				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Economic Development Plan	No	No	No	No
Comment: *City is built out*				
Shoreline Management Plan	No	No	No	No
Comment: *No shoreline here*				
Community Wildfire Protection Plan	No	No	No	No
Comment: *No forests*				
Forest Management Plan	No	No	No	No
Comment:				
Climate Action Plan	No	No	No	No
Comment:				
Comprehensive Emergency Management Plan	Yes	Yes	Yes	Yes
Comment: *(Ord. No. 1850, § 6, 8-13-07) Signatory city under the Harris County EM Plan*				
Threat & Hazard Identification & Risk Assessment (THIRA)	No	No	No	No
Comment:				
Post-Disaster Recovery Plan	Yes	No	Yes	Yes
Comment: *Contracts in place for debris hauling and debris monitoring. Plan reviewed annually*				
Continuity of Operations Plan	Yes	No	No	No
Comment: *Updated March 2019*				
Public Health Plan	No	No	No	No
Comment:				

Table 28-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • **If no, who does? If yes, which department?**	Yes Public Works – Development Services Division
Does your jurisdiction have the ability to track permits by hazard area?	No
Does your jurisdiction have a buildable lands inventory?	No

Table 28-5. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes (Water, Sewer, Solid Waste Collection, Permits)
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	No
Withhold Public Expenditures in Hazard-Prone Areas	No
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes

Table 28-6. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	City Planner/Building Official
Engineers or professionals trained in building or infrastructure construction practices	Yes	PW Director, Asst. PW Director, Operations Superintendent, Chief Building Official, Planner
Planners or engineers with an understanding of natural hazards	Yes	(outsourced)
Staff with training in benefit/cost analysis	Yes	Assistant Public Works Director
Surveyors	Yes	(outsourced)
Personnel skilled or trained in GIS applications	Yes	City Information Technology Department
Scientist familiar with natural hazards in local area	No	
Emergency manager	Yes	Fire Chief
Grant writers	Yes	Contracted with DCMC Partners for mitigation grant writing and management

Table 28-7. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • **If yes, briefly describe.**	No
Do you use social media for hazard mitigation education and outreach? • **If yes, briefly describe.**	Yes – Issue dependent
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • **If yes, briefly describe.**	No
Do you have any other programs already in place that could be used to communicate hazard-related information? • **If yes, briefly describe.**	Yes Swift911 Mass Notification System
Do you have any established warning systems for hazard events? • **If yes, briefly describe.**	Yes Swift911 Mass Notification System

Table 28-8. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Public Works – Development Services
Who is your floodplain administrator? (department/position)	Clay Chew – Chief Building Official
Are any certified floodplain managers on staff in your jurisdiction?	Yes
What is the date that your flood damage prevention ordinance was last amended?	2018
Does your floodplain management program meet or exceed minimum requirements? • **If exceeds, in what ways?**	Exceeds 24 inch Freeboard Requirement Article IX Flood Damage Prevention
When was the most recent Community Assistance Visit or Community Assistance Contact?	CAV November 13, 2018
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • **If so, state what they are.**	No
Are any RiskMAP projects currently underway in your jurisdiction? • **If so, state what they are.**	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • **If no, state why.**	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? • **If so, what type of assistance/training is needed?**	No
Does your jurisdiction participate in the Community Rating System (CRS)? • **If yes, is your jurisdiction interested in improving its CRS Classification?** • **If no, is your jurisdiction interested in joining the CRS program?**	Yes Yes
How many flood insurance policies are in force in your jurisdiction?[a] • **What is the insurance in force?** • **What is the premium in force?**	3358 $1,644,530 $490.00
How many total loss claims have been filed in your jurisdiction?[a] • **How many claims are still open or were closed without payment?** • **What were the total payments for losses?**	Zero Zero $3,441,439

a. According to FEMA statistics as of June 30, 2018

Table 28-9. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	Yes	7	2019
Building Code Effectiveness Grading Schedule	Yes	4/4	2014
Public Protection	Yes	Class 1	02/01/2015
Storm Ready	No		
Firewise	No		

Table 28-10. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:***	Low
Jurisdiction-level monitoring of climate change impacts ***Comment:***	Low
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:***	Low
Participation in regional groups addressing climate risks ***Comment:***	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	Low
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	Low
Identified strategies for adaptation to impacts ***Comment:***	Low
Champions for climate action in local government departments ***Comment:***	Low
Political support for implementing climate change adaptation strategies ***Comment:***	Low
Financial resources devoted to climate change adaptation ***Comment:***	Low
Local authority over sectors likely to be negative impacted ***Comment:***	Low
Public Capacity	
Local residents knowledge of and understanding of climate risk ***Comment:***	Medium
Local residents support of adaptation efforts ***Comment:***	Low
Local residents' capacity to adapt to climate impacts ***Comment:***	Low
Local economy current capacity to adapt to climate impacts ***Comment:***	Low
Local ecosystems capacity to adapt to climate impacts ***Comment:***	Low

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

28.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning and capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

28.5.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- **Harris County Flood Control District** — Floodplain/Watershed Management
- **Harris County Office of Emergency Management and Homeland Security –** Emergency Management Program
- **City of West University –** Community Improvement Plan(Capital Improvement Plan)

28.5.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- **Zoning Code** – To integrate mitigation measures identified in the plan into future zoning considerations.

28.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 28-11 lists past occurrences of natural hazards for which specific damage was recorded in The City of West University Place. Other hazard events that broadly affected the entire planning area, including West University Place, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

28.7 HAZARD RISK RANKING

Table 28-12 presents a local ranking for The City of West University Place of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

28.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. This section provides information on a few key vulnerabilities for the jurisdiction. Available jurisdiction-specific risk maps of the hazards are provided at the end of this annex.

Table 28-11. Past Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Severe Storms	N/A	April 7 2019	Severe Storms and high winds damaged several residential properties and required activation of debris hauler to clear vegetation from public right of way. Damage estimated at $100,000
Hurricane Harvey	DR 4332	2017	Estimated $500,000 in Public Assistance, Damage assessment cost to private property unknown.
Severe Storms/Flooding	DR 4269	2016	N/A
Severe Storms/Flooding	DR 4223	2015	N/A
Hurricane Ike	EM 3294	2008	N/A
Hurricane Gustav	EM 3290	2008	N/A
Tropical Storm Erin	DR 1730	2007	N/A
Hurricane Dean	EM 3277	2007	N/A
Hurricane Rita	EM 3261	2005	N/A
Hurricane Katrina	EM 3216	2005	N/A
Tropical Storm Allison	DR 1379	2001	N/A
Severe Storms/Flooding	SBA 3259	2000	N/A
Severe Storms/ Flooding	DR 1257	1998	N/A
Tropical Storm Frances	DR 1245	1998	N/A
Severe Storms/Flooding	DR 1041	1994	N/A
Severe Storms/Tornado	SBA 8253	1994	N/A
Severe Storms/Tornado	DR 970	1992	N/A

Table 28-12. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Severe Weather	48	High
2	Hurricane	32	High
3	Flooding	22	Medium
4	Earthquake	14	Low
5	Drought	6	Low
5	Mass Movement	6	Low
6	Dam Failure	0 (No Exposure)	None
6	Wildfire	0 (No Exposure	None
6	Tsunami	0 (No Exposure)	None
6	Coastal Erosion	0 (No Exposure)	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

28.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: 35
- Number of FEMA-identified Severe-Repetitive-Loss Properties: 3
- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated: 1

Mitigation actions addressing these issues were prioritized for consideration in the action plan presented in this annex.

28.9 STATUS OF PREVIOUS PLAN ACTIONS

Table 28-13 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

Table 28-13. Status of Previous Plan Actions

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
Improvements to storm water drainage system in the 3800 block from University Blvd. south to Bellaire Blvd. The Auden Street Drainage Improvements limits are on Auden Street from University Blvd. to Bellaire Blvd. The improvements consist of storm sewer improvements ranging from 42" RCP to 72" RCP and the replacement of 1/2 curb and gutter concrete street.	No		X	WUP-11
Comment:				
Raising concrete walls around head works at the wastewater treatment plant to mitigate future flood water inundation. Currently the headworks is below base flood elevation allowing flood water to overtop the walls and inundate the headworks, raising the walls would reduce the likelihood of shut down due to flood waters.	No	X		
Comment: This action item has been revised to allow additional mitigation options for the facility. The new action item is WUP-6.				
Ruffino Hills Flood Detention – The City owns approximately 75 acres of land near the I-69 South/BW 8 interchange (adjacent to approximately another 75 acre tract owned by the City of Bellaire) that could be used for flood control detention space. The site operated as a landfill from 1959 to Jan 1992. This site is adjacent to Keegans Bayou which is one of the largest contributors of water to the Brays Bayou. Both cities are proposing to use their 75 acres toward flood mitigation for a total of 150 acres. The proposed regional detention facility will provide up to 1,770 acre-feet of storage, allowing storm water to be diverted out of Keegans Bayou and reducing storm flow rates in the lower reaches of that stream and along Brays Bayou downstream of the Keegans Bayou confluence. Preliminary modeling results indicate that 100-year (1% chance) flow rates along Keegans may be reduced by as much as 1,800 cubic feet per second, while Brays Bayou flow rates may be reduced by as much as 1,500 cubic feet per second. This project represents a regional drainage solution that will benefit the City of West University Place, the City of Bellaire, the City of Houston, and unincorporated areas within Harris County. Potential stakeholders and project participants include those entities as well as the Harris County Flood Control District.	No	X		
Comment: This action item is being removed and replaced with a broader action item to allow pursuit of detention space in more than one location. The new related action item is WUP-7.				
Reduce the potential for wildfires along the Union Pacific rail line through improved control of vegetation adjacent to the railroad tracks.	No	X		
Comment: Existing action item removed due to a change in community priorities.				
Expand mass notification warning systems to notify residents of impending dangers and increase coverage of the community's population.	Yes	X		
Comment: Completed in 2015				
Installation of emergency generator at the West University/Harris County Public Library to ensure continuity of operation for warming/cooling center.	No	X		
Comment: Existing action item removed due to a change in community priorities.				

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
Home Elevations – 10 homes or less; raise elevation of repetitive loss structures above base flood elevation. The City is interested in assisting interested residents in mitigating flood risk of existing structures by raising the foundation above base flood elevation. Specific mitigation sites have not yet been identified.	No	X		
Comment: Existing action item removed due to Action Item WUP-1 addressing retrofitting to include home elevations.				
Improvements to storm water drainage along the Buffalo Speedway Corridor from Bellefontaine Street in Houston north through West University Place and continuing up to the south ROW for the Interstate 69 corridor at Buffalo Speedway and including areas east and west of this described corridor to extend the drainage area by adding a 2nd 66 inch monolithic concrete pipe in addition to replacing the existing 66 in monolithic concrete pipe.	No		X	WUP-10
Comment: Carried over to plan update. The City has applied for HMGP and CDBG-DR grant funding for the project. Engineering contract has been awarded.				
Improve Ruskin Street storm water drainage infrastructure by installing new roadway with improved curb and gutters. Install underground piping to increase underground detention capacity. Will include installation of additional inlets and catch basins.	Yes	X		
Comment: Completed in 2015				
Adopt latest edition and higher standard Building Codes, Zoning / City / Storm Water Ordinances for Mitigation of Riverine Flood Hazards.	Yes	X		
Comment: Completed in 2018. Ongoing. This action item has been modified and titled WUP-9 in the plan update.				
Develop/implement and harden an alternative ground-water source to limit the damages of water shortages caused by drought	Yes	X		
Comment: Completed in 2016;				
Develop/implement tree management program to reduce potential debris damages from high-wind and canopy crown-fires.	Yes	X		
Comment: Completed in 2018. Tree Management and Debris reduction are also addressed in WUP-2 in the plan update.				
Develop/implement hail public education program to educate the public on hail hazards and appropriate actions to take to reduce hail damages to property.	No	X		
Comment: Not currently a priority for the City.				
Establish / Expand GIS Mapping / Identification of Pipeline Risk Areas.	No	X		
Comment: Existing action item removed due to a change in community priorities.				
Conduct Pipeline Awareness Training & Pre-Planning for Local Responders.	Yes	X		
Comment: Completed				

28.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 28-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 28-15 identifies the priority for each action. Table 28-16 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 28-14. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action WUP1 — Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding						
Existing	3, 4, 10, 11, 12	West University Place – EMC	West University Place – Public Works	High	HMGP, PDM, FMA	Short-term
Action WUP2 — Integrate the hazard mitigation plan into other plans, ordinances and programs that dictate land use decisions in the community, including Zoning Ordinances.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding						
New and Existing	1, 3, 4, 5, 7, 8, 9, 10	West University Place – Public Works	West University Place – EMC	Low	Staff Time, General Funds	Ongoing
Action WUP3 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Earthquake, Drought, Mass Movement						
New and Existing	1, 5, 8	West University Place – EMC	West University Place – Hazard Mitigation Planning Team	Low	Staff Time, General Funds	Short-term
Action WUP4 — Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements: • Enforce the flood damage prevention ordinance. • Participate in floodplain identification and mapping updates. • Provide public assistance/information on floodplain requirements and impacts.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding						
New and Existing	1, 3, 5, 7, 10, 15	West University Place – Public Works Chief Building Official		Low	Staff Time, General Funds	Ongoing
Action WUP5 — Improvements to storm water drainage system in planning areas 1-12 as outlined in the 2019 Citywide Drainage Study to increase capacity and reduce flood hazard.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding						
New and Existing	3, 4, 7, 11, 12	West University Place – Public Works		High	HMGP, PDM, FMA	Long Term
Action WUP6 — Enhance flood water protection for the City's Wastewater Treatment Plant to reduce the likelihood of shut down due to flood waters.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding						
New and Existing	3, 4, 7, 9, 10, 11, 13, 15	West University Place – Public Works		Medium	HMGP, PDM, FMA	Short Term
Action WUP7 — Coordinate with Harris Flood Control District to obtain flood water detention space within the Brays Watershed to reduce the likelihood of flooding.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding						
New	3, 4, 11, 12, 14, 15	West University Place – Public Works		High	HMGP, PDM, FMA	Short Term
Action WUP8 — Seek opportunities to relocate above ground utilities to harden infrastructure and reduce impacts of severe weather events and/or disruption of City services.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Earthquake						
New and Existing	4, 11, 13	West University Place – Public Works		High	HMGP, PDM, FMA	Long Term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action WUP9 — Adopt latest edition and higher standard Building Codes, Zoning / City / Storm Water Ordinances for Mitigation of Flood Hazards.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Earthquake						
New and Existing	3, 4, 7, 9, 10, 11, 12, 14, 15	West University Place-Public Works		Low	Staff Time, General Funds	Ongoing
Action WUP10 — Improvements to storm water drainage along the Buffalo Speedway Corridor from Bellefontaine Street in Houston north through West University Place and continuing up to the south ROW for the Interstate 69 corridor at Buffalo Speedway and including areas east and west of this described corridor to extend the drainage area by adding a 2nd 66 inch monolithic concrete pipe in addition to replacing the existing 66 in monolithic concrete pipe						
Hazards Mitigated: Severe Weather, Hurricane, Flooding						
New and Existing	3, 4, 9, 10, 11, 13	West University Place – Public Works		High	HMGP, PDM, FMA, CDBG-DR, Municipal Bonds	Short Term
Action WUP11 — Improvements to storm water drainage system in the 3800 block from University Blvd. south to Bellaire Blvd. The Auden Street Drainage Improvements limits are on Auden Street from University Blvd. to Bellaire Blvd. The improvements consist of storm sewer improvements ranging from 42" RCP to 72" RCP and the replacement of 1/2 curb and gutter concrete street.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding						
New and Existing	3, 4, 9, 10, 11, 13	West University Place – Public Works		High	HMGP, PDM, FMA, CDBG-DR, Municipal Bonds	Short Term
Action WUP12 — Academy Street Drainage – Improvements to storm water drainage system in the 4100 block from Bissonnet St. south to the discharge for Academy trunk line to reduce the likelihood of flooding.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding						
New and Existing	3, 4, 9, 10, 11, 13	West University Place – Public Works		High	HMGP, PDM, FMA, CDBG-DR, Municipal Bonds	Long Term
Action WUP13 – Coordinate with Harris County Flood Control District and the City of Southside Place to improve storm water drainage and increase capacity along the drainage easement containing Poor Farm Ditch to reduce the likelihood of flooding.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding						
New and Existing	3, 4, 7, 10, 11, 15	Harris County Flood Control District	West University Place, Southside Place	High	HMGP, PDM, FMA, CDBG-DR, Municipal Bonds	Short Term
Action WUP14— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Earthquake, Drought, Mass Movement						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	City Administration	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 28-15. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
WUP1	5	High	High	Yes	Yes	No	Medium	High
WUP2	8	Medium	Low	Yes	No	Yes	High	Low
WUP3	3	Low	Low	Yes	No	Yes	High	Low
WUP4	6	Medium	Low	Yes	No	Yes	High	Low
WUP5	5	High	High	Yes	Yes	No	Medium	High
WUP6	8	High	Medium	Yes	Yes	No	Medium	High
WUP7	6	High	High	Yes	Yes	No	Medium	High
WUP8	3	High	High	Yes	Yes	No	Low	Medium
WUP9	9	Medium	Low	Yes	No	Yes	High	Low
WUP10	6	High	High	Yes	Yes	No	Medium	High
WUP11	6	High	High	Yes	Yes	No	Medium	High
WUP12	6	High	High	Yes	Yes	No	Medium	High
WUP13	6	High	High	Yes	Yes	No	Medium	High
WUP14	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 28-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Severe Weather	WUP-1, 3, 4, 9, 14	WUP-1, 5, 6, 7, 8, 10, 11, 12, 13	WUP-2, 3, 4, 5, 14	WUP-6	WUP-5, 6, 7, 8, 10, 11, 12, 13, 14	WUP-5, 6, 7, 10, 11, 12, 13	WUP-9	WUP-2, 3, 9, 14
Hurricane	WUP-1, 3, 4, 9, 14	WUP-1, 5, 6, 7, 8, 10, 11, 12, 13	WUP-2, 3, 4, 5, 14	WUP-6	WUP-5, 6, 7, 8, 10, 11, 12, 13, 14	WUP-5, 6, 7, 10, 11, 12, 13	WUP-9	WUP-2, 3, 9, 14
Medium-Risk Hazards								
Flood	WUP-1, 3, 4, 9, 14	WUP-1, 5, 6, 7, 8, 10, 11, 12, 13	WUP-2, 3, 4, 5, 14	WUP-6	WUP-5, 6, 7, 8, 10, 11, 12, 13, 14	WUP-5, 6, 7, 10, 11, 12, 13	WUP-9	WUP-2, 3, 9, 14
Low-Risk Hazards								
Mass Movement	WUP-1, 3, 4, 9, 14	WUP-1, 5, 6, 7, 8, 10, 11, 12, 13	WUP-2, 3, 4, 5, 14	WUP-6	WUP-5, 6, 7, 8, 10, 11, 12, 13, 14	WUP-5, 6, 7, 10, 11, 12, 13	WUP-9	WUP-2, 3, 9, 14
Earthquake	WUP14		WUP14		WUP14			WUP14
Drought	WUP14		WUP14		WUP14			WUP14

a. See the introduction to this volume for explanation of mitigation types.

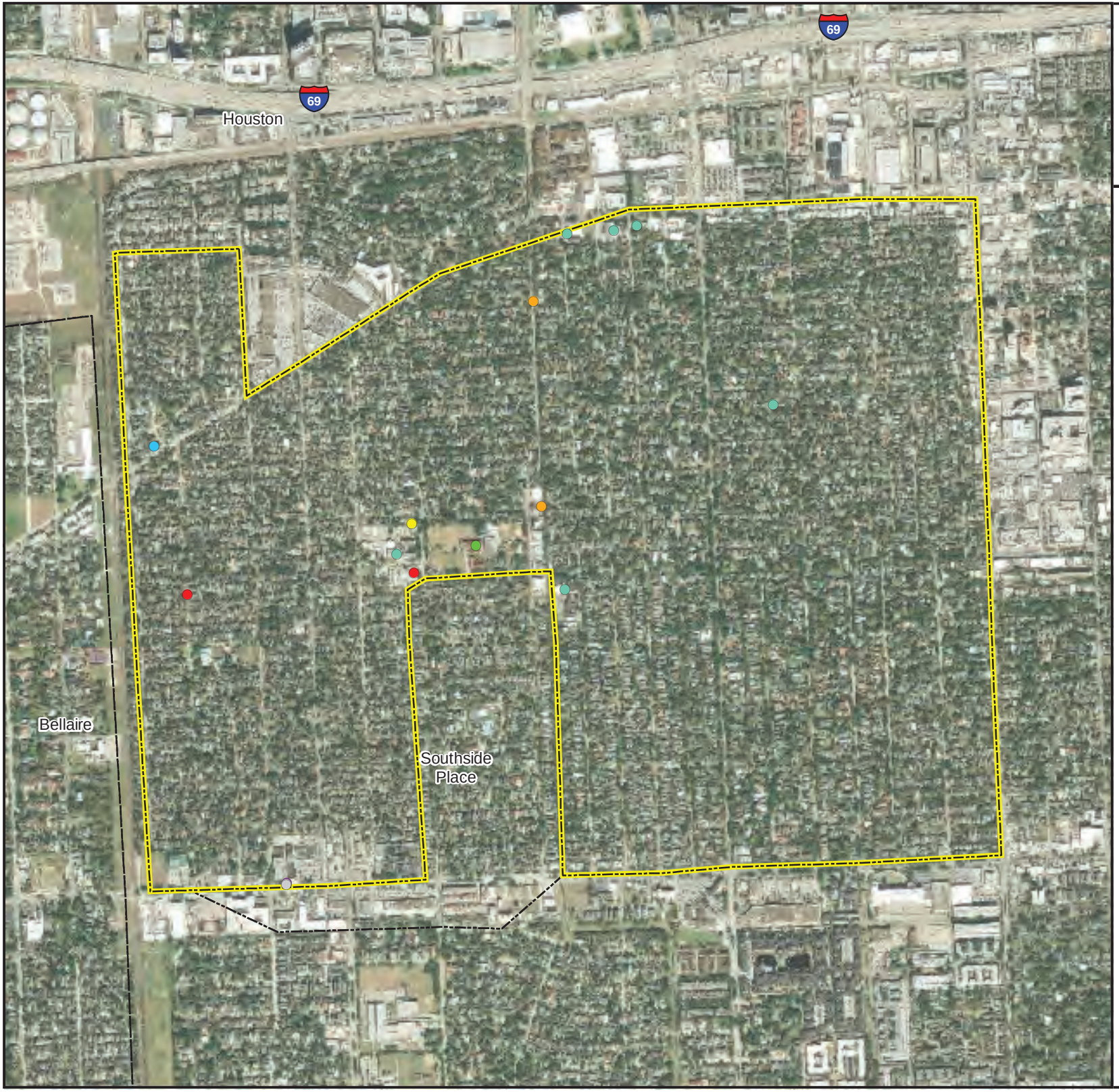
28.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- **City of West University Place Municipal Code** — The municipal code was reviewed for the full capability assessment and for identifying opportunities for action plan integration.
- **City of West University Place Flood Damage Prevention Ordinance** — The flood damage prevention ordinance was reviewed for compliance with the National Flood Insurance Program.
- **City of West University Place –** Citywide Drainage Study
- **City of West University Place –** Community Improvement Plan

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.
- **FEMA Disaster History Data, CRS & NFIP requirements**.



West University Place

Critical Facilities

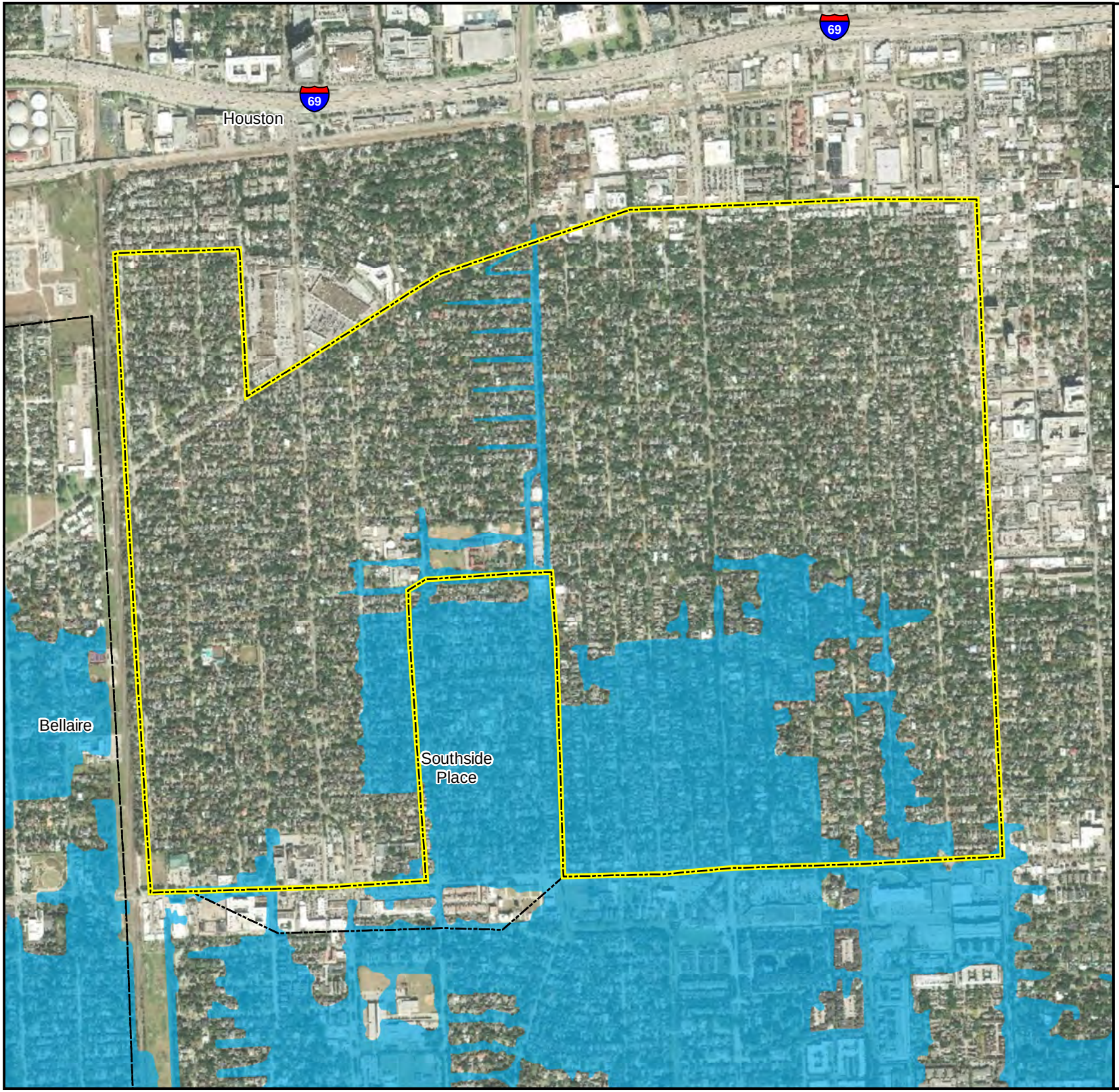
- Education Facilities
- Emergency Services
- Government Facilities
- Hazardous Material Sites
- Health and Medical Facilities
- Historical and Cultural Sites
- Transportation Systems
- Utility Systems
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3 Miles



West University Place

FEMA Flood Hazard

1% Annual Chance Flood (100-yr)

Incorporated Cities

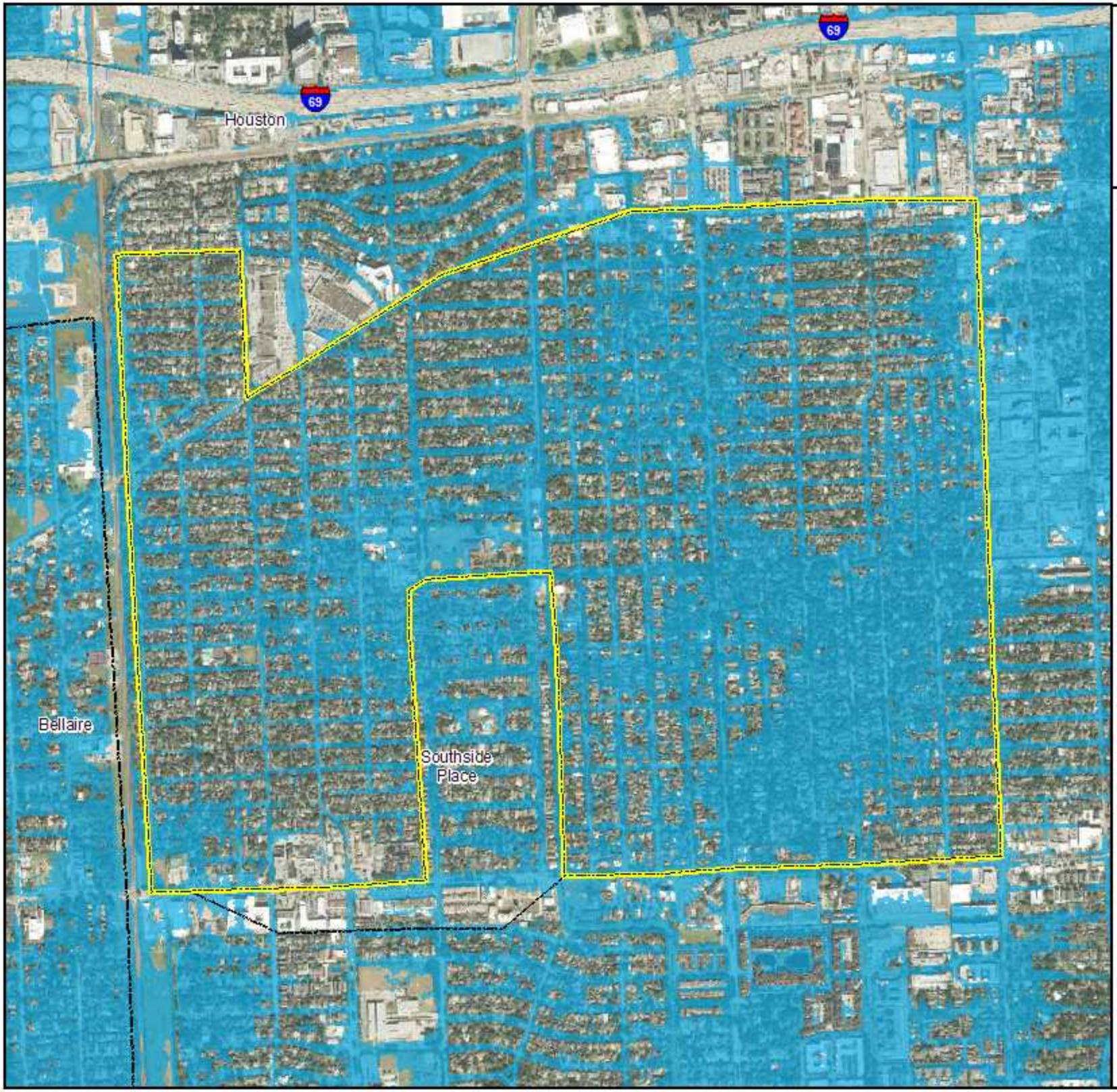
Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3
Miles



West University Place

Flood Hazard
Hurricane Harvey

Flooding Extent

Incorporated Cities

Harris County

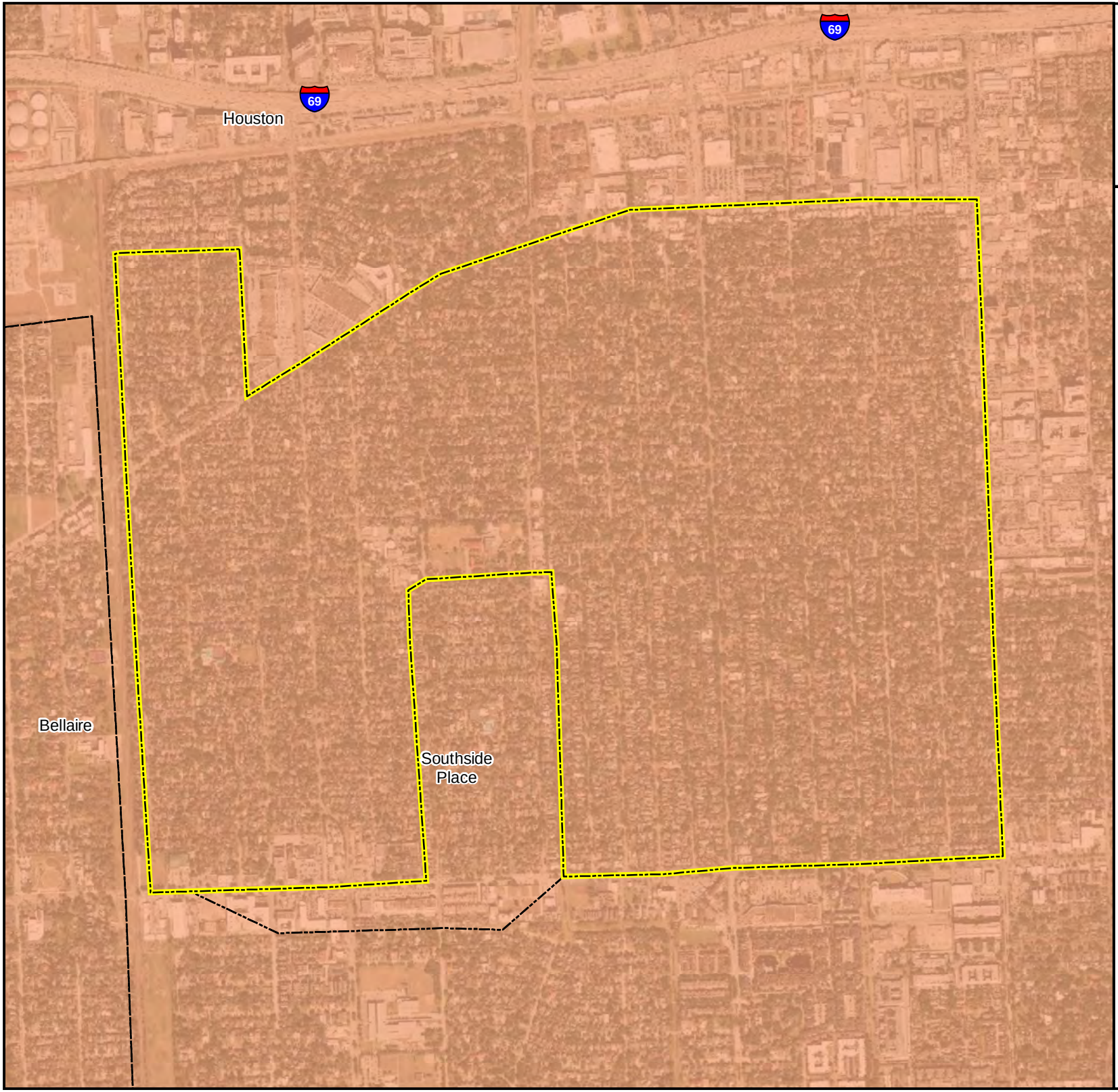
Note: Flooding extent shown for Hazard Mitigation Plan planning area only.

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3
Miles



West University Place

Hurricane Alicia (1983)

Peak WInd Gust (mph)

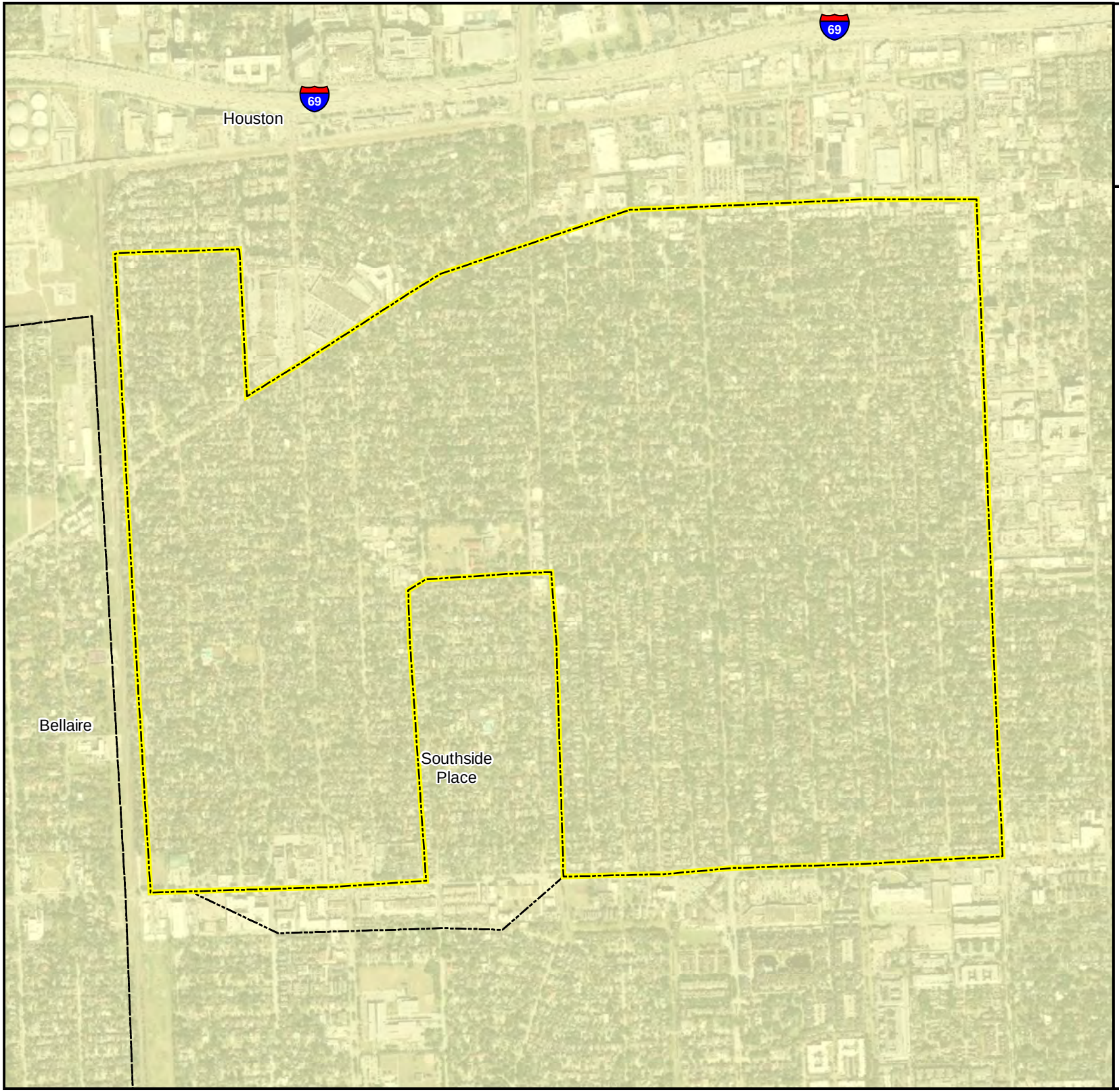
- 87 - 94
- 95 - 98
- 99 - 101
- 102 - 104
- 105 - 110
- Storm Track
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3 Miles



West University Place

20-year Probabilistic Hurricane

Peak Wind Gust (mph)

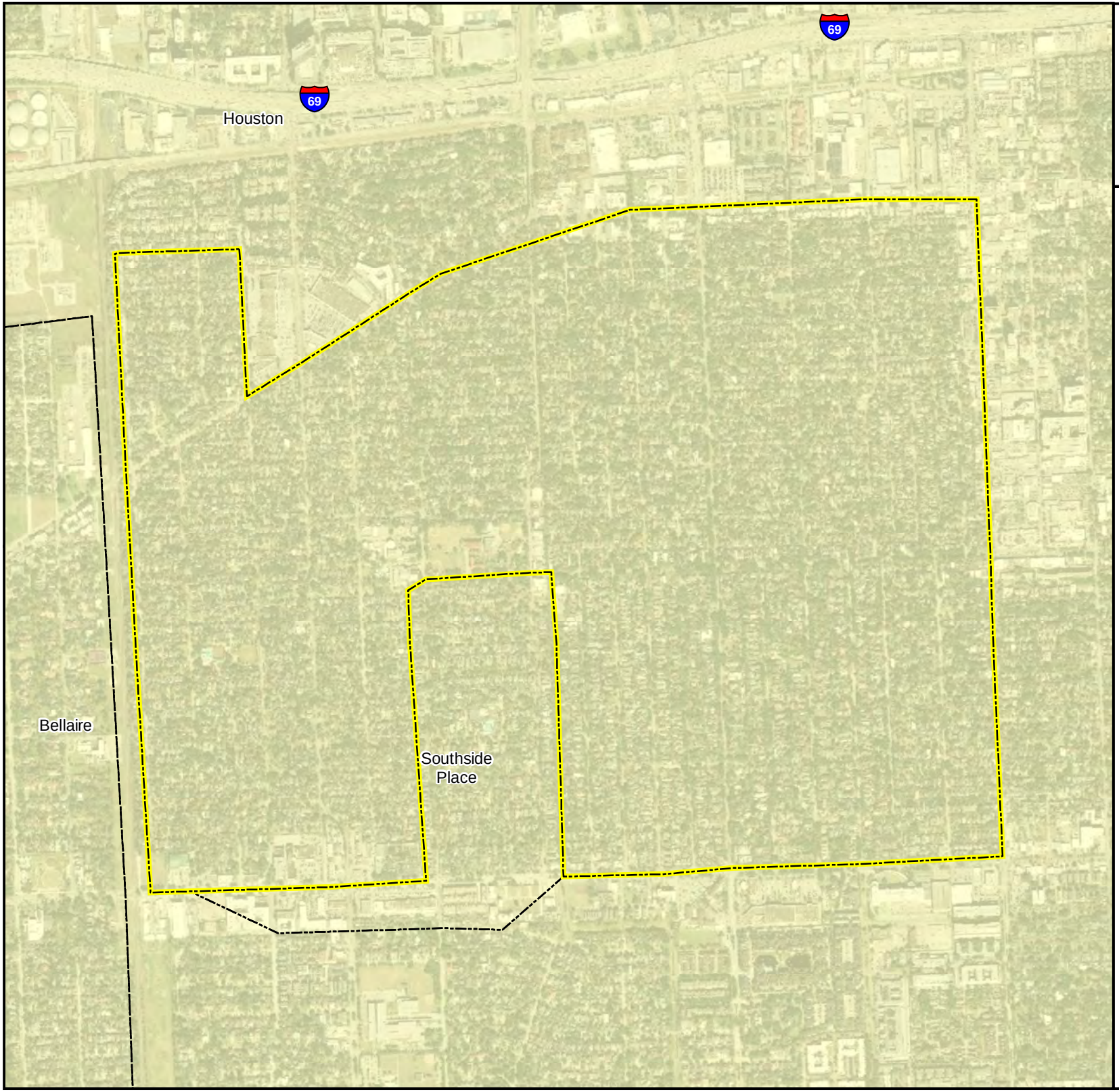
- 63 - 71
- 72 - 76
- 77 - 80
- 81 - 84
- 85 - 92
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3 Miles



West University Place

100-year Probabilistic Hurricane

Peak Wind Gust (mph)

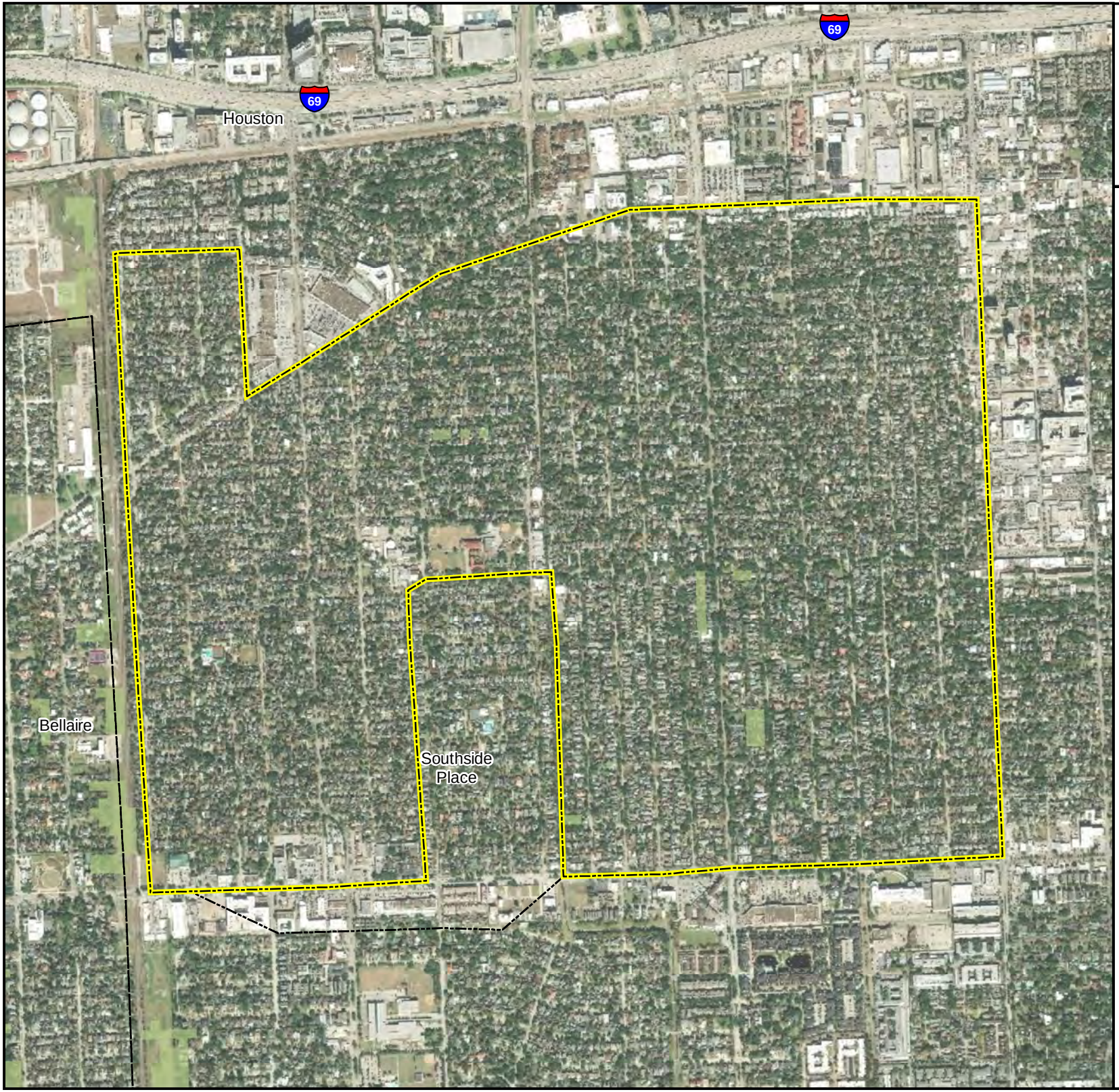
- 89 - 101
- 102 - 106
- 107 - 111
- 112 - 117
- 118 - 128
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3 Miles



West University Place

Wildfire Ignition Density

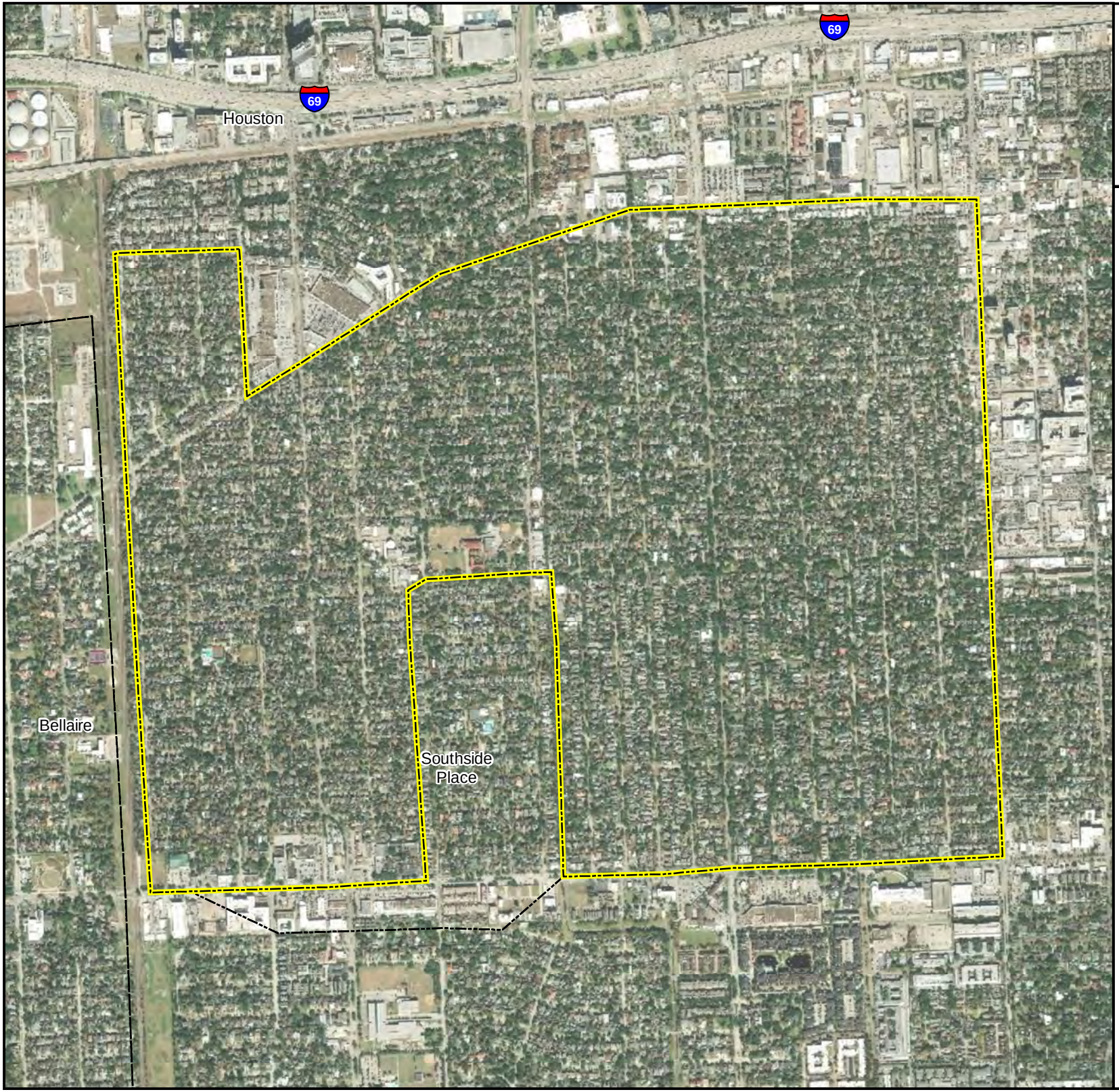
- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3
Miles



West University Place

Wildfire Threat

- 1 (Low)
- 2
- 3 (Moderate)
- 4
- 5 (High)
- 6
- 7 (Very High)
- Incorporated Cities
- Harris County

HARRIS COUNTY TEXAS

TETRA TECH

N

0 0.075 0.15 0.3
Miles

29. HOUSTON INDEPENDENT SCHOOL DISTRICT

29.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Wm. Earl Finley
6351 Pinemont Street
Houston, Texas 77092
Telephone: 713-556-9225
email Address: wfinley@houstonisd.org or
email Address: RiskManagement@houstonisd.org

Alternate Point of Contact
Robert Cage
6351 Pinemont Street
Houston, Texas 77092
Telephone: 713-556-9225
email Address: RCageJr@houstonisd.org or
email Address: RiskManagement@houstonisd.org

29.2 JURISDICTION PROFILE

29.2.1 Overview

The Houston Independent School District (HISD) is the largest school district in Texas and the seventh largest school district in America. HISD was established in 1923 by the Texas Legislature. HISD encompasses 333 square miles within greater Houston. Over 209,000 students attend HISD's 280 schools, and over 27,000 employees work for the district. HISD has the lowest property taxes of all the school districts in Harris County. The sources of district funding are the state of Texas, local property taxes, bonds, and grants. The district has 53 dual-language schools and 44 schools listed on U.S. News and World Reports Best High Schools in America; 92 percent of HISD's schools received *a met standard* rating on the state's accountability system, and 90.7 percent of HISD's highly effective teachers have been retained. HISD has the highest credit rating — AAA — from Moody's rating service, and is rated AA+ by Standard and Poor's.

The Houston Independent School District assumes responsibility for the adoption of this plan; the HISD Board or its designee will oversee the plan's implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 29-1.

Table 29-1. Local Mitigation Planning Team Members

Name	Title
Wm Earl Finley	HISD Senior Manager of Risk Management
Robert Cage	HISD Field Safety Team Leader

1.2.2 Service Area and Trends

HISD's service area covers 333 square miles within greater Houston, serving a population of 209,000 students with over 27,000 employees. The districts customers are our students, our parents, and our community where all our schools reside. After Hurricane Harvey the number of students attending HISD declined. The number of students attending will likely remain level or the same due to there are many families that are still displaced from their homes working with FEMA and other sources of funding to have their homes rebuilt.

29.2.2 Assets

Table 29-2 summarizes the critical assets of the district and their value.

Table 29-2. Special Purpose District Assets

Asset	Value
Property	
All – School, Non-School Buildings, and Property	$5,154,473,535
Equipment	
1200 Buses	$96,448,308
SUVS	$2,135,291
Trucks, Various Types – Bobtail (Dry & Ref), Box, Flatbed, Stahl Body, Pick-up, Stake Bed, Welding, Wrecker, etc.	$14,057,484
Vans – Various – Cargo, Crew, Cutaway, Passenger, Stahl Body	$9,425,594
Other – 53 Generators (+3 very large mounted generators)	$1,436,552*
Other – 25 Trailers, Flatbed and 44 Trailers, Enclosed	$1,258,629*
Other – 8 Backhoes	$358,912*
Other – 15 Tractors	$544,830*
Other – 29 Forklifts	$681,529*
Other – 2 Bulldozers	—
Total:	**$5,263,899,258**
Critical Facilities and Infrastructure for Response	
Transportation Department	Included Above
Nutrition Services Department	Included Above
Facility Services Department	Included Above
Hattie Mae White Administration Bldg.	Included Above
Senior Staff	Included Above
Communications Department	Included Above
IT Department	Included Above
Police Department	Included Above

* Averaged Value for Total $ Entered

29.3 CAPABILITY ASSESSMENT

An assessment of the district's current capabilities was conducted to identify opportunities to expand, initiate or integrate capabilities in order to facilitate hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table in Section 29.9 identifies these as community capacity building mitigation actions.

29.3.1 Planning and Regulatory Capabilities

Jurisdictions develop plans and programs and implement rules and regulations to protect and serve residents. When effectively prepared and administered, these plans, programs and regulations can support the implementation of mitigation actions. Table 29-3 summarizes existing codes, ordinances, policies, programs or plans that are applicable to this hazard mitigation plan.

Table 29-3. Planning and Regulatory Capability

Plan, Study or Program	Date of Most Recent Update	Comment
Emergency Operations Plan (EOP)	July 2018	Each School or Non-School location must also have their own Emergency Operations Plan. National Incident Management System (NIMS)
Hurricane Preparedness Guide Protocols and Procedures – Districtwide	May 2019	Pre-storm, During Storm, After Storm Recovery National Incident Management System (NIMS)
District Design Standards	Nov 2018	
District Facility Assessment	2016	
District Capital Improvement Plan	2012	
Refuge of Last Resort	2019-2020	Agreement with City of Houston to Make Available Seven Schools to use as a refuge of last resort in an emergency.
NFIP Policies in Place for flood zone properties	April 2019	Elevation Certificates on File for All Properties in the Flood Zone Covered by NFIP
Applicable City/County/State/Federal Codes or Standards:	Various	Must include any and all Americans with Disabilities Act (ADA) related codes and regulations.
>Detention Ponds	As or When Applicable	City/County Codes
>Elevating Property at Four Elementary Schools, Located in the Flood Zone Substantially Damaged as a Result of Hurricane Harvey.	In Progress	Braeburn Elem.., Kolter Elem., Mitchell, Elem., and Scarborough Elem. are the four schools being rebuilt and elevated per city code.
Addition of and/or Replacement of Generators at Key Support Facilities Within the District Requiring Emergency Power.	2016	Planned addition/replacement or when unforeseen damage or breakdown occurs supporting replacement rather than repair.
Applicable Houston ISD Board Policies Related to Safety, Health, and Environmental	Various	

29.3.2 Fiscal, Administrative and Technical Capabilities

Fiscal capability is an indicator of a jurisdiction's ability to fulfill the financial needs associated with hazard mitigation projects. An assessment of fiscal capabilities is presented in Table 29-4. Administrative and technical capabilities represent a jurisdiction's staffing resources for carrying out the mitigation strategy. An assessment of administrative and technical capabilities is presented in Table 29-5.

Table 29-4. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Capital Improvements Project Funding	No
Authority to Levy Taxes for Specific Purposes	No
User Fees for Water, Sewer, Gas or Electric Service	No
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	No
Incur Debt through Private Activity Bonds	No
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	No
Federal Grant Programs	Yes
Other – 1. Limited Tax Bonds; 2. Tax Anticipation Notes and Revenue Anticipation Notes; 3. Delinquent Tax Notes; 4. Time Warrants; 5. Maintenance Tax Notes and Contractual Obligations; 6. Lease Purchase Agreements; and 7. Revenue Bonds	Yes

Table 29-5. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Bond/Construction Department
Engineers or professionals trained in building or infrastructure construction practices	Yes	Bond/Construction Department
Planners or engineers with an understanding of natural hazards	Yes	Bond/Construction Department
Staff with training in benefit/cost analysis	Yes	Finance & Budget Department
Surveyors	Yes	Under Contract
Personnel skilled or trained in GIS applications	Yes	Bond/Construction Department
Scientist familiar with natural hazards in local area	Yes	Not Under Contract
Safety and Emergency Manager	Yes	Risk Management Department
Grant Writers	Yes	Grant Development Department

29.3.3 Education and Outreach Capabilities

Outreach and education capability identifies the connection between government and community members, which opens a dialogue needed for a more resilient community. An assessment of education and outreach capabilities is presented in Table 29-6.

Table 29-6. Education and Outreach

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • If yes, please briefly describe	Yes Facility Maintenance Department – Submitting a Repair Request Risk Management Department – Submitting an Insurable Claim
Do you use social media for hazard mitigation education and outreach? • If yes, please briefly describe	Yes Emergency Operation Procedure Phone App What to Do in Bad Weather – Posted on Internet Main Page Use of Robo Phone Call System; Twitter, HISD News Blog
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • If yes, please briefly specify	No
Do you have any other programs already in place that could be used to communicate hazard-related information? • If yes, please briefly describe	Yes Use of Robo Phone Call System; Twitter, HISD News Blog, Post Message on Internet Main Page; Local Media – Radio & TV
Do you have any established warning systems for hazard events? • If yes, please briefly describe	Yes Manager of Safety and Emergency Management receives and monitors alerts communicates via chain of command of an emergency, and provides information and recommendations to be relayed up the chain of command to Senior Staff.

29.3.4 Adaptive Capacity for Climate Change

Given the uncertainties associated with how hazard risk may change with a changing climate, a jurisdiction's ability to track such changes and adapt as needed is an important component of the mitigation strategy. Table 29-7 summarizes the jurisdiction's adaptive capacity for climate change.

Table 29-7. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:***	Medium
Jurisdiction-level monitoring of climate change impacts ***Comment:***	Medium
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Medium
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:*** Flood Zones are Changing Due to Harvey. Rebuilding may Require Elevation of Structure	Medium to High
Participation in regional groups addressing climate risks ***Comment:***	Medium
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:*** New LEED Schools, Energy Efficient; Flood Mitigation Planning; Energy Management	Medium to High
Identified strategies for greenhouse gas mitigation efforts ***Comment:*** New LEED Schools – Bond Program; Energy Management	Medium to High
Identified strategies for adaptation to impacts ***Comment:*** New Construction – Bond Program	Medium to High
Champions for climate action in local government departments ***Comment:***	Unsure
Political support for implementing climate change adaptation strategies ***Comment:*** New LEED Buildings; Flood Mitigation Planning; Energy Management	High
Financial resources devoted to climate change adaptation ***Comment:*** New Construction – Bond Program	Medium – High
Local authority over sectors likely to be negative impacted ***Comment:***	Unsure
Public Capacity	
Local residents knowledge of and understanding of climate risk ***Comment:***	Unsure
Local residents support of adaptation efforts ***Comment:***	Medium to High
Local residents' capacity to adapt to climate impacts ***Comment:***	Unsure
Local economy current capacity to adapt to climate impacts ***Comment:***	Unsure
Local ecosystems capacity to adapt to climate impacts ***Comment:***	Unsure

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

29.4 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

29.4.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- Houston ISD Facilities Assessment
- Houston ISD has a Long Term Capital Improvement Plan
- Houston ISD Hurricane Preparedness Guide – Protocols and Procedures – Districtwide. The plan has defined 1) pre-storm, 2) during Storm, and 3) after storm recovery – checklists that can and may mitigate potential for damage.
- Houston ISD has a Refuge of Last Resort Agreement in place with the City of Houston for seven Houston ISD schools to be used as places of refuge in an emergency.
- Obtained elevation certificates and purchased NFIP insurance for schools in the flood zone.

29.4.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- The New FEMA Flood Zone Map(s) for Houston Area are due out in 2023. This may require adjustments to HISD's long term capital improvement plan.
- Future Bond/Construction Programs
- Adopt or Develop a Climate Action Plan

29.5 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 29-8 lists past occurrences of natural hazards for which specific damage was recorded in the Houston Independent School District. Other hazard events that broadly affected the entire planning area, including the Houston Independent School District, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 29-8. Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Hurricane Harvey	DR 4332	2017	Active, Ongoing Claim
Severe Storms & Flooding	DR 4269	2016	$1,433,755.45
Severe Storms & Flooding	DR 4223	2015	$1,045,522.42
Hurricane IKE	DR 1791	2008	$21,023,715.29
Hurricane Rita	DR 1606	2005	Minimal Damage

29.6 HAZARD RISK RANKING

Table 29-9 presents a local ranking for the Houston Independent School District of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 29-9. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Severe Weather	48	High
1	Hurricane	48	High
2	Flooding	27	Medium
3	Earthquake	14	Low
3	Tsunami[a]	14	Low
4	Dam Failure	12	Low
5	Wildfire	9	Low
6	Drought	6	Low
6	Mass Movement[b]	6	Low
7	Coastal Erosion	0 (No exposure)	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

a. No Data Available – Utilized earthquake statistics, because earthquakes can cause tsunamis.

b. No Data Available – Utilized drought statistics, because drought leads to mass movement (*subsidence, sinkholes, landslide*)

29.7 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. The following jurisdiction-specific issues have been identified based on a review of the results from the Houston/Harris County's risk assessment (Loss/Matrix Report), public involvement strategy, and other available resources:

- The natural hazards below historically for Houston ISD are the highest risk and occurred more frequently.
  - Severe Weather — Extreme Heat, Hail, Tornadoes, Severe Thunderstorms, Winter Storms and Freezes
  - Hurricane — Coastal Storms/Tropical Systems, Named Storms, Named Hurricanes, and Tornadoes.
  - Flooding — Resulting from either Severe Weather or Hurricane above
- The next six natural hazards below are of lower risk for Houston ISD. Drought and Mass Movement have historically caused damage to Houston ISD property.
  - Wildfire
  - Earthquake
  - Tsunami
  - Dam Failure
  - Drought (Damage to sewer and water lines, gas lines, foundations, walls, sidewalks, parking lots, driveways, etc.)
  - Mass Movement – (subsidence, sinkholes, landslide)
- Non-Natural Hazards of risk to Houston ISD include:

- Toxic Release/Hazardous Materials
- Energy Pipeline Failures

Mitigation actions addressing these issues were prioritized for consideration in the action plan presented in this annex.

29.8 STATUS OF PREVIOUS PLAN ACTIONS

Houston Independent School District has not participated before with the Harris County All Hazard Mitigation Plan. There are no previous plan actions to review.

29.9 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 29-10 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 29-11 identifies the priority for each action. Table 29-12 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 29-10. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action HOUISD1 — Where appropriate, support retrofitting, relocation, or rebuilding of structures that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: For Medium to High Risk Hazards – *Severe Weather*, Hurricane*, Flooding**						
Existing	1-15	Business Operations Support	N/A	High	Staff Time, General Funds	Short-term
Action HOUISD2 — Where appropriate, support retrofitting, relocation, or rebuilding of structures that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas..						
Hazards Mitigated: For Low to Medium Risk Hazards – *Wildfire, Earthquake, Tsunami, Dam Failure, Drought, Mass Movement*						
Existing	1-15	Business Operations Support	N/A	Low to Medium	Staff Time, General Funds	Short-term
Action HOUISD3 — Partner with Harris County and the City of Houston for mutual disaster preparedness, training, response and support						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Earthquake, Tsunami, Wildfire, Dam Failure, Drought, Mass Movement						
Existing	1, 3 6, 7, 8, 9, 10, 11, 12, 13, 14, 15	Risk Management and Business Operations Support	County & City	Low	Staff Time, General Funds	Ongoing
Action HOUISD4 — Trimming or Removal of Trees Close to Buildings or Playgrounds; and, Planting of More Drought Resistant Type Plants and Shrubs						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Earthquake, Tsunami, Wildfire, Dam Failure, Drought, Mass Movement						
Existing	2, 7, 11	Business Operations Support	N/A	Low	Staff Time, General Funds	Ongoing
Action HOUISD5 — Flood Mitigation – Code Required by City/County						
Hazards Mitigated: Detention Ponds / Irrigation-Drainage Modifications / Flood Mitigation						
Existing	3, 7, 9, 10, 11, 15	Bond / Construction	N/A	Medium to High	Staff Time, General Funds Bond Funds	Long-term and When Required
Action HOUISD6 — Flood Mitigation						
Hazards Mitigated: Property Elevation (code required) – *For the Rebuilding of a School/Non-School Building in Flood Zone*						
Existing	3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15	Bond / Construction	N/A	High	General Funds or Bond Funds	Long-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action HOUISD7 — Hazard Response Preparedness						
Hazards Mitigated: Acquire / Replace / Have Ready – Response equipment including portable fencing, sand bags, portable generators, portable pumps, other tools & equipment needed for and used for response.						
Existing	3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14	Business Operations Support	N/A	Medium	Staff Time, General Funds	Ongoing
Action HOUISD8 — CERT Training – Ensure appropriate, key staff is trained to support District functions when the (EOC) Emergency Operation Center is activated.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Earthquake, Tsunami, Wildfire, Dam Failure, Drought, Mass Movement						
New	1, 3, 4, 6, 7, 8, 9, 10, 13, 14	Risk Management and Business Operations Support	N/A	Low	Staff Time, General Funds	Ongoing
Action HOUISD9 — Plan, instruct, and equip campuses with procedures/protocols for a toxic hazardous materials event or a hazardous energy pipeline event.						
Hazards Mitigated: Non-Natural Hazards – Toxic Release/Hazardous Materials and Energy Pipeline Failures						
New	1, 3, 4, 6, 7, 8, 9, 10, 13, 14	Risk Management and Business Operations Support	N/A	Low	Staff Time, General Funds	Ongoing
Action HOUISD10 — Performing preventative maintenance and repair protocols, which mitigate natural hazards.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Earthquake, Tsunami, Wildfire, Dam Failure, Drought, Mass Movement						
Existing	1-15	Risk Management and Business Operations Support	N/A	High	Staff Time, General Funds	Ongoing
Action HOUISD11— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Earthquake, Tsunami, Wildfire, Dam Failure, Drought, Mass Movement						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	Risk Management and Business Operations Support	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 29-11. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
HOUISD1	15	High	High	Yes	Yes	Yes	High	High
HOUISD2	15	Medium	Low to Medium	Yes	Yes	Yes	Low to Medium	Low to Medium
HOUISD3	12	High	Low	Yes	Yes	Yes	High	Low
HOUISD4	3	High	Low	Yes	Yes	Yes	High	Low
HOUISD5	6	High	Medium to High	Yes	Yes	Yes	High	Medium to High
HOUISD6	11	High	High	Yes	Yes	Yes	High	High
HOUISD7	11	Medium	Medium	Yes	Yes	Yes	Medium	Medium
HOUISD8	9	Medium	Low	Yes	Yes	Yes	medium	Low
HOUISD9	10	High	Low	Yes	Yes	Yes	High	Low
HOUISD10	15	High	High	Yes	Yes	Yes	High	High
HOUISD11	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 29-12. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Severe Weather	HOUISD 1-7, 9, 10,11	HOUISD 1, 2, 4, 5, 6, 7, 10	HOUISD 3, 11		HOUISD 3, 7, 8, 11	HOUISD 1, 2, 6, 10	HOUISD 1, 2, 5, 6, 10	HOUISD 3, 8, 11
Hurricane	HOUISD 1-7, 9, 10,11	HOUISD 1, 2, 4, 5, 6, 7, 10	HOUISD 3, 11		HOUISD 3, 7, 8, 11	HOUISD 1, 2, 6, 10	HOUISD 1, 2, 5, 6, 10	HOUISD 3, 8, 11
Medium-Risk Hazards								
Flooding	HOUISD 1-7, 9, 10,11	HOUISD 1, 2, 4, 5, 6, 7, 10	HOUISD 3, 11		HOUISD 3, 7, 8, 11	HOUISD 1, 2, 6, 10	HOUISD 1, 2, 5, 6, 10	HOUISD 3, 8, 11
Low-Risk Hazards								
Drought	HOUISD 1-7, 9, 10,11	HOUISD 1, 2, 4, 5, 6, 7, 10	HOUISD 3, 11		HOUISD11	HOUISD 1, 2, 6, 10		HOUISD11
Mass Movement	HOUISD 1-7, 9, 10,11	HOUISD 1, 2, 4, 5, 6, 7, 10	HOUISD 3, 11		HOUISD11	HOUISD 1, 2, 6, 10		HOUISD11
Wildfire	HOUISD 1-7, 9, 10, 11	HOUISD 1, 2, 4, 5, 6, 7, 10	HOUISD 3, 11		HOUISD 3, 7, 8	HOU1, 2, 6, 10	HOUISD 1, 2, 5, 6, 10	HOUISD 3, 8
Earthquake	HOUISD11		HOUISD11		HOUISD11			HOUISD11
Tsunami	HOUISD11		HOUISD11		HOUISD11			HOUISD11
Dam Failure	HOUISD11		HOUISD11		HOUISD11			HOUISD11

a. See the introduction to this volume for explanation of mitigation types.

29.10 REVIEW AND INCORPORATION OF RESOURCES FOR THIS ANNEX

29.10.1 Existing Reports, Plans, Regulatory Tools and Other Resources

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- General information available on HISD's website
- HISD Risk Management Department – Asset Information
- HISD Finance Department – Financial Question/Answers
- HISD Facilities Department information available on HISD's website
- HISD Bond/Construction 2012 Bond Program information available on HISD's Website
- District Design Standards
- District Facilities Assessment
- District Capital Improvement Plan
- Applicable District Policies

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.

29.10.2 Staff and Local Stakeholder Involvement in Annex Development

Utilized information available on HISD's website, information on file with HISD Risk Management, HISD Finance Department for financial questions, and HISD Facilities Department and HISD Bond/Construction Department information on HISD's website at www.houstonisd.org.

29.11 FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

- A new district capital improvement plan (CIP) will replace the current capital improvement plan.
- A new district facility assessment plan (FAP) will replace the current facility assessment plan.
- The new flood zone maps, when issued by FEMA for Houston, may require adjustments to CIP and FAP above and adjustments to insurance coverage as well.
- The new flood zone maps, when issued by FEMA, may require adjustments to current insurance coverage like NFIP insurance.

29.12 ADDITIONAL COMMENTS

The new flood zone maps, when issued by FEMA, are going to be critical to future plans and types of insurance coverage.

30. HUFFMAN INDEPENDENT SCHOOL DISTRICT

30.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Tim Brittain, Chief Financial Officer
24302 FM 2100
Huffman, TX 77336
Telephone: 281-324-7623
e-mail Address: tbrittain@huffmanisd.net

Alternate Point of Contact
David Carpenter, Emergency Management Coordinator
24302 FM 2100
Huffman, TX 77336
Telephone: 281-324-7659
e-mail Address: dcarpenter@huffmanisd.net

30.2 JURISDICTION PROFILE

30.2.1 Overview

Huffman ISD is a public school district in Texas that serves approximately 3,600 students and has 445 staff members. Through the efforts of our staff, our students flourish in academics, the fine arts, and athletics. Our Falcons excel from our pre-K program to the time they graduate. Through our programs we provide character education and promote pride in being a part of our school community. Importantly, our district succeeds because of the high standards for achievement in our community. There is no place that supports their public schools like Huffman. It is a great place to raise a family.

Our district enrollment is approximately 3,400 students. We have four campuses: Huffman Elementary School, Falcon Ridge Elementary School, Huffman Middle School, and Hargrave High School.

Huffman ISD receives funding from three sources: the state (54%), property taxes and other local sources (44%), and the federal government (2%). The proportion of funding from each source varies across Texas school districts.

The Huffman Independent School District assumes responsibility for the adoption of this plan; Harris County will oversee its implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 30-1.

30.2.2 Service Area and Trends

Huffman ISD is an unincorporated community thirty miles northeast of Houston in Harris County. The district service area covers 52 square miles, serving a population of 8,678. Huffman is a unique community comprised largely of residential subdivisions, scattered farms, apartments, and small businesses. The area is showing steady medium growth. The main subdivisions include; The Commons of Lake Houston, Fairway Crossing, Lochshire, Lakewood Heights, Spanish Cove, Saddle Creek Farms, and Indian Shores. Most residents commute to Houston, Humble, Baytown, and surrounding communities for employment.

Table 30-1. Local Mitigation Planning Team Members

Name	Title
Tim Brittain	Huffman ISD, Chief Financial Officer
David Carpenter	Huffman ISD, Director of Safety & Security
Tom Trial	Bond Program Management Services, Program Manager
Jason McCright	Rostan Solutions, Senior Consultant
Dinh Ho	Adico, LLC, Engineer
Martin Brennan	Joiner Architects, Architect
Jim Moore	Rostan Solutions, Consultant
Jonathan Dotch	Rostan Solutions, Consultant

30.2.3 Assets

Table 30-2 summarizes the critical assets of the district and their value.

Table 30-2. Special Purpose District Assets

Asset	Value
Property	
125 acres of land	$5,125,000
Equipment	
Buses – 38	$3,914,000
Maintenance Vehicles	$325,000
Total:	***$4,239,000***
Critical Facilities and Infrastructure	
Administration – 24302 FM 2100, Huffman, TX 77336	$4,104,500
Huffman Elementary School – 24403 East Lake Houston Pkwy, Huffman, TX 77336	$44,865,000
Falcon Ridge Elementary – 26503 FM 2100, Huffman, TX 77336	$23,500,000
Huffman Middle School – 3407 Huffman Eastgate Rd., Huffman, TX 77336	$30,291,100
Hargrave High School – 25400 Willy Lane, Huffman, TX 77336	$45,736,725
Athletic Complex – 25400 Willy Lane, Huffman, TX 77336	$6,758,000
Maintenance and Warehouse – 421 Swift Current, Huffman, TX 77336	$712,000
Water Plant – 3407 Huffman Eastgate, Rd., Huffman, TX 77336	$650,000
Sewer Plant – 3407 Huffman Eastgate, Rd., Huffman, TX 77336	$1,205,000
Total:	***$157,822,825***

30.3 CAPABILITY ASSESSMENT

An assessment of the district's current capabilities was conducted to identify opportunities to expand, initiate or integrate capabilities in order to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table in Section 29.9 identifies these as community capacity building mitigation actions.

30.3.1 Planning and Regulatory Capabilities

Jurisdictions develop plans and programs and implement rules and regulations to protect and serve residents. When effectively prepared and administered, these plans, programs and regulations can support the implementation of mitigation actions. Table 30-3 summarizes existing codes, ordinances, policies, programs or plans that are applicable to this hazard mitigation plan.

Table 30-3. Planning and Regulatory Capability

Plan, Study or Program	Date of Most Recent Update	Comment
District Design Standards	2017	
Capital Improvement Plan	Annually	5 year plan
Emergency Operations Plan	2018	
District Facility Assessment	2014	
Harris County Building Codes		
City of Houston Building Codes		

30.3.2 Fiscal, Administrative and Technical Capabilities

Fiscal capability is an indicator of a jurisdiction's ability to fulfill the financial needs associated with hazard mitigation projects. An assessment of fiscal capabilities is presented in Table 30-4. Administrative and technical capabilities represent a jurisdiction's staffing resources for carrying out the mitigation strategy. An assessment of administrative and technical capabilities is presented in Table 30-5.

Table 30-4. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	No
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	No
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	No
Federal Grant Programs	Yes
Other	

Table 30-5. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Contract Support
Engineers or professionals trained in building or infrastructure construction practices	Yes	Contract Support
Planners or engineers with an understanding of natural hazards	Yes	Contract Support
Staff with training in benefit/cost analysis	Yes	Chief Financial Officer
Surveyors	Yes	Contract Support
Personnel skilled or trained in GIS applications	Yes	Technology Director
Scientist familiar with natural hazards in local area	No	
Emergency manager	Yes	Emergency Management Coordinator
Grant writers	No	
Other		

30.3.3 Education and Outreach Capabilities

Outreach and education capability identify the connection between government and community members, which opens a dialogue needed for a more resilient community. An assessment of education and outreach capabilities is presented in Table 30-6.

Table 30-6. Education and Outreach

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • **If yes, please briefly describe**	No
Do you use social media for hazard mitigation education and outreach? • **If yes, please briefly describe**	Yes Share Partner Content
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • **If yes, please briefly specify**	Yes School Safety and Security Committee
Do you have any other programs already in place that could be used to communicate hazard-related information? • **If yes, please briefly describe**	No
Do you have any established warning systems for hazard events? • **If yes, please briefly describe**	No

30.3.4 Adaptive Capacity for Climate Change

Given the uncertainties associated with how hazard risk may change with a changing climate, a jurisdiction's ability to track such changes and adapt as needed is an important component of the mitigation strategy. Table 30-7 summarizes the jurisdiction's adaptive capacity for climate change.

Table 30-7. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts	Medium
Comment:	
Jurisdiction-level monitoring of climate change impacts	Low
Comment:	
Technical resources to assess proposed strategies for feasibility and externalities	Low
Comment:	
Jurisdiction-level capacity for development of greenhouse gas emissions inventory	Low
Comment:	
Capital planning and land use decisions informed by potential climate impacts	Medium
Comment:	
Participation in regional groups addressing climate risks	Low
Comment:	
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes	Low
Comment:	
Identified strategies for greenhouse gas mitigation efforts	Low
Comment:	
Identified strategies for adaptation to impacts	Low
Comment:	
Champions for climate action in local government departments	Low
Comment:	
Political support for implementing climate change adaptation strategies	Low
Comment:	
Financial resources devoted to climate change adaptation	Low
Comment:	
Local authority over sectors likely to be negative impacted	Low
Comment:	
Public Capacity	
Local residents knowledge of and understanding of climate risk	Low
Comment:	
Local residents support of adaptation efforts	Low
Comment:	
Local residents' capacity to adapt to climate impacts	Low
Comment:	
Local economy current capacity to adapt to climate impacts	Low
Comment:	
Local ecosystems capacity to adapt to climate impacts	Low
Comment:	

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

30.4 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

30.4.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- **Capital Improvement Plan** — The hazard mitigation plan may identify new possible funding sources for capital improvement projects and may result in modifications to proposed projects based on results of the risk assessment.
- **Emergency Operations Plan** — The results of the risk assessment may identify modifications to the emergency operations plan.

30.4.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- **Capital Improvement Projects** — Capital improvement project proposals may take into consideration hazard mitigation potential as a means of evaluating project prioritization.
- **Post-Disaster Recovery Plan** — The District does not have a recovery plan and intends to develop one as a mitigation planning action during the next five years. The plan will build on the mitigation goals and objectives identified in the mitigation plan.

30.5 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 30-8 lists past occurrences of natural hazards for which specific damage was recorded in Huffman ISD. Other hazard events that broadly affected the entire planning area, including Huffman ISD, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 30-8. Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Hurricane Harvey	DR-4332	8/25/17	$17,000,000
Tornado		4/18/16	Information Not Available
Tornado		11/8/11	Information Not Available
Hurricane Ike	DR-1791	9/7/08	$61,476
Tornado		12/14/05	Information Not Available
Hail		2/14/03	Information Not Available
Flood		5/27/16	Information Not Available

30.6 HAZARD RISK RANKING

Table 30-9 presents a local ranking for Huffman ISD of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 30-9. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Hurricanes and Costal Storms	27	High
1	Flooding	27	High
2	Severe Thunderstorms	21	Medium
3	Tornados	16	Medium
4	Hail	10	Low
5	Extreme Heat	6	Low
5	Drought	6	Low
6	Coastal Erosion	0 (No Exposure)	None
6	Dam Failure	0 (No Exposure)	None
6	Mass Movements	0 (No Exposure)	None
6	Tsunami	0 (No Exposure)	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

30.7 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. The following jurisdiction-specific issues have been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- The eastern part of the district is in the floodway. The transportation facility was located in this part of the district and we are determining mitigation currently. The sewer plant that serves Huffman Middle School and Hargrave High School is located in the floodway.
- Parts of Huffman Middle and Hargrave High School campuses are located in a high hazard flood zone.
- The water and sewer plants that serves Huffman Middle School and Hargrave High School are in a high hazard flood zone.
- District elementary schools are located in an area of terrain transition and may be at increased risk for tornados

Mitigation actions addressing these issues were prioritized for consideration in the action plan presented in this annex.

30.8 STATUS OF PREVIOUS PLAN ACTIONS

The Huffman Independent School District has not previously completed any hazard mitigation planning effort.

30.9 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 30-10 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 30-11 identifies the priority for each action. Table 30-12 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 30-10. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action HUF1 — Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Flooding, Hurricanes, Tornados, Severe Thunderstorms, Hail						
Existing	3, 4, 10	District Administration	TBD	High	HMGP, PDM, FMA	Short-term
Action HUF2 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: Hurricanes and Costal Storms, Flooding, Severe Thunderstorms, Tornados, Hail, Extreme Heat, Drought						
New and Existing	1, 5, 8	District Administration	TBD	Low	Staff Time, General Funds	Short-term
Action HUF3 — Integrate the hazard mitigation plan into other plans, ordinances and programs within the community						
Hazards Mitigated: Dam failure, earthquake, flooding, landslide, severe weather, tsunami, wildfire						
Existing	2, 6, 9	District Administration	TBD			
Action HUF4 — Expand generator capability for critical facilities lacking sufficient backup power						
Hazards Mitigated: Hurricanes, Tornados, Severe Thunderstorms						
Existing	3, 4, 10	District Administration	TBD	High	HMGP, PDM, FMA	Short-term
Action HUF5— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
Hazards Mitigated: Hurricanes and Costal Storms, Flooding, Severe Thunderstorms, Tornados, Hail, Extreme Heat, Drought						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	District Administration	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 30-11. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
HUF1	3	High	High	Yes	Yes	No	Medium	High
HUF2	3	Low	Low	Yes	No	Yes	High	Low
HUF3	3	High	Medium	Yes	Yes	No	Medium	High
HUF4	3	High	Medium	Yes	Yes	No	Medium	High
HUF5	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 30-12. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Flooding	HUF2, 3, 5	HUF1	HUF5		HUF1, 5	HUF1		HUF2, 3, 5
Hurricanes and Costal Storms	HUF2, 3, 5	HUF1, 4	HUF5		HUF1, 4, 5	HUF1		HUF2, 3, 5
Medium-Risk Hazards								
Severe Thunderstorms	HUF2, 3, 5	HUF1, 4	HUF5		HUF1, 4, 5			HUF2, 3, 5
Tornados	HUF2, 3, 5	HUF1, 4	HUF5		HUF1, 4, 5			HUF2, 3, 5
Low-Risk Hazards								
Drought	HUF2, 3, 5		HUF5		HUF5			HUF2, 3, 5
Extreme Heat	HUF2, 3, 5		HUF5		HUF5			HUF2, 3, 5
Hail	HUF2, 3, 5	HUF1	HUF5		HUF5			HUF2, 3, 5

a. See the introduction to this volume for explanation of mitigation types.

30.10 REVIEW AND INCORPORATION OF RESOURCES FOR THIS ANNEX

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- Huffman ISD emergency Operations Plan

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.

31. PASADENA INDEPENDENT SCHOOL DISTRICT

31.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Kevin Fornof, Associate Superintendent Facilities & Construction
1814 E. Sam Houston Parkway South
Pasadena, TX 77503
Telephone: 713-740-5350
e-mail Address: kfornof@pasadenaisd.org

Alternate Point of Contact
Carla Merka, CFO
1515 Cherrybrook Lane
Pasadena, TX 77502
Telephone: 713-740-0023
e-mail Address: cmerka@pasadenaisd.org

31.2 JURISDICTION PROFILE

31.2.1 Overview

The Pasadena Independent School District was created in 1893. The district serves 54,000 students. It currently has 8,800 employees. A seven-member elected Board of Trustee governs the District. The district is funded with local tax dollars, state revenue and federal grants.

The Board of Trustees assumes responsibility for the adoption of this plan; the superintendent, associate superintendent and CFO will oversee its implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 31-1.

Table 31-1. Local Mitigation Planning Team Members

Name	Title
Dr. DeeAnn Powell	Superintendent
Kevin Fornof	Associate Superintendent Facilities & Construction
Carla Merka	Chief Financial Officer

31.2.2 Service Area and Trends

The District is a fiscally independent, political subdivision of the State of Texas located in Harris County and serving a population of 54,000 students. The District service area covers 85.5 square miles.

31.2.3 Assets

Table 31-2 summarizes the critical assets of the district and their value.

Table 31-2. Special Purpose District Assets

Asset	Value
Property	
80 building sites spread over the district	
Equipment	
FF&E spread over the district	$138,057,020
Vehicles	$37,655,595
Library Book & Media	$13,623,515
Critical Facilities and Infrastructure	
80 building spread over the district	$1,168,329,961
Total:	***$1,168,329,961***

31.3 CAPABILITY ASSESSMENT

An assessment of the district's current capabilities was conducted to identify opportunities to expand, initiate or integrate capabilities in order to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table identifies these as community capacity building mitigation actions.

31.3.1 Planning and Regulatory Capabilities

Jurisdictions develop plans and programs and implement rules and regulations to protect and serve residents. When effectively prepared and administered, these plans, programs and regulations can support the implementation of mitigation actions. PISD follows the currently adopted codes and ordinances of the U.S. federal governmental agencies, the state of Texas, the city of Houston, the city of south Houston, the city of Pasadena, and the city of Pearland. Current PISD planned projects include the following:

- Add detention to various facilities to benefit the school and the community
- Add emergency generator to various facilities to ensure that electrical, and data and phone communications are available and food coolers and freezers maintain proper temperatures during power outages.
- Demolish and rebuild Thompson Intermediate to elevations that raise the facility out of the flood zone.

31.3.2 Fiscal, Administrative and Technical Capabilities

Fiscal capability is an indicator of a jurisdiction's ability to fulfill the financial needs associated with hazard mitigation projects. An assessment of fiscal capabilities is presented in Table 31-3. Administrative and technical capabilities represent a jurisdiction's staffing resources for carrying out the mitigation strategy. An assessment of administrative and technical capabilities is presented in Table 31-4.

31.3.3 Education and Outreach Capabilities

Outreach and education capability identifies the connection between government and community members, which opens a dialogue needed for a more resilient community. An assessment of education and outreach capabilities is presented in Table 31-5.

Table 31-3. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	No
User Fees for Water, Sewer, Gas or Electric Service	No
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	No
Incur Debt through Private Activity Bonds	No
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	No
Federal Grant Programs	Yes

Table 31-4. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Civil consultants
Engineers or professionals trained in building or infrastructure construction practices	Yes	Civil and MEP consultants
Planners or engineers with an understanding of natural hazards	Yes	Civil and MEP consultants
Staff with training in benefit/cost analysis	Yes	PISD facilities and construction
Surveyors	Yes	PISD has a unit price agreement with West Belt Surveying
Personnel skilled or trained in GIS applications	No	
Scientist familiar with natural hazards in local area	Yes	Civil engineering, surveyor, geotechnical engineers, and landscape consultants
Emergency manager	Yes	Varies by event
Grant writers	Yes	PISD Grants Dept.

Table 31-5. Education and Outreach

Criterion	Response
Do you have a public information officer or communications office?	YES
Do you have personnel skilled or trained in website development?	YES
Do you have hazard mitigation information available on your website? • If yes, please briefly describe	No
Do you use social media for hazard mitigation education and outreach? • If yes, please briefly describe	No
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • If yes, please briefly specify	No
Do you have any other programs already in place that could be used to communicate hazard-related information? • If yes, please briefly describe	Yes Automated Phone Messaging / Email / Text / Social Media/ Local News Channels
Do you have any established warning systems for hazard events? • If yes, please briefly describe	Yes Automated Phone Messaging / Email / Text / Social Media/ Local News Channels

31.3.4 Adaptive Capacity for Climate Change

Given the uncertainties associated with how hazard risk may change with a changing climate, a jurisdiction's ability to track such changes and adapt as needed is an important component of the mitigation strategy. Table 31-6 summarizes the jurisdiction's adaptive capacity for climate change.

Table 31-6. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:***	High
Jurisdiction-level monitoring of climate change impacts ***Comment:***	Low
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:***	High
Participation in regional groups addressing climate risks ***Comment:***	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	Low
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	Low
Identified strategies for adaptation to impacts ***Comment:***	High
Champions for climate action in local government departments ***Comment:***	Low
Political support for implementing climate change adaptation strategies ***Comment:***	Low
Financial resources devoted to climate change adaptation ***Comment:***	Medium
Local authority over sectors likely to be negative impacted ***Comment:***	Medium
Public Capacity	
Local residents knowledge of and understanding of climate risk ***Comment:***	Low
Local residents support of adaptation efforts ***Comment:***	Medium
Local residents' capacity to adapt to climate impacts ***Comment:***	High
Local economy current capacity to adapt to climate impacts ***Comment:***	High
Local ecosystems capacity to adapt to climate impacts ***Comment:***	High

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

31.4 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

31.4.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- Use of energy management practices, meet or exceed IECC code, and material and equipment selections

31.4.2 Opportunities for Future Integration

The capability assessment presented in this annex identified no plans or programs that provide opportunities to integrate hazard mitigation information in the future.

31.5 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 31-8 lists past occurrences of natural hazards for which specific damage was recorded in Pasadena ISD. Other hazard events that broadly affected the entire planning area, including Pasadena ISD, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 31-8. Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
TORNADO	N/A	April 8, 2019	$190,000
HURRICANE HARVEY	4332 DR	August 17, 2017	$15,379,690
HURRICANE IKE	1791 DR / 3294 EM	September 13, 2008	$16,764,211.76

31.6 HAZARD RISK RANKING

Table 31-9 presents a local ranking for Pasadena ISD of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

31.7 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. No additional vulnerabilities specific to this jurisdiction have been identified.

31.8 STATUS OF PREVIOUS PLAN ACTIONS

The Pasadena Independent School District has not previously completed any hazard mitigation planning effort.

Table 31-9. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Severe Weather	48	High
1	Hurricane	48	High
2	Flooding	24	Medium
3	Earthquake	14	Low
4	Wildfire	6	Low
4	Drought	6	Low
5	Dam Failure	0 (No Exposure)	None
5	Mass Movement	0 (No Exposure)	None
5	Tsunami	0 (No Exposure)	None
5	Coastal Erosion	0 (No Exposure)	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

31.9 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 31-10 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 31-11 identifies the priority for each action. Table 31-12 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 31-10. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action PSD1 — Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Severe weather, hurricane, Earthquake, flooding, wildfire						
Existing	11, 13	District Administration	TBD	High	HMGP, PDM, FMA	Short-term
Action PSD2 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Earthquake, Wildfire, Drought						
New and Existing	9, 10	District Administration	TBD	Low	Staff Time, General Funds	Short-term
Action PSD3 — Integrate the hazard mitigation plan into other plans, ordinances and programs within the community						
Hazards Mitigated: Hurricane, earthquake, flooding, severe weather wildfire						
Existing	2, 6, 9	District Administration	TBD	Low	Staff Time, General Funds	Short-term
Action PSD4— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Earthquake, Wildfire, Drought						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	District Administration	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 31-11. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
PSD1	3	High	High	Yes	Yes	No	High	High
PSD2	3	Medium	Low	Yes	No	Yes	Medium	Low
PSD3	3	Medium	Low	Yes	No	Yes	Medium	Low
PSD4	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 31-12. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Severe Weather	PSD1, 4	PSD1	PSD4		PSD4	PSD1		PSD2, 3, 4
Hurricane	PSD1, 4	PSD1	PSD4		PSD4	PSD1		PSD2, 3, 4
Medium-Risk Hazards								
Flooding	PSD1, 4	PSD1	PSD4		PSD4	PSD1		PSD2, 3, 4
Low-Risk Hazards								
Earthquake	PSD1, 4	PSD1	PSD4		PSD4	PSD1		PSD2, 3, 4
Wildfire	PSD1, 4	PSD1	PSD4		PSD4	PSD1		PSD2, 3, 4
Drought	PSD4		PSD4		PSD4			PSD2, 3, 4

a. See the introduction to this volume for explanation of mitigation types.

31.10 REVIEW AND INCORPORATION OF RESOURCES FOR THIS ANNEX

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- Discussions with staff and administrations

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.

Building requests were developed from need assessments to better respond to catastrophes through better communications and by better protecting district resources

31.11 FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

Our detention ponds will give relieve to our neighborhoods from flooding. We also have two schools in a flood zone that backs up to the flood district. If we could move those schools that area could be turned into a larger detention pond for the flood district.

32. HOUSTON COMMUNITY COLLEGE

32.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Robert McCracken,
Executive Director, Risk Management
3200 Main St
Houston, TX 77459
Telephone: 713-718-7520
e-mail Address: Robert.McCracken@hccs.edu

Alternate Point of Contact
Brian Owoseni,
Manager, Emergency Management.
3200 Main St
Houston, TX 77459
Telephone: 713-718-2591
e-mail Address: Oludoyin.Owoseni@hccs.edu

32.2 JURISDICTION PROFILE

32.2.1 Overview

Since its opening in 1971, millions of students have improved their lives through education and training obtained from Houston Community College (HCC). An open admission public institution, HCC awards associate degrees and certificates in academic studies and career and technology programs. HCC is committed to meeting the needs of its diverse communities, providing academic courses for transfer to four-year institutions; associates degrees and certificates in more than 70 fields of work; as well as continuing education, corporate training, literacy, adult education, and lifelong learning and enrichment programs. HCC provides comprehensive educational services to the greater Houston region.

The Houston Community College District was created under the governance of the Houston Independent School District (HISD) as the result of a public referendum on May 18, 1971. HCC separated from HISD in 1989, establishing its own Board of Trustees and taxing authority. HCC restructured in 1991, creating five regional colleges, as well as the College Without Walls and selected six college presidents. The president of HCC then became the HCC System Chancellor. The Coleman College for Health Sciences was established in 2004. Through the process of transformation initiated in 2014, instructional programs were organized into Centers of Excellence and Instructional Divisions, providing increased focus for credit programs. In spring 2018, HCC established the Online College to meet the 21st century educational needs of our students, especially those with full-time jobs.

HCC employs 2,600 full-time faculty and staff and 3,800 adjunct faculty and part-time staff. Operations are funded primarily through local property tax, state appropriations, and tuition and fees. The Board of Trustees is composed of nine members elected from single-member districts. The Board of Trustees is the official governing body of HCC and is responsible for the adoption of this plan. The Office of Emergency Management will oversee its implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 32-1.

Table 32-1. Local Mitigation Planning Team Members

Name	Title
Robert McCracken	Executive Director, Risk Management
Brian Owoseni	Manager, Emergency Management
Marshall Heins	Chief Facilities Officer
Carin Hutchins	Associate Vice Chancellor, Finance & Accounting
Greg Cunningham	Chief of Police
Darin Baskin	Faculty Senate President
Dr. Monique Umphrey	President, Northeast College

32.2.2 Service Area and Trends

The HCC Service District Area (SDA) includes Houston, Katy, Spring Branch, and Alief Independent School Districts (ISDs); Stafford Municipal District; and the portions of Fort Bend ISD located in Missouri City, the City of Pearland, and the City of Houston (see Figure 32-1). The SDA encompasses 631.3 square miles and serves a population of over 2.4 million people. HCC has an unduplicated enrollment of over 114,000 students annually.

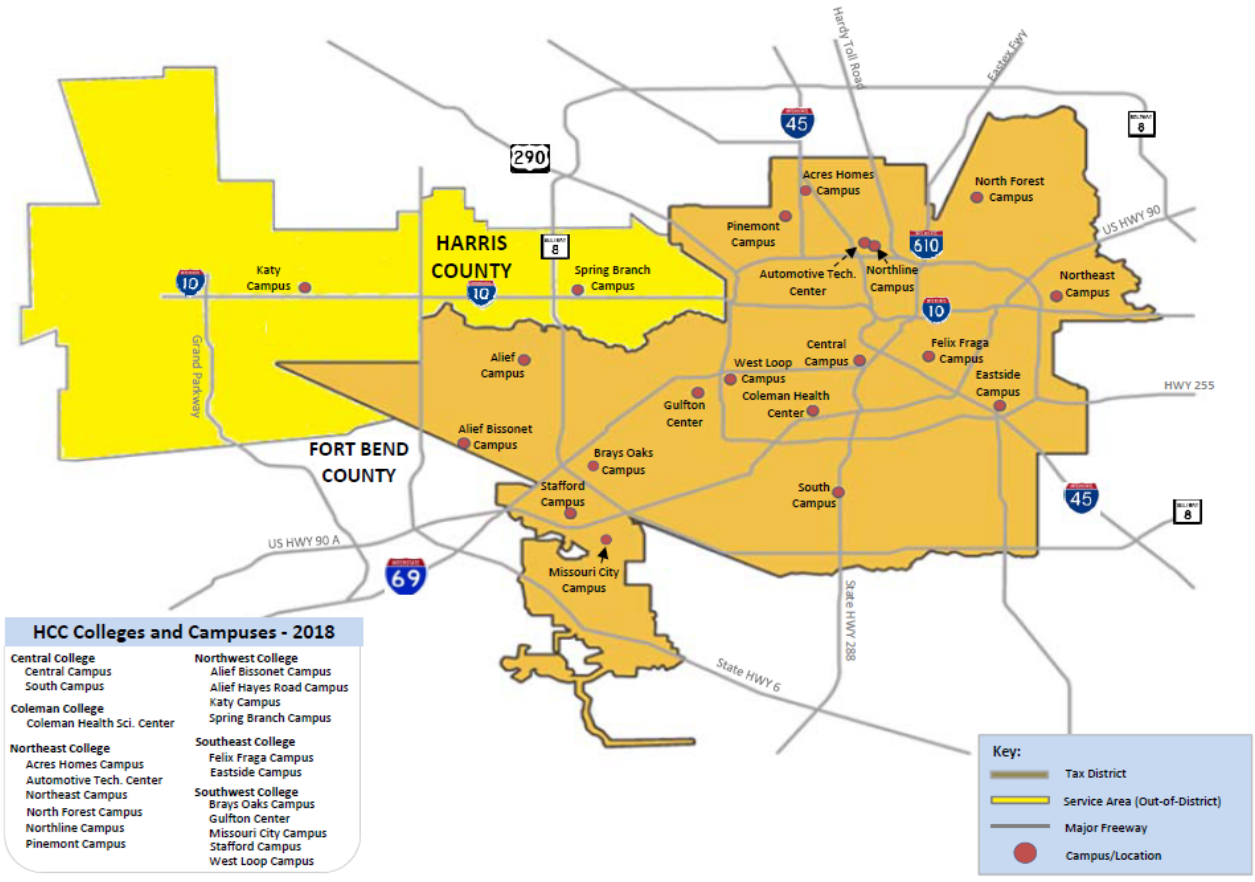


Figure 32-1. Houston Community College 2018 Service Area

The HCC SDA is economically, educationally and ethnically diverse. While the average household income is $96,707, more that 22.3% of the households in the SDA have an income less than $25,000. While 41.0% of the population has a college degree, 19.5% of the population has no high school degree. The population's ethnicity is 40.9% Hispanic, 26.1% white, 22.7% African American and 10.3% Asian/Other. There is a relatively large young

population — 24.5% under the age of 18 years old. These factors give HCC the potential of providing a large workforce pool for the service delivery area, the state and the nation's economic growth, particularly in the energy and healthcare sectors. In fall 2018 the semester credit hour student population's ethnicity was 38% Hispanic, 29% African American, 15% Asian, 13% white, and 5% Other.

32.2.3 Assets

Table 32-2 summarizes the critical assets of the district and their value.

Table 32-2. Special Purpose District Assets

Asset	Value
Property	
436 acres of land	undetermined
Equipment	
25 Permanently Installed Emergency Generators	undetermined
5 Mobile Generators	$50,000
Total:	***undetermined***
Critical Facilities and Infrastructure	
Administrative Buildings (multiple buildings) – 3100 Main St.	$181,000,000
NE College (multiple campuses) – 555 Community College Dr.	$178,000,000
Central College (multiple campuses) – 1300 Holman St.	$229,000,000
SE College (multiple campuses) – 6815 Rustic St.	$144,000,000
Coleman College (multiple buildings) – 1900 Pressler St.	$122,000,000
SW College (multiple campuses) – 10041 Cash Rd.	$231,000,000
NW College (multiple campuses) – 2811 Hayes Rd.	$203,000,000
Total:	***$1,288,000,000***

32.3 CAPABILITY ASSESSMENT

An assessment of the district's current capabilities was conducted to identify opportunities to expand, initiate or integrate capabilities in order to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table in Section 29.9 identifies these as community capacity building mitigation actions.

32.3.1 Planning and Regulatory Capabilities

Jurisdictions develop plans and programs and implement rules and regulations to protect and serve residents. When effectively prepared and administered, these plans, programs and regulations can support the implementation of mitigation actions. Table 32-3 summarizes existing codes, ordinances, policies, programs or plans that are applicable to this hazard mitigation plan.

32.3.2 Fiscal, Administrative and Technical Capabilities

Fiscal capability is an indicator of a jurisdiction's ability to fulfill the financial needs associated with hazard mitigation projects. An assessment of fiscal capabilities is presented in Table 32-4. Administrative and technical capabilities represent a jurisdiction's staffing resources for carrying out the mitigation strategy. An assessment of administrative and technical capabilities is presented in Table 32-5.

Table 32-3. Planning and Regulatory Capability

Plan, Study or Program	Date of Most Recent Update	Comment
HCC Institutional Emergency Operations Plan	2018	
HCC Strategic Plan	2019	
HCC Capital Improvements Program	2013	
HCC Facilities Condition Assessment	2019	
International Building Code	2018	
NFPA 1, Fire Code 2015 Edition	2015	
NFPA 101, Life Safety Code 2015 Edition	2015	
Various Federal/State regulations relating to Environmental, Health & Safety	Various	

Table 32-4. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	No
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	No
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	No
Federal Grant Programs	Yes
Other	Yes- miscellaneous revenues

Table 32-5. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Facilities Department / Contracted Services
Engineers or professionals trained in building or infrastructure construction practices	Yes	Facilities Department / Contracted Services
Planners or engineers with an understanding of natural hazards	Yes	Environmental Health & Safety, HCC Emergency Management
Staff with training in benefit/cost analysis	Yes	Finance & Accounting
Surveyors	Yes	Contracted Services
Personnel skilled or trained in GIS applications	No	
Scientist familiar with natural hazards in local area	No	
Emergency manager	Yes	Emergency Management
Grant writers	Yes	Grants Department

32.3.3 Education and Outreach Capabilities

Outreach and education capability identifies the connection between government and community members, which opens a dialogue needed for a more resilient community. An assessment of education and outreach capabilities is presented in Table 32-6.

Table 32-6. Education and Outreach

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • **If yes, please briefly describe**	No
Do you use social media for hazard mitigation education and outreach? • **If yes, please briefly describe**	No
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • **If yes, please briefly specify**	No
Do you have any other programs already in place that could be used to communicate hazard-related information? • **If yes, please briefly describe**	Yes In addition to a comprehensive website, social media, marketing, and communications capacity HCC operates HCC TV which includes studios, television and video production capacity.
Do you have any established warning systems for hazard events? • **If yes, please briefly describe**	Yes Emergency Notification System mass notification tool for HCC students, staff, and faculty. Additional warning systems/channels include website, social media, local television and radio stations, Harris County Joint Information Center, and local systems for HCC campuses. Additionally, HCC police utilize radios and a dispatch center.

32.3.4 Adaptive Capacity for Climate Change

Given the uncertainties associated with how hazard risk may change with a changing climate, a jurisdiction's ability to track such changes and adapt as needed is an important component of the mitigation strategy. Table 32-7 summarizes the jurisdiction's adaptive capacity for climate change.

Table 32-7. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:***	Low
Jurisdiction-level monitoring of climate change impacts ***Comment:***	Low
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Medium
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:***	Low
Participation in regional groups addressing climate risks ***Comment:***	Medium

Criterion	Jurisdiction Rating[a]
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	Low
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	Low
Identified strategies for adaptation to impacts ***Comment:***	Low
Champions for climate action in local government departments ***Comment:***	Low
Political support for implementing climate change adaptation strategies ***Comment:***	Medium
Financial resources devoted to climate change adaptation ***Comment:***	Low
Local authority over sectors likely to be negative impacted ***Comment:***	Low
Public Capacity	
Local residents' knowledge of and understanding of climate risk ***Comment:***	Low
Local residents' support of adaptation efforts ***Comment:***	Low
Local residents' capacity to adapt to climate impacts ***Comment:***	Low
Local economy current capacity to adapt to climate impacts ***Comment:***	Low
Local ecosystems capacity to adapt to climate impacts ***Comment:***	Low

a. High = Capacity exists and is in use; Medium = Capacity may exist but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

32.4 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

32.4.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- **Emergency Operations Plan** — The results of the risk assessment were used in the development of the emergency operations plan.

- **Facilities Plan** — The results of the risk assessment and mapped hazard areas are used in facility planning for the district. Potential sites are reviewed for hazard risks and appropriate mitigation measures are considered in building and site design.
- **Junior College Audit Report –** The required review of campus safety and security includes extensive review of emergency preparedness, response, recovery, prevention and mitigation. Results of the review are utilized to guide hazard mitigation activities and projects.
- **Facility Condition Assessment –** The assessment details the current condition of major building systems and identifies needed capital improvements and established a long-term projection for necessary capital spending to maintain the facilities. Many of the identified needs relate to major system upgrades and renovations that can increase facility resiliency and mitigate damages incurred as the result of a hazard.
- **Facilities Maintenance Plan –** The facilities maintenance plan focuses resources on maintaining the facility grounds, parking lots, landscaping, and structures in a manner that minimizes damages from natural hazards to reduce the impact of high winds, flooding, and power disruptions.
- **Information Systems Business Continuity Plan –** The District Information Systems are designed with redundancies to minimize the risk of loss of data due to damaged District buildings or regional infrastructure.

32.4.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- **Facility Master Plan-** Integration of hazard data into planning process can provide insight into the costs and benefits of renovations to existing facilities, consideration of new facilities/sites, and potential changes to workforce training needs.
- **Capital Improvement Plan-** Capital improvement project proposals may take into consideration hazard mitigation potential as a means of evaluating project prioritization.

32.5 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 32-8 lists past occurrences of natural hazards for which specific damage was recorded on HCC campuses or facilities in the past 10 years. Other hazard events that broadly affected the entire planning area, including HCC, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 32-8. Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Severe Weather / Flooding		2019	Significant Operational Impact
Winter Freeze		2018	Significant Operational Impact
Hurricane Harvey	4332DR	2017	Significant Operational Impact $1,700,000
Severe Weather / Flooding		2017	Significant Operational Impact
Severe Weather / Tornado		2017	$15,000
Tax Day Flood	4272DR	2016	Significant Operational Impact
Memorial Day Flood	4223DR	2015	Significant Operational Impact
Hurricane Ike	1791DR	2008	Significant Operational Impact $4,700,000

32.6 HAZARD RISK RANKING

Table 32-9 presents a local ranking for HCC of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described

in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 32-9. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Hurricane	54 (3 x (9+6+3))	High
2	Flood	45 (3 x (6+6+3))	High
3	Severe Weather	36 (3 x (9+2+1))	High
4	Dam Failure	20 (2 x (3+4+3))	Medium
5	Earthquake	14 (1 x (9+4+1))	Low
6	Wildfire	6 (1 x (3+2+1))	Low
6	Drought	6 (3 x (0+1+1))	Low
6	Landslide	6 (1 x (3+2+1))	Low
7	Tsunami	3 (1 x (3+0+0))	Low
7	Coastal Erosion	3 (1x (3+0+0))	Low

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

32.7 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. The following jurisdiction-specific issue has been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- HCC Police Department building is not equipped with a generator but houses police personnel during ride-out situations.

Mitigation actions addressing this issue were prioritized for consideration in the action plan in this annex.

32.8 STATUS OF PREVIOUS PLAN ACTIONS

Houston Community College has not previously completed a formally adopted hazard mitigation plan.

32.9 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 32-10 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 32-11 identifies the priority for each action. Table 32-12 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 32-10. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action HCC 1 — Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are in high- or medium-risk hazard areas.						
Hazards Mitigated: Hurricane, flooding, severe weather, dam failure, earthquake, landslide, wildfire						
Existing	3, 4, 5, 6, 8, 9, 10, 11, 12, 13,	Facilities	Finance	High	HMGP, PDM, FMA, General Funds, CIP, Bonds	Long Term
Action HCC 2 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: Hurricane, Flood, Severe Weather, Dam Failure, Earthquake, Wildfire, Drought, Landslide, Tsunami, Coastal Erosion						
New and Existing	1, 3, 5, 9, 10	Risk Management	Facilities	Low	Staff Time, General Funds	Ongoing
Action HCC 3 — • Develop and/or update plans that support or enhance continuity of operations following disasters.						
Hazards Mitigated: All Hazards						
New and Existing	1, 3, 4, 10, 13	Risk Management	IT, Facilities	Medium	HMGP, PDM, Staff Time, General Funds, Technology Fee, CIP	Ongoing
Action HCC 4 — Integrate the hazard mitigation plan into other plans and programs within the College.						
Hazards Mitigated: All Hazards						
New and Existing	3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 15	Risk Management	Facilities, Finance & Administration	Low	Staff Time, General Funds, Technology Fee, CIP	Ongoing
Action HCC 5 — • Develop a post-disaster recovery plan and a debris management plan.						
Hazards Mitigated: All Hazards						
Existing	6, 8, 9, 10, 13, 14	Facilities	Procurement	Low	HMGP, PDM, FMA, General Funds, Insurance	Short Term
Action HCC 6 – Purchase generators for critical facilities and infrastructure that lack adequate back-up power and install quick connect emergency generator hook ups for non-permanently installed generators.						
Hazards Mitigated: Flooding, Hurricane, Severe Weather, Earthquake, Dam Failure, Wildfire, Landslide, Tsunami						
Existing	1, 4, 9, 10, 11	HCC Facilities	Procurement	High	HMGP, PDM, General Funds, CIP, Bonds	Long Term
Action HCC 7 — Build and operationalize the Regional Emergency Response Training Center to increase regional capabilities during flood events.						
Hazards Mitigated: Hurricane, Flooding, Severe Weather, Dam Failure, Tsunami						
New and Existing	3, 4, 5, 10, 13	HCC Facilities	President's Office, Finance, Procurement	High	HMGP, PDM, FMA, General Funds, CIP, Bonds, State Appropriation, Partnership Agreements, HCC Foundation	Short Term
Action HCC 8 — Dry-proof the Stafford Campus Fine Arts Center to increase resistance to water intrusion.						
Hazards Mitigated: Hurricane, Flooding, Dam Failure						
Existing	4, 11, 12, 13, 15	HCC Facilities	Risk Management, Procurement	$150k	HMGP, General Funds, PA Grant, Insurance	Short Term
Action HCC 9 — Retrofit smoke exhaust louvers to prevent water intrusion by wind driven rain at Alief Hayes Campus.						
Hazards Mitigated: Severe Weather, Hurricane						
Existing	4, 11, 12, 13, 15	HCC Facilities	Risk Management, Procurement	$30k	HMGP, General Funds, PA Grant	Short Term
Action HCC 10 — Increase resiliency to electrical system failures with appropriate upgrades / retrofits of lightning protection, uninterruptable power supplies, switch gear, transfer switches, transformers, and emergency generator replacement.						
Hazards Mitigated: Hurricane, Flooding, Severe Weather, Dam Failure, Earthquake, Wildfire, Landslide, Tsunami						
New and Existing	1, 4, 9, 10, 11, 13	HCC Facilities	Finance, Procurement	$2.5 M	HMGP, PDM, FMA, General Funds, CIP, Bond	Long Term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action HCC 11 — Complete appropriate structural retrofits of existing building to improve the integrity of the building envelope and roof systems.						
Hazards Mitigated: Hurricane, Flooding, Severe Weather, Dam Failure						
New and Existing	4, 9. 10, 11, 13	HCC Facilities	Finance, Procurement	$10.0 M	HMGP, PDM, FMA, General Funds, CIP, Bond	Long Term
Action HCC 12 — Where appropriate Improve site drainage to minimize risk of urban flash flooding.						
Hazards Mitigated: Hurricane, Flooding, Dam Failure						
Existing	1, 4, 9, 10, 11, 12	HCC Facilities		$1.0 M	HMGP, PDM, FMA, General Funds, CIP, Bond	Short Term
Action HCC 13— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
Hazards Mitigated: Hurricane, Flood, Severe Weather, Dam Failure, Earthquake, Wildfire, Drought, Landslide, Tsunami, Coastal Erosion						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	HCC Facilities	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 32-11. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
HCC1	10	High	High	Yes	Yes	No	Low	Medium
HCC2	5	Low	Low	Yes	No	Yes	High	Low
HCC3	5	High	Medium	Yes	Yes	No	High	High
HCC4	11	Low	Low	Yes	No	Yes	High	Low
HCC5	6	High	Low	Yes	Yes	Yes	High	High
HCC6	5	High	High	Yes	Yes	No	Low	Medium
HCC7	5	High	High	Yes	Yes	No	Medium	High
HCC8	5	High	Low	Yes	Yes	Yes	High	High
HCC9	5	High	Low	Yes	Yes	Yes	High	High
HCC10	6	High	High	Yes	Yes	No	Low	Medium
HCC11	4	High	High	Yes	Yes	No	Low	Medium
HCC12	5	High	Medium	Yes	Yes	No	Medium	High
HCC13	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 32-12. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Hurricane	HCC1, 12, 13	HCC1, 6, 8, 9, 10, 11	HCC2, 4, 7, 13	HCC12	HCC3, 4, 5, 6, 7, 9, 10, 13	HCC8, 12	HCC3, 12	HCC2, 3, 4, 5, 13
Flood	HCC1, 12, 13	HCC1, 6, 8, 10, 11	HCC2, 4, 7, 13	HCC12	HCC3, 4, 5, 6, 7, 10, 13	HCC8, 12	HCC3, 12	HCC2, 3, 4, 5, 13
Severe Weather	HCC1, 12, 13	HCC1, 6, 9, 10, 11	HCC2, 4, 7, 13		HCC3, 4, 5, 6, 7, 9, 10, 13		HCC3, 12	HCC2, 3, 4, 5, 13
Medium-Risk Hazards								
Dam Failure	HCC1, 12 , 13	HCC1, 6, 8, 10, 11	HCC2, 4, 7, 13	HCC12	HCC3, 4, 5, 6, 7, 10, 13	HCC8, 12	HCC3	HCC2, 3, 4, 5, 13
Low-Risk Hazards								
Earthquake	HCC1, 13	HCC1, 6, 10	HCC2, 4, 13		HCC3, 4, 5, 6, 10, 13			HCC2, 3, 4, 5, 13
Wildfire	HCC1, 13	HCC1, 6, 10	HCC2, 4, 13		HCC3, 4, 5, 6, 10, 13		HCC3	HCC2, 3, 4, 5, 13
Drought	HCC13	HCC11	HCC2, 4, 13		HCC3, 4, 5, 13		HCC3	HCC2, 3, 4, 5, 13
Landslide	HCC1, 13	HCC1, 6, 10	HCC2, 4, 13		HCC3, 4, 5, 6, 10, 13			HCC2, 3, 4, 5, 13
Tsunami	HCC13	HCC10	HCC2, 4, 7, 13		HCC3, 4, 5, 6, 7, 10, 13			HCC2, 3, 4, 5, 13
Coastal Erosion	HCC13		HCC2, 4, 13		HCC3, 4, 5, 13		HCC3	HCC2, 3, 4, 5, 13

a. See the introduction to this volume for explanation of mitigation types.

32.10 REVIEW AND INCORPORATION OF RESOURCES FOR THIS ANNEX

32.10.1 Existing Reports, Plans, Regulatory Tools and Other Resources

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- **HCC Hazard Vulnerability Assessment** — This tool scores and ranks potential hazards or threats to HCC staff, operations, or property, and is used in EOP development.
- **HCC Property Insurance Loss Runs** – The historical data regarding losses during past disasters was utilized in the analysis of hazards and the development of the hazard mitigation action plan.
- **HCC Institutional Emergency Operations Plan** and **HCC Business Continuity Plan** were reviewed during the capability assessment and determining the level of integration with existing plans.
- **HCC Strategic Plan** was reviewed during the capability assessment and in determining the level of integration with existing plans.
- **HCC Facilities Condition Assessment** provides a detailed assessment of the condition of HCC facilities and identifies specific actions that can be taken to increase the resilience of the facilities to natural hazards. The assessment also includes projected capital expenditure required to maintain existing

buildings over time. The assessment was utilized as a primary driver for the selection of facilities related mitigation actions.

- **HCC Property Insurance Statement of Values** was utilized to establish the critical facilities and assets and the associated values.
- **HCC Comprehensive Annual Financial Report** was utilized during the capability assessment and the completion of the mitigation action plan matrix and the establishment of mitigation priorities.
- **HCC Capital Improvements Program** was utilized during the capability assessment.

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.
- **FEMA Flood Maps** were utilized in the hazard ranking and the selection of hazard mitigation action plan items.
- **NFPA 101, Life Safety Code 2015 Edition** was utilized during the capability assessment.
- **Robert T. Stafford Disaster Relief and Emergency Assistance Act,** (as amended), 42 U.S.C. 5121 was utilized to in the completion of the hazard mitigation action plan.
- **FEMA, Continuity Guidance Circular** 1, July 2013 and **FEMA, Continuity Guidance Circular 2**, October2013 were utilized in the completion of the capability assessment.
- **FEMA, Guide for Developing High-Quality Emergency Operations Plans for Institutions of Higher Education** was utilized in the completion of the capability assessment.
- **Junior College Audit Reporting Tool** is provided by the Texas School Safety Center and provides a comprehensive checklist utilized to facilitate the capability assessment.

32.10.2 Staff and Local Stakeholder Involvement in Annex Development

The annex was developed by a committee involving HCC Office of Emergency Management, Risk Management, Facilities, HCC Police, Northeast College Office of the President, and Finance. Committee meetings were held as each phase was released, and relevant departments were consulted for related sections of the annex. Updates were internally circulated and vetted for accuracy.

33. LONE STAR COLLEGE

33.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Derrick Harris, Senior Business Analyst
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Houston, TX 77070
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33.2 JURISDICTION PROFILE

33.2.1 Overview

The Lone Star College (LSC) was established in 1972 as a public junior college district providing post-secondary educational opportunities. LSC is governed by a nine-member Board of Trustees. The Chancellor serves as the Chief Executive Officer and oversees the daily operations of LSC. The Chancellor assumes responsibility for the adoption of this plan; the Department of Emergency Preparedness will oversee its implementation. LSC currently has approximately 7,800 full-time and part-time employees. Funding comes primarily through ad valorem taxes, tuition and fees, and state appropriations. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 33-1.

Table 33-1. Local Mitigation Planning Team Members

Name	Title
Derrick Harris	Senior Business Analyst, Department of Emergency Preparedness
Cheryl Cepeda	Manager, Department of Emergency Preparedness
Paul Willingham	Senior Associate Vice-Chancellor/Police Chief
Mark Pemberton	Captain, Police Department
Sandra Joachim	Chief of Staff, Police Department

33.2.2 Service Area and Trends

The Lone Star College (LSC) currently has a student enrollment of 95,000 with a service area covering more than 1,400 square miles in Harris, Montgomery, San Jacinto, and Walker counties, including multiple school districts: Aldine, Cleveland, Conroe, Cypress-Fairbanks, Humble, Huntsville, Klein, Magnolia, Montgomery, New Caney, New Waverly, Splendora, Spring, Tarkington, Tomball, Waller, and Willis. Lone Star College is the largest institution of higher education in the Houston area and is one of the top three largest colleges in the nation. LSC is composed of seven colleges, two university centers, and ten centers. LSC continues to grow with plans to build additional centers and complete building expansion at various locations to accommodate the growth demand in the LSC service area.

33.2.3 Assets

Table 33-2 summarizes the critical assets of the district and their value.

Table 33-2. Special Purpose District Assets

Asset	Value
Property	
Land -Property addresses listed below under critical facilities and infrastructure	$86,978,392
Construction-in-Progress	$47,692,568
Equipment	
Furniture, Machinery, Vehicles	$100,186,178
Total:	
Critical Facilities and Infrastructure	$906,495,848
LSC-Cyfair – 9191 Barker Cypress Road, Cypress, TX 77433	
LSC-Cypress Center – 19710 Clay Road, Katy, Texas 77449	
LSC-Westway Park Technology Center – 5060 Westway Park Boulevard, Houston, Texas 77041	
LSC-Kingwood – 20000 Kingwood Drive, Kingwood, TX 77339-3801	
LSC-Atascocita Center – 15903 West Lake Houston, Houston, TX 77044	
LSC-EMCID Center, 21575 Highway 59 N, New Caney, TX 77357	
LSC-Process Technology Center, 14001 Lockwood Rd, Houston, Texas 77044	
LSC-Houston North Fairbanks – 14955 Northwest Freeway, Houston, Texas 77040	
LSC-Houston North Greenspoint – 250 N. Sam Houston Pkwy E., Houston, Texas 77060	
LSC-Houston North Victory – 4141 Victory Drive, Houston, Texas 77088	
LSC-Montgomery – 3200 College Park Drive, Conroe, TX 77384	
LSC-Conroe Center – 777 Conroe Park North Drive, Conroe, TX 77303	
LSC-North Harris – 2700 W.W. Thorne Drive, Houston, TX 77073	
CHI LSC-North Harris – 910 E Richey Rd., Houston, TX 77073	
LSC-Health Professions Building – 17200/17202 Red Oak Dr., Houston, TX 77090	
LSC-Transportation Institute – 24037 W Hardy Rd., Spring, TX 77373	
LSC-East Aldine Center (Opening Fall 2019) – 2500 Aldine Mail Route Road, Houston, Texas 77039	
LSC-Tomball – 30555 Tomball Parkway, Tomball, TX 77375	
LSC-Tomball Health Science Building – 700 Graham Dr., Tomball, Texas 77375	
LSC-Creekside Center – 8747 West New Harmony Trail., The Woodlands 77375	
LSC-University Park – 20515 SH 249, Houston, 77070	
LSC-Energy & Manufacturing Institute – 11521 Compaq Center West Drive, Houston, TX 77070	
LSC-Center for Science & Innovation – 919 University Park Campus Drive, Houston, TX 77070	
LSC-Central Plant – 20555 SH 249, Houston, TX 77070	
Visitors Center/YMCA Child Care – 11144 Compaq Center W Dr., Houston, TX 77070	
Total:	***$1,141,352,986***

33.3 CAPABILITY ASSESSMENT

An assessment of the district's current capabilities was conducted to identify opportunities to expand, initiate or integrate capabilities in order to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table in Section 29.9 identifies these as community capacity building mitigation actions.

33.3.1 Planning and Regulatory Capabilities

Jurisdictions develop plans and programs and implement rules and regulations to protect and serve residents. When effectively prepared and administered, these plans, programs and regulations can support the implementation of mitigation actions. Table 33-3 summarizes existing codes, ordinances, policies, programs or plans that are applicable to this hazard mitigation plan.

Table 33-3. Planning and Regulatory Capability

Plan, Study or Program	Date of Most Recent Update	Comment
Emergency Operations Plan/Emergency Management Plan	2015	Currently being updated
Continuity of Operations Plan	2015	Currently being updated
Evacuation Plan	2018	Some locations undergoing revisions

33.3.2 Fiscal, Administrative and Technical Capabilities

Fiscal capability is an indicator of a jurisdiction's ability to fulfill the financial needs associated with hazard mitigation projects. An assessment of fiscal capabilities is presented in Table 33-4. Administrative and technical capabilities represent a jurisdiction's staffing resources for carrying out the mitigation strategy. An assessment of administrative and technical capabilities is presented in Table 33-5.

Table 33-4. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Capital Improvements Project Funding	No
Authority to Levy Taxes for Specific Purposes	No
User Fees for Water, Sewer, Gas or Electric Service	No
Incur Debt through General Obligation Bonds	No
Incur Debt through Special Tax Bonds	No
Incur Debt through Private Activity Bonds	No
State-Sponsored Grant Programs	Yes, Hazard Mitigation Grant Program
Development Impact Fees for Homebuyers or Developers	No
Federal Grant Programs	Yes, Hazard Mitigation Grant Program

Table 33-5. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	No	
Engineers or professionals trained in building or infrastructure construction practices	Yes	Facilities & Construction
Planners or engineers with an understanding of natural hazards	Yes	Department of Emergency Preparedness
Staff with training in benefit/cost analysis	Yes	Department of Emergency Preparedness
Surveyors	Yes	Contractor
Personnel skilled or trained in GIS applications	No	
Scientist familiar with natural hazards in local area	No	
Emergency manager	Yes	Department of Emergency Preparedness
Grant writers	Yes	Resource Development & Administration/ Department of Emergency Preparedness

33.3.3 Education and Outreach Capabilities

Outreach and education capability identifies the connection between government and community members, which opens a dialogue needed for a more resilient community. An assessment of education and outreach capabilities is presented in Table 33-6.

Table 33-6. Education and Outreach

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • **If yes, please briefly describe**	No
Do you use social media for hazard mitigation education and outreach? • **If yes, please briefly describe**	No
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • **If yes, please briefly specify**	No
Do you have any other programs already in place that could be used to communicate hazard-related information? • **If yes, please briefly describe**	Yes Emergency Preparedness website is currently being developed and will include hazard-related information.
Do you have any established warning systems for hazard events? • **If yes, please briefly describe**	Yes LoneStarCollegeAlert/RAVE is the emergency notification system used to inform the LSC community of hazard events.

33.3.4 Adaptive Capacity for Climate Change

Given the uncertainties associated with how hazard risk may change with a changing climate, a jurisdiction's ability to track such changes and adapt as needed is an important component of the mitigation strategy. Table 33-7 summarizes the jurisdiction's adaptive capacity for climate change.

33.4 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

33.4.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- **Emergency Operations Plan/Emergency Management Plan:** The results of the risk assessment were used in the development of the LSC Emergency Management Plan.

Table 33-7. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:***	Medium
Jurisdiction-level monitoring of climate change impacts ***Comment:***	Medium
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:***	Low
Participation in regional groups addressing climate risks ***Comment:***	High
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	Medium
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	Low
Identified strategies for adaptation to impacts ***Comment:***	Medium
Champions for climate action in local government departments ***Comment:***	Medium
Political support for implementing climate change adaptation strategies ***Comment:***	Medium
Financial resources devoted to climate change adaptation ***Comment:***	Low
Local authority over sectors likely to be negative impacted ***Comment:***	Low
Public Capacity	
Local residents knowledge of and understanding of climate risk ***Comment:***	Low
Local residents support of adaptation efforts ***Comment:***	Low
Local residents' capacity to adapt to climate impacts ***Comment:***	Low
Local economy current capacity to adapt to climate impacts ***Comment:***	Low
Local ecosystems capacity to adapt to climate impacts ***Comment:***	Low

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

33.4.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- **LSC Emergency Management Plan Annexes –** The LSC-Department of Emergency Preparedness will be integrating hazard mitigation information on its annexes, such as, communications, public information, recovery, hazardous materials & chemical spills, and campus/department emergency operations plans.

33.5 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 33-8 lists past occurrences of natural hazards for which specific damage was recorded in Lone Star College. Other hazard events that broadly affected the entire planning area, including Lone Star College are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 33-8. Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Hurricane Harvey	4332 DR	2017	LSC-Kingwood suffered major damages due to flooding
Severe Storms and Flooding	4269 DR	2016	Not Available
Severe Storms and Flooding	4272 DR	2016	Not Available
Severe Storms, Tornadoes, Straight Line Winds and Flooding	4245 DR	2015	Not Available
Severe Storms, Tornadoes, Straight Line Winds and Flooding	4223 DR	2015	Not Available
Hurricane Ike	1791 DR	2008	LSC-North Harris had power outage for 2 weeks
Hurricane Ike	3294 EM	2008	LSC-North Harris had power outage for 2 weeks
Hurricane Rita	1606 DR	2005	LSC-North Harris closed for a week due to electrical issues and high water
Hurricane Rita	3261 EM	2005	LSC-North Harris closed for a week due to electrical issues and high water
Hurricane Katrina Evacuation	3216 EM	2005	Not Available
Tropical Storm Allison	1379 DR	2001	Not Available

33.6 HAZARD RISK RANKING

Table 33-9 presents a local ranking for Lone Star College of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 33-9. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Severe Weather	48	High
1	Hurricane	48	High
2	Flooding	27	Medium
3	Earthquake	14	Low
4	Dam Failure	12	Low
5	Wildfire	9	Low
6	Drought	6	Low
7	Coastal Erosion	0 (No exposure)	None
7	Mass Movement	0 (No exposure)	None
7	Tsunami	0 (No exposure)	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

33.7 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. The following jurisdiction-specific issues have been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- LSC-Kingwood suffered tremendous flood damage caused by Hurricane Harvey, damaging 6 of 9 buildings.
- LSC-University Park's Center for Science Innovation also sustained some flood damage, pushing back the original opening date.
- A critical facility used by ride-out teams not equipped with a generator.

Mitigation actions addressing these issues were prioritized for consideration in the action plan presented in this annex.

33.8 STATUS OF PREVIOUS PLAN ACTIONS

Table 33-10 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

Table 33-10. Status of Previous Plan Actions

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
2014LONSTR001: Reduce the buildup of fuel areas to mitigate the risk of wildfire and provide public awareness to LSC community to further aid in the reduction of fuel areas.			X	LSC4
Comment: *Ongoing – Action item carried over to plan update due t to departmental reorganization.*				
2014LONSTR002: Increase the effectiveness of exterior warning systems by increasing the number of systems/devices provided through a network connected system-wide exterior speaker array system) installed at LSC facilities that will result in improved public information and warnings on wildfire hazards and threats.			X	LSC5
Comment: *In Progress – Initial planning started*				

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
2014LONSTR003: Create a sustainable balance that will allow the LSC community to operate safely while maintaining environmental harmony in a wildland/urban interface setting through implementation of the Firewise Program. Phase I: (a) enlist a specialist to complete a community assessment and create a plan that identifies agreed-upon achievable solutions to be implemented by the LSC community and (b) sponsor a local Firewise Task Force Committee which maintains the Firewise Community/USA program, then in Phase II submit an annual report to Firewise Communities/USA that documents continuing compliance with the program.		X		
Comment: *Removed – Intent of previously identified action is unclear; adequate personnel not available due to department reorganization.*				
2014LONSTR004: Increase the effectiveness of warning systems by increasing the number of LSC workspaces with NOAA weather alert radios.			X	LSC6
Comment: *On Going – NOAA weather alert radios distributed within LSC-Police Department. Plans to distribute more to other departments if funding becomes available.*				
2014LONSTR005: Assist LSC with funding to provide the proper design criteria for "tornado safe rooms" or shelters for areas without a safe area for shelter, such as libraries with two or more walls that are 80% or more glass.		X		
Comment: *Removed – change in priorities; most facilities have safe areas in interior rooms with no windows/glass.*				
2014LONSTR006: Expand LSC warning systems to include audio and visual warnings and supporting literature as a means of providing timely public warning and information that includes individuals with functional and access needs while at an LSC campus in the event of a tornado or threat.		X		
Comment: *Removed – intent of previously identified action is unclear; action item similar to 2014LONSTR011 and 2014LONSTR012.*				
2014LONSTR007: Create a chemical safety/hazmat emergency management program to include associated materials specifically for use by educational facilities in partnership with Harris County first responder agencies. This program would include a consolidated database of MSDS/SDS sheet for the top 700+ chemicals tracked by the Environmental Protection Agency and the program would be used to increase the number of Tier II report submissions to the Department of State Health Services, local fire departments and Local Emergency Planning Committees (LEPCs) by members of the LSC community.	X			
Comment: *In Progress – The Environmental Health & Life Safety department established and chemical inventories along with SDS are stored in V Drive. Chemical inventories are also included in the intranet site and Digital Sandbox.*				
2014LONSTR008: Provide proper labeling, secure storage, and appropriate disposal of hazardous materials to avoid spillage and breakage during a hazard event. This program will mitigate risk of hazardous materials accidents within the Lone Star community and aid in increasing the number of entities submitting the appropriate TIER II reports to the Department of State Health Services, local fire departments and Local Emergency Planning Committees (LEPCs).	X			
Comment: *In Progress – Awareness program implemented; information available online under www.lonestar.edu/oem, Environmental Health & Safety, Waste Management Guidelines.*				

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
2014LONSTR009: Install flood protection measures to reduce the adverse effects of flood events by reducing the number of low water crossings at LSC facilities. Public crossings will be elevated by using an articulated concrete block mattress solution (interlocking mats) to form a mattress in the low water. The interlocking mats will elevate grounds allowing for improved stability at crossings for pedestrians while not impeding the passage of vehicles and animals.		X		
Comment: *Removed – The LSC department tasked with such activity was not properly consulted; intent of action item was unclear.*				
2014LONSTR010: Implement an effective flood mitigation program that includes (a) the use of flood controls during construction, (b) the development of a riverine-erosion protection program for riverine-erosion prone areas caused by flooding, and (c) the implementation of a flood awareness program by providing FEMA/NFIP materials to patrons of LSC campus public libraries including those managed by the Harris County Libraries.			X	LSC7
Comment: *Ongoing – All new construction now includes flood controls during the design phase. Flood awareness materials and information will be included in LSC Department of Emergency Preparedness website.*				
2014LONSTR011: Reduce the loss of property damage resulting from severe weather events by improving external warning systems used to alert/warn the LSC community about severe weather including severe thunderstorms and enhance warning concerning severe weather preparedness.		X		
Comment: *Removed – intent of previously identified action is unclear; action item similar to 2014LONSTR006 and 2014LONSTR012.*				
2014LONSTR012: Expand warning systems by adding sirens and exterior mass notification at all LSC facilities by installing hardware such as speaker arrays, sirens, strobes, and horns to reach LSC occupants in a timely manner that are on or near campus in parking lots and remote areas of campus who may require functional needs support services and/or limited English proficiency.			X	LSC8
Comment: *Ongoing – Exterior mass notification plans have been developed as part of the Safety and Security Bond.*				
2014LONSTR013: Develop an LSC system wide Drought Contingency Program to include a plan and mitigation actions to identify additional potential impacts of drought on the community to include utilities such as power, drinking water, health and safety (including special needs), and emergency response such as fire and medical services. This action will aid in reducing loss of life and property damage resulting from severe weather events in the LSC community.			X	LSC9
Comment: *Project not started – department undergoing reorganization and will carry over this action item to plan update.*				
2014LONSTR015: Expand LSC emergency management public education campaigns as a means of extending the reach to those with limited English proficiency and others requiring functional needs support services so that more receive timely warning and information.			X	LSC10
Comment: *In Progress – Pre-scripted messages are available in English and Spanish. Updates to literature materials are currently being reviewed.*				
2014LONSTR016: Develop and enhance alternate sources for additional feed and adequate shelter for livestock and other animals to mitigate the adverse impact of an energy pipeline failure and to update the LSC-Tomball evacuation plan.			X	LSC11
Comment: *Project not started – department undergoing reorganization and will carry over this action item to plan update.*				
2014LONSTR017: Harden the LSC Emergency Operations Center by improving its' technological capabilities for monitoring, warning, and mitigating natural disasters and energy pipeline accidents		X		
Comment: *Removed – LSC will be utilizing web EOC and will rely on Harris County EOC for support if needed during natural disasters.*				

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
2014LONSTR018: Develop a tree trimming program to prevent limb breakage and safeguard nearby utility lines by working with utilities to identify critical areas of concern involving communication and transmission lines.		X		
Comment: *Removed – Tree trimming has occurred however coordination with location utilities unknown at this time.*				
2014LONSTR020: Enhance the warning of populations at risk from extreme heat when on campus and when participating in outdoor activities and using the information to provide viable options to minimize their risk of extended exposure.		X		
Comment: *Removed – Action item similar to 2014LONSTR002.*				
2014LONSTR021: Increase public awareness through the creation and distribution of materials and provide warning and alerts on the dangers of excessive heat to include persons with functional and access needs while at an LSC facility**.**			X	LSC12
Comment: *Project not started – department undergoing reorganization and will carry over this action item to plan update.*				
2014LONSTR022: Install hail resistant roofing and window coverings, determined by a feasibility study, by hardening LSC buildings and critical infrastructure such as Police Offices, server rooms, and shelters for remote areas such as soccer fields, tennis courts that are not adjacent to any structures.		X		
Comment: *Removed – intent of previously identified action is unclear.*				
2014LONSTR024: Evaluate LSC buildings to determine how to mitigate storm damage through hardening measures then educate the LSC community on lessons learned.		X		
Comment: *Project not started – department undergoing reorganization and will carry over this action item to plan update.*				
2014LONSTR025: Harden critical facilities on campuses that would be used by ride-out teams and first responders such as police offices that include rehabilitation facilities, refrigerator, cooling, microwave/stove, water, food, generator, and other essential services.			X	LSC13
Comment: *In Progress – LSC Department of Emergency Preparedness will continue working with the Police Department and Facilities to harden critical facilities used by ride-out teams.*				

33.9 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 33-11 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 33-12 identifies the priority for each action. Table 33-13 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 33-11. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
LSC1 — Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Earthquake, flooding, landslide, severe weather, hurricane, tsunami, wildfire						
Existing	3, 4, 10, 12	College Administration	TBD	High	HMGP, PDM, FMA	Short-term
LSC2 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Earthquake, Dam Failure, Wildfire, Drought						
New and Existing	1, 5, 8	College Administration	TBD	Low	Staff Time, General Funds	Short-term
LSC3 — Integrate the hazard mitigation plan into other plans, ordinances and programs within the community.						
Hazards Mitigated: Dam failure, drought, earthquake, flooding, landslide, severe weather, hurricane, tsunami, wildfire						
Existing	2, 6, 9	College Administration	TBD	Low	Staff Time	Short-term
LSC4 — Reduce the buildup of fuel areas to mitigate the risk of wildfire and provide public awareness to LSC community to further aid in the reduction of fuel areas.						
Hazards Mitigated: Wildfire						
Existing	2, 3, 8	DEP	EHLS, Facilities	Low	HMGP	Ongoing
LSC5 — Increase the effectiveness of exterior warning systems by increasing the number of systems/devices provided through a network connected system-wide exterior speaker array system) installed at LSC facilities that will result in improved public information and warnings on wildfire hazards and threats.						
Hazards Mitigated: Dam failure, earthquake, flooding, landslide, severe weather, hurricane, tsunami, wildfire						
New and Existing	1, 6, 15	TBD	TBD	High	HMGP, Bond	Ongoing
LSC6 — Increase the effectiveness of warning systems by increasing the number of LSC workspaces with NOAA weather alert radios.						
Hazards Mitigated: Earthquake, flooding, landslide, severe weather, hurricane, tsunami, wildfire						
Existing	1, 3, 11	DEP	PD	Medium	HMGP, PDM, FMA	Short-term
LSC7 — Implement an effective flood mitigation program that includes (a) the use of flood controls during construction, (b) the development of a riverine-erosion protection program for riverine-erosion prone areas caused by flooding, and (c) the implementation of a flood awareness program by providing FEMA/NFIP materials to patrons of LSC campus public libraries including those managed by the Harris County Libraries.						
Hazards Mitigated: Flooding, severe weather, hurricane						
New and Existing	3, 4, 10	College Administration	TBD	High	HMGP, PDM, FMA	Ongoing
LSC8 — Expand warning systems by adding sirens and exterior mass notification at all LSC facilities by installing hardware such as speaker arrays, sirens, strobes, and horns to reach LSC occupants in a timely manner that are on or near campus in parking lots and remote areas of campus who may require functional needs support services and/or limited English proficiency.						
Hazards Mitigated: Dam failure, earthquake, flooding, landslide, severe weather, hurricane, tsunami, wildfire						
New and Existing	1, 4, 11	College Administration	TBD	High	HMGP, Bond	
LSC9 — Develop an LSC system wide Drought Contingency Program to include a plan and mitigation actions to identify additional potential impacts of drought on the community to include utilities such as power, drinking water, health and safety (including special needs), and emergency response such as fire and medical services. This action will aid in reducing loss of life and property damage resulting from severe weather events in the LSC community.						
Hazards Mitigated: Drought, severe weather						
Existing	3, 4, 14	DEP	TBD	Low	HMGP, Staff Time	Ongoing

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
LSC10 — Expand LSC emergency management public education campaigns as a means of extending the reach to those with limited English proficiency and others requiring functional needs support services so that more receive timely warning and information.						
Hazards Mitigated: Dam failure, drought, earthquake, flooding, land slide, severe weather, hurricane, tsunami, wildfire						
New and Existing	1, 4, 15	DEP	TBD	Low	HMGP, PDM, FMA	Ongoing
LSC11 — Develop and enhance alternate sources for additional feed and adequate shelter for livestock and other animals to mitigate the adverse impact of an energy pipeline failure and to update the LSC-Tomball evacuation plan.						
Hazards Mitigated: Earthquake, flooding, severe weather, hurricane, tsunami, wildfire						
Existing	8, 11, 15	College Administration	TBD	Medium	HMGP	Ongoing
LSC12 — Increase public awareness through the creation and distribution of materials and provide warning and alerts on the dangers of excessive heat to include persons with functional and access needs while at an LSC facility.						
Hazards Mitigated: Drought, severe weather, wildfire						
New and Existing	1, 2, 4	DEP	TBD	Low	HMGP, Staff Time	Ongoing
LSC13 — Harden critical facilities on campuses that would be used by ride-out teams and first responders such as police offices that include rehabilitation facilities, refrigerator, cooling, microwave/stove, water, food, generator, and other essential services.						
Hazards Mitigated: Drought, earthquake, flooding, severe weather, hurricane						
New and Existing	1, 3, 7, 13	College Administration	TBD	High	HMGP, PDM, FMA	Long-term
LSC14 — Develop and/or update plans that support or enhance continuity of operations following disasters.						
Hazards Mitigated: Dam failure, drought, earthquake, flooding, landslide, severe weather, hurricane, tsunami, wildfire						
Existing	3, 8, 10, 13, 14	DEP	TBD	Low	Staff Time, HMGP	Short-term
LSC15 — Purchase generators for critical facilities and infrastructure that lack adequate back-up power.						
Hazards Mitigated: Dam failure, drought, earthquake, flooding, landslide, severe weather, hurricane, tsunami, wildfire						
New and Existing	1, 13	College Administration	TBD	High	HMGP, PDM	Long-term
Action LSC16— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Earthquake, Dam Failure, Wildfire, Drought						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	College Administration	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 33-12. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
LSC1	4	High	High	Yes	Yes	No	Medium	High
LSC2	3	Low	Low	Yes	No	Yes	High	Low
LSC3	3	High	Medium	Yes	Yes	No	Medium	High
LSC4	3	Medium	Medium	Yes	Yes	No	Medium	Medium
LSC5	3	High	High	Yes	Yes	Yes	Low	Low
LSC6	3	High	Medium	Yes	Yes	Yes	Medium	Medium
LSC7	3	High	High	Yes	Yes	No	Medium	High
LSC8	3	High	High	Yes	Yes	Yes	Low	Low
LSC9	3	Medium	Medium	Yes	Yes	No	Medium	Medium
LSC10	3	Medium	Medium	Yes	Yes	Yes	Low	Low
LSC11	3	Medium	Medium	Yes	Yes	No	Medium	Low
LSC12	3	Medium	Medium	Yes	Yes	Yes	Low	Low
LSC13	4	High	High	Yes	Yes	No	Medium	High
LSC14	5	High	Medium	Yes	Yes	Yes	Medium	High
LSC15	2	High	High	Yes	Yes	No	Medium	High
LSC16	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 33-13. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Severe Weather	LSC-1, 7, 16	LSC-1, 7	LSC-7, 10, 12, 16	LSC-7	LSC-5, 6, 8, 11, 13, 15, 16	LSC-1		LSC-2, 3, 9, 14, 16
Hurricane	LSC-1, 16	LSC-7	LSC-7, 10, 16	LSC-7	LSC-5, 6, 8, 11, 13, 15, 16	LSC-7		LSC-2, 3, 14, 16
Medium-Risk Hazards								
Flooding	LSC-1, 16	LSC-1, 7,	LSC-7, 10, 16		LSC-5, 6, 8, 11, 13, 15, 16	LSC-1		LSC-2, 3, 14, 16
Low-Risk Hazards								
Earthquake	LSC-1, 16		LSC-10, 16		LSC-5, 6, 8, 11, 13, 15, 16			LSC-2, 3, 14, 16
Dam Failure	LSC16		LSC-10, 16		LSC-5, 6, 8, 15, 16			LSC-2, 3, 14, 16
Wildfire	LSC-1, 4, 16	LSC-1,	LSC-4, 10, 12, 16		LSC-5, 6, 8, 11, 15, 16	LSC-1		LSC-2, 3, 14, 16
Drought	LSC16		LSC-10, 12, 16		LSC-13, 15, 16			LSC-2, 3, 9, 16

a. See the introduction to this volume for explanation of mitigation types.

33.10 REVIEW AND INCORPORATION OF RESOURCES FOR THIS ANNEX

33.10.1 Existing Reports, Plans, Regulatory Tools and Other Resources

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- **LSC Hazard Mitigation Plan 2018 Annual Evaluation and Monitoring Report** – Reviewed last report submitted and used information to update existing action items.
- **LSC Approved Budget Report Fiscal Year 2019**
- **LSC Comprehensive Annual Report, August 31, 2018**

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.

33.10.2 Staff and Local Stakeholder Involvement in Annex Development

This annex was developed with input from the LSC Police Department and Department of Emergency Preparedness (DEP). All departments were asked to contribute to the annex development through reviewing and contributing to the capability assessment, reporting on the status of previously identified actions, and participating in action identification and prioritization. The LSC DEP, formerly known as LSC Office of Emergency Management, has gone through a reorganization earlier this year and will further reevaluate the departments that will be represented on the Hazard Mitigation Team to ensure all key stakeholders are included.

34. UNIVERSITY OF HOUSTON

34.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Kelly Boysen,
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34.2 JURISDICTION PROFILE

34.2.1 Overview

Established in 1927, the University of Houston is an institution of higher education whose mission is to offer nationally competitive and internationally recognized opportunities for learning, discovery and engagement to a diverse population of students in a real-world setting. The University has 166 buildings and currently employs approximately 10,000 staff and faculty. Funding for the University comes primarily through Tuition/Fees, Contracts & Grants, State Appropriations, Other Operating, and Endowment Income.

Table 34-1. Local Mitigation Planning Team Members

Name	Title
Kelly Boysen	Director, Emergency Management
Jeff Benjamin	Executive Director, Facilities Services
Wayne Brown	Director, Risk Management
Bret Collier/Andrea Black	Captain, Police Department
Chris McDonald	Director, Fire and Life Safety
Christa Rieck	Executive Director, Facilities, Planning & Construction
Mike Rosen	Executive Director, Media Relations

34.2.2 Service Area and Trends

The University of Houston campus covers 574 acres, serving a population of more than 55,000 students, faculty and staff with approximately 8,000 student residents living on campus. The majority of students are from Harris and adjacent counties, however 1,200 are from out of state and over 3,600 are international students, making the University one of the most diverse student populations in the nation. Student enrollment has increased 13.2% in the last five years.

34.2.3 Assets

Table 34-2 summarizes the critical assets of the district and their value.

Table 34-2. Special Purpose District Assets

Asset	Value
Property	
574 acres of land	$939,915,900.00
Equipment	
69 Generators	$20,265,648.00
Pipelines	$10,000,000.00
Fleet (153 vehicles)	$4,881,465.00
Radio Equipment (150 Police radios/264 Facilities Radios)	$360,000.00
Chillers and Boilers	$31,831,500.00
Facilities Equipment	$1,717,640.00
Total:	***$69,056,253.00***
Critical Facilities and Infrastructure	
UH Police Department – 4051 Wheeler St, Houston, TX, 77204	$5,396,471.37
Central Plant – 4738 Calhoun Rd, Houston, TX, 77204	$4,458,428.01
Center for Public Broadcasting building (includes Emergency Operations Center & EAS LP 2 at KUHF) – 4343 Elgin St, Houston, TX, 77204	$49,508,554.75
General Services Building – 4267 Elgin St, Houston, TX, 77204	$15,734,759.16
Bulk Fueling Diesel Tank Farm – 4267 Elgin St, Houston, TX, 77204	$2,500,000.00
Computing Center – 4221 Elgin St, Houston, TX, 77204	$20,054,948.53
Ezekiel Cullen Building – 4302 University Dr, Houston, TX, 77204	$42,395,830.27
Cougar Sub-Station – 2200 Schlumberger, Houston, TX, 77023	$14,183,424.00
Health 1 – 4849 Calhoun Rd, Houston, TX, 77204	$65,991,467.94
Science and Research 2 – 3455 Cullen Blvd, Houston, TX, 77204	$44,215,511.04
J. Davis Armistead – 4901 Calhoun Rd, Houston, TX, 77204	$32,245,751.81
Sci. & Eng. Research Center – 3517 Cullen Blvd, Houston, TX, 77204	$66,251,298.82
College of Pharmacy (Texas Medical Center) – 1441 Moursund St, Houston, TX, 77204	$17,771,304.96
Child Care Center – 4139 Wheeler St, Houston, TX, 77204	$365,728.13
Isabel C. Cameron – 4235 Cullen Blvd, Houston, TX, 77204	$4,609,979.80
Moody Towers Residence Hall – 4401 Cougar Village Dr, Houston, TX, 77204	$50,773,506.05
Cougar Village I – 4385 Cougar Village Dr, Houston, TX, 77204	$58,414,694.40
Cougar Village II – 4373 Cougar Village Dr, Houston, TX, 77204	$53,865,000.00
Cougar Place – 4016 Cullen Blvd, Houston, TX, 77204	$42,200,625.56
Conrad Hilton College of Hotel & Restaurant Management – 4450 University Dr, Houston, TX, 77204	$76,875,208.70
University Lofts Apartments – 4700 Calhoun Rd, Houston, TX, 77204	$104,403,658.75
Bayou Oaks Apartments – 5063 Calhoun Rd, Houston, TX, 77204	$25,792,819.20
Cullen Oaks Apartments – 4600 Cullen Blvd, Houston, TX, 77204	$102,952.18
Science and Research 1 – 3507 Cullen Blvd, Houston, TX, 77204	$63,574,308.86
Science Teaching Lab – 3589 Cullen Blvd, Houston, TX, 77204	$35,522,664.87
Cullen College of Engineering 1 – 4726 Calhoun Rd, Houston, TX, 77204	$66,589,599.74
Cullen College of Engineering 2 – 4722 Calhoun Rd, Houston, TX, 77204	$31,421,011.97
Lamar Fleming, Jr – 3585 Cullen Blvd, Houston, TX, 77204	$36,556,462.08
Science Building – 3581 Cullen Blvd, Houston, TX, 77204	$15,562,022.63
Univ of Houston Science Center -3369 Cullen Blvd, Houston, TX, 77204	$44,630,507.52
Campus Recreation & Wellness Center – 4500 University Dr, Houston, TX, 77204	$62,088,726.53

Asset	Value
Fertitta Center – 3422 Cullen Blvd, Houston, TX, 77204	$62,745,230.00
Football Indoor Practice Facility – 3820 Holman St., Houston, TX, 77204	$20,000,000.00
Health 2 – 4733 Wheeler St., Houston, TX, 77204	$136,000,000.00
Charles F. McElhinney Hall – 3623 Cullen Blvd, Houston, TX, 77204	$11,940,393.03
Guy V. Lewis Basketball Development Facility – 3480 Cullen Blvd, Houston, TX, 77204	$23,000,000.00
Engineering Research Building – 4718 Calhoun Rd., Houston, TX, 77204	$61,000,000.00
Wortham House – 1505 South Blvd. Houston, TX, 77006	$3,194,912.85
University Center – 4455 University Dr, Houston, TX, 77204	$66,562,000.00
University Center Satellite – 3457 Cullen Blvd, Houston, TX, 77204	$6,210,840.38
Cougar Woods Dining – 4277 Cougar Village Dr, Houston, TX, 77204	$9,560,678.40
UH Health Center – 4367 Cougar Village Dr, Houston, TX, 77204	$2,097,845.66
Philip Guthrie Hoffman Hall – 3551 Cullen Blvd, Houston, TX, 77204	$31,874,030.93
Bates Law – 4604 Calhoun Rd, Houston, TX, 77204	$20,686,786.56
Leroy and Lucile Melcher Hall – 4750 Calhoun Rd, Houston, TX, 77204	$40,136,988.67
M.D. Anderson Library – 4333 University Dr, Houston, TX, 77204	$198,948,261.89
Reb.& John Moores Schools of Music – 3333 Cullen Blvd, Houston, TX, 77204	$46,693,933.06
John M. O'Quinn Law Library – 4604 Calhoun Rd, Houston, TX, 77204	$47,258,779.26
Justin Dart Jr. Center for Students w/ DisAbilties – 4369 Cougar Village Dr, Houston, TX, 77204	$800,092.20
Melcher Gym/Charter School – 3871 Holman St, Houston, TX, 77204	$5,131,607.52
Susanna Garrison Gymnasium – 3875 Holman St, Houston, TX, 77204	$6,446,637.72
Cullen Performance Hall – 4300 University Dr, Houston, TX, 77204	$11,841,688.39
UH ERP 1 – 5000 Gulf Fwy, Houston, TX, 77204	$14,424,016.90
UH ERP 2 – 5000 Gulf Fwy, Houston, TX, 77204	$7,143,590.76
UH ERP 3 – 5000 Gulf Fwy, Houston, TX, 77204	$11,664,027.65
UH ERP 4 – 5000 Gulf Fwy, Houston, TX, 77204	$9,438,895.28
UH ERP 5 – 5000 Gulf Fwy, Houston, TX, 77204	$8,313,957.53
UH ERP 6 – 5000 Gulf Fwy, Houston, TX, 77204	$3,546,077.68
UH ERP 7 – 5000 Gulf Fwy, Houston, TX, 77204	$14,523,927.04
UH ERP 8 – 5000 Gulf Fwy, Houston, TX, 77204	$11,075,678.21
UH ERP 9 – 5000 Gulf Fwy, Houston, TX, 77204	$11,863,481.26
UH ERP 10 – 5000 Gulf Fwy, Houston, TX, 77204	$1,528,973.11
UH ERP 11 – 5000 Gulf Fwy, Houston, TX, 77204	$7,422,911.76
UH ERP 13 – 5000 Gulf Fwy, Houston, TX, 77204	$5,250,832.79
UH ERP 14 – 5000 Gulf Fwy, Houston, TX, 77204	$17,072,934.14
UH ERP 15 – 5000 Gulf Fwy, Houston, TX, 77204	$4,136,768.96
UH ERP 19 – 5000 Gulf Fwy, Houston, TX, 77204	$7,879,680.00
UH ERP 20 – 5000 Gulf Fwy, Houston, TX, 77204	$26,265.60
C.W. Mitchell Center for the Arts – 3351 Cullen Blvd, Houston, TX, 77204	$13,400,433.65
College of Technology Building – 4730 Calhoun Rd, Houston, TX, 77204	$12,896,409.60
Technology Annex – 4902 Gulf Fwy, Houston, TX, 77204	$4,195,053.29
Fine Arts Building – 4188 Elgin St, Houston, TX, 77204	$33,559,031.81
G.D. Hines Coll of Architecture – 4200 Elgin St, Houston, TX, 77204	$36,971,458.56
Teaching Unit 2 Building – 4604 Calhoun Rd, Houston, TX, 77204	$8,209,276.21
Fred J. Heyne – 3695 Cullen Blvd, Houston, TX, 77204	$13,737,538.64
Max Krost Hall – 4604 Calhoun Rd, Houston, TX, 77204	$15,937,497.32
Agnes Arnold Hall – 3553 Cullen Blvd, Houston, TX, 77204	$31,820,249.09
Stephen Power Farish Hall – 3657 Cullen Blvd, Houston, TX, 77204	$25,917,843.46

Asset	Value
Graduate School of Social Work – 3511 Cullen Blvd, Houston, TX, 77204	$9,039,947.13
Jack J. Valenti School of Comm. – 3347 Cullen Blvd, Houston, TX, 77204	$7,329,529.01
Science & Engineering Classroom Building – 3487 Cullen Blvd, Houston, TX, 77204	$9,613,209.60
Roy G. Cullen – 3687 Cullen Blvd, Houston, TX, 77204	$10,160,247.55
Classroom and Business Building – 4742 Calhoun Rd, Houston, TX, 77204	$33,261,705.22
Michael J. Cemo Hall – 4746 Calhoun Rd, Houston, TX, 77204	$8,510,054.40
Science & Engineering Annex – 4712 Calhoun Rd, Houston, TX, 77204	$2,123,342.26
Engineering Lecture Hall – 4726 Calhoun Rd, Houston, TX, 77204	$553,005.40
B. Keeland Jr. Design.& Expl Ctr – 4222 Elgin St, Houston, TX, 77204	$660,648.13
Athletic Center – 3204 Cullen Blvd, Houston, TX, 77204	$40,340,447.26
A.D. Bruce Religion Center – 3841 Cullen Blvd, Houston, TX, 77204	$3,377,678.50
TDECU Stadium – 3700 Cullen Blvd, Houston, TX, 77204	$115,014,600.00
Alumni Center – 3204 Cullen Blvd, Houston, TX, 77204	$2,265,060.39
UH-DPS Parking Enforcement – 4055 Wheeler St, Houston, TX, 77204	$1,050,624.00
Student Service Center 1 – 4365 Cougar Village Dr, Houston, TX, 77204	$8,601,868.86
Student Service Center 2 – 4367 Cougar Village Dr, Houston, TX, 77204	$608,737.66
Fire & Life Safety Storage – 4739 Cullen Blvd, Houston, TX, 77204	$1,050,624.00
Visitor Information Booth 1 – 4422 University Dr, Houston, TX, 77204	$105,952.18
KUHT Fiber Optics Building – 4515 Cullen Blvd, Houston, TX, 77204	$364,087.39
KUHT Telephone Equipment – 4515 Cullen Blvd, Houston, TX, 77204	$821,170.41
Tex. Learn & Comp. Ctr. Annex – 4513 Cullen Blvd, Houston, TX, 77204	$718,921.52
Cullen Annex Laboratory – 4519 Cullen Blvd, Houston, TX, 77204	$595,477.68
Dynamometer Test Laboratory – 4505 Cullen Blvd, Houston, TX, 77204	$1,710,650.90
Safety, Human Factors & Ergo. Lab – 4517 Cullen Blvd, Houston, TX, 77204	$213,035.95
South Park Annex – 5011 Calhoun Rd, Houston, TX, 77204	$6,430,346.09
Health and Biomedical – 4733 Wheeler Ave, Houston, TX 77004	$65,991,467.94
Clinical Research Services Ctr – 4455 Cullen Blvd, Houston, TX, 77204	$2,828,080.92
Total:	*$2,631,485,264.80*

34.3 CAPABILITY ASSESSMENT

An assessment of the University's current capabilities was conducted to identify opportunities to expand, initiate or integrate capabilities in order to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table identifies these as community capacity building mitigation actions.

34.3.1 Planning and Regulatory Capabilities

The University develops plans and programs and implements rules and regulations to protect and serve the campus community. When effectively prepared and administered, these plans, programs and regulations can support the implementation of mitigation actions. Table 34-3 summarizes existing codes, ordinances, policies, programs or plans that are applicable to this hazard mitigation plan.

Table 34-3. Planning and Regulatory Capability

Plan, Study or Program	Date of Most Recent Update
Texas Facilities Commission Uniform General Conditions (and Supplementary General Conditions)	2015 (Supplementary: 2018)
Campus Design Guidelines and Standards	2018
International Building Code	2018
NFPA 1, Fire Code 2015 Edition	2015
NFPA 101, Life Safety Code 2015 Edition	2015
Various Federal/State regulations relating to Environmental, Health & Safety	Various
Texas Food Establishment Rules	2015
University of Houston (UH) Manual of Administrative Policies and Procedures (MAPP) Emergency Management Policy (06.01.01)	2017
UH MAPP Continuity of Operations Planning (06.01.02)	2019
UH MAPP Laboratory Safety Program and Corresponding Safety Manuals (06.02.03)	2018
UH MAPP Fire and Life Safety Code (06.03.01)	2015
University of Houston System Administrative Memorandum (SAM) 01.C.01- Risk Management Policy	2017
University of Houston Emergency Management Plan	2018
University of Houston Continuity of Operations Plan	2018
Various UH policies, procedures relating to Environmental, Health & Safety	Various

34.3.2 Fiscal, Administrative and Technical Capabilities

Fiscal capability is an indicator of a jurisdiction's ability to fulfill the financial needs associated with hazard mitigation projects. An assessment of fiscal capabilities is presented in Table 34-4. Administrative and technical capabilities represent a jurisdiction's staffing resources for carrying out the mitigation strategy. An assessment of administrative and technical capabilities is presented in Table 34-5.

34.3.3 Education and Outreach Capabilities

Outreach and education capability identifies the connection between the University and community members, which opens a dialogue needed for a more resilient community. An assessment of education and outreach capabilities is presented in Table 34-6.

Table 34-4. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	No
User Fees for Water, Sewer, Gas or Electric Service	No
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	No
Incur Debt through Private Activity Bonds	Yes
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	No
Federal Grant Programs	Yes
Other	Yes (Private Donors; Funding from State Legislature)

Table 34-5. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Contract for service
Engineers or professionals trained in building or infrastructure construction practices	Yes	Contract for service
Planners or engineers with an understanding of natural hazards	Yes	Contract for service
Staff with training in benefit/cost analysis	Yes	Facilities Planning, Space Management and Campus Architect
Surveyors	Yes	Contract for service
Personnel skilled or trained in GIS applications	Yes	Contract for service
Scientist familiar with natural hazards in local area	Yes	Various University Instructors
Emergency manager	Yes	UH Office of Emergency Management
Grant writers	Yes	University Division of Research / Office of Contracts and Grants
Other	No	

Table 34-6. Education and Outreach

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • If yes, please briefly describe	Yes UH Office of Emergency Management Website
Do you use social media for hazard mitigation education and outreach? • If yes, please briefly describe	Yes Facebook and Twitter Accounts
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • If yes, please briefly specify	Yes University Emergency Planning Committee
Do you have any other programs already in place that could be used to communicate hazard-related information? • If yes, please briefly describe	Yes UH Emergency Management Plan, Various Community Outreach and Training Programs
Do you have any established warning systems for hazard events? • If yes, please briefly describe	Yes University's Emergency Notification System, UH ALERT

34.4 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in Section 1.9 were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

34.4.1 Existing Integration

The University of Houston is a new Planning Partner and will report on this at the five-year review period.

34.4.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- **Capital Improvement Plan** — The University will work to integrate projects outlined in the hazard mitigation plan with the Capital Improvement Plan in order to help mitigate potential hazards.
- **UH Recovery Plan** — The University does not have a formal, written recovery plan and intends to develop one as a mitigation planning action during the next five years.

34.5 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 34-8 lists past occurrences of natural hazards for which specific damage was recorded for the University of Houston. Other hazard events that broadly affected the entire planning area, including University of Houston, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 34-8. Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Hurricane Harvey	4332 DR	Aug/Sept 2017	$28,000,000
Severe Storms and Flooding	4269 DR	April 2016	N/A (1 day University closure occurred)
Severe Storms, Tornadoes, Straight Line Winds and Flooding	4223 DR	May 2015	$25,000
Hurricane Ike	1791 DR	Sept 2008	$23,000,000
Tropical Storm Allison	1379 DR	June 2001	$76,000,000

34.6 HAZARD RISK RANKING

Table 34-9 presents a local ranking for University of Houston of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 34-9. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Severe Weather	(3X16) = 48	High
2	Hurricane	(3X15)= 45	High
3	Flooding	(3X13)= 39	High
4	Drought	(3X4) = 12	Low
5	Earthquake	(1X11) = 11	Low
6	Wildfire	(1X6) = 6	Low
7	Mass Movement	(1X4) = 4	Low
8	Dam Failure	(2X0) = 0	None
8	Tsunami	(1X0) = 0	None
8	Coastal Erosion	(0X0) = 0	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

34.7 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. The following jurisdiction-specific issues have been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- A number of University buildings possess a flood risk and have experienced repetitive loss.
- Majority of University buildings have hurricane and severe weather risk where power loss may be caused due to high winds. This includes some residence halls, research, and other critical facilities which do not have generators or full-emergency back-up power. In addition, University's electrical grid is vulnerable due to limited redundancies.
- Campus roadways experience frequent flooding and become impassable often due to brief, intense rainfall events.

Mitigation actions addressing these issues were prioritized for consideration in the action plan presented in this annex.

34.8 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 34-10 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 34-11 identifies the priority for each action. Table 34-12 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 34-10. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action UOH1 — Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Severe weather, hurricane, flooding, drought						
Existing	7, 10, 11, 12, 13, 15	Facilities Services	Facilities Planning & Construction	High	HMGP, PDM, FMA, General Funds	Long-term
Action UOH2 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: Severe weather, hurricane, flooding, drought, earthquake, mass movement, dam failure, wildfire, tsunami						
New and Existing	3, 9, 10	UH Office of Emergency Management (OEM)	UH Campus Safety	Low	Staff Time, General Funds	Short-term
Action UOH3 — Integrate the hazard mitigation plan into other plans, guidelines, standards, university policies and programs (including the University Capital Improvement Plan) within the campus community.						
Hazards Mitigated: Severe weather, hurricane, flooding, drought, earthquake, mass movement, dam failure, wildfire, tsunami						
New and Existing	9, 10, 12, 13, 15	Facilities Planning & Construction	Facilities Services	Low	Staff Time, General Funds	Short-term
Action UOH4 — Develop a disaster recovery plan.						
Hazards Mitigated: Severe weather, hurricane, flooding, drought, earthquake, mass movement, dam failure, wildfire, tsunami						
New and Existing	3, 6, 7, 9, 10, 11, 13	UH OEM	UH Campus Safety	Low	Staff Time, General Funds	Short-term
Action UOH5 — Develop and/or update plans that support or enhance continuity of operations during/following disasters.						
Hazards Mitigated: Severe weather, hurricane, flooding, drought, earthquake, mass movement, dam failure, wildfire, tsunami						
New and Existing	3, 11, 13	UH OEM	UH Campus Safety	Low	Staff Time, General Funds	Ongoing

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action UOH6 — Conduct an assessment and purchase generators for critical facilities and infrastructure that lack adequate back-up power.						
Hazards Mitigated: Severe weather, hurricane, flooding, earthquake						
Existing	4, 6, 7, 10, 11, 13	Facilities Services	Facilities Planning & Construction	Medium	HMGP, PDM, General Funds	Long-term
Action UOH7 — Expand the University's emergency alert system by adding additional mass notification channels, capabilities and/or coverage.						
Hazards Mitigated: Severe weather, hurricane, flooding, drought, earthquake, mass movement, dam failure, wildfire, tsunami						
New and Existing	1, 4	UH OEM	IT, University Communications, UHPD, Campus Safety Systems	Medium	HMGP, General funds	Short-term
Action UOH8 — Enhance the University's weather preparedness programs in order to meet the requirements and receive the National Weather Service's StormReady designation.						
Hazards Mitigated: Severe weather, hurricane, flooding						
New and Existing	1, 3	UH OEM	UH Police Department	Low	Staff Time, General Funds	Short-term
Action UOH9 — Assess and develop a stand-alone UH Hazard Mitigation Plan or pursue better integration into the State Hazard Mitigation Plan.						
Hazards Mitigated: Severe weather, hurricane, flooding, drought, earthquake, mass movement, dam failure, wildfire, tsunami						
New and Existing	3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 15	UH OEM	TDEM	Medium	Staff Time, HMGP, PDM, FMA, General Funds	Short-term
Action UOH10 — Assess additional insurance coverages.						
Hazards Mitigated: Severe weather, hurricane, flooding, drought, earthquake, mass movement, dam failure, wildfire, tsunami						
Existing	3, 10, 13	UH Risk Management	UH Finance	Medium	Staff Time, General Funds	Ongoing
Action UOH11 — Retrofit/Replace roofs based on recent assessment.						
Hazards Mitigated: Severe weather, hurricane, flooding, earthquake						
Existing	10, 11, 13	Facilities Services	Facilities Planning & Construction	High	HMGP, PDM, FMA, General Funds	Ongoing
Action UOH12 — Investigate and implement redundancies for the campus electrical grid to improve resiliency of University power supply.						
Hazards Mitigated: Severe weather, hurricane, flooding, drought, earthquake, mass movement, dam failure, wildfire, tsunami						
Existing	7, 10, 11, 13	Facilities Services	Facilities Planning & Construction	High	HMGP, PDM, FMA, General Funds	Long-term
Action UOH13 — Conduct drainage study of campus and based on the study, implement recommended actions to improve drainage on campus.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding						
Existing	3, 6, 7, 9, 10, 11, 15	Facilities Planning & Construction	Facilities Services	Medium	HMGP, PDM, FMA, General Funds	Short-term
Action UOH14— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Drought, Earthquake, Wildfire, Mass Movement						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	UH Risk Management	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 34-11. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
UOH1	6	High	High	Yes	Yes	No	High	High
UOH2	3	Low	Low	Yes	No	Yes	High	Low
UOH3	5	Medium	Low	Yes	No	Yes	High	Low
UOH4	7	Low	Low	Yes	Yes	Yes	High	Low
UOH5	3	Low	Low	Yes	No	Yes	High	Low
UOH6	6	High	Medium	Yes	Yes	No	High	High
UOH7	2	High	Medium	Yes	Yes	No	Medium	Medium
UOH8	2	Low	Low	Yes	No	Yes	High	Low
UOH9	11	Medium	Medium	Yes	Yes	No	Medium	Medium
UOH10	3	Low	Medium	No	No	No	Low	Low
UOH11	3	High	High	Yes	Yes	No	Medium	High
UOH12	4	High	High	Yes	Yes	No	High	High
UOH13	7	Low	Medium	No	Yes	Yes	Medium	Medium
UOH14	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 34-12. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Severe Weather	UOH3, 13, 14	UOH1, 11	UOH8, 14		UOH6, 7, 12, 14	UOH1, 11, 13	UOH3, 13	UOH2, 4, 5, 9, 10, 13, 14
Hurricane	UOH3, 13, 14	UOH1, 11	UOH8, 14		UOH6, 7, 12, 14	UOH1, 11, 13	UOH3, 13	UOH2, 4, 5, 9, 10, 13, 14
Flooding	UOH3, 13, 14	UOH1, 11	UOH8, 14		UOH6, 7, 12, 14	UOH1, 11, 13	UOH3, 13	UOH2, 4, 5, 9, 10, 13, 14
Low-Risk Hazards								
Drought	UOH3, 14	UOH1	UOH14		UOH7, 12, 14	UOH1	UOH3	UOH2, 4, 5, 9, 10, 14
Earthquake	UOH3, 14	UOH1, 11	UOH14		UOH6, 7, 12, 14	UOH11	UOH3	UOH2, 4, 5, 9, 10, 14
Wildfire	UOH3, 14		UOH14		UOH7, 12, 14		UOH3	UOH2, 4, 5, 9, 10, 14
Mass Movement	UOH3, 14		UOH14		UOH7, 12, 14		UOH3	UOH2, 4, 5, 9, 10, 14

a. See the introduction to this volume for explanation of mitigation types.

34.9 REVIEW AND INCORPORATION OF RESOURCES FOR THIS ANNEX

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- **Campus Design Guidelines and Standards** – This was used during the Capability Assessment.
- **University of Houston (UH) Manual of Administrative Policies and Procedures (MAPP) 06.01.01 – Emergency Management Policy** – This was used during the Capability Assessment.
- **UH MAPP 06.01.02 – Continuity of Operations Planning** – This was used during the Capability Assessment
- **UH MAPP 06.02.03 Laboratory Safety Program and Corresponding Safety Manuals** – This was used during the Capability Assessment.
- **UH MAPP 06.03.01 Fire and Life Safety Code** – This was used during the Capability Assessment.
- **University of Houston System Administrative Memorandum (SAM) 01.C.01- Risk Management Policy** – This was used during the Capability Assessment.
- **University of Houston Emergency Management Plan** – This was used during the Capability Assessment, and reviewed to determine potential for integration with mitigation planning.
- **University of Houston Continuity of Operations Plan** – This was used during the Capability Assessment.
- **UH Department Continuity of Operations Plan Template –** This was used during the Capability Assessment, and reviewed to determine potential for integration with mitigation planning.
- **Physical Recovery Emergency Plan** – This was used during the Capability Assessment, and reviewed to determine potential for integration with mitigation planning.
- **Ride Out Team Program** – This was used during the Capability Assessment, and reviewing to determine potential for integration with mitigation planning.

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.
- **Texas Facilities Commission Uniform General Conditions** – This was used during the Capability Assessment.
- **International Building Code** – This was used during the Capability Assessment.
- **NFPA 1, Fire Code (2015 Edition)** – This was used during the Capability Assessment because this Code is adopted by the State of Texas for State owned/leased buildings.
- **NFPA 101, Life Safety Code (2015 Edition) –** This was used during the Capability Assessment because this Code is adopted by the State of Texas for State owned/leased buildings.
- **Texas Food Establishment Rules** – This was used during the Capability Assessment because these Rules must be followed by every food establishment that serves the public in the State of Texas

35. HARRIS COUNTY FLOOD CONTROL DISTRICT

35.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Todd Ward, Risk Mitigation Department Manager
9900 Northwest Freeway
Houston, TX 77092
Telephone: 346-286-4858
e-mail Address: Todd.Ward@HCFCD.hctx.net

Alternate Point of Contact
James Wade, Property Acquisition Services
Department Manager
9900 Northwest Freeway
Houston, TX 77092
Telephone: 346-286-4036
e-mail Address: James.Wade@HCFCD.hctx.net

35.2 JURISDICTION PROFILE

35.2.1 Overview

The Harris County Flood Control District (the District) is a special purpose district created by the Texas Legislature in 1937 in response to devastating floods that struck the region in 1929 and 1935. The mission of the Harris County Flood Control District is to *provide flood damage reduction projects that work , with appropriate regard for community and natural values.* Funding comes primarily through property taxes and revenue bonds, much of which is leveraged to secure additional grant funds.

The Harris County Commissioners Court assumes responsibility for the adoption of this plan; the County Judge will oversee its implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 35-1.

Table 35-1. Local Mitigation Planning Team Members

Name	Title
Todd Ward	Risk Mitigation Department Manager
James Wade	Property Acquisition Department Manager

35.2.1 Service Area and Trends

The District's jurisdictional boundaries are set to coincide with Harris County, a community that includes the City of Houston. The district service area covers 1,756 square miles serving a population of approximately 4.7 million people. The District's drainage and flood control infrastructure is extensive, including more than 1,500 channels totaling about 2,500 miles in length.

35.2.2 Assets

Table 35-2 summarizes the critical assets of the district and their value.

Table 35-2. Special Purpose District Assets

Asset	Value
Property	
39,949 acres (44% easements, 56% fee simple ownership)	$1,649,735,796
Equipment	
Primarily back-up generators, District Fleet (vehicles, tractors & heavy duty), & misc. equipment	$12,132,213.00
Total:	***$12,132,213.00***
Critical Facilities and Infrastructure	
Administration/Buyout Office	$6,221,741.19
Service Center #1 Canopy	$167,500.00
Service Center #2 Wash Facility	$63,525.33
Service Center #2 Maintenance	$568,200.00
Service Center #3 Office	$301,200.00
Mike Talbott Service Center Pavilion	$648,600.00
Mike Talbott Service Center Canopy	$237,500.00
Mike Talbott Service Center Maintenance Bldg.	$838,600.00
Mike Talbott Service Center Fuel Facility	$78,100.00
Mike Talbott Service Center Garage	$278,000.00
Mike Talbott Service Center Administration Bldg.	$1,816,200.00
Mike Talbott Service Center Storage Bldg.	$154,705.64
Mike Talbott Service Center Wash Facility	$67,089.23
Mike Talbott Service Center Canopy #2	$152,361.61
Mike Talbott Service Center Distribution Center	$564,900.00
Total:	***$12,158,223.00***

35.3 CAPABILITY ASSESSMENT

An assessment of the district's current capabilities was conducted to identify opportunities to expand, initiate or integrate capabilities in order to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table in Section 29.9 identifies these as community capacity building mitigation actions.

35.3.1 Planning and Regulatory Capabilities

Jurisdictions develop plans and programs and implement rules and regulations to protect and serve residents. When effectively prepared and administered, these plans, programs and regulations can support the implementation of mitigation actions. Table 35-3 summarizes existing codes, ordinances, policies, programs or plans that are applicable to this hazard mitigation plan.

Table 35-3. Planning and Regulatory Capability

Plan, Study or Program	Date of Most Recent Update	Comment
Capital Improvement Program	Updated and approved annually	Covers 5 year timeframe. This CIP encompasses all of the estimated capital improvement activities the District will initiate throughout Harris County this fiscal year.
Bond Program 2018	2018	On August 14, 2018, Harris County Commissioners Court approved a list of flood risk reduction projects that would meet the goal of the 2018 bond election, which is to both assist with recovery after previous flooding events (including Harvey) and to make our county more resilient for the future.
Flood Operations & Hurricane Response Plan	2018	For use by HCFCD employees as a guide for conducting Flood Operations and to address the actions to be taken for the successful function of HCFCD operations during each phase of a hurricane threat, landfall, and recovery.
Property Acquisition Program	Continuous	Responsible for voluntary buyout and project Right-of-Way acquisition for HCFCD.
Property Management Program	Continuous	Primary responsibilities are to identify deficiencies of the District's channel and detention basin infrastructure, to define the scope of operations to be performed, and to prioritize repairs and cyclical maintenance within the available budget.
Vegetation Management Program	Continuous	Responsible for debris removal & de-snag operations, herbicide applications, selective clearing, and vegetation establishment including turf and native grass, wildflowers, and trees.
System Repair Plan	Continuous	Covers 5 year timeframe. Constantly monitors and assesses the potential repair sites to ensure HCFCD facilities retain their functions.
Stormwater Quality Program	2019	Supports the Flood Control District's mission by ensuring compliance with all storm water permits and supporting other divisions through design of environmental enhancements and site stabilization and revegetation. Updated annually during Annual Report to TCEQ.
Watershed Environmental Baseline Program	2019	Documents the baseline environmental conditions, including natural, cultural, and physical resources deemed necessary to evaluate potential project alternatives in Harris County's watersheds and proposed project areas Updated annually with new environmental database records
LOMR Review Program	2019	This partnership program between FEMA and HCFCD allows for HCFCD to perform LOMR and CLOMR reviews for those requests submitted in Harris County. Mapping Activity Statements are developed annually.
Model and Map Management System	Continuous	This system helps maintain current and reliable effective hydrology and hydraulic models, FIRMs, and FIS data.
Greens Bayou Wetland Mitigation Bank		Provides opportunities for federally permitted government and private developments to mitigate for the unavoidable loss of wetlands elsewhere in Harris County by preserving, restoring and creating wetlands.
HCFCD Frontier Program	2019	The purpose of this program is to plan for and implement orderly drainage infrastructure in advance of future land development in specific areas to more effectively mitigate increased stormwater runoff while offering opportunities to provide community amenities and enhance & preserve the area's natural resources through development of recreation and open space areas.
Upper Langham Creek Frontier Program	2012	Exists to implement certain common elements of a regional detention plan that embraces concepts from the HCFCD Frontier Program and uses funding from existing impact fees.
Little Cypress Creek Frontier Program	2018	HCFCD initiated the Little Cypress Creek Frontier Program as part of a strategic effort to efficiently and methodically plan for and implement effective flood risk reduction projects, both for existing flooding issues and in anticipation of future development within the watershed
Little Cypress Creek Master Drainage Plan	2019	A plan for effective flood risk reduction projects, both for existing flooding issues and in anticipation of future development within the watershed.

Plan, Study or Program	Date of Most Recent Update	Comment
Cypress Creek Overflow Management Plan	2016	Established a set of policies, technical criteria and guidelines that will allow the Flood Control District and Harris County to plan for and implement programs that reduce flood risks that are reflective of the unique hydrologic conditions in upper Cypress Creek and the drainage areas upstream of Addicks and Barker reservoirs.
Policy, Criteria, and Procedures Manual	2019	Provides written policies and criteria for the engineering community and HCFCD staff to use for land development and infrastructure projects that are effective, consistent, and practical. Provides a written review and acceptance procedure to efficiently coordinate land development and infrastructure projects with the HCFCD.
Harris County Low Impact Development & Green Infrastructure Design Criteria for Storm Water Management	2011	This document is intended to provide a set of interim guidelines for the use of Low Impact Development (LID) and Green Infrastructure (GI) techniques.
Little Cypress Creek Interim Guidelines	2014	These guidelines are intended to promote the implementation of the Interim Drainage Plan until such time that the HCFCD adopts a final Regional Drainage Plan for Little Cypress Creek watershed.
Supplemental Guidelines And Criteria For Developing In The Addicks Reservoir Watershed, Barker Reservoir Watershed And The Cypress Creek Watershed Upstream Of US 290	2016	Provides direction for the engineering community and HCFCD staff to comply with the HCFCD no adverse impact policy associated with management of stormwater runoff from land development and infrastructure projects in the Cypress Creek watershed upstream of US 290 (upper Cypress Creek), Addicks Reservoir and Barker Reservoir watersheds within Harris County.
Upper Langham Creek Development Guidelines	2012	Provides a clear understanding of the roles and responsibilities for constructing new development in the Upper Langham Creek Service Area
Hydrology and Hydraulics Guidance Manual	2019	HCFCD prepared this Hydrology and Hydraulics Guidance Manual to document hydrologic and hydraulic methodologies for the analysis of watersheds and open channel projects in Harris County. Updated in 2019 to include additional guidance on 1D Unsteady and 2D flow modeling.
Ordinary High Water Mark Delineation Manual	2005	For use as a guide in executing future OHWM delineations for HCFCD.
Land Surveying Guidelines	2019	Intended to identify and create land surveying standards applicable to all HCFCD related work. Helps ensure clarity and consistency of survey data.
Design Manual for Articulating Concrete Block Systems	2001	This Design Manual provides guidelines and procedures for the design and installation of articulating concrete block revetment systems.
Design Guidelines for HCFCD Wet Bottom Detention Basins with Water Quality Features	2014	These Design Guidelines identify criteria, considerations, and procedures for wet bottom detention basins with water quality features that are planned, designed, constructed, operated, and maintained by HCFCD.
Detention Basin Pump Operation & Maintenance Manual	2012	The focus of this document is to identify specific content requirements associated with the O&M Manual identified in Section 6.15 of the HCFCD's Policy Criteria and Procedures Manual

35.3.2 Fiscal, Administrative and Technical Capabilities

Fiscal capability is an indicator of a jurisdiction's ability to fulfill the financial needs associated with hazard mitigation projects. An assessment of fiscal capabilities is presented in Table 35-4. Administrative and technical capabilities represent a jurisdiction's staffing resources for carrying out the mitigation strategy. An assessment of administrative and technical capabilities is presented in Table 35-5.

Table 35-4. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	No
User Fees for Water, Sewer, Gas or Electric Service	No
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	No
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes
Federal Grant Programs	Yes
Other: Rent on owned property (less than 1% of District revenue)	Yes

Table 35-5. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Planning Division; Watershed Management Department
Engineers or professionals trained in building or infrastructure construction practices	Yes	Construction Division
Planners or engineers with an understanding of natural hazards	Yes	Planning Division; Engineering Division
Staff with training in benefit/cost analysis	Yes	Planning Division; Engineering Division
Surveyors	Yes	Surveying Department
Personnel skilled or trained in GIS applications	Yes	GIS Services
Scientist familiar with natural hazards in local area	Yes	Hydrologic Operations Division
Emergency manager	Yes	Hydrologic Operations Division
Grant writers	Yes	Many HCFCD divisions prepare grant applications with in-house staff. Consultant support for grant writing also utilized.

35.3.3 Education and Outreach Capabilities

Outreach and education capability identifies the connection between government and community members, which opens a dialogue needed for a more resilient community. An assessment of education and outreach capabilities is presented in Table 35-6.

35.3.4 Adaptive Capacity for Climate Change

Given the uncertainties associated with how risk may change with a changing climate, a jurisdiction's ability to track such changes and adapt as needed is an important component of the mitigation strategy. Table 35-7 summarizes the jurisdiction's adaptive capacity for climate change.

Table 35-6. Education and Outreach

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • **If yes, please briefly describe**	Yes The information on the website is project specific
Do you use social media for hazard mitigation education and outreach? • **If yes, please briefly describe**	Yes Twitter, Facebook, and NextDoor are used for hazard alerts, general education, and safety tips
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • **If yes, please briefly specify**	Yes The Harris County Flood Control Task Force was created by the Commissioners Court in 1972 to advise and make recommendations to Harris County government
Do you have any other programs already in place that could be used to communicate hazard-related information? • **If yes, please briefly describe**	Yes Annual outreach/educational events throughout the county
Do you have any established warning systems for hazard events? • **If yes, please briefly describe**	Yes An interactive flood warning system utilizes an extensive gage network to provide near real-time rainfall, stream level, and inundation extent information

Table 35-7. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts	High
Comment: *HCFCD has done a review of 2014 IPCC data regarding the observed and projected impacts to the frequency and severity of precipitation, floods, hurricanes, to sea level rise, and to water quality. HCFCD has a contract with the Texas State Climatologist to study climate change patterns.*	
Jurisdiction-level monitoring of climate change impacts	High
Comment: *HCFCD has an extensive rain and flood stage gage network across the county and the areas that drain into the county, and also has many water quality monitoring sites.*	
Technical resources to assess proposed strategies for feasibility and externalities	High
Comment: *The District has many technical resources, both in house and with consulting support, to evaluate the effectiveness of mitigation strategies*	
Jurisdiction-level capacity for development of greenhouse gas emissions inventory	Low
Comment: *This is not an inventory that the District currently keeps, although we would have record of kilowatt hours purchased for our buildings, fuel purchased for our vehicles and tools, and could potentially seek to determine fuel costs for our construction and maintenance contractors vehicles and tools.*	
Capital planning and land use decisions informed by potential climate impacts	High
Comment: *This capacity exists and is in use, and the District is considering improvements. The District currently implements several strategies, and is considering additional strategies, to increase ecosystem resilience and protect critical ecosystem services, thereby minimizing vulnerability of human and natural systems to climate change. Additionally, the District is considering the newly released NOAA Atlas 14 rainfall study results in the planning of future flood reduction projects.*	
Participation in regional groups addressing climate risks	Medium
Comment: *The District participates with HGAC*	

Criterion	Jurisdiction Rating[a]
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes	High
Comment: *The District is reviewing a plan aimed at reducing emissions and preparing for climate change.*	
Identified strategies for greenhouse gas mitigation efforts	High
Comment: *Since 2001, the District has planted a total of 264,422 trees. These trees remove carbon dioxide from the air, and slow the growth of grasses, reducing the need for and emissions from mowing.*	
Identified strategies for adaptation to impacts	High
Comment: *The District has identified a number of strategies, both ongoing and proposed, to reduce or mitigate climate change impacts. A plan aimed at reducing emissions and preparing for climate change is under review.*	
Champions for climate action in local government departments	Medium
Comment: *Harris County Commissioners Court*	
Political support for implementing climate change adaptation strategies	High
Comment: *Judge Lina Hidalgo is strongly in support of climate change adaptation being a part of The District's efforts.*	
Financial resources devoted to climate change adaptation	High
Comment: *Related to the capital planning and land use decisions.*	
Local authority over sectors likely to be negative impacted	High
Comment: *The District has local authority to execute structural and non-structural projects which can reduce flood risks for Harris County property owners, as well as projects to improve water quality.*	
Public Capacity	
Local residents knowledge of and understanding of climate risk	Medium
Comment: *The District is publishing information regarding newly increased rainfall estimates*	
Local residents support of adaptation efforts	Unsure
Comment: *Residents supported the bond program, and have largely voiced support for updating Flood Insurance Rate Maps to reflect the increased rainfall risk estimates, which are influenced by climate change.*	
Local residents' capacity to adapt to climate impacts	Unsure
Comment:	
Local economy current capacity to adapt to climate impacts	Unsure
Comment:	
Local ecosystems capacity to adapt to climate impacts	Unsure
Comment:	

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

35.4 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

35.4.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- **Capital Improvement Program** — The capital improvement program includes projects that can help mitigate potential hazards and studies that can identify recommended projects or inform watershed management criteria. The District will act to ensure consistency between the hazard mitigation plan and the current and future capital improvement plans. The hazard mitigation plan may identify new possible funding sources for capital improvement projects and may result in modifications to proposed projects based on results of the risk assessment.
- **Bond Program** — The bond improvement program includes projects that can help mitigate potential hazards. The District will act to ensure consistency between the hazard mitigation plan and the projects in the bond program. The hazard mitigation plan may identify new possible funding sources for bond projects and may result in modifications to proposed projects based on results of the risk assessment.
- **Flood Operations & Hurricane Response Plan** — The Hurricane Response Plan addresses the actions to be taken for the successful function of the District operations during each phase of a hurricane threat, landfall, and recovery. The primary purpose of the Harris County Flood Control District (HCFCD) Flood Operations is to better serve the citizens of Harris County and our core partners before, during, and after floods and near-floods. The hazard mitigation plan may provide information to help The District identify, and thus respond to, imminent risks during severe weather events. The hazard mitigation plan may identify new possible funding sources for equipment to help the District monitor and respond to severe weather.
- **LOMR Review Program & Model and Map Maintenance System** — The LOMR Review program and Model and Map Maintenance System help maintain up-to date and reliable FEMA effective hydrology and hydraulic models, Flood Insurance Rate Maps, and Flood Insurance Study documentation. Keeping this data up to date and reliable helps with identification of hazards considered in risk assessment, and thus informs efforts to mitigate flood risk.
- **Property Acquisition Program** — The Property Acquisition program is responsible for voluntary property acquisitions which remove structures at high risk of flooding so that they never flood again, Right-of-Way property acquisitions which can be used to acquire land necessary for construction of flood risk reduction projects. The hazard mitigation plan risk assessment may help inform the prioritization of property acquisition efforts, and may identify new possible sources of funding for voluntary acquisition and project right-of-way acquisition based on the results of the risk assessment.
- **Little Cypress Creek Frontier Program** — The Little Cypress Creek Frontier Program is part of a strategic effort to economically incentivize, plan for, and implement effective and holistic flood risk management solutions in advance of anticipated future development.
- **Upper Langham Creek Frontier Program** — The Upper Langham Creek Frontier Program identifies strategies to more effectively mitigate increased stormwater runoff and replace natural resource functions for new development in the upper Langham Creek area.

35.4.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- **Adapting Infrastructure for Climate Change** — This plan is under development but not yet approved. The plan will recommend actions to reduce net carbon emissions and mitigate hazards associated with climate change. The plan will build on mitigation goals and objectives identified in the mitigation plan.
- **Vegetation Management Program** — The goals and objectives identified in the hazard mitigation plan may be utilized to refine the practices in the Vegetation Management Program. The hazard mitigation plan may identify new possible sources of funding for vegetation management efforts.
- **Stormwater Quality Program** — The goals and objectives identified in the hazard mitigation plan may be utilized to refine the practices in the Stormwater Quality Program. The hazard mitigation plan may

identify new possible sources of funding for activities such as natural channel design and other environmental enhancements.

- **Watershed Environmental Baseline Program** — The goals and objectives identified in the hazard mitigation plan may be utilized to identify new datasets it would be desirable to include or develop for inclusion on the Watershed Environmental Baseline Program.

35.5 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 35-8 lists past occurrences of natural hazards for which specific damage was recorded in the Harris County Flood Control District. Other hazard events that broadly affected the entire planning area, including the Harris County Flood Control District, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 35-8. Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Hurricane Harvey	4332 DR	2017	Over 300,000 flooded vehicles & 154,170 flooded homes
Severe Storms and Flooding	4269 DR	2016	9,840 flooded homes
Severe Storms and Flooding	4272 DR	2016	425 homes and 22 businesses flooded
Severe Storms, Tornadoes, Straight Line Winds and Flooding	4245 DR	2015	394 flooded homes
Severe Storms, Tornadoes, Straight Line Winds and Flooding	4223 DR	2015	6,335 flooded homes
Severe Storms and Flooding		2014	109 flooded homes
Severe Storms and Flooding		2012	71 flooded homes
Severe Storms and Flooding		2010	40-45 flooded homes
Severe Storms and Flooding		April 28, 2009	3,370 flooded homes
Severe Storms and Flooding		April 18, 2009	170-180 flooded homes
Hurricane Ike	1791 DR	2008	3,700-3,900 flooded homes
Tropical Storm Erin	1730 DR	2007	508 homes, 601 apartment units, and 55 businesses flooded
Severe Storms and Flooding		June 2006	3,370 homes, 561 apartments, and 1 nursing home flooded
Severe Storms and Flooding		October 16, 2006	115-125 flooded homes
Severe Storms and Flooding		October 26, 2006	26-36 flooded homes
Severe Storms and Flooding		2003	300 flooded homes
Severe Storms and Flooding		2002	1,225 flooded homes
Tropical Storm Allison	1379 DR	2001	73,000 Affected houses

35.6 HAZARD RISK RANKING

Table 35-9 presents a local ranking for the Harris County Flood Control District of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 35-9. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Hurricane	48	High
1	Severe Weather	48	High
2	Flooding	30	High
3	Earthquake	14	Low
4	Dam Failure	12	Low
5	Wildfire	11	Low
6	Mass Movement	6	Low
6	Drought	6	Low
6	Tsunami	6	Low
7	Coastal Erosion	0 (No exposure)	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

35.7 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. The following jurisdiction-specific issues have been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- The District's Brookhollow office may become inoperable in the event of a Category 3 or higher hurricane.
- The District's infrastructure is subject to erosion during flood events, which can reduce the flood carrying capacity of the infrastructure for events to follow.

Mitigation actions addressing these issues were prioritized for consideration in the action plan presented in this annex.

35.8 STATUS OF PREVIOUS PLAN ACTIONS

Table 35-10 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

Table 35-10. Status of Previous Plan Actions

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
1 Aldine Estates residential acquisition/demolition (23 homes)			X	FCD180
Comment: *Gatewood, Aldine Estates & Greenbranch buyouts are to include 482 parcels. 254 parcels remain to be purchased.*				
2 Arbor Oaks residential acquisition/demolition (37 homes)			X	FCD180
Comment: *Arbor Oaks buyouts are to include 231 parcels. 23 parcels remain to be purchased.*				
3 Blue Bell residential acquisition/demolition (28 homes)			X	FCD180
Comment: *Blue Bell buyouts are to include 152 parcels. 33 parcels remain to be purchased.*				
4 Brookglen residential acquisition/demolition (27 homes)			X	FCD180
Comment: *Brookglen buyouts are to include 56 parcels. 13 parcels remain to be purchased.*				
5 Castlewood residential acquisition/demolition (36 homes)		X		
Comment: *This voluntary buyout project was replaced with a flood reduction capital project.*				

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
6 Creekside-Ted Burger residential acquisition/demolition (10 homes)			X	FCD180
Comment: *Creekside-Ted Burger buyouts are to include 134 parcels. 18 parcels remain to be purchased.*				
7 Gatewood residential acquisition/demolition (188 homes)			X	FCD180
Comment: *Gatewood, Aldine Estates & Greenbranch buyouts are to include 482 parcels. 254 parcels remain to be purchased.*				
8 Gatewood residential acquisition/demolition (12 homes)			X	FCD180
Comment: *Gatewood, Aldine Estates & Greenbranch buyouts are to include 482 parcels. 254 parcels remain to be purchased.*				
9 Greenbranch residential acquisition/demolition (20 homes)			X	FCD180
Comment: *Gatewood, Aldine Estates & Greenbranch buyouts are to include 482 parcels. 254 parcels remain to be purchased.*				
10 Homeowned Estates residential acquisition/demolition (58 homes)			X	FCD180
Comment: *Homeowned estates buyouts are to include 111 parcels. 67 parcels remain to be purchased.*				
11 Lake Forest residential acquisition/demolition (48 homes)		X		
Comment: *Depth of structures did not meet the criteria for buyouts*				
12 Lakewood residential acquisition/demolition (53 homes)			X	FCD180
Comment: *Lakewood buyouts are to include 141 parcels. 125 parcels remain to be purchased.*				
13 Langley Road Place residential acquisition/demolition (12 homes)			X	FCD180
Comment: *Langley Road Place (Farrington) buyouts are to include 103 parcels. 84 parcels remain to be purchased.*				
14 Langwood residential acquisition/demolition (23 homes)			X	FCD180
Comment: *Langwood buyouts are to include 143 parcels. 99 parcels remain to be purchased.*				
15 Ramona residential acquisition/demolition (10 homes)			X	FCD180
Comment: *Ramona buyouts are to include 17 parcels. 15 parcels remain to be purchased.*				
16 Woodland Trail and Woodland Oaks residential acquisition/demolition (196 homes)			X	FCD180
Comment: *Woodland Trail and Woodland Oaks buyouts are to include 547 parcels. 71 parcels remain to be purchased.*				
17 Woodshadows residential acquisition/demolition (90 homes)			X	FCD180
Comment: *Woodshadows buyouts are to include 158 parcels. 92 parcels remain to be purchased.*				
18 The Brays Bayou Flood Damage Reduction Project			X	FCD29
Comment: *Eldridge Road Basin, Old Westheimer Basin, Arthur Storey Park Basin, and Willow Waterhole Basins are complete. 10 of 12 channel modifications reaches are complete, as well as 16 of 32 bridge modifications.*				
19 The Clear Creek Flood Damage Reduction Project			X	FCD58
Comment: *In 2013, the Corps completed a General Reevaluation Report (GRR), which presents an alternative to the Clear Creek Federal Project that was being implemented by the Corps, Flood Control District and Galveston County based on a 1986 agreement.*				
20 Cypress Creek Watershed damage reduction projects			X	FCD71
Comment: *A feasibility study is underway to develop a drainage plan to reduce for major tributaries in Cypress Creek, and to investigate detention options along the main stem of the channel. Additionally, the District is buying land for floodplain preservation.*				
21 The Greens Bayou Federal Flood Damage Reduction Project			X	FCD84
Comment: *Phase II construction of the project began in late 2016 and is expected to take approximately three years to complete. Phase II work includes completion of the north cell of the basin, located north of West Greens Road; excavation of the south cell, which is located south of West Greens Road; and construction of the channel conveyance improvements from Cutten Road to Veterans Memorial Drive. Phase I of the project, which included excavation of the north cell and construction of an outfall structure to Greens Bayou, was completed in 2016.*				

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
22 Hunting Bayou Flood Damage Reduction Project			X	FCD102
Comment: *Construction began in August 2017 on the final phase of excavation for H500-01-00. 784,000 cy of soil will be removed during this phase. The first two phases removed 265,000 cy and 648,000 of soil, respectively. Also in August 2017, construction began on channel improvements between H500-01-00 and Liberty Road. Channel improvements have been completed between North Loop 610 near North Gorge Street to Dabney Street. The project will include replacing a pedestrian bridge, and lengthening UPRR and Loop 610 bridges over Hunting Bayou.*				
23 Poor Farm Ditch Conveyance Improvements Project			X	FCD32
Comment: *The plans are at 90%. The District is working on interlocal agreements with West University and the City of Southside Place. Lack of funding has slowed progress.*				
24 The Sims Bayou Federal Flood Reduction Project	X			
Comment: *10/10/2015*				
25 White Oak Bayou Flood Reduction Project			X	FCD148
Comment: *Channel work from E122-00-00 to Beltway 8 is complete, as are basins E500-01-00, E500-02-00, E500-03-00, E500-10-00, E500-11-00, E500-12-00 and bypass channel E200-00-00. Delay in reimbursements from USACE stalled progress on additional construction.*				
26 Buffalo Bayou & Lower White Oak Bayou Federal Flood Damage Reduction and Ecosystem Restoration Study	X			
Comment: *4/17/2017*				
27 Halls Bayou Federal Feasibility Study	X			
Comment: *9/12/2013*				
28 Increase flood predictive capability for streams and creeks that affect the District (stream gages).			X	FCD165
Comment: *The district currently has 176 stream gages, and intends to add more.*				
29 Develop and adopt master drainage plans in order for HCFCD to exercise the authority granted to districts under Chapter 49.211 of the Texas Water Code. Changes to Chapter 49.211, made via House Bill 919, require HCFCD review and approval of subdivision drainage plans			X	FCD186
Comment: *Ongoing. The District has developed and adopted a master plan and does update and modify it.*				
30 Periodic informational mailings to SFHA property owners (flood insurance, importance of maintaining drainage, flood safety easy mitigation measures, permit requirements).	X			
Comment: *12/31/2012*				
31 Obtain generators for District facilities due to be able to work during and after an event			X	FCD187
Comment: *The District owns 5 backup generators to serve its various facilities, but may rent additional generators during an event if warranted.*				
32 Harden the District's Office with Hurricane Shutters		X		
Comment: *It is planned that the District's Office will relocate in a few years.*				
33 Educating the employees on hazards including HCFCD evacuation plan and emergency plan and precautions that need to be taken for facilities.			X	FCD188
Comment: *Evacuation plan is posted around Brookhollow and intranet. An updated evacuation plan is needed for the Mike Talbott Service Center. The District last updated its hurricane response plan in 2018, but that plan requires occasional updates.*				

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
34 Due to the data deficiency identified in Section 6 [of the HCFCD HMP adopted in 2014] relative to the current RL non-residential data (RL list does not differentiate non-residential buildings as commercial or industrial) HCFCD will attempt to further identify Non-residential properties between the approval of this plan and the next update.		X		
Comment: *Differentiating between types of non-residential repetitive loss buildings does not seem to serve any purpose that supports The District's mission.*				
35 Utilize public information capabilities, including social media and printed media, to inform public of the importance of water conservation and water rationing during drought conditions by installing flow restrictors, low-flow toilets, replacing showerheads and xeriscaping		X		
Comment: *These activities would not fall under the Harris County Flood Control District's responsibilities.*				
36 Replace landscaping with drought resistant plants and trees around HCFCD facilities			X	FCD189
Comment: *Ongoing. The District plants drought resistant species where appropriate as a part of our ongoing tree planting and maintenance program*				
37 Clear out dead brush and tree limbs around HCFCD facilities that could be a burn agent to wildfires			X	FCD190
Comment: *Ongoing. It is part of our regular infrastructure maintenance that we clear brush and tree limbs from around HCFCD facilities.*				
38 Obtain the data necessary to complete and improve future vulnerability analysis on HCFCD's facilities for certain hazards			X	FCD173
Comment: *Ongoing*				
U100-00-00-E007 Upper Langham Creek Frontier Program			X	FCD195
Comment: *10/23/2013*				
U100-00-00-P003 Addicks Reservoir Watershed Master Plan	X			
Comment: *9/29/2010*				
U100-00-00-P004 Upper Langham Creek Frontier Study	X			
Comment: *4/13/2010*				
U101-00-00-P001 S Mayde Creek Sub-Reg Frontier	X			
Comment: *3/24/2016*				
U502-02-00-E001 John Paul's Landing Park Basin	X			
Comment: *10/26/2017*				
U502-02-00-E002 E & R Agreement-Sprint (JPL)	X			
Comment: *3/10/2014*				
U506-05-00-E001 E & R Contract-Sprint	X			
Comment: *4/5/2012*				
U506-05-00-E002 E & R Contract-Sprint	X			
Comment: *5/23/2011*				
B100-00-00-H002 City of Pasadena Interlocal	X			
Comment: *7/21/2010*				
B109-00-00-C001 Conveyance Improvements	X			
Comment: *3/10/2017*				
B500-02-00-W001 Fairmont Basin Environmental Enhancement	X			
Comment: *5/3/2017*				

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
B500-04-00-E002 E&R Agreement ***Comment:*** *4/12/2016*	X			
B509-03-00-E001 E&R Agreement ***Comment:*** *This project has just kicked off*			X	FCD25
T100-00-00-P001 Barker Reservoir Watershed Master Plan ***Comment:*** *1/11/2011*	X			
T501-01-00-E001 Basin Master Plan ***Comment:*** *3/14/2017*	X			
D100-00-00-B006 South 75th Street Bridge ***Comment:*** *Scheduled for construction to begin 3rd Quarter 2019 and finish 2nd Quarter 2021.*			X	FCD29
D100-00-00-B007 Forest Hill Street Bridge ***Comment:*** *Began construction July 23, 2018. Scheduled to finish 3rd Quarter 2019.*			X	FCD29
D100-00-00-B008 Lawndale Street Bridge ***Comment:*** *Scheduled for construction to begin 3rd Quarter 2019 and finish 2nd Quarter 2021.*			X	FCD29
D100-00-00-B009 Telephone Road Bridge ***Comment:*** *Scheduled for construction to begin 3rd Quarter 2019 and finish 2nd Quarter 2021.*			X	FCD29
D100-00-00-B010 Old Spanish Trail Bridge ***Comment:*** *3/8/2016*	X			
D100-00-00-B011 Calhoun Street Bridge ***Comment:*** *Scheduled for construction to begin 2nd Quarter 2019 and finish 2nd Quarter 2020.*			X	FCD29
D100-00-00-B015 Almeda Road Bridge ***Comment:*** *Scheduled for construction to begin 3rd Quarter 2019 and finish 2nd Quarter 2021.*			X	FCD29
D100-00-00-B038 Galveston Sub Railroad Bridge ***Comment:*** *Scheduled for construction to begin 1st Quarter 2019 and finish 3rd Quarter 2019.*			X	FCD29
D100-00-00-B040 Wheeler Street Bridge ***Comment:*** *3/1/2017*	X			
D100-00-00-E002 Conveyance Improvements, DS 101 ***Comment:*** *3/30/2016*	X			
D100-00-00-E003 Conveyance Improvements, DS 102 ***Comment:*** *4/11/2014*	X			
D100-00-00-E004 Conveyance Improvements, DS 103 ***Comment:*** *3/30/2017*	X			
D100-00-00-E006 Conveyance Improvements, DS 105 ***Comment:*** *3/8/2016*	X			
D100-00-00-E007 Conveyance Improvements, DS 106 ***Comment:*** *3/14/2016*	X			
D100-00-00-E008 DS107 – Braeswood to S Main ***Comment:*** *3/8/2016*	X			
D100-00-00-E009 DS108 – S Main to Buffalo Speedway ***Comment:*** *11/01/2017*	X			
D100-00-00-G002 BBFFDRP – Development ***Comment:*** *On-call engineering in support of Project Brays, to be held open through the completion of Project Brays*			X	FCD29

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
D100-00-00-G003 BBFFDRP – Bridge Survey	X			
Comment: *11/4/2013*				
D100-00-00-G005 BBFFDRP – H & H Support			X	FCD29
Comment: *Hydrology and Hydraulics modeling support for no-rise letters for elements of Project Brays to be held open through the completion of Project Brays*				
D100-00-00-G006 BBFFDRP – DDR Engineering	X			
Comment: *11/4/2013*				
D100-00-00-G007 BBFFDRP – Control Survey			X	FCD29
Comment: *Surveying services to establish horizontal and vertical control for design survey in support of Project Brays, to be held open through the completion of Project Brays*				
D100-00-00-G009 BBFFDRP – Architectural & Tree Survey			X	FCD29
Comment: *Development of architectural guidelines as well as tree location survey and preservation plan in support of Project Brays, to be held open through the completion of Project Brays*				
D100-00-00-G011 BBFFDRP – UPRR Engineering	X			
Comment: *7/18/2016*				
D100-00-00-G0013 BBFFDRP – Evaluation of TxDot Bridges	X			
Comment: *3/14/2016*				
D100-00-00-G0015 BBFFDRP – Public Awareness	X			
Comment: *11/4/2013*				
D100-00-00-G0017 BBFFDRP – Recreation Feasibility Study			X	FCD29
Comment: *HCFCD sponsored feasibility study to identify recreational elements that may qualify for federal funding. To be held open through the completion of Project Brays*				
D100-00-00-Y005 Brays Bayou Federal Feasibility Study	X			
Comment: *4/09/2009*				
D111-00-00-Y003 Project Dev. Report for Poor Farm Ditch	X			
Comment: *12/16/2015*				
D500-04-00-E016 Basin Improvements, DS16	X			
Comment: *5/25/2012*				
D500-04-00-E023 Eldridge Detention Basin Comp 1, DS 23	X			
Comment: *4/7/2016*				
D500-04-00-E025 Eldridge Detention Basin DS25	X			
Comment: *4/7/2016*				
D500-06-00-E002 Basin Improvements, DS12	X			
Comment: *12/27/2018*				
D500-06-00-E022 Basin Improvements, DS22	X			
Comment: *7/25/2013*				
D500-06-00-V071 Brays Bayou Federal Flood Control Project	X			
Comment: *3/14/2016*				
D512-01-00-E201 Basin Improvements, DS201	X			
Comment: *11/7/2016*				
D512-01-00-E202 Basin Improvements, DS202	X			
Comment: *12/14/2018*				

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
D512-01-00-E209 Basin Improvements, DS209 ***Comment:*** *5/25/2016*	X			
D512-01-00-R001 ROW Acquisition – Basin ***Comment:*** *Additional sites may be investigated and acquired for expansion of the D512-01-00 detention basin.*			X	FCD29
W100-00-00-P006 Buffalo Bayou Federal Feasibility Study ***Comment:*** *4/17/2017*	X			
W100-00-00-R002 Buffalo Bayou Acquisition Downtown ***Comment:*** *4/13/2017*	X			
W129-00-00-C001 Conveyance Improvements, Phase 1 ***Comment:*** *10/21/2008*	X			
W129-00-00-C002 Conveyance Improvements, Phase 2 ***Comment:*** *3/14/2016*	X			
W140-04-00-Y001 Interlocal Agreement with City of Hilshire Village ***Comment:*** *1/12/2010*	X			
W151-00-00-P001 Drainage & Flood Control Study ***Comment:*** *11/27/2012*	X			
K100-00-00-H013 FMA-1 ***Comment:*** *6/11/2010*	X			
K100-00-00-P003 Upper Cypress Creek Watershed Master Plan ***Comment:*** *3/10/2011*	X			
K100-00-00-R001 ROW Acquisition – Floodplain ***Comment:*** *4/19/2013*	X			
K100-00-00-R002 ROW Acquisition – Maintenance ***Comment:*** *2/7/2005*	X			
K161-00-00-R001 ROW Acquisition – Channel ***Comment:*** *6/18/2009*	X			
K500-01-00-E001 E & R Contract – Sprint ***Comment:*** *4/5/2012*	X			
K500-01-00-FP001 Basin Improvements ***Comment:*** *12/31/2014*	X			
L100-00-00-P002 Little Cypress Frontier Program ***Comment:*** *The Master Plan has been adopted by Commissioners Court. Implementation of the*			X	FCD108
L500-01-00-R001 ROW Acquisition – Basin ***Comment:*** *7/13/2010*	X			
L500-02-00-E001 Conveyance Improvements, DS 102 ***Comment:*** *12/29/2017*	X			
L514-01-00-E001 Conveyance Improvements, DS 103 ***Comment:*** *8/10/2009*	X			
L514-01-00-E002 Conveyance Improvements, DS 103 ***Comment:*** *3/18/2019*	X			
F101-06-00-C001 Channel Conveyance Exxon Mobil ***Comment:*** *4/13/2018*	X			

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
F101-06-00-E001 Replacement of Transition Control Structure	X			
Comment: *8/16/2012*				
P118-00-00-P003 Halls Bayou Federal Feasibility Study	X			
Comment: *9/12/2013*				
P118-00-00-P004 Halls Bayou Federal Feasibility Study	X			
Comment: *2/8/2018*				
P118-00-00-R002 Halls Bayou ROW Acquisition		X		
Comment: *ROW for Halls Bayou is being acquired under project IDs.*				
P118-14-00-FP000 HMGP 1791 P118-14-00 Halls Bayou			X	FCD99
Comment: *This effort includes excavation of 2 basins and channel conveyance improvements which are currently under design.*				
P518-02-00-B001 Pedestrian Bridges Keith-Weiss Park	X			
Comment: *6/10/2010*				
P518-02-00-Y001 Detention Basin Improvements at Keith-Weiss Park	X			
Comment: *8/3/2010*				
P518-03-00-E001 Street Closure	X			
Comment: *4/4/2012*				
P518-03-00-FP000 Hall Park Detention Basin	X			
Comment: *2/15/2019*				
P518-04-00-E001 Utility Adjustment/Street Closure	X			
Comment: *4/6/2009*				
P518-04-00-E002 Bretshire Basin – Recreational Amenities	X			
Comment: *3/15/2010*				
P518-04-00-E003 Bretshire Stormwater Detention Basin Final	X			
Comment: *2/10/2014*				
P518-04-00-W001 Bretshire Stormwater Basin Env. Enhance	X			
Comment: *3/8/2016*				
P100-00-00-FP005 U.S. Army Corps of Engineers Veterans MEM to BAMMEL			X	FCD184
Comment: *P100-00-00-FP005, P100-00-00-FP006, and* P500-05-00-FP000 *are under construction. Construction is 45% complete (channel and basin combined); 86% complete at the basin.*				
P100-00-00-FP006 U.S. Army Corps of Engineers BAMMEL N HOU. To CUTTEN			X	FCD184
Comment: *P100-00-00-FP005, P100-00-00-FP006, and* P500-05-00-FP000 *are under construction. Construction is 45% complete (channel and basin combined); 86% complete at the basin.*				
P100-00-00-P004 Greens Bayou Watershed Master Plan	X			
Comment: *1/11/2011*				
P100-00-00-R001 ROW Acquisition – Floodplain			X	FCD180
Comment: *Project to be held open for when floodplain ROW becomes necessary or available.*				
P100-00-00-Y018 Greens Bayou Bid Reach FDRP	X			
Comment: *8/11/2009*				
P500-02-00-E008 E & R Contract – Sprint	X			
Comment: *1/8/2010*				
P500-02-00-E009 Harris County Interlocal Agreement/ Hollister	X			
Comment: *11/23/2011*				

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
P500-03-00-E001 Basin Improvements, Phase 1	X			
Comment: *2/4/2010*				
P500-03-00-E002 Basin Improvements, Phase 2			X	FCD191
Comment: *Basin excavation is underway. 15% excavated as of now.*				
P500-04-00-R001 ROW Acquisition – Basin	X			
Comment: *4/6/2009*				
P500-05-00-FP000 U.S. Army Corps of Engineers Antoine Basin			X	FCD184
Comment: *P100-00-00-FP005, P100-00-00-FP006, and* P500-05-00-FP000 *are under construction. Construction is 45% complete (channel and basin combined); 86% complete at the basin.*				
P500-06-00-R002 Castlewood Buyout	X			
Comment: *3/8/2016*				
P500-08-00-E001 Basin Improvements, Phase 1			X	FCD192
Comment: *Excavation and removal approximately 87% complete; Installed access ramps to each cell; Began repairs to adjacent trail system; Began concrete work for weir on basin A*				
P500-08-00-FP000 HMGP 1791 Greens Bayou Mid Reach		X		
Comment: *This was rolled into P500-08-00-E001*				
P500-08-00-R001 ROW Acquisition – Basin	X			
Comment: *2/1/2011*				
P545-01-00-E005 Kuykendahl Stormwater Detention Basin			X	FCD193
Comment: *Excavation and removal approximately 97% complete; Installed 2-54" outfalls, 48" CMP, and 10x6 and 12x6 RCBs; Installed the P145-03-00 and P145-00-00 weirs; Began concrete/grading along P145 channel; Completed the channel slope repairs*				
P545-01-00-Y008 E & R Contract – Weatherford	X			
Comment: *1/15/2010*				
P700-01-00-Y001 GB Wetlands Mitigation Project	X			
Comment: *Construction is completed, but the management of the mitigation bank is ongoing.*				
H100-00-00-P003 Project Hunting – Hydrology and Hydraulics Support	X			
Comment: *9/11/2017*				
H100-00-00-R001 ROW Acquisition – Channel			X	FCD102
Comment: *All but 2 tracts necessary for the Hunting Bayou Project have been obtained.*				
H100-00-00-Y001 Hunting Bayou Federal Feasibility Study	X			
Comment: *11/7/2016*				
H100-00-00-Y005 Project Dev. Report for Project Hunting	X			
Comment: *10/27/2017*				
H500-01-00-E001 Basin Improvements, Phase 1	X			
Comment: *4/4/2012*				
H500-01-00-E002 Homestead Stormwater Detention Basin	X			
Comment: *8/10/2017*				
G103-00-00-H002 Home Buyout	X			
Comment: *11/16/2009*				
G103-05-02-R001 ROW Acquisition – Maintenance	X			
Comment: *4/6/2009*				
G103-27-00-E001 Lake Houston to Cuba Libra Drive	X			
Comment: *9/4/2015*				

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
G504-01-00-R001 Deer Park Interlocal for G504-01-00 ***Comment:*** *11/26/2018*	X			
C100-00-00-B016 MLK Boulevard Bridge ***Comment:*** *10/4/2010*	X			
C100-00-00-B022 Almeda Road Bridge ***Comment:*** *1/11/2011*	X			
C100-00-00-B023 Buffalo Speedway Bridge ***Comment:*** *9/1/2011*	X			
C100-00-00-B024 Whiteheather Road Bridge ***Comment:*** *12/3/2012*	X			
C100-00-00-B025 Hiram Clark Street Bridge ***Comment:*** *5/17/2017*	X			
C100-00-00-B026 South Post Oak Street Bridge ***Comment:*** *9/19/2017*	X			
C100-00-00-B027 Heatherbrook Street Bridge ***Comment:*** *2/22/2016*	X			
C100-00-00-B039 Law Park Pedestrian Bridge ***Comment:*** *12/19/2013*	X			
C100-00-00-B040 Buxley Pedestrian Bridge ***Comment:*** *7/3/2013*	X			
C100-00-00-E012 SBFFDRP – LERRD ***Comment:*** *7/1/2013*	X			
C100-00-00-E013 SBFFDRP – LERRD ***Comment:*** *11/7/2016*	X			
C100-00-00-E014 SBFFDRP – LERRD ***Comment:*** *11/7/2016*	X			
C100-00-00-G001 SBFFDRP – Overall Support ***Comment:*** *10/10/2015*	X			
C100-00-00-G003 SBFFDRP – Bridge Management ***Comment:*** *4/9/2013*	X			
C106-00-00-P003 Channel Improvements Impact Analysis ***Comment:*** *6/11/2013*	X			
C106-03-00-C002 Channel Improvements Phase 2 ***Comment:*** *1/13/2019*	X			
C106-03-00-C003 Channel Improvements Phase 3 ***Comment:*** *4/20/2010*	X			
C106-03-00-FP01 Mitigation Project – Basin ***Comment:*** *11/21/2016*	X			
C106-08-00-C003 Conveyance Improvements Phase 2 ***Comment:*** *8/30/2012*	X			
C200-00-00-Y001 Sims Bayou Conditions Assessment ***Comment:*** *8/14/2015*	X			

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
C500-03-00-Y001 The Hill at Sims Greenway ***Comment:*** *8/3/2010*	X			
C500-03-00-Y003 The Hill Site Stabilization Project ***Comment:*** *2/26/2014*	X			
C500-03-00-Y004 The Hill Site Stabilization Project Phase 2 ***Comment:*** *2/26/2014*	X			
C508-02-00-E003 E&R Agreement ***Comment:*** *9/9/2013*	X			
J100-00-00-R001 ROW Acquisition – Floodplain ***Comment:*** *Some ROW acquired. Project to be held open for when floodplain ROW becomes necessary or available.*			X	FCD144
O100-00-00-E001 Goose Creek Flood Damage Reduction Project ***Comment:*** *12/16/2014*	X			
O100-00-00-E002 Channel Improvements ***Comment:*** *3/29/2004*	X			
E100-00-00-R002 Arbor Oaks Buyout ***Comment:*** *20 remaining structures to be purchased*			X	FCD179
E100-00-00-Y001 White Oak Bayou Federal Study Support ***Comment:*** *12/19/2016*	X			
E100-00-00-Y003 White Oak Bayou Federal Study ***Comment:*** *3/15/2016*	X			
E100-00-00-Y009 White Oak Bayou Lawsuit ***Comment:*** *2/8/2018*	X			
E121-00-00-E001 Vogel Creek Conveyance Improvement Project ***Comment:*** *3/8/2011*	X			
E121-00-00-E003 Vogel Creek Project, Phase 3 ***Comment:*** *8/16/2010*	X			
E200-00-00-E003 Jersey Village Channel Project, Phase 3 ***Comment:*** *4/5/2012*	X			
E500-00-00-FP001 Inwood Golf Course Acquisition ***Comment:*** *The City of Houston purchased this land instead of the District*		X		
E500-03-00-E001 Basin Improvements, Phase 3 ***Comment:*** *11/4/2013*	X			
E500-03-00-W001 Environmental Enhancements ***Comment:*** *Recent nutria rat colonization of the site has slowed progress*			X	FCD148
E500-11-00-E001 Ranchstone Stormwater Detention Basin ***Comment:*** *8/3/2010*	X			
E500-11-00-W001 Environmental Enhancements ***Comment:*** *10/16/2017*	X			
E500-12-00-E001 Fallbrook Stormwater Detention Basin ***Comment:*** *5/7/2009*	X			
E515-01-00-E001 Brickhouse Gully Stormwater Detention Basin ***Comment:*** *3/15/2010*	X			

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
E515-01-00-W001 Environmental Enhancements ***Comment:*** *4/28/2017*	X			
E535-01-00-E004 PER for Stormwater Detention Basin ***Comment:*** *10/27/2017*	X			
E535-01-00-FP001 HMGP1791 Jersey Village Basin ***Comment:*** *10/27/2017*	X			
M125-00-00-E001 Conveyance Improvements ***Comment:*** *1/18/2019*	X			
M500-01-00-E001 E & R Contract – Morris Tractor ***Comment:*** *9/22/2017*	X			

35.9 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 35-11 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 35-12 identifies the priority for each action. Table 35-13 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 35-11. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline
Action FCD1 — Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Earthquake, flooding, landslide, tsunami, wildfire						
Existing	3, 4, 10	HCFCD	TBD	High	HMGP, PDM, FMA	Short-term
Action FCD2 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: All hazards						
New and Existing	1, 5, 8	HCFCD	TBD	Low	Staff Time, General Funds	Short-term
Action FCD3 — Integrate the hazard mitigation plan into other plans, ordinances and programs within the community						
Hazards Mitigated: Dam failure, earthquake, flooding, landslide, severe weather, tsunami, wildfire						
Existing	2, 6, 9	HCFCD	TBD	High	TBD	Ongoing
Action FCD4 — C-40, AB Res SECTION-216, Corps of Engineers Section 216 Study – Addicks and Barker Reservoirs						
Hazards Mitigated: Dam failure, flooding						
New and Existing	8, 10, 11	USACE	HCFCD	Low	Congressional Appropriation	Short-term
Action FCD5 — F-53, U100-00-00-CONV, Rehabilitation of Channels Upstream of Addicks Reservoir to Restore Channel Conveyance Capacity						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline
Action FCD6 — F-54, U100-00-00-E008, Right-Of-Way Acquisition, Design and Construction of Control Structures and Stormwater Quality Features for the Upper Langham Creek Program						
Hazards Mitigated: Flooding						
New	2, 10, 11, 12, 15	HCFCD	N/A	Low	2018 HCFCD BOND, Private Participants	Short-term
Action FCD7 — C-36, U101-00-00-FP001, Right-Of-Way Acquisition, Design and Construction of Channel Conveyance Improvements and Bypass Channel for South Mayde Creek						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	TBD	High	2018 HCFCD BOND	Long-term
Action FCD8 — C-46, U101-00-00-FP002, Right-Of-Way Acquisition, Design and Construction of a Stormwater Detention Basin on South Mayde Creek						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	TBD	High	2018 HCFCD BOND	Long-term
Action FCD9 — C-47, U101-00-00-FP003, Design and Construction of a Bridge Replacement for Greenhouse Road at South Mayde Creek						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	HCED	High	2018 HCFCD BOND	Short-term
Action FCD10 — C-48, U101-00-00-FP004, Right-Of-Way Acquisition, Design and Construction of a Stormwater Detention Basin on South Mayde Creek near the Grand Parkway						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	TBD	High	2018 HCFCD BOND	Long-term
Action FCD11 — F-55, U102-00-00-FP001, Planning, Right-Of-Way Acquisition, Design, and Construction for Ultimate Conveyance on Bear Creek						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD12 — F-84, U102-12-00-FP, Design and Construction of Secondary Outfall for John Pauls Landing for the Upper Langham Creek Program						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD13 — F-56, U500-00-00-FP002, Right-Of-Way Acquisition, Design, and Construction of a Retention Area						
Hazards Mitigated: Dam failure, flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD14 — C-37, U500-01-CON, Design and Construction of Little York Stormwater Detention Basin						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	TBD	High	2018 HCFCD BOND	Short-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline
Action FCD15 — F-83, U500-North-JPL, Right-Of-Way Acquisition, Design and Construction of a Stormwater Detention Basin North of John Pauls Landing for the Upper Langham Creek Program						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD16 — C-38, U520-01-CON, Design and Construction of Dinner Creek Stormwater Detention Basin						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	TBD	High	2018 HCFCD BOND	Short-term
Action FCD17 — F-112, U700-00-00-FP001, Right-Of-Way Acquisition, Design, and Construction of Wetland Mitigation Bank						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD18 — C-52, U-USACE-CONV, Rehabilitation of Channels Inside of Addicks Reservoir to Restore Channel Conveyance Capacity						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	USACE	Low	2018 HCFCD BOND	Short-term
Action FCD19 — F-99, B100-CON, Right-Of-Way, Design and Construction of Conveyance Improvements along Armand Bayou						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD20 — F-96, B100-GEN, Investigations of General Drainage Improvements in Armand Bayou Watershed						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD21 — C-44, B100-RESTORE, Armand Bayou Right-of-Way Acquisition and Floodplain Preservation						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11, 15	HCFCD	TBD	Medium	2018 HCFCD BOND	Ongoing
Action FCD22 — CI-023, B104-00-00-FP, Right-Of-Way, Design and Construction of Conveyance Improvements along Horsepen Bayou						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD23 — C-06, B112-00-00-404, Right-Of-Way Acquisition, Design and Construction of B112-00-00 and Tributaries Conveyance Improvements						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	TBD	High	2018 HCFCD BOND	Long-term
Action FCD24 — CI-021, B112-BGLEN, Brookglen Flooding Mitigation Analysis						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	TBD	Low	2018 HCFCD BOND	Short-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline
Action FCD25 — C-07, B509-0304-CON, Design and Construction of the B509-03-00 and B509-04-00 Stormwater Detention Basins						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	TBD	High	2018 HCFCD BOND	Short-term
Action FCD26 — F-72, B513-02-00-FP, Design and Construction of the Baywood Stormwater Detention Basin						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD27 — F-52, T100-00-00-CONV, Rehabilitation of Approximately 20 Miles of Channels Upstream of Barker Reservoir to Restore Channel Conveyance Capacity						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD28 — C-53, T-USACE-CONV, Rehabilitation of Channels Inside of Barker Reservoir to Restore Channel Conveyance Capacity						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	USACE	Low	2018 HCFCD BOND	Short-term
Action FCD29 — C-11, D100-00-00-USACE, Design and Construction of Project Brays Corps of Engineers (Section 211(f) Project)						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	USACE	Low	2018 HCFCD BOND	Short-term
Action FCD30 — CI-025, D100-AddDet, Investigation of Additional Stormwater Detention Basins in the Brays Bayou Watershed						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD31 — CI-034, D100-USFondren, Investigation of Channel Improvements Upstream of Fondren Road on Brays Bayou						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD32 — C-12, D111-00-00-404, Right-Of-Way, Design and Construction of Conveyance Improvements along Poor Farm Ditch						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	City of Southside Place and City of West University Place	High	2018 HCFCD BOND	Long-term
Action FCD33 — CI-038, D115-00-00-FP, Restore Channel Conveyance Capacity Along D115-00-00						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	City of Houston	Medium	2018 HCFCD BOND	Short-term
Action FCD34 — F-07, D118-00-00-FP001, Planning, Right-Of-Way Acquisition, Design, and Construction of Channel Conveyance Improvements on Keegans Bayou						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline
Action FCD35 — C-13, D133-00-00-404, Planning, Right-Of-Way, Design and Construction of Conveyance Improvements along Bintliff Ditch						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	City of Houston	High	2018 HCFCD BOND	Long-term
Action FCD36 — F-08, D140-00-00-FP001, Planning, Right-Of-Way Acquisition, Design, and Construction of Channel Conveyance Improvements on Fondren Diversion Channel						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD37 — F-58, W100-00-00-LIN, Construction of Linear Detention on Buffalo Bayou						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD38 — CI-017, W100-BCON, Design & Construction of Replacement Bridges Along Buffalo Bayou						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD39 — CI-016, W100-Bstudy, Investigations of Bridges and Potential Channel Bypasses over Buffalo Bayou						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD40 — F-82, W100-COMMERCE, Demolition of 1119 Commerce Street and Slope Stabilization Along Buffalo Bayou						
Hazards Mitigated: Flooding						
	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD41 — CI-018, W140-00-00-GEN, Rehabilitation of W140-00-00 to Restore Channel Conveyance Capacity						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD42 — F-59, W140-CON, Spring Branch Creek Stabilization						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD43 — F-80, W141-00-00-GEN, Planning, Right-Of-Way Acquisition, Design and Construction Along Soldiers Creek						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD44 — F-81, W151-153-GEN, Planning, Right-Of-Way Acquisition, Design and Construction Along W151-00-00 and W153-00-00						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD45 — F-79, W157-00-00-GEN, Planning, Right-Of-Way Acquisition, Design and Construction Along W157-00-00						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline
Action FCD46 — CI-009, W190-JOINT, Partnership Project with Fort Bend County on Right-of-Way Acquisition, Design, and Construction of General Drainage Improvements along Clodine Ditch						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	Fort Bend County	Medium	2018 HCFCD BOND	Long-term
Action FCD47 — CI-024, W500-Micro, Investigation of Effectiveness of Micro-Detention in the Buffalo Bayou Watershed						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD48 — F-70, Q100-00-00-FP, Upstream Cedar Bayou Project – Right-Of-Way Acquisition, Design and Construction of Channel Conveyance Improvements and Stormwater Detention Basin Upstream of FM 1960						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD49 — F-42, Q114-00-00-FP, Right-of-Way Acquisition, Design and Construction of Channel Conveyance Improvements along Magee Gully						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD50 — F-41, Q122-00-00-FP, Right-of-Way Acquisition, Design and Construction of Channel Conveyance Improvements along Clawson Ditch and Q124-00-00						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD51 — F-43, Q128-00-00-FP, Right-of-Way Acquisition, Design and Construction of Channel Conveyance Improvements along Adlong Ditch						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD52 — F-44, Q130-00-00-FP, Right-of-Way Acquisition, Design and Construction of Channel Conveyance Improvements along Q130-00-00						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD53 — F-45, Q134-00-00-FP, Planning, Right-Of-Way Acquisition, Design and Construction of Channel Conveyance Improvements on Q134-00-00 and Q134-00-01						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD54 — F-69, Q136-00-00-FP, Right-Of-Way Acquisition, Design and Construction of channel conveyance improvements on Q136-00-00 – Part of the Upstream Cedar Bayou Project						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline
Action FCD55 — F-46, Q500-01-00-FP, Right-Of-Way Acquisition, Design and Construction of the Q500-01 Stormwater Detention Basin						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD56 — F-47, Q500-CWA, Right-Of-Way Acquisition, Design and Construction of Stormwater Detention Basins near Coastal Water Authority canals and IH 10						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD57 — F-48, Q700-01-CON, Design and Construction of Crosby Eastgate Environmental Mitigation Bank						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD58 — C-03, A100-00-00-USACE, Design and Construction of Corps of Engineers Clear Creek Federal Flood Risk Management Project						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	USACE	Low	2018 HCFCD BOND, Congressional Appropriation	Long-term
Action FCD59 — CI-001, A100-CONV, Rehabilitation of the Clear Creek channel to Restore Channel Conveyance Capacity						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD60 — CI-039, A100-Nassau, Partnership Project with Nassau Bay to Reduce the Risk of Flooding						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	City of Nassau Bay	Low	2018 HCFCD BOND, Nassau Bay	Short-term
Action FCD61 — CI-013, A104-CONV, Restore Channel Conveyance Capacity on A104-00-00						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD62 — F-01, A135-00-00-FP001, Right-Of-Way Acquisition, Design, and Construction of Channel Conveyance Improvements on A135-00-00						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD63 — CI-003, A214-CONV, Rehabilitation of the A214-00-00 channel to Restore Channel Conveyance Capacity						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	TBD	Medium	2018 HCFCD BOND	Short-term
Action FCD64 — F-02, A500-04-CON, Right-Of-Way Acquisition, Design and Construction of Hughes Stormwater Detention Basin on Clear Creek						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline
Action FCD65 — F-03, A500-08-CON, Design and Construction of Dagg Road Stormwater Detention Basin on Clear Creek						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD66 — CI-62, A500-528-Dixie, Construction of Stormwater Detention Basins Near FM 528 and Dixie Farm Road in Friendswood						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	USACE	High	2018 HCFCD BOND	Short-term
Action FCD67 — C-05, A520-03-00-FP, Construction of South Belt Stormwater Detention Basin and Channel Conveyance Improvements Along Beamer Road Ditch (A120-00-00)						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	USACE	Low	2018 HCFCD BOND	Short-term
Action FCD68 — F-76, A700-01-WMB, Identification, Design and Construction of the A700-01 Environmental Mitigation Bank						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD69 — CI-012, K100-CONV, Major Maintenance of Cypress Creek and Tributaries						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD70 — F-20, K100-ROW, Cypress Creek Right-of-Way Acquisition and Floodplain Preservation						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11, 15	HCFCD	N/A	Low	2018 HCFCD BOND	Ongoing
Action FCD71 — CI-035, K100-TRIBS-DET, Update to 2003 Texas Water Development Board Cypress Creek Tributary Study and Investigate Expanding Stormwater Detention Basins in Cypress Creek Watershed						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD72 — F-21, K129-00-00-X007, Restore Channel Conveyance Capacity on K129-00-00						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD73 — F-22, K140-MAINT, Restore Channel Conveyance Capacity Along Pillot Gully						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD74 — F-23, K163-CON, Construction of Channel Conveyance Improvements Along K163-00-00						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline
Action FCD75 — F-24, K700-01-WMB, Identification, Design and Construction of the K700-01 Environmental Mitigation Bank						
Hazards Mitigated: Flooding						
New and Existing	2, 6, 7, 8	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD76 — F-98, F100-00-00-CON, Right-of-Way Acquisition, Design and Construction of General Drainage Improvements in Galveston Bay Watershed						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD77 — F-101, F100-00-00-GEN, Investigations of General Drainage Improvements in Galveston Bay Watershed						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD78 — C-58, F101-06-00-E002, Right-of-Way Acquisition, Design and Construction of General Drainage Improvements Along F101-06-00						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	City of La Porte	Low	2018 HCFCD BOND	Long-term
Action FCD79 — C-57, F216-00-CONV, Right-of-Way Acquisition, Design and Construction of General Drainage Improvements Along F216-00-00						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	TBD	Low	2018 HCFCD BOND	Long-term
Action FCD80 — F-120, O100-00-00-CON, Right-Of-Way Acquisition, Design, and Construction of General Drainage Improvements in Goose Creek watershed						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD81 — F-121, O100-00-00-GEN, Investigations of General Drainage Improvements in Goose Creek watershed						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD82 — F-109, O200-00-00-CON, Right-Of-Way Acquisition, Design, and Construction of General Drainage Improvements on Spring Gully						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD83 — F-39, O200-00-00-GEN, Investigations of General Drainage Improvements on Spring Gully						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD84 — C-20, P100-00-00-FP, Mid-Reach Greens Bayou Project – Design and Construction of Channel Conveyance Improvements along Greens Bayou						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	USACE	High	2018 HCFCD BOND	Short-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline
Action FCD85 — CI-006, P118-BROCK, Design and Construction of a Stormwater Detention Basin in Brock Park						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	City of Houston	High	2018 HCFCD BOND	Short-term
Action FCD86 — CI-022, P130-05-01-DET, ROW, Design, and Construction of Stormwater Detention Basin Near P130-05						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD87 — C-31, P133-CON, Design and Construction of the Smith Road Channel Diversion						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	TBD	High	2018 HCFCD BOND	Short-term
Action FCD88 — C-43, P138-01-01-FP, Planning, Right-of-Way Acquisition, Design and Construction of Channel Conveyance Improvements along P138-01-01						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	HUD	High	2018 HCFCD BOND, CDBG	Long-term
Action FCD89 — F-40, P500-01-CON, Repairs and Enhancements to the Lower Greens Bayou Regional Detention Embankment and Control Structure						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD90 — C-32, P500-02-00-FP001, Design and Construction of the Cutten Road Stormwater Detention Basin Improvements						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	TBD	High	2018 HCFCD BOND	Short-term
Action FCD91 — C-33, P500-04-00-FP, Design and Construction of Aldine-Westfield Stormwater Detention Basin Improvements						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	TBD	High	2018 HCFCD BOND	Short-term
Action FCD92 — C-34, P500-06-00-E003/4, Design and Construction of Lauder Stormwater Detention Basin Improvements						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	HUD	High	2018 HCFCD BOND, CDBG	Short-term
Action FCD93 — C-23, P118-08-00-FP, Right-Of-Way, Design, and Construction of Channel Conveyance Improvements on P118-08-00						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	TBD	High	2018 HCFCD BOND	Long-term
Action FCD94 — C-24, P118-09-00-FP, Right-Of-Way, Design, and Construction of Channel Conveyance Improvements on P118-09-00						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	TBD	High	2018 HCFCD BOND	Long-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline
Action FCD95 — C-25, P118-21-00-FP, Right-Of-Way, Design, and Construction of Channel Conveyance Improvements on P118-21-00						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	HUD	High	2018 HCFCD BOND, CDBG	Long-term
Action FCD96 — C-26, P118-23-00-FP, Right-Of-Way, Design, and Construction of Channel Conveyance Improvements on P118-23-00 and P118-23-02						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	City of Houston; Harris County	High	2018 HCFCD BOND, City of Houston, Harris County	Long-term
Action FCD97 — C-28, P118-25-00-FP, Right-Of-Way, Design, and Construction of Channel Conveyance Improvements on P118-25-00 & P118-25-01						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	City of Houston; Harris County	High	2018 HCFCD BOND, City of Houston, Harris County	Long-term
Action FCD98 — C-30, P118-27-00-FP, Right-Of-Way, Design, and Construction of Channel Conveyance Improvements on P118-27-00						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	TBD	High	2018 HCFCD BOND	Long-term
Action FCD99 — C-35, P518-10-00-FP001, Design and Construction of Stormwater Detention Basin and Associated Channel Improvements						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	HUD	High	2018 HCFCD BOND, CDBG	Short-term
Action FCD100 — C-01, P518-26-00-FP, Construction of P518-26 Stormwater Detention Basin						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	HUD	High	2018 HCFCD BOND, CDBG	Short-term
Action FCD101 — C-02, P518-ALDINE-CDBG, Aldine Westfield Stormwater Detention Basin and Channel Improvements						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	City of Houston	High	2018 HCFCD BOND	Long-term
Action FCD102 — C-18, H100-00-00-USACE, Design and Construction of Corps of Engineers Hunting Bayou, Section 211(f) Project						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	USACE	Low	2018 HCFCD BOND	Short-term
Action FCD103 — CI-59, H102-DIV, Planning, Right-Of-Way, Design and Construction of a Diversion Channel from H102-00-00 to H100-00-00 through Galena Park						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD104 — CI-031, H103-00-00-FP001, HCFCD Cost Share of Study with the City of Houston on Wallisville Outfall						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	City of Houston	Low	2018 HCFCD BOND	Short-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline
Action FCD105 — F-17, H103-00-00-FP002, Right-Of-Way Acquisition, Design and Construction of Wallisville Outfall						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD106 — F-107, R100-00-00-CON, Right-of-Way Acquisition, Design and Construction of General Drainage Improvements in Jackson Bayou Watershed						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD107 — F-73, R100-00-00-GEN, Investigations of General Drainage Improvements in Jackson Bayou Watershed						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD108 — F-26, L100-00-00-MNG, Management, Right-of-Way Acquisition, Design and Construction of the Little Cypress Creek Frontier Program						
Hazards Mitigated: Flooding						
New	2, 10, 11, 12, 15	HCFCD	N/A	Medium	2018 HCFCD BOND	Long-term
Action FCD109 — F-27, L500-01-CON, Design and Construction of Zube Park Stormwater Detention Basin						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD110 — F-28, L500-02-CON, Right-Of-Way Acquisition, Design, and Construction of Kluge Stormwater Detention Basin						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD111 — F-29, L500-06-CON, Right-Of-Way Acquisition, Design, and Construction of Mueschke East Stormwater Detention Basin						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD112 — F-30, L500-09-CON, Right-Of-Way Acquisition, Design, and Construction of Schiel Stormwater Detention Basin						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD113 — F-31, L500-10-CON, Construction of Mueschke West Stormwater Detention Basin Improvements						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD114 — F-32, L500-11-CON, Construction of Hegar Stormwater Detention Basin Improvements						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline
Action FCD115 — F-89, L500-INC, Design and Construction of Additional Volume in Little Cypress Creek Stormwater Detention Basins						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD116 — F-33, L512-01-CON, Construction of Kleb Woods Stormwater Detention Basin Improvements						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD117 — F-34, L512-03-CON, ROW, Design, and Construction of Mason Stormwater Detention Basin in Little Cypress Creek watershed						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD118 — F-35, L514-01-CON, Construction of Bauer-Hockley Stormwater Detention Basin Improvements						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD119 — F-108, S100-00-00-CON, Right-of-Way Acquisition, Design and Construction of General Drainage Improvements in Luce Bayou Watershed						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD120 — F-85, S100-00-00-GEN, Investigations of General Drainage Improvements along Luce Bayou						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD121 — F-51, S100-00-00-ROW, Luce Bayou Right-of-Way Acquisition and Floodplain Preservation						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11, 15	HCFCD	N/A	Low	2018 HCFCD BOND	Ongoing
Action FCD122 — C-50, G103-00-00-JOINT, Funding for Future Partnership Projects Based on Results of Study – for Right-of-Way Acquisition, Design, and Construction of General Drainage Improvements in San Jacinto River Watershed Study						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	TBD	High	2018 HCFCD BOND	Long-term
Action FCD123 — C-17, G103-00-00-STUDY, San Jacinto River Watershed Study						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	SJRA, City of Houston, Montgomery County, FEMA	Low	2018 HCFCD BOND, HMGP	Short-term
Action FCD124 — F-15, G103-Atascocita, Planning , Right-Of-Way Acquisition, design and Construction of General Drainage Improvements Near Atascocita						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline
Action FCD125 — CI-61, G103-Dredge, East Fork, West Fork and Lake Houston Dredging						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	USACE	HCFCD, City of Houston	High	HMGP	Short-term
Action FCD126 — F-110, G103-ELH, Planning , Right-Of-Way Acquisition, design and Construction of General Drainage Improvements East of Lake Houston						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD127 — CI-028, G103-GATES, Design and Construction of Additional Gates on Lake Houston in Partnership with the City of Houston						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	City of Houston	High	2018 HCFCD BOND	Short-term
Action FCD128 — CI-019, G103-GlenDaleDet, Investigations of Potential Detention Sites Around Glendale Dredge Site in Partnership with the City of Houston						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	City of Houston	High	2018 HCFCD BOND	Short-term
Action FCD129 — F-110, G103-Huffman, Planning , Right-Of-Way Acquisition, design and Construction of General Drainage Improvements Near Huffman						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD130 — F-14, G103-Kingwood, Planning , Right-Of-Way Acquisition, design and Construction of General Drainage Improvements Near Kingwood						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD131 — CI-60, G112-CON, Planning, Right-Of-Way, Design and Construction of Conveyance Improvements along Panther Creek						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	TBD	Low	2018 HCFCD BOND	Long-term
Action FCD132 — CI-029, C102-00-00-FP, Restore Channel Conveyance Capacity Along C102-00-00						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	City of Houston	High	2018 HCFCD BOND	Short-term
Action FCD133 — CI-027, C106-00-00-FP, Planning, Right-Of-Way Acquisition, Design, and Construction of Improvements for the Tributaries of C106-00-00						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	City of Houston; City of South Houston	Low	2018 HCFCD BOND	Long-term
Action FCD134 — F-92, C116-00-00-GEN, Planning, Right-Of-Way Acquisition, Design and Construction Along C116-00-00						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline
Action FCD135 — C-08, C118-00-00-FP001, Right-Of-Way Acquisition, Design, and Construction of Stormwater Detention Basin and Channel Conveyance Improvements along Salt Water Ditch						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	City of Houston	High	2018 HCFCD BOND	Long-term
Action FCD136 — F-93, C124-00-00-GEN, Planning, Right-Of-Way Acquisition, Design and Construction Along C124-00-00						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD137 — F-94, C143-00-00-GEN, Planning, Right-Of-Way Acquisition, Design and Construction Along C143-00-00						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD138 — F-95, C144-00-00-GEN, Planning, Right-Of-Way Acquisition, Design and Construction Along C144-00-00						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD139 — CI-037, C146-00-00-FP, Restore Channel Conveyance Capacity Along C146-00-00						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	City of Houston	Medium	2018 HCFCD BOND	Short-term
Action FCD140 — C-09, C147-00-00-FP001, Right-Of-Way Acquisition, Design, and Construction of South Post Oak Stormwater Detention Basin and Channel Conveyance Improvements along C147-00-00						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	FEMA	High	2018 HCFCD BOND, HMGP	Long-term
Action FCD141 — C-10, C506-01-CON, Design and Construction of South Shaver Stormwater Detention Basin						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	City of Houston	High	2018 HCFCD BOND	Short-term
Action FCD142 — F-119, J100-00-00-CON, Right-of-Way Acquisition, Design and Construction of General Drainage Improvements along Spring Creek						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD143 — F-75, J100-00-00-GEN, Investigations of General Drainage Improvements along Spring Creek						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD144 — F-19, J100-00-00-ROW, Spring Creek Right-of-Way Acquisition and Floodplain Preservation						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11, 15	HCFCD	N/A	Low	2018 HCFCD BOND	Ongoing

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline
Action FCD145 — C-118, J100-RES, Planning, Right-of-Way Acquisition, Design and Construction of a Reservoir along Spring Creek						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	TBD	Medium	2018 HCFCD BOND	Long-term
Action FCD146 — F-104, I100-00-00-CON, Right-of-Way Acquisition, Design and Construction of General Drainage Improvements in Vince Bayou Watershed						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD147 — F-78, I100-00-00-GEN, Investigations of General Drainage Improvements in Vince Bayou Watershed						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD148 — C-14, E100-00-00-USACE, Design and Construction of Corps of Engineers White Oak Bayou Section 211(f) Project						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	USACE	Low	2018 HCFCD BOND	Short-term
Action FCD149 — CI-011, E100-HIDDEN, Partnership Project with the City of Houston for Feasibility Study of General Drainage Improvements around Hidden Lake Townhomes						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	City of Houston	Medium	2018 HCFCD BOND	Short-term
Action FCD150 — F-09, E101-00-00-FP001, Planning, Right-Of-Way Acquisition, Design and Construction of Little White Oak Bayou Channel Conveyance Improvements						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD151 — CI-033, E105-JOINT, Partnership Project with City of Houston on Planning, Right-of-Way Acquisition, Design, and Construction of General Drainage Improvements along E105-00-00						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	City of Houston	Medium	2018 HCFCD BOND	Long-term
Action FCD152 — CI-030, E106-00-00-GEN, Right-of-Way Acquisition, Design and Construction of General Drainage Improvements along Turkey Gully						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	City of Houston	High	2018 HCFCD BOND	Long-term
Action FCD153 — F-10, E115-00-00-FP001, Right-Of-Way Acquisition, Design, and Construction of Channel Conveyance Improvements on Brickhouse Gully						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD154 — CI-010, E127-JOINT, Partnership Project with Jersey Village on Right-of-Way Acquisition, Design, and Construction of General Drainage Improvements along E127-00-00						
Hazards Mitigated: Flooding						

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline
New and Existing	8, 10, 11	HCFCD	City of Jersey Village	Medium	2018 HCFCD BOND	Long-term
Action FCD155 — C-39, E200-02-00-NC, Right-of-Way Acquisition, Design and Construction of the North Canal						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	TXDoT	High	2018 HCFCD BOND	Long-term
Action FCD156 — C-59, E500-21-CON, Construction of Inwood Forest West Stormwater Detention Basin						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	City of Houston	High	2018 HCFCD BOND	Short-term
Action FCD157 — CI-032, E500-AddDet, Investigation of Additional Stormwater Detention Basins in the White Oak Bayou Watershed						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	City of Houston	Medium	2018 HCFCD BOND	Short-term
Action FCD158 — C-15, E500-ARBOROAKS-404, Design and Construction of Arbor Oaks Stormwater Detention Basin						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	City of Houston	High	2018 HCFCD BOND	Short-term
Action FCD159 — C-16, E500-WDLNDTRL-404, Design and Construction of Woodland Trails Stormwater Detention Basin						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	USACE	High	2018 HCFCD BOND	Short-term
Action FCD160 — F-106, M100-00-00-CON, Right-of-Way Acquisition, Design and Construction of General Drainage Improvements in Willow Creek Watershed						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Long-term
Action FCD161 — F-71, M100-00-00-GEN, Investigations of General Drainage Improvements in Willow Creek Watershed						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD162 — F-36, M100-00-00-ROW, Willow Creek Right-of-Way Acquisition and Floodplain Preservation						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11, 15	HCFCD	N/A	Low	2018 HCFCD BOND	Ongoing
Action FCD163 — F-37, M124-00-00-FP001, Design and Construction of Channel Conveyance Improvements on M124-00-00 Downstream of SH 249						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline
Action FCD164 — F-38, M528-01-CON, Design and Construction of Cypress Rosehill Stormwater Detention Basin						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD165 — Z-09, Z.FWS, Upgrades and Expansion of the Harris County Flood Warning System						
Hazards Mitigated: Flooding						
Existing	1, 3	HCFCD	N/A	Low	2018 HCFCD BOND	Ongoing
Action FCD166 — Z-10, Z.REMAP, Harris County Floodplain Mapping Updates						
Hazards Mitigated: Flooding						
New and Existing	3, 12, 14, 15	HCFCD	FEMA	Low	2018 HCFCD BOND, FEMA CTP Grant	Short-term
Action FCD167 — Z-02, D100-00-00-P011, City of Bellaire Master Drainage Concept Plan						
Hazards Mitigated: Flooding						
New and Existing	2, 10, 11, 12, 15	HCFCD	City of Bellaire	Low	2018 HCFCD BOND	Short-term
Action FCD168 — Z-02, D112-00-00-E001, Flood Risk Reduction Project						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	City of Houston	Low	2018 HCFCD BOND	Long-term
Action FCD169 — Z-02, D100-00-00-E016, Detention on City of Houston ROW at S Braewood and W 610 Loop						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	City of Houston	Low	2018 HCFCD BOND	Short-term
Action FCD170 — Z-02, U106-00-00-E004, Partnership Project with Spencer Road PUD						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	Spencer Road PUD	Low	2018 HCFCD BOND	Short-term
Action FCD171 — Z-02, P152-00-00-E002, Partnership with WCID 109 for Local Flood Damage Reduction						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	WCID 109	Low	2018 HCFCD BOND	Short-term
Action FCD172 — Z-02, W100-00-00-P011, St. George Place and Surrounding Area Feasibility Study						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	St. George Redevelopment Authority/TIRZ 1	Low	2018 HCFCD BOND	Short-term
Action FCD173 — Z-03, Z100-00-00-PLAN, Countywide Ongoing Planning						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Ongoing
Action FCD174 — Z-05, Z100-00-00-P029, Drainage Reuse Initiative Feasibility Study						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	HCED	Low	2018 HCFCD BOND	Short-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline
Action FCD175 — Z-05, Z100-00-00-Y106, Ecosystem Services Study						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	KPC, Rice SSPEED Center, Texas A&M Agrilife, Prairie View A&M, Simfero, Cibor, Walter P. Moore	Low	2018 HCFCD BOND	Short-term
Action FCD176 — Z-05, W100-00-00-Y002, Fluvial Geomorphic Assessment to Improve the Stability and Resiliency of Buffalo Bayou						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	Buffalo Bayou Partnership	Low	2018 HCFCD BOND	Short-term
Action FCD177 — CI-026, Z100-COH, Investigation of City of Houston Properties for Conversion to Stormwater Detention Basins						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	City of Houston	Low	2018 HCFCD BOND	Short-term
Action FCD178 — Z-04, U502-02-00-E007, John Paul Landing Central Cell Excavation						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	HCED	Low	2018 HCFCD BOND	Short-term
Action FCD179 — Z-Buyout, Z100-HMGP, Countywide Federal Grant Funded Volunteer Home Buyouts						
Hazards Mitigated: Flooding						
Existing	8, 10, 11, 15	HCFCD	TBD	Low	2018 HCFCD BOND, HMGP, PDM, FMA	Ongoing
Action FCD180 — Z-01, Z100-ROW, Countywide Floodplain Preservation and Right of Way Acquisition						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11, 15	HCFCD	TBD	Low	2018 HCFCD BOND, HMGP, PDM, FMA	Ongoing
Action FCD181 — Z-08, Z100-TUNNEL, Preliminary Engineering for Large Diameter Tunnels for Stormwater Conveyance						
Hazards Mitigated: Flooding						
New and Existing	3, 8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Short-term
Action FCD182 — F-88, Z500-CONV, ROW Acquisition, Design and Construction of Stormwater Detention Basins in Large Buyout Areas						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	2018 HCFCD BOND	Ongoing
Action FCD183 — Z-StormRep, Z-StormRep, Countywide Storm Repairs in Harris County						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	TBD	Low	2018 HCFCD BOND	Ongoing
Action FCD184 — The Greens Bayou Federal Flood Damage Reduction Project						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	USACE	HCFCD	Low	Congressional Appropriation	Short-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline
Action FCD185 — Implement the recommendations of the "HCFCD Adapting Infrastructure for Climate Change" presentation.						
Hazards Mitigated: Dam Failure, Drought, Flooding, Hurricane, Wildfire						
New and Existing	1, 3, 5, 8, 11	HCFCD	N/A	Low	Operations & Maintenance Budget	Ongoing
Action FCD186 — Develop and adopt master drainage plans in order for HCFCD to exercise the authority granted to districts under Chapter 49.211 of the Texas Water Code. Changes to Chapter 49.211, made via House Bill 919, require HCFCD review and approval of subdivision drainage plans						
Hazards Mitigated: Flooding						
New and Existing	2, 10, 11, 12, 15	HCFCD	N/A	Low	Operations & Maintenance Budget	Ongoing
Action FCD187 — Obtain generators for District facilities due to be able to work during and after an event						
Hazards Mitigated: Earthquake, Flooding, Landslide, Severe Weather, Hurricane, Tsunami, Wildfire						
Existing	11, 13	HCFCD	N/A	Low	Operations & Maintenance Budget	Short-term
Action FCD188 — Educating the employees on hazards including HCFCD evacuation plan and emergency plan and precautions that need to be taken for facilities.						
Hazards Mitigated: Earthquake, Flooding, Landslide, Severe Weather, Hurricane, Tsunami, Wildfire						
Existing	3, 10	HCFCD	N/A	Low	Operations & Maintenance Budget	Ongoing
Action FCD189 — Replace landscaping with drought resistant plants and trees around HCFCD facilities						
Hazards Mitigated: Drought						
Existing	7, 8, 11	HCFCD	N/A	Low	Operations & Maintenance Budget	Ongoing
Action FCD190 — Clear out dead brush and tree limbs around HCFCD facilities that could be a burn agent to wildfires						
Hazards Mitigated: Wildfire						
Existing	2, 7, 8, 10, 11	HCFCD	N/A	Low	Operations & Maintenance Budget	Ongoing
Action FCD191 — P500-03-00-E002 Basin Improvements, Phase 2						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	CIP Budget	Short-term
Action FCD192 — P500-08-00-E001 Basin Improvements, Phase 1						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	CIP Budget	Short-term
Action FCD193 — P545-01-00-E005 Kuykendahl Stormwater Detention Basin						
Hazards Mitigated: Flooding						
New and Existing	8, 10, 11	HCFCD	N/A	Low	CIP Budget	Short-term
Action FCD194 — Prepare a backup facility from which to conduct Flood Watch activities in the event of a Category 3 or higher hurricane, and train staff to access and utilize that facility						
Hazards Mitigated: Hurricane						
Existing	1, 13	HCFCD	N/A	Low	Operations & Maintenance Budget	Ongoing

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline
Action FCD195 — F-54, U100-00-00-E008 Upper Langham Frontier Program						
Hazards Mitigated: Flooding						
New	2, 10, 11, 12, 15	HCFCD	N/A	Low	2018 HCFCD Bond	Long-term
Action FCD196— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
***Hazards Mitigated*:** Hurricane, Severe Weather, Flooding, Earthquake, Dam Failure, Wildfire, Mass Movement, Drought, Tsunami						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	HCFCD	HCOHSEM	Low	General Funds	Ongoing
Action FCD197—Pursue the use of green stormwater infrastructure on buyout properties with the best management practices determined at the time of design.						
Hazards Mitigated: **Flooding**						
New and Existing	2, 5, 6, 7, 8, 10, 11	HCFCD	N/A	Low	Operations & Maintenance Budget	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 35-12. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
FCD1	3	High	High	Yes	Yes	No	Medium	High
FCD2	3	Low	Low	Yes	No	Yes	High	Low
FCD3	3	High	Medium	Yes	Yes	No	Medium	High
FCD4	3	Medium	Low	Yes	No	Yes	High	Low
FCD5	3	High	Low	Yes	Yes	Yes	High	High
FCD6	5	High	Low	Yes	Yes	Yes	High	High
FCD7	3	High	High	Yes	Yes	Yes	Medium	High
FCD8	3	High	High	Yes	Yes	Yes	Medium	High
FCD9	3	High	High	Yes	Yes	Yes	High	High
FCD10	3	High	High	Yes	Yes	Yes	Medium	High
FCD11	4	High	Low	Yes	Yes	Yes	Medium	High
FCD12	3	High	Low	Yes	Yes	Yes	High	High
FCD13	3	High	Low	Yes	Yes	Yes	Medium	High
FCD14	3	High	High	Yes	Yes	Yes	High	High
FCD15	3	High	Low	Yes	Yes	Yes	Medium	High
FCD16	3	High	High	Yes	Yes	Yes	High	High
FCD17	3	High	Low	Yes	Yes	Yes	Medium	High
FCD18	3	High	Low	Yes	No	Yes	High	Low
FCD19	3	High	Low	Yes	Yes	Yes	Medium	High
FCD20	4	High	Low	Yes	Yes	Yes	High	High
FCD21	4	High	Medium	Yes	Yes	Yes	High	High
FCD22	3	High	Low	Yes	Yes	Yes	High	High

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
FCD23	3	High	High	Yes	Yes	Yes	Medium	High
FCD24	4	Medium	Low	Yes	Yes	Yes	High	High
FCD25	3	High	High	Yes	Yes	Yes	High	High
FCD26	3	High	Low	Yes	Yes	Yes	High	High
FCD27	3	High	Low	Yes	Yes	Yes	High	High
FCD28	3	High	Low	Yes	No	Yes	High	Low
FCD29	3	High	Low	Yes	No	Yes	High	Low
FCD30	3	Medium	Low	Yes	Yes	Yes	High	High
FCD31	3	High	Low	Yes	Yes	Yes	High	High
FCD32	3	High	High	Yes	Yes	Yes	Medium	High
FCD33	3	High	Medium	Yes	Yes	Yes	High	High
FCD34	3	High	Low	Yes	Yes	Yes	Medium	High
FCD35	4	High	High	Yes	Yes	Yes	Medium	High
FCD36	4	High	Low	Yes	Yes	Yes	Medium	High
FCD37	3	High	Low	Yes	Yes	Yes	High	High
FCD38	3	High	Low	Yes	Yes	Yes	High	High
FCD39	4	Medium	Low	Yes	Yes	Yes	Medium	Medium
FCD40	3	High	Low	Yes	Yes	Yes	High	High
FCD41	3	High	Low	Yes	Yes	Yes	High	High
FCD42	3	High	Low	Yes	Yes	Yes	High	High
FCD43	3	High	Low	Yes	Yes	Yes	Medium	High
FCD44	4	High	Low	Yes	Yes	Yes	Medium	High
FCD45	4	High	Low	Yes	Yes	Yes	Medium	High
FCD46	3	High	Medium	Yes	Yes	Yes	Medium	High
FCD47	4	Medium	Low	Yes	Yes	Yes	High	High
FCD48	3	High	Low	Yes	Yes	Yes	Medium	High
FCD49	3	High	Low	Yes	Yes	Yes	Medium	High
FCD50	3	High	Low	Yes	Yes	Yes	Medium	High
FCD51	3	High	Low	Yes	Yes	Yes	Medium	High
FCD52	4	High	Low	Yes	Yes	Yes	Medium	High
FCD53	3	High	Low	Yes	Yes	Yes	Medium	High
FCD54	3	High	Low	Yes	Yes	Yes	Medium	High
FCD55	3	High	Low	Yes	Yes	Yes	Medium	High
FCD56	3	High	Low	Yes	Yes	Yes	Medium	High
FCD57	3	High	Low	Yes	Yes	Yes	High	High
FCD58	3	High	Low	Yes	No	Yes	Medium	Low
FCD59	3	High	Low	Yes	Yes	Yes	High	High
FCD60	4	High	Low	Yes	Yes	Yes	High	High
FCD61	3	High	Low	Yes	Yes	Yes	High	High
FCD62	3	High	Low	Yes	Yes	Yes	Medium	High
FCD63	3	High	Medium	Yes	Yes	Yes	High	High
FCD64	3	High	Low	Yes	Yes	Yes	Medium	High
FCD65	3	High	Low	Yes	Yes	Yes	High	High

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
FCD66	3	High	High	Yes	No	Yes	High	Low
FCD67	3	High	Low	Yes	No	Yes	High	Low
FCD68	4	Medium	Low	Yes	Yes	Yes	Medium	Medium
FCD69	3	High	Low	Yes	Yes	Yes	High	High
FCD70	4	High	Low	Yes	Yes	Yes	High	High
FCD71	4	Medium	Low	Yes	Yes	Yes	High	High
FCD72	3	High	Low	Yes	Yes	Yes	High	High
FCD73	3	High	Low	Yes	Yes	Yes	High	High
FCD74	3	High	Low	Yes	Yes	Yes	High	High
FCD75	4	Medium	Low	Yes	Yes	Yes	Medium	Medium
FCD76	3	High	Low	Yes	Yes	Yes	Medium	High
FCD77	4	Medium	Low	Yes	Yes	Yes	High	High
FCD78	3	High	Low	Yes	Yes	Yes	Medium	High
FCD79	3	High	Low	Yes	Yes	Yes	Medium	High
FCD80	3	High	Low	Yes	Yes	Yes	Medium	High
FCD81	4	Medium	Low	Yes	Yes	Yes	High	High
FCD82	3	High	Low	Yes	Yes	Yes	Medium	High
FCD83	4	High	Low	Yes	Yes	Yes	High	High
FCD84	3	High	High	Yes	No	Yes	High	Low
FCD85	3	High	Medium	Yes	Yes	Yes	High	High
FCD86	3	High	Low	Yes	Yes	Yes	Medium	High
FCD87	3	High	High	Yes	Yes	Yes	High	High
FCD88	4	High	High	Yes	Yes	Yes	Medium	High
FCD89	3	High	Low	Yes	Yes	Yes	High	High
FCD90	3	High	High	Yes	Yes	Yes	High	High
FCD91	3	High	High	Yes	Yes	Yes	High	High
FCD92	3	High	High	Yes	Yes	Yes	High	High
FCD93	3	High	High	Yes	Yes	Yes	Medium	High
FCD94	3	High	High	Yes	Yes	Yes	Medium	High
FCD95	3	High	High	Yes	Yes	Yes	Medium	High
FCD96	3	High	High	Yes	Yes	Yes	Medium	High
FCD97	3	High	High	Yes	Yes	Yes	Medium	High
FCD98	3	High	High	Yes	Yes	Yes	Medium	High
FCD99	3	High	High	Yes	Yes	Yes	High	High
FCD100	3	High	High	Yes	Yes	Yes	High	High
FCD101	3	High	Medium	Yes	Yes	Yes	Medium	High
FCD102	3	High	Low	Yes	No	Yes	High	Low
FCD103	4	High	Low	Yes	Yes	Yes	Medium	High
FCD104	4	Medium	Low	Yes	Yes	Yes	High	High
FCD105	3	High	Low	Yes	Yes	Yes	High	High
FCD106	3	High	Low	Yes	Yes	Yes	Medium	High
FCD107	4	Medium	Low	Yes	Yes	Yes	High	High
FCD108	5	High	Medium	Yes	Yes	Yes	Medium	High

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
FCD109	3	High	Low	Yes	Yes	Yes	High	High
FCD110	3	High	Low	Yes	Yes	Yes	Medium	High
FCD111	3	High	Low	Yes	Yes	Yes	Medium	High
FCD112	3	High	Low	Yes	Yes	Yes	Medium	High
FCD113	3	High	Low	Yes	Yes	Yes	High	High
FCD114	3	High	Low	Yes	Yes	Yes	High	High
FCD115	3	High	Low	Yes	Yes	Yes	High	High
FCD116	3	High	Low	Yes	Yes	Yes	High	High
FCD117	3	High	Low	Yes	Yes	Yes	Medium	High
FCD118	3	High	Low	Yes	Yes	Yes	Medium	High
FCD119	3	High	Low	Yes	Yes	Yes	Medium	High
FCD120	4	Medium	Low	Yes	Yes	Yes	High	High
FCD121	4	High	Low	Yes	Yes	Yes	High	High
FCD122	4	Medium	High	No	Yes	Yes	Medium	Medium
FCD123	4	Medium	Low	Yes	Yes	Yes	High	High
FCD124	4	High	Low	Yes	Yes	Yes	Medium	High
FCD125	3	High	High	Yes	Yes	Yes	High	High
FCD126	4	High	Low	Yes	No	Yes	Medium	Low
FCD127	3	High	High	Yes	Yes	Yes	High	High
FCD128	4	Medium	Medium	Yes	Yes	Yes	High	High
FCD129	4	High	Low	Yes	Yes	Yes	Medium	High
FCD130	4	High	Low	Yes	Yes	Yes	Medium	High
FCD131	4	High	Low	Yes	Yes	Yes	Medium	High
FCD132	3	High	Medium	Yes	Yes	Yes	High	High
FCD133	4	High	Low	Yes	Yes	Yes	Medium	High
FCD134	4	High	Low	Yes	Yes	Yes	Medium	High
FCD135	3	High	High	Yes	Yes	Yes	Medium	High
FCD136	4	High	Low	Yes	Yes	Yes	Medium	High
FCD137	4	High	Low	Yes	Yes	Yes	Medium	High
FCD138	4	High	Low	Yes	Yes	Yes	Medium	High
FCD139	3	High	Medium	Yes	Yes	Yes	High	High
FCD140	3	High	High	Yes	Yes	Yes	Medium	High
FCD141	3	High	High	Yes	Yes	Yes	High	High
FCD142	3	High	Low	Yes	Yes	Yes	Medium	High
FCD143	4	Medium	Low	Yes	Yes	Yes	High	High
FCD144	4	High	Low	Yes	Yes	Yes	High	High
FCD145	4	High	Medium	Yes	Yes	Yes	Medium	High
FCD146	3	High	Low	Yes	Yes	Yes	Medium	High
FCD147	4	High	Low	Yes	Yes	Yes	High	High
FCD148	3	High	Low	Yes	No	Yes	High	Low
FCD149	4	High	Medium	Yes	Yes	Yes	High	High
FCD150	4	High	Low	Yes	Yes	Yes	High	High
FCD151	4	High	Medium	Yes	Yes	Yes	Medium	High

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
FCD152	3	High	High	Yes	Yes	Yes	Medium	High
FCD153	3	High	Low	Yes	Yes	Yes	Medium	High
FCD154	3	High	Medium	Yes	Yes	Yes	Medium	High
FCD155	3	High	High	Yes	Yes	Yes	Medium	High
FCD156	3	High	High	Yes	Yes	Yes	High	High
FCD157	4	High	Medium	Yes	Yes	Yes	High	High
FCD158	3	High	High	Yes	Yes	Yes	High	High
FCD159	3	High	High	Yes	No	Yes	High	Low
FCD160	3	High	Low	Yes	Yes	Yes	Medium	High
FCD161	4	High	Low	Yes	Yes	Yes	High	High
FCD162	4	High	Low	Yes	Yes	Yes	High	High
FCD163	3	High	Low	Yes	Yes	Yes	High	High
FCD164	3	High	Low	Yes	Yes	Yes	High	High
FCD165	2	High	Low	Yes	Yes	Yes	High	High
FCD166	4	Medium	Low	Yes	Yes	Yes	High	High
FCD167	5	Medium	Low	Yes	Yes	Yes	High	High
FCD168	3	High	Low	Yes	Yes	Yes	Medium	High
FCD169	3	High	Low	Yes	Yes	Yes	High	High
FCD170	3	High	Low	Yes	Yes	Yes	High	High
FCD171	3	High	Low	Yes	Yes	Yes	High	High
FCD172	3	Medium	Low	Yes	Yes	Yes	High	High
FCD173	4	Medium	Low	Yes	Yes	Yes	High	High
FCD174	3	Low	Low	Yes	Yes	Yes	High	High
FCD175	3	Low	Low	Yes	Yes	Yes	High	High
FCD176	3	Medium	Low	Yes	Yes	Yes	High	High
FCD177	4	Medium	Low	Yes	Yes	Yes	High	High
FCD178	3	High	Low	Yes	Yes	Yes	High	High
FCD179	4	High	Low	Yes	Yes	Yes	High	High
FCD180	4	High	Low	Yes	Yes	Yes	High	High
FCD181	4	Medium	Low	Yes	Yes	Yes	High	High
FCD182	3	High	Low	Yes	Yes	Yes	High	High
FCD183	3	High	Low	Yes	Yes	Yes	High	High
FCD184	3	High	Low	Yes	No	Yes	High	Low
FCD185	5	Medium	Low	Yes	Yes	Yes	High	High
FCD186	5	Medium	Low	Yes	Yes	Yes	High	High
FCD187	2	Medium	Low	Yes	Yes	Yes	High	High
FCD188	2	High	Low	Yes	No	Yes	High	Low
FCD189	3	Medium	Low	Yes	No	Yes	High	Low
FCD190	5	High	Low	Yes	Yes	Yes	High	High
FCD191	3	High	Low	Yes	Yes	Yes	High	High
FCD192	3	High	Low	Yes	Yes	Yes	High	High
FCD193	3	High	Low	Yes	Yes	Yes	High	High
FCD194	2	High	Low	Yes	No	Yes	High	Low

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
FCD195	5	High	Low	Yes	Yes	Yes	Medium	High
FCD196	8	Medium	Low	Yes	Yes	Yes	High	High
FCD197	7	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 35-13. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Hurricane	FCD196	FCD194	FCD196		FCD187, FCD194, 196		FCD185	FCD2, 3, 188, FCD194, 196
Severe Weather	FCD196		FCD196		FCD187, 196			FCD2, 3, 188, 196
Flooding	FCD21, 70, 108, 121, 144, 162, 166, 167, 180, 195, 196	FCD1, 21, 70, 121, 144, 162, 180	FCD166, 196	FCD5, 6, 17, 18, 21, 27, 28, 33, 40, 41, 42, 57, 59, 61, 63, 68, 69, 70, 72, 73, 75, 89, 121, 132, 139, 144, 162, 175, 176, 180, 183, 195	FCD165, 187, 196	FCD6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 19, 22, 23, 25, 26, 29, 32, 34, 35, 36, 37, 38, 40, 43, 44, 45, 46, 48, 49, 50, 51, 52, 53, 54, 55, 56, 58, 62, 64, 65, 66, 67, 74, 76, 78, 79, 80, 82, 84, 85, 86, 87, 88, 90, 91, 92, 93, 94, 95, 96, 94, 98, 99, 100, 101, 102, 103, 105, 106, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 122, 124, 125, 126, 127, 129, 130, 131, 133, 134, 135, 136, 137, 138, 140, 141, 142, 145, 146, 148, 150, 151, 152, 153, 154, 155, 156, 158, 159, 160, 163, 164, 168, 169, 170, 171, 178, 182, 184, 191, 192, 193, 195	FCD174, 185	FCD2, 3, 4, 11, 20, 24, 30, 31, 34, 35, 36, 39, 43, 44, 45, 47, 53, 60, 71, 77, 81, 83, 88, 103, 104, 107, 120, 123, 124, 126, 128, 129, 130, 131, 133, 134, 136, 137, 138, 143, 145, 147, 149, 150, 151, 157, 161, 172, 173, 174, 175, 176, 177, 181, 186, 188, 196
Low-Risk Hazards								
Earthquake	FCD196		FCD196		FCD187, 196			FCD2, 3, 188, 196
Dam Failure	FCD196		FCD196		FCD196		FCD185	FCD2, 3, 196
Wildfire	FCD196		FCD196	FCD190	FCD187, 196		FCD185	FCD2, 3, 188, 196
Mass Movement	FCD196		FCD196		FCD187, 196			FCD2, 3, 188, 196
Drought	FCD196		FCD196	FCD189	FCD196		FCD185	FCD2, 3, 196
Tsunami	FCD196		FCD196		FCD187, 196			FCD2, 3, 188, 196

a. See the introduction to this volume for explanation of mitigation types.

35.10 REVIEW AND INCORPORATION OF RESOURCES FOR THIS ANNEX

35.10.1 Existing Reports, Plans, Regulatory Tools and Other Resources

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- **Harris County Flood Control District Hazard Mitigation Plan (2014) —** This plan was reviewed to identify action items from the plan, and to help identify areas of existing integration with relevant planning mechanisms.
- **Flood Operations & Hurricane Response Plan —** This plan was reviewed to provide information for the Planning and Regulatory Capabilities section of this annex and to help identify areas of existing integration with relevant planning mechanisms.
- **Harris County Flood Control District Policy, Criteria & Procedure Manual —** This manual was reviewed to provide information for the Planning and Regulatory Capabilities section of this annex.
- **Harris County Flood Control District Hydrology and Hydraulics Guidance Manual —** This manual was reviewed to provide information for the Planning and Regulatory Capabilities section of this annex.
- **Harris County Flood Control District Land Surveying Guidelines —** These guidelines were reviewed to provide information for the Planning and Regulatory Capabilities section of this annex.
- **Design Guidelines for HCFCD Wet Bottom Detention Basins with Water Quality Features —** These guidelines were reviewed to provide information for the Planning and Regulatory Capabilities section of this annex.
- **Design Manual for Articulating Concrete Block Systems —** This manual was reviewed to provide information for the Planning and Regulatory Capabilities section of this annex.
- **Harris County Low Impact Development & Green Infrastructure Design Criteria for Storm Water Management Manual —** This manual was reviewed to provide information for the Planning and Regulatory Capabilities section of this annex.
- **Ordinary High Water Mark Delineation Manual —** This manual was reviewed to provide information for the Planning and Regulatory Capabilities section of this annex.
- **Detention Basin Pump Operation & Maintenance Manual —** This manual was reviewed to provide information for the Planning and Regulatory Capabilities section of this annex.
- **Little Cypress Creek Interim Guidelines —** These guidelines were reviewed to provide information for the Planning and Regulatory Capabilities section of this annex.
- **Little Cypress Creek Master Drainage Plan —** This plan was reviewed to identify action items from the plan, and to help identify areas of existing integration with relevant planning mechanisms.
- **Cypress Creek Overflow Management Plan —** This plan was reviewed to provide information for the Planning and Regulatory Capabilities section of this annex and to help identify areas of existing integration with relevant planning mechanisms.
- **Supplemental Guidelines and Criteria for Developing in the Addicks Reservoir Watershed, Barker Reservoir Watershed, and the Cypress Creek Watershed Upstream of US 290 —** These guidelines were reviewed to provide information for the Planning and Regulatory Capabilities section of this annex and to help identify areas of existing integration with relevant planning mechanisms.
- **Upper Langham Creek Development Guidelines —** These guidelines were reviewed to provide information for the Planning and Regulatory Capabilities section of this annex and to help identify areas of existing integration with relevant planning mechanisms.

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.
- **Integrated Management Application —** This is an application used by the District to track project information, including status updates and financial information. This was used to help report on the status of previously identified actions.
- **HCFCD.org —** The District's main website has many pages describing District projects, plans, studies, and programs.

- **Immediate Flood Reports —** The District's reports summarizing impacts after flooding events were used to inform the Jurisdiction-Specific Natural Hazard Event History.

35.10.2 Staff and Local Stakeholder Involvement in Annex Development

This annex was developed over the course of several months with input from many district divisions and departments including Financial Services, the Communications Department, the Engineering Division, and the Planning Division. These divisions and departments were asked to contribute to the annex development through reviewing and contributing to the capability assessment, reporting on the status of previously identified actions, and participating in action identification and prioritization.

36. HARRIS COUNTY EMERGENCY SERVICE DISTRICT NO. 12

36.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
James Novick, Battalion Chief
911 Hollywood Street
Houston, Texas 77015
Telephone:713-453-1811
e-mail Address: jnovick@cloverleaf-fire.org

Alternate Point of Contact
Edward M. Russell, Fire Chief/Business Administrator
911 Hollywood Street
Houston, Texas 77015
Telephone: 713-453-1811
e-mail Address: emrussell@cloverleaf-fire.org

36.2 JURISDICTION PROFILE

36.2.1 Overview

The Harris County Emergency Service District No. 12 Fire Department (HCESD12) provides fire prevention, suppression, and emergency medical response for basic life support services to an unincorporated area located on the east side of Harris County. HCESD12 was formed on December 12, 2001 as a rural fire protection district; however, on March 3, 2014 the organization transitioned to an Emergency Service District based on the consolidation of laws and regulations governing special districts. The laws that govern the political subdivision of HCESD12 is the Texas Health and Safety Code, Chapter 775, 2011. The department has a career staff that maintains a minimum staffing level of 9 fire firefighters on duty 24 hours-a-day; a total staff of 38 personnel. A five-member elected Board of Commissioners governs the district. Funding for HCESD12 is accomplished by the collection of property tax and sales tax generated within its boundaries.

The Emergency Service District Board of Commissioners assumes responsibility for the adoption of this plan; the Fire Chief will oversee its implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 36-1.

Table 36-1. Local Mitigation Planning Team Members

Name	Title
Edward M. Russell	Fire Chief/Business Administrator
James Novick	Battalion Chief

The District participates in the Public Protection Class Rating System and currently has a rating of 4.

36.2.2 Service Area and Trends

The district service area covers 9.9 square miles, serving a population of 55,000 residents. The Harris County Emergency Service District No. 12 Fire Department was formed to provide fire protection to the residents of the unincorporated area of east Harris County known as Cloverleaf. The response district consists

of commercial, educational, industrial, marine, multi-family dwellings, residential dwellings, office buildings warehousing occupancies, and chemical plants. In addition, the district contains sections of Interstate 10, the Sam Houston Toll Road-Beltway 8, and several railroads. The district extends south to the Houston Ship Channel, north to Crosby Freeway-Highway 90, east to Beltway 8, and west to Greens Bayou; included in the district are the Northshore, Pine Trails, Newforest, Woodforest and Cloverleaf additions. The Cloverleaf and Woodforest additions are densely populated. The economic growth of the area still trends upwards yearly even though the unemployment rate in the district is 8 percent.

In 2018, HCESD12 became a first responder organization licensed by the Texas Department of State Health Services; working in cooperation with the licensed medical provider North Channel Emergency Medical Service. As the transition continues, HCESD12 is expected to experience an increase of medical responses to assist the public; our rescue/medical responses has increase 52 percent since the emergency medical service operations started. As of 2019, the department has had a 48 percent increase of call volume since 2013 and the projected annual percentage increase is around 10.5 percent yearly.

36.2.3 Assets

Table 36-2 summarizes the critical assets of the district and their value.

Table 36-2. Special Purpose District Assets

Asset	Value
Property	
3 acres of land	$216,775
Equipment	
Fire Apparatus	$4,920,290
Response Equipment	$953,576
Total:	***$5,873,866***
Critical Facilities and Infrastructure	
Station 1 — 911 Hollywood Street, Houston, TX 77015	$2,301,163
Station 2 — 14222 Wallisville Road, Houston, TX 77049	$1,986,757
Communication Center	$1,200,000
Total:	***$5,487,920***

36.3 CAPABILITY ASSESSMENT

An assessment of the district's current capabilities was conducted to identify opportunities to expand, initiate or integrate capabilities in order to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table in Section 29.9 identifies these as community capacity building mitigation actions.

36.3.1 Planning and Regulatory Capabilities

Jurisdictions develop plans and programs and implement rules and regulations to protect and serve residents. When effectively prepared and administered, these plans, programs and regulations can support the implementation of mitigation actions. Table 36-3 summarizes existing codes, ordinances, policies, programs or plans that are applicable to this hazard mitigation plan.

Table 36-3. Planning and Regulatory Capability

Plan, Study or Program	Date of Most Recent Update	Comment
Harris County Fire Code	2012	Adopted in December 2014 to be effective on March 1, 2015.
Texas Commission of Fire Protection	2009	Texas Government Code Chapter 419
HCESD No. 12 Employee Handbook	2018	
Harris County Emergency Response Plan	2015	

36.3.2 Fiscal, Administrative and Technical Capabilities

Fiscal capability is an indicator of a jurisdiction's ability to fulfill the financial needs associated with hazard mitigation projects. An assessment of fiscal capabilities is presented in Table 36-4. Administrative and technical capabilities represent a jurisdiction's staffing resources for carrying out the mitigation strategy. An assessment of administrative and technical capabilities is presented in Table 36-5.

Table 36-4. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	No
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	No
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	No
Federal Grant Programs	Yes

Table 36-5. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/ Position
Planners or engineers with knowledge of land development and land management practices	Yes	Harris County
Engineers or professionals trained in building or infrastructure construction practices	Yes	Harris County
Planners or engineers with an understanding of natural hazards	Yes	Harris County
Staff with training in benefit/cost analysis	Yes	Fire Administration
Surveyors	No	
Personnel skilled or trained in GIS applications	Yes	IT
Scientist familiar with natural hazards in local area	No	
Emergency manager	Yes	Fire Administration
Grant writers	Yes	Fire Administration

36.3.3 Education and Outreach Capabilities

Outreach and education capability identifies the connection between government and community members, which opens a dialogue needed for a more resilient community. An assessment of education and outreach capabilities is presented in Table 36-6.

Table 36-6. Education and Outreach

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • **If yes, please briefly describe**	No
Do you use social media for hazard mitigation education and outreach? • **If yes, please briefly describe**	No
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • **If yes, please briefly specify**	No
Do you have any other programs already in place that could be used to communicate hazard-related information? • **If yes, please briefly describe**	No
Do you have any established warning systems for hazard events? • **If yes, please briefly describe**	No Industrial Emergency Notification, Harris Co. Emergency Alerting

36.3.4 Adaptive Capacity for Climate Change

Given the uncertainties associated with how hazard risk may change with a changing climate, a jurisdiction's ability to track such changes and adapt as needed is an important component of the mitigation strategy. Table 36-7 summarizes the jurisdiction's adaptive capacity for climate change.

Table 36-7. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:*** *Related to hurricanes and the result of flooding hazards*	High
Jurisdiction-level monitoring of climate change impacts ***Comment:***	Medium
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:*** *No regulatory ability to affect carbon emissions.*	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:*** *Handled by the county and not the district.*	Low
Participation in regional groups addressing climate risks ***Comment:***	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:*** *No authority*	Low
Identified strategies for greenhouse gas mitigation efforts ***Comment:*** *No authority*	Low
Identified strategies for adaptation to impacts ***Comment:*** *Changes in response due to hazard impacts.*	Medium
Champions for climate action in local government departments ***Comment:*** *Non-existent for response agency*	Low

Criterion	Jurisdiction Rating[a]
Political support for implementing climate change adaptation strategies ***Comment:***	Low
Financial resources devoted to climate change adaptation ***Comment:*** *Impacts pertain to response*	Low
Local authority over sectors likely to be negative impacted ***Comment:*** *No authority*	Low
Public Capacity	
Local residents knowledge of and understanding of climate risk ***Comment:***	Low
Local residents support of adaptation efforts ***Comment:***	Low
Local residents' capacity to adapt to climate impacts ***Comment:***	Low
Local economy current capacity to adapt to climate impacts ***Comment:***	Low
Local ecosystems capacity to adapt to climate impacts ***Comment:***	Low

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

36.4 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

36.4.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- **Capital Improvement Plan —** Provides the plan for capital improvements. Within the plan, projects can be identified to assist in hazard mitigation. The hazard mitigation plan can provide funding support for proposed projects based on a risk assessment.

36.4.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- **Capital Improvement Projects —** Capital improvement project proposals may take into consideration hazard mitigation potential as a means of evaluation project prioritization.
- **Emergency Operations Plan** — The District does not have an Emergency Operations Plan and intends to develop one as a mitigation planning action during the next five years.
- **Continuity of Operations Plan** — The District does not have a Continuity of Operations Plan and intends to develop one as a mitigation planning action during the next five years.

36.5 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 36-8 lists past occurrences of natural hazards for which specific damage was recorded in HCESD12. Other hazard events that broadly affected the entire planning area, including HCESD12, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 36-8. Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Hurricane Harvey	4332 DR	2017	240,000
Hurricane Ike	1791 DR	2008	NA
Hurricane Rita	1606 DR	2005	NA
Hurricane Katrina Evac.	3216 EM	2005	NA
Hail	NA	2005	NA
Tropical Storm Allison	1379 DR	2001	NA
Flood/River Fire	NA	1994	NA
Severe Weather	970 DR	1992	NA
Hurricane Alicia	689 DR	1983	NA

36.6 HAZARD RISK RANKING

Table 36-9 presents a local ranking for HCESD12 of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 36-9. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Severe Weather	48	High
2	Hurricane	32	High
3	Flooding	28	Medium
4	Earthquake	14	Low
5	Drought	6	Low
5	Wildfire	6	Low
6	Dam Failure	0 (No exposure)	None
6	Mass Movement	0 (No Exposure)	None
6	Tsunami	0 (No Exposure)	None
6	Coastal Erosion	0 (No Exposure)	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

36.7 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. The following jurisdiction-specific issues have been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- Station fourteen's district frequently loses power due to a lack of tree maintenance; this excludes the fire station due to the department owned stand-by generator.

- One of the District's two fire stations is located in a very high flood risk area.
- Several neighborhoods in Station twenty-four's district has the potential to have ingress and egress cut off as the result flooding.

Mitigation actions addressing these issues were prioritized for consideration in the action plan presented in this annex.

36.8 STATUS OF PREVIOUS PLAN ACTIONS

The Harris County Emergency Service District No. 12 Fire Department has not previously completed any hazard mitigation planning effort.

36.9 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 36-10 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 36-11 identifies the priority for each action. Table 36-12 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 36-10. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action ESD1 — Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Flooding						
Existing	3, 4, 8, 10, 11, 13, 15	HCESD12	TBD	High	HMGP, PDM, FMA	Long-term
Action ESD2 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Earthquake, Drought, Wildfire						
New and Existing	1, 5, 8	HCESD12	TBD	Low	Staff Time, General Funds	Short-term
Action ESD3 — Integrate the hazard mitigation plan into other plans, ordinances and programs within the community.						
Hazards Mitigated: Earthquake, flooding, hurricane, severe weather, wildfire						
Existing	1, 3, 6, 9	HCESD12	NA	Low	Staff Time, General Funds	Ongoing
Action ESD4 — Participate in annual multi-agency training.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Earthquake, Drought, Wildfire,						
New and Existing	3, 4	HCESD12	HCESD50, HCESD60	Low	Staff Time, General Funds	Short-term
Action ESD5 — Control low hanging, un-kept tree debris from making contact with electrical power sources.						
Hazards Mitigated: Severe Weather						
New and Existing	8, 10, 11	HCESD12	Harris County Precinct 2 & 3	Low	General Funds	Short-term
Action ESD6 — Utilize multiple avenues, including organization website, social media, and public education campaigns to disseminate natural hazard information and methods to prepare for and mitigate those risks.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Earthquake, Drought, Wildfire,						
New and Existing	3, 4, 10	HCESD12	TBD	Low	Staff Time, General Funds	Ongoing

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action ESD7 — Participate in the development of further interoperability between multiple organizations to improve emergency communications; upgrade mobile and portable radio units to new and current capabilities.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Earthquake, Drought, Wildfire, All Hazards						
New and Existing	1, 3, 4, 9, 11, 15	ECOM	HCESD12, HCESD50, HCESD60, HCESD6, HCESD4, HCESD5, HCESD14	High	Assistance to Firefighters Grant Program	Short-term
Action ESD8 — Evaluate, analyze, and improve drainage of Big Gulch, a Greens Bayou tributary, to assist in minimizing flooding in station 24's district.						
Hazards Mitigated: Hurricane, Flooding, Severe Weather						
New and Existing	3, 4, 6, 8, 11	Harris County Flood Control District	HCESD12	High	HMGP, PDM, FMA	Long-term
Action ESD9 — Improve, expand, and develop new equipment, techniques, and abilities to respond to high water emergencies.						
Hazards Mitigated: Hurricane, Flooding, Severe Weather						
New and Existing	4, 11	HCESD12	NA	Medium	Staff Time, General Funds	Short-term
Action ESD10 — Develop, implement, and evaluate an Emergency Operations and Continuity of Operations plan.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Earthquake, Drought, Wildfire, All Hazards						
New and Existing	9, 11, 13	HCESD12	TBD	Low	Staff Time, General Funds; HMGP, PDM, FMA	Short-term
Action ESD11— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Earthquake, Drought, Wildfire						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	HCESD12	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 36-11. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
ESD1	7	High	High	Yes	Yes	No	Medium	High
ESD2	3	Low	Low	Yes	No	Yes	High	Low
ESD3	4	High	Medium	Yes	Yes	No	Medium	High
ESD4	2	High	Medium	Yes	Yes	Yes	Medium	Low
ESD5	3	High	Low	Yes	No	Yes	Medium	Low
ESD6	3	Low	Low	Yes	No	Yes	Low	Low
ESD7	6	High	High	Yes	Yes	No	High	High
ESD8	5	High	High	Yes	Yes	No	High	High
ESD9	2	High	Medium	Yes	Yes	Yes	High	Low
ESD10	3	Medium	Low	Yes	Yes	Yes	Medium	Medium
ESD11	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 36-12. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Severe Weather	ESD5, 11	ESD5, 8	ESD6, 11		ESD 4, 7, 9, 10, 11	ESD1, 3		ESD1, 7, 11
Hurricane	ESD5, 11	ESD5, 8	ESD6, 11		ESD4, 7, 9, 10, 11	ESD1, 3		ESD1, 7, 8, 11
Medium-Risk Hazards								
Flooding	ESD8, 11	ESD8	ESD6, 11	ESD8	ESD4, 7, 9, 10, 11	ESD1, 3		ESD1, 7, 8, 11
Low-Risk Hazards								
Earthquake	ESD11		ESD6, 11		ESD7, 10, 11			ESD11
Drought	ESD11		ESD6, 11		ESD7, 10, 11			ESD11
Wildfire	ESD11	ESD5	ESD6, 11		ESD7, 10, 11			ESD11

a. See the introduction to this volume for explanation of mitigation types.

36.10 REVIEW AND INCORPORATION OF RESOURCES FOR THIS ANNEX

36.10.1 Existing Reports, Plans, Regulatory Tools and Other Resources

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- **Fire Inventory (PSTrax) —** Utilized to determine capabilities of response.
- **Fire Data (Firehouse) —** Used in the determination of previous incidents.

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.
- **Safe-D ESD Handbook** — Gathered information pertaining to the administration and operations of an emergency service district.

36.10.2 Staff and Local Stakeholder Involvement in Annex Development

This annex was developed over the course of several months with a review of material from different areas of tasks including operations, budgeting, and the planning sectors. Information was gathered to contribute to the development of the annex, material was reviewed, and collaborated to use the most vital details for the annex. Discussions were held to identify the capability assessment, planning initiatives, hazard assessment and ranking, and future action plans. Once actions had been identified and complied in the annex, the draft was circulated for review, comments, and adjustments.

37. HARRIS HEALTH SYSTEM

37.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Ray W. Higgins, Director of Emergency Management
9240 Kirby
Houston, TX 77054
Telephone: (713) 634-1470
e-mail Address: Ray.Higgins@harrishealth.org

Alternate Point of Contact
David Attard, Associate Administrator, Healthcare Systems Engineering
9240 Kirby
Houston, TX 77054
Telephone: (713) 634-1451
e-mail Address: David.Attard@harrishealth.org

37.2 JURISDICTION PROFILE

37.2.1 Overview

The Harris Health System, previously the Harris County Hospital District, is a governmental entity with taxing authority that owns and operates three hospitals, 18 community health centers, three large multi-specialty clinics, five same-day clinics, five school-based clinics, one free-standing dental center, one dialysis center, one geriatric center, and 10 homeless shelter clinics — including five homeless eligibility service locations, mobile immunization and a medical outreach program throughout Harris County, Texas. The system administrative offices are located in Houston.

The Harris County Hospital District was created by voter referendum in November 1965 and was formally designated as a political subdivision with taxing authority on January 1, 1966. A hospital district is a governmental entity in Texas, established pursuant to the Texas Constitution or the general statutes of Texas, and its purpose is to provide medical care to the needy residents of a particular county.

The system's two main hospitals serve approximately one million under-insured and uninsured people, nearly a quarter of the entire population of Harris County, the third most-populous county in the United States. Harris County includes Houston, the fourth largest city in the United States.

- Ben Taub Hospital is a Level 1 trauma center with 444 licensed beds. It is located in the Texas Medical Center, the largest medical complex in the world, and is staffed by Harris Health employees, faculty, residents, and students of Baylor College of Medicine.
- Lyndon B. Johnson Hospital is a 207-bed general hospital with a Level 3 trauma center located northeast of downtown Houston. It is staffed by Harris Health employees, faculty, residents, and students of the University of Texas Health Science Center at Houston and the University of Texas M. D. Anderson Cancer Center.
- Quentin Mease Hospital ceased inpatient activities on February 28, 2019 and will be reconfigured to be an outpatient facility.

In January 2012, board members of Harris County Hospital District approved name rebranding to "Harris Health System." The rebranding became effective on September 6, 2012.

The Harris Health System Board of Trusties assumes responsibility for the adoption of this plan; the Chief Executive Officer (CEO) will oversee its implementation. Development of this annex was carried out by the members of the Harris Health System Mitigation Planning Team, whose members are listed in Table 37-1.

Table 37-1. Local Mitigation Planning Team Members

Name	Title
Ray W. Higgins	Director of Emergency Management
David Attard	Associate Administrator, Healthcare Systems Engineering
Aaron Velasquez	Emergency Management Specialist (LBJ)
Jason Kunnacherry	VP, Operations (Ben Taub)
Christopher Okezie	VP, Operations (System)
Benny Stansbury	Director Facilities Management (Ben Taub)
Jake Goldstein	Administrative Director, Ancillary Services (ACS)
Jose A. Lara	Operations Manager Engineering (ACS)
Justin Adams	Emergency Management Specialist (Ben Taub)

37.2.2 Service Area and Trends

Harris Health System serves Harris County residents. Harris County area covers 1,777 square miles. According to the Census Bureau, the 2018 Harris County population was 4.7 million.

- **Ben Taub Hospital —** Ben Taub Hospital is planning on expanding surgical capacity by 18% in the upcoming calendar year through the opening of 7 additional operating rooms in the hospital. This will allow the facility to become more in-line with community standard wait times for urgent and elective cases. In early 2019, Harris Health will complete the transition from four-bed rooms to semi-private rooms. While this reduces the overall bed count in the facility, it provides for an improved care environment not only for patients, but also for providers. At the same time, performance improvement initiatives are being put in place to reduce length of stay, time from admission decision to arrival in the nursing unit, and turnaround times from patient discharge to the room being ready for the next patient. From a specialty clinic perspective, Harris Health is working on provider efficiencies by considering potential mid-level providers to assist physicians in throughput and appointment availability. Lastly, as the psychiatric needs in Harris County continue to rise, Harris Health is working with other entities to improve access and venues for patients to seek treatment.
- **Quentin Mease —** Quentin Mease Hospital ceased inpatient activities on February 28, 2019 and will be reconfigured to be an outpatient facility. While the need for rehab and skilled nursing facilities continues and will be managed through outsourcing, the existing facility is no longer able to support based on aging infrastructure and changes in code requirements. A master plan is in the works to consolidate to other Harris Health outpatient facilities (Thomas Street Health Center and Riverside Dialysis) into a renovated footprint at Quentin Mease.
- **Lyndon B. Johnson Hospital —** Lyndon B. Johnson Hospital is planning on expanding its ICU bed capacity by adding a new surgical intensive care unit with 8 beds. Current ICU bed capacity at LBJ Hospital is 16 beds, and this will increase the number of ICU beds by 50%. LBJ is also currently analyzing the population's needs and growth. Future trends show growth for the need of services in the service area related to an Oncology Radiation Center, Higher Trauma level designation, and inpatient services. LBJ is currently planning on expanding Oncology by planning to build a new facility on campus specifically for oncology radiation treatment. Trends show a population growth in the area around LBJ.

LBJ is in a medically underserved area. There will be a need for an additional 150-bed tower on campus to serve the growing population. Also, there will be a push to have a Level 2 trauma center with helipad to accommodate the growth of the city and its need.

- **Ambulatory Community Services —** Harris Health will continue to operate a range of clinics throughout Harris County. Potential future expansions include managing more care for inmates and collaborating with Harris County on the Riverside Mental Health Center proposed expansion. Service trends will likely include more partnerships with community facilities, like food banks, exercise programs and parks, and community clinics, as well as an increased use of new technology such as telemedicine remote consults and at home patient monitoring and diagnostic tools.

37.2.3 Assets

Table 37-2 summarizes the critical assets of the district and their estimated values.

Table 37-2. Special Purpose District Assets

Asset	Value
PROPERTY	
141.757 acres of land	$49,614,950
Equipment	
Ben Taub Hospital	$122,111,233
Quentin Mease	$2,075,463
Lyndon B. Johnson Hospital	$ 93,999,366
Ambulatory Community Services Equipment (45 locations)	$234,637,672
Total:	***$452,823,734***
Critical Facilities and Infrastructure	
HOSPITALS	
• Ben Taub Hospital, NPC, Tower, & Garage – 1504 Taub Loop	$479,773,550
• Lyndon B. Johnson Hospital, OC, & Garage – 5656 Kelly Street	$239,100,742
PRIMARY CARE & SPECIALTY CARE CLINICS (Does not include rental properties)	
• Acres Home Health Center – 818 Ringold Street, Houston 77088	$9,412,000
• Aldine Health Center – 4755 Aldine Mail Route, Houston 77039	$6,233,900
• Baytown Health Center -1602 Garth Road, Baytown 77520	$6,580,650
• Casa de Amigos Health Center – 1615 North Main Street, Houston 77009	$5,451,300
• Danny Jackson Clinic – 5503 N. Fry Rd, Katy 77449	$5,662,700
• El Franco Lee Health Center – 8901 Boone Road, Houston 77099	$20,749,700
• Gulfgate Health Center – 7550 Office City Drive, Houston 77012	$8,587,000
• Martin Luther King Jr. Health Center – 3550 Swingle Road 77047	$23,471,100
• Northwest Health Center – 1100 West 34th Street, Houston 77018	$6,492,000
• Quentin Mease – 3601 North McGregor Way	$31,618,529
• Smith Clinic – 2525-A Holly Hall, Houston 77054	$91,619,800
• Vallbona Health Center – 6630 De Moss Drive, Houston 77074	$5,717,900
ELIGIBILITY CENTERS, ADMINISTRATIVE FACILITY	
• Lois J. Moore Eligibility Center – 8901-B Boone Rd, Houston 77099	$1,156,106
• Southeast Eligibility Center – 3550-A Swingle Rd, Houston 77047	$1,119,370
• Administration Building & Garage – 2525 Holly Hall, Houston 77054	$204,245,165
Total:	***$1,152,274,012***

37.3 CAPABILITY ASSESSMENT

An assessment of the district's current capabilities was conducted to identify opportunities to expand, initiate or integrate capabilities in order to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table in Section 37.9 identifies these as community capacity building mitigation actions.

37.3.1 Planning and Regulatory Capabilities

Jurisdictions develop plans and programs and implement rules and regulations to protect and serve residents. When effectively prepared and administered, these plans, programs and regulations can support the implementation of mitigation actions. Table 37-3 summarizes existing codes, ordinances, policies, programs or plans that are applicable to this hazard mitigation plan.

Table 37-3. Planning and Regulatory Capability

Plan, Study or Program	Date of Most Recent Update	Comment
Texas Department of State Health Services Licensing & Regulation	2017	General and special hospitals to be licensed by the Department of State Health Services.
City of Houston – Applicable Building, Fire, Health, Food, & Enforcement Codes	2012 & 2017	Building approval & enforcement of COH codes.
Harris County Regulations – Applicable Building, Fire, and Enforcement Codes	2012	Building approval & enforcement of Harris County codes.
Centers for Medicare & Medicaid Services (CMS) 42 CFR § 482	2017	Hospitals must meet standards established by the federal government in order to receive reimbursement from the federally funded programs (e.g., Medicare and/or Medicaid).
National Integrated Accreditation for Healthcare Organizations (NIAHO)	2018	Hospitals participating in the Medicare and Medicaid program are required to comply with current Conditions of Participation. Complying with NIAHO standards ensure healthcare programs are meeting or exceeding CMS standards of clinical readiness and patient safety.

37.3.2 Fiscal, Administrative and Technical Capabilities

Fiscal capability is an indicator of a jurisdiction's ability to fulfill the financial needs associated with hazard mitigation projects. An assessment of fiscal capabilities is presented in Table 37-4. Administrative and technical capabilities represent a jurisdiction's staffing resources for carrying out the mitigation strategy. An assessment of administrative and technical capabilities is presented in Table 37-5.

Table 37-4. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	No
User Fees for Water, Sewer, Gas or Electric Service	No
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	No
Incur Debt through Private Activity Bonds	No
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	No
Federal Grant Programs	Yes

Table 37-5. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Healthcare Systems Engineering Administration
Engineers or professionals trained in building or infrastructure construction practices	Yes	Healthcare Systems Engineering Administration Department & Hospital Facilities Management Directors
Planners or engineers with an understanding of natural hazards	Yes	Healthcare Systems Engineering Administration
Staff with training in benefit/cost analysis	Yes	Healthcare Systems Engineering Administration
Surveyors	No	
Personnel skilled or trained in GIS applications	No	
Scientist familiar with natural hazards in local area	No	
Emergency manager	Yes	Emergency Management Department
Grant writers	Yes	Harris County Hospital District Foundation Grant Writer & Researcher
Other	No	

37.3.3 Education and Outreach Capabilities

Outreach and education capability identifies the connection between government and community members, which opens a dialogue needed for a more resilient community. An assessment of education and outreach capabilities is presented in Table 37-6.

Table 37-6. Education and Outreach

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • **If yes, please briefly describe**	No
Do you use social media for hazard mitigation education and outreach? • **If yes, please briefly describe**	No
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • **If yes, please briefly specify**	No
Do you have any other programs already in place that could be used to communicate hazard-related information? • **If yes, please briefly describe**	Yes Mass Communication System (Internal); Twitter, Facebook
Do you have any established warning systems for hazard events? • **If yes, please briefly describe**	Yes Site based emergency communication / notification via text, e-mail, phone and overhead paging.

37.3.4 Adaptive Capacity for Climate Change

Given the uncertainties associated with how hazard risk may change with a changing climate, a jurisdiction's ability to track such changes and adapt as needed is an important component of the mitigation strategy. Table 37-7 summarizes the jurisdiction's adaptive capacity for climate change.

Table 37-7. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:***	Low
Jurisdiction-level monitoring of climate change impacts ***Comment:***	Low
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:***	Low
Participation in regional groups addressing climate risks ***Comment:***	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	Low
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	Low
Identified strategies for adaptation to impacts ***Comment:***	Low
Champions for climate action in local government departments ***Comment:***	Low
Political support for implementing climate change adaptation strategies ***Comment:***	Low
Financial resources devoted to climate change adaptation ***Comment:***	Low
Local authority over sectors likely to be negative impacted ***Comment:***	Low
Public Capacity	
Local residents knowledge of and understanding of climate risk ***Comment:***	Medium
Local residents support of adaptation efforts ***Comment:***	Medium
Local residents' capacity to adapt to climate impacts ***Comment:***	Medium
Local economy current capacity to adapt to climate impacts ***Comment:***	Medium
Local ecosystems capacity to adapt to climate impacts ***Comment:***	Medium

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

37.4 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

37.4.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- City of Houston Flood Mitigation required for new building projects and building plans for existing facilities. Critical Access facilities (Hospitals) have to meet even stricter mitigation requirements.

37.4.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- **Capital Improvement Program —** Capital improvement project proposals may take into consideration hazard mitigation potential as a means of evaluating project prioritization.

37.5 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 37-8 lists past occurrences of natural hazards for which specific damage was recorded in Harris Health System. Other hazard events that broadly affected the entire planning area, including Harris County, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 37-8. Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Texas Severe Storm & Flooding / Allison	DR-1379	6/09/2001	No damage records found
Hurricane Ike	DR-1791	9/12/2008	$950,270
Hurricane Harvey	DR-4332	08/24/17	$15,742,260

37.6 HAZARD RISK RANKING

Table 37-9 presents a local ranking for Harris Health System of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 37-9. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Severe Weather	48	High
1	Hurricane	48	High
2	Flooding	27	Medium
3	Earthquake	14	Low
4	Dam Failure	12	Low
5	Wildfire	9	Low
6	Drought	6	Low
7	Tsunami	0 (No exposure)	None
7	Mass Movement	0 (No exposure)	None
7	Coastal Erosion	0 (No exposure)	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

37.7 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. The following jurisdiction-specific issues have been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- Flooding
- Hurricane
- Severe Weather

Mitigation actions addressing these issues were prioritized for consideration in the action plan in this annex.

37.8 STATUS OF PREVIOUS PLAN ACTIONS

Table 37-10 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

Table 37-10. Status of Previous Plan Actions

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
2014HCOHHS001 — Install flood barrier systems, such as flood panels, gates and passive systems, to increase flood protection and minimize damage for critical care facilities			X	HH-019
Comment: *Ben Taub Central Plant is undergoing dry flood proofing to ensure compliance with floodplain regulations and is replacing existing generators located on ground level. Relocated inside Central Plant and behind flood proofing barrier to keep generators from flooding.*				
2014HCOHHS002 — Expand flood warning system(s), i.e. a mass notification system, to increase coverage to all the Hospital District's hospitals, clinics and support facilities.	X			
Comment: *Mass Notification System is implemented. Medical Center Flood Warning System and RICE Flood Alert System.*				
2014HCOHHS003 — Develop and install retention ponds to reduce flood damages at the Hospital's or District's critical care facilities.			X	HH-020
Comment: *No update at this time.*				

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
2014HCOHHS004 — Implement flood control measures (riverine erosion controls) to minimize damage to critical care facilities within the flood hazard area.			X	HH-005
Comment: *No update at this time*				
2014HCOHHS005 — Implement project(s) to elevate emergency generators above base flood elevation(s) at critical care facilities.	X			
Comment: *Ben Taub is replacing existing generators located on ground level. Relocated inside Central Plant and behind flood proofing barrier to keep generators from flooding.*				
2014HCOHHS006 — Retrofit roofing of critical care facilities to meet industry-accepted hurricane high-wind guidelines and retrofit gravel roofing to non-gravel roofing at all locations near critical care facilities to limit damage from high winds and loose debris.	X			
Comment: *Ben Taub is in-process. LBJ is complete with only a partial upgrade over annex needing to be retrofitted. LBJ and Ben Taub are retrofitting existing built up roofs (asphalt) with a single ply membrane that meets high-wind guidelines.*				
2014HCOHHS007 — Bury primary service power lines.	X			
Comment: *LBJ increased redundancy by replacing CenterPoint's transformers and updated capacity and new automatic transfer situations. Increased level of redundancy and additional capacity. Upgrading the main incoming distribution system.*				
2014HCOHHS008 — Installation of generators / power back-up systems.	X			
Comment: *Smith Clinic installation of generator(s) is in progress.*				
2014HCOHHS009 — Install Roof Modifications necessary for critical care facilities to better survive high wind damage.		X		
Comment: *Project is no longer feasible. Roofs will not be modified, but entirely replaced.*				
2014HCOHHS010 — Install early warning system, i.e. a mass notification system to increase alert capabilities for the Hospital District and provide coverage to the District's hospitals, clinics and support facilities.	X			
Comment: *Mass Notification and warning systems implemented.*				
2014HCOHHS011 — Provide community early warning system i.e. a mass notification system, to increase alert capabilities for the Hospital District to provide coverage to all the District's hospitals, clinics, support facilities and general public	X			
Comment: *Completed*				
2014HCOHHS012 — Install lightning and surge protection measures for critical infrastructure.			X	HH-006
Comment: *Not started*				
2014HCOHHS013 — Develop and harden safe room areas in critical care facilities.			X	HH-007
Comment: *Not started*				
2014HCOHHS014 — Develop/implement cooling center with emergency power to provide critical life safety cooling during extreme heat events.			X	HH-008
Comment: *Not started*				
2014HCOHHS015 — Install back-up generators to increase capacity and coverage of HVAC systems to all in-patient care areas.			X	HH-009
Comment: *Not started*				
2014HCOHHS016 — Install drought-tolerant landscaping to reduce potable water use as part of a water conservation program.			X	HH-010
Comment: *Not started*				
2014HCOHHS017 — Install ground water well(s) as secondary potable water and cooling water source to mitigate drought at critical care facilities.			X	HH-011
Comment: *Not started*				

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
2014HCOHHS018 — Harden water supply piping with materials that can accommodate dry ground conditions due to drought.			X	HH-012
Comment: *Not started*				
2014HCOHHS019 — Adopt groundwater drought contingency planning measures.			X	HH-013
Comment: *Not started*				
2014HCOHHS020 — Retrofit existing roofs on critical care facilities to resist the damaging effects of hail.			X	HH-014
Comment: *Not started*				
2014HCOHHS021 — Install protective structures to minimize damage to critical assets and equipment.	X			
Comment: *Near completion. Ben Taub generators being relocated inside Central Plant.*				
2014HCOHHS022 — Install and improve intake air filtration with higher capacity and higher quality filtration/purification system at critical care facilities to minimize health risks and equipment damage associated with smoke and reduced air quality.			X	HH-015
Comment: *Not started*				
2014HCOHHS023 — Establish buffer zones cleared of vegetative fuel loads around all critical care facilities. Implement a vegetative fuel load reduction program.		X		
Comment: *Not necessary*				
2014HCOHHS024 — Provide adequate freeze-protection insulation for domestic water supply piping and fire water supply piping where these systems are exposed to the weather.			X	HH-016
Comment: *Not started*				
2014HCOHHS025 — Implement tree management program, especially where trees abut electric power transmission lines.			X	HH-017
Comment: *Not started*				
2014HCOHHS026 — Upgrade and improve community warning system to provide reliable HazMat situational awareness and response instruction (evacuation, stay-at-home, seal doors and windows, etc.) Develop/implement HazMat Awareness Safety Program.		X		
Comment: *Not started*				
2014HCOHHS027 — Improve intake air filtration at critical care facilities to minimize health risks and equipment damage associated with reduced air quality resulting from toxic material releases.	X			
Comment: *LBJ – replacement of outside air handling units with upgraded air filtration system.*				
2014HCOHHS028 — Identify all energy pipelines within ¼ mile of critical care facilities. Develop and implement a pipeline awareness safety program for critical care personnel, identifying all energy pipelines within ¼ mile of critical care facilities and coordinating with community early-warning systems for rapid and reliable information dissemination for critical care personnel and their patients.			X	HH-018
Comment: *Not started*				
2014HCOHHS029 — Improve intake air filtration at critical care facilities to minimize health risks and equipment damage associated with possible smoke and reduced air quality resulting from energy pipeline failure.	X			
Comment: *LBJ – replacement of outside air handling units with upgraded air filtration system.*				

37.9 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 37-11 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 37-12 identifies the priority for each action. Table 37-13 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 37-11. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action HH-001 — Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Hurricane, Flooding, Severe Weather						
Existing	3, 4, 10	Harris Health	Harris County	High	HMGP, PDM, FMA	Short-term
Action HH-002 — Actively participates in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: All hazards						
New and Existing	1, 5, 8	Harris Health	Harris County	Low	Staff Time, General Funds	Short-term
Action HH-003 — Integrate the hazard mitigation plan into other plans, ordinances and programs within the community,						
Hazards Mitigated: Hurricane, Flooding, Severe Weather						
Existing	2, 6, 9	Harris Health	Harris County	Low	Staff Time, General Funds	Short-term
Action HH-004 — Install back-up generators to increase capacity for the coverage of patient care/treatment and critical support facilities.						
Hazards Mitigated: Hurricane, Flooding, Severe Weather						
New	3, 4, 10	Harris Health	Harris County	High	HMGP, PDM, FMA	Short-term
Action HH-005 — Implement flood control measures (riverine erosion controls) to minimize damage to critical care facilities within the flood hazard area.						
Hazards Mitigated: Flood, Severe Weather, Hurricane						
New and Existing	6, 9, 11, 13	Harris Health	Harris County	High	Grant funding	Short term
Action HH-006 — Install lightning and surge protection measures for critical infrastructure.						
Hazards Mitigated: Severe Weather, Hurricane, Earthquake						
Existing	9, 11, 13	Harris Health	Harris County	Medium	General and/or Grant funds	Short term
Action HH-007 — Develop and harden safe room areas in critical care facilities.						
Hazards Mitigated: Severe Weather, Hurricane, Earthquake						
New and Existing	4, 11, 13	Harris Health	Harris County	High	Grant funding	Short term
Action HH-008 — Develop/implement cooling center with emergency power to provide critical life safety cooling during extreme heat events.						
Hazards Mitigated: Severe Weather, Hurricane, Earthquake						
New	4, 11, 13	Harris Health	Harris County	High	Grant funding	Short term
Action HH-009 — Install back-up generators to increase capacity and coverage of HVAC systems to all in-patient care areas.						
Hazards Mitigated: Severe Weather, Hurricane, Earthquake						
New	4, 11, 13	Harris Health	Harris County	High	Grant funding	Short term
Action HH-010 — Install drought-tolerant landscaping to reduce potable water use as part of a water conservation program.						
Hazards Mitigated: Drought						
New and Existing	5, 7, 8, 10, 15	Harris Health	Harris County	Low	Staff Time, General Funds	Short-term
Action HH-011 — Install ground water well(s) as secondary potable water and cooling water source to mitigate drought at critical care facilities.						
Hazards Mitigated: Drought						
Existing	5, 7, 8, 10, 15	Harris Health	Harris County	Medium	Staff Time, General Funds	Short-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action HH-012 — Harden water supply piping with materials that can accommodate dry ground conditions due to drought.						
Hazards Mitigated: Drought						
Existing	5, 7, 11, 13	Harris Health	Harris County	Medium	General and/or grant funds	Short term
Action HH-013 — Adopt groundwater drought contingency planning measures.						
Hazards Mitigated: Drought						
Existing	5, 7, 8, 10, 15	Harris Health	Harris County	Low	Staff Time, General Funds	Short-term
Action HH-014 — Retrofit existing roofs on critical care facilities to resist the damaging effects of hail.						
Hazards Mitigated: Severe Weather						
Existing	11, 13	Harris Health	Harris County	High	Grant funds	Long term
Action HH-015 — Install and improve intake air filtration with higher capacity and higher quality filtration/purification system at critical care facilities to minimize health risks and equipment damage associated with smoke and reduced air quality.						
Hazards Mitigated: Wildfire						
Existing	11, 13	Harris Health	Harris County	Medium	Staff Time, General Funds	Short term
Action HH-016 — Provide adequate freeze-protection insulation for domestic water supply piping and fire water supply piping where these systems are exposed to the weather.						
Hazards Mitigated: Severe Weather						
Existing	11, 13	Harris Health	Harris County	Medium	General and/or grant funds	Short term
Action HH-017 — Implement tree management program, especially where trees abut electric power transmission lines.						
Hazards Mitigated: Severe Weather, Hurricanes, Wildfire						
Existing	6, 8, 11, 13	Harris Health	Harris County	Low	Staff Time, General Funds	Short term
Action HH-018 — Identify all energy pipelines within ¼ mile of critical care facilities. Develop and implement a pipeline awareness safety program for critical care personnel, identifying all energy pipelines within ¼ mile of critical care facilities and coordinating with community early-warning systems for rapid and reliable information dissemination for critical care personnel and their patients.						
Hazards Mitigated: Earthquake						
Existing	1, 3, 9, 11	Harris Health	Harris County	Low	Staff Time, General Funds	Short term
Action HH-019 — Install flood barrier systems, such as flood panels, gates and passive systems, to increase flood protection and minimize damage for critical care facilities						
Hazards Mitigated: Flood						
Existing	11, 13	Harris Health	Harris County	High	Grant funds	Long term
Action HH-020 — Develop and install retention ponds to reduce flood damages at the Hospital's or District's critical care facilities.						
Hazards Mitigated: Flood						
Existing	6, 7, 8, 11, 13	Harris Health	Harris County	High	Grant funds	Long term
Action HH-021— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
Hazards Mitigated: Severe Weather, Hurricane, Flooding, Earthquake, Dam Failure, Wildfire, Drought						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	HCESD12	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 37-12. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
HH-001	3	High	High	Yes	Yes	No	High	High
HH-002	3	Low	Low	Yes	Yes	Yes	Medium	Low
HH-003	3	Low	Low	Yes	Yes	Yes	Medium	Low
HH-004	3	High	High	Yes	Yes	No	High	High
HH-005	5	High	High	Yes	Yes	No	High	High
HH-006	3	High	Medium	Yes	Yes	No	High	High
HH-007	3	High	High	Yes	Yes	No	High	High
HH-008	3	High	High	Yes	Yes	No	High	High
HH-009	3	High	High	Yes	Yes	No	High	High
HH-010	5	Medium	Low	Yes	No	Yes	Medium	Low
HH-011	5	Medium	Medium	Yes	No	Yes	Medium	Low
HH-012	5	Medium	Medium	Yes	No	Yes	Medium	Low
HH-013	5	Medium	Low	Yes	No	Yes	Medium	Low
HH-014	2	High	High	Yes	Yes	No	High	High
HH-015	2	Medium	Medium	Yes	No	Yes	Medium	Low
HH-016	2	High	Medium	Yes	No	Yes	Medium	Low
HH-017	4	Medium	Low	Yes	No	Yes	Medium	Low
HH-018	5	Medium	Low	Yes	No	Yes	Medium	Low
HH-019	2	High	High	Yes	Yes	No	High	High
HH-020	5	High	High	Yes	Yes	No	High	High
HH-021	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 37-13. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Severe Weather	HH-001, 004, 005,006, 007, 008, 009, 014, 016, 017, 21	HH-001, 004, 005, 006, 007, 008, 009, 014, 016	HH-003, 21	HH-017	HH-21	HH-004, 005, 006, 008, 009, 014, 016		HH-21
Hurricane	HH-001, 004, 005, 006, 007, 008, 009, 017, 21	HH-001, 004, 005, 006, 007, 008, 009	HH-003, 21	HH-017	HH-21	HH_004, 005, 006, 008, 009,		HH-21
Medium-Risk Hazards								
Flooding	HH-001, 004, 005, 019, 020, 21	HH-001, 004, 005, 019	HH-003, 21		HH-21	HH-004, 005, 019, 020		HH-21
Low-Risk Hazards								
Earthquake	HH-006, 007, 008, 009, 018, 21	HH-006, 007, 008, 009	HH-018, 21		HH-21	HH-006, 008, 009		HH-21
Dam Failure	HH-21		HH-21		HH-21			HH-21
Wildfire	HH-015, 017, 21		HH-21	HH-017	HH-015	HH-015		HH-21
Drought	HH-011, 012, 013, 21	HH 001, 011, 012, 013	HH-21	HH-010, 011, 013	HH-21	HH-011, 012, 013	HH-010, 011, 012, 013	HH-21

a. See the introduction to this volume for explanation of mitigation types.

37.10 REVIEW AND INCORPORATION OF RESOURCES FOR THIS ANNEX

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- Harris Health System Hazard Vulnerability Analysis -Risk Analysis of all Harris Health System Facilities
- Capital Improvement Plan – Capital improvement plan is updated annually and covers a 5 year span
- Emergency Operations Plan – Updated in 2019

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.
- South East Texas Regional Advisory Council Regional Hazard Vulnerability Assessment 2018 (Bi-annual Report)

38. TEXAS MEDICAL CENTER

38.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Warren Porter
2450 Holcombe Blvd., Suite 1
Houston, TX 77021
Telephone: 713-791-8843
e-mail Address: wporter@tmc.edu

Alternate Point of Contact
Ashley McPhail
2450 Holcombe Blvd., Suite 1
Houston, TX 77021
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38.2 JURISDICTION PROFILE

38.2.1 Overview

Texas Medical Center (TMC) — the largest medical complex in the world — is at the forefront of advancing life sciences. TMC is a 2.1-square-mile medical district and neighborhood in south-central Houston, Texas, immediately south of the Museum District and west of Texas State Highway 288. Over sixty medical institutions, largely concentrated in a triangular area between Brays Bayou, Rice University, and Hermann Park, are members of the Texas Medical Center Corporation — a non-profit umbrella organization — which constitutes the largest medical complex in the world. The TMC has an extremely high density of clinical facilities for patient care, basic science, and translational research.

The Texas Medical Center contains over 60 medicine-related institutions, with 21 hospitals and eight specialty institutions, eight academic and research institutions, four medical schools, seven nursing schools, three public health organizations, two pharmacy schools and a dental school. All institutions are not-for-profit. Among the affiliated medical schools are the University of Texas Health Science Center at Houston, Baylor College of Medicine, University of Texas Medical Branch at Galveston and Texas A&M College of Medicine. Some member institutions are located outside the city of Houston.

The Texas Medical Center employs over 106,000 people, hosts 10 million patient encounters annually, and has a gross domestic product of US$25 billion. TMC foot print has expanded south of Brays Bayou towards NRG Park, and the organization has developed ambitious plans for a new “innovation campus” south of the river. The 4.93-square-mile Medical Center / Astrodome area, highly populated with medical workers, is home to over 20,000 people.

The TMC is serviced by the Metro Rail Red Line, a north-south light rail route which connects the district to Downtown Houston and NRG Park.

The Texas Medical Center assumes responsibility for the adoption of this plan; Texas Medical Center will oversee its implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 38-1.

Table 38-1. Local Mitigation Planning Team Members

Name	Title
Warren J. Porter	Safety and Emergency Preparedness Manager
Ashley McPhail	Vice President for Strategy
Abbey Roberson	Vice President for Planning
David Pollard	TMC PD Director

The District does not participate in the Public Protection Class Rating System.

38.2.2 Service Area and Trends

The district service area covers 2.1 Square Miles serving a population of 10 Million patient visits per year. With a 1,345-acre campus in downtown Houston, TMC serves as tertiary care centers for over 35 counties in Southeast Texas. TMC is the world's largest medical center campus, with 750,000 annual ER visits, 180,000 surgeries annually, contains the world's largest Children's and Cancer hospitals, and has over $3 billion in current construction. Additionally, more than 160,000 people visiting TMC every day, totaling over 8 million patient visits annually.

TMC is developing a biomedical research hub that will cluster researchers and industry experts together on a collaborative 30-acre campus. The TMC campus integrates leading researchers with a host of top-tier expertise from the private sector. The TMC3 founding institutions are Texas Medical Center, Baylor College of Medicine, Texas A&M University Health Science Center, The University of Texas Health Science Center (UTHealth) and The University of Texas MD Anderson Cancer Center. TMC3 is set to break ground in early 2020.

The groundbreaking project will generate a $5.2 billion stimulus to Texas and create nearly 26,000 new jobs, according to a third-party economic impact study by Silverlode Consulting conducted in November 2017. As a center of innovation advancing life sciences through collaboration, education and research, TMC will expand its 50 million square feet of medical, research and office space with an additional 3 million square feet currently in planning stages. TMC's infrastructure must meet the changing demands for a more robust transportation system by expanding mobility options to support existing development and future growth.

38.2.3 Assets

Table 38-2 summarizes the critical assets of the district and their value.

Table 38-2. Special Purpose District Assets

Asset	Value
Property	
Buildings and Improved property	$405,170,000
Equipment	
Police and security vehicles (Patrol vehicles)	$288,000
Police specialty vehicles	$215,000
Police Support vehicles	$135,000
Security Vehicles	$256,000
Other vehicles	$135,00
Total:	***$8,029,000***

Asset	Value
Critical Facilities and Infrastructure	
TMC Police Department Generator	$75,000
Garage 1 6519 Fannin Houston, TX 77030	$25,080,000
Garage 2 1511 E. Holcombe Blvd. Houston, TX 77030	$39,642,000
Garage 4 1406 Cambridge Houston, TX 77030	$ 27,971,000
Garage 5 1001 Holcombe Blvd., Houston, TX 77030	$9,955,000
Garage 7 1120 Freeman Blvd., Houston, TX 77030	$16, 452,000
Garage 8 2151 W. Holcombe Blvd., Houston, TX 77030	$22,712,000
Garage 9 1100 Bates Houston, TX 77030	$5,664,000
Garage 10 6700 M.D. Anderson Blvd., Houston, TX 77030	$27,735,000
Executive Offices and Garage 15 6550 Bertner, Houston, TX 77030	$34,257,000
Garage 17 1653 Braeswood Blvd., Houston, TX 77030	$30,950,000
Garage 18 2450 Holcombe Blvd., Houston, TX 77021	$8,339,000
J.P. McGovern Bldg. 2450 Holcombe Blvd., Houston, TX 77021	$90,587,000
Garage 19 2010 S. Braeswood, Houston, TX 77030	$32,844,000
Baylor College of Medicine 1 Baylor Plaza, Houston, TX 77030	$500,000,000
M.D. Anderson Cancer Center 1300 Moursund St., Houston, TX 77030	$900,000,000
Texas Children's Hospital 1102 Bates, Houston, TX 77030	$500,000,000
City of Houston Health and Human Services 1115 S. Braeswood Blvd., Houston, TX 77030	$250,000,000
The Methodist Hospital 1130 Earle St., Houston, TX 77030	$700,000,000
Univ. of Texas Health Science Ctr., 1200 Pressler, Houston, TX 77030	$1,000,000,000
Memorial Hermann Hospital 1333 Moursund, Houston, TX 77030	$1,000,000,000
Memorial Hermann TIRR Rehab Hospital 13333 Moursund, Houston, TX 77030	$650,000,000
Harris County Hospital (Ben Taub) 1504 Taub Loop, Houston, TX 77030	$1,000,000,000
Thermal Energy Corporation 1615 Braeswood, Houston, TX 77030	$750,000,000
Harris County Forensic Institute 1885 Old Spanish Trail, Houston, TX 77030	$500,000,000
Houston Hospice 1905 Holcombe Blvd., Houston, TX 77030	$25,000,000
Ronald McDonald House 1907 Holcombe Blvd., Houston, TX 77030	$30,000,000
Michael E. DeBakey Vet. Affairs Medical Center 2002 Holcombe Blvd., Houston, TX 77030	$1,000,000,000
St. Luke's Episcopal Hospital 6720 Bertner, Houston, TX 77030	$800,000,000
Texas Women's Hospital 7600 Fannin St., Houston, TX 77030	$700,000,000
Texas Medical Center Police Station 1511 E. Holcombe Blvd. Houston, TX 77030	$5,000,000
Shriner's Hospital- Houston 6977 Main St., Houston, TX 77030	$800,000,000
The Center for Hearing and Speech 3100 Shenandoah, Houston, TX 77021	$250,000,000

38.3 CAPABILITY ASSESSMENT

An assessment of the district's current capabilities was conducted to identify opportunities to expand, initiate or integrate capabilities in order to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table in Section 29.9 identifies these as community capacity building mitigation actions.

38.3.1 Planning and Regulatory Capabilities

Jurisdictions develop plans and programs and implement rules and regulations to protect and serve residents. When effectively prepared and administered, these plans, programs and regulations can support the implementation of mitigation actions. Table 38-3 summarizes existing codes, ordinances, policies, programs or plans that are applicable to this hazard mitigation plan.

Table 38-3. Planning and Regulatory Capability

Plan, Study or Program	Date of Most Recent Update	Comment
Business Continuity of Operations Plan	2018	
Texas Medical Center Emergency Response Plan (Previous name: TMC Pandemic Influenza Plan)	2012	Currently under revision
Texas Medical Center Flood and High Water Response Plan Catastrophic Medical Operations Center Regional Plan	2016 2019	Currently Under revision

38.3.2 Fiscal, Administrative and Technical Capabilities

Fiscal capability is an indicator of a jurisdiction's ability to fulfill the financial needs associated with hazard mitigation projects. An assessment of fiscal capabilities is presented in Table 38-4. Administrative and technical capabilities represent a jurisdiction's staffing resources for carrying out the mitigation strategy. An assessment of administrative and technical capabilities is presented in Table 38-5.

Table 38-4. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	No
User Fees for Water, Sewer, Gas or Electric Service	No
Incur Debt through General Obligation Bonds	No
Incur Debt through Special Tax Bonds	No
Incur Debt through Private Activity Bonds	No
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	No
Federal Grant Programs	Yes

Table 38-5. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/ Agency/ Position
Planners or engineers with knowledge of land development and land management practices	Yes	Through Long Term Contracting Services
Engineers or professionals trained in building or infrastructure construction practices	Yes	Through Long Term Contracted Services
Planners or engineers with an understanding of natural hazards	Yes	Emergency Preparedness Manager and Through Long Term Contracted Services
Staff with training in benefit/cost analysis	Yes	Emergency Preparedness Manager and Through Long Term Contracted Services
Surveyors	Yes	Through Long Term Contracted Services
Personnel skilled or trained in GIS applications	Yes	Through Long Term Contracted Services
Scientist familiar with natural hazards in local area	Yes	Through Long Term Contracted Services
Emergency manager	Yes	Safety and Emergency Preparedness
Grant writers	Yes	Emergency Preparedness Manager or Corporate support

38.3.3 Education and Outreach Capabilities

Outreach and education capability identifies the connection between government and community members, which opens a dialogue needed for a more resilient community. An assessment of education and outreach capabilities is presented in Table 38-6.

Table 38-6. Education and Outreach

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • **If yes, please briefly describe**	Yes TMC has an Emergency Preparedness website
Do you use social media for hazard mitigation education and outreach? • **If yes, please briefly describe**	Yes TMC utilizes two primary mechanisms for this. We utilize Social Media platforms, as well as Everbridge notification platform to outreach ad notification
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • **If yes, please briefly specify**	Yes We primarily have two councils to address hazard mitigation: Emergency Preparedness; and Police/Security Councils- both are comprised of representatives from each member institution.
Do you have any other programs already in place that could be used to communicate hazard-related information? • **If yes, please briefly describe**	Yes We utilize Everbridge notification system
Do you have any established warning systems for hazard events? • **If yes, please briefly describe**	Yes Everbridge notification system allows for notification of via telephone, text and emails

38.3.4 Adaptive Capacity for Climate Change

Given the uncertainties associated with how hazard risk may change with a changing climate, a jurisdiction's ability to track such changes and adapt as needed is an important component of the mitigation strategy. Table 38-7 summarizes the jurisdiction's adaptive capacity for climate change.

Table 38-7. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts	Medium
Comment	
Jurisdiction-level monitoring of climate change impacts	Low
Comment	
Technical resources to assess proposed strategies for feasibility and externalities	Medium
Comment	
Jurisdiction-level capacity for development of greenhouse gas emissions inventory	Low
Comment	
Capital planning and land use decisions informed by potential climate impacts	Low
Comment	
Participation in regional groups addressing climate risks	Medium
Comment: TMC works along with the City of Houston and Harris County and private partners to address climate change issues which are expected to impact TMC campus	
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes	Low
Comment	
Identified strategies for greenhouse gas mitigation efforts	Low
Comment	
Identified strategies for adaptation to impacts	Low
Comment	
Champions for climate action in local government departments	Low
Comment	
Political support for implementing climate change adaptation strategies	Low
Comment	
Financial resources devoted to climate change adaptation	Low
Comment	
Local authority over sectors likely to be negative impacted	Low
Comment	
Public Capacity	
Local residents knowledge of and understanding of climate risk	N/A
Comment	
Local residents support of adaptation efforts	N/A
Comment	
Local residents' capacity to adapt to climate impacts	N/A
Comment	
Local economy current capacity to adapt to climate impacts	N/A
Comment	
Local ecosystems capacity to adapt to climate impacts	N/A
Comment	

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

38.4 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in Section 1.4.1 were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

38.4.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- **Texas Medical Center Pandemic Influenza Plan** — This document was used to review current plans, support identification of hazards, processes, and development of the mitigation plan.
- **Texas Medical Center Flood and High Water Response Plan** — The plan was used to review current plans and processes, support the identification of past hazard events and noted vulnerabilities, assist in establishing priorities and risk ranking, and the development of the mitigation action plan.
- **Southeast Texas Regional Advisory Council (SETRAC) Catastrophic Medical Operations Center Regional Plan —** The plan was used to review current plans and processes, support the identification of past hazard events and noted vulnerabilities, assist in establishing priorities and risk ranking, and the development of the mitigation action plan.

38.4.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

- **Texas Medical Center Emergency Access Study —** TMC is currently in the initial stages of initiating a study to evaluate emergency access into and throughout the TMC campus during severe weather incidents. This will incorporate water table data, flood data, improvements in Brays Bayou and adjacent water drainage activities, traffic flow and other factors. The resulting plan will coordinate emergency access to several regional tertiary medical centers located on campus. TMC is Regional asset, with several tertiary care medical facilities serving a 35-county area in SE Texas.
- **Texas Medical Center Emergency Evacuation Plan** — TMC (this district) does not have a coordinated evacuation plan which incorporates all of the tertiary medical facilities, rehabilitation facilities, medical support facilities and transportation needs into one coordinated plan. This was borne out during a FEMA mandated evacuation drill where the major hospitals, rehabilitation centers, nursing homes, and support facilities had 90 minutes to evacuate 10 % of the staffed beds. This drill identified several areas for improvement. This plan will build a coordinated evacuation plan which addresses access, vehicular movement within the campus, and identifies resources needed to support evacuation of medical facilities. TMC intends to develop one as a mitigation planning action during the next five years.
- **Texas Medical Center Emergency Response Plan** — TMC (this district) does not have currently have a coordinated emergency response plan and intends to develop one as a mitigation planning action during the next five years. TMC intends on to develop such a plan in the next five years and the plan will build on the mitigation goals and objectives identified in the mitigation plan. Since TMC is Regional asset, we will also coordinate this plan with Harris County, City of Houston, as well as SETRAC which represents hospitals in a 35-county area in SE Texas.
- **Texas Medical Center Mitigation Plan** — This plan address TMC Strategic priorities and identifies areas which need specific mitigation efforts. TMC (this district) currently does not have a coordinated

mitigation plan. There are several individual hospital or healthcare facilities with individual plans on campus, however those plans have been developed in isolation and do not contribute to an organized and coordinated mitigation plan.

- **Upgrade Brays Bayou flood prediction (remodeling) –** The Brays Bayou, which flows though the TMC Campus, is the primary waterborne threat to the TMC campus. This project will update the modeling capability to predict and mitigate flood impact within the TMC campus and the several tertiary care medical facilities on campus.
- **Post-Disaster Recovery Plan** — Texas Medical Center (this district) does not have a coordinated post-disaster recovery plan and intends to develop one as a mitigation planning action during the next five years.

38.5 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 38-8 lists past occurrences of natural hazards for which specific damage was recorded in Texas Medical Center. Other hazard events that broadly affected the entire planning area, including Texas Medical Center, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 38-8. Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Hurricane Harvey	4332 DR	2017	$1,400,000
Severe Storms and Flooding	4269 DR	2016	Not Available
Severe Storms and Flooding	4272	2016	Not Available
Severe Storms and Flooding	4245 DR	2015	Not Available
Severe Storms and Flooding	4223 DR	2015	Not Available
Hurricane Ike	1791 DR	2008	Not Available
Hurricane Ike	3294 EM	2008	Not Available
Hurricane Gustav	3290 EM	2008	Not Available
Hurricane Dean	3277 EM	2007	Not Available
Tropical Storm Erin	1730 DR	2007	Not Available
Hurricane Rita	1606 DR	2005	Not Available
Hurricane Rita	3261 EM	2005	Not Available
Severe Storms and Flooding	1439 DR	2002	Not Available
Tropical Storm Allison	1379 DR	2001	Not Available

38.6 HAZARD RISK RANKING

Table 38-9 presents a local ranking for the Texas Medical Center of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 38-9. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Flood	9 x 3 = 27	High
1	Hurricane/Coastal Storms	9 x 3= 27	High
1	Severe Weather	9 x 3= 27	High
2	Dam/Levee Failure	7 x 3= 21	Medium
3	Tsunami	8 x 2=16	Medium
4	Non-Natural	7 x 1= 7	Low
5	Earthquake	5 x 1= 5	Low
6	Mass Movement	4 x 1= 4	Low
7	Wildfire	3x1=3	Low
8	Coastal Erosion	2x1=2	Low
9	Drought	1x1=1	Low

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

38.7 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. The following jurisdiction-specific issues have been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- Access into and throughout the campus is significantly affected due to flooding with approximately 50% of roads into medical campus impassable during severe flooding events. This impacts 35 counties as the campus serves as the majority of the tertiary care centers for the region. Specific areas effected: limiting to emergency access and evacuation for patients, trans-campus movement limited, limits patient access and logistical support.
- Ten intersections within campus are prone to intermittent flooding during severe storms; as an example, the TMC Police station is located adjacent to flood prone intersection
- The majority of internet and telephone communications come through one location which is not storm resilient. Any interruption would impact ~75-80% communication for most of the facilities.
- There is a tunnel system which links several major medical facilities, should this be impacted, such as in TS Allison, this would be a significant loss to those facilities.
- There is a dearth of institutional knowledge regarding severe weather impact with the various recent and current construction projects within the campus. This lack of understanding is a barrier to ensuring resiliency.

Mitigation actions addressing these issues were prioritized for consideration in the action plan for this annex:

- Conduct a detailed assessment of transportation access into and throughout the medical center campus. Determine adaptive actions which can be implemented in the near, and long term.
- Conduct an assessment of the flood prone intersections and their impact on adjacent structures. Develop resilient solutions to address this issue over the long term.
- Conduct as detailed assessment on critical communication infrastructure and develop a specific action plan to ensure resiliency and redundancy to maintain critical communications.
- Conduct a detailed assessment of the tunnel network under the major medical facilities and develop specific measures to ensure the uninterrupted utilization of the tunnels.
- Develop a tracking system which addresses resiliency of structures and updates the system when changes are made. This would help move to a more resilient medical center campus.

38.8 STATUS OF PREVIOUS PLAN ACTIONS

TMC has not previously completed a formally adopted hazard mitigation plan.

38.9 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 38-10 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 38-11 identifies the priority for each action. Table 38-12 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 38-10. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action TMC1 — Study to evaluate and develop improved and resilient access into and throughout TMC Campus to include critical transportation infrastructure, during severe weather events						
Hazards Mitigated:	Flood, Severe weather, Non-natural, Earthquake, Hurricane/Coastal Storms					
Existing assets	3, 4, 6, 10, 11, 13, 15	TMC	Harris County, City of Houston	High	HMGP	Long-term
Action TMC2 — Study to evaluate and develop improved patient access and resilient evacuation capabilities during severe weather events						
Hazards Mitigated:	Flood, Severe weather, Non-natural, Earthquake, Hurricane/Coastal Storms					
Existing assets	1, 4, 6, 13	TMC	Harris County, City of Houston, DSHS, TDEM	High	HMGP	Long-Term
Action TMC3 — Study to evaluate and develop the resiliency of aircraft landing points, as well as the establishment of a coordinated Air Corridor around major medical campus, to support during severe weather events						
Hazards Mitigated:	Flood, Severe Weather, Hurricane/Coastal Storms					
New Assets	4, 6, 9, 10, 13	TMC	Harris County, City of Houston, TDEM	High	HMGP, TBD	Long-Term
Action TMC4 — Study to evaluate and develop resilient of pedestrian and handicapped access within TMC Campus						
Hazards Mitigated:	Flood, Severe weather, Non-natural, Earthquake, Hurricane/Coastal Storms					
Existing assets	3, 4, 9, 13, 15	TMC	TBD	~$250,000	HMGP	Short-term
Action TMC5 — Study to evaluate and develop an integrated and resilient logistical infrastructure, to support a major medical campus, during prolonged severe weather events						
Hazards Mitigated:	Flood, Severe weather, Non-natural, Earthquake, Hurricane/Coastal Storms					
Exiting Assets	3,4,6,10,13	TMC	TBD	~$250,000	HMGP	Short-term
Action TMC6 — Improve the resiliency of early warning notification and communication networks within TMC Campus during severe weather events						
Hazards Mitigated:	Flood, Severe weather, Non-natural, Earthquake, Hurricane/Coastal Storms					
Existing assets	1, 3, 4, 6, 9,10,13	TMC	TMC Campus Partners	~$500,000	HMGP	Short-Term
Action TMC7 — Development of an integrated severe weather education program for patients, facility visitors and staff						
Hazards Mitigated:	Flood, Severe weather, Hurricane/Coastal Storms					
Existing assets	1, 3, 4	TMC	TMC Campus Partners	~$250,000	HMGP	Short-term
Action TMC8 — Study and improve the resiliency of power supply, to include steam and chill water mechanisms, for critical infrastructure during severe weather events						
Hazards Mitigated:	Flood, Severe weather, Hurricane/Coastal Storm					
Existing	3, 6, 11, 13	TMC	TECO, TMC Campus Partners	High	HMGP	Long-Term
Action TMC9 — Study and development of resilient storm safe buildings for critical infrastructure medical facilities						
Hazards Mitigated:	Flood, Severe weather, Hurricane/Coastal Storms					
Existing	3, 4, 6, 11, 13, 15	TMC	TBD	High	HMGP	Long-Term
Action TMC10 — Study and development of resilient water supply for critical infrastructure major medical campus, during severe weather events						
Hazards Mitigated:	Severe weather, Hurricane/Coastal Storms					
Existing	3, 11, 13, 15	TMC	TBD	High	HMGP	Long-Term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action TMC11 — Study and development of an integrated severe weather response plan, within major medical campus (critical infrastructure) during severe weather events						
Hazards Mitigated:	Flood, Severe weather, Hurricane/Coastal Storms					
Existing	3, 4, 6, 10, 13	TMC	TMC Campus Partners	High	HMGP	Short-Term
Action TMC12 — Study and development of an integrated family reunification plan and processes during a severe weather event						
Hazards Mitigated:	, Severe weather, Non-natural, Earthquake, Hurricane/Coastal Storms					
Existing	3, 4, 9, 10, 13	TMC	TMC Campus Partners	~$150,000	HMGP	Short-Term
Action TMC13 — Development of an integrated Continuity of Operations Plan for major medical campus, with several tertiary care centers, covering several counties, during a severe weather event						
Hazards Mitigated:	Flood, Severe weather, Hurricane/Coastal Storms					
Existing	3, 4, 9, 10, 13	TMC	TMC Campus Partners	~$250,000	HMGP	Short-Term
Action TMC14 — Development of a coordinated structural resiliency and damage tracking system for the TMC campus						
Hazards Mitigated:	Flood, Severe weather, Non-natural, Earthquake, Hurricane/Coastal Storms					
Existing	3, 10, 11, 12, 13, 15	TMC	TMC Campus Partners	~$125,000	HMGP	Short-Term
Action TMC15 — Development of a coordinated post-disaster resiliency plan for the TMC campus						
Hazards Mitigated:	Flood, Severe weather, Non-natural, Earthquake, Hurricane/Coastal Storms					
Existing	3, 4, 6, 7, 9, 10, 13, 15	TMC	TMC Campus Partners	~$150,000	HMGP	Short-Term
Action TMC16 — Develop and implement a personnel benefit-cost process and software training program for mitigation planning						
Hazards Mitigated:	Flood, Severe weather, Non-natural, Earthquake, Hurricane/Coastal Storms					
Existing	3, 4, 13, 15	TMC	TMC Campus Partners	~$50,000	HMGP	Short-Term
Action TMC17— Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan. *Hazards Mitigated*: Flood, Hurricane/Coastal Storms, Severe Weather, Dam/Levee Failure, Tsunami, Non-Natural, Earthquake, Mass Movement, Wildfire, Coastal Erosion, Drought						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	TMC	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 38-11. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
TMC1	7	High	High	Yes	Yes	No	Medium	High
TMC6	7	High	Medium	Yes	Yes	No	Medium	High
TMC11	5	High	Medium	Yes	Yes	No	Medium	High
TMC13	6	Medium	Medium	Yes	Yes	No	Medium	Medium
TMC16	8	High	Medium	Yes	Yes	No	Medium	Medium
TMC3	5	High	High	Yes	Yes	No	Medium	High
TMC5	5	High	Medium	Yes	Yes	No	Medium	High
TMC8	4	High	High	Yes	Yes	No	Medium	High
TMC9	6	High	High	Yes	Yes	No	Medium	High
TMC10	4	High	High	Yes	Yes	No	Medium	High
TMC14	5	Medium	Medium	Yes	Yes	No	Medium	Medium
TMC12	5	Medium	Medium	Yes	Yes	No	Medium	Medium
TMC8	3	Medium	Medium	Yes	Yes	No	Medium	Medium

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
TMC2	4	Medium	Medium	Yes	Yes	No	Medium	Medium
TMC4	5	Medium	Medium	Yes	Yes	No	Medium	Medium
TMC16	4	Medium	Medium	Yes	Yes	No	Medium	Medium
TMC17	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 38-12. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Flood	TMC: 6, 7, 11, 13, 17	TMC: 1, 4, 5, 6, 8, 9, 10, 11, 13, 14, 15, 16	TMC: 6, 7, 12, 17		TMC: 1, 2, 3, 6, 11, 13, 15	TMC: 1, 4, 8, 9, 10, 127	TMC: 8, 10	TMC: 5, 6, 11, 17
Hurricane/Coastal Storms	TMC: 6, 7, 11, 13, 17	TMC: 1, 4, 5, 6, 8, 9, 10, 11, 13, 14, 15, 16	TMC: 6, 7, 12, 17		TMC: 1, 2, 3, 6, 11, 13, 15	TMC: 1, 4, 8, 9, 10, 17	TMC: 8, 10	TMC: 5, 6, 11, 17
Severe Weather	TMC: 6, 7, 11, 13, 17	TMC: 1, 4, 5, 6, 8, 9, 10, 11, 13, 14, 15, 16	TMC: 6, 7, 12, 17		TMC: 1, 2, 3, 6, 11, 13, 15	TMC: 1, 4, 8, 9, 10, 17	TMC: 8, 10	TMC: 5, 6, 11, 17
Medium-Risk Hazards								
Dam/Levee Failure	TMC127		TMC17			TMC17		TMC17
Tsunami	TMC17		TMC17			TMC17		TMC17
Low-Risk Hazards								
Non-Natural	TMC: 6, 17	TMC: 1, 5, 14, 15, 16	TMC: 6, 12, 17		TMC: 1, 2, 6, 15	TMC: 1, 4, 17		TMC: 5, 6, 17
Earthquake	TMC: 6, 17	TMC: 1, 5, 14, 15, 16	TMC: 6, 12, 17		TMC: 1, 2, 6, 15	TMC17		TMC17
Mass Movement	TMC17		TMC17			TMC17		TMC17
Wildfire	TMC17		TMC17			TMC17		TMC17
Coastal Erosion	TMC17		TMC17			TMC17		TMC17
Drought	TMC17		TMC17			TMC17		TMC17

a. See the introduction to this volume for explanation of mitigation types.

38.10 REVIEW AND INCORPORATION OF RESOURCES FOR THIS ANNEX

38.10.1 Existing Reports, Plans, Regulatory Tools and Other Resources

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to review current plans, support the identification of past hazard events and noted vulnerabilities, assist in establishing priorities and risk ranking, and the development of the mitigation action plan.
- **Texas Medical Center Continuity of Operations Plan** — This document was used to review current plans, support identification of hazards, processes, and development of the mitigation plan.
- **Texas Medical Center Pandemic Influenza Plan** — This document was used to review current plans, support identification of hazards, processes, and development of the mitigation plan.
- **Texas Medical Center Flood and High Water Response Plan** — The plan was used to review current plans and processes, support the identification of past hazard events and noted vulnerabilities, assist in establishing priorities and risk ranking, and the development of the mitigation action plan.
- **Southeast Texas Regional Advisory Council (SETRAC) Catastrophic Medical Operations Center Regional Plan —** The plan was used to review current plans and processes, support the identification of past hazard events and noted vulnerabilities, assist in establishing priorities and risk ranking, and the development of the mitigation action plan.

38.10.2 Staff and Local Stakeholder Involvement in Annex Development

This annex was developed over the course of several months with input from several departments within TMC including planning, finance, Police/Security, and Strategic planning as well as several (TMC Campus) member institutions in open meeting. All stated departments and (TMC Campus) member institutions were asked to contribute/comment *en toto* or in relevant parts to the development of this annex. We have met in different venues covering various aspects of the plan. This is an ongoing process and we will continue to work as a team to ensure this plan is completed.

38.11 FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

We (TMC) estimate that we will need additional studies on flooding in and around Houston (river delta), structural stability in a flood zone, hydrology and actions of water in current and future water movement structures (e.g. viaducts, water channels), climate change relative to long-term impacts on structures and ground water/soil deterioration, identification of appropriate technologies to assist us in understanding and/or gathering appropriate data.

38.12 ADDITIONAL COMMENTS

One area of note for the TMC Campus which will significantly impact mitigation efforts in the short term is the addition of a large medical research facility set to begin breaking ground in early 2020. This new research facility will include over an additional 1.5 million ft^2 of space, 250,000 ft^2 of collaborative space and 112,000 ft^2 of shared research space. This will increase the world's largest medical center even more when it opens approximately in 2022.

Appendix A. Planning Partner Expectations

A. PLANNING PARTNER EXPECTATIONS

GROUPS INVOLVED IN THE PLANNING PROCESS

One of the goals of the multi-jurisdictional approach to hazard mitigation planning is to achieve compliance with the Disaster Mitigation Act (DMA) for all participating members in the planning effort. There are several distinct groups who will be involved in this process at various levels. To provide clarity, the following is a general breakdown of those groups:

- **The Core Planning Team (CPT) —** The Core Planning Team (CPT) includes the Hazard Mitigation Planning Coordinator (HMPC) and appropriate personnel from HCOHSEM along with the Project Manager and discipline leads from Harris County's contract consultant, Tetra tech, Inc. The CPT will ensure project management and the 5-year update process by scheduling meetings, distributing agendas, preparing information/presentations, documenting meeting summaries, and generally seek to facilitate the planning activities. In addition, the CPT will develop and organize the content of the Harris County Multi-Hazard Mitigation Action Plan (MH-MAP). This content will be reviewed by each Local Mitigation Planning Team (LMPT) and approved by the Multi-Jurisdictional Steering Committee (SC) before being posted to the public website or recommended for adoption.
- **The Multi-Jurisdictional Steering Committee (SC) —** The SC serves as a "coordinating entity" to assist with the development of the entire planning area of the MH-MAP. The origination of the SC is such that interests of all planning partners is represented as well as those of identified stakeholders within the planning area that are not participating as full planning partners. The organization of the SC will strive to follow the guidance of FEMA's Community Rating System (CRS) activity 510, step 2 protocol, but will not be the total basis for the organization of the SC. The organization will strive for a balance between planning partners that can commit time to the SC and non-governmental stakeholders that have a clearly defined stake in the outcomes of this planning process. The size of the SC will be managed such that quorums can be established that are achievable over a defined time frame for this planning process. At a minimum, the makeup of the SC will strive to include the following representation:

    - At least 2 representatives from Harris County
    - Harris County Flood Control District
    - Each jurisdiction that is participating in the CRS program, or considering participation in the CRS program will have a seat on the SC.
    - Representation of the interests for each non-municipal planning partner, (i.e. if there are 4 school districts with the planning partnership, at least one representative from a school district)
    - Non-governmental stakeholder's such as; academia, business interests, advocacy groups, private non-profits, and residents.

    The SC is responsible for building consensus and developing and approving key planning process milestones that address that address the entire planning area. The SC is chaired by the Hazard Mitigation Planning Coordinator (HMPC) and operate under a Charter approved at their 1st organizational meeting. All SC meetings will be open to the public and advertised as such during the plan update process. The SC

will meet according to a defined schedule that will be posted on the www.readyharris.org website as part of the public engagement strategy for this plan update process.

- **The planning partners —** those jurisdictions or special purpose districts that are developing an annex to the county plan.
- **The planning stakeholders —** the individuals, groups, businesses, academia, private non-profits, etc., from which the planning team gains information to support the various elements of the plan. For this plan update process, 2 types of stakeholders have been defined:

  - **Participatory Stakeholders-** These are identified stakeholders that are willing to participate in this planning process as a member of the SC or LMPT.
  - **Coordinating Stakeholders-** These are stakeholders that will not actually participate in the process but have requested to be kept apprised of plan development milestones and are provided the opportunity to comment on key planning milestones.

DEFINITION OF PARTICIPATION

DMA compliance requires that participation be defined in order to maintain eligibility with respect to meeting the requirements that allow a jurisdiction or special purpose district to develop an annex to the base plan. To achieve compliance for *all* planning partners, the plan must clearly document how each planning partner that is seeking linkage to the plan participated in the plan's development. The best way to do this is to clearly define "participation." For this planning process, "participation" is defined by the following criteria:

Estimated Level of Effort

It is estimated that the total time commitment to meet these "participation" requirements for a planning partner not participating on the steering committee would be approximately 36 to 46 hours over the 14-month period. Most of this time will be devoted to completing the jurisdictional annex template described below. This time may be reduced somewhat for special purpose districts.

Duration of the Planning Process

This process is expected to take 14 months to complete. It will be easy to become disconnected with the process objectives if you do not participate in some of these meetings to some degree.

Participate in the Process

As indicated, it must be documented in the plan that each planning partner "participated" in the process to the best of its capabilities. There is flexibility in defining "participation," which can vary based on the type of planning partner involved (i.e.: city or county vs. a special purpose district). However, the level of participation must be defined at the on-set of the planning process, and we must demonstrate the extent to which this level of participation has been met for each partner.

- **Complete administrative tasks.** Participation in this plan includes the following administrative tasks:

  - **Complete a letter of intent.** Provide a "Letter of Intent to participate" or a Resolution to participate to the Core Planning Team (CPT). (See exhibit A).
  - **Identification of a Local Mitigation Planning Team.** Each participating jurisdiction will establish a jurisdiction-specific Local Mitigation Planning Team (LMPT). The LMPT is responsible for the development of a jurisdictional annex to the Mitigation Action Plan. LMPT membership should consist of agencies with authority to regulate development and enforce local ordinances or regulatory standards. This may include any of the following agencies involved in hazard mitigation activities,

such as building/fire code enforcement, emergency management, emergency services, floodplain management, parks and recreation, planning/community development, public information, public works/engineering, stormwater management, transportation, or infrastructure. LMPTs will ensure tasks and responsibilities are completed as required for each participating jurisdiction.

- **Designate points of contact.** Designate a primary and secondary point of contact for this effort. These designees will be listed as the hazard mitigation points of contact for your jurisdiction in the plan.
- **Approve the Steering Committee.** The Steering Committee will be approved via an email vote.

- **Participate, as able, in additional opportunities**. Attendance or participation in the following opportunities will also be recorded. These records will be used to document participation for each planning partner. No thresholds will be established as minimum levels of participation for these events. However, each planning partner should attempt to attend all possible meetings and events:

  - Attend steering committee meetings.
  - Attend or host public meetings or open houses.
  - Participate in and advertise the public review and comment period prior to adoption.

- **Support the steering committee.** This planning process will utilize a Steering Committee that will assume responsibility for many of the planning milestones prescribed for this process to help reduce the burden of time required by each planning partner. This committee will be representative of the whole body. This committee will meet periodically (frequency to be determined by the committee, but likely to be monthly) throughout the process and provide direction and guidance to the planning team. Steering Committee meetings are not mandatory meetings for all planning partners. If you are not on the Steering Committee, your attendance is not required; however, it is our hope that all planning partners will remain engaged with this process and attend meetings from time to time.
- **Support the public involvement strategy.** The Core Planning Team will also request support from the partnership during the implementation of the public involvement strategy developed by the Steering Committee. Support could be in the form of providing venues for public meetings, attending these meetings as meeting participants, providing technical support, providing access to mailing lists, providing existing public information materials, etc.
- **Participate in the critical facility update.** The primary source of building inventory is from the Harris County Appraisal District's (HCAD) Parcel Data and certified tax roll. Each planning partner will be asked to update their facilities list for use during the risk assessment. If the list is not updated, HAZUS default data will be utilized. Updating this list provides a much more detailed analysis.
- **Complete the jurisdictional annex template. *** Each planning partner must complete a jurisdictional annex template. This template will be distributed to the planning partnership in a phased approach (3 Phases) to extend the level of effort over a series of months. Key components of the annex include the following:

  - **Attend three mandatory workshops.** There will be three ***mandatory*** workshops that all planning partners will be required to attend. These workshops will cover the proper completion of the jurisdictional annex template, which is the basis for each partner's jurisdictional chapter in the plan. The three phase workshops are defined as follows:

    - Phase 1 — Jurisdictional profile and the review of the status of prior action
    - Phase 2 — Capability Assessment
    - Phase 3 — Hazard Risk Ranking and action Plan development/Confirmation

  - Failure to have a representative at each of these workshops will result in one-on one outreach from members of the CPT to assist the jurisdiction in the completion of that phase. The schedule for these

workshops will be such that all committed planning partners will be able to attend. After participation in each of these mandatory workshops, each partner will be required to complete their template and provide it to the CPT in the time frame established. Failure to complete the template in the required time frame *may* lead to disqualification from the partnership.

- **Perform a capability assessment.** All planning partners will conduct a capability assessment. This assessment will require a review of existing documents (plans, studies and ordinances) as well as technical and financial capabilities pertinent to each jurisdiction that can support hazard mitigation. It should be noted that it is a viable mitigation action to increase a jurisdiction's capability.
- **Review the risk assessment**. Each partner will be asked to review the risk assessment and identify hazards and vulnerabilities specific to its jurisdiction. The planning team will provide the jurisdiction specific mapping and technical consultation to aid in this task, but the determination of risk and vulnerability will be up to each partner (through a facilitated process during the mandatory workshop).
- **Review county-wide mitigation recommendations.** Each partner will be asked to review and determine if the mitigation recommendations chosen in the base plan will meet the needs of its jurisdiction.
- **Develop a mitigation action plan.** All planning partners will develop an action plan that identifies each project, who will oversee the task, how it will be financed and when it is estimated to occur. Projects within each jurisdiction consistent with the base plan recommendations will need to be identified and prioritized and reviewed to determine their benefits vs. costs.

- **Adopt the plan. **** The hazard mitigation plan must be formally adopted by each jurisdiction.

**Note: Templates and instructions to aid in the compilation and development of this information will be provided to all committed planning partners. Each partner will be asked to complete their templates in a timely manner and according to the timeline specified by the steering committee and the planning team.*

*** Note: Once this plan is completed, and FEMA approval has been received for each partner, maintaining that eligibility will be dependent upon each partner implementing the plan implementation-maintenance protocol identified in the plan.*

EXHIBIT A — EXAMPLE LETTER OF INTENT TO PARTICIPATE

Harris County Hazard Mitigation Planning Partnership
Mr. David J. Alamia, Jr., MPA, CEM®
Mitigation Planner
Harris County
Office of Homeland Security and Emergency Management
6922 Katy Road
Houston, TX 77024

Harris County Hazard Mitigation Planning Partnership,

Please be advised that the _____ (***insert City or district name***) is committed to participating in the update of the Harris County Multi-Hazard Mitigation Action Plan. As the _____ (title, e.g., Chief Administrative Official) for this jurisdiction, I certify that I will commit all necessary resources in order to meet Partnership expectations as outlined in the "Planning Partners expectations" document provided by the Core Planning Team (CPT), in order to obtain Disaster Mitigation Act (DMA) compliance for our jurisdiction.

The following individuals will be our jurisdiction's primary and alternate point of contact for the mitigation planning process:

Name	Title	Phone	Email

The following individuals will serve on the jurisdiction's Local Mitigation Planning Team (LMPT):

Name	Title	Phone	Email

Sincerely,

_____

Appendix B. Procedures for Linking to Hazard Mitigation Plan

B. Procedures for Linking to Hazard Mitigation Plan

Not all eligible local governments are included in the Harris County Multi-Hazard Mitigation Action Plan. Some or all of these non-participating local governments may choose to "link" to the Plan at some point to gain eligibility for programs under the federal Disaster Mitigation Act (DMA). The following "linkage" procedures define the requirements established by the planning team for dealing with an increase in the number of planning partners linked to this plan. No currently non-participating jurisdiction within the defined planning area is obligated to link to this plan. These jurisdictions can choose to do their own "complete" plan that addresses all required elements of Section 201.6 of Chapter 44 of the Code of Federal Regulations (44 CFR).

INCREASING THE PARTNERSHIP THROUGH LINKAGE

Eligibility

Eligible jurisdictions located in the planning area may link to this plan at any point during the plan's performance period (5 years after final approval). Eligibility will be determined by the following factors:

- The linking jurisdiction is a local or tribal government as defined by the Disaster Mitigation Act.
- The boundaries or service area of the linking jurisdiction is completely contained within the boundaries of the planning area established for this hazard mitigation plan.
- The linking jurisdiction's critical facilities were included in the critical facility and infrastructure risk assessment completed for this hazard mitigation plan.

Requirements

It is expected that linking jurisdictions will complete the requirements outlined below and submit their completed template to the Harris County Office of Homeland Security and Emergency Management for review within six months of beginning the linkage process:

- The eligible jurisdiction requests a "Linkage Package" by contacting the Point of Contact (POC) for the plan:

  Benzon K John
  Resilience Planner
  Harris County Office of Homeland Security & Emergency Management
  6922 Katy Rd. Houston, TX 77024
  Office: (713) 881-3100 | Desk: (713) 426-9554 | Fax: (713) 437-8435
  Planning Section Email: plans@hcoem.net

- The POC will provide a linkage procedure package that includes linkage information and a linkage tool-kit:

- Linkage Information
  - Procedures for linking to the multi-jurisdictional hazard mitigation plan
  - Planning partner's expectations for linking jurisdictions
  - A sample "letter of intent" to link to the multi-jurisdictional hazard mitigation plan
  - A copy of Section 201.6 of 44 CFR, which defines the federal requirements for a local hazard mitigation plan.
- Linkage Tool-Kit
  - Copy of Volume 1 and 2 of the plan
  - A municipal or special purpose district template and instructions
  - A catalog of hazard mitigation alternatives
  - A sample resolution for plan adoption

- The new jurisdiction will be required to review both volumes of the Harris County Multi-Hazard Mitigation Action Plan, which include the following key components for the planning area:
  - Goals and objectives
  - The planning area risk assessment
  - Comprehensive review of alternatives
  - Plan implementation and maintenance procedures.

  Once this review is complete, the jurisdiction will complete its specific annex using the template and instructions provided by the POC.

- The development of the new jurisdiction's annex must not be completed by one individual in isolation. The jurisdiction must develop, implement and describe a public involvement strategy and a methodology to identify and vet jurisdiction-specific actions. The original partnership was covered under a uniform public involvement strategy and a process to identify actions that covered the planning area described in Volume 1 and Volume 2 of this plan. Since new partners were not addressed by these strategies, they will have to initiate new strategies and describe them in their annex. For consistency, new partners are encouraged to develop and implement strategies similar to those described in this plan.
- The public involvement strategy must ensure the public's ability to participate in the plan development process. At a minimum, the new jurisdiction must solicit public opinion on hazard mitigation at the onset of the linkage process and hold one or more public meetings to present the draft jurisdiction-specific annex for comment at least two weeks prior to adoption by the governing body. The POC will have resources available to aid in the public involvement strategy, including:
  - The questionnaire utilized in the plan development
  - Presentations from public meeting workshops and the public comment period
  - Press releases used throughout the planning process
  - The plan website.

- The methodology to identify actions should include a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard and a description of the process by which chosen actions were identified. As part of this process, linking jurisdictions should coordinate the selection of actions among the jurisdiction's various departments.
- Once their public involvement strategy and template are completed, the new jurisdiction will submit the completed package to the POC for a pre-adoption review to ensure conformance with the multi-jurisdictional plan format and linkage procedure requirements.

- The POC will review for the following:
  - Documentation of public involvement and action plan development strategies
  - Conformance of template entries with guidelines outlined in instructions
  - Chosen actions are consistent with goals, objectives and mitigation catalog of the Harris County Multi-Hazard Mitigation Action Plan
  - A designated point of contact
  - A completed FEMA plan review crosswalk.
- Plans will be reviewed by the POC and submitted to Texas Division of Emergency Management (TDEM) for review and approval.
- TDEM will review plans for state compliance. Non-compliant plans are returned to the lead agency for correction. Compliant plans are forwarded to FEMA for review with annotation as to the adoption status.
- FEMA reviews the linking jurisdiction's plan in association with the approved plan to ensure DMA compliance. FEMA notifies the new jurisdiction of the results of review with copies to TDEM and the approved plan lead agency.
- Linking jurisdiction corrects plan shortfalls (if necessary) and resubmits to TDEM through the approved plan lead agency.
- For plans with no shortfalls from the FEMA review that have not been adopted, the new jurisdiction governing authority adopts the plan and forwards adoption resolution to FEMA with copies to lead agency and TDEM.
- FEMA regional director notifies the new jurisdiction's governing authority of the plan's approval.

The new jurisdiction plan is then included with the multi-jurisdiction hazard mitigation plan and the linking jurisdiction is committed to participate in the ongoing plan maintenance strategy identified in Chapter 22, Volume 1 of the hazard mitigation plan.

DECREASING THE PARTNERSHIP

The eligibility afforded under this process to the planning partnership can be rescinded in two ways. First, a participating planning partner can ask to be removed from the partnership. This may be done because the partner has decided to develop its own plan or has identified a different planning process for which it can gain eligibility. A partner that wishes to voluntarily leave the partnership shall inform the POC of this desire in writing. This notification can occur any time during the calendar year. A jurisdiction wishing to pursue this avenue is advised to make sure that it is eligible under the new planning effort, to avoid any period of being out of compliance with the Disaster Mitigation Act.

After receiving this notification, the POC shall immediately notify both TDEM and FEMA in writing that the partner in question is no longer covered by the Harris County Multi-Hazard Mitigation Action Plan, and that the eligibility afforded that partner under this plan should be rescinded based on this notification.

The second way a partner can be removed from the partnership is by failure to meet the participation requirements specified in the "Planning Partner Expectations" package provided to each partner at the beginning of the process, or the plan maintenance and implementation procedures specified in Volume 1 of the plan. Each partner agreed to these terms by adopting the plan.

Eligibility status of the planning partnership will be monitored by the POC. The determination of whether a partner is meeting its participation requirements will be based on the following parameters:

- Are partners notifying the POC of changes in designated points of contact?

- Are the partners supporting the Steering Committee by attending designated meetings or responding to needs identified by the body?
- Are the partners continuing to be supportive as specified in the planning partners expectations package provided to them at the beginning of the process?

Participation in the plan does not end with plan approval. This partnership was formed on the premise that a group of planning partners would pool resources and work together to strive to reduce risk within the planning area. Failure to support this premise lessens the effectiveness of this effort. The following procedures will be followed to remove a partner due to the lack of participation:

- The POC will advise the Steering Committee of this pending action and provide evidence or justification for the action. Justification may include: failure to attend meetings determined to be mandatory by the Steering Committee, failure to act on the partner's action plan, or inability to reach designated point of contact after a minimum of five attempts.
- The Steering Committee will review information provided by POC, and determine action by a vote. The Steering Committee will invoke the voting process established in the ground rules established during the formation of this body.
- Once the Steering Committee has approved an action, the POC will notify the planning partner of the pending action in writing via certified mail. This notification will outline the grounds for the action, and ask the partner if it is their desire to remain as a partner. This notification shall also clearly identify the ramifications of removal from the partnership. The partner will be given 30 days to respond to the notification.
- Confirmation by the partner that they no longer wish to participate or failure to respond to the notification shall trigger the procedures for voluntary removal discussed above.
- Should the partner respond that they would like to continue participation in the partnership, they must clearly articulate an action plan to address the deficiencies identified by the POC. This action plan shall be reviewed by the Steering Committee to determine whether the actions are appropriate to rescind the action. Those partners that satisfy the Steering Committee's review will remain in the partnership, and no further action is required.
- Automatic removal from the partnership will be implemented for partners where these actions have to be initiated more than once in a 5-year planning cycle.

Appendix C. Annex Instructions and Templates

INSTRUCTIONS FOR COMPLETING CITY/COUNTY ANNEX TEMPLATE

The jurisdictional annex templates for the 2018 *Harris County Hazard Mitigation Plan* update will be completed in three phases. **This document provides instructions for completing each phase of the template for municipalities.**

The target timeline for phase completion is as follows:

- **Phase 1**—Profile, Trends and Previous Plan Status
  - Deployed: November 26, 2018
  - Due: December 31, 2018
- **Phase 2**—Capability Assessment and Information Sources
  - Deployed: February 19, 2019
  - Due: March 29, 2019
- **Phase 3**—Risk Ranking, Action Plan, and Information Sources
  - Deployed: Mandatory Phase 3 Workshops in mid-July 2019
  - Due: August 2019

Please direct any questions and return your completed Phase 3 template by August 9, 2019 to:

Brian Rutherford
Tetra Tech
Phone: (281) 414-6741
E-mail: Brian.Rutherford@tetratech.com

A Note About Formatting:

The template for the annex is a Microsoft Word document in a format that will be used in the final plan. Partners are asked to use this template so that a uniform product will be completed for each partner.

Content should be entered within the yellow, highlighted text that is currently in the template, rather than creating text in another document and pasting it into the template. Text from another source will alter the style and formatting of the document.

The numbering in the document will be updated when completed annexes are combined into the final document. Please do not adjust any of this numbering.

IMPORTANT! READ THIS

Phase 1 and Phase 2 templates were previously provided to your jurisdiction for completion. If your jurisdiction returned completed Phase 1 and Phase 2 templates:

- The Phase 1 and Phase 2 content you provided is already incorporated into your Phase 3 template.
- Please review the template to see if we have inserted any comments requesting further work to be done on Phase 1 and Phase 2
  - ***If any comments are included, please address them.*** Then, begin your work on Phase 3 following the Phase 3 instructions beginning on page 10.
  - If no comments are included, then you **DO NOT** need to do any further work on the Phase 1 and Phase 2 content. ***Go directly to the instructions for Phase 3, beginning on page 10.***

If your jurisdiction has **NOT** yet done any work on the Phase 1 and Phase 2 templates, then follow the instructions below for providing the Phase 1 and Phase 2 information.

If your jurisdiction started work on the Phase 1 or Phase 2 template but never completed and submitted it, please copy the work you had completed so far into the new template you received for Phase 3. Then complete Phases 1 and 2 following the instructions provided here.

PHASE 1 AND PHASE 2 INSTRUCTIONS

CHAPTER TITLE

You jurisdiction's name has already been entered as the title of the chapter. Please review and correct if needed.

HAZARD MITIGATION PLAN POINT OF CONTACT

Provide the name, title, mailing address, telephone number, and e-mail address for the primary point of contact for your jurisdiction. This should be the person responsible for monitoring, evaluating and updating the annex for your jurisdiction. This person should also be the principle liaison between your jurisdiction and the Steering Committee overseeing development of this plan.

In addition, designate an alternate point of contact. This would be a person to contact should the primary point of contact be unavailable or no longer employed by the jurisdiction.

Note: Both of these contacts should match the contacts that were designated in your jurisdiction's letter of intent to participate in this planning process. If you have changed the primary or secondary contact, please let the planning team know by inserting a comment into the document.

JURISDICTION PROFILE

Provide information specific to your jurisdiction as indicated, in a style similar to the examples provided below. This should be information that will not be provided in the overall mitigation plan document.

Location

Describe the community's location, size and prominent features, similarly to the example below

> The City of Jones is in the northwest portion of Smith County, along the Pacific Coast in northern California. It is almost 300 miles of San Francisco. The city's total area is 4.2 square miles, with boundaries generally extending north-south from State Highway 111 to the Johnson River and east-west from Coast Road to East Frank Avenue. The City of Allen is to the north, unincorporated county is to the west, the City of Bethany is to the south, and the Pacific Ocean is to the west.
>
> Jones is home to the University of Arbor, Bickerson Manufacturing, and the western portion of Soosoo National Park.

History

Describe the community's history, focusing on economy and development, and note its year of incorporation, similarly to the example below

> The City of Jones was incorporated in 1858. The area was settled during the gold rush in the 1850s as a supply center for miners. As the gold rush died down, timber and fishing became the area's major economic resources. By 1913, the Jones Teachers College, a predecessor to today's University of Arbor, was founded. Recently, the presence of the college has come to shape Jones' population into a young and educated demographic. In 1981 the City developed the Jones Marsh and Wildlife sanctuary, an environmentally friendly sewage treatment enhancement system.
>
> With numerous annexations since its original incorporation, the city's area has almost doubled. Today it features a commercial core in the center of the city, with mostly residential areas to the north and south, the university to the west and the national park on the east.

Climate

Describe the community's key climate characteristics, similarly to the example below

> Jones' weather is typical of the Northern California coast, with mild summers and cool, wet winters. It rarely freezes in the winter and it is rarely hot in the summer. Annual average rainfall is over 40 inches, with 80 percent of that falling from November through April. The average year-round temperature is 59ºF. Humidity averages 72 to 87 percent. Prevailing winds are from the north, and average 5 mph.

Governing Body Format

Describe the community's key governance elements, similarly to the example below

> The City of Jones is governed by a five-member city council. The City consists of six departments: Finance, Environmental Services, Community Development, Public Works, Police and the City Manager's Office. The City has 13 commissions and task forces, which report to the City Council.
>
> The City Council assumes responsibility for the adoption of this plan; the City Manager will oversee its implementation.

Complete the table providing the names and titles of members of the local mitigation planning team responsible for completion of this annex. Team membership should consist of agencies with authority to regulate development and enforce local ordinances or regulatory standards, such as building/fire code enforcement, emergency management, emergency services, floodplain management, parks and recreation, planning/community

development, public information, public works/engineering, stormwater management, transportation, or infrastructure.

CURRENT TRENDS

Population

For population data, use the most current population figure for your jurisdiction based on an official means of tracking (e.g., the U.S. Census or state office of financial management).

> According to California Department of Finance, the population of Jones as of July 2018 was 17,280. Since 2010, the population has grown at an average annual rate of 1.2 percent, though that rate is declining, with an annual average of only 0.8 percent since 2015.

Development

In the yellow-highlighted text that says "Describe trends in general," provide a brief description of your jurisdiction's recent development trends similar to the following example:

> Anticipated development levels for Jones are low to moderate, consisting primarily of residential development. The majority of recent development has been infill. Residentially, there has been a focus on affordable housing and a push for more secondary mother-in-law units on properties.
>
> The City of Jones adopted its general plan in July 2000. The plan focuses on issues of the greatest concern to the community. City actions, such as those relating to land use allocations, annexations, zoning, subdivision and design review, redevelopment, and capital improvements, must be consistent with the plan. Future growth and development in the city will be managed as identified in the general plan.

Complete the table titled "Recent and Expected Future Development Trends." Please note:

- The portion of the table requesting the number of permits by year is specifically looking for development permits for new construction. If your jurisdiction does not have the ability to differentiate between permit types, please list the total number of permits and indicate "N/A" (not applicable) for the permit sub-types.
- If your jurisdiction does not have the ability to track the number of permits for each hazard area, please delete the bullet list of hazard areas and insert a qualitative description of where development has occurred.
- Examples of qualitative descriptions of buildout in the jurisdiction are as follows:
  - The Town is close to being built out. Most new projects involve the demolition of an existing residence and construction of a new replacement residence. A few subdivisions are processed each year.
  - There are five parcels of underdeveloped land within the city limits. According to the General Plan, the total potential units for these parcels is 33 units.

CAPABILITY ASSESSMENT

Please note that it is unlikely that you will be able to complete all sections of the capability assessment on your own. You will likely need to reach out to other departments within your local government, such as planning, finance, public works, etc. It may be beneficial to provide these individuals with background information about this planning process, as you will want input from them again during Phase 3 of your annex development.

Fill in your jurisdiction's name where indicated on the first line of the first paragraph under the heading "1.4 Capability Assessment."

Legal and Regulatory Capability

In the table titled "Legal and Regulatory Capability," indicate "Yes" or "No" for each listed code, ordinance, requirement or planning document in each of the following columns:

- **Local Authority**—Enter "Yes" if your jurisdiction has prepared or adopted the identified item; otherwise, enter "No." If yes, then enter the code, ordinance number, or plan name and its date of adoption in the comments column. ***Note: If you are entering yes, please be sure that you are providing a comment with the appropriate code, ordinance or plan.***
- **Other Jurisdiction Authority**—Enter "Yes" if there are any regulations that may impact your jurisdiction that are enforced or administered by another agency (e.g., a state agency or special purpose district) or if you know that there are any state or federal regulations or laws that would prohibit local implementation of the identified item; otherwise, enter "No." ***Note: If you answer yes, please indicate the other agency in the comments.***
- **State Mandated**—Enter "Yes" if state laws or other requirements enable or require the listed item to be implemented at the local level; otherwise, enter "No." ***Note: If you are entering yes, please be sure that you are providing a comment.***
- **Integration Opportunity**—Enter "Yes" if your jurisdiction has opportunities for integration of the code, ordinance or plan with the hazard mitigation plan. Consider entering "Yes" in the Integration Opportunity column if you answer "yes" to any of the following:

  - If you answered "Yes" in the Local Authority column for this code, ordinance or plan:

    - Does the code, ordinance or plan already address hazards and their potential impacts?
      - If so, should it be updated or revised to reflect new information about risk?
      - If not, will (or should) the code, ordinance or plan be updated over the performance period of the hazard mitigation plan (5 years)?
    - Does the code, ordinance or plan include specific projects that should be reviewed to incorporate hazard mitigation goals?
    - Does the code, ordinance or plan include specific projects that should be included as action items in the hazard mitigation action plan?

  - If you answered "No" in the Local Authority column for this code, ordinance or plan:

    - Will your jurisdiction develop the code, ordinance or plan during the performance period of the hazard mitigation plan?

  Note: Each capability with a "Yes" answer to Integration Opportunity will be discussed in more detail later in the annex. You may wish to keep notes when assessing the Integration Opportunity or review the "Integration with Other Planning Initiatives" section below.

- **Comments**—Enter the code number and adoption date for any local code indicated as being in place; provide other comments as appropriate to describe capabilities for each entry. PLEASE DO NOT OVERLOOK THIS STEP

For the category "Capital Improvement Plan," answer the specific question regarding plan update frequency, in addition to completing the four columns indicating level of capability.

Development and Permit Capabilities

Complete the table titled "Development and Permitting Capabilities."

Fiscal Capability

Complete the table titled "Fiscal Capability" by indicating whether each of the listed financial resources is accessible to your jurisdiction. Enter "Yes" if the resource is fully accessible to your jurisdiction. Enter "No" if there are limitations or prerequisites that may hinder your eligibility for this resource.

Administrative and Technical Capability

Complete the table titled "Administrative and Technical Capability" by indicating whether your jurisdiction has access to each of the listed personnel resources. Enter "Yes" or "No" in the column labeled "Available?". If yes, then enter the department and position title in the right-hand column. If you have contract support staff with these capabilities, you can still answer "Yes." Indicate in the department column that this resource is provided through contract support.

Education and Outreach Capabilities

Complete the table titled "Education and Outreach" to indicate your jurisdiction's capabilities and existing efforts regarding natural hazard mitigation education and outreach.

National Flood Insurance Program Compliance

Complete the table titled "National Flood Insurance Program Compliance" by indicating your jurisdiction's capabilities related to each question in the table.

Classification in Hazard Mitigation Programs

Complete the table titled "Community Classifications" to indicate your jurisdiction's participation in various national programs related to natural hazard mitigation. For each program enter "Yes" or "No" in the second column to indicate whether your jurisdiction participates. If yes, then enter the classification that your jurisdiction has earned under the program in the third column and the date on which that classification was issued in the fourth column; enter "N/A" in the third and fourth columns if your jurisdiction is not participating. If you do not know your current classification, information is available at the following websites:

- **Community Rating System**— https://www.fema.gov/media-library-data/1503240360683-30b35cc754f462fe2c15d857519a71ec/20_crs_508_oct2017.pdf
- **Storm Ready**— https://www.weather.gov/stormready/communities
- **Firewise**— http://www.firewise.org/usa-recognition-program/map-of-active-participants.aspx

- **Building Code Effectiveness Grading Schedule (BCEGS)**— https://www.isomitigation.com/bcegs/iso-s-building-code-effectiveness-grading-schedule-bcegs.html
- **Public Protection Classification**— https://firechief.iso.com/FCWWeb/mitigation/ppc0001.jsp

Adaptive Capacity for Climate Change

Consider the climate change impact concerns identified for the planning area:

- Reduced snowpack
- Increased wildfires

- Sea level rise and inland flooding
- Threats to sensitive species (e.g. coho salmon)
- Loss in agricultural productivity (e.g. forestry, wine grapes, nursery products, dairy)
- Public health and safety.

With those impacts in mind, complete the table titled "Adaptive Capacity for Climate Change" by indicating that your jurisdiction's capacity for each listed criterion as follows:

- **High**—The capacity exists and is in use.
- **Medium**—The capacity may exist, but is not used or could use some improvement.
- **Low**—The capacity does not exist or could use substantial improvement.
- **Unsure**—Not enough information is known to assign a rating.

This is a subjective assessment, but providing a few words of explanation is useful. It is highly recommended that you complete this table with an internal planning team and that you review the results of the other capability assessment tables before completing.

INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning and capital facilities planning, and that relevant information from those sources is used in hazard mitigation. The goal of plan integration is to ensure that the potential impact of hazards is considered in planning for future development. FEMA recommends integration as follows:

- Integrate hazard mitigation plan goals with community objectives (e.g. incorporate the goals for risk reduction and safety into the policies of other plans).
- Use the risk assessment to inform plans and policies (e.g. incorporate risk assessment findings into land use plans, site plan review, emergency operations plans).
- Implement mitigation actions through existing mechanisms (e.g. include mitigation projects in the capital improvement plan).
- Think about mitigation before and after a disaster (e.g. build recovery planning on existing mitigation plans and goals).

After reviewing the plans, programs and ordinances identified in the capability assessment tables, identify all plans and programs that have already been integrated with the hazard mitigation plan, and those that offer opportunities for future integration. The simplest way to do this is to review the Legal and Regulatory Capabilities table to see which items were marked as "Yes" under the Integration Opportunity column.

Existing Integration

In the highlighted bullet list, list items for which you entered "Yes" under the Integration Opportunity column of the "Legal and Regulatory Capability" table because the plan or ordinance already addresses potential impacts or includes specific projects that should be included as action items in the mitigation action plan. Consider listing items marked as Completed in the "Status of Previous Plan Actions" table if they were indicated as being ongoing actions. Provide a brief description of how the plan or ordinance is integrated. Examples are as follows:

- **Capital Improvement Plan**—The capital improvement plan includes projects can help mitigate potential hazards. The City will act to ensure consistency between the hazard mitigation plan and the current and future capital improvement plans. The hazard mitigation plan may identify new possible funding sources for capital improvement projects and may result in modifications to proposed projects based on results of the risk assessment.

- **Building Code and Fire Code**—The City's adoption of the 2016 California building and fire codes incorporated local modifications to account for the climatic, topographic and geographic conditions that exist in the City.
- **General Plan**—The general plan includes a "Safety, Services, and Infrastructure" element to protect the community from unreasonable risk by establishing policies and actions to avoid or minimize the following hazards:

  - Geologic and seismic hazards
  - Fire hazards
  - Hazardous materials
  - Flood control
  - Impacts from climate change.

- **Climate Action Plan**—The City's Climate Action Plan includes projects for reducing greenhouse gas emissions and adapting to likely impacts of climate change. These projects were reviewed to identify cross-planning initiates that serve both adaptation and mitigation objectives.

Note: Any plans that fall into this category should be reviewed during the development of the mitigation strategy in Phase 3 and included as appropriate.

Opportunities for Future Integration

List any remaining items that say "Yes" in the Integration Opportunity column in the Legal and Regulatory Capabilities and explain the process by which integration will occur. Examples follow:

- **Zoning Code**—The City of Smithburg is conducting a comprehensive update to its zoning code. The opportunity to incorporate additional mitigation and abatement measures will be contemplated for inclusion into the Code.
- **Capital Improvement Projects**—Capital improvement project proposals may take into consideration hazard mitigation potential as a means of evaluating project prioritization.
- **Post-Disaster Recovery Plan**—Smithburg does not have a recovery plan and intends to develop one as a mitigation planning action during the next five years. The plan will build on the mitigation goals and objectives identified in the mitigation plan.

After you have accounted for all items marked as "Yes" under the Integration Opportunity column, consider other programs you may have in place in your jurisdiction that include routine consideration and management of hazard risk. Examples of such programs may include: tree pruning programs, right-of-way mowing programs, erosion control or stream maintenance programs, etc. Please add any such programs to the integration discussion and provide a brief description of how these program manage (or could be adapted to manage) risk from hazards.

STATUS OF PREVIOUS PLAN ACTIONS

Please note that this section only applies to jurisdictions that are conducting updates to previously approved hazard mitigation plans. If your jurisdiction has not previously participated in an approved plan, please enter a note stating this, and we will remove this section in your final annex.

All action items identified in prior mitigation planning efforts must be reconciled in this plan update. Action items must all be marked as **ONE** of the following; check the appropriate box (place an X) and provide the following information:

- **Completed—**If an action has been completed since the prior plan was prepared, please check the appropriate box and provide a date of completion in the comment section. If an action has been initiated and is an ongoing program (e.g. annual outreach event), you may mark it as completed and note that it is ongoing in the comments. If an action addresses an ongoing program you would like to continue to include in your action plan, please see the Carried Over to Plan Update bullet below.
- **Removed—**If action items are to be removed because they are no longer feasible, a reason must be given. Lack of funding does not mean that it is no longer feasible, unless the sole source of funding for an action is no longer available. Place a comment in the comment section explaining why the action is no longer feasible or barriers that prevented the action from being implemented (e.g., "Action no longer considered feasible due to lack of political support."). If the wording and/or intent of a previously identified action is unclear, this can be a reason for removal. A change in community priorities may also be a reason for removal and should be discussed in the comments.
- **Carried Over to Plan Update—**If an action is in progress, is ongoing, or has not been initiated and you would like to carry it over to the plan update, please check the "Check if Yes" column under "Carried Over to Plan Update." Selecting this option indicates that the action will be included in the mitigation action plan for this update. If you are carrying over an action to the update, please include a comment describing any action that has been taken or why the action was not taken (specifically, any barriers or obstacles that prevented the action from moving forward or slowed progress). Leave the last column, "Action # in Update," blank at this point. This will be filled in after completing the updated action plan in Phase 3.

Please ensure that you have provided a status and a comment for each action.

REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

Please note that this section will ultimately describe all information sources used to develop this annex, but that only the sources used for Phases 1 and 2 will be listed at this point. Additional sources will be added with the preparation of the Phase 3 annex template.

This section should describe what resources you used to complete the annex and how you used them. Several items are started for you, but please be sure to update and enhance any descriptions. This may seem trivial or unimportant, but it is a requirement to pass the state and FEMA review process.

THIS COMPLETES PHASES 1 AND 2

PHASE 3 INSTRUCTIONS

JURISDICTION-SPECIFIC NATURAL EVENT HISTORY

In the table titled "Past Natural Hazard Events," list in chronological order (most recent first) any natural hazard event that has caused damage to your jurisdiction. Include the date of the event and the estimated dollar amount of damage it caused. You are welcome to include any events, but special attention should be made to include major storms and federally declared disasters. Please refer to the table listing all Presidential Disaster Declarations for the County that is included in the toolkit you received at the workshop. We recommend including most large-scale disasters, unless you know that there were no impacts to your jurisdiction. Specifically, we recommend that you include these events if you have damage estimate information or can provide a brief description of impacts that occurred within your community. In addition to these events, please refer to the NOAA storm events database included in the tool kit. We recommend conducting a search for the name of your jurisdiction in order to identify events with known impacts. Other potential sources of damage information include:

- Preliminary damage estimates your jurisdiction filed with the county or state
- Insurance claims data
- Newspaper archives
- Other plans/documents that deal with emergency management (safety element of a comprehensive plan, emergency response plan, etc.)
- Resident input.

If you do not have estimates for dollars of damage caused, please list "Not Available" in the appropriate column or simply list a brief description of the damages (e.g. Main Street closed as a result of flooding, downed trees and residential damages). Please note that tracking such damages is a valid and useful mitigation action if your jurisdiction does not currently track such information.

HAZARD RISK RANKING

The risk ranking performed for the overall planning area is presented in the risk assessment section of the overall hazard mitigation plan. However, each jurisdiction has differing degrees of risk exposure and vulnerability and, therefore, needs to rank risk for its own area, using the same methodology as used for the overall planning area. The risk-ranking exercise assesses two variables for each hazard: its probability of occurrence; and its potential impact on people, property and the economy.

Enter Risk Rank Based on Loss Matrix Spreadsheet and Local Knowledge

Tetra Tech has developed a draft risk ranking for your jurisdiction. It is included in the "Loss Matrix" spreadsheet provided in the toolkit distributed at the workshop. The hazard with the highest risk rating (probability x impact) was given a rank of 1; the hazard with the second highest rating is listed with a rank of 2; and so on. Two hazards with equal risk ratings were given the same rank. "High," Medium," and "Low" assignments were given for each hazard of concern based on a total score. To complete this section of the annex template, you need to review the risk ranking provided in the spreadsheet, and then do one of the following:

- **If you agree with the results**, copy them from the spreadsheet into the risk ranking table in your annex.
- **If the results differ from what you know based on substantiated data and documentation**, you may alter the ranking based on this knowledge, and enter the revised ranking into the risk ranking table in your annex.

If you modify the spreadsheet-generated risk ranking based on local knowledge, please note this fact in your template and include what you believe the rank should be and why. For example, the spreadsheet may have assigned a low risk rank to drought, but you know that the local economy is heavily reliant on water-using industries, such as agriculture or manufacturing, so you believe it should be ranked as medium. Remember that this exercise is about categorizing hazards into broad levels of risk (high, medium, low), not precise calculations.

In modifying any risk ratings, keep in mind that one of the purposes of this exercise is to support the selection and prioritization of actions in your plan. **You will need to have at least one true mitigation action for each hazard rated as "high" or "medium."** This is discussed in more detail in the Hazard Mitigation Action Plan section of these instructions.

Review Risk Ranking Process Used in the Loss Matrix

The sections below describe the methodology that was used to derive the risk ranking. They are provided for your information in reviewing the risk ranking prepared for your jurisdiction.

Probability of Occurrence for Each Hazard

A probability factor is assigned based on how often a hazard is likely to occur. The probability of occurrence of a hazard event is generally based on past hazard events in an area, although weight can be given to expected future probability of occurrence based on established return intervals and changing climate conditions. For example, if your jurisdiction has experienced two damaging floods in the last 25 years, the probability of occurrence is high for flooding and scores a 3 under this category. If your jurisdiction has experienced no damage from landslides in the last 100 years, your probability of occurrence for landslide is low, and scores a 1 under this category. Each hazard was assigned a probability factor as follows:

- High—Hazard event is likely to occur within 25 years (Probability Factor = 3)
- Medium—Hazard event is likely to occur within 100 years (Probability Factor = 2)
- Low—Hazard event is not likely to occur within 100 years (Probability Factor = 1)
- None—If there is no exposure to a hazard, there is no probability of occurrence (Probability Factor = 0)

Potential Impacts of Each Hazard

The impact of each hazard is divided into three categories: impacts on people, impacts on property, and impacts on the economy. These categories are also assigned weighted values. Impact on people was assigned a weighting factor of 3, impact on property was assigned a weighting factor of 2 and impact on the economy was assigned a weighting factor of 1. Impact factors for each category (people, property, economy) are described below.

Impacts on People

Values are assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. Impact factors were assigned as follows:

- High—25 percent or more of the population is exposed to a hazard (Impact Factor = 3)
- Medium—10 percent to 24 percent of the population is exposed to a hazard (Impact Factor = 2)
- Low—9 percent or less of the population is exposed to the hazard (Impact Factor = 1)
- No impact—None of the population is exposed to a hazard (Impact Factor = 0)

The percent of the total population exposed to each hazard of concern with a defined extent (e.g. floodplain) can be found in the loss estimate matrix in the **green highlighted column.** For hazards that do not have a defined

extent, the entire population or a portion of the population is considered to be exposed, depending on the hazard. For the drought hazard, it is common for jurisdictions to list "low" or "none," because all people in the planning area would be exposed to drought, but impacts to the health and safety of individuals are expected to be minimal.

Impacts on Property

Values are assigned based on the percentage of the total ***property value exposed*** to the hazard event:

- High—25 percent or more of the total replacement value is exposed to a hazard (Impact Factor = 3)
- Medium—10 percent to 24 percent of the total replacement value is exposed to a hazard (Impact Factor = 2)
- Low—9 percent or less of the total replacement value is exposed to the hazard (Impact Factor = 1)
- No impact—None of the total replacement value is exposed to a hazard (Impact Factor = 0)

The percent of the total value exposed to each hazard of concern with a defined extent and location (e.g. floodplain) can be found in the loss estimate matrix in the **blue highlighted column.** For those hazards that do not have a defined extent and location (e.g. severe weather) the entire building stock is generally considered to be exposed. For the drought hazard, it is common for jurisdictions to list "low" or "none," because all structures in the planning area would be exposed to drought, but impacts to structures are expected to be minimal.

Impacts on the Economy

Values were assigned based on the percentage of the total ***property value vulnerable*** to the hazard event. Values represent estimates of the loss from a major event of each hazard in comparison to the total replacement value of the property exposed to the hazard. For some hazards, such as wildland fire and landslide, vulnerability may be considered to be the same or a portion of exposure due to the lack of loss estimation tools specific to those hazards.

- High—Estimated loss from the hazard is 10 percent or more of the total replacement value (Impact Factor = 3)
- Medium—Estimated loss from the hazard is 5 percent to 9 percent of the total replacement value (Impact Factor = 2)
- Low—Estimated loss from the hazard is 4 percent or less of the total replacement value (Impact Factor = 1)
- No impact—No loss is estimated from the hazard (Impact Factor = 0).

The loss estimates for each hazard of concern that was modeled (i.e. dam failure, flood, earthquake) can be found in the loss estimate matrix in the **purple highlighted column.** For those hazards that have a defined extent and location, but do not have modelled loss results, loss estimates can be the same as exposure or a portion thereof. For example, a large percentage of the building stock may be exposed to landslide or wildland fire risk, but it would not be expected that one event that resulted in loss to all exposed structures would occur. For those hazards that do not have a defined extent and location, exposure is based on the hazard type.

Risk Rating for Each Hazard

A risk rating for each hazard was determined by multiplying the assigned probability factor by the sum of the weighted impact factors for people, property and the economy:

Risk Rating = Probability Factor x Weighted Impact Factor {people + property + economy}

This is the number shown in the risk ranking table in your template. Generally, scores of 30 or greater are rated "high", scores between 15 and 30 are rated "medium", and scores of less than 15 are rated "low".

JURISDICTION-SPECIFIC VULNERABILITIES

Repetitive Loss Properties

A repetitive loss property is any property for which FEMA has paid two or more flood insurance claims in excess of $1,000 in any rolling 10-year period since 1978. In the space provided, Tetra Tech has inserted the following information based on data provided by FEMA:

- The number of any FEMA-identified repetitive-loss properties in your jurisdiction.
- The number of any FEMA-identified severe-repetitive-loss properties in your jurisdiction.
- The number (if any) of repetitive-loss or severe-repetitive-loss properties in your jurisdiction that have been mitigated. Mitigated for this exercise means that flood protection has been provided to the structure.

Please note that if your jurisdiction has any repetitive loss properties, we would strongly encourage you to include a mitigation action that addresses mitigating these properties.

Other Vulnerabilities

Review the results of the risk assessment included in the toolkit, your jurisdiction's natural-events history, and any relevant public comments/input, and based on that review, develop a few sentences that discuss specific risks. You do not need to develop a sentence for every parameter, but review the results and identify a few issues you would like to highlight. For example:

- Only about 2 percent of the jurisdiction's population is estimated to reside in the 1 percent annual chance flood hazard area; however, 45 percent of the population is estimated to reside in the 0.2 percent annual chance flood hazard area where flood insurance is generally not required.
- A magnitude 7.5 earthquake on the Smithburg Fault may produce nearly 1 million tons of structure debris.
- Over the past 10 years, the jurisdiction has experienced more than $6 million in estimated damages from severe storm events.
- More than 50 buildings are located in areas that will be permanently inundated with 12 inches of sea level rise.
- The results of the public survey indicated that 40 percent of Smithburg residents would not be able to be self-sufficient for 5 days following a major event.

In addition, list any noted vulnerabilities in your jurisdiction related to hazard mitigation that may not be apparent from the risk assessment and other information provided. This may include things such as the following:

- An urban drainage issue that results in localized flooding every time it rains.
- An area of the community that frequently loses power due to a lack of tree maintenance.
- A critical facility, such as a police station, that is not equipped with a generator.
- A neighborhood that has the potential to have ingress and egress cut off as the result of a hazard event, such as a flood or earthquake (e.g. bridge only access).
- Substantial number of buildings in one area of the community are unreinforced masonry or soft-story construction.
- An area along the river is eroding and threatening public and/or private property.
- A large visitor population that may not be aware of tsunami risk.

Spending some time thinking about the results of the risk assessment and other noted vulnerabilities will be a big help in the development of your mitigation strategy. Tetra Tech has inserted a few items in this section to get you started. In addition, two examples are shown in the table below.

Noted Vulnerability	Example Mitigation Action
Only about 2 percent of the jurisdiction's population is estimated to reside in the 1 percent annual chance flood hazard area; however, 45 percent of the population is estimated to reside in the 0.2 percent annual chance flood hazard area where flood insurance is generally not required.	Develop and implement an annual public information initiative that targets residents in the 0.2 percent annual chance flood hazard area. Provide information on the availability of relatively low cost flood insurance policies.
An urban drainage issue results in localized flooding every time it rains.	Replace undersized culverts that are contributing to localized flooding. Priority areas include: • The corner of Main Street and 1st Street • Old Oak subdivision.

HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

This section is the heart of your jurisdictional annex. This is where you will identify the actions your jurisdiction would like to pursue with this plan. All of the work that you have done thus far should provide you with a plethora of ideas for actions. With this in mind, we recommend that you review the following and develop a list of potential actions:

Wording Your Action Descriptions:

Descriptions of your actions need not provide great detail. That will come when you apply for a project grant. Provide enough information to identify the project's scope and impact. The following are typical descriptions for an action plan action:

- **Action 1—**Address repetitive-loss properties. Through targeted mitigation, acquire, relocate or retrofit the five repetitive loss structures in the County as funding opportunities become available.
- **Action 2—**Perform a non-structural, seismic retrofit of City Hall.
- **Action 3—**Acquire floodplain property in the Smith subdivision.
- **Action 4—**Enhance the County flood warning capability by joining the NOAA "Storm Ready" program.

- **Capability Assessment Section of Annex—**Review the Legal and Regulatory Capability table, the Fiscal Capability table, the Administrative and Technical Capability table, the Education and Outreach table, and the Community Classification table.
  - ➢ For any capability that you indicated that you did not have, ask yourself – should we have this capability? If yes, consider including an action to develop/acquire the capability.
  - ➢ Example: Ensure a staff person from public works and planning are trained in the use of FEMA's benefit-cost analysis software.
  - ➢ Review the Legal and Regulatory capabilities. If any have not been reviewed and updated in more than 10 years, consider an action to review and update the capability and, as appropriate, incorporate hazard mitigation principles or information obtained in the risk assessment (Note: actions such as this should also be identified in the opportunities for future integration section). Also, consider including projects or actions that have been identified in other plans and programs such as Capital Improvement Plans, Strategic Plans, etc. as actions in this plan.
  - ➢ For any capability that you indicated you do have, consider how this capability can be leveraged to increase or improve hazard mitigation in the jurisdiction.

- **National Flood Insurance Program Compliance Table of this Annex**—Review the table and consider the following:
  - ➢ If you have no certified floodplain managers and you have flood risk, consider adding an action to provide key staff members with training appropriate to obtain certification.
  - ➢ If your flood damage prevention was last updated in or before 2004, you should identify an action to update your ordinance to ensure it is compliant with NFIP requirements.

  - If you have any outstanding NFIP compliance issues, be sure to add an action to address them.
  - If flood hazard maps do not adequately address the flood risk within your jurisdiction, consider actions to request new mapping or conduct studies.
  - If you don't participate in CRS or you would like to improve your classification, consider this as an action.
  - If the number of flood insurance polices in your jurisdiction is low relative to the number of structures in the floodplain, consider an action that will promote flood insurance in your jurisdiction.

- **Adaptive Capacity for Climate Change Section of this Annex**—Consider your responses to this section. For those criteria that you listed as medium or low, think of ways you could improve this rating (see adaptive capacity portion of the mitigation best practices catalog). For those criteria you listed as high, think about how you can leverage this capacity to improve or enhance mitigation or continue to improve this capacity. For those criteria that you were unable to provide responses for, consider ways you could improve your understanding of this capacity (see mitigation best practices and adaptive capacity catalog).
- **Opportunities for Future Integration Section in this Annex**—Review the items you identified in this section. For items that address land use, include them in the prepopulated action in your template that reads as follows: *Integrate the hazard mitigation plan into other plans, ordinances and programs that dictate land use decisions in the community, including* _____. For other items listed in this section, consider an action that specifically says what the plan, code, ordinance etc. is and how it will be integrated.
- **Jurisdiction-Specific Vulnerabilities Section in this Annex—**Review the items that you have identified in this section and consider actions that will help reduce these vulnerabilities (see mitigation best practices catalog).
- **Mitigation Best Practices Catalog**—A catalog that includes FEMA and other agency identified best practices, steering committee and other stakeholder recommendations was developed as part of the plan development process and included in your tool kit. Review the catalog and identify those actions that your jurisdiction should consider including in its action plan.
- **Public Input**—Review input received during the process, specifically the public survey results included in your toolkit.
- **Prior Mitigation Planning Efforts**—If your jurisdiction participated in a previous hazard mitigation plan, please be sure to remember to include any actions that were identified as "carry over" actions. Once you have carried them over, return to the Status of Previous Actions table and record the new action number (see discussion below).

Be sure to consider the following factors in your selection of actions:

- Select actions that are consistent with the overall purpose, goals, and objectives of the hazard mitigation plan.
- Identify actions where benefits exceed costs.
- Include any action that your jurisdiction has committed to pursuing regardless of grant eligibility.
- Know what is and is not grant-eligible under the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) and Flood Mitigation Assistance (FMA) grants (see fact sheet provided in toolkit). If you have actions that are not HMGP, PDM or FMA grant eligible, but do mitigate part or all of the hazard and may be eligible for other grant programs sponsored by other agencies, include them in this section.
- **You must identify at least one true mitigation action (i.e. not a preparedness or response action) that is clearly defined and actionable for hazards ranked as "high" or "medium."**

Review Actions Recommended for All Partners

Four actions have been prepopulated in your annex template. These actions should be included in every annex and should not be removed, although the specifics should be adjusted as needed for the particulars of each community.

- Where appropriate, support retrofitting, purchase or relocation of structures located in high hazard areas, prioritizing those structures that have experienced repetitive losses and/or are located in high or medium ranked hazard areas.
- Integrate the hazard mitigation plan into other plans, ordinances and programs that dictate land use decisions within the community.
- Actively participate in the plan maintenance protocols outlined in Volume 1 of the hazard mitigation plan.
- Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements:
  - Enforce the flood damage prevention ordinance.
  - Participate in floodplain identification and mapping updates.
  - Provide public assistance/information on floodplain requirements and impacts.

We also recommend that every planning partner strongly consider the following additional actions, adjusted as needed for the particulars of each community:

- Develop and implement a program to capture perishable data after significant events (e.g. high water marks, preliminary damage estimates, damage photos) to support future mitigation efforts including the implementation and maintenance of the hazard mitigation plan.
- Develop a post-disaster recovery plan and a debris management plan.
- Develop and/or update plans that support or enhance continuity of operations following disasters.
- Purchase generators for critical facilities and infrastructure that lack adequate back-up power.

Complete the Table

Complete the table titled "Hazard Mitigation Action Plan Matrix" for all the actions you have identified and would like to include in the plan:

- Enter the action number and description. Replace the "xxx" included in the template with the letter code for your jurisdiction as follows:
  - Harris County—HAR1, HAR2, HAR3…
  - City of Baytown—BAY1, BAY2, BAY3…
  - City of Bellaire—BEL1, BEL2, BEL3…
  - City of Bunker Hill Village—BNK1, BNK2, BNK3…
  - City of Deer Park—DPK1, DPK2, DPK3…
  - City of El Lago—LAG1, LAG2, LAG3…
  - City of Friendswood—FRD1, FRD2, FRD3…
  - City of Galena Park—GAL1, GAL2, GAL3…
  - City of Hedwig Village—HED1, HED2, HED3…
  - City of Hilshire Village—HIL1, HIL2, HIL3…
  - City of Humble—HUM1, HUM2, HUM3…
  - City of Hunters Creek Village—HNT1, HNT2, HNT3…
  - City of Jacinto City—JAC1, JAC2, JAC3…
  - City of Jersey Village—JRV1, JRV2, JRV3…
  - City of Katy—KTY1, KTY2, KTY3…
  - City of LaPorte—LPT1, LPT2, LPT3…
  - City of Missouri City —MSS1, MSS2, MSS3…
  - City of Morgan's Point—MRG1, MRG2, MRG3…
  - City of Nassau Bay—NAS1, NAS2, NAS3…
  - City of Pasadena—PAS1, PAS2, PAS3…
  - City of Piney Point Village—PPV1, PPV2, PPV3…
  - City of Seabrook—SBR1, SBR2, SBR3…
  - City of Shore Acres—SHR1, SHR2, SHR3…
  - City of Southside Place—SSP1, SSP2, SSP3…
  - City of Spring Valley—SPV1, SPV2, SPV3…
  - City of Stafford—STF1, STF2, STF3
  - City of Taylor Lake Village—TLV1, TLV2, TLV3
  - City of Tomball—TOM1, TOM2, TOM3…
  - City of Webster—WEB1, WEB2, WEB3…
  - City of West University Place—WUP1, WUP2, WUP3…
- If the action is carried over from your previous hazard mitigation plan, return to the "Status of Previous Plan Actions" table you completed in Phase 1 and enter the new action number in the column labeled Action # in Update.

- Indicate whether the action mitigates hazards for new and/or existing assets.
- Identify the specific hazards the action will mitigate (note: you must list the hazards, simply indicating all hazards is not deemed acceptable).
- Identify by number the mitigation plan objectives that the action addresses (see toolkit).
- Indicate who will be the lead in administering the action. This will most likely be a department within your jurisdiction (e.g. planning or public works). If you wish to indicate more than one department, please ensure that it is clear who the lead agency will be and list supporting agencies in the appropriate column.
- Enter an estimated cost in dollars if known; otherwise, enter "High," "Medium" or "Low" as determined for the prioritization process described in the following section.
- Identify funding sources for the action. If it is a grant, include the funding sources for the cost share. Refer to your fiscal capability assessment to identify possible sources of funding and refer to **the table below** for project eligibility for FEMA's hazard mitigation assistance grant programs.
- Indicate the time line as "short-term" (1 to 5 years) or "long-term" (5 years or greater) or "ongoing" (a continual program)

Eligible Activities	Hazard Mitigation Grant Program	Pre-Disaster Mitigation	Flood Mitigation Assistance
Property Acquisition and Structure Demolition	√	√	√
Property Acquisition and Structure Relocation	√	√	√
Structure Elevation	√	√	√
Mitigation Reconstruction	√	√	√
Dry Floodproofing of Historic Residential Structures	√	√	√
Dry Floodproofing of Non-residential Structures	√	√	√
Generators	√	√	
Localized Flood Risk Reduction Projects	√	√	√
Non-Localized Flood Risk Reduction Projects	√	√	
Structural Retrofitting of Existing Buildings	√	√	√
Non-Structural Retrofitting of Existing Buildings and Facilities	√	√	√
Safe Room Construction	√	√	
Wind Retrofit for One- and Two-Family Residences	√	√	
Infrastructure Retrofit	√	√	√
Soil Stabilization	√	√	√
Wildland fire Mitigation	√	√	
Post-Disaster Code Enforcement	√		
Advance Assistance	√		
5 Percent Initiative Projects*	√		
Aquifer and Storage Recovery**	√	√	√
Flood Diversion and Storage**	√	√	√
Floodplain and Stream Restoration**	√	√	√
Green Infrastructure**	√	√	√
Miscellaneous/Other**	√	√	√
Hazard Mitigation Planning	√	√	√
Technical Assistance			√
Management Costs	√	√	√

* FEMA allows increasing the 5% Initiative amount up to 10% for a Presidential major disaster declaration under HMGP. The additional 5% can be used for activities that promote disaster-resistant codes for all hazards. As a condition of the award, a disaster-resistant building code must be adopted or an improved Building Code Effectiveness Grading Schedule is required.

** Proposed actions will be evaluated against program requirements. Eligible projects will be approved if funding is available.

Prioritization of Mitigation Actions

Complete the information in the table titled "Mitigation Strategy Priority Schedule" as follows:

- **Action #**—Indicate the action number from the previous annex table (Hazard Mitigation Action Plan Matrix).
- **# of Objectives Met**—Enter the number of objectives the action will meet.
- **Benefits**—Enter "High," "Medium" or "Low" as follows:

  - High: Action will have an immediate impact on the reduction of risk exposure to life and property.
  - Medium: Action will have a long-term impact on the reduction of risk exposure to life and property, or action will provide an immediate reduction in the risk exposure to property.
  - Low: Long-term benefits of the action are difficult to quantify in the short term.

- **Costs**—Enter "High," "Medium" or "Low" as follows:

  - High: Would require an increase in revenue via an alternative source (i.e., bonds, grants, fee increases) to implement. Existing funding levels are not adequate to cover the costs of the proposed action.
  - Medium: Could budget for under existing work-plan, but would require a reapportionment of the budget or a budget amendment, or the cost of the action would have to be spread over multiple years.
  - Low: Possible to fund under existing budget. Action is or can be part of an existing ongoing program.
  - If you know the estimated cost of an action because it is part of an existing, ongoing program, indicate the amount.

- **Do Benefits Exceed the Cost?**—Enter "Yes" or "No." This is a qualitative assessment. Enter "Yes" if the benefit rating (high, medium or low) is the same as or higher than the cost rating (high benefit/high cost; high benefit/medium cost; medium benefit/low cost; etc.). Enter "No" if the benefit rating is lower than the cost rating (medium benefit/high cost, low benefit/medium cost; etc.)
- **Is the Action Grant-Eligible?**—Enter "Yes" or "No." Refer to the fact sheet on HMGP, PDM and FMA and the table above.
- **Can Action Be Funded Under Existing Program Budgets?**—Enter "Yes" or "No." In other words, is this action currently budgeted for, or would it require a new budget authorization or funding from another source such as grants?
- **Implementation Priority**— Enter "High," "Medium" or "Low" as follows:

  - **High Priority**—An action that meets multiple objectives, has benefits that exceed costs, and has a secured source of funding. Action can be completed in the short term (1 to 5 years).
  - **Medium Priority**—An action that meets multiple objectives, has benefits that exceed costs, and is eligible for funding though no funding has yet been secured for it. Action can be completed in the short term (1 to 5 years), once funding is secured. Medium-priority actions become high-priority actions once funding is secured.
  - **Low Priority**—An action that will mitigate the risk of a hazard, has benefits that do not exceed the costs or are difficult to quantify, has no secured source of funding, and is not eligible for any known grant funding. Action can be completed in the long term (1 to 10 years). Low-priority actions are generally "wish-list" actions. They may be eligible for grant funding from programs that have not yet been identified.

- **Grant Pursuit Priority**— Enter "High," "Medium" or "Low" as follows:

- **High Priority**—An action that meets identified grant eligibility requirements, has high benefits, and is listed as high or medium implementation priority; local funding options are unavailable or available local funds could be used instead for actions that are not eligible for grant funding.
- **Medium Priority**—An action that meets identified grant eligibility requirements, has medium or low benefits, and is listed as medium or low implementation priority; local funding options are unavailable.
- **Low Priority**—An action that has not been identified as meeting any grant eligibility requirements.

This prioritization is a simple way to determine that your identified actions meet one of the primary objectives of the Disaster Mitigation Act. It is not the detailed benefit/cost analysis required for HMGP/PDM /FMA action grants. The prioritization will identify any actions whose probable benefits will not exceed the probable costs. Those actions identified as high-priority grant funding actions should be closely reviewed for consideration when grant funding opportunities arise.

Note: If a jurisdiction wishes to identify an action as high priority that is outside of the prioritization scheme for high priorities, a note indicating so should be inserted and a rationale should be provided.

An example completed table is provided below.

Table 1-9. Mitigation Strategy Priority Schedule

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Action Grant-Eligible?	Can Action Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
EX-1	3	High	High	Yes	Yes	No	Medium	High
EX-2	7	Medium	Low	Yes	No	Yes	High	Low
EX-3	2	Low	Medium	No	No	Maybe	Low	Low
EX-4	10	Low	Low	Yes	No	Yes	High	Low
EX-5	3	Low	Low	Yes	No	Yes	High	Low
EX-6	6	Medium	Low	Yes	No	Yes	High	Low
EX-7	3	Medium	Low	Yes	No	Yes	High	Low
EX-8	1	Medium	Medium	Yes	Yes	No	Medium	High
EX-9	2	Medium	Low	Yes	No	Yes	High	Low
EX-10	7	Medium	Low	Yes	No	Yes	High	Medium
EX-11	3	High	Medium	Yes	Yes	No	Medium	High

Analysis of Mitigation Actions

Complete the table titled "Analysis of Mitigation Actions" summarizing the mitigation actions by hazard of concern and the following eight mitigation types. Please note that an action can be more than one mitigation type:

- **Prevention**—Government, administrative or regulatory actions that influence the way land and buildings are developed to reduce hazard losses. Includes planning and zoning, floodplain laws, capital improvement programs, open space preservation, and stormwater management regulations.
- **Property Protection**—Modification of buildings or structures to protect them from a hazard or removal of structures from a hazard area. Includes acquisition, elevation, relocation, structural retrofit, storm shutters, and shatter-resistant glass.

- **Public Education and Awareness**—Actions to inform residents and elected officials about hazards and ways to mitigate them. Includes outreach projects, real estate disclosure, hazard information centers, and school-age and adult education.
- **Natural Resource Protection**—Actions that minimize hazard loss and preserve or restore the functions of natural systems. Includes sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, wetland restoration and preservation, and green infrastructure.
- **Emergency Services**—Actions that protect people and property during and immediately after a hazard event. Includes warning systems, emergency response services, and the protection of essential facilities.
- **Structural Projects**—Actions that involve the construction of structures to reduce the impact of a hazard. Includes dams, setback levees, floodwalls, retaining walls, and safe rooms.
- **Climate Resilient**—Actions that incorporate methods to mitigate and/or adapt to the impacts of climate change. Includes aquifer storage and recovery activities, incorporating future conditions projections in project design or planning, or actions that specifically address jurisdiction-specific climate change risks, such as sea level rise or urban heat island effect.
- **Community Capacity Building**—Actions that increase or enhance local capabilities to adjust to potential damage, to take advantage of opportunities, or to respond to consequences. Includes staff training, memorandums of understanding, development of plans and studies, and monitoring programs.

This exercise demonstrates that the jurisdiction has selected a comprehensive range of actions. Planning partners should aim to identify at least one action in each category (although this is not required) and should make sure there is at least one action to address "high" and "medium" ranked hazards:

An example completed table is provided below.

Analysis of Mitigation Actions

	Action Addressing Hazard, by Mitigation Type							
Hazard Type	Prevention	Property Protection	Public Education and Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
Dam Failure	EX-2, 3, 4, 5	EX-1, 6	EX-4, 6		EX-8, 11			EX-3, 9, 10
Drought	EX-2	EX-1	EX-4					EX-8, 9, 10
Earthquake	EX-2, 3, 4, 5	EX-1, 7	EX-4		EX-8, 11			EX-3, 4, 8, 9
Flooding	EX-2, 3, 4, 5	EX-1, 6, 7	EX-4, 6	EX-9	EX-8, 11	EX-4	EX-1, 7	EX-3, 4, 8, 9
Landslide	EX-2, 3, 4, 5	EX-1, 7	EX-4		EX-8, 11	EX-4		EX-3, 4, 10
Severe Weather	EX-2, 3, 4, 5	EX-1, 7, 9	EX-4		EX-8, 9, 11			EX-8, 9, 10
Wildland fire	EX-2, 3, 4, 5	EX-1, 7, 9	EX-4, 9	EX-9	EX-8, 11		EX-1, 7, 9	EX-3, 9, 10

REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

Please note that this section will ultimately describe all information sources used to develop this annex. You should have previously listed the sources used for Phases 1 and 2. You should now add any further sources used for the preparation of Phase 3.

This section should describe what resources you used to complete the annex and how you used them. Several items are started for you, but please be sure to update and enhance any descriptions. This may seem trivial or unimportant, but it is a requirement to pass the state and FEMA review process.

FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

In this section, identify any future studies, analyses, reports, or surveys your jurisdiction needs to better understand its vulnerability to identified or currently unidentified risks. These could be needs based on federal or state agency mandates. Please note that this section is optional.

ADDITIONAL COMMENTS

Use this section to add any additional information pertinent to hazard mitigation and your jurisdiction not covered in this template. Please note that this section is optional.

NEXT STEPS

After all jurisdictions have submitted their annexes, the draft plan will be submitted for public comment. Following the public comment period and any revisions responsive to public comment, the plan will be submitted to state and federal review agencies. At that point planning partners will be asked to begin making preparations to formally adopt the plan.

Once FEMA has reviewed the plan and issued an approved-pending-adoption (APA) notice, planning partners will be asked to adopt the plan. Each planning partner must have its governing board adopt this plan via resolution or ordinance. Once adopted, planning partners will submit adoption information to Tetra Tech, who will submit the proof of adoption to FEMA. Once such adoption has been received, FEMA will issue final approval via a letter for those planning partners who have adopted the plan.

It is important to understand that approval is not final until proof of adoption has been received by FEMA and they have issued a letter specifically naming your jurisdiction. More information on the review and approval process, along with adoption support materials, will be provided at a later date.

1. JURISDICTION NAME

1.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Name, Title
Street Address
City, State ZIP
Telephone: xxx-xxx-xxxx
e-mail Address: xxx@xxx.xxx

Alternate Point of Contact
Name, Title
Street Address
City, State ZIP
Telephone: xxx-xxx-xxxx
e-mail Address: xxx@xxx.xxx

1.2 JURISDICTION PROFILE

1.2.1 Location

___[jurisdiction name]___ is in ___[general location description]___

The current boundaries generally extend from ___[describe]___, encompassing an area of ___[area in square miles]___.

1.2.2 History

___[jurisdiction name]___ was incorporated in ___[date]___. ___[brief historical summary]___

1.2.3 Climate

The climate of ___[jurisdiction name]___ is ___[general description]___.

1.2.4 Governing Body Format

___[general description]___.

The __[name of adopting body]___ assumes responsibility for the adoption of this plan; __[name of oversight agency]__ will oversee its implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 1-1.

Table 1-1. Local Mitigation Planning Team Members

Name	Title

1.3 CURRENT TRENDS

1.3.1 Population

According to ___[identify data source]___, the population of ___[jurisdiction name]___ as of ___[month year]___ was ___[population]___ Since ___[year]___, the population has grown at an average annual rate of ___[number]___ percent.

1.3.2 Development

_DESCRIBE TRENDS IN GENERAL__.

Table 1-2 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

Table 1-2. Recent and Expected Future Development Trends

Criterion	Response						
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan? • **If yes, give the estimated area annexed and estimated number of parcels or structures.**	Yes/No _____						
Is your jurisdiction expected to annex any areas during the performance period of this plan? • **If yes, describe land areas and dominant uses.** • **If yes, who currently has permitting authority over these areas?**	Yes/No _____ _____						
Are any areas targeted for development or major redevelopment in the next five years? • **If yes, briefly describe, including whether any of the areas are in known hazard risk areas**	Yes/No _____						
How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?		**2014**	**2015**	**2016**	**2017**	**2018**	
	Single Family	__	__	__	__	__	
	Multi-Family	__	__	__	__	__	
	Other (commercial, mixed use, etc.)	__	__	__	__	__	
	Total	__	__	__	__	__	
Provide the number of new-construction permits for each hazard area or provide a qualitative description of where development has occurred.	• Special Flood Hazard Areas: # • Landslide: # • High Liquefaction Areas: # • Tsunami Inundation Area: # • Wildfire Risk Areas: #						
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	_____						

1.4 CAPABILITY ASSESSMENT

__[jurisdiction name]__ performed an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities is presented in Table 1-3.
- Development and permitting capabilities are presented in Table 1-4.
- An assessment of fiscal capabilities is presented in Table 1-5.
- An assessment of administrative and technical capabilities is presented in Table 1-6.
- An assessment of education and outreach capabilities is presented in Table 1-7.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 1-8.
- Classifications under various community mitigation programs are presented in Table 1-9.
- The community's adaptive capacity for the impacts of climate change is presented in Table 1-10.

Findings of the capability assessment were reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table in Section 1.10 identifies these as community capacity building mitigation actions.

Table 1-3. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code	Yes/No	Yes/No	Yes/No	Yes/No
Comment:				
Zoning Code	Yes/No	Yes/No	Yes/No	Yes/No
Comment:				
Subdivisions	Yes/No	Yes/No	Yes/No	Yes/No
Comment:				
Stormwater Management	Yes/No	Yes/No	Yes/No	Yes/No
Comment:				
Post-Disaster Recovery	Yes/No	Yes/No	Yes/No	Yes/No
Comment:				
Real Estate Disclosure	Yes/No	Yes/No	Yes/No	Yes/No
Comment:				
Growth Management	Yes/No	Yes/No	Yes/No	Yes/No
Comment:				
Site Plan Review	Yes/No	Yes/No	Yes/No	Yes/No
Comment:				
Environmental Protection	Yes/No	Yes/No	Yes/No	Yes/No
Comment:				
Flood Damage Prevention	Yes/No	Yes/No	Yes/No	Yes/No
Comment:				
Emergency Management	Yes/No	Yes/No	Yes/No	Yes/No
Comment:				
Climate Change	Yes/No	Yes/No	Yes/No	Yes/No
Comment:				
Other	Yes/No	Yes/No	Yes/No	Yes/No
Comment:				
Planning Documents				
General Plan	Yes/No	Yes/No	Yes/No	Yes/No
Is the plan compliant with Assembly Bill 2140? *Yes/No*				
Comment:				
Capital Improvement Plan	Yes/No	Yes/No	Yes/No	Yes/No
How often is the plan updated? _____				
Comment:				
Disaster Debris Management Plan	Yes/No	Yes/No	Yes/No	Yes/No
Comment:				
Floodplain or Watershed Plan	Yes/No	Yes/No	Yes/No	Yes/No
Comment:				
Stormwater Plan	Yes/No	Yes/No	Yes/No	Yes/No
Comment:				
Urban Water Management Plan	Yes/No	Yes/No	Yes/No	Yes/No
Comment:				
Habitat Conservation Plan	Yes/No	Yes/No	Yes/No	Yes/No
Comment:				
Economic Development Plan	Yes/No	Yes/No	Yes/No	Yes/No
Comment:				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Shoreline Management Plan	Yes/No	Yes/No	Yes/No	Yes/No
Comment:				
Community Wildfire Protection Plan	Yes/No	Yes/No	Yes/No	Yes/No
Comment:				
Forest Management Plan	Yes/No	Yes/No	Yes/No	Yes/No
Comment:				
Climate Action Plan	Yes/No	Yes/No	Yes/No	Yes/No
Comment:				
Comprehensive Emergency Management Plan	Yes/No	Yes/No	Yes/No	Yes/No
Comment:				
Threat & Hazard Identification & Risk Assessment (THIRA)	Yes/No	Yes/No	Yes/No	Yes/No
Comment:				
Post-Disaster Recovery Plan	Yes/No	Yes/No	Yes/No	Yes/No
Comment:				
Continuity of Operations Plan	Yes/No	Yes/No	Yes/No	Yes/No
Comment:				
Public Health Plan	Yes/No	Yes/No	Yes/No	Yes/No
Comment:				
Other	Yes/No	Yes/No	Yes/No	Yes/No
Comment:				

Table 1-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • **If no, who does? If yes, which department?**	Yes/No _____
Does your jurisdiction have the ability to track permits by hazard area?	Yes/No
Does your jurisdiction have a buildable lands inventory?	Yes/No

Table 1-5. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants	Yes/No
Capital Improvements Project Funding	Yes/No
Authority to Levy Taxes for Specific Purposes	Yes/No
User Fees for Water, Sewer, Gas or Electric Service	Yes/No (If yes, specify)
Incur Debt through General Obligation Bonds	Yes/No
Incur Debt through Special Tax Bonds	Yes/No
Incur Debt through Private Activity Bonds	Yes/No
Withhold Public Expenditures in Hazard-Prone Areas	Yes/No
State-Sponsored Grant Programs	Yes/No
Development Impact Fees for Homebuyers or Developers	Yes/No
Other	Yes/No (if yes, specify)

Table 1-6. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes/No	Insert appropriate information
Engineers or professionals trained in building or infrastructure construction practices	Yes/No	Insert appropriate information
Planners or engineers with an understanding of natural hazards	Yes/No	Insert appropriate information
Staff with training in benefit/cost analysis	Yes/No	Insert appropriate information
Surveyors	Yes/No	Insert appropriate information
Personnel skilled or trained in GIS applications	Yes/No	Insert appropriate information
Scientist familiar with natural hazards in local area	Yes/No	Insert appropriate information
Emergency manager	Yes/No	Insert appropriate information
Grant writers	Yes/No	Insert appropriate information
Other	Yes/No	Insert appropriate information

Table 1-7. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes/No
Do you have personnel skilled or trained in website development?	Yes/No
Do you have hazard mitigation information available on your website? • **If yes, briefly describe.**	Yes/No Insert appropriate information
Do you use social media for hazard mitigation education and outreach? • **If yes, briefly describe.**	Yes/No Insert appropriate information
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • **If yes, briefly describe.**	Yes/No Insert appropriate information
Do you have any other programs already in place that could be used to communicate hazard-related information? • **If yes, briefly describe.**	Yes/No Insert appropriate information
Do you have any established warning systems for hazard events? • **If yes, briefly describe.**	Yes/No Insert appropriate information

Table 1-8. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Insert appropriate information
Who is your floodplain administrator? (department/position)	Insert appropriate information
Are any certified floodplain managers on staff in your jurisdiction?	Yes/No
What is the date that your flood damage prevention ordinance was last amended?	Insert appropriate information
Does your floodplain management program meet or exceed minimum requirements? • **If exceeds, in what ways?**	Meets/Exceeds Insert appropriate information
When was the most recent Community Assistance Visit or Community Assistance Contact?	Insert appropriate information
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • **If so, state what they are.**	Yes/No Insert appropriate information
Are any RiskMAP projects currently underway in your jurisdiction? • **If so, state what they are.**	Yes/No Insert appropriate information

Criterion	Response
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • **If no, state why.**	Yes/No Insert appropriate information
Does your floodplain management staff need any assistance or training to support its floodplain management program? • **If so, what type of assistance/training is needed?**	Yes/No Insert appropriate information
Does your jurisdiction participate in the Community Rating System (CRS)? • **If yes, is your jurisdiction interested in improving its CRS Classification?** • **If no, is your jurisdiction interested in joining the CRS program?**	Yes/No Yes/No Yes/No
How many flood insurance policies are in force in your jurisdiction?[a] • **What is the insurance in force?** • **What is the premium in force?**	Insert appropriate information $_____ $_____
How many total loss claims have been filed in your jurisdiction?[a] • **How many claims are still open or were closed without payment?** • **What were the total payments for losses?**	Insert appropriate information Insert appropriate information $_____

a. According to FEMA statistics as of MONTH XX, 201X

Table 1-9. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	Yes/No	_____	Date
Building Code Effectiveness Grading Schedule	Yes/No	_____	Date
Public Protection	Yes/No	_____	Date
Storm Ready	Yes/No	_____	Date
Firewise	Yes/No	_____	Date

Table 1-10. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:***	High/Medium/Low
Jurisdiction-level monitoring of climate change impacts ***Comment:***	High/Medium/Low
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	High/Medium/Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	High/Medium/Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:***	High/Medium/Low
Participation in regional groups addressing climate risks ***Comment:***	High/Medium/Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	High/Medium/Low
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	High/Medium/Low

Criterion	Jurisdiction Rating[a]
Identified strategies for adaptation to impacts	High/Medium/Low
Comment:	
Champions for climate action in local government departments	High/Medium/Low
Comment:	
Political support for implementing climate change adaptation strategies	High/Medium/Low
Comment:	
Financial resources devoted to climate change adaptation	High/Medium/Low
Comment:	
Local authority over sectors likely to be negative impacted	High/Medium/Low
Comment:	
Public Capacity	
Local residents knowledge of and understanding of climate risk	High/Medium/Low
Comment:	
Local residents support of adaptation efforts	High/Medium/Low
Comment:	
Local residents' capacity to adapt to climate impacts	High/Medium/Low
Comment:	
Local economy current capacity to adapt to climate impacts	High/Medium/Low
Comment:	
Local ecosystems capacity to adapt to climate impacts	High/Medium/Low
Comment:	

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

1.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

The information on hazards, risk, vulnerability and mitigation contained in this hazard mitigation plan is based on the best available data. Plan integration is the incorporation of this information into other relevant planning mechanisms, such as general planning and capital facilities planning. It includes the integration of natural hazard information and mitigation policies, principles and actions into local planning mechanisms and vice versa. Additionally, plan integration is achieved though the involvement of key staff and community officials in collaboratively planning for hazard mitigation.

1.5.1 Existing Integration

In the performance period since adoption of the previous hazard mitigation plan, ___[jurisdiction name]___ made progress on integrating hazard mitigation goals, objectives and actions into other planning initiatives. The following plans and programs currently integrate components of the hazard mitigation strategy:

- **Plan or Program Name**—Description
- **Plan or Program Name**—Description
- **Plan or Program Name**—Description
- **Plan or Program Name**—Description
- **Plan or Program Name**—Description

Resources listed in Section 1.11 were used to provide information for this annex on integration of hazard mitigation information into other jurisdiction plans or programs.

1.5.2 Opportunities for Future Integration

As this hazard mitigation plan is implemented, ___[jurisdiction name]___ will use information from the plan as the best available science and data on natural hazards. The capability assessment presented in this annex identifies codes, plans and programs that provide opportunities for integration. The progress reporting process described in Volume 1 will outline the progress of area-wide and local hazard mitigation actions related to plan integration. The annual progress report also will identify new opportunities for integration. The capability assessment identified the following plans and programs that do not currently integrate goals or recommendations of the hazard mitigation plan but provide opportunities to do so in the future:

- **Plan or Program Name**—Description
- **Plan or Program Name**—Description
- **Plan or Program Name**—Description
- **Plan or Program Name**—Description
- **Plan or Program Name**—Description

1.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 1-11 lists past occurrences of natural hazards for which specific damage was recorded in ___[jurisdiction name]___. Other hazard events that broadly affected the entire planning area, including ___[jurisdiction name]___, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 1-11. Past Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Insert event type	_____	Date	$_____
Insert event type	_____	Date	$_____
Insert event type	_____	Date	$_____
Insert event type	_____	Date	$_____
Insert event type	_____	Date	$_____
Insert event type	_____	Date	$_____
Insert event type	_____	Date	$_____
Insert event type	_____	Date	$_____
Insert event type	_____	Date	$_____
Insert event type	_____	Date	$_____
Insert event type	_____	Date	$_____
Insert event type	_____	Date	$_____
Insert event type	_____	Date	$_____
Insert event type	_____	Date	$_____
Insert event type	_____	Date	$_____

1.7 HAZARD RISK RANKING

Table 1-12 presents a local ranking for ___[jurisdiction name]___ of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 1-12. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	_____	_____	High/Medium/Low
2	_____	_____	High/Medium/Low
3	_____	_____	High/Medium/Low
4	_____	_____	High/Medium/Low
5	_____	_____	High/Medium/Low
6	_____	_____	High/Medium/Low
7	_____	_____	High/Medium/Low
8	_____	_____	High/Medium/Low
9	_____	_____	High/Medium/Low

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

1.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. This section provides information on a few key vulnerabilities for the jurisdiction. Available jurisdiction-specific risk maps of the hazards are provided at the end of this annex.

1.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: XX
- Number of FEMA-identified Severe-Repetitive-Loss Properties: XX
- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated: XX

1.8.2 Other Noted Vulnerabilities

The following jurisdiction-specific issues have been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- Insert as appropriate.
- Insert as appropriate.
- Insert as appropriate.

Mitigation actions addressing these issues were prioritized for consideration in the action plan presented in Section 1.10.

1.9 STATUS OF PREVIOUS PLAN ACTIONS

Table 1-13 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

Table 1-13. Status of Previous Plan Actions

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
Insert Action Number & Text *Comment:*				
Insert Action Number & Text *Comment:*				
Insert Action Number & Text *Comment:*				
Insert Action Number & Text *Comment:*				
Insert Action Number & Text *Comment:*				
Insert Action Number & Text *Comment:*				
Insert Action Number & Text *Comment:*				
Insert Action Number & Text *Comment:*				
Insert Action Number & Text *Comment:*				
Insert Action Number & Text *Comment:*				
Insert Action Number & Text *Comment:*				

1.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 1-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 1-15 identifies the priority for each action. Table 1-16 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 1-14. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action xxx1—Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Earthquake, flooding, landslide, tsunami, wildfire						
Existing	3, 4, 10	TBD	TBD	High	HMGP, PDM, FMA	Short-term
Action xxx2— Integrate the hazard mitigation plan into other plans, ordinances and programs that dictate land use decisions in the community, including _____						
Hazards Mitigated: Dam failure, drought, earthquake, flooding, landslide, tsunami, wildfire						
New and Existing	1, 3, 4, 5, 7, 8, 10	TBD	TBD	Low	Staff Time, General Funds	Ongoing
Action xxx3—Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: All hazards						
New and Existing	1, 5, 8	TBD	TBD	Low	Staff Time, General Funds	Short-term
Action xxx4—Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements: • Enforce the flood damage prevention ordinance. • Participate in floodplain identification and mapping updates. • Provide public assistance/information on floodplain requirements and impacts.						
Hazards Mitigated: Dam failure, flooding, severe weather, tsunami, sea level rise						
New and Existing	1, 3, 5, 7, 8, 10	TBD	TBD	Low	Staff Time, General Funds	Ongoing
Action xxx5—Description						
Hazards Mitigated: TBD						
Action xxx6—Description						
Hazards Mitigated:						
Action xxx7—Description						
Hazards Mitigated: TBD						
Action xxx8—Description						
Hazards Mitigated: TBD						
Action xxx9—Description						
Hazards Mitigated: TBD						

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 1-15. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
xxx1	3	High	High	Yes	Yes	No	Medium	High
xxx2	7	Medium	Low	Yes	No	Yes	High	Low
xxx3	3	Low	Low	Yes	No	Yes	High	Low
xxx4	6	Medium	Low	Yes	No	Yes	High	Low
xxx5								
xxx6								

a. See the introduction to this volume for explanation of priorities.

Table 1-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education and Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
_____								
_____								
_____								
Medium-Risk Hazards								
_____								
_____								
_____								
Low-Risk Hazards								
_____								
_____								
_____								

a. See the introduction to this volume for explanation of mitigation types.

1.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- **___[jurisdiction name]___ Municipal Code**—The municipal code was reviewed for the full capability assessment and for identifying opportunities for action plan integration.
- **___[jurisdiction name]___ Flood Damage Prevention Ordinance**—The flood damage prevention ordinance was reviewed for compliance with the National Flood Insurance Program.
- <INSERT PLAN/PROGRAM AND DESCRIPTION OF HOW IT WAS USED>
- <INSERT PLAN/PROGRAM AND DESCRIPTION OF HOW IT WAS USED>
- <INSERT PLAN/PROGRAM AND DESCRIPTION OF HOW IT WAS USED>
- <INSERT PLAN/PROGRAM AND DESCRIPTION OF HOW IT WAS USED>

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit**—The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.
- <INSERT DOCUMENT AND DESCRIPTION OF HOW IT WAS USED>

1.12 FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

Insert text, if any; otherwise, delete section

1.13 ADDITIONAL COMMENTS

Insert text, if any; otherwise, delete section

INSTRUCTIONS FOR COMPLETING SPECIAL PURPOSE DISTRICT ANNEX TEMPLATE

The jurisdictional annex templates for the 2018 *Harris County Hazard Mitigation Plan* update will be completed in three phases. **This document provides instructions for completing each phase of the template for special purpose districts.**

The target timeline for phase completion is as follows:

- **Phase 1**—Profile, Trends and Previous Plan Status
  - Deployed: November 26, 2018
  - Due: December 31, 2018
- **Phase 2**—Capability Assessment and Information Sources
  - Deployed: February 19, 2019
  - Due: March 29, 2019
- **Phase 3**—Risk Ranking, Action Plan, and Information Sources
  - Deployed: Mandatory Phase 3 Workshops in mid-July 2019
  - Due: August 2019

Please direct any questions and return your completed Phase 3 template by August 9, 2019 to:

Brian Rutherford
Tetra Tech
Phone: (281) 414-6741
E-mail: Brian.Rutherford@tetratech.com

A Note About Formatting:

The template for the annex is a Microsoft Word document in a format that will be used in the final plan. Partners are asked to use this template so that a uniform product will be completed for each partner.

Content should be entered within the yellow, highlighted text that is currently in the template, rather than creating text in another document and pasting it into the template. Text from another source will alter the style and formatting of the document.

The numbering in the document will be updated when completed annexes are combined into the final document. Please do not adjust any of this numbering.

IMPORTANT! READ THIS

Phase 1 and Phase 2 templates were previously provided to your jurisdiction for completion. If your jurisdiction returned completed Phase 1 and Phase 2 templates:

- The Phase 1 and Phase 2 content you provided is already incorporated into your Phase 3 template.
- Please review the template to see if we have inserted any comments requesting further work to be done on Phase 1 and Phase 2
  - ***If any comments are included, please address them.*** Then, begin your work on Phase 3 following the Phase 3 instructions beginning on page 10.
  - If no comments are included, then you **DO NOT** need to do any further work on the Phase 1 and Phase 2 content. ***Go directly to the instructions for Phase 3, beginning on page 10.***

If your jurisdiction has **NOT** yet done any work on the Phase 1 and Phase 2 templates, then follow the instructions below for providing the Phase 1 and Phase 2 information.

If your jurisdiction started work on the Phase 1 or Phase 2 template but never completed and submitted it, please copy the work you had completed so far into the new template you received for Phase 3. Then complete Phases 1 and 2 following the instructions provided here.

PHASE 1 AND PHASE 2 INSTRUCTIONS

CHAPTER TITLE

You jurisdiction's name has already been entered as the title of the chapter. Please review and correct if needed.

HAZARD MITIGATION PLAN POINT OF CONTACT

Please provide the name, title, mailing address, telephone number, and e-mail address for the primary point of contact for your jurisdiction. This should be the person responsible for monitoring, evaluating and updating the annex for your jurisdiction. This person should also be the principle liaison between your jurisdiction and the Steering Committee overseeing development of this plan.

In addition, designate an alternate point of contact. This would be a person to contact should the primary point of contact be unavailable or no longer employed by the jurisdiction.

Note: Both of these contacts should match the contacts that were designated in your jurisdiction's letter of intent to participate in this planning process. If you have changed the primary or secondary contact, please let the planning team know by inserting a comment into the document.

JURISDICTION PROFILE

Overview

Please provide a brief summary description of the following:

- The purpose of the jurisdiction

- The date of inception
- The type of organization
- The number of employees
- The mode of operation (i.e., how operations are funded)
- The type of governing body, and who has adoptive authority.

This should be information that is specific to your jurisdiction and will not be provided in the overall, planning area-wide mitigation plan document. Provide information similar to the following example:

> The Johnsonville Community Services District is a special district created in 1952 to provide water and sewer service. A five-member elected Board of Directors governs the District. The Board assumes responsibility for the adoption of this plan; the General Manager will oversee its implementation. The District currently employs a staff of 21. Funding comes primarily through rates and revenue bonds.

Complete the table providing the names and titles of members of the local mitigation planning team responsible for completion of this annex. Team membership should consist of agencies with authority to regulate development and enforce local ordinances or regulatory standards, such as building/fire code enforcement, emergency management, emergency services, floodplain management, parks and recreation, planning/community development, public information, public works/engineering, stormwater management, transportation, or infrastructure.

Service Area and Trends

Please provide a brief summary description of the following:

- A description of who the district's customers are
- An approximation of area served in square miles
- A geographical decription of the service area
- An overview of current service area trends, including an approximation of current users/subscribers,
- A summary description of previous growth trends in the service area and anticipated future increase/decrease in services (if applicable)

This should be information that is specific to your jurisdiction and will not be provided in the overall, planning area-wide mitigation plan document. Provide information similar to the following example:

> The Johnsonville Community Services District originally was formed to serve the unincorporated area east of the City of Smithburg known as Johnsonville. The District's designated service area expanded throughout the years to include other unincorporated areas of Jones County: Creeks Corner, Jones Hill, Fields Landing, King Salmon, and Freshwater. As of April 30, 2016, the District serves 7,305 water connections and 6,108 sewer connections, with a total service area of 3.3 square miles.

Assets

Please provide an approximate value for the noted areas within the table. Include the sum total value for identified assets for each section in the "Total" line for the section.

Property

Provide an approximate value for the land owned by the District.

Equipment

List categories of equipment **owned by the District** that are used in times of emergency or that, if incapacitated, have the potential to severely impact the service area. Provide an approximate **aggregate replacement value** for each. For water and sewer, include mileage of pipeline under this category.

Critical Facilities and Infrastructure

List District facilities and infrastructgure vital to maintain services to the designated service area. Include the address of each facility. Provide an approximate **aggregate replacement value** for each line. The Steering Committee has decided upon the following definition of critical facilities for this planning process:

- A local (not state or federal) facility in either the public or private sector that is critical to the health and welfare of the population and that is especially important following hazard events, including but not limited to the following:
  - Structures or facilities that produce, use, or store highly volatile, flammable, explosive, toxic and/or water-reactive materials
  - Hospitals, nursing homes, and housing facilities likely to contain occupants who may not be sufficiently mobile to avoid death or injury during a natural hazard event
  - Mass gathering facilities that may be utilized as evacuation shelters
  - Infrastructure such as roads, bridges and airports that provide sources for evacuation before, during and after natural hazard events
  - Police stations, fire stations, government facilities, vehicle equipment and storage facilities, hardware stores and emergency operation centers that are needed for response activities before, during and after a natural hazard event
  - Public and private utility facilities that are vital to maintaining and restoring normal services to damaged areas before, during and after natural hazard events.

Please use this definition as a guideline when selecting critical facilities the District owns.

NOTE:

Placeholders in the table of assets request **ADDRESSES** for critical facilities. These addresses will not be included in the final published annex, but are needed in order to perform risk mapping and risk analysis for the hazard mitigation plan. Include the addresses in the table if convenient. If not, then provide a separate document listing all critical facilities and addresses for use in development of the hazard mitigation plan.

Sample Completed Table – Special District Assets

Asset	Value
Property	
11.5 Acres	$5,750,000
Equipment	
Total length of pipe 40 miles ($1.32 million per mile X 40 miles)	$52,800,000
4 Emergency Generators	$250,000
Total:	***$53,050,000***
Critical Facilities and Infrastructure	
Administrative Buildings – 357 S. Jones Street	$2,750,000
Philips Pump Station – 111 Fifth Avenue N.	$377,000
Total:	***$3,127,000***

CAPABILITY ASSESSMENT

Planning and Regulatory Capability

List any federal, state, local or district laws, ordinances, codes and policies that govern your jurisdiction that include elements related to hazard mitigation. List any other plans, studies or other documents that address hazard mitigation issues for your jurisdiction. Please provide the date of last update and any comments as appropriate. A few examples follow:

Plan, Study or Program	Date of Most Recent Update	Comment
District Design Standards	2010	
Capital Improvement Program	Updated and approved annually	covers 5 year timeframe
Emergency Operations Plan	2000	
Facility Maintenance Manual	1990	
State Building Code	2016	
Division of State Architects		Review and approval of all building and site design features is required prior to construction
Habitat Conservation Plan		All development impacting critical habitat must meet federal and state requirements pertaining to the protection of endangered species

Fiscal, Administrative and Technical Capabilities

Fiscal Capability

Complete the table titled "Fiscal Capability" by indicating whether each of the listed financial resources is accessible to your jurisdiction. Enter "Yes" if the resource is fully accessible to your jurisdiction. Enter "No" if there are limitations or prerequisites that may hinder your eligibility for this resource.

Administrative and Technical Capability

Complete the table titled "Administrative and Technical Capability" by indicating whether your jurisdiction has access to each of the listed personnel resources. Enter "Yes" or "No" in the column labeled "Available?". If yes, then enter the department and position title in the right-hand column. If you have contract support staff with these capabilities, you can still answer "Yes." Indicate in the department column that this resource is provided through contract support.

Education and Outreach Capabilities

Complete the table titled "Education and Outreach" to indicate your jurisdiction's capabilities and existing efforts regarding natural hazard mitigation education and outreach.

Adaptive Capacity for Climate Change

Consider the climate change impact concerns identified for the planning area:

- Reduced snowpack
- Increased wildfires
- Sea level rise and inland flooding
- Threats to sensitive species (e.g. coho salmon)
- Loss in agricultural productivity (e.g. forestry, wine grapes, nursery products, dairy)

- Public health and safety.

With those impacts in mind, complete the table titled "Adaptive Capacity for Climate Change" by indicating that your jurisdiction's capacity for each listed criterion as follows:

- **High**—The capacity exists and is in use.
- **Medium**—The capacity may exist, but is not used or could use some improvement.
- **Low**—The capacity does not exist or could use substantial improvement.
- **Unsure**—Not enough information is known to assign a rating.

This is a subjective assessment, but providing a few words of explanation is useful. It is highly recommended that you complete this table with an internal planning team and that you review the results of the other capability assessment tables before completing.

INTEGRATION WITH OTHER PLANNING INITIATIVES

The goal of plan integration is to ensure that the potential impact of hazards is considered in planning for future development. FEMA recommends integration as follows:

- Integrate hazard mitigation plan goals with community objectives (e.g. incorporate the goals for risk reduction and safety into the policies of other plans).
- Use the risk assessment to inform plans and policies (e.g. incorporate risk assessment findings into land use plans, site plan review, emergency operations plans).
- Implement mitigation actions through existing mechanisms (e.g. include mitigation projects in the capital improvement plan).
- Think about mitigation before and after a disaster (e.g. build recovery planning on existing mitigation plans and goals).

After reviewing the plans, programs and ordinances identified in the capability assessment, identify all plans and programs that have already been integrated with the goals and recommendations of the hazard mitigation plan, and those that offer opportunities for future integration.

Existing Integration

Provide a brief description of integrated plans or ordinances and how each is integrated. Consider listing items marked as Completed in the "Status of Previous Plan Actions" table if they were indicated as being ongoing actions. Examples are as follows:

- **Capital Improvement Plan**—The capital improvement plan includes projects can help mitigate potential hazards. The District will act to ensure consistency between the hazard mitigation plan and the current and future capital improvement plans. The hazard mitigation plan may identify new possible funding sources for capital improvement projects and may result in modifications to proposed projects based on results of the risk assessment.
- **Emergency Operations Plan**—The results of the risk assessment were used in the development of the emergency operations plan.
- **Facilities Plan**—The results of the risk assessment and mapped hazard areas are used in facility planning for the district. Potential sites are reviewed for hazard risks and appropriate mitigation measures are considered in building and site design.

Opportunities for Future Integration

List any plans or program that offer the potential for future integration and describe the process by which integration will occur. Examples follow:

- **Capital Improvement Projects**—Capital improvement project proposals may take into consideration hazard mitigation potential as a means of evaluating project prioritization.
- **Post-Disaster Recovery Plan**—The District does not have a recovery plan and intends to develop one as a mitigation planning action during the next five years. The plan will build on the mitigation goals and objectives identified in the mitigation plan.

Consider other programs you may have in place in your jurisdiction that include routine consideration and management of hazard risk. Examples of such programs may include: tree pruning programs, right-of-way mowing programs, erosion control or stream maintenance programs, etc. Please add any such programs to the integration discussion and provide a brief description of how these program manage (or could be adapted to manage) risk from hazards.

STATUS OF PREVIOUS PLAN ACTIONS

Please note that this section only applies to jurisdictions that are conducting updates to previously approved hazard mitigation plans. If your jurisdiction has not previously participated in an approved plan, please enter a note stating this, and we will remove this section in your final annex.

All action items identified in prior mitigation planning efforts must be reconciled in this plan update. Action items must all be marked as **ONE** of the following; check the appropriate box (place an X) and provide the following information:

- **Completed—**If an action has been completed since the prior plan was prepared, please check the appropriate box and provide a date of completion in the comment section. If an action has been initiated and is an ongoing program (e.g. annual outreach event), you may mark it as completed and note that it is ongoing in the comments. If an action addresses an ongoing program you would like to continue to include in your action plan, please see the Carried Over to Plan Update bullet below.
- **Removed—**If action items are to be removed because they are no longer feasible, a reason must be given. Lack of funding does not mean that it is no longer feasible, unless the sole source of funding for an action is no longer available. Place a comment in the comment section explaining why the action is no longer feasible or barriers that prevented the action from being implemented (e.g., "Action no longer considered feasible due to lack of political support."). If the wording and/or intent of a previously identified action is unclear, this can be a reason for removal. A change in community priorities may also be a reason for removal and should be discussed in the comments.
- **Carried Over to Plan Update—**If an action is in progress, is ongoing, or has not been initiated and you would like to carry it over to the plan update, please check the "Check if Yes" column under "Carried Over to Plan Update." Selecting this option indicates that the action will be included in the mitigation action plan for this update. If you are carrying over an action to the update, please include a comment describing any action that has been taken or why the action was not taken (specifically, any barriers or obstacles that prevented the action from moving forward or slowed progress). Leave the last column, "Action # in Update," blank at this point. This will be filled in after completing the updated action plan in Phase 3.

Please ensure that you have provided a status and a comment for each action.

REVIEW AND INCORPORATION OF RESOURCES FOR THIS ANNEX

Please note that this section will ultimately describe all information sources used to develop this annex, but that only the sources used for Phases 1 and 2 will be listed at this point. Additional sources will be added with the preparation of the Phase 3 annex template.

This section should describe what resources you used to complete the annex and how you used them. Several items are started for you, but please be sure to update and enhance any descriptions. This may seem trivial or unimportant, but it is a requirement to pass the state and FEMA review process.

PHASE 3 INSTRUCTIONS

JURISDICTION-SPECIFIC NATURAL EVENT HISTORY

In the table titled "Past Natural Hazard Events," list in chronological order (most recent first) any natural hazard event that has caused damage to your jurisdiction. Include the date of the event and the estimated dollar amount of damage it caused. You are welcome to include any events, but special attention should be made to include major storms and federally declared disasters. Please refer to the table listing all Presidential Disaster Declarations for the County that is included in the toolkit you received at the workshop. We recommend including most large-scale disasters, unless you know that there were no impacts to your jurisdiction. Specifically, we recommend that you include these events if you have damage estimate information or can provide a brief description of impacts that occurred within your community. In addition to these events, please refer to the NOAA storm events database included in the tool kit. We recommend conducting a search for the name of your jurisdiction in order to identify events with known impacts. Other potential sources of damage information include:

- Preliminary damage estimates your jurisdiction filed with the county or state
- Insurance claims data
- Newspaper archives
- Other plans/documents that deal with emergency management (safety element of a comprehensive plan, emergency response plan, etc.)
- Resident input.

If you do not have estimates for dollars of damage caused, please list "Not Available" in the appropriate column or simply list a brief description of the damages (e.g. Power out to 35,000 customers for 24 hours). Please note that tracking such damages, is a valid and useful mitigation action if your jurisdiction does not currently track such information.

HAZARD RISK RANKING

The risk ranking performed for the overall planning area is presented in the risk assessment section of the overall hazard mitigation plan. However, each jurisdiction has differing degrees of risk exposure and vulnerability and, therefore, needs to rank risk for its own area, using the same methodology as used for the overall planning area. The risk-ranking exercise assesses two variables for each hazard: its probability of occurrence; and its potential impact on people, property and the economy.

Enter Risk Rank Based on Loss Matrix Spreadsheet and Local Knowledge

Tetra Tech has developed a draft risk ranking for your jurisdiction. It is included in the "Loss Matrix" spreadsheet provided in the toolkit distributed at the workshop. The hazard with the highest risk rating (probability x impact) was given a rank of 1; the hazard with the second highest rating is listed with a rank of 2; and so on. Two hazards with equal risk ratings were given the same rank. "High," Medium," and "Low" assignments were given for each hazard of concern based on a total score. To complete this section of the annex template, you need to review the risk ranking provided in the spreadsheet, and then do one of the following:

- **If you agree with the results**, copy them from the spreadsheet into the risk ranking table in your annex.
- **If the results differ from what you know based on substantiated data and documentation**, you may alter the ranking based on this knowledge, and enter the revised ranking into the risk ranking table in your annex.

If you modify the spreadsheet-generated risk ranking based on local knowledge, please note this fact in your template and include what you believe the rank should be and why. For example, the spreadsheet may have assigned a low risk rank to drought, but you know that the local economy is heavily reliant on water-using industries, such as agriculture or manufacturing, so you believe it should be ranked as medium. Remember that this exercise is about categorizing hazards into broad levels of risk (high, medium, low), not precise calculations.

In modifying any risk ratings, keep in mind that one of the purposes of this exercise is to support the selection and prioritization of actions in your plan. **You will need to have at least one true mitigation action for each hazard rated as "high" or "medium."** This is discussed in more detail in the Hazard Mitigation Action Plan section of these instructions.

Review Risk Ranking Process Used in the Loss Matrix

The sections below describe the methodology that was used to derive the risk ranking. They are provided for your information in reviewing the risk ranking prepared for your jurisdiction.

Probability of Occurrence for Each Hazard

A probability factor is assigned based on how often a hazard is likely to occur. The probability of occurrence of a hazard event is generally based on past hazard events in an area, although weight can be given to expected future probability of occurrence based on established return intervals and changing climate conditions. For example, if your jurisdiction has experienced two damaging floods in the last 25 years, the probability of occurrence is high for flooding and scores a 3 under this category. If your jurisdiction has experienced no damage from landslides in the last 100 years, your probability of occurrence for landslide is low, and scores a 1 under this category. Each hazard was assigned a probability factor as follows:

- High—Hazard event is likely to occur within 25 years (Probability Factor = 3)
- Medium—Hazard event is likely to occur within 100 years (Probability Factor = 2)
- Low—Hazard event is not likely to occur within 100 years (Probability Factor = 1)
- None—If there is no exposure to a hazard, there is no probability of occurrence (Probability Factor = 0)

Potential Impacts of Each Hazard

The impact of each hazard is divided into three categories: impacts on people, impacts on property, and impacts on the economy. These categories are also assigned weighted values. Impact on people was assigned a weighting factor of 3, impact on property was assigned a weighting factor of 2 and impact on the economy was assigned a weighting factor of 1. Impact factors for each category (people, property, economy) are described below:

- **People**—Values are assigned based on the percentage of the total ***population exposed*** in your service area to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. Impact factors were assigned as follows:

  - High—25 percent or more of the population is exposed to a hazard (Impact Factor = 3)
  - Medium—10 percent to 24 percent of the population is exposed to a hazard (Impact Factor = 2)
  - Low—9 percent or less of the population is exposed to the hazard (Impact Factor = 1)
  - No impact—None of the population is exposed to a hazard (Impact Factor = 0)

- **Property**—Values are assigned based on the percentage of the total ***district assets exposed*** to the hazard event:

- High—25 percent or more of the total replacement value of assets is exposed to a hazard (Impact Factor = 3)
- Medium—10 percent to 24 percent of the total replacement value of assets is exposed to a hazard (Impact Factor = 2)
- Low—9 percent or less of the total replacement value of assets is exposed to the hazard (Impact Factor = 1)
- No impact—None of the total replacement value is exposed to a hazard (Impact Factor = 0)

- **Operations**—Impact on operations is assessed based on estimates of how long it will take your jurisdiction to become 100-percent operable after a hazard event. The estimated functional downtime for critical facilities has been subjectively assigned an impact as follows:

  - High—Functional downtime of 365 days or more (Impact Factor = 3)
  - Medium—Functional downtime of 180 to 364 days (Impact Factor = 2)
  - Low—Functional downtime of 180 days or less (Impact Factor = 1)
  - No impact—No functional downtime is estimated from the hazard (Impact Factor = 0).

Risk Rating for Each Hazard

A risk rating for each hazard was determined by multiplying the assigned probability factor by the sum of the weighted impact factors for people, property and the economy:

Risk Rating = Probability Factor x Weighted Impact Factor {people + property + operations}

This is the number that is shown in the risk ranking table in your template. Generally, scores of 30 or greater are rated "high", scores between 15 and 30 are rated "medium", and scores of less than 15 are rated "low".

JURISDICTION-SPECIFIC VULNERABILITIES

Review the results of the risk assessment included in the toolkit, your jurisdiction's natural-events history, and any relevant public comments/input, and based on that review, develop a few sentences that discuss specific risks. You do not need to develop a sentence for every parameter, but review the results and identify a few issues you would like to highlight. For example:

- One of the District's wastewater treatment plants is located in an area likely to be permanently inundated by sea level rise by 2030.
- Three of the District's five fire stations are located in very high landslide risk areas.
- The vast majority of the service area for the district is located on high liquefaction potential soils, which has the potential to severely disrupt service for an extended period following even a moderate earthquake event.
- The District headquarters is more likely than not to be extensively damaged during a Smithburg fault M7.0 event.

In addition, list any noted vulnerabilities in your jurisdiction related to hazard mitigation that may not be apparent from the risk assessment and other information provided. This may include things such as the following:

- An area of the community that frequently loses power due to a lack of tree maintenance.
- A critical facility, such as a police station, that is not equipped with a generator.
- A neighborhood that has the potential to have ingress and egress cut off as the result of a hazard event, such as a flood or earthquake (e.g. bridge only access).

Spending some time thinking about the results of the risk assessment and other noted vulnerabilities will be a big help in the development of your mitigation strategy. Tetra Tech has inserted a few items in this section to get you started. In addition, two examples are shown in the table below.

Noted Vulnerability	Example Mitigation Action
One of the District's wastewater treatment plants is located in an area likely to be permanently inundated by sea level rise by 2030.	Conduct a detailed assessment of the wastewater treatment plant vulnerability to sea level rise. Determine adaptation actions that can be implemented in the near- and long-term.
A critical facility, such as a police station, that is not equipped with a generator.	Unsure all critical facilities within the District have backup power generation capabilities. Priority facilities include: • Main street pump station • Old Oak subdivision pump station.

HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

This section is the heart of your jurisdictional annex. This is where you will identify the actions your jurisdiction would like to pursue with this plan. All of the work that you have done thus far should provide you with a plethora of ideas for actions. With this in mind, we recommend that you review the following and develop a list of potential actions:

Wording Your Action Descriptions:

Descriptions of your actions need not provide great detail. That will come when you apply for a project grant. Provide enough information to identify the action's scope and impact. The following are typical descriptions for an action plan action:

- **Action 1**—Address repetitive-loss issues. Through targeted mitigation, acquire, relocate or retrofit the nine pump stations that have been repetitively damaged.
- **Action 2**—Perform a non-structural, seismic retrofit of the administrative building.
- **Action 3**—Develop a schedule to underground overhead powerlines.

- **Capability Assessment Section of Annex**—Review the Planning and Regulatory Capability table, the Fiscal Capability table, the Administrative and Technical Capability table, and the Education and Outreach table.
  - ➢ For any capability that you indicated that you did not have, ask yourself – should we have this capability? If yes, consider including an action to develop/acquire the capability.
  - ➢ Example: Ensure a staff person is trained in the use of FEMA's benefit-cost analysis software.
  - ➢ Review the Legal and Regulatory capabilities. If you have not reviewed and updated a capability in more than 10 years, consider an action to review and update the capability and, as appropriate, incorporate hazard mitigation principles or information obtained in the risk assessment (Note: actions such as this should also be identified in the opportunities for future integration section). Also, consider including projects or actions that have been identified in other plans and programs such as Capital Improvement Plans, Strategic Plans, etc. as actions in this plan.
  - ➢ For any capability that you indicated you do have, consider how this capability can be leveraged to increase or improve hazard mitigation in the jurisdiction.

- **Adaptive Capacity for Climate Change Section of this Annex**—Consider your responses to this section. For those criterion that you listed as medium or low, think of ways you could improve this rating (see adaptive capacity portion of the mitigation best practices catalog). For those criterion you listed as high, think about how you can leverage this capacity to improve or enhance mitigation or continue to improve this capacity. For those criterion that you were unable to provide responses for, consider ways you could improve your understanding of this capacity (see mitigation best practices).

- **Opportunities for Future Integration Section in this Annex**—Review the items you identified in this section. Consider an action that specifically says what the plan, code, ordinance etc. is and how it will be integrated.
- **Jurisdiction-Specific Vulnerabilities Section in this Annex—**Review the items that you have identified in this section and consider actions that will help reduce these vulnerabilities (see mitigation best practices catalog).
- **Mitigation Best Practices Catalog**—A catalog that includes FEMA and other agency identified best practices, steering committee and other stakeholder recommendations was developed as part of the plan development process and included in your tool kit. Review the catalog and identify those actions that your jurisdiction should consider including in its action plan.
- **Public Input**—Review input received during the process, specifically the public survey results included in your toolkit.
- **Prior Mitigation Planning Efforts**—If your jurisdiction participated in a previous hazard mitigation plan, please be sure to remember to include any actions that were identified as "carry over" actions. Once you have carried them over, return to the Status of Previous Actions table and record the new action number (see discussion below).

Be sure to consider the following factors in your selection of actions:

- Select actions that are consistent with the overall purpose, goals, and objectives of the hazard mitigation plan.
- Identify actions where benefits exceed costs.
- Include any action that your jurisdiction has committed to pursuing regardless of grant eligibility.
- Know what is and is not grant-eligible under the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) and Flood Mitigation Assistance (FMA) grants (see fact sheet provided in toolkit). If you have actions that are not HMGP, PDM or FMA grant eligible, but do mitigate part or all of the hazard and may be eligible for other grant programs sponsored by other agencies, include them in this section.
- **You must identify at least one true mitigation action (i.e. not a preparedness or response action) that is clearly defined and actionable for hazards ranked as "high" or medium."**

Review Actions Recommended for All Partners

Three actions have been prepopulated in your annex template. These actions should be included in every annex and should not be removed, although the specifics should be adjusted as needed for the particulars of each community.

- Where appropriate, support retro-fitting, purchase or relocation of structures located in high hazard areas, prioritizing those structures that have experienced repetitive losses and/or are located in high or medium ranked hazard areas.
- Actively participate in the plan maintenance protocols outlined in Volume I of the hazard mitigation plan.
- Integrate the hazard mitigation plan into other plans, ordinances and programs within the community.

We also recommend that every planning partner strongly consider the following additional actions, adjusted as needed for the particulars of each community:

- Develop and implement a program to capture perishable data after significant events (e.g. high water marks, preliminary damage estimates, damage photos) to support future mitigation efforts including the implementation and maintenance of the hazard mitigation plan.
- Develop a post-disaster recovery plan and a debris management plan.
- Develop and/or update plans that support or enhance continuity of operations following disasters.
- Purchase generators for critical facilities and infrastructure that lack adequate back-up power.

Complete the Table

Complete the table titled "Hazard Mitigation Action Plan Matrix" for all the actions you have identified and would like to include in the plan:

- Enter the action number and description. Replace the "xxx" included in the template with the letter code for your jurisdiction as follows:
  - Cypress Fairbanks Independent School District—CYF1, CYF2, CYF3…
  - Harris County Emergency Service District No. 12—ESD1, ESD2, ESD3…
  - Harris County Flood Control District—FCD1, FCD2, FCD2…
  - Harris Health System—HHS1, HHS2, HHS3…
  - Houston Community College—HCC1, HCC2, HCC3…
  - Houston Independent School District—HOU1, HOU2, HOU3…
  - Huffman Independent School District—HUF1, HUF2, HUF2…
  - Lone Star College—LSC1, LSC2, LSC3…
  - Pasadena Independent School District—PSD1, PSD2, PSD3…
  - Texas Medical Center—TMC1, TMC2, TMC3…
  - Texas Southern University—TSU1, TSU2, TSU3…
  - University of Houston—UOH1, UOH2, UOH3…
- If the action is carried over from your previous hazard mitigation plan, return to the "Status of Previous Plan Actions" table you completed in Phase 1 and enter the new action number in the column labeled Action # in Update.
- Indicate whether the action mitigates hazards for new and/or existing assets.
- Identify the specific hazards the action will mitigate.
- Identify by number the mitigation plan objectives that the action addresses (see toolkit).
- Indicate who will be the lead in administering the action. This will most likely be a department within your jurisdiction (e.g. planning or public works). If you wish to indicate more than one department, please ensure that it is clear who the lead agency will be and list supporting agencies in the appropriate column.
- Enter an estimated cost in dollars if known; otherwise, enter "High," "Medium" or "Low" as determined for the prioritization process described in the following section.
- Identify funding sources for the action. If it is a grant, include the funding sources for the cost share. Refer to your fiscal capability assessment to identify possible sources of funding and refer to **the table below** for project eligibility for FEMA's hazard mitigation assistance grant program.
- Indicate the time line as "short-term" (1 to 5 years) or "long-term" (5 years or greater) or ongoing (a continual program)

Eligible Activities	Hazard Mitigation Grant Program	Pre-Disaster Mitigation	Flood Mitigation Assistance
Property Acquisition and Structure Demolition	√	√	√
Property Acquisition and Structure Relocation	√	√	√
Structure Elevation	√	√	√
Mitigation Reconstruction	√	√	√
Dry Floodproofing of Historic Residential Structures	√	√	√
Dry Floodproofing of Non-residential Structures	√	√	√
Generators	√	√	
Localized Flood Risk Reduction Projects	√	√	√
Non-Localized Flood Risk Reduction Projects	√	√	
Structural Retrofitting of Existing Buildings	√	√	√
Non-Structural Retrofitting of Existing Buildings and Facilities	√	√	√
Safe Room Construction	√	√	
Wind Retrofit for One- and Two-Family Residences	√	√	
Infrastructure Retrofit	√	√	√

Eligible Activities	Hazard Mitigation Grant Program	Pre-Disaster Mitigation	Flood Mitigation Assistance
Soil Stabilization	√	√	√
Wildland fire Mitigation	√	√	
Post-Disaster Code Enforcement	√		
Advance Assistance	√		
5 Percent Initiative Projects*	√		
Aquifer and Storage Recovery**	√	√	√
Flood Diversion and Storage**	√	√	√
Floodplain and Stream Restoration**	√	√	√
Green Infrastructure**	√	√	√
Miscellaneous/Other**	√	√	√
Hazard Mitigation Planning	√	√	√
Technical Assistance			√
Management Costs	√	√	√

* FEMA allows increasing the 5% Initiative amount up to 10% for a Presidential major disaster declaration under HMGP. The additional 5% can be used for activities that promote disaster-resistant codes for all hazards. As a condition of the award, a disaster-resistant building code must be adopted or an improved Building Code Effectiveness Grading Schedule is required.

** Proposed actions will be evaluated against program requirements. Eligible projects will be approved if funding is available.

Prioritization of Mitigation Actions

Complete the information in the table titled "Mitigation Strategy Priority Schedule" as follows:

- **Action #**—Indicate the action number from the previous annex table (Hazard Mitigation Action Plan Matrix).
- **# of Objectives Met**—Enter the number of objectives the action will meet.
- **Benefits**—Enter "High," "Medium" or "Low" as follows:

  - High: Action will have an immediate impact on the reduction of risk exposure to life and property.
  - Medium: Action will have a long-term impact on the reduction of risk exposure to life and property, or action will provide an immediate reduction in the risk exposure to property.
  - Low: Long-term benefits of the action are difficult to quantify in the short term.

- **Costs**—Enter "High," "Medium" or "Low" as follows:

  - High: Would require an increase in revenue via an alternative source (i.e., bonds, grants, fee increases) to implement. Existing funding levels are not adequate to cover the costs of the proposed action.
  - Medium: Could budget for under existing work-plan, but would require a reapportionment of the budget or a budget amendment, or the cost of the action would have to be spread over multiple years.
  - Low: Possible to fund under existing budget. Action is or can be part of an existing ongoing program.

  If you know the estimated cost of a action because it is part of an existing, ongoing program, indicate the amount.

- **Do Benefits Exceed the Cost?**—Enter "Yes" or "No." This is a qualitative assessment. Enter "Yes" if the benefit rating (high, medium or low) is the same as or higher than the cost rating (high benefit/high cost; high benefit/medium cost; medium benefit/low cost; etc.). Enter "No" if the benefit rating is lower than the cost rating (medium benefit/high cost, low benefit/medium cost; etc.)

- **Is the Action Grant-Eligible?**—Enter "Yes" or "No." Refer to the fact sheet on HMGP, PDM and FMA.
- **Can Action Be Funded Under Existing Program Budgets?**—Enter "Yes" or "No." In other words, is this action currently budgeted for, or would it require a new budget authorization or funding from another source such as grants?
- **Implementation Priority**— Enter "High," "Medium" or "Low" as follows:

  - **High Priority**—An action that meets multiple objectives, has benefits that exceed costs, and has a secured source of funding. Action can be completed in the short term (1 to 5 years).
  - **Medium Priority**—An action that meets multiple objectives, has benefits that exceed costs, and is eligible for funding though no funding has yet been secured for it. Action can be completed in the short term (1 to 5 years), once funding is secured. Medium-priority actions become high-priority actions once funding is secured.
  - **Low Priority**—An action that will mitigate the risk of a hazard, has benefits that do not exceed the costs or are difficult to quantify, has no secured source of funding, and is not eligible for any known grant funding. Action can be completed in the long term (1 to 10 years). Low-priority actions are generally "wish-list" actions. They may be eligible for grant funding from programs that have not yet been identified.

- **Grant Pursuit Priority**— Enter "High," "Medium" or "Low" as follows:

  - **High Priority**—An action that meets identified grant eligibility requirements, has high benefits, and is listed as high or medium implementation priority; local funding options are unavailable or available local funds could be used instead for actions that are not eligible for grant funding.
  - **Medium Priority**—An action that meets identified grant eligibility requirements, has medium or low benefits, and is listed as medium or low implementation priority; local funding options are unavailable.
  - **Low Priority**—An action that has not been identified as meeting any grant eligibility requirements.

This prioritization is a simple way to determine that your identified actions meet one of the primary objectives of the Disaster Mitigation Act. It is not the detailed benefit/cost analysis required for HMGP/PDM /FMA action grants. The prioritization will identify any actions whose probable benefits will not exceed the probable costs. Those actions identified as high-priority grant funding actions should be closely reviewed for consideration when grant funding opportunities arise.

Note: If a jurisdiction wishes to identify an action as high priority that is outside of the prioritization scheme for high priorities. A note indicting so should be inserted and a rationale should be provided.

An example completed table is provided below.

Table 1-9. Mitigation Strategy Priority Schedule

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Action Grant-Eligible?	Can Action Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
EX-1	3	High	High	Yes	Yes	No	Medium	High
EX-2	7	Medium	Low	Yes	No	Yes	High	Low
EX-3	2	Low	Medium	No	No	Maybe	Low	Low
EX-4	10	Low	Low	Yes	No	Yes	High	Low
EX-5	6	Medium	Low	Yes	No	Yes	High	Low

Analysis of Mitigation Actions

Complete the table titled "Analysis of Mitigation Actions" summarizing the mitigation actions by hazard of concern and the following eight mitigation types. Please note that an action can be more than one mitigation type:

- **Prevention**—Government, administrative or regulatory actions that influence the way land and buildings are developed to reduce hazard losses. Includes planning and zoning, floodplain laws, capital improvement programs, open space preservation, and stormwater management regulations.
- **Property Protection**—Modification of buildings or structures to protect them from a hazard or removal of structures from a hazard area. Includes acquisition, elevation, relocation, structural retrofit, storm shutters, and shatter-resistant glass.
- **Public Education and Awareness**—Actions to inform residents and elected officials about hazards and ways to mitigate them. Includes outreach projects, real estate disclosure, hazard information centers, and school-age and adult education.
- **Natural Resource Protection**—Actions that minimize hazard loss and preserve or restore the functions of natural systems. Includes sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, wetland restoration and preservation, and green infrastructure.
- **Emergency Services**—Actions that protect people and property during and immediately after a hazard event. Includes warning systems, emergency response services, and the protection of essential facilities.
- **Structural Projects**—Actions that involve the construction of structures to reduce the impact of a hazard. Includes dams, setback levees, floodwalls, retaining walls, and safe rooms.
- **Climate Resilient**—Actions that incorporate methods to mitigate and/or adapt to the impacts of climate change. Includes aquifer storage and recovery activities, incorporating future conditions projections in project design or planning, or actions that specifically address jurisdiction-specific climate change risks, such as sea level rise or urban heat island effect.
- **Community Capacity Building**—Actions that increase or enhance local capabilities to adjust to potential damage, to take advantage of opportunities, or to respond to consequences. Includes staff training, memorandums of understanding, development of plans and studies, and monitoring programs.

This exercise demonstrates that the jurisdiction has selected a comprehensive range of actions. Planning partners should aim to identify at least one action in each category (although this is not required) and should make sure there is at least one action to address "high" and "medium" ranked hazards.

Please see the example below based off the recommended actions, but please note that these recommendations are heavy on generalized actions on the prevention spectrum and light in other areas and specificity.

Analysis of Mitigation Actions

	Action Addressing Hazard, by Mitigation Type							
Hazard Type	Prevention	Property Protection	Public Education and Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
Dam Failure	EX-2, 3, 4, 5	EX-1, 6	EX-4, 6		EX-8, 11			EX-3, 9, 10
Drought	EX-2	EX-1	EX-4					EX-8, 9, 10
Earthquake	EX-2, 3, 4, 5	EX-1, 7	EX-4		EX-8, 11			EX-3, 4, 8, 9
Flooding	EX-2, 3, 4, 5	EX-1, 6, 7	EX-4, 6	EX-9	EX-8, 11	EX-4	EX-1, 7	EX-3, 4, 8, 9
Landslide	EX-2, 3, 4, 5	EX-1, 7	EX-4		EX-8, 11	EX-4		EX-3, 4, 10
Severe Weather	EX-2, 3, 4, 5	EX-1, 7, 9	EX-4		EX-8, 9, 11			EX-8, 9, 10
Wildland fire	EX-2, 3, 4, 5	EX-1, 7, 9	EX-4, 9	EX-9	EX-8, 11		EX-1, 7, 9	EX-3, 9, 10

REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

Please note that this section will ultimately describe all information sources used to develop this annex. You should have previously listed the sources used for Phases 1 and 2. You should now add any further sources used for the preparation of Phase 3.

This section should describe what resources you used to complete the annex and how you used them. Several items are started for you, but please be sure to update and enhance any descriptions. This may seem trivial or unimportant, but it is a requirement to pass the state and FEMA review process.

FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

In this section, identify any future studies, analyses, reports, or surveys your jurisdiction needs to better understand its vulnerability to identified or currently unidentified risks. These could be needs based on federal or state agency mandates. Please note that this section is optional.

ADDITIONAL COMMENTS

Use this section to add any additional information pertinent to hazard mitigation and your jurisdiction not covered in this template. Please note that this section is optional.

NEXT STEPS

After all jurisdictions have submitted their annexes, the draft plan will be submitted for public comment. Following the public comment period and any revisions responsive to public comment, the plan will be submitted to the California Governor's Office of Emergency Services (Cal OES) for review. After their review and approval, Cal OES will submit the plan to FEMA Region IX for plan review and approval. At that point planning partners will be asked to begin making preparations to formally adopt the plan. Each participating planning partner must have the governing board of their jurisdiction adopt via resolution or ordinance. Once FEMA has reviewed the plan and issued an approved pending adoption (APA) notice, planning partners will be asked to go forth and adopt the plan. Once adopted, planning partners will submit adoption information to Tetra Tech, who will submit the proof of adoption to FEMA. Once such adoption has been received, FEMA will issue final approval via a letter for those planning partners who have adopted the plan. It is very important to understand that approval is not final until proof of adoption has been received by FEMA and they have issued a letter specifically naming your jurisdiction. More information on the review and approval process, along with adoption support materials, will be provided at a later date.

1. DISTRICT NAME

1.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Name, Title
Street Address
City, State ZIP
Telephone: xxx-xxx-xxxx
e-mail Address: xxx@xxx.xxx

Alternate Point of Contact
Name, Title
Street Address
City, State ZIP
Telephone: xxx-xxx-xxxx
e-mail Address: xxx@xxx.xxx

1.2 JURISDICTION PROFILE

1.2.1 Overview

Insert Narrative Profile Information, per Instructions.

The __[name of adopting body]___ assumes responsibility for the adoption of this plan; __[name of oversight agency]__ will oversee its implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 1-1.

Table 1-1. Local Mitigation Planning Team Members

Name	Title

All fire districts should include the following sentence (non-fire special purpose districts may delete the sentence):

The District participates/does not participate in the Public Protection Class Rating System and currently has a rating of #.

1.2.2 Service Area and Trends

The district service area covers ___[area in square miles]___, serving a population of _ population_.

Insert summary description of service trends.

1.2.3 Assets

Table 1-2 summarizes the critical assets of the district and their value.

Table 1-2. Special Purpose District Assets

Asset	Value
Property	
**number** **acres of land**	$_value_
Equipment	
**description**	$_value_
**description**	$_value_
**description**	$_value_
**description**	$_value_
**description**	$_value_
Total:	***$_value_***
Critical Facilities and Infrastructure	
**description – Include Address**	$_value_
**description – Include Address**	$_value_
**description – Include Address**	$_value_
**description – Include Address**	$_value_
**description – Include Address**	$_value_
**description – Include Address**	$_value_
Total:	***$_value_***

1.3 CAPABILITY ASSESSMENT

An assessment of the district's current capabilities was conducted to identify opportunities to expand, initiate or integrate capabilities in order to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The "Analysis of Mitigation Actions" table in Section 1.9 identifies these as community capacity building mitigation actions.

1.3.1 Planning and Regulatory Capabilities

Jurisdictions develop plans and programs and implement rules and regulations to protect and serve residents. When effectively prepared and administered, these plans, programs and regulations can support the implementation of mitigation actions. Table 1-3 summarizes existing codes, ordinances, policies, programs or plans that are applicable to this hazard mitigation plan.

Table 1-3. Planning and Regulatory Capability

	Date of Most Recent Update	Comment
Name of code, ordinance, policy, program or plan	_____	_____
Name of code, ordinance, policy, program or plan	_____	_____
Name of code, ordinance, policy, program or plan	_____	_____
Name of code, ordinance, policy, program or plan	_____	_____
Name of code, ordinance, policy, program or plan	_____	_____

1.3.2 Fiscal, Administrative and Technical Capabilities

Fiscal capability is an indicator of a jurisdiction's ability to fulfill the financial needs associated with hazard mitigation projects. An assessment of fiscal capabilities is presented in Table 1-4. Administrative and technical

capabilities represent a jurisdiction's staffing resources for carrying out the mitigation strategy. An assessment of administrative and technical capabilities is presented in Table 1-5.

Table 1-4. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Capital Improvements Project Funding	Yes/No
Authority to Levy Taxes for Specific Purposes	Yes/No
User Fees for Water, Sewer, Gas or Electric Service	Yes/No
Incur Debt through General Obligation Bonds	Yes/No
Incur Debt through Special Tax Bonds	Yes/No
Incur Debt through Private Activity Bonds	Yes/No
State-Sponsored Grant Programs	Yes/No
Development Impact Fees for Homebuyers or Developers	Yes/No
Federal Grant Programs	Yes/No
Other	Yes/No (if yes, please specify)

Table 1-5. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes/No	Insert appropriate information
Engineers or professionals trained in building or infrastructure construction practices	Yes/No	Insert appropriate information
Planners or engineers with an understanding of natural hazards	Yes/No	Insert appropriate information
Staff with training in benefit/cost analysis	Yes/No	Insert appropriate information
Surveyors	Yes/No	Insert appropriate information
Personnel skilled or trained in GIS applications	Yes/No	Insert appropriate information
Scientist familiar with natural hazards in local area	Yes/No	Insert appropriate information
Emergency manager	Yes/No	Insert appropriate information
Grant writers	Yes/No	Insert appropriate information
Other	Yes/No	Insert appropriate information

1.3.3 Education and Outreach Capabilities

Outreach and education capability identifies the connection between government and community members, which opens a dialogue needed for a more resilient community. An assessment of education and outreach capabilities is presented in Table 1-6.

Table 1-6. Education and Outreach

Criterion	Response
Do you have a public information officer or communications office?	Yes/No
Do you have personnel skilled or trained in website development?	Yes/No
Do you have hazard mitigation information available on your website? • If yes, please briefly describe	Yes/No Insert appropriate information
Do you use social media for hazard mitigation education and outreach? • If yes, please briefly describe	Yes/No Insert appropriate information

Criterion	Response
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • **If yes, please briefly specify**	Yes/No Insert appropriate information
Do you have any other programs already in place that could be used to communicate hazard-related information? • **If yes, please briefly describe**	Yes/No Insert appropriate information
Do you have any established warning systems for hazard events? • **If yes, please briefly describe**	Yes/No Insert appropriate information

1.3.4 Adaptive Capacity for Climate Change

Given the uncertainties associated with how hazard risk may change with a changing climate, a jurisdiction's ability to track such changes and adapt as needed is an important component of the mitigation strategy. Table 1-7 summarizes the jurisdiction's adaptive capacity for climate change.

Table 1-7. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating[a]
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts ***Comment:***	High/Medium/Low
Jurisdiction-level monitoring of climate change impacts ***Comment:***	High/Medium/Low
Technical resources to assess proposed strategies for feasibility and externalities ***Comment:***	High/Medium/Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory ***Comment:***	High/Medium/Low
Capital planning and land use decisions informed by potential climate impacts ***Comment:***	High/Medium/Low
Participation in regional groups addressing climate risks ***Comment:***	High/Medium/Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes ***Comment:***	High/Medium/Low
Identified strategies for greenhouse gas mitigation efforts ***Comment:***	High/Medium/Low
Identified strategies for adaptation to impacts ***Comment:***	High/Medium/Low
Champions for climate action in local government departments ***Comment:***	High/Medium/Low
Political support for implementing climate change adaptation strategies ***Comment:***	High/Medium/Low
Financial resources devoted to climate change adaptation ***Comment:***	High/Medium/Low
Local authority over sectors likely to be negative impacted ***Comment:***	High/Medium/Low

Criterion	Jurisdiction Rating[a]
Public Capacity	
Local residents knowledge of and understanding of climate risk	High/Medium/Low
Comment:	
Local residents support of adaptation efforts	High/Medium/Low
Comment:	
Local residents' capacity to adapt to climate impacts	High/Medium/Low
Comment:	
Local economy current capacity to adapt to climate impacts	High/Medium/Low
Comment:	
Local ecosystems capacity to adapt to climate impacts	High/Medium/Low
Comment:	

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement; Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

1.4 INTEGRATION WITH OTHER PLANNING INITIATIVES

The information on hazards, risk, vulnerability and mitigation contained in this hazard mitigation plan is based on the best available data. Plan integration is the incorporation of this information into other relevant planning mechanisms, such as general planning and capital facilities planning. It includes the integration of natural hazard information and mitigation policies, principles and actions into local planning mechanisms and vice versa. Additionally, plan integration is achieved though the involvement of key staff and community officials in collaboratively planning for hazard mitigation.

1.4.1 Existing Integration

In the performance period since adoption of the previous hazard mitigation plan, ___[district name]___ made progress on integrating hazard mitigation goals, objectives and actions into other planning initiatives. The following plans and programs currently integrate components of the hazard mitigation strategy:

- **Plan or Program Name**—Description
- **Plan or Program Name**—Description
- **Plan or Program Name**—Description
- **Plan or Program Name**—Description
- **Plan or Program Name**—Description

Resources listed in Section 1.10 were used to provide information on integration of hazard mitigation information into other jurisdiction plans or programs.

1.4.2 Opportunities for Future Integration

As this hazard mitigation plan is implemented, ___[district name]___ will use information from the plan as the best available science and data on natural hazards. The capability assessment presented in this annex identifies codes, plans and programs that provide opportunities for integration. The progress reporting process described in Volume 1 will outline the progress of area-wide and local hazard mitigation actions related to plan integration. The annual progress report also will identify new opportunities for integration. The capability assessment identified the following plans and programs that do not currently integrate goals or recommendations of the hazard mitigation plan but provide opportunities to do so in the future:

- **Plan or Program Name**—Description
- **Plan or Program Name**—Description
- **Plan or Program Name**—Description
- **Plan or Program Name**—Description
- **Plan or Program Name**—Description

1.5 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 1-8 lists past occurrences of natural hazards for which specific damage was recorded in ___[district name]___. Other hazard events that broadly affected the entire planning area, including ___[district name]___, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 1-8. Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Insert event type	_____	Date	$_____
Insert event type	_____	Date	$_____
Insert event type	_____	Date	$_____
Insert event type	_____	Date	$_____
Insert event type	_____	Date	$_____
Insert event type	_____	Date	$_____
Insert event type	_____	Date	$_____
Insert event type	_____	Date	$_____
Insert event type	_____	Date	$_____
Insert event type	_____	Date	$_____
Insert event type	_____	Date	$_____
Insert event type	_____	Date	$_____
Insert event type	_____	Date	$_____
Insert event type	_____	Date	$_____
Insert event type	_____	Date	$_____

1.6 HAZARD RISK RANKING

Table 1-9 presents a local ranking for ___[district name]___ of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Table 1-9. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	_____	_____	High/Medium/Low
2	_____	_____	High/Medium/Low
3	_____	_____	High/Medium/Low
4	_____	_____	High/Medium/Low
5	_____	_____	High/Medium/Low
6	_____	_____	High/Medium/Low
7	_____	_____	High/Medium/Low

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
8	_____	_____	High/Medium/Low
9	_____	_____	High/Medium/Low

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

1.7 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. The following jurisdiction-specific issues have been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- Insert as appropriate.
- Insert as appropriate.
- Insert as appropriate.

Mitigation actions addressing these issues were prioritized for consideration in the action plan presented in Section 1.9.

1.8 STATUS OF PREVIOUS PLAN ACTIONS

Table 1-10 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

Table 1-10. Status of Previous Plan Actions

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
Insert Action Number & Text *Comment:*				
Insert Action Number & Text *Comment:*				
Insert Action Number & Text *Comment:*				
Insert Action Number & Text *Comment:*				
Insert Action Number & Text *Comment:*				
Insert Action Number & Text *Comment:*				
Insert Action Number & Text *Comment:*				
Insert Action Number & Text *Comment:*				
Insert Action Number & Text *Comment:*				
Insert Action Number & Text *Comment:*				

Action Item from Previous Plan	Completed	Removed; No Longer Feasible	Carried Over to Plan Update: Check if Yes	Carried Over to Plan Update: Action # in Update
Insert Action Number & Text				
Comment:				
Insert Action Number & Text				
Comment:				

1.9 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 1-11 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 1-12 identifies the priority for each action. Table 1-13 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 1-11. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action xxx1—Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
Hazards Mitigated: Earthquake, flooding, landslide, tsunami, wildfire						
Existing	3, 4, 10	TBD	TBD	High	HMGP, PDM, FMA	Short-term
Action xxx2—Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
Hazards Mitigated: All hazards						
New and Existing	1, 5, 8	TBD	TBD	Low	Staff Time, General Funds	Short-term
Action xxx3— Integrate the hazard mitigation plan into other plans, ordinances and programs within the community,						
Hazards Mitigated: Dam failure, earthquake, flooding, landslide, severe weather, tsunami, wildfire						
Existing	2, 6, 9	TBD	TBD			
Action xxx4—Description						
Hazards Mitigated: TBD						
Action xxx5—Description						
Hazards Mitigated: TBD						
Action xxx6—Description						
Hazards Mitigated: TBD						
Action xxx7—Description						
Hazards Mitigated: TBD						
Action xxx8—Description						
Hazards Mitigated: TBD						
Action xxx9—Description						
Hazards Mitigated: TBD						

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 1-12. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority[a]	Grant Pursuit Priority[a]
xxx1	3	High	High	Yes	Yes	No	Medium	High
xxx2	3	Low	Low	Yes	No	Yes	High	Low
xxx3	3	High	Medium	Yes	Yes	No	Medium	High

a. See the introduction to this volume for explanation of priorities.

Table 1-13. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education and Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Medium-Risk Hazards								
Low-Risk Hazards								

Hazard Type	Action Addressing Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education and Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building

a. See the introduction to this volume for explanation of mitigation types.

1.10 REVIEW AND INCORPORATION OF RESOURCES FOR THIS ANNEX

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- <INSERT PLAN/PROGRAM AND DESCRIPTION OF HOW IT WAS USED>
- <INSERT PLAN/PROGRAM AND DESCRIPTION OF HOW IT WAS USED>
- <INSERT PLAN/PROGRAM AND DESCRIPTION OF HOW IT WAS USED>

The following **o**utside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit**—The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.
- <INSERT DOCUMENT AND DESCRIPTION OF HOW IT WAS USED>

1.11 FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

Insert text, if any; otherwise, delete section

1.12 ADDITIONAL COMMENTS

Insert text, if any; otherwise, delete section