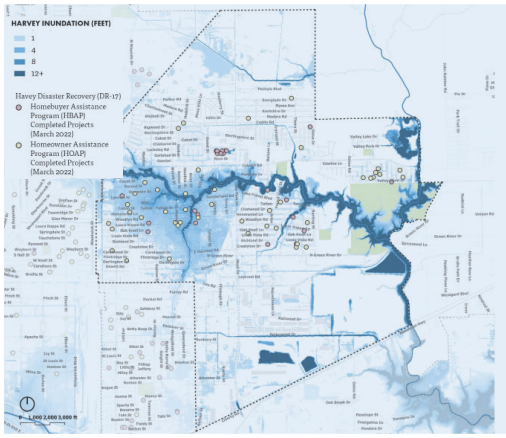
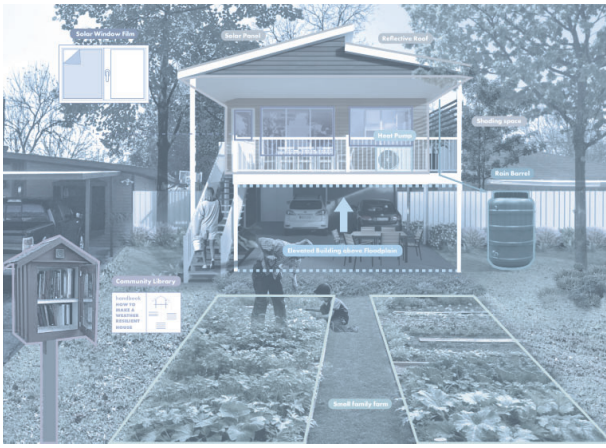
EAST HOUSTON NEIGHBORHOOD RESILIENCE PLAN

MAY 2023





PREAMBLE

The challenges of resilience in Houston are as unique as the city itself. Houston is a metropolis, composed of eighty-eight (88) diverse Super Neighborhoods—each with its own identifiable character and historical significance. Although the effects of climate-related disasters are widespread in Houston, neighborhoods recover better and rebuild faster when there is a plan in place to help focus efforts and guide decision making.

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STATEMENT FROM THE MAYOR

The City of Houston has experienced seven federally declared disasters in the last seven years. Flooding from Hurricane Harvey, a historic freeze in 2021 and other recent catastrophic weather events had a devastating impact on our infrastructure, homes and our families. When the floodwaters cleared, what emerged was the strength and perseverance of the people who supported each other even when they had little to give. It is those same people who have guided our efforts to ensure greater resilience for the future. Even as we worked together to return to normalcy, we knew that recovery was a short-term goal. We knew these devastating events would not be the last. We knew we needed to learn from those experiences and have a plan in place to protect vulnerable neighborhoods and make them resilient for the future.

So, in 2022 we launched the Neighborhood Resilience Plan initiative in three pilot neighborhoods. This program provides community-driven strategies and policies to support neighborhood recovery from weather related disasters and vulnerability against multiple hazards - from hurricanes to extreme heat waves, and chronic stresses such as poor air quality, and flooding. The plans not only address risk reduction, but they also include strategies for improving infrastructure, empowering community leaders and bolstering economic development to bring all communities to a greater level of resilience. These three neighborhoods are just a start.

Each plan is tailored to address needs identified by each community, but these initial efforts will establish an adaptable planning framework for the future. In these pages you will find a blueprint to guide neighborhoods across the city about how to overcome existing barriers to resiliency.

Join me, our partnering agencies, community leaders and residents to take a closer look at the needs expressed in this plan. Lend your support as we move forward to put this plan into action. We cannot control the weather, but we can rediscover the collective fortitude and the generosity of spirit that we forged in the aftermath of the storm. Let's not wait for another crisis to strengthen our neighborhoods and create a more resilient Houston. We will use this plan to make this community better starting today.

- Mayor Sylvester Turner

EXECUTIVE SUMMARY

Mayor Turner's Resilient Houston plan, published February 2020, is a direct response to the devastation and catastrophic flooding caused when one trillion gallons of rain fell on Houston during Hurricane Harvey. The plan defines 62 actions across 18 goals to enhance Houston's resilience against acute shocks and chronic stresses, and adaptation to a changing climate and energy reality.

The *East Houston Neighborhood Resilience Plan* implements a key target of *Resilient Houston*, to develop 50 neighborhood plans by 2030, and is the first of its kind in Houston. It serves the purpose of providing a strategic action plan to achieve Resilient Houston's goals and targets at the neighborhood scale. It provides a community-based vision of neighborhood resilience, and makes recommendations for people-based and placed-based strategies and actions to improve neighborhood resilience now and into the future. East Houston is one of the first three neighborhoods selected by the Mayor for a Neighborhood Resilience Plan, as a pilot project in a program led by the Houston Planning and Development Department.

The shared purpose of *Resilient Houston* and Neighborhood Resilience Plans is to reduce the impacts of shocks and stresses, and to improve preparation for—and the fastest and best recovery from—adverse events. Houstonians are consistently reminded of the urgent need for transformative change and for these changes to be built on long-term holistic, equitable, and inclusive strategies and actions, particularly in historically disadvantaged communities like East Houston.

The *East Houston Neighborhood Resilience Plan* takes direction from *Resilient Houston*

"Enshrining equity and equitable outcomes in all policies and programs is an essential step toward addressing root causes of inequity, including historical disinvestment and disproportionate negative impacts for communities of color and our most vulnerable residents."

(Resilient Houston, page 130)

by incorporating climate adaptation and risk reduction, infrastructure modernization, housing stability and security, environmental protection, social empowerment, and economic development into place-based strategies for the community. The plan provides a vision for doing things in neighborhoods that have not historically been done to create the safety and stability the community needs to face the challenges and uncertainties of today. The plan is a tool to direct neighborhood-based investments into practical and tangible projects to reduce flooding, manage heat, and address physical and social vulnerabilities to climate and other hazards. Simultaneously, the plan works to improve the overall quality of life and economic opportunities in the community.

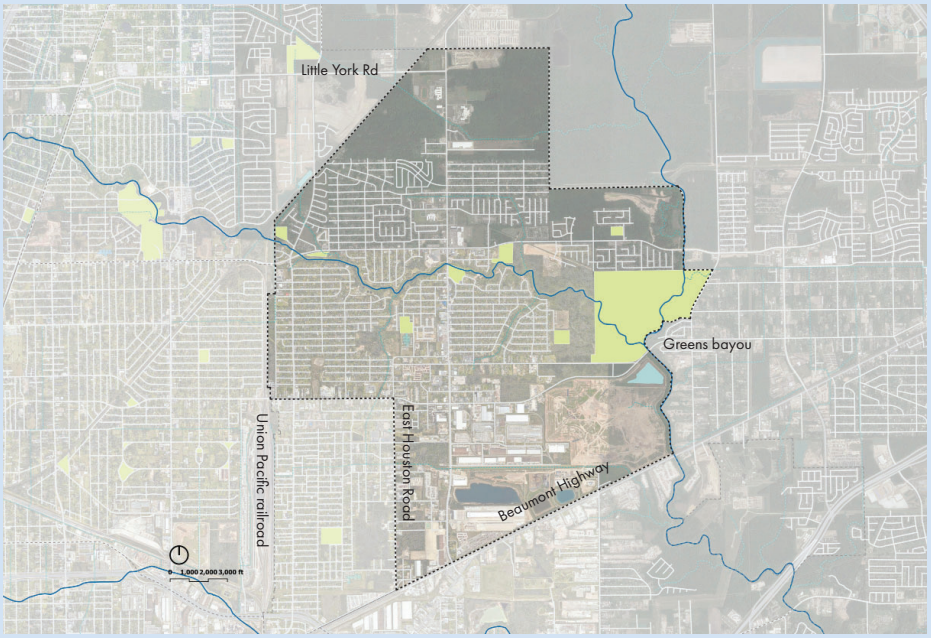


Figure 2: Super Neighborhood 49

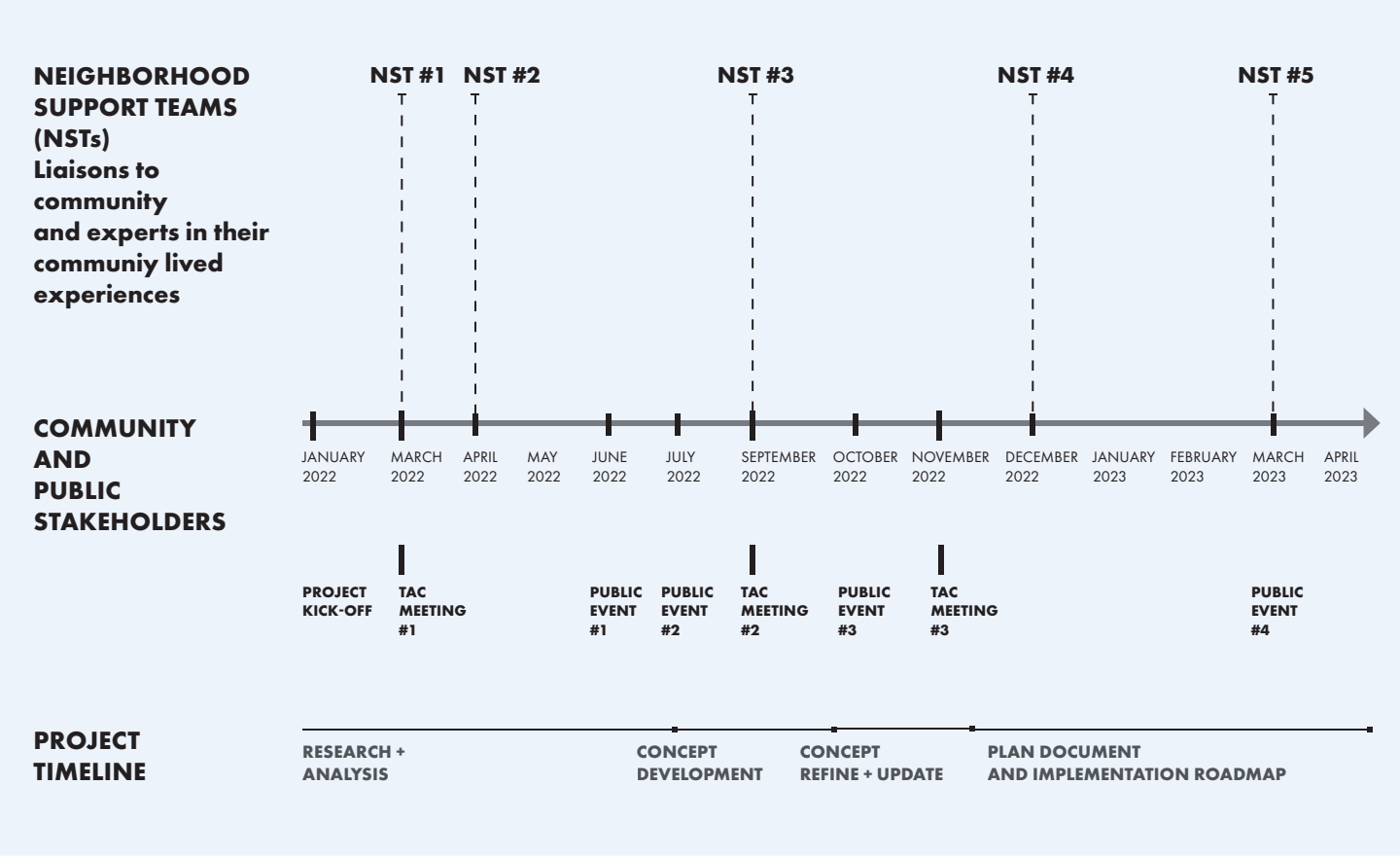


Figure 3: project timeline

The East Houston Super Neighborhood 49 is located generally along East Houston Road and the Union Pacific railroad to the west, Greens Bayou to the east, Beaumont Highway to the south, and along Little York Road to the north. Located in City Council District B. The East Houston neighborhood has been selected to receive one of three of the first City of Houston Resilience Plans due to the severity of flood damage from Hurricane Harvey, vulnerability to climate related hazards, watershed location, the presence of active and supportive civic organizations and other demographics.

Over the course of 15 months, the planning team has been in active dialogue with the East Houston community as part of the formulation of the *East Houston Neighborhood Resilience Plan*. The team took direction from the community through traditional public meetings and surveys, focused one-on-one conversations with community leaders, and working sessions with the Neighborhood Support Team (NST) and proactive residents. The wants and needs heard in these meetings provide the basis of the plan's development and resulting recommendations. The community's goals have been vetted and coordinated with City staff through several Technical Advisory Committee (TAC) meetings intended to ensure the plan's feasibility, identify lead departments and agencies, and identify or allocate potential funds to implement projects.

EXECUTIVE SUMMARY

Through conversations with the community, several neighborhood priorities have been identified that define the community's vision for their neighborhood:

- Improved **waste management** and overall healthier environments
- Fully recover from Hurricane Harvey, particularly in terms of **housing rehabilitation**;
- Update neighborhood **infrastructure** to reduce local flood risks;
- **Floodproof housing** to reduce the impacts of future floods;
- **Weatherize housing** to enhance energy efficiency and to reduce the impact of extreme temperatures;
- Strengthening the **'can do' culture** within the community to continue its efforts to realize its vision and address its needs most efficiently and effectively;
- Catalyze **economic development** and support **workforce development**;
- Increase sustainable mobility and reduce traffic violence through creating **complete and healthy streets**; and
- **Mitigate** the effects of **heat** by increasing the tree canopy, considering ways to reduce solar gain, and increasing greening projects generally.

The community's vision for resilience in their neighborhood and the foundational goals and targets of the Resilient Houston parent plan provide the basis for the strategies and actions recommended in this plan.

Guiding Principles and Projects

They inform the people- and place-based project-based investments across the neighborhood to continue the momentum created during the resilience planning process. The recommended projects are organized into three implementation stages:

- **short-term** for immediate implementation, like public art or home energy audits;
- **near-term** or projects that require some coordination and planning but that can be realized within the next few years, like complete sidewalks, tree planting and home weatherization; and
- **long-term** projects that take substantial amounts of time to coordinate, fund, and construct, such as the expansion and ecological rehabilitation of Halls Bayou.

In the **short-term**, the community will be more aware of risks and opportunities for improving safety at home while celebrating the spirit of East Houston through public art activities and other convenings that encourage preparedness and aid recovery. In the **near-term**, the community will begin improving homes and businesses as well as the shared public spaces such as streets and bayous, further reducing risks while bringing community members together and supporting its development. In the **long-term**, substantial changes in flood risk reduction and improvements in mitigating the urban heat island effect will significantly alter the physical reality and associated risks of living in East Houston.

GUIDING PRINCIPLES

LIVING IN A CONNECTED COMMUNITY
SAFE AT HOME
SAFE IN THE NEIGHBORHOOD

SHORT-TERM

QUICK WINS link community needs, funding opportunities, energy with City or not-for-profit and philanthropy

EXECUTE NOW...or really soon.

- Keep The Momentum
- Model Resilient Homes
- Streetscape Improvements
- Green Stormwater Infrastructure

NEAR-TERM

PLACED-BASED INTERVENTIONS realize multiple concepts, and have multiple benefits

COLLABORATE across City agencies + place in Capital Improvements Plan

DESIGN + ENGINEER PROJECT with community input

EXECUTE in approximately 3-5 years

- Resilience Hub Facility + Service Network
- Mesa Drive Corridor Improvements

LONG-TERM

PLACED-BASED INTERVENTIONS to catalyze transformation across multiple stakeholder groups

IDENTIFY project leader + supporting actors

VISION DOCUMENT to use to secure State, Federal + private and/or philanthropic funding

DESIGN + ENGINEER project components after (partial) funding is secured, and get input from the community

EXECUTE in phases

- Expand Capacity Of Halls + Greens Bayous

PLANNING PROCESS:

WHAT IS A RESILIENT NEIGHBORHOOD?

WHAT IS A NEIGHBORHOOD RESILIENCE PLAN?

WHAT IS A RESILIENT NEIGHBORHOOD PLANNING PROCESS?

HOW TO USE THIS PLAN

WHAT IS A RESILIENT NEIGHBORHOOD?

The City of Houston has experienced 18 major weather events including flooding, heat, cold, and drought since 2000, along with a major global pandemic, lives have been lost and billions-trillions of dollars lost in damage. Houston's Climate Impact Assessment projects that weather events will continue along this trajectory, or that they will continue to intensify in terms of both frequency and magnitude (*Climate Impact Assessment:* 9), and specifically for Houston these projections mean more severe droughts, sea level rise, more intense coastal flooding and increased intensity of storms. It is imperative that the community works consistently toward reducing the impact of future events.

In terms of climate, the neighborhood is experiencing a general warming trend and changing precipitation patterns. The City of Houston's *Climate Impact Assessment* published in August 2020 summarizes Houston's changing climate, finding that the City has already experienced:

What is Resilience?

"Resilience is the capacity of a system, be it an individual, a forest, a city or an economy, to deal with change and continue to develop. It is about how humans and nature can use shocks and disturbances like a financial crisis or climate change to spur renewal and innovative thinking."[6]

"Enhanced resilience allows better anticipation of disasters and better planning to reduce disaster losses — rather than waiting for an event to occur and paying for it afterward."[7]

Goals from Resilient Houston

PREPARED & THRIVING HOUSTONIANS	
GOAL 1	We will support Houstonians to be prepared for an uncertain future.
GOAL 2	We will expand access to wealth-building and employment opportunities.
GOAL 3	We will improve safety and well-being for all Houstonians.
SAFE & EQUITABLE NEIGHBORHOODS	
GOAL 4	We will ensure that all neighborhoods have equitably resourced plans.
GOAL 5	We will invest in arts and culture to strengthen community resilience.
GOAL 6	We will ensure all neighborhoods are healthy, safe, and climate ready.
GOAL 7	We will build up, not out, to promote smart growth as Houston's population increases.
HEALTHY & CONNECTED BAYOUS	
GOAL 8	We will live safely with water.
GOAL 9	We will embrace the role of our bayous as Houston's front yard.
ACCESSIBLE & ADAPTIVE CITY	
GOAL 10	We will demonstrate leadership on climate change through action.
GOAL 11	We will modernize Houston's infrastructure to address the challenges of the future.
GOAL 12	We will advance equity and inclusion for all.
GOAL 13	We will transform city government to operationalize resilience and build trust.
INNOVATIVE & INTEGRATED REGION	
GOAL 14	We will continue to invest in the region's diverse economy
GOAL 15	We will increase regional transportation choice.
GOAL 16	We will manage our land and water resources from prairie to bay
GOAL 17	We will enhance regional emergency preparedness and response.
GOAL 18	We will leverage existing and new investments and partnerships.

Figure 4: The goals of the *Resilient Houston* plan.

- Increases in the average temperature of all seasons;
- Lengthening of summer, with summer beginning earlier and ending later;
- Increases in energy demand for cooling buildings for the spring, summer, and fall seasons;
- Increases in the number of hot days per year (defined here as maximum temperature above 100°F) and the number of warm nights per year (defined here as minimum temperature above 80°F);
- Increases in the temperature of the hottest days experienced each year;
- Longer multi-day heatwaves;
- Little change in total annual precipitation but a decrease in summer precipitation and increase in fall precipitation; and
- Greater variability in day-to-day precipitation that includes both slight increases in number of dry days and increasing risk of drought due to soil moisture decreases resulting from higher temperatures, as well as increases in the precipitation falling during extreme precipitation events such as the wettest three-day period each year" (*Climate Impact Assessment: 7*).

In addition to weather events, stresses and shocks can include other types of events such as pandemics, economic changes such as rising energy prices, sudden spikes in housing demand, and exposure to environmental toxins. Each event adds to the nature and scope of what a resilience planning effort must consider.

Given the increased likelihood of extreme weather events, and the compounding effects of repeat or multiple events on a community, as well as underlying stresses, it is imperative that tangible action be taken now to reduce the impact of events, and optimize the recovery from them. This plan is a key step in taking action to mitigate the impacts of climate change and other extreme events on the community.

"**Temperatures** in Texas have risen almost 1.5 degrees Fahrenheit since the beginning of the 20th Century. **Historically unprecedented warming** is projected during this century, with associated increases in extreme heat events"

"Although projected changes in annual precipitation are uncertain, increases in **extreme precipitation events** are projected. Higher temperatures will increase soil moisture loss during dry spells, increasing the intensity of naturally occurring **droughts**"

"Future changes in the number of landfalling **hurricanes** in Texas are difficult to project. As the climate warms, hurricane rainfall rates, storm surge height due to sea level rise, and the intensity of the strongest hurricanes are all projects to increase."[4]

WHAT IS A NEIGHBORHOOD RESILIENCE PLAN?

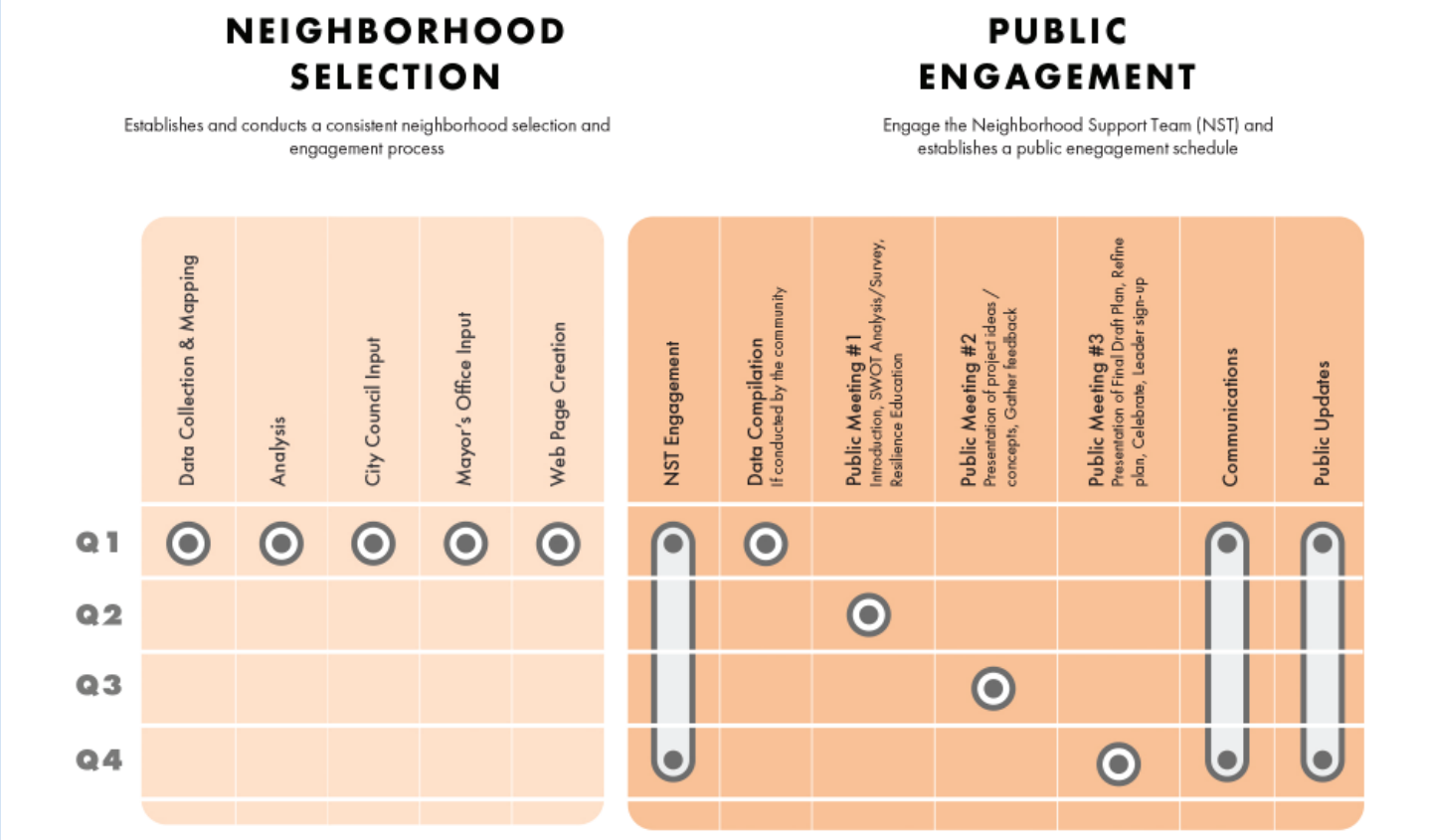


Figure 5: Diagram showing how the replicability framework supports the neighborhood resilience planning process.

A *Neighborhood Resilience Plan* is a strategic action plan for government, community leaders and innovators looking to address core resilience issues facing their community. It has the flexibility to align both to Resilient Houston's goals and targets while also aligning to the unique physical characteristics and community priorities of the neighborhood. The plan helps to guide the community, its leaders, and its elected representatives toward decisions that reduce and mitigate neighborhood vulnerabilities, and it provides the essential foundation for forming partnerships with local government, philanthropy, community-based organizations, and other institutions and organizations.

The plan contains Community Engagement (see page 42) and Vulnerability Assessment findings (see page 22) that inform and shape the community's vision for resilience. Encapsulating the community's resilience vision, the Guiding Principles describe the high-level actions that lay the foundation for neighborhood resilience. The Guiding Principles of the plan appear broad and widely applicable across the City of Houston but are also localized to create concrete action today. Projects and programs make the Guiding Principles tangible and actionable through specific recommendations for people-specific and placed-based initiatives designed to achieve resilience in the East Houston neighborhood. To ensure that the community's vision and ambitions laid out in this plan are realized, ambitious performance targets, implementation timelines, and feasible funding strategies are embedded in the projects and expanded on in the plan's appendices.

TECHICAL ADVISORY COMMITTEE

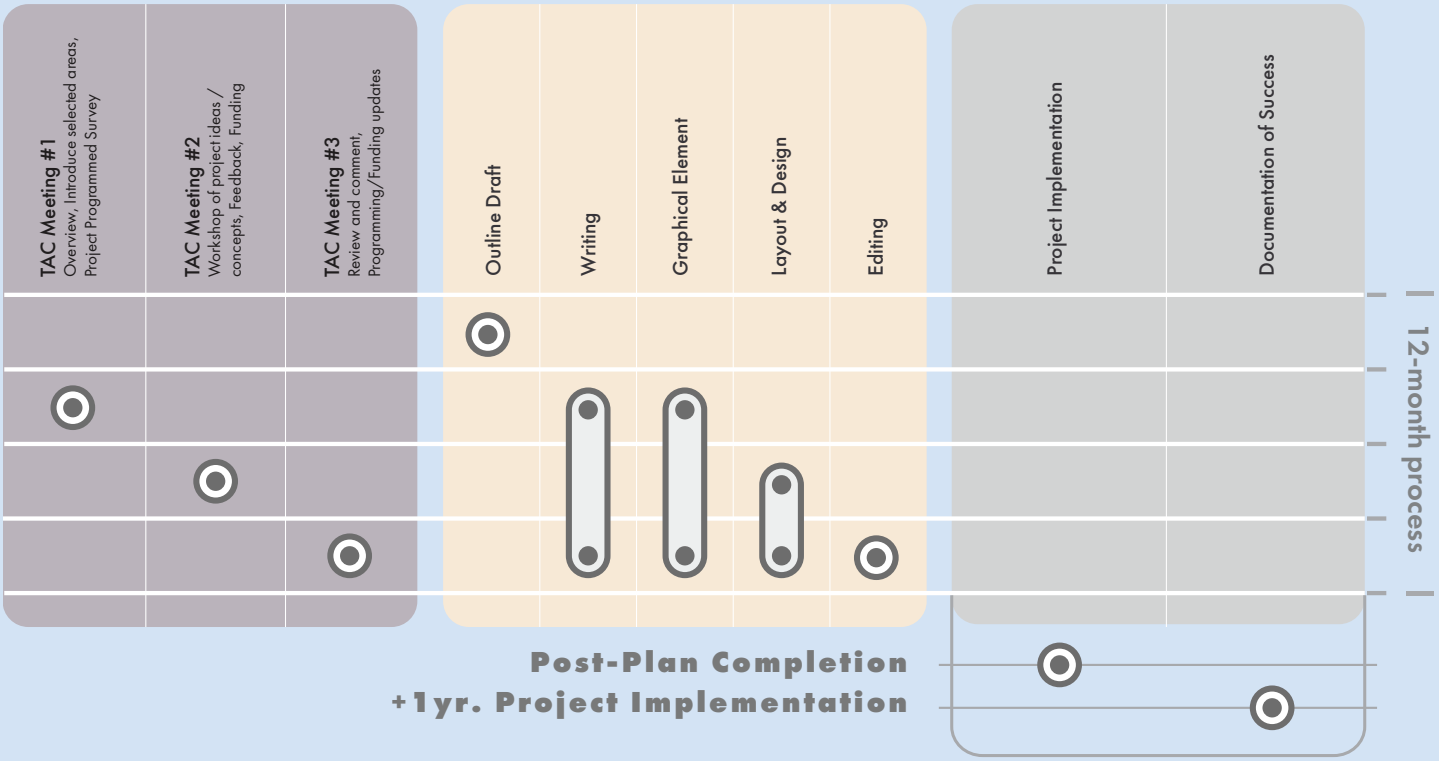
Provides guidance and feedback on recommended actions and plans and advises on feasibility and funding

PLAN PRODUCTION

Provides packages of implementable projects alongside, recommended funding sources, order of actions, policy implications and program leadership/support-team assumptions

IMPLEMENTATION REPORTING

Provides monitoring and evaluation guidelines in alignment with Resilient Houston M&E workflows



The plan is designed to:

- Make sure the community is equipped with the best knowledge, skills, and resources available surrounding resilience practices.
- Enable the community to take ownership of their neighborhood by supporting the community to seek grants and private partnerships;
- Support community advocacy in local government decision making processes; and
- Describe a number of strategies and implementable projects that will create tangible change in the neighborhood.

It provides action items on how to prepare homes and buildings to withstand flooding, heat, and power outages through innovative building technology, harnessing nature to cool and insulate, and implementing other best building practices, while also addressing outstanding repairs from previous disasters. The plan organizes infrastructure and other major public investments across agencies and jurisdictions; it harnesses nature to manage heat and flooding at a neighborhood scale and recommends substantial investments in streets and the bayou through multiple benefit projects that result in healthy and complete streets, improved ecology and environmental health, and greater flood water capacity. It also recommends programs and projects to increase community capacity to withstand, respond to, and recover from shocks and stresses by increasing local knowledge and awareness, strengthening networks for distributing resources and other forms of support, and increasing resources in the neighborhood through economic development.

WHAT IS A RESILIENT NEIGHBORHOOD PLANNING PROCESS?

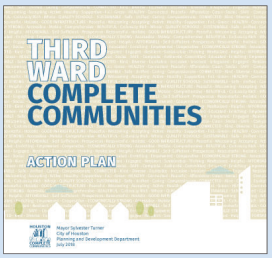
The *East Houston Neighborhood Resilience Plan* is linked to the substantial work already developed in *Resilient Houston*, the *Houston Climate Action Plan*, *Complete Communities*, the many community housing and public health programs, and the various Harvey Recovery projects. With thoughtful outreach, in collaboration with local community leaders and organizations, this plan identifies compound risks and vulnerabilities, and then offers multi-benefit strategies to address identified risks and vulnerabilities through placed-based projects. These include climate adaptation and flood risk reduction projects, infrastructure modernization, housing stability and security, healthy clean environment, social empowerment, economic development, and heat mitigation. It also provides people-based strategies that address historic and prevailing inequities. The plan collectively builds on capacity to advance neighborhood priorities, attract, and guide investment, and encourage equitable growth and redevelopment. This effort seeks to transfer agency to neighborhood advocates and community members to steward resilience efforts at the local level, while considering initiatives and impacts at the City and regional levels.

Nested Scales

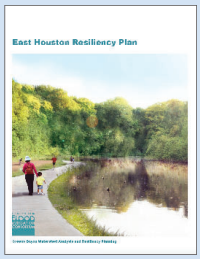
The neighborhood planning process is organized in terms of 'nested scales', or various planning efforts occurring at different scales but in relation to one another other.[8] In the City of Houston, for instance, the bayous are one of the linking elements between the different scales—the regional, city, neighborhood, and individual—within regional management of the White Oak Bayou watershed, Harris County bayou improvement planning, White Oak Bayou neighborhood specific plans and individual parcel owner water management projects.

Resilient Houston Shocks and Stresses

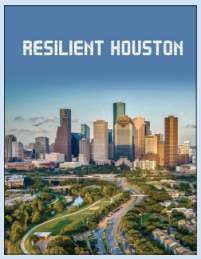
Building on the priority shocks and stressors identified in Resilient Houston, the neighborhood resilience action planning effort assesses stressors expected to affect the City of Houston at large as well as vulnerability amplifiers specific to each neighborhood. In East Houston such overarching amplifiers include flood, housing, energy, public health, with specific amplifiers, including socio-economic factors that lead to reduced housing quality, food and energy, as well as adjacencies to heavy industry, which lead to public health and environmental health concerns (see Vulnerability Assessment, page 30). Recognizing that citywide stressors and shocks are experienced differently across the neighborhoods, the plan acknowledges the disparities in the ways Houstonians experience climate events and provides a pathway for the East Houston neighborhood to highlight the opportunities and challenges that are of highest priority to the community.



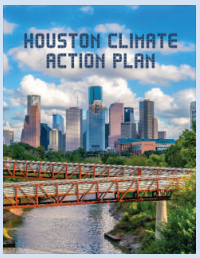
Complete Communities Action Plan, 2018



Greens Bayou Watershed Analysis and Resiliency Planning, 2019



Resilient Houston, 2020



Houston Climate Action Plan, 2020

FLOODS: Collaborative Community Design Initiative No. 5, 2020

Figure 6: The basis of planning for East Houston Neighborhood Resilience Plan

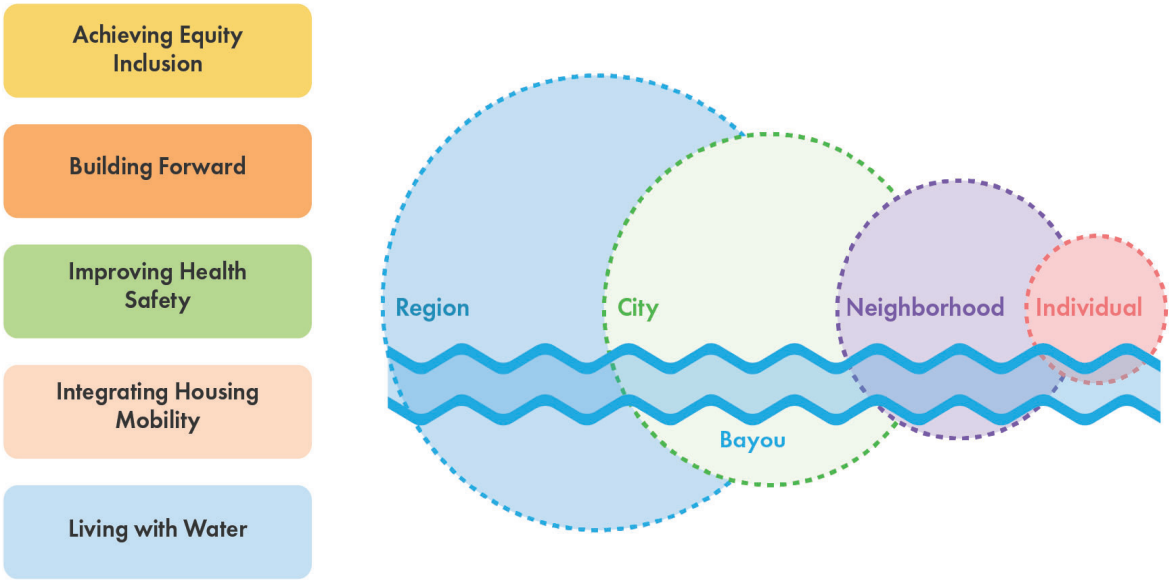


Figure 7: The Nested Scales diagram in the Resilient Houston plan document visualizes how the city is connected the bayous at different geographic scales.

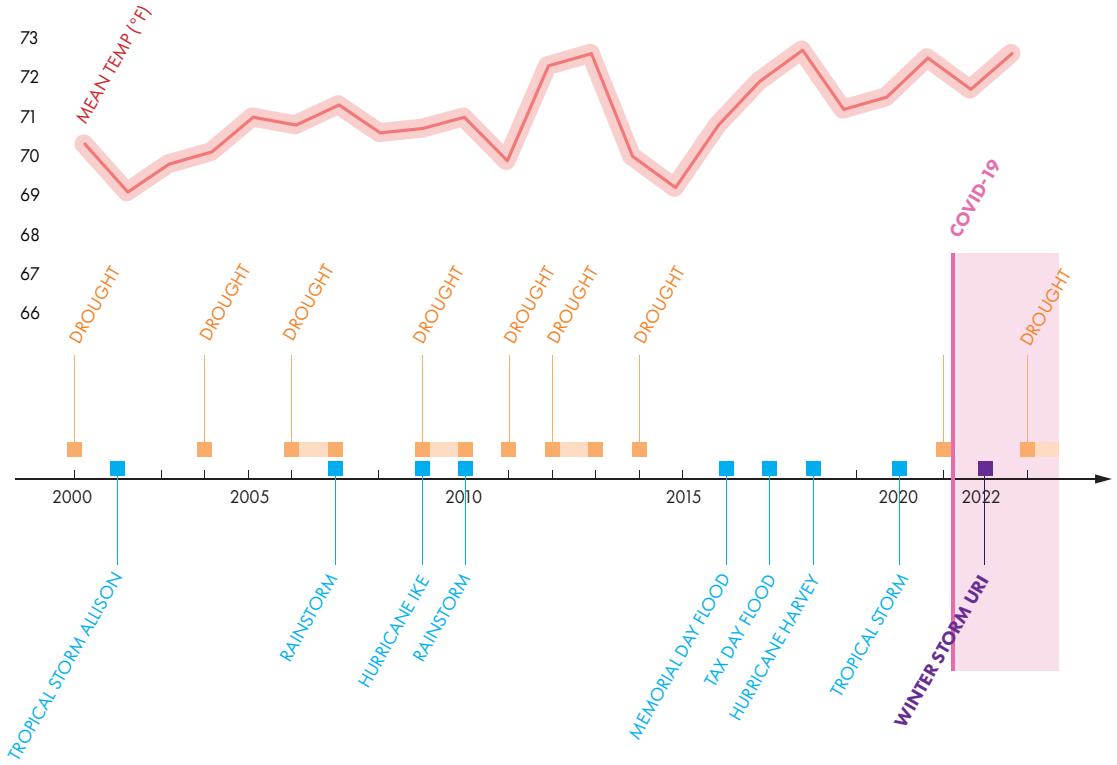


Figure 8: City of Houston's timeline of stresses + shocks between 2000 and today.

HOW TO USE THIS PLAN

The plan guides and supports decision-making around local investments in physical infrastructure, programs, and policies, which means it can be used to promote the interests of different stakeholder groups. The *East Houston Neighborhood Resilience Plan* provides the foundation for forming collaborative partnerships with local government, philanthropy, community-based organizations, and other institutions and organizations. The plan sets a clear vision that the community can organize around and creates a constructive interface through which various stakeholders can collaborate with the local community toward shared goals. It does so by defining projects and programs and is a tool for the community to guide decision-making, identify stakeholder roles and responsibilities, and forge the partnerships, relationships, and networks essential to realizing the ambitious resilience actions and activities in this plan. Community members should refer to the plan document to focus community-based resilience efforts and initiatives, and to understand which stakeholders to reach out to about which topics and when, and as a reference for community need and consensus-informed solutions.

Community Members + Organizations

For community-based plan users, the neighborhood resilience action plan helps to engage various stakeholders productively and systematically, including local government, nonprofits, and other private interest groups. The plan provides a clear statement of what is needed to realize neighborhood resilience in East Houston. Having a clear statement of what is still needed in a City-led plan makes it clear to grant administrators and private partners how they can help the neighborhood. The plan also identifies roles and responsibilities that sets the foundation for coordination amongst resilience efforts as well as transparency and accountability at implementation. It also allows groups, organizations, and institutions to work relatively independently by following the plan's strategies and actions yet ensures a shared understanding of the vision and goals, and accountability as to the who, what, when, and how.

How to be a Community Advocate

Use this plan to attain procedural justice, or as a tool to advocate for community interests and priorities. Advocacy that is grounded in an agreed-on plan document such as this one, carries weight in conversations with local government and other private partners. The plan can guide decision making at Super Neighborhoods meetings, city council meetings, and other local government committees. It also serves as a means of constructively holding the community, community partners, and local government accountable for their part in realizing this plan, by identifying project leads, timelines, and metrics for success.

A key aspect of equity in government is procedural justice or: "being fair in processes, being transparent in actions, providing opportunity for voice, and being impartial in decision making"[9]

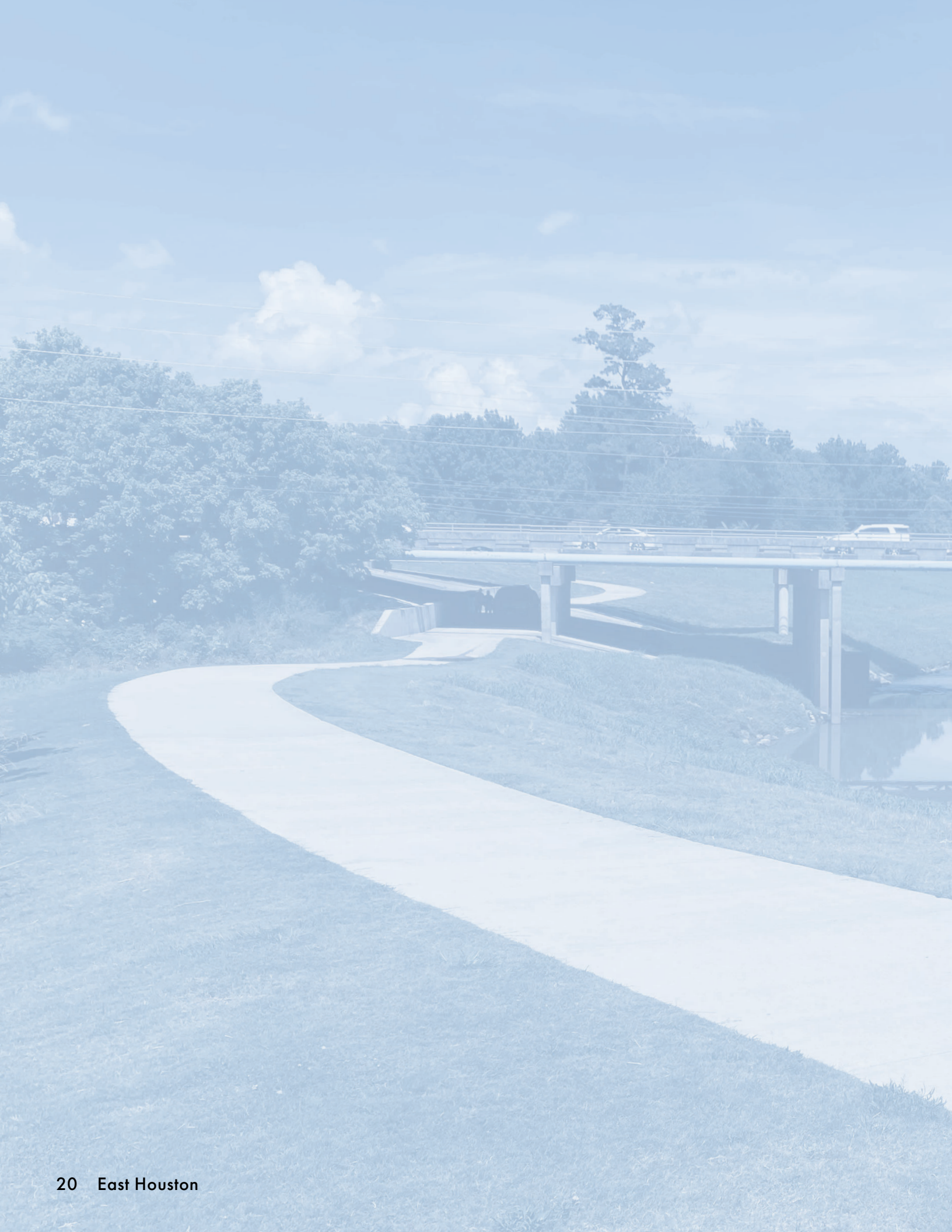
The plan is designed to support community-identified priorities and therefore is intended to be used by community-based organizations and community leaders to support their advocacy efforts. Advocacy efforts might include requesting funds allocations from developing partnerships with local donors, state and federal government, developing programs, or increasing service levels from city departments and agencies, or prioritizing physical infrastructure

investments made by Harris County Flood Control and other governmental agencies. In these, and other advocacy efforts, the plan serves as the basis for implementing broader change, provides assurances to organizations granting funding to CBOs such as local nonprofits, and other community-driven initiatives.

How to be a Community Partner

Partners outside the community and local government often have aligned interests, as resilience ensures property values remain stable and businesses remain active, improves the environment and ecology, builds equity, and in some cases can serve as an economic stimulus tool. In cases where business interests and resilience plan actions and projects align, there is an existing shared interest that can be leveraged to ensure timely implementation of the neighborhood resilience action plan.

Community partners should refer to the *East Houston Neighborhood Resilience Plan* as a cohesive community-driven vision of resilience for the neighborhood. The Guiding Principles lay out strategies and actions, along with key stakeholders and their responsibilities. Stakeholders, particularly private partners, can review to understand where additional support may be needed to realize the neighborhood's vision. Additionally, partners can review the projects and the implementation steps to find shared interests to pursue. The funding, metrics, and timelines support finding ways to optimize private interests with broader neighborhood resilience principles.



VULNERABILITY ASSESSMENT

VULNERABILITY ASSESSMENT

Flood vulnerability
Housing
Stormwater infrastructure
Community services
Clean neighborhoods
Heat vulnerability
Public health
Chronic social stresses

VULNERABILITY FINDINGS

VULNERABILITY ASSESSMENT

The vulnerability assessment findings provide the basis for plan recommendations, in combination with the community engagement findings. The vulnerability assessment findings are derived from:

- Spatial analysis of flooding and extreme heat impacts on community assets and people;
- Conversations with the community on the impacts of and recovery from Hurricane Harvey; and
- Considering the compounding effects exacerbating chronic social stresses.

The community-identified priorities—flooding, housing, neighborhood cleanliness, and neighborhood capacity—provide the context for analyzing the East Houston community's vulnerabilities. The findings largely align with the community's priorities, as discussed in the Community Engagement Findings section, with the exception of heat vulnerability.

Heat vulnerability, and the general impacts of heat, are underestimated. The risks associated with high temperatures and prolonged heat exposure are not as commonly known and the effects not as immediately evident as other risks that are clearly visible and vividly experienced, such flooding or the condition of homes in the neighborhood. However, the City of Houston and HARC partnered with NOAA in 2020 to address heat, publishing resources via the H3AT program hosted by HARC.

Flood vulnerability was estimated using the following assessment factors:

- Location relative to the FEMA National Flood Hazard Layer (NFHL), which shows both the 1% and the 0.2% annual chance floodplain boundaries;
- The year the structure was constructed, which governs the nature of the floodplain regulations in affect at the time the structure was built; and,

Whether the structure is considered a critical facility (e.g. a hospital or a nursing home). In the following sections, "highly vulnerable" assets are those that are classified as having 'high combined vulnerability and risk' to floodplain inundation based on the assessment factors outlined above.

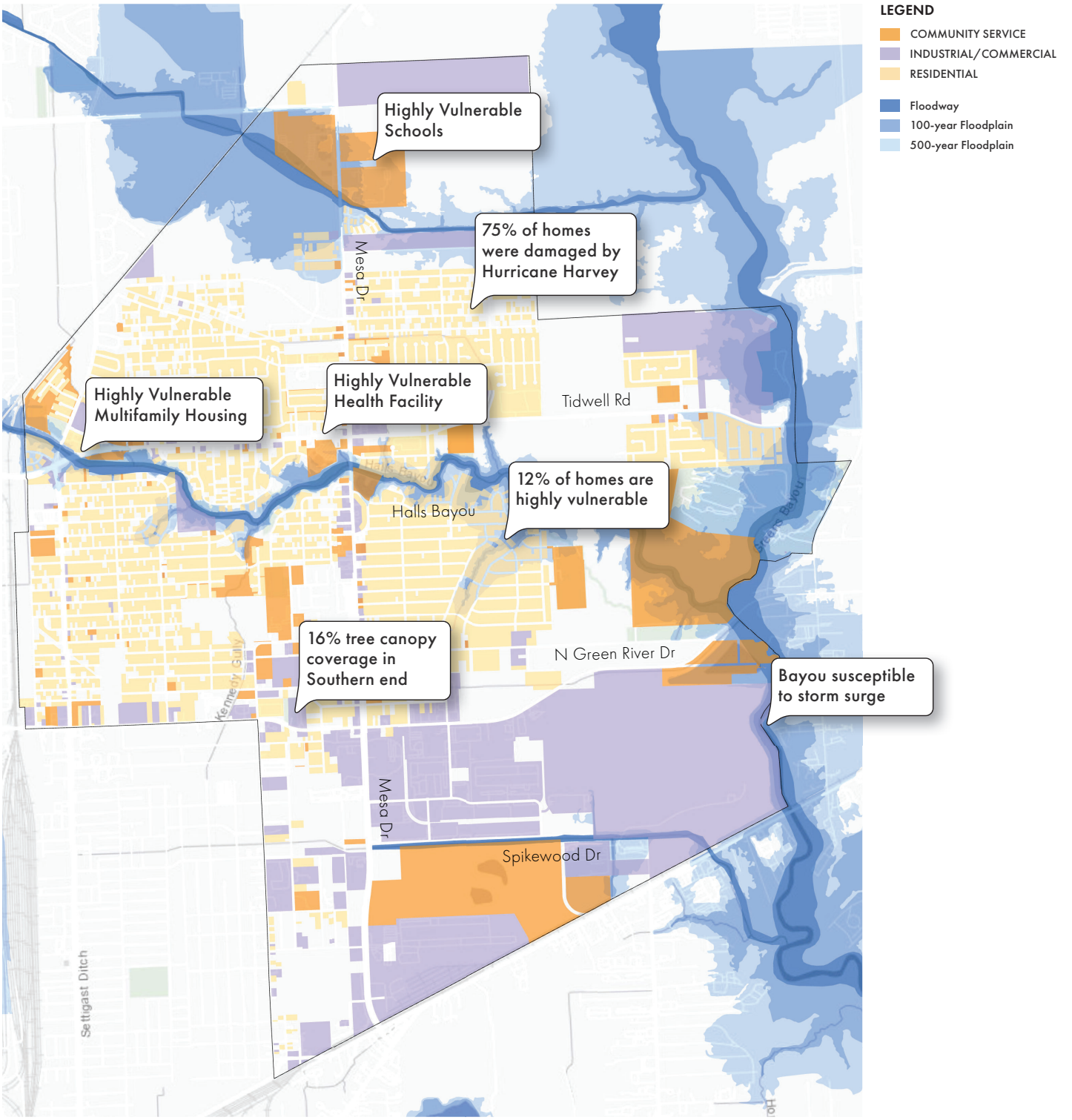


Figure 9: East Houston Neighborhood Vulnerabilities.

VULNERABILITY ASSESSMENT

Neighborhood Vulnerabilities Summary
The vulnerability indicators consider three factors: the overall flood vulnerability of homes and businesses in the neighborhood, the individual components of flood vulnerability related to homes in the neighborhood, and the social vulnerabilities of residents living in the neighborhood.

- At the neighborhood level, East Houston is highly vulnerable to and at risk of floodplain inundation. Approximately 12 percent of residential properties, 35 percent of city- and county-owned property, 8 percent of commercial and industrial, and 20 percent of community services properties have a high vulnerability to greater than a 1.0% annual chance of flooding (which exceeds the current standard of care for new development and civil infrastructure). Despite there being properties at higher risk of flooding than others, this should not overshadow the fact that virtually all of Houston is at risk of flooding.
- With nearly 6,200 residential properties in the neighborhood, and more being added through active development in the area, there are close to 720 (or 12%) properties with high vulnerability to flooding. In addition, of the 1,600 or so residential parcels identified as "vacant", 142 are exposed to flooding (may or may not have a structure on them). Approximately 12 percent of residential properties are highly vulnerable to flooding. Social vulnerability indicators, based on the 2020 American Community Survey 5-year Census, identify approximately 12 percent of residents without access to a vehicle, and living in an area that is low-density with limited alternative transportation modes (as evidenced by Land Use and Transportation maps). Median household income in the neighborhood is around $38,361 and about 37% households pay more than 30% of their income for housing and may have difficulty affording other necessities. Less than 10 percent of residents have a college education, limiting employability and the types of jobs attainable.

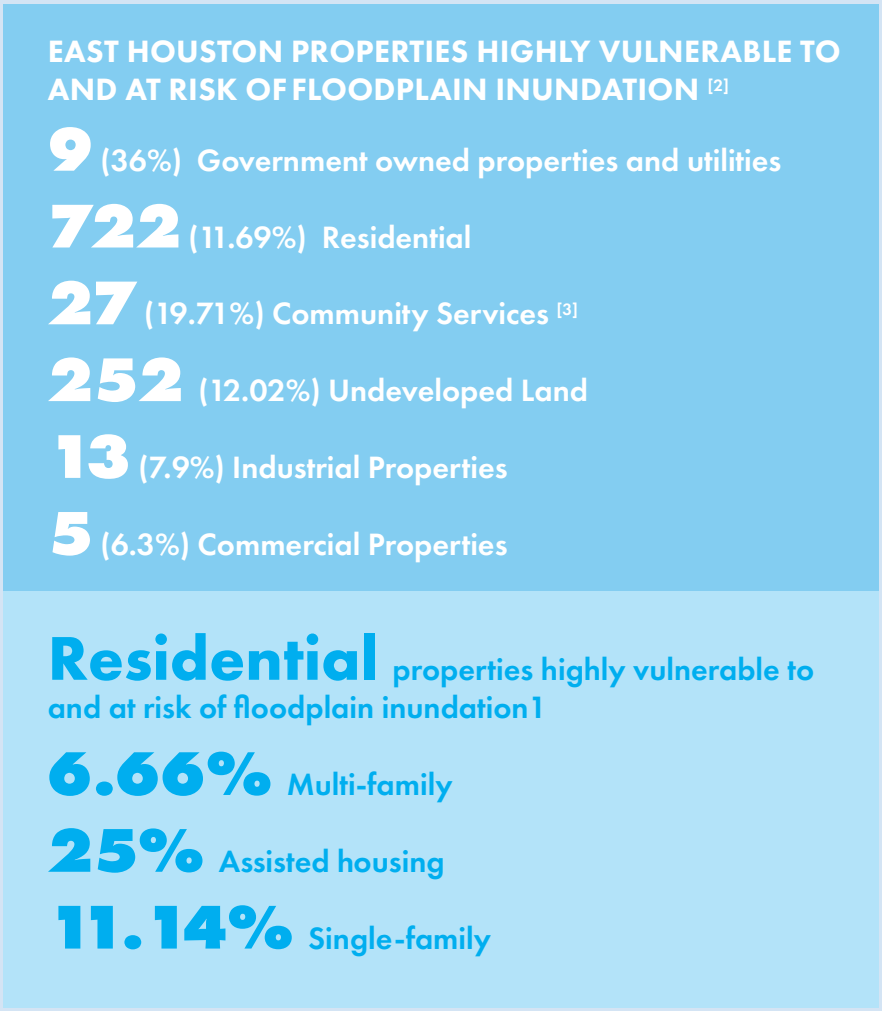


Figure 10: Key figures and statistics describing the resilience challenges in the East Houston neighborhood

Census-based indicators of social vulnerability					
Social Vulnerability Indicators	Census Tract 2310	Census Tract 2311	Census Tract 2312	Census Tract 2313	Average
No Vehicle Access	6%	19%	12%	10%	11.75%
Median Household Income	$43,358	n/a	$35,337	$36,389	$38,361
Housing Cost-Burdened	27%	38%	43%	38%	36.5%
Individuals without any Health Insurance	no	no	yes	no	--
Social Vulnerability Index (SVI; 2020)[5]	0.92	0.99	0.97	0.89	
SVI - Socioeconomic Status	0.91	0.98			-
SVI - Household Characteristics	0.97	0.93	0.99	0.70	-
SVI - Racial and Ethnic Minority Status	0.92	0.89	0.88	0.97	-
SVI - Housing and Transportation	0.6	0.98	0.80	0.80	-

Figure 11: Statistics describing the resilience challenges in the East Houston neighborhood.

VULNERABILITY FINDINGS

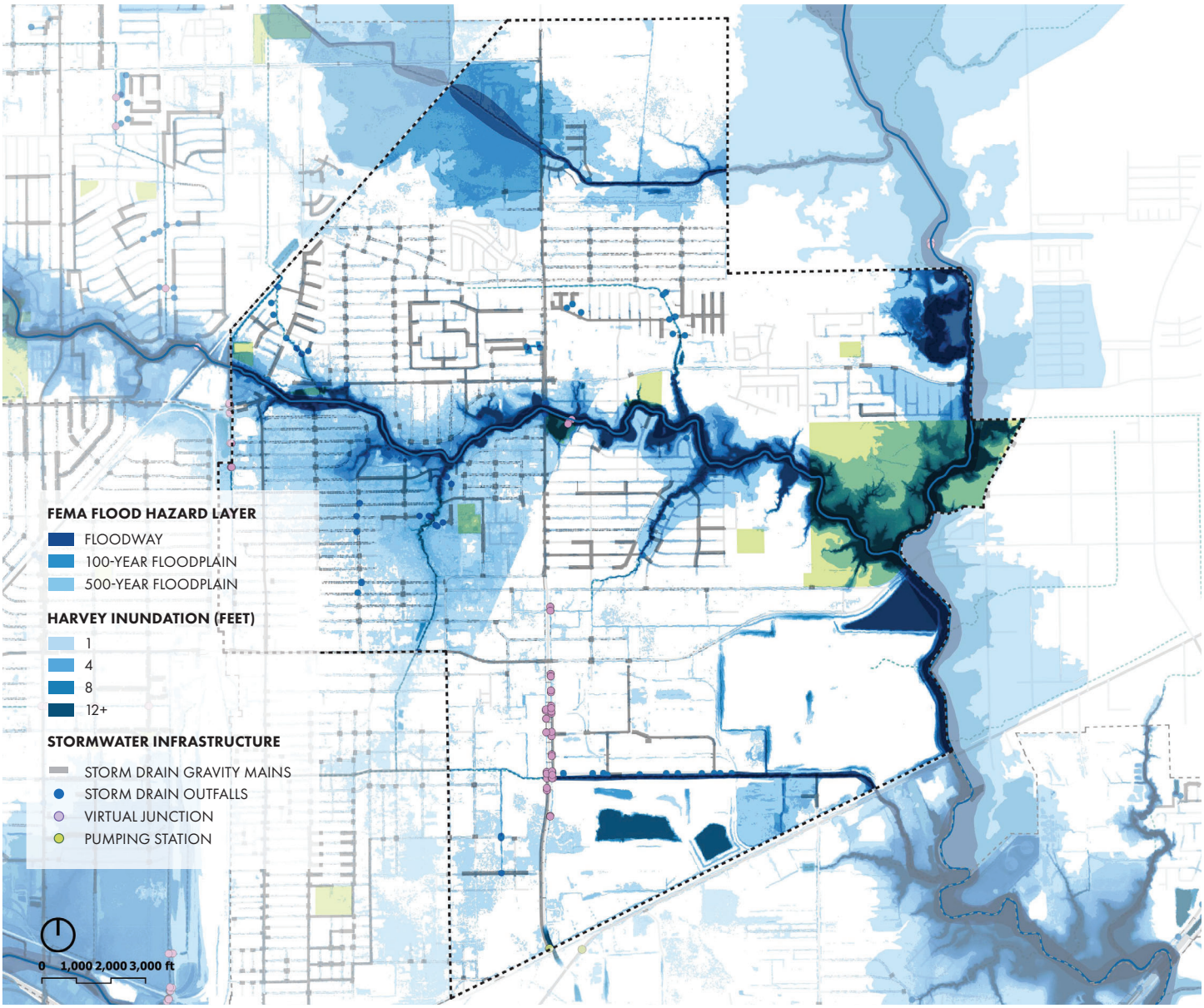


Figure 12: Hurricane Harvey Inundation + Recovery Services.

Flood Vulnerability

Neighborhood flooding can occur from a variety of sources, including bayou flooding, extreme rain events, tropical storms, and hurricanes.

The physical characteristics of the neighborhood in terms of geography and climate include low lying land that is experiencing subsidence, proximity to Halls and Green Bayous and location that is downstream in the regional watershed. East Houston faces high flood risk given that the neighborhood is low lying with major waterways running through the neighborhood carrying regional stormwater to Galveston Bay, in combination with groundwater withdrawals that cause irreversible subsidence. Significant flood impacts were seen from Hurricane Harvey flooding. Extreme rain events, from weather systems, tropical depressions, and hurricanes can lead to both neighborhood flooding as well as bayou flooding.

The physical characteristics of the neighborhood contribute to vulnerabilities.

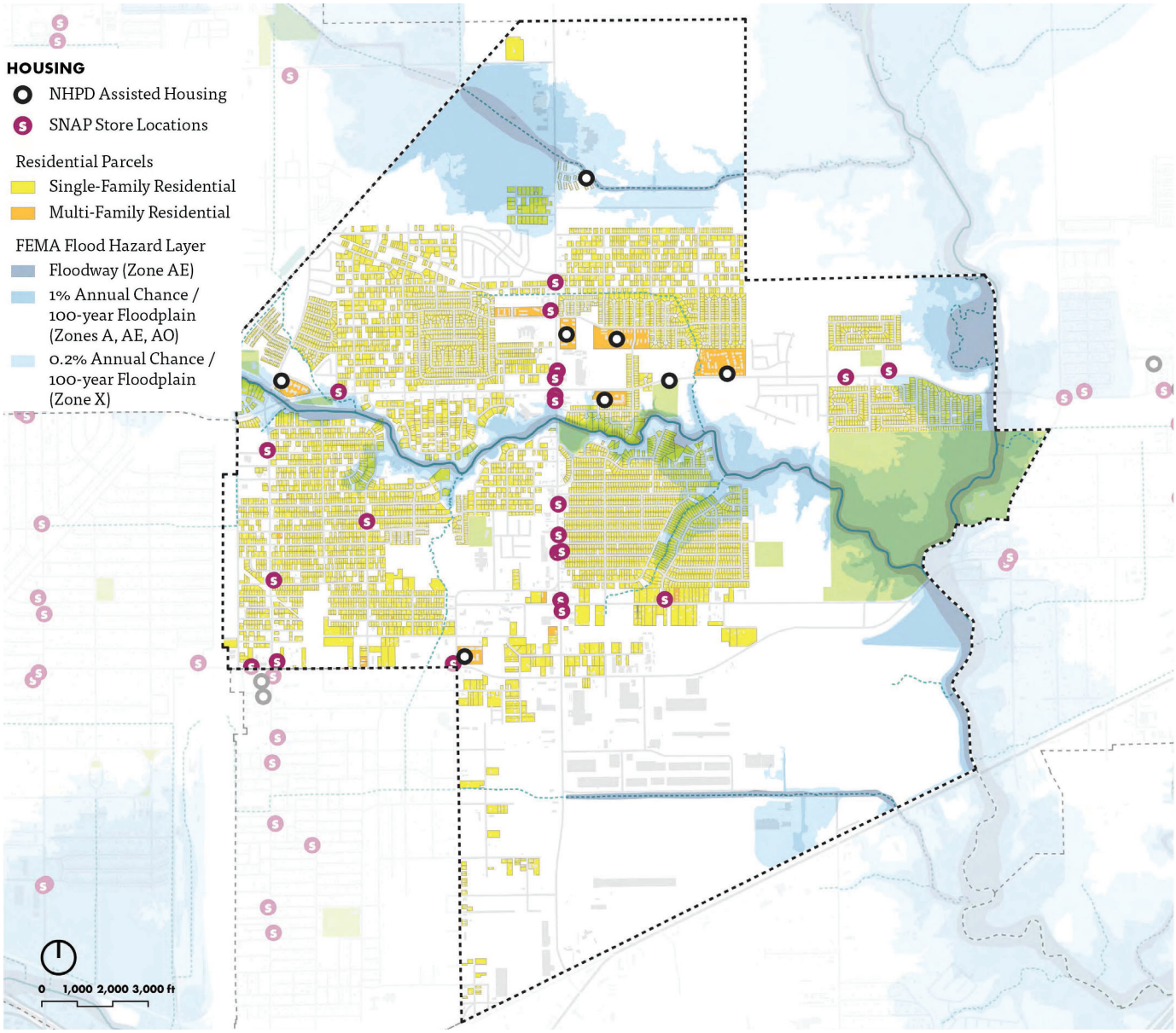


Figure 13: Housing typology and relationship to the floodplain.

Houston neighborhoods that developed before the 1990s are more susceptible to flooding from rainfall because the National Flood Insurance Act of 1968 did not lead to floodplain mapping in Houston until the late 1980s. After the adoption of flood maps in the 1990s, more stringent drainage design requirements and floodplain permitting requirements were

Drainage system infrastructure designed to drain excess rain and ground water from impervious surfaces that is made up of storm drain, storm sewer, surface water drain/sewer, or stormwater drain, open air ditches, bioswales, and bayous. If the rainfall intensity exceeds the capacity of the local drainage system, street and neighborhood flooding can occur.

Storm sewer is grey infrastructure, or made man infrastructyre, designed to drain excess rain and ground water from impervious surfaces such as paved streets, car parks, parking lots, footpaths, sidewalks, and roofs. Storm sewers, and other grey infrastructure, is typically made of concrete channels and pipes and is often placed under ground.

VULNERABILITY FINDINGS

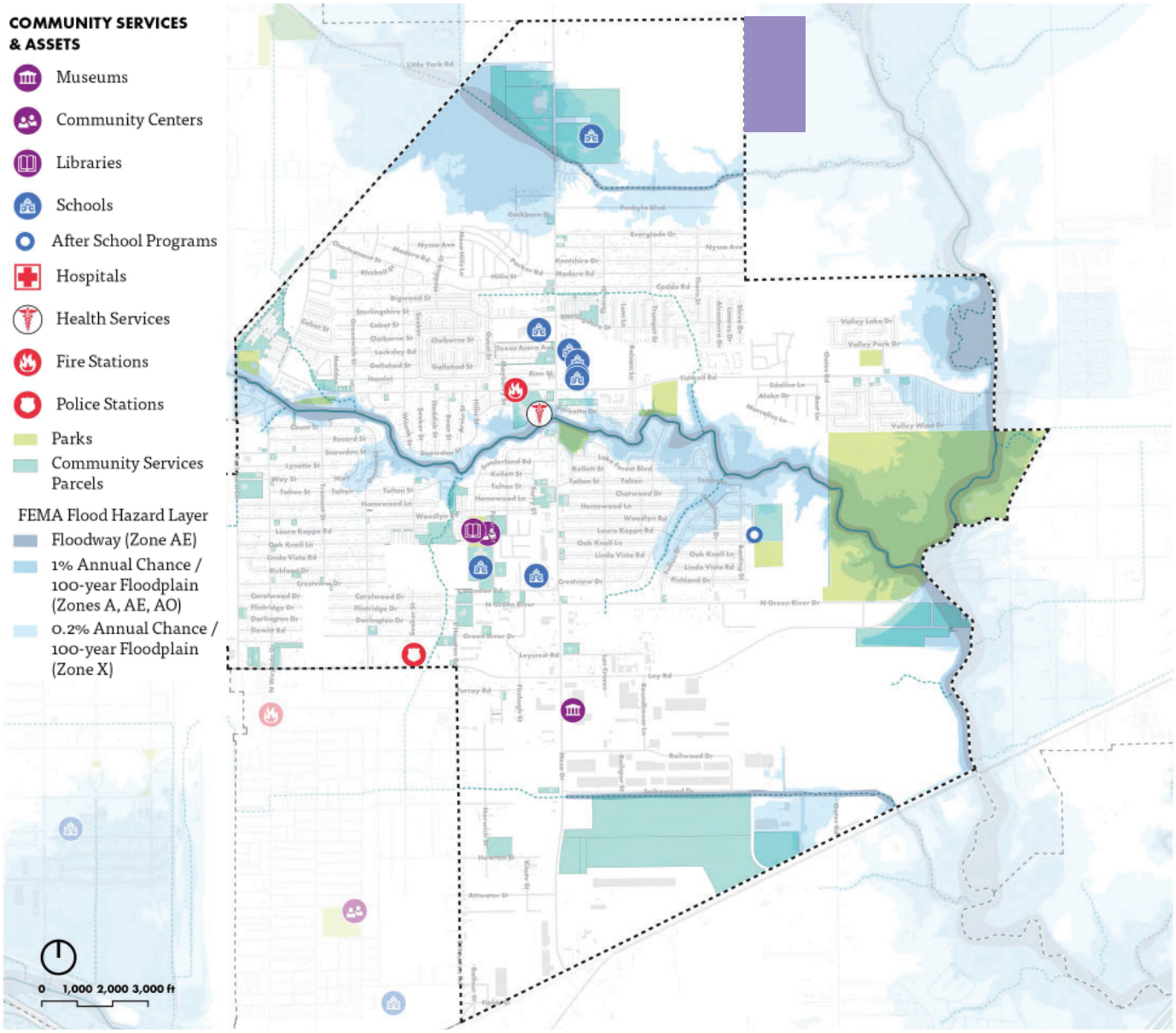


Figure 14: City facilities and relationship to the floodplain.

implemented. As a result of decades of development prior to today's standard restrictions:

- buildings, roads, and other infrastructure, including the neighborhood drainage system, were built to substantially lower drainage standards than would be required today.
- homes, schools, and other critical neighborhood services have been built in the floodplain and the floodway.

Given the development pattern in the neighborhood, buildings within the 100-year and possibly 500-year flood plain are highly susceptible to flood events, and the local drainage system capacity is highly susceptible to rain events that cause neighborhood and street flooding.

Changing rules and development patterns have also resulted in a limited tree canapy. The tendency to clear properties of trees, shrubs, and other vegetation as part of a development has reduced the ability of vegetation to slow water flow and increase water absorption. The high percentage of impervious surfaces creates an effect called sheet flow, where water moves

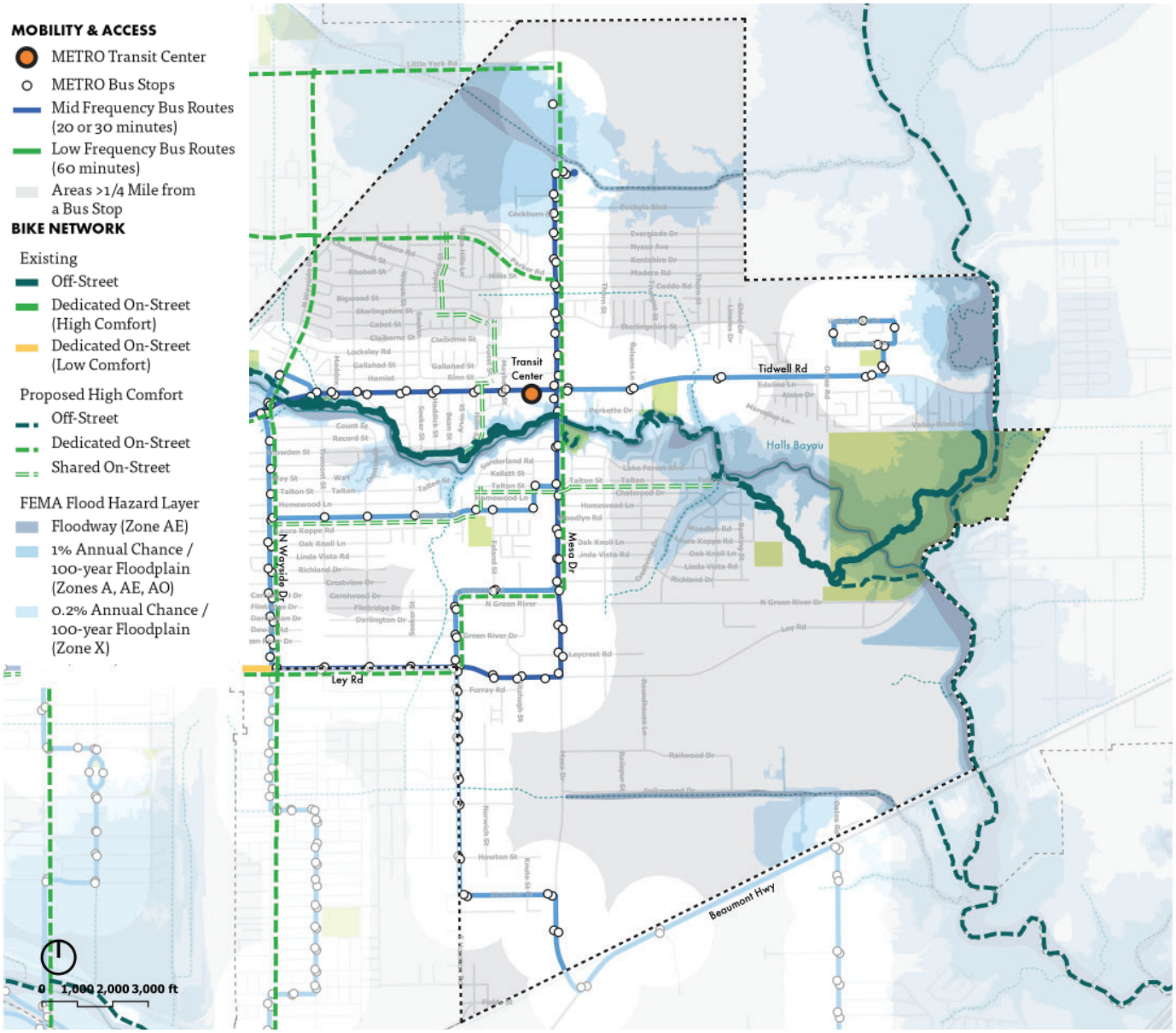


Figure 15: Public transportation routes + services and relationship to the floodplain.

quickly across the impervious surface, and further contributes to the amount of stormwater runoff. It also contributes to increased water speed and volume during flooding events. Impervious surfaces such as concrete, asphalt, and building roofs are the major contributors to creating sheet flow, thereby increasing stormwater runoff that depicts the existing development in the neighborhood. The low amount of undeveloped land shown in this figure indicates that stormwater runoff is higher than with undeveloped land.

Housing

Approximately twelve (12) percent of residential properties in East Houston are classified as highly vulnerable to flooding from Halls Bayou (not counting those vulnerable from street flooding). Highly vulnerable residential properties are predominantly single-family homes but do include one multifamily development and three assisted-living properties. A driving factor of vulnerability is that over 75 percent of homes in the neighborhood were constructed before federal regulations came into place limiting the construction of homes and other structures in the floodplain. Today

VULNERABILITY FINDINGS

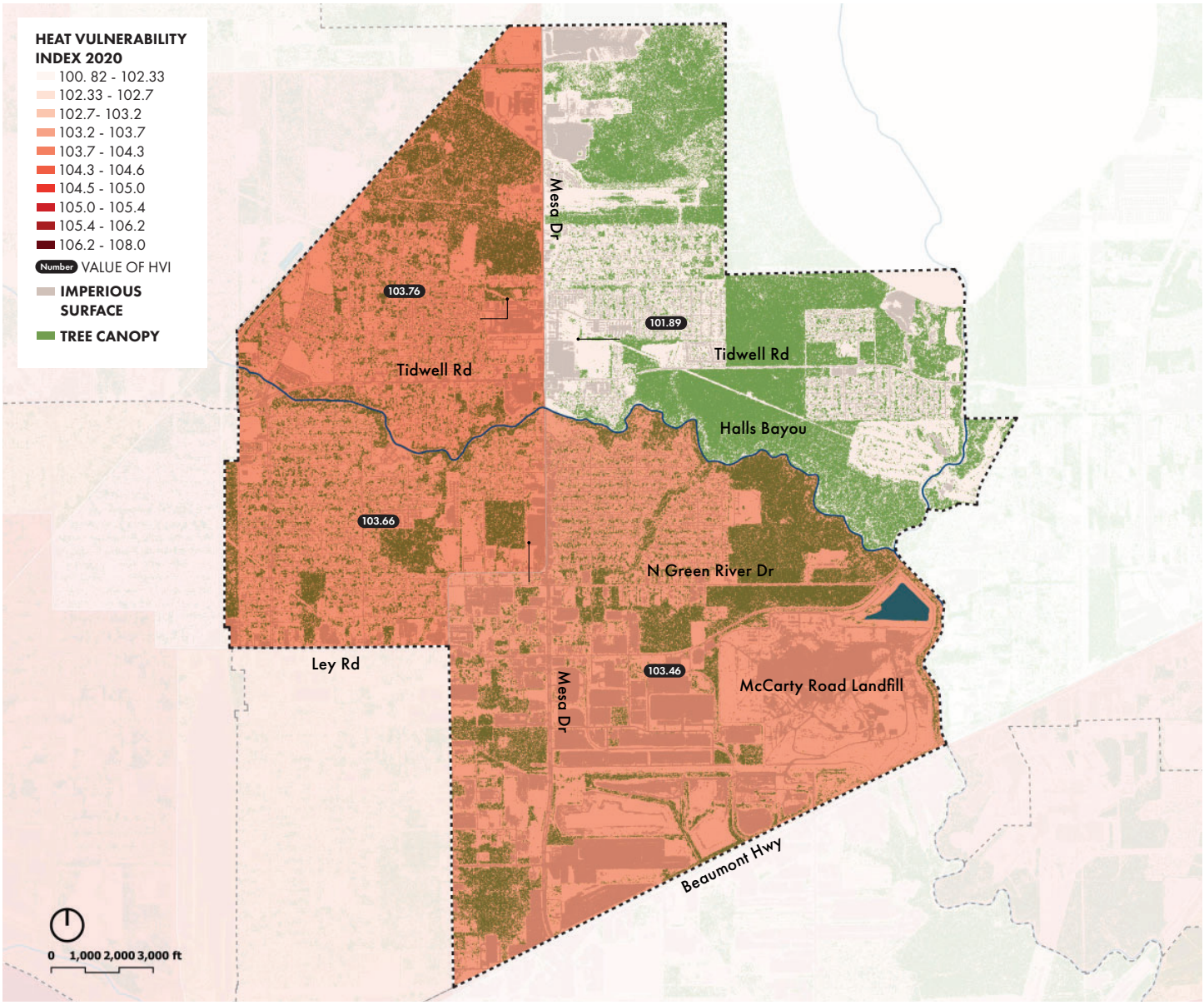


Figure 16: Correlation between percent tree canopy and percent impervious surface as an urban heat island estimation.

federal regulations minimally require homes built or rebuilt on land in the floodplain are elevated to reduce the likelihood of inundation.

Houston's Floodplain Management Office minimum stardards now require all new structures be at least two feet above the 500-year (0.2%) flood plain. (See the Flooplain Managment Office for other requirements.)

Housing vulnerability is exacerbated by a housing stock that is deteriorating due to slow recovery from previous disasters. Nearly 75 percent, or an estimated 5,000, homes in East Houston sustained damage during Hurricane Harvey. Many of the structures are outside of the current FEMA floodplain, which does not account for the compound flooding seen during Hurricane Harvey. Community members report many barriers to accessing recovery funds, including insurance requirements and a heavy paperwork burden that can require property titles and heirship rights. Property owners are often under- or uninsured, and do not have sufficient personal funds to cover the high costs of home repair. The result is that many homes have not been repaired and the funds

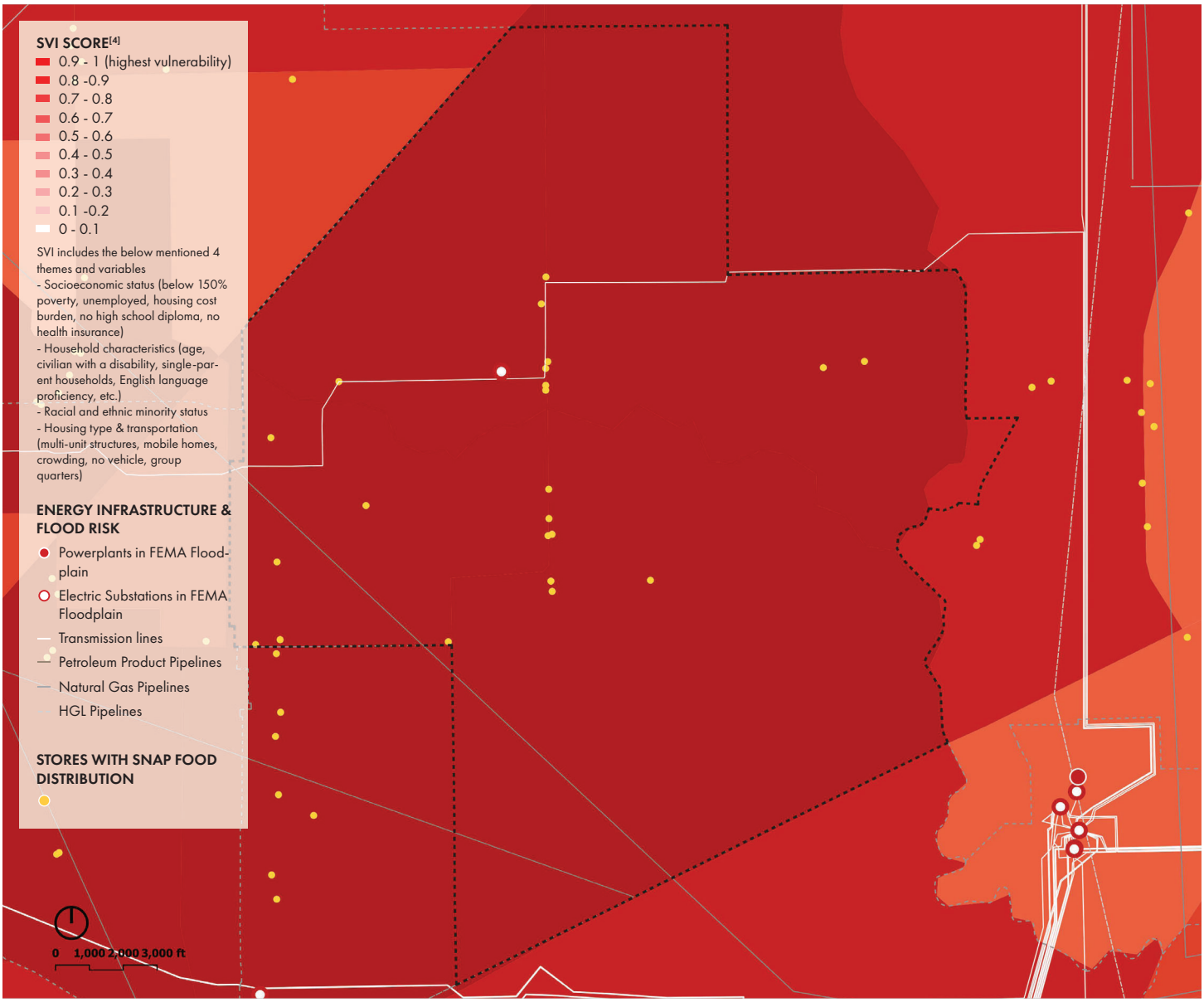


Figure 17: Social vulnerability index as an estimation of socio-economic stress.

dedicated to their repair have remained unclaimed.

Stormwater Infrastructure

The streets and local drainage systems were designed and installed prior to the adoption of more stringent drainage design requirements of the late 1990s. Relative to current design standards and the likelihood of extreme rainfall events occurring, the local drainage systems are undersized and street flooding is likely. Orphan drains, or unmaintained storm drains, are prone to clogging and flooding streets due to a lack of regular maintenance. The lack of maintenance and cleanup is not compensated by a program such as the City's Adopt-A-Drain program: very few storm drains have been adopted as part of the program in the neighborhood. Participants volunteer to remove leaves and debris at least four times a year at each location.

Community Services

Four of the seven Houston ISD properties in East Houston are highly vulnerable to floodplain inundation, as is a health department facility (Houston Medi-Clinics) and a library (Lakewood Library). Schools located on the HISD property include:

VULNERABILITY FINDINGS

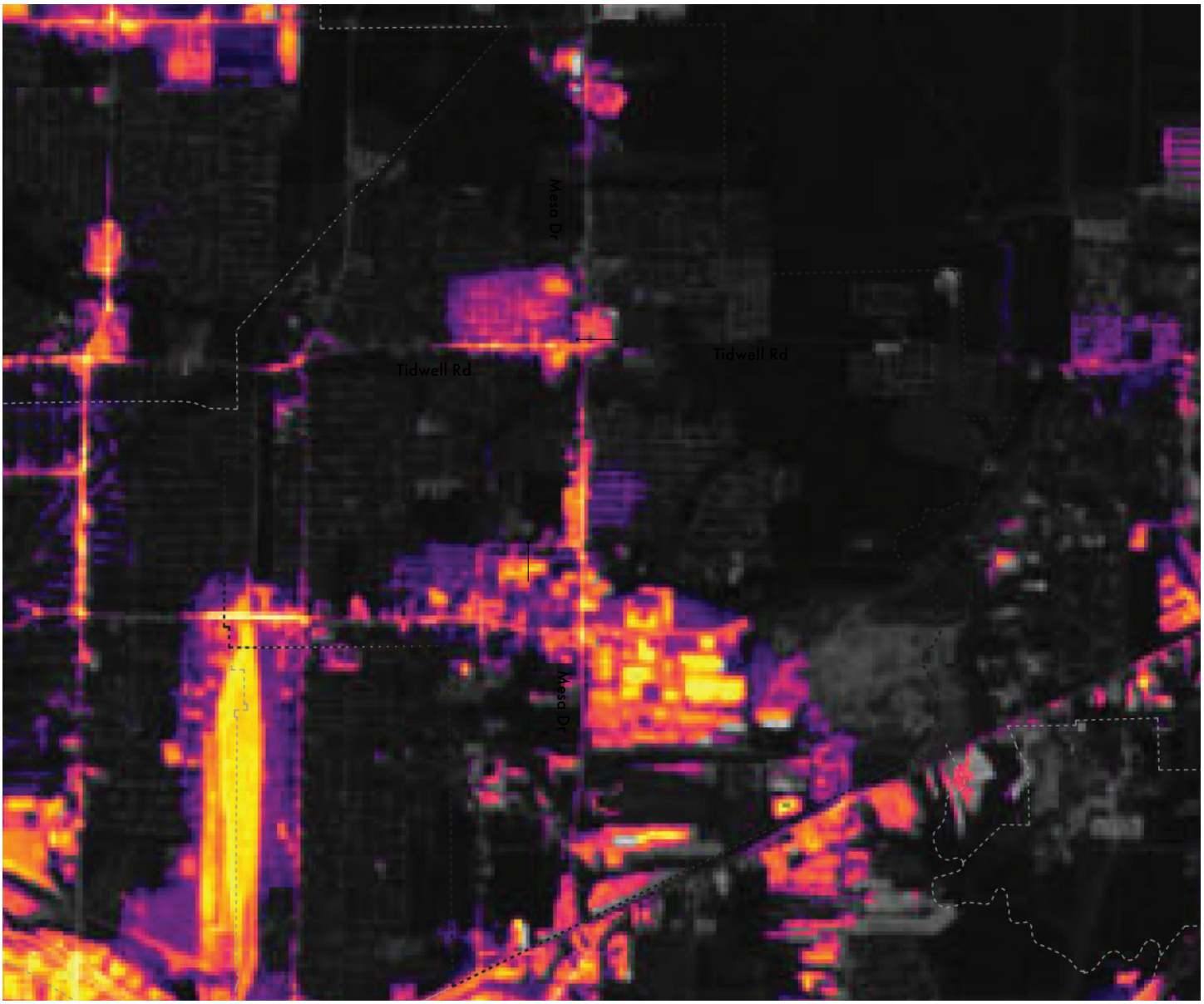


Figure 18: Before Winter Storm Uri power outages as visible from NASA satellites

- North Forest High School (10726 Mesa Dr);
- Fonwood ECC (9709 Mesa Dr);
- Hilliard EL (8115 E Houston Rd); and
- McGowen Elementary (6820 Homestead Rd)

The Lakewood Library was flooded during Hurricane Harvey and was the only library in the neighborhood. Like housing, most community service facilities have been constructed before current floodplain management requirements were in place. In addition, some community facilities are not weatherized to the extent necessary for the types of extreme heat and cold recently experienced, or do not have backup power supplies that would allow them to operate during a power outage.

With limited public transportation options, community members commented on street layout and local flooding as hindering evacuation away from floodwaters advancing through their neighborhood. There is not currently a designated network of dry pathways out of the neighborhood.

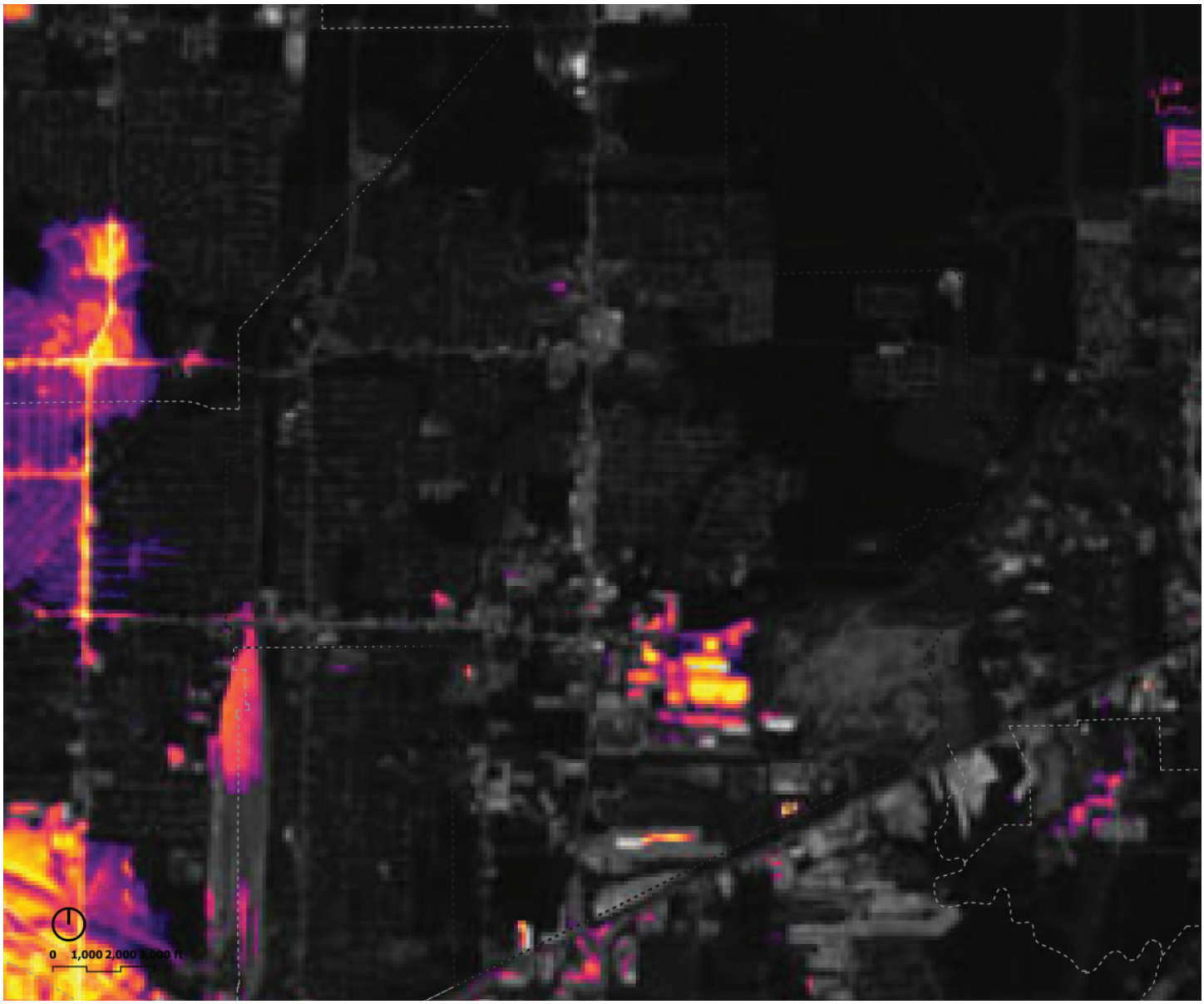


Figure 19: After Winter Storm Uri power outages as visible from NASA satellites.

Clean Neighborhoods

Replacement and refurbishment are also needed due to the age of existing infrastructure. In addition, stormwater infrastructure is largely unprotected from debris entering the system, the bayou is overgrown with trees and shrubs increasing susceptibility to blockage, and environmental pollution is experienced due to lingering solid waste in public right-of-way, bioswales and waterways, and residential and commercial properties are in proximity to heavy industry activities as well as heavy freight truck routes.

Heat Vulnerability

As part of the original East Houston neighborhood development, trees and vegetation were cleared to create the broad streets, such as Mesa Drive and more recently Robin's Landing (Robin's Landing is designed to meet the city's development requirements and Harris County Flood Control's Atlas 14 standards). The moderate tree canopy coverage in the neighborhood is at risk from clearing of undeveloped land for new development, although the neighborhood has a large amount of undeveloped and forested land

VULNERABILITY FINDINGS

preserved along Halls Bayou, in neighborhood parks, and other undeveloped lands. When natural land cover is replaced by buildings and other impervious surfaces that absorb and retain more heat, it causes dense urbanized areas to become hotter than surrounding rural areas when left unmitigated. The phenomenon that developed areas tend to be hotter than undeveloped areas is an effect known as Urban Heat Island (UHI). The effect "occur[s] when cities replace natural land cover with dense concentrations of pavement, buildings, and other surfaces that absorb and retain heat. This effect increases energy costs (e.g., for air conditioning), air pollution levels, and heat-related illness and mortality."

Though Houston is no stranger to hot weather, urban heat is a growing risk in a warming climate. Acute heat events are the deadliest weather-related risk and unusually hot days also impact public health, education, and quality of life.

The Harris County Extreme Heat Vulnerability Assessment considers many environmental and social factors and shows a high percentage of heat-vulnerable populations in the neighborhood, including those with limited access to air conditioning and living with incomes below the federal poverty line, making rising energy costs more impactful on this neighborhood, and people living with the health risk of heart disease and disabilities, and without health insurance. Despite not being a community priority, community members have reported the need for cooling, particularly along transit routes and at transit stops along Mesa Drive and Tidwell Road.

Public Health

Some residential properties in the neighborhood are adjacent to heavy industrial uses. The industrial activity emits pollutants into the air, as well as water and soil. The extent to which these pollutants affect residents is unknown, however studies conducted in similar areas show higher rates of asthma and other respiratory health issues. Homes that have not recovered from Harvey pose high health risks to the potential of mold infestation, leaking roofs, and limited climate controls for heating and air conditioning. Additionally, energy insecurity poses health risks at home because it potentially increases exposure to heat and cold. For those relying on life-saving medical devices or LSMDs, energy insecurity is an even greater risk.

Chronic Social Stresses

The community experiences chronic stresses such as food and energy insecurity, limited or no vehicle access, limited access to public transportation. In addition to these factors, a limited recovery of core services assets damaged during Hurricane Harvey–such as the Lakewood Library and the community center–have further exacerbated the day-to-day challenges of living in the neighborhood. While the city is actively working to bring services back to the community, large investments such as a community library require substantial planning to fund, design, and construct. Community members have built strong organizations in response to the local need, and the neighborhood is recognized as an active Super Neighborhood. However, the community needs additional support from the city for existing needs and to reduce vulnerabilities to shocks that may be experienced in the future.

Community members described food insecurity as one of the chronic social stresses. The 2019 USDA Food Access Research Atlas identifies the northeastern Census Tract in East Houston as "Low Income and Low-Access", meaning an area with limited access to healthy food in combination with limited buying power.

Two of the four census tracts have some of the highest percentage of households without access to a vehicle underscoring the need for improved public transit options (CDC Social Vulnerability Index (SVI 2020) dataset based on the American Community Survey (ACS)). The land development pattern in the area is low density and car-oriented, with few alternative transportation options. The Mesa Transit Center serves the

East Houston neighborhood with one bus route running at a one-hour frequency. There is a limited and disconnected sidewalk network that community members report as having inadequate ADA compliance at curbs and intersections. There is an existing trail network along Halls Bayou that provides access to core services within the neighborhood, although the trail is not constructed to ADA standards and community members report safety concerns due to poor visibility on the trail.

Environmental Justice

The previous sections described a variety of the resilience challenges in the neighborhood, from flood vulnerability to chronic social stresses. These vulnerabilities vary across the country, region, and city, leaving some locations with fewer challenges than others. The case of the East Houston neighborhood, it is clear that the neighborhood as whole faces greater challenges than other neighborhoods in the city, as well as across the State of Texas as well as the wider United States. Factors the neighborhood experiences at a higher levels.

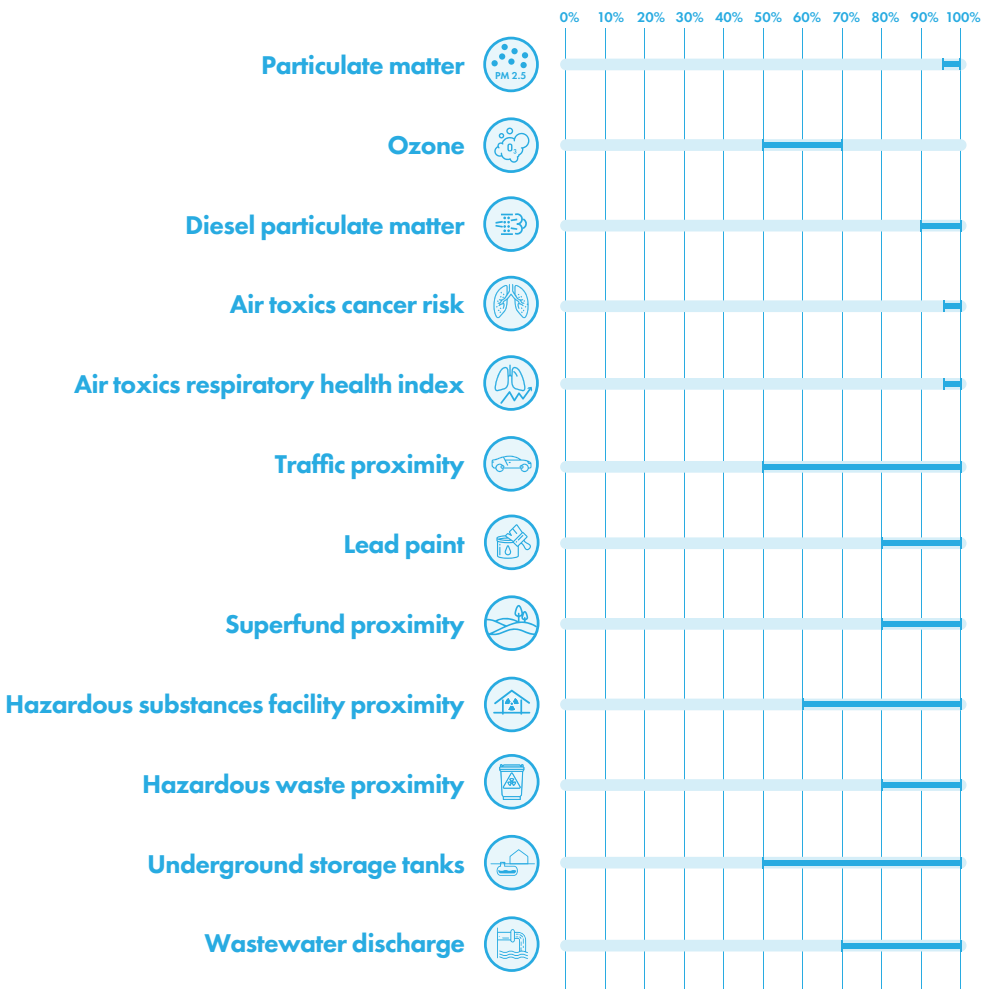


Figure 20: Environmental Justice Indicators for East Houston

VISION

A RESILIENT EAST HOUSTON

ENGAGEMENT SUMMARY

GUIDING PRINCIPLES

Living in a Connected Community

The strong sense of community and its capacity to meet difficult challenges is central to building neighborhood resilience.

Safe at Home

Resilience begins with a secure and healthy home—a home prepared to withstand the impacts of extreme weather events, natural disasters, and other hazards

Safe in the Neighborhood

Good infrastructure contributes to reduced risk from flooding and other extreme events, and from stresses such as increased heat and traffic violence, while providing benefits to the residents.

A RESILIENT EAST HOUSTON

The community's resilience vision for the neighborhood:

- is clean and healthy
- is fully recovered from Hurricane Harvey, particularly in terms of housing rehabilitation;
- has updated neighborhood infrastructure to reduce local flood risks;
- has floodproof housing to reduce the impacts of future floods;
- has weatherized housing to enhance energy efficiency and to reduce the impact of extreme temperatures;
- is continuously strengthening the 'can do' culture within the community to continue its efforts to realize its vision and address its needs most efficiently and effectively;
- is invested in for economic development and that supports workforce development;
- has increased sustainable mobility and reduced traffic violence through the creation complete and healthy streets; and
- mitigates the effects of heat by increasing the tree canopy, considered ways to reduce solar gain, and has an increased number of greening projects generally.

The East Houston neighborhood, located northeast of downtown Houston, has a rich history that has been marked by both struggles and triumphs. Historically, it was a diverse neighborhood that was home to African American and Hispanic families. However, the development of the nearby industrial district and the construction of the freeway system in the mid-20th century led to the displacement of many residents, particularly those who were poor or people of color.

Environmental disasters have also had a significant impact on the community. In 2012, the neighborhood was hit by severe flooding from Hurricane Isaac, which displaced many residents and caused extensive damage to homes and businesses. This disaster highlighted the vulnerability of the community to flooding, which has been exacerbated by climate change and Houston's rapid development.

Despite these challenges, the community has shown incredible resilience and a commitment to equity. Following Hurricane Harvey in 2017, which caused widespread devastation throughout Houston, community leaders in East Houston came together to form the East Houston Civic Club. This organization worked tirelessly to support residents in the aftermath of the storm, distributing supplies and coordinating volunteers to help with cleanup efforts.

The University of Houston has also played a significant role in building resilience in East Houston. The Community Design Resource Center has worked with community members to develop a comprehensive plan for the neighborhood, which focuses on increasing access to affordable housing, improving transportation infrastructure, and mitigating flood risk.

For the East Houston community, working toward resilience means preparation for the types of events projected to occur. Major events like pandemics show the unpredictability of disasters, and the many ways in which underlying stresses, such as systemic inequalities, public health challenges and air quality, compound them. Flooding events, prolonged heat waves, and other minor events are projected to occur as the result of our changing climate. Preparation

may reduce neighborhood risks and make events less impactful on the community and help to optimize emergency response and recovery. It helps community members be safer in their homes by addressing outstanding building damage from previous flooding, elevating homes out of the floodplain, and reducing energy costs increased by extreme temperatures and other compounding factors. It helps the neighborhood to update and enhance stormwater and drainage infrastructure to address street flooding, to add shade trees and pedestrian and bicycle facilities to support community members' health and safety. It also invests in building connections between community members to help each other in times of need. These activities encourage community leaders to work closely with local government to improve their communities and make neighborhood investments go further.

The East Houston Neighborhood Resilience Plan is a key organizing tool in preparing for the community's future. The plan serves as a model and method for future neighborhood planning efforts that can be replicated at the community level, either independent of the city or in partnership with the city.[1]

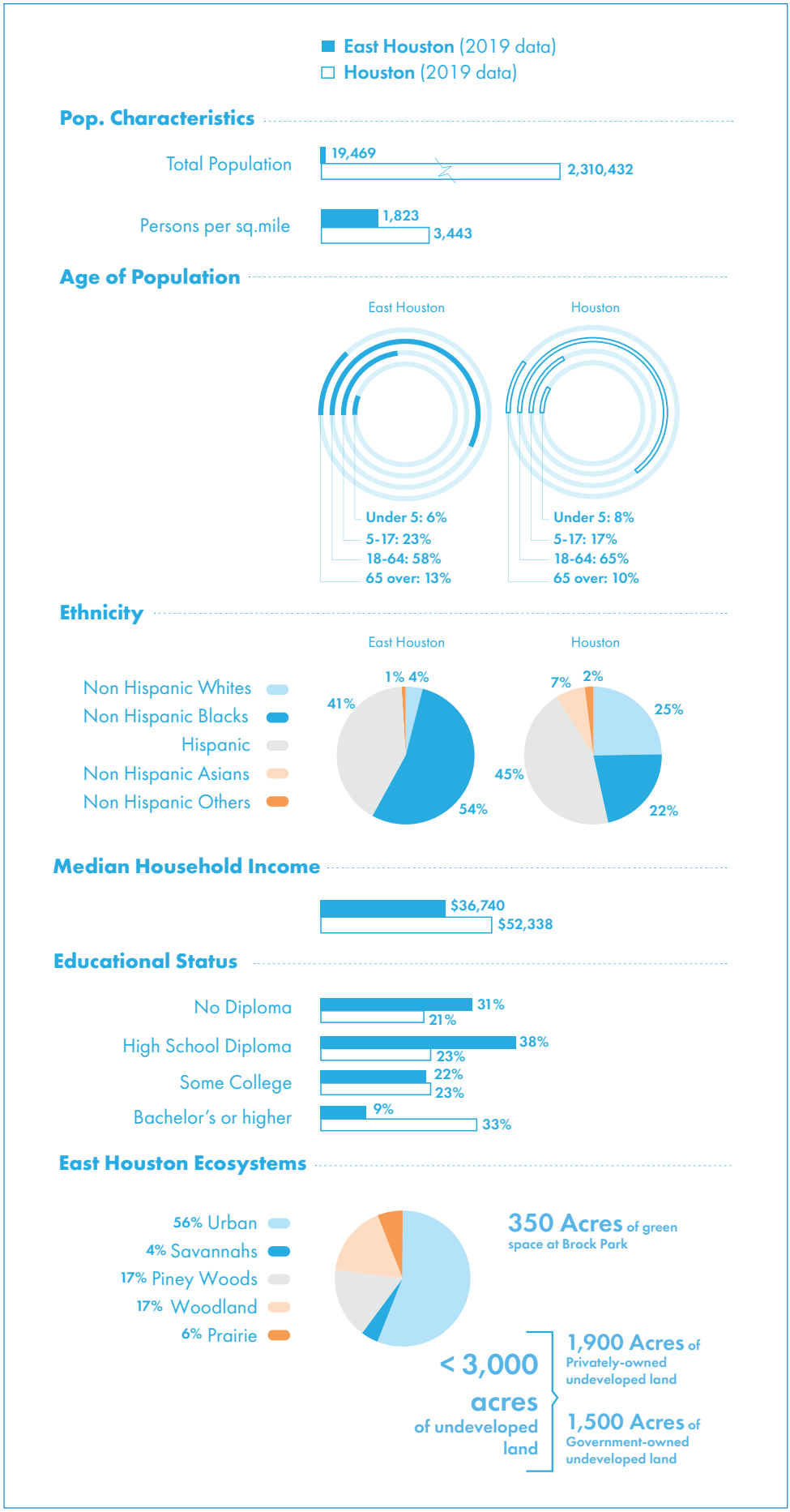


Figure 21: Snapshot of the East Houston neighborhood demographics and key physical features of the neighborhood.

A RESILIENT EAST HOUSTON

The community's priorities have been consistent across the several recent planning efforts that have informed this plan. There have been drainage improvements identified for the western portion of the Halls Bayou corridor, as well as proposals to remove homes from the floodplain in this same area. These are reflected in part by the city's and Harris County Flood Control's Capital Improvements plan that has funded two upstream drainage projects along Halls Bayou, in addition to three additional bayou projects in the neighborhood. There have also been three projects improving the trail system, park lands, and railway alignment in the bayou area. Another upstream bayou project is under construction along Greens Bayou, as well as trail improvements on a segment of the Greens Bayou trail in the neighborhood. The city has undertaken a drainage improvement project to the southern portion of the neighborhood, and has planned improvements for Ley Road running east from Mesa Drive. Along Mesa Drive there have been several recent community-led efforts to plant trees by the local civic club, community gardens near the Mesa-Tidwell intersection, and discussions about elevating Mesa Drive to provide a dry evacuation pathway and barrier to flood waters. All of these efforts are evidence of strong community leadership and advocacy efforts. Efforts that will further strengthen community leadership and advocacy include proposals to expand economic development around the Mesa-Tidwell intersection, and establishing a new community center near the Mesa Transit Center.

The history of East Houston has been shaped by environmental disasters, economic inequality, and systemic racism. However, the community has shown incredible strength and resilience in the face of these challenges, and its leaders are working to build a more equitable and sustainable future for the neighborhood. This plan is a critical component for that.

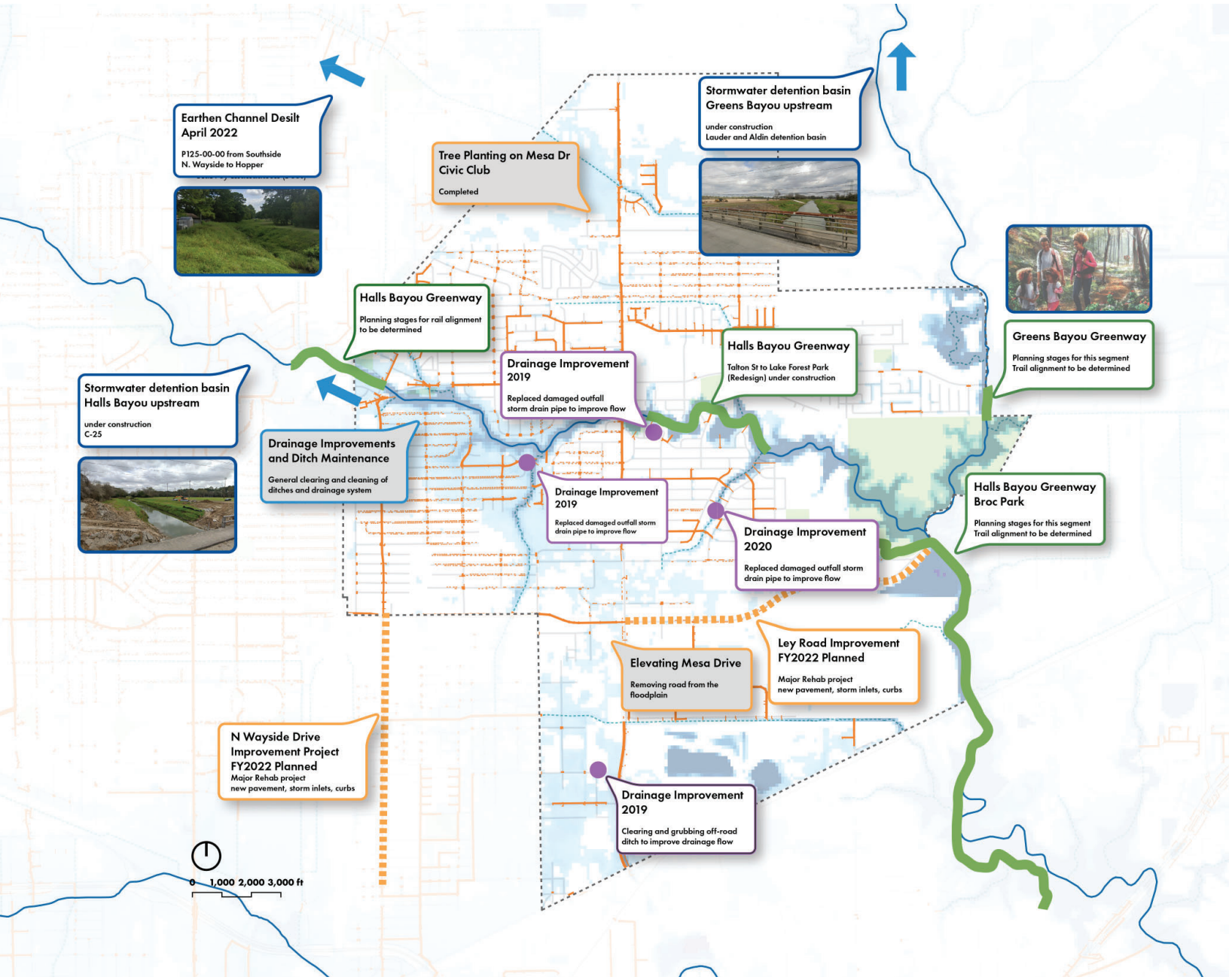


Figure 22: Past and ongoing East Houston's capital improvement projects

LEGEND

CURRENT CAPITAL IMPROVEMENT PROJECTS

LEADING AGENCY	PREVIOUS PLANS
PARKS	PARKS
BAYOU GREEN WAY	BAYOU GREEN WAY
PROPOSED CONSERVATION EASEMENTS	PROPOSED CONSERVATION EASEMENTS
PROPOSED AREAS FOR DEPAVING	PROPOSED AREAS FOR DEPAVING

COMMUNITY ENGAGEMENT

PROCESS

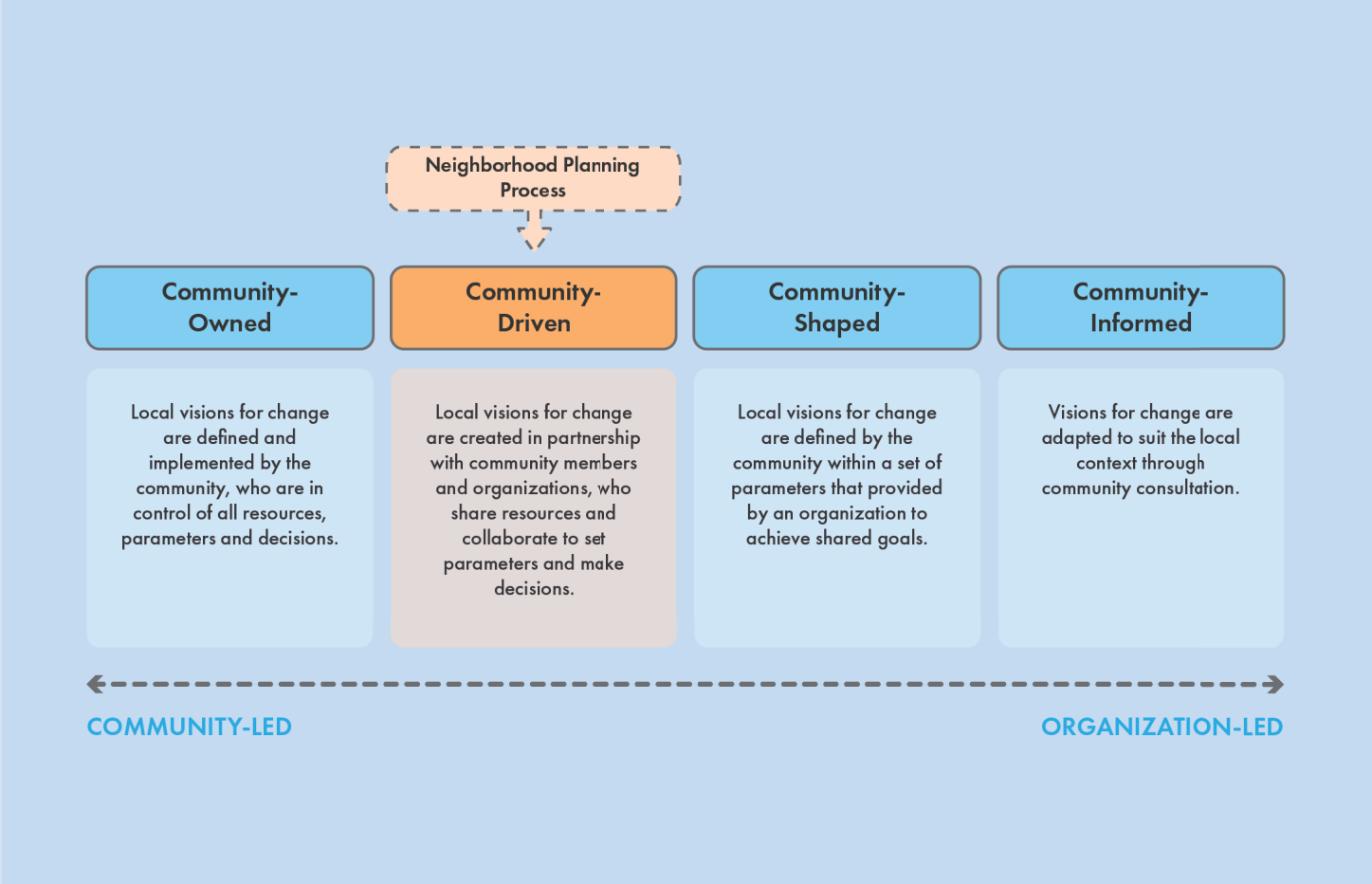


Figure 23: The Attygale community participation spectrum that four types of interacting with the community when creating a City-adopted planning document.

The planning process is founded in the principles of environmental justice, which 'demands the right of community members to participate as equal partners at every level of decision making, including needs assessment, planning, implementation, enforcement, and evaluation'. Engagement strategies and participation opportunities have been designed to be equitable so that all community member and stakeholder voices are intentionally sought, listened to, affirmed, and incorporated in the development of the neighborhood action plan.

Community engagement took place between March 2022 to March 2023. Guided by a NST made up of nine community members, based on their willingness to serve, representation of broad community interests, and experience with community-level projects, members served as ambassadors to their community and encouraged community participation in the planning process through their networks. Members participated in four NSTs meetings with the planning team, three public meetings (which included Spanish translation), four interactive planning workshops, two surveys, and countless one-on-one conversations with community members on an ongoing basis.

In total, the engagement process has

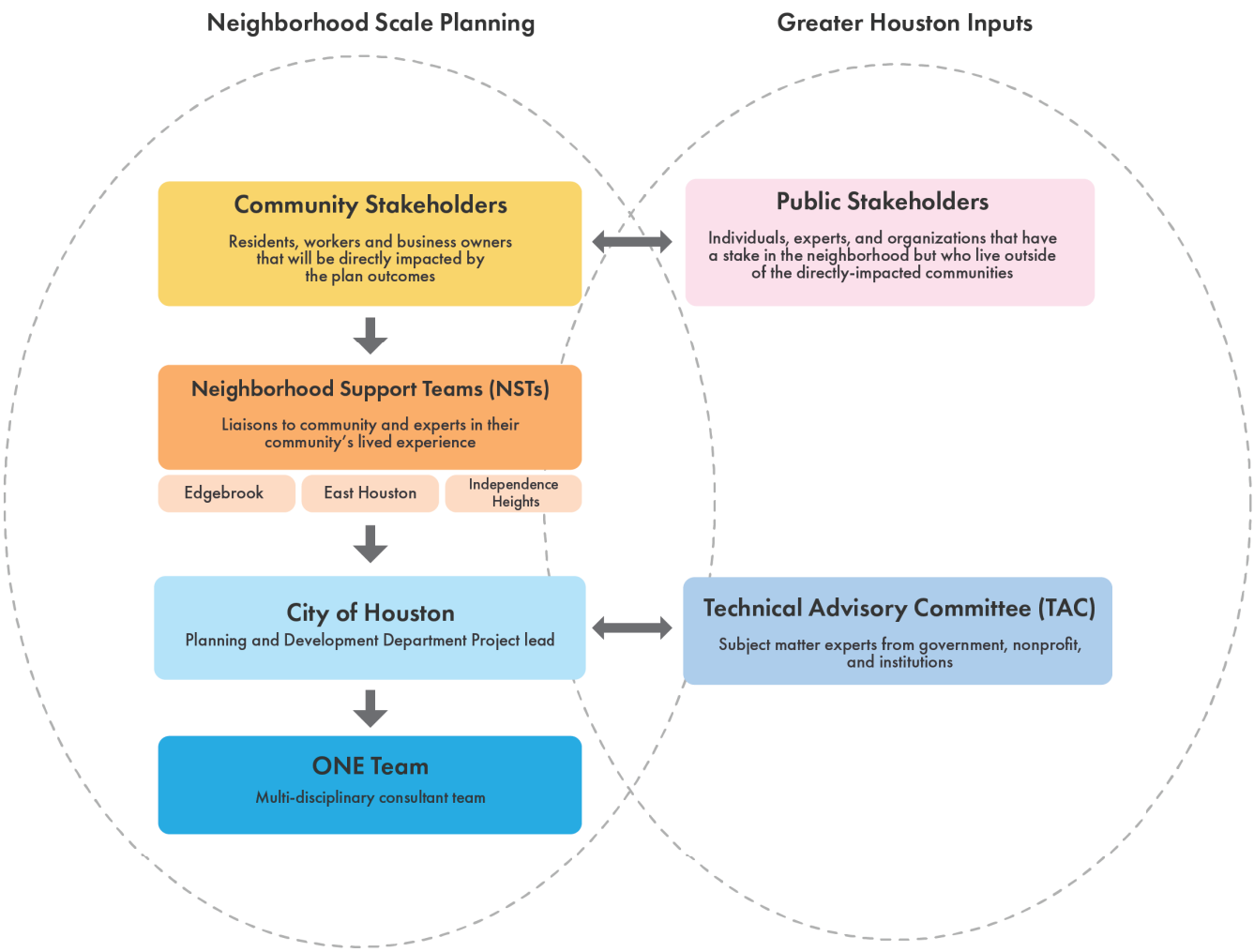


Figure 24: Diagram of the Neighborhood Resilence Planning Process.

informed thousands of people in East Houston about the planning process. The planning team reached out to the community through flyer distribution via social media, postings in community centers and businesses, an opinion article in the North Forest Newspaper (at a circulation rate of 5,000), Councilmember newsletters, online and in-person surveys on Let's Talk Houston, and four presentations at the East Houston Super Neighborhood 49 and East Houston Civic Club meetings.

Ultimately, an estimated 300 people took at least one of the following actions: filled out one of two online surveys, provided project feedback on physical project boards, or attended a virtual or in-person workshop or presentation.

A highlight of the community engagement process is the unveiling of the mural art project. During the planning process, the opportunity arose to apply for funding for such a project, and the community, the city team and the consultants found it a great way to demonstrate 'resilience building in action.' During the unveiling, community leaders, city leaders, and the planning engagement team unveiled the original utility box covers created by artist Danny Asberry. The art celebrates the cultural identity of the neighborhood and raises awareness around resilience topics. Mr. Asberry spoke about his experience creating the murals and the community presented him with an award of recognition.

COMMUNITY ENGAGEMENT

PROCESS

DATE	EVENT	DESCRIPTION AND PURPOSE	NO. OF SIGN-INS	OUTCOMES
2022 MAR. 23-MAR	NST Meeting	Project Kick Off + Feedback on Existing Conditions	9	Input and direction on existing conditions analysis
2022 APR. 28-APR	Interactive Workshop	Driving Tour	1	Input and direction on existing conditions analysis
28-APR	NST Meeting	Project Kick Off + Feedback on Existing Conditions	6	Input and direction on existing conditions analysis
2022 MAY 21-MAY	Interactive Workshop	Community Fair	150	Raise awareness of NRP
2022 JUN. 16-JUN	Interactive Workshop	Civic Club Meeting	20-30	Raise awareness of NRP
Dates Distributed	Outreach	Raise awareness of public meeting + increase participation in feedback	-	Raise awareness of NRP
23-JUN	Public Meeting	Project Kick Off + Feedback on Existing Conditions	40	Feedback on Existing Conditions
2022 JUL. Dates Distributed	Outreach	Raise awareness of public meeting + increase participation in feedback	-	Raise awareness of NRP
19-JUL	Public Meeting	Project Kick Off + Feedback on Existing Conditions	25	Feedback on Existing Conditions
2022 SEP. 15-SEP	Interactive Workshop	Project Kick Off + Feedback on Existing Conditions	25	Feedback on Existing Conditions
22-SEP	NST Meeting	Present Projects and Collect Feedback on the Projects	4	Feedback and direction on projects and approach for Public Meeting 3
2022 OCT. 1-OCT	Interactive Workshop	Ribbon Cutting w/Artist, Community and Congresswoman Sheila Jackson's Office		Raise awareness of and support for NRP
8-OCT	Public Meeting	Present Projects and Collect Feedback on the Projects	27	Feedback and direction on projects and approach
18-OCT	Interactive Workshop	Super Neighborhoods Meeting		Raise awareness of and support for NRP
2023 JAN. 31-JAN	NST Meeting	Present Draft Plan and Collect Feedback on the Plan		Feedback and direction on draft plan
2023 FEB. TBD	Outreach	Raise awareness of final public meeting + increase participation in feedback		Feedback and direction on draft plan
2023 MAR. 18-Mar	Public Meeting	Present Draft Plan and Collect Feedback on the Plan		Feedback and direction on draft plan

Figure 25: Timeline of Community Engagement Activities in the East Houston resilience planning process.

Figure 30: Public art on utility boxes in the East Houston Neighborhood.

4 Neighborhood Service Team Meetings

3 public meetings & hundreds of participants

Social media postings thru NST members

1250 flyers handed out

Tons of barbeque!!

Figure 26: Key community engagement statistics measuringthe extent of the community outreach.

COMMUNITY ENGAGEMENT

Figure 27: Public Meeting on October 8, 2022 where the ONE Team explains the neighborhood resilience plan to the public.

Figure 28: Public Meeting on March 18 where the ONE Team discusses the neighborhood resilience plan with the public.

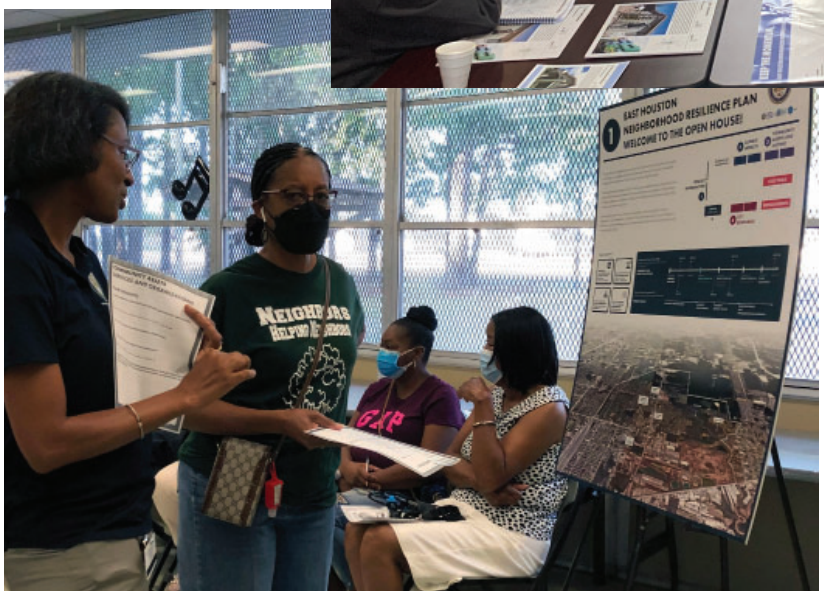


Figure 29 : Planning staff discuss the East Houston neighborhood resilience plan with a community member at an open house.

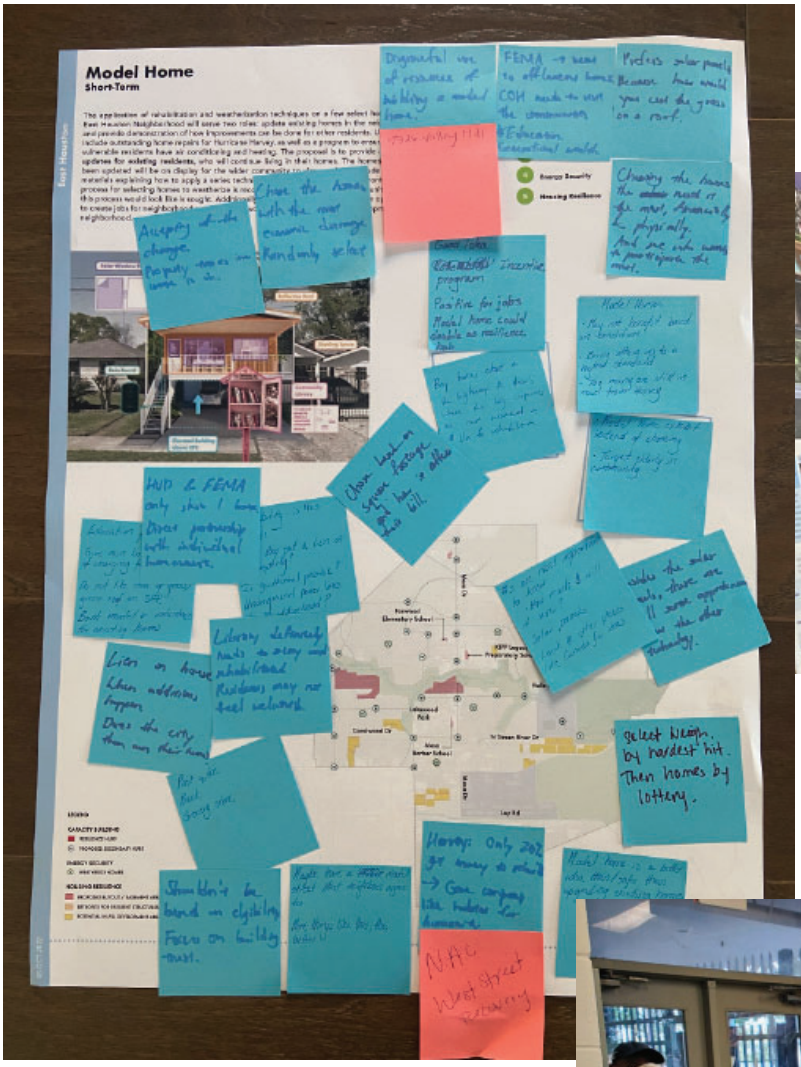


Figure 30: The public meeting on October 8, 2022 where almost all the residents at the meeting were receptive and had positive feedback to all the projects proposed, particularly the Model Adaptive Home project.

Figure 31: Residents look at the boards that delineate the East Houston Neighborhood Resilience Plan on March 18, 2023

Figure 32: Residents listen to a neighborhood resilience plan presentation.

COMMUNITY ENGAGEMENT

Figure 33: Mesa Dr. across Halls Bayou

Figure 34: Waterfront of Halls Bayou

Figure 35: Street view at Mesa Dr.

Figure 36: McCarty Road gas recovery facility

Figure 37: An existing bioswale filled with fallen leaves

Figure 38: Existing bioswale in front of a single family house

COMMUNITY PRIORITIES

With a community-driven neighborhood resilience action plan the strategies and actions are optimized to best address the community's resilience needs and goals and to support community advocacy and funding efforts most effectively. The community's priorities captured from the engagement process include:

- **Flood Risk + Infrastructure Improvements** – Community members' greatest concern surrounds the risk of flooding. The community desires substantial infrastructure improvements to address this risk;
- **Housing Security** – There is a desire to both fully repair housing from previous disasters and reduce future flood risk to homes;
- **Clean Neighborhood** – Community members expressed concerns about the impacts of illegal dumping and nearby industrial activities. Illegal dumping and industrial activities have compounding effects on public health, and illegal dumping can cause blockages to stormwater conveyance. They want to clean up their green spaces, particularly along the bayou, which the community recognizes as one of the neighborhood's great assets;
- **Capacity Building** – There is desire for more education and outreach to empower communities to take a stronger and more efficacious leadership role. Specifically, the community desires greater capacity to navigate the recovery process, improve local understanding of individual and household risk, and improve the community's ability to successfully advocate in local government;
- **Economic Development** – The community expressed a desire for better and more employment opportunities, as well as more vibrant commercial retail activity and housing developments; and
- **Heat Mitigation**- Community members have reported the need for cooling, particularly along transit routes and at transit stops along Mesa Drive and Tidwell Road.

Community priorities inform the neighborhood resilience action plan. At each stage of the planning process, the NST and wider community has had an opportunity to review, comment, and direct the development of the plan.

The continued support of community-based initiatives and growing the capacity of the community to implement the projects and programs they envision needs support from outside the community. The city, non-profit, philanthropic, and other non-governmental entities are essential supports to the community. This type of co-ownership of underlying resilience strategies is not just about empowerment, it's about making sure that the neighborhood is successful in achieving resilience beyond this planning process.

"I feel like for some reason with this team, something is going to move. I really feel like our hearts are in the right place and we have the tools and muscles to move whatever burdens we've been facing. I really believe that today."[11]

~Anonymous East Houston Resident

Figure 39: East Houston at the peak of flooding during Hurricane Harvey.

Figure 40: Public Meeting 2 that took place the East Houston Civic Club on October 8, 2022.

Figure 41: A drain blocked by trash and fallen leaves.

GUIDING PRINCIPLES

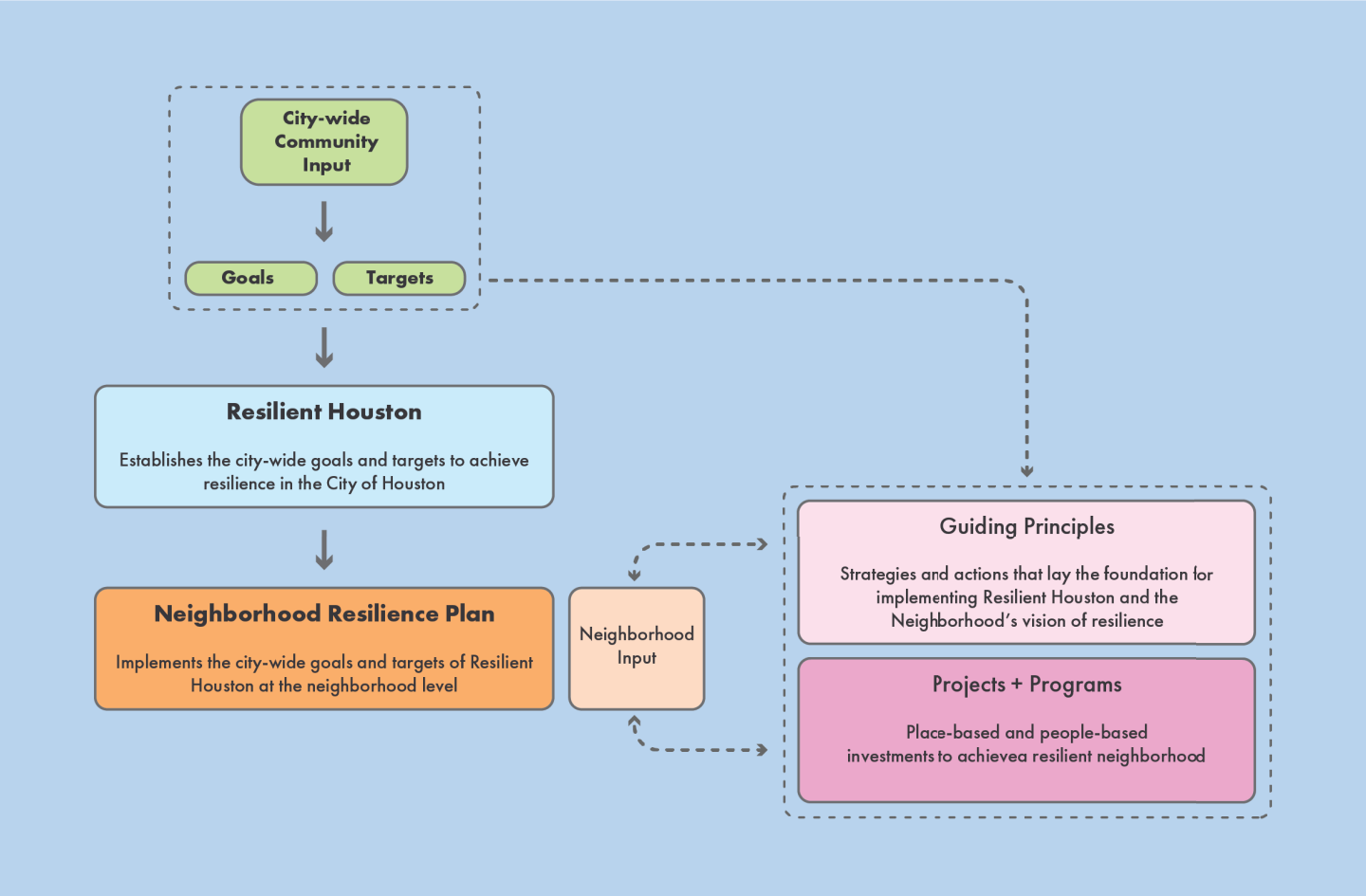


Figure 42: Relationship between *Resilient Houston* plan + the Neighborhood Resilience planning process.

Guiding principles define the goals and objectives of the Neighborhood Resilience Plan, and help orient and focus individual stakeholders actions toward resilience. They are aligned with the directives of *Resilient Houston*, and articulate the community's unique vision for resilience in their neighborhood. By laying the foundation and creating an enabling environment, the guiding principles help formulate the goals and targets of Resilient Houston at the neighborhood scale and describe the high-level actions that support the implementation of the projects. The principles integrate the community's priorities in three clear themes that focus resilience planning on three scales: the individual household, the neighborhood, and critical social infrastructure. The three themes ensure that the implementation of *Resilient Houston* in East Houston best fits the needs, goals, and aspirations of the neighborhood.


Feland St

LIVING IN A CONNECTED COMMUNITY

East Houston's strong sense of community and its capacity to meet difficult challenges is central to building neighborhood resilience.

People form the basis of a resilient neighborhood. When disaster strikes, the ability to call on a neighbor for help can be critical for survival. Neighbors that know each other look out for each other, for instance by helping those less mobile or those with less resources. After a disaster, people who know each other, and who know of each other, can help with cleanup, find an energy source to charge a phone or power a medical device, and assist with the recovery process. These aspects of a community are also known as adaptive capacity, or the ability for a community to respond to and recover from stresses and shocks.

More importantly, though, is the role people play in preparing for a disaster, or, more generally, making their neighborhood stronger because they are better poised to withstand and recover from stresses and shocks. In the neighborhood resilience action planning process, strengthening the neighborhood starts with understanding the neighborhood's vulnerabilities. In conversations within the community, it becomes clearer how these vulnerabilities are related. For instance, how debris and solid waste are related to backed up drainage which reduces personal and household safety, what the challenges and barriers are to avoid debris and solid waste buildup in our drains, how to prioritize potential actions both at home and in the neighborhood.

Sharing elements of community conversations with other stakeholders, like City Staff, elected representatives, and project partners can strengthen the collective capacity to achieve resilience. A community that understands and can communicate its vulnerabilities can more effectively advocate for actions and influence decisions of elected representatives and City officials. The community is also better positioned to secure resources on both the individual- and organizational-levels and from a variety of sources including city, state, or federal programs, grant opportunities, philanthropic giving, and collaborative partnerships.

A community cannot be alone in building resilience. There are several ways to connect: preparedness, advocacy, and the sharing of resources. Preparing means knowing your vulnerabilities, advocacy means effectively using the democratic process to affect the kind of change you would like to see, and the sharing of resources means distributing knowledge, skills, and things like food and water through your social network. A community can also increase their resilience by learning from other communities' resilience successes. The community should be able to connect with the City and other agencies to access the resources available for the homeowners trying to weatherize or rehab their property, to make sure that infrastructure investments are done so that they maximize benefits, achieve multiple benefits, and align with the communities' needs and priorities.

The neighborhood resilience action planning process has five critical elements to build a connected community and increase its capacity for resilience:

1. Advance community access to existing resources, such as recovery funds and grants, housing programs for energy assistance or A/C unity, health and food programs, and educational resources for creating household emergency plans.
2. Advance community's understanding of personal vulnerabilities and options for vulnerability reduction and to learn how to advocate for the types of changes desired, for instance through public art, resiliency training, health assessments, and home energy audits.
3. Advance neighborhood-wide community advocacy efforts by continuing the Complete Communities University trainings, supporting the Super Neighborhood activities, and providing additional training and coaching successfully advocating for investments in both local government and philanthropic settings.
4. Advance community-wide collaboration to ensure all neighborhood residents have the skills, knowledge, and resources to best withstand extreme weather events through the demonstration of weatherization and floodproofing of homes and businesses, resiliency training, and public art programs.
5. Expand and optimize a network of neighborhood-based skills, information, and resources related to resilience and resilience-building, using the designation of resilience hubs, continued advancement of digital notification systems and centralization of resilience information, initiatives, and programs.

The above can only be achieved through collaboration with government agencies, non-profits, philanthropy, schools and academic institutions. In order to make this possible, it is equally important to think about how the physical spaces in the neighborhood—where people meet each other naturally and where people visit anyway on their daily routines—can become the 'social infrastructure' that strengthens the community and that connects people to one another, to information, and to essential resources.

Neighborhood Resilience Postcards
Postcards have been created as an ongoing community outreach tool showcasing key resilience tools for the City of Houston, how each tool works to mitigate resilience challenges, as well as possible uses of the tool at a neighborhood scale. The cards are available in Spanish and can be easily shared in print or digital formats."

Figures 43-46: Images of Resilience Postcards created to help raise awareness of resilience topics and potential tools for mitigating vulnerability.

"Strong neighborhoods foster community through social infrastructure and invisible social bonds that help neighbors prepare for, survive, and recover from emergencies together rather than on their own."
(Resilient Houston, page 72)

SAFE AT HOME

Resilience begins with a secure and healthy home—a home prepared to withstand the impacts of extreme weather events, natural disasters, and other hazards

Home safety is not just about reducing the risk of flood or increasing energy efficiency, it also involves improving personal health and safety at home before an event takes place. Personal health preparation might mean going for regular walks to improve mobility, or making healthy food a priority to stave off the onset of diabetes. Personal safety is about having a plan in place—a 72-hour plan, a go bag—for such events as power outages. For example, personal safety was compromised during Winter Storm Uri as unprepared homeowners looked to creative solutions to try and stay warm. Some inadvertently exposed themselves to toxic levels of carbon monoxide or started unsafe indoor fires that spread to the house itself.

Preparing for recovery is also an important component of home safety. Finding the right insurance and backing up essential documents—birth certificate, property title, car title, identification, social security card—can help speed the recovery process. After an event takes place, post-flood impacts can include mold infestation that can have detrimental effects on respiratory health, and negatively impact other existing health issues. Homeowners planning for floods can opt for mold resistance materials such as concrete and brick and create a plan to run fans, dehumidifiers, and air filters post flood.

Whatever the household resilience plan is, when a household is not healthy before an event, the challenges of recovery are significantly amplified. When homes do not fully recover, the financial and health security of the members of the household is reduced and may not recover for generations.

Being safe at home requires actions on many levels. Several of those are land-use related, such as removing homes from the floodplain and finding alternative and affordable housing for residents. Others concern improvements to the homes themselves. Flood risk can be reduced by elevating a home, putting electrical equipment at a higher location, or using flood proof materials. Increased heat and cold snaps can be mitigated by weatherizing homes (such as adding storm windows, shading devices, and insulation), which also helps to reduce energy bills (and load on the grid, a frequent cause of blackouts). Residential yards also play a role for resilience by helping with drainage, using plantings that can reduce the impacts of heat, or even by utilizing yards for growing food and composting as a heat source as part of a wider neighborhood network of growers and composters.

When thinking about improvements to the housing stock, however, it is important to realize that, in East Houston, there are homes that have not yet recovered from recent disasters such as Hurricane Harvey. The backlog shows how difficult housing resilience and weatherization is, particularly when families lack the resources or 'know how' to do the repairs. Many homeowners, especially in marginalized communities such as East Houston, do not have access to the resources needed to do the necessary recovery or make upgrades. Renters can be at the mercy of landlords who may be reluctant to make the investments in their property that would improve resilience. Therefore, part of what needs to be done to speed up recovery and build resilience is informational: help owners and tenants get access to information that points them to funding for repairs, A/C units and other equipment, energy bill assistance, and other forms of assistance.

Recovery, repair, and preparation requires understanding the necessary changes to make, navigating municipal requirements, and implementing those changes. Like most challenges, there are also opportunities. The need for rehabilitation repairs and weatherization upgrades introduces opportunities for engagement of local businesses, workforce development, and 'sweat equity' in lieu of direct cash payments.

East Houston needs new housing to replenish the housing stock that is beyond repair or in flood prone areas, to revitalize the community by increasing local businesses and amenities, to keep up with housing demand, and to improve the overall quality of the housing stock. When planning new housing, it is critical to build on properties that are not flood prone and add housing at locations where it can strengthen the existing land use development pattern by, for example, building housing in safe walking distance of reliable public transit. It is equally critical to consider equitable access to housing for low- to moderate income (LMI) community members.

Figures 47-49: Images of Resilience Postcards created to help raise awareness of resilience topics and potential tools for mitigating vulnerability.

SAFE AT HOME

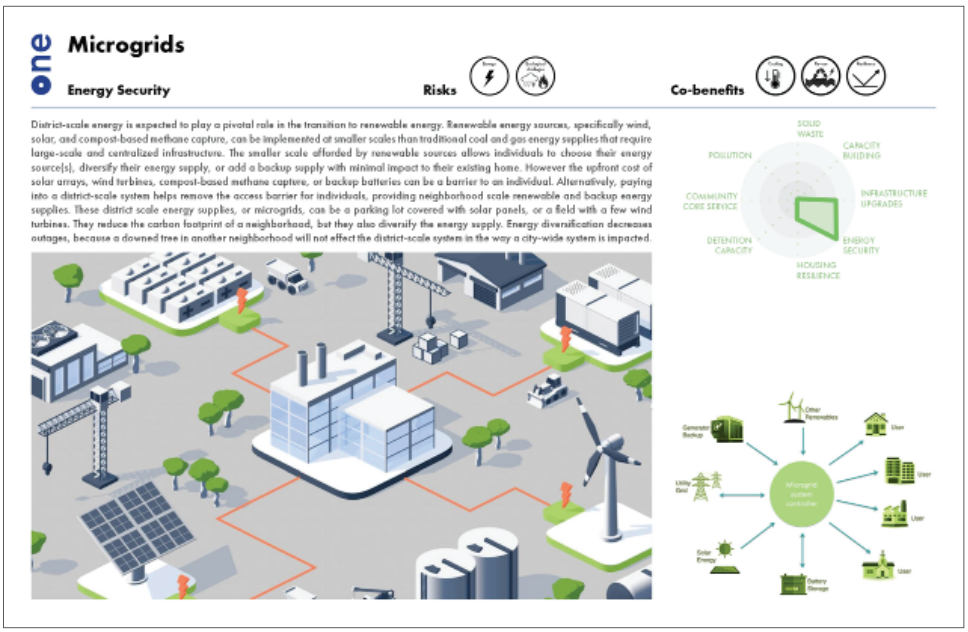
Resilience begins with a secure and healthy home—a home prepared to withstand the impacts of extreme weather events, natural disasters, and other hazards

Energy Security

Winter Storm Uri's blackouts and boil water alerts shows that energy security is a critical component of a resilient home. Blackouts can have serious health impacts because medical devices and support systems fail. The related energy price increases are extremely burdensome to the East Houston community. Additionally, when blackouts occur, critical infrastructure can be impacted, leading to such things as boil water notices or going without heat during extreme cold. Without a backup energy supply at home to boil water or run a heater people may have no other choice but to drink unsafe water and brave the cold. Recognizing that our changing climate likely means there will likely be more winter storms like Winter Storm Uri, as well as heat waves that place increasing stress on the centralized power grid, steps should be taken to prepare for outages and alleviate dependency on centralized power sources. The increased pressure on the power grid also results in higher energy bills, which creates additional financial burdens to residents. For example, during a heatwave when community members cannot afford air conditioning, there is a documented increase in emergency room visits.

Houston, the energy capital of the world, has set itself the goal to provide its citizens with reliable, increasingly renewable energy (Resilient Houston: 141). At the neighborhood level, many energy security measures can be made at home and at work. It is important that public utility providers increase resiliency of their infrastructure through diversification, which is largely achieved through breaking the highly centralized power grid into smaller chunks. Meaning, small or localized energy supplies, such as district-scale solar arrays, achieves energy diversification, such as portable batteries and solar panels. One well known strategy, which also helps with decarbonization, are local solar grids that provide neighborhood scale energy supplies. Local energy production can provide extra income to property owners who sell excess energy back to the local energy company.

"The City will work with partners, such as CenterPoint Energy, to grow existing weatherization education efforts and implement weatherization programs, prioritizing low- to moderate-income households and neighborhoods with repeated flooding damage."
(Resilient Houston, page 50)



Figures 50-52: Images of Resilience Postcards created to help raise awareness of resilience topics and potential tools for mitigating vulnerability.

SAFE IN THE NEIGHBORHOOD

Good infrastructure contributes to reduced risk from flooding and other extreme events, and from stresses such as increased heat and traffic violence, while providing benefits to the residents.

The extreme weather events of the last decade, which have become more intense due to the changing climate, have laid bare the gaps in some infrastructure along with the poor siting of critical infrastructure, such as power stations, water treatment facilities, and emergency response facilities. Being safe in the neighborhood starts with a shared understanding of current and future vulnerabilities.

Recent events have generated a lot of data about these vulnerabilities, however, data accessibility limits, especially for the community, makes the understanding of the neighborhood's vulnerabilities difficult. Better data management and communication lies at the heart of a safe neighborhood.

One frequent complaint about the neighborhood concerns trash. Solid waste dumping clogs up drains and makes people feel unsafe. A baseline set of actions for any neighborhood should include addressing the waste problem and rallying the community around this topic.

A safe neighborhood is a collective effort. It requires strategic land and development management on the one hand, and robust multi-functional infrastructure on the other. Infrastructure investments need to consider community needs and priorities, be designed for multiple benefits, and combine both 'gray' and nature-based solutions.

During the neighborhood resilience action planning process, it was discovered that all too often the community was not aware of infrastructure being constructed or planned, and how these infrastructure improvements are reducing their risks. Such a lack of awareness undermines trust in government and makes it difficult to receive input from the residents.

When infrastructure work is being planned in the neighborhood, multi-benefit solutions should be prioritized. Storm sewer work to reduce street flooding, adding sidewalks and bus shelters to encourage mass transit use, planting shade trees to reduce heat impacts, and making road repairs and adding traffic calming features can be combined. This minimizes the disturbance for the community, makes the improvements more visible, and likely saves costs.

One type of infrastructure that is increasingly used worldwide is green infrastructure. Green infrastructure, also called nature-based solutions, is cheaper[6], increases biodiversity and overall ecological health, and is often more flexible. While such solutions might be difficult to implement in Houston, given the current practices and the nature of its weather events, it is important to continue to make progress with them because of their long-term benefits. These benefits include workforce development. While significantly cheaper to construct, green infrastructure requires more intensive maintenance, and can thus provide green jobs.

To achieve well-planned, multi-functional, and green solutions, the City and County collaboration and innovation is essential. Both entities must continue to work toward alignment with their capital planning, and internally between their various departments each contributing to implementation of projects. To improve success and reduce overall costs, designing projects and creating implementation plans that optimize inter-agency and interdepartmental coordination and integration is necessary. Pilot projects allow for institutional creativity and learning that propels local government to create leading-edge solutions. All while working together with the local community, especially for a long-term transformative project such as that for Hall's Bayou—a project that, when designed well, can provide many benefits for the community, from health to recreation and education, and likely at a fraction of the upfront and ongoing maintenance costs of traditional 'gray' infrastructure.

Managing water and heat extremes cannot only be addressed in the public right-of-way. On private property, green infrastructure can help with drainage and reduce the impacts of extreme heat, while creating more biodiversity. Turf grass lawns have little environmental benefit, require a lot of water and are extremely high maintenance. Instead, residential landscapes can reduce water and maintenance by removing turf grass and planting with native trees, shrubs, and perennials. Outreach and education for homeowners on how to make the necessary changes on their property will be necessary to change the way people see and use it.

"The City will work collaboratively across local agencies and with private-sector and community partners to support community-driven planning processes for neighborhoods that have faced flood related disinvestment, allowing them to control their own destiny and improve their neighborhoods without the risk of displacement."
(Resilient Houston, page 108)

one

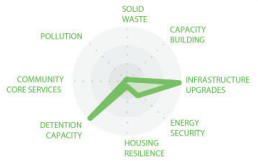
Detention racks and stormwater grilles

Solid Waste Management

Risks

Co-benefits

The purpose of the trash rack is to keep floating debris away from the orifices and weirs to prevent clogging. The greater the surface area of the trash rack, the greater ability it has to hold debris while allowing water to discharge properly. Trash racks require routine maintenance to remove accumulated debris.
Stormwater grilles are drains that works as small collection capillaries in a sewer system. Trench can often be spotted in pedestrian spaces, stretching across sidewalks and driveways, through plazas, and edging green spaces.



one

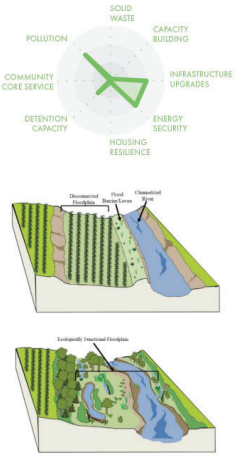
Dechannelized Bayou

Detention Capacity of Floodplain

Risks

Co-benefits

To restore the naturally occurring protections Houston's bayous offer, **rightsizing the bayou** is proposed. That means reclaiming bayou lands used by development, removing concrete paving in the bayou's waterway, and restoring vegetation. Rightsizing is also an opportunity to **create public spaces** for recreation—such as sports fields and running trails. Vegetation restoration **improves biodiversity** and provides opportunities for **education and eco-tourism**. It's also an opportunity to provide multi-modal pathways that reduce dependency on driving by allowing people to better connect to buses and trains, as well as walk and bike to get around.



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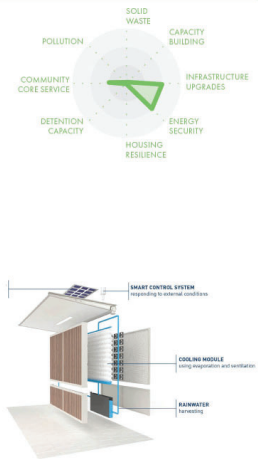
Cooling + Charging Center

Adaptive Capacity

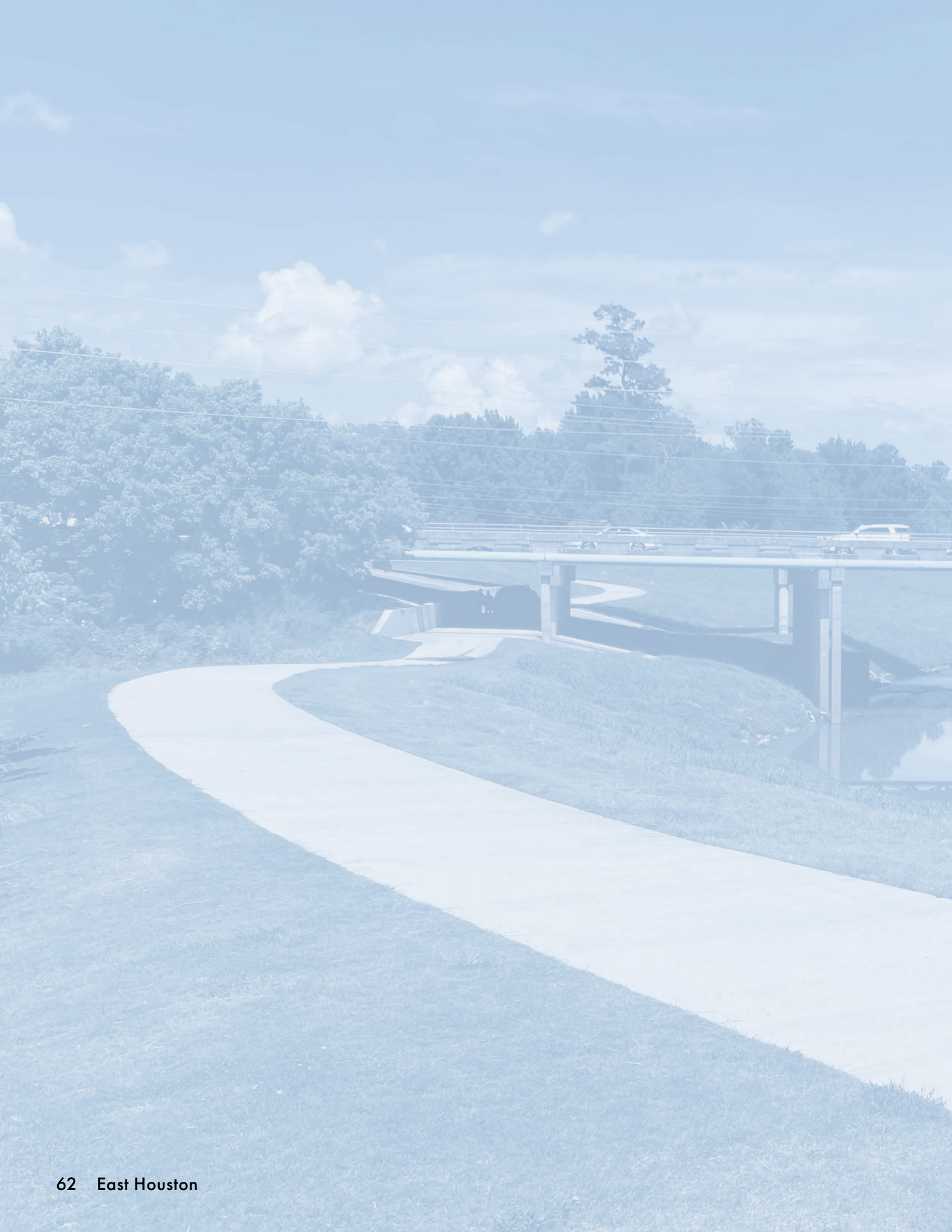
Risks

Co-benefits

Cooling centers are air conditioned spaces open to the public. They have become increasingly important services as heat waves are more frequent, lasting longer, and reaching higher temperatures. So the community is more heat stressed and for longer periods of time so the need for cooling increases with this heat stress. Cooling spaces provide relief from the, which reduces heat stress particularly for those reliant on public transportation, whose income and social circumstances make cooling a significant cost burden or cost prohibitive, and those whose job requires that they be outside in the heat.



Figures 53-55: Images of Resilience Postcards created to help raise awareness of resilience topics and potential tools for mitigating vulnerability.



PROJECTS

OVERVIEW

Projects create visible change in the neighborhood. They are primarily proposed as physical interventions in the neighborhood, such as completing the sidewalk network to support walkable neighborhoods, but they also include people-specific interventions, or programmatic activities, such as supporting initiatives to increase public art to improve neighborhood awareness of resilience challenges. Addressing both physical and social aspects of resilience provides for a more holistic and comprehensive approach to improving resilience.

"[A]pply a neighborhood planning approach to adapt to climate change, with place-based interventions to ensure that all Houstonians live in neighborhoods that are healthy, safe, and climate ready."
(Resilient Houston, page 79)

PREPARED & THRIVING HOUSTONIANS			
GOAL 1	We will support Houstonians to be prepared for an uncertain future.	TARGET 1	Provide at least 500,000 Houstonians with preparedness training by 2025.
GOAL 2	We will expand access to wealth-building and employment opportunities.	TARGET 2	Offer 20,000 Hire Houston Youth Summer Jobs in 2020.
GOAL 3	We will improve safety and well-being for all Houstonians.	TARGET 3	Ensure zero traffic-related fatalities and serious injuries on Houston streets by 2030.
SAFE & EQUITABLE NEIGHBORHOODS			
GOAL 4	We will ensure that all neighborhoods have equitably resourced plans.	TARGET 4	Develop 50 neighborhood plans by 2030.
GOAL 5	We will invest in arts and culture to strengthen community resilience.	TARGET 5	Invest $5 million in local artists to create resilience awareness projects across the city by 2025.
GOAL 6	We will ensure all neighborhoods are healthy, safe, and climate ready.	TARGET 6	Plant 4.6 million new native trees by 2030.
GOAL 7	We will build up, not out, to promote smart growth as Houston's population increases.	TARGET 7	Build at least 375,000 new homes across every income level by 2050 to welcome new residents to the city of Houston.
HEALTHY & CONNECTED BAYOUS			
GOAL 8	We will live safely with water.	TARGET 8	Remove all habitable structures from the floodway by 2030.
GOAL 9	We will embrace the role of our bayous as Houston's front yard.	TARGET 9	Construct at least 500 miles of trails and bike lanes by 2025.
ACCESSIBLE & ADAPTIVE CITY			
GOAL 10	We will demonstrate leadership on climate change through action.	TARGET 10	Achieve carbon neutrality by 2050 in accordance with the Paris Agreement.
GOAL 11	We will modernize Houston's infrastructure to address the challenges of the future.	TARGET 11	Complete 100 new green stormwater infrastructure projects by 2025.
GOAL 12	We will advance equity and inclusion for all.	TARGET 12	Eliminate geographic disparities in life expectancy by 2050.
GOAL 13	We will transform city government to operationalize resilience and build trust.	TARGET 13	Appoint Department Resilience Officers in every City of Houston Department in 2020.
INNOVATIVE & INTEGRATED REGION			
GOAL 14	We will continue to invest in the region's diverse economy	TARGET 14	Attract or incubate 50 Energy 2.0 companies in Greater Houston by 2025.
GOAL 15	We will increase regional transportation choice.	TARGET 15	Provide 100% of Houstonians access to high-frequency public transportation choices within a half-mile by 2050.
GOAL 16	We will manage our land and water resources from prairie to bay	TARGET 16	Conserve 24% of undeveloped regional lands as natural spaces by 2040.
GOAL 17	We will enhance regional emergency preparedness and response.	TARGET 17	Ensure that 100% of Houstonians and visitors have access to accurate, real-time emergency alerting by 2030.
GOAL 18	We will leverage existing and new investments and partnerships.	TARGET 18	Invest $50 billion in major recovery, mitigation, and modernization projects that increase resilience by 2040.

Figure 56: Goals and targets of the *Resilience Houston* plan.

NEIGHBORHOOD RESILIENCE PLAN PROJECTS

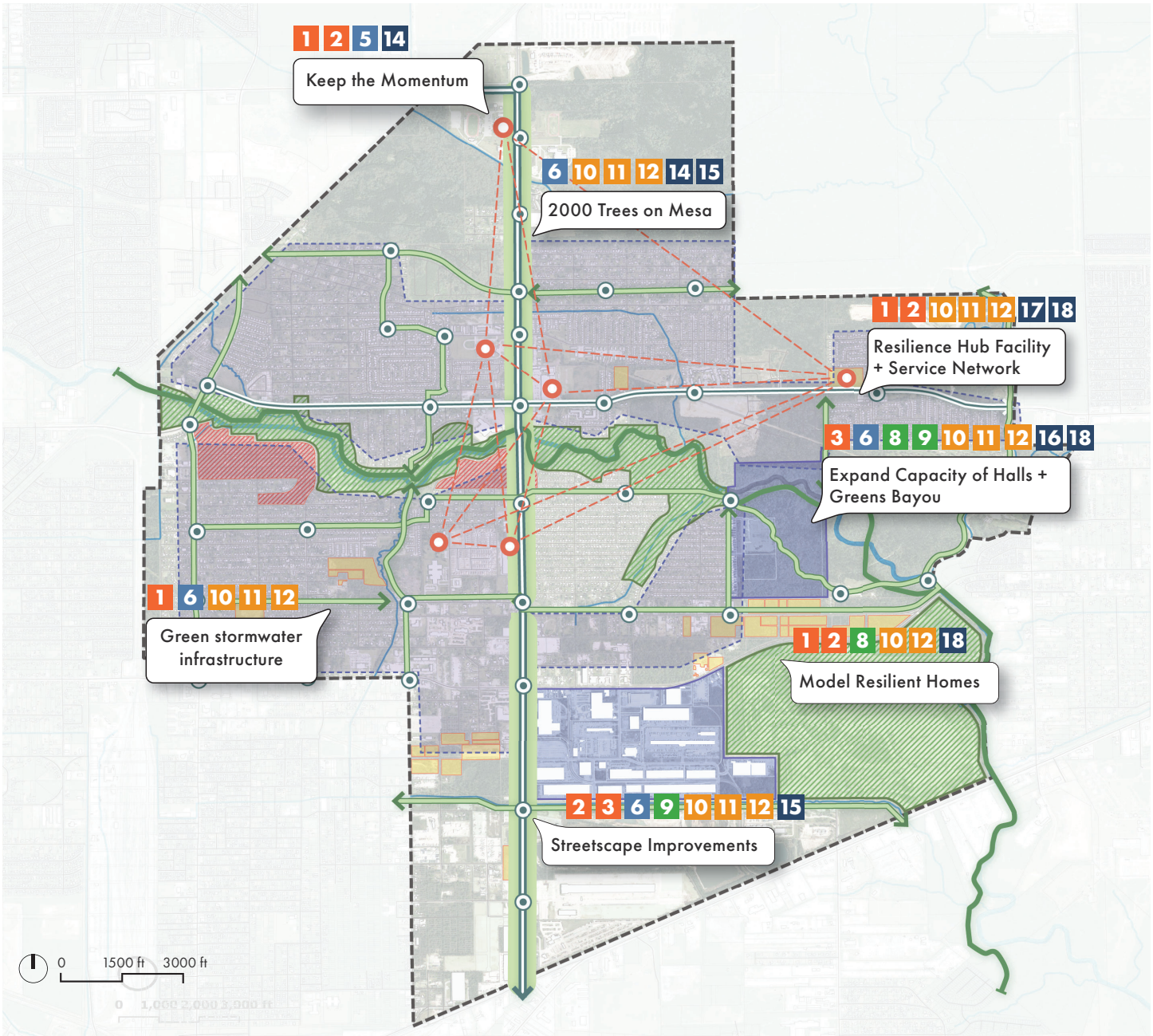


Figure 57: East Houston neighborhood map showing relationship between the Resilient Houston plan targets and the recommended neighborhood resilience plan projects.

LEGEND

KEEP THE MOMENTUM + RESILIENCE HUB FACILITY + SERVICE NETWORK

- RESILIENCE HUBS CANDIDATES
- RESILIENCE SPOTS CANDIDATES

MODEL ADAPTIVE HOMES + GREEN STORMWATER INFRASTRUCTURE

- PROPOSED RELOCATION OF STRUCTURES FROM FLOODPLAIN / EASEMENT AREA
- POTENTIAL IN-FILL DEVELOPMENT AREAS

STREETSCAPE IMPROVEMENTS + GREEN STORMWATER INFRASTRUCTURE

- PROPOSED MULTI-MODAL TRANSIT - PRIMARY
- PROPOSED MULTI-MODAL TRANSIT - SECONDARY
- PROPOSED GREENWAY
- PROPOSED DRAINAGE IMPROVEMENT

2000 TREES ON MESA

- 2000 TREES ON MESA STREET

EXPAND CAPACITY OF HALLS + GREENS BAYOU

- PLANNED HCFCD BAYOU CHANNEL IMPROVEMENTS PROJECT
- PARKS
- BAYOU GREEN WAY
- PROPOSED CONSERVATION EASEMENTS
- PROPOSED AREAS FOR DEPAVING

OVERVIEW

Multiple projects have been identified by taking input from the community and building upon existing planning efforts, such as the *Climate Impact Assessment* and *Climate Action Plan*. These projects are categorized based on the city's current capabilities, including department budgets and staffing, as well as the city's capital improvement planning. Future perspectives and resilience challenges of the neighborhood are also considered to ensure the long-term relevance of the neighborhood plan.

This view to the future is largely one where public private partnerships are formed around executing the aspirational goals of the plan that may require staffing, funds, or expertise not currently available.

Aspirational projects are those that are known to significantly reduce the risk on the community's resilience, such as costly riparian expansion and rehabilitation, or innovative albeit proven urban design practices that reduce stormwater runoff and improve human health, but that we do not have all the implementation steps in place to guarantee implementation today. These projects are feasible, but will require that the city and community continue working toward developing implementation pathways particularly for funding and ongoing maintenance.

Implementation of this plan's projects will occur on varying schedules and timelines relative to the project complexity and how the project is funded and staffed. Each city-committed project should start now (some have started already). Aspirational projects will start later and require that the city and the community will work toward developing partnerships that can realize them. For each of the projects, necessary and recommended steps to realize resilience are defined, city leads and critical non-governmental partners are identified, anticipated project timeline are laid out, funding pathways proposed, and metrics for success described.

Work on the implementation of city-committed projects should begin at plan adoption or earlier, and those aspirational projects needing non-governmental partners should begin working on forging relationships and agreements.

Keep the Momentum
is about generating the adaptive capacity required to withstand and overcome stresses and shocks. It continues the work done in the neighborhood resilience action planning process by creating events and activities to bring the community together, keeping the conversation around resilience going, and helping build local adaptive capacity. Continuing to make community driven public art raises awareness about resilience topics and keeps the neighborhood engaged. Capacity and relationships are built in preparation of a resilience conference which, at the end of the year, celebrates partnerships and project progress. Economic development makes sure people have access to the resources and information they need within the neighborhood.

Model Resilient Homes
addresses the lack of community-based knowledge about, and resources for, housing resilience by creating pilot projects to rehabilitate and weatherize homes, and remove them from the floodplain. The "Model Resilient Homes" project serves as an example of what is possible to implement on the typical home in East Houston, and provides practical tools and guides for homeowners and renters to pursue their own adaptive home improvements.

Resilience Hub Facility + Service Network
builds on the city's Resilience Hubs project to extend the facilities and service network that support unique preparation, response and recovery from stresses and shocks in the specific neighborhood they serve.

Community-based facilities, such as churches, schools and libraries, heighten the level of service and resources in a community. The associated programs that take place at such facilities strengthen community relationships and form distribution networks that work to make sure community members are informed in advance of an event, and as prepared as possible for the effects of stresses and shocks;

Streetscape Improvements through improved delivery and communication of projects that address aging infrastructure through the implementation of leading-edge stormwater infrastructure practices, mobility improvements, and reduced exposure to heat in a coordinated manner.

2,000 Trees on Mesa look primarily to increase the neighborhood tree canopy, particularly along Mesa Drive, but also in other areas such as John Ralston Road. The vision for Mesa Drive is to become the neighborhood boulevard by planting trees in the right-of-way, and on the adjacent parking lots. Associated with parking lot improvements is updated site plan requirements that would support a mixed-use development pattern as part of a neighborhood economic development strategy. Increasing the urban tree canopy improves traffic safety, provides a cool corridor for safe multi-modal transportation, and reduces stormwater runoff.

Green Stormwater Infrastructure can be effective in cooling and cleaning the air, providing shade, helping reduce nuisance flooding while improving the appearance of a block or the neighborhood. Expanding the use of green infrastructure—such as trees, bioswales, bioretention planters, rain gardens and other features on private property— can be facilitated if development permitting rules are modified to incentivize their installation.

Expand Capacity of Halls + Greens Bayous will enhance existing flood mitigation infrastructure and create an amenity for the neighborhood. Building on plans for the Bayou, the project proposes an integrated and community-driven approach to expanding and enhancing Halls Bayou to help reduce neighborhood flood risk, enhance sustainable mobility and recreational opportunities, improve environmental health, and mitigate heat effects through urban forestry.

These projects are first and foremost championed by the East Houston NST and the broader community. They are also supported by the City of Houston Planning and Development Department, additional city departments and elected representatives, and other nongovernmental partners.

EVALUATION CRITERIA MATRIX

EVALUATION CRITERIA	KEEP THE MOMENTUM	MODEL RESILIENT HOMES	RESILIENCE HUB FACILITY + SERVICE NETWORK
1. Does the project have neighborhood support? Does it respond to the neigborhood's needs?	Yes	Yes	Yes
2. Which vulnerabilities does the project respond to?	Equity	Equity, housing, flooding, energy poverty, public health, heat	Equity, recovery
3. What is the efficacy of the project in terms of resilience?	Increases adaptive capacity	High, when scaled succesfully	Increases adaptive capacity
4. Are there clear implementation parhways?	Requires new partnerships	Yes	Yes, through MORS
5. Does the project have the ability to strengthen other processes?	Yes, will strenghten adaptive capacity	Linked to economic development and flood contro	Yes
6. Does the project align with the Resilient Houston Plan and EJ criterion?	Yes, in RH Yes, supports EJ	Yes, in RH Yes, supports EJ	Yes, in RH

STREETSCAPE IMPROVEMENTS	GREEN STORMWATER INFRASTRUCTURE	2,000 TREES ON MESA	EXPAND CAPACITY OF HALLS + GREENS BAYOUS
Yes	Yes	Yes	Yes
Heat, traffic safety, flooding	Heat, traffic safety, pollution	Heat, flooding, pollution	Heat, flooding, pollution
High, when scaled succesfully	Medium, needs uptake	High	High
Yes	Requires community uptake and partnerships	Yes	Yes, long term
Yes	Yes, pilot for uptake in ROW	Yes, economic development	Yes, will fundamentally strenghten overall resilience
Yes, in RH	Yes, in RH	Yes, in RH	Yes, in RH
Yes, supports EJ	Yes, supports EJ	Yes, supports EJ	Yes, supports EJ

KEEP THE MOMENTUM

Figure 58

KEEP THE MOMENTUM

Building resilience is a continuous process, in which this neighborhood resilience action plan is an important step. During this planning process, the community's trust and adaptive capacity has increased, and clear steps forward toward neighborhood improvement have been identified. The realization of the mini-mural art as utility box covers—even during the planning process—is a good reason to celebrate the energy and spirit in the community. The completion of the formal planning process, however, should not mean the end to the broader neighborhood planning process that brings the community together around resilience topics and builds adaptive capacity. In the next year, neighborhood-led planning processes should continue, such that additional improvements to the neighborhood can be realized in the short term, the community conversations refined, and efforts broadened to collaborate with new partners. To 'keep the momentum', three actions are proposed.

Expand Public Art

Community art has marked the beginning of tangible change in the East Houston neighborhood. Renowned artist Danny Asberry El's utility box covers, installed in October 2022, introduce original murals that celebrate the neighborhood's existing identity and cultural assets and raises community awareness around resilience topics. The artworks raise community risk awareness around personal risks associated with flooding and other stresses and shocks. This highly

EXPAND PUBLIC ART

Engage public agencies and local artists to install public art to raise risk awareness around climate change and other stresses and shocks, such as mini murals, murals, sculptures, crosswalk art or other types of art.

Benefits equity; adaptive capacity, public health

Timeline Short-term (1-2 years)

Guiding Principles Connected Community

Resilience Houston Targets GOAL 2 GOAL 5

"The City will work with partners to collaboratively develop and implement an education and advocacy campaign to build Houstonians' awareness about the risks that are exacerbated by climate change and the impact they have on their health, the economy, and the built environment."
(Resilient Houston, page 50)

EXPAND AND ENHANCE NEIGHBORHOOD RESILIENCE ACTIVITIES

Establish programs and activities to build adapative capacity by sustaining community-based dialogue around resilience

Benefits equity; adaptive capacity, public health

Timeline Short-term (1-2 years)

Guiding Principles Connected Community

Resilience Houston Targets GOAL 1 GOAL 2 GOAL 14

SUPPORT EXISTING LOCAL BUSINESSES AND INCUBATE NEW LOCAL BUSINESS

Establish programs and activities that support existing local businesses, new local businesses, and incubate innovative new local business in order to improve job opportunities and services in the neighborhood.

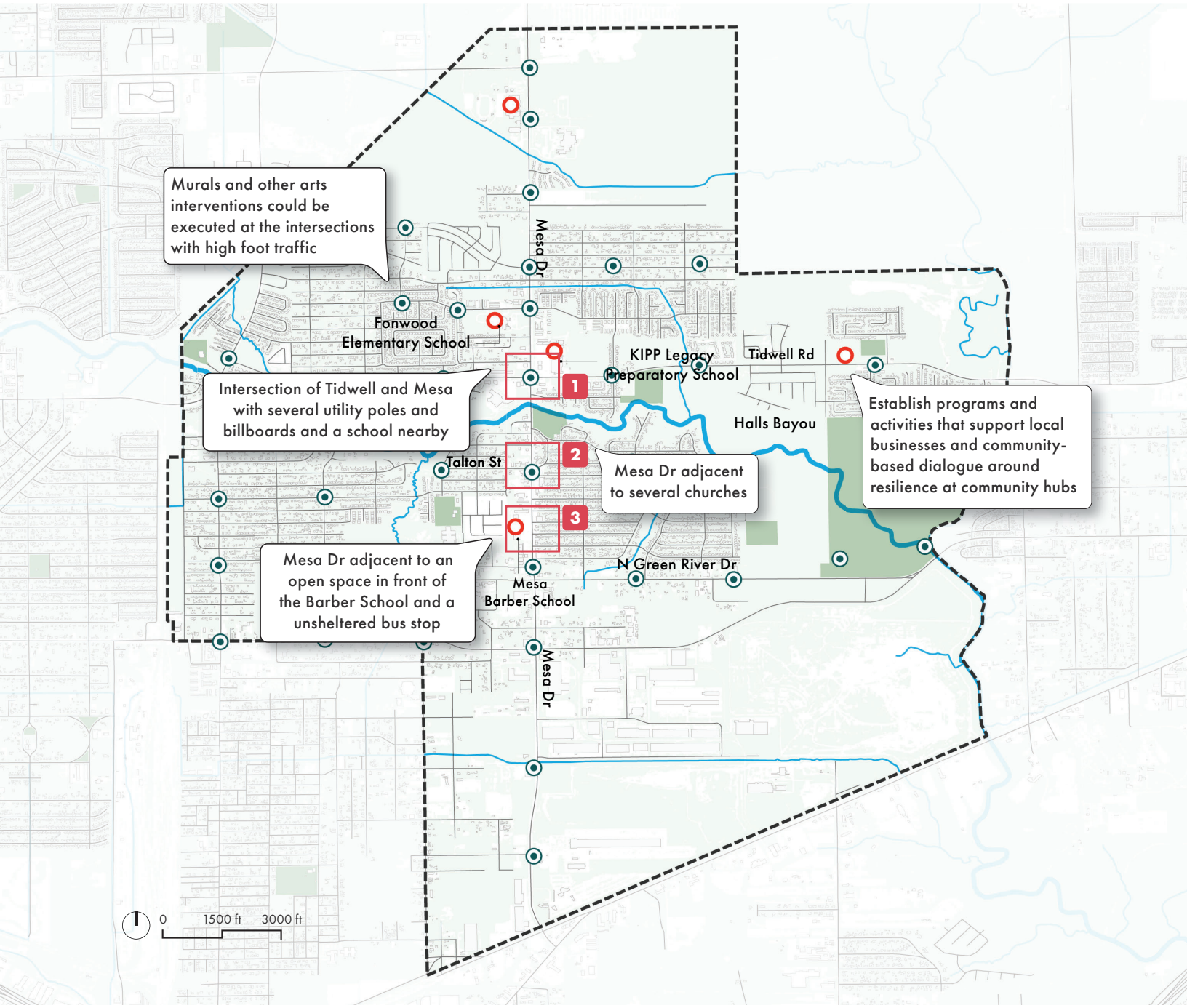
Benefits equity; adaptive capacity; public health

Timeline Short-term (1-2 years)

Guiding Principles Connected Community

Resilience Houston Targets GOAL 14

Figure 59: Potential locations for program and activities to keep the momentum



LEGEND

CAPACITY BUILDING

- RESILIENCE HUBS CANDIDATES
- RESILIENCE SPOTS CANDIDATES
- WATERWAYS
- EXISTING ROADS
- EXISTING PARKS

KEEP THE MOMENTUM

ACTIONS

visible, albeit small change, symbolizes pride and growing neighborhood momentum, energizing residents and business owners to participate in related neighborhood activities such as preparedness parties and training and educational seminars on advocacy. Continuing such public art projects is important not just to continue neighborhood beautification but to keep building community resilience awareness and the community's momentum for neighborhood-level agency, advocacy and change.

"Cultural expression is a marker of the social cohesion so vital for resilient communities."
(Resilient Houston, page 77)

Expand and Enhance Neighborhood Resilience Activities
In addition to the expansion of public art, a broader effort to improve social resilience funded in strong social connections allow communities to prepare for, withstand and emerge stronger from shocks like extreme weather events. That is enabled by creating a connected community, in a robust network of community organizations, public spaces and facilities. To enhance social resilience, the establishment of programs and activities that sustain community-based dialogue and build capacity around resilience is recommended. A community resilience conference at the end of 2023 is a good way to demonstrate progress, celebrate partnerships, and bring new partners into the conversation. The process of preparing for such a conference will ensure the work on resilience continues, and ensure knowledge, programs, and initiatives advance measurably toward resilience goals and targets. Additional participatory activities can include workshops, the development of a certificate in resilience, home energy audits, a resilience tradeshow, etc. Events of this kind keep the conversation going, raise awareness of the risks and resources to mitigate the risks.

Support Local Business and Incubate Business Innovation
Keeping the momentum in the neighborhood is supported by making sure the resources and knowledge necessary to support community activity is present in the neighborhood. For this, there are many approaches, but local economic development helps to make sure the necessary resources are available, and that the community is its healthiest, happiest, and most vibrant. By supporting economic development in the neighborhood–through support of local business and the incubation of local business innovation–adaptive capacity is improved. A strong local economy helps the whole community gain access to livable incomes, the resources and services the community needs to stay healthy and informed are made available, and the social networks the community relies on to provide supplemental services and trainings are supported.

Figure 60: An example of Community art

EXPAND PUBLIC ART

STEPS	LEAD		PARTNERS	FUNDING	METRICS
	CITY	NEIGHBORHOOD			
1 Work with City, County, and regional departments along with various programs to install public art on city property	**MOCA, HCFCD**		**Up Art Studio,** Solel International	MOCA, NEA, Bloomberg Philanthropy	# of art pieces installed in neighborhood
2 Seek funding to support projects					
3 Work with public and/or private property owners by identifying desired locations and art projects, following City process requirements, raising required funding, installing and celebrating the final installation.					

EXPAND AND ENHANCE NEIGHBORHOOD RESILIENCE ACTIVITIES

STEPS	LEAD		PARTNERS	FUNDING	METRICS
	CITY	NEIGHBORHOOD			
1 Work with various partners to establish year-round programs and activities, and sepcifically a regular Resilience Fair/Conference	**DON**	**East Houston Civic Club**	**OEM,** MORS, PW (Green Resource Center), HPH, HCDD, HPL	TBD - OEM, OED	# of individuals + businesses reached
2 Work with community on providing information to them, whether online, in seminars and classes, or other formats					
3 Periodically review and update programs and activities					

SUPPORT EXISTING LOCAL BUSINESSES AND INCUBATE NEW LOCAL BUSINESS

STEPS	LEAD		PARTNERS	FUNDING	METRICS
	CITY	NEIGHBORHOOD			
1 Conduct neighborhood-wide survey of existing local businesses	**OED**		**Private Developer/ Corporation,** OBO, US SBA, Houston Area Urban League, University of Houston, Prairie View A&M, Council Member (Jackson) District B, SCORE	TBD	# of local profitting businesses; local tax revenue
2 Identify gaps in service, employment gaps, and other opportunities for business development in the neighborhood					
3 Work with a private partner to establish a grant program to support existing local business and an incubator program that provides work space, funding, and mentoring of aspiring local businesses					

MODEL RESILIENT HOMES

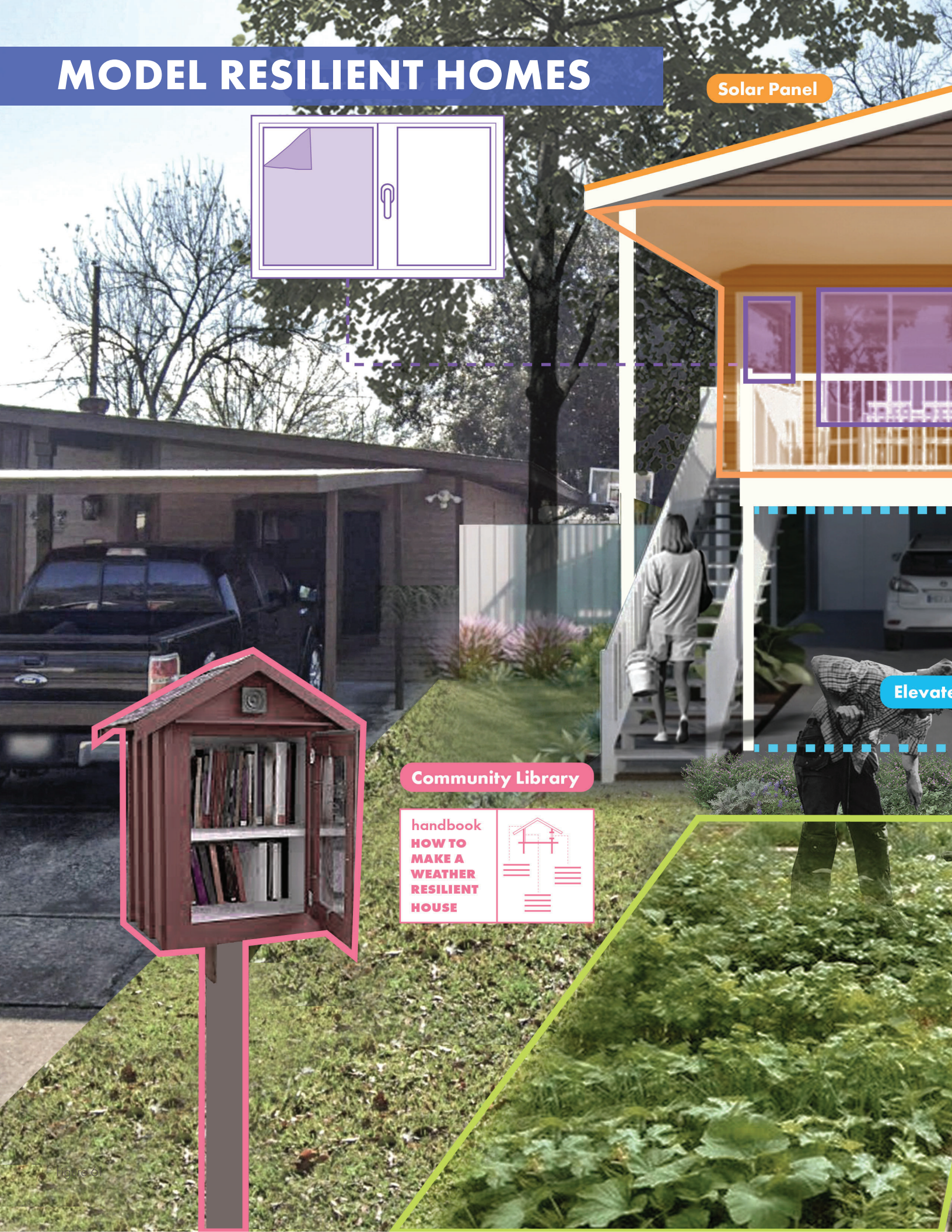
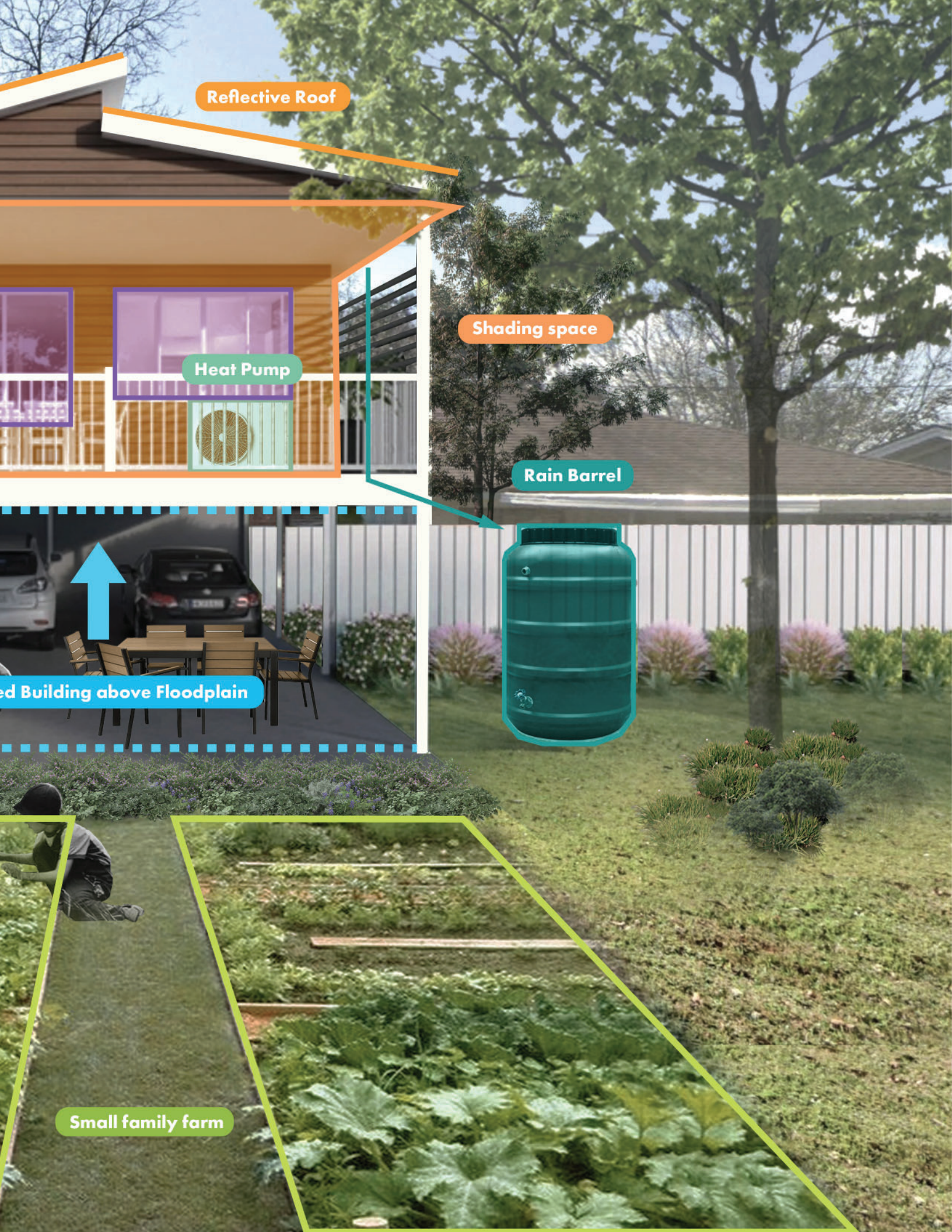


Figure 6


Reflective Roof
Heat Pump
Shading space
Rain Barrel
ed Building above Floodplain
Small family farm

MODEL RESILIENT HOMES

Housing resilience is a key factor in any neighborhood, and in East Houston it is an essential factor. A backlog of housing repairs lingers in the recovery from Hurricane Harvey, which has left many displaced or living in unsafe housing. Many homes are located in the floodway, leaving those tasked with the protection of residents' health and safety no choice but to recommend that the properties be bought-out and vacated to ensure the health and safety of neighborhood residents. Other homes that are located in the floodplain or are otherwise at risk of flood will need to be elevated and have critical equipment relocated.

Not all homes will be flooded, but all homes will face the stresses and shocks surrounding heat, cold, wind and rain. That means all homes–including rental homes–should be weatherized to make it easier to cool and heat, save energy, and reduce the burden of energy bills. Many of the actions to do this reside with individual homeowners and landlords, such as installing solar, home backup batteries, heating and cooling pumps, adding insulation, replacing low efficiency windows, doors, and plumbing fixtures, and conducting home energy audits. It is clear, though, that many homeowners and landlords are not aware of what they should do, how they should do it, and how to access resources needed to make the needed changes. Homeowners, landlords, and renters too would benefit from being shown what is possible, to set higher

REHAB & WEATHERIZE HOMES STILL AFFECTED

Establish programs and activities to define pathways to funding, services, and other resources and create courses and materials that disseminate best practices and pathways to floodplain removal, weatherization, and rehabilitation to both implement and showcase and demonstrate optimized pathways for homeowners and business owners to safe guard their individual assets

Benefits Equity; adaptive capacity, public health; flood risk

Timeline Short-term (1-2 years)

Guiding Principles Safe at Home

Resilience Houston Targets GOAL 1, GOAL 2, GOAL 8, GOAL 10, GOAL 11, GOAL 12, GOAL 18

ESTABLISH AND MAINTAIN BUILDING PREPARATION AND RECOVERY BEST PRACTICES

Create floodplain removal, weatherization, and rehabilitation best practices for East Houston to showcase and demonstrate best practices to community members for the weatherization of homes and businesses, to emphasize energy efficiency and energy security of building improvements.

Benefits Equity; adaptive capacity, public health; flood risk

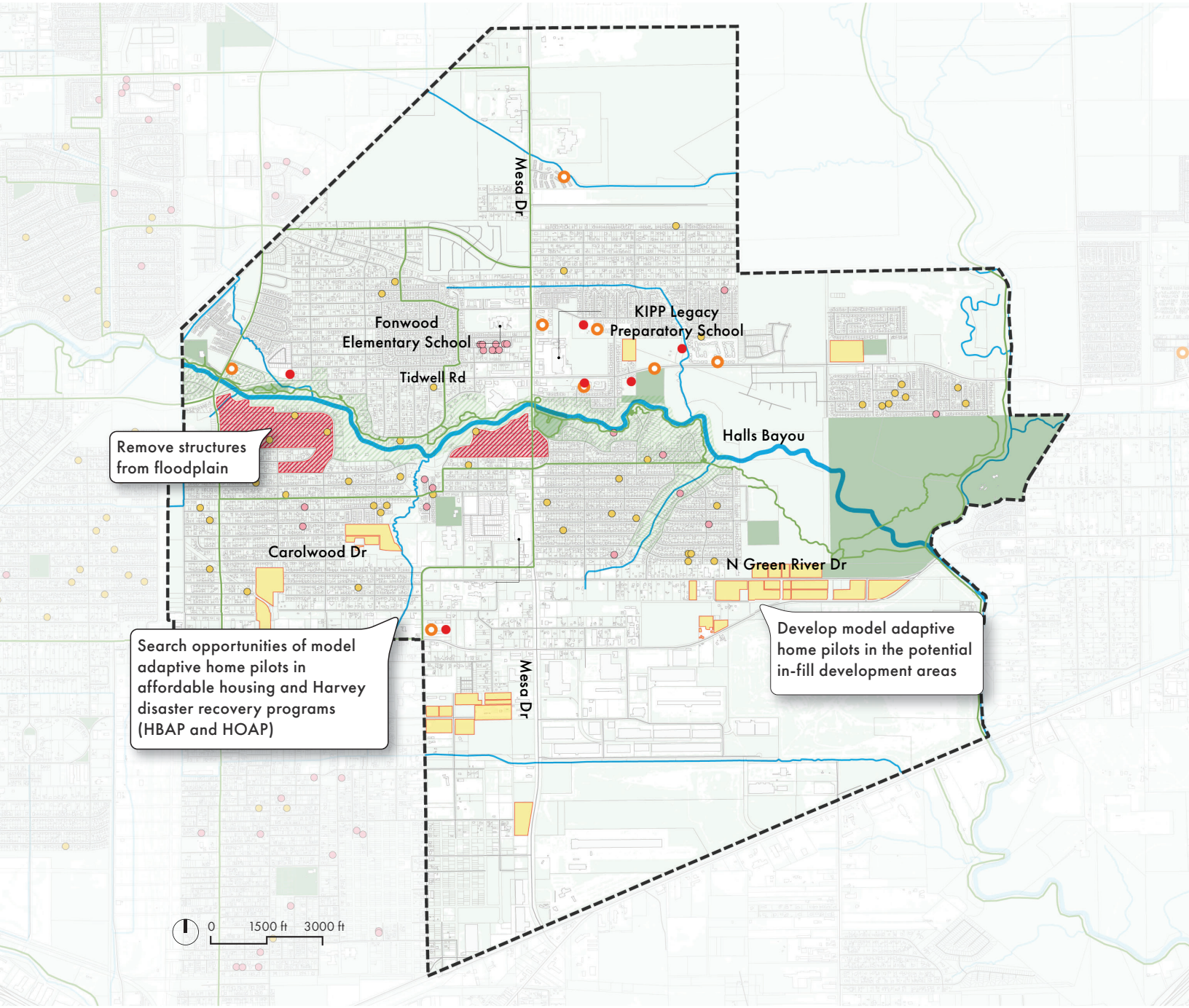
Timeline Near-term (3-5 years)

Guiding Principles Safe at Home

Resilience Houston Targets GOAL 1, GOAL 2, GOAL 8, GOAL 10, GOAL 11, GOAL 12, GOAL 18

"The City will work with partners, such as CenterPoint Energy, to grow existing weatherization education efforts and implement weatherization programs, prioritizing low- to moderate-income households and neighborhoods with repeated flooding damage."
(Resilient Houston, page 50)

Figure 62: Potential locations to create floodplain removal, weatherization, and rehabilitation best practices



LEGEND

HOUSING RESILIENCE

- PROPOSED RELOCATION OF STRUCTURES FROM FLOODPLAIN / EASEMENT AREA
- POTENTIAL IN-FILL DEVELOPMENT AREAS
- NHPD ASSISTED HOUSING
- AFFORDABLE HOUSING

HARVEY DISASTER RECOVERY (DR-17)

- HOMEBUYER ASSISTANCE PROGRAM (HBAP) COMPLETED PROJECTS (MARCH 2022)
- HOMEOWNER ASSISTANCE PROGRAM (HOAP) COMPLETED PROJECTS (MARCH 2022)

MODEL RESILIENT HOMES
ACTIONS

aspirations and expectations for their home, and from there the community—that has consistently shown their ability to independently implement the changes they want to see—may embark on a variety of DIY projects.

Research shows that homeowners in marginalized communities have far greater difficulty in improving housing resilience and accessing resources than in wealthier communities. To achieve equitable outcomes in building housing resilience, the "Model Resilient Homes" project proposes the rehabilitation, weatherization, and elevation of demonstration homes in the East Houston neighborhood. The project will serve three roles:

- identify and define clear pathways to contribute to a fuller recovery from Hurricane Harvey and protect and improve existing homes in the neighborhood;
- demonstrate how improvements can be done for other residents by giving out how-to manuals and provide instructional workshops on such topics as technical approaches to window replacements, how to work with contractors, or how to do it yourself, and how to access funding required to make up the gap in household resources; and
- encourage opportunities for local contractors and workforce development.

Rehabilitate and weatherize homes still affected

Rehabilitation and weatherization should include outstanding home repairs for Hurricane Harvey and other damage from storms, as well as a program to make sure that the most vulnerable residents have adequate air conditioning and heating, backup energy supplies, and other features to improve their health and safety at home. The proposal is to provide a series of updates that both rehabilitate, weatherize, and remove the home from the floodplain for existing residents that will continue living in their homes. The eligibility criteria and selection process for the "Model Resilient Homes" project will be informed by the community.

The roll-out of the "Model Resilient Homes" program is an opportunity to support workforce development by offering neighborhood residents training to elevate, weatherize and rehabilitate homes, and potentially the work of creating educational programs to support promotion of, or to implement, home rehabilitation and weatherization.

A successful project and associated programs, which will be developed together with the Houston Housing and Community Development Department, local utilities and contractors, as well as not-for-profits like HARC, will spur investment into the neighborhood's housing resilience by providing clear pathways for community members to improve their housing resilience.

Establish building preparation and recovery best practices

The homes that are updated as part of the "Model Resilient Homes" project will become part of a community education program, including designated home tours and hands-on demonstrations during the rehabilitation process. Following completion, the homes will serve as examples for others to follow. These will be part of a broader rebuilding program including trainings at local community events and will include education materials explaining how to apply a series of techniques to other structures. Providing an example of rehabilitation, weatherization, floodplain removal in the neighborhood ensures that techniques used are applicable to the local building stock, and that residents have ready access to professionally vetted examples of how to approach work on their own homes. By including improvements in the yard, such as green infrastructure, rainwater harvesting and urban farming, wider benefits can be demonstrated.

Figure 63: A home elevation pilot project to demonstrate how improvements can be done.

REHAB & WEATHERIZE HOMES STILL AFFECTED

STEPS	LEAD		PARTNERS	FUNDING	METRICS
	CITY	NEIGHBORHOOD			
1 Find funding source(s)	**HCD**	**East Houston Super Neighborhood**	**HARC,** Private Developer/ Corporation	TBD - DOE, US-HUD, IRS, US-EPA, HCD, TDHCA, TX-PACE, CenterPoint Energy, Reliant Energy, FEMA, CDBG, Justice 40, Texas Housing, Harris County Long-term Recovery, Private Developers, Philanthropy	# of individuals + businesses reached; # of assets prepared and/or recovered
2 Work with Houston Land Bank and other property owners to find sites					
3 Establish selection criteria + find willing property owners					
4 Design and plan weatherization of home or business					
5 Weatherize home or business					
6 Conduct associated educational activities, whether online, in seminars and classes, or other formats					
7 Periodically review and update practices, programs and activities					

ESTABLISH AND MAINTAIN BUILDING PREPARATION AND RECOVERY BEST PRACTICES

STEPS	LEAD		PARTNERS	FUNDING	METRICS
	CITY	NEIGHBORHOOD			
1 Work with various partners to establish yearound programs and activities	**HCD**		**HPW (Green Resource Center)**, GSD	HPW	# of assets prepared and/or recovered
2 Work with community on providing information to them, whether online, in seminars and classes, or other formats					
3 Periodically review and update programs and activities					

RESILIENCE HUB FACILITY + SERVICE NETWORK

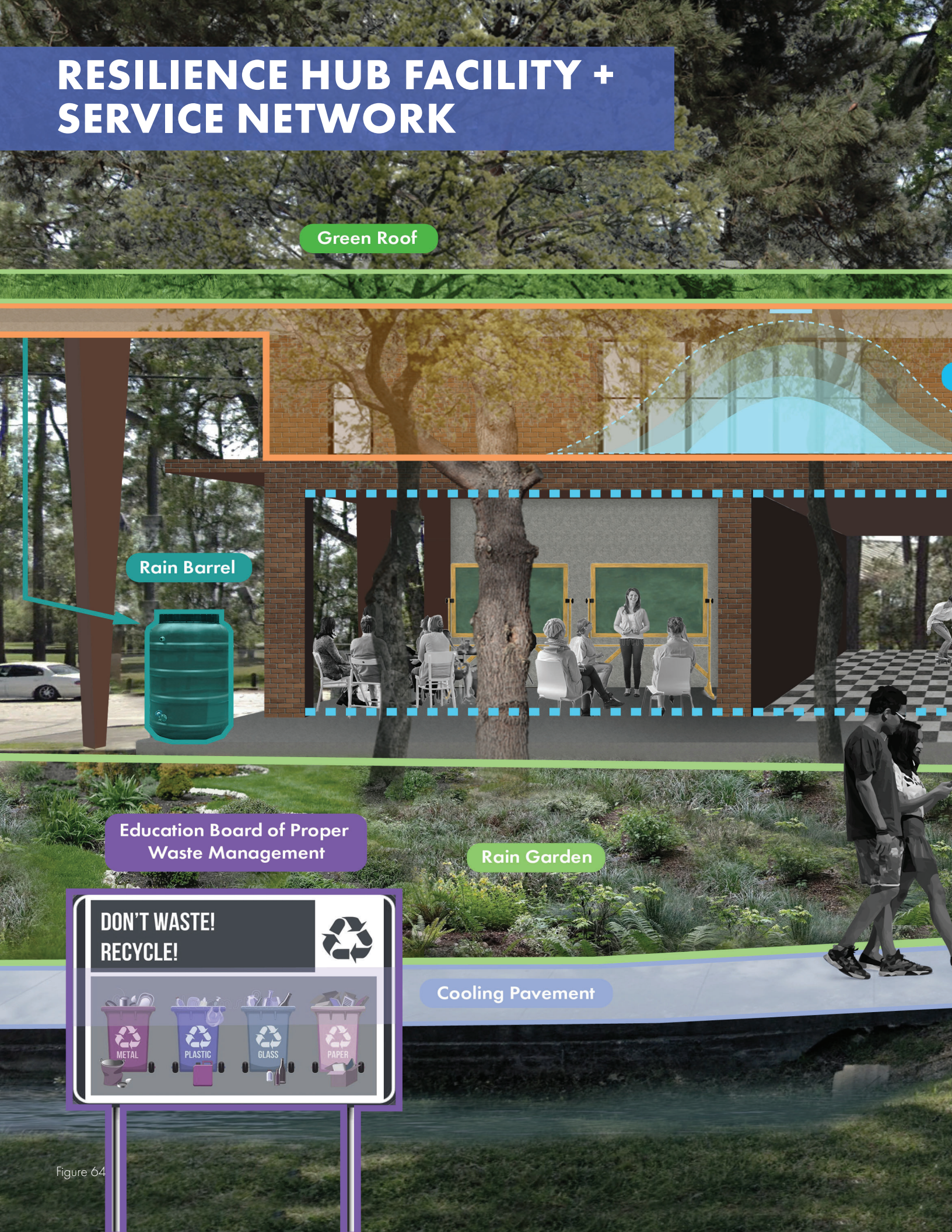
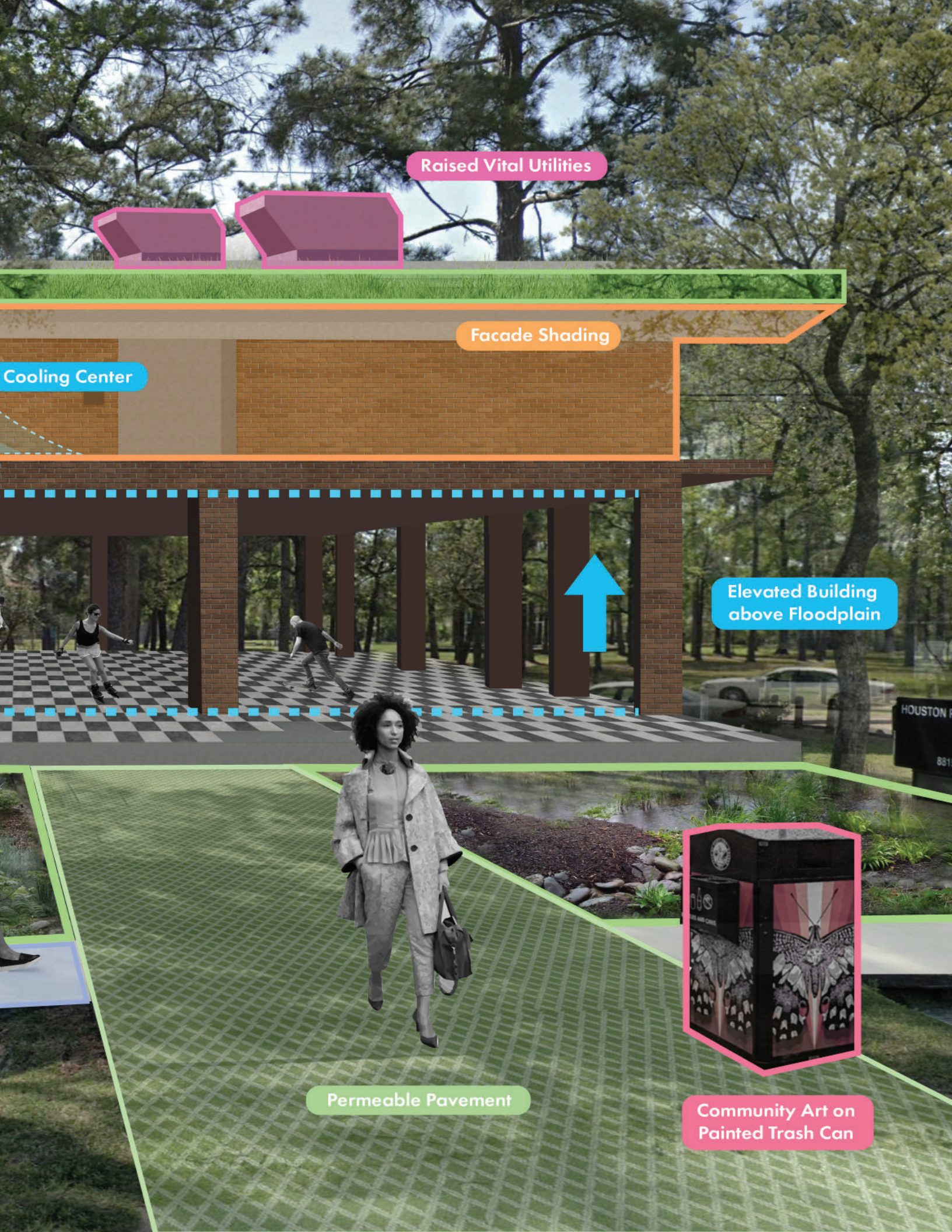


Figure 64


Raised Vital Utilities
Facade Shading
Cooling Center
Elevated Building above Floodplain
Permeable Pavement
Community Art on Painted Trash Can

RESILIENCE HUB FACILITY + SERVICE NETWORK

A goal of *Resilient Houston* is to provide a city-wide network of Resilience Hubs, or public spaces dedicated to preparing for and recovering from extreme weather event, or other hazardous events.
A Resilience Hub works to reduce sensitivities and exposures to extreme heat and cold, flooding and drought, blackouts, and food security, and other vulnerabilities. Currently, a Resilient Hub Master Plan is being developed by the Mayor's Office of Resilience and Sustainability. Embedded in this effort is the identification of Resilience Spots, or secondary facilities, and Spokes, or safe routes to information and resources. Secondary Spots may provide one or two protections, such as a standalone cooling center or recharging location, as opposed to the Hub that is intended as a kind of one-stop-shop. Spots are also not emergency operations centers, instead they provide only pre- and post-disaster services. The relationships between each of these facilities creates the network serving the neighborhood, in which, like a mesh network, the different parts strengthen each other.

"Create safe places of refuge in communities that also build neighborhood resilience between disruptions and disasters."
(Resilient Houston, page 81)

ESTABLISH NEIGHBORHOOD RESILIENCE HUB FACILITY NETWORK

Establish a resilience hub network to support community resilience preparedness and to plan for and assist with recovery following events. Such hubs would centraily house services and programming for preparedness, emergency response, and recovery in the neighborhood

Benefits Equity; adaptive capacity, public health; flood risk

Timeline Near-term (3-5 years)

Guiding Principles Safe in the Neighborhood

Resilience Houston Targets

ESTABLISH NEIGHBORHOOD RESILIENCE PROGRAMS AND SERVICES NETWORK

Establish a resilience hub programs and services network to help build community's adaptive capacity, specifically to improve resilience preparedness and to plan for and assist with recovery following events. Such a services network would provide support services and programming for preparedness, emergency response, and recovery.

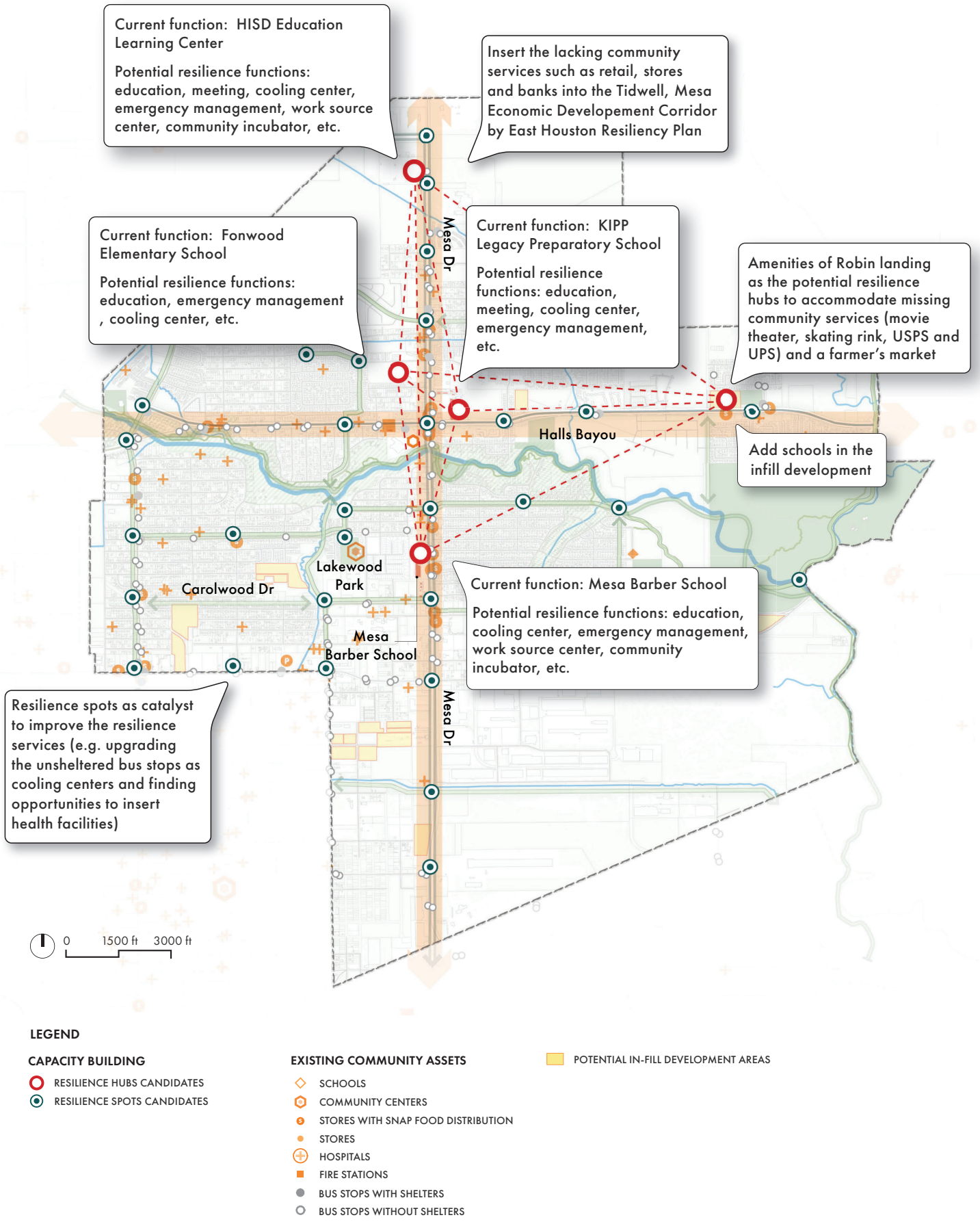
Benefits Equity; adaptive capacity, public health; flood risk

Timeline Short-term (1-2 years)

Guiding Principles Safe in the Neighborhood

Resilience Houston Targets

Figure 65: Locatons of resilience hub facility and service network



RESILIENCE HUB FACILITY + SERVICE NETWORK

ACTIONS

Establish Facility Network
Currently, there is a lack of city-owned facilities that can be readily designated as a resilience hub. There are no healthcare facilities, community centers, and libraries in the neighborhood. The neighborhood library, located in the floodplain, was lost during Hurricane Harvey, after having flooded several times prior.[7] Nevertheless, the city is currently studying its building and property assets in the neighborhood in an effort to provide a dedicated building to support neighborhood resilience.

As the city is conducting that assessment as part of the Mayor's Office of Resilience and Sustainability master plan, there remains a need for physical space in the neighborhood. One site to assess is Robin's Landing, for which there are plans for a new library. Other facilities that can be designated as secondary resilience facilities, also referred to as 'resilience spots', include faith-based centers, civic clubs, and local businesses. These privately-owned facilities can fulfill the need now for dedicated space in the neighborhood. Once a city-owned facility is designated, the interim privately-owned facilities may opt to continue serving a function in the resilience facility network.

Given the current lack of public community spaces, East Houston is in great need of the community facilities that heighten the level of service in an area for no other reason than physical proximity to those served. The resilience hub as a facility will provide essential services such as city and volunteer emergency response teams, emergency management, rescue boats, medical care, food and water, and other essential resources services necessary before and after events. Outside of emergency response and recovery periods, the facilities will be used to aid preparedness.

Establish Services Network
The Resilience Hub is not just a physical space, it provides neighborhood-specific educational and training programming, resource distribution before and after events, and other services such as heating and cooling centers, charging centers. During normal conditions these community facilities can also provide critical community services in the neighborhood to complement and enhance the core resilience services, such as computing, continuing education and job training, and event or meeting spaces for community organizations, or as a venue for a regular farmer's market. Expanded services can also be brought into the neighborhood to meet today's service needs in line with the goals of building adaptive capacity, generally improving overall neighborhood resilience through education and resource distribution, economic development by providing business development resources for local entrepreneurs, classes on starting or operating successful businesses, and civic engagement and community agency by providing leadership training for community members.

"Neighborhood Resilience Hubs are physical spaces, hosted within trusted spaces in neighborhoods, that facilitate social, climate, and economic resilience along with disaster preparedness."
(Resilient Houston, page 81)

ESTABLISH NEIGHBORHOOD RESILIENCE HUB FACILITY NETWORK

STEPS	LEAD		PARTNERS	FUNDING	METRICS
	CITY	NEIGHBORHOOD			
1 Follow guidelines established by MORS for both public- and privately-owned facilities to create new facilities and designate existing facilties	**MORS**		**OEM,** HPL, Parks, MSC, HHD, Faith-based organizations, Area Schools, Area Fire Station, Council Member B Office	MORS, US-EPA	Percentage of neighborhood within a defined service boundary (e.g. 1000 feet)

ESTABLISH NEIGHBORHOOD RESILIENCE PROGRAMS AND SERVICES NETWORK

STEPS	LEAD		PARTNERS	FUNDING	METRICS
	CITY	NEIGHBORHOOD			
1 Follow guidelines established by MORS for essential services **2** Work with neighborhood leaders to create neighborhood specific programs and services	**MORS**		**OEM,** HPL, Habitat for Humanity, Parks, MSC, HHD, Faith-based organizations, Area Schools, Area Fire Station, Council Member B Office	MORS, US-EPA	Quantifiable risk reduction (e.g. fewer heat strokes, fewer cases of diabetes, fewer homes without AC, etc)

STREETSCAPE IMPROVEMENTS

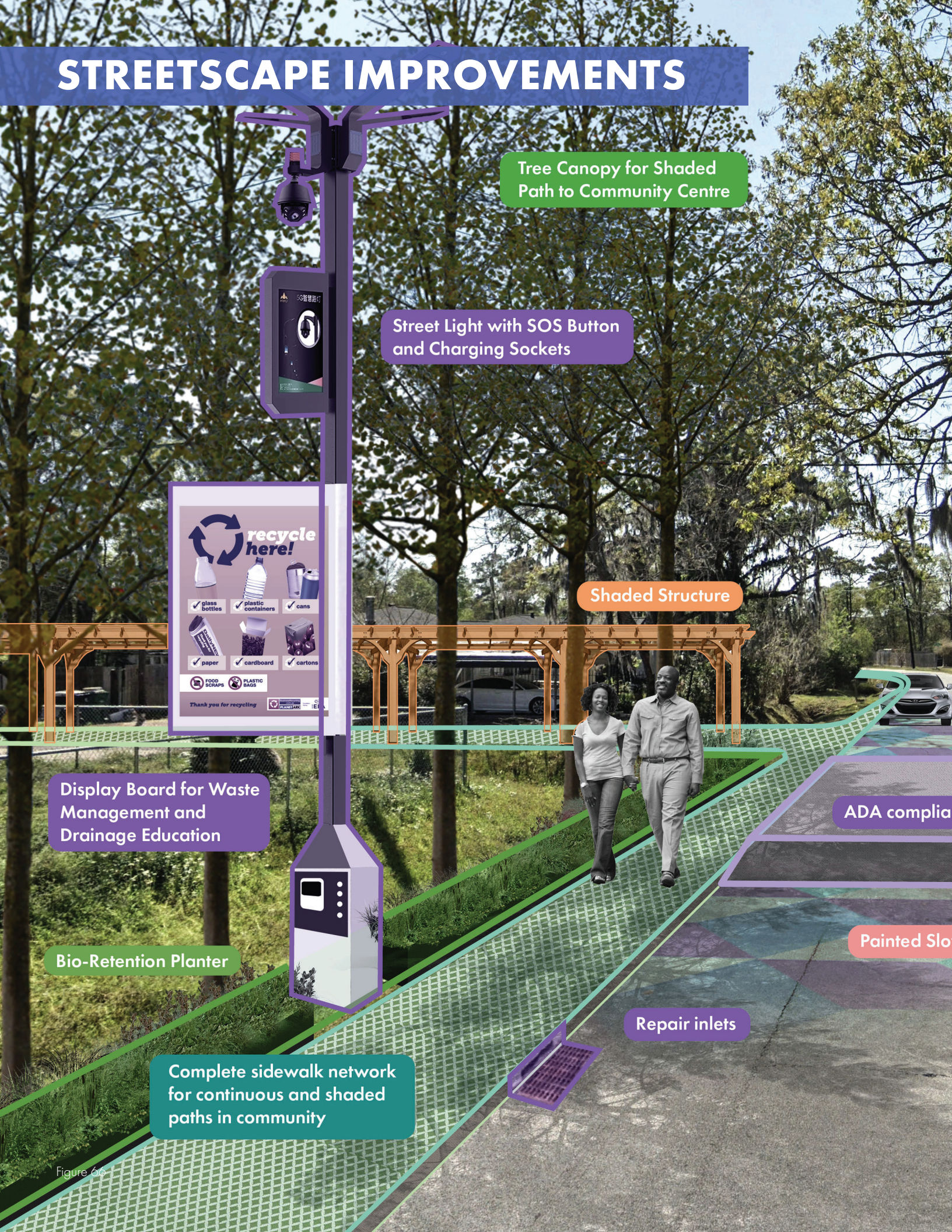
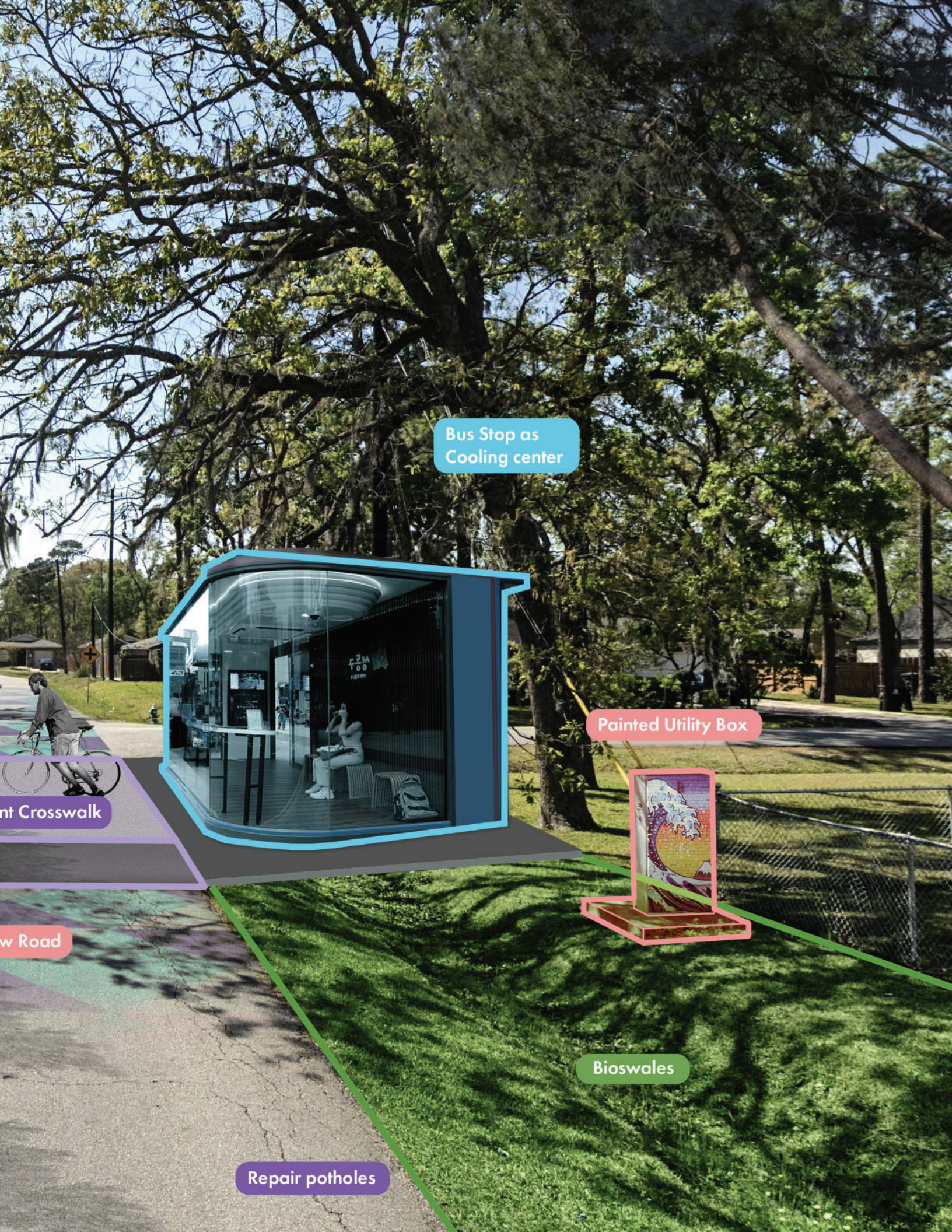


Figure 66


Bus Stop as
Cooling center
Painted Utility Box
nt Crosswalk
w Road
Bioswales
Repair potholes

STREETSCAPE IMPROVEMENTS

The neighborhood's street network was built to provide vehicle access to the residences and businesses in the area. The original street design creates a fragmented sidewalk network intended for both pedestrian and bicyclist mobility, and was predominantly built prior to the passing of the Americans with Disabilities Act (ADA) so many curbs and other features do not meet today's ADA standards. The City has maintained the street infrastructure and made updates to its original design and layout where

ESTABLISH LEADING EDGE URBAN DESIGN AND SITE PLAN STANDARDS

Establish urban design and site plan standards to integrate street trees, bioretention planters, and other GSI features into the streetscape as part of the platting and permitting requirements for both City ROW and private property setbacks in order to improve drainage, mitigate UHI, improve air and water quality

Benefits Equity; flood risk reduction; public health; microclimate regulation; ecological health

Timeline Near-term (3-5 years)

Guiding Principles Safe in the Neighborhood

Resilience Houston Targets GOAL 6, GOAL 10, GOAL 11, GOAL 12, GOAL 15

CONTINUE TO IMPROVE NEIGHBORHOOD STREET AND SIDEWALK NETWORK

Complete sidewalk network and provide panel improvements, install ADA compliant curbs, repair inlets and potholes along multi-modal routes, and improve drainage, particularly along Mesa Drive and John Ralston Road as well as the intersection of Mesa Drive and Tidwell Road

Benefits Equity; public health; flood risk

Timeline Short-term (1-2 years)

Guiding Principles Safe in the Neighborhood

Resilience Houston Targets GOAL 6, GOAL 10, GOAL 11, GOAL 12, GOAL 15

CONTINUE TO IMPROVE ROAD SAFETY

Conduct street improvements, particularly for areas along Mesa Drive, Tidwell Road, Wayside Drive, and Ley Road, to improve pedestrian, cyclist and motorist safety

Benefits Equity; public health; flood risk

Timeline Near-term (3-5 years)

Guiding Principles Safe in the Neighborhood

Resilience Houston Targets GOAL 6, GOAL 10, GOAL 11, GOAL 12, GOAL 15

CONTINUE TO IMPROVE STORMWATER DRAINAGE SYSTEM

Address aging infrastructure by executing upgrades of all drainage system components to reduce nuisance flooding, increase stormwater capacity, and improve stormwater drainage system

Benefits Equity; public health; flood risk

Timeline Near-term (3-5 years)

Guiding Principles Safe in the Neighborhood

Resilience Houston Targets GOAL 6, GOAL 10, GOAL 11, GOAL 12, GOAL 15

CONTINUE TO IMPROVE NEIGHBORHOOD CLEANLINESS

Advance neighborhood-wide collaboration around eliminating littering, illegal dumping, and tree trimming, to ensure the cleanest neighborhood possible

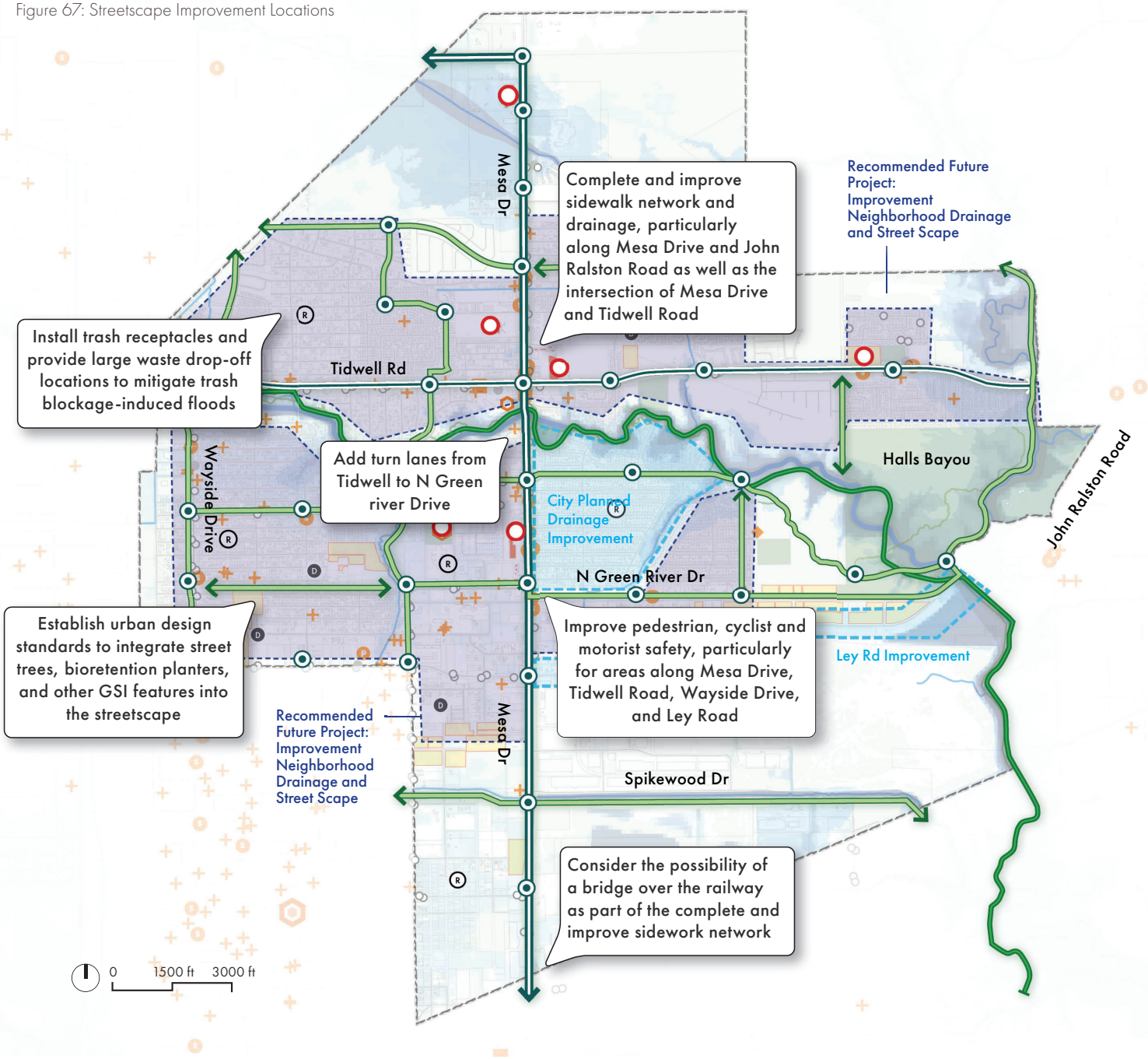
Benefits Equity; public health; flood risk

Timeline Short-term (1-2 years)

Guiding Principles Safe in the Neighborhood

Resilience Houston Targets GOAL 2, GOAL 3, GOAL 6, GOAL 9, GOAL 10, GOAL 11, GOAL 12, GOAL 15

Figure 67: Streetscape Improvement Locations



LEGEND

BASIC INFRASTRUCTURE UPGRADES

- PROPOSED MULTI-MODAL TRANSIT - PRIMARY
- PROPOSED MULTI-MODAL TRANSIT - SECONDARY
- PROPOSED GREENWAY
- RECOMMENDED FUTURE PROJECT: IMPROVEMENT NEIGHBORHOOD DRAINAGE AND STREET SCAPE

EXISTING COMMUNITY ASSETS

- SCHOOLS
- COMMUNITY CENTERS
- STORES WITH SNAP FOOD DISTRIBUTION
- STORES
- HOSPITALS
- FIRE STATIONS
- BUS STOPS WITH SHELTERS
- BUS STOPS WITHOUT SHELTERS

IMPROVE SOLID WASTE MANAGEMENT

- TRASH RECEPTACLE INFRASTRUCTURE
- CLEAN UP DUMPING IN VACANT LOTS

CAPACITY BUILDING

- RESILIENCE HUBS CANDIDATES
- RESILIENCE SPOTS CANDIDATES

STREETSCAPE IMPROVEMENTS

possible, but a comprehensive update to key portions of the streetscape would serve to address the aging street infrastructure, move away from the vehicle-centric design, and reduce exposure to the heat island effect.

"Shift the focus to people-centric neighborhoods and away from car-centric ones"
(Resilient Houston, page 121)

"Accessible sidewalks and pathways will make traveling Houston's built environment safe, comfortable, and enjoyable for all Houstonians."
(Resilient Houston, page 63)

Improve neighborhood street and sidewalk network
A general effort to improve the sidewalk conditions and sidewalk network is needed to allow for safe multi-modal transportation options. A complete sidewalk network connects neighborhood residents to neighborhood services, to public transportation, to recreational opportunities such as the bayous, and to one another. The effort should include complete gaps between sidewalks, or making sure that sidewalks do not abruptly end, provide panel improvements and replacements, install ADA compliant curbs particularly along key pedestrian routes to transit and retail services, repair inlets to improve drainage, repair cracks and potholes. This work should be focused along Mesa Drive and John Ralston Road as well as the intersection of Mesa Drive and Tidwell Road.

Continue to improve road safety
Community members have voiced a need for improved safety for pedestrians and bicyclists. Many safety features can be incorporated into overall street design standards, such as lighting, raised and lit crosswalks, traffic visibility triangles, audible beaconing, and other features. Further study of the current conditions is necessary to identify which street improvements are needed to improve traffic safety for motorists, bicyclists and pedestrians. Street improvements, particularly for areas along Mesa Drive, Tidwell Road, Wayside Drive, and Ley Road, have been identified by the community, particularly at intersections. Tidwell Road suffers from traffic backups that should also be addressed.

Continue to improve stormwater drainage system
The neighborhood's stormwater infrastructure was largely built to outdated standards, and would benefit from reconstruction. The costs for updating the system are not just prohibitively expensive, the construction itself would take years and have a negative impact on the livability for current residents. Nevertheless, it remains a shared goal to update what can be, when it can be updated, so that the system reaches higher performance standards and as a result reduce the flood risk in the neighborhood.

Establish leading edge urban design standards
Part of improving the streetscape can be achieved by harnessing incremental development activity, so that new develop and redeveloped properties contribute their fair share to the overall improvement of the neighborhood. To do so, establishing leading edge urban design and site planning requirements as part of the platting and permitting process will improve the streetscape plat-by-plat and permit-by-permit.

"Property owners and developers have a significant role in embracing greener practices for stormwater infrastructure if provided with alternatives on how best to use and incorporate them"
(Resilient Houston, page 50)

Continue to improve neighborhood cleanliness

Part of improving the streetscape involves its maintenance, and the community has been vocal about the need for improvements in cleanliness. Not only does street cleanliness affect the overall look and feel of a neighborhood, it can have negative impacts on the stormwater drainage system, ecological health, and public health. This project aims to eliminate littering and illegal dumping, and provide regular tree trimming through neighborhood-led initiative and collaborations with City services.

impacts on the stormwater drainage system, ecological health, and public health. This project aims to eliminate littering and illegal dumping, and provide regular tree trimming through neighborhood-led initiative and collaborations with City services.

"The City will continue to encourage the use of innovative on-site water capture and retention strategies that will provide relief to the overburdened stormwater system and reduce downstream watershed impacts and costly conveyance requirements"
(Resilient Houston, page 97)

Figure 68: Expand City-proposed bike lanes into multi-modal greenways with continuous and shaded sidewalks

STREETSCAPE IMPROVEMENTS

ACTIONS

CONTINUE TO IMPROVE NEIGHBORHOOD STREET AND SIDEWALK NETWORK

STEPS	LEAD		PARTNERS	FUNDING	METRICS
	CITY	NEIGHBORHOOD			
1 Conduct neighborhood-wide assessment of existing sidewalks, bike lanes, intersections, stormdrains, and other features to identify network gaps and areas for improvement	**HPW**		**Private Developer/ Corporation**	TBD	Higher walkscore
2 Conduct community preference survey on the expansion and improvement of mobility network and drainage system					
3 Coordinate private partner-led improvements					

CONTINUE TO IMPROVE ROAD SAFETY

STEPS	LEAD		PARTNERS	FUNDING	METRICS
	CITY	NEIGHBORHOOD			
1 Conduct neighborhood-wide assessment to determine road safety improvements	**HPW**		**PD (Transportation)**	HPW	Improved walkscore; Lower rate of traffic incidents
2 City to design and implement improvements					
3 Comprehensively assess traffic safety every 3-5 years					

CONTINUE TO IMPROVE STORMWATER DRAINAGE SYSTEM

STEPS	LEAD		PARTNERS	FUNDING	METRICS
	CITY	NEIGHBORHOOD			
1 Conduct neighborhood-wide assessment to determine necessary drainage system improvements	**HPW**		**Private Developer/ Corporation**	TBD	Lower frequency of nuisance flooding
2 Work with private partners to design and implement improvements					
3 Assess drainage system performance every 5-10 years					

ESTABLISH LEADING EDGE URBAN DESIGN AND SITE PLAN STANDARDS

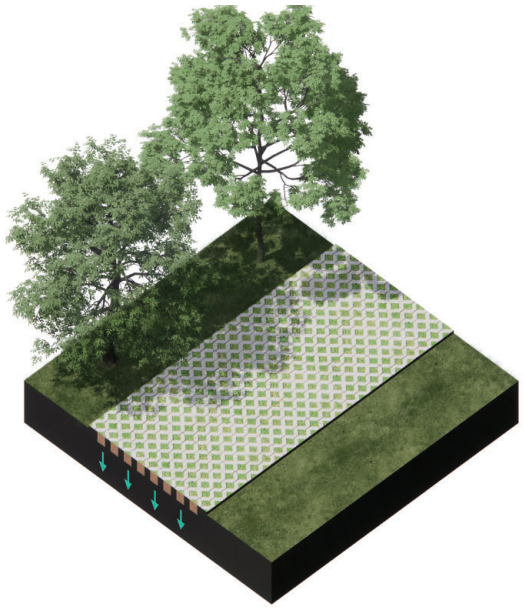
STEPS	LEAD		PARTNERS	FUNDING	METRICS
	CITY	NEIGHBORHOOD			
1 Conduct neighborhood-wide assessment to determine highest and best use of GSI in the neighborhood **2** Develop urban design standards articulating the best use of GSI **3** Work to adopt guidelines as part of the City's formal platting and permitting process or otherwise informally as "good neighbor" standards by the Super Neighborhood or Civic Club **4** Review and update guidelines every 3-5 years	**HPW**		**Private Developer/ Corporation**	HPW	Higher rate of permeable paving and tree canopy

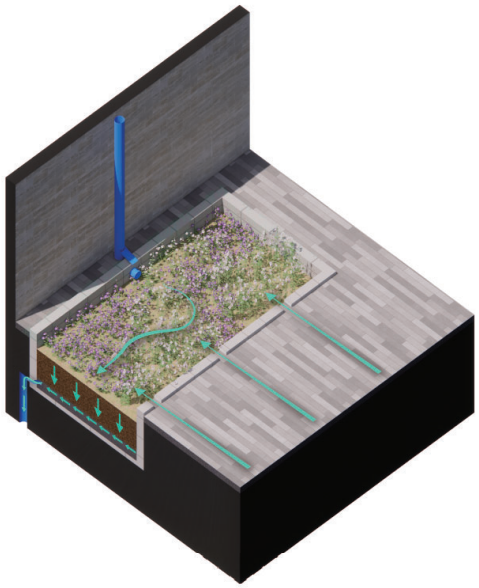
CONTINUE TO IMPROVE NEIGHBORHOOD CLEANLINESS

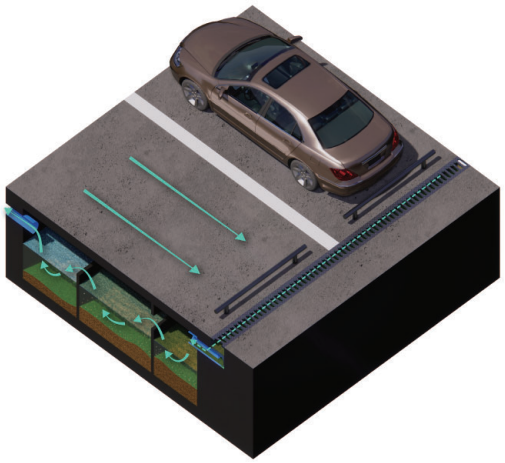
STEPS	LEAD		PARTNERS	FUNDING	METRICS
	CITY	NEIGHBORHOOD			
1 Semi-annually conduct a community-led neighborhood-wide assessment to determine cleanup needs **2** Coordinate with City staff to capitalize on existing City programs (e.g. Adopt-a-Drain, Adopt-an-Esplanade, Adopt-a-Block, Adopt-a-Container) **3** Organize neighborhood cleanups and beautification events **4** Create an outreach campaign that includes how to report illegal dumping to 311, that distributes 'Trash Facts' within the community on disposal options	**SWMD,** HPW, HPARD		**PD,** DON, 311, Keep Houston Beautiful	SWMD - TIRZ, Management District, SWMD, Illegal Dumping Penalty Fees, Philanthropy	Percent increase in neighborhood tree canopy; linear feet of shading provided along pedestrian corridors; # of bus stops and shelters shaded;

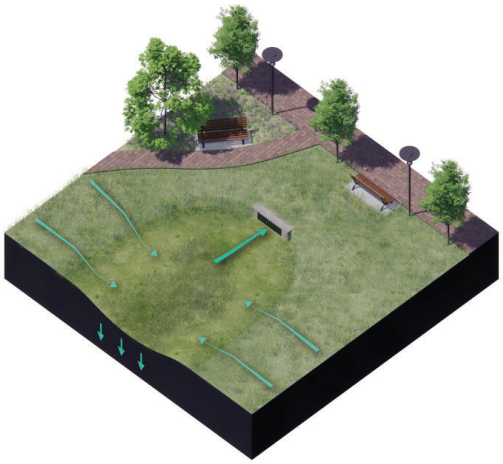
GREEN STORMWATER INFRASTRUCTURE

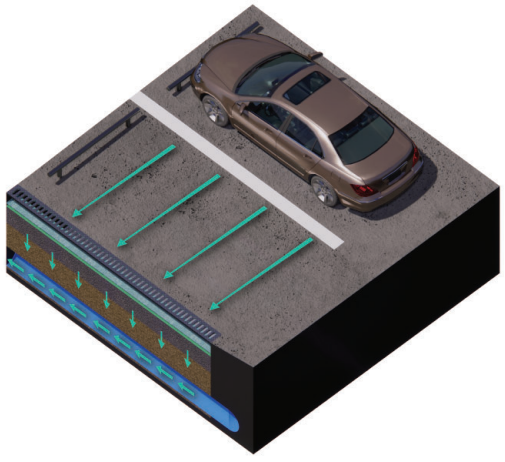
Figure 69

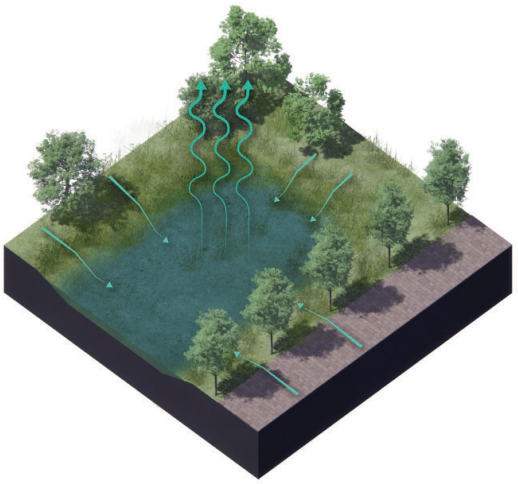












GREEN STORMWATER INFRASTRUCTURE

Green Stormwater Infrastructure (GSI) has many advantages. It can beautify the neighborhood, reduce nuisance flooding, slow stormwater runoff, improve air and water quality, provide cooling through vegetative shading and evapotranspiration, increase biodiversity, as well as provide recreational opportunities, and calm traffic.

It is also considered more cost effective to construct, easier to adapt to changing conditions (which helps in the era of a rapidly changing climate) and provides green local jobs for maintenance. In Houston, however, GSI is difficult to implement due to funding available. The city has a separated sewer system, in which stormwater does not mix with wastewater. A separated system such is regulated differently from combined systems, means separate funding is allocated to each system making it more difficult to set aside funds for GSI as a stormwater drainage solution. With the scope of the stormwater improvements needed in the neighborhood to address fluvial flooding events GSI is rarely a cost effective or otherwise a total solution to mitigate fluvial flooding. Given the way that the water system is structured in Houston, and the scope of flood risk in the neighborhood, the city has no established way to fund, build, operate and maintain it without significant outside investment in both the upfront installation costs and the ongoing maintenance costs.

Establish and maintain GSI Best Practices

Regardless of the challenges of implementing GSI in Houston, Resilient Houston states GSI as both a goal and target for city-wide resilience, and it is the task of the neighborhood resilience planning process to realize the vision of Resilient Houston. At the neighborhood level in East Houston, it is proposed to implement development best practices for designing and implementing GSI in Houston in order to foster implementation of green stormwater infrastructure (GSI) in the neighborhood. Once best practices have been established, creating demonstration installations in the neighborhood of bioretention planters, rain gardens, and other features. The new Robin's Landing development may be an opportunity to do so.

ESTALISH AND MAINTAIN GSI BEST PRACTICES

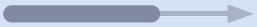
Create GSI best practices for East Houston to showcase and demonstrate best practices for the use of GSI on private property to increase awareness of how GSI as a resilence tool and provide education on how to install GSI for DIY-ers.

Benefits

Equity; flood risk reduction; public health; microclimate regulation; ecological health

Timeline

Near-term (3-5 years)



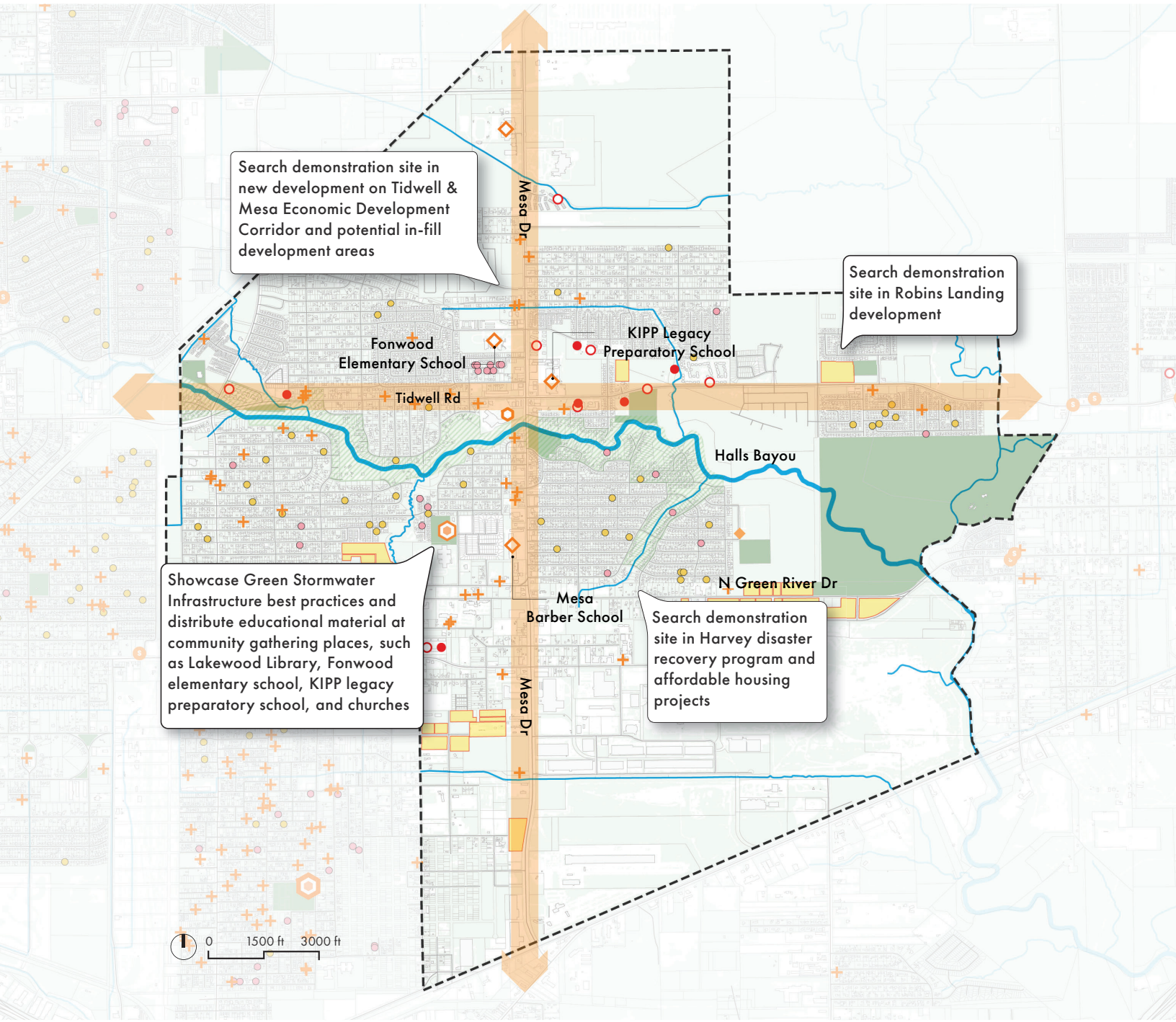
Guiding Principles

Safe in the Neighborhood

Resilience Houston Targets

GOAL 6 GOAL 10 GOAL 11 GOAL 12

Figure 70: Potential Locations of GSI Best Practices



LEGEND

HOUSING RESILIENCE

- POTENTIAL IN-FILL DEVELOPMENT AREAS
- NHPD ASSISTED HOUSING
- AFFORDABLE HOUSING

HARVEY DISASTER RECOVERY (DR-17)

- HOMEBUYER ASSISTANCE PROGRAM (HBAP) COMPLETED PROJECTS (MARCH 2022)
- HOMEOWNER ASSISTANCE PROGRAM (HOAP) COMPLETED PROJECTS (MARCH 2022)

EXISTING COMMUNITY ASSETS

- SCHOOLS
- COMMUNITY CENTERS
- HOSPITALS
- CHURCHES

GREEN STORMWATER INFRASTRUCTURE
ACTIONS

Create and Disseminate Educational Material on GSI Best Practices

Once best practices have been established, sharing the practices information with the community to increase awareness and develop local knowledge on how and why to install GSI is recommended. Creating programs around demonstration gardens, providing signage for self-guided tours, and other hands-on materials for the community to self-educate about what GSI is and how it best works in their neighborhood is recommended.

CREATE AND DISSEMINATE EDUCATIONAL MATERIALS ON GSI

Create GSI educational material to showcase and demonstrate best practices for the use of GSI in Houston on for homeowners and business owners to increase awareness of how GSI as a resilence tool and provide education on how to install GSI for DIY-ers

Benefits

Equity; adaptive capacity, flood risk reduction; public health; microclimate regulation; ecological health

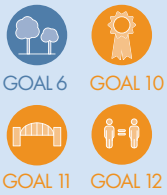
Timeline

Short-term (1-2 years)

Guiding Principles

Safe in the Neighborhood

Resilience Houston Targets



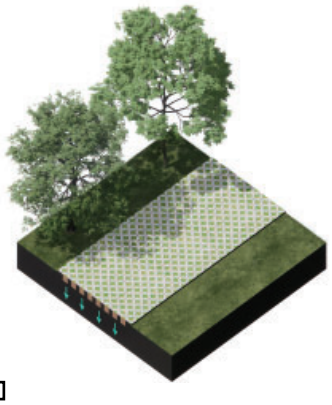
ESTALISH AND MAINTAIN GSI BEST PRACTICES

STEPS	LEAD		PARTNERS	FUNDING	METRICS
	CITY	NEIGHBORHOOD			
1 Find demonstration site, such as Robins Landing development **2** Work with private partner to design and implement demonstration, and support ongoing biannual maintenance requirement **3** Identify CBO to host educational events and activities	**HPW**	**East Houston Civic Club**	**Private Developer/ Corporation**	TBD	Higher rate of permeable paving and tree canopy

CREATE AND DISSEMINATE EDUCATIONAL GSI MATERIALS

STEPS	LEAD		PARTNERS	FUNDING	METRICS
	CITY	NEIGHBORHOOD			
1 Work with private partner to develop GSI best practices for Houston **2** Create educational programs, materials, and other actitivites to disseminate best practices thorugh the community **3** Identify CBO to host educational events and activities	**HPW**	**East Houston Civic Club**	**PD, DON, Private Developer/ Corporation**	TBD	# of individuals + businesses reached

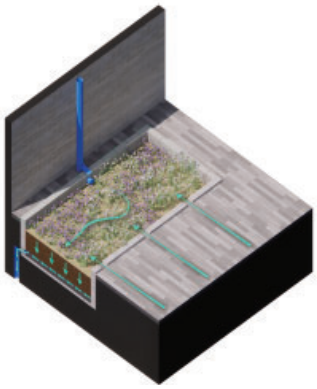
GREEN STORMWATER INFRASTRUCTURE



■□

PERMEABLE PAVERS / SURFACES

A permeable paver system is a pavement surface composed of structural units with void areas that are filled with pervious materials such as gravel, sand, or grass turf. The system is installed over a gravel base course that provides structural support and stores stormwater runoff that infiltrates through the system into underlying permeable soils.



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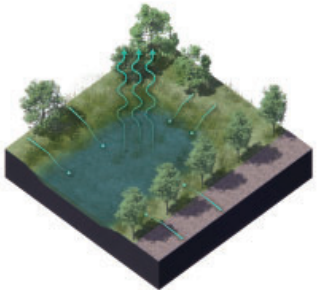
FLOW-THROUGH PLANTERS

Flow-through planters are structures placed above ground with impervious bottoms that are filled with soil and vegetation which allow stormwater to infiltrate through the soil before being discharged. The bottom of a planter contains a porous pipe that drains the stormwater after it has filtered through the soil and vegetation. Planters are typically installed next to buildings or common open areas to treat stormwater from rooftops.



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STORMWATER POND

Stormwater ponds are constructed stormwater retention basins that have a permanent pool (or micropool) of water. Some runoff reduction is achieved within a stormwater pond or detention system through evaporation and transpiration. Stormwater ponds provide water quality treatment through sediment precipitation in the permanent pool.

■□

BIORETENTION

Bioretention areas are shallow stormwater basins or landscaped areas that utilize engineered soils and vegetation to capture and treat stormwater runoff. Bioretention areas may be designed with an underdrain that returns runoff to the conveyance system or designed without an underdrain to exfiltrate runoff into the soil.

Figure 71: Illustrations of GSI on Commercial + Residential Property

□

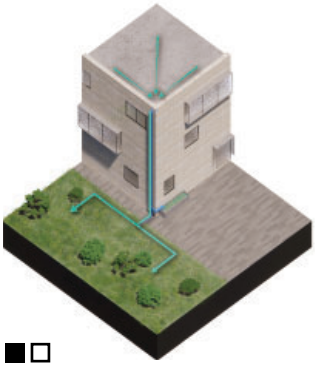
DRY DETENTION POND

A dry detention basin is an impoundment or excavated basin for the short-term detention of stormwater runoff from a completed development that allows a controlled release from the structure at downstream, pre-development flow rates. Conventional dry detention basins typically control peak runoff for 2-year and 10-year 24-hour storms. They are not specifically designed to provide extended dewatering times, wet pools, or groundwater recharge. Sometimes flows can be controlled using an outlet pipe but this approach typically cannot control multiple design storms.

■□

EXTENDED DRY DETENTION POND

Extended dry detention basins are modified conventional dry detention basins, designed to hold stormwater for at least 24 hours to allow solids to settle and to reduce local and downstream flooding. Extended dry detention basins may be designed with either a fixed or adjustable outflow device. Pretreatment is a fundamental design component of an extended dry detention basin to reduce the potential for clogging. Other components such as a micropool or shallow marsh may be added to enhance pollutant removal.



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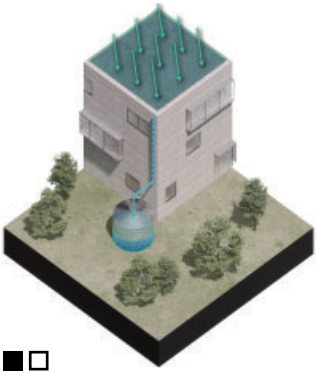
DOWNSPOUT DISCONNECT

A downspout disconnect spreads rooftop runoff from individual downspouts across lawns, vegetated areas, and other pervious areas, where the runoff is slowed, filtered, and can infiltrate into the native soils



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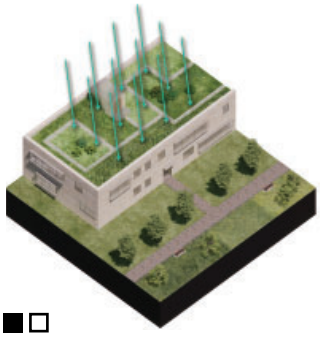
RAINWATER HARVESTING

Rainwater harvesting is a common stormwater management practice used to catch rainfall and store it for later use. Typically, gutters and downspout systems are used to collect the water from roof tops and direct it to a storage tank. Once captured in the storage tank, the water may be used for non-potable indoor (requires treatment) and outdoor uses.



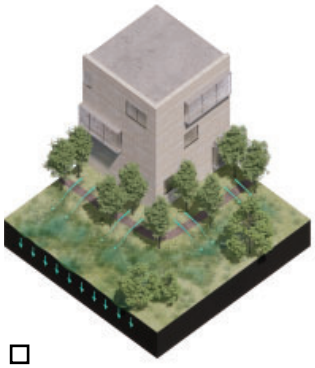
■□

GREEN ROOF

Green roofs represent an alternative to traditional impervious roof surfaces and typically consist of underlying waterproofing, drainage systems, and an engineered planting media where stormwater runoff is captured and temporarily stored. There are two different types of green roof systems. Intensive green roofs have a thick layer of soi. Extensive green roofs have a much thinner layer of soil that is comprised primarily of drought tolerant vegetation.

■ RESIDENTIAL GSI TOOLKIT

□ COMMERCIAL GSI TOOLKIT



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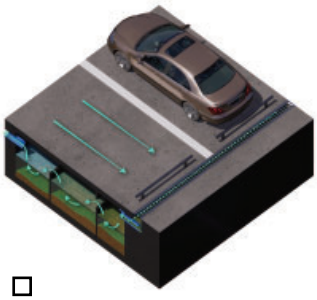
POCKET STORMWATER WETLAND

A pocket wetland is used to capture and treat a specific volume of stormwater runoff. This structure is a shallow wetland with a permanent pool and wetland species added to the bottom to enhance the pollutant removal capability. For this BMP, a high groundwater table is used to maintain the shallow pool and wetland vegetation.



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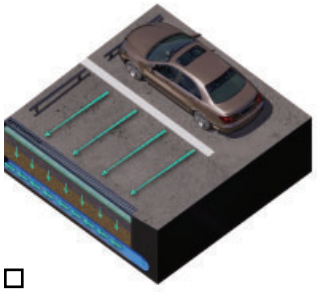
OIL / GRIT SEPARATOR

Oil / grit separators are hydrodynamic controls that use the movement of stormwater runoff through a specially-designed structure to remove target pollutants. They are typically used on smaller, impervious, commercial sites and urban hotspots.



□

UNDERGROUND FILTER

Underground sand filters are concrete structures designed to store and filter rainwater through sand to remove pollutants collected from rooftops, sidewalks, and roads. Water first filters through an oil/grit trap to remove heavy debris, and then flows through layers of sand and gravel before being released through a pipe into local streams or storm drain system.

□

POCKET POND

A pocket pond is characterized by a small drainage area; the water level is sustained by groundwater during dry weather.

2000 TREES ON MESA

2000 TREES ON MESA

Mesa Drive is a primary north-south central commercial and transportation corridor that is centrally located running north-south through the neighborhood. Fronting onto the corridor is a neighborhood school to the north, area grocery and other neighborhood serving retail around the Tidwell-Mesa intersection, and connections to the manufacturing and industrial sites to the south. Although a key artery in the neighborhood, it suffers from aging street infrastructure, a vehicle-centric design unsafe for other modal types, low-density commercial building pattern, and limited neighborhood services.

Mesa Drive floods frequently, has minimal provisions for multimodal mobility including disconnected sidewalks, and is minimally furnished in terms of street lighting, furniture, trash receptacles, vegetation, and other urban design features. The community has been vocal about traffic safety along the corridor, particularly at the Tidwell intersection, and regarding the heavy flow of industrial diesel freight trucks that emit pollutants. As a heat sink with high rates of asphalt roads and surface parking, concrete for sidewalks and other landscape features, dark building rooftops, and low density of trees and shrubs. Such impermeable surfaces result in higher rates of heat absorption and heat retention. This is compounded by low canopy density limiting heat absorption as well as evapotranspiration. The corridor has a number of national corporate businesses, such as the Dollar Store and Valero. Community members reported concerns that some property owners do not invest in or maintain a poorer overall neighborhood appearance. However, with improvements, Mesa Drive has great potential to become a key service and amenities corridor for the community. Community members have expressed a real desire to see new functions here, from a bank and a UPS store, to a pharmacy or a food store.

Expanding tree canopy

Expanding the tree canopy in the neighborhood would help mitigate the urban heat island effect by providing shade and increasing vegetative cooling. Trees do not absorb and retain heat at the rates of concrete and asphalt, are generally effective shaders, and also consume (heat) energy in order to carry out their primary activity: evapotranspiration. Other benefits of expanding the tree canopy include reduction of air pollution, improved water infiltration and water quality, reduction of stormwater runoff, and generally beautification. Specifically, planting trees along Mesa Drive, and potentially John Ralston Road, is a multi-benefit solution that allows community members to more safely use sidewalks to access local retail and transportation services, particularly when temperatures are high.

Initial studies of Mesa Drive show that the amount of public right-of-way is limited because of the narrow shoulders of the road. Tree planting in Segment A (northern portion of Mesa Drive) is prioritized due to its proximity to neighborhood-serving commercial retailers, bus stops, and residential areas. Segment B (southern portion of Mesa Drive) benefits

CONTINUE TO EXPAND TREE CANOPY

Plant trees to increase beautification, reduce heat stress and improve energy security through microclimate regulation, reduce air pollution, increase water infiltration, and reduce and run-off, particularly along Mesa Drive

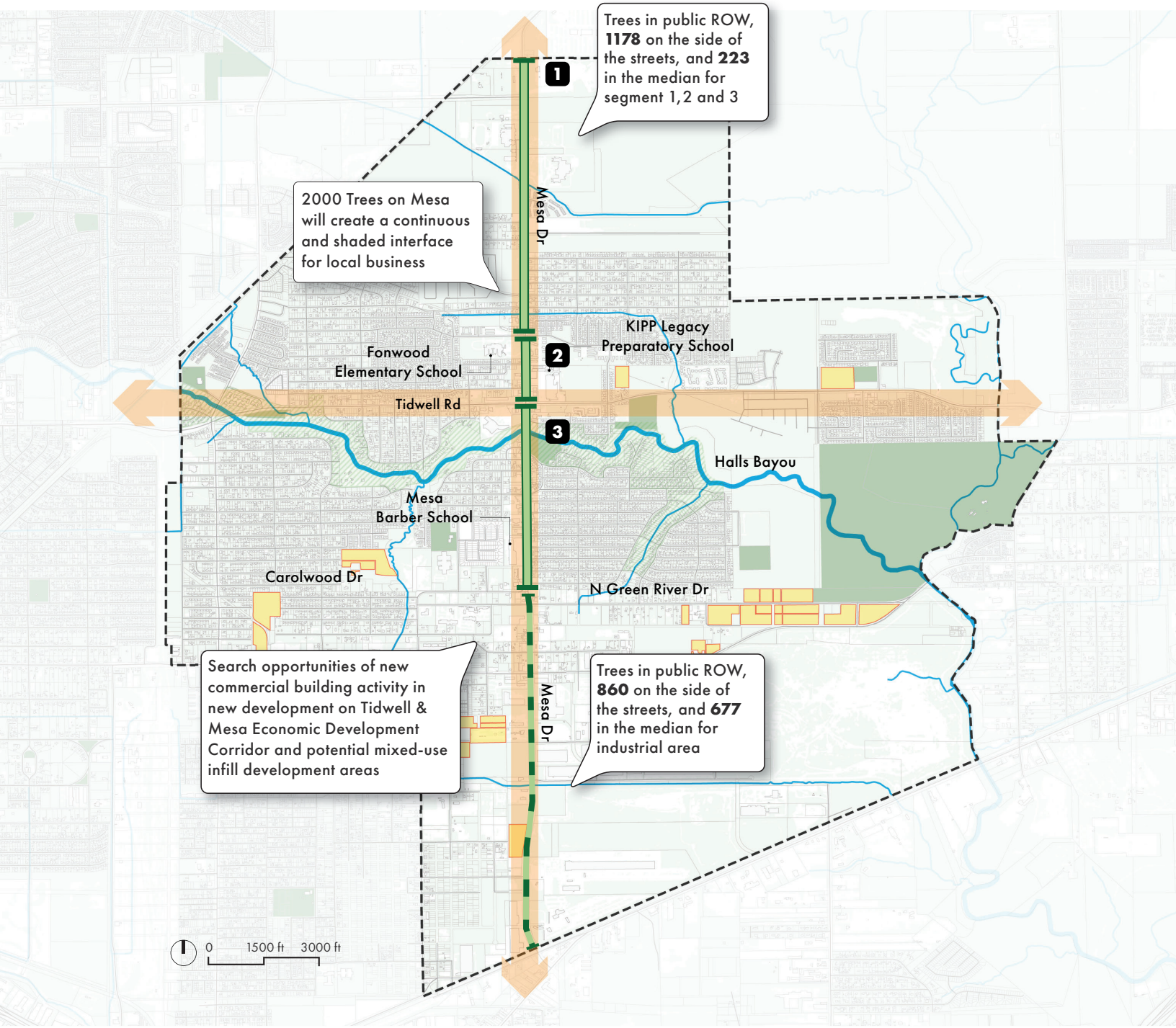
Benefits Equity; flood risk reduction; public health; microclimate regulation; ecological health

Timeline Near-term (3-5 years)

Guiding Principles Connected Community

Resilience Houston Targets GOAL 6, GOAL 10, GOAL 11, GOAL 12, GOAL 15

Figure 73: Location of "2000 Trees" on Mesa



LEGEND

ECONOMIC DEVELOPMENT

POTENTIAL IN-FILL DEVELOPMENT AREAS

TIDEWELL & MESA ECONOMIC DEVELOPMENT CORRIDOR

2000 TREES ON MESA

from tree planting primarily for cooling, pollution and traffic calming, but since it is surrounded by industrial uses would have a lesser impact on the day-to-day lives of community members. Both segments would nevertheless benefit. To plant the proposed trees, some reconfiguration of the existing street layout may be necessary, including the widening of shoulders and introducing a turning lane would allow for more robust trees and improved sidewalks. Such a street reconfiguration would contribute to the traffic calming that the trees themselves bring, and support the work of the City's Complete Communities program. When developing further plans, bus stops in the shade and other mobility measures should be included. In order to plant the right trees that will provide a sustainable canopy, an assessment should be done to evaluate species relevant to Houston's changing climate, groundwater, growing times, expected maintenance, and the available planting areas (taking, for instance, into account underground infrastructure).

New commercial building activity

East Houston was primarily developed with a low-density building pattern characterized by large single-story commercial retail buildings (ranging from approximately 20,000-100,000 square feet of tenant space wrapped by ample street-facing surface parking. To diversify the business activity and support local businesses, a shift in the way buildings are divided into tenants spaces and their relationship to the road and sidewalk would benefit from better urban design. Smaller tenant spaces would allow for correspondingly smaller, local businesses to operate. Similarly, consideration for upper story office uses would allow for new commercial uses not currently a strong presence in the neighborhood. Adjusting the site planning requirements, such as the building setback from the street such that the building is in closest proximity to the street, uses the building to screen the parking lot and provides the possibility of walk-up retail and office spaces for pedestrians and bicyclists. The large amounts of parking and roadways on private land should be included in the planning. By bringing businesses and institutions into the project and giving them the tools to improve their lots by adding trees and lighting, and improving the safety and ease of the circulation, they will contribute to the overall success of the neighborhood and will individually benefit from increased economic activities on their properties. If diversification of the commercial uses occurs, particularly along Mesa Drive, and the site planning shifts to support pedestrian and bicyclist as a transportation option, the physical conditions for development of the local economy would be achieved.

SUPPORT NEW COMMERCIAL BUILDING ACTIVITY

Review and update applicable City platting and permitting requirements to incentivize and encourage mixed-use infill development to enhance local services and job opportunities in the neighborhood, particularly along the Mesa Drive commercial corridor

Benefits Equity; adaptive capacity; public health

Timeline Short-term (1-2 years)

Guiding Principles Connected Community

Resilience Houston Targets GOAL 14

Figure 74: Continuous and shaded sidewalks with public space will benefit the surrounding businesses

"By focusing on planting trees and vegetation in areas with minimal green space and improving shade in areas without it, Houston can also address environmental injustice and improve neighborhood equity."
(Resilient Houston, page 80)

2000 TREES ON MESA

ACTIONS

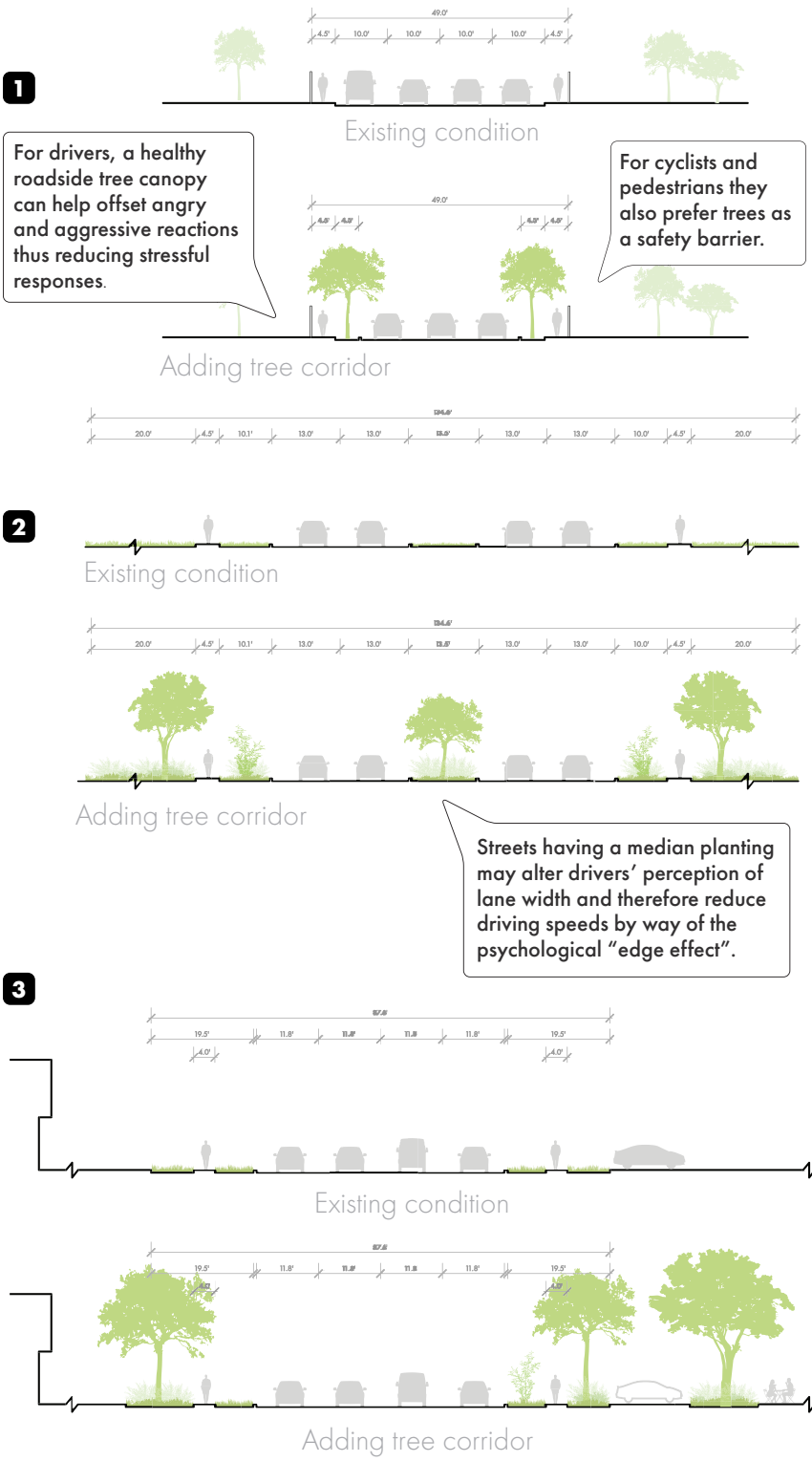


Figure 75: Street sections at three points along Mesa Drive depicting existing and proposeed conditions.

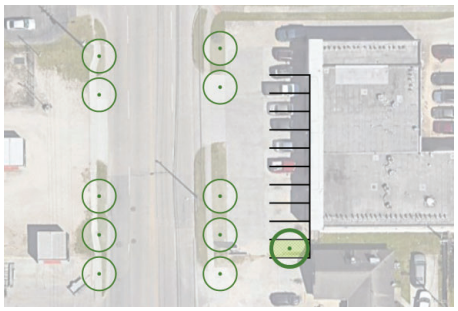


Figure 76: Parking lot site plan with 10% landscape requirement.

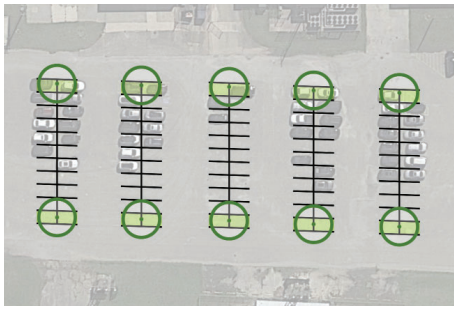


Figure 77: Parking lot site plan with 10% landscape requirement.

There are three types of land use adjacent to Mesa proposed with street trees. For the school area, sidewalks are with limited width and without shading, therefore space in the right-of-way is being explored to plant canopy trees. Along the commercial area, tree alley is being considered to provide shading for commercial activities and parking space and calm the traffic. In the industrial area, the proposed street trees will contribute to air quality improvement and a greener and less polluted working space.

EXPAND TREE CANOPY

STEPS	LEAD		PARTNERS	FUNDING	METRICS
	CITY	NEIGHBORHOOD			
1 Conduct feasibility study to determine optimal planting plan for increasing tree canopy in tandem with optimal street design **2** Conduct community preference survey on the expansion of the tree canopy and street design options using the city's approved tree and shrub list **3** Coordinate community-led tree planting **4** Work with private partner to implement street design improvements	**PD**		**HPW,** Trees for Houston, Houston Wilderness, METRO, Private Developer/ Corporation	PD, COH General Fund, Stormwater Utility Fee	Percent increase in neighborhood tree canopy; linear feet of shading provided along pedestrian corridors; # of bus stops and shelters shaded

SUPPORT NEW COMMERCIAL BUILDING ACTIVITY

STEPS	LEAD		PARTNERS	FUNDING	METRICS
	CITY	NEIGHBORHOOD			
1 Conduct neighborhood-wide market assessment to determine which type of commercial activity can be best sustained and at which locations, and use this to identify market goals **2** Assess locations current platting and permitting requirements for whether commercial use and building pattern is permitted **3** Revise platting and permitting requirements to align with market goals	**OED**		**Private Developer/ Corporation**	TBD	# of commercial building permits pulled; # of commercial (non-residential) plat

EXPAND CAPACITY OF HALLS + GREENS BAYOUS

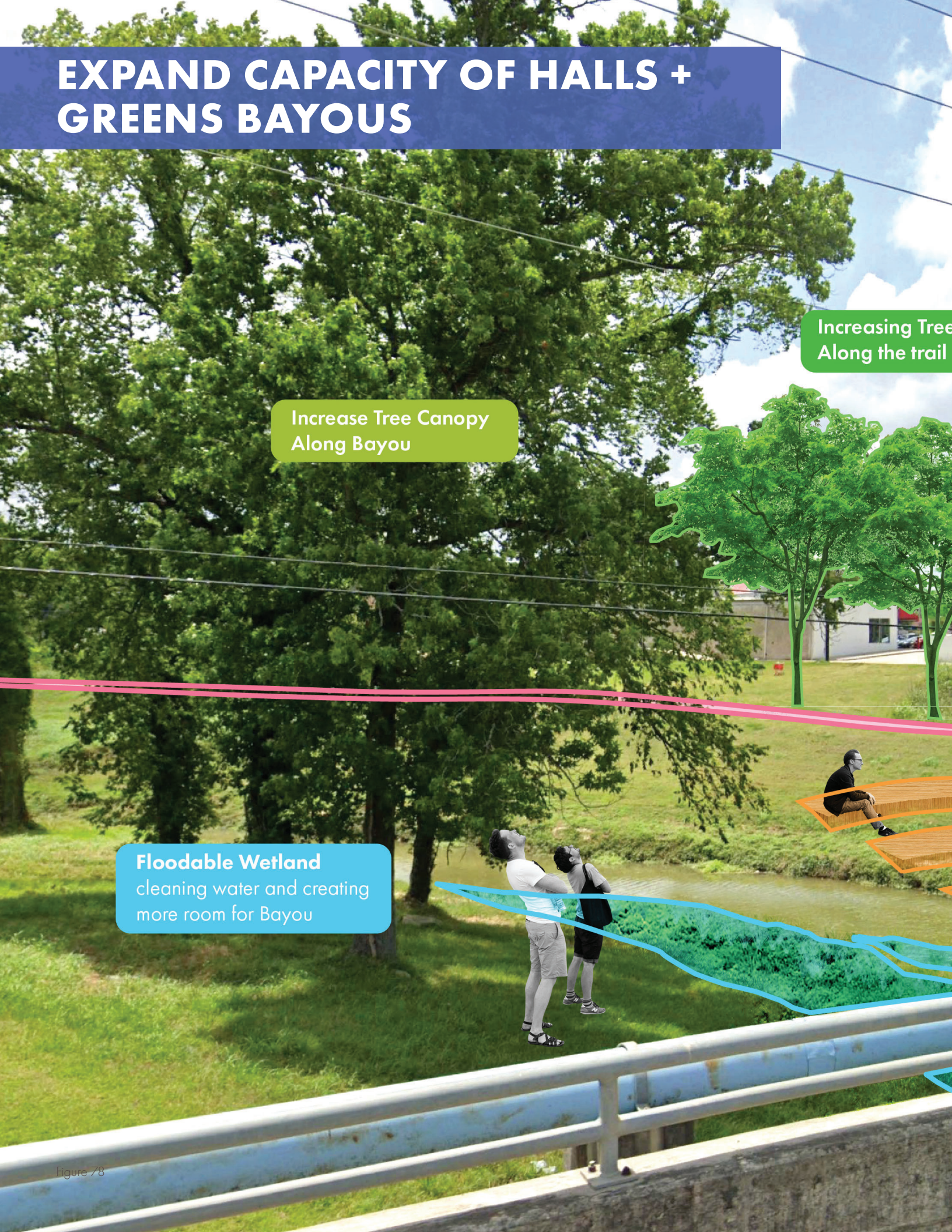
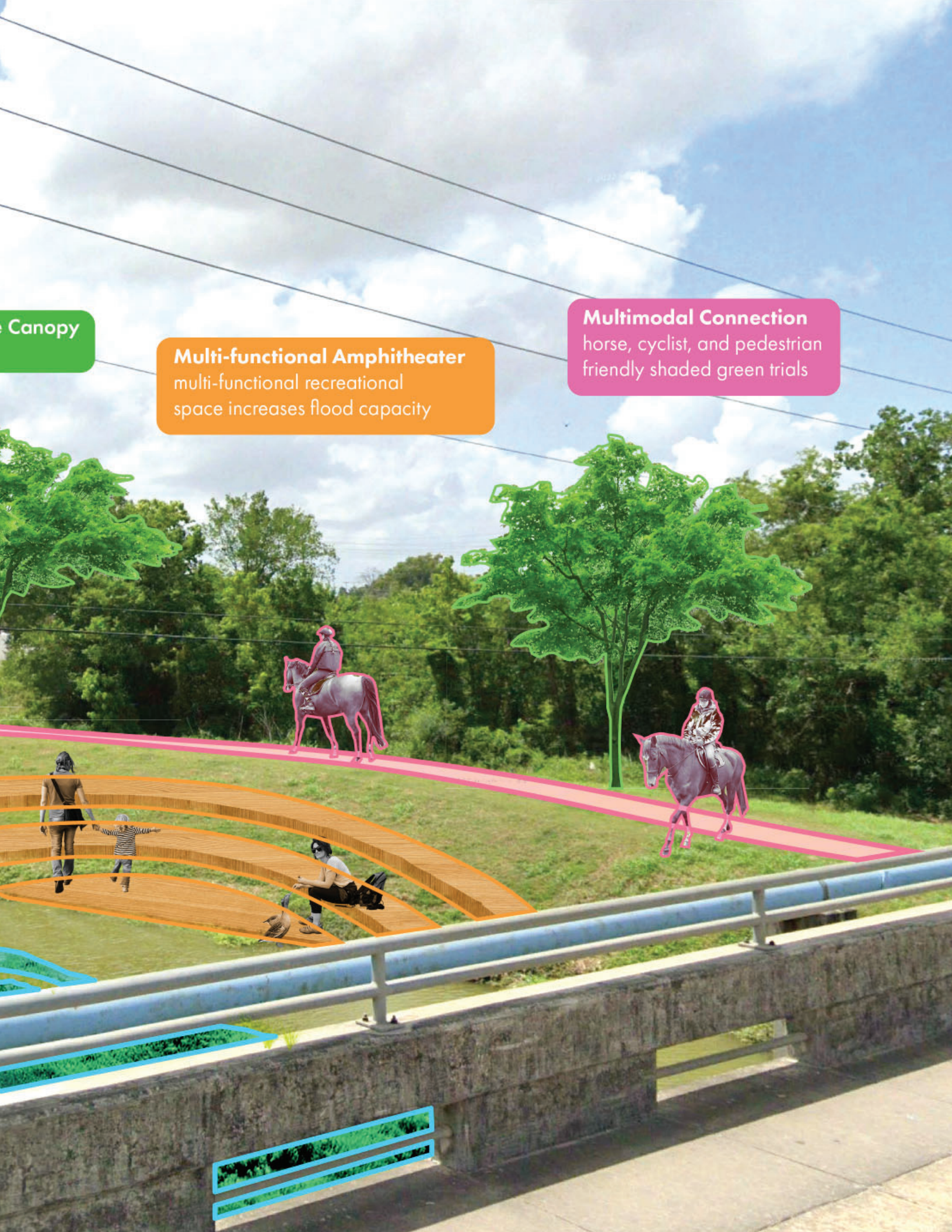


Figure 78


e Canopy
Multi-functional Amphitheater
multi-functional recreational
space increases flood capacity
Multimodal Connection
horse, cyclist, and pedestrian
friendly shaded green trials

EXPAND CAPACITY OF HALLS + GREENS BAYOUS

Perhaps the greatest assets of the East Houston neighborhood are the bayous and undeveloped lands that surround them. Halls Bayou cuts through the neighborhood running east-west and Greens Bayou runs north-south along the eastern edge of the neighborhood. There is generous land area along the bayous' banks that remains undeveloped, and the bayous generally have not suffered from development encroachment. Given their relatively untouched state, they are in prime condition for investments that would harness them as natural flood management tools, expand their role as ecological greenways that provide the full gambit of ecosystem services, and create a car-free pedestrian and bicyclist transportation artery complimented by a host of other public amenities.

The project will serve three main functions:

Flood Management

The expansion and rehabilitation of the Bayou harnesses naturally occurring systems to reduce flood risk. Flood risk is reduced by increasing the bayous' detention capacity, slowing the rate of water flow so that downstream floodwaters are reduced, and increasing the rate of water absorption to also slow the rate of water flow as well as provide more areas for the water to go. While the bayous already play a role in mitigating the effects of neighborhood flooding, this work would increase the role they play in providing a safe place for stormwater to go.

Key in the realization of any bayou project in the City of Houston is the coordination and collaboration with the Harris County Flood Control District (HCFCD). HCFCD currently has planned efforts to improve water flow along the bayous in East Houston, funded by a 2018 bond initiative (C-25 Halls Bayou Tributary P118-21-00 and related Stormwater Detention). In the short term, urgent improvements are sought around ditch P118. Their long-term plan is to reduce flood risk in the Hall's Bayou watershed by correcting erosion along the banks to redirect water flow, and remove sediment build up to allow improved water flow. Beyond the currently planned HCFCD projects, this plan recommends seeking to further expand the detention capacity of the bayous through channel modifications that would both widen and deepen the current bayous by working with private partners. This effort would also seek to remediate soil and water quality due to debris build up and industrial contamination from the heavy industrial operations in the neighborhood.

Greenway

The improvement of the bayous as a flood management tool is also an opportunity to conserve a significant amount of green space in the City, create a greenway park, and extend the growing network of greenways along Houston's bayous across the city. Already described in earlier planning efforts, such as the Greater Houston Flood Mitigation Consortium's East Houston Resiliency Plan, designating and enhancing a greenway along the bayous will significantly improve the ecological health, provide a cooling effect in the area, and offer pollution mitigation through air filtration and

EXPAND FLOODWATER CAPACITY AND EXPAND CITY'S GREENWAY NETWORK ALONG BAYOUS

Harness Halls and Greens Bayous as a flood management tool, greenway, and multiuse path to reduce flood risk, improve ecological health and natural cooling, and provide multimodal connection through the neighborhood

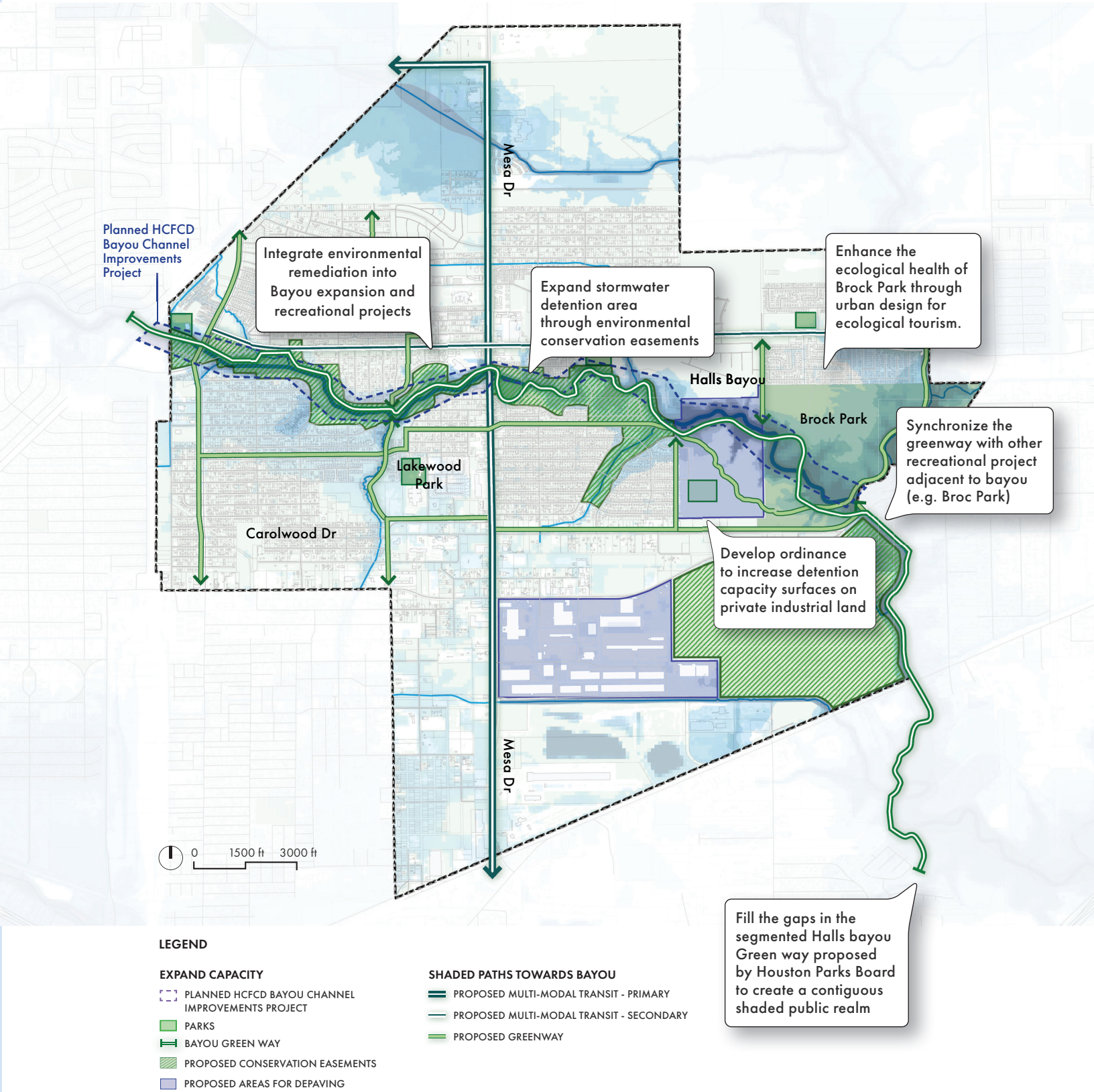
Benefits Equity; flood risk reduction; public health; microclimate regulation; ecological health

Timeline Long-term (6+ years)

Guiding Principles Safe in the Neighborhood

Resilience Houston Targets GOAL 3, GOAL 6, GOAL 9, GOAL 10, GOAL 11, GOAL 12, GOAL 16, GOAL 18

Figure 79: Location of expansion capacity of Halls + Greens Bayous



EXPAND CAPACITY OF HALLS + GREENS BAYOUS

ACTIONS

phytoremediation, and floating wetlands. Many of the lands adjacent to the Bayou have been polluted through heavy industrial activity. Environmental remediation of the soil in the bayous is an integrated part of the project that will reduce the environmental impacts of soil pollution.

The greenway component of this project is an opportunity to provide an arterial multi use path that would provide multimodal transportation options, or make walking and biking around the neighborhood a viable transportation mode. By increasing lighting and smart urban design, the safety of these recreational spaces can be improved. It would also conserve and increase the green spaces in the neighborhood. This is important for biodiversity. The increased area devoted to vegetation has secondary benefits of cooling and cleaning. The plants cool by providing shade and consuming energy (heat) in the evapotranspiration process thereby reducing temperatures in the area. Additionally, trees and shrubs are effective at removing certain particulate pollutants from the air, including particulates from roadway pollution. It should be explored how the bayous can be designed to optimize the ecosystem benefits at specific locations. For example, where the bayous abut heavy industrial sites, additional berms and other landscape buffering can be provided to reduce the impact on nearby residential properties.

"Improved natural features and functions of our bayous—restoring the native flora and fauna and making room for water—can make them do even more for us. A nature-based approach can not only further reduce flood risk but also improve air and water quality, mitigate urban heat, restore habitats, and provide opportunities for recreation."
(Resilient Houston, page 96)

Multimodal Connection

The project can benefit from integration with an alternative transportation strategy that would provide multimodal trail connections along the waterway intended for area residents and workers. A system of safe and well-lit walkways along the bayous could connect to arterial roads, such as Mesa Drive and John Ralston Road, the local transit center, and other neighborhood functions that could serve as a significant car-free pedestrian and cyclist corridor. The pathway is not just a modal option, it provides recreational opportunities for walking, running, bicycling, horseback riding, etc. This corridor is ripe for other amenities, such as educational signage about the bayous as a flood tool or the native plants and animals likely to be seen along the pathway. —An integrated project for a bayou park is an additional opportunity to provide recreational opportunities, including sports fields for basketball, baseball, and other sports, located and designed such that the safety in the area is increased. The park would support public health by

Figure 80: A footpath along Bayou creating connections northwest-southeast to existing road connections


Figure 81: Horseback riding trails

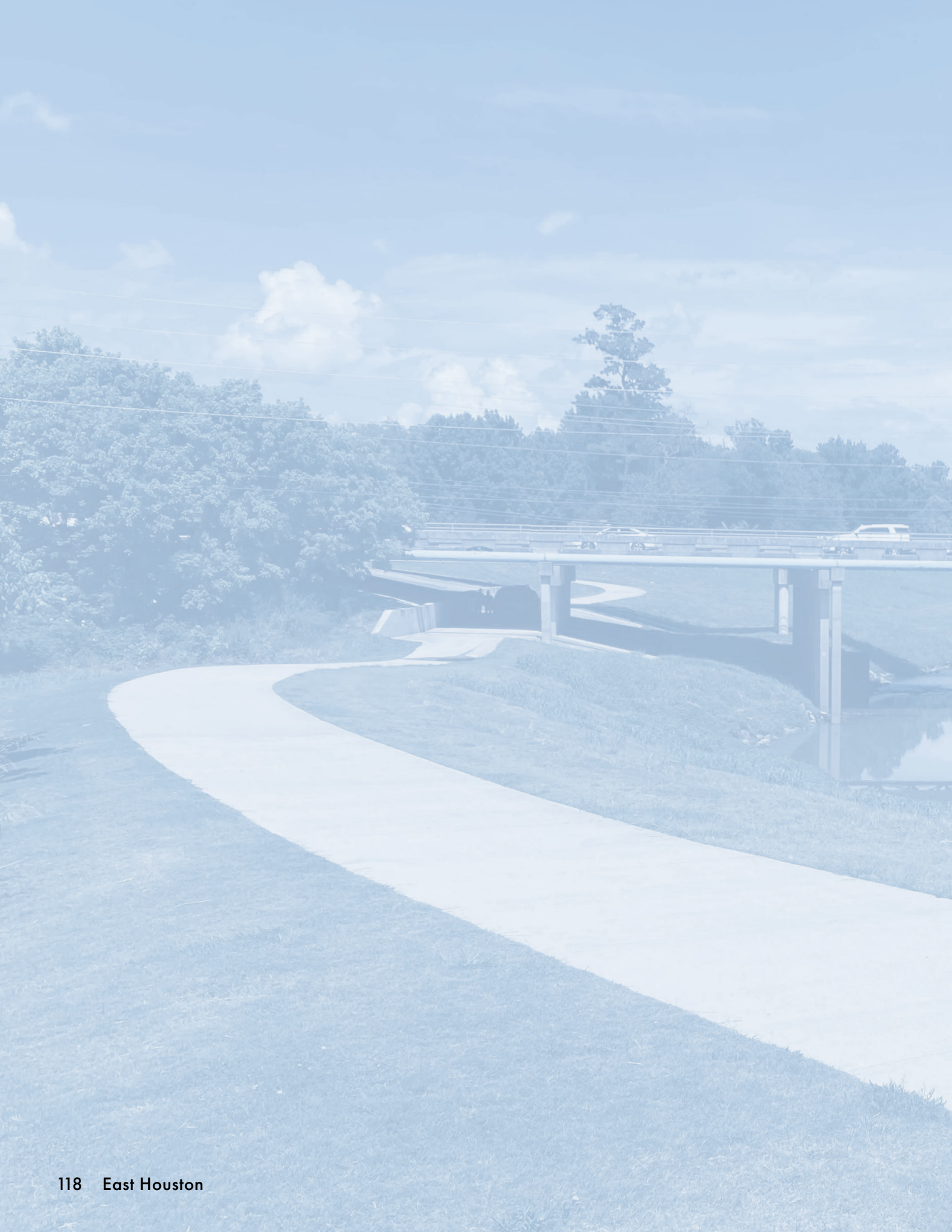
EXPAND FLOODWATER CAPACITY AND GREENWAY NETWORK ALONG BAYOUS

STEPS	LEAD		PARTNERS	FUNDING	METRICS
	CITY	NEIGHBORHOOD			
1 Support ongoing HCFCD project to reduce erosion and remove sediment along Halls Bayou **2** Work with community to submit Citizen's Request Service to HCFCD for the planting of trees along the Bayou **3** Work with private partners to conduct assessment of the bayou for expanded detention capacity for floodwater runoff, design and implement bayou detention expansion and redesign so that Halls and Greens Bayous become part of Houston's growing network of bayou greenways	**HCFCD + HPW**	**East Houston Civic Club**	**Private Developer/ Corporation,** PD, HPRD, SWMD	HCFCD BOND - US-DOT, TXDOT, HCFCD, PRN, FEMA HAZARD MITIGATION GRANTS, HUD CDBG-DR, HUD CDBGMIT, USACE, HCFCD PARTNERSHIP FUNDING, GENERAL REVENUE, STORMWATER UTILITY FEES, HCFCD BOND	FEMA flood mapping update removes areas of the neighborhood from floodplain; Purple air quality measures improvements; Water quality improves; HVI is reduced

providing safe family-friendly and free recreational activities, it could become an important neighborhood asset as a community gathering space, and could further reduce flood risk if designed to detain additional stormwater.

"All of the elements of a resilient city come together along our bayous: flood risk reduction and climate adaptation measures meet healthy ecosystems and healthy communities; safe and high quality trails provide new ways to get around the city and drive economic development; arts and cultural practices lift up the Bayou City identity; and neighborhood connections to and along our bayous provide equitable access to these amenities."
(Resilient Houston, page 104)

The bayous project as a whole should be planned in an integrated way to optimize and maximize the benefits and include East Houston's community input. While it will be realized in incremental steps over a long period of time, the planning process should start soon so that it builds on current efforts. As with any long-term plan, updates will need to be made at a later stage to incorporate new insights and developments. Having a strong plan in place soon will ascertain that Halls and Greens Bayous will be a driver and an anchor of the



NEXT STEPS & IMPLEMENTATION

NEXT STEPS & IMPLEMENTATION

With any plan, the planning work continues past plan adoption. Ongoing work is carried out—by both the community and the City—to implement the City-committed projects, and work toward realizing the aspirational projects proposed in this document.

Funding + Adoption

Once a plan is adopted, the work really begins to allocate existing funds, and secure additional funds to execute the projects and programs included in the plan. Departmental budgets, the capital improvements plan, and other sources internal to the city have been tentatively identified for "city committed" projects. Additional funding is necessary to implement "aspirational" projects. The Funding Matrix, a living document attached as an addendum to this document, outlines a number of external funding sources as well as a number of funding mechanisms, like development impact fees, TIRZ and management districts. And while city staff are a critical part in securing funding, this plan has been written to support the community and its leaders in seeking out funding for projects and programs in their neighborhoods as well.

Monitoring + Evaluation

The metrics established are designed to assess each of the plan's projects efficacy in achieving the East Houston neighborhood's vision for resilience, or what is also known as monitoring and evaluation.

The purpose of metrics is to tell us whether the projects and programs to improve neighborhood resiliency are working as intended. If the metrics show that progress is slower than desired or that the project is not as impactful as intended, there is an opportunity to change course and make the necessary adjustments to calibrate the projects and programs so that they will better and more quickly realize East Houston's vision for neighborhood resilience.

Generally there are two types of metrics, those that track progress torward a goal or objective, and those that measure outcomes and performance of a strategy or action. For East Houston, the plan's success is tracked according to the following metrics:

- # of art pieces installed in neighborhood
- # of individuals + businesses reached
- # of structures weatherized and/or removed from floodplain; # of individuals reached through educational outreach; # of neighborhood residents trained and employed
- # of residents within 1000 feet of resilience hub; # of resilience hubs secured from stressors and shocks (e.g. floodproofed); # of resilience hubs providing programming and other services
- percent increase in neighborhood tree canopy; linear feet of shading provided; # of bus stops and shelters shaded; economic improvements
- # of improvement projects constructed and or programmed, $ spent on improvements
- # of receptacles, # of solid waste-related complaints
- # of people reached with educational materials; # of DIY rain gardens constructed
- # of improvements, miles of improvements, $ spent and/or obligated.

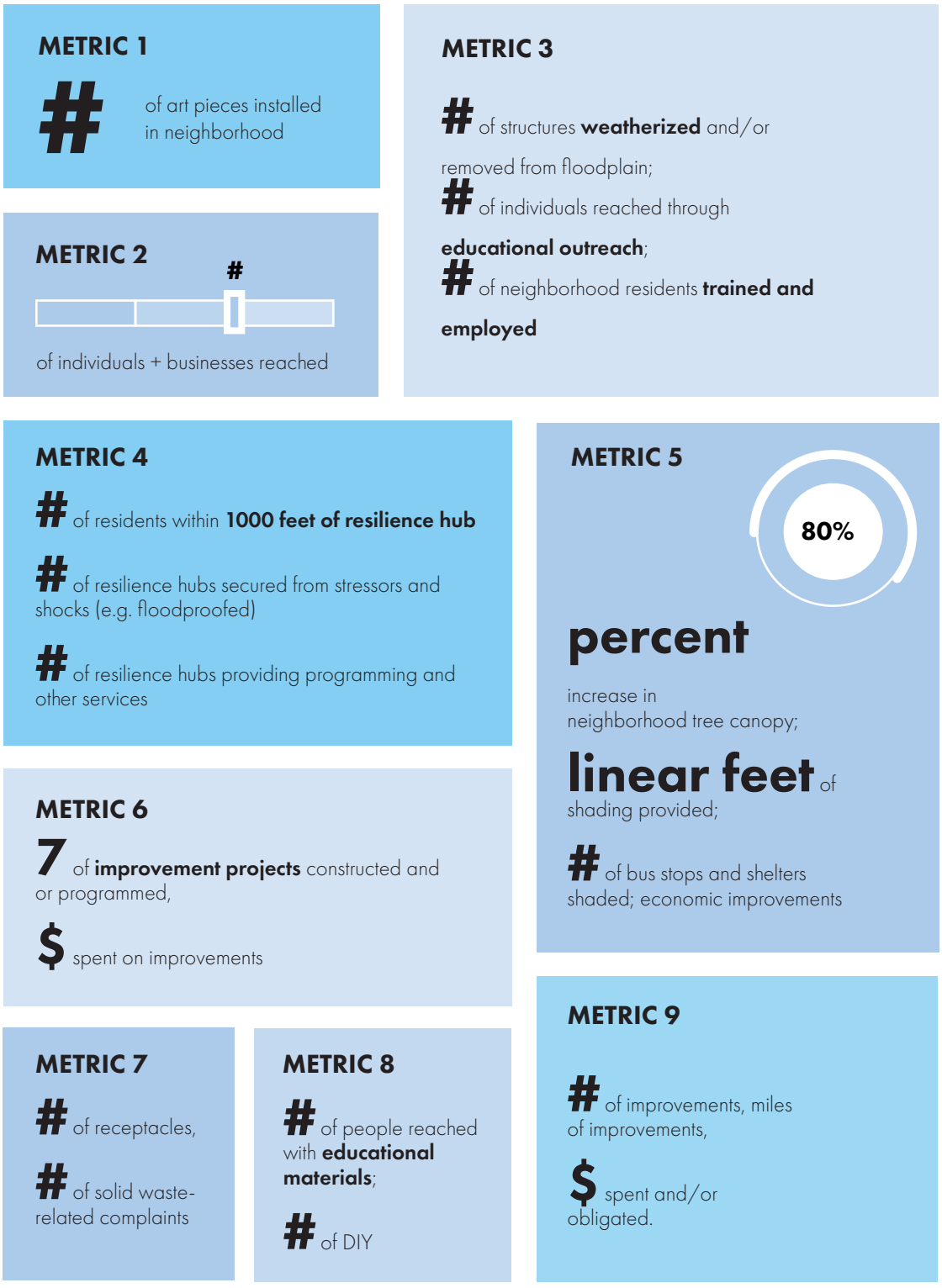


Figure 82: Key metrics for measuring the sucess of plan implementation.

NEXT STEPS & IMPLEMENTATION

Living Document
The plan is designed as a living document, or a document that is periodically updated to maintain its relevancy to the neighborhood and community, and to keep up with best practices in resilisence over the document's lifespan. Part of ensuring the continued resonance and relevance of the document is keeping the document up to date through periodic minor modifications for small and substantively inconsequential changes, or minor and major amendments for small to large content changes or additions.

There are two types of document updates. The first is a staff-initiated update, where city staff identify a need to update the plan document. The second is a community-initiated update, where a community leader or leaders propose a change to the plan. The process for carrying forward a proposed plan update is the same for both staff-initiated and community-initiated proposals. In both cases, proposals are presented to the Super Neighborhood and must receive majority recommendation to carry forward a proposal to City Council for adoption. Community-initiated proposals must receive support from the Planning and Development Department and any other impacted city department or division for their proposed change prior to seeking a Super Neighborhood recommendation.

Minor Modification minimally affects the plan's vision and the associated projects, and is conducted to improve the plan's accuracy, efficacy, and fundability.

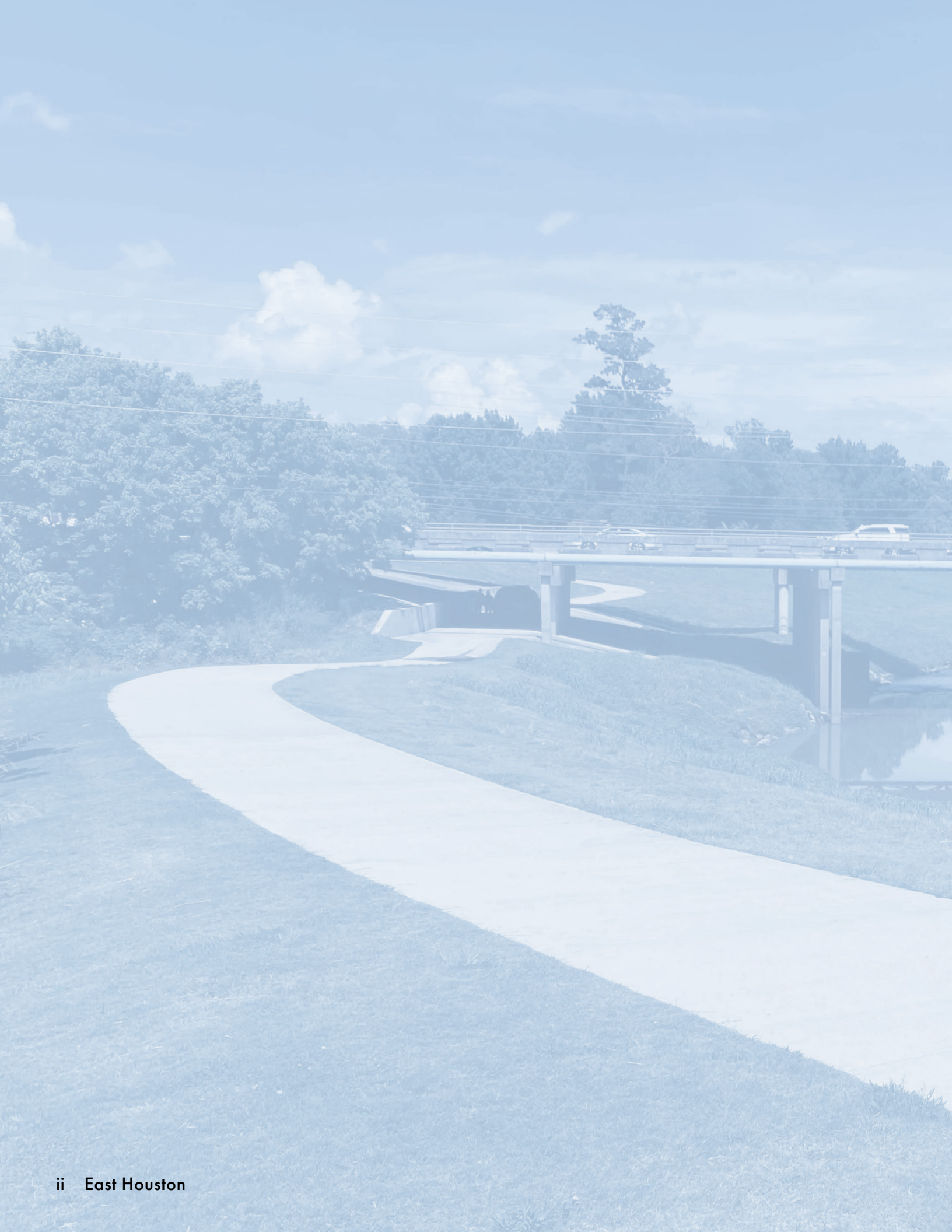
Major Modification is somewhat impactful to the overarching plan vision and projects, and is conducted to adjust the scope and type of work proposed so as to improve the plan's accuracy, efficacy, and fundability.

Minor Amendment is a minimal adjustment to the plan, such as a data update, that impacts but does not substantially alter the underlying assumptions of the community engagement findings, vulnerability assessment, resilience vision, or recommended projects, but is necessary to carry out for plan accuracy, efficacy, and fundability.

Major Amendment substantially adjusts the plan, such as a data update, that alters the underlying assumptions of the community engagement findings, vulnerability assessment, resilience vision, or recommended projects, and is necessary to carry out for plan accuracy, efficacy, and fundability.

Supplemental Attachment
minimally affects the plan's vision and the associated projects, and is conducted to add substantially new data, findings, or projects. A supplement expands the plan's scope and will typically be accompanied by a minor or major amendment. The attachment is intended to improve the plan's accuracy, efficacy, and fundability.

Keeping the document regularly updated will support neighborhood resilience for years, even decades, to come.



APPENDICES

APPENDIX A
WATERSHED BEST PRACTICES

Neighborhood Resilience Plans are a crucial step forward in realizing the vision established in the citywide resilience plan, Resilient Houston. The Neighborhood Resilience Plans are a key component of achieving Goal 4 of Resilient Houston: We will ensure that all neighborhoods have equitably resourced plans. In recent years, many cities and regions have introduced new watershed management practices for regional and urban watersheds.

Key lessons for Houston

We have identified 5 key lessons for Houston. Please refer to the report for a full description and actions.

1. Make every investment stormwater proof:

Each day, Houstonians and the City invest in the physical transformation of the built environment. Houstonians upgrade gardens, yards, roofs, and driveways and build houses. The City maintains streets, constructs new infrastructure, and refurbishes parks. Every small- or large-scale investment decision by community members and the City alike can consider how each action incorporates mitigation strategies for reducing future risks associated with climate change. Over time, these daily practices help build resilience at the city level.

2. Creating room for the bayous and surface stormwater in the neighborhoods:

Harris County Flood Control District and the Army Corps of Engineers are constructing more detention areas, such as Buffalo Bayou Park and the Reservoirs, to create room for stormwater. Additionally, the City of Houston and Harris County Flood Control District can collaborate to create even more space for stormwater detention by establishing an integrated, flexible program focused on the dual goals of ensuring water safety and improving spatial quality.

3. Clear communication for community outreach:

Setting up a social network approach to connect all residents and stakeholders who are involved in the physical transformation of neighborhoods can help facilitate stormwater-proof investments. Producing clear communication materials that are easy to understand helps community members become more aware of what is going on, connect ideas to their own apartments, houses, streets, parks, and neighborhoods, and inform them of what they can do to build resilience (from implementing measures to purchasing flood insurance).

4. Online data and shared information between agencies:

As water flows across juridical boundaries, providing real-time data on a shared, online platform helps with collaboration between agencies, so that Houston can maintain daily operations as long as possible and avoid upstream actions that may cause downstream flooding. It can also help to warn people of impending hazards such as flooding due to extreme rainfall or storm surge. The City of Houston could invest in an online platform for stormwater flooding in the neighborhoods to link with the existing online platform from Harris County Flood Control.

5. Modeling stormwater street runoff:

Accelerating the building of a stormwater model showing street runoff during various storm events is a prerequisite for calculating type of best watershed management measures (BMPs), for creating cloudburst management plans, for creating an online shared data platform, and for assigning an economic value per gallon rainwater detention to remove runoff from stormwater sewers.

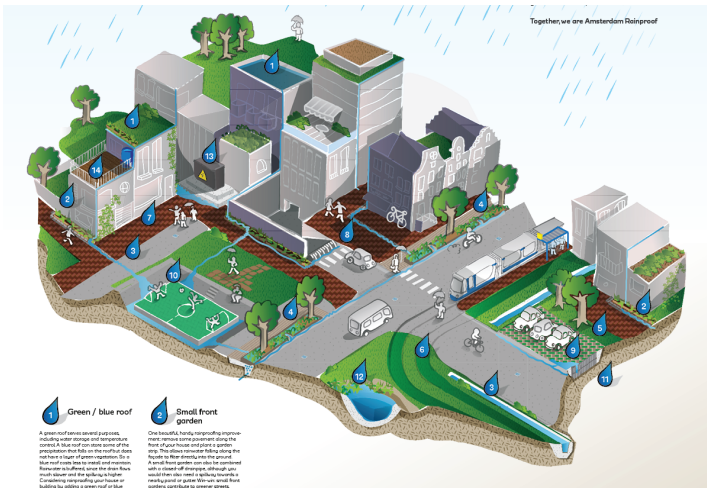
Figure 83: Precedents from Watershed Best Practices Report.

Portland Green infrastructure

New Orleans Ready for Rain program

Charleston Rainproof

Room for the river (the Netherlands)



Amsterdam Rainproof (the Netherlands)

Rotterdam Approach (the Netherlands)

APPENDIX A

WATERSHED BEST PRACTICES

NAME	INITIATOR	WATER CONCERNS MANAGED	COMMUNITY ENGAGEMENT
Portland Green Infrastructure	City of Portland		Government, Schools, NGOs Volunteering program + Tours
New Orleans Ready for Rain	City's office for homeland security and emergency preparedness		Community non-profit organizations program + tours
Charleston Rainproof	City of Charleston		Local nurseries and gardeners Workshops on installations
The City of Hoboken Green infrastructure	City of Hoboken		Outreach meetings + online survey
Room for the River (The Netherlands)	The Dutch State		Measures chosen with local and regional stakeholders 'block-set' tool + tours
Smart water management (The Netherlands)	Deltaprogram fresh water (combined program of national, regional and local public sector)		in-house exchange of partner collaboration between responsible organizations
Amsterdam Rainproof (The Netherlands)	Public Water Cycle company of Amsterdam, Waternet		Facilitating / connecting all public and private stakeholders involved Working with middleman to reach wider audience
Rotterdam Approach (The Netherlands)	City of Rotterdam		Design process with surrounding community
Copenhagen Cloudburst Management Plan (Denmark)	City of Copenhagen		Identifying projects through interdisciplinary approach – focusing first on public departments followed by private sector
City of 1000 tanks Chennai (India)	Water as leverage for resilient cities Asia by various international organizations (including world bank and NL)		Workshops with experts, vulnerable communities (women/children), government officials

SCALE	FUNDING MECHANISM	IMPLEMENTATION STRATEGIES	KEY LESSONS
City	Various, including EPA + leverage funding from Portland Affordable transportation fund + local improvement districts	Through mainstreaming in green projects and showcasing projects	Expand existing programs to encompass various green programs
City Neighborhood Parcel	City's capital investment + local and federal funds	Capital projects and community members	Clear outreach and information on measures and what to do during and following an event
City Neighborhood	Small scale measures on private land are privately funded	Creating awareness and capacity building skills	Empowering communities through community engagement and collaborating with local businesses
City	Various including trust funds, leverage funds, federal grants, and municipal bonds	Identification of suitable projects in sewersheds	Use of data for identifying projects in sewersheds
Country Region	Funding by national government + often leveraged by regional public partners	National responsibility for overall program + local responsibility per river branche	Combined goal of water safety + spatial quality Flexibility of program approach with tools
Country Region	Deltafund and labor by collaborators	Daily collaboration with short lines of communication to avoid crises	Shared online information platform with real time data, Creating collaborative lines of reasoning prior to crisis
City Neighborhood Parcel	Sewage tax with leverage in hours by all stakeholders involved	Mainstreaming rainproof by capacity building in all policies, strategies and actions of public and private stakeholders	Taking climate change into account in every investment made Integrated social network approach
City Neighborhood Parcel	Capital investment of city, water authority and funds of Europe + Public works pays others per per m3 water detained	Vulnerability models calculate extent and cost of water that must be detained and making it part of yearly capital budget per neighborhood	An economic number per gallon water detained helps Adding water detention to large scale public/private infrastructure
City Neighborhood	Public funding supported by an analysis what 'to do nothing' would cost + a socio-economic cost benefit analysis for green over grey	Creating a cloudburst plan per catchment area of the city to mainstream cloudburst in each public street and space design	Creating integrated below and above ground GIS model + cloudburst plans + calculating in economic quantities
Region City Neighborhood	Engaging early with potential (international) financers to ensure long-term bankability. Funding incremental	Incremental implementations for flexibility with attention to culture and awareness programs, and upscaling with flagship projects	Making local communities main stakeholder and innovative practices of funding

APPENDIX B

FUNDING MATRIX

This overview of potential funding sources for the projects identified in the Neighborhood Resilience Planning can serve to explore next steps. This overview is non-exhaustive. Funding sources and application periods change frequently.

NRP Project	Type	Source	Name	Description	URL
Expand Capacity Of Little White Oak Bayou + I-45 Integration; Expand Capacity Of Halls + Greens Bayous	Federal - Grant	FEMA	Flood Mitigation Assistance (FMA)	Flood Mitigation Assistance is a competitive grant program that provides funding to states, local communities, federally recognized tribes and territories. Funds can be used for projects that reduce or eliminate the risk of repetitive flood damage to buildings insured by the National Flood Insurance Program.	https://www.fema.gov/grants/mitigation/floods
Model Resilient Homes; Resilience Hub Facility + Service Network	Federal - Grant	EPA	EJ4Climate Grants - Environmental Justice	The EJ4Climate grant program welcomes projects that, for example, address extreme weather impacts, support the transition to clean energy and/or transportation systems, conduct conservation or restoration works, or employ traditional ecological knowledge to address climate change impacts. Eligible applicants range from nonprofit and nongovernmental organizations (NGOs), civil society groups, environmental groups and community-based associations to faith-based organizations, tribal nations, and Indigenous Peoples and communities.	https://www.epa.gov/newsreleases/epa-commission-environmental-cooperation-announce-2-million-ej4climate-grant-program
Model Resilient Homes; Resilience Hub Facility + Service Network	Federal - Formula Grants	HUD	Home Investment Partnerships Program	The HOME Investment Partnerships Program (HOME) provides formula grants to states and localities that communities use - often in partnership with local nonprofit groups - to fund a wide range of activities including building, buying, and/or rehabilitating affordable housing for rent or homeownership or providing direct rental assistance to low-income people. HOME is the largest federal block grant to state and local governments designed exclusively to create affordable housing for low-income households. HOME funds are awarded annually as formula grants to participating jurisdictions (PJs). The program's flexibility allows states and local governments to use HOME funds for grants, direct loans, loan guarantees or other forms of credit enhancements, or rental assistance or security deposits.	https://www.hud.gov/program_offices/comm_planning/home
All Projects	Federal - Program	HUD	Community Development Block Grant Program (CDBG)	The Community Development Block Grant (CDBG) Program supports community development activities to build stronger and more resilient communities. To support community development, activities are identified through an ongoing process. Activities may address needs such as infrastructure, economic development projects, public facilities installation, community centers, housing rehabilitation, public services, clearance/acquisition, microenterprise assistance, code enforcement, homeowner assistance, etc.	https://www.hudexchange.info/programs/cdbg/
Model Resilient Homes	Federal	HUD	Housing Trust Fund (HTF)	The Housing Trust Fund (HTF) provides grants to states to produce and preserve affordable housing for extremely low- and very low-income households.	https://www.hudexchange.info/programs/htf/
All projects	Federal	FEMA	Hazard Mitigation Grant Program (HMGP)	FEMA's Hazard Mitigation Grant Program provides funding to state, local, tribal and territorial governments so they can develop hazard mitigation plans and rebuild in a way that reduces, or mitigates, future disaster losses in their communities. When requested by an authorized representative, this grant funding is available after a presidentially declared disaster.	https://www.fema.gov/grants/mitigation/hazard-mitigation
Expand Capacity Of Little White Oak Bayou + I-45 Integration; Expand Capacity Of Halls + Greens Bayous; Drainage	Federal	FEMA	Flood Mitigation Assistance (FMA)	Flood Mitigation Assistance is a competitive grant program that provides funding to states, local communities, federally recognized tribes and territories. Funds can be used for projects that reduce or eliminate the risk of repetitive flood damage to buildings insured by the National Flood Insurance Program.	https://www.fema.gov/grants/mitigation/floods

NRP Project	Type	Source	Name	Description	URL
All projects	Federal	FEMA	Building Resilient Infrastructure and Communities (BRIC)	Building Resilient Infrastructure and Communities (BRIC) will support states, local communities, tribes and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards.	https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities
Model Resilient Homes; Resilience Hub Facility + Service Network; Vulnerability Assessment	Federal	HHS - CDC	Climate and Health Program - Building Resilience Against Climate Effects (BRACE)	The Building Resilience Against Climate Effects (BRACE) framework is a five-step process that allows health officials to develop strategies and programs to help communities prepare for the health effects of climate change. Part of this effort involves incorporating complex atmospheric data and both short and long range climate projections into public health planning and response activities. Combining atmospheric data and projections with epidemiologic analysis allows health officials to more effectively anticipate, prepare for, and respond to a range of climate sensitive health impacts.	https://www.cdc.gov/climateandhealth/BRACE.htm#:~:text=CDC's%20Building%20Resilience%20Against%20Climate%20Effects%20(BRACE)%20Framework,-Print&text=The%20Building%20Resilience%20Against%20Climate,health%20effects%20of%20climate%20change.
Model Resilient Homes; Resilience Hub Facility + Service Network	Federal	DOE - State Energy Program (SEP)	Weatherization Assistance Program	The U.S. Department of Energy (DOE) Weatherization Assistance Program (WAP) reduces energy costs for low-income households by increasing the energy efficiency of their homes, while ensuring their health and safety. The program supports 8,500 jobs and provides weatherization services to approximately 35,000 homes every year using DOE funds.	https://www.energy.gov/scep/wap/weatherization-assistance-program
Model Resilient Homes; Resilience Hub Facility + Service Network	Federal	DOE - State Energy Program (SEP)	Community Energy Program	Community Energy Programs (CEP) provides federal support and resources to local and tribal governments, public schools, nonprofit organizations, workforce development groups, and other community-serving entities.	https://www.energy.gov/scep/community-energy-programs
Future NRP; Vulnerability Assessment	Federal	NOAA	Effects of Sea Level Rise	ESLR is a multidisciplinary research program that emphasizes the use of integrated models and tools of dynamic physical and biological processes capable of evaluating vulnerability and resilience of our coasts under multiple sea level rise (SLR), inundation, and management scenarios to inform coastal restoration, land management, and planning activities.	https://www.grants.gov/web/grants/search-grants.html?keywords=resilience
Future NRP; Vulnerability Assessment	Federal	NOAA	Earth System Science and Modeling Research for Coastal Inundation	Climate variability and change present society with significant economic, health, safety, and security challenges. As part of the National Oceanic and Atmospheric Administration (NOAA) climate portfolio within the Office of Oceanic and Atmospheric Research (OAR), Climate Program Office (CPO), the Earth System Science and Modeling (ESSM) Division programs address climate challenges by managing competitive research programs that support high-priority science initiatives. CPO/ESSM Programs advance our understanding of the Earth's climate system and foster the application and use of this knowledge to improve the resilience of our Nation and its partners. The National Ocean Service (NOS) provides data, tools, and services that support coastal economies and their contribution to the national economy, especially in the area of preparedness and risk reduction. The Climate Program Office is working across OAR and NOS, and in collaboration with the National Weather Service, to develop and support research on the topic of coastal inundation.w	https://www.grants.gov/web/grants/search-grants.html?keywords=resilience

APPENDIX B
FUNDING MATRIX

NRP Project	Type	Source	Name	Description	URL
Model Resilient Homes; Resilience Hub Facility + Service Network	Federal	DOL	Youth Build	Under the YouthBuild Funding Opportunity Announcement, DOL will award grants through a competitive process to organizations providing pre-apprenticeship services that support education, occupational skills training, and employment services to opportunity youth, ages 16 to 24, while performing meaningful work and service to their communities. The YouthBuild program model prepares participants for quality jobs in a variety of careers, including infrastructure, and contains wrap-around services such as mentoring, trauma-informed care, personal counseling, and employment – all key strategies for addressing community violence. YouthBuild applicants must include construction skills training and may include occupational skills training in other in-demand industries. This expansion into additional indemand industries is the Construction Plus component, a priority in this grant competition.	https://www.grants.gov/web/grants/search-grants.html?key-words=resilience
Expand Capacity Of Little White Oak Bayou + I-45 Integration; Expand Capacity Of Halls + Greens Bayous	Federal	NPS - LWCF	Outdoor Recreation - Aquisition and Development	The LWCF State and Local Assistance Program was created by Congress in 1964 to assist in preserving, developing and assuring accessibility to present and future generations of U.S. citizens and visitors "such quality and quantity of outdoor recreation resources as may be available and are necessary and desirable for individual active participation in such recreation and to strengthen the health and vitality of the citizens of the United States[.]" This is accomplished in part by authorizing and providing grants to states, and through states to local units of government and federally-recognized Indian tribes, for projects that will provide outdoor recreation opportunities to the public through the acquisition of lands and waters for parks and other outdoor recreation areas, as well as through the development of new, or the renovation of existing, outdoor recreation facilities. The LWCF State and Local Assistance program is operated by the National Park Service (NPS) in partnership with designated lead agencies in each of the 50 states as well as American Samoa, the District of Columbia, Guam, Northern Marianas Islands, Puerto Rico, and the Virgin Islands. Congress allocates money from the LWCF for this program, which is then allocated to the states based on a legislative formula. To be eligible for LWCF grants, states must maintain an approved Statewide Comprehensive Outdoor Recreation Plan (SCORP), which must be updated at least once every five years. Among other things, SCORPs are used to assess the supply and demand for outdoor recreation resources and set priorities for the use of LWCF funds. In 2014, in coordination with Congress and the Secretary of the Interior, NPS created the Outdoor Recreation Legacy Partnership (ORLP) Program, a competitive grant program administered under the authority of the LWCF Act. NPS designed the ORLP with input from Congressional Committee staff, the States, and other interested parties. As designed, the goal of the ORLP Program is to provide new or significantly improve recreation opportunities for economically-disadvantaged communities in larger urbanized areas (as designated by the Census Bureau) that are under-served in terms of parks and other outdoor recreation resources. With Congressional support, the NPS has funded and issued grants pursuant to the ORLP each year. ORLP grants are selected through an NPS-lead national competition following a solicitation and nomination by the States, and such grants do not count against State apportionments.	https://www.grants.gov/web/grants/search-grants.html?key-words=resilience
Model Resilient Homes	State of Texas	Texas Department of Housing and Community Affairs (TDHCA)	Low-Income Housing Tax Credit (LIHTC)	The Low-Income Housing Tax Credit (LIHTC) program is the most important resource for creating affordable housing in the United States today. Created by the Tax Reform Act of 1986, the LIHTC program gives State and local LIHTC-allocating agencies the equivalent of approximately $8 billion in annual budget authority to issue tax credits for the acquisition, rehabilitation, or new construction of rental housing targeted to lower-income households.	https://www.huduser.gov/portal/data-sets/lihtc.html
	State of Texas	Texas Water Development Board (TWDB)	Texas Flood Infrastructure Fund (FIF)	Passed by the Legislature and approved by Texas voters through a constitutional amendment, the FIF program provides financial assistance in the form of loans and grants for flood control, flood mitigation, and drainage projects. The Flood Intended Use Plan (Flood IUP) details the structure of each funding cycle.	https://www.twdb.texas.gov/financial/programs/fif/index.asp

NRP Project	Type	Source	Name	Description	URL
Model Resilient Homes; Resilience Hub Facility + Service Network	Federal	DOL	Youth Build	Under the YouthBuild Funding Opportunity Announcement, DOL will award grants through a competitive process to organizations providing pre-apprenticeship services that support education, occupational skills training, and employment services to opportunity youth, ages 16 to 24, while performing meaningful work and service to their communities. The YouthBuild program model prepares participants for quality jobs in a variety of careers, including infrastructure, and contains wrap-around services such as mentoring, trauma-informed care, personal counseling, and employment – all key strategies for addressing community violence. YouthBuild applicants must include construction skills training and may include occupational skills training in other in-demand industries. This expansion into additional indemand industries is the Construction Plus component, a priority in this grant competition.	https://www.grants.gov/web/grants/search-grants.html?keywords=resilience
Expand Capacity Of Little White Oak Bayou + I-45 Integration; Expand Capacity Of Halls + Greens Bayous	Federal	NPS - LWCF	Outdoor Recreation - Aquisition and Development	The LWCF State and Local Assistance Program was created by Congress in 1964 to assist in preserving, developing and assuring accessibility to present and future generations of U.S. citizens and visitors "such quality and quantity of outdoor recreation resources as may be available and are necessary and desirable for individual active participation in such recreation and to strengthen the health and vitality of the citizens of the United States[.]" This is accomplished in part by authorizing and providing grants to states, and through states to local units of government and federally-recognized Indian tribes, for projects that will provide outdoor recreation opportunities to the public through the acquisition of lands and waters for parks and other outdoor recreation areas, as well as through the development of new, or the renovation of existing, outdoor recreation facilities.The LWCF State and Local Assistance program is operated by the National Park Service (NPS) in partnership with designated lead agencies in each of the 50 states as well as American Samoa, the District of Columbia, Guam, Northern Marianas Islands, Puerto Rico, and the Virgin Islands. Congress allocates money from the LWCF for this program, which is then allocated to the states based on a legislative formula. To be eligible for LWCF grants, states must maintain an approved Statewide Comprehensive Outdoor Recreation Plan (SCORP), which must be updated at least once every five years. Among other things, SCORPs are used to assess the supply and demand for outdoor recreation resources and set priorities for the use of LWCF funds. In 2014, in coordination with Congress and the Secretary of the Interior, NPS created the Outdoor Recreation Legacy Partnership (ORLP) Program, a competitive grant program administered under the authority of the LWCF Act. NPS designed the ORLP with input from Congressional Committee staff, the States, and other interested parties. As designed, the goal of the ORLP Program is to provide new or significantly improve recreation opportunities for economically-disadvantaged communities in larger urbanized areas (as designated by the Census Bureau) that are under-served in terms of parks and other outdoor recreation resources. With Congressional support, the NPS has funded and issued grants pursuant to the ORLP each year. ORLP grants are selected through an NPS-lead national competition following a solicitation and nomination by the States, and such grants do not count against State apportionments.	https://www.grants.gov/web/grants/search-grants.html?keywords=resilience
Model Resilient Homes	State of Texas	Texas Department of Housing and Community Affairs (TDHCA)	Low-Income Housing Tax Credit (LIHTC)	The Low-Income Housing Tax Credit (LIHTC) program is the most important resource for creating affordable housing in the United States today. Created by the Tax Reform Act of 1986, the LIHTC program gives State and local LIHTC-allocating agencies the equivalent of approximately $8 billion in annual budget authority to issue tax credits for the acquisition, rehabilitation, or new construction of rental housing targeted to lower-income households.	https://www.huduser.gov/portal/datasets/lihtc.html
	State of Texas	Texas Water Development Board (TWDB)	Texas Flood Infrastructure Fund (FIF)	Passed by the Legislature and approved by Texas voters through a constitutional amendment, the FIF program provides financial assistance in the form of loans and grants for flood control, flood mitigation, and drainage projects. The Flood Intended Use Plan (Flood IUP) details the structure of each funding cycle.	https://www.twdb.texas.gov/financial/programs/fif/index.asp

APPENDIX B
FUNDING MATRIX

NRP Project	Type	Source	Name	Description	URL
Expand Capacity Of Little White Oak Bayou + I-45 Integration; Expand Capacity Of Halls + Greens Bayous; Green Stormwater Infrastructure	Harris County - Bond	Harris County Flood Control	Flood Bond	Drainage infrastructure	https://www.hcfcd.org/Activity/2018-Bond-Program/Completed-Bond-ID-Summaries
Expand Capacity Of Little White Oak Bayou + I-45 Integration; Expand Capacity Of Halls + Greens Bayous; Green Stormwater Infrastructure	Harris County	Flood Control	Tree Planting Program	The Flood Control District's mission is to devise the Stormwater Management Plans, implement the plans and maintain the infrastructure, all with appropriate regard for community and natural values. Trees play an integral role in fulfilling the elements of the Flood Control District's mission.	https://www.hcfcd.org/Activity/Maintenance-Programs/Tree-Planting-Program
Expand Capacity Of Little White Oak Bayou + I-45 Integration; Expand Capacity Of Halls + Greens Bayous; Green Stormwater Infrastructure; Stormwater Infrastructure For Conveyance; Streetscape Improvements	City of Houston - Special Fund Tax	City of Houston	Prop 1: Dedicated Drainage and Street Renewal Fund	To provide for the enhancement, improvement and ongoing renewal of Houston's drainage and streets, a dedicated, pay-as-you-go fund	https://www.rebuildhouston.org/proposition-1-charter-amendment
Model Resilient Homes; Resilience Hub Facility + Service Network	Public - Rebate	DOE + state energy offices	Home Energy Performance Based Whole House Rebates (HOMES)	Rebates for retrofits that make residential property more energy efficient	https://uscode.house.gov/view.xhtml?req=(title:42%20section:18795%20edition:prelim)%20OR%20(granuleid:USC-prelim-title42-section18795)&f=treesort&num=0&edition=prelim
Model Resilient Homes; Resilience Hub Facility + Service Network	Public - Rebate	DOE + state energy offices	High-Efficiency Electric Home Rebate Program (HEEHR)	Rebates for installation of new, efficient electric appliances for new residential construction and retrofits. Qualified electric appliances include heat pump HVAC systems, heat pump water heaters, electric cooking appliances, heat pump clothes dryers, and enabling measures - upgraded circuit panels, insulation, and wiring	https://www.energy.gov/scep/home-energy-rebate-programs
Public		HUD	Green and Resilient Retrofit Program (GRRP)	Projects at HUD-subsidized multifamily properties related to 1) energy and water benchmarking, 2) improving energy or water efficiency, indoor air quality or sustainability, 3) implementing the use of low-emission technologies, materials, or processes, including: zero emission electricity generation, energy storage, or building electrification, and 4) addressing climate resilience.	https://www.hud.gov/sites/dfiles/CFO/documents/25_FY22CJ-GreenandResilientRetrofit.pdf
Model Resilient Homes; Resilience Hub Facility + Service Network	Public - Tax Credit	IRS	Energy Efficient Home Credit	Extends and expands existing credit for building to ENERGY STAR and Zero Energy Ready Homes standards	https://www.irs.gov/forms-pubs/about-form-8908
Model Resilient Homes; Resilience Hub Facility + Service Network	Public - Tax Credit	IRS	Renewable Energy Investment Tax Credit	Extends tax credit for solar systems on residential properties, with increased credits available for affordable housing and low-income communities.	https://www.irs.gov/forms-pubs/about-form-3468

NRP Project	Type	Source	Name	Description	URL
Model Resilient Homes; Resilience Hub Facility + Service Network	Public - Block Grant	EPA	Environmental and Climate Justice Block Grants	Targets investments for nonprofits working in disadvantaged communities to address environmental and climate justice challenges, including mitigating health risks from extreme heat and neighborhood resilience and adaptation.	https://www.epa.gov/environmentaljustice/environmental-justice-grants-funding-and-technical-assistance
Resilience Hub Facility + Service Network	Public	EPA	Greenhouse Gas Reduction Fund	Provide capital, leverage capital, and provide other forms of financial assistance to nonprofits, states, and other entities for the rapid deployment of low- and zero-emission products, technologies, and services, such as rooftop and community solar power. Most of the funds are intended to allow low-income/disadvantaged communities to deploy or benefit from zero-emission technologies and to provide financial and technical assistance in low-income and disadvantaged communities.	https://www.epa.gov/greenhouse-gas-reduction-fund
I-45 Expansion + Little White Oak Bayou Integration	Federal - Grant	US DOT + State Trans-portation Agencies	Neighborhood Access and Equity Grants		https://www.congress.gov/bill/117th-congress/house-bill/5267
Expand Capacity Of Little White Oak Bayou + I-45 Integration; Expand Capacity Of Halls + Greens Bayous; Green Stormwater Infrastructure	Federal - Grant	USFS	Urban and Community Forestry Program	Funds urban tree cover to address extreme heat and climate change impacts.	https://www.fs.usda.gov/managing-land/urban-forests
Model Resilient Homes; Resilience Hub Facility + Service Network (network)	Public	FEMA	Building Resilient Infrastructure and Communities	BRIC seeks to categorically shift the federal focus from reactive disaster spending toward research-supported, proactive investment in community resilience as identified in planning, so when the hurricane, flood, or wildfire comes, communities are better prepared	https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities
All projects	Federal - Block Grant	HUD	Community Development Block Grant (CDBG)	The Community Development Block Grant (CDBG) Program supports community development activities to build stronger and more resilient communities. To support community development, activities are identified through an ongoing process. Activities may address needs such as infrastructure, economic development projects, public facilities installation, community centers, housing rehabilitation, public services, clearance/acquisition, microenterprise assistance, code enforcement, homeowner assistance, etc.	https://www.hudexchange.info/programs/cdbg/
Model Resilient Homes; Resilience Hub Facility + Service Network	State of Texas	TDHCA (state)	Weatherization Assistance Program	WAP is designed to help low income customers control their energy costs through installation of weatherization materials and education. The program goal is to reduce the energy cost burden of low income households through energy efficiency. The WAP is administered through subrecipients, which collectively cover all 254 counties of the state.	https://www.tdhca.state.tx.us/community-affairs/wap/
Expand Capacity Of Little White Oak Bayou + I-45 Integration; Expand Capacity Of Halls + Greens Bayous; Green Stormwater Infrastructure; Resilience Hub Facility + Service Network (network)	City of Houston - TIRZ	City of Houston	TIRZ 22 Leeland Woods	includes projects such as roadway construction/reconstruction, stormwater conveyance and mgmt systems, water, wastewater improvements, affordable housing, municipal facilities, sidewalks, lighting, trails, park and green space improvements, and lanscaping enhancements	https://www.houstontx.gov/ecodev/tirz/22.html

APPENDIX C

LIVING IN A CONNECTED COMMUNITY

This overview of potential funding sources for the projects identified in the Neighborhood Resilience Planning can serve to explore next steps. This overview is non-exhaustive. Funding sources and application periods change frequently.

STRATEGY	SUPPORTING ACTIONS	NEIGHBORHOOD PROJECTS	RESILIENT HOUSTON GOALS	RESILIENT HOUSTON TARGETS
Community Core Services (Resilience Hub Network)	**1** Advance community-wide collaboration to provide a network of resilience facilities and social infrastructures	Resilience hub facility + Service network		Target 1; 18
	2 Optimize management of the City's resilience communication with the community			Target 12; 17
	3 Conduct Resilience Network pilot projects and research			Target 12; 18
	4 Build a community-wide network of weatherized resilience facilities and connected social infrastructure networks that will provide skills, knowledge, and resources to reduce vulnerabilities and risks			Target 1; 10; 12; 18

STRATEGY	SUPPORTING ACTIONS	NEIGHBORHOOD PROJECTS	RESILIENT HOUSTON GOALS	RESILIENT HOUSTON TARGETS
Capacity Building	**1** Advance community access to existing resources	Adaptive Resilient Home	GOAL 1, GOAL 12, GOAL 13, GOAL 17	Target 1; 12; 17
	2 Advance community's understanding of personal vulnerabilities and options for vulnerability reduction and to learn how to advocate for the types of changes desired		GOAL 1, GOAL 12, GOAL 17	Target 1; 12; 17
	3 Advance neighborhood-wide community advocacy efforts		GOAL 13, GOAL 18	Target 1; 12; 17
	4 Advance community-wide collaboration to ensure all neighborhood residents have the skills, knowledge, and resources to best withstand to extreme weather events.	Keep the Momentum	GOAL 5, GOAL 12, GOAL 13, GOAL 17	Target 1; 12; 17
	5 Expand and optimize network of neighborhood-based skills, information, and resources related to resilience and resilience-building		GOAL 1, GOAL 12, GOAL 13, GOAL 17, GOAL 18	Target 1; 12; 17

APPENDIX C

LIVING IN A CONNECTED COMMUNITY

Resilience begins with a secure and healthy home—a home prepared to withstand the impacts of extreme weather events, natural disasters, and other hazards

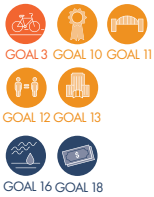
STRATEGY	SUPPORTING ACTIONS	NEIGHBORHOOD PROJECTS	RESILIENT HOUSTON GOALS	RESILIENT HOUSTON TARGETS
Housing Security	**1** Conduct weatherization pilot projects and research	Model Resilient Homes	GOAL 6, GOAL 10, GOAL 12, GOAL 14, GOAL 18	Target 8; 10; 12
	2 Achieve total housing recovery from prior disasters		GOAL 6, GOAL 12	Target 8; 12
	3 Support vulnerable populations and underserved communities through both the preservation and rehabilitation of existing housing and new housing development that serves their needs.		GOAL 6, GOAL 7, GOAL 12	Target 7; 8; 10; 12
	4 Expand housing production and availability for low-, moderate-, and middle-income households in safe areas (IH + EH)		GOAL 6, GOAL 7, GOAL 12	Target 7; 8; 10; 12
	5 Help communties and asset owners understand what individual actions they can take to be safe at home, including how to access resources		GOAL 6, GOAL 8, GOAL 12	Target 8; 12
	6 Relate the combined effects of inadequate housing and extreme weather to public health impacts		GOAL 6, GOAL 12	Target 10; 12
	7 Link investment in housing resilience to local workforce development			
Food Security (EB)	**1** Increase food security by giving excess food to communities in need		GOAL 6, GOAL 12	Target 10; 12; 14
	2 Conduct food waste diversion pilot projects and research		GOAL 6, GOAL 12	Target 10; 12; 14 ; 18

STRATEGY	SUPPORTING ACTIONS	NEIGHBORHOOD PROJECTS	RESILIENT HOUSTON GOALS	RESILIENT HOUSTON TARGETS
Energy Security	**1** Conduct energy capture pilot projects and research	Model Resilient Homes	GOAL 6, GOAL 10, GOAL 14, GOAL 18	Target 10; 11; 14; 18
	2 Accelerate the adoption of clean electric power by expanding use of home power supplies, electric appliances, and electric mobility options		GOAL 6, GOAL 10, GOAL 14	Target 10; 11; 12; 14; 17; 18
	3 Expand the renewable energy and decarbonization energy supply and its workforce with targeted support for renewable energy industry operations in the neighborhood and disadvantaged workers in the neighborhood		GOAL 2, GOAL 6, GOAL 12, GOAL 14, GOAL 18	Target 1; 2; 10; 14; 18
	4 Explore the feasibility of a reliable and flexible neighborhood-scale grid		GOAL 10, GOAL 14, GOAL 18	Target 1; 10; 14; 18
	5 Invest in local renewable energy sources and energy resilience projectsincluding how to access resources		GOAL 2, GOAL 6, GOAL 10, GOAL 12, GOAL 14, GOAL 18	Target 1; 2; 10; 14; 18
	6 Support vulnerable populations and underserved communities by providing affordable and reliable essential energy		GOAL 6, GOAL 12	Target 10; 12; 14; 18

APPENDIX C

SAFE IN THE NEIGHBORHOOD

Decisions about what, where and how to build should be made with local community members. Good infrastructure contributes to reduced risk from flooding and other extreme events, and from stresses such as increased heat and traffic violence, while providing benefits to the residents

STRATEGY	SUPPORTING ACTIONS	NEIGHBORHOOD PROJECTS	RESILIENT HOUSTON GOALS	RESILIENT HOUSTON TARGETS
Invest in clear communication and collaboration for safe and clean neighborhoods	**1** Create clear and transparent communication to the community and between different governmental departments to show all the work that is been planned and done in the public realm and create possibilities for holistic street design that combines planned work with planned work	Streetscape Improvements		Target 1; 12
	2 Create conditions through education and pilot projects for implementing green stormwater infrastructure for holding stormwater, heatstress reduction and biodiversity benefits on private property	Green Stormwater Infrastructure		Target 6; 10; 11; 12
	3 Align capital projects. Coordinate floodrisk improvement projects for additional detention and conveyance with other benefits to the community such as recreational facilities and mobility projects for connected sidewalk and multiuse path network that will provide last mile connections.	Expand Capacity Of Halls + Greens Bayous, Streetscape Improvement		Target 3; 9; 10; 12; 15
	4 Advance community-wide collaboration for a clean neighborhood to continually maximize and optimize solid waste management solutions that reduce litter build-up, illegal dumping, and overgrown vegetation to provide the cleanest streets and waterways possible	Streetscape Improvements		Target 2; 12
Work towards multiple benefits in healthy streets and connected Bayous	**1** Coordinate basic infrastructure improvement and other planning projects for most efficient and effective outcomes, reduce nuisance flooding, upgrade existing street conditions for health and safety, improve sustainable mobility networks, and incorporate multibenificial green in standard streetscapes	Streetscape Improvements		Target 6; 9; 10; 11; 12; 15

STRATEGY	SUPPORTING ACTIONS	NEIGHBORHOOD PROJECTS	RESILIENT HOUSTON GOALS	RESILIENT HOUSTON TARGETS
Work towards multiple benefits in healthy streets and connected Bayous	**2** Maximize greening for cooling, stormwater reduction and integration of local biodiversity throughout the public realm	Model Resilient Homes		Target 6; 9; 10; 11; 12; 15; 18
	3 Link the capital and operational investments in floodrisk reduction by additional detention and conveyance systems to restoration and enhancement of the bayous, parks and public land, to biodiversity improvement, to connected mobility and to additional recreational facilities	2000 Trees on Mesa, Expand Capacity Of Halls + Greens Bayous		Target 6; 9; 10; 11; 12; 15; 18
Innovate for a resilient future	**1** Conduct art-based community outreach pilot projects and research for clean and safe streets and connected communities	Keep the Momentum		Target 1, 5; 12
	2 Research the conditions required to set up the right example of implementing green stormwater infrastructure in public right of way and innovate with small projects in the public realm	Streetscape Improvements		Target 6; 10; 11; 12
	3 Advance city-wide and intergovernmental collaboration to continually provide the most timely, clear and transparent data and shared information feasible for projects, for supporting resiliency in the community prior and during a heatwave or flood event and for maintenance purposes	Streetscape Improvements, Expand Capacity Of Halls + Greens Bayous		Target 17

APPENDIX D

RESILIENCE DEFINITIONS AND CONCEPTS

Climate Adaptation refers to changes in social, economic, and ecological systems in response to climatic risks and their effects.

Climate resilience is the ability to anticipate, absorb, accommodate and recover from adverse climate impacts.

Adaptive Capacity is the, "ability of a human or natural systems to adjust to climate change (including climate variability and extremes) by moderating potential damages, taking advantage of opportunities, or coping with the consequences."[23]

Related Terms

A **Climate Hazard** is a physical process or event that can harm human health, livelihoods, or natural resources. Examples are flooding, extreme heat, or hurricanes.

Flooding (also "Inundation")

Flash Flood is a sudden local flood, typically due to a heavy rainfall or other cause.

Nuisance Flooding refers to low levels of inundation (typically due to high tides) that do not pose significant threats to public safety or cause major property damage, but can disrupt routine day-to-day activities, put added strain on infrastructure systems such as roadways and sewers, and cause minor property damage.

Subsidence is the sinking of the ground because of underground material movement—is most often caused by the removal of water, oil, natural gas, or mineral resources out of the ground by pumping, fracking, or mining activities.

Extreme heat is defined as summertime temperatures that are much hotter and/or humid than average.

Remove from the floodplain means many things. It can mean:

- Relocating residents, demolishing buildings, and maintaining new open space;
- Elevation of the structures on the property above the floodplain elevation;
- Changing topography, providing flood barriers, and other physical barriers that remove a property from the floodplain;
- Expansion and enhancement of stormwater infrastructure that removes property from the floodplain

Severe Weather

Extreme Events are occurrences of unexpected or unusually severe weather or climate conditions that can cause devastating impacts on communities and agricultural and natural ecosystem.

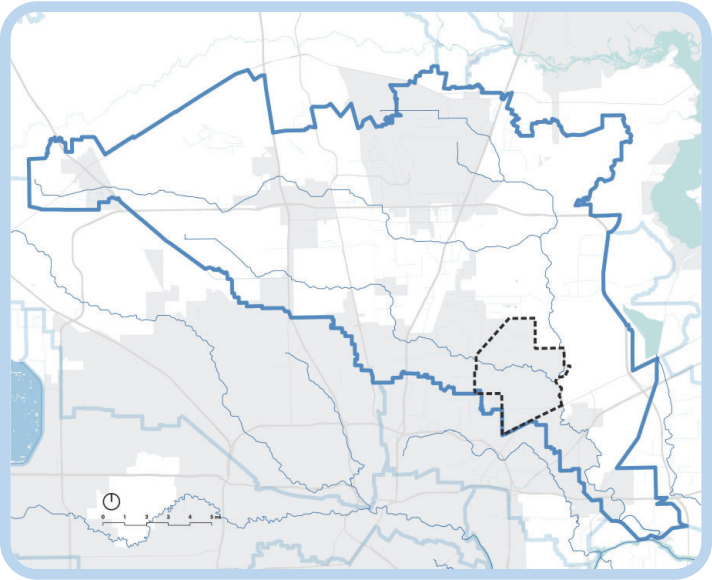


Figure 84: Map of the Halls Watershed

A housing recovery from Hurricane Harvey involves two strategies: rehabilitation and weatherization of homes.

- **Rehabilitation** means repairing the home from damage that occurred as the result of an event. This can mean repairing or replacing the roof, removing and replacing flood damaged materials such as plasterboard and floors, and removing and replacing damaged systems such as appliances including heaters and AC units. Often rehabbing flood damaged homes requires extensive mold remediation, even in areas of the home that were not touched by floodwaters.
- **Weatherization** means improving the home's construction and systems to improve energy efficiency by updating windows, doors, wall and attic insulation; removing the home and its critical systems from the floodplain through home elevation, flood barriers, and other strategies; adding climate adaptation solutions such as backup power supplies, green infrastructure for cooling, and others. Frequently, weatherizing home improvements are carried out at the same time as post-disaster home rehabilitation.

An **Acute Extreme Weather Event** is an extreme weather event that takes place in a relatively short period of time, such as a tropical storm or cloudburst flooding event.

Chronic Extreme Weather Event is an extreme weather event that takes place in a relatively long period of time, such as a heat wave or drought.

Watershed Planning & Flooding

Watersheds (also called drainage basin, drainage areas, or catchments) are areas of land where all surface runoff that is created within that area drains to one common point. As water that is draining towards the ocean and is always conveying towards the lowest point in elevation, water will start in a large number of small streams at the top of watersheds ("tributaries"),and streams will continually combine and become rivers as the streams pick up more water along the way.

Watersheds are defined on the borders by "ridges" or hills where if a raindrop falls on the point, both elevations on either side are lower than the high point and water could drain to either side. Areas in the lower part of watersheds will have larger volumes of water in higher concentrations of volume as water accumulates as it moves toward the ocean. As watersheds are defined by the drainage area that reach one specific point, watersheds can be defined on several scales, depending on which common outlet point is picked for analysis.

Waterway is a river, canal, or other route for travel by water.

Riparian zones, or areas, are lands that occur along the edges of rivers, streams, lakes, and other water bodies.

Floodway is the channel of a river or other water course and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a

APPENDIX D

RESILIENCE DEFINITIONS AND CONCEPTS

designated height. The floodway is the channel of a river or stream and those portions of the floodplain adjoining the channel required to carry the regional flood discharge. The floodway is the most dangerous part of the floodplain -- it is associated with moving water.

Base Flood Elevation or BFE is the elevation determined by FEMA to which flood water is expected to rise during the base flood.

Design Flood Elevation or DFE the elevation of the highest flood that a retrofitting method is designed to protect against. Homes are elevated to the DFE for example.

Storm sewers: typically a connected network of subsurface concrete pipes

1% or 0.2% chance of flood: 1% or 0.2% chance of flood; The Federal Emergency Management Association (FEMA) maintains nation-wide floodplain maps that identify properties located in what they consider to be the floodplain. The floodplain is mapped in terms of a 100 year or 1% chance of flood every year, and a 500 year or a .2% chance of flood every year. Properties located in the 100-year and the 500-year floodplain, as identified by FEMA, are those referred to when we say, **"a home is located in the floodplain."** The FEMA designation carries regulatory and insurance implications, as well implications for recovery funds.

100-year floodplain means there is at least a 1% chance each year that the property will flood

500 year floodplain means there is at least a 2% chance each year that the property will flood

Green Infrastructure & Nature-based Processes

Ecosystem Services are the goods and services provided by ecosystems to humans. Ecosystem Services make human life possible by, for example, providing nutritious food and clean water, regulating disease and climate, supporting the pollination of crops and soil formation, and providing recreational, cultural and spiritual benefits.

Gray Stormwater Infrastructure is a network of at-grade and below-grade drainage channels that make up a stormwater drainage system. It is referred to as "grey" infrastructure because the system is typically made out of concrete.

Green Infrastructure is the harnessing of ecological systems to improve urban ecology.

Green Stormwater Infrastructure refers to a variety of practices that restore or mimic natural hydrological processes. While "gray" stormwater infrastructure is designed to convey stormwater away from the built environment, green infrastructure uses soils, vegetation, landscape forms, and other media to manage rainwater where it falls through capture, storage, and evapotranspiration. By integrating natural processes into

Floodplain is any land area susceptible to being inundated by floodwaters from any source. This can include coastal areas impacted by storm surge, land along a river or bayou that is flooded when that waterway rises out of its banks, or low-lying land that fills with water when it rains. Flooding occurs in a wide range of landscapes due to rainfall or storm surge. The floodplain is land that has been or may be covered by floodwater during the regional flood. The floodplain includes the floodway and flood fringe areas. These areas are labeled on the Flood Insurance Rate Maps as A, AE, A1-30, AO or AH zones.

the built environment, green infrastructure provides a wide variety of community benefits, including reducing stormwater flooding impacts, improving water and air quality, reducing urban heat island effects, creating habitat for pollinators and other wildlife, and providing aesthetic and recreation.

Evapotranspiration is the sum of all processes by which water moves from the land surface to the atmosphere via evaporation and transpiration, through in this way, trees can effectively cool the surrounding air.

Phytoremediation is a plant-based approach, which involves the use of plants to extract and remove elemental pollutants or lower their bioavailability in soil.

Heat & Energy

Urban Heat Island Effect an urban or metropolitan area that is significantly warmer than its surrounding rural areas due to the lack of shade, prevalence of heat absorbing materials, and other human actitivies such as manufacturing.

Service Network is a structure that brings together several entities to deliver a particular service. In the context of this report, service network builds on the

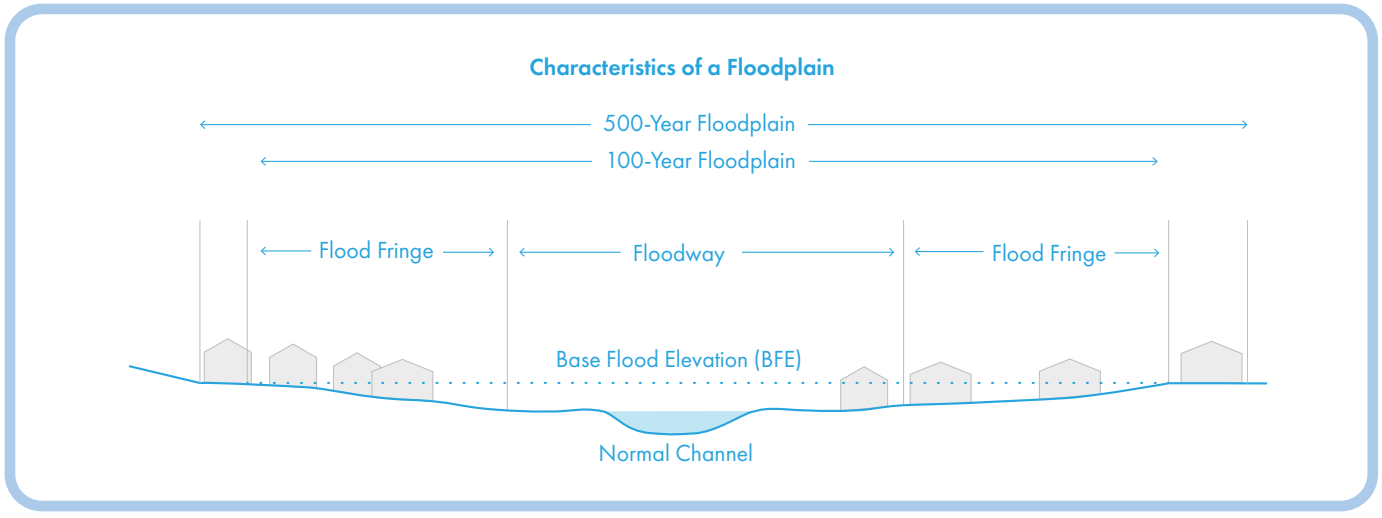


Figure 85: Diagram of the floodplain

APPENDIX D

RESILIENCE DEFINITIONS AND CONCEPTS

City's Resilience Hubs project to extend the facilities and service network that support unique preparation, response and recovery from stresses and shocks in the specific neighborhood they serve.

Brownout is a drop in voltage in an electrical power supply system. Unintentional brownouts can be caused by excessive electricity demand, severe weather events, or a malfunction or error affecting electrical grid control or monitoring systems. Intentional brownouts are used for load reduction in an emergency, or to prevent a total grid power outage due to high demand.

Weatherization means improving a building's energy performance primarily by reducing heat loss or heat gain due to leakage at the building envelope. It can also include other performance improvements that reduce energy demand such as upgrading appliances and systems, reducing unwanted heat gain by installing a cool roof or planting trees along the southern building exposure, and many more.

Drainage system: comprised of ditches, and traditional underground storm sewers. if the rainfall intensity exceeds the capacity of the local drainage system, street and neighborhood flooding can occur.

Social Justice

Social vulnerability is the susceptibility of social groups to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood.

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies.

Energy insecurity is a lack of access to (affordable and reliable) energy. In the context of this report, it is defined as the inability to meet basic household energy needs, especially caused by extreme event (e.g. Winter Storm Uri).

Procedural justice refers to the idea of fair processes, and how people's perception of fairness is strongly impacted by the quality of their experiences and not only the end result of these experiences.

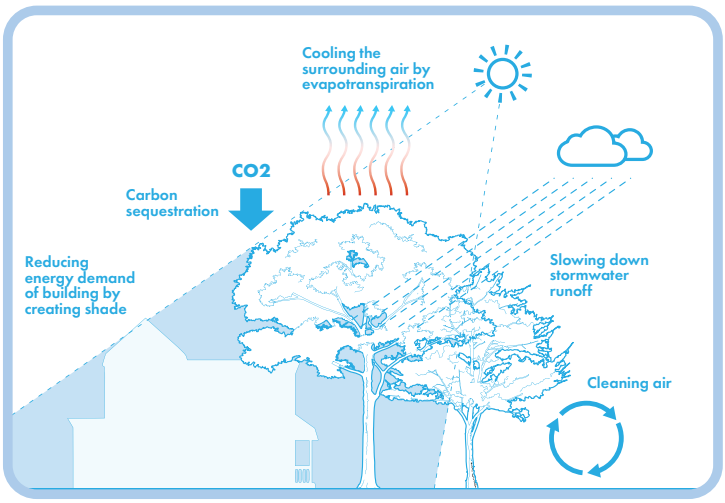


Figure 86: How a tree cools

Flood vulnerable means properties are identified as being 'highly vulnerable' to flood through a neighborhood vulnerability assessment carried out as part of the neighborhood planning process. Vulnerability is assessed by considering multiple factors, such as parcel and building location relative to the the geographic boundaries of the FEMA floodplain, type of property use and elevation requirements in place when the property was built. This is an important consideration when assessing risk in East Houston, whose flooding has historically been far more extensive than the FEMA floodplains indicate.

Community Planning

Complete Communities is to build one complete city from recovery to resilience by championing the voices of residents that have been ignored for far too long and offering every Houston resident the foundational resources needed to thrive. We work across private, public, and nonprofit sectors to collectively overcome economic, environmental, and equity challenges to transform Houston's legacy into one everyone can be proud of.

The Fifteen Minute Neighborhood is created by prioritizing pedestrian and cyclist mobility over vehicle mobility, and allowing for a mixture of uses such that residents can reach essential services, jobs, and other key destination within fifteen minutes of walking or biking from their home or workplace.

Living with Water: The City of Houston and partners hosted two Living with Water workshops in November 2018 and May 2019 as part of Houston's resilience program. Living with Water Houston brought together local, national, and Dutch experts representing multiple disciplines to solve site-specific water and resilience challenges alongside local governments, state and federal agencies, and community stakeholders.

Houston Municipal Context

Resilient Houston, the City's resilience strategy, was released on February 12, 2020. Resilient Houston provides a framework for collective action for every Houstonian; our diverse neighborhoods and watersheds; City departments; and local, regional, and partners. The strategy links existing efforts with new ones that will collectively work to protect Houston against future disasters—from hurricanes to extreme heat waves—and chronic stresses such as aging infrastructure, poor air quality, and flooding.

APPENDIX D

RESILIENCE DEFINITIONS AND CONCEPTS

Houston Climate Action Plan provides evidenced-based measures to reduce greenhouse gas emissions and preventative measures to address the negative outcomes of climate change. The plan will demonstrate how the City will adapt and improve its resilience to climate hazards that impact the city today as well as risks that may increase in the coming years.

General Fund refers to revenues accruing to the state from taxes, fees, interest earnings, and other sources which can be used for the general operation of state government, including the Capital Improvements Program.

Capital Improvements Program is a list of the budgets allocated to capital projects, and the associated funding approved by the City Council. The City of Houston has a five (5) year plan updated annually, addressing the infrastructure needs.

Figure 87: Focus areas and goals of Houston Climate Action plan

Interventions (misc.)

Bioretention planters are stormwater infiltration cells constructed with walled vertical sides, a flat bottom area, and a large surface capacity to capture, treat, and manage stormwater runoff from the street.

Dry or wet bioswales are vegetated open channels that are designed and constructed to treat stormwater runoff within dry or wet cells formed by check dams or other structures. A dry swale is designed to prevent standing water, with or without an underdrain, while a wet swale is designed to hold water.

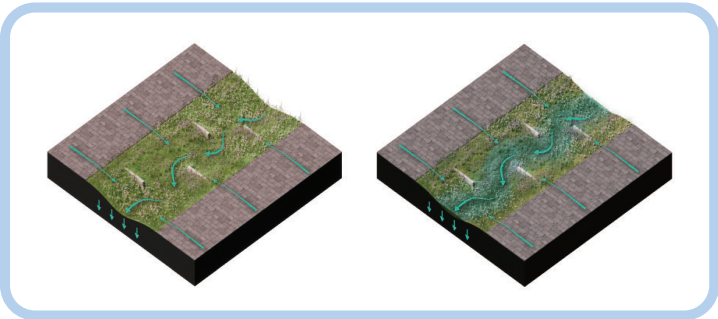


Figure 88: Dry or wet bioswales

Detention system is an area that stores water temporarily and eventually drains into the sewer system, such as green roofs, green-blue roofs, park space, bioswales, berms, sunken basketball courts, and sunken playgrounds.

Conveyance system means that portion of a drain system that consists of a series of pipes that transport water from one area to another without providing detention.

Rain gardens are a depressed area in the landscape that collects rain water from a roof, driveway or street and allows it to soak into the ground.

Reflective Roofs are roofs that reflect the suns energy back instead of absorbing the heat. The heat absorbed is passed to the building, which translates as higher cooling costs.

Multiple Benefit Strategies + Actions refers to physical interventions, such as a street remodel, that implement a variety of different resilience solutions in a single intervention. For example, a street remodel can upgrade the stormwater drainage system, add a bike lane and traffic calming features, install ADA complaint curbs and ramps, install street trees and bioretention planters, street lighting and furniture, wayfinding and other features, all as part of a single project.

Sticky Event is a community engagement event that is designed to carry information of interest after the event takes place. For example, an event initializing awareness about a planning effort, public engagement opportunity, or resilience risk and resources.

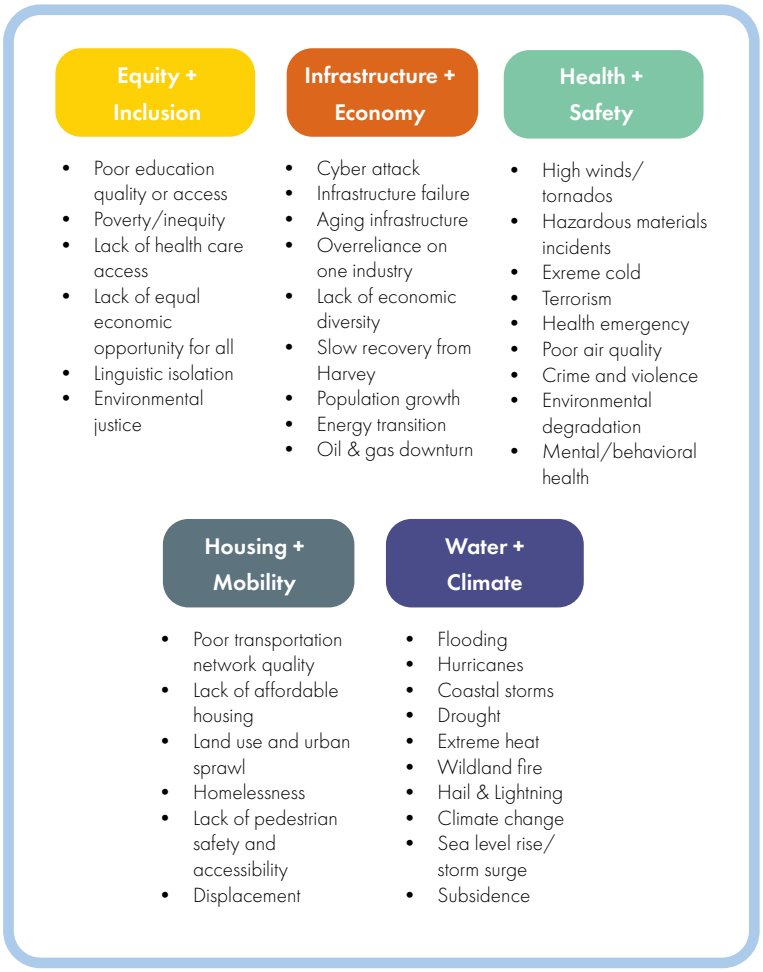


Figure 89: Priority Shocks and Stresses for Houston

APPENDIX E

ACRONYMS

AC or A/C	Air Conditioning
ACS	American Community Survey
ADA	American Disabilities Act
ARA	Administration & Regulatory Affairs
CASPER	Community Assessment for Public Health Emergency Response
CBO	Community-Based Organization
CCP	Community Participation Plan
CDC	Community Development Corporation
CDHO	Community Housing Development Organization
CE	Community Engagement
CEAP	*Comprehensive Energy Assistance Program*
CIP	Capital Improvements Program
CRO	Chief Resilience Officer
DON	Department of Neighborhoods
ECHO	Elder Cottage House Opportunity
GI	Green Infrastructure
GSI	Green Stormwater Infrastructure
HAP	Homeowners Assistance Program
HCD	Housing and Community Development
HFD	Houston Fire Department
HHD	Houston Health Department
HPARD	Houston Parks and Recreation
HPL	Houston Public Library
HPW	Houston Public Works
HVAC	Heating, Ventilation, and Air Conditioning
HVI	Heat Vulnerability Index
ICC	Increased Cost of Compliance
IDM	Infrastructure Design Manual
LEED	Leadership in Energy and Environmental Design
LIHTC	Low-Income Housing Tax Credit
LMI	Low- or Moderate-Income
MOCC	Mayor's Office of Complete Communities
MOED	Mayor's Office of Economic Development
MOCA	Mayors Office of Cultural Affairs
MORS	Mayor's Office of Resilience and Sustainability
NGO	Nonprofit Government Organization
NOFA	Notice of Funding Availability
NRP	Neighborhood Resilience Plan
NST	Neighborhood Support Team
OBO	Office Of Business Opportunity
OEM	Office of Emergency Management
PD	Planning and Development
PROW	Public Right-of-Way
QAP	Qualified Allocation Plan
ROW	Right-of-Way
SBA	Small Business Administration
SWAT	Stormwater Action Team
SWD	Solid Waste Management
TAC	Technical Advisory Committee
TIRZ	Tax Increment Reinvestment Zone
VAD	Vacant, Abandoned, and Deteriorated

DEPARTMENT & OFFICE ACRONYMS

311	Help and Information
CC	Civic Club
CCU	Complete Communities University
CDBG	Community Development Block Grant
CDBG-DR	Community Development Block Grant Disaster Recovery
CDBG-MIT	Community Development Block Grant Mitigation
CFRTF	Harris County Community Flood Resilience Task Force
COH	City of Houston
DC PSC	District of Columbia Public Service Commission
DC SEU	District of Columbia Sustainable Energy Utility
DOEE	Department of Energy and Environment
DON	Department of Neighborhoods
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
GCPD	Gulf Coast Protection District
GLO	Texas General Land Office
HARC	Houston Advanced Research Center
HCDD	Housing and Community Development Department
HCFCD	Harris County Flood Control District
HCHA	Harris County Housing Authority
HEF	Houston Equity Fund
HHA	Houston Housing Authority
HHS	Health and Human Services
HPCD	Houston Planning and Community Development
HPRD	Houston Parks and Recreation Department
HUD	Housing and Urban Development
ISD or Houston ISD	Independent School District
LTH	Let's Talk Houston
METRO	Metropolitan Transit Authority of Harris County
MOCA	Mayor's Office of Cultural Affairs
MOR	Mayor's Office of Resilience
MORS	Mayor's Office of Resilience and Sustainability
NHPD	National Housing Preservation Database
OEM	Office of Emergency Management
PD	Planning Department
PW or HPW	Public Works
SN	Super Neighborhood
SWMD	Solid Waste Management Department
TDHCA	Texas Department of Housing and Community Affairs
TX-PACE	Texas Property Assessed Clean Energy
TxDOT	Texas Department of Transportation
US HUD	United States Housing and Urban Development

APPENDIX F
ENDNOTES

EXECUTIVE SUMMARY

1 *Resilient Houston*: 130

THE PROCESS

2 *Climate Impact Assessment*: 9
3 *Ibid*: 7
4 NOAA National Centers for Environmental Information State Climate Summaries 2022 Texas: https://statesummaries.ncics.org/chapter/tx/ (Accessed: 26 Feb 2023).
5 It is recommended that the community work in partnership with the City where funding and staffing permits. Doing so establishes buy-in with a wider group of stakeholders and creates greater credibility when the City stands behind the plan.
6 Stockholm Resilience Centre www.stockholmresilience.org/research/research-news/2015- 02-19-what-is-resilience.html
7 National Academies of Sciences, Engineering, and Medicine www.nationalacademies.org/topics/resilience/
8 *Resilient Houston* (targets and goals table).
9 https://cops.usdoj.gov/html/dispatch/04-2015/a_new_procedural_justice_course.asp

THE NEIGHBORHOOD

10 https://www.ejnet.org/ej/principles.pdf
11 Quotation from anonymous East Houston resident at a Neighborhood Resilience Planning public engagement event.
12 AccelAdapt, 2023.
13 Houston Galveston Area Council Basin Highlights Report: https://datalab.h-gac.com/BHR2017/index.html
14 Community members voiced concern about the stormwater impacts of new development, so it's important to highlight that new development is being built to substantially higher requirements than original development, so should not have the same neighborhood wide effects that previous development activity has had. The Robin's Landing is designed to meet the City's low impact development requirements and Harris County Flood Control's Atlas 14 standards, which means the development is designed not to exacerbate stormwater flooding through design features such as on-site detention ponds and stormwater system upgrades.
15 Tree Equity Score: https://treeequityscore.org/map/#11.06/29.7811/-95.286
16 Environmental Protection Agency: https://www.epa.gov/green-infrastructure/reduce-urban-heat-island-effect
17 CDC Social Vulnerability Index (SVI 2020) dataset based on the American Community Survey (ACS)

THE PLAN

*Resilient Houston*: 72
18 Crimmins, A., et al., Executive Summary, in The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment. 2016, U.S. Global Change Research Program: Washington, DC. p. 1–24.
19 *Resilient Houston*: 141
20 *Ibid*: 50
21 Green infrastructure varies greatly in type, and with it the associated maintenance requirements. Generally, GSI has lower maintenance costs because GSI uses natural systems that are fundamentally self-regulating or self-sustaining.

The City of Portland, for example, reports a biannual maintenance requirement for the City's urban bioretention planters in the public right-of-way. Additionally, since GSI tends not to use turf grass, the associated mowing, weeding, aeration, watering, and fertilization requirements of maintaining turf grass are eliminated.

21 *Resilient Houston*: 108

22 *Ibid*: 79

23 https://www.epa.gov/climate-adaptation/climate-adaptation-and-epas-role#:~:text=Adaptive%20capacity%20is%20the%20ability,or%20coping%20with%20the%20consequences.)

24 *Resilient Houston*: 50

25 *Ibid*: 77

26 https://www.energy.gov/energysaver/do-it-yourself-home-energy-assessments

27 *Resilient Houston:* 50

28 *Ibid:* 81

29 Houston Public Library has partnered with Habitat for Humanity to bring a new library to the Robin's Landing. The proposed location is outside of the floodplain and more centrally within the neighborhood, and will be in a newly constructed building.The re-establishment of a neighborhood library brings back a critical public space and facility into the neighborhood, and may service some passive resilience functions such as a cooling or heating center, charging center, internet cafe, job center, and others, but cannot serve as a resilience hub. The Robin's Landing is designed to meet the City's low impact development requirements and Harris County Flood Control's Atlas 14 standards, which means the development is designed not to exacerbate stormwater flooding through design features such as on-site detention ponds and stormwater system upgrades.

30 *Resilient Houston:* 81

31 *Ibid:* 121

32 *Ibid:* 50

33 *Ibid:* 63

34 *Ibid:* 97

35 City of Houston's Tree Planting Guidebook: https://www.houstontx.gov/parks/pdfs/2015/TreePlantingGuideBooklet_Eng.pdf

36 The 15-minute neighborhood is created by prioritizing pedestrian and cyclist mobility over vehicle mobility, and allowing for a mixture of uses such that residents can reach essential services, jobs, and other key destination within fifteen minutes of walking or biking from their home or workplace.

37 *Resilient Houston:* 80

38 *Ibid:* 96

38 *Ibid:* 104

APPENDIX F
ILLUSTRATIONS

STATEMENT FROM THE MAYOR

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PLANNING PROCESS

VULNERABILITY ASSESSMENT

VISION

PROJECTS

APPENDIX F
ILLUSTRATIONS

NEXT STEPS & IMPLEMENTATION

APPENDICES

ACKNOWLEDGMENTS

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Chris B. Brown, Controller

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Abbie Kamin, District C
Carolyn Evans-Shabazz, District D
Dave Martin, District E
Tiffany D. Thomas, District F
Mary Nan Huffman, District G
Karla Cisneros, District H
Robert Gallegos, District I
Edward Pollard, District J
Martha Castex-Tatum, District K
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David Robinson, At-Large Position 2
Michael Kubosh, At-Large Position 3
Letita Plummer, At-Large Position 4
Sallie Alcorn, At-Large Position 5

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Climate Adaptation Partners
Community Lattice
Black United Fund of Texas
Enterprise Community Partners
5Engineering
Fernleaf

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Doris Brown
Janice Thomas
Kimberly Lee
Philip Jones

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Department of Neighborhoods (DON)
Housing and Community Development (HCD)
Houston Fire Department (HFD)
Houston Health Department (HHD)
Houston Parks and Recreation (HPARD)
Houston Public Library (HPL)
Houston Public Works (HPW)
Mayor's Office of Complete Communities (MOCC)
Mayor's Office of Economic Development (MOED)
Mayors Office of Cultural Affairs (MOCA)
Mayor's Office of Resilience and Sustainability (MORS)
Office of Business Opportunity (OBO)
Office of Emergency Management (OEM)
Planning and Development (PD)
Solid Waste Management (SWD)

Outside Organizations
CenterPoint Energy
Harris County Flood Control District (HCFCD)
Houston Independent School District (HISD)
Houston Metropolitan Transit Authority (METRO)

Special Thanks To The Following Organizations For Their Participation And Guidance
Habitat for Humanity
Hawes Hill and Associates
Houston Advanced Research Center (HARC)
Houston Land Bank

Resilience is a process.

In the East Houston Neighborhood Resilience Plan you will find short-term projects that will start to create change soon, but also longer-term projects that will still take work.

Use this document to learn about your vulnerabilities, read about the projects, be inspired to develop new initiatives, and build the partnerships necessary to continue creating change in the community.

CITY OF HOUSTON HOUSING AND COMMUNITY DEVELOPMENT

PLANNING & DEVELOPMENT DEPARTMENT

RESILIENT HOUSTON

one architecture

climate adaptation partners
resilience through collaborative partnerships

COMMUNITY LATTICE

5engineering

Enterprise

FERNLEAF INTERACTIVE