



CITY OF HOUSTON | HOUSING AND COMMUNITY DEVELOPMENT DEPARTMENT

DRAFT ACTION PLAN FOR  
DISASTER RECOVERY

# 2021 WINTER STORM

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## A. Executive Summary

Overview. The U.S. Department of Housing and Urban Development (HUD) announced that the *City of Houston* will receive \$30,296,000 in funding to support long-term recovery efforts following *2021 Winter Storm (the 2021 Winter Storm)* through the *Office of the Assistant Secretary for Community Planning and Development, HUD*. Community Development Block Grant-Disaster Recovery (CDBG-DR) funding is designed to address needs that remain after all other assistance has been exhausted. This plan details how funds will be allocated to address remaining unmet need in *the City of Houston*.

To meet disaster recovery needs, the statutes making CDBG-DR funds available have imposed additional requirements and authorized HUD to modify the rules that apply to the annual CDBG program to enhance flexibility and allow for a quicker recovery. HUD has allocated \$30,296,000 in CDBG-DR funds to the *City of Houston* in response to the *2021 Winter Storm (2021 Freeze) (FEMA DR-4586)* through the publication of the Federal Register, Vol. 87, No. 100, Tuesday, May 24, 2022 ([https://www.hud.gov/sites/dfiles/CPD/documents/CDBG-DR/87\\_FR\\_31636.pdf](https://www.hud.gov/sites/dfiles/CPD/documents/CDBG-DR/87_FR_31636.pdf)). This allocation was made available through *the Disaster Relief Supplemental Appropriations Act, 2022 (Pub. L. 117-43) approved September 30, 2021*.

### 1. Disaster Specific Overview

In February 2021, severe winter storms plagued the State of Texas for almost a week. The 2021 Winter Storm (Winter Storm Uri or the 2021 Freeze) was a severe weather event in which a record amount of snow and ice impacted the entire State of Texas, including the City of Houston. The 2021 Winter Storm lasted for 5 days, February 13 -17, 2021, and on February 20, 2021, the President of the United States approved a Texas Disaster Declaration. With the State's power grid unable to produce electricity, an estimated 70% of Texans lost power and almost 50% did not have access to water.<sup>1</sup> The record snow and ice created hazardous traveling conditions, which restricted access to shelters, grocery stores, hospitals, and other services. Because of these conditions, over 200 people perished, and the estimated direct and indirect financial loss ranges from \$80 to \$130 billion<sup>2</sup>, with an insured loss estimated at \$10 - \$20 billion<sup>3</sup>.

With extremely low temperatures, including a low of 13 degrees on Tuesday, February 16, 2022, many Houstonians lost power and water. The *Winter Storm Uri Survey* conducted by the University of Houston estimated that 91% of Houston area residents lost power, which is significantly higher than in other counties. Houston area residents also seemed to experience a disproportionate loss of water compared to other Texas counties, with 65% of the population being without water during the storm. Because of the freezing temperature, about 38% of Houstonians experienced bursting pipes and suffered water damage, and despite the risk of carbon monoxide poisoning and other hazards, many Houstonians took extreme measures to stay warm

- 34% of Houstonians used natural gas ovens or cooktops
- 9% used a grill or smoker indoors
- 8% used an outdoor propane heater indoors<sup>4</sup>

Given the severe conditions, the State of Texas' 87th Legislature took actions to mitigate extreme power outages; however, some residents have yet to recover, both physically and financially from the impacts of the 2021 Winter Storm. While many residents have recovered, they may not be prepared for another freeze. With rapid climate

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<sup>1</sup> *The Winter Storm of 2021 Survey*, University of Houston, March 19, 2021. Available at <https://uh.edu/hobby/winter2021/>.

<sup>2</sup> Brian K. Sullivan, Texas Deep Freeze Could Cost \$90 Billion in Losses, Bloomberg, February 24, 2021. Available at <https://www.bloomberg.com/news/articles>.

<sup>3</sup> Garrett Golding, Anil Kumar, and Karel Mertens, *Cost of Texas' 2021 Deep Freeze Justifies Weatherization*, Federal Reserve of Dallas, April 15, 2021. Available at <https://www.dallasfed.org/research/economics/2021/0415.aspx>

<sup>4</sup> *The Winter Storm of 2021 Survey – Harris County*, University of Houston, March 19, 2021. Available at <https://uh.edu/hobby/winter2021/>.

change, a freeze may be likely to occur again, and many homes are not weatherized and cannot withstand such extreme temperatures and weather conditions.

On March 22, 2022, HUD allocated nearly \$3 billion in Community Development Block Grant Disaster Recovery (CDBG-DR) funds appropriated through the Disaster Relief Supplemental Appropriations Act, 2022 for major disasters occurring in 2020 and 2021, which includes the 2021 Winter Storm. On May 24, 2022, HUD published a Federal Register notice titled *Allocations for Community Development Block Grant Disaster Recovery and Implementation of the CDBG-DR Consolidated Waivers and Alternative Requirements Notice*, 87 Fed. Reg. 100, 31636 (“87 FR 31636”) about the \$2.2 billion in CDBG-DR funds specifically allocated to grantees recovering from qualifying disasters in 2021 such as the 2021 Winter Storm. This notice, and any subsequent notices, describes grant requirements and procedures applicable to CDBG-DR funds.

These funds have been allocated to help communities with long-term recovery and restoration from disasters like the 2021 Winter Storm and to implement mitigation activities that reduce risks in the most impacted and distressed (MID) areas in future disasters. This Action Plan will provide a framework for how CDBG-DR funds will be utilized to achieve these goals, and it will include a needs assessment that will review unmet housing, infrastructure, and economic recovery needs along with the estimated damage and impacts. The needs assessment will guide the development and prioritization of planned recovery activities and mitigation activities, particularly in MID areas.

## 2. Summary

Given the disruption and damage caused by the 2021 Winter Storm and the compounding impacts from previous disasters, unmet needs in the City of Houston remain significant. The City is committed to addressing these needs and supporting an equitable disaster recovery process that leverages other resources to support the recovery effort.

The City of Houston Housing and Community Development Department (HCD) used available data and conducted resident and stakeholder engagement to produce an unmet needs assessment. The resident and stakeholder engagement included a resident survey, a stakeholder survey, stakeholder interviews, a public hearing, and a 30-day comment period. The public hearing was recorded and made available to the public after the meeting.

The unmet needs assessment and public engagement directly informed the strategies and funding decisions for the City’s Community Development Block Grant Disaster Recovery for the 2021 Winter Storm (CDBG-DR21). Houstonians were impacted Approximately, 102,783 households were impacted by the 2021 Winter Storm, and FEMA estimated \$39,306,713 in verified residential loss.

The following table provides a summary of disaster impacts from the 2021 Winter Storm (FEMA DR-4586) with the program allocation amounts.

Table 1: Unmet Need and Proposed Allocation

Category	Remaining Unmet Need	% of Unmet Need**	Program	Program Allocation Amount*	% of Program Allocation*
Housing	TBD**	-	Winter Storm Home Repair	\$23,879,200	78%
			Renter Housing Counseling	\$550,000	2%
Infrastructure	\$0	-		-	
Economic Revitalization	\$4,934,239	-		-	
Mitigation	-	-	Neighborhood Facilities Resilience	\$4,152,000	15%

Source: HCD

\*Allocation amount includes project delivery costs and does not include administration and planning costs.

\*\*The City has requested but not received applicable housing data to calculate the remaining housing unmet need. The City anticipates receiving data soon.

The primary objectives of CDBG-DR21 are to assist Houston residents by repairing and reconstructing storm damaged homes, to reimburse homeowners for eligible repairs to their homes, create more resilient neighborhood facilities that can be support residents before, during, and after a disaster, and assist renters to find and maintain housing. The following activities will be funded using CDBG-DR21, Winter Storm Home Repair Program, Neighborhood Facilities Resilience Program, Renter Housing Counseling Program, Planning, and Administration.

## B. Unmet Needs Assessment

### 1. Overview

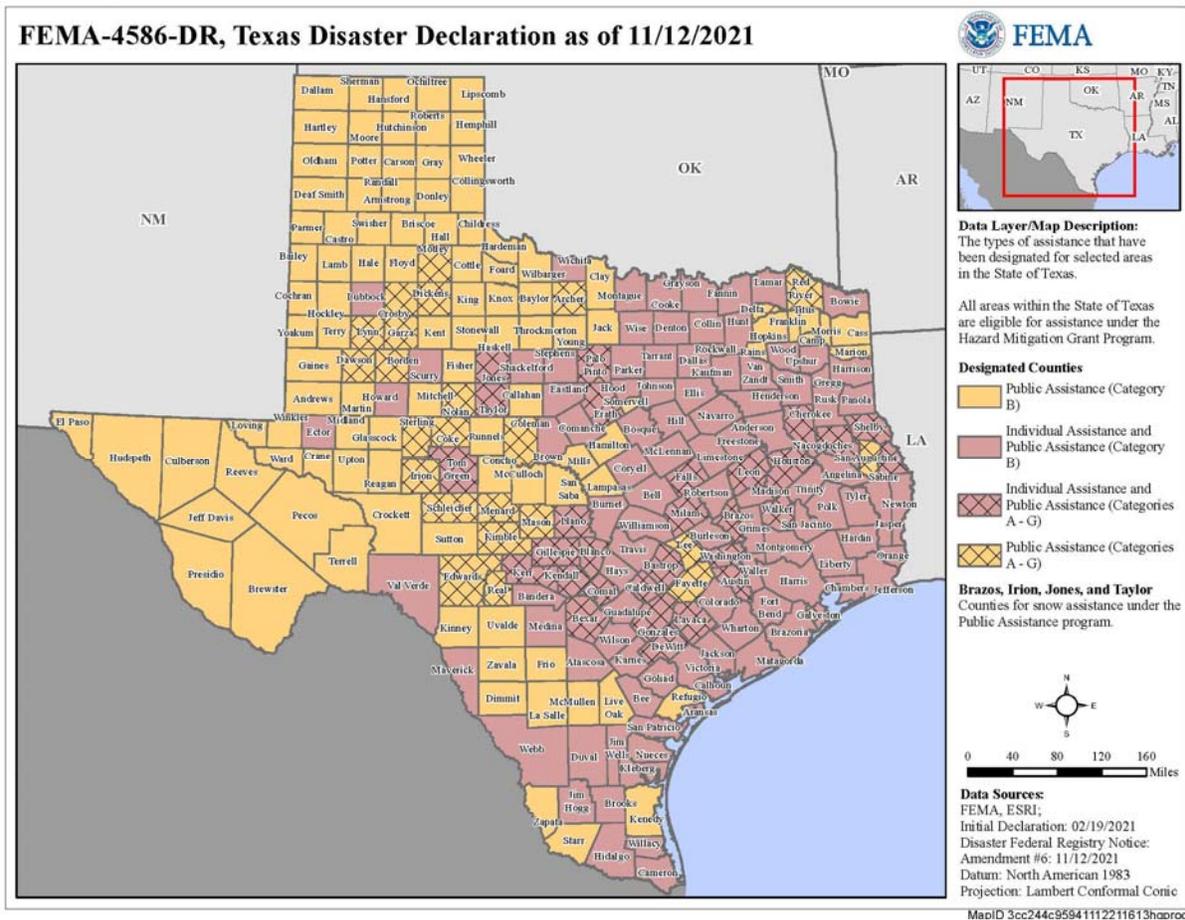
The City of Houston performed a needs assessment to identify the effects, long-term needs, and priorities for CDBG-DR funding.

The needs assessment includes specific details about unmet needs within the City of Houston. This includes details for housing, infrastructure, and economic revitalization. This assessment takes into consideration pre-disaster needs in addition to unmet recovery needs resulting from the 2021 Winter Storm. It discusses additional types of assistance that may be available to affected communities and individuals, such as insurance, other federal assistance, or other possible funding sources. Additional data may become available and adjustments or amendments to the Action Plan may be needed to incorporate this data.

#### a. Background

The following Federal Emergency Management Agency (FEMA) map illustrates the federally declared disaster areas and the type of FEMA funding approved for each impacted county from the 2021 Winter Storm. The entire City of Houston is within counties that FEMA designated for FEMA Individual Assistance (FEMA IA). FEMA IA designation allows the individuals and households in these counties to apply for financial and direct services after a federally declared disaster.

Figure 7: Map of DR-4586 Disaster Declaration Areas



Source: FEMA

### b. HUD Designated Most Impacted and Distressed Areas

HUD has designated the entire City of Houston as a “Most Impacted and Distressed” area (MID area). The City will spend 100 percent of the CDBG-DR funds in the City of Houston.

### c. Summary of Disaster Impacts

In mid-February 2021, a severe winter storm hit Texas leaving millions of people without power. The freezing temperatures caused disruptions in electricity and natural gas services in Texas, resulting in issues for Houstonians, including the loss of drinking water, chemical exposure coming from inside the home, and damage to buildings, including burst pipes causing additional damage to building interiors and personal property.

The 2021 Winter Storm hit Texas while residents continued to live under pandemic conditions wrought by the COVID-19 pandemic. Additionally, Houstonians continue to recover from six flooding disasters beginning in 2015, which includes the largest disaster, Hurricane Harvey. Multiple disasters have left Houstonians with compounding impacts including no financial savings, increased amounts of debt, continued deferred home maintenance, and other resilience challenges. These disasters have highlighted the need for continued disaster recovery and mitigation efforts, resilience planning, and program implementation in impacted and vulnerable areas.

The impacts from recent disasters have further exacerbated housing affordability in Houston, limiting housing options for low- and moderate-income (LMI) residents. Overall market conditions in the United States and the world show higher inflation and have limited the availability of building materials further causing housing construction and repair work to continue to increase in price. In addition, these disasters have left many with unrepaired homes or deferred maintenance issues, making them more vulnerable to future disasters.

## 2. Housing Unmet Need

### a. Disaster Damage and Impacts - Housing

As the City of Houston was recovering from FEMA-declared damage resulting from the floods in 2015 and 2016, Hurricane Harvey, and Tropical Storm Imelda, the city’s housing stock was still rebounding. The 2021 Winter Storm has exposed new challenges to the City’s approach to preparing for disaster events and reducing risk for all residents.

#### *Overview of Data Sources*

This section examines the data available to understand impacts the 2021 Winter Storm had on housing in Houston. Sources include FEMA Individual Assistance, Small Business Administration (SBA), Texas Department of Insurance, and non-profit organizations, like Connective.

#### *Limitations of Data*

This section presents an analysis of data to reflect the damage caused by the 2021 Winter Storm in Houston and to demonstrate the ongoing unmet recovery needs of residents impacted by the 2021 Winter Storm. Ultimately, no one data source accurately captures the population impacted by the 2021 Winter Storm. This Action Plan and unmet needs analysis captures a point in time and reflects the best available data at the time of its publication. In addition to using the methodology outlined by HUD to calculate housing unmet needs, other data and information is also used to validate the FEMA IA data and to get a more complete assessment of impacts and unmet needs.

- **FEMA Individual Assistance (IA)** – The Federal Emergency Management Agency (FEMA) Individual Assistance Program is the primary basis for establishing housing unmet recovery need for CDBG-DR grantees. Residents register voluntarily for FEMA IA, and eligible applicants include both renters and owners. FEMA Verified Loss awards only aid with repair and replacement to make the home habitable. Because of this, the full damage and recovery assistance needed for full recovery may not be documented

through this program. In addition, there may be a gap between what the FEMA data indicates and the true disaster impacts as it may not capture households that did not register for assistance due to lack of knowledge of the program or certain immigrant resident's fear of applying for government assistance. However, it does provide data at the household level, including income and damage, needed to perform the calculation of unmet needs outlined in the Federal Register Notice.

- **Small Business Administration** – Similar to FEMA IA, the SBA Disaster Loan Program is a voluntary program that is made available to impacted households. As a loan program, SBA residential loan registrations skew towards homeowners. However, compared to FEMA Verified Loss inspections, which only cover the cost for repair and replacement, SBA loan amounts are based on an inspection that covers the full cost to restore a home.
- **American Community Survey 2020 (ACS-5 Year) and Decennial Census (DEC 2020)** – The American Community Survey (ACS) is updated annually and is based on a sample of United States residents (3.5 million) in the 50 states. The ACS asks more comprehensive questions than the ten-year census with the goal of making this information available to communities each year. The census, on the other hand, is conducted every ten years and counts every person living in the United States. The census asks a shorter set of questions concerning age, sex, race, Hispanic origin, and owner/renter status. The goal of the decennial census is to provide an official count of the population. The relevant ACS and DEC data are used in this report...
- **Center for Disease Control(CDC) / Agency for Toxic Substances and Disease Registry Social Vulnerability Data (ATSDR)** – The CDC/ATSDR Social Vulnerability Index was created as a geographic database to help emergency response planners and public health officials identify and map communities to prepare and respond to disaster events. The index ranks each census tract in the United States (and aggregates into the county level) on 15 social factors, including socioeconomic status – below poverty, unemployment rate, income, no high school diploma, household composition and disability – age 65 or older, age 17 or younger, civilian with a disability, single-parent households, minority status and language – minority and speaks English “less than well”, and housing type and transportation – multi-unit structures, mobile homes, crowding, no vehicle, group quarters. The benefit of this data is that it provides an aggregate score to better understand holistic vulnerabilities compared to similar geographies around the United States. The limitation of this data is that it was last updated in 2018 and therefore, may be outdated.
- **Homeless Point-In-Time Count** – The Point-In-Time (PIT) Count is an annual count conducted by every Continuum of Care (CoC) in the country throughout a single night in January. It counts the number of people housed in emergency shelter, transitional housing, Safe Havens, and the number of unsheltered people. Because the count only takes place on one day, it is a static count and may not reflect annual numbers. Because point-in-time counts include the number of people sleeping outside and in shelters, they often undercount the “hidden homeless” – people experiencing homelessness who are sleeping in motels, on friends' couches, in cars, etc. This count often underestimates children and families experiencing homelessness.
- **Low- and Moderate-Income Data** – This data is available on HUD Exchange at the block group, census tract, and county levels. The limitation of this data is that the LMI calculations come from the 2011-2015 ACS data and may be outdated. According to the description of the LMI data provided, the statistical information used in the calculation of estimates identified in the data sets comes from two sources: 1) the 2011-2015 American Community Survey (ACS), and 2) the Income Limits for Metropolitan Areas and Non-Metropolitan Counties. The data necessary to determine an LMI percentage for an area is not published in the ACS data tables. Therefore, the Bureau of Census matches the family size, income, and income limits in a special tabulation to produce the estimates.

### *Disaster Survey*

Immediately after the 2021 Winter Storm, Connective, an organization that works with funders and service providers to implement technology tools for human-centered social service programs, deployed a needs assessment survey to community partners and the community at large. This survey was developed in partnership with the Kinder Institute

(<https://harveyhomeconnect.tfaforms.net/186>). The data collected from the survey was given to nonprofit and philanthropic partners to inform pending recovery programming. This survey also captures contact information so that Connective could connect residents to services that they expressed a need for when those services became available.

According to the Kinder Institute’s analysis of the Connective Disaster Survey findings in the *Harris County Winter Storm Uri Resilience Assessment*, the most common damages reported by survey respondents included interior and exterior burst pipes, power loss for 4+ days, roof leaks, electrical systems, and heating system. When asked what needs they still lacked 2-3 months after the 2021 Winter Storm, survey respondents indicated that basic needs, such as food, water shelter, were still most needed, as many residents were still in crisis following the disaster. This may also show that because of compounding damages from other disasters, residents lack financial means and are first concerned with finding necessities. After basic needs, the next highest household need cited by survey respondents was emergency home repair.

Table 2: Household Needs 2-3 Months After Storm

Needs	Number of Households
Food Assistance	3,890
Utilities Assistance	3,602
Rent / Mortgage Assistance	3,399
Drinking Water	3,386
Emergency Home Repairs	2,157
Other Supplies	1,639
Mental Health Counseling	1,310
Temporary Relocation Assistance	888
Transportation Assistance	648
Other Services	350
Legal Aid	248

Source: *Harris County Winter Storm Uri Resilience Assessment*, Kinder Institute (2022) and Connective Disaster Survey 2021

### *Houston Harris County Winter Storm Relief Fund*

In February 2021, Houston Mayor Sylvester Turner and Harris County Judge Lina Hidalgo established the Houston Harris County Winter Storm Relief Fund to help the region’s most vulnerable residents after the 2021 Winter Storm. The Greater Houston Community Foundation (GHCF) and United Way of Greater Houston oversaw and administered the grant distribution process. The fund raised \$17 million in donations and disbursed all available funds through six rounds of funding to 58 nonprofit partners providing critical resources and recovery services to vulnerable families impacted by the winter storm throughout the City of Houston and Harris County.

Table 3: Houston Harris County Winter Storm Relief Fund

Service Area	Amount Dispersed	Individuals Served	Households Served
Emergency Financial Assistance	\$5,832,500	23,411	7,141
Home Repair	\$10,175,000	3,682	1,252
Systems Coordination	\$739,626	NA	NA
<b>Total</b>	<b>\$16,747,126</b>	<b>27,093</b>	<b>8,393</b>

Source: Houston Harris County Winter Storm Relief Fund Interim Impact – One Year Later, February 15, 2022 ([https://winterstormrelieffund.org/wp-content/uploads/2022/02/2021\\_HHC-WSRF\\_Interim-Impact-Report-2.18.22.pdf](https://winterstormrelieffund.org/wp-content/uploads/2022/02/2021_HHC-WSRF_Interim-Impact-Report-2.18.22.pdf))

Note: Some individuals and households received both Emergency Financial Assistance and Home Repair Services.

The Emergency Financial Assistance program was administered by the United Way of Greater Houston and used nonprofit partners to provide financial assistance directly to those in need. The households served were almost all (98%) low- and moderate-income with 88% of households earning 60% of the area median income or less. Almost half (48%) of all people served were Hispanic / Latino and 37% were African American / Black. Over two-thirds (68%) were renters and 27% were homeowners.

In partnership with Connective, 15 home repair partners provided home repair services for low-income communities in the Houston area in to address impacts of the 2021 Winter Storm also funded by the Houston Harris County Winter Storm Relief Fund. In addition, Connective provided reimbursement assistance directly to Houston area residents by reimbursing homeowners who had paid for their repairs out of pocket. The cap of reimbursement assistance per household was \$5,000 with some exceptional cases being allowed up to \$10,000. As of February 2022, the program had completed 1,252 home repairs for homeowners with the average repair cost at \$4,200 in Tier 1 and \$4,000 in Tier 2, and 152 households received reimbursement. All households assisted with home repair services were low- and moderate-income with the majority (81%) earning 60% or less of the area median income. All households receiving reimbursement earned 120% or less than the area median income with the majority (88%) of households earning below 80% of the area median income. Almost all (94%) households assisted lived in single-family homes. Almost half (47%) of the homeowners served had insurance, but 83% could not afford the deductible. As of June 2022, Connective reported serving 152 households with reimbursement and 2,243 households with home repair.

### *Project Snapshot*

Well into the implementation of their home repair program addressing impacts of the 2021 Winter Storm, in August 2021, Connective began to require agencies to complete an additional form to close-out home repair cases. This form was introduced to gather data about deferred maintenance of homes. Many home repair agencies had to repair deferred maintenance issues to make disaster-affected homes habitable again. Deferred maintenance needs may not have been directly caused by the storm but are often not planned for in disaster recovery home repair funding, even though they are a consistent, necessary cost. The data gathered from the form is called Project Snapshot and attempts to quantify outstanding repair needs, which are the repairs a home needed after the home repair agency completed repairs. Project Snapshot represents repairs that the homes assisted with home repair through the Houston Harris County Winter Storm Relief Fund likely still need but fell outside of the winter storm funding scope of repairs.

Approximately half of the completed home repair projects have completed Project Snapshot forms. Of 262 homes that were estimated to have deferred maintenance and are still in need of repair, the total estimated cost to make full repairs is \$2,637,822. Project Snapshot included assessments of the home's envelope, including roofing, siding, windows, interior repairs, mechanical, electrical, and plumbing repairs, as well as structural costs.

### *Insurance*

Insurance is one way that can significantly assist residents after a disaster. However, as described earlier, most homeowners with unmet needs do not have homeowners' insurance. The Texas Department of Insurance summarizes the insurance data for property insurance, automobile insurance, and all other lines of insurance, which make up almost all of the insurance markets in Texas.

As of December 31, 2021, about 96% of the residential property claims related to the 2021 Winter Storm were closed, but insurers are still investigating and adjusting commercial property claims. The average case incurred loss for residential property was \$17.2 thousand and for commercial property it was \$145.6 thousand in Texas. Approximately 85.1% of claims in Texas were residential property; 10.1% were commercial property; and 3.9% were automobile claims. Harris County was the county with the most reported claims (111,705), the most total paid losses (\$1,568.8 million), and most total case-incurred losses (\$1,982.1 million). City of Houston applicants made up 10.8% of all applicants in Texas. About 9.7% of all case-incurred losses in the state were in Houston, and 10.5% of the paid

losses in Texas were in Houston. Almost \$200 million, or 20% of the case-incurred losses are left outstanding in Houston.

Table 4: Insurance

Area	Reported Claims	Paid Losses	Case Incurred Losses
City of Houston	54,970	796,100,000	\$989,200,000
State of Texas	508,529	7,573,900,000	\$10,163,200,000

Source: *Insured Losses Resulting from the February 2021 Texas Winter Weather Event*, data as of December 31, 2021, Texas Department of Insurance

### FEMA Individual Assistance (FEMA IA)

The Federal Emergency Management Agency (FEMA) Individual Assistance (IA) Program is direct assistance provided through grant payments made directly to the disaster survivor and will supplement disaster damages not covered under insurance. For the 2021 Winter Storm, FEMA IA made several programs available, including

- Other Needs Assistance (ONA) provides financial assistance for expenses related to medical and dental, funeral costs, repair/replacement of personal items, and other expenses.
- Housing Assistance provides financial assistance for temporary housing, repair, replacement and semi-permanent or permanent housing construction
- Disaster Unemployment Assistance (DUA) provides unemployment benefits and re-employment services to individuals who have become unemployed because of a major disaster and who are not eligible for regular State unemployment insurance
- Disaster Legal Assistance (DLS) provides legal assistance to low-income individuals who, before or because of the disaster are unable to secure legal services adequate to meet their disaster-related needs.
- Other programs like the Crisis Counseling Assistance and Training Program (CCP) and Disaster Case Management (DCM)

FEMA IA is the primary basis for establishing housing unmet recovery need for CDBG-DR grantees. Despite the limitations of FEMA IA data, which likely undercounts and undervalues the true impacts of the disaster, the following section provides an overview of the housing impacts for FEMA DR-4586 – Texas Severe Winter Storms. The following FEMA IA data is from June 4, 2022 downloaded from [OpenFEMA Dataset: Individuals and Households Programs – Valid Registrations – v1](#). The City anticipates receiving additional FEMA IA data soon to calculate the unmet housing need as defined in the Federal Register Notice.

A total of 102,783 applicants registered for FEMA IA assistance in Houston, including 43,668 homeowner applicants and 59,030 renter applicants. After FEMA inspections occurred, 16,0851 were determined to have loss that could be verified due to the 2021 Winter Storm making them eligible for disaster assistance. This is known as FEMA Verified Loss. The total FEMA verified loss in Houston for the 2021 Winter Storm is \$39,306,713.

Table 5: Total FEMA IA Applications in the City of Houston

Occupancy Type	Total Applications	FEMA Verified Loss Over \$0
Owner	43,668	10,048
Renter	59,030	6,903
N/A (Not Applicable)	85	0
<b>Total</b>	<b>102,783</b>	<b>16,851</b>

Source: *OpenFEMA Dataset, FEMA IA as of June 4, 2022*

### FEMA Applications by Tenure and Housing Type

FEMA applications can be categorized in different ways, including by housing type and by tenure, which is illustrated in the table below. The number of renter applications far exceeded the number of homeowner applications, and the

number of inspections performed for renters slightly exceed the inspections performed for homeowners. The number of homeowners receiving assistance is almost one third more than renters, and the total FEMA verified loss for homeowners was over four times the loss amount for renters.

Almost all homeowner applicants lived in a single-family home. Although more renters living in multifamily developments applied for FEMA IA assistance, most renters receiving assistance lived in single-family homes.

Table 6: FEMA IA Applications in the City of Houston by Tenure and Housing Type

Occupancy Type	Number of Applications	Number of Inspections	Number Inspected with Damage	# Received Assistance	Total FEMA Verified Loss	Average FEMA Verified Loss
Owner	43,668	11,372	10,048	8,239	\$31,615,192	\$3,146
Single-Family	40,844	10,695	9,497	7,794	\$30,127,617	\$3,172
Multifamily	637	164	118	93	\$356,741	\$3,023
Other*	2,187	513	433	352	\$1,130,834	\$2,612
Renter	59,030	12,423	6,903	6,325	\$7,691,521	\$1,114
Single-Family	22,717	7,072	4,144	3,946	\$4,613,481	\$1,113
Multifamily	34,306	5,132	2,699	2,309	\$3,026,669	\$1,121
Other*	2,007	219	60	70	\$51,372	\$856
N/A (Not Applicable)	85	85	-	-	-	-
Single-Family	73	73	-	-	-	-
Multifamily	5	5	-	-	-	-
Other*	7	7	-	-	-	-
<b>Total</b>	<b>102,783</b>	<b>23,880</b>	<b>16,951</b>	<b>14,564</b>	<b>\$39,306,713</b>	<b>\$2,319</b>

Source: OpenFEMA Dataset, FEMA IA as of June 4, 2022

\*Other includes Assisted Living Facility, Boat, Correction Facility, Military Housing, Mobile Home, Other, and Travel Trailer.

When reviewing FEMA IA applications in terms of income, 43% of applicants were from households earning \$30,000 or under, 32% of owner applicants were in this income category and 51% of renter applicants were in this income category. Lower-income applicants are presumed to have less resources to recover from a disaster, and therefore, government assistance may be critical for their recovery.

Table 7: FEMA IA Applicants in the City of Houston by Tenure and Income

Occupancy Type	Number of Applications	Number of Inspections	Number Inspected with Damage	# Received Assistance	Total FEMA Verified Loss	Average FEMA Verified Loss
Owner	43,668	11,372	10,048	8,239	\$31,615,192	\$3,146
\$30,000 or under	13,835	5,048	4,564	3,967	\$14,216,187	\$3,115
\$30,001-\$60,000	11,802	2,716	2,400	1,942	\$7,357,659	\$3,066
\$60,001-\$120,000	6,239	985	848	629	\$2,632,905	\$3,105
Over \$120,000	1,902	214	169	111	\$558,226	\$3,303
N/A	9,890	2,409	2,067	1,590	\$6,850,215	\$3,314
Renter	59,030	12,423	6,903	6,325	\$7,691,521	\$1,114
\$30,000 or under	29,904	6,758	3,843	3,848	\$4,211,826	\$1,096
\$30,001-\$60,000	12,799	2,228	1,204	1,011	\$1,375,783	\$1,143
\$60,001-\$120,000	2,134	348	202	169	\$252,763	\$1,251
Over \$120,000	201	36	18	16	14,461.32	\$803
N/A (Not Applicable)	13,992	3,053	1,636	1,281	1836686.95	\$1,123
N/A (Not Applicable)	85	85	-	-	-	-
<b>Total</b>	<b>102,783</b>	<b>23,880</b>	<b>16,951</b>	<b>14,564</b>	<b>\$39,306,713</b>	<b>\$2,319</b>

Source: OpenFEMA Dataset, FEMA IA as of June 4, 2022

Approved FEMA IA applicants received \$45,365,811 in housing assistance and \$5,104,801 other needs assistance (ONA). Applicants earning under \$30,000 and receiving assistance received approximately half of the total housing assistance funds dispersed. Almost 70%, or \$31,067,197, of the housing assistance funding went to homeowners, and 74%, or \$3,757,670, of the other needs assistance amount went to renters. Although FEMA provided \$45 million for housing assistance, the goal of these funds is to make a home livable, and these funds do not cover all costs related to repair all the damage resulting from the 2021 Winter Storm.

### Small Business Administration – Housing

Eligible FEMA IA applicants that have outstanding repairs or needs can apply through the Small Business Administration (SBA) for a disaster loan. In Houston, SBA had 5,481 applicants for disaster loans, and 939 of the applicants were approved for assistance. Those approved for assistance had an SBA calculated loss of \$29,258,119, of which \$16,990,192 were for loss estimates related to real estate repair or reconstruction. On average approved SBA applicants had \$17,834 in estimated home repair needs.

SBA provides loan assistance for physical damage, like damage to a home, and for economic injury (working capital), which other financial losses incurred. SBA has disbursed \$16,585,900 in loans to applicants, to assist them in the recovery from the 2021 Winter Storm.

### Housing Unmet Needs

The Federal Register Notice outlines the following damage categories by owner-occupied and rental units.

#### FEMA Inspected Owner Units

- **Minor-Low:** Less than \$3,000 of FEMA inspected real property damage.
- **Minor-High:** \$3,000 to \$7,999 of FEMA inspected real property damage.

- **Major-Low:** \$8,000 to \$14,999 of FEMA inspected real property damage and/or 1 to 3.9 feet of flooding on the first floor.
- **Major-High:** \$15,000 to \$28,800 of FEMA inspected real property damage and/or 4 to 5.9 feet of flooding on the first floor.
- **Severe:** Greater than \$28,800 of FEMA inspected real property damage or determined destroyed and/or 6 or more feet of flooding on the first floor.

#### FEMA Inspected Owner Units – Personal Property

- **Minor-Low:** Less than \$2,500 of FEMA inspected personal property damage.
- **Minor-High:** \$2,500 to \$3,499 of FEMA inspected personal property damage.
- **Major-Low:** \$3,500 to \$4,999 of FEMA inspected personal property damage or 1 to 3.9 feet of flooding on the first floor.
- **Major-High:** \$5,000 to \$9,000 of FEMA inspected personal property damage or 4 to 5.9 feet of flooding on the first floor.
- **Severe:** Greater than \$9,000 of FEMA inspected personal property damage or determined destroyed and/or 6 or more feet of flooding on the first floor.

#### FEMA Inspected Rental Units

- **Minor-Low:** Less than \$1,000 of FEMA inspected personal property damage.
- **Minor-High:** \$1,000 to \$1,999 of FEMA inspected personal property damage or determination of “Moderate” damage by the FEMA inspector.
- **Major-Low:** \$2,000 to \$3,499 of FEMA inspected personal property damage or 1 to 3.9 feet of flooding on the first floor or determination of “Major” damage by the FEMA inspector.
- **Major-High:** \$3,500 to \$7,500 of FEMA inspected personal property damage or 4 to 5.9 feet of flooding on the first floor.
- **Severe:** Greater than \$7,500 of FEMA inspected personal property damage or determined destroyed and/or 6 or more feet of flooding on the first floor or determination of “Destroyed” by the FEMA inspector.

According to HUD, only the most impacted homes are to be included in calculations for unmet housing needs. Owner-occupied homes are determined to be most impacted if they have real property damage of \$8,000 or more. Rental homes are determined to be most impacted if they have personal property damage of \$2,000 or more.

To calculate the unmet housing need, the number of housing units determined as the most impacted are multiplied by the multiplier amount corresponding to that category. These multipliers were determined using SBA estimated median repair costs in each of the Major-Low, Major-High, and Severe categories subtracting out the assumed assistance from FEMA and SBA.

The City requested and anticipates receiving additional FEMA IA data soon to calculate the unmet housing need as defined in the Federal Register Notice.

#### a. [Single Family v. Multi-Family Needs; Owner Occupied v. Tenant](#)

Information about impacts to single-family, multifamily, owner, and renter homes can be found in a previous section titled *FEMA Applications by Tenure and Housing Type*.

#### [Definition of Affordable Rents, Income Limits, for Tenants, and Minimum Affordability Periods](#)

The City of Houston will not use CDBG-DR related to this Action Plan to assist with the rehabilitation, reconstruction, or new construction of rental housing. Therefore, the following are currently not specified for CDBG-DR21 activities related to rental housing: definition of affordable rents, income limits for tenants of rental housing that is rehabilitation, reconstructed, or constructed with CDBG-DR funds, and minimum affordability periods.

**b. Public Housing and Affordable Housing**

The following table shows the HUD multifamily assisted properties in the City of Houston. These include, but are not limited to, properties funded with Federal Housing Administration (FHA) mortgage insurance, Section 202 Supportive Housing for the Elderly, and Section 811 Supportive Housing for Persons with Disabilities. According to HUD, all Houston area HUD multifamily assisted properties have reported any needed repairs from the 2021 Winter Storm have been completed. There were no displaced tenants resulting from the 2021 Winter Storm reported at any of these properties.

*Table 8: Multifamily Assisted Housing*

Type of Damage	# of Properties	# of Units	# of Units Assisted	# of Units Waiting Assistance	Remaining Unmet Need
Minor-Low	44	5,263	4,345	0	0
Minor-High	0	0	0	0	0
Major-Low	0	0	0	0	0
Major-High	0	0	0	0	0
Severe	0	0	0	0	0
Total	0	0	0	0	0

Source: U.S. Housing and Urban Development, Multifamily Housing – Southwest Region  
 FEMA does not inspect rental units for real property damage so personal property damage is used as a proxy for unit damage.

The Houston Housing Authority (HHA) serves low-income families by providing housing and services. According to HHA, one public housing community sustained damage from the 2021 Winter Storm, and 19 homes in this community were damaged. The estimated cost of repairs was \$445,000 and included repairs to electrical, plumbing, insulation, sheetrock, flooring, and appliances and electric fixtures. These homes became uninhabitable, and the families had to be relocated due to the damage. A significant challenge was the relocation of these families due to the small number of homes available at an affordable rent.

*Table 9: Public Housing Authorities Damaged*

County / Municipality	Total # PHAs Developments	Total PHAs Damaged	Total PHA Developments Damaged	# of Units Damaged	Remaining Unmet Need
City of Houston / Houston Housing Authority	18	3,135	1	19	\$445,000

Source: Houston Housing Authority

**c. Social Equity, Fair Housing and Civil Rights**

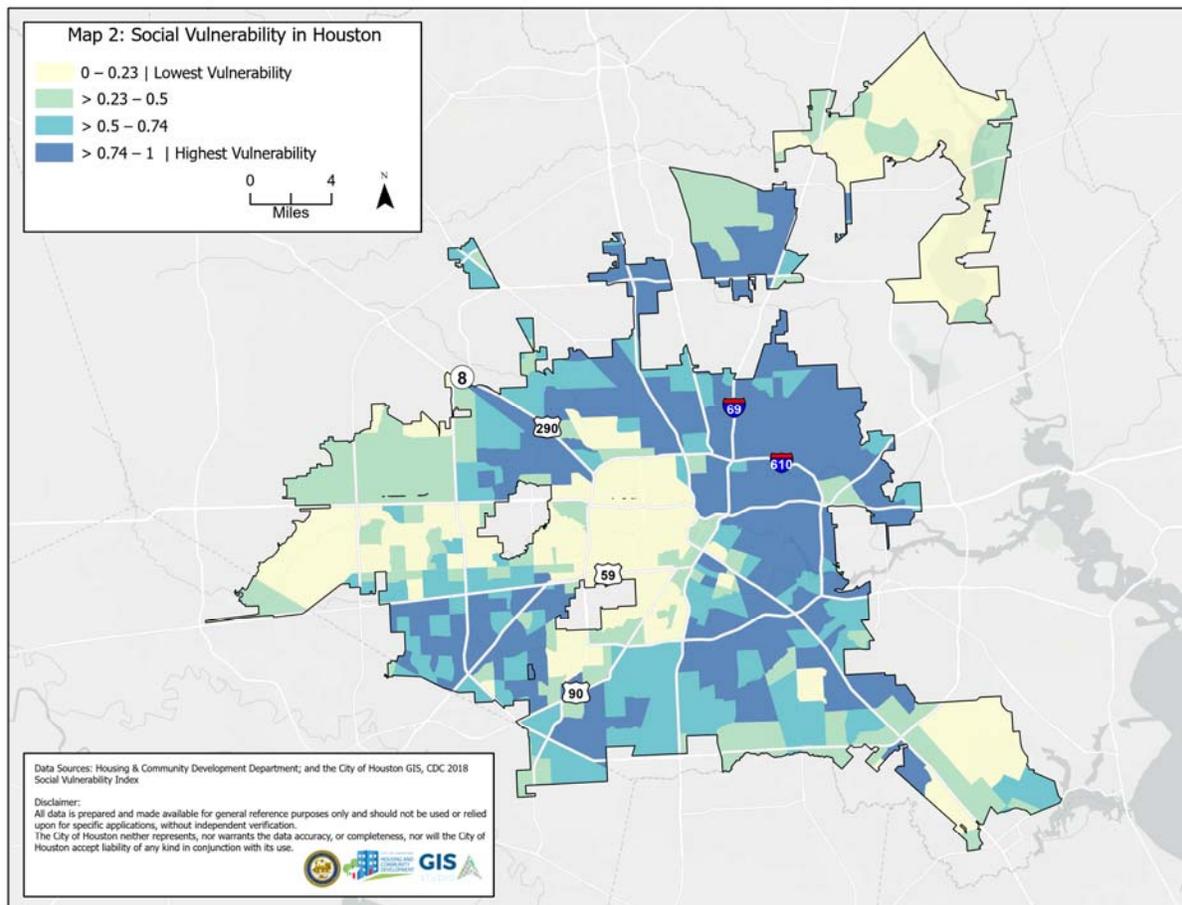
Disaster related risk often corresponds with a high level of social vulnerability, compounding the impact of disaster events with the challenges of poverty for many affected residents. The following section will review the City’s general demographics and disaster impacts related to the 2021 Winter Storm. HUD defines vulnerable populations as a group or community whose circumstances present barriers to obtaining or understanding information or accessing resources. This will include reviewing social vulnerability and the state of different groups of Houstonians including protected classes and homeless individuals, which may be considered vulnerable populations.

*Social Vulnerability*

According to the Centers for Disease Control and Prevention (CDC), “social vulnerability refers to the resilience of communities when confronted by external stresses on human health, stresses such as natural or human-caused disasters, or disease outbreaks. Reducing social vulnerability can decrease both human suffering and economic loss.” The CDC’s Social Vulnerability Index (SVI) uses 15 U.S. census variables at the tract level to help local officials

identify communities that may need support in preparing for hazards; or recovering from disaster.<sup>5</sup> Social Vulnerability Index themes include socioeconomic status, household composition, language, and transportation/housing status. It is important to note that this index does not include environmental hazards or possible environmental hazards in an area. The following map shows the overall Social Vulnerability Index for the City of Houston.

Figure 2: Map of Social Vulnerability in Houston



In the *Harris County Winter Storm Uri Resilience Assessment*, the Kinder Institute analyzed the following housing factors at the zip code level to determine where housing stock is most vulnerable to the effects of a disaster event.

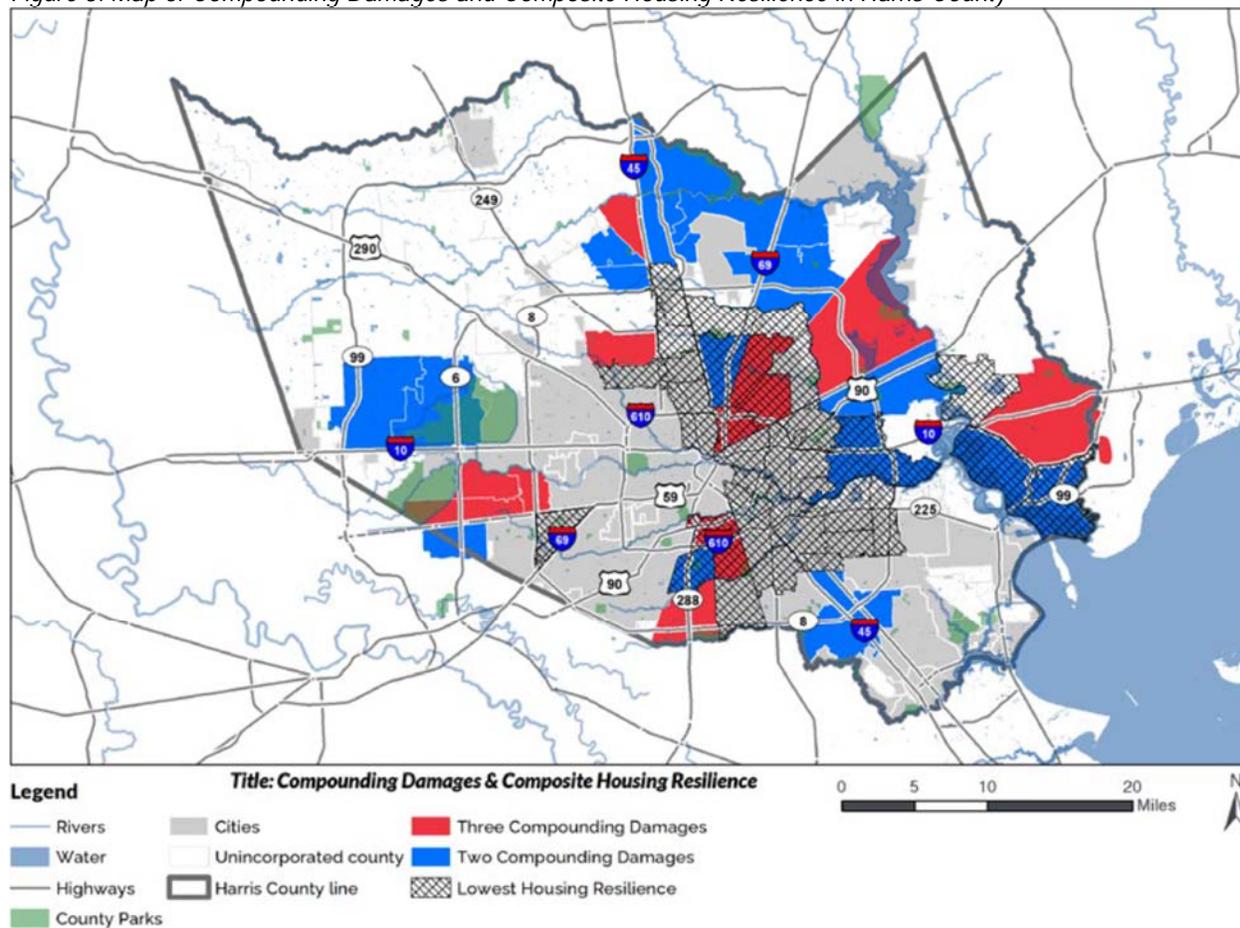
- Median age of housing
- Share of owner-occupied units under \$100,000 in home value
- Median gross rent
- Share of low-quality housing as defined by the appraisal district

Most of the zip codes with substantial vulnerable housing are located on the east side of Houston, inside Beltway 8 and between Interstate 45 and Highway 288. Areas with low housing resilience representing the most vulnerable housing stock were then compared to areas hardest hit in prior events in which housing suffered compounding damages from Hurricane Harvey, the 2021 Winter Storm, and COVID-19. Not every area with housing vulnerability

<sup>5</sup> <https://www.atsdr.cdc.gov/placeandhealth/svi/index.html>

suffered from compounding damages from disasters, but several areas do have vulnerable housing stock and face compounding damages, including Kashmere Gardens, South Park/Sunnyside, Cloverleaf, and East Aldine.

Figure 3: Map of Compounding Damages and Composite Housing Resilience in Harris County



Source: *Harris County Winter Storm Uri Resilience Assessment (2022)*, Kinder Institute

### Race and Ethnicity

The Fair Housing Act prohibits discrimination by race, color, and national origin. Information collected by the U.S. Census does not specifically address the protected class of color. Instead, data and information based on race and ethnicity, and sometimes national origin, can be serve as a proxy for color. When determining impacts on the basis of color, race information will be used to also to describe color.

Houston is a majority-minority city with more than three-quarters (75.9%) of its population identifying as minority including nearly half of Houston residents (44.5%)<sup>6</sup> identifying as Hispanic/Latino of any race. All disaster programs implemented by the City of Houston must evaluate equity and the impact on protected classes, including vulnerable people and consider their needs during the planning process. Due to historic housing patterns that reinforced discrimination through segregation, community isolation and inequitable access to resources, disaster impacts vulnerable populations disproportionately and exacerbates already existing inequities.<sup>7</sup> Further, immigrant

<sup>6</sup> 2016-2020 ACS DP05

<sup>7</sup> Howell, J. and Elliott, J. R. "Damages Done: The longitudinal impacts of natural hazards on wealth inequality in the United States." *Social Problems*, Volume 66, Issue 3, August 2019, pg 448-467.

communities also need special considerations due to language barriers and fear in Hispanic or Latino communities that seeking assistance after disasters will lead to detention and deportation.<sup>8</sup>

The Kinder Institute's report *Harris County Winter Storm Uri Resilience Assessment* confirms the impacts from the 2021 Winter Storm followed previous patterns of inequity by determining that the highest share of households that had outstanding needs not covered by insurance were in majority-Black zip codes, followed by majority-Hispanic zip codes. The report determined this by cataloging households eligible for FEMA Individual and Households Program (IHP) from the 2021 Winter Storm by ZIP code, and then categorized those zip codes by respective racial/ethnic majority.

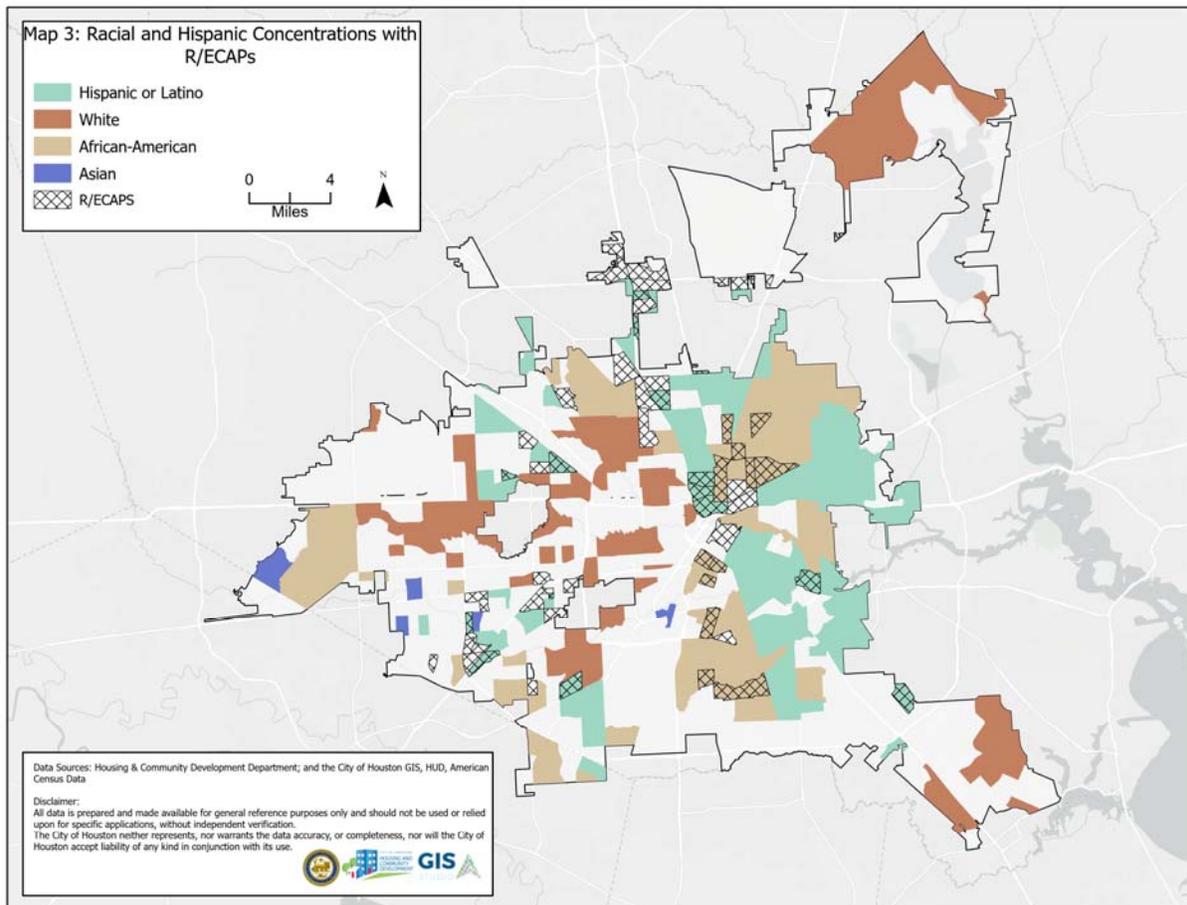
As defined in the 2020-2024 City of Houston Consolidated Plan, a neighborhood with a racial or ethnic concentration is one in which the percentage of persons of a racial or ethnic group is at least 20 points higher than that group's percentage in the city as a whole. A minority concentrated neighborhood is one in which the total percentage of minority persons is at least 20 points higher than the total percentage of minorities in the city as a whole. To determine racial and Hispanic concentrations in Houston, census tracts were used as a proxy for neighborhood. In addition, racial groups were categorized as non-Hispanic and Hispanic, with the Hispanic group including persons of Hispanic or Latino origin of any race.

The following map illustrates these minority concentrated areas in the city. It demonstrates Houston's status as a majority-minority city where 75.9% of the population is the minority. It also shows the racially/ethnically areas of poverty (R/ECAP), which are census tracts where more than half the population is non-white and 40% or more of the population is in poverty or where the poverty rate is greater than three times the average poverty rate in the area. R/ECAP areas represent areas that may show areas of entrenched patterns of segregation.

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<sup>8</sup> Mendez, M., Flores-Haro, G., and Zucker, L. *The (In)visible Victims of Disaster: Understanding the vulnerability of undocumented Latino/a and indigenous immigrants*. Retrieved from <https://orfaleacenter.ucsb.edu/wp-content/uploads/2020/12/1-s2.0-S0016718520301925-main.pdf>

Figure 4: Map of Racial, Hispanic, and Minority Concentrations by Census Tract in Houston with R/ECAPs



The following table further breaks down demographics and disaster impacted populations of the City of Houston. Because the City of Houston is in a MID, the Area-Wide Estimates, Disaster Declaration Estimate, and MID Estimate all represent the City of Houston population.

*Table 10: Grantee Demographics and Disaster Impacted Populations*

Demographic	Area-Wide Estimate	Area-Wide Percent	Disaster Declaration Estimate	Disaster Declaration Percent	MID Estimate	MID Percent
Total Population	2,304,580		2,304,580		2,304,580	
Under 5 years	172,727	7.5	172,727	7.5	172,727	7.5
65 years and over	217,596	11	217,596	11	217,596	11
Population with a Disability	224,151	9.8	224,151	9.8	224,151	9.8
White or Caucasian	1,192,226	51.7	1,192,226	51.7	1,192,226	51.7
Black or African American	888,431	38.6	888,431	38.6	888,431	38.6
American Indian and Alaska Native	8,012	0.4	8,012	0.4	8,012	0.4
Asian	158,853	6.9	158,853	6.9	158,853	6.9
Native Hawaiian and Other Pacific Islander	1,088	0.05	1,088	0.05	1,088	0.05
Other	262,512	11.4	262,512	11.4	262,512	11.4
Population with two or more races	162,402	7	162,402	7	162,402	7

Source: 2016-2020 American Community Survey (ACS) DP05, S1810, and S0101

The following table shows the Houston’s race and Hispanic demographics together.

*Table 11: Houston Race and Ethnicity*

Demographic	Number	Percent
Total Population	2,304,580	100.0
White or Caucasian, Non-Hispanic	558,561	24.1
Black or African American, Non-Hispanic	515,956	22.3
American Indian and Alaska Native, Non-Hispanic	2,895	0.1
Asian, Non-Hispanic	157,230	6.8
Native Hawaiian and Other Pacific Islander, Non-Hispanic	668	0.0
Other, Non-Hispanic	6,165	0.3
Population with two or more races, Non-Hispanic	43,021	1.9
Hispanic of any race	1,028,742	44.5

Source: 2016-2020 American Community Survey (ACS) DP05, S1810, and S0101

*Income*

Income affects a household's disaster recovery and resilience; this is significant in that a person's earning potential may be influenced by their association with one or more protected classes. Households with low income often lack adequate savings to spend on evacuation, shelter, or recovery from disaster scenarios. Due to financial insecurity, these households are often less able to recover or bounce back quickly after a disaster. Further, there is a strong relationship between household income, household type, race/ethnicity, and other factors. These relationships often create misconceptions and biases that could raise equitable recovery concerns. The geographic division by income further exacerbates these inequities and can reinforce discrimination and inequitable outcomes in recovery. These factors must be considered when planning for disaster recovery activities, and planning must include those from communities that experience concentrated areas of poverty.

*Table 12: Income Demographics*

Income/Economic Demographics	Statewide	Areas Impacted by Disaster	HUD MIDs
Median Household Income	\$63,826	\$53,600	\$53,600
Per Capita Income	\$32,177	\$33,626	\$33,626

Source: 2016-2020 ACS S1901; 2016-2020 ACS B19301

*Table 13: Income Demographics – Low Income*

Income/Economic Demographics	Statewide	Areas Impacted by Disaster	HUD MIDs
Income in the past 12 months below poverty level	3,984,260	447,326	447,326

Source: 2016-2020 ACS S1701

*Table 14: LMI Analysis - Overall*

Category	Total LMI Persons	Total Population	Percent LMI
Area wide (City of Houston)	1,321,486	2,279,732	58

Source: 2016-2020 ACS S1701; U.S. Treasury. *SLFRF LMI Tool*. Retrieved from: <https://home.treasury.gov/system/files/136/SLFRF-LMI-tool.xlsx>

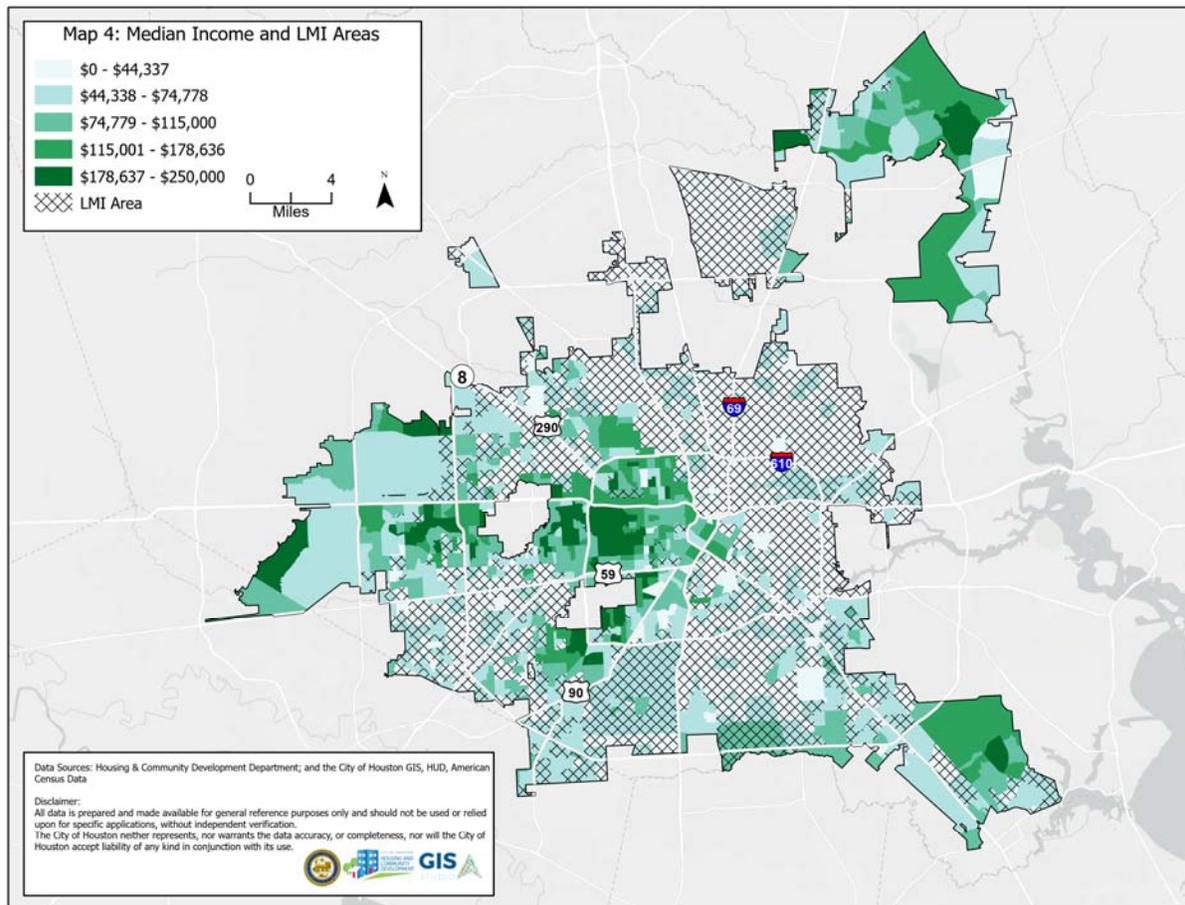
*Table 15: LMI Analysis-Federally Declared Disaster Areas*

County / Municipality	Non-MID-Total LMI Persons	Non-MID-Total Population	Non-MID Percentage LMI	MID-Total LMI Persons	MID-Total Population	MID Percentage LMI
City of Houston	0	0	0	1,321,486	1,321,486	58

Source: 2016-2020 ACS S1701; U.S. Treasury. *SLFRF LMI Tool*. Retrieved from: <https://home.treasury.gov/system/files/136/SLFRF-LMI-tool.xlsx>

The map below shows locations of median income by census block groups. Most areas that are comparable to the city's median income or below are located on the east side. Many of the areas in Houston that are below the median income are also areas with a high percentage of minority populations.

Figure 5: Map of Median Income and LMI Areas



### Manufactured Housing

One low-cost housing option for very low-income residents is manufactured homes. However, within the Houston city limits, there are very few manufactured homes, making up .9% of all homes in the city. Manufactured homes are vulnerable to temperature extremes, such as the cold weather during the 2021 Winter Storm.

Table 16: Manufactured Housing Units Impacted by Disaster

County/Municipality	Number of Units	% of Total Units in County / Municipality	Remaining Unmet Need*
City of Houston	9,150	0.9	\$513,763

Source: 2016-2020 ACS DP04; FEMA IA

\*Remaining unmet need is calculated as FEMA verified loss of manufactured homes less FEMA IA assistance disbursed for repair or replacement.

### Persons with Disabilities

All CDBG-DR programs must comply with relevant federal laws that prohibit discrimination based on disability and to require physical accessibility and the provision of reasonable accommodations and reasonable modifications, including the Fair Housing Act, Section 504 of the Rehabilitation Act of 1973, and the Americans with Disabilities Act.

The Fair Housing Act defines disability, to a person as:

- A physical or mental impairment that substantially limits one or more of such person’s major life activities

- A record of having such an impairment, or
- Being regarded as having such an impairment.

In 2020, an estimated 224,151 Houston residents had sensory, physical, mental, work, mobility, and/or self-care limitations, representing approximately 9.8% of the city’s civilian, non-institutionalized population. Currently, 116,945 (5.5%) of persons with disabilities in Houston reported having ambulatory difficulty. About 92,156 (4.3%) of people with disabilities reported having cognitive difficulty and approximately 82,398 (4.8%) reported having independent living difficulty.<sup>9</sup>

People with disabilities are disproportionately impacted by disasters as a result of disruptions to support systems and medical care, which exacerbate barriers already present in daily life. Due to impairment or limited physical or cognitive abilities, individuals may be unable to evacuate safely or easily, create or maintain a preparedness plan, advocate fully for their needs, or seek out or access necessary care while displaced. After disasters, people with disabilities face significant barriers in finding and securing appropriate housing, transportation, employment, services, and other supports critical to long-term recovery.<sup>10</sup>

At least 15% of the population in the heavily disaster impacted neighborhoods of northeast Harris County have a disability, including high concentrations in the Little York/Homestead, Trinity/Houston Gardens, Settegast, Kashmere Gardens, and Fifth Ward neighborhoods.

Table 17: Disability Type

Disability Type	Houston	
	#	%
Hearing Difficulty	53,748	2.3%
Vision Difficulty	46,204	2.0%
Cognitive Difficulty	92,156	4.3%
Ambulatory Difficulty	116,945	5.5%
Self-care Difficulty	50,301	2.4%
Independent Living Difficulty	82,398	4.8%

Source: 2016-2020 ACS S1810

### Families with Children

Familial status is protected by the Fair Housing Act and is defined as having one or more individuals under 18 years of age who reside with a parent or another person with care and legal custody of the child. Familial status also includes a pregnant person or a person who is in the process of adopting or otherwise securing legal custody of any individual under 18 years of age.

According to the CDC, “children and elders are the most vulnerable groups in disaster events.”<sup>11</sup> Households with children under 18 are more likely to require assistance with finances, transportation, medical care, and childcare during the disaster event and recovery.<sup>12</sup> These needs must be considered when planning disaster recovery and resilience efforts.

<sup>9</sup> 2016-2020 ACS S1810

<sup>10</sup> Stough, L. M., Sharp, A. N., Resch, J. A., Decker, C., and Wilker, N. *Barriers to the long-term recovery of individuals with disabilities following a disaster*. Retrieved from <https://onlinelibrary.wiley.com/doi/10.1111/disa.12161>

<sup>11</sup> Centers for Disease Control. *CDC SVI Documentation 2018*. Retrieved from [https://www.atsdr.cdc.gov/placeandhealth/svi/documentation/SVI\\_documentation\\_2018.html](https://www.atsdr.cdc.gov/placeandhealth/svi/documentation/SVI_documentation_2018.html)

<sup>12</sup> Flanagan, Barry E., Gregory, Edward W., Hallisey, Elaine J, Heitgerd, Janet L. and Lewis, Brian. "A Social Vulnerability Index for Disaster Management" *Journal of Homeland Security and Emergency Management* 8, no. 1 (2011): 0000102202154773551792. <https://doi.org/10.2202/1547-7355.1792>

### Population 65 and Older

Age is not a protected class covered by the Fair Housing Act, but because of its correlation to a disability, it is important to consider the needs of seniors when planning disaster recovery and resilience efforts. Senior households are disproportionately affected by disasters and face special challenges in recovery: mobility or cognitive impairments may hinder safe evacuations, income is limited and/or fixed and unable to adjust to the added pressure of recovery expenses, and owner-occupied households may have limited to no insurance due to household budget or lack of mortgage, and individuals may be unable to access medication or care when medical systems are disrupted.

### Limited English Proficiency

Fair Housing laws protect individuals based on their national origin. Discrimination on national origin can include an individual’s ability to read, write, speak, or understand English. Houston is a diverse community with many foreign-born residents living in the city and the region. According to the 2020 American Community Survey, the total number of foreign-born residents in Houston was 668,490 (28.9%).

Many Houstonians, whose first language is not English, may have a limited ability to read, write, speak, or understand English and are considered limited English proficient (LEP). More than one in five Houstonians, 5 years and older, speak English “less than very well.” Those with limited English proficiency living in Houston most frequently speak Spanish, Vietnamese, Chinese, Arabic or French.<sup>13</sup> The Civil Rights Act of 1964 prohibits discrimination based on national origin and requires that government entities ensure that persons with LEP have access to the same benefits, services, and information as English-speaking residents.

The Kinder Institute found that areas with high shares of non-English-speaking residents were more likely to have difficulty accessing FEMA assistance as a result of issues with applications. These areas also lacked grassroots organizations that could support residents with damage assessments and applications. The communities must be given special consideration in the disaster recovery planning process to achieve equitable outcomes including providing translations and opportunities for interpretation when needed.

*Table 18: Limited English Proficiency Breakdown of Disaster-Related Areas*

County/Municipality	Estimate Speak English Less than ‘Very Well’	Percent Speak English Less than ‘Very Well’
City of Houston	474,920	22.2

Source: 2016-2020 ACS DP05

### Persons Experiencing Homelessness

Persons experiencing homelessness are especially vulnerable during disasters and require additional support during disaster recovery. For those already experiencing housing and resource instability, a disaster and subsequent displacement can be disproportionately consequential. The lack of a permanent address or limited digital communications access make locating and evacuating people experiencing homelessness very difficult, and the effects of experiencing disaster can exacerbate existing physical and/or mental health challenges.

The Point-in-Time Count table below represents a one-night count of persons experiencing homelessness in Houston. Over the last ten years, homelessness has been decreasing in the Houston area because of a concerted and coordinated effort to provide supportive housing opportunities and streamline the intake process and Coordinated Access System. The Coalition for the Homeless reports that more than 25,000 people have been placed into The Way Home’s permanent housing programs. In 2011, the Point-in-Time count revealed 8,471 people experiencing homelessness, which is almost three times higher than the most recent count of 3,223 experiencing homelessness in 2022.

<sup>13</sup> Source: 2011-2015 American Community Survey

Table 19: Point-in-Time Count – Type of Shelter

Geography	Emergency Shelter*	Transitional Housing	Unsheltered Homeless	Total Known Homeless
Area wide / FEMA Declared / MID	1,212	509	1,502	3,223

Source: The Way Home Continuum of Care 2022 Homeless Count and Survey Analysis, March 2022

\*Includes Safe Havens

As the winter weather was first forecast, staff from the Coalition for the Homeless met with City and County representatives to coordinate a plan for responding to the incoming cold weather. The City and Harris County opened facilities as shelters and warming centers a few days before the storm hit. On February 13 and 14, 2021, Houston METRO, the Houston Police Department, Sheriff Homeless Outreach team, and agency partners transported people willing to seek shelter to designated shelters and warming centers.

The next table shows those impacted by the 2021 Winter Storm as defined by The Way Home Continuum of Care, which included 190 homeless individuals that took shelter at the George R. Brown Convention Center and were assessed through the Coordinated Access System and referred to services. This table does not account for other unsheltered homeless individuals that may have been subject to the elements, including at least two people experiencing homelessness in the Houston area who died because of the 2021 Winter Storm.<sup>14</sup> Although shelters and transitional housing were occupied and likely individuals staying there were impacted by the loss of electricity and water, The Way Home did not consider these individuals as having impact from the disaster in the table below.

Table 20: Point-in-Time Count – Impacted by Disaster

Geography	Emergency Shelter	Transitional Housing	Unsheltered Homeless	Total Known Homeless
Area wide / FEMA Declared / MID	-	-	190	190

Source: Coalition for the Homeless, Lead Agency to The Way Home Continuum of Care

### Assisted Housing Impacted by the Disaster

There are a few main categories of programs which support assisted housing in Houston that serve low- and moderate-income households. These include the Houston Housing Authority’s Housing Choice Voucher Program of 19,788 vouchers, including 17,699 regular vouchers and 2,089 special vouchers, and 3,136 homes in the Public Housing Program. The State of Texas Department of Housing and Community Affairs funds the development of affordable homes through the Low-Income Housing Tax Credit Program (LIHTC). In Houston, there are 42,810 affordable homes that are designated as LIHTC. The following table shows the total number of assisted homes and the number of homes impacted by the 2021 Winter Storm.

Table 21: Assisted Housing Impacted by the Disaster

County / Municipality	Total Housing Choice Vouchers	Total Impacted Housing Choice Voucher Units	Total LIHTC Units	Total Impacted LIHTC Units	Total Public Housing Dwelling Units	Total Impacted Public Housing Dwelling Units	Remaining Unmet Need
City of Houston	19,788*	205	42,810	Unavailable	3,136	56	Unavailable

Source: Houston Housing Authority; Texas Department of Housing and Community Affairs, Multifamily Finance Division

\*17,699 regular vouchers and 2,089 special purpose vouchers

<sup>14</sup> “At least six people experiencing homelessness died during the winter storm.” *Texas Tribune*. February 22, 2021.

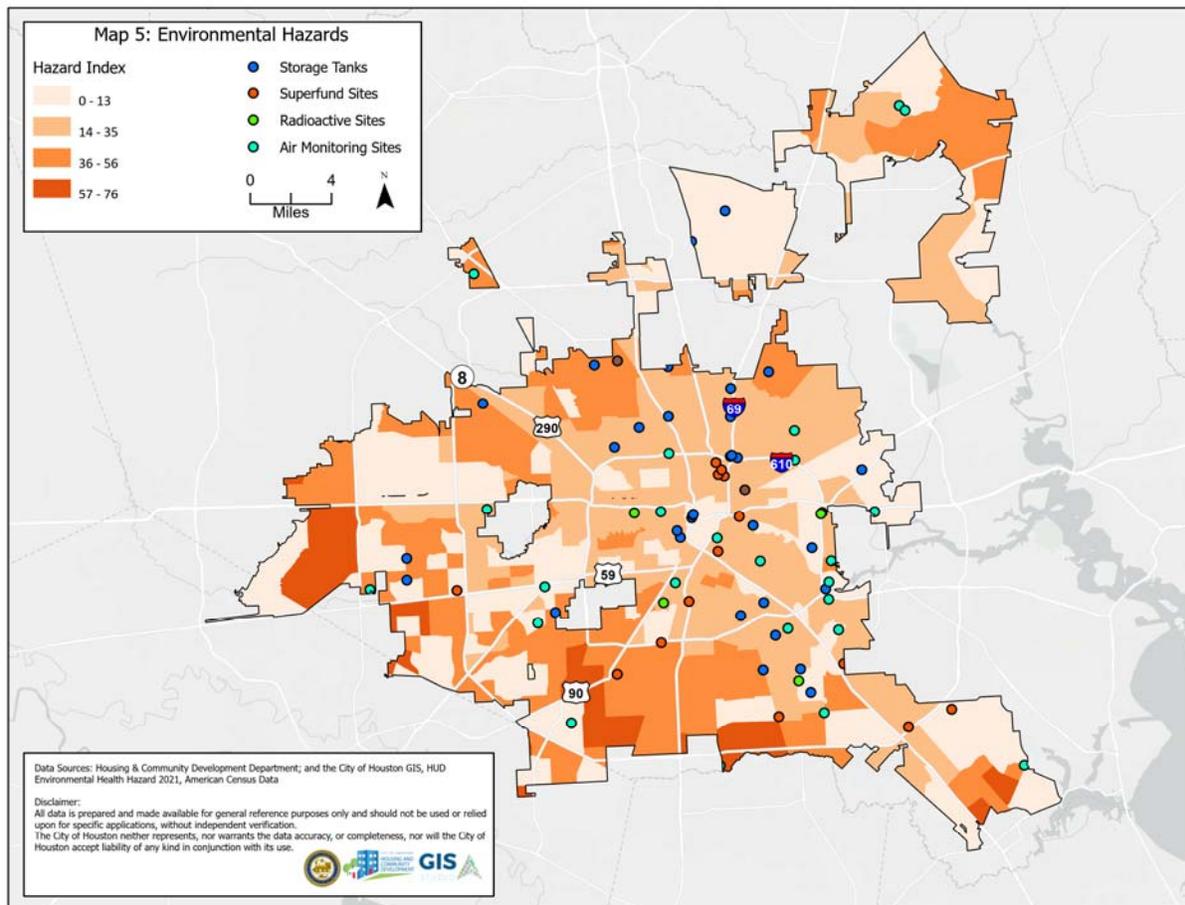
### Proximity to Natural and Environmental Hazards

Housing and health are linked; a home is one of many social determinants of health. The affordability, safety and quality of a home may spur detrimental conditions inside the home and may inhibit medical care or treatment for those who are strained financially by housing costs. Environmental and social characteristics of neighborhoods can also impact health, positively or negatively.

East Houston has been identified by the EPA as being exposed to a multitude of pollutants due to its proximity to industrial and chemical plants east of Houston. As illustrated in the following map, most health hazards are located east of the central business district in Houston and are in near the Port of Houston. The map summarizes potential exposure to harmful toxins at a neighborhood level, which disproportionately affects areas with more people of color who live in east Houston. Another area of note is Kashmere Gardens, a historically black neighborhood that is experiencing a concentration of cancer-related deaths and other medical issues due to toxic chemical waste and emissions. In addition, natural disasters such as flooding are known to exacerbate such concerns.

The City will prioritize disaster recovery activities that can mitigate environmental concerns and increase resilience among affected populations to protect against the effects of extreme weather events and other natural hazards.

Figure 6: Map of Environmental Hazards



### *Affirmatively Furthering Fair Housing*

The City of Houston is obligated to affirmatively further fair housing (AFFH). HUD regulations at 24 CFR 5.151 provide that affirmatively furthering fair housing means taking meaningful actions, in addition to combating discrimination, that overcome patterns of segregation and fostering inclusive communities free from barriers that restrict access to opportunity based on protected characteristics. Specifically, affirmatively furthering fair housing means taking meaningful actions that, taken together, address significant disparities in housing needs and in access to opportunity, replacing segregated living patterns with truly integrated and balanced living patterns, transforming racially or ethnically concentrated areas of poverty into areas of opportunity, and fostering and maintaining compliance with civil rights and fair housing laws.

All planned disaster programs by the City of Houston for recovery and resilience must take into consideration this obligation to AFFH.

## 3. Infrastructure Unmet Need

### a. Disaster Damage and Impacts - Infrastructure

There have been 8 major disaster declarations in Houston since 2015. The most common natural disasters that result in a federal disaster declaration are flood and hurricanes. The City of Houston is still rebuilding from previous disasters, including Hurricane Harvey. Most damages from recent disasters include damage to buildings and infrastructure like water system facilities, roads, and bridges due to flooding. In addition to direct damage to infrastructure caused by flooding, infrastructure that is aging or under-sized can also lead to flooding in residential homes and other buildings.

Different from previous disasters, the 2021 Winter Storm's electricity loss led to much of the subsequent damage or infrastructure systems failures, like the loss of drinking water. The City's preparation and post-disaster assistance for any disaster heavily relies on electricity that is subject to outages during a disaster. The loss of power can potentially leave residents stranded or in unsafe conditions in their home, but it can also impact emergency responders' and the City's ability to provide critical safety services and other general services that are necessary before, during, and after a disaster. During the 2021 Winter Storm, the critical infrastructure across the City experienced challenges in power generation reliability like the residents of the City.

### *FEMA Public Assistance*

Initially, FEMA approved only assistance for emergency protective measures (Category B) in all 254 Texas counties. In September 2021, FEMA approved an additional 44 counties for all categories (A-G) of FEMA Public Assistance; however, counties in and around the Houston area were not part of the expansion. Therefore, the City of Houston only has information for FEMA Public Assistance Category B, which are actions taken by the City before, during, and after a disaster to save lives, protect public health and safety, prevent damage to improved public health and safety, and prevent damage to improved public and private property. Generally, these are actions taken by the community to warn residents, reduce the disaster damages, ensure the continuation of essential public services, and protect lives and public health or safety. The table below shows the estimated FEMA PA Cost by the one category made available to the City of Houston through the program.

Table 22: Total Cost and Need by PA Category

PA Category	Estimated PA Cost	Local Match	15% Resiliency	Total Need (Match + Resiliency)
A – Debris	-	-	-	-
B – Emergency Measures	\$12,600,000	\$1,400,000	\$1,890,000	\$3,290,000
C – Roads and Bridges	-	-	-	-
D – Water Control Facilities	-	-	-	-
E – Building and Equipment	-	-	-	-
F – Utilities	-	-	-	-
G - Other	-	-	-	-
<b>Total</b>	<b>\$12,600,000</b>	<b>\$1,400,000</b>	<b>\$1,890,000</b>	<b>\$3,290,000</b>

Source: City of Houston

Although the City was only allowed to submit for assistance for one FEMA public assistance category, this does not mean that there weren't other impacts from the 2021 Winter Storm that impacted infrastructure. After the 2021 Winter Storm, the City of Houston assessed damage to City owned buildings and facilities. The estimated damage was \$4 million, and the City will make an insurance claim of this amount for citywide insured property damages related to the 2021 Winter Storm, which include City owned buildings/structures, contents within the buildings and plant facilities (wastewater and drinking water. The City's deductible is approximately \$2 million, which represents an unmet need for the City's buildings and equipment.

### Hazard Mitigation Grant Program

The FEMA Hazard Mitigation Grant Program (HMGP) serves as a resource to fund programs that reduce the risk of loss of life and property and is activated following a presidential major disaster declaration. HMGP funds, provided at the amount of FEMA disaster recovery assistance under the presidential declaration, are allocated on a sliding scale formula based on an appropriate percentage of the estimated total of federal assistance (less administrative costs) wherein each individual activity is required to have at least a 25 percent non-federal cost share.

The next table shows the HMGP applications submitted from DR-4586. The City of Houston requested \$7.6 million of federal funding, which will need \$2.4 million in local match. The local match represents an unmet need for infrastructure.

Table 23: Hazard Mitigation Grant Program Applications for DR-4586

Application Description	HMGP Request (Federal)	Total Local Match Needed (Unmet Need)	Total Project Cost
Generators for Lift Station and Wastewater	\$5,889,000	\$1,837,500	\$7,717,500
Generators for Emergency Services (Police/Fire)	\$1,732,837	\$577,612	\$2,310,450
<b>Total</b>	<b>\$7,621,837</b>	<b>\$2,415,112</b>	<b>\$10,036,950</b>

Source: City of Houston

### Infrastructure Mitigation

The *Resilient Houston* plan both outlines the types of consequences likely to affect the City in a landscape of changing climate and describes the steps necessary to better combat those consequences. Among them is a subset of goals, under the heading of leveraging disaster recovery resources, which includes steps like prioritizing and investing in resilient infrastructure and transforming City assets. The plan also cites the identification of additional critical and essential facilities for fortification in City efforts to modernize building codes and standards. Additionally, the City's Hazard Mitigation Plan identifies critical facilities as subject to hazards in winter storms, including: 111 Law

Enforcement Facilities; 110 Fire, Rescue and Emergency Services Facilities; 3 Airports with Support Facilities; and 14 Healthcare/Public Health Facilities; and 24 Hospitals.

During the 2021 Winter Storm, much of Houston’s service area experienced power failures that partially contributed to the City-Wide Boil Water Notice (BWN). As the largest regional water provider in the greater Houston metropolitan area, over 4 million people rely on the City’s drinking water system for their potable water. The City has identified having additional reliable sources of back-up power generation by increasing and hardening emergency power production as a way to increase drinking water resilience. The current unmet need for improving electricity generation to keep drinking water facilities online during a disaster is over \$20 million.

Similar issues can occur due to loss of power for other critical infrastructure, including wastewater operations, traffic and drainage operations, and emergency services. The Emergency Services Generator Project will provide backup power through the placement or upgrade of emergency generators at police and fire facilities. These facilities support a wide range of first responders, such as SWAT, Fire and Police. These facilities hold tactical equipment, some of which cannot work without power. Without backup power, communications is lost which immediately hinders rescue operations, which could be even more devastating in a disaster. The total estimated cost to upgrade generators through the Emergency Services Generator Project is \$36,283,875.

*Table 24: Hazard Mitigation Needs per County or Known Project (as applicable)*

Project	Cost	Funding Source	Unmet Need
Drinking Water Generator Improvement	\$20,708,536	\$0	\$20,708,536
Wastewater Operations Generator Improvement	\$2,514,337	\$0	\$2,514,337
Traffic and Drainage Operations Generator Improvement	\$1,814,337	\$0	\$1,814,337
Emergency Services Generator Project	\$36,283,875	\$0	\$36,283,875
<b>Total</b>	<b>\$61,321,085</b>	<b>\$0</b>	<b>\$61,321,085</b>

Source: City of Houston Office of Emergency Management and Houston Public Works

### *Summary of Infrastructure Unmet Need*

HUD’s method to calculate 2021 unmet needs for infrastructure projects uses the expected local cost share to repair permanent public infrastructure (Categories C to G) to their pre-storm conditions. As FEMA only made available Category B of Public Assistance for the City of Houston, there are no unmet needs for infrastructure using this calculation. However, if an alternative method is used to include local costs to restore building and equipment, outside of expected insurance payments, and use the estimated cost to add or enhance generators for critical infrastructure and emergency services, the infrastructure unmet need is \$63,321,085.

## 4. Economic Revitalization Unmet Need

### a. Disaster Damage and Impacts – Economic Revitalization

At the beginning February 2021, the United States had optimism about the vaccine rollout with new COVID-19 cases plummeting and fewer hospitalizations. Like other places around the world, the economic toll of COVID-19 was immense. The economic conditions before the 2021 Winter Storm mainly included addressing issues of COVID-19 and its impacts.

Houston’s economy is 7<sup>th</sup> largest in the country. In January 2021, the Texas Workforce Commission reported the unemployment rate for the United States was 6.8%, Texas was 7%, and the Houston metro area was 7.9%. A year later in January 2022, there was a significant decrease in unemployment with the Houston area unemployment rate

decreasing to 5.5%.<sup>15</sup> Houston’s economy is diverse with the health, education, business and professional services industries accounting for nearly 1 out of 3 jobs in the area.<sup>16</sup> The Texas Medical Center, the world’s largest medical complex, and the Johnson Space Center are in Houston. Digital technology and innovation continue to grow with over 60 organizations supporting tech start-ups in Houston.

### *Small Business Administration*

The SBA offers Business Physical Disaster Loans and Economic Injury Disaster Loans (EIDL) to businesses to repair or replace disaster damaged property, including real estate, inventories, supplies, machinery, equipment and working capital until normal operations resume. Businesses of all sizes as well as private, nonprofit organizations are eligible for SBA business disaster loans. There were 332 SBA applicants, and the 32 approved applicants had \$2,401,862 in Current Total Verified Loss and have received \$2,218,200 in funds disbursed by the SBA. Based on HUD’s methodology the remaining unmet need for economic revitalization in Houston is \$9,654,964.

HUD estimates unmet need for small business by multiplying the median damage estimates for Categories 3-5 by the number of small businesses denied an SBA loan.

- Category 1: Real estate + content loss = below \$12,000
- Category 2: Real estate + content loss = \$12,000–\$29,999
- Category 3: Real estate + content loss = \$30,000–\$64,999
- Category 4: Real estate + content loss = \$65,000–\$149,999
- Category 5: Real estate + content loss = \$150,000 and above

This estimate assumes that damage among those denied at pre-inspection have the same distribution of damage as those denied after inspection.

*Table 25: SBA Applicants Approved and Denied and Unmet Need*

Category	Number of Applicants	Amount Disbursed	Unmet Need
Approved	32	\$2,218,200	-
Denied	300	-	\$4,934,239
Auto Decline – Credit	23	-	-
Declined	127	-	-
Duplicate	7	-	-
In Approval	1	-	-
Late Filing – Not Accepted	2	-	-
Withdrawn	140	-	-

Source: *Small Business Administration*

### *Summary of Economic Unmet Need*

Overall, the Houston economy continues to strengthen even following disaster declarations for COVID-19 and the 2021 Winter Storm. Economic recovery differs by neighborhood and can look different from household to household. Individuals with lower educational attainment or employment skills may be less resilient than others to recovery from a major disaster event. So, although the economy is improving at a macro level, many households struggle to recover from the multiple disaster events since 2015.

<sup>15</sup> *State Continues Streak of Positive Job Gains in First Month of 2022* Greater Houston Partnership, March 11, 2022. Available at <https://www.twc.texas.gov/news/texas-unemployment-rate-48-percent-state-adds-29000-jobs-january>

<sup>16</sup> *Talking Points: Greater Houston Partnership*, January 24, 2022. Available at <https://www.twc.texas.gov/news/texas-unemployment-rate-48-percent-state-adds-29000-jobs-january>

## 5. Mitigation Needs Assessment

As required by HUD, the City of Houston developed a mitigation needs assessment based in part on the *City of Houston Hazard Mitigation Plan*. To develop the mitigation needs assessment, the City reviewed: the FEMA Local Mitigation Plan Handbook, Department of Homeland Security (DHS) Office of Infrastructure Protection, National Association of Counties Improving Lifelines (2014), resources about wildfires from the U.S. Forest Service, and the National Interagency Coordination Center (NICC), CDBG-MIT Action Plan, and HUD’s CPD mapping tool. This assessment addresses current and future risks, including hazards, vulnerability, and impacts of disasters and identifies appropriate mitigation actions to reduce the highest risks that Houston faces. This mitigation needs assessment informs the use of the 15% CDBG-DR mitigation set-aside and helps to build resilience and mitigation measures into recovery programs and projects.

### *Overview of the City of Houston Hazard Mitigation Plan*

The goal of the *Hazard Mitigation Plan* is to minimize or eliminate long-term risks to human life and property from known hazards by identifying and implementing cost-effective hazard mitigation actions. The participatory planning process is an opportunity for the City of Houston, other government and business stakeholders, and the general public to evaluate and develop successful hazard mitigation actions, reducing the future risk of fatalities and property damage resulting from a disaster in the Houston planning area.

The mission statement of the Plan is: “Maintaining a secure and sustainable future through the revision and development of targeted hazard mitigation actions to protect life and property.” Hazard mitigation activities are an investment in a community’s safety and sustainability. It is widely accepted that the most effective hazard mitigation measures are implemented at the local government level, where decisions on the regulation and control of development are ultimately made. Throughout the planning process, which was guided by the Texas Division of Emergency Management, members of community groups, local businesses, neighboring jurisdictions, schools, and hospitals were invited to participate in the City of Houston’s Office of Emergency Management’s (OEM) development of the Plan. Elements of the Hazard Mitigation Plan have been used to inform this assessment, including hazard identification, risk assessment, and the identification of potential projects.

### *Hazard Analysis and Lifeline Assessment*

The most recent comprehensive hazard identification and risk assessment for mitigation planning was completed in 2018. Upon a review of the full range of natural hazards suggested under the FEMA planning guidance, the City of Houston identified 12 hazard types, 11 natural hazards and 1 quasi-technological hazard (dam failure), as significant enough to include in the *City of Houston Hazard Mitigation Plan*. This data is presented in table below title “Hazard Risk Ranking.” The potential impact is further defined in the table titled “Impact Statements.”

*Table 26: Hazard Risk Ranking*

Hazard	Frequency of Occurrence	Potential Severity	Ranking
Flood	Highly Likely	Substantial	High
Hurricane	Highly Likely	Major	High
Extreme Heat	Highly Likely	Substantial	High
Thunderstorm Wind	Highly Likely	Substantial	High
Lightning	Highly Likely	Substantial	Moderate
Tornado	Likely	Substantial	Moderate
Expansive Soils	Likely	Limited	Low
Hail	Highly Likely	Limited	Low
Wildfire	Highly Likely	Minor	Low
Drought	Highly Likely	Limited	Low

Dam Failure	Unlikely	Substantial	Low
Winter Storm	Likely	Limited	Low

Source: *City of Houston Hazard Mitigation Plan Update 2018*

Table 27: Impact Statements

Potential Severity	Description
Substantial	Multiple deaths. Complete shutdown of facilities for 30 days or more. More than 50 percent of property destroyed or with major damage.
Major	Injuries and illnesses resulting in permanent disability. Complete shutdown of critical facilities for at least 2 weeks. More than 25 percent of property destroyed or with major damage.
Minor	Injuries and illnesses do not result in permanent disability. Complete shutdown of critical facilities for more than 1 week. More than 10 percent of property destroyed or with major damage.
Limited	Injuries and illnesses are treatable with first aid. Shutdown of critical facilities and services for 24 hours or less. Less than 10 percent of property destroyed or with major damage.

Source: *City of Houston Hazard Mitigation Plan Update 2018*

This mitigation risk assessment addresses all hazards identified in the *City of Houston Hazard Mitigation Plan* and the CDBG-MIT Action Plan. More detailed analyses are provided on hazards which have significantly impacted Houston in recent years as well as sea level rise. These risks are considered the highest likelihood for the City of Houston.

FEMA defined Community Lifelines for incident response allowing the federal government a better understanding of the impacts of hazards and disasters in state and local jurisdictions. Although the *City of Houston Hazard Mitigation Plan* does not currently evaluate hazards using these lifelines, future risk assessments and plans will include lifeline assessments to align with this federal initiative. The lifelines assessed and their components are shown in the following table.

Table 28: Community Lifeline Components

Safety & Security	Food, Water, Sheltering	Communications
Law Enforcement/Security	Food	Infrastructure
Fire Service	Water	Responder Communications
Search and Rescue	Shelter	Alerts, Warnings, Messages
Government Service	Agriculture	Finance
Community Safety		911 and Dispatch
Transportation	Health and Medical	Hazardous Material (Mgmt)
Highway/Roadway/Motor Vehicle	Medical Care	Facilities
Mass Transit	Public Health	HAZMAT, Pollutants, Contaminants
Railway	Patient Movement	Energy
Aviation	Medical Supply Chain	Power Grid
Maritime	Fatality Management	Fuel

Source: FEMA Community Lifelines Toolkit 2.0

Ensuring the resilience of Community Lifelines is an important concept in all phases of emergency management. To quantitatively assess lifelines, the City of Houston is evaluating known facilities and infrastructure to support each lifeline and conducting geographic assessments of each with known hazard zones. The quantitative assessment is limited to flood risks (both inland and coastal). A preliminary assessment of each lifeline by hazard is provided in this section using vulnerability and consequence/impact assessments for each of the seven community lifelines. The classifications of vulnerability and consequences are shown in the following tables “Vulnerability Classifications” and “Consequence Classifications.” These assessments are presented at the end of each hazard section. Consequence

analysis may include all components of a lifeline or be isolated to one or two components or subcomponents that are critical in a given hazard condition.

*Table 29: Vulnerability Classifications*

Vulnerability	Description
High Vulnerability	Geographically widespread exposure of facilities and systems to the damaging effects of a hazard AND the lifeline has low resilience to a hazard.
Moderate Vulnerability	The geographic exposure of facilities and systems to a hazard is widespread OR the lifeline has a low resilience to a hazard and the hazard is geographically isolated.
Low Vulnerability	Exposure of facilities and systems related to a community lifeline are geographically isolated or the system itself has significant resilience to the hazard.

Source: City of Houston OEM

*Table 30: Consequence Classifications*

Consequence	Description
Significant Impact to Lifeline/Services	In the worst, most probable hazard situation, services and infrastructure are functioning within weeks of onset of the hazard condition.
Moderate Impact to Lifeline/Services	In the worst, most probable hazard situation, services and infrastructure are functioning within days of onset of the hazard condition.
Low Impact to Lifeline/Services	In the worst, most probable hazard situation, services and infrastructure are fully functioning within hours of onset of the hazard condition.

Source: City of Houston OEM

The sections below provide an overview of the hazards affecting Houston, including information related to previous occurrences and their magnitude and impacts, as well as the probability of future hazard events.

**a. Flood**

Flooding is the foremost hazard that threatens the City of Houston. The severity of a flood event is determined by a combination of several major factors including stream and river basin topography and physiography, precipitation and weather patterns, moisture conditions of watershed, recent soil moisture conditions, the degree of vegetative clearing and impervious surfaces, and drainage system capacity and condition of infrastructure. Floods can be short-term or long-term in duration, ranging from several hours to several days.

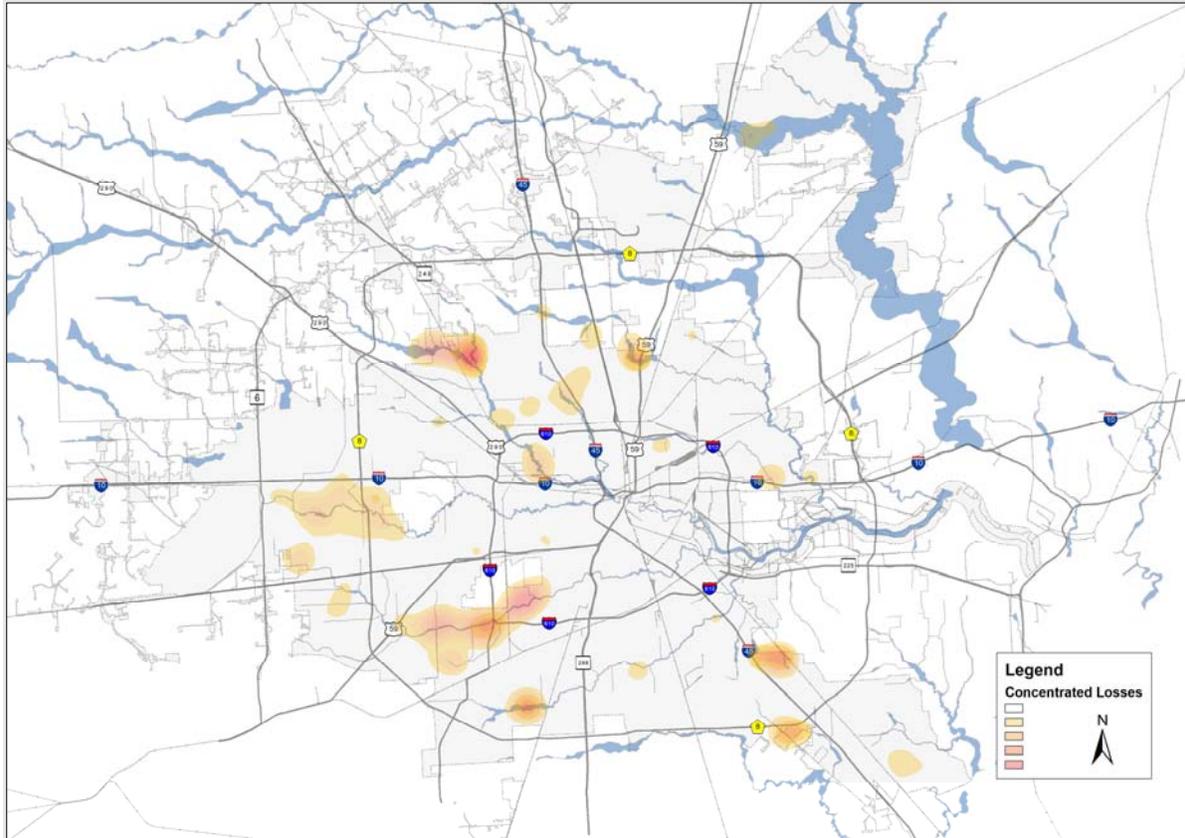
The Harris County Flood Control District (HCFCD) and FEMA are currently partnering on a flood hazard assessment project to produce a comprehensive set of maps that will include previously unmapped urban flood hazards. Current maps do not account for all the complexities of drainage patterns in a rapidly developing environment and are an incomplete snapshot of flood risk in the Houston area. This assessment will incorporate the National Oceanic and Atmospheric Administration’s (NOAA) Atlas 14 results, which include increased estimates of the precipitation amounts in a standard return period (i.e., 100-year interval).<sup>17</sup> HCFCD’s project will culminate in the development of new FEMA Flood Insurance Rate Maps (FIRMs), which are used to regulate new development and to control the improvement and repair of substantially-damaged buildings, and other flood risk projects.

The Harris County Flood Control District has reviewed recent storms within the new parameters outlined by the Atlas 14 study. Since 2016 Houston has experienced a 50-year storm, two 100-year storms, and a 500-year storm. If the timeline is extended to twenty years and includes Tropical Storm Allison, Houston has experienced two storms with a

<sup>17</sup> Source: Harris County Modeling Assessment and Awareness Project. <http://www.maapnext.org/>

500-year probability of recurrence. Data for the Houston area indicate a 30 percent increase in estimated rainfall during extreme events. Flood risks are likely to be greater than previously thought. The figure below shows the intensity of repetitive flood losses in Houston.

Figure 7: Heat Map of Repetitive Flooding in Houston



Source: Houston Public Works

Flooding is the deadliest natural disasters that occur in the U.S. each year, and it poses a constant and significant threat to the health and safety of the people in the City of Houston. Impacts to the community can include:

- Flood-related rescues may be necessary due to swift water and low water crossings, or in flooded neighborhoods where roads have become impassable, which places first responders and residents in harm's way. This increases the risk to first responders.
- Evacuations may be required for entire neighborhoods because of rising floodwaters, further taxing limited response capabilities and increasing sheltering needs for displaced residents.
- Health risks and threats to residents are elevated after flood waters have receded due to contamination (untreated sewage and hazardous chemicals) and mold growth typical in flooded buildings and homes.
- Significant flood events often result in widespread power outages, increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outages can also result in an increase in structure fires and/or carbon monoxide poisoning, as individuals attempt to cook or heat their home with alternative, unsafe cooking or heating devices, such as grills.
- Floods can destroy or make residential structures uninhabitable, requiring shelter or relocation of residents in the aftermath of the event.

- First responders are exposed to downed power lines, contaminated and potentially unstable debris, hazardous materials, and generally unsafe conditions, elevating the risk of injury to first responders and potentially diminishing emergency response capabilities.
- Emergency operations and services may be significantly impacted due to damaged facilities.
- Significant flooding can result in the inability of emergency response vehicles to access areas of the community.
- Critical staff may suffer personal losses or otherwise be impacted by a flood event and be unable to report for duty, limiting response capabilities.
- City or county departments may be flooded, delaying response and recovery efforts for the entire community.
- Private sector entities that the City and its residents rely on, such as utility providers, financial institutions, and medical care providers, may not be fully operational and may require assistance from neighboring communities until full services can be restored.
- Damage to infrastructure may slow economic recovery since repairs may be extensive and lengthy.
- Some businesses not directly damaged by the flood may be negatively impacted while utilities are being restored or water recedes, further slowing economic recovery.
- When the community is affected by significant property damage it is anticipated that funding would be required for infrastructure repair and restoration, temporary services and facilities, overtime pay for responders, as well as normal day-to-day operating expenses.
- Displaced residents may not be able to immediately return to work, further slowing economic recovery.
- Residential structures substantially damaged by a flood may not be rebuilt for years and uninsured or underinsured residential structures may never be rebuilt, reducing the tax base for the community.
- Large floods may result in a dramatic population fluctuation, as people are unable to return to their homes or jobs and must seek shelter and/or work outside of the affected area.
- Businesses that are uninsured or underinsured may have difficulty reopening, which results in a net loss of jobs for the community and a potential increase in the unemployment rate.
- Flooding may cause significant disruptions of clean water and sewer services, elevating health risks and delaying recovery efforts.
- The psychosocial effects on flood victims and their families can traumatize them for long periods of time, creating long-term increases in medical treatment and services.
- Extensive or repetitive flooding can lead to decreases in property value for the affected community.
- Flood poses a potential catastrophic risk to annual and perennial crop production and overall crop quality, leading to higher food costs.
- Flood-related declines in production may lead to an increase in unemployment.
- The City of Houston includes 52,912 acres of total park space. Recreation activities throughout the City's parks may be unavailable, and tourism can be unappealing for years following a large flood event, devastating directly-related local businesses and negatively impacting economic recovery.
- Flooding exacerbates the housing inequality crisis and further reduces the City's accessibility of affordable housing structures.
- Significant sediment redeposition throughout the community alters the natural waterways, increases erosion, and impairs the Houston Ship Channel.
- Flooding increases pollutants and toxicants into the local waterways, affecting the ecosystem, residential use, and quality of life in the community.

A summary assessment of flood hazard vulnerability and impacts to the community lifelines is presented in the following table.

*Table 31: Flood Vulnerability and Consequence Summary by Lifeline*

Flood	Vulnerability	Consequence
Safety and Security	High Vulnerability	Moderate Impact to Lifeline/Services
Food, Water, Sheltering	High Vulnerability	Significant Impact to Lifeline/Services
Communications	Moderate Vulnerability	Moderate Impact to Lifeline/Services
Transportation	High Vulnerability	Significant Impact to Lifeline/Services
Health and Medical	Moderate Vulnerability	Significant Impact to Lifeline/Services
Hazardous Material (Mgmt)	High Vulnerability	Significant Impact to Lifeline/Services
Energy (Power and Fuel)	High Vulnerability	Significant Impact to Lifeline/Services

**b. Hurricane**

The location of the City of Houston near the Gulf Coast increases vulnerability to direct and indirect factors related to a hurricane event, such as high-force winds, storm surge, and flooding. Hurricanes and/or tropical storms can impact Houston during the official Atlantic U.S. hurricane season, which occurs between June 1 and November 30 each year. The City of Houston planning area is in a moderate- to high-risk area for hurricane wind speeds up to 155 miles per hour (mph). Forty-three tropical cyclones have occurred within 50 miles of the City of Houston since 1871.

Hurricanes are categorized according to the strength and intensity of their winds using the [Saffir-Simpson Hurricane Scale](#), as shown in the following table. A Category 1 storm has the lowest wind speeds, while a Category 5 hurricane has the highest. However, a lower category storm may inflict greater damage than higher category storms depending on location, storm surge, regional weather patterns, and speed.

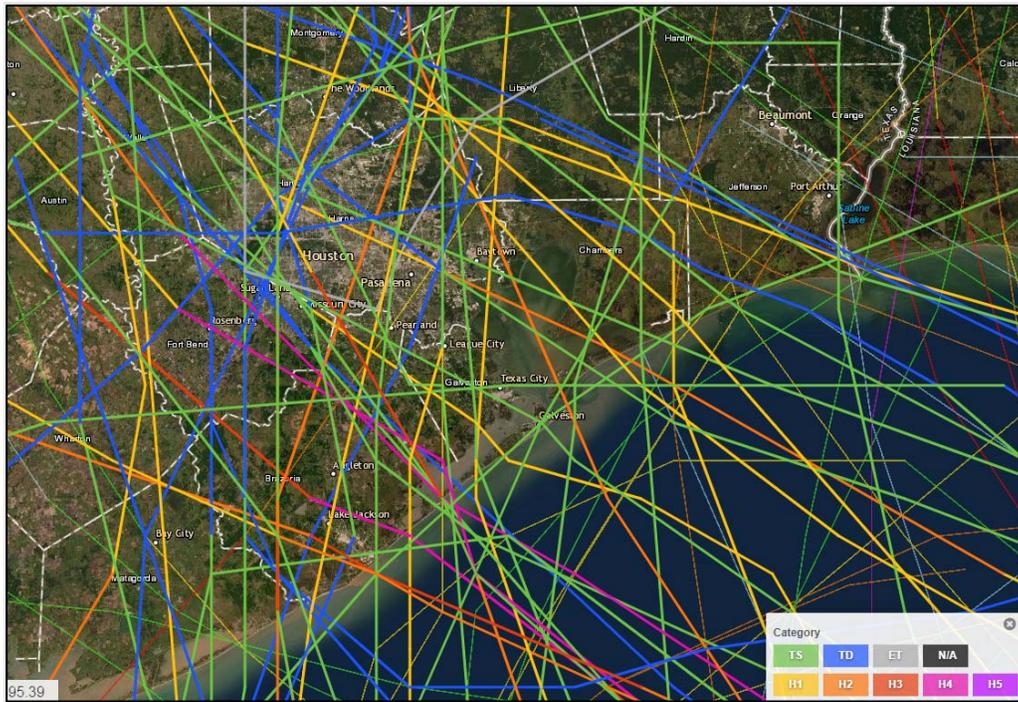
*Table 32: Saffir-Simpson Scale*

Category	Maximum Sustained Wind Speed (mph)	Minimum Surface Pressure (millibars)	Storm Surge (feet)
1	74 – 95	Greater than 980	3 – 5
2	96 – 110	979 – 965	6 – 8
3	111 – 130	964 – 945	9 – 12
4	131 – 155	944 – 920	13 – 18
5	155 +	Less than 920	19+

Source: <https://www.nhc.noaa.gov/aboutsshws.php>

The following figure presents historical tracking of tropical storms and hurricanes that have impacted the City of Houston planning area.

Figure 8: Historical Hurricane Tracks near Houston



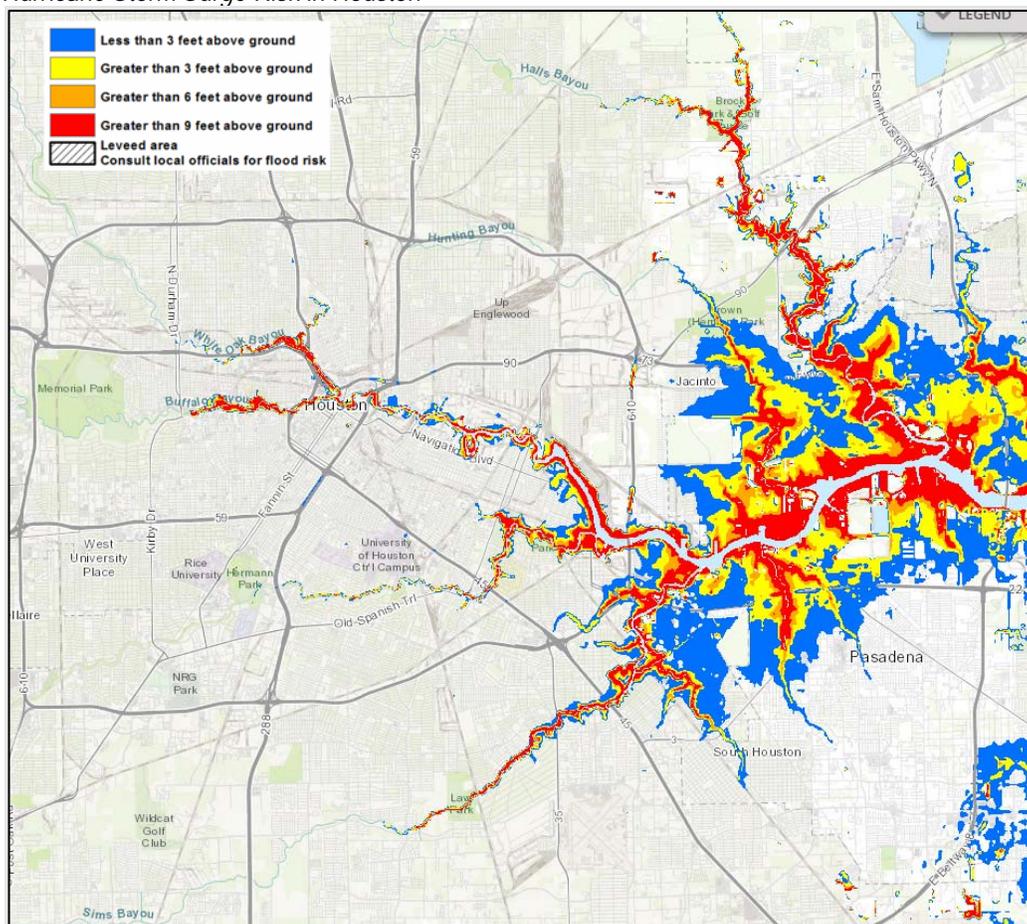
Source: <https://coast.noaa.gov/hurricanes/>

Hurricanes and Tropical Storms can cause major damage, all existing buildings, facilities, and populations are equally exposed and vulnerable to this hazard and could potentially be impacted. Approximately 52 percent of single-family residential homes, representing about 514,077 structures in the city, were built before 1980.<sup>18</sup> These structures are more susceptible to storm damage due to the outdated and less stringent construction standards and building codes.

Houston also has multiple mobile or manufactured home parks. These parks are more vulnerable to hurricane events than typical site-built structures if they are not properly anchored or properly maintained. The 2016-2020 American Community Survey indicates a total of 9,150 manufactured homes located in the City of Houston.

<sup>18</sup> Source: U.S. Census Bureau 5-year American Community Survey 2016-2020.

Figure 9: Hurricane Storm Surge Risk in Houston



Source: NOAA, National Storm Surge Hazard Maps: <https://noaa.maps.arcgis.com/home/index.html>

The previous figure presents the risk associated with storm surge produced by a hurricane. It should be noted that storm surge is not entirely dependent on the strength of the storm but can vary depending on the size or speed of the storm.

Hurricane events have the potential to pose a significant risk to people and can create dangerous and difficult situations for public health and safety officials. In addition to the effects of widespread flooding previously described, impacts of hurricanes to the Houston community can include:

- Individuals exposed to the storm can be struck by flying debris, falling limbs, or downed trees causing serious injury or death.
- Structures can be damaged or crushed by falling trees, which can result in physical harm to the occupants.
- Driving conditions may be dangerous during a hurricane event, especially over elevated bridges, increasing the risk of injury and accidents during evacuations if not timed properly.
- Emergency evacuations may be necessary prior to a hurricane making landfall, requiring emergency responders, evacuation routing, and temporary shelters.
- Significant debris and downed trees can result in emergency response vehicles being unable to access areas of the community.
- Downed power lines may result in roadways being unsafe for use, which may prevent first responders from answering calls for assistance or rescue.

- During hurricane landfall, first responders may be prevented from responding to calls as the winds may reach a speed in which their vehicles and equipment are unsafe to operate.
- Hurricane events often result in widespread power outages, increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outages can also result in an increase in structure fires and carbon monoxide poisoning as individuals attempt to cook or heat their homes with alternative, unsafe cooking or heating devices, such as grills.
- Extreme hurricane events may rupture gas lines and down trees and power lines, increasing the risk of structure fires during and after a storm event.
- Extreme hurricane events may lead to prolonged evacuations during search and rescue, and immediate recovery efforts requiring additional emergency personnel and resources to prevent entry, protect citizens, and protect property.
- First responders are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions.
- Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications.
- Critical staff may be unable to report for duty, limiting response capabilities.
- City or county departments may be damaged, delaying response and recovery efforts for the entire community.
- Private sector entities that the City and its residents rely on, such as utility providers, financial institutions, and medical care providers, may not be fully operational and may require assistance from neighboring communities until full services can be restored.
- Economic disruption negatively impacts the programs and services provided by the community due to short- and long-term loss in revenue.
- Some businesses not directly damaged by the hurricane may be negatively impacted while roads are cleared and utilities are being restored, further slowing economic recovery.
- Older structures built to less stringent building codes may suffer greater damage as they are typically more vulnerable to hurricane damage.
- Large scale hurricanes can have significant economic impact on the affected area, as it must now fund expenses such as infrastructure repair and restoration, temporary services and facilities, overtime pay for responders, as well as normal day-to-day operating expenses.
- Businesses that are more reliant on utility infrastructure than others may suffer greater damages without a backup power source.

The economic and financial impacts of a hurricane will depend entirely on the scale of the event, an inventory of damage, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning performed by the counties, communities, local businesses, and residents will also contribute to the overall economic and financial conditions in the aftermath of any hurricane event.

Based on historical occurrences of significant hurricane events, the probability of future events is highly likely with the frequency of occurrence of one event, every year for the City of Houston. A summary assessment of hurricane hazard vulnerability and impacts to the community lifelines is presented in the table below.

Table 33: Hurricane Vulnerability and Consequence Summary by Lifeline

Hurricane	Vulnerability	Consequence
Safety and Security	High Vulnerability	Significant Impact to Lifeline/Services
Food, Water, Sheltering	High Vulnerability	Significant Impact to Lifeline/Services
Communications	High Vulnerability	Significant Impact to Lifeline/Services
Transportation	High Vulnerability	Significant Impact to Lifeline/Services
Health and Medical	Moderate Vulnerability	Significant Impact to Lifeline/Services
Hazardous Material (Mgmt)	High Vulnerability	Significant Impact to Lifeline/Services
Energy (Power and Fuel)	High Vulnerability	Significant Impact to Lifeline/Services

**c. Extreme Heat**

Extreme heat occurs when temperatures hover ten degrees or more above the average temperature in a region for an extended period. Extreme heat is often associated with conditions of high humidity. When these conditions persist over a long period of time, it is defined as a heat wave. Extreme heat during the summer months is a common occurrence throughout the State of Texas, and the City of Houston is no exception. In addition, the City of Houston experiences urban heat islands, primarily in downtown areas, due to an increase of asphalt and concrete.

The greatest risk from extreme heat is to public health and safety. Potential impacts to the community may include:

- Vulnerable populations, particularly the elderly and children under 5, can face serious or life-threatening health problems from exposure to extreme heat including hyperthermia; heat cramps; heat exhaustion; and heat stroke (or sunstroke).
- Response personnel including utility workers, public works personnel, and any other professions where individuals are required to work outside, are more subject to extreme heat related illnesses since their exposure would typically be greater.
- High energy demand periods can outpace the supply of energy, potentially creating the need for rolling brownouts, which would elevate the risk of illness to vulnerable residents.
- Highways and roads may be damaged by excessive heat causing asphalt roads to soften and concrete roads to shift or buckle.
- Vehicle engines and cooling systems typically run harder during extreme heat events, resulting in increases in mechanical failures.
- Extreme heat events during times of drought can exacerbate the environmental impacts associated with drought, decreasing water and air quality, and further degrading wildlife habitat.
- Extreme heat increases ground-level ozone (smog), increasing the risk of respiratory illnesses.
- Tourism and recreational activities predominant in the City of Houston may be negatively impacted during extreme heat events, reducing seasonal revenue.
- Food suppliers can anticipate an increase in food costs due to increases in production costs and crop and livestock losses.
- Fisheries may be negatively impacted by extreme heat, suffering damage to fish habitats (either natural or man-made), and a loss of fish and/or other aquatic organisms due to decreased water flows or availability.
- Negatively impacted water suppliers may face increased costs resulting from the transport of water or developing supplemental water resources.
- Outdoor activities may see an increase in school injury or illness during extreme heat events.

The economic and financial impacts of extreme heat will depend on the duration of the event, demand for energy, drought associated with extreme heat, and many other factors. The level of preparedness and the amount of planning done by the jurisdiction, local businesses, and citizens will impact the overall economic and financial conditions before, during, and after an extreme heat event.

According to historical records the City of Houston planning area has experienced 63 events in a 21-year reporting period. This provides a frequency of occurrence of approximately 3 event every year. This frequency supports a highly likely probability of future events. A summary assessment of extreme heat hazard vulnerability and impacts to the community lifelines is presented in the following table.

*Table 34: Extreme Heat Vulnerability and Consequence Summary by Lifeline*

Extreme Heat	Vulnerability	Consequence
Safety and Security	Moderate Vulnerability	Low Impact to Lifeline/Services
Food, Water, Sheltering	Moderate Vulnerability	Low Impact to Lifeline/Services
Communications	Moderate Vulnerability	Low Impact to Lifeline/Services
Transportation	Low Vulnerability	Low Impact to Lifeline/Services
Health and Medical	Low Vulnerability	Low Impact to Lifeline/Services
Hazardous Material (Mgmt)	Moderate Vulnerability	Low Impact to Lifeline/Services
Energy (Power and Fuel)	High Vulnerability	Moderate Impact to Lifeline/Services

#### d. Thunderstorm Wind

Thunderstorms create extreme wind events including straight-line winds. Wind is the horizontal motion of the air past a given point, beginning with differences in air pressures. Pressure that is higher at one place than another sets up a force pushing from the high toward the low pressure: the greater the difference in pressures, the stronger the force. The distance between the area of high pressure and the area of low pressure also determines how fast the moving air is accelerated.

Straight-line winds are responsible for most thunderstorm wind damages. One type of straight-line wind, the downburst, is a small area of rapidly descending air beneath a thunderstorm. A downburst can cause damage equivalent to a strong tornado and make air travel extremely hazardous.

Thunderstorm wind events have the potential to pose a significant risk to people and can create dangerous and difficult situations for public health and safety officials. Impacts to the planning area can include:

- Individuals exposed to the storm can be struck by flying debris, falling limbs, or downed trees, causing serious injury or death.
- Structures can be damaged or crushed by falling trees, which can result in physical harm to the occupants.
- Significant debris and downed trees can result in emergency response vehicles being unable to access areas of the community.
- Downed power lines may result in roadways being unsafe for use, which may prevent first responders from answering calls for assistance or rescue.
- During exceptionally heavy wind events, first responders may be prevented from responding to calls, as the winds may reach a speed in which their vehicles and equipment are unsafe to operate.
- Thunderstorm wind events often result in widespread power outages, increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outages often result in an increase in structure fires and carbon monoxide poisoning, as individuals attempt to cook or heat their homes with alternate, unsafe cooking or heating devices, such as grills.
- First responders are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions.
- Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications.

- Critical staff may be unable to report for duty, limiting response capabilities.
- City or county departments may be damaged, delaying response and recovery efforts for the entire community.
- Private sector entities that the City and its residents rely on, such as utility providers, financial institutions, and medical care providers may not be fully operational and may require assistance from neighboring communities until full services can be restored.
- Economic disruption negatively impacts the programs and services provided by the community due to short- and long-term loss in revenue.
- Some businesses not directly damaged by thunderstorm wind events may be negatively impacted while roads are cleared and utilities are being restored, further slowing economic recovery.
- Older structures built to less stringent building codes may suffer greater damage as they are typically more vulnerable to thunderstorm winds.
- Large scale wind events can have significant economic impact on the affected area, as it must now fund expenses such as infrastructure repair and restoration, temporary services and facilities, overtime pay for responders, as well as normal day-to-day operating expenses.
- Businesses that are more reliant on utility infrastructure than others may suffer greater damages without a backup power source.
- A large thunderstorm wind event could impact recreational activities, placing visitors and residents in imminent danger, potentially requiring emergency services or evacuation. Recreational areas and parks may be damaged or inaccessible due to downed trees or debris, causing temporary impacts to area businesses.

The economic and financial impacts of thunderstorm winds will depend entirely on the scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will also contribute to the overall economic and financial conditions in the aftermath of any thunderstorm wind event.

Most thunderstorm winds occur during the spring, in the months of March, April, and May, and in the fall, during the month of September. Based on available records of historic events, 170 events, including those since the last update of the plan, in a 22-year reporting period provide a frequency of occurrence of 7 to 8 events every year. Even though the intensity of thunderstorm wind events is not always damaging for the City of Houston planning area, the frequency of occurrence for a thunderstorm wind event is highly likely, meaning that an event is probable within the next year for the Houston planning area. A summary assessment of thunderstorm wind hazard vulnerability and impacts to the community lifelines is presented in the following table.

*Table 35: Thunderstorm Wind Vulnerability and Consequence Summary by Lifeline*

Thunderstorm Wind	Vulnerability	Consequence
Safety and Security	Low Vulnerability	Low Impact to Lifeline/Services
Food, Water, Sheltering	Moderate Vulnerability	Low Impact to Lifeline/Services
Communications	High Vulnerability	Moderate Impact to Lifeline/Services
Transportation	Low Vulnerability	Moderate Impact to Lifeline/Services
Health and Medical	Low Vulnerability	Low Impact to Lifeline/Services
Hazardous Material (Mgmt)	Moderate Vulnerability	Moderate Impact to Lifeline/Services
Energy (Power and Fuel)	Moderate Vulnerability	Significant Impact to Lifeline/Services

#### e. Lightning

Lightning is a discharge of electrical energy resulting from the buildup of positive and negative charges within a thunderstorm, creating a “bolt” when the buildup of charges becomes strong enough. This flash of light usually occurs

within the clouds or between the clouds and the ground. A bolt of lightning can reach temperatures approaching 50,000 degrees Fahrenheit. Lightning rapidly heats the sky as it flashes but the surrounding air cools following the bolt. This rapid heating and cooling of the surrounding air causes the thunder which often accompanies lightning strikes. While most often affiliated with severe thunderstorms, lightning often strikes outside of heavy rain and might occur as far as 10 miles away from any rainfall.

According to Federal Emergency Management Agency (FEMA), an average of 300 people are injured and 80 people are killed in the United States each year by lightning. Direct lightning strikes also have the ability to cause significant damage to buildings, critical facilities, and infrastructure. Lightning is also responsible for igniting wildfires that can result in widespread damages to property before firefighters have the ability to contain and suppress the resultant fire.

Based on historical records, the U.S. National Lightning Detection Network, and input from the planning team, the probability of occurrence for future lightning events in the City of Houston planning area is considered highly likely, or an event probable in the next year. According to National Oceanic and Atmospheric Administration (NOAA), the City of Houston planning area is in a part of the country that experiences 12 to 28 lightning flashes per square mile per year (approximately 7,524 to 17,556 flashes per year). Given this estimated frequency of occurrence, it can be expected that future lightning events will continue to threaten life and cause minor property damages throughout the planning area.

Lightning events have the potential to pose a significant risk to people and can create dangerous and difficult situations for public health and safety officials. Impacts to the planning area can include:

- Lightning events could impact recreational activities, placing residents and visitors in imminent danger, potentially requiring emergency services or park evacuation.
- Individuals exposed to the storm can be directly struck, posing significant health risks and potential death.
- Structures can be damaged or crushed by falling trees damaged by lightning, which can result in physical harm to the occupants.
- Lightning strikes can result in widespread power outages, increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outages often result in an increase in structure fires and carbon monoxide poisoning, as individuals attempt to cook or heat their homes with alternate, unsafe cooking or heating devices, such as grills.
- Lightning strikes can be associated with structure fires and wildfires, creating additional risk to residents and first responders.
- Emergency operations and services may be significantly impacted due to power outages and/or loss of communications.
- City departments may be damaged, delaying response and recovery efforts for the entire community.
- Economic disruption due to power outages and fires negatively impacts the programs and services provided by the community due to short and long-term loss in revenue.
- Some businesses not directly damaged by lightning events may be negatively impacted while utilities are being restored, further slowing economic recovery.
- Businesses that are more reliant on utility infrastructure than others may suffer greater damages without a backup power source.

The economic and financial impacts of lightning will depend entirely on the scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will also contribute to the overall economic and financial conditions in the aftermath of any lightning event.

A summary assessment of lightning hazard vulnerability and impacts to the community lifelines is presented in the following table.

*Table 36: Lightning Vulnerability and Consequence Summary by Lifeline*

Lightning	Vulnerability	Consequence
Safety and Security	Moderate Vulnerability	Low Impact to Lifeline/Services
Food, Water, Sheltering	Moderate Vulnerability	Low Impact to Lifeline/Services
Communications	Moderate Vulnerability	Moderate Impact to Lifeline/Services
Transportation	Low Vulnerability	Low Impact to Lifeline/Services
Health and Medical	Moderate Vulnerability	Low Impact to Lifeline/Services
Hazardous Material (Mgmt)	Moderate Vulnerability	Moderate Impact to Lifeline/Services
Energy (Power and Fuel)	High Vulnerability	Moderate Impact to Lifeline/Services

**f. Tornado**

A tornado is a rapidly rotating column of air extending between, and in contact with, a cloud and the surface of the earth.<sup>19</sup> Tornadoes are among the most violent storms on the planet; the most violent tornadoes are capable of tremendous destruction, with wind speeds of 250 miles per hour (mph) or more. In extreme cases, winds may approach 300 mph. Damage paths can be in excess of one mile wide and 50 miles long.

The most powerful tornadoes are produced by “supercell thunderstorms.” Supercell thunderstorms are created when horizontal wind shears (winds moving in different directions at different altitudes) begin to rotate the storm. This horizontal rotation can be tilted vertically by violent updrafts, and the rotation radius can shrink, forming a vertical column of very quickly swirling air. This rotating air can eventually reach the ground, forming a tornado.

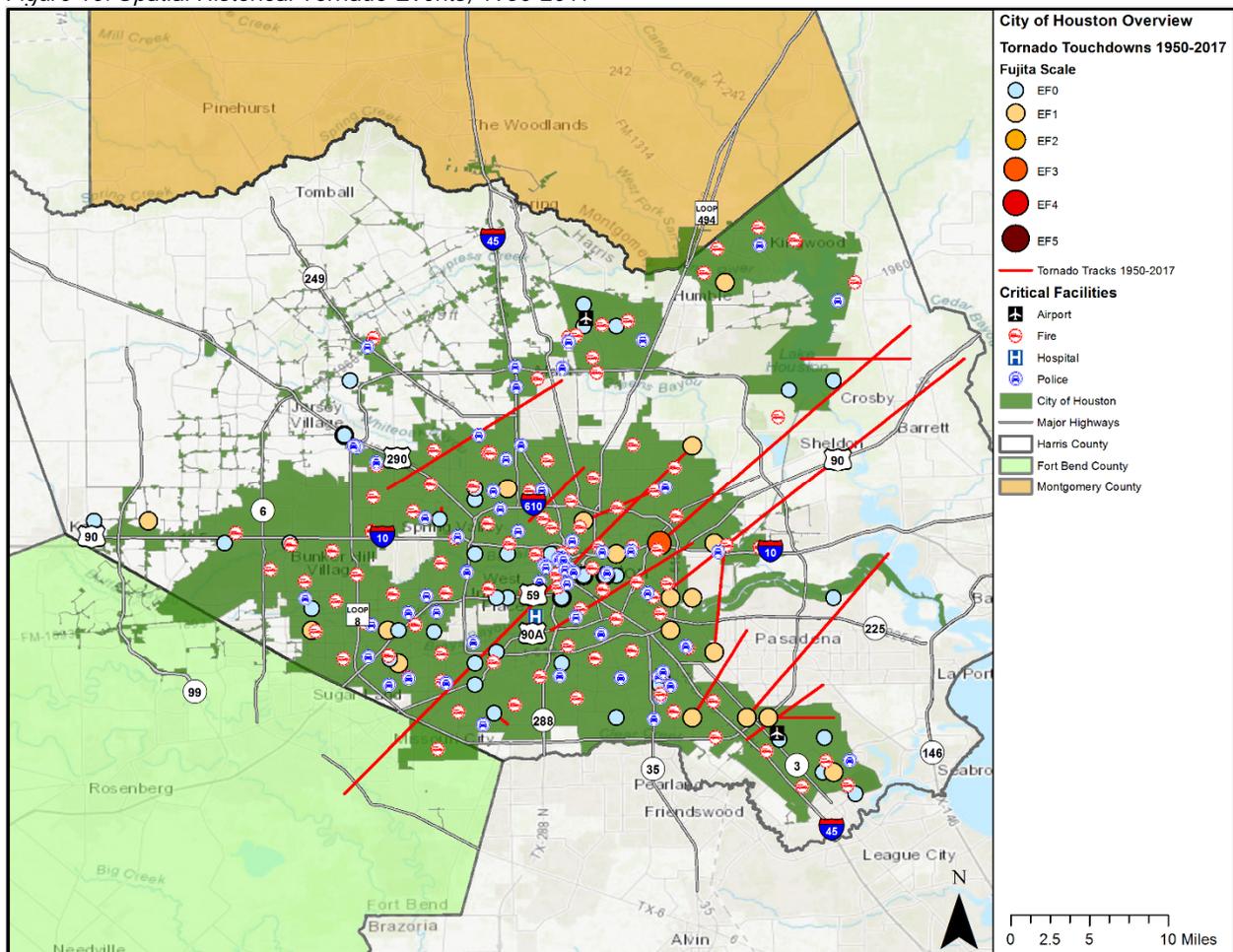
Tornado magnitudes prior to 2005 were determined using the traditional version of the Fujita Scale. Since February 2007, the Fujita Scale has been replaced by the Enhanced Fujita Scale, which retains the same basic design and six strength categories as the previous scale. The newer scale reflects more refined assessments of tornado damage surveys, standardization, and damage consideration to a wider range of structures. For the purposes of this plan, those tornadoes that occurred prior to the adoption of the EF scale will still be mentioned in the Fujita Scale for historical reference.

Both the Fujita Scale and Enhanced Fujita Scale should be referenced in reviewing previous occurrences since tornado events prior to 2007 will follow the original Fujita Scale. The largest magnitude reported within the planning area is F2 on the Fujita Scale, a “Significant Tornado.” Based on the planning area’s location in within wind risk rating zones, the planning area could experience anywhere from an EF0 to an EF4 depending on the wind speed. An EF4 is considered to be the worst, most probable tornado type for the City of Houston. Historical tornado tracks are presented in the following figure.

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<sup>19</sup> Source: <https://www.weather.gov/phi/TornadoDefinition>

Figure 10: Spatial Historical Tornado Events, 1950-2017



Source: *City of Houston Hazard Mitigation Plan Update 2018*

Tornadoes have the potential to pose a significant risk to the population and can create dangerous situations. Often providing and preserving public health and safety is difficult. Impacts to the planning area can include:

- Individuals exposed to the storm can be struck by flying debris, falling limbs, or downed trees, causing serious injury or death.
- Structures can be damaged or crushed by falling trees, which can result in physical harm to the occupants.
- Manufactured homes may suffer substantial damage as they would be more vulnerable than typical site-built structures.
- Significant debris and downed trees can result in emergency response vehicles being unable to access areas of the community.
- Downed power lines may result in roadways being unsafe for use, which may prevent first responders from answering calls for assistance or rescue.
- Tornadoes often result in widespread power outages, increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outages can result in an increase in structure fires and/or carbon monoxide poisoning, as individuals attempt to cook or heat their home with alternate, unsafe cooking or heating devices, such as grills.
- Tornadoes can destroy or make residential structures uninhabitable, requiring shelter or relocation of residents in the aftermath of the event.

- First responders must enter the damage area shortly after the tornado passes to begin rescue operations and to organize cleanup and assessments efforts. Therefore, they are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions, elevating the risk of injury to first responders and potentially diminishing emergency response capabilities.
- Emergency operations and services may be significantly impacted due to damaged facilities, loss of communications, and damaged emergency vehicles and equipment.
- City or county departments may be damaged or destroyed, delaying response and recovery efforts for the entire community.
- Private sector entities that jurisdictions rely on, such as utility providers, financial institutions, and medical care providers may not be fully operational and may require assistance from neighboring communities until full services can be restored.
- Economic disruption negatively impacts the programs and services provided by the community due to short and long-term loss in revenue.
- Damage to infrastructure may slow economic recovery since repairs may be extensive and lengthy.
- Some businesses not directly damaged by the tornado may be negatively impacted while roads and utilities are being restored, further slowing economic recovery.
- When the community is affected by significant property damage it is anticipated that funding would be required for infrastructure repair and restoration, temporary services and facilities, overtime pay for responders, as well as normal day-to-day operating expenses.
- Displaced residents may not be able to immediately return to work, further slowing economic recovery.
- Residential structures destroyed by a tornado may not be rebuilt for years, reducing the tax base for the community.
- Large or intense tornadoes may result in a dramatic population fluctuation, as people are unable to return to their homes or jobs and must seek shelter and/or work outside of the affected area.
- Businesses that are uninsured or underinsured may have difficulty reopening, which results in a net loss of jobs for the community and a potential increase in the unemployment rate.
- Recreation activities may be unavailable, and tourism can be unappealing for years following a large tornado, devastating directly related local businesses.

The economic and financial impacts of a tornado event will depend on the scale of the event, what is damaged, costs of repair or replacement, lost business days in impacted areas, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by government, businesses, and citizens will contribute to the overall economic and financial conditions in the aftermath of a tornado event.

Tornadoes can occur at any time of year and at any time of day, but they are typically more common in the spring months during the late afternoon and evening hours. A smaller, high frequency period can emerge in the fall during the brief transition between the warm and cold seasons. According to historical records, 16 events in a 67-year reporting period for the City of Houston provides a probability of occurrence of approximately one every three years. This frequency supports a likely probability of future events for the City of Houston planning area. A summary assessment of tornado hazard vulnerability and impacts to the community lifelines is presented in the following table.

Table 37: Tornado Vulnerability and Consequence Summary by Lifeline

Tornado	Vulnerability	Consequence
Safety and Security	Moderate Vulnerability	Moderate Impact to Lifeline/Services
Food, Water, Sheltering	Moderate Vulnerability	Moderate Impact to Lifeline/Services
Communications	Moderate Vulnerability	Moderate Impact to Lifeline/Services
Transportation	Moderate Vulnerability	Moderate Impact to Lifeline/Services
Health and Medical	Moderate Vulnerability	Moderate Impact to Lifeline/Services
Hazardous Material (Mgmt)	Moderate Vulnerability	Moderate Impact to Lifeline/Services
Energy (Power and Fuel)	High Vulnerability	Significant Impact to Lifeline/Services

**g. Expansive Soils**

Expansive soils are soils and soft rocks with a relatively high percentage of clay minerals that are subject to changes in volume as they swell and shrink with changing moisture conditions. Drought conditions can cause soils to contract in response to a loss of soil moisture.

Expansive soils contain minerals such as smectite clays that are capable of absorbing water. When these clays absorb water, they increase in volume and expand. Expansions in soil of 10 percent or more are not uncommon in the City of Houston planning area. The change in soil volume and resulting expansion can exert enough force on a building or other structure to cause damage.

Expansive soils will also lose volume and shrink when they dry. A reduction in soil volume can affect the support to buildings or other structures and result in damage. Fissures in the soil can also develop and facilitate the deep penetration of water when moist conditions or runoff occurs. This produces a cycle of shrinkage and swelling that place repetitive stress on structures.

The amount and depth of potential swelling that can occur in a clay material are, to some extent, functions of the cyclical moisture content in the soil. In drier climates where the moisture content in the soil near the ground surface is low because of evaporation, there is a greater potential for extensive swelling than in the same soil in wetter climates where the variations of moisture content are not as severe. Volume changes in highly expansive soils range between 7 and 10 percent, however under abnormal conditions, they can reach as high as 25 percent.

Homeowners and public agencies that assume they cannot afford preventative measures such as more costly foundations and floor systems, often incur the largest percentage of damage and costly repairs from expanding soil. No figures are available for the total damage to homes in the planning area from expansive clays. For the City of Houston planning area, the most extensive damage from expansive soils can occur to bridges, highways, streets, and parking lots. The greatest damage occurs when structures are constructed when clays are dry (such as during a drought) and then subsequent soaking rains swell the clay.

The impact of expansive soils experienced in the City of Houston planning area has resulted in no injuries and fatalities, supporting a limited severity of impact meaning injuries and/or illnesses are treatable with first aid, shutdown of facilities and services for 24 hours or less, and less than 10 percent of property is destroyed or with major damage.

Damages from expansive soils are typically associated with droughts, previous occurrences for expansive soils can be correlated with previous occurrences for drought, which are typically negligible. The City of Houston has experienced two known events. In the summer of 2011, a drought caused the ground to contract, leading to hundreds of broken pipes. The second event occurred in the summer of 2012, during a wet period, the ground expanded and

led to cracks in streets. A summary assessment of expansive soils hazard vulnerability and impacts to the community lifelines is presented in the following table.

*Table 38: Expansive Soils Vulnerability and Consequence Summary by Lifeline*

Expansive Soils	Vulnerability	Consequence
Safety and Security	Low Vulnerability	Low Impact to Lifeline/Services
Food, Water, Sheltering	Moderate Vulnerability	Low Impact to Lifeline/Services
Communications	Low Vulnerability	Low Impact to Lifeline/Services
Transportation	Moderate Vulnerability	Low Impact to Lifeline/Services
Health and Medical	Moderate Vulnerability	Low Impact to Lifeline/Services
Hazardous Material (Mgmt)	Low Vulnerability	Low Impact to Lifeline/Services
Energy (Power and Fuel)	Low Vulnerability	Low Impact to Lifeline/Services

#### h. Hail

Hailstorm events are a potentially damaging outgrowth of severe thunderstorms. During the developmental stages of a hailstorm, ice crystals form within a low-pressure front due to the rapid rising of warm air into the upper atmosphere and the subsequent cooling of the air mass. Frozen droplets gradually accumulate into ice crystals until they fall as frozen masses of round or irregularly shaped ice typically greater than 0.75 inches in diameter. The size of hailstones is a direct result of the size and severity of the storm. High velocity updraft winds are required to keep hail in suspension in thunderclouds. The strength of the updraft is a by-product of heating on the Earth’s surface. Higher temperature gradients above Earth’s surface result in increased suspension time and hailstone size.

The National Weather Service (NWS) classifies a storm as “severe” if there is hail 3/4 of an inch in diameter (approximately the size of a penny) or greater, based on radar intensity or as seen by observers. The intensity category of a hailstorm depends on hail size and the potential damage it could cause,

In April 2001, numerous reports of hail were reported on the west side of Houston the afternoon. Hail sizes from 0.75 inch to 1.5 inches were reported along I-10 between Hunters Creek Village and the West Loop. Hail measures 1 to 1.5 inches near South Braeswood and Fondren Road and accumulated up to several inches deep. The hail was still on the ground 24 hours after the storm. There were numerous reports of windows broken and trees and shrubs stripped of their leaves. Damage estimates exceeded \$27 million (2017) dollars.

Hail events have the potential to pose a significant risk to people and can create dangerous situations. Impacts to the planning area can include:

- Hail may create hazardous road conditions during and immediately following an event, delaying first responders from providing for or preserving public health and safety.
- Individuals and first responders who are exposed to the storm may be struck by hail, falling branches, or downed trees resulting in injuries or possible fatalities.
- Residential structures can be damaged by falling trees, which can result in physical harm to occupants.
- Large hail events will likely cause extensive roof damage to residential structures along with siding damage and broken windows, creating a spike in insurance claims and a rise in premiums.
- Automobile damage may be extensive depending on the size of the hail and length of the storm.
- Hail events can result in power outages over widespread areas, increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outages can result in an increase in structure fires and/or carbon monoxide poisoning, as individuals attempt to cook or heat their home with alternate, unsafe cooking or heating devices, such as grills.

- First responders are exposed to downed power lines, damaged structures, hazardous spills, and debris that often accompany hail events, elevating the risk of injury to first responders and potentially diminishing emergency response capabilities.
- Downed power lines and large debris, such as downed trees, can result in the inability of emergency response vehicles to access areas of the community.
- Hazardous road conditions may prevent critical staff from reporting for duty, limiting response capabilities.
- Economic disruption negatively impacts the programs and services provided by the community due to short- and long-term loss in revenue.
- Some businesses not directly damaged by the hail event may be negatively impacted while roads are cleared and utilities are being restored, further slowing economic recovery.
- Businesses that are more reliant on utility infrastructure than others may suffer greater damages without a backup power source.
- Hazardous road conditions will likely lead to increases in automobile accidents, further straining emergency response capabilities.
- Depending on the severity and scale of damage caused by large hail events, damage to power transmission and distribution infrastructure can require days or weeks to repair.
- A significant hail event could significantly damage agricultural crops, resulting in extensive economic losses for the community and surrounding area.
- Hail events may injure or kill livestock and wildlife.
- A large hail event could impact the accessibility of recreational areas and parks due to extended power outages or debris clogged access roads.

The economic and financial impacts of hail will depend entirely on the scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning conducted by the community, local businesses, and citizens will contribute to the overall economic and financial conditions in the aftermath of any hail event. The frequency of historic events supports a highly likely probability of future events for the Houston area.

A summary assessment of hail hazard vulnerability and impacts to the community lifelines is presented in the following table.

*Table 39: Hail Vulnerability and Consequence Summary by Lifeline*

Hail	Vulnerability	Consequence
Safety and Security	Moderate Vulnerability	Low Impact to Lifeline/Services
Food, Water, Sheltering	Moderate Vulnerability	Low Impact to Lifeline/Services
Communications	Moderate Vulnerability	Moderate Impact to Lifeline/Services
Transportation	Low Vulnerability	Low Impact to Lifeline/Services
Health and Medical	Moderate Vulnerability	Low Impact to Lifeline/Services
Hazardous Material (Mgmt)	Moderate Vulnerability	Low Impact to Lifeline/Services
Energy (Power and Fuel)	Moderate Vulnerability	Low Impact to Lifeline/Services

**i. Wildfire**

A wildfire event occurs most often in the summer when the brush is dry, and flames can move unchecked through a highly vegetative area. Wildfires can start as a slow burning fire along the forest floor killing and damaging trees. The fires often spread more rapidly as they reach the tops of trees with wind carrying the flames from tree to tree. Dense smoke is usually the first indication of a wildfire.

A wildfire event often begins unnoticed and spreads quickly, lighting brush, trees, and homes on fire. A wildfire may be started by a campfire that was not doused properly, a tossed cigarette, burning debris, or arson. Texas has seen a significant increase in the number of wildfires in the past 30 years, which included wildland, interface, or intermix fires. Wildland Urban Interface or Intermix (WUI) fires occur in areas where structures and other human improvements meet or intermingle with undeveloped wildland or vegetative fuels. Wildland fires are fueled almost exclusively by natural vegetation while interface or intermix fires are urban/wildland fires in which vegetation and the built environment provide the fuel.

A wildfire event can be a potentially damaging consequence of drought. Wildfires can vary greatly in terms of size, location, intensity, and duration. While wildfires are not confined to any specific geographic location, they are most likely to occur in open grasslands. The threat to people and property from a wildfire event is greater in the fringe areas where developed areas meet open grass lands, such as the WUI. It is estimated that 14.3 percent of the total population in the City of Houston live within the WUI. However, the entire City of Houston is at risk for wildfires.

The Texas Forest Service reported 43 wildfire events between 2005 and 2015. The National Centers for Environmental Information (NCEI) did not include any wildfire events from 1996 through August 1, 2017. The Texas Forest Service (TFS) and volunteer fire departments started fully reporting events in 2005. Due to a lack of recorded data for wildfire events prior to 2005 and after 2015, frequency calculations are based on an eleven-year period, using only data from recorded years.

A wildfire event poses a potentially significant risk to public health and safety, particularly if the wildfire is initially unnoticed and spreads quickly. The impacts associated with a wildfire are not limited to the direct damages. Potential impacts for the planning area include:

- Persons in the area at the time of the fire are at risk for injury or death from burns and/or smoke inhalation.
- First responders are at greater risk of physical injury since they are near the hazard while extinguishing flames, protecting property or evacuating residents in the area.
- First responders can experience heart disease, respiratory problems, and other long term related illnesses from prolonged exposure to smoke, chemicals, and heat.
- Emergency services may be disrupted during a wildfire if facilities are impacted, and roadways are inaccessible, or personnel are unable to report for duty.
- Critical city and/or county departments may not be able to function and provide necessary services depending on the location of the fire and the structures or personnel impacted.
- Non-critical businesses may be directly damaged, suffer loss of utility services, or be otherwise inaccessible, delaying normal operations and slowing the recovery process.
- Displaced residents may not be able to immediately return to work, further slowing economic recovery.
- Roadways in or near the WUI could be damaged or closed due to smoke and limited visibility.
- Older homes are generally exempt from modern building code requirements, which may require fire suppression equipment in the structure.
- Some high-density neighborhoods feature small lots with structures close together, increasing the potential for fire to spread rapidly.
- Air pollution from smoke may exacerbate respiratory problems of vulnerable residents.
- Charred ground after a wildfire cannot easily absorb rainwater, increasing the risk of flooding and potential mudflows.
- Wildfires can cause erosion, degrading stream water quality.
- Wildlife may be displaced or destroyed.
- Historical or cultural resources may be damaged or destroyed.
- Tourism can be significantly disrupted, further delaying economic recovery for the area.
- Economic disruption negatively impacts the programs and services provided by the community due to short and long- term loss in revenue.

- Fire suppression costs can be substantial, exhausting the financial resources of the community.
- Residential structures lost in a wildfire may not be rebuilt for years, reducing the tax base for the community.
- Direct impacts to municipal water supply may occur through contamination of ash and debris during the fire, destruction of aboveground delivery lines, and soil erosion or debris deposits into waterways after the fire.
- Recreation activities throughout the city’s parks may be unavailable and tourism can be unappealing for years following a large wildfire event, devastating directly related local businesses and negatively impacting economic recovery.

The economic and financial impacts of a wildfire event will depend on the scale of the event, what is damaged, costs of repair or replacement, lost business days in impacted areas, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by government, businesses, and citizens will contribute to the overall economic and financial conditions in the aftermath of a wildfire event.

A summary assessment of wildfire hazard vulnerability and impacts to the community lifelines is presented in the following table.

*Table 40: Wildfire Vulnerability and Consequence Summary by Lifeline*

Wildfire	Vulnerability	Consequence
Safety and Security	Low Vulnerability	Moderate Impact to Lifeline/Services
Food, Water, Sheltering	Moderate Vulnerability	Moderate Impact to Lifeline/Services
Communications	Low Vulnerability	Significant Impact to Lifeline/Services
Transportation	Low Vulnerability	Significant Impact to Lifeline/Services
Health and Medical	Low Vulnerability	Moderate Impact to Lifeline/Services
Hazardous Material (Mgmt)	Low Vulnerability	Moderate Impact to Lifeline/Services
Energy (Power and Fuel)	Moderate Vulnerability	Moderate Impact to Lifeline/Services

**j. Drought**

Drought is a period of substantially lower rainfall than the region average causing a serious hydrologic imbalance. Drought is the consequence of anticipated natural precipitation not being met over an extended period, usually a season or more in length. Droughts can become very prolonged and persist from one year to the next. Drought is a normal part of virtually all climatic regions including areas with high and low average rainfall. Droughts can be classified as meteorological, hydrologic, agricultural, and socioeconomic. The following table presents definitions for these different types of droughts.

*Table 41: Drought Classification Definitions<sup>20</sup>*

Meteorological Drought	The degree of dryness, as measured as departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales.
Hydrologic Drought	The effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
Agricultural Drought	Soil moisture deficiencies relative to water demands of plant life, usually crops.
Socioeconomic Drought	The effect of demands for water exceeds the supply as a result of a weather-related supply shortfall.

<sup>20</sup> Source: Multi-Hazard Identification and Risk Assessment: A Cornerstone of the National Mitigation Strategy, Federal Emergency Management Agency (FEMA).

Droughts occur regularly throughout Texas and the City of Houston and are a normal condition. However, they can vary greatly in their intensity and duration. There is no distinct geographic boundary to drought; therefore, it can occur throughout the City of Houston planning area equally.

Based on available records of historic events, there have been 18 extended time periods of drought (ranging in length from approximately 30 days to over 420 days) within a 21-year reporting period. The probability of future events is 0.86 per year, or an event probable in the next year. This frequency supports a highly likely probability of future events.

Drought impacts large areas and crosses jurisdictional boundaries. All existing and future buildings, facilities, and populations are exposed to this hazard and could potentially be impacted. However, drought impacts are mostly experienced in water shortages and crop/livestock losses on agricultural lands and typically have no impact on buildings.

Houston's Drinking Water Operations (DWO) is responsible for operating and maintaining three water purification plants and 56 ground water plants. Houston's water system serves approximately 2.2 million citizens each day and spans over 600 square miles serving four counties making it one of the most complex water systems in the nation. Local lakes and rivers supply the City of Houston surface water resources. Eighty-seven percent of the planning areas water supply flows from the Trinity River into Lake Livingston, and from the San Jacinto River into Lake Conroe and Lake Houston. Deep underground wells drilled into the Evangeline and Chicot aquifers currently provide the other 13 percent of the City's water supply. While the planning area relies on multiple water resources, high demand can deplete these resources during extreme drought conditions. As resources are depleted, potable water is in short supply and overall water quality can suffer, elevating health concerns for all residents but especially vulnerable populations – typically children, the elderly, and the ill. In addition, potable water is used for drinking, sanitation, patient care, sterilization, equipment, heating and cooling systems, and many other essential functions in medical facilities.

Drought has the potential to impact people in the City of Houston planning area. While it is rare that drought, in and of itself, leads to a direct risk to the health and safety of people in the U.S., severe water shortages could result in inadequate supply for human needs. Drought is frequently associated with a variety of impacts, including:

- The number of health-related low-flow issues (e.g., diminished sewage flows, increased pollution concentrations, reduced firefighting capacity, cross-connection contamination) will increase as the drought intensifies.
- Public safety issues from forest/range wildfires will increase as water availability and/or pressure decreases.
- Respiratory ailments may increase as the air quality decreases.
- There may be an increase in disease due to wildlife concentrations (e.g., rabies, Rocky Mountain spotted fever, Lyme disease).
- Jurisdictions and residents may disagree over water use/water rights, creating conflict.
- Political conflicts may increase between municipalities, counties, states, and regions.
- Water management conflicts may arise between competing interests.
- Increased law enforcement activities may be required to enforce water restrictions.
- Severe water shortages could result in inadequate supply for human needs as well as lower quality of water for consumption.
- Firefighters may have limited water resources to aid in firefighting and suppression activities, increasing risk to lives and property.
- During drought, there is an increased risk for wildfires and dust storms.
- The community may need increased operational costs to enforce water restriction or rationing.
- Prolonged drought can lead to increases in illness and disease related to drought.
- Utility providers can see decreases in revenue as water supplies diminish.

- Utilities providers may cut back energy generation and service to their customers to prioritize critical service needs.
- Hydroelectric power generation facilities and infrastructure would have significantly diminished generation capability. Dams simply cannot produce as much electricity from low water levels as they can from high water levels.
- Fish and wildlife food and habitat will be reduced or degraded over time during a drought and disease will increase, especially for aquatic life.
- Wildlife will move to more sustainable locations, creating higher concentrations of wildlife in smaller areas, increasing vulnerability and further depleting limited natural resources.
- Severe and prolonged drought can result in the reduction of a species or cause the extinction of a species altogether.
- Plant life will suffer from long-term drought. Wind and erosion will also pose a threat to plant life as soil quality will decline.
- Dry and dead vegetation will increase the risk of wildfire.
- Recreational activities that rely on water may be curtailed, such as canoeing at the Armand Bayou Nature Center, resulting in fewer tourists and lower revenue.
- Drought poses a significant risk to annual and perennial crop production and overall crop quality, leading to higher food costs.
- Drought related declines in production may lead to an increase in unemployment.
- Drought may limit livestock grazing resulting in decreased livestock weight, potential increased livestock mortality, and increased cost for feed.
- Negatively impacted water suppliers may face increased costs resulting from the transport of water or developing supplemental water resources.
- Long-term drought may negatively impact future economic development.

The overall extent of damages caused by periods of drought is dependent on its extent and duration. The level of preparedness and pre-event planning done by government, businesses, and citizens will contribute to the overall economic and financial conditions in the aftermath of a drought event.

A summary assessment of drought hazard vulnerability and impacts to the community lifelines is presented in the following table.

*Table 42: Drought Vulnerability and Consequence Summary by Lifeline*

Drought	Vulnerability	Consequence
Safety and Security	High Vulnerability	Low Impact to Lifeline/Services
Food, Water, Sheltering	High Vulnerability	Low Impact to Lifeline/Services
Communications	Low Vulnerability	Low Impact to Lifeline/Services
Transportation	Low Vulnerability	Low Impact to Lifeline/Services
Health and Medical	Moderate Vulnerability	Low Impact to Lifeline/Services
Hazardous Material (Mgmt)	Low Vulnerability	Low Impact to Lifeline/Services
Energy (Power and Fuel)	High Vulnerability	Low Impact to Lifeline/Services

#### k. Dam-Related Hazards

While dam failures are possible, no probability of occurrence can be calculated for the area since there are no historical records of dam failures in the City of Houston. Although the probability is low, the consequences of a dam failure would be significant.

Table 43: Dam Hazards in the City of Houston

Jurisdiction	Dam Name	Height (Ft.)	Storage (Acre Ft.)	Condition	Profiled
Houston	Barker Dam	42	209,000	Unsatisfactory	Yes
Houston	Addicks Dam	52	200,800	Unsatisfactory	Yes
Magnolia Gardens (Owned by City of Houston)	Lake Houston Dam	66	281,800	Satisfactory	Yes

Source: City of Houston Office of Emergency Management

In the aftermath of Hurricane Harvey, the decision was made to allow a controlled release of both the Addicks and Barker Dams, both of which are owned and operated by the U.S. Army Corps of Engineers. Water was released in a controlled, combined manner of 4,000 cfs into concrete-armored spillways, which is preferable to overtopping the dams. Neighborhoods downstream experienced flooding or additional flooding as a result of the controlled release and neighborhoods upstream experienced flooding from the reservoir itself. Upstream neighborhoods experienced flooding because of the overflow in the reservoirs backing up behind the dams. Downstream, the water was released into Buffalo Bayou, which was already experiencing flooding prior to the release.<sup>21</sup>

The *Texas Tribune* states that the Army Corps of Engineers believed the failure of these dams would have resulted in damages exceeding \$60 billion and impacting nearly 1 million residents. While homes and business were flooded due to the release, the damage sustained was less than what an overtopped dam would have ultimately cost the Houston community. Evacuations were considered voluntary and were not mandated during the controlled release. Approximately 53 neighborhoods are located within the Addicks Watershed and 40 within Barker Dam Reservoir area.<sup>22</sup>

Any individual dam has a very specific area that will be impacted by a catastrophic failure. Dams identified with potential risk can directly threaten the lives of individuals living or working in the inundation zone below the dam. The impact from any catastrophic failure would be like that of a flash flood. Potential impacts for the planning area include:

- Lives could be lost.
- There could be injuries from impacts with debris carried by the flood.
- Swift-water rescue of individuals trapped by the water puts the immediate responders at risk for their own lives.
- Individuals involved in the cleanup may be at risk from the debris and contaminants.
- Continuity of operations for any jurisdiction outside the direct impact area could be very limited.
- Roads and bridges could be destroyed.
- Homes and businesses could be damaged or destroyed.
- Emergency services may be temporarily unavailable.
- Disruption of operations and the delivery of services in the impacted area.
- A large dam with a high head of water could effectively scour the terrain below it for miles, taking out all buildings, and other infrastructure.
- Scouring force could erode soil and any buried pipelines.
- Scouring action of a large dam will destroy all vegetation in its path.
- Wildlife and wildlife habitat caught in the flow will likely be destroyed.
- Fish habitat will likely be destroyed.
- Topsoil will erode, slowing the return of natural vegetation.

<sup>21</sup> Source: Harris County Flood Control District <https://www.hcfdc.org/hurricane-harvey/flooding-impacts-in-connection-with-the-reservoirs/>

<sup>22</sup> Source: Texas Tribune: <https://www.texastribune.org/2017/08/29/q-why-houstons-reservoirs-arent-going-fail/>

- The destructive high velocity water flow may include substantial debris and hazardous materials, significantly increasing the risks to life and property in its path.
- Debris and hazardous material deposited downstream may cause further pollution of areas far greater than the inundation zone.
- Destroyed businesses and homes may not be rebuilt, reducing the tax base and impacting long term economic recovery.
- Historical or cultural resources may be damaged or destroyed.
- Recreational activities and tourism may be temporarily unavailable or unappealing, slowing economic recovery.
- The Downtown business district could be devastated, and the Houston Ship Channel could be severely damaged, causing a catastrophic economic loss for the region.

The economic and financial impacts of dam failure on the area will depend entirely on the location of the dam, scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by the government, community, local businesses, and residents will also contribute to the overall economic and financial conditions in the aftermath of any dam failure event.

A summary assessment of dam failure hazard vulnerability and impacts to the community lifelines is presented in the following table.

*Table 44: Dam Failure Vulnerability and Consequence Summary by Lifeline*

Dam Failure	Vulnerability	Consequence
Safety and Security	Moderate Vulnerability	Significant Impact to Lifeline/Services
Food, Water, Sheltering	Moderate Vulnerability	Significant Impact to Lifeline/Services
Communications	Moderate Vulnerability	Significant Impact to Lifeline/Services
Transportation	Moderate Vulnerability	Significant Impact to Lifeline/Services
Health and Medical	Moderate Vulnerability	Significant Impact to Lifeline/Services
Hazardous Material (Mgmt)	Moderate Vulnerability	Significant Impact to Lifeline/Services
Energy (Power and Fuel)	Moderate Vulnerability	Significant Impact to Lifeline/Services

### I. Winter Storms

A winter storm event is identified as a storm with primarily snow, ice, or freezing rain.<sup>23</sup> Winter storms are associated with the combined effects of winter precipitation and strong winds creating a dangerous wind chill, or perceived air temperature. This type of storm can cause significant problems for area residents due to snow, ice hazards, and cold temperatures. Wind chill is a function of temperature and wind. Low wind chill is a product of high winds and freezing temperatures.

The greatest risk from a winter storm hazard is to public health and safety. Potential impacts for the planning area may include:

- Vulnerable populations, particularly the elderly and infants, can face serious or life-threatening health problems from exposure to extreme cold including hypothermia and frostbite. Houston residents are located far south in Texas and therefore may be even more vulnerable than the general population of the United States based on not having proper outdoor wear and warm weather accessories needed to be in the cold.
- Loss of electric power or other heat sources can result in increased potential for fire injuries or hazardous gas inhalation because residents burn candles for light and use fires or generators to stay warm.

<sup>23</sup> Source: <http://www.nssl.noaa.gov/education/svrwx101/winter/>

- Response personnel, including utility workers, public works personnel, debris removal staff, tow truck operators, and other first responders are vulnerable to injury or illness resulting from exposure to extreme cold temperatures.
- Response personnel would be required to travel in potentially hazardous conditions, elevating the life safety risk due to accidents, and potential contact with downed power lines.
- Operations or service delivery may experience impacts from electricity blackouts due to winter storms.
- Power outages are possible throughout the planning area due to downed trees and power lines and/or rolling blackouts.
- Critical facilities without emergency backup power may not be operational during power outages.
- Emergency response and service operations may be impacted by limitations on access and mobility if roadways are closed, unsafe, or obstructed.
- Hazardous road conditions will likely lead to increases in automobile accidents, further straining emergency response capabilities.
- Depending on the severity and scale of damage caused by ice and snow events, damage to power transmission and distribution infrastructure can require days or weeks to repair.
- A winter storm event could lead to tree, shrub, and plant damage or death.
- Severe cold and ice could significantly damage agricultural crops.
- Schools may be forced to shut early due to treacherous driving conditions.
- Exposed water pipes may be damaged by severe or late season winter storms at both residential and commercial structures, causing significant damages.
- Cities located in the north have a higher frequency and therefore have more resources allocated yearly to fight and mitigate the impacts of winter storms. The resources here, while abundant, may not be primarily focused on mitigating this risk and therefore do not have the resources prepared and staged like cities in the northern United States.

The economic and financial impacts of winter weather on the community will depend on the scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by government, businesses, and citizens will also contribute to the overall economic and financial conditions in the aftermath of a winter storm event.

A summary assessment of winter storm hazard vulnerability and impacts to the community lifelines is presented in the table below.

*Table 45: Winter Storm Vulnerability and Consequence Summary by Lifeline*

Winter Storm	Vulnerability	Consequence
Safety and Security	Moderate Vulnerability	Moderate Impact to Lifeline/Services
Food, Water, Sheltering	Moderate Vulnerability	Significant Impact to Lifeline/Services
Communications	Moderate Vulnerability	Moderate Impact to Lifeline/Services
Transportation	High Vulnerability	Significant Impact to Lifeline/Services
Health and Medical	Moderate Vulnerability	Moderate Impact to Lifeline/Services
Hazardous Material (Mgmt)	Moderate Vulnerability	Moderate Impact to Lifeline/Services
Energy (Power and Fuel)	High Vulnerability	Significant Impact to Lifeline/Services

#### m. Sea Level Rise

According to NOAA, the sea level around Galveston, Texas has risen 18 inches since 1950. The speed of rise has accelerated over the last 10 years and is now rising by nearly 1 inch every year. Scientists have determined these

figures by measuring the sea level every 6 minutes using equipment like satellites, floating buoys off the coast, and tidal gauges to accurately measure the local sea level as it accelerates and changes.

By 2050, the Galveston Pleasure Pier can expect to see up to 22 inches of additional rise. The NOAA sea level rise viewer, a web-mapping tool designed to view potential impacts from coastal flooding or sea level rise, provides a range of local scenarios. One of these scenarios is an intermediate-high scenario for Galveston that shows increased water levels in the San Jacinto River and Buffalo Bayou watersheds, as well as severe impacts in the far southeastern reaches of Houston.

The City of Houston considers sea level rise in climate action planning as well as mitigation planning, though it often appears in conjunction with hurricane and flood hazard mitigation due to the inland nature of most of the City.

A summary assessment of hazard vulnerability and impacts to the community lifelines related to sea level rise is presented the table below.

*Table 46: Sea Level Rise Vulnerability and Consequence Summary by Lifeline*

Sea Level Rise	Vulnerability	Consequence
Safety and Security	Low Vulnerability	Significant Impact to Lifeline/Services
Food, Water, Sheltering	Low Vulnerability	Significant Impact to Lifeline/Services
Communications	Low Vulnerability	Low Impact to Lifeline/Services
Transportation	Low Vulnerability	Moderate Impact to Lifeline/Services
Health and Medical	Low Vulnerability	Significant Impact to Lifeline/Services
Hazardous Material (Mgmt)	Low Vulnerability	Significant Impact to Lifeline/Services
Energy (Power and Fuel)	Low Vulnerability	Significant Impact to Lifeline/Services

#### Mitigation Needs Assessment Conclusion

This mitigation needs assessment assessed the characteristics and impacts of current and future hazards. Although the risk of winter storms in Houston are likely the potential severity of the risk is limited meaning injuries can be treated with first aid and critical services and facilities are shut down for less than 24 hours.

Unfortunately, this was not the case in the 2021 Winter Storm, which was declared a federal disaster. In the 2021 Winter Storm, the loss of electricity led to other lifelines being impacted or even becoming non-operable for a period, such as housing and drinking water. Addressing lifelines like electricity and housing can help mitigate against compounding damages in multiple types of future disasters.

## 6. Mitigation Only Activities

Mitigation activities are defined as those that increase resilience to disasters and reduce or eliminate the long-term risk of loss of life, injury, damage to and loss of property, and suffering and hardship, by lessening the impact of future disasters. The mitigation funding set aside within the CDBG-DR grant for the 2021 Winter Storm represents an opportunity to build on current strategic efforts and mitigation activities the City developed under *Resilient Houston* while furthering progress to become more resilient as continued under the CDBG-MIT funding.

The City of Houston has experienced eight presidentially declared disasters from 2015 to 2021: the Memorial Day and Halloween floods in 2015, Tax Day and the May/June floods in 2016, Hurricane Harvey in 2017, Tropical Storm Imelda in 2019, COVID-19 beginning in 2020, and winter storm in 2021. The CDBG-DR funding from the 2021 Winter Storm presents an opportunity to address the existing need to better prepare the City's residents and infrastructure against extreme weather – winter, heat, storm, or flooding – through efforts in weatherization and infrastructure fortification. Extended exposure to cold is a risk the City intends to mitigate with weatherization and adapting critical infrastructure and community resources to maintain more reliable energy generation for provision of services. Mitigation only activities will meet the definition of mitigation activities, address identified risks in Houston and direct or indirect impact from the 2021 Winter Storm and meet a CDBG National Objective.

The City of Houston will undertake the mitigation only activity under the Public Facility Resilience Program. This Program addresses the current and future risk of power outages as identified in the mitigation needs assessment. Ensuring electricity is available at neighborhood facilities during and after a disaster event can help residents find and access resources close to where they live. Two goals of this program include providing resilience during power or grid outages and providing stronger disaster response capacity.

In addition, the Winter Storm Home Repair Program will also incorporate mitigation measures into its implementation so that residents are better prepared for future disaster events.

## C. General Requirements

### 1. Citizen Participation

#### a. Outreach and Engagement

In the development of this disaster recovery action plan, *City of Houston* consulted with disaster-affected citizens, stakeholders, local governments, public housing authorities, and other affected parties in the surrounding geographic area to ensure consistency of disaster impacts identified in the plan, and that the plan and planning process was comprehensive and inclusive. The City of Houston consulted with a variety of stakeholders and communities including Federal partners (HUD), City and other governmental partners (Houston Housing Authority, Office of Emergency Management, Office of Recovery, Office of Resilience and Sustainability), nongovernmental organizations (service providers and housing advocates), and the private sector (housing developers). A full list of organizations consulted is located in the appendix.

*City of Houston* recognizes that affected stakeholders are the center of, and partners in, the development and implementation of this plan. Opportunities for citizen input were provided throughout the planning process through *interviews, agency and community meetings, surveys, emails/electronic notifications, and publications/postings.*

In addition to the activities above, *City of Houston* has published this action plan on <https://houstontx.gov/housing/dr.html#uri> for a 30-day public comment period. Citizens were notified through a public notice in the Houston Chronicle, stakeholder and community listservs, and social media. *The City of Houston* will ensure that all citizens have equal access to information, including persons with disabilities (vision and hearing impaired) and limited English proficiency (LEP).

A summary of citizen comments on this action plan, along with *City of Houston* responses, is in the appendix of this document.

For more information, citizens can refer to the *CDBG-DR21* citizen participation plan that can be found at <https://houstontx.gov/housing/dr.html#uri>.

A more detailed description of the outreach and feedback received in the development of this plan is included in the appendix.

#### b. Public hearings

CDBG-DR21 grantees are required to convene at least one public hearing on the proposed action plan after it has published on its website to solicit public comment and before submittal of the action plan to HUD. The City hosted a virtual public hearing that was open to all residents and stakeholders on August 9, 2022. A Spanish translator provided live translations on an audio line, and live CART services was also provided for those who are deaf or hard of hearing. As listed on the public notice and advertisements, the City makes necessary special arrangements for those who make a request for such arrangements in advance.

The public hearing will be advertised in a variety of ways. Public notices will be published in the Houston Chronicle in English and La Voz in Spanish. The Constant Contact email campaign will reach over 8,500 residents and stakeholders, and the CitizensNet email campaign will reach over 31,200 residents and stakeholders. Additionally, the City will request that the Mayor's Offices and City Council members not only attend but also share information about the public hearings with their constituents and networks.

Public hearing attendees can join the meeting using multiple streaming and broadcasting platforms like Microsoft Teams and Facebook Live or by calling the dedicated English or Spanish audio lines. During the public hearing,

City staff will present information about the CDBG-DR21 grant, requirements, and goals. Attendees will be able to engage with City staff in multiple ways during and after the presentation. Residents will participate in live polls, give input through the chat, and may also provide a 3-minute comment. Attendees will also be allowed to ask questions in real-time with City staff providing responses. The engagement methods will allow attendees several opportunities to share their needs, priorities, and views on addressing recovery from the 2021 Winter Storm with CDBG-DR21 grant funds.

Following the public hearings, interested persons will also have opportunities to review information, engage, and give input on the proposed action plan. Recordings, transcripts, and presentation slides will be made available for review the City's Long-Term Disaster Recovery webpage: <https://houstontx.gov/housing/dr.html>. The public hearing will also be rebroadcasted on HTV and available to watch on several platforms including HCD's Facebook Live, HCD's YouTube, and HTV's webpage. Since the public hearing will be held during the 30-day comment period on the action plan, residents and stakeholders will also be able to give input through written comments via postal mail and email or comments left via voicemail.

During the term of the CDBG-DR21 grant, the City will provide residents and other interested parties with reasonable and timely access to information and records relating to this plan and the use of grant funds. This Action Plan and associated amendments and performance reports will be made available on HCD's website, and upon request, from the HCD. In addition, these documents are available in a form accessible to persons with disabilities and those with limited English proficiency, upon request.

### c. Complaints

Complaints alleging violation of fair housing laws will be directed to HUD for immediate review. Complaints regarding fraud, waste, or abuse of funds will be forwarded to the HUD OIG Fraud Hotline (phone: 1-800-347-3735 or email: [hotline@hudoig.gov](mailto:hotline@hudoig.gov)). *The City of Houston* will make available to HUD detailed Fraud, Waste, and Abuse Policies and Procedures on <https://houstontx.gov/housing/dr.html#uri> to demonstrate adequate procedures are in place to prevent fraud, waste, and abuse.

To promote transparency and partnership with communities where HCD operates, HCD responds to all complaints and appeals in a timely and equitable manner consistent with HUD requirements. An appeal is a communication from an applicant of any of HCD's programs who wishes to overturn a decision made regarding either the applicant's application or resulting case.

A complaint is a communication from a member of the public to a City official or employee which includes a concern or grievance regarding the operations of the City or any party acting on behalf of the City. There are two types of complaints, informal and formal. An informal complaint is done through verbal discussion (either through telephone calls or in-person) and are intended to resolve concerns at the earliest stage possible. Formal complaints are any written statement of grievance – including emails, faxes, letters or those complaints filed via Formal Complaint Submission Form – that provide a contact(s) with which HCD staff can communicate the results of an investigation or request additional information. Formal complaints are also those that were not able to be resolved informally and need an additional level of review.

Written complaints from the public related to this Action Plan (or its amendments), QPRs, or the City's activities or programs funded with CDBG-DR21, will receive careful consideration and will be answered in writing, or other effective method of communication, within 15 business days, where practicable.

Written complaints should be sent to:

Attn: Planning and Grants Management  
City of Houston Housing and Community Development Department  
2100 Travis Street, Suite 900  
Houston, TX 77002

Email: [HCDDComplaintsAppeals@houstontx.gov](mailto:HCDDComplaintsAppeals@houstontx.gov)  
Phone: 832.394.6200

Complaints regarding fraud, waste, or abuse of government funds will be forwarded to the City of Houston Office of Inspector General or the Department of Housing and Urban Development Office of Inspector General (Phone: 1-800-347-3735 or Email: [hotline@hudoig.gov](mailto:hotline@hudoig.gov)).

## 2. Public Website

*The City of Houston* will maintain a public website that provides information accounting for how all grant funds are used, managed, and administered, including links to all disaster recovery action plans, action plan amendments, program policies and procedures, performance reports, citizen participation requirements, and activity and program information described in this plan, and details of all contracts and ongoing procurement processes.

These items are made available through <https://houstontx.gov/housing/dr.html#uri>. Specifically, *the City of Houston* will make the following items available:

- the action plan created using DRGR (including all amendments);
- each QPR (as created using the DRGR system);
- citizen participation plan; procurement policies and procedures;
- all executed contracts that will be paid with CDBG-DR funds as defined in 2 CFR 200.22 (including subrecipients' contracts); and
- a summary including the description and status of services or goods currently being procured by the grantee or the subrecipient (e.g., phase of the procurement, requirements for proposals, etc.).

Contracts and procurement actions that do not exceed the micro-purchase threshold, as defined in 2 CFR 200.67, are not required to be posted to a grantee's website.

In addition, *the City of Houston* will maintain a comprehensive website regarding all disaster recovery activities assisted with these funds.

The website will be updated in a timely manner to reflect the most up-to date information about the use of funds and any changes in policies and procedures, as necessary. At a minimum, updates will be made monthly.

## 3. Amendments

Over time, recovery needs will change. Thus, *the City of Houston* will amend the disaster recovery action plan as often as necessary to best address our long-term recovery needs and goals. This plan describes proposed programs and activities. As programs and activities develop overtime an amendment may not be triggered if the program or activity is consistent with the descriptions provided in this plan.

Amendments to this Action Plan are divided into two categories: Substantial amendments and non-substantial Amendments. As amendments occur, both types of amendments are numbered sequentially and posted on HCD's Disaster Recovery webpage, [www.houstontx.gov/housing/dr.html](http://www.houstontx.gov/housing/dr.html). Copies of amendments are available upon request to: [hcdd@houstontx.gov](mailto:hcdd@houstontx.gov) or 832.394.6200. Changes in amendments will be identified at the beginning of each amendment.

The most current version of entire Action Plan will be accessible for viewing as a single document. Each amendment will have highlighted changes, and the beginning of amendments will include:

- Section identifying exactly what content is added, deleted, or changed

- Revised budget allocation table that reflects all funds and illustrates where funds are coming from and moving to, as amended and applicable
- Description of how amendment is consistent with the mitigation needs assessment

#### a. Substantial Amendment

A change to this action plan is considered to be a substantial amendment if it meets the following criteria:

- A change in program benefit or eligibility criteria,
- The addition or deletion of an activity, or
- The allocation or reallocation of *more than 25 percent of an activity in the program budget*.

When *the City of Houston* pursues the substantial amendment process, the amendment will be posted here at <https://houstontx.gov/housing/dr.html#uri> for a 30-day public comment period. The amendment will be posted in adherence with ADA and LEP requirements. *The City of Houston* will review and respond to all public comments received and submit to HUD for approval.

Substantial amendments are subject to a citizen participation process and require formal action by the City Council and submission to HUD. The City announces substantial amendments to the public through a public notice published in one or more newspapers of general circulation, for a period of 30 days, in order to provide opportunity for public review and comment regarding proposed substantial amendments. Notices will be available in English and may also be available in Spanish and other languages, as feasible. The City will consider all written and/or oral comments or views concerning proposed substantial amendments that are received during the comment period. A summary of these comments and views, including comments or views not accepted, and the reason why, along with HCD's response to each, shall be submitted with each Substantial Amendment.

#### b. Non-Substantial Amendment

A non-substantial amendment is an amendment to the plan that includes technical corrections and clarifications and budget changes that do not meet the monetary threshold for substantial amendments to the plan and does not require posting for public comment. *City of Houston* will notify HUD five (5) business days before the change is effective.

All amendments will be numbered sequentially and posted to the website into one final, consolidated plan.

### 4. Displacement of Persons and Other Entities

To minimize the displacement of persons and other entities that may be affected by the activities outlined in this action plan, the *City of Houston* will coordinate with *all agencies and entities necessary to ensure that all programs are administered in accordance with the amended RARAP, Uniform Relocation Assistance and Real Property Acquisition Policies Act (URA) of 1970, as amended (49 CFR Part 24,) and Section 104(d) of the Housing and Community Development Act of 1974, as amended, and the implementing regulations at 24 CFR Part 570.496(a)* to minimize displacement. Should any proposed projects or activities cause the displacement of people, the following policy has been adopted to ensure the requirements of Uniform Relocation Assistance and Real Property Acquisition Act of 1970 (URA), as amended are met.

The City of Houston does not plan to administer activities that will cause a direct or indirect displacement of persons or entities. Should any proposed projects or activities cause the displacement of persons or entities, the City of Houston plans to amend the current Residential Anti-displacement and Relocation Assistance Plan (RARAP) to reduce any hardship of a displaced person or entity and increase oversight to ensure the requirements of Uniform Relocation Assistance and Real Property Acquisition Act of 1970 (URA), as amended are met. The amended RARAP will set the minimum standard for, but not limited to, planning efforts, Relocation Plan, relocation schedule,

accommodations for displaced persons with disabilities, relocation budget, and project the number of staffing needed to carry-out URA requirements.

If relocation is applicable, a program or project must demonstrate it has met the latest RARAP requirements before it can be approved prior to implementing any activity. Relocation activities will be budgeted within the applicable CDBG-DR program.

CDBG-DR funds may not be used to support any federal, state, or local projects that seek to use the power of eminent domain, unless eminent domain is employed only for a public use. None of the currently planned projects under this Action Plan anticipate the use of eminent domain.

## 5. Protection of People and Property

The City of Houston will promote high quality, durable, energy efficient, sustainable, and mold resistant construction methods for residents impacted by the disaster. All newly constructed buildings must meet all locally adopted building codes, standards, and ordinances. Future property damage will be minimized by requiring that any rebuilding be done according to Chapter 19 of the City's Code of Ordinance.

### a. Elevation Standards

For new construction, repair of substantially damaged, or substantial improvement to structures principally for residential use and located in the 1 percent annual (or 100-year) floodplain must be elevated with the lowest flood, including the basement, at least two feet above the 1 percent annual floodplain elevation.

Mixed-use structures with no dwelling units and no residents must be elevated or floodproofed up to at least two feet above base flood elevation.

If a structure is located in a 500-year floodplain, the structure must be elevated three feet above the 100-year floodplain.

At minimum, the City will adhere to the advanced elevation requirements established in section II.B.2.c of the Federal Register "Elevation standards for new construction, reconstruction, and rehabilitation of substantial damage, or rehabilitation resulting in substantial improvements."

The average cost to elevate a home can vary significantly and is dependent upon the number of feet it must be elevated, the location of the home, and the square footage of the home. The average cost to elevate a 1,200 square foot home in Houston is estimated \$116,100 based on factors mentioned above. Program guidelines will determine the most cost reasonable method to adhere to elevation standards, particularly for elevating standards related to rehabilitation of substantial damage or rehabilitation resulting in substantial improvements. For housing rehabilitation programs, the maximum amount of assistance does not include additional allocations. The City of Houston will ensure that all rehabilitation of substantial damage will meet the HUD-required elevation standards through the construction requirements of all CDBG-DR housing programs.

Chapter 19 of the City's Code of Ordinances requires new structures (and/or significant improvement to structures) located in the special flood hazard area to elevate to 24 inches above the 500-year flood elevation or to 36 inches above the 500-year flood elevation for critical facilities. This will help mitigate housing damage during future flooding disasters.

### b. Flood Insurance Requirements

Assisted property owners must comply with all flood insurance requirements. HUD-assisted homeowners for a property located in a Special Flood Hazard Area must obtain and maintain flood insurance in the amount and

duration prescribed by FEMA's National Flood Insurance Program (NFIP). *The City of Houston* may not provide disaster assistance for the repair, replacement or restoration of a property to a person who has received Federal flood disaster assistance that was conditioned on obtaining flood insurance and then that person failed to obtain or allowed their flood insurance to lapse for the property. *The City of Houston* is prohibited by HUD from providing CDBG-DR assistance for the rehabilitation or reconstruction of a house if:

- The combined household income is greater than 120% AMI or the national median,
- The property was located in a floodplain at the time of the disaster, and
- The property owner did not maintain flood insurance on the damaged property.

To ensure adequate recovery resources are available to low- and moderate-income homeowners who reside in a floodplain but who are unlikely to be able to afford flood insurance may receive CDBG-DR assistance if:

- The homeowner had flood insurance at the time of the qualifying disaster and still has unmet recovery needs, or
- The household earns less than 120% AMI or the national median and has unmet recovery needs.

The 2021 Winter Storm was not a flooding event; however, the City of Houston is committed to ensuring that homeowners are protected from future flooding disasters, which are occurring more frequently in the Houston area.

### c. Construction Standards

*The City of Houston* will require quality inspections and code compliance inspections on all projects and places an emphasis on high-quality, durable, sustainable, and energy efficient construction methods and materials. Site inspections will be required on all projects to ensure quality and compliance with building codes.

All rehabilitation, reconstruction, or new construction must meet an industry-recognized standard that has achieved certification under at least one of the following programs:

- Energy STAR (Certified Homes or Multifamily High Risk)
- Enterprise Green Communities
- LEED (New Construction, Homes, Midrise, Existing Building Operations and Maintenance or Neighborhood Development)
- ICC- 700 National Green Building Standards
- EPA Indoor AirPlus
- Any other equivalent comprehensive green building standard program acceptable to HUD

*The City of Houston* will use *the most updated local building and construction standards, including accessibility standards*, for the proposed programs or activities.

For rehabilitation of non-substantially damaged residential buildings, *the City of Houston* will follow the guidelines to the extent applicable as specified in the [HUD CPD Green Building Retrofit Checklist](#). When older or obsolete products are replaced as part of rehabilitation work, the rehabilitation is required to use ENERGY STAR-labeled, WaterSense-labeled, or Federal Energy Management Program (FEMP)-designed products and appliances.

For infrastructure projects, *the City of Houston* will encourage, to the extent practicable, implementation of sustainable planning and design methods that promote adaptation and resilience.

All projects will be subject to cost reasonableness standards as outlined in the policies and procedures of the applicable programs specific to the applicable activity.

A substantially damaged structure means the damage sustained by a structure for which the cost of repair or restoration of the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure. For this definition, the market value refers to the value of the structure immediately prior to the damage.

#### d. Contractors Standards

Contractors selected under *the City of Houston* will make every effort to provide opportunities to low and very low-income persons by providing resources and information to notify Section 3 individuals and businesses of opportunities in the community. *The City of Housing will undertake the following efforts to help meet its Section 3 goals:*

- *Ensure Section 3 requirements are in all applicable contracts and subrecipient (if applicable) agreements*
- *Build the capacity of stakeholders, including subrecipients (if applicable) and contractors, to meet Section 3 standards through technical assistance and guidance*
- *Conduct outreach to certify Section 3 businesses*

*The City of Houston* will report Section 3 accomplishments in the Disaster Recovery Grant Reporting (DRGR) system.

Recovery programs implemented by HCD, and its partners, will incorporate uniform best practices of construction standards for all construction contractors performing work in all relevant jurisdictions. Construction contractors will be required to carry the required licenses and insurance coverage(s) for all work performed and may be required to provide a warranty period for all work performed.

Contractor standards and warranty periods will be detailed in the respective guidelines, policies, and procedures documents and will pertain to the scale and type of work being performed, including the controls for ensuring that construction costs are reasonable and consistent with market costs at the time and place of construction. Rehabilitation contract work provided through a program administered by HCD included in this Action Plan may be appealed by homeowners whose property was repaired by contractors.

As included in the City's certifications, HCD is committed to meeting full and open competition requirements, which will help ensure that construction costs are reasonable and consistent with market costs at the time and place of construction.

The processes for homeowners to submit appeals and complaints for rehabilitation work completed with CDBG-DR21 funds will be detailed within each respective set of program guidelines and on the CDBG-DR21 webpage.

#### e. Preparedness, Mitigation and Resiliency

Resilience is defined as a community's ability to minimize damage and recover quickly from extreme events and changing conditions, including natural hazard risks.

To integrate hazard mitigation and resilience planning with recovery efforts, HCD will continue to promote sound, sustainable, long-term recovery planning informed by post-disaster evaluation of hazard risk, including climate-related hazards, and the creation of resilience performance metrics.

#### *Protect People and Property from Harm*

The CDBG-DR21 activities will include measures that will increase resilience to disasters and reduce or eliminate the long-term risk of life, injury, damage to and loss of property, and suffering and hardship by lessening the impact of future disasters. Hardships include, but are not limited to, financial hardship and hardship caused by future disasters and climate change. HCD will document how programs and activities protect people and property from hardship within program and/or applicant files.

### *Emphasize Quality, Durability, Energy Efficiency, Sustainability, and Mold Resistance*

HCD's construction related activities include construction standards incorporating resilience and hazard mitigation measures, as feasible. This Action Plan aligns with the City's existing hazard mitigation plan. In addition, mitigation measures will be incorporated when carrying out activities to construct, reconstruct, or rehabilitate residential or non-residential structures with CDBG-DR funds.

For construction activities related to residential or non-residential structures, HCD will establish resilience performance metrics for the activity including:

- An estimate of the projected risk to the completed activity from natural hazards, including those hazards that are influenced by climate change.
- Identification of the mitigation measures that will address the projected risks.
- An assessment of the benefit of the grantee's measures through verifiable data.

### *Support Adoption and Enforcement of Modern and/or Resilient Building Codes and the Mitigation of Natural Hazards*

HCD is supporting the modernization efforts for building codes to help make Houston a more resilient city for its residents. HCD is supporting the effort through previous CDBG-DR funding. The effort will create a plan in which City staff can follow to update future building codes on a regular basis. The effort is expected to also produce an updated building code to be adopted by 2024.

### *Establish and Support Recovery Efforts by Funding Feasible, Cost-Effective Measures That Will Make Communities More Resilient Against Future Disaster*

As a direct result of the 2021 Winter Storm, the City of Houston and CenterPoint Energy have partnered on a new initiative called Resilient Now to ensure the future energy demands and needs are met for the Houston region's economy to grow and thrive for all stakeholders. This initiative will create a Master Energy Plan which will help prepare our infrastructure to handle multiple future disaster events, including flooding, high winds and hurricanes, winter storms, heatwaves, and drought. This plan to enhance power resilience across the region will likely be completed by the end of 2022 and will include short- and medium-term goals like implementing climate ready infrastructure and energy efficiency in commercial, industrial, and residential buildings.

The goal of the programs funded with CDBG-DR21 is to address impact from the 2021 Winter Storm but also to make communities more resilient against future disasters. HCD programs will document their efforts in program files, which may include a cost reasonableness and/or cost-benefit analysis of the activity, quantifiable benefits or description of the mitigation benefits of the program. Documents may include, but are not limited to an analysis of

- The risks to public health, safety, and well-being without the project or program
- The costs against the anticipated value of the risk reduction in both direct damages and subsequent negative impacts to the area if future disasters were to occur
- The contribution of the activity to a long-term solution to the problem it is intending to address
- How the activity will protect the functionality of the project for its useful life and/or create management future maintenance and modification options

### *Make Land Use Decisions that Reflect Responsible and Safe Standards to Reduce Future Natural Hazard Risks*

The City of Houston does not have zoning; however, the City has other building requirements that help reduce risks of impact and damage due to future hazards and disasters. After Hurricane Harvey, the City updated Chapter 19 of the Code of Ordinances to ensure that new construction and substantial rehabilitation of a structure were raised to certain levels to avoid future flooding. In addition, the City of Houston's partnership with CenterPoint Energy through the Resilient Now initiative will help to modernize infrastructure to address disruptive weather events and increase the uses of renewable energy sources.

### *Increase Awareness of the Hazards in Communities Including Underserved Communities, Through Outreach in the MID Areas*

As a MID area, the City shares information with residents and businesses through local, trusted partners to effectively increase the awareness of community hazards. The Office of Emergency Management (OEM) regularly communicates directly with the public and through non-profit organizations, including Voluntary Organizations Active in Disaster (VOADs) before, during, and after disasters. OEM has free materials and actively makes presentations to the public about disaster preparedness. In addition, over the past several years, HCD has funded non-profit organizations and community advocates through an ongoing program to reach underserved communities with fair housing, hurricane preparedness, and resilience information. This is also an effective way to receive feedback from organizations and community members regarding disaster awareness.

### *Promote Sound, Sustainable Long-Term Recovery Planning Informed by a Post-Disaster Evaluation of Natural Hazard Risks*

The City of Houston will soon update its Hazard Mitigation Plan to include information about recent disaster events. In addition, HCD has allocated previous CDBG-DR funds for planning activities directly linked to action items in *Resilient Houston*, the City's resilience strategy. Multiple planning efforts are currently taking place to promote sound, sustainable long-term recovery efforts informed by post-disaster evaluation of hazard risk, especially land-use decisions that reflect responsible floodplain management and consider future possible extreme weather events and other natural hazards and long-term risks.

The City of Houston is allocating the CDBG-DR21 mitigation set-aside funding to improve neighborhood facilities in low- and moderate-income areas by updating or creating power resilience. This is considered an infrastructure activity under CDBG. Considering the limited ability for local infrastructure to address the concerns of a large-scale power outage due to infrastructure outside of the City's jurisdiction, as occurred in the 2021 Winter Storm disaster, local infrastructure solutions can address the needs of emergency power across multiple neighborhood facilities that can be used to provide essential services, especially to assist vulnerable communities. While the benefits are harder to predict than cost savings, when it comes to infrastructure that is primarily utilized in disaster scenarios, more reliable emergency power generation will not only serve the City's ability to respond to or recover from a disaster and ensure the safety of its residents in winter storm events, but it will also serve the City in other disaster events like flooding as well. In addition, electric generation could provide annual cost savings to organizations, such as nonprofits, that own and manage a neighborhood facility.

The Neighborhood Facilities Resilience Program will enhance the community-based mitigation system by making neighborhood facilities operable during power outages, which can be used by nearby residents and also serve as places where assistance is distributed immediately after a disaster event. Because the climate-related risks include increased likelihood of weather-related events that can cause power outages, these mitigation measures will provide electricity in neighborhood facilities across the city. This activity is directly tied to the *Climate Action Plan* and *Resilient Houston* action 17 Develop "Lily Pads" to Serve as Neighborhood Resilience Hubs and action 31 Adopt and Implement the Climate Action Plan Goals and Actions. Working with other City Departments and using up to date research, the City will employ adaptable and reliable technologies.

### *FEMA-Approved Hazard Mitigation Plan*

Houston's Office of Emergency Management is the lead agency for developing the City's FEMA-approved Hazard Mitigation Plan. The City's Hazard Mitigation Plan informs the larger landscape of disaster recovery planning, including the activities within *Resilient Houston*. This Action Plan utilizes the City's Hazard Mitigation Plan to inform its mitigation needs assessment.

#### **f. Broadband Infrastructure in Housing**

Any substantial rehabilitation or new construction of a building with more than four (4) rental units will include installation of broadband infrastructure, except when:

- The location of the new construction or substantial rehabilitation makes the broadband infrastructure infeasible,
- The cost of installing broadband infrastructure would result in a fundamental alteration in the nature of its program or activity or in an undue financial burden, or
- The structure of the housing to be substantially rehabilitated makes installation of broadband infrastructure infeasible.

#### g. Cost Effectiveness

HCD will establish policies and procedures to assess the cost-effectiveness of each proposed program or activity to assist a household under any residential rehabilitation or reconstruction program or activity funded with CDBG-DR funds. Policies and procedures also will establish the criteria for determining when the cost of the rehabilitation or reconstruction of the unit will not be cost-effective relative to other means of assisting the property owner.

HCD will define “demonstrable hardship” in its policies and procedures before carrying out activities that may be subject to the one-for-one replacement housing requirements.

HCD will define a residential property as “not suitable for rehabilitation” in its policies and procedures before carrying out activities that may be subject to the one-for-one replacement housing requirements.

Exceptions to award maximums on a case-by-case basis may apply as outlined in program guidelines. If applicable, program guidelines will describe the circumstances in which an exception is needed and will be reviewed and the amount of assistance necessary and reasonable. Exceptions defined in the guidelines could include items such as neighborhood or environmental conditions. HCD may make exceptions to the maximum award, when necessary, to comply with federal accessibility standards or to reasonably accommodate a person with disabilities. All exceptions to award limitations are subject to grant fund availability.

#### h. Duplication of Benefits

Section 312 of the Stafford Act, as amended, generally prohibits any person, business concern, or other entity from receiving financial assistance with respect to any part of a loss resulting from a major disaster for which such person, business concern, or other entity has received financial assistance under any other program or from insurance or any other source. A duplication of benefits occurs when an impacted homeowner or community receives financial assistance from multiple sources, such as FEMA, insurance, etc. for a cumulative amount that exceeds the total need for a particular unmet need or mitigation purpose.

Through its guidelines, policies and procedures, City of Houston, and any subrecipients as applicable, will determine an applicant’s unmet need to ensure that each activity aids a person or entity only to the extent that the person or entity has a disaster recovery need that has not been fully met. Further requirements of duplication of benefits are outlined in 84 FR28836 and 84 FR 28848, published June 20, 2019, and other applicable notices

All agreements between HCD and beneficiaries (and subrecipients, if applicable) require all sources of possible duplicative assistance to be disclosed to HCD. Additionally, a subrogation clause contained in these agreements requires any person who receives further assistance to repay that assistance, if the amount of assistance exceeds the funding required for the project.

## D. Grantee Proposed Use of Funds

### 1. Overview

*The City of Houston* is the lead agency and responsible entity for administering Disaster Relief Supplemental Appropriations Act, 2022 (PL117-43) in CDBG-DR funds allocated for disaster recovery. These programs include *Winter Storm Home Repair Program, Neighborhood Facilities Resilience Program, Rental Housing Counseling, Planning, and Administration.*

Based on the unmet needs assessment and input from impacted communities and stakeholders in Houston, the City of Houston has prioritized activities that will assist in meeting the short- and long-term recovery needs of its residents and communities and increase resilience against climate impacts. The initial analysis indicates unmet need in three core recovery categories defined by HUD: housing, infrastructure, and economic revitalization. The largest recovery need is housing.

Reflecting these findings, the City of Houston intends to utilize CDBG-DR funding to support multiple recovery programs that complement each other. Further, by implementing resilience measures across programs, the City aims to facilitate an equitable recovery that results in not only repairing impact from the 2021 Winter Storm but fund a recovery leading to a community that can better withstand the impacts of future disasters.

### 2. Program Budget

The below program budget table reflects the allocation of \$30 million for the 2021 Winter Storm.

Table 47: Program Budget

Program Category	Program	Budget	HUD Identified MID Budget	% of Allocation	Maximum Award	National Objective	Estimated Outcome
Housing	Winter Storm Home Repair Program	\$23,879,200	\$23,879,200	78.9%	Based on Program Standards	Low- and Moderate-Income	300
Public Services	Housing Counseling	\$550,000	\$550,000	1.8%	Based on Program Standards	Low- and Moderate-Income	990
Mitigation	Neighborhood Facilities Resilience Program	\$4,152,000	\$4,152,000	13.7%	Based on Program Standards	Low- and Moderate-Income	6
Admin	Admin	\$1,514,800	\$1,514,800	5.0%	-	-	-
Planning	Planning	\$200,000	\$200,000	0.6%	-	-	-
Total		\$30,296,000	\$30,296,000	100.0%	-	-	-

Source: HCD

### 3. Connection to Unmet Needs

As required by the 87 FR 31636, *the City of Houston* will allocate at least 80 percent of the funds to address unmet needs with HUD-identified “most impacted and distressed” areas. The remaining 20 percent of the allocation may be used to address unmet needs that received a *DR-4586* presidential major disaster declaration. HCD will allocate 100% of the CDBG-DR21 funds to address unmet needs within the HUD-identified “most impacted and distressed” (MID) areas. HUD designated the entire City of Houston as a MID area.

This action plan primarily considers and addresses unmet needs of residents, including homeowners and renters, through housing and infrastructure unmet recovery and mitigation needs, along with public services and planning that support housing and residents finding and maintaining housing.

At least 70 percent of all program funds will benefit LMI persons or households. All of the programs funded with CDBG-DR21 are limited to benefitting low- and moderate-income persons or have allocated only a portion of program funds to serve residents earning above 80% of the area median income. The Winter Storm Home Repair Program through the Reimbursement Pathway is the only activity that will serve households through the urgent need national objective. HCD plans to exceed HUD's requirement of at least 70% of all program funds expended to benefit LMI persons or households. HCD will monitor the impact of its programs on impacted LMI persons, including vulnerable populations, protected classes, and members of underserved communities.

The Winter Storm Home Repair Program will assist homeowners with grants and forgivable loans to repair or rebuild homes that were damaged as a direct result of the 2021 Winter Storm. Home repair was found to be one of the main needs in the needs assessment, and it was also a funding priority from public engagement. Stakeholders said that many residents live in homes with deferred maintenance that can put them at risk in future disasters, including vulnerable populations such as seniors. In addition, the resident survey found that some Houstonians borrowed funding to help address impacts from the Winter Storm, including from payday lenders, and financial reimbursement could help to make these families whole. The Winter Storm Home Repair Program will help improve Houston's housing, which will give residents a safer place to stay in future disasters.

The Renter Housing Counseling Program will assist disaster-impacted households that are facing challenges and are making life-changing decisions related to housing and their household finances. Due to the recurring disasters, many households are forced to make quick decisions with little to no financial support, which may have long-term effects on the household, and particularly vulnerable households. The Renter Housing Counseling Program will help vulnerable renters find and/or maintain housing, while preparing them to be more prepared for future disasters. This assistance is critical for helping renters plan for current and future housing costs, accessing recovery programs, and gaining support needed to drive their recovery in a way that makes them more resilient to future disasters and disruptions.

The Neighborhood Facilities Resilience Program is a mitigation activity, supported by the stakeholder and community feedback received. The Federal Register Notice requires that 15 percent, \$3,952,000, of the total estimate for unmet needs allocated to this disaster is set-aside for the City to carry out mitigation activities. HCD may meet the requirements of the CDBG-DR mitigation set-aside:

- By incorporating mitigation measures into the recovery activities included in this Action Plan and documenting how those activities and the incorporated mitigation measures will meet the definition of mitigation, or
- By including eligible activities that do not have a tie-back to the 2021 Winter Storm but still incorporate mitigation measures, meeting the mitigation definition, into the recovery activities.

HCD is allocating 100 percent of the mitigation set-aside program funding to incorporate property hardening activities within neighborhood facilities, which will make the facilities withstand future disaster events to better serve the community before, during, and after a disaster event occurs. Other activities, including home repair, may have additional mitigation measures.

Mitigation activities are those that increase resilience to future disasters and reduce or eliminate the long-term risk of loss of life, injury, damage to and loss of property, and suffering and hardship. Proactively addressing the impacts of climate change and natural disasters is critical to building long-term community resilience.

Proposed mitigation activities utilizing the set-aside must:

- *Identify how the proposed use meets the definition of mitigation activities.* This activity will help to prepare Houston communities for future disasters by hardening neighborhood facilities primarily by ensuring they have backup power to become resource hubs for residents during and after a disaster.
- *Address the current and future risks identified in HCD's mitigation needs assessment.* The loss of energy and power can impact multiple other lifelines after a disaster, including food, water, and shelter. According to the mitigation needs assessment, energy is highly vulnerability to multiple types of risks, including winter storm, flood, hurricane, extreme heat, thunderstorm, lightening, tornado, and drought. By providing a neighborhood facility that can withstand disasters, even when power goes out, residents may have a safe place to receive preparedness materials, shelter from the disaster, and services after a disaster.
- *Ensure proposed activities are CDBG eligible or eligible under waivers or alternative requirements in the Federal Register Notice.* Proposed activities will be CDBG-eligible public facility improvements.

Planning activities support plans, studies, strategies, or research about direct and indirect impacts of the 2021 Winter Storm or mitigation needs related to future disaster events.

The majority of the CDBG-DR21 funding is allocated for housing assisting low- and moderate-income Houstonians, both homeowners and renters. Although the unmet needs assessment identified unmet needs in the infrastructure and economic revitalization categories, other funding sources have been made available to assist in the recovery within these categories. As illustrated in the allocation of the CDBG-DR21 funds, HCD has made it a priority to direct the majority of the funding for housing programs to assist residents impacted by the 2021 Winter Storm and who have still not recovered.

#### a. Leveraging Funds

The City of Houston anticipates leveraging CDBG-DR funds with funding provided by other federal, state, local, and non-profit sources to fully utilize the limited CDBG-DR funds to generate a more effective and comprehensive recovery. As applicable, leveraging requirements may be added to program guidelines, applications, or NOFA/RFPs.

#### b. Program Partners

HCD may engage program partners through formal agreements such as subrecipient agreements and interagency agreements and through informal partnerships. HCD engages with program partners so that programs are more accessible, understandable, and tailored to equitably meet the unmet needs of the disaster-impacted residents and communities. When formally engaging through agreements, HCD will ensure that subrecipients and other partners have the capacity and will provide technical assistance and training to partners on program requirements, applicable federal cross-cutting requirements, and reporting and performance requirements.

### 4. Distribution of Funds

It is a requirement of State Grantees to describe how they will distribute grant funds to local governments and Indian tribes. This section does not apply to the City of Houston.

### 5. Program Income

HCD does not intend to implement any programs or activities that generate income as described in 87 FR 31636. However, if any CDBG-DR activities generate income before or after close-out of the grant, HCD will retain program income to fund additional CDBG-DR activities or to fund the repair, operation, or maintenance of existing CDBG-DR activities. HCD will comply with all HUD requirements and the program income waiver and alternative requirement in 87 FR 31636 and subsequent notices, including tracking program income in the Disaster Recovery Grants Reporting (DRGR) system and using program income before drawing additional grant funds. Specifically, the City will adhere to the program income policies and procedures as stated in the City's financial certifications.

## 6. Resale or Recapture

HCD will use recapture requirements in its Home Repair Program. The recapture requirements are described within the Home Repair Program section and program guidelines will provide additional details on the terms of the recapture and specific circumstance under which recapture will be used. HCD will not use resale provisions for any of the CDBG-DR21 funded programs

## 7. Program Details

The following provides details about the activities and programs HCD will implement using CDBG-DR21 funds to address impacts from the 2021 Winter Storm and increase resilience in Houston.

### a. Winter Storm Home Repair Program

This program will assist homeowners to recover from this disaster. The City will provide reimbursement for low- and moderate-income and urgent need homeowners by defraying some of the financial burden homeowners experienced due to the disaster. The City will also rehabilitate or reconstruct homes for low- and moderate-income homeowners impacted by the disaster. Resilience measures such as power generation and/or storage enhancements will be incorporated when feasible. The City may administer this program directly or offer this program through subrecipients or other program partners. The total budget includes activity delivery expenses.

1. Total Budget: \$23,879,200
2. Reimbursement Pathway
  - a. Total Budget: \$1,656,978
  - b. National Objective: LMI Benefit, Urgent Need
  - c. Compliance Period: None (Grant only)
  - d. Max Award: \$6,000
  - e. Selection Criteria/Award Methodology: The application period will open to all interested parties at the same time. Applicants will be assigned phases based on area median income (AMI). A priority deadline date will be established. Complete applications received by the priority submission deadline will be served in Round 1 by the assigned phases. Incomplete applications submitted by the priority deadline may be moved to subsequent rounds and then served according to the assigned phase. Applications received after the priority deadline will be served in subsequential rounds based on the assigned phases on a first come first serve basis (pending funding availability).
    - i. Phase 1: Elderly (62 years or older) or disabled household member at or below 80 percent AMI
    - ii. Phase 2: Households at or below 50 percent AMI
    - iii. Phase 3: Households at or below 80 percent AMI
    - iv. Phase 4: Households at or below 120 percent AMI
3. Reconstruction or Rehabilitation Pathway

- a. Total Budget: \$22,222,222
  - b. National Objective: LMI Benefit
  - c. Compliance Period: Rehabilitation and reconstruction projects will have a 3- year compliance period with a lien. Assistance will be provided in the form of a zero-interest secured forgivable loan. Homeowner(s) must agree to the forgivable loan compliance period and lien requirements, as applicable.
    - i. The lien on the property will be removed upon completion of the terms and conditions of all documents related to the program and completion of the compliance period.
    - ii. Homeowner(s) are required to maintain principal residency in the assisted property throughout the length of the forgivable loan compliance period.
    - iii. Homeowner(s) must maintain required insurance for the assisted property during the applicable compliance period.
    - iv. Where disaster assistance triggers the flood insurance purchase requirement, assisted homeowners will notify any transferee of the requirement to obtain and maintain flood insurance, in writing, and to maintain such written notification in the documents evidencing the transfer of the property, and that the transferring owner may be liable, if he or she fails to do so.
    - v. Should the homeowner sell or otherwise convey their ownership interest in the property during the compliance period, the remaining prorated amount of assistance will become immediately due and payable.
  - d. Rehabilitation Max Award: \$100,000 (including environmental expenses, resiliency measures, accessibility needs, neighborhood requirements and temporary relocation assistance.)
  - e. Reconstruction Max Award: \$300,000 (including environmental expenses, resiliency measures, accessibility needs, neighborhood requirements and temporary relocation assistance.)
  - f. Selection Criteria/Award Methodology: The application period will open to all interested parties at the same time. Applicants will be assigned phases based on AMI. A priority deadline date will be established. Complete applications received by the priority submission deadline will be served in Round 1 by the assigned phases. Incomplete applications submitted by the priority deadline may be moved to subsequent rounds and then served according to the assigned phase. Applications received after the priority deadline will be served in subsequential rounds based on the assigned phases on a first come first serve basis (pending funding availability). The City will advise homeowners which construction pathway they are eligible for based on the condition of their home.
    - i. Phase 1: Elderly (62 years or older) or disabled household member at or below 80 percent AMI
    - ii. Phase 2: Households at or below 50 percent AMI
    - iii. Phase 3: Households at or below 80 percent AMI
4. Eligible Activities: Housing activities allowed under CDBG-DR; HCDA Section 105(a)(1), 105(a)(3-4), 105(a)(11), 105(a)(18), and 105(a)(26), 24 CFR 570.201(g) including but are not limited to:
- a. Single family owner-occupied reimbursement, rehabilitation and reconstruction.
  - b. Hazard mitigation.
  - c. Mobility (ADA) measures.
  - d. Relocation assistance.
  - e. Other activities associated with the recovery of impacted single family housing stock.

5. Ineligible Activities:

- a. Incentive payments to households that move to disaster-impacted floodplains.
- b. Properties that served as second homes during or following the disaster, are not eligible for rehabilitation assistance.
- c. Properties located in the floodway.
- d. Properties where the following are applicable:
  - i. the combined household income is greater than 120% AMI or the national median, and
  - ii. the property is in a 100-year floodplain at the time of the disaster, and
  - iii. the property owner did not maintain flood insurance on the damaged property, even when the property owner was not required to obtain and maintain such insurance. ([Section 582 of the National Flood Insurance Reform Act of 1994, as amended, 42 U.S.C. 5154a](#))

6. Eligibility Criteria:

- a. Property
  - i. Not located in a floodway.
  - ii. Sustained damage from the 2021 Winter Freeze.
  - iii. Environmentally cleared.
  - iv. Costs for rehabilitation, reconstruction, and new construction are reasonable and consistent with market costs at the time and place of construction.
  - v. Substantially damaged/substantially improved properties in the 100- or 500-year flood plain must be elevated in accordance with City of Houston Ordinance Chapter 19.
  - vi. Property taxes are current, on an approved payment plan or have an exemption under current laws.
  - vii. Must be on current on mortgage or be on a payment plan.
  - viii. No liens on property at the time the award is distributed.
- b. Applicant
- c. Applicant(s) must own the property.
- d. The property must be the owner's primary residence at the time of the storm and at the time the award is distributed.
- e. All household members 18 and older must be current on child support payments or on an approved payment plan.
- f. Applicant(s) cannot have abstract judgments at the time the award is distributed.
- g. Applicant(s) must agree to a limited subrogation of any future awards related to the 2021 Winter Freeze to ensure duplication of benefits compliance.

7. Timeframe: The City is prepared to complete program within the established period of performance allowable under this grant.

**b. Public Services Program**

HCD will administer public services by awarding grants to nonprofit organizations, other qualified subrecipients, and/or partners to deliver services to impacted renters. These services will support renters to become more resilient in future disasters, whether they be natural, economic, or personal. Services may include, but are not limited to, housing counseling, tenant/landlord counseling, fair housing, financial literacy, applying for public and private resources, and interim assistance, which may include payment of renter's insurance premiums. The total budget includes activity delivery expenses.

1. Total Budget: \$550,000

2. Max Award: \$550,000
3. Eligible and Ineligible Activities: Eligible activities include the provision of public services as listed in HCDA Sec. 105(a)(8) and relocation assistance in 105(a)(11).
4. Eligible Criteria for Assistance: Subrecipient(s) will be determined through an application or NOFA process and will include non-profit agencies. Houstonians will receive assistance directly through the selected subrecipient(s). Subrecipient(s) will ensure services are open to all residents, including those with limited English proficiency or other special needs populations.
5. Selection Criteria: Subrecipient(s) will be selected through an application or NOFA process. The NOFA will clearly establish the process and acceptance period, threshold criteria, selection criteria, and the award process. Selection criteria and any prioritization of impacted households will be established in the Rental Counseling Program guidelines or NOFA. Selection criteria will likely include: the activity and need, cost reasonableness and effectiveness, activity management and implementation, and experience/past performance.
6. National Objectives: LMI benefit
7. Timeframe: The City is prepared to complete program within the established period of performance allowable under this grant.

#### c. Neighborhood Facilities Resilience Program

HCD will assist neighborhood facilities by providing funding for resilience measures including standby electric power options that will allow these facilities to be a resource to the surrounding community in the event of future disasters. Building improvements may include, but not be limited to, adding a generator or other power generation and/or storage enhancements.

This program will harden the community facilities, owned by the City of Houston or a non-profit organization. Facilities will be places residents can go to receive information or services related to disaster preparedness and/or disaster recovery. Facilities may be used as shelters or distribution points during or immediately following a disaster. The total budget includes activity delivery expenses.

1. Total Budget: \$4,152,000
2. Max Award: \$1,000,000
3. Eligible and Ineligible Activities: Activities allowed under CDBG-DR; HCDA Section 105(a)(1, 2, 4, 5, 8, and 14), 105(a)(7-9), and 105(a)(11), include but are not limited to:
4. Eligible Activities:
  - a. Infrastructure improvements (such as water and sewer facilities, streets, provision of generators, removal of debris, bridges, etc.), including flood control and drainage repair and improvements through the construction or rehabilitation of stormwater management system; Natural or green infrastructure
  - b. Clearance, demolition, rehabilitation of publicly or privately-owned buildings, and code enforcement
  - c. Provision of assistance including loans and grants for activities carried out by public or private nonprofit entities, including acquisition of real property, and acquisition, construction, reconstruction, rehabilitation, or installation of public facilities or commercial or industrial property improvements.

5. Ineligible Activities:
  - a. Emergency response services
  - b. Funds may not be used to assist a privately-owned facility for any purpose
  - c. Buildings and facilities used for the general conduct of government (e.g., city halls, courthouses, and emergency operation centers)
6. Eligible Criteria: Facilities requesting assistance must be in an area where the service radius is more than 50% residential and 51% or more Low-to-Moderate Income. Assisted facilities must be open to the public.
7. Selection Criteria: Non-profit subrecipient(s) will be selected through an application or NOFA process. The application or NOFA will clearly establish the process and acceptance period, threshold criteria, selection criteria, and the award process. Selection criteria and any prioritization will be established in the Neighborhood Facilities Resilience Program guidelines or NOFA. Selection criteria will likely include the activity and need, cost reasonableness and effectiveness, activities management and implementation, and experience/past performance, and target areas that are identified as having a high need. City-owned facilities may also be funded directly through letter of agreement.
8. National Objectives: LMA Benefit
9. Timeframe: The City is prepared to complete program within the established period of performance allowable under this grant.

#### d. Planning

Planning activities will support the development and management of the Action Plan for Disaster Recovery 2021 Winter Storm. Activities will include community engagement to inform the City's plan development. The City may also use these funds to study specific topic related to mitigation or resilience. Planning activities will strive to promote sound, sustainable long-term recovery planning informed by a post-disaster evaluation of hazard risk, especially land-use decisions that reflect responsible floodplain management and consider future possible extreme weather events and other natural hazards and long-term risks.

1. Total Budget: \$200,000
2. Eligible and Ineligible Activities:
  - a. Eligible Activities: The eligible activity is planning, urban environment design, and policy-planning-management-capacity building activities as listed in 24 CFR 570.205
3. Timeframe: The City began the program before the grant was awarded and is prepared to complete the program within the period of performance. The program will end when all funds have been expended and program activities have completed closeout or six years after execution of the grant agreement with HUD.

#### e. Administration

HCD will use administration funds for necessary general administration costs related to CDBG-DR grants, including but not limited to staff time administering programs, compliance, and monitoring of the City's subrecipients, vendors, and other recipients of funding; and other costs specified as eligible administrative expenses in 2 CFR 570.206. Up to 5% of the overall grant and any program income may be used for administration of the grant.

1. Total Budget: \$1,514,800
2. Eligible and Ineligible Activities

- a. Eligible expenses are Administration Costs, as defined at 24 CFR 570.205 and 24 CFR § 570.206 and any applicable waivers or alternative requirements.
3. Timeframe: The City will begin the program after the grant is awarded and is prepared to complete the program within the period of performance. The program will end when all funds have been expended and program activities have completed closeout or six years after execution of the grant agreement with HUD.

## E. Appendix

## 1. Certifications

- a. The grantee certifies that it has in effect and is following a residential anti-displacement and relocation assistance plan (RARAP) in connection with any activity assisted with CDBG–DR grant funds that fulfills the requirements of Section 104(d), 24 CFR part 42, and 24 CFR part 570, as amended by waivers and alternative requirements.
- b. The grantee certifies its compliance with restrictions on lobbying required by 24 CFR part 87, together with disclosure forms, if required by part 87.
- c. The grantee certifies that the action plan for disaster recovery is authorized under state and local law (as applicable) and that the grantee, and any entity or entities designated by the grantee, and any contractor, subrecipient, or designated public agency carrying out an activity with CDBG–DR funds, possess(es) the legal authority to carry out the program for which it is seeking funding, in accordance with applicable HUD regulations as modified by waivers and alternative requirements.
- d. The grantee certifies that activities to be undertaken with CDBG–DR funds are consistent with its action plan.
- e. The grantee certifies that it will comply with the acquisition and relocation requirements of the URA, as amended, and implementing regulations at 49 CFR part 24, as such requirements may be modified by waivers or alternative requirements.
- f. The grantee certifies that it will comply with section 3 of the Housing and Urban Development Act of 1968 (12 U.S.C. 1701u) and implementing regulations at 24 CFR part 75.
- g. The grantee certifies that it is following a detailed citizen participation plan that satisfies the requirements of 24 CFR 91.115 or 91.105 (except as provided for in waivers and alternative requirements). Also, each local government receiving assistance from a state grantee must follow a detailed citizen participation plan that satisfies the requirements of 24 CFR 570.486 (except as provided for in waivers and alternative requirements).
- h. State grantee certifies that it has consulted with all disaster-affected local governments (including any CDBG entitlement grantees), Indian tribes, and any local public housing authorities in determining the use of funds, including the method of distribution of funding, or activities carried out directly by the state.
- i. The grantee certifies that it is complying with each of the following criteria:
  1. Funds will be used solely for necessary expenses related to disaster relief, long-term recovery, restoration of infrastructure and housing, economic revitalization, and mitigation in the most impacted and distressed areas for which the President declared a major disaster pursuant to the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1974 (42 U.S.C. 5121 et seq.).
  2. With respect to activities expected to be assisted with CDBG–DR funds, the action plan has been developed so as to give the maximum feasible priority to activities that will benefit low- and moderate-income families.
  3. The aggregate use of CDBG–DR funds shall principally benefit low- and moderate income families in a manner that ensures that at least 70 percent (or another percentage permitted by HUD in a waiver) of the grant amount is expended for activities that benefit such persons.
  4. The grantee will not attempt to recover any capital costs of public improvements assisted with CDBG–DR grant funds, by assessing any amount against properties owned and occupied by persons of low- and moderate-income, including any fee charged or assessment made as a condition of obtaining access to such public improvements, unless:
    - a. Disaster recovery grant funds are used to pay the proportion of such fee or assessment that relates to the capital costs of such public improvements that are financed from revenue sources other than under this title; or
    - b. for purposes of assessing any amount against properties owned and occupied by persons of moderate income, the grantee certifies to the Secretary that it lacks sufficient CDBG funds (in any form) to comply with the requirements of clause (a).
- j. State and local government grantees certify that the grant will be conducted and administered in conformity with title VI of the Civil Rights Act of 1964 (42 U.S.C. 2000d), the Fair Housing Act (42 U.S.C. 3601–3619),

and implementing regulations, and that it will affirmatively further fair housing. An Indian tribe grantee certifies that the grant will be conducted and administered in conformity with the Indian Civil Rights Act.

- k. The grantee certifies that it has adopted and is enforcing the following policies, and, in addition, state grantees must certify that they will require local governments that receive their grant funds to certify that they have adopted and are enforcing: (1) A policy prohibiting the use of excessive force by law enforcement agencies within its jurisdiction against any individuals engaged in nonviolent civil rights demonstrations; and (2) A policy of enforcing applicable state and local laws against physically barring entrance to or exit from a facility or location that is the subject of such nonviolent civil rights demonstrations within its jurisdiction.
- l. The grantee certifies that it (and any subrecipient or administering entity) currently has or will develop and maintain the capacity to carry out disaster recovery activities in a timely manner and that the grantee has reviewed the requirements applicable to the use of grant funds.
- m. The grantee certifies to the accuracy of its Financial Management and Grant Compliance Certification Requirements, or other recent certification submission, if approved by HUD, and related supporting documentation as provided in section III.A.1. of the Consolidated Notice and the grantee's implementation plan and related submissions to HUD as provided in section III.A.2. of the Consolidated Notice.
- n. The grantee certifies that it will not use CDBG-DR funds for any activity in an area identified as flood prone for land use or hazard mitigation planning purposes by the state, local, or tribal government or delineated as a Special Flood Hazard Area (or 100-year floodplain) in FEMA's most current flood advisory maps, unless it also ensures that the action is designed or modified to minimize harm to or within the floodplain, in accordance with Executive Order 11988 and 24 CFR part 55. The relevant data source for this provision is the state, local, and tribal government land use regulations and hazard mitigation plans and the latest-issued FEMA data or guidance, which includes advisory data (such as Advisory Base Flood Elevations) or preliminary and final Flood Insurance Rate Maps.
- o. The grantee certifies that its activities concerning lead-based paint will comply with the requirements of 24 CFR part 35, subparts A, B, J, K, and R.
- p. The grantee certifies that it will comply with environmental requirements at 24 CFR part 58.
- q. The grantee certifies that it will comply with the provisions of title I of the HCDA and with other applicable laws.

Warning: Any person who knowingly makes a false claim or statement to HUD may be subject to civil or criminal penalties under 18 U.S.C. 287, 1001, and 31 U.S.C. 3729.

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Sylvester Turner, Mayor

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Date

## 2. Summary and Response of Public Comments

The following provides a summary of public comments received for the *Action Plan for Disaster Recovery 2021 Winter Storm* in response to *2021 Winter Storm* during the public comment period of *August 5, 2022* through *September 4, 2022*. The City of Houston received a total of *X* number of comments during the 30 calendar days.

*Attachment of full public comment will be added after comment period has ended.*

In addition, this section contains a summary of the information received through public engagement during the development of this Action Plan.

### Community Engagement Summary

The City of Houston implemented several strategies to receive feedback regarding long-term recovery and funding strategies related to this Action Plan. Opportunities for the community to give feedback about their disaster impacts, remaining community recovery needs, and priorities for funding, included

- Stakeholder interviews
- Two surveys
- 30-day comment period
- Public hearing

### Key Engagement Findings

- Houstonians have not yet fully recovered from the 2021 Winter Storm, and damaged homes are still in need of repair.
- Recovery assistance is most needed for vulnerable populations and other residents that have been negatively impacted by multiple disaster events.
- Many residents need home repair assistance to address deferred maintenance, which if unrepaired, could leave them vulnerable to future disasters. In addition, home weatherization is needed to help residents become more resilient.
- Improvements to infrastructure to decrease power and water outages is necessary, although changes at the state-wide level are needed.
- Community facilities should be improved to become a resilience hub, so they can serve as a resource for residents during and after a disaster event.

### Stakeholder Interviews

HCD staff reached out to advocates, nonprofit organizations, and government partners to conduct interviews to support the development of this Action Plan. During the interviews, HCD staff asked open-ended questions about immediate and long-term impacts of the 2021 Winter Storm, current unmet needs, groups that are unable to access assistance, recovery needs due to multiple disaster events, and activities needed to help address outstanding needs.

The following organizations participated in the interviews. Other stakeholders were contacted and did not reply for a request for interview.

AARP	Houston Area Urban League
Area Council on Aging	Hope Disaster Recovery
CEER	Houston Habitat for Humanity
City of Houston General Services Department	Houston Housing Collaborative
City of Houston Office of Complete Communities	Houston Volunteer Lawyers
City of Houston Office of Emergency Management	Houston LISC
City of Houston Office of Resilience and Sustainability	Housing Advocates Collective
Connective	Rebuild Together Houston
Crowdsourc	The Alliance
Disability Rights Texas	VN Teamwork
Fifth Ward CRC	West Street Recovery
Greater Houston Community Foundation	

The following summarizes the findings from the stakeholder interviews categorized by unmet need, program design, and funding priorities.

#### *Unmet Need*

- There are outstanding repairs to homes impacted by the Winter Storm.
- There is deferred home maintenance that may lead to residents living in an unhealthy environment or that may lead residents to be more vulnerable to impacts from future disasters.
- Houstonians have compounding issues from multiple disasters, leaving them without savings to address future emergencies.
- Many Houstonians have not been able to access disaster assistance because of language barriers, socioeconomic status, or financial barriers.
- Houstonians need financial assistance.
- There continue to be landlord and tenant issues, including landlords delaying needed repairs.

#### *CDBG-DR21 Program Design*

- Work with residents to design programs that are directly benefiting residents.
- Streamline application processes to decrease barriers like documentation and wait time.
- Use community organizations and trusted messengers.
- Meet people where they are.
- Focus on vulnerable populations / target areas.
- Must build trust with community.
- Ensure access for people with language barriers.

#### *CDBG-DR21 Priority Activities*

- Home repair to address deferred maintenance and unrepaired damage from the Winter Storm.
- Weatherization, including additional home repairs to prepare homes for weatherization upgrades.
- Assistance for community organizations to carry out assistance programs.
- Resilience hubs / Lily pads – neighborhood spaces that provide assistance and resources to residents before, during, and after a disaster.
- General disaster preparation activities, including providing information and outreach directly before a disaster.
- Prioritization of vulnerable residents and areas with compounding need.
- Resilient infrastructure so there will be less or no interruption to electricity or water service.

### *Stakeholder Survey*

HCD made a stakeholder survey available online for advocates, nonprofit organizations, for-profit organizations, and government agencies beginning June 27, 2022. The survey was advertised through HCD's social media and email listserv, CitizensNet, and various community partners. The purpose of the survey was to gather information about HCD partners and the communities they serve including impact, remaining unmet need, disaster preparation needs, and funding priorities. As of July 31, 2022, there were 99 respondents that took the survey. The following summarizes the feedback received from the survey.

#### *Information about Respondents*

- Almost half (46%) of respondents were staff members from a nonprofit organization; about one quarter were staff from a government agency (25%) and for-profit organization (23%); and 5% were advocates.
- Over half (60%) of respondents said their organization primarily serves low- and moderate-income people.
- Only 10% of respondents indicated that their organization was not financially impacted by a recent disaster; most respondents' organizations were financially impacted by the COVID-19 pandemic (82%) and Hurricane Harvey (65%).

#### *Impacts from the 2021 Winter Storm*

- Almost all respondents indicated that the 2021 Winter Storm impacted their organization, of which almost half (45%) had their organization closed for 1 to 3 days and over a third (37%) had their organization closed for more than 3 days. Most respondents (55%) could not serve their clients due to the disaster.
- About one in five (19%) respondents' organizations sustained building damage, and only 2% had damage to contents, like furniture or other belongings. The following shows the highest and lowest amounts received regarding the estimated organizational cost of damage incurred from the 2021 Winter Storm
  - \$3,000 and \$275,000 for lost work
  - \$89 and \$100,000 for building damage
  - \$650 and \$50,000 for contents damage
- About one in ten respondents (13%) indicated an outstanding building repair need for their organization, in which some or no repairs or replacement have been made due to damages from the 2021 Winter Storm.

#### *Recovery Needs*

- Respondents indicated the following would have helped their organization recover more quickly from the 2021 Winter Storm: 1) Stronger electric infrastructure that can withstand weather related events keeping power and water on, 2) Additional funding to assist with recovery efforts, 3) Backup power, and 4) Additional staff.
- The following are the top ways that respondents thought their organizations need to better prepare for the next disaster: 1) Install alternative power supply or backups (generators, batteries, solar, wind) (58%), Create and follow a risk assessment, emergency plan, communication plan or business continuity plan (50%), 3) Prepare staff to work remotely (48%), and 4) Prepare buildings to withstand future disaster events better (38%).
- The top three community unmet needs identified by respondents are: 1) Home repair to fix damages and weatherization to make homes more resilient, 2) Addressing needs of underserved populations including seniors, people living in poverty, and people of color, 3) Assist residents in need of housing.
- The top ways that respondents identified for the City to help low- and moderate-income communities and vulnerable Houstonians recovery from a similar disaster are: 1) Improve disaster preparedness, education, and planning for all types of future disaster events, 2) Assist to weatherize homes, 3) Provide backup power, and 4) Provide funding assistance.

#### *Funding Priorities*

- The top three funding priorities are:
  - Repair owner-occupied homes with outstanding damages from the 2021 Winter Storm

- Improve City infrastructure to withstand future disaster events better
- Improve community facilities to be resources for Houstonians during disaster events
- The top four groups that should receive funding priority:
  - Low- and moderate-income people
  - Seniors
  - People with a physical disability
  - People experiencing homelessness

### *Resident Survey*

HCD made a resident survey available online beginning June 27, 2022. The survey was advertised through HCD's social media and email listserv, CitizensNet, and various community partners. The purpose of the survey was to gather information about impact, remaining unmet need, and funding priorities. As of July 31, 2022, there were 915 survey responses. The following is a summary of the responses received.

#### *Information about Respondents*

- Most respondents were homeowners (73%); one quarter were renters (16% renting an apartment and 9% rented a single-family home); and the remaining 2% of respondents either lived with a friend or family member, did not have a permanent home, or had other living arrangements.
- Over half of respondents were White (60%); almost one-third were Black or African American (29%); 5% were Asian; 3% were American Indian or Alaska Native; and 8% were another race.
- Almost one in five respondents were Hispanic, Latino, or Spanish Origin (17%).
- Almost half of the respondents lived in a household earning below \$50,000 (42%); approximately one-third lived in a household earning \$50,001-\$100,000 (30%); and one quarter of respondents lived in a household earning over \$100,000.
- Over three quarters of respondents had financial losses from a recent disaster in Houston other than the 2021 Winter Storm (78%).

#### *General Impacts*

- Almost all respondents (93%) had a loss of electricity during the 2021 Winter Storm with almost half (47%) experiencing a loss of electricity or rolling blackouts for more than 3 days.
- Almost all of respondents (84%) had a loss of water or low water pressure, with 42% of respondents experiencing a loss of water or low water pressure for more than 3 days.
- Almost three-quarters of respondents (74%) were affected by a mandatory boil water notice.
- Over a quarter of respondents (28%) lost pay due to the 2021 Winter Storm with 18% of respondents going more than 3 days without pay.
- A small number of respondents (4%) permanently lost employment due to the 2021 Winter Storm.
- Respondents had the following impacts from the 2021 Winter Storm: 50% experienced emotional trauma or anxiety; 14% had a health or mental health crisis; 10% had damage to their vehicle; 5% had a slip and fall; and 24% had other impacts.

#### *Winter Storm Damage to Homes*

- Over half (53%) of respondents had damage to their home during the 2021 Winter Storm.
  - Respondents estimated their building repair costs: 30% estimated costs up to \$1,000, 28% estimated costs between \$1,001 and \$5,000, 11% estimated repair costs between \$5,001 and \$10,000, and 15% estimated costs above \$10,000.
  - Half of respondents have made all repairs, while 38% have made some repairs and 11% have made no repairs.
- Over half (59%) had damage to personal belongings due to the 2021 Winter Storm.

- Respondents estimated the cost to fix or replace their personal belongings: 53% estimated costs up to \$1,000, 22% estimated costs between \$1,001 and \$5,000, 7% estimated costs between \$5,001 and \$10,000, and 10% estimated costs above \$10,000.
- Over a third (37%) of respondents have fixed or replaced damaged personal belongings, while 46% have only fixed or repaired some and 18% have fixed or replaced none of their damaged belongings.
- To pay for damages to their homes, over half of respondents (53%) used their savings, 16% used a gift or loan from friends or family members, 11% used insurance, 4% used government assistance (FEMA, SBA), 4% used a loan from a payday lender, 3% used grant or assistance from a community organization.

#### *Long-term Recovery*

- The top issues that respondents had trouble with since the 2021 Winter Storm include: Over a quarter (27%) had trouble paying for repairs that need to be made to their home, 27% paying utility bills, 20% paying for rent or mortgage, 19% paying for home insurance, 16% paying property taxes, 15% finding a better place to live.
- Since the 2021 Winter Storm, 45% of respondents made home improvements or changed something at home to better prepare for similar future disasters.
- Over half (56%) of respondents plan on making changes to better prepare for a similar event in the future.

#### *Funding Priorities*

- The top three funding priorities are:
  - Improve City infrastructure to withstand future disaster events better
  - Repair owner-occupied homes with outstanding damages from the 2021 Freeze
  - Improve community facilities to be resources for Houstonians during disaster events
- The top three groups that should receive funding priority:
  - Seniors
  - People with a physical disability
  - People experiencing homelessness

### 3. Data Sources / Methodologies

#### Owner Occupied Households:

- Minor-Low:
  - Less than \$3,000 of FEMA inspected real property damage
- Minor-High:
  - \$3,000 to \$7,999 of FEMA inspected real property damage
- Major-Low:
  - \$8,000 to \$14,999 of FEMA inspected real property damage
- Major-High:
  - \$15,000 to \$28,800 of FEMA inspected real property damage
- Severe:
  - Greater than \$28,800 of FEMA inspected real property damage

#### Renter Occupied Households:

- Minor-Low:
  - Less than \$1,000 of FEMA inspected personal property damage
- Minor-High:
  - \$1,000 to \$1,999 of FEMA inspected personal property damage
- Major-Low:
  - \$3,500 to \$4,999 of FEMA inspected personal property damage
- Major-High:
  - \$5,000 to \$8,999 of FEMA inspected personal property damage
- Severe:
  - Greater than \$9,000 of FEMA inspected personal property damage

#### 4. Important Definitions and Terms

AMI: Area Median Income

CBDO: Community Based Development Organization

CDBG: Community Development Block Grant

CDBG-DR: Community Development Block Grant- Disaster Recovery

CFR: Code of Federal Regulations

CO: Certifying Officer

CP: Participation

DOB: Duplication of Benefits

DRGR: Disaster Recovery and Grant Reporting System

FEMA: Federal Emergency Management Agency

HCD Act: Housing and Community Development Act of 1974, as amended

HMGP: Hazard Mitigation Grant Program

IA: (FEMA) Individual Assistance

LIHTC: Low-Income Housing Tax Credit

LMI: Low and moderate-income

NFIP: National Flood Insurance Program

PA: (FEMA) Public Assistance

RE: Responsible Entity

RFP: Request for Proposals

SBA: U.S. Small Business Administration

SFHA: Special Flood Hazard Area

UGLG: Unit of general local government

URA: Uniform Relocation Assistance and Real Property Acquisition Act of 1970, as amended

USACE: U.S. Army Corps of Engineers

5. Standard Form 424

<b>Application for Federal Assistance SF-424</b>		
* 1. Type of Submission: <input type="checkbox"/> Preapplication <input checked="" type="checkbox"/> Application <input type="checkbox"/> Changed/Corrected Application	* 2. Type of Application: <input checked="" type="checkbox"/> New <input type="checkbox"/> Continuation <input type="checkbox"/> Revision	* If Revision, select appropriate letter(s): <input style="width: 100%;" type="text"/> * Other (Specify): <input style="width: 100%;" type="text"/>
* 3. Date Received: <input style="width: 100%;" type="text"/>	4. Applicant Identifier: <input style="width: 100%; text-align: center; value: B21-MF-48-0002;" type="text"/>	
5a. Federal Entity Identifier: <input style="width: 100%;" type="text"/>		5b. Federal Award Identifier: <input style="width: 100%;" type="text"/>
<b>State Use Only:</b>		
6. Date Received by State: <input style="width: 100%;" type="text"/>	7. State Application Identifier: <input style="width: 100%;" type="text"/>	
<b>8. APPLICANT INFORMATION:</b>		
* a. Legal Name: <input style="width: 100%; text-align: center; value: City of Houston;" type="text"/>		
* b. Employer/Taxpayer Identification Number (EIN/TIN): <input style="width: 100%; text-align: center; value: 746001164;" type="text"/>	* c. UEI: <input style="width: 100%; text-align: center; value: J4MAQ69KQKF5;" type="text"/>	
<b>d. Address:</b>		
* Street1: <input style="width: 100%; text-align: center; value: 2100 Travis Street, 9th Floor;" type="text"/> Street2: <input style="width: 100%;" type="text"/> * City: <input style="width: 100%; text-align: center; value: Houston;" type="text"/> County/Parish: <input style="width: 100%;" type="text"/> * State: <input style="width: 100%; text-align: center; value: TX: Texas;" type="text"/> Province: <input style="width: 100%;" type="text"/> * Country: <input style="width: 100%; text-align: center; value: USA: UNITED STATES;" type="text"/> * Zip / Postal Code: <input style="width: 100%; text-align: center; value: 77002;" type="text"/>		
<b>e. Organizational Unit:</b>		
Department Name: <input style="width: 100%;" type="text"/>	Division Name: <input style="width: 100%;" type="text"/>	
<b>f. Name and contact information of person to be contacted on matters involving this application:</b>		
Prefix: <input style="width: 100%;" type="text"/>	* First Name: <input style="width: 100%; text-align: center; value: Keith;" type="text"/>	
Middle Name: <input style="width: 100%; text-align: center; value: W." type="text"/>		
* Last Name: <input style="width: 100%; text-align: center; value: Bynam;" type="text"/>		
Suffix: <input style="width: 100%;" type="text"/>		
Title: <input style="width: 100%; text-align: center; value: Director;" type="text"/>		
Organizational Affiliation: <input style="width: 100%;" type="text"/>		
* Telephone Number: <input style="width: 100%; text-align: center; value: 832-394-6134;" type="text"/>	Fax Number: <input style="width: 100%;" type="text"/>	
* Email: <input style="width: 100%; text-align: center; value: Keith.Bynam@houstontx.gov;" type="text"/>		

**Application for Federal Assistance SF-424**

**\* 9. Type of Applicant 1: Select Applicant Type:**

C: City or Township Government

Type of Applicant 2: Select Applicant Type:

Type of Applicant 3: Select Applicant Type:

\* Other (specify):

**\* 10. Name of Federal Agency:**

U.S. Department of Housing and Urban Development

**11. Catalog of Federal Domestic Assistance Number:**

14.218

CFDA Title:

Community Development Block Grant

**\* 12. Funding Opportunity Number:**

\* Title:

**13. Competition Identification Number:**

Title:

**14. Areas Affected by Project (Cities, Counties, States, etc.):**

City of Houston

Add Attachment

Delete Attachment

View Attachment

**\* 15. Descriptive Title of Applicant's Project:**

Community Development Block Grant Disaster Recovery (CDBG-DR)

Attach supporting documents as specified in agency instructions.

Add Attachments

Delete Attachments

View Attachments

**Application for Federal Assistance SF-424**

**16. Congressional Districts Of:**

\* a. Applicant

\* b. Program/Project

Attach an additional list of Program/Project Congressional Districts if needed.

Add Attachment

Delete Attachment

View Attachment

**17. Proposed Project:**

\* a. Start Date:

\* b. End Date:

**18. Estimated Funding (\$):**

* a. Federal	<input type="text" value="30,296,000.00"/>
* b. Applicant	<input type="text" value="0.00"/>
* c. State	<input type="text" value="0.00"/>
* d. Local	<input type="text" value="0.00"/>
* e. Other	<input type="text" value="0.00"/>
* f. Program Income	<input type="text" value="0.00"/>
* g. TOTAL	<input type="text" value="30,296,000.00"/>

**\* 19. Is Application Subject to Review By State Under Executive Order 12372 Process?**

- a. This application was made available to the State under the Executive Order 12372 Process for review on
- b. Program is subject to E.O. 12372 but has not been selected by the State for review.
- c. Program is not covered by E.O. 12372.

**\* 20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes," provide explanation in attachment.)**

- Yes
- No

If "Yes", provide explanation and attach

Add Attachment

Delete Attachment

View Attachment

**21. \*By signing this application, I certify (1) to the statements contained in the list of certifications\*\* and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances\*\* and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 18, Section 1001)**

\*\* I AGREE

\*\* The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.

**Authorized Representative:**

Prefix:  \* First Name:   
Middle Name:   
\* Last Name:   
Suffix:

\* Title:

\* Telephone Number:  Fax Number:

\* Email:

\* Signature of Authorized Representative:

\* Date Signed:

ASSURANCES - CONSTRUCTION PROGRAMS

OMB Number: 4040-0009  
 Expiration Date: 02/28/2025

Public reporting burden for this collection of information is estimated to average 15 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0042), Washington, DC 20503.

**PLEASE DO NOT RETURN YOUR COMPLETED FORM TO THE OFFICE OF MANAGEMENT AND BUDGET. SEND IT TO THE ADDRESS PROVIDED BY THE SPONSORING AGENCY.**

**NOTE:** Certain of these assurances may not be applicable to your project or program. If you have questions, please contact the Awarding Agency. Further, certain Federal assistance awarding agencies may require applicants to certify to additional assurances. If such is the case, you will be notified.

As the duly authorized representative of the applicant:, I certify that the applicant:

1. Has the legal authority to apply for Federal assistance, and the institutional, managerial and financial capability (including funds sufficient to pay the non-Federal share of project costs) to ensure proper planning, management and completion of project described in this application.
2. Will give the awarding agency, the Comptroller General of the United States and, if appropriate, the State, the right to examine all records, books, papers, or documents related to the assistance; and will establish a proper accounting system in accordance with generally accepted accounting standards or agency directives.
3. Will not dispose of, modify the use of, or change the terms of the real property title or other interest in the site and facilities without permission and instructions from the awarding agency. Will record the Federal awarding agency directives and will include a covenant in the title of real property acquired in whole or in part with Federal assistance funds to assure non-discrimination during the useful life of the project.
4. Will comply with the requirements of the assistance awarding agency with regard to the drafting, review and approval of construction plans and specifications.
5. Will provide and maintain competent and adequate engineering supervision at the construction site to ensure that the complete work conforms with the approved plans and specifications and will furnish progressive reports and such other information as may be required by the assistance awarding agency or State.
6. Will initiate and complete the work within the applicable time frame after receipt of approval of the awarding agency.
7. Will establish safeguards to prohibit employees from using their positions for a purpose that constitutes or presents the appearance of personal or organizational conflict of interest, or personal gain.
8. Will comply with the Intergovernmental Personnel Act of 1970 (42 U.S.C. §§4728-4763) relating to prescribed standards of merit systems for programs funded under one of the 19 statutes or regulations specified in Appendix A of OPM's Standards for a Merit System of Personnel Administration (5 C.F.R. 900, Subpart F).
9. Will comply with the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. §§4801 et seq.) which prohibits the use of lead-based paint in construction or rehabilitation of residence structures.
10. Will comply with all Federal statutes relating to non-discrimination. These include but are not limited to: (a) Title VI of the Civil Rights Act of 1964 (P.L. 88-352) which prohibits discrimination on the basis of race, color or national origin; (b) Title IX of the Education Amendments of 1972, as amended (20 U.S.C. §§1681 1683, and 1685-1686), which prohibits discrimination on the basis of sex; (c) Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. §794), which prohibits discrimination on the basis of handicaps; (d) the Age Discrimination Act of 1975, as amended (42 U.S.C. §§6101-6107), which prohibits discrimination on the basis of age; (e) the Drug Abuse Office and Treatment Act of 1972 (P.L. 92-255), as amended relating to nondiscrimination on the basis of drug abuse; (f) the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91-616), as amended, relating to nondiscrimination on the basis of alcohol abuse or alcoholism; (g) §§523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. §§290 dd-3 and 290 ee 3), as amended, relating to confidentiality of alcohol and drug abuse patient records; (h) Title VIII of the Civil Rights Act of 1968 (42 U.S.C. §§3601 et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing; (i) any other nondiscrimination provisions in the specific statute(s) under which application for Federal assistance is being made; and (j) the requirements of any other nondiscrimination statute(s) which may apply to the application.

11. Will comply, or has already complied, with the requirements of Titles II and III of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646) which provide for fair and equitable treatment of persons displaced or whose property is acquired as a result of Federal and federally-assisted programs. These requirements apply to all interests in real property acquired for project purposes regardless of Federal participation in purchases.
12. Will comply with the provisions of the Hatch Act (5 U.S.C. §§1501-1508 and 7324-7328) which limit the political activities of employees whose principal employment activities are funded in whole or in part with Federal funds.
13. Will comply, as applicable, with the provisions of the Davis-Bacon Act (40 U.S.C. §§276a to 276a-7), the Copeland Act (40 U.S.C. §276c and 18 U.S.C. §874), and the Contract Work Hours and Safety Standards Act (40 U.S.C. §§327-333) regarding labor standards for federally-assisted construction subagreements.
14. Will comply with flood insurance purchase requirements of Section 102(a) of the Flood Disaster Protection Act of 1973 (P.L. 93-234) which requires recipients in a special flood hazard area to participate in the program and to purchase flood insurance if the total cost of insurable construction and acquisition is \$10,000 or more.
15. Will comply with environmental standards which may be prescribed pursuant to the following: (a) institution of environmental quality control measures under the National Environmental Policy Act of 1969 (P.L. 91-190) and Executive Order (EO) 11514; (b) notification of violating facilities pursuant to EO 11738; (c) protection of wetlands pursuant to EO 11990; (d) evaluation of flood hazards in floodplains in accordance with EO 11988; (e) assurance of project consistency with the approved State management program developed under the Coastal Zone Management Act of 1972 (16 U.S.C. §§1451 et seq.); (f) conformity of Federal actions to State (Clean Air) implementation Plans under Section 176(c) of the Clean Air Act of 1955, as amended (42 U.S.C. §§7401 et seq.); (g) protection of underground sources of drinking water under the Safe Drinking Water Act of 1974, as amended (P.L. 93-523); and, (h) protection of endangered species under the Endangered Species Act of 1973, as amended (P.L. 93-205).
16. Will comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. §§1271 et seq.) related to protecting components or potential components of the national wild and scenic rivers system.
17. Will assist the awarding agency in assuring compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. §470), EO 11593 (identification and protection of historic properties), and the Archaeological and Historic Preservation Act of 1974 (16 U.S.C. §§469a-1 et seq).
18. Will cause to be performed the required financial and compliance audits in accordance with the Single Audit Act Amendments of 1996 and OMB Circular No. A-133, "Audits of States, Local Governments, and Non-Profit Organizations."
19. Will comply with all applicable requirements of all other Federal laws, executive orders, regulations, and policies governing this program.
20. Will comply with the requirements of Section 106(g) of the Trafficking Victims Protection Act (TVPA) of 2000, as amended (22 U.S.C. 7104) which prohibits grant award recipients or a sub-recipient from (1) Engaging in severe forms of trafficking in persons during the period of time that the award is in effect (2) Procuring a commercial sex act during the period of time that the award is in effect or (3) Using forced labor in the performance of the award or subawards under the award.

SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL  	TITLE Mayor
APPLICANT ORGANIZATION City of Houston	DATE SUBMITTED

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## ASSURANCES - NON-CONSTRUCTION PROGRAMS

Public reporting burden for this collection of information is estimated to average 15 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0040), Washington, DC 20503.

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**NOTE:** Certain of these assurances may not be applicable to your project or program. If you have questions, please contact the awarding agency. Further, certain Federal awarding agencies may require applicants to certify to additional assurances. If such is the case, you will be notified.

As the duly authorized representative of the applicant, I certify that the applicant:

1. Has the legal authority to apply for Federal assistance and the institutional, managerial and financial capability (including funds sufficient to pay the non-Federal share of project cost) to ensure proper planning, management and completion of the project described in this application.
2. Will give the awarding agency, the Comptroller General of the United States and, if appropriate, the State, through any authorized representative, access to and the right to examine all records, books, papers, or documents related to the award; and will establish a proper accounting system in accordance with generally accepted accounting standards or agency directives.
3. Will establish safeguards to prohibit employees from using their positions for a purpose that constitutes or presents the appearance of personal or organizational conflict of interest, or personal gain.
4. Will initiate and complete the work within the applicable time frame after receipt of approval of the awarding agency.
5. Will comply with the Intergovernmental Personnel Act of 1970 (42 U.S.C. §§4728-4763) relating to prescribed standards for merit systems for programs funded under one of the 19 statutes or regulations specified in Appendix A of OPM's Standards for a Merit System of Personnel Administration (5 C.F.R. 900, Subpart F).
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12. Will comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. §§1271 et seq.) related to protecting components or potential components of the national wild and scenic rivers system.
13. Will assist the awarding agency in assuring compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. §470), EO 11593 (identification and protection of historic properties), and the Archaeological and Historic Preservation Act of 1974 (16 U.S.C. §§469a-1 et seq.).
14. Will comply with P.L. 93-348 regarding the protection of human subjects involved in research, development, and related activities supported by this award of assistance.
15. Will comply with the Laboratory Animal Welfare Act of 1966 (P.L. 89-544, as amended, 7 U.S.C. §§2131 et seq.) pertaining to the care, handling, and treatment of warm blooded animals held for research, teaching, or other activities supported by this award of assistance.
16. Will comply with the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. §§4801 et seq.) which prohibits the use of lead-based paint in construction or rehabilitation of residence structures.
17. Will cause to be performed the required financial and compliance audits in accordance with the Single Audit Act Amendments of 1996 and OMB Circular No. A-133, "Audits of States, Local Governments, and Non-Profit Organizations."
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<p>SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL</p> <div style="border: 1px solid black; height: 60px; width: 100%;"></div>	<p>TITLE</p> <div style="border: 1px solid black; padding: 2px;">Mayor</div>
<p>APPLICANT ORGANIZATION</p> <div style="border: 1px solid black; padding: 2px;">City of Houston</div>	<p>DATE SUBMITTED</p> <div style="border: 1px solid black; height: 40px; width: 100%;"></div>

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## CERTIFICATIONS

As required by the Consolidated Notice and the Allocation Announcement Notice, the grantee must make the certification below by signing where indicated.

### Compliance Certification

The grantee certifies that: it has reviewed the requirements of Public Law(s) 117-43, which appropriates CDBG-DR funds, and the Consolidated Notice and Allocation Announcement Notice that establish the rules, waivers, and alternative requires and allocate CDBG-DR funds; that its responses to this checklist and submitted supporting documentation are accurate; that it will adhere to the controls, standards, processes, corrective actions, and procedures it described in this checklist and supporting documentation; and that it has in place proficient financial controls and procurement processes and that it has established adequate procedures to prevent any duplication of benefits as defined by section 312 of the Stafford Act, to ensure timely expenditure of funds, to maintain comprehensive websites regarding all disaster recovery activities assisted with these funds, and to detect and prevent waste, fraud, and abuse of funds.

\_\_\_\_\_  
Signature of Certifying Official

Sylvester Turner

\_\_\_\_\_  
(Printed Name of Certifying Official)

\_\_\_\_\_  
(Date)

Attest/Seal:

\_\_\_\_\_  
City Secretary

Countersigned:

\_\_\_\_\_  
City Controller

DATE OF COUNTERSIGNATURE: \_\_\_\_\_

**APPROVED:**

\_\_\_\_\_  
Director  
Housing and Community Development Department

**APPROVED AS TO FORM:**

\_\_\_\_\_  
Senior Assistant City Attorney

