I. Project Information*

Project Director	Stephanie Glenn
Project Title	Equity Informed Climate Resilience Planning for a Texas Gulf Coastal Golden Triangle At-Risk Community
Project Location	Port Arthur
Project Summary	The EQUIP PA project will examine the City of Port Arthur, Texas' Disaster Recovery and Resiliency Plan (DRRP) and revise it into an updated community-led, climate data driven, and equity-informed resilience plan. Community In-Power and Development Association (CIDA) has worked with Port Arthur residents and local organizations to address environmental and public health issues for over 20 years. The Houston Advanced Research Center (HARC) is a nonprofit research organization committed to sustainability and has experience developing data visualizations as communication tools and working with stakeholders to identify and assess barriers to community resilience. Jupiter Data Factory has participated in development of several assessments and tools for the Texas Upper Coast. CIDA and HARC have partnered to develop the Port Arthur/Golden Triangle Environmental Justice Initiative with the support of the City of Port Arthur and multiple local organizations. Port Arthur is an at-risk community, facing a wide range of concerns, including climate disasters, disproportionate risk, and environmental hazards. Deliverables of this project will include:•A case study that documents the collaborative planning process;•An updated community-led, climate data driven, and equity-informed DRRP;•An analysis that examines the similarities and differences between the original and equity-informed plan including a discussion about the community partners' reflection on the planning process, output, and potential outcomes; and,•An online project portal with data, visualization and video resources that document the planning process to be used as a model framework for equity-informed climate resilience planning along the Gulf Coast.

II. Progress Report Questions

1. Please revisit your proposal and review your goals and the outcomes you were seeking to achieve through this grant. How successful were you in meeting your goals? Please assess your success against the criteria you set in your proposal and use any combination of anecdotes, stories, graphs, charts, visuals as well as data to explain your success. Upload supporting files if you choose.*

The overall goal of the EQUIP PA proposal was to examine the City of Port Arthur, Texas' Disaster Recovery and Resiliency Plan (DRRP) and revise it into an updated community-led, climate data driven, and equity-informed resilience plan. We achieved this goal (see attached EQUIP PA). We achieved this through the tasks and outcomes discussed in the proposal. First, through Community Visioning, Capacity Building and Plan Review, which involved the Houston Advanced Research Center (HARC) with partner Community In-Power and Development Association (CIDA) conducting stakeholder workshops, one-on-one conversations, community surveys, and other engagement strategies to initiate a community-led update to the DRRP. Then through Data Synthesis, Communication, Visualization and Flow. HARC and Jupiter Data Factory (JD) worked together to develop the data characterization and explanation of the various climate scenarios targeted to that area and prepare data visualization and communication materials for stakeholder assessment. HARC developed the online project portal (https://sites.google.com/view/thrive-in-port-arthur/community-projects/equip-pa?authuser=0), which we kept updated throughout with project material, data visualizations, final project results. HARC and CIDA worked together to develop the revised equity-informed and climate updated plan, which included outlining the collaborative planning process as a framework for other coastal communities.

We stated in the proposal that project success would consist of an actionable and climate-informed revised equity-focused plan that incorporates input from community members, City officials, and additional stakeholders to meet the needs of the most vulnerable community members. The plan would need to have a stakeholder-led path forward, the data and information they need to act on their plan, and an understanding that equity is a key component in their solutions. The plan would need to be flexible and adaptable, allowing the community to come back periodically to adapt and change as population, floodplains, or other information and data may change. The plan would need to outline funding possibilities to provide a pathway for implementation of the equity-informed resilience plan. Finally, the planning process should be replicable so it can be adopted in other communities. EQUIP PA meets all the criteria we laid out for success in the proposal.

Optional File Upload

EQUIP PA Full Report.pdf

Filename: EQUIP PA Full Report.pdf **Size:** 50.7 MB

2. How has your work benefited your organization, professional field, community, or other stakeholders?*

THRIVE is working Towards a Healthy, Resilient, Inclusive Vision for Everyone in Port Arthur. THRIVE is a multi-stakeholder community environmental justice initiative aimed at clean air, water, and energy, flood and climate resilience, and improved housing, jobs, and health. The EQUIP PA project helped lay the framework and create synergy for other similar projects in Port Arthur under the THRIVE umbrella, which benefited all stakeholders. For example, the Montrose Green Infrastructure project, which is aimed at reducing flooding and ponding in the Montrose area of Port Arthur through green infrastructure and showcasing how green infrastructure could benefit the rest of our community. Another example is the Solar for Safety and Success project, which is aimed at increasing access to solar on Port Arthur commercial buildings, providing job training for Port Arthur residents, and building resilience to power outages in the community.

3. Are there any other successes related more broadly to this project that you would like to share with us?*

EQUIP PA played a pivotal role in establishing the foundation for Nature Based Solutions (NBS) initiatives in Port Arthur. CIDA orchestrated collaborative partnerships and community outreach efforts, spearheading initiatives such as the West Port Arthur Floodplain Management Plan, the Montrose Green Infrastructure Master Plan, and the Montrose Green Infrastructure Pilot Project. Following the completion of these primary endeavors, CIDA, in conjunction with HARC, formulated the Comprehensive Collaborative Coastal Resilience Plan (CCCRP). This plan encapsulates NBS strategies derived from the aforementioned projects, accentuating the community engagement that permeated throughout. The CCCRP also includes NBS Cost-Benefit Analyses for practices outlined in the Montrose Green Infrastructure Master Plan and executed by the Montrose Green Infrastructure Pilot Project, alongside various potential scenarios. The CCCRP serves as a resource to assist coastal communities in implementing NBS for climate resilience, delving into the discussed projects and exploring nature’s toolkit for climate resilience. It emphasizes the pivotal role of stakeholder and community engagement as guiding principles, as well as the significance of integrating cultural sensitivity, equity, and lived experiences into community-based resilience endeavors. The CCCRP proved indispensable in delineating NBS plans and priorities for Port Arthur, with EQUIP PA playing a pivotal role in its development.

4. What did you learn (positive or negative) as a result of this grant? What lessons would you share with other organizations or the field at large?*

The journey through this project taught us invaluable lessons about stakeholder engagement. Initially, our traditional approach faltered, with larger meetings proving ineffective. Amidst the challenges of COVID and stakeholder fatigue, compounded by historical neglect in resilience and climate equity efforts, we realized the need for a shift. Transitioning to intimate one-on-one interactions, employing diverse communication methods such as stakeholder surveys and personal conversations, became pivotal. This tailored approach yielded the response and dialogue essential for project progression. Consistently applying these lessons, we culminated the project in a remarkably successful final stakeholder meeting, marked by robust communication and active participation, affirming the significance of adapting strategies to foster meaningful engagement. The final stakeholder meeting was well-attended and gave stakeholders the opportunity to provide feedback and ask questions about EQUIP PA, empowering them towards ownership of the plan.

5. How do you characterize your relationship with the GRP and what suggestions do you have for improvement?*

GRP was very supportive of this work; it could not have happened without them. The call between all entities funded through this program at the beginning of the project was really helpful - both in terms of networking and in hearing about other projects in terms of resources. In our region, there's a significant focus on resilience work, particularly within the smaller, underserved coastal communities. The GRP possesses a comprehensive network and knowledge base regarding these initiatives. It would be immensely beneficial if the GRP could facilitate engagement among various teams operating in similar domains – maybe hosting an end-of-projects call to discuss results, challenges, and lessons learned.

6. Please provide any other feedback or comments you have for the GRP.*

We thank the GRP for this opportunity. Developing the EQUIP PA is a remarkable achievement for Port Arthur, and has already opened up other opportunities (see above) in the region. We strongly encourage GRP to continue the important work of fostering partnerships and collaboration with other organizations, agencies, and initiatives working on related issues in the Gulf Coast region. This is such an important and needed role for our region, and strengthens all the work occurring by leverage existing resources and expertise to maximize the impact of resilience efforts.

7. If applicable, please identify and describe the ways you or your organization leveraged GRP's grant (e.g., other funders, volunteers who worked on the program, in-kind donations etc.) Please specify the value and/or number/hours of volunteers if possible.

n/a

Equity Informed Climate Resilience Plan in Port Arthur, Texas

February 2024
National Academy of Sciences
Agreement 2000013193

National Academy of Sciences Agreement 2000013193

Deliverable: Equity Informed Climate Resilience Plan in Port Arthur, Texas

Prepared by the Houston Advanced Research Center (HARC) with partner Community In-Power and Development Association (CIDA)

February 2024

Research reported in this plan was supported by the Gulf Research Program of the National Academies of Sciences, Engineering, and Medicine under award number 2000013193

HARC

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Figures

ACRONYMS

BRIC	Building Resilient Infrastructure and Communities
CBA	Cost-Benefit Analysis
CCCRP	Comprehensive Collaborative Coastal Resilience Plan
CDC	Centers for Disease Control and Prevention
CEJST	Climate and Economic Justice Screening Tool
CIDA Inc.	Community In-Power and Development Association Inc.
DOE	U.S. Department of Energy
DRRP	Disaster Recovery and Resiliency Plan
EECBG	The Energy Efficiency and Conservation Block Grant
EPA	Environmental Protection Agency
EJScreen	Environmental Justice Screening Tool
EQUIP PA	Equity Informed Climate Resilience Plan
FEMA	Federal Emergency Management Agency
GETCAP	Greater East Texas Community Action Program
GLO	General Land Office
HARC	Houston Advanced Research Center
HUD	U.S. Department of Housing and Urban Development
JDF	Jupiter Data Factory
LEAD	Low-Income Energy Affordability Data
LIHEAP	Low-Income Home Energy Assistance Program
NAS GRP	National Academy of Sciences Gulf Research Program
NBS	Nature-Based Solutions
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NRDC	National Resources Defense Council
NWS	National Weather Service
PM	Particulate Matter
RDE	Random Device Engagement
RCP	Representative Concentration Pathway
RESIN	Resilience Science Information Network
S2G	Sabine Pass to Galveston Bay Coastal Storm Risk Management Program
SEP	Supplemental Environmental Project
SETRPC	Southeast Texas Regional Planning Commission
SLAMM	Sea Level Affecting Marsh Migration Model
SLOSH	Sea, Lake, and Overland Surges from Hurricanes Model
SLR	Sea Level Rise
STAN	Southeast Texas Alerting Network
TCEQ	Texas Commission on Environmental Quality
THRIVE	Towards a Healthy, Resilient, Inclusive Vision for Everyone in Port Arthur
TWDB	Texas Water Development Board
TxDOT	Texas Department of Transportation
US ACE	United States Army Corps of Engineers
WAP	U.S. Department of Energy's Weatherization Assistance Program

EXECUTIVE SUMMARY

Background

The **Equity Informed Climate Resilience Plan** (EQUIP PA) in Port Arthur, Texas, considers climate hazards, community health, and vulnerable populations through an equity-centered approach. The stakeholder-led plan addresses environmental and public health issues faced by Port Arthur residents like frequent flooding, environmental hazards, segregation, poverty, and high unemployment, particularly in neighborhoods close to industrial facilities.

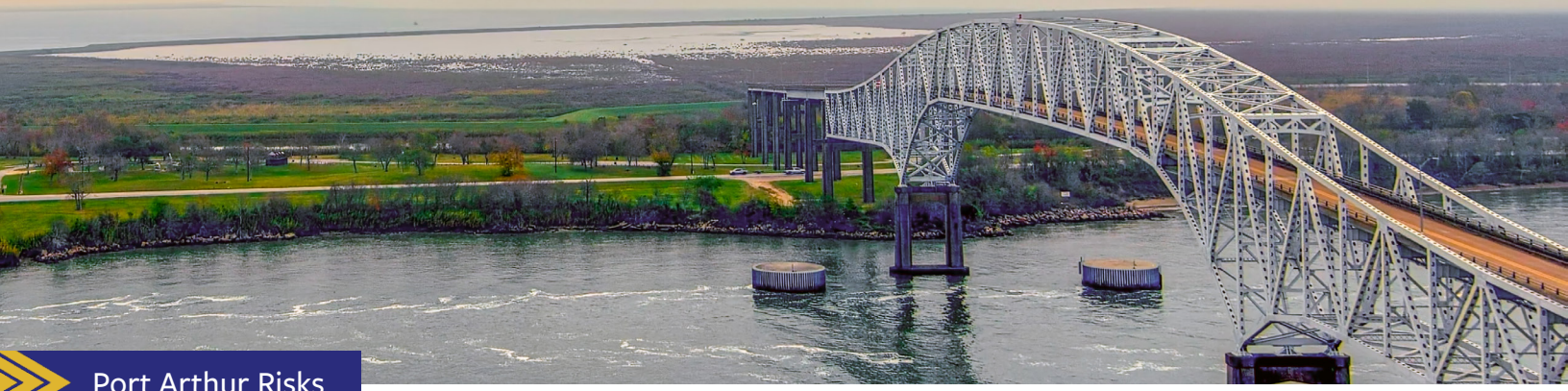
Port Arthur is a unique mix of Louisiana and Texan culture combined. Many of Port Arthur's residents have roots in Louisiana and brought their Cajun and Creole culture with them when they migrated here, in search of a brighter future in the petroleum industry.[1] That optimism and love for life and fun is still very much alive in the Port Arthur way of living. It is embedded in how the people of Port Arthur cook, celebrate, create art, and support each other as a community.

The survival of historic African American communities (42.3% of the population), despite the inhospitable conditions and areas they were forced into during the Jim Crow era, is a testament to the determination and perseverance of the culture and its people's ability to bond together and survive extreme challenges.[2]

Located on the Texas Gulf Coast, Port Arthur has a history of enduring extreme weather events such as hurricanes and floods, impacting its social vulnerability and economic disparities. Residents face elevated risks due to proximity to industrial sites, experiencing poor air quality and health risks exceeding national averages. These challenges compound other persistent issues like poverty, high energy burden, inadequate housing, and disparities in healthcare access, leading to a significant impact on residents' physical and mental well-being.

EQUIP PA incorporates data analysis, community input and feedback, and recommendations from resilience practitioners to visualize and prepare for Port Arthur's future risks, striving to develop a community matching the strength and resilience found within its diverse population. By prioritizing stakeholder inclusion, equity, long-term preparedness, robust communication, and sustainability integration, EQUIP PA endeavors to become an all-encompassing guide for disaster recovery and community resilience in Port Arthur, and a guide for other Gulf Coast communities.

[1] Theriot, J. P. (2017). The Migration of Cajuns to Southeast Texas. Louisiana History: The Journal of the Louisiana Historical Association, 58(4), 443–467.
[2] United States Census Bureau. 2018-2022 estimates. https://www.census.gov/quickfacts/fact/table/portarthurcitytexas/PST045223



Port Arthur Risks

Port Arthur, situated on the Texas Gulf Coast, faces substantial risks from climate-related hazards, including floods, extreme weather events, and sea-level rise. The city's current levee system, consisting of approximately 27.8 miles of levees and over six and a half miles of floodwalls, requires ongoing maintenance and improvements to handle escalating precipitation levels and storm surges. Efforts led by the U.S. Army Corps of Engineers aim to enhance coastal storm risk management through the Sabine Pass to Galveston Bay Coastal Storm Risk Management Program, set to be completed by 2026.

The drainage system in Port Arthur presents challenges, with downtown pipes undersized for modern rainfall and pump stations designed for rainfall events that are now increasingly surpassed. Drainage District 7, the drainage district in Port Arthur, has strategies to mitigate potential flooding which include activating pumps before extreme weather events to lower water levels, but further infrastructure upgrades are crucial to handle projected escalating rainfall. Moreover, Port Arthur faces future potential loss of vital coastal marshes due to sea-level rise, resulting in weakened resilience against climate change impacts.

Models projecting future scenarios reveal a trend of rising temperatures, longer and more frequent heatwaves, and increased rainfall intensity. Such changes pose multifaceted risks, from heightened health concerns due to heat-related illnesses to strained energy resources and disruptions to daily life. Strategies to address these risks include heat wave preparedness plans, resilient infrastructure development, sustainable water management, and community-driven climate resilience initiatives to safeguard vulnerable populations and ensure the city's overall adaptability to climate challenges.

Port Arthur's community, engaged through equity-informed approaches led by EQUIP PA, involved stakeholders and residents in decision-making processes. Surveys conducted by the Houston Advanced Research Center (HARC) and The Community In-Power Development Association Inc. (CIDA) gathered insights from 139 respondents, using a mix of online Pollfish surveys and in-person door-to-door methods, primarily targeting Westside, Montrose, and El Vista/Vista village neighborhoods. The Pollfish survey utilized digital devices offering incentives within mobile apps, while in-person surveys focused on community meetings and door-to-door engagement in specific areas. Survey results provided diverse demographic data reflecting Port Arthur's population.

Concerns and Recommendations Articulated by Port Arthur Residents

Community leaders, integral to this engagement, shared experiences and insights, emphasizing the need for grassroots efforts, capacity building, and accurate information dissemination. Recommendations highlighted the necessity of resources and programs linking community needs with available solutions. These findings underscored the importance of varied communication pathways for disseminating official information related to disaster preparedness. For example, recommendations stressed the significance of utilizing television, radio, and social media to reach a broader audience, ensuring information access for residents regardless of their preferred information sources. Surveyed residents primarily rely on television news and social media for emergency information. However, lack of computing resources and internet subscription (23% and 39%, respectively) necessitates diverse information sources. Furthermore, community leaders suggested establishing accessible centers providing information and enrollment in programs for energy efficiency, weatherization, and flood resilience to aid residents in protecting their homes from extreme weather. These insights, gleaned from both surveys and community leaders, provide crucial guidance for future engagement and disaster preparedness strategies in Port Arthur.

Disaster Preparedness and Recovery in Port Arthur

The Southeast Texas Regional Planning Commission (SETRPC) runs the community alerting system, the Southeast Texas Alerting Network (STAN). STAN facilitates community alerts and requires resident registration for area-specific notifications via text, email, or phone call. Community survey results showed residents exhibit awareness of emergency shelter locations (75%) and evacuation zones (71%). About 47% have not utilized emergency shelters, citing difficulties in locating suitable ones. Extreme weather and power outages commonly prompt shelter visits. However, nearly half of shelter users left within a day. For some, shelters are distant, leading to moderate to challenging travel experiences.

Residents prioritize food, water, and power for medical devices in emergency shelters. During disasters, assistance largely comes from the Federal Emergency Management Authority (FEMA) and the Red Cross. Home damage due to extreme weather affects 69% of respondents, with repair times varying. A significant portion (38%) lack flood insurance. Residents can call 2-1-1 for emergency information including regarding their local shelter.

Nature-Based Solutions (NBS) are strategies imitating natural processes to mitigate climate change effects, offering benefits such as flood control and biodiversity preservation. Unequal NBS distribution can disadvantage communities of color and low-income areas, leading to social inequities. Integrating NBS with equity considerations can enhance community resilience and improve quality of life regardless of socioeconomic status.

Port Arthur faces energy resilience challenges, with frequent power outages disproportionately affecting disadvantaged communities. High energy burden exacerbates challenges for vulnerable residents, leading to rationing power use to afford bills, but compromising health and safety at home.

Funding from the federal government provided through the Greater East Texas Community Action Program (GETCAP) supports light bill assistance, aiming to alleviate energy burden. Energy efficiency and weatherization programs offer solutions, helping low-income residents improve home energy use. These programs, available to homeowners or renters, focus on upgrading devices and improving insulation for weather safety and reduced energy consumption.

Overall, Port Arthur grapples with climate resilience, unequal NBS distribution, and energy challenges. Inclusive approaches, infrastructure improvements, and equitable access to resources are needed for a more resilient and sustainable community. Enhanced outreach strategies, funding for preparedness, and expanded programs are suggested for disaster readiness and recovery. Energy resilience remains a concern, with frequent power outages and high energy burden affecting residents, particularly those in poverty. Concerted efforts are necessary to bolster disaster preparedness, address power outages, and ensure equitable access to resources and information, strengthening community resilience in Port Arthur.

Recommendations for Implementation

The recommendations outlined for implementing the EQUIP PA project in Port Arthur focus on multifaceted strategies aimed at bolstering community resilience and addressing climate-related vulnerabilities. These recommendations provide a blueprint for other communities seeking similar initiatives.

The results highlight several focal points for implementation in Port Arthur. Priority areas include emphasizing equity in climate resilience planning, supporting individuals with preparedness and recovery efforts, facilitating effective communication among different levels of government, seeking diverse funding sources, practicing continuous improvement, prioritizing resilient construction practices, addressing 500-year flood zones, integrating climate change projections into planning, prioritizing NBS, upgrading drainage systems, enhancing job placement and training, and utilizing varied communication channels for community engagement.

Key recommendations underscore the necessity of equitable community involvement in planning, addressing housing vulnerabilities, integrating climate change projections into infrastructure development, prioritizing NBS, upgrading drainage systems, enhancing job opportunities, and ensuring diverse communication channels for disseminating crucial information to residents before, during, and after emergencies. These recommendations provide a comprehensive framework for resilience planning that emphasizes inclusivity, proactive strategies, infrastructure improvement, job creation, and effective communication strategies.

EQUIP PA Recommendations for Implementation

***Prioritize Equity in Planning for Community Climate Resilience*:**
More effective planning for and implementation of climate resilience is needed throughout the community, and residents should be included and equipped to make decisions in this planning early and often. Residents in under-resourced parts of the community or who have been historically marginalized may need prioritization to ensure they can participate in climate resilience planning and benefit from solutions.

Prioritize Equity by Supporting Individuals with Preparedness and Recovery:
Residents interviewed for this plan identified that funding for disaster preparedness and recovery may be allocated unfairly, that homes that have been damaged by Harvey are still damaged today, and that certain homes or neighborhoods may be overlooked. It is recommended that community leadership augment the opportunities offered to residents for disaster preparedness and recovery.

Facilitate Effective Communication among Different Tiers of Government:
This cohesive messaging fosters productive synergy and reduces confusion for residents. Foster collaboration among government agencies, community-based organizations, and other stakeholders to leverage resources, share expertise, and enhance communication.

***Seek Diverse Funding Sources that Can Provide More Opportunities for Individual and Community Preparedness*:**
Planning for resource allocation is crucial, necessitating the identification of potential funding avenues. Inflation Reduction Act and Infrastructure Investment and Jobs Act funding for infrastructure improvement and community development generally carries priority for disadvantaged communities, which encompasses the majority of Port Arthur.

***Practice Continuous Improvement*:**
Ongoing evaluation of the effectiveness of resilience strategies: allowing for adaptive implementation to be adjusted based on lessons learned and changing climate dynamics. Continuous collaboration, community involvement, and adaptive management remain pivotal to sustaining ongoing progress.

Prioritizing Resilient and Sustainable Construction/Reconstruction/Housing Practices:
Highlighting the importance of thoughtful rebuilding and ensuring safety sustainability in both neighborhoods and homes is critical. The goal should be to expedite rehousing while also prioritizing resilient and sustainable reconstruction practices. This step will help individuals avoid repeat displacement.

***Account for 500-Year Flood Zones*:**
Events like Hurricane Harvey demonstrated the necessity of considering more severe flooding scenarios beyond the standard 100-year recurrence level. Addressing 500-year flood zones, when possible, ensures a more comprehensive and adaptable approach to flood management. However, Jefferson County does not have the 500-year flood plan data. When these data are released, local planning should incorporate 500-year flood zones.

***Risk Assessment and Adaptation*:**
Implement a schedule to conduct comprehensive risk assessment to identify coastal hazards and current mitigation practices. Develop strategies and infrastructure improvements that prioritize vulnerable populations and prioritize Nature-Based Solutions.

Integrate Climate Change Projections:
Integrate proactive hazard mitigation and resilience planning by incorporating climate change projections in future coastal development and infrastructure expansion.

Prioritize Nature-Based Solutions:
Incorporate strategies centered around green infrastructure to mitigate floods in flood-prone areas and enhance community resilience. By utilizing natural solutions, such as wetlands and permeable surfaces, the community can effectively manage water and reduce flood risks.

Upgrade the Drainage System:
The drainage system under parts of Port Arthur is already undersized for current storms. This will only worsen in the future when, as discussed in the EQUIP PA plan, by 2050, downtown is expected to receive up to 6.4 inches of rain for its 3-day highest rainfall, and by 2100, this number increases to 7.2 inches.

Job Placement and More Job Training for High Wage Jobs:
Expand programs to get more people educated and working. Ensure they are targeted to unemployed and underemployed individuals to help reduce barriers for these residents to access the programs. With more income, a resident has more opportunity in everyday life and more adaptive capacity in a disaster situation.

Use Varied Sources for Communication with Community Members:
Widely dispersed communication with clear, consistent messaging before, during, and after an emergency is important to help with preparedness, safety, and recovery. The survey results indicate a need to focus on multiple pathways of information with an emphasis on getting official information (from Texas Department of Transportation [TxDOT], the Southeast Texas Alerting Network, the City, or the County) onto television, radio, and social media outlets. The focus on all three pathways will reach more residents than a focus on one pathway, ensuring residents who lack access to one or more of these sources are not missing critical information.

INTRODUCTION

The development of this Equity Informed Climate Resilience Plan (EQUIP PA) in Port Arthur, Texas addressed climate hazards, community health, and vulnerable populations through an equity lens by using a community-based climate resilience planning approach. Research reported in this plan was supported by the Gulf Research Program of the National Academies of Sciences, Engineering, and Medicine under award number 2000013193. The Community In-Power Development Association Inc. (CIDA) is a 501(C)(3) nonprofit organization that works to empower residents in low-income communities in Port Arthur, Texas. CIDA has worked with Port Arthur residents and local organizations to address environmental and public health issues for over 20 years. The Houston Advanced Research Center (HARC) is a nonprofit research organization committed to sustainability. HARC has experience developing data visualizations as communication tools and working with stakeholders to identify and assess barriers to community resilience. Jupiter Data Factory has participated in the development of several resilience assessments and tools for the Texas Upper Coast. CIDA and HARC have partnered to develop the Port Arthur/Golden Triangle Environmental Justice Initiative with the support of the City of Port Arthur and multiple local organizations.

Due to its coastal location, Port Arthur is especially vulnerable to hurricanes and extreme precipitation driven flood events. In addition, while the community bond that many have in Port Arthur is strong, many residents simultaneously grapple with compounding issues like exposure to environmental hazards,[3] frequent flooding,[4] food insecurity,[5] segregation,[6,7] high unemployment,[8,9] poverty,[10] and road, childcare, and job quality. Based on feedback CIDA and HARC received during community events, residents have a strong sense of culture and connectedness to the way of life in Port Arthur. In the past, certain residents were compelled to move to less desirable locations like marshlands. Despite this, they not only survived but also flourished, establishing a closely-knit community. Today, after several generations, that area holds immense importance for the residents, symbolizing their enduring resilience. This plan coalesces climate modeling, resident concerns, and recommendations from community members and resilience practitioners to adequately portray Port Arthur's risks in the coming decades, lay out a roadmap to better prepare for them, and pave the way for a resilient Port Arthur that matches the strength people find in their community.

[3] EPA. (2022). Version 2.0. EJScreen. https://ejscreen.epa.gov/mapper/

[4] Risk Factor (2020). https://riskfactor.com/city/port-arthur-texas/4858820_fsid/flood

[5] US Department of Agriculture, Economic Research Service. Food Research Atlas. https://www.ers.usda.gov/data-products/food-access-research-atlas/go-to-the-atlas/

[6] U.S. Census Bureau. (2021). American Communities Survey (ACS) 5-Year Estimates. DP05 Demographic and Housing Estimates. https://data.census.gov/table/ACSDP5YSPT2021.DP05?q=race&g=040XX00US48_050XX00US48245_160XX00US4858820&d=ACS+5-Year+Estimates+Selected+Population+Data+Profiles

[7] U.S. Census Bureau. (2021). American Communities Survey (ACS) 5-Year Estimates. DP03 Selected Economic Characteristics. https://data.census.gov/table/ACSDP5YSPT2021.DP03?q=race&g=040XX00US48_050XX00US48245_160XX00US4858820&d=ACS+5-Year+Estimates+Selected+Population+Data+Profiles

[8] U.S. Census Bureau. (2021). American Communities Survey (ACS) 5-Year Estimates. DP05 Demographic and Housing Estimates. https://data.census.gov/table/ACSDP5YSPT2021.DP05?q=race&g=040XX00US48_050XX00US48245_160XX00US4858820&d=ACS+5-Year+Estimates+Selected+Population+Data+Profiles

[9] U.S. Census Bureau. (2021). American Communities Survey (ACS) 5-Year Estimates. DP03 Selected Economic Characteristics. https://data.census.gov/table/ACSDP5YSPT2021.DP03?q=race&g=040XX00US48_050XX00US48245_160XX00US4858820&d=ACS+5-Year+Estimates+Selected+Population+Data+Profiles

[10] Ibid.

Port Arthur Demographics and Economics

The City of Port Arthur is on the Texas Gulf Coast in Jefferson County (Figure 1). Port Arthur is one of three cities that forms the Golden Triangle area of Southeast Texas. With a 2021 population of 55,757,[11] it is the 67th largest city in Texas, according to World Population Review.[12] Port Arthur's population has increased by 1.04% since the 2010 census, which recorded a population of 53,676.[13] Median household income is $42,933, and the poverty rate is 25.8%.[14]

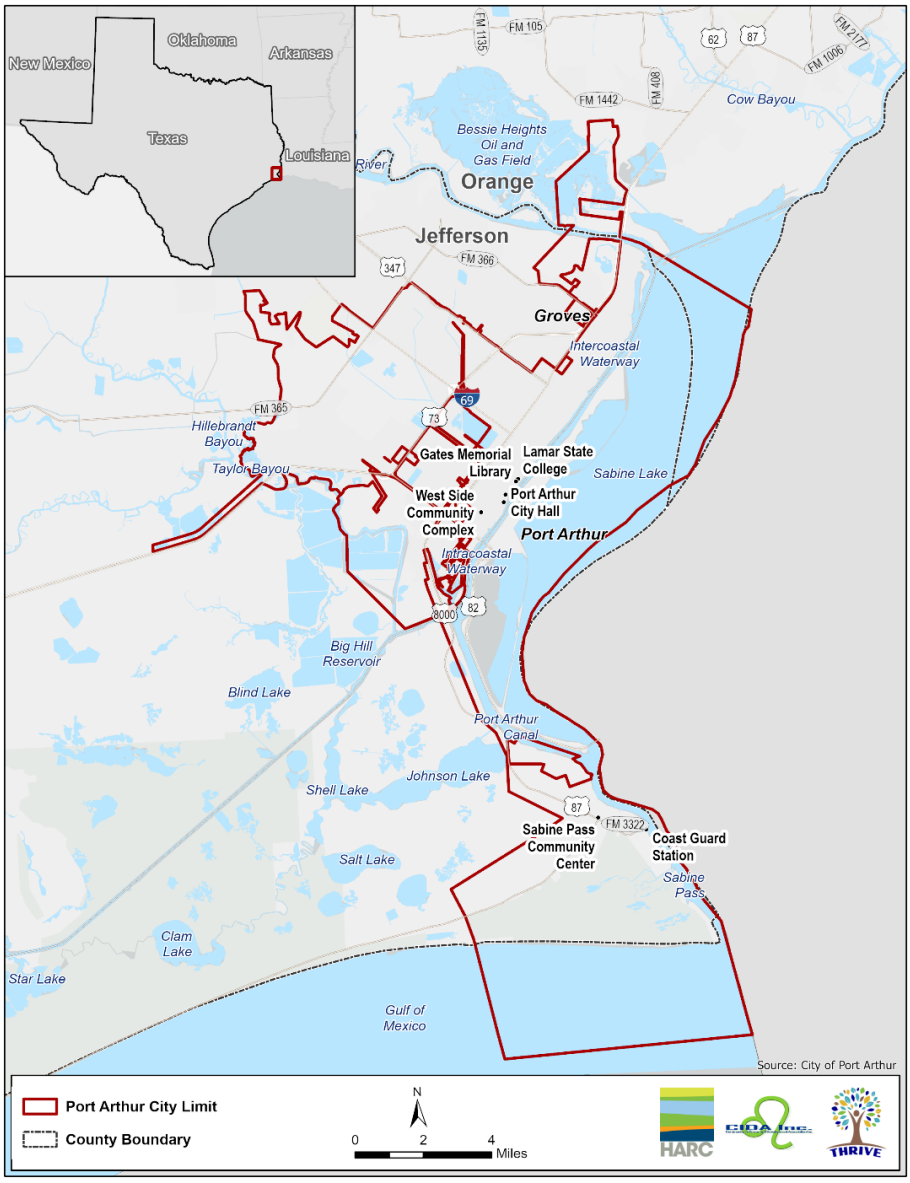


Figure 1 Overview Map of Port Arthur, Texas

The Port of Port Arthur accounts for about $18.2 billion in trade, about 8.9% of the amount traveling through Texas' seaports.[15] The State Comptroller estimates trade associated with the port contributes about 68,000 net jobs and $9.7 billion in gross domestic product to the state economy. Port Arthur is home to multiple chemical plants and refineries.[16] The Valero Refinery has a capacity of 375,000 barrels per day.[17] With a capacity of 603,000 barrels per day, the Motiva refinery is the largest oil refinery in North America and one of the top ten largest in the world.[18] Port Arthur is also a hub for the marine economy. JBS Packing processes about 125,000 pounds of shrimp per day, about one quarter of the state's shrimp fishing supply.[19] Community stakeholders acknowledged the refineries' positive contributions to the local area, emphasizing their significant role in boosting the community's financial well-being and supporting initiatives, while some stakeholders expressed concerns about health-related issues, highlighting the complex impact of the refineries on the local economy and community support.

[11] U.S. Census Bureau. (2021). American Communities Survey (ACS) 5-Year Estimates. DP05 Demographic and Housing Estimates. https://data.census.gov/table/ACSDP5YSPT2021.DP05?q=race&g=040XX00US48_050XX00US48245_160XX00US4858820&d=ACS+5-Year+Estimates+Selected+Population+Data+Profiles.

[12] World Population Review. (2024). https://worldpopulationreview.com/world-cities

[13] U.S. Census Bureau. (2010). American Communities Survey (ACS) 5-Year Estimates. DP05 Demographic and Housing Estimates. https://data.census.gov/table/ACSDP5YSPT2010.DP05?q=race&g=040XX00US48_050XX00US48245_160XX00US4858820&d=ACS+5-Year+Estimates+Selected+Population+Data+Profiles. https://worldpopulationreview.com/world-cities

[14] U.S. Census Bureau. (2021). American Communities Survey (ACS) 5-Year Estimates. DP03 Selected Economic Characteristics. https://data.census.gov/table/ACSDP5YSPT2021.DP03?q=race&g=040XX00US48_050XX00US48245_160XX00US4858820&d=ACS+5-Year+Estimates+Selected+Population+Data+Profiles.

[15] Office of the Texas Comptroller of Public Accounts. (2015). Port of Entry Port Arthur. https://comptroller.texas.gov/economy/economic-data/ports/2016/port-arthur.php

[16] Ibid.

[17] Ibid.

[18] Ibid.

[19] Ibid.

Despite this economic activity, much of Port Arthur is classified as high social vulnerability, based on the Centers for Disease Control and Prevention (CDC)'s Social Vulnerability Index (shown in Figure 2). In 2021, while Texas had about 5.4% unemployment with a population of 13.5% Black/African American residents, Port Arthur had 8.5% unemployment with a population of 43.6% Black/African American residents and 34% Hispanic/Latino residents.[20, 21] Residents living in the fence line neighborhoods closest to the industrial facilities experience high poverty, high unemployment, low wages, and inadequate housing at an even higher rate while also representing a higher proportion of the city's Black/African American residents than the rest of the city. In the census tract that includes Port Arthur's historic Westside neighborhood, 93.7% of residents are Black/African American and 14.4% experience unemployment; and in the census tract that includes El Vista/Vista Village, 87.8% of residents are Black/African American and 27.6% experience unemployment.[22, 23] The income disparity highlights that the benefits of the refineries are not generally available to the residents experiencing most of the pollution.

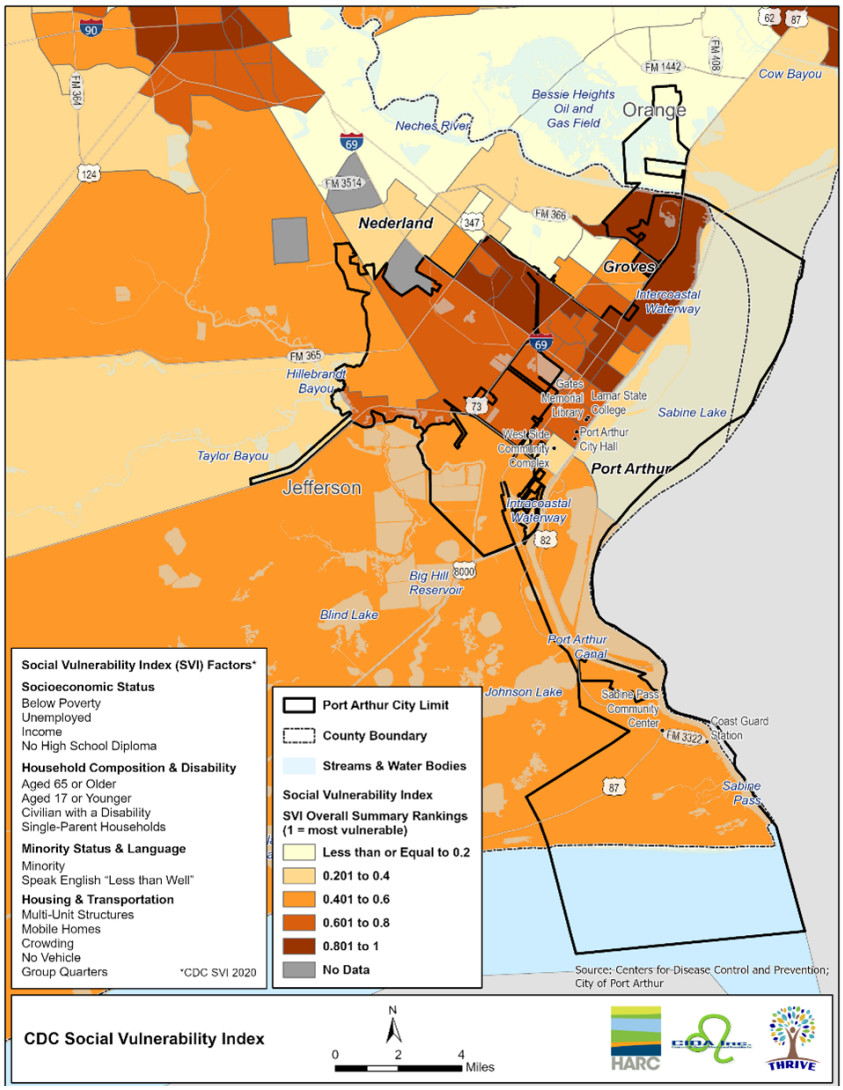


Figure 2 Social Vulnerability Index Map of Port Arthur, Texas

[20] U.S. Census Bureau. (2021). American Communities Survey (ACS) 5-Year Estimates. DP05 Demographic and Housing Estimates. https://data.census.gov/table/ACSDP5YSPT2021.DP05?q=race&g=040XX00US48_050XX00US48245_160XX00US4858820&d=ACS+5-Year+Estimates+Selected+Population+Data+Profiles

[21] U.S. Census Bureau. (2021). American Communities Survey (ACS) 5-Year Estimates. DP03 Selected Economic Characteristics. https://data.census.gov/table/ACSDP5YSPT2021.DP03?q=race&g=040XX00US48_050XX00US48245_160XX00US4858820&d=ACS+5-Year+Estimates+Selected+Population+Data+Profiles

[22] U.S. Census Bureau. (2021). American Communities Survey (ACS) 5-Year Estimates. DP05 Demographic and Housing Estimates. https://data.census.gov/table/ACSDP5YSPT2021.DP05?q=race&g=040XX00US48_050XX00US48245_160XX00US4858820&d=ACS+5-Year+Estimates+Selected+Population+Data+Profiles

[23] U.S. Census Bureau. (2021). American Communities Survey (ACS) 5-Year Estimates. DP03 Selected Economic Characteristics. https://data.census.gov/table/ACSDP5YSPT2021.DP03?q=race&g=040XX00US48_050XX00US48245_160XX00US4858820&d=ACS+5-Year+Estimates+Selected+Population+Data+Profiles

Extreme Weather in Port Arthur

For decades, Port Arthur has been vulnerable to disasters. Residents have experienced multiple extreme weather events in recent years, including hurricanes, tropical storms, and freezes leading to floods, power outages, and damage to homes and businesses—notably, Hurricanes Ike (2008), Harvey (2017), Laura (2020), Delta (2020), and Winter Storm Uri (2021).[24,25,26,27,28] The National Oceanic and Atmospheric Administration's (NOAA) National Centers for Environmental Information reports a weather and climate risk score for every county in the nation. Scores are relative—county risk is evaluated in comparison to other counties. Residents of Jefferson County have a weather and climate risk over two and a half times that of Texas (44.76 compared to 17.29), and over thirteen times that of the United States (3.36).[29] There are only seven other counties in Texas with a higher risk. Residents of Jefferson County have a heightened risk of experiencing severe storms, tropical cyclones, flooding, freezes, wildfires, and droughts compared to the rest of the state. According to the Federal Emergency Management Agency's (FEMA) National Risk Index, some of the fence line communities (e.g., Montrose and El Vista/Vista Village) are categorized as relatively high and very high risk for flood. Low-income residents may be more affected by climate disasters than other residents, for example because they lack the resources to evacuate to a hotel in another community, or insurance to fund repairs, or their neighborhood lacks adequate drainage to prevent flooding.

> **On the impacts of extreme weather: "now even if you drive around parts of Port Arthur currently, you can still see homes that have the blue tarps on the roof and they have siding missing and things of that nature. Just because they didn't have the opportunity to fix it. They're still trying to recover from, you know, the hurricane that happened two or three years ago when they get hit by another one. So it just kind of compounds on the issue."**
>
> **- Port Arthur Community Member**

Community and individual resilience—the ability to bounce back after an event—is a major challenge for all people and places in Port Arthur, including businesses, government buildings, schools, and households due to frequent power outages. Many of these events are caused by the increasing frequency of severe storms and extreme weather events that are driving increasing levels of blackouts and brownouts of the fragile electricity system. Some residents whose homes flooded during Hurricane Harvey still have not been able to return six years later—as CIDA Inc., a non-profit organization that works with underserved communities throughout Port Arthur to combat environmental injustices related to air pollution and environmental contamination, learned through engagement with community members.

[24] Genoways, T. (2013). Port Arthur, Texas: American Sacrifice Zone. Natural Resources Defense Council. https://www.nrdc.org/stories/port-arthur-texas-american-sacrifice-zone

[25] Texas Tribune Staff. (2021). "More than 100,000 Texas electricity customers without power after Nicholas. Restoring it to everyone could take days." The Texas Tribune. https://www.texastribune.org/2021/09/13/texas-tropical-storm-nicholas-updates/

[26] Bryce, R. (2021). "Winter Storm Uri Underscored The Problem Of Energy Poverty And The Importance Of Fuel Diversity." Forbes. https://www.forbes.com/sites/robertbryce/2021/03/31/winter-storm-uri-underscored-the-problem-of-energy-poverty-and-the-importance-of-fuel-diversity/?sh=b2d3b9962de7

[27] Yan, H. and Chavez, N. (2017). "Harvey aftermath: Death toll rises; so do the floodwaters." CNN. https://www.cnn.com/2017/08/30/us/harvey-texas-louisiana/index.html

[28] Ehling, J. (2020). "Port Arthur sees power outages and major tree damage from Hurricane Laura." https://abc13.com/hurricane-laura-in-port-arthur-causes-tree-damage-severe-weather-houston-power-outages/6391385/

[29] National Oceanic and Atmospheric Administration National Centers for Environmental Information (2022a). U.S. Billion-Dollar Weather and Climate Disasters. https://www.ncdc.noaa.gov/billions/ , DOI: 10.25921/stkw-7w73.

Air Quality in Port Arthur

Port Arthur is vulnerable to poor air quality and high health risks in multiple ways. Residential neighborhoods are close to industrial activities which produce frequent, intense emissions. The fence line neighborhoods have multiple points of disproportionate vulnerability, according to the United States Environmental Protection Agency's (EPA) Environmental Justice Screening Tool (EJScreen).[30] Residents in these neighborhoods of Port Arthur have a higher elevated cancer risk from exposure to higher levels of air toxics than 95-100% of residents in the U.S. They have exposure to Risk Management Plan facilities at a higher level than 90-100% of the nation's population, and a higher air toxics respiratory hazard index and risk for PM 2.5 than 80-90% of the population. Residents have a lower life expectancy than 90-100% of the population. Residents experience disparate health issues, as well. Residents residing near refineries in Port Arthur have a higher level of risk for heart disease than 80-95% of the population, and a higher risk of asthma than 80-100% of the nation's population.[31]

Air quality issues may cause respiratory problems and increase the risk of contracting or worsening the impacts of respiratory diseases. According to the American Lung Association, in communities with higher incidences of air pollution, air pollution can worsen COVID-19.[32] Petroni et al. found hazardous air pollution to be a contributing factor to COVID-19 mortality.[33]

Additionally, Port Arthur residents may experience air emergencies in which they must shelter-in-place and turn off their air conditioning to avoid the harmful chemicals emitted from nearby facilities. Emergencies are more common in the summer when turning off air conditioning can be particularly harmful for residents.[34]

Multiple studies since 2010 have reported on Port Arthur's air quality issues and the impact on residents. An evaluation by McCoy et al. in 2010 showed that in Port Arthur, air emissions upset events are equivalent to having an additional refinery in the area.[35] Emissions events are more likely to occur in summer, in the morning, and early in the work week.[36] However, some refineries underreport their emissions events; the authors recommended more air monitoring. Morris et al. found a marked difference in adverse health effects and ear/nose/throat symptoms in residents of Port Arthur compared to a reference community that was not located near refineries.[37] A broad study of impacts of pollution across the United States by Tessum et al. found that, generally, Black and Latinx individuals are exposed to more fine particulate matter (PM2.5) than White individuals, yet consume less of the goods and services that contribute to air pollution.[38] Fine particulate matter can affect the heart or lungs; multiple studies have linked exposure to heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, increased respiratory symptoms, or premature death in people with heart or lung disease.[39]

[30] EPA. (2022). Version 2.0. EJScreen. https://ejscreen.epa.gov/mapper/
[31] Ibid.
[32] American Lung Association.(2021). Understanding the link between COVID-19 Mortality and Air Pollution. https://www.lung.org/blog/covid-19-mortality-and-air-pollution
[33] Petroni, M., Hill, D., Younes, L., Barkman, L., Howard, S., Howell, I. B., ... & Collins, M. B. (2020). Hazardous air pollutant exposure as a contributing factor to COVID-19 mortality in the United States. Environmental Research Letters, 15(9), 0940a9.
[34] Analysis of data collected from the Texas Commission on Environmental Quality (2023). Air Emissions Event Report Database. https://www2.tceq.texas.gov/oce/eer/
[35] McCoy, B. J., Fischbeck, P. S., & Gerard, D. (2010). How big is big? How often is often? Characterizing Texas petroleum refining upset air emissions. Atmospheric Environment, 44(34), 4230-4239.
[36] Ibid.
[37] Morris, D. L., Barker, P. J., & Legator, M. S. (2004). Symptoms of adverse health effects among residents from communities surrounding chemical-industrial complexes in southeast Texas. Archives of Environmental Health: An International Journal, 59(3), 160-165.
[38] Tessum, C. W., Apte, J. S., Goodkind, A. L., Muller, N. Z., Mullins, K. A., Paolella, D. A., ... & Hill, J. D. (2019). Inequity in consumption of goods and services adds to racial–ethnic disparities in air pollution exposure. Proceedings of the National Academy of Sciences, 116(13), 6001-6006.
[39] EPA (2023). Health and Environmental Effects of Particulate Matter (PM). https://www.epa.gov/pm-pollution/health-and-environmental-effects-particulate-matter-pm#:~:text=Exposure%20to%20such%20particles%20can,nonfatal%20heart%20attacks

Environmental Justice in Port Arthur

In 2010, EPA named Port Arthur as an Environmental Justice Showcase Community.[40] Residents noted problems with local air quality, odors, and greenhouse gas emissions from local industry, particularly in the area refineries. They also called attention to local drinking water quality; wastewater discharges from a local seafood company; how hazardous materials are used, produced, and stored in town; and the process for allowing rights-of-way across residents' properties. Many health impacts were listed, including respiratory ailments, asthma, cancer, and allergies. Other concerns included lack of trust in local government, local zoning, and noise. Residents requested improved communication, air monitoring, an epidemiological study, access to jobs, fines imposed on industry to be used to better the community, and additional recreational facilities. Some expressed interest in assistance moving to another part of the city. Residents also called for better planning for emergencies, including accidental emissions releases, explosions, and natural disasters, and for an improved process for notifications and access to resources, particularly for the elderly or disabled individuals.

Multi-faceted environmental justice concerns persist in Port Arthur. In addition to the disproportionate air quality and health impacts, residents experience lack of affordable, suitable housing; traffic; flooding; frequent power outages; and climate risks. For example, Jefferson County is among the counties with the highest disaster risk in the United States and is in the top ten counties in Texas, mainly due to high combination weather and climate risk, as well as risk of floods, severe storm, and tropical cyclone.[41] These hazards exacerbate the persistent air quality and health concerns and disproportionately impact residents with low incomes or housing issues. Additionally, many residents lack access to information technology.

> **On residential water supply: "Then you have water. You know, it might not come out at full pressure like it would on the other side of the city, but you have water. So don't complain and they just move on."**
>
> **- Port Arthur Community Member**

[40] EPA Office of Environmental Justice and Tribal Affairs. (2012). Environmental Justice Showcase Communities Pilot Program Analysis Final Report. https://www.groundworkjacksonville.org/wp-content/uploads/2015/02/showcase_communities_analysis_report_final.pdf

[41] Zuzak, C., E. Goodenough, C. Stanton, M. Mowrer, A.Sheehan, B. Roberts, P. McGuire, and J. Rozelle. (2023). National Risk Index Technical Documentation. Federal Emergency Management Agency, Washington, D.C.

Energy Equity in Port Arthur

In addition to being an energy capital for the nation, Port Arthur is an environmental justice community that experiences disproportionate environmental and energy justice impacts. The average resident of Port Arthur spends 3% of their income on energy, but lower income residents spend much more: low-to-moderate income residents spend 7% of their income on energy while the lowest income residents (the over 25.8% of the population at or below the federal poverty level) spend 14% of their income on their energy bills.[42]

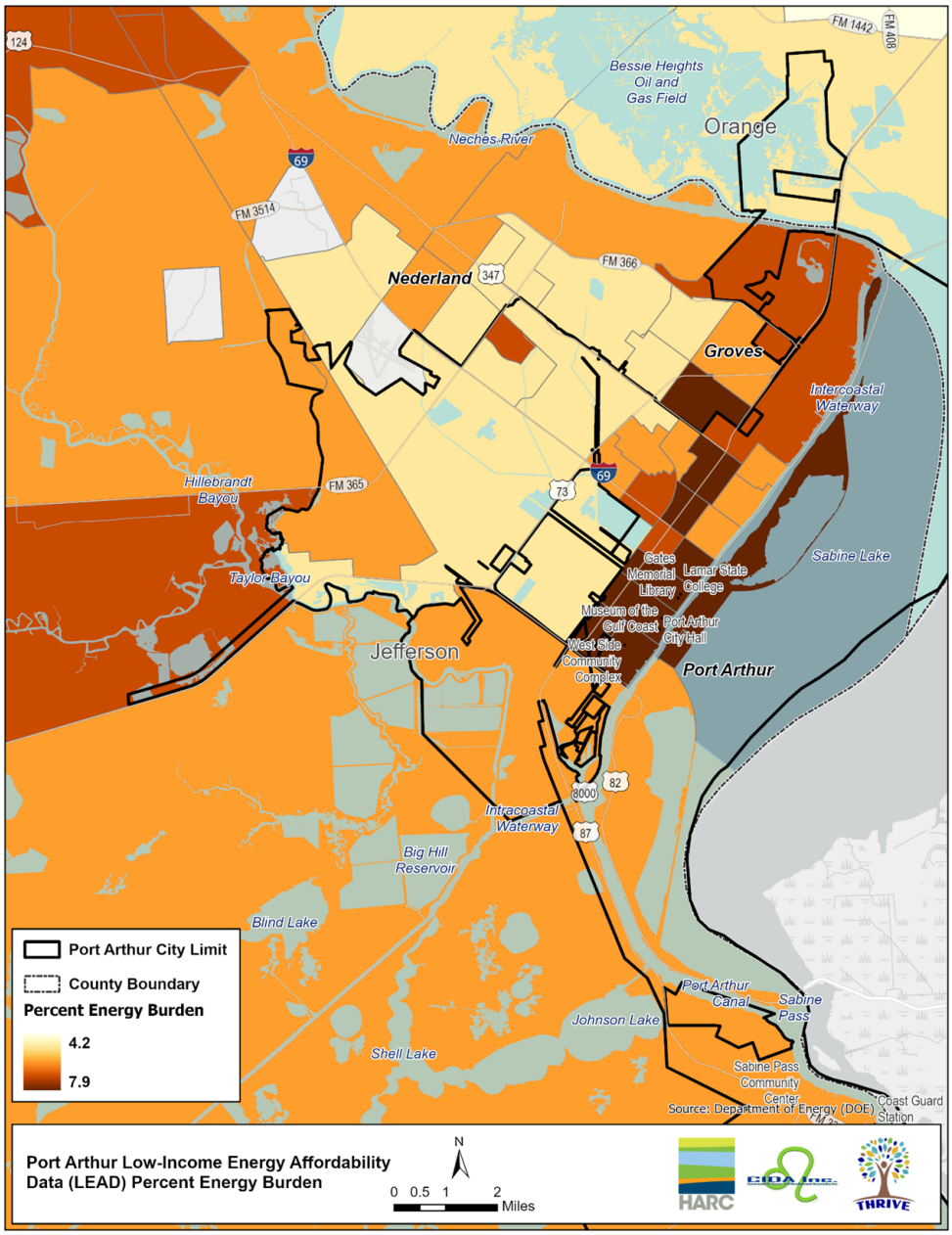


Figure 3 Residents throughout Port Arthur experience high energy burden. The map shows energy burden by census tract in Port Arthur, as calculated by the Department of Energy.

[42] U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy. (2020). Low-Income Energy Affordability Data - LEAD Tool - 2018 Update [data set]. Retrieved from https://dx.doi.org/10.25984/1784729

There are still lingering health concerns in the community. The cancer mortality rates among Black residents of Jefferson County is 69% higher than that of the average Texan and 26% higher than the cancer mortality rate for white residents of Jefferson County.[43] In 2012, the Natural Resources Defense Council (NRDC) reported that residents of Port Arthur were four times more likely than residents 100 miles away to report "suffering from heart and respiratory conditions; nervous system and skin disorders; headaches and muscle aches; and ear, nose, and throat ailments."[44]

Disparities in life conditions in Port Arthur may be exacerbating health issues as well. Prochaska et al. used health assessment tools to identify cumulative risk of chemical and social determinants of health in Port Arthur. Social risks included poorly designed roadways, poor food security, poor childcare availability, high unemployment, a depressed economy, poverty, and segregation.[45] The study found that these non-chemical determinants of health might be worse than chemical exposure. Additionally, there is a high incidence of concerns that can exacerbate physical and mental health impacts, such as adult smoking (20% of residents in Port Arthur compared to 14% of residents in the State), obesity (42% compared to state 31%), physical inactivity (32% compared to state 23%), and food insecurity (19% compared to state 15%).[46] Unsuitable housing conditions such as presence of mold or inadequate ventilation can also lead to health concerns such as upper respiratory issues.

> **"You know you got people dealing with post-traumatic stress. Hurricane Harvey. They don't even realize that's what [they're] dealing with. You know, soon as it rains, [you're] listening to see if the pumps come on."**
>
> **- Port Arthur Community Member**

> **"We need more healthcare available in these areas, even if it's just, you know, one of the mobile units that can come down on Monday, Wednesday, and Friday, something like that would be, I think, advantageous to those people because not everybody has the means to hop in the car and go to Houston and go get checked up."**
>
> **– Port Arthur Community Member**

Mental health is also a concern. The compounding climate disasters, impending air emergencies, prevalent poverty, and inadequate housing create a stressful environment for residents. Jefferson County is ranked among the least healthy counties in Texas according to the University of Wisconsin County Health Rankings. There are 4.4 poor mental health days compared to the state average of 3.8 days, and 15% of Jefferson County residents experience frequent mental distress compared to 12% at the state level.[47] About 42% of residents experience insufficient sleep compared to 34% at the state level, and the suicide rate is 14% compared to 13% at the state level.[48] Evidence from the National Alliance of Mental Illness shows 90% of people who die by suicide have mental illness.[49]

Stakeholders consulted for this report shared that while some resources exist in the community, residents do not know about them or how to use them. These stakeholders indicated that there is a need to promote health at the community level.

[43] National Cancer Institute. (2017). State Cancer Profiles: Incidence Rates for Texas by County. U.S. Department of Health & Human Services, National Institutes of Health and U.S. Centers for Disease Control and Prevention. https://statecancerprofiles.cancer.gov/map/map.withimage.php?48&county &001&001&00&0&01&0&1&5&0#results

[44] Genoways, T. (2013). Port Arthur, Texas: American Sacrifice Zone. On Earth

[45] Prochaska, J. D., Nolen, A. B., Kelley, H., Sexton, K., Linder, S. H., & Sullivan, J. (2014). Social determinants of health in environmental justice communities: Examining cumulative risk in terms of environmental exposures and social determinants of health. Human and Ecological Risk Assessment: An International Journal, 20(4), 980-994.

[46] University of Wisconsin Population Health Institute. (2021). County Health Rankings. http://www.countyhealthrankings.org

[47] Ibid.

[48] Ibid.

[49] National Alliance on Mental Illness. (2016). Risk of suicide.

Port Arthur Resilience

The 2018 Disaster Recovery and Resiliency Plan (DRRP) for the City of Port Arthur, Texas, was developed as a critical document to guide the city's response and recovery efforts in response to Hurricane Harvey. It focuses mainly on the recovery efforts as a subsequent effort. The DRRP outlines its plan in three phases, addressing needs and actions the City would need to undertake during the post-disaster period after Harvey. The DRRP plan prioritized recovery and housing aspects in response to Hurricane Harvey. In the pursuit of comprehensive resilience, aspects such as long-term resiliency planning, equity considerations, and climate planning could further fortify collective preparedness and sustainability.

In the development of EQUIP PA, the following areas were targeted:

Inclusion of Stakeholders and Leaders: Including explicit identification of specific stakeholders and leaders who will play pivotal roles in guiding the framework and execution of the recovery plan. By incorporating key city officials, community leaders—including neighborhood captains or leaders of community-based organizations or houses of worship, and representatives from various sectors, the community can benefit from a more coordinated and collaborative approach to disaster recovery and resilience.

Targeted Focus on Equity: An emphasis on equity will ensure a stronger commitment to fairness and accessibility in the recovery process, ultimately fostering a more inclusive and just recovery for all residents. To maximize the impact of funding allocation, a clearer delineation of the eligible individuals and groups who stand to benefit from financial assistance needs to be outlined.

Emphasis on Future Preparedness and Mitigation: Including a robust emphasis on long-term disaster recovery and mitigation strategies will strengthen the plan. Integration of forward-looking measures, such as infrastructure improvements and community education initiatives, can better safeguard against future disasters.

Enhanced Communication Strategies: By encompassing community outreach plans, targeted messaging, and diverse communication channels (to include information on incident commands and communication tools for those without internet access) in resilience planning, community leaders can ensure that vital information reaches all residents.

Sustainability and Resilience as Central Tenets: Including a more comprehensive approach that shows how sustainability and resilience will be integrated into the recovery frameworks, such as incorporating renewable energy sources, promoting urban green spaces, and encouraging resilient building practices, will ensure a robust resilience plan.

By focusing on stakeholder inclusion, equity, eligible beneficiaries, future preparedness, comprehensive rehousing, flood management, green infrastructure, communication strategies, and the embodiment of sustainability and resilience, the EQUIP PA plan can be developed into a comprehensive and impactful tool for disaster recovery and community resilience.

PORT ARTHUR RISKS

Port Arthur's Current and Future Levee System

Jefferson County Drainage District developed "A Plan Related to Drainage and Flood Damage Reduction in 2019"[50] to adopt a master drainage plan. The plan calls for the Jefferson County Drainage District to, among other things, identify priorities for future watershed studies, to coordinate local involvement in the revision of flood maps by FEMA, and to formalize how flood conditions are documented. The plan outlines the current flooding situation in Jefferson County and emphasizes the need for periodic maintenance of its 281 miles of drainage channels and 21 pump stations, as well as the existing 34 miles of earthen levee and floodwall. The plan notes, "[The cities of Port Arthur, Port Neches, Groves, and Nederland] . . . entities maintain flood maps that were prepared by the National Flood Insurance Program through FEMA. Many of those map panels do not show all areas that are known to be prone to flooding. In addition, because many of the map panels are more than 20 years old, they do not take into account increases in runoff due to more recent land development."

The current levee system in Port Arthur is approximately 27.8 miles of levees, over six and half miles of floodwalls, and coastal storm risk infrastructure that was supported by the Flood Control Act of 1962 and constructed between 1966-1982.[51] The U.S. Army Corps of Engineers (US ACE) Galveston District has begun implementing the Sabine Pass to Galveston Bay Coastal Storm Risk Management Program (S2G Program)[52] to increase the resiliency of the upper Texas coast. The S2G Program's goal is to deliver solutions to reduce risk from coastal storm surge in Orange, Jefferson, and Brazoria Counties. Port Arthur, US ACE, and the Jefferson County Drainage District 7 are partnering to reduce risk from coastal storms. When the Port Arthur work is complete, the earthen levees will range in height from 14.5 to 20 feet, and the concrete floodwalls will range in height from 15.5 to 24.5 feet.[53] Part of the Port Arthur work will include raising about six miles of existing levees; addition or reconstruction of almost six miles of floodwall; raising levee heights; construction of a new earthen levee in Port Neches, and erosion protection improvement.

Completion of this project is currently scheduled for 2026.

The Sea, Lake, and Overland Surges from Hurricanes (SLOSH) is a model developed by the National Weather Service (NWS) to estimate storm surge heights resulting from historical, hypothetical, or predicted hurricanes. It considers various factors such as the storm's size, forward speed, intensity, atmospheric pressure, and the coastline's shape, contour, and elevation. This model plays a crucial role in enhancing public safety and helping authorities mitigate the risks associated with hurricanes by providing valuable information well in advance of an approaching storm.

NOAA v3 storm surge (slosh model-based) data sets were processed for Port Arthur and analyzed for all five hurricane storm categories by Jupiter Data Factory, a project partner. Hurricanes are categorized based on the Saffir-Simpson Hurricane Wind Scale, which was developed to estimate potential property damage and expected sustained wind speeds. The scale consists of five categories, each representing a range of sustained wind speeds and potential damage, with Category 1 (wind speeds at 74-95 miles per hour) being the least damaging, to Category 5 (wind speeds: 157 mph or higher) being the most damaging.

The Category 1 scenario projected storm surge over 10 feet through the Port Arthur area. The Category 5 scenario projected storm surge greater than 20 feet coming inland approximately 21 miles. A typical two-story house is estimated at about 20 feet in height. The updated levee will be vital to protect residents from these potential storm surges, though the height in some parts of the system may be lower than the modeled Category 5 storm surges. This discrepancy does not necessarily predict a problem, but it does indicate a potential vulnerability to certain storms. To help residents prepare, it will be critical for the S2G Program to communicate successes, delays, and eventual completion of the levee project to the Port Arthur community.

[50] Jefferson County Drainage District No. 7, Jefferson County, Texas. (2019). A Plan Related to Drainage and Flood Damage Reduction. http://dd7.org/uploads/DD7%20Master%20Drainage%20Plan%2011-19-19-Final.pdf

[51] US ACE,Port Arthur Project. (2019). https://www.swg.usace.army.mil/S2G/PortArthur/

[52] US ACE, Sabine Pass to Galveston Bay Coastal Strom Risk Management Program, Port Arthur Project Overview. (2019). US ACE, Sabine Pass to Galveston Bay Coastal Strom Risk Management Program, Port Arthur Project Overview. (2019). https://www.swg.usace.army.mil/Portals/26/Port%20Arthur%20brochure%20for%20web.pdf

[53] US ACE, correspondence with HARC via email January 2024 regarding Port Arthur Coastal Storm Risk Management Project Levee Improvements

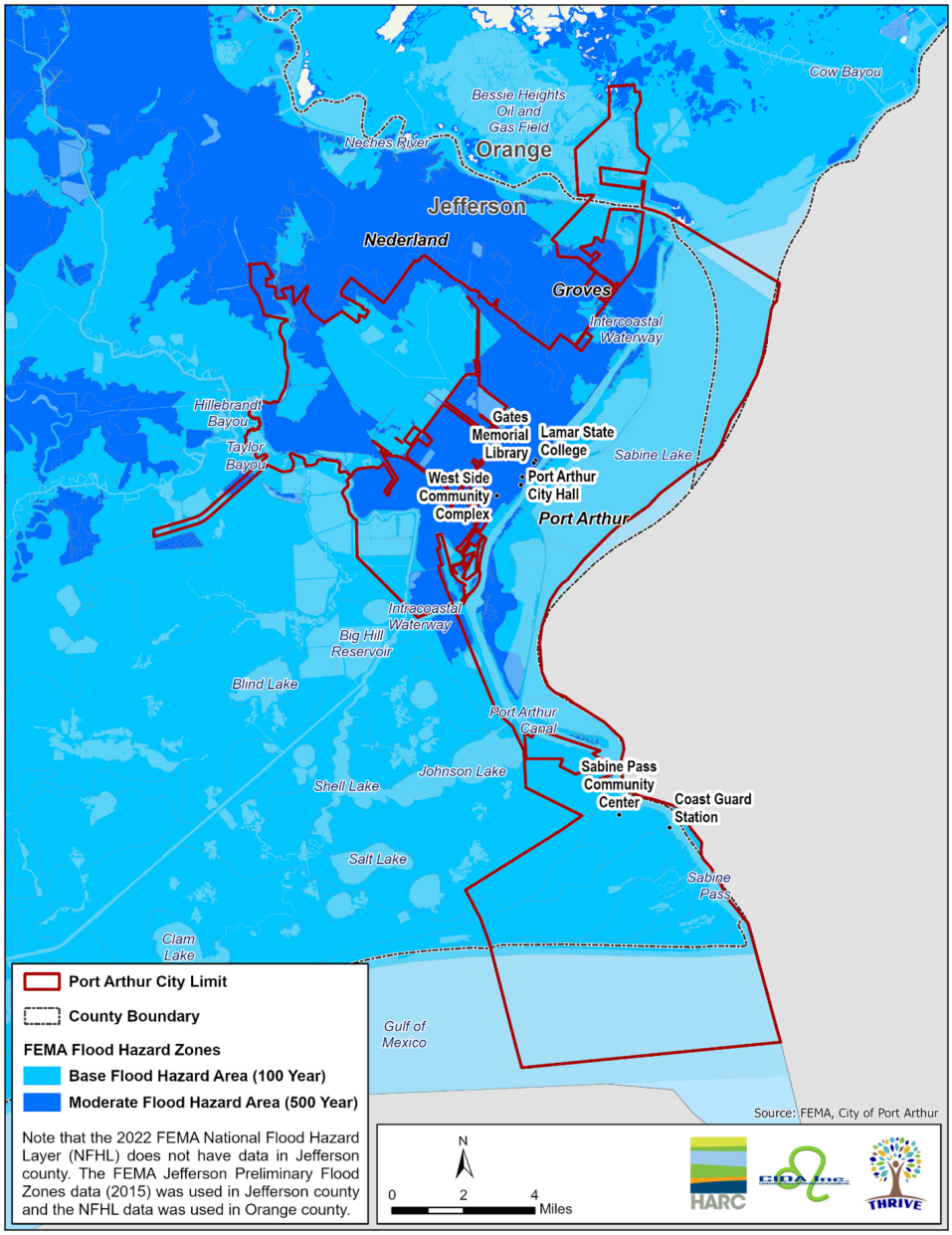


Figure 4 FEMA Flood Hazard Zones for Port Arthur, Texas

Figure 4 shows the FEMA Flood Hazard Zones for Port Arthur, Texas. A 100-year flood zone refers to an area susceptible to a flood event that has a 1% chance of occurring in any given year. In other words, a 100-year flood zone designation does not imply that such a flood will happen once every century, but rather indicates the probability of it occurring in any given year. A 500-year flood zone refers to an area prone to a flood event that statistically has a 0.2% chance of occurring in any given year. Areas within the 500-year flood zone are considered to have a relatively lower probability of experiencing a flood of that magnitude compared to those within a 100-year flood zone but still pose a risk during an extreme weather event. Note that the FEMA layers for Jefferson County are from 2015, as noted by the Jefferson County Drainage District above. These layers need to be updated to reflect changes in land use and rainfall to better reflect current flooding hazards.

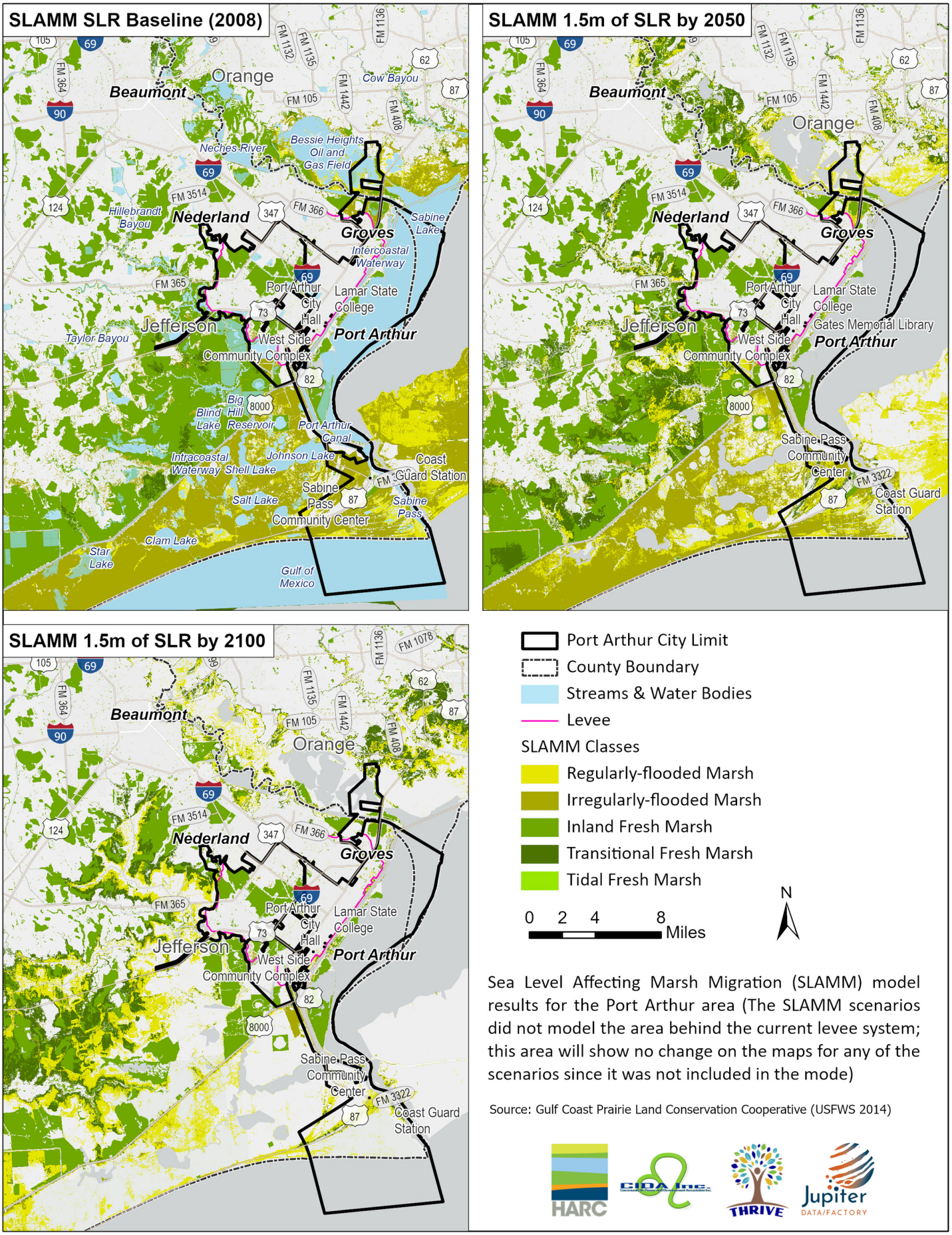
Port Arthur's Drainage System

Drainage District 7, the drainage district in Port Arthur, provided information on drainage concerns impacting Port Arthur residents and their potential causes. First, the pipes under downtown Port Arthur are sized for a one-inch rain event. Modern building designs require a five-inch curb and gutter on new designs, pushing water underground. However, the one-inch pipes under the city are not large enough to handle this water. The recommended size would be able to handle a five-to-six-inch rain event. It should be noted that according to climate modeling included in Figure 9, Port Arthur's expected rain events are over six inches by 2050, and over seven inches by 2100. Pump stations in Port Arthur were built in the 1970s and designed for six-to-eight-inch rain events. Should the city upgrade drainage lines, the pump stations would also need to be upgraded to handle more water.

To reduce potential flooding in Port Arthur, prior to extreme weather events, Drainage District 7 will turn the pumps on to reduce water in storage throughout the community to make room for more water. Additionally, Drainage District 7 has applied for Texas Water Development Board Flood Infrastructure Fund dollars for Port Arthur flood mitigation, but it is not for the drainage lines. The funding would address an underground box culvert in Port Acres.

Sea-level Affecting Marshes Model Results

Around the coastal City of Port Arthur, nature-based solutions include freshwater and estuarine marshes. A Port Arthur-specific Sea Level Affecting Marsh Migration (SLAMM) model was used to estimate how several potential future scenarios of sea level rise (SLR) may alter coastal marshes. The SLAMM model is a Gulf-wide database with a maximum resolution of 30-meter x 30-meter of SLR inundation levels projected to 2100 for saltwater marshes, freshwater marshes, and other classes of wetlands. The SLAMM mapping visualizes how future changes could cause coastal marshes to shift or be lost, which may result in a weakened ability to cope with climate change. The SLAMM scenarios did not model the area behind the current levee system; this area will show no change on the maps for any of the scenarios since it was not included in the model.



Sea Level Affecting Marsh Migration (SLAMM) model results for the Port Arthur area (The SLAMM scenarios did not model the area behind the current levee system; this area will show no change on the maps for any of the scenarios since it was not included in the mode)

Source: Gulf Coast Prairie Land Conservation Cooperative (USFWS 2014)

Figure 5 Sea Level Affecting Marsh Migration (SLAMM) model results for the Port Arthur area (The SLAMM scenarios did not model the area behind the current levee system; this area will show no change on the maps for any of the scenarios since it was not included in the model)

Figure 5 shows the results of three SLAMM scenarios. SLAMM SLR Baseline (2008) represents wetlands that were present in 2008, providing a baseline comparison. SLAMM 1.5m of SLR by 2020 includes 1.5 meters (4.92 feet) of SLR projected to 2050. SLAMM 1.5m of SLR by 2100 has the same amount of projected SLR for 2100. The nearshore areas and barrier islands around Port Arthur are showing significant wetland loss. The Regularly-flooded Marsh and Irregularly-flooded Marsh land classes in this area are showing substantial loss to SLR. The Inland Fresh Marsh class on western outside area of Port Arthur is showing considerable loss and transition to Regularly-flooded Marsh.

The loss of wetlands can have significant implications for ecosystem services, which are the benefits that ecosystems provide to both humans and the environment. Wetlands act as natural sponges, absorbing excess water during heavy rainfall and storms, which helps in mitigating flood impacts. Coastal wetlands, specifically those with tidal influence such as estuarine marshes, provide storm surge protection, wave attenuation, and mitigate erosion. Wetland loss can increase the frequency and severity of flooding in surrounding areas. In addition, wetlands serve as natural water filters, trapping sediments and pollutants, reducing impacts on water quality and aquatic life. Wetlands are also incredibly biodiverse habitats, hosting a wide variety of plant and animal species, and can be popular recreational areas. Estuarine marshes are critical nurseries for commercial and non-commercial fish and shellfish species. Ecosystem restoration and nature-based adaptation aids in mitigating the risks posed by climate change and enhancing coastal resilience. Healthy coastal habitats, such as marshes and wetlands, reduce the risk of erosion and flooding for coastal communities.

Future Resilience Impacts

As climate patterns grow increasingly erratic, communities are facing unforeseen risks that could jeopardize investments in infrastructure, public health, and overall well-being. The Resilience Science Information Network (RESIN) contains statistically downscaled future projections of climate indicators, produced by ATMOS Research & Consulting, and made publicly available by HARC. RESIN is a data-driven portal supporting communities in creating performance-focused plans to prepare for and adapt to future climate conditions. Using the data scenarios information available in RESIN, potential climate scenarios for Port Arthur were developed. Precipitation projections are derived from global climate models, statistically downscaled using the Asynchronous Regional Regression Model. Meanwhile, temperature projections utilize the Statistical Trend Analysis of Residuals – Empirical Statistical Downscaling Model. Analysis of the climate indicators in the Port Arthur area offers insights into future temperature, heat, and precipitation conditions.

These indicators represent long-term trends and fluctuations in environmental factors related to climate change scenarios. Two Representative Concentration Pathways (RCPs), namely RCP4.5 and RCP8.5, are used to capture a range of potential climate futures. RCP4.5 scenario envisions a moderate climate change scenario, assuming increased use of renewable energy, conservation efforts, and climate-friendly policies, leading to stabilized greenhouse gas concentrations by midcentury. On the other hand, RCP8.5 scenario depicts a future with higher energy demands and inadequate climate policies, resulting in a continuous rise of greenhouse gas emissions, leading to more significant climate change impacts. The maps below depict the RCP8.5 scenario, which is often used for planning. Planning for the worst scenario allows planners to prepare for extreme events or adverse conditions that could have severe consequences. The RCP8.5 scenario allows more robust preparedness for uncertainty. In addition, designing plans that can withstand the impacts of the worst-case scenario enhances resilience. It encourages the development of robust strategies, infrastructure, and policies that can cope with extreme conditions, thereby reducing vulnerability to adverse events. Utilizing the RCP8.5 scenario doesn't mean expecting or solely focusing on catastrophic outcomes. It encourages adaptive planning strategies that can be adjusted according to evolving conditions.

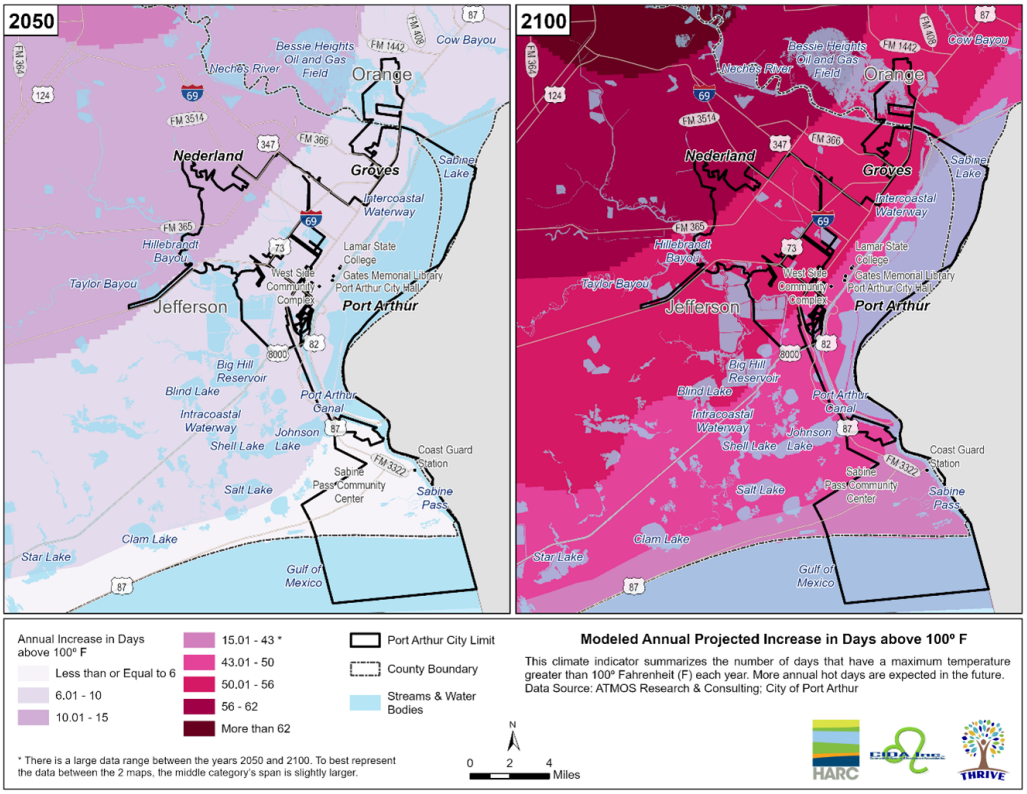


Figure 6 Modeled Annual Projected Increase in Days above 100° F in 2050 and 2100 for Port Arthur, Texas

Figure 6 summarizes the number of days that have a projected maximum temperature greater than 100° Fahrenheit (F) each year. The overall trend shows an increasing number of days over 100° F annually. The city of Port Arthur is projected to see more than six to twelve additional days a year over 100° F by 2050, and more than 43-62 additional days a year over 100° F by 2100.

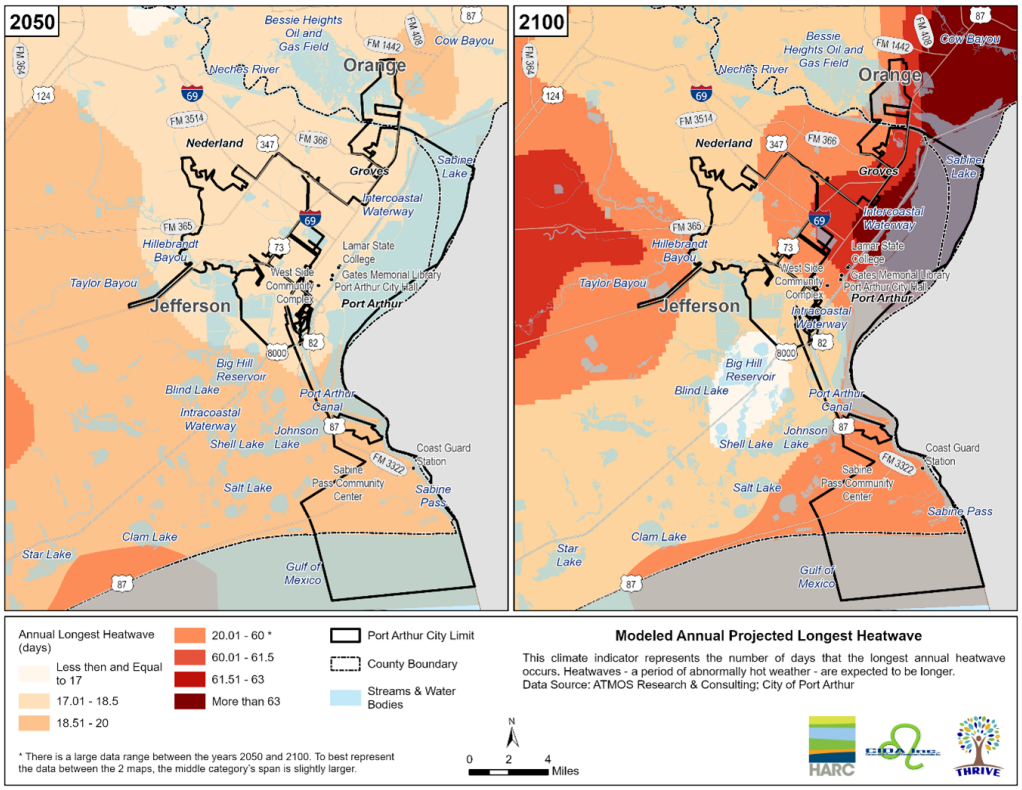


Figure 7 Modeled Annual Projected Longest Heatwave in 2050 and 2100 for Port Arthur, Texas

Figure 7 represents the number of days that the longest annual heatwave occurs. Heatwaves -- a period of abnormally hot weather -- are expected to increase in duration. For Port Arthur, the modeled scenarios show a 17-20 day annual longest heatwave for 2050, and a 60-63 day annual longest heatwave for 2100.

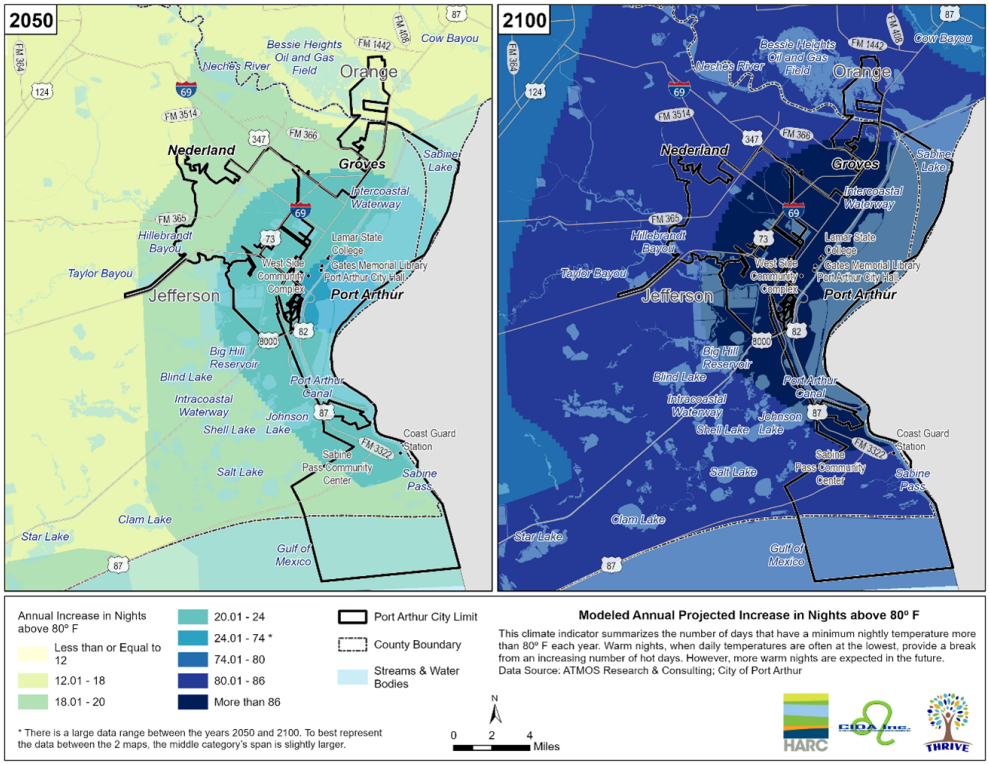


Figure 8 Modeled Annual Projected Increase in Nights above 80° F in 2100 in Port Arthur, Texas

Figure 8 shows the projected increase in the number of nights that have a minimum nightly temperature more than 80° F each year. This climate indicator represents warm nighttime temperatures, which is when daily temperatures are often at the lowest, giving ecosystems, infrastructure, and communities a break from the extreme heat. The projections are showing a decreasing number of cool nights for Port Arthur. For Port Arthur, the modeled scenarios show a 16-24 annual increase in nights above 80° F for 2050, and a 78-86 annual increase in nights above 80° F for 2100.

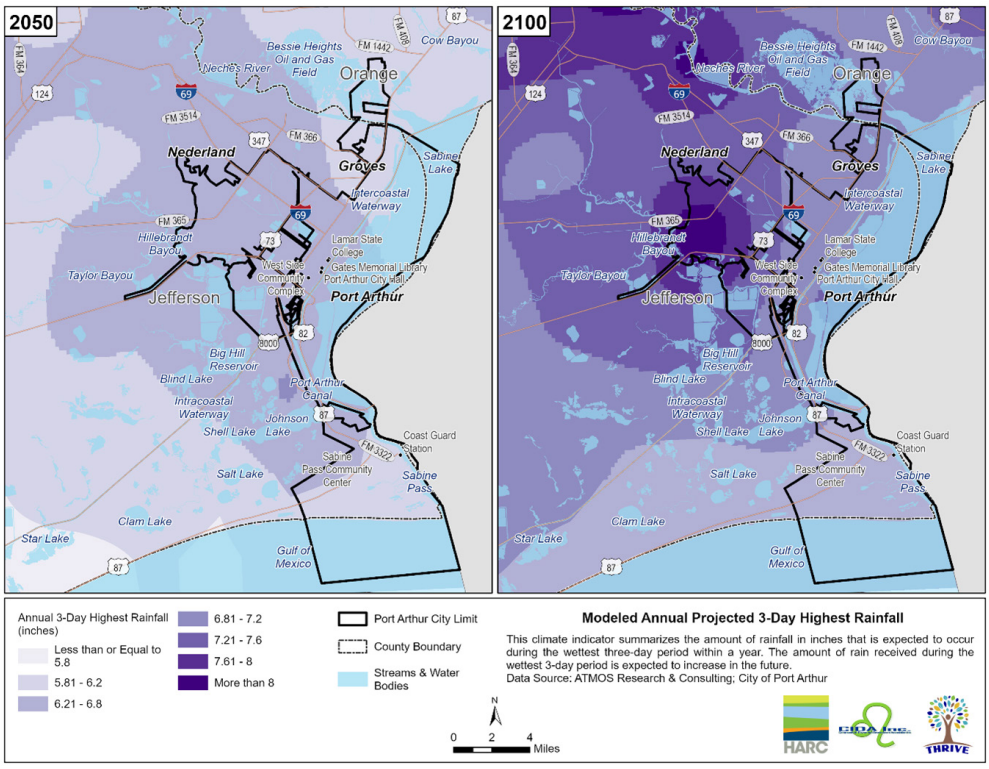


Figure 9 Modeled Annual Projected 3-Day Highest Rainfall in 2050 and 2100 in Port Arthur, Texas

Figure 9 depicts the projected annual 3-day highest rainfall (the total amount of rain received in a 3-day period). The projections for Port Arthur show 6-6.4 inches for the annual 3-day highest rainfall in 2050, and 6.8-8 inches for the annual 3-day highest rainfall in 2100. The increase in these more intense, flashy storms can lead to more issues with flooding impacts.

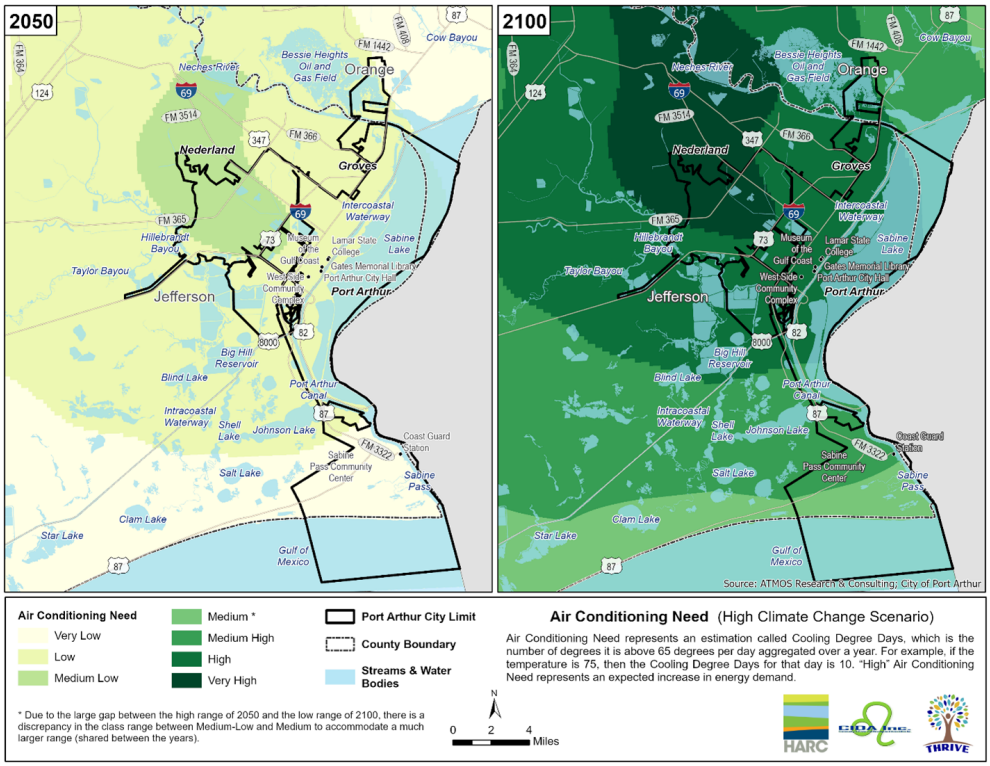


Figure 10 Modeled Air Conditioning Need for 2050 and 2100 in Port Arthur, Texas

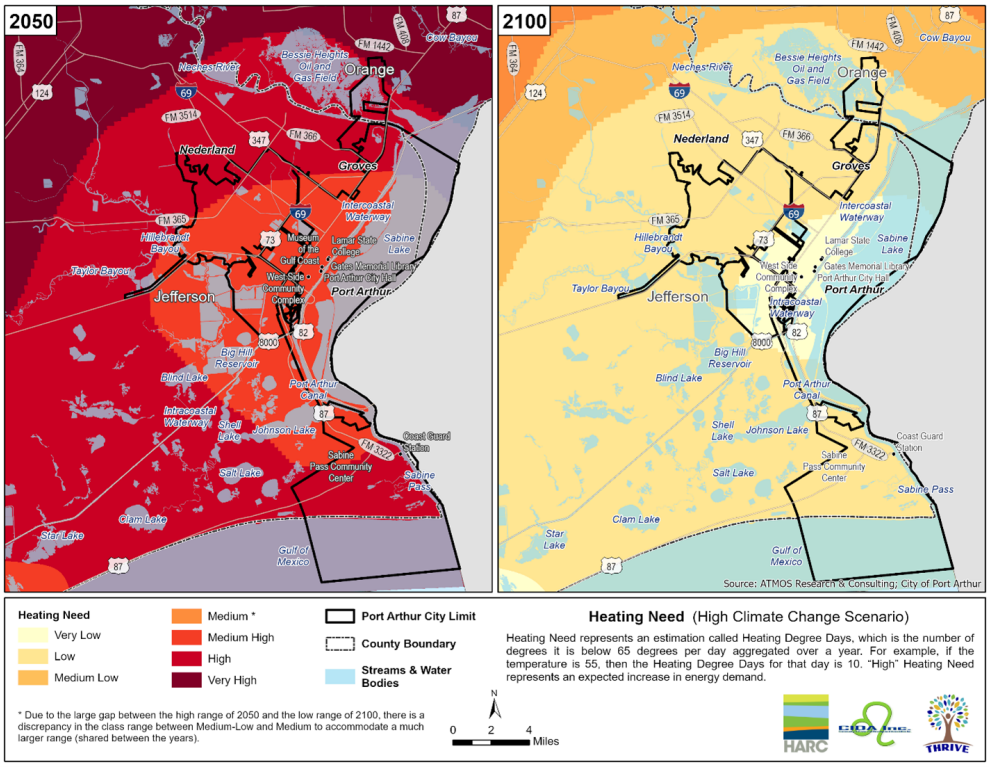


Figure 11 Modeled Heating Need for 2050 and 2100 in Port Arthur, Texas

Figure 10 shows projected Air Conditioning need, which represents an estimation called Cooling Degree Days, that measures the cumulative number of degrees each day's average temperature is above 65° F. Figure 11 shows Heating Need, which represents an estimation called Heating Degree Days, that measures the cumulative number of degrees each day's average temperature is below 65° F. Heating and Cooling Degree Days are designed to quantify the demand for energy needed to heat or cool a building. Figure 10 shows projection for Port Arthur for Low to Medium Low Air Conditioning Need for 2050 and Medium High to Very High Air Conditioning Need for 2100. Figure 11 shows projection for Port Arthur for Medium High to High Heating Need for 2050 and Very Low to Low Heating Need for 2100.

Increased occurrences of hotter days and nights and longer heat waves can have various impacts that put Port Arthur at risk. Prolonged exposure to extreme heat can result in heat-related illnesses such as heat exhaustion, heatstroke, and dehydration. Vulnerable populations, including the elderly, children, and individuals with chronic health conditions, such as rheumatoid arthritis, chronic obstructive pulmonary disease, asthma, type 2 diabetes, or cardiovascular disease, are at higher risk. Increased heat can contribute to higher evaporation rates and the drying of soil, leading to water scarcity and drought conditions. Extreme heat can disrupt ecosystems by altering habitats and migration patterns, leading to shifts in species distribution and biodiversity loss. It can also contribute to the decline of sensitive species, especially those adapted to specific temperature ranges. Higher temperatures can lead to increased energy demand for cooling or heating purposes, straining power grids and infrastructure. This increased demand can result in blackouts or power shortages during peak periods. Figure 10 shows the projected increase in demand for air conditioning. Extreme heat events can disrupt daily life, impacting work productivity, transportation, and outdoor activities. It can also lead to increased energy costs as well as healthcare costs due to heat-related illnesses and strains on emergency services.

Addressing the impacts of increased days with extreme heat requires implementing strategies such as heat wave preparedness plans, improved infrastructure for heat-resilient cities, and sustainable water management. Community-Based climate resilience refers to a community's capacity to prepare for, withstand, and recover from the anticipated impacts of a shifting climate. The collective experiences and insights within communities are pivotal in identifying the most threatening climate hazards. Additionally, this knowledge guides the allocation of efforts and resources towards bolstering resilience, particularly for those within the community most vulnerable to these challenges.

CONCERNS AND RECOMMENDATIONS ARTICULATED BY PORT ARTHUR RESIDENTS

Stakeholder Engagement and Community Outreach

EQUIP PA approached stakeholder engagement with a focus on equity-informed principles and inclusion of all individuals in the planning process. CIDA led stakeholders to engage the local government and residents in the decision-making process, building on its successful track record in engagement, goal setting, and capacity building among underserved communities in Port Arthur. A stakeholder-led and locally resonant framing of resilience for Port Arthur will increase connectivity, collaboration, and trust among key stakeholders in the City, laying the foundation for success.

To gather information for this plan, HARC and CIDA, as the research team, conducted surveys of Port Arthur residents and interviews or conversations with community leaders. Residents were surveyed about how they access information, their experiences with extreme events and emergency shelter, and disaster response. CIDA hosted community meetings in Port Arthur focused on community resilience to solicit survey responses and celebrate community unity with local residents. The survey was administered: a) in person, on paper, or online at the community meetings hosted by CIDA; b) in person door-to-door; and c) online via Pollfish with an incentive to participate. In total, 139 respondents were surveyed, 100 online and 39 in person.

The Pollfish survey was administered via their algorithm. This platform was chosen for its ability to sample residents. The Pollfish platform uses random digital devices, like smartphones and tablets, to collect an "organic sample" from over 600 million people that engage with mobile apps, like games, by offering a small non-monetary incentive within the game or app, such as an extra life in a game or access to premium content, in exchange for completing the survey.[54] This method is called Random Device Engagement (RDE) and has higher response rates than traditional telephone and online surveys.[55]

[54] Pollfish Resources. (2019). Organic Random Device Engagement Sampling Methodology. https://resources.pollfish.com/market-research/random-device-engagement-and-organic-sampling/

[55] Ibid.

In-person respondents were recruited from the Westside, Downtown, and Lewis Drive neighborhoods in particular, and through community meetings that CIDA held in the Port Arthur area. Residents were surveyed door-to-door in the Westside, Montrose, and El Vista/Vista village neighborhoods. The Pollfish survey was targeted to the wider Port Arthur area. Figure 13 shows the proportion of survey respondents from different areas of Port Arthur.

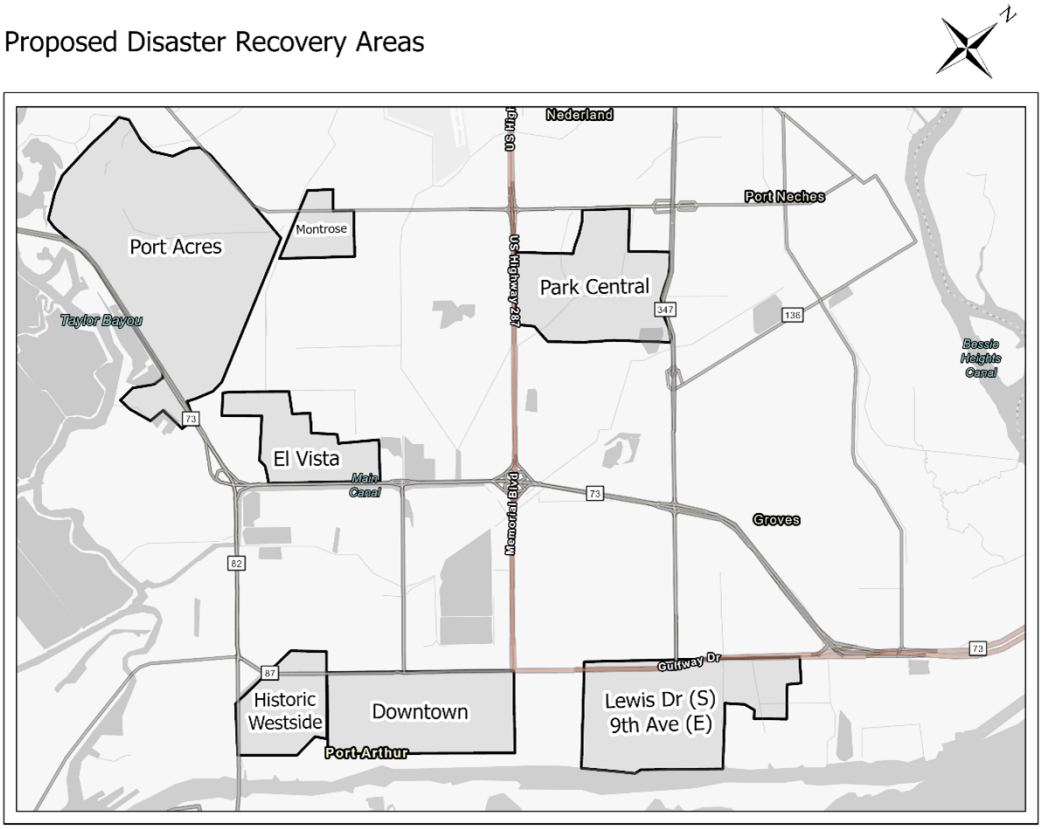


Figure 12 Neighborhood map, adapted from Port Arthur Disaster Recovery and Resilience Plan. "Mid County" is roughly the area North of highway 96, south of highway 347, between highway 73 and Nederland Ave.

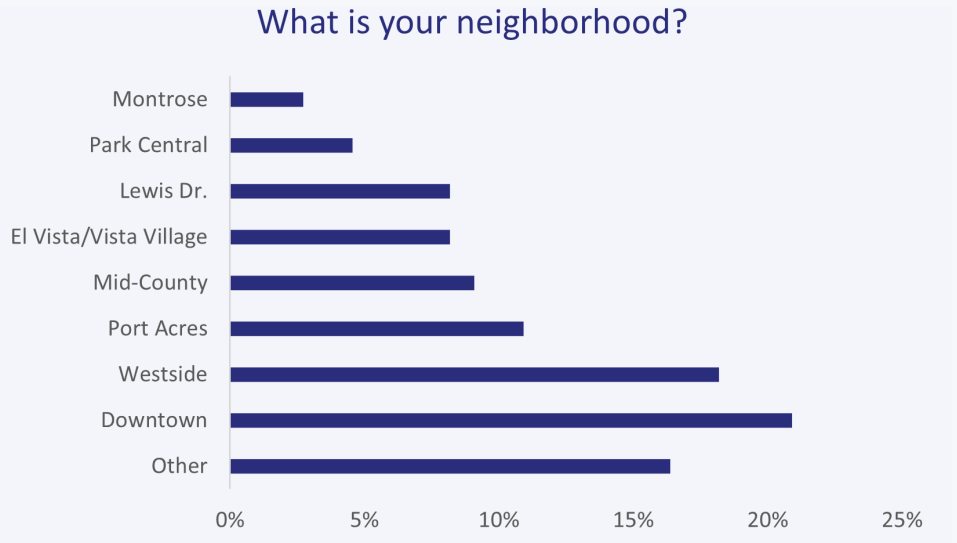


Figure 13 Survey respondents' neighborhoods

Additional survey results from the community engagement process are interwoven throughout this report.

Inclusive Engagement of Diverse Community Stakeholders

Survey respondents represent a diverse cross section of the Port Arthur area. HARC and CIDA reached out to residents from under-resourced areas of Port Arthur and used Pollfish to reach a diverse set of residents from around the community. The following figures show the makeup of the 100 survey respondents to the Pollfish survey only. Demographic, employment, and educational questions were not asked of in-person respondents. Other responses throughout this document represent in-person responses as well.

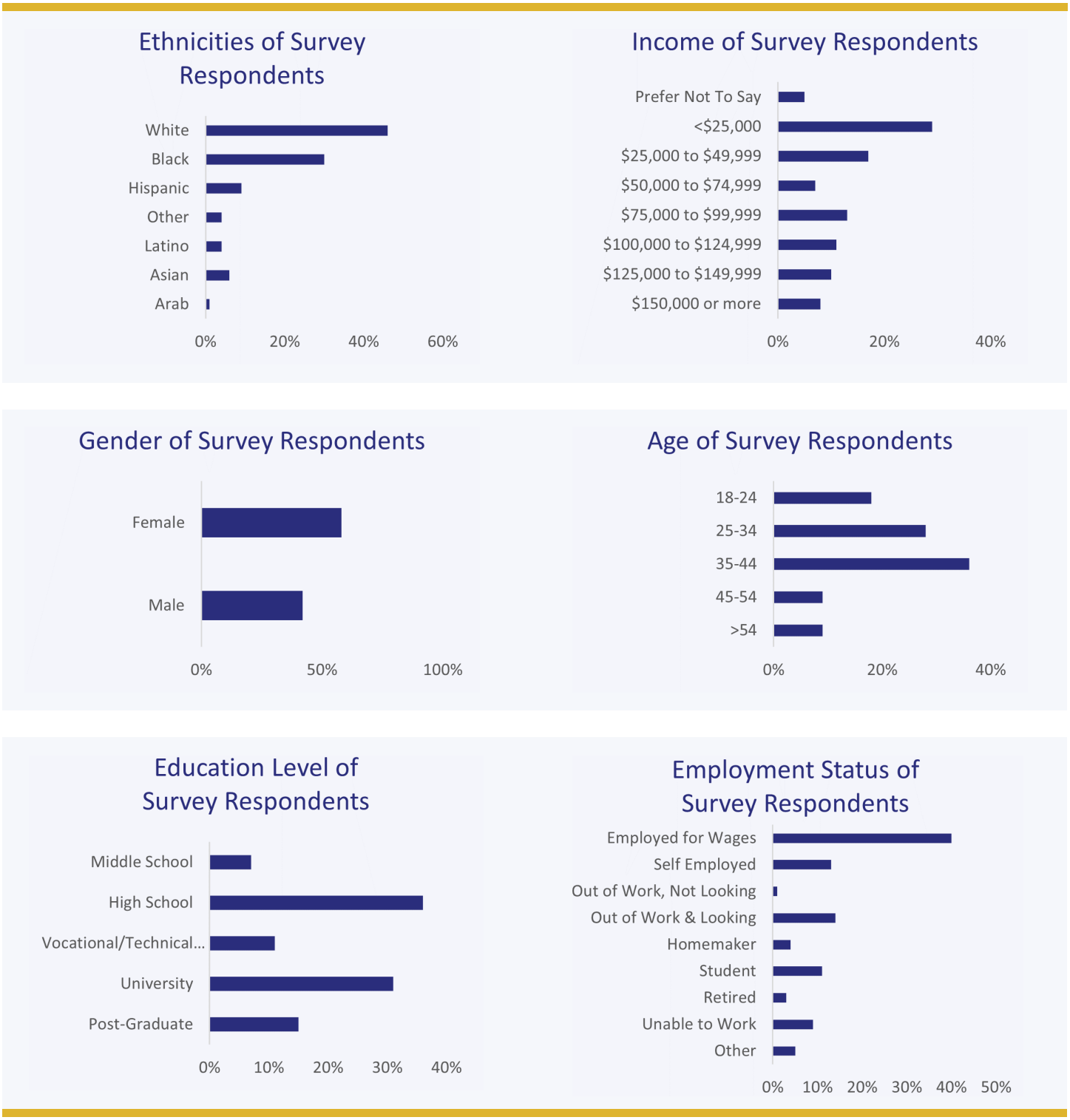


Figure 14 Demographic, educational, and employment statistics for Pollfish survey respondents

Input from Community Leaders

In addition to community surveys, HARC and CIDA reached out to community leaders who served the area before, during, and after disasters. These leaders participated in informal discussions, surveys, or formal interviews about their role in community resilience and their professional experiences working in and serving the people of Port Arthur.[56] They do not represent an exhaustive list of representatives from the community. Some representatives declined or did not respond to requests to participate. Interviews were used to provide context to survey results or explain how community resilience efforts are currently deployed in Port Arthur. Community leader commentary is interspersed with survey results throughout this section. Additional quotes from community leaders are included in the previous sections to this report and identified as such.

Community Engagement, Education, and Communication Recommendations

Future engagement and education efforts for community resilience will need to focus on grassroots efforts, including knocking on doors, talking to people, holding breakfasts or luncheons "where you get to sit down and actually communicate with people one-on-one and see what each person needs." Another community leader emphasized "building capacity and providing people with accurate information, and making sure they're aware of opportunities." Engagements will need to focus on providing people with information about and linking people to the resources that could serve them. There are people in the community who have a basic understanding of problems or solutions but do not have access to resources or the programs that provide resources. These recommendations gleaned from the interviews were supported by the survey findings. One community leader recommended providing a place where people can go to learn about and be enrolled in the programs that would help them with energy efficiency, weatherization, flood resilience, or other efforts that could help protect them or their homes from extreme weather. Access to this information is a hindrance to residents. About 13% of residents surveyed are familiar with the DRRP, compared to 84% of residents who are unfamiliar with the DRRP—over one third of residents who are unaware of it, 26% of residents who are aware but unfamiliar, and 21% who have read it but are still unfamiliar. These results suggest a need for additional outreach and education on the DRRP, lessons that should be applied to EQUIP PA and future disaster recovery and resilience plans.

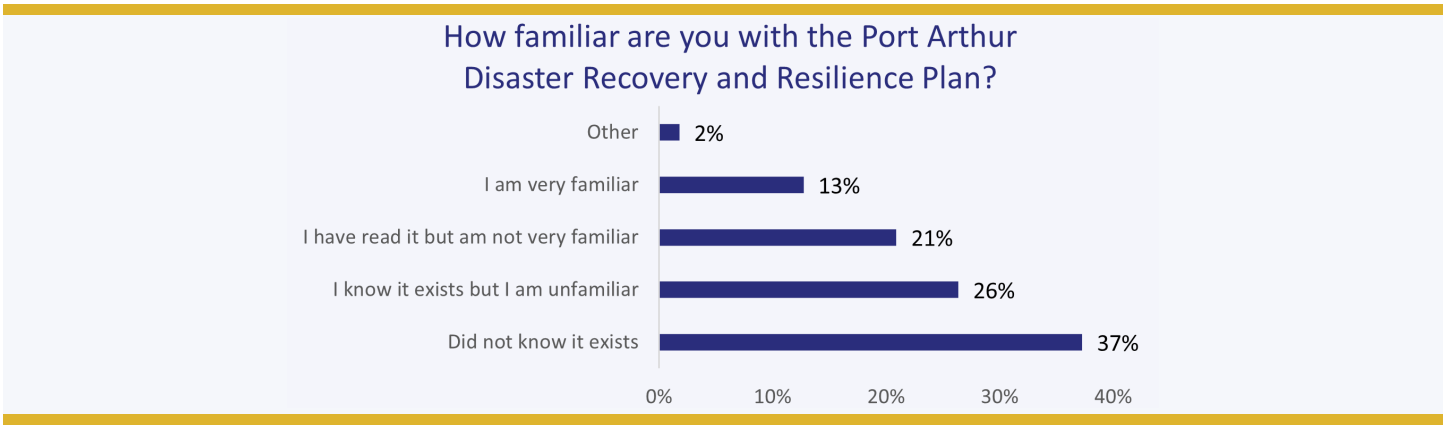


Figure 15 Familiarity with the Disaster Recovery and Resilience Plan

Communication is an issue for residents. The survey results indicate a need to focus on multiple pathways of information with an emphasis on getting official information (from TxDOT, the Southeast Texas Alerting Network, the City, or the County) onto television, radio, and social media outlets. The focus on all three pathways will reach more residents than a focus on one pathway, ensuring residents who lack access to one or more of these sources are not missing critical information.

Additional input provided by residents and community leaders is included in subsequent sections regarding disaster preparedness, nature-based solutions, and energy resilience.

[56] Leaders who were consulted by HARC about community resilience include the Mayor of Port Arthur, Thurmon Bartie; City Manager, Ron Burton; Lamar State College President, Dr. Betty Reynard; Southeast Texas Regional Planning Commission Executive Director, Shanna Burke; Port Arthur Transit Authority Manager, Ivan Mitchell; Digital Workforce Academy Founder and Director of Golden Triangle Empowerment Center, Melvin White; Port Arthur Independent School District Superintendent Dr. Mark Porterie; Assistant Superintendents, Melvin Getwood and Phyllis Geans; Executive Director of the Port Arthur Housing Authority, Cele Quesada; Drainage District 7 Assistant Manager and District Engineer, Allen Sims and additional Drainage District7 staff; Port Arthur Community Action Network Organizer and Activist, John Beard Jr.; and National Association for the Advancement of Colored People (NAACP) Chapter President, Clay Roy. Their expertise is used to inform this report and related efforts regarding community resilience and clean energy. This report does not represent each of their opinions.

Community Disaster Preparedness

The Southeast Texas Regional Planning Commission (SETRPC) runs the community alerting system, the Southeast Texas Alerting Network (STAN).[57] Board membership includes county judges and city officials. Each of the member government officials can put out an alert. Residents can be on any list that is relevant to them, including for chemical plants testing or flaring. Residents need to sign up to receive alerts from STAN for the area for which they want to receive alerts via text, email, and/or phone call. Residents should make sure they are registered, regardless of if they have been in the past. In 2023, STAN migrated providers, meaning all residents would need to re-register.

The Area Agency on Aging runs the 211 division for the region. The agency keeps a list of people, including seniors and medically vulnerable individuals, who need help with evacuations. Residents can call 211 to register. Residents can also call to find information about shelters. Previous short-term emergency shelters in Port Arthur include:

- Carl A. Parker Multipurpose Center
- Thomas Jefferson Middle School
- Woodrow Wilson Jr. High School
- Memorial High School
- New St. John Church
- Golden Triangle Empowerment Center

SETRPC's Lighthouse program provides resources for certain individuals to make their homes safer. The program is funded by the Texas Commission on Environmental Quality (TCEQ) as a Supplemental Environmental Project (SEP), a program funded by refineries and petrochemical facilities in the area that have incurred fines associated with air quality violations. The program focuses on the low-income and disabled population because they believe they are the most vulnerable to power outages or disasters. With the lighthouse program, they can make their homes safer and their energy more affordable. Upgrades are also cost-effective because of their significant impact in reducing the home's energy demand. The program requires significant energy education. For example, some residents have never had central air or central heat. They can inadvertently use more energy and incur a higher energy bill in operating the systems like their previous window units rather than in an energy efficient and effective manner.

The commission has hosted a household hazardous waste event to collect old paint, electronics, tires, batteries, light bulbs, and other things residents should not throw away or that could create household disasters.

The commission develops resilience planning through criminal justice and homeland security information. SETRPC helps cities and counties with those plans and maintains a regional plan.

If funding comes from state agencies, it usually comes through SETRPC. SETRPC previously had a contractual relationship with the Texas General Land Office (GLO). However, GLO now does this work directly. Instead, SETRPC provides GLO with eligibility services for applications going through their system.

The SETRPC facility has a generator.

Individual Disaster Preparedness

- Get their "go bag" and documents together. SETRPC provides bags to residents with checklists of what to pack to prepare for or during an emergency. These bags are particularly important during hurricane season to ensure residents have their disaster items prepared. Residents should visit Ready.gov/kit for details on how to build a "go bag." Basic supplies include water and food for several days for all household members, radio, flashlight, first aid kit, batteries, whistle, dust mask, plastic sheeting and duct tape, moist towelettes, garbage bags and ties, wrench or pliers to turn off utilities, manual can opener for canned food, local maps, cell phone with chargers, and a backup battery.[58]
- Be prepared for the expected. What is needed to get out of the area quickly? At what point do you choose to leave? What happens if your chosen road is blocked or backed up? Do you have somewhere to shelter in place, someone to call, or somewhere to go? SETRPC keeps a list of hotels that are pet friendly.
- Make sure insurances and contacts are up-to-date.

[57] Interview with Shanna Burke of SETRPC. July 31, 2023.

[58] U.S. Department of Homeland Security. (2023). "Build A Kit." https://www.ready.gov/kit

Sources of Disaster Preparedness and Emergency Information

Residents were asked about where they get emergency information, as well as how they get information to plan for locally common emergencies like floods or chemical-related events. TV news is the most common source of emergency, flood, and chemical information for residents surveyed for this plan. Most respondents also use social media for general emergencies, floods, or chemical emergency information. Friends or family, radio, and STAN are also common resources, reported by more than one third of respondents. During a disaster, cities and counties report information to SETRPC. Residents who have signed up for STAN receive alerts. Any residents can call 211 to get this local information. About 23% of residents in Port Arthur lack access to computing resources and 39% lack access to an internet subscription.[59] About 65% have access to smartphones, 53% have access to a desktop or laptop, and 37% have access to a tablet for communication.[60] Using multiple, disparate sources of information creates more opportunities for residents with limitations like these to access important information.

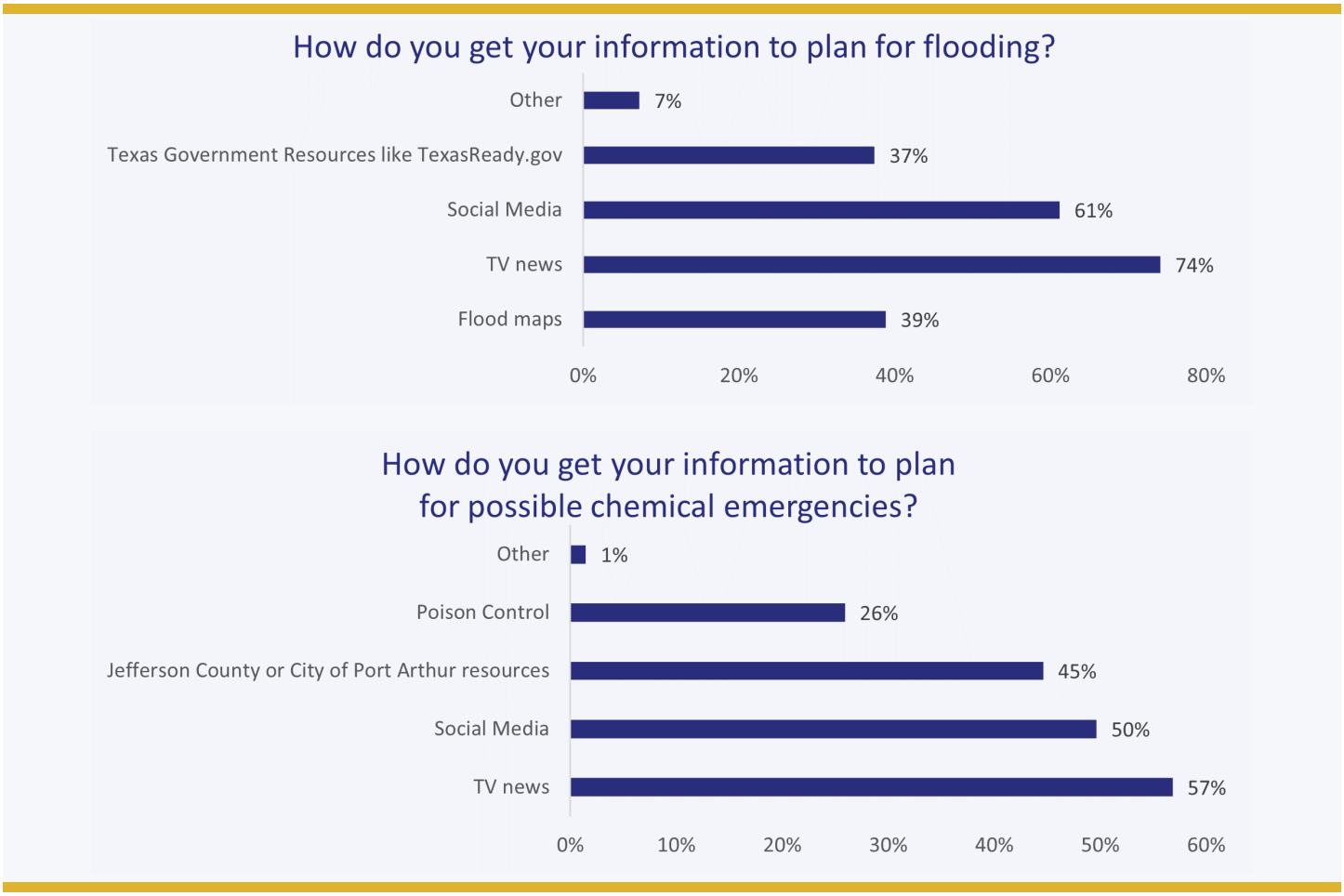


Figure 16 (a) Sources of flood information; (b) Sources of chemical emergency information

In planning for flooding, in addition to TV news and social media, over one-third of respondents also seek information from the state government or flood maps. Alternatively, in planning for chemical emergencies, in addition to TV news and social media, nearly half of survey respondents also seek information from the county or city, and about one quarter seek information from poison control.

[59] U.S. Census Bureau. (2021). American Communities Survey (ACS) 5-Year Estimates. DP04 Selected Housing Characteristics. https://data.census.gov/table/ACSDP5YSPT2021.DP04?q=race&g=040XX00US48_050XX00US48245_160XX00US4858820&d=ACS+5-Year+Estimates+Selected+Population+Data+Profiles

[60] Ibid.

Community Response During a Disaster

Nearly three quarters of residents are aware of emergency shelter locations in their neighborhood. However, 25% of residents are not. A similar percentage of residents are aware of their evacuation zone (71% aware vs. 28% not aware). While there is a high level of emergency shelter and evacuation zone knowledge, some additional education will be needed.

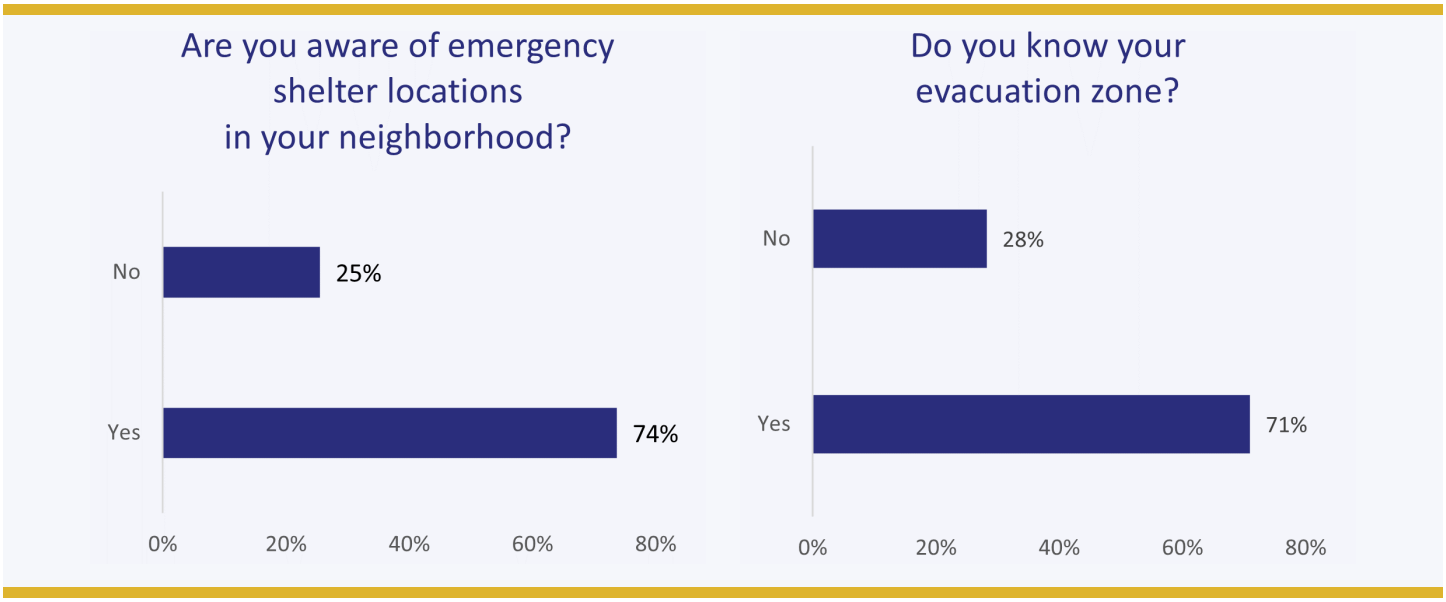


Figure 17 Awareness of emergency shelters and evacuation zones

Extreme weather is a relatively common occurrence in Port Arthur. Residents were asked about their experiences with seeking shelter during an emergency and which organizations assisted them. About 47% of residents surveyed have not gone to an emergency shelter compared to 45% who have.

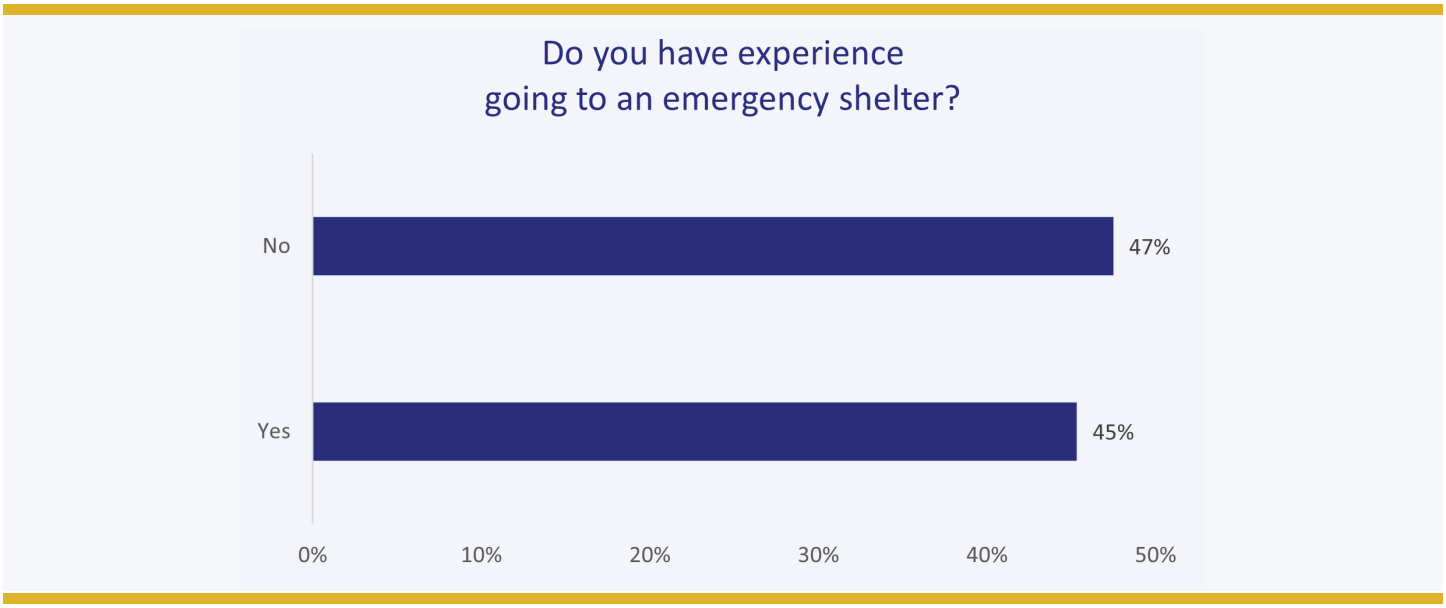


Figure 18 Experience with emergency shelters

When asked how difficult it was to locate a shelter that met their family's needs, about 30% of residents surveyed reported some difficulty and 2% recalled that experience being very difficult, compared to 16% who reported no difficulty locating an emergency shelter. These difficulties could be due to a variety of factors including a lack of education on local emergency shelters, a lack of access to nearby shelters, or a lack of shelters that could meet their family's needs. For example, some locations might not allow pets and residents might not want to leave their pets unattended during an emergency.

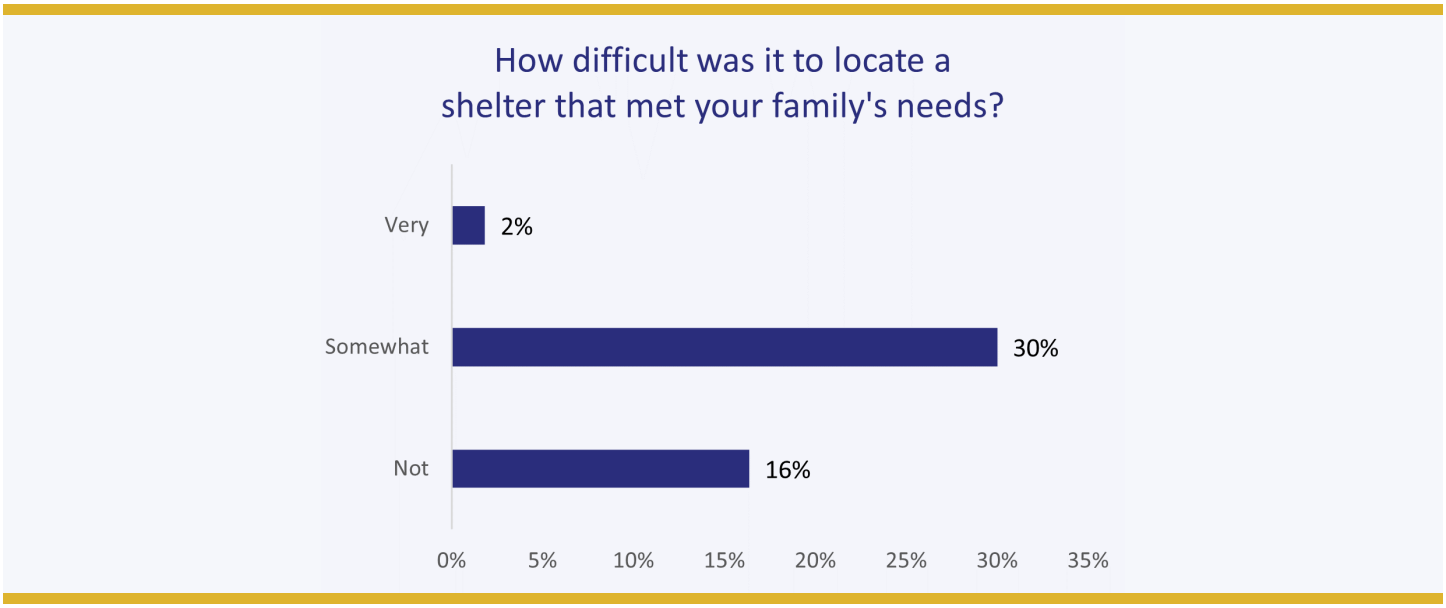


Figure 19 Difficulty locating emergency shelter

Residents surveyed indicated that floods, and hurricane or tropical storm events are the most common reasons that caused them to seek emergency shelter. However, they were also impacted by power outages, air emergencies, and extreme heat or cold.

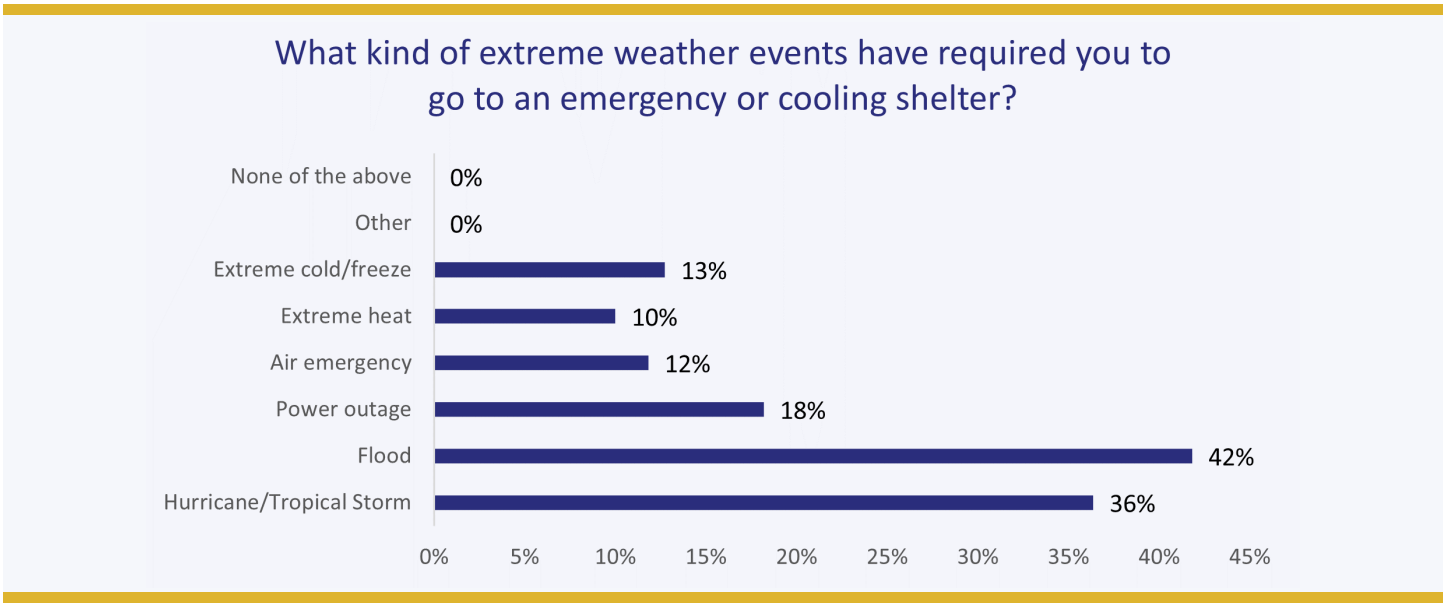


Figure 20 Extreme events that caused respondent to seek shelter

There is no common timeframe for the longest period residing at an emergency shelter. Residents surveyed varied in their time spent in emergency or cooling shelters at a range of 7-14% across all responses. Using this data, shelters wanting to plan for resources might expect more residents in the short term. About half of residents who reported using an emergency shelter left the shelter at or before one day. A small but considerable proportion of residents required long-term shelter. About 7% of respondents (or 15% of residents who reported using an emergency shelter) described staying in a shelter longer than three days.

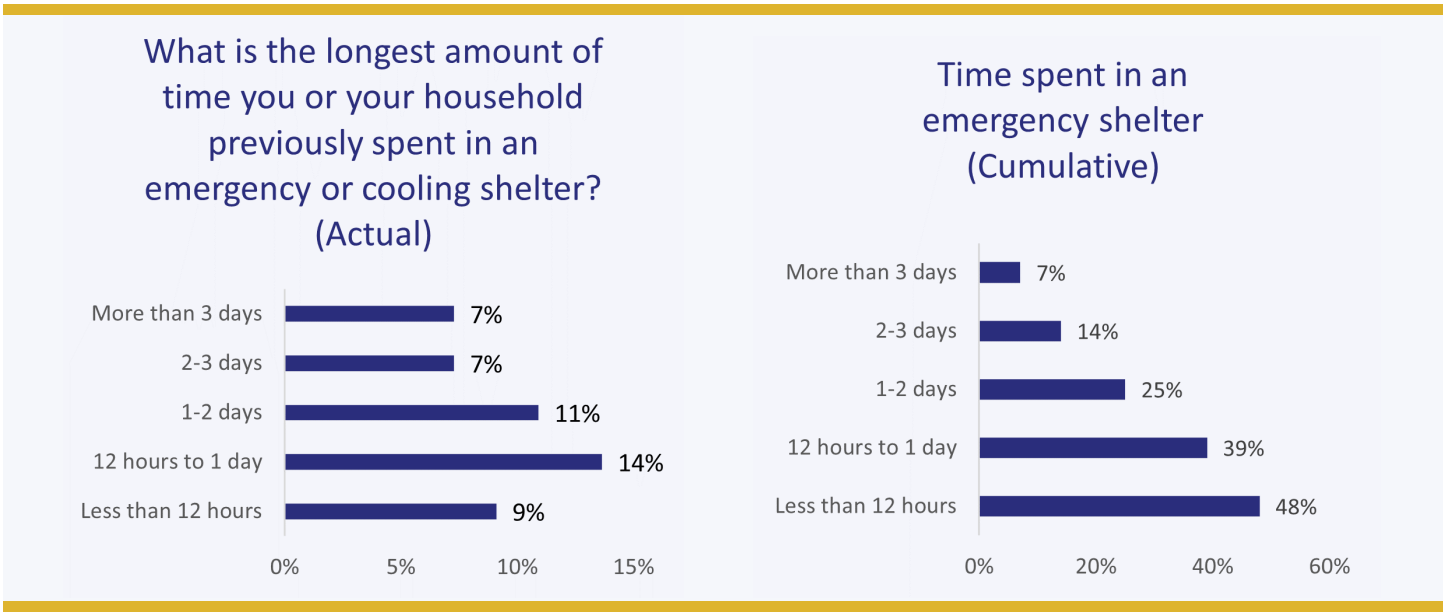


Figure 21 (left) Longest amount of time household spent in emergency shelter (right) The percent of respondents that would be using an emergency shelter at each time period, given responses to the question

Residents surveyed indicated their local emergency shelter is far from their home, either 10 or more minutes walking (15%) or 10 or more minutes driving (19%). Only 4% of respondents indicated their shelter is very close by, under 10 minutes walking distance from their home.

Figure 22 Longest distance traveled to emergency shelter

Residents surveyed indicated their experience traveling to emergency shelters was moderate (31%) to difficult (10%) or terrible (1%) compared to respondents whose travel experience was easy (7%). One community leader recalled transporting residents between shelters because one flooded. When they reached the alternative shelter, it was too crowded to accept residents. The residents returned home instead.

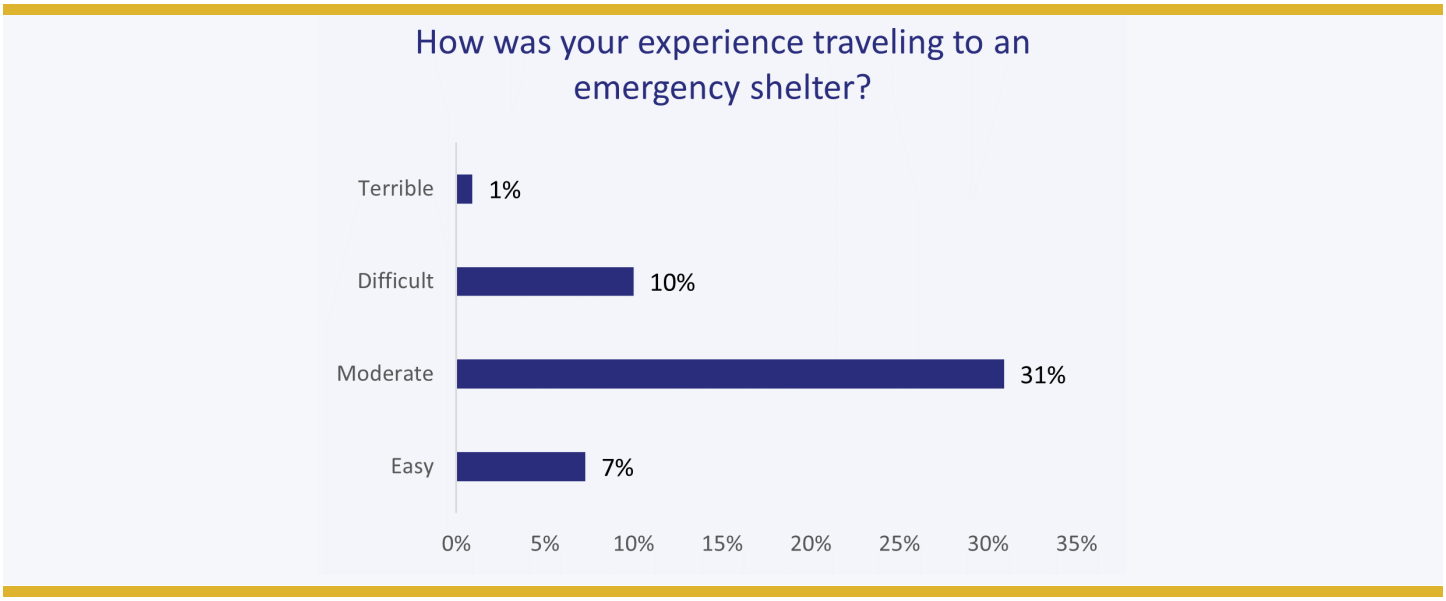


Figure 23 Experience traveling to an emergency shelter. Responses collected from community meetings and wider Port Arthur area

With this information in mind, transportation for residents to get to their nearest shelter is critical for community resilience. The local transit agency in Port Arthur provides some of this transportation for residents during emergency events. Ensuring the transit agency has resilient power during a power outage and extreme weather events—alongside other important logistical emergency planning—could be important for Port Arthur community resiliency. Additional shelters in the neighborhoods of residents who attended the community meetings, as well as in the wider Port Arthur area, could shorten the distance residents need to commute to get to their shelter and reduce anguish from the travel experience.

In planning for future emergency shelters or resilience hubs, the community can consider the needs and wants of residents. Residents surveyed were asked about the services they most want in an emergency shelter. They prioritized food and water to a much higher degree than anything else. The next highest ranked services included power for medical devices, ability to charge phones, baby supplies, and pet-friendly services.

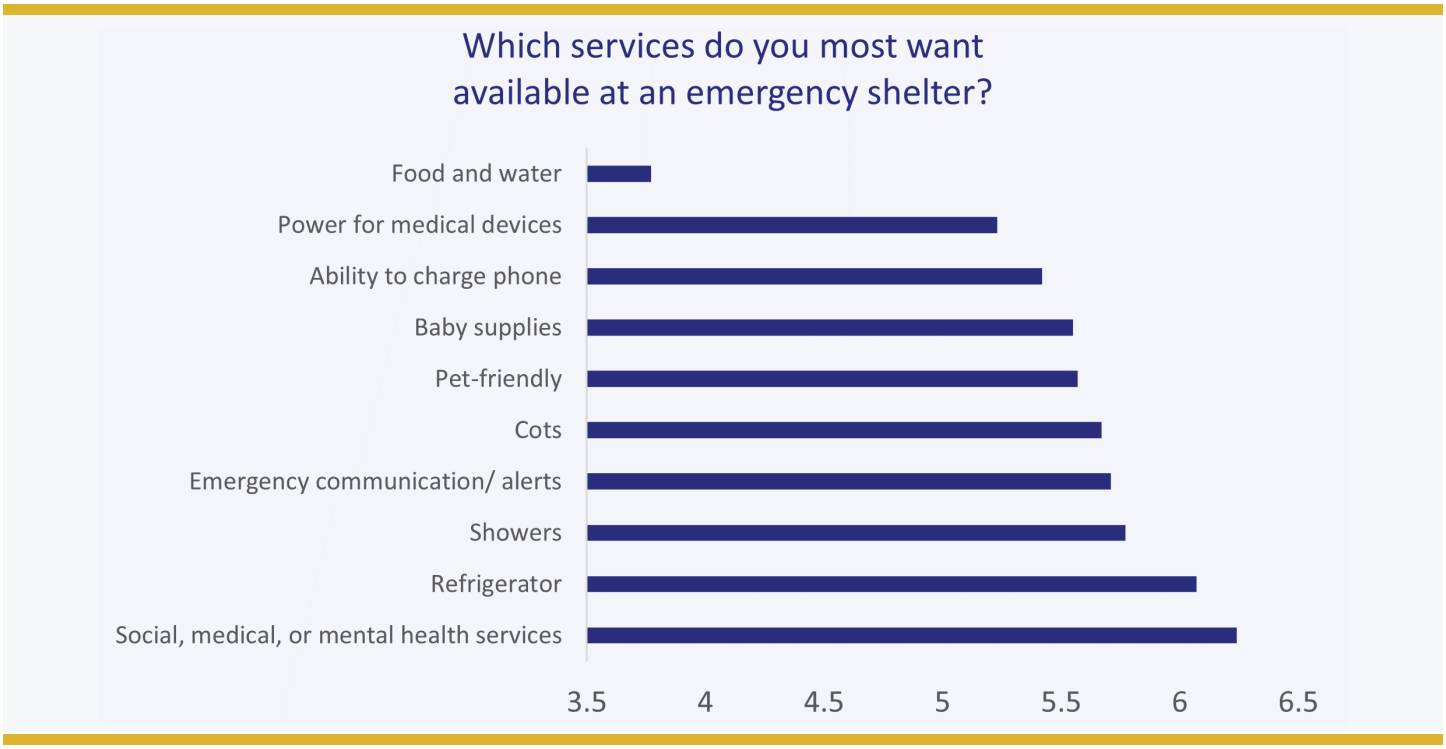


Figure 24 Preferences for emergency shelter services

Residents surveyed report receiving assistance during or immediately after an emergency from the Federal Emergency Management Agency (63%) or the American Red Cross (60%), with smaller percentages receiving aid from the City (47%), first responders (35%), the County (27%), the SETRPC (24%), and houses of worship (19%). According to SETRPC, cities and counties should be frontline disaster response, and SETRPC is intended to be an extension of these services.[61] SETRPC staff provide assistance to cities and counties for Emergency Operations Centers during disaster and right after. Additionally, during a disaster or widescale power outage, state agencies will want to send supplies. SETRPC helps organize the supplies and get them distributed.

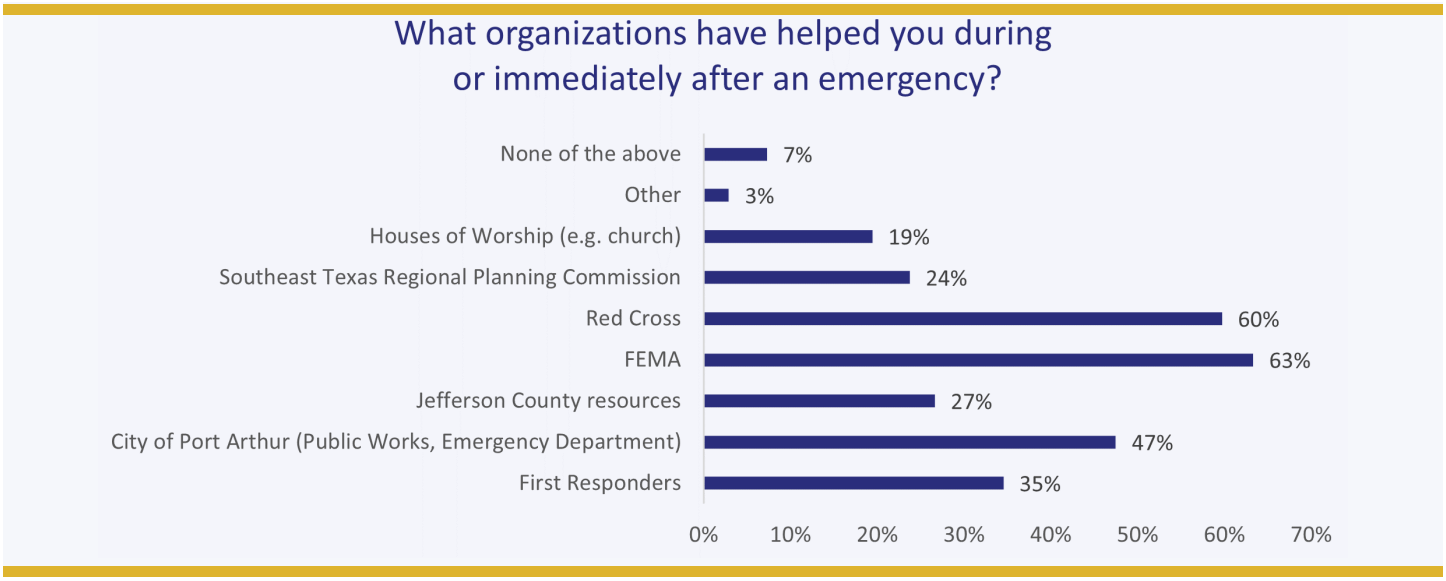


Figure 25 Organizations residents recall assisting them

Residents were asked whether their home had been damaged due to an extreme weather event, how long it took to repair that damage, and which organizations assisted with that repair. Over two-thirds of respondents (69%) reported sustaining damage to their home due to an extreme weather event.

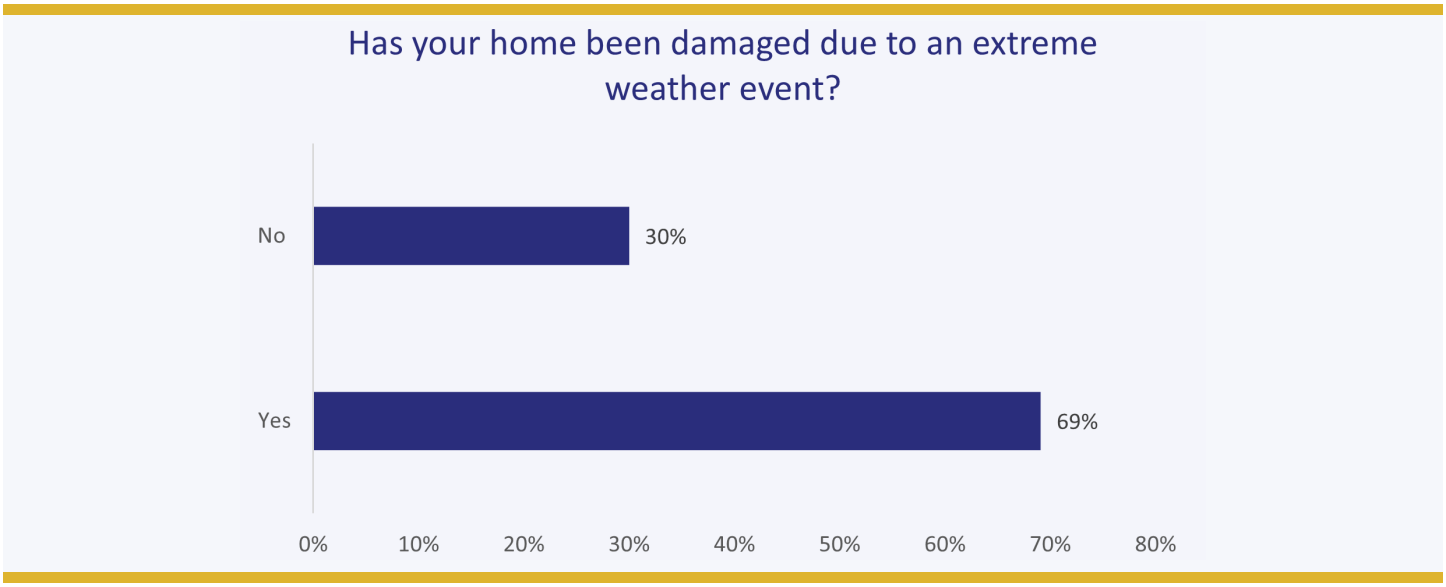


Figure 26 Home damage due to extreme events

Approximately half of respondents repaired this damage within three months, while approximately one quarter of respondents had damage that took over three months to repair, and 20% of respondents have damage that has not been repaired.

[61] Interview with Shanna Burke, SETRPC. July 31, 2023.

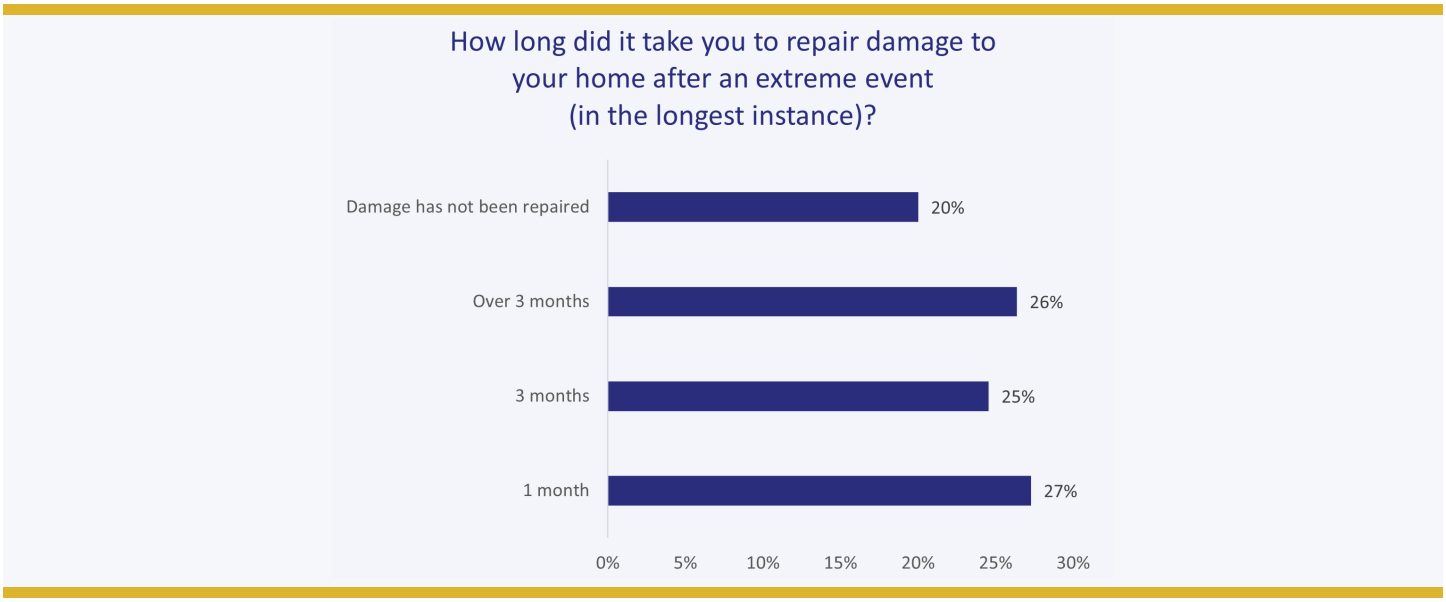


Figure 27 Time to repair home damage

Approximately half of respondents received assistance for home repair from FEMA, while 42% of respondents received assistance from insurance. A smaller portion of survey respondents reported receiving assistance for home repair from the Red Cross (30%), SETRPC (21%), and City of Port Arthur (17%). About 13% of respondents reported not receiving assistance for home repair from any of these organizations.

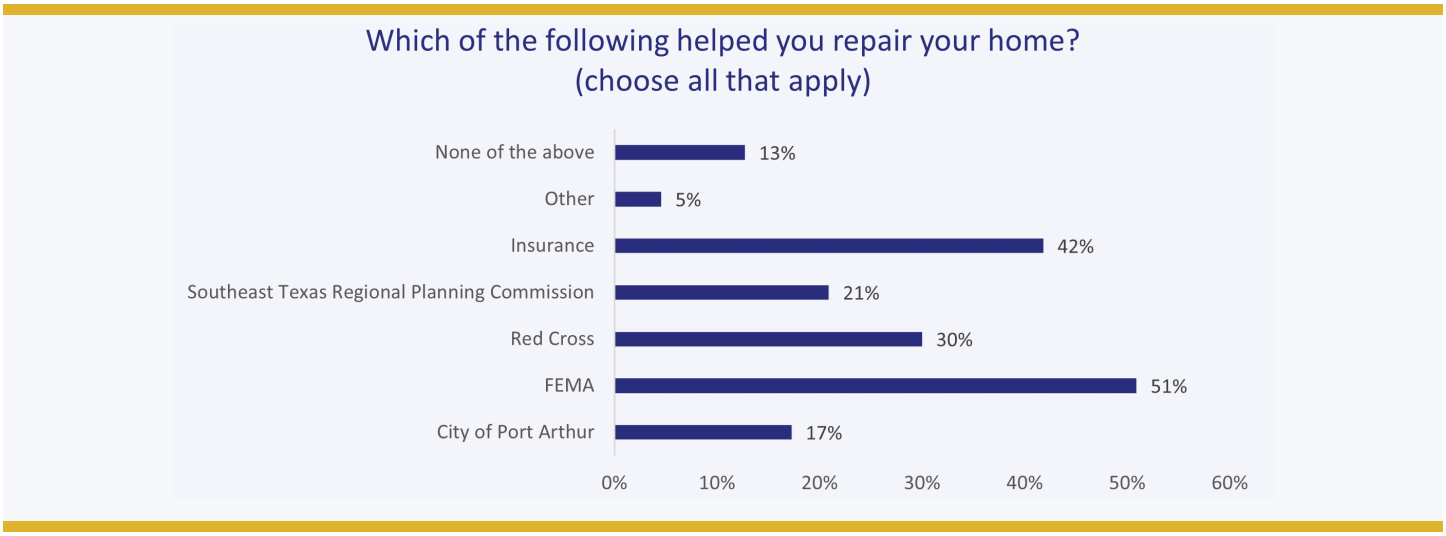


Figure 28 Organizations residents recall assisting them with home repair

Approximately 38% of respondents report no flood insurance, compared to 44% who have National Flood Insurance Program (NFIP) insurance, and 17% who have private insurance.

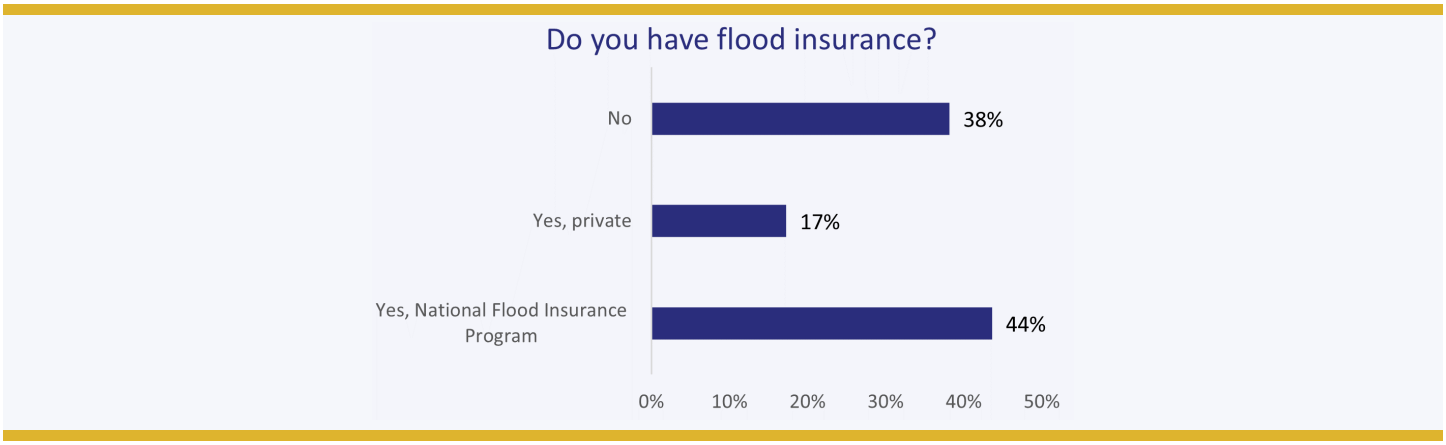


Figure 29 Use of flood insurance

Disaster Preparedness and Emergency Preparedness Recommendations

The survey results indicate a need to focus on multiple pathways of information with an emphasis on getting official information (from TxDOT, the Southeast Texas Alerting Network, the City, or the County) onto television, radio, and social media outlets. The focus on all three pathways will reach more residents than a focus on one pathway, ensuring residents who lack access to one or more of these sources are not missing critical information.

Community leader recommendations include improving the opportunities offered to residents for disaster preparedness and recovery. This change might include more funding available for preparedness or rebuilding. It might include expanding the Lighthouse program or similar programs that provide home energy resilience, especially for low-income residents. As leaders mentioned, the area is quite distressed; programs that update homes are needed. Additionally, improving opportunities might include expanding programs that get more people educated and working. With more income, a resident has more opportunity in everyday life and in a disaster situation. Many people cannot simply pack up and go somewhere for a period to avoid a disaster. Instead, they remain in a shelter for two weeks.

Resilience Strategies

Climate resilience is the ability to prepare for, respond to, and subsequently bounce back from impacts of climate change. By preparing for future hazards and risks that are connected to our changing climate, communities can better withstand different magnitudes of events and lessen detrimental effects. Participation in resilient thinking from all levels of a community or region can strengthen adaptation actions (steps that lessen the negative impacts of current or future changes in climate), promoting resilience.

As defined by FEMA, critical infrastructure includes those assets, systems, networks, and functions so vital that their systemic breakdown would have a devastating impact on security, national economic security, public health and/or safety.[62] Understanding vulnerabilities within critical infrastructure and facilities is key to planning for future events. The impact on a community, should a system crucial to daily life be interrupted or become unavailable, must be considered. Protecting critical infrastructure and facilities from the impacts brought on by a changing climate through adaptation and mitigation efforts is vital to developing resilient communities. This can include retrofitting critical infrastructure to withstand climate impacts, while being cognizant of the design life of existing infrastructure.

Climate mitigation is focused on reducing climate change by reducing the flow of greenhouse gases into the atmosphere and avoiding significant human interference with the climate. This includes reducing sources of greenhouse gases via reducing fossil fuel burning while enhancing the efficiency of sinks, like forests or oceans. Strategies include steps to reduce climate change like increasing use of solar energy to offset fossil fuel powered electricity generation or planting more trees.

Climate adaptation is focused on adapting to life in a changing climate, which involves adjusting to the future climate. This includes reducing risks from effects like sea level rise or food insecurity, and identifying and making use of potential benefits, like longer growing seasons. Strategies include strategically located trees to increase shade in areas of high heat islanding or increasing heights of levees.

Nature-Based Solutions

Nature-Based Solutions (NBS) refer to strategies aimed at conserving or imitating natural processes. These approaches are geared towards fostering community resilience and lessening the effects of climate change, such as flooding and drought. NBS initiatives encompass diverse undertakings, ranging from extensive natural and semi-natural area networks to the conservation and rehabilitation of ecosystems. This can include endeavors like beach or coastal dune revitalization, ecologically engineered sustainable developments, and the restoration of floodplains.

NBS enhances stormwater management by mitigating flooding impacts and improving water quality, which

[62] FEMA. (2008). Critical Infrastructure and Key Resources Support Annex. https://www.fema.gov/pdf/emergency/nrf/nrf-support-cikr.pdf

lowers the damage costs and protects the population from human health risks. NBS, in combination with retrofitting and building more efficient drainage systems, can protect people, the environment, and the economy from climate risks.

NBS projects are also connected to restoration and protection of biodiversity. Green space provides multiple benefits beyond flood protection, including heat mitigation, carbon sequestration, air quality improvement, and property value increases. Restoring habitats as NBS provides these benefits to people and supports the local ecosystem. Biodiversity supports ecosystem health, maintaining NBS benefits long term. NBS projects can also become protected areas that can provide much needed green space to marginalized communities, who traditionally have limited access to green space, a pattern exacerbated by redlining.[63, 64]

Recent studies have shown that NBS are not equitably distributed in many urban areas.[65, 66] This can lead to social inequities, preventing certain communities from accessing and benefiting from the ecosystem services provided by NBS. This issue is prominent in neighborhoods inhabited by people of color and/or low-income residents, where there are not enough trees and green spaces.[67, 68]

NBS can privilege certain populations over others, depending on how funding is allocated, who participates in the decision and design process, and whether accurate data exists to inform planning. Thoughtfully integrating NBS with equity and justice considerations can yield substantial benefits. Access to NBS fosters ongoing proximity to nature, contributing to residents' overall quality of life, regardless of socioeconomic status, which bolsters social capital, physical health, mental wellbeing, and community economics. Incorporating NBS also provides additional benefits such as improving air and water quality, keeping cities cooler, mitigating flood impacts, improving climate resilience, aiding in erosion control, and increasing habitat for plants and animals.

To achieve long-term equitable outcomes, it is imperative to incorporate inclusive community-driven approaches when planning, designing, and implementing NBS projects. For instance, coupling NBS with advocacy planning has been recommended to counter the inequitable impacts of land use changes affecting under-resourced communities.[69] Engaging residents in the NBS project process through increased community science has proven effective.

In a different Port Arthur-focused project, CIDA coordinated partnership collaboration and community outreach, and led activities to engage residents in: 1) the West Port Arthur Floodplain Management Plan; 2) the Montrose Green Infrastructure Master Plan; and 3) the Montrose Green Infrastructure Pilot Project. After completion of the three primary projects, CIDA, in partnership with HARC, assembled the Comprehensive Collaborative Coastal Resilience Plan (CCCRP).[70] The CCCRP documents NBS strategies from the three projects and describes the community involvement that ran throughout. In addition, NBS Cost-Benefit Analyses (CBA) were conducted for practices detailed in the Montrose Green Infrastructure Master Plan and constructed by the Montrose Green Infrastructure Pilot Project, along with several plausible scenarios. The CCCRP presents this information to support coastal communities in the implementation of NBS for climate resilience. The CCCRP explored these projects along with relevant discussions on nature's toolbox for climate resilience, how stakeholder and community engagement can serve as guiding threads, and the importance of incorporating cultural sensitivity, equity, and lived experience in community-based resilience projects.

[63] Hope, D., Gries, C., Zhu, W., Fagan, W. F., Redman, C. L., Grimm, N. B., ... & Kinzig, A. (2003). Socioeconomics drive urban plant diversity. Proceedings of the national academy of sciences, 100(15), 8788-8792.
[64] Locke, D.H., Hall, B., Grove, J.M., Pickett, S.T.A., Ogden, L.A., Aoki, C., Boone, C.G. & O'Neil-Dunne, J.P. (2021) Residential housing segregation and urban tree canopy in 37 US Cities. Urban Sustainability 1(15). https://doi.org/10.1038/s42949-021-00022-0
[65] Ibid.
[66] The authors of this plan have further detailed how NBS and other aspects of water infrastructure intersect with, lead to, or can address environmental injustices in "Addressing challenges to ensuring justice and sustainability in policy and infrastructure for Texas water resources in the 21st century" by Cook et al. 2024 (in review).
[67] Locke, D.H., Hall, B., Grove, J.M., Pickett, S.T.A., Ogden, L.A., Aoki, C., Boone, C.G. & O'Neil-Dunne, J.P. (2021) Residential housing segregation and urban tree canopy in 37 US Cities. Urban Sustainability 1(15). https://doi.org/10.1038/s42949-021-00022-0
[68] Schell, C.J., Dyson, K., Fuentes, T.L., Roches, S.D., Harris, N.C., Miller, D.S., Woelfle-Erskine, C.A. and Lambert, M.R. (2020). The ecological and evolutionary consequences of systemic racism in urban environments. Science. https://doi.org/10.1126/science.aay4497
[69] Zhu, R., Newman, G., & Atoba, K. (2021). Simulating the Impact of Land Use Change on Contaminant Transferal during Flood Events in Houston, Texas. Landscape Journal, 40(2), 79-99. https://doi.org/10.3368/lj.40.2.79
[70] Comprehensive Collaborative Coastal Resilience Plan. (2023). CIDA Inc. and HARC. Bare, R., Vernin, K., Riley, S., Smith, M., Patin, J. https://www.cidainc.org/single-post/comprehensive-collaborative-coastal-resilience-plan-cccrp

The CBA practices and the green infrastructure strategies documented in the CCCRP can be used as a framework for successful NBS implementation in Port Arthur. The CBA scenarios were guided by a set of assumptions to estimate the costs and benefits of a set of NBS practices that included rain gardens and bioswales, urban forests, stormwater wetlands, pervious surfaces, and bioretention ponds. Several of the practices outlined in the CCCRP were found to provide greater benefits than the costs of installation and maintenance; for example, community-led tree-planting projects which had a high benefit cost ratio due to low capital costs. Another practice that would likely result in realized benefits that exceed the costs of installation and maintenance is constructed wetlands. These findings underscore the significance of considering both projected costs and benefits, as well as understanding the community's requirements, viewpoints, and capacity to execute and sustain NBS approaches.

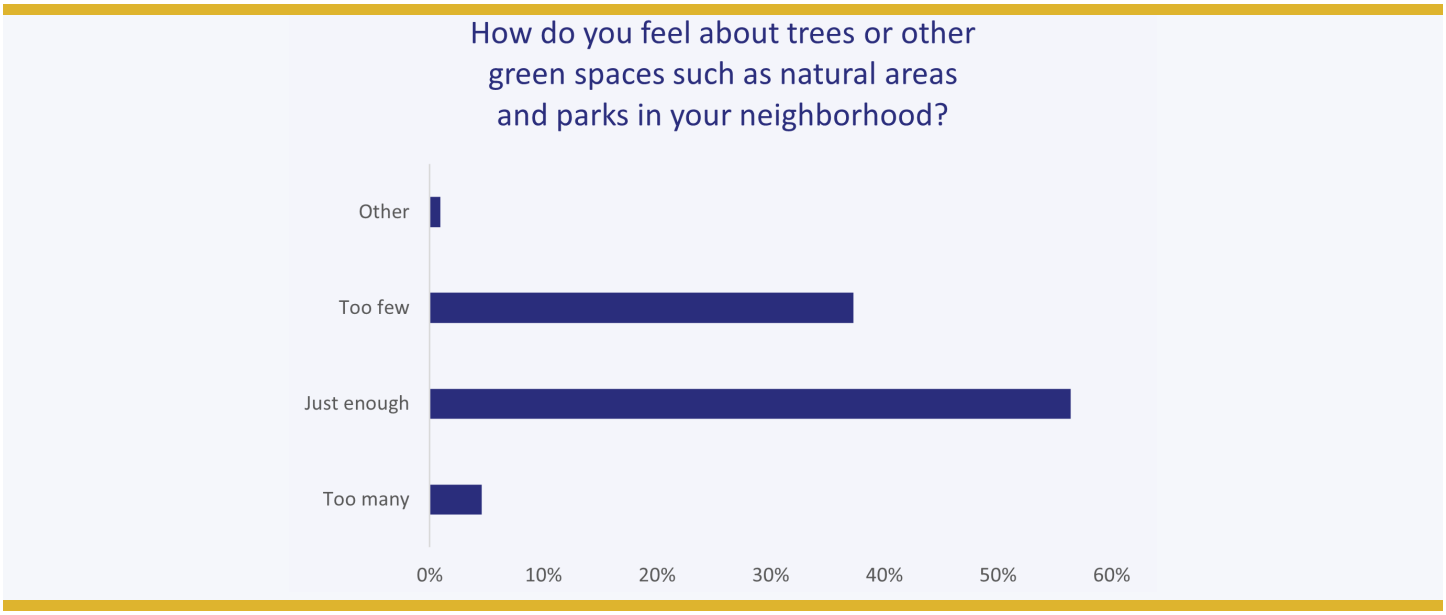


Figure 30 Resident sentiment regarding trees in their neighborhood

Energy Resilience

The community has articulated concerns about frequent power outages, particularly during summer months. Many of these power outages are due to weather events, both smaller storms and larger-scale hurricanes or winter freezes, and underinvestment in local infrastructure. One community leader reported that "it really doesn't even have to be an extreme event for power to go out." Another leader from the Port of Port Arthur mentioned one month with 28 power outages recorded.

Multiple community leaders recommended putting power lines underground to avoid power outages. Light poles are frequently broken and contribute to blight in the community. "When a hurricane comes, light pole breaks. Strong wind comes, light pole breaks. They just put another light pole next to the light pole that was broken." The Port is working with Entergy to run lines underground in part of the community.

Entergy applied for federal funding for grid resilience improvements in the Port Arthur area. According to Entergy:

> Entergy Texas' project submitted for consideration by the U.S. government calls for hardening a total of 900 transmission structures and undergrounding 57 distribution structures and associated spans. These proposed infrastructure improvements would bolster the grid's reliability during extreme weather events, directly benefitting approximately 7,000 residential, commercial, and industrial customers within disadvantaged communities of Port Arthur, Texas. The planned hardening, undergrounding and battery installation activities would increase the robustness of Port Arthur's local grid by improving circuit reliability during extreme weather and facilitating more rapid restoration of the system if outages occur.[71]

The proposal was not awarded in the first round of funding.[72]

[71] Entergy News Release. (2023). Entergy Texas seeks government grant funding for grid strengthening project in Port Arthur. https://www.entergynewsroom.com/news/entergy-texas-seeks-government-grant-funding-for-grid-strengthening-project-in-port-arthur/

[72] Department of Energy. (2023). Grid Resilience and Innovation Partnerships (GRIP) Program Projects. https://www.energy.gov/gdo/grid-resilience-and-innovation-partnerships-grip-program-projects

When asked why it seems some areas of the community might experience power outages more than others, one community leader mentioned certain residents are "kind of just forgotten. They put a patch on everything and say, well, that's good enough." One community leader mentioned, "You have people who need energy, like physically needed to survive. And they're without it. But if you look towards the other side of this same city, it's lit up... that's disheartening."

Residents surveyed through engagement efforts for EQUIP PA were asked about their experiences with power outage to get a better understanding of the need for power resilience. Almost half of residents surveyed experience outages monthly (15%) or multiple times a year (31%). An additional 10% of residents experience outages yearly, while 14% of residents did not report experiencing power outages at all.

The CDC states that perishable food should be thrown out in the event of a power outage of four hours or more.[73] Residents experiencing power outages of this length would either lose the food in their homes and the money spent to supply it, or risk food-borne illnesses if they cannot afford to throw it away. These longer outages also interrupt businesses, school, and other aspects of society. One third of residents surveyed for this plan reported experiencing outages of over four hours monthly (9%) or multiple times a year (24%). An additional 11% of residents experience these lengthy outages yearly, while 20% of residents did not report experiencing power outages longer than four hours at all.

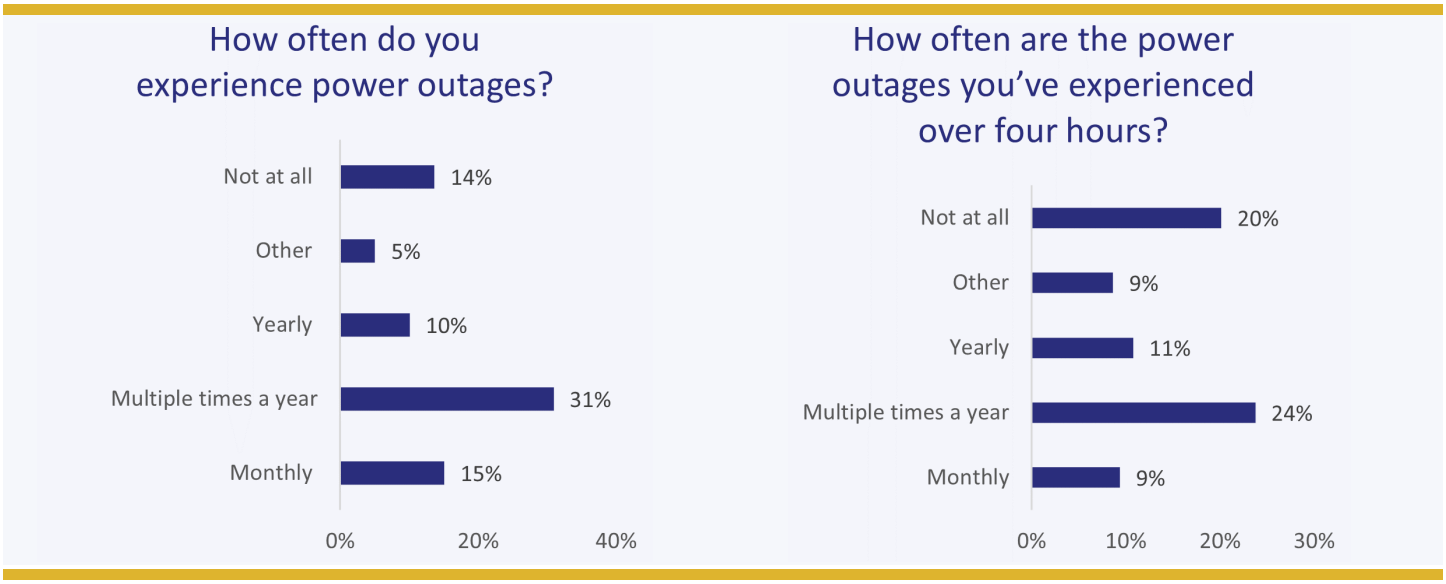


Figure 31 (left) Frequency of power outages and (right) Frequency of 4-hour power outages

Further, due to high energy burden, reaching up to 19% of income for residents already experiencing poverty, residents limit energy use to make it affordable. See Figure 3 for discussion and graphical representation of energy burden in the Port Arthur area. To combat high energy burden, residents may run a box fan or open their door for airflow. They may have drafty homes that do not maintain a cool temperature indoors during the summer or do not keep them warm in the winter. However, rationing energy use can result in situations where vulnerable residents including children, elders, or people with medical conditions experience unsafe temperatures. As one community leader stated, "That's a bad situation to be in when you have to say, do I want gas or food or do I want, you know, to be comfortable for 8 or 10 hours?"

There are energy bill affordability programs available to Port Arthur residents, including through the Greater East Texas Community Action Program (GETCAP). The agency receives funding for light bill assistance or "the Comprehensive Home Energy Assistance Program" from the U.S. Department of Housing and Urban Development's (HUD) Low-income Home Energy Assistance Program (LIHEAP). However, in 2023, the agency stopped accepting applications for this program by April 14.

Residents can apply for light bill assistance from GETCAP at https://www.get-cap.org/

Residents can find other light bill assistance options at https://www.entergy-texas.com/bill-help/

[73] Centers for Disease Control and Prevention. (2023). Food Safety for Power Outages. https://www.cdc.gov/foodsafety/food-safety-during-a-power-outage.html

Energy Efficiency and Weatherization

Residents can improve their homes to make them use energy more efficiently, reducing their energy use and their energy bills. Energy efficient devices use less energy and still get the same functionality. For example, switching from incandescent bulbs to LED lightbulbs or from older appliances to appliances with good Energy Star ratings can save energy. Improving insulation or upgrading to double or triple pane windows can make homes less drafty and more weather safe.

Weatherization programs make these changes to a home for low-income residents who qualify for the program. These programs are available to homeowners or renters. In the Port Arthur area, Entergy and GETCAP provide weatherization services. GETCAP receives funding from the U.S. HUD LIHEAP program and the U.S. Department of Energy's (DOE)'s Weatherization Assistance Program (WAP) for weatherization for low-income residents. Residents with incomes at or below 200% of the Federal Poverty Limit qualify for WAP weatherization funds. Residents with incomes at or below 150% of the Federal Poverty Limit qualify for both WAP and LIHEAP weatherization funds. The map below shows the number of homes weatherized through the LIHEAP and WAP programs in ZIP Codes in the Port Arthur area.

Residents can apply for GETCAP's weatherization program at https://www.get-cap.org/

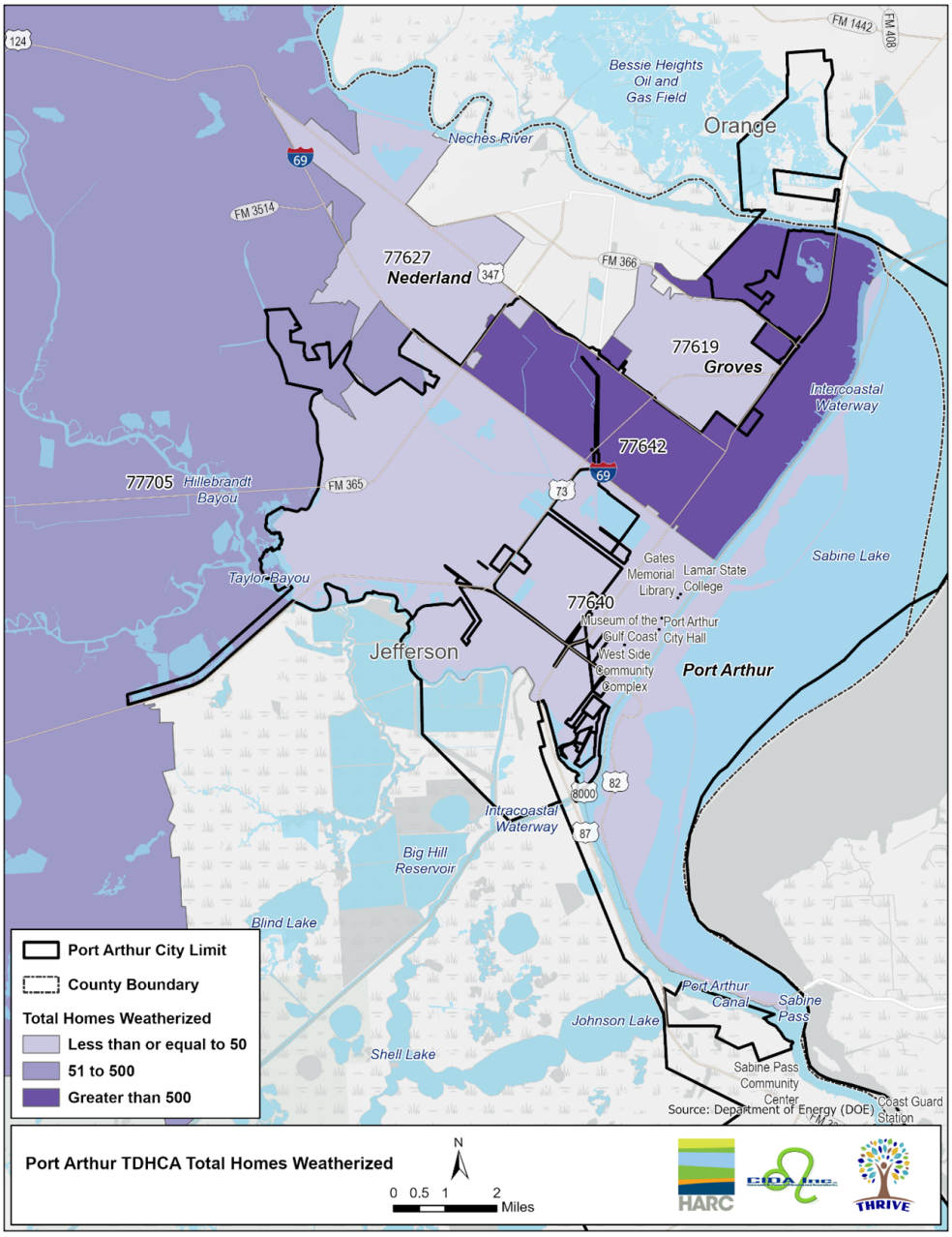


Figure 32 Homes weatherized between 2002 and 2023 as reported to the Texas Department of Health and Community Affairs

Federally funded weatherization activity in Port Arthur is concentrated in the Northeastern portion of the community, with few weatherization activities in the Westside, Vista Village, Montrose, and Port Acres areas as shown in Figure 32. A total of 906 homes have been weatherized in Port Arthur: 883 homes in the 77642 ZIP Code, and 28 homes in the 77640 ZIP Code. The population of the 77642 ZIP Code is about 2.3 times that of the 77640 ZIP Code, with 31 times the number of homes weatherized since 2002.

Entergy provides energy efficiency services through its Home Energy Efficiency Program for Low-Income Customers. Residents with incomes at or below 200% of the Federal Poverty Limit qualify for Entergy's program. To participate in this program, residents call Entergy-approved program contractors who can provide services on a first-come, first-serve basis until funds are exhausted.

Residents can find more information about Entergy's program at https://www.entergy-texas.com/your_home/save_money/ee/home_hard_to_reach/

The Lighthouse Program provided by SETRPC provides many home upgrades beyond weatherization services, retrofitting and rehabilitating homes. The program is available to low-income residents and those with disabilities and is only available to homeowners in the Port Arthur city limits.

Residents can find more information about the Lighthouse Program at https://www.setrpc.org/the-lighthouse-program/

Residents can apply with this application: https://www.setrpc.org/wp-content/uploads/2017/03/Lighthouse_application-2.doc

For any questions and/or comments concerning the Lighthouse Program, you may contact Pam Lewis at plewis@setrpc.org or (409) 899-8444 ext 7506.

COMMUNITY FEEDBACK ON DRAFT EQUIP PA

As an equity-informed climate resilience plan, this document could not be complete without feedback from community members. Comments, questions, and corrections from residents and community leaders were incorporated into this plan through the engagement previously mentioned and through feedback on the draft report. Incorporating this community feedback ensures EQUIP PA accurately portrays the people and issues present in Port Arthur. It also helps to make sure that the recommendations, if implemented, can effectively address the issues identified. A disclaimer with this information was included on the draft report provided to residents and community leaders for comment.

The draft report information was provided to community members through the following avenues:

Community Meeting

Community members received a presentation on the report, broken into sections matching the sections of the draft report. After each section, community members were asked questions and allowed to discuss in groups before providing group feedback. Residents could also fill out individual feedback forms. Print copies of the report and executive summary were available onsite for additional detail. Due to severe weather conditions, the community meeting was held in a hybrid format with online and in-person attendees. An online discussion was held via breakout rooms. The meeting was advertised through social media and mail, and incentives and dinner were provided to encourage attendance.

Email correspondence with residents

Some residents were unable to attend in-person or online but provided feedback online through a Microsoft Form with the same questions provided at the in-person meeting. They were provided with the executive summary as well as the presentation from the community meetings with accompanying notes explaining the slides. They were also given the full draft EQUIP PA report for reference. These residents were also offered incentives for their feedback.

Email correspondence with community leaders

Community leaders were asked to provide feedback as well. They were provided with the draft report, the executive summary, and the presentation from the community meeting. For accuracy and transparency, these individuals were specifically asked to ensure they were quoted correctly and that any programs or initiatives included were accurately portrayed.

Figure 33 Stakeholders meet to discuss the draft EQUIP PA in Port Arthur

Feedback Received

Community feedback is critical to resilience planning, serving as an invaluable source of firsthand insights and experiences that are crucial for implementing effective and inclusive strategies. The lived experiences of residents provide a nuanced understanding of the vibrant community and culture as well as the challenges they face, ranging from economic disparities and inadequate infrastructure to environmental concerns and social inequalities. Incorporating this feedback into resilience planning not only acknowledges the diverse needs of the community but ensures that solutions are tailored to address specific vulnerabilities. The discussion below provides the feedback received from the Port Arthur community on EQUIP PA. Several stakeholder concerns that were raised fall beyond the scope of the resilience plan; nonetheless, we are reflecting them in this context to discuss the broader community concerns and underscore the comprehensive nature of community challenges.

Community Issues

The community stakeholders identified critical issues including flooding, poor roads, air pollution, lack of resources, lack of preparedness for climate-related events, and disparities in resource distribution. There were desires for improvements, including better infrastructure, roads, recreational facilities, and business development. The stakeholders called for more community involvement, unity, and collaboration to address challenges. There was some disagreement on whether the community is accurately represented by their local leaders, with some feeling well-represented and others feeling often overlooked.

Preparedness for Risks

There were mixed feelings about community preparedness for climate-related risks, with some expressing confidence and others highlighting inadequacies. Stakeholders agreed on a range of suggestions for better preparation, including improved drainage systems, better communication, and proactive disaster planning. The stakeholders felt there was a lack of community support from their leaders during and after disasters.

Community Care and Engagement

The biggest concerns of the stakeholders when it came to community care were: a) lack of concern for the elderly in the community in terms of disaster planning and recovery; and b) not enough for the youth and children in the community, in general. They also feel that there is a need for more local businesses and economic development.

Disparities and Inequities

The community stakeholders expressed concern for disadvantaged residents struggling to access resources as well as unequal distribution of help and resources after disasters. Specifically, residents from the neighborhoods of El Vista, Montrose, Westside, and Eastside felt they were not treated equitably in the aftermath of disasters and resource distribution. Stakeholders expressed certain neighborhoods were not represented equally in disaster preparedness and that, in general, there was inadequate housing. The stakeholders noted that they often experience power outages due to outdated infrastructure. The residents expressed concerns about the unequal distribution of resources, favoritism in assistance, and the impact of economic disparities on technology access during power outages.

Preparedness and Response: Infrastructure

Many of the messages heard from residents were on the problems of flooding, specifically street flooding getting worse in recent years. This common concern speaks to the persistence of drainage problems in Port Arthur. The residents agreed with the recommendation to Upgrade the Drainage System in the Recommendations for Implementation section. Some community members also spoke about power outages on the Westside of Port Arthur. One community leader suggested including a list of buildings that had previously served as emergency shelters to show some of the resources provided for residents during emergencies. A non-exhaustive list has been added to the document.

Community representatives noted the positive contributions of the refineries to the local area. It was highlighted that these industrial facilities play a significant role in bolstering the community's financial well-being, actively engaging in initiatives that benefit residents and contribute to the overall welfare of the region. Other community members expressed concerns about odor and pollution from chemical plants and refineries, stating health concerns. The sentiment expressed by community members underscores the multifaceted impact of the refineries on the local economy and the support they provide to community-oriented endeavors.

Preparedness and Response: Communication and Information

Many stakeholders expressed concern about the communities' lack of preparedness for natural disasters. They have historically experienced issues with shelter availability, rules, and treatment, and have concerns about the response time of FEMA and other agencies. There was also a consensus that there is a lack of information during emergencies, and difficulty in reaching the right agencies for assistance. A significant community concern is a need for better communication and awareness. One community member recommended neighborhood disaster relief councils that allow residents to communicate with government officials and organizations providing aid and to streamline efforts to determine who and how to help.

> **"Communication is vital. People need to know what they need to do before and after emergency events/climate events."**[74]
>
> **- Community Member**

Implementation

Stakeholder concerns about implementation mainly revolve around financial constraints, potential misuse of funds by city officials, and the need for accountability. Residents emphasize the importance of community collaboration, equitable distribution of resources, and improved communication during emergencies. For better resilience and disaster preparedness, additional stakeholder recommendations included better drainage, early information dissemination, community outreach, and improved communication systems.

These themes reflect a range of opinions and concerns within the community, emphasizing the need for accurate representation, collaboration, and proactive measures to address both positive aspects and challenges in Port Arthur. In summary, the feedback reflects a community deeply concerned about disparities, lack of support, and issues with infrastructure and environmental hazards. The recommendations center around improving community engagement, addressing inequalities, and enhancing disaster preparedness and response.

Stakeholders endorsed the identified risks and recommendations outlined in the draft EQUIP PA. Modifications and revisions were made to the draft EQUIP PA to reflect stakeholder concerns. For example, language was added to reflect the strong community of culture and support in Port Arthur. In addition, stakeholders noted the strong financial support refineries brought to the community, while other stakeholders expressed concerns about health impacts. Commentary reflecting this feedback has been added to the document. The themes of equity and communication were evident through stakeholder discussions, both during development of EQUIP PA and while reviewing the draft. These concerns are reflected through the Recommendation for Implementation.

Additional feedback from community members is included in the Appendix B: Community Feedback.

> **"As a community, we are not prepared. We don't have the manpower for one to handle the issues we have now. The stores we have don't have enough supplies, and most of our elderly simply can't afford the supplies"**[75]
>
> **- Community Member**

[74] Answering the questions, "Do you have any concerns about these recommendations? Do you see any hurdles or possible issues that might make them difficult to implement?"
[75] Answering the question: "Do you feel prepared for climate risks in Port Arthur?"

RECOMMENDATIONS FOR IMPLEMENTATION

Methodolgy

This plan is developed to be adaptative and adjust with implementation and future risks. Community members and practitioners in Port Arthur in the future or in other communities wanting to do this work in their community can follow a similar approach to the EQUIP PA team with the following methodology.

1. Assess baseline social conditions using existing screening tools and data sources like the CDC's Social Vulnerability Index, EPA EJScreen, the DOE Low-Income Energy Affordability Data (LEAD) Tool, the Census Bureau's American Community Survey, and the Climate and Economic Justice Screening Tool (CEJST).

2. Assess current risks using NOAA and FEMA data and future risks using down-scaled climate models showing key climate indicators. Model future conditions including SLAMM, showing change over time.

3. Determine current community resilience capacity, including any existing plans or frameworks for resilience.

4. Conduct community engagement activities, adapting to meet community where they are and capture information regarding community assets and needs. The first step should be a stakeholder analysis to determine key community leaders, including official and unofficial leaders and trusted individuals. Engaging with this initial set of individuals will help identify best practices for how to reach out to members of the community. It is important to reach out beyond this group to get grassroots voices as opinions of community leaders may be biased by their role and very different from the average resident, especially those in under-resourced areas of the community. The effort to reach out to residents on a wide scale may include in-person or online questionnaires, community meetings or celebrations, and door-to-door, phone, or in-person conversations. The results of this engagement should yield information regarding community needs, assets, and recommendations for future work.

5. Coalesce the results of data analysis and engagement to prioritize risks and recommendations.

Recommendations for Implementation

The significance of these recommendations lies in their potential to guide similar initiatives in other communities, em phasizing inclusive and proactive approaches to address climate-related vulnerabilities and enhance community resilience while considering the diverse needs and circumstances of the residents. These recommendations serve as a blueprint for multifaceted, adaptable, and community-centered strategies in mitigating climate risks and building resilience.
The results of this work in Port Arthur show several focus areas and priorities for implementation goals:

EQUIP PA Recommendations for Implementation

Prioritize Equity in Planning for Community Climate Resilience: More effective planning for and implementation of climate resilience is needed throughout the community, and residents should be included and equipped to make decisions in this planning early and often. Residents in under-resourced parts of the community or who have been historically marginalized may need prioritization to ensure they can participate in climate resilience planning and benefit from solutions. Build capacity in these areas and provide people with education and accurate information to make sure they are equipped to support planning efforts. Use grassroots community engagement efforts to include people while meeting them where they are. Efforts used to inform EQUIP PA promoted a shared understanding of the challenge, including identifying Port Arthur's vulnerabilities, existing resilience-building assets and activities, and critical gaps.

Prioritize Equity by Supporting Individuals with Preparedness and Recovery: Residents interviewed for this plan identified that funding for disaster preparedness and recovery may be allocated unfairly, that homes that have been damaged by Harvey are still damaged today, and that certain homes or neighborhoods may be overlooked. It is recommended that community leadership augment the opportunities offered to residents for disaster preparedness and recovery. For example, this change may include expanding the Lighthouse Program, weatherization, or other programs aimed at upgrading homes to better equip them with energy efficiency and insulation and otherwise make them more climate ready. Use community engagement efforts to more effectively provide people with information about and link people to the resources that could serve them.

Facilitate Effective Communication among Different Tiers of Government: This cohesive messaging fosters a productive synergy and reduces confusion for residents. Foster collaboration among government agencies, community-based organizations, and other stakeholders to leverage resources, share expertise, and enhance communication.

Seek Diverse Funding Sources that Can Provide More Opportunities for Individual and Community Preparedness: Planning for resource allocation is crucial, necessitating the identification of potential funding avenues. Inflation Reduction Act and Infrastructure Investment and Jobs Act funding for infrastructure improvement and community development generally carry priority for disadvantaged communities, which encompasses the majority of Port Arthur. At the writing of this report, Port Arthur and its school district have been on multiple priority lists for federal funding competitions for improvements like zero emissions school buses. See Funding in the Appendix below.

Practice Continuous Improvement: Ongoing evaluation of the effectiveness of resilience strategies, allowing for adaptive implementation to be adjusted based on lessons learned and changing climate dynamics. Addressing issues as they arise rather than maintaining the status quo becomes paramount. Continuous collaboration, community involvement, and adaptive management remain pivotal to sustaining ongoing progress.

Prioritizing Resilient and Sustainable Construction/Reconstruction/Housing Practices: Highlighting the importance of thoughtful rebuilding and ensuring safety sustainability in both neighborhoods and homes is critical. The goal should be to expedite rehousing while also prioritizing resilient and sustainable reconstruction practices. This step will help individuals avoid repeat displacement. In certain instances, residents might find it necessary to relocate due to persistent hazards in their current location. This circumstance presents a challenging choice for residents deeply connected to their homes and neighborhoods, bonded through long histories and various ties. In addition, there is the question of how to ensure equity in providing adequate home value to the resident; the market values of the homes in vulnerable areas are systematically driven down, not just due to disaster risk, but due to industry proximity and redlining. It is vital to invest in resilient housing infrastructure that reduces the need for rehousing and ensures critical facilities like hospitals, shelters, and utilities are accessible.

Account for 500-Year Flood Zones: Events like Hurricane Harvey demonstrated the necessity of considering more severe flooding scenarios beyond the standard 100-year recurrence level. Addressing 500-year flood zones, when possible, ensures a more comprehensive and adaptable approach to flood management. However, Jefferson County does not have the 500-year flood plan data. When these data are released, local planning should incorporate 500-year flood zones.

Risk Assessment and Adaptation: Implement a schedule to conduct comprehensive risk assessment to identify coastal hazards and current mitigation practices. Develop strategies and infrastructure improvements that prioritize vulnerable populations and prioritize Nature-Based Solutions. It is important to re-evaluate risks as infrastructure and other adaptation measures are implemented, and as certain hazards change.

Integrate Climate Change Projections: Integrate proactive hazard mitigation and resilience planning by incorporating climate change projections in future coastal development and infrastructure expansion.

Prioritize Nature-Based Solutions: Incorporate strategies centered around green infrastructure to mitigate floods in flood-prone areas and enhance community resilience. By utilizing natural solutions, such as wetlands and permeable surfaces, the community can effectively manage water and reduce flood risks. The Comprehensive Collaborative Coastal Resilience Plan (CCCRP) frames out a strategic path for planning Nature-Based Solutions in Port Arthur.

Upgrade the Drainage System: The drainage system under parts of Port Arthur is already undersized for current storms. This will only worsen in the future when, as shown in Figure 9, by 2050, downtown is expected to receive up to 6.4 inches of rain for its 3-day highest rainfall, and by 2100, this number increases to 7.2 inches.

Job Placement and More Job Training for High Wage Jobs: Expand programs to get more people educated and working. Ensure they are targeted to unemployed and underemployed individuals to help reduce barriers for these residents to access the programs. With more income, a resident has more opportunity in everyday life and more adaptive capacity in a disaster situation. Additionally, job placement programs that incorporate relationship building with large industrial employers may be effective at placing residents from fence line communities and under-represented backgrounds in higher-paying positions, especially if they can circumvent current barriers to entry.

Use Varied Sources for Communication with Community Members: Widely dispersed communication with clear, consistent messaging before, during, and after an emergency is important to help with preparedness, safety, and recovery. Residents need enough information and time to act on it. The survey results indicate a need to focus on multiple pathways of information with an emphasis on getting official information (from TxDOT, the Southeast Texas Alerting Network, the City, or the County) onto television, radio, and social media outlets. The focus on all three pathways will reach more residents than a focus on one pathway, ensuring residents who lack access to one or more of these sources are not missing critical information. One community leader recommended providing a place where people can go to learn about and be enrolled in the programs that would help them with energy efficiency, weatherization, flood resilience, or other efforts that could help protect them or their homes from extreme weather. Lack of access to this information is a hindrance to residents.

APPENDIX A: FUNDING

A crucial aspect to the implementation of the resilience plan is to secure funding that will support the personnel, equipment, and/or resources behind the actions. Project funding can be acquired from a variety of state and federal programs. Typically, funds for projects and program development can be issued in the form of a grant or loan. Some focused funding sources that may be applicable to implementation of the plan are provided in this section. This list is non-exhaustive. In addition to this list, the community may want to review state and federal rebates, equipment rebates, philanthropic grants, SECO grants, Texas PACE loans, and other financing opportunities that could help lower costs of resilience solutions.

Environmental Quality Incentives Program (EQIP)

The Environmental Quality Incentives Program (EQIP) provides financial and technical assistance to agricultural producers. The program is oriented towards conservation and requires contracts up to a ten-year term. The contracts provide financial assistance to help plan and implement conservation practices that can improve water quality.

Section 319(h) Federal Clean Water Act

Section 319 of the Federal Clean Water Act covers the Nonpoint Source Management Program. States are eligible to receive grants that support a variety of initiatives that assess the success of specific nonpoint source implementation projects.

TCEQ Small Business and Local Government Assistance (SBLGA)

The TCEQ Small Business and Local Government Assistance is not in itself a grant program but offers a suite of tools and information to provide confidential assistance to small business and local government without threat of enforcement. The program also provides possible sources of funding and covers air, water and waste environmental issues.

Texas Water Development Board (TWDB) State Loan Program Texas Water Development Fund II (DFund)[76]

The Water Development Fund is a state funded loan program that combines multiple loan opportunities such as water and wastewater into a single loan. The DFund loans can be applied to water supply, wastewater, and flood control projects.

TWDB Rural Water Assistance Fund (RWAF) Program[77]

The TWDB's Rural Water Assistance program allows rural political subdivisions to obtain low-cost financing for water and wastewater projects. The financing is often provided with tax-exempt equivalent interest rate loans that have long-term finance options. This program's funding can be applied to water related projects as well as water quality enhancements that may include planning, design and construction projects such as water treatment plants, wastewater collection and treatment, and nonpoint source pollution abatement.

TWDB SWIFT: State Water Implementation Fund for Texas[78]

The TWDB's State Water Implementation Fund for Texas allows any political subdivision or nonprofit water supply corporation with a project included in the most recently adopted state water plan to apply for funding. Eligible projects include recommended water management strategy projects with an associated capital cost in the most recently adopted state water plan. These projects may include conservation and reuse, desalinating groundwater and seawater, building new pipelines, developing reservoirs and well fields, and purchasing water rights.

TWDB State Participation[79]

The TWDB's State Participation fund allows political subdivisions and nonprofit water supply corporations to apply for funding for planning, design, acquisition, and construction for the excess capacity of regional projects for water supply, including reservoirs, well fields, and water rights, wastewater, and flood control.

Texas Water Development Fund[80]

The TWDB's Texas Water Development Fund allows political subdivisions and nonprofit water supply corporations to apply for funding for planning, design, acquisition, and construction of projects for water supply, including reservoirs, well fields, conservation, water quality enhancement, flood control, wastewater, and municipal solid waste.

[76] https://www.twdb.texas.gov/financial/programs/index.asp
[77] Ibid.
[78] Ibid.
[79] Ibid.
[80] Ibid.

DWSRF: Drinking Water State Revolving Fund[81]

The Drinking Water State Revolving Fund administered by TWDB allows publicly and privately owned water systems, nonprofit water supply corporations, and nonprofit, non-community public water systems to apply for funding for planning, design, acquisition, and construction to correct water system deficiencies, upgrade or replace water systems, consolidate systems, purchase capacity, purchase other systems, implement green projects, implement source water protection projects, or refinance (under limited scenarios).

DWSRF Lead Service Line Replacement (LSLR) Program[82]

The Drinking Water State Revolving Fund Lead Service Line Replacement Program is a combination loan and principal forgiveness program for planning, acquisition, design, and construction of lead service line replacement projects, including initial inventories required to comply with the EPA's Lead and Copper Rule Revisions regulation. Eligible applicants include community public water systems, including political subdivisions, nonprofit water supply corporations, privately-owned community water systems, non-profit/non-community public water systems, and state agencies.

Clean Water Act State Revolving Fund (CWSRF)[83]

The Clean Water Act State Revolving Fund provides low interest rates and flexible terms that are often well below the national market interest rate. The funds provide significant support for nonpoint source pollution control and estuary protection. A multitude of borrowers are eligible to borrow from the CWSRF.

Outdoor Recreation Grants

Managed by the Texas Parks and Wildlife Department, this program provides 50% matching grant funds to municipalities, counties, municipal utility districts (MUD) and other local units of government with a population less than 500,000 to acquire and develop parkland or to renovate existing public recreation areas. There are two funding cycles per year with a maximum award of $500,000. Eligible sponsors include cities, counties, MUDs, river authorities, and other special districts. The projects must be completed in a short-term three-year time period.

Environmental Education Grants (EE)

An EPA program that seeks grant proposals to support environmental education projects that will promote environmental awareness and stewardship. Ideal proposals to receive support include the design, demonstration, or methods and techniques of environmental education projects.

Economically Distressed Area Program (EDAP)[84]

The Economically Distressed Area Program (EDAP) is a TWDB initiative that provides financial assistance to provide water and wastewater services to economically distressed areas where these services are not available, or the current system does not meet the applicable requirements. This funding can be applied to planning, land acquisition design, and construction of first-time improvements to water supply and wastewater collection and treatment works. Grants or a combination of grants/loans are available.

Supplemental Environmental Projects Program (SEP)

The Supplemental Environmental Projects Program (SEP) is overseen by the TCEQ and allows environmentally beneficial projects stemming from the settlement of an enforcement action. The fines, fees, and penalties resulting from environmental violations can be used to support pollution prevention, pollution reduction, and water quality enhancement projects.

Federal Emergency Management Agency Flood Mitigation Assistance (FMA)[85]

Federal Emergency Management Agency Flood Mitigation Assistance is a grant for planning assistance to communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the National Flood Insurance Program (NFIP). Eligible work includes acquisition of insured structures and real property; relocation or demolition of insured structures; dry flood proofing of insured structures; elevation of insured structures; minor, localized structural projects that are not fundable by state or other federal programs; and beach nourishment activities such as planting of dune grass. Eligible applicants include political subdivisions, including any authorized tribal or native organization, that has zoning and building code jurisdiction over a particular area having special flood hazards, and is participating in the NFIP. Communities that are suspended or on probation from the NFIP are not eligible. A community applying for a FMA Project Grant must have an approved Flood Mitigation Plan.

[81] https://www.twdb.texas.gov/financial/programs/index.asp
[82] Ibid.
[83] Ibid.
[84] Ibid.
[85] Ibid.

Federal Emergency Management Agency Severe Repetitive Loss (SRL)[86]

Federal Emergency Management Agency Severe Repetitive Loss is a grant program that provides federal funding to assist states and communities in implementing mitigation measures to reduce or eliminate the long-term risk of flood damage to severe repetitive loss of residential structures insured under the NFIP. Eligible activities include relocation or acquisition and demolition structures; dry flood proofing; elevation; mitigation reconstruction; and minor, localized structural projects. Eligible applicants include political subdivisions, Indian Tribal governments, and state agencies that have zoning and building code jurisdiction over a particular area having special flood hazards and are participating in the NFIP. A community applying for a Severe Repetitive Loss Project Grant must have an approved Flood Mitigation Plan.

TWDB Flood Infrastructure Fund (FIF)[87]

TWDB Flood Infrastructure Fund includes grant funds and loans with 0% interest rates. Funding can be used for flood protection planning for watersheds; planning, acquisition, design, construction, rehabilitation; federal award matching funds; and measures immediately effective in protecting life and property. Upon TWDB adoption of the initial state flood plan, FIF may only fund flood projects in the state flood plan. Eligible applicants include political subdivisions (Categories 1-4), and Council of Governments and certain non-profit water supply or sewer service corporations (Category 1 only).

National Academies of Science, Engineering, and Medicine Gulf Research Program (NASEM GRP)

NASEM GRP funded the development of this plan. The program was developed with funds from a criminal settlement following Deepwater Horizon. Studies, projects, and activities from the program are meant to advance and apply science, engineering, and public health knowledge to help Gulf Coast communities to better plan for and recover from disasters. Implementation of parts of this plan or other efforts to improve climate resilience or health along the Gulf Coast may be funded by NASEM.

Building Resilient Infrastructure and Communities (BRIC)[88]

BRIC supports states, local communities, tribes, and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards. As part of FEMA's commitment to the Justice40 Initiative to instill equity as a foundation of emergency management, in the most recent cycle of projects, FEMA prioritized and selected project sub-applications, which includes tribes, Economically Disadvantaged Rural Communities, and other disadvantaged communities.

Energy Efficiency and Conservation Block Grant Program (EECBG)[89]

The EECBG Program is designed to assist states, local governments, and Tribes in implementing strategies to reduce energy use, to reduce fossil fuel emissions, and to improve energy efficiency.

Hazard Mitigation Grant Program (HMGP)[90]

FEMA's Hazard Mitigation Grant Program provides funding to state, local, tribal and territorial governments so they can develop hazard mitigation plans and rebuild in a way that reduces, or mitigates, future disaster losses in their communities. This grant funding is available after a presidentially declared disaster.

[86] https://www.twdb.texas.gov/financial/programs/index.asp
[87] Ibid.
[88] https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities
[89] https://www.energy.gov/scep/energy-efficiency-and-conservation-block-grant-program
[90] https://www.fema.gov/grants/mitigation/hazard-mitigation

APPENDIX B: COMMUNITY FEEDBACK

Section 1 - Introduction

Is your community represented accurately? Why or why not?

Some residents responded to this question regarding whether the report or community presentation represented Port Arthur accurately. Some residents responded in regards to whether their local government or local news station represents Port Arthur well.

Community members responding "No" and comments:

- I believe that there are certain aspects that were omitted from the description. It is abundantly clear when you look at Port Arthur as a whole that the health issues faced by the community is compounded by the lack of access to a reliable and well-funded healthcare facilities. As well as city government's refusal to speak out.

Locations in Port Arthur that community members identified are under-represented:

- East Port Arthur [is not represented]
- Stores, gas pumps, need signs to designate area. El Vista designated dump sites for homeowners
- El Vista, ditches, the whole city has issues – roads
- Because after Hurricane Harvey our family didn't quality for FEMA housing and some of our neighbors did and we a family of 8 at that time in a tent behind our house, 2 adults + 6 kids in the El Vista area near Port Acres Area.
- No we never heard anything about the things that are happening in the area of Lakeside, Vista Village so on. Who is [the] counselor for this area?
- Why our representative is not visible – City Counselor, Lakeside, Palamor, El Vista, Vista Village
- No one knows about Montrose
- No one knows about Montrose. We are not Port Arthur.
- It is not represented properly in West P.A. Need more involvement to better the conditions on the Westside.
- Who represents [the] Westside community?
- Westside [is not represented]
- It's not because we don't have no support on the Westside of Port Arthur.
- I have two homes, one on West 18th St which is an area that caters only to the refinery and not the residents. My other home is on West Port Arthur Rd and Hwy 73 and all I hear is gunshots and sirens all night long. Wherever there is a lot of rain my home on West 18th St floods because the pumps aren't turned on until the water is removed from the rest of town. My flood insurance at that house, which is smaller, is double the price of my other, larger home.
- Many resources that come into the community goes to the suburbs instead of Inner city.

Comments about the local leadership or persistent problems:

- I feel everyone wants to go with their own ideas instead of working together.
- I feel that the people in charge don't want to work together.
- I feel that we don't come together as a community
- City Governments refusal to play a major role in helping to implement the changes needed
- We not only have the largest refinery in Port Arthur along with 8 plus refineries. It is said the Port Arthur is the poorest city in TX. How can that be, total misrepresentation
- Need more involvement to represent better quality in performance for the community health and wellbeing for families

- We don't have an independent voice. It's difficult to find out when and where to receive resources. Schedule of city services.
- When the mayor or the City council is involved, no.
- Things in my community are sometime handled, but not in a timely manner for the ones that live in my community. So I believe not.
- Our community is under-represented in many areas. housing, job
- Drainage, [a] city like Nederland or Port Neches never floods
- Traffic Bumps -Slow Areas Down - In City debris - Rail over pass -Roads
- Air pollution is terrible. Air creates breathing conditions.
- There is a lot of culture within the City of Port Arthur. I feel like the community doesn't care anymore, the roads are bad. A lot of crime throughout this city. Drugs being sold to young kids now. When will it stop and who's going to stop it?
- My community isn't represented accurately because the good things about Port Arthur are never talked about. The only thing that the news covers is crimes and drugs.
- Stores, drugs.
- All cities need to be broke down
- Things for youth or children

Community members responding "Yes" and comments:

- Well represented: All areas covered regarding equity.
- The plan is diversified for PA.
- It is. Because it sounds similar to my community
- The community is represented accurately.
- Being here made me aware

Comments about local leadership:

- We have people who care for Port Arthur doing their best to fight for what's needed
- Our community is represented well. We have many [voices] that represent our community.
- I feel like it is, we have great leaders that have an open ear to the community concerns and voice our concerns to the right people who has the power to bring change.
- Ok. Always help the people who need the most help
- We have a councilman. The City sends some resources.
- It is represented correctly. We have people that really care about the community.
- I feel that it is, but there is no documentation or [person]. Some areas of the city aren't aware of who [representation] is.

Inconclusive responses:

- Sometime
- Not [sure] need more of meetings like this to be more informed

Are there highlights about Port Arthur that you would like to see included?

Some residents responded to this question regarding highlights about Port Arthur that should be included in the report. Some residents responded with their concerns and what additional support or benefits they would like to see more of in Port Arthur.

Community members responding regarding highlights in Port Arthur that should be recognized in EQUIP PA:

- I would like to see more of the talent that comes from Port Arthur
- Community organizations and social groups came together to fill the void and help citizens
- The weather preparedness plan

Community members responding regarding what is needed more in Port Arthur:

Community Collaboration, Aid:

- All should come together and help those don't have much
- Adding food and clothing pantries to help more families in our area who don't have transportation to get to the ones located more in Port Arthur area.
- It seems like the citizens of [the Westside] of Port Arthur no longer matter.

Air Pollution & Refinery Issues

- Air safety. Refinery effects.
- Air pollution
- Holding the refinery more accountable for violations.

Health & Housing:

The health issues, poor and inadequate housing, physical and mental wellbeing

Roads, Streetlights, and Revitalization

- Upgrades on the streets
- Roads need to be fixed
- Roads fixed
- Better streetlights
- Development of downtown, and streets
- Roads are bad, better streetlights
- Quality of roads very poor
- Fix the roads
- Highlight the revitalization – we are being told it is coming but we are not seeing it. Downtown – everything is out in Midcounty instead of Downtown. Nothing is being brought back. Need more revitalization concentration on Downtown.

Restaurants and Grocery Stores:

- Open up food restaurants on Eastside
- Grocery stores, places to eat
- More grocery stores and fast food places to eat
- Downtown Port Arthur, more restaurants and attraction spots need to built for people to have places to enjoy
- I would like to see the lack of grocery/food options addressed on the Westside of Port Arthur
- More restaurants Westside and Eastside

Businesses:

- Better business all over Port Arthur
- More businesses
- More local jobs for people that actually live in the community

Activities for children:

- More community outreach for our children and activities for them to do
- More to do for the youth
- More playgrounds for kids, more activity for kids
- More for the youth and children to do
- More rec center and activity centers for families and kids
- Entertainment place to take families

Drainage, flooding, water, raising homes:

- Floods on a regular rain day
- The flooding should be looked at especially
- I would like to see the flood issues addressed on the Westside of Port Arthur
- People that live in flood zones - can they get help with rising their house, because flood insurance is so high
- Homes raised on Westside, especially elderly
- Better drainage (2)
- Water drainage needs to be checked and cleaned on a regular basis.
- Better drains East Port Arthur 9th Ave.
- Drainage improvements – floods easily on Westside
- Drainage problems
- Would like to see new infrastructure with the City of Port Arthur water piping system. There seems to be a major problem with pipes breaking year-round and residents constantly going without water.
- Wastewater and sewer infrastructure

Are the issues you experience in Port Arthur represented accurately?

General:

- Somewhat but there were things left out
- My personal experiences have been some good and some bad, luckily I can say that either

Locations:

- Equity should be for everyone. Westside Eastside Lakeside.

Housing:

- We need more housing.
- Lack of housing for displaced citizens

Vulnerable Groups:

- Lack of help and resources for disabled citizens
- There should be more focus on homeless, health care for all

Air Pollution and Respiratory Issues:

- I have really bad asthma, so therefore the air pollution doesn't help me at all when it comes to my breathing.
- More representation in pollution

Lack of Action:

- Many issues that we experience never get taken care of
- Things take too long to get fixed.
- I feel the issues are guidance. The actions are lacking and being more informed
- Same things are happening. no changes
- Depends. City officials no!
- No one wants to spend the money on the right thing
- The issues that I have experienced are not being addressed and I really believe it's due to the fact that the areas are both mainly minority and the Westside is mainly low income.

Flooding:

- Flooding and health hazards
- We still flood it's an ongoing issue that never seems to be taken care of

Roads:

- I think that the roads need to be redone. The roads that are getting fixed don't even need to be fixed.
- Roads never fixed.
- There should be more focus on roads
- The streets are a major problem – upkeep is not happening – damaged through multiple storms, freezes, traffics (refineries), not kept up, not maintained. The temporary fixes don't help at all.

Local Industry:

- The refineries are not reflected accurately – they do a lot to help the communities financially – do a lot to help the community.

Would you like to share anything else about this section? Is there anything missing in this section?

Equity concerns:

- Equity – Balance of city resources and National Resources into City
- Equality – fair treatment across all lines. Financial, racial, address, community relations, resources
- If everyone can come together and be on one accord and stop the confusion and respect each other opinions. Every voice adds all about coming together
- Equity should be for everyone, westside, eastside, lakeside, downtown
- Port Arthur has a lot of parts like Westside and Eastside of Montrose and more
- Communicating with the elderly better when we don't have smart phones, computers

Additional concerns in Port Arthur:

- List of possible City resources, so the citizens will know what is available from the City and State. A website or phone number
- Better leadership overall
- Better schooling, more funding in schools

- Better schools
- More participation in the youth community
- Jobs for resident
- Completion of levee, city development, more local jobs
- Drainage should be clean on a regular basis. Create jobs for people to check drainage and clean regular.
- I have always felt safe in the Westside of Port Arthur but once I moved from West 5th to West 18th I had to constantly deal with flooding.
- Ditches, Trash pickup
- I think that they should fix the roads on the westside of town
- I think they should fix the holes in the roads
- Hurricanes have really impacted us throughout the years and hurt us.

Section 2 - Port Arthur Risks

What did this section tell you about the risks in your community?

General:

- That if we don't make a change, and get in a hurry the fight will be lost.
- The risk needs more attention in discussing how to better the community
- Getting more protection
- Needs lots of work – who is suppose to get the work started

Levee, Drainage, Storm Models:

- If the levee breaks we are going to flood, bad sewage problems
- Water pump system
- Verifies the lack of drainage capacity
- Our draining system is very poor. They need to turn the pumps on ahead of time
- It shows me that Montrose needs a lot of pumps and a lot of help.
- That I may have to move or raise my house
- Storm models – flood models
- Flood water need lot work to fix
- That those maps have not been updated for a long time. So we are still at risk for homes. Talked to insurance and asked them why they haven't been updating the map because we may be overpaying. Since the drainage and pumps have been updated there has not been an update on the insurance that reflects it.
- Levee, Drainage, Storm Models, Future Risks
- Told us about the levee that's to be completed by 2026. Drainage system. Storm models and future risks: Rising Temperature
- Levee completed by 2026. Drainage system undersized for modern rain fall, storm models future risks
- It state three main risks in PA: Levee, storm models, drainage systems

Climate Change and Rising Temperatures:

- Climate change
- Climate change risks, disruptions
- Climate change is making it hotter

Wetland Loss from Sea Level Rise:

- Nature is playing a part
- Wetlands are disappearing leaving us open to more flooding.
- With the sea level rising we will be more prone to flooding.

Local Industry:

- Future risk – air pollution
- The risk in my community is high because of the refineries

Are there any risks that are missing? What are they?

Disaster & Recovery Issues

- No rescue units
- Lack of Unified Emergency Rescue Team and Resources
- Lack of building supplies
- Lack of building supplies...to start over after disaster

Flooding, Drainage, Levee:

- Water being pumped from other areas into certain areas up Port Arthur
- We need more pumps and a way to get out.
- The control of water levels – need to be controlled early to prevent over-flooding to residents to have to start over the after math to repair
- We need better water system drainage
- Yes, Flood with low rainfall
- Westside when it rains
- Standing water – causes erosion. Better drainage.
- Flooding getting worse in the last few years, keeps getting worse. When it rains it floods.
- The height of the levee

Pollution & Local Industry Issues:

- Yes heavy smoke year after year that has been inundating our homes either from local marsh fires or either from our neighboring state of Louisiana (Cameron Parrish) Major problem and health hazard.
- Air Pollution
- Pollutions stemming from the refinery and chemical plants.
- The runoff from the plants. A pump was put on the tank farm that led water from their plant onto the Montrose neighborhood. Tank farm located near Montrose during Hurricane Harvey. Exacerbated flooding and made it worse. Residents have pictures of them doing that.

» Refineries taking over and running the residents out of the neighborhoods. It's bad enough that they city has an overabundance of low income housing complexes but if people are forced out of the affordable housing in the neighborhoods they will have to leave the city all together for the quality of life that they are accustomed to.

Additional Issues:

» The youth children

» Communication, Public Information

» We need better electrical

» We need better roads

» I would like to see the money really spent on the things that need attention

Do you feel prepared for climate risks in Port Arthur? Why or why not?

No and reasons why:

» No!!!! We have to rely on the news for information but no one is providing an action plan

» Harvey caught me in bed @ 2:00 am, Not fully aware of situation by News and Weather

» Lack of education from the city. No well-known information center

» Because I am not educated in climate change or the resources to prepare for it

» Need more information

» Need more information about how to prepare

» Need more measures in place to help protect us

» Because of the fact enough people don't work together.

» It is going to get hotter, colder each year.

» Summer too hot most time any kind of weather

» No sometime /too hot most time

» Not for flooding

» Because I live in a flood zone

» We will flood in unrepresented communities. The massive loss of homes in El Yisza and Westside Port Arthur.

» Because we can't know how much rain we will get

» We are not prepared for climate risks in Port Arthur. We need better drainage

» Due to poor infrastructure, income limits

» I am not because it takes money and I don't have any

» We don't have enough assistance with evacuations and aid to assist with dislocated people.

» Not really Port Arthur has a lot of work to do things are not safe.

Somewhat and reasons why:

» Somewhat

» Somewhat but you can't stop Mother Nature, especially water

» The risk depends on the amount the climate when

» Kind of, but also feels confusing because it seems so much different now for example. As prepared as I can get, I probably can't afford it. The federal government requires flood insurance, and residents in the area are poor and cannot afford it. Help won't be given if they don't have insurance.

» Yes/no because of the lack of leadership on the risks and no stronger voices from our local government the citizens and the future of Port Arhtur will not be here long.

Yes and reasons why:

» With the current knowledge that I have learned I feel prepared for climate risk specifically in my area. I know how to handle a climate change due to current and past living situations.

» As much as you can be. It's a big disruption.

» I feel that if it was broadcast more before the bad weather comes that would be more beneficial for everyone

» I do feel prepared for climate risks because it's nothing that we haven't dealt with already.

What changes would you like to see to better prepare you and your community for these risks?

Information/Communication:

» Information Campaign

» I would like to see more time ready preparedness. Instead of last-minute information release.

» Information Campaign. Facebook, email blast, commercials

» Communication

» Better communication to the people so we know what we need to do

» Simply more alerts and planning before hand

» When people were evacuating the Nederland and groves. Their mayor and officials told them to leave. Would like to see a quicker response from the city officials similar to Nederland Texas.

Collaboration:

» For everyone to come to speak up so every voice can be heard

» More discussions to handle any type of condition

» In case of emergency climate changes I would like for the community to be more helpful than selfish. If people would be more considerate it would be easier for people to adjust to change.

Drainage, Infrastructure:

» I would like to see the drainage system upgraded, better roads

» Water pumps need to be turned on sooner

» Fix the wetland, Continue to improve drainage around PA. Work on Pump equipment

» Raise the levee and more pumping stations

» Better pumping so we don't flood in the Lakeside area

» Drains installed, being local and next to ditch, Sea level rising

» Drainage is the main thing. We heed the warnings when there are storms and we need to evacuate. Consensus on drainage – definitely drainage. You can't get out of your driveway because the corners of the streets are flooded – have to wait hours or maybe days to get out. After Hurricane Rita, flooding is happening more often/more easily, getting into a person's house, ripping up carpets again.

» Montrose is a high risk according to the map

» Improve the infrastructure. Complete one project before starting another. Address the flood prone areas first. Provide shelters. During Harvey people were taken to the Civic Center which flooded and destroyed people had to be moved elsewhere. Find a place where people would actually be safe

Financial Assistance, Grants, Affordability:

- More grants in place to help us prepare
- Disaster preparation prior to – proactive resources in place (Basic, beforehand)
- Emerging Disaster fund
- Federal, state, local initiatives sounding the alarm and funding real solutions projects now.
- More resources to help with the cost of utilities for the heat waves and cold fronts
- More financial assistance, food aid and housing needs available to assist our dislocated community people.
- We residents of Port Arthur need help with the high cost of Windstorm insurance and flood also. The high cost is far too much for low-income residents.
- As a community, we are not prepared. We don't have the manpower for one to handle the issues we have now. The stores we have don't have enough supplies, and most of our elderly simply can't afford the supplies.

Other:

- More regulations

Would you like to share anything else about this section? Is there anything missing in this section?

- Port Arthur could be great if we would stand together and not against each other. Too much confusion and negative.
- To update the drainage system
- Once it starts flooding, there isn't anything we can do. Once the flooding begins we get flooding from Beaumont that comes to us too. Montrose is the lowest area being so low. Montrose is considered a bowl. What would and could we do to stop the water from settling naturally in the Montrose. What would it take to fix that? Are we going to always lose everything each flood event. More communication on that/ buy outs needs to be brought up if no solution

Section 3 - Community Engagement and Resilience

What do you think may be causing some of the disparities that residents reported they have experienced?

Equity Issues & Vulnerable Residents:

- Poor Neighborhoods
- Economic inequity
- The economic inequity is definitely a large issue. It keeps residents from being able to purchase the desired technology necessary to be able to fight through power outages.
- Disadvantaged citizen can't get resources
- System Racism, income bracket, lack of equity
- Not really concerned with people of a difference race, sex, or other different groups
- People may have been treated unlike others based on demographic.
- Not enough people that cares about the community and elderly
- Not enough people that's in place that actually cares about the elderly
- Some difficulty for medical devices getting to shelter.

Flooding & Lack of Preparedness:

- Natural disasters and lack of preparedness
- Our community is not protected well when it comes down to flooding from storms and hurricanes
- Lack of FEMA immediate response, leadership, areas of the city, flooding
- After Hurricane Harvey some of our neighbors received help that our family could not and we were in a tent with 6 kids and no transportation. One of our neighbors was already back in their house and still received a FEMA trailer and we were in a tent and still struggling to get back into our house.
- Accommodate ways to improve flooding – have the best equipment to take care of situation
- Flooding homes
- Food, water, transportation if possible

Energy:

- Power outages may be caused due to outdated transformers and wires
- Lack of concern for the life, liberty, and pursuit of happiness of Port Arthur citizens, as well as affordable solar, wind, and other clean energy sources.

Local Industry & Pollution:

- More safety in the operation of chemical plants.
- Odor unexpected release - More early planning
- Refineries are releasing chemicals that are messing our cars
- Health risk, pollution with chemicals from the refinery and chemical plants and mosquitos are an issue as well.

Other:

- Trash pickup, roads
- Favorite special people
- People not reporting to the right agency when they report not getting any response
- Lack of commerce, not many businesses here
- We went to Lufkin, but a lot of people had their tablets to get information from their tablets. From social media/ Facebook there's only so much information
- Location! If you aren't in the Mid-county area you don't matter. No one seems to care about South County

Are there any major concerns in the community that are missing?

General:

- Every aspect in Port Arthur
- Cities need to stand up and take responsibility for their own actions and take pride in our community and it would be a much better place

Trash:

- Trash pickups
- Trash pickup (Disaster Debris), Contractor Accountability (City Enforced), Community Scammers (from out of town), Stealing of Property (Displaced Citizens)

Roads & Lighting:

- Yes, Insufficient lighting in our neighborhoods & streets
- Fixing our roads and infrastructure where needed first.

Trees:

- Broken Trees, trees falling blocking roadways and driveways
- Dead trees need to be removed before storms

Emergency Resources and Awareness:

- Not knowing where to go during an emergency for services, etc
- Not knowing where emergency services are
- Outreach to the elder pre- and post-disaster for preparation and recovery resources, don't do much internet or cell
- Where is the designated shelter for the West side of PA? A lot of unanswered questions for the West side of PA.
- Make people more aware of the programs that they have. A lot of people aren't aware. They [used] to have meetings before the storms under the previous mayor, had meetings in west Port Arthur road at the center, and then at the civic center. Preparedness meetings. Need to bring those in person preparedness meetings back.
- Need more preparation for the senior citizens. Need to make it available for senior citizens. Senior citizens and those with mobility/access issues are left out.
- A group during Harvey sent out trucks out with soda, sandwiches links out, bring back that. They helped out with cleaning from the storm effects and gave out food.

Housing & Recovery Issues:

- Many abandoned homes on the Westside that need to be demolished.
- Abandoned homes, overgrown trees, lack of FEMA after the storm
- Fair Housing
- Need property repairs, through government grants instead of government loans, especially for older people with no insurance
- People need help with foundation problems and roofing for the elderly. Need funds

Equity Issues:

- Elderly left alone, need someone to knock on doors to check
- I believe that some people are treated unfairly based off a number of things. As a resident and being a firsthand victim, I know that change has come but not indefinite. Poorness and oppression still pose the biggest threats to our everyday society.
- We did not have enough recognition in our area to get the help we needed
- Our area really needs more help with food and clothing pantries for the residents that can walk or ride a bike to receive this help. We need some roads fixed in our area as well. We also need more grocery stores and businesses in the El Vista and westside areas.

Education & Economic Development:

- Job creation/Job training
- Education trade schools
- More local business

Energy:

- Entergy – Westside – problem – low powerlines, need to be raised, major concern
- Power Outages – Entergy is really good about getting it back up within an hour.
- We have problems on the Westside of PA with power outages and the response time has not been that great. Sometimes it can be 24 hours, sometime 48 hours. They've started replacing electrical wires recently, so we will see if that has an impact.

Would you like to share anything else about this section? Is there anything missing in this section?

- Let's strive to make Port Arthur great. We can do it.
- We need fairness in all accounts
- Share the news help others
- Our streets are rough, too many potholes tearing up peoples tires.
- Shelters: initial lack of resources, inconsistence with rules, treatment by those in charge - sometimes negative, uncertainty of where shelter would be available – constant threat of having to leave
- FEMA need a better response time
- Power outages – constant even when weather is nice

Section 4 - Recommendations

Do you have any concerns about these recommendations? Do you see any hurdles or possible issues that might make them difficult to implement?

Community members responding with hurdles and issues:

- Late information given to the community
- Will there be enough funds allocated to handle the concerns brought forward?
- Port Arthur can be a really clean community if it would clean our air and stop putting pollution and dumping toxins in the community
- Government/city officials funding/discrimination per area code
- Lack of finances, committed organization with funding (not the city)
- More diversity reinforcing, keep evaluating risks, update drainage
- Equity for everyone (housing)
- I see no problem the community can't fix if the community stands together. Difficult for few, but easy for all.
- Seeing how it will be implemented in a way to truly help those in need and hold those in power accountable/ Accountability for proper assistance for those in need
- My concern is that if we don't come together, network, and collaborate we will always be in each other's way
- Being treated fairly
- Have resources available
- Communicating
- Fixing the roads, widening some of the smaller side streets
- City officials taking the funds for other things rather than the community and elderly

- Hurdle: Financial Piece. Does PA have the money to make these implementations happen?
- No, all of the solutions seem straight to the point. Communication is vital. People need to know what they need to do before and after emergency events/climate events.
- The refineries are trying to close down streets which will make it harder to navigate in the event of real emergencies. From the west side of Port Arthur there are only so many ways to evacuate residents in the case of flood, problem at one of the refineries, etc

Do you have recommendations for what is needed in the community to better prepare for disasters that aren't included already?

Community members responding "No" and comments:

- No, but update drainage
- Not really as long as we can be equipped with the things we need and the right safety precautions are taken, we should be prepared.

Community members responding "Yes" and comments:

- Get information out early and to everyone in the community
- Generators
- It has to come to a stop and we have to stand up for it... Everyone matters
- There needs to be a section or place to get all this information
- Better awareness, better communication, better support to return home after a disaster
- Funding for grass-rooted organization (in each community), who can help pass out resources, community advocates (law, health in crisis to help get finances)
- Voting turnout for right person to help people equitably
- Emergency relief fund – funded by areas
- Protect industries (oil and gas)
- I think the city should plan to build a huge shelter up off the ground and have it set up to separate from single men and women so it's safe for families and women. I feel this would be good because we evacuated to the civic center and not even 30 mins the civic center flooded.
- A disaster relief council for multiple neighborhoods that can continuously communicate with government officials as well as organizations who are in place to help those in need. So when disaster happens they know exactly who to help and how faster and simpler.
- Transportation and reliability of our city officials
- Planning
- Improving the city throughout
- Helping people more they may not understand how to go about getting the help they need
- On a frequent basis come out to evaluate in person to make assessments with community outreach.
- Communication – where to go for information
- More evacuation plans, so that people won't have to worry as much about power outages.
- Would like to have community meetings regularly/from time to time. To communicate with the officials what is on the citizens minds and what their concerns are. Montrose is a small community but. Usually have meetings with the council for the area, then the rest.
- Need more streetlights.

Would you like to share anything else about this section? Is there anything missing in this section?

Community members responding "No" and comments:

- No. But we must work together!!!
- Enjoy it as a whole very informative
- Be prepared better than last minute is important, having more meetings and put in plan beforehand so that the community can be prepared
- More preparation, less reactions.

Community members responding "Yes" and comments:

- We shall overcome one day.
- Placing all this information in a central location, facebook, email, etc.
- An improved process to make sure that people who are not as financially stable as others are appropriately represented and assisted
- Updated drainage
- Job training
- Better and more organized alerting systems for residents, industrial events, and climate disasters
- Better communication. With the tank farms when there are emergency events. Sirens/ and emergency procedures need to be implemented. The citizens throughout Montrose cannot hear when there is an emergency, only the workers.
- A lot of these can't withstand another flood/storm. Some of those houses should have been rebuilt. What do those people do without a home? If another storm comes, they will be displaced. About a month ago when the occurrence happened with the tank alarm notifying, that said "emergency evacuate", and then said "all clear" 15 minutes after the notification that was given. Who is that speaker for? If all residents of Montrose cannot hear it. Our lives are not worth enough to have the community members and all of the community to hear.
- Better communication between local governments, industry and citizens
- As soon as they get access to the 500 year floodplain the local officials should act fast.

February 2024

National Academy of Sciences Agreement 2000013193

Equity Informed Climate Resilience Plan in Port Arthur, Texas

Executive Summary