The city of
Southside Place
Texas

City of Southside Place, Texas
Hazard Mitigation Plan

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Prepared by:
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Chapter 1: Introduction and Background

On October 30, 2000, the Disaster Mitigation Act of 2000 (DMA2k) was signed into law. Among its other features, DMA2k established the requirement that in order to be eligible for federal mitigation grant funding, local governments must develop and adopt local hazard mitigation plans. On February 26, 2002, the Federal Emergency Management Agency (FEMA) published an Interim Final Rule (IFR) that set forth the guidance and regulations under which such plans were to be developed, reviewed, and approved. The IFR provided detailed descriptions of both the planning process and the required contents of the plan. The IFR requirements were later codified at 44 CFR, §201.6. This plan responds to those requirements.

1.1 Plan Purpose Regulations

The requirement to have a local mitigation plan is detailed in 44 CFR, §201.6. The local mitigation plan is the physical manifestation of the jurisdiction’s commitment to reduce risks from natural hazards, serving as a guide for decision makers as they commit resources to reducing the effects of natural hazards. Local plans also serve as the basis for the State to provide technical assistance and to prioritize project funding.¹

A sub-recipient must have a mitigation plan approved in order to receive Hazard Mitigation Grant Program (HMGP) project grants. A sub-applicant must have a mitigation plan approved in order to apply for and receive mitigation project grants under all other Hazard Mitigation Assistance (HMA) programs.²

1.2 Background and Scope

This hazard mitigation plan is the inaugural hazard mitigation plan for the City of Southside Place, Texas (the City). The City has experienced repeated occurrences of natural hazards in recent years, most notably from Hurricane Harvey in 2017. These experiences led the City to determine that it was in their interest, and in the interest of the mission and community that they serve, to undertake the work necessary to identify, prioritize, and mitigate their own risks and vulnerabilities.

The City commissioned the development of this plan primarily to allow them to apply for and receive federal hazard mitigation grant funding, but also to provide them with a studied blueprint that may be used to guide their hazard mitigation efforts. This inaugural plan was developed in 2021, and covers only the people, assets, and resources of the City. In the future, the City will investigate and consider re-joining larger planning efforts, such as the Harris County Multi-jurisdictional Plan, to allow for more comprehensive planning and strategy implementation.

1.3 Organization of the Plan

Federal regulations require specific content of local mitigation plans, including:

- Documentation of the planning process;
- A risk assessment that provides the factual basis for activities proposed to reduce losses from identified natural hazards;

¹ 44 CFR, §201.6
² 44 CFR, §201.6(a)(1)
City of Southside Place, Texas Hazard Mitigation Plan

- A mitigation strategy that provides the community’s blueprint for reducing potential losses identified in the risk assessment;
- A plan maintenance process; and
- Documentation that the plan has been formally adopted by the governing body of the community.  

In support of these requirements, this plan is organized in the following manner:
- Chapter 1 – Introduction and Background
- Chapter 2 – Planning Process
- Chapter 3 – Community Profile
- Chapter 4 – Hazard Identification and Risk Assessment
- Chapter 5 – Capability Assessment
- Chapter 6 – Mitigation Strategy
- Chapter 7 – Plan Monitoring and Maintenance
- Chapter 8 – Plan Adoption and Approval
- Appendix A – Plan Adoption and Approval Documents
- Appendix B – Meeting Documentation
- Appendix C – Public Outreach Documentation
- Appendix D – Asset Listing

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3 44 CFR, §201.6(c)
Chapter 2: Planning Process

2.1 Planning Process Regulations
44 CFR, 201.6(b) provides the requirements related to the planning process for local mitigation plans.

An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process must include:

- An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
- An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and non-profit interests to be involved in the planning process; and
- Review and incorporate, if appropriate, of existing plans, studies, reports, and technical information.\(^4\)

Additionally, the plan must include documentation of the planning process used to develop the plan, including how it was developed, who was involved in the process, and how the public was involved.\(^5\)

2.2 Overview of Hazard Mitigation Planning
This plan was initiated during a global pandemic, one in which the ability to safely conduct traditional plan development activities – such as workshops and in-person meetings – was not available to the planning team. To ensure the necessary activities could occur, and that the resulting plan would comply with all regulatory requirements, an alternate plan development methodology was established by the City.

The planning team determined that it was possible to effectively and efficiently conduct all necessary plan development activities – such as Planning Committee Member input sessions and public comment periods – remotely, via email, internet announcements, and virtual meetings. This alternate methodology allowed for the completion of all regulatory elements of the plan while keeping all members of the planning team safe and their risk of exposure to the virus minimal.

2.3 History of Hazard Mitigation Planning in Southside Place
This is the inaugural hazard mitigation plan for the City, but it is not their first effort at planning for emergencies and disasters. The City has developed and maintains a number of emergency, threat, and disaster-related planning efforts, include:

- 2002 Comprehensive Plan
- Damage Impact Study for EM-3530

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\(^4\) 44 CFR, §201.6(b)
\(^5\) 44 CFR, §201.6(c)(1)
These plans, while not specifically related to this natural hazard mitigation plan, establish that the City is well versed in hazard and risk planning, and that they clearly understand the necessity and importance of not only developing these plans, but of maintaining, updating, and exercising them, as appropriate. This experience of planning and plan maintenance will carry through to this hazard mitigation plan.

2.4 Preparing the 2021 Plan
This sub-section details how this plan was developed, the participants in the plan development process, and the data and documentation that informed the development of this plan.

2.5 Planning Team
All members of the planning team are current employees or leadership of the City. The members were selected to ensure a broad range of knowledge and experience, as well as an array of perspectives, would be brought to the plan development process.

The long time City Manager, David Moss, served as the primary point of contact for plan development.

The following table provides the membership of the Planning Committee.

<table>
<thead>
<tr>
<th>Member Name</th>
<th>Member Title</th>
<th>Member Email Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>David Moss</td>
<td>City Manager</td>
<td><a href="mailto:citymgr@southside-place.org">citymgr@southside-place.org</a></td>
</tr>
<tr>
<td>Don McCall</td>
<td>Police Chief</td>
<td><a href="mailto:dmccall@southside-place.org">dmccall@southside-place.org</a></td>
</tr>
<tr>
<td>Steve Kenney</td>
<td>Public Works Director</td>
<td><a href="mailto:publicworks@southside-place.org">publicworks@southside-place.org</a></td>
</tr>
<tr>
<td>Ulissess Serrano</td>
<td>Fire Chief</td>
<td><a href="mailto:firechief@southside-place.org">firechief@southside-place.org</a></td>
</tr>
</tbody>
</table>

Additionally, the City solicited input from the neighboring communities of West University Place and the City of Bellaire. Emails were sent to the Fire Chief/Emergency Management Coordinator for West University Place and the City Secretary for Bellaire, requesting input on the plan development process.

<table>
<thead>
<tr>
<th>Stakeholder Name</th>
<th>Stakeholder Title</th>
<th>Stakeholder Entity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chief Aaron Taylor</td>
<td>Fire Chief/Emergency Management Coordinator</td>
<td>City of West University Place</td>
</tr>
<tr>
<td>Tracy Dutton, TRMC</td>
<td>City Clerk</td>
<td>City of Bellaire</td>
</tr>
</tbody>
</table>

Both stakeholders contacted acknowledged receipt, but neither had additional information to add to the City of Southside Place’s plan development process. As there are limited other stakeholders in the City of Southside Place, no other stakeholders with an interest in the process were identified for contact and input.
2.6 Planning Committee Coordination
The following table provides an overview of the coordination and activities of the Planning Committee. All coordination and activities were remote/virtual/conducted via email, due to the pandemic. Documentation of these efforts can be found in Appendix B.

Table 3: Planning Committee Coordination

<table>
<thead>
<tr>
<th>Coordination Period</th>
<th>Coordination Methodology</th>
<th>Meeting Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>October 29, 2021</td>
<td>Virtual</td>
<td>Kickoff meeting to identify and define the Planning Committee Member activities and data/documentation needed for plan development, and to review the plan development process and timeline; Hazard identification exercise completed by members of the Planning Committee</td>
</tr>
<tr>
<td>November 04, 2021</td>
<td>Virtual</td>
<td>Qualitative risk assessment exercise and validation of proposed strategy goals/objectives completed by all members of the Planning Committee</td>
</tr>
<tr>
<td>November 09, 2021</td>
<td>Virtual</td>
<td>Review and concurrence of proposed mitigation strategy by all members of the Planning Committee</td>
</tr>
<tr>
<td>November 09, 2021</td>
<td>Email</td>
<td>Issuance of initial draft of plan to Planning Committee members for review and comment (conducted via email)</td>
</tr>
</tbody>
</table>

2.7 Public Involvement in the Planning Process
The following table provides an overview of the involvement of the public in the planning process. Documentation of these opportunities can be found in Appendix C.

Table 4: Public Involvement Overview

<table>
<thead>
<tr>
<th>Date</th>
<th>Meeting Methodology</th>
<th>Description</th>
<th>Plan Stage (Draft or Final)</th>
</tr>
</thead>
<tbody>
<tr>
<td>November 09, 2021</td>
<td>Virtual</td>
<td>Announcement of public review and comment period</td>
<td>Draft</td>
</tr>
<tr>
<td>November 09, 2021</td>
<td>Email</td>
<td>Request for external stakeholder review and comment sent to cities of West University Place (Emergency Management Coordinator/Fire Chief) and Bellaire (City Clerk)</td>
<td>Draft</td>
</tr>
</tbody>
</table>

No comments were received, either from the public or from the external stakeholders.

2.8 Plans, Reviews, Studies, and Data Used in Planning Process
The following table provides the listing of documents and data used to develop this plan.
# City of Southside Place, Texas Hazard Mitigation Plan

## Table 5: Data and Documents Used for Plan Development

<table>
<thead>
<tr>
<th>Authoring Agency</th>
<th>Source Title</th>
<th>How Utilized in Plan</th>
<th>Section of Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southside Place</td>
<td>Comprehensive Plan</td>
<td>Informed as to planning history, established priorities and procedures, and areas of concern</td>
<td>Community Profile, Hazard Identification &amp; Risk Assessment, &amp; Mitigation Strategy</td>
</tr>
<tr>
<td>Southside Place</td>
<td>Phase II ESA for Bellaire Boulevard Project</td>
<td>Informed as to planning history, established priorities and procedures, and areas of concern</td>
<td>Community Profile</td>
</tr>
<tr>
<td>Southside Place</td>
<td>Stormwater Management Plan (2014)</td>
<td>Informed as to planning history, established priorities and procedures, and areas of concern</td>
<td>Community Profile, Hazard Identification &amp; Risk Assessment, &amp; Mitigation Strategy</td>
</tr>
<tr>
<td>Southside Place</td>
<td>Drainage &amp; Flooding Mitigation Strategy (2020)</td>
<td>Informed as to planning history, established priorities and procedures, and areas of concern</td>
<td>Community Profile, Hazard Identification &amp; Risk Assessment, &amp; Mitigation Strategy</td>
</tr>
<tr>
<td>Southside Place</td>
<td>Auden-Edloe-Harper Drainage Improvement Project plans, studies, and grant applications</td>
<td>Informed as to planning history, established priorities and procedures, and areas of concern</td>
<td>Community Profile, Hazard Identification &amp; Risk Assessment, &amp; Mitigation Strategy</td>
</tr>
<tr>
<td>Southside Place</td>
<td>Auden Street Drainage Improvement Project plans, studies, and grant applications</td>
<td>Informed as to planning history, established priorities and procedures, and areas of concern</td>
<td>Community Profile, Hazard Identification &amp; Risk Assessment, &amp; Mitigation Strategy</td>
</tr>
<tr>
<td>Harris County</td>
<td>Harris County Multi-Hazard Mitigation Plan (2020)</td>
<td>Informed as to hazards, risks, vulnerabilities, and mitigation strategies for the communities surrounding the City</td>
<td>Community Profile, Hazard Identification &amp; Risk Assessment, &amp; Mitigation Strategy</td>
</tr>
<tr>
<td>State of Texas</td>
<td>State of Texas Hazard Mitigation Plan (2018)</td>
<td>Informed as to hazards, risks, vulnerabilities, and mitigation strategies for the communities surrounding the City</td>
<td>Community Profile, Hazard Identification &amp; Risk Assessment, &amp; Mitigation Strategy</td>
</tr>
<tr>
<td>NFIP</td>
<td>Policy, Claims, &amp; RL/SRL Data</td>
<td>Informed as to hazards, risks, vulnerabilities, and mitigation strategies for the communities surrounding the City</td>
<td>Community Profile, Hazard Identification &amp; Risk Assessment, &amp; Mitigation Strategy</td>
</tr>
<tr>
<td>NOAA</td>
<td>NCEI Storm Event Database</td>
<td>Informed as to hazards, risks, vulnerabilities, and mitigation strategies for the communities surrounding the City</td>
<td>Community Profile, Hazard Identification &amp; Risk Assessment, &amp; Mitigation Strategy</td>
</tr>
</tbody>
</table>

The preceding table comprises the primary published sources of data used for the development of this plan. Other sources of data and information from web-based sources may be noted throughout the plan.
Chapter 3: Community Profile

3.1 General Overview of the Community
The City of Southside Place (the City) is a political subdivision and is an independent reporting entity as defined by the Governmental Accounting Standards. The policy-making functions of the City are the responsibility of the City Council and Mayor, and are implemented by the City Manager and staff.

The City is located completely within Harris County, Texas, and serves a population of approximately 1,835 as of the 2020 Census. The City is located in the Texas 7th Congressional District.

The City has a land area of 0.2 miles², and is surrounded by the cities of Bellaire, Houston, and West University Place. The City is completely built out, and does not expect any future development.

3.2 Population
The median age of residents is 39.7 years, and 76.3% of the population speaks only English at home. Almost half of the City’s residents have a graduate or professional degree, and more than 80% of residents use private transportation to commute to work, with another 5.4% working from home.

3.4 Local Economy
The residents of the City are employed predominantly in two fields, according to the US Census Bureau:

- Educational services, and health care and social assistance (31.7%)
- Professional, scientific, and management, and administrative and waste management services (25.1%)

As the City is almost entirely comprised of residential and government structures, the overwhelming majority of the City’s residents that do work do so outside of the City.

3.5 Assets
The City of Southside Place is very small, occupying only .2 mi². As such, the City owns/operates four assets, all of which are critical to City operations. The table below details these assets.

<table>
<thead>
<tr>
<th>Asset Name</th>
<th>Asset Type</th>
<th>Asset Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>City Hall/EOC</td>
<td>Government; Emergency Services</td>
<td>Public Safety (police); Fire Response Center; 911 Center; Sleeping quarters for public safety personnel</td>
</tr>
<tr>
<td>Water Plant</td>
<td>Utility</td>
<td>Water production (ground and surface)</td>
</tr>
</tbody>
</table>

---

7 Southside Place city, Texas. Retrieved 10.29.21 from https://data.census.gov/cedsci/profile?g=1600000US4869272
8 Southside Place city, Texas. Retrieved 10.29.21 from https://data.census.gov/cedsci/profile?g=1600000US4869272
A critical asset provides services and functions essential to a community, especially during and after a disaster. Examples of critical facilities requiring special consideration include:

- Facilities that are designated as shelters or for other post-event emergency use
- Drinking water and wastewater treatment plants
- Structures or facilities that produce, use, or store highly volatile, flammable, explosive, toxic, and/or water-reactive materials

For the purposes of this hazard mitigation plan, all City-owned/operated assets are considered to be critical.

3.6 City Public Education/Outreach Capabilities

The City routinely provides information related to natural hazards to their residents and visitors, via a number of platforms, include the City’s website, postings at City hall, and through public discussion at City Council meetings.
Chapter 4: Hazard Identification and Risk Assessment

4.1 Hazard Identification and Risk Assessment Requirements

44 CFR, 201.6(c)(2) provides the requirements related to the hazard identification and risk assessment for local mitigation plans.

The plan must include the following:

- A risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards. The risk assessment shall include:
  - A description of the type, location, and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.
  - A description of the jurisdiction’s vulnerability to the hazards that can affect the jurisdiction. This description shall include an overall summary of each hazard and its impact on the community. The plan should describe vulnerability in terms of:
    - The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas;
    - An estimate of the potential dollar losses to identified vulnerable structures and a description of the methodology used to prepare the estimate; and
    - A general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.
  - A description of all structures insured by the National Flood Insurance Program (NFIP) that have been repetitively damaged by floods. Include explicit statement as to whether the community participates in the NFIP and complies with the NFIP regulations. Include a table of repetitive loss property information along with a table for the NFIP claims/losses.

4.2 Natural Hazards that Can Affect the Community

In accordance with the requirements of the Interim Final Rule, all hazards with potential to affect the City were considered in the development of this plan.

Various national, regional, and local sources were used to identify and classify different hazards for the City. The criteria used were:

1. **History** – incorporating historical accounts and records that the hazard has affected the City in the past, and that the hazard has occurred often and/or with widespread or severe consequences.
2. **Potential for mitigation** – acknowledging that there are ways to address the hazard, and that the methods are technically feasible and have the potential to be cost-effective [i.e. mitigation measures are available at a reasonable cost, and damages to property, lives and/or community functions would be reduced or eliminated.]
3. **Presence of susceptible areas or vulnerability** – indicating that the City has numerous facilities, operations, or populations that may be subjected to damage from the hazard.

4. **Data availability** – demonstrating that sufficient quality data is available to permit an accurate and comprehensive risk assessment.

5. **Federal disaster declarations and local emergency declarations** – noting that the City has been part of a federal disaster declaration for the hazard.

To determine the possible natural hazards that can affect the City, a review of three existing hazard mitigation plans was performed. The existing plans that were reviewed included:

2. State of Texas Hazard Mitigation Plan (2018)

The natural hazards identified in these plans were compiled, and an exercise was conducted with the Planning Committee members. Members were asked to provide their assessment as to if the hazard has previously impacted the City, and their opinion as to if the hazard should be included in this hazard mitigation plan. Discussion was held amongst the members to come to consensus as to which hazards should be included in the plan.

The following table provides the details of natural hazards that can or have affected the community.

*Table 7: Natural Hazards Affecting the Community*

<table>
<thead>
<tr>
<th>Natural Hazard</th>
<th>Included in Harris County Plan?</th>
<th>Included in State of Texas Plan?</th>
<th>Include in City’s Plan?</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coastal erosion</td>
<td>X</td>
<td>X</td>
<td>No</td>
<td>No coastal areas within the City’s jurisdiction</td>
</tr>
<tr>
<td>Dam/levee failure</td>
<td>X</td>
<td>X</td>
<td>No</td>
<td>No dams, levees, or inundation areas in or near the City</td>
</tr>
<tr>
<td>Drought</td>
<td>X</td>
<td>X</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Earthquake</td>
<td>X</td>
<td>X</td>
<td>No</td>
<td>No history of earthquakes or known fault areas within the City</td>
</tr>
<tr>
<td>Expansive soils</td>
<td></td>
<td>X</td>
<td>No</td>
<td>Not a known hazard within the greater area</td>
</tr>
<tr>
<td>Extreme cold</td>
<td>X</td>
<td>X</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Extreme heat</td>
<td>X</td>
<td>X</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Flood</td>
<td>X</td>
<td>X</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Hail</td>
<td>X</td>
<td>X</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Hurricanes/tropical storms</td>
<td>X</td>
<td>X</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>
4.3 Previous Disaster Declarations
The following table provides details of all known emergency or disaster declarations of hazard events in the greater community of Harris County, Texas. As disaster declarations are issued at the county level, additional detail is not always available as to the direct or actual impacts on a smaller or specific area within the county. Therefore, for the purposes of this plan, the assumption is that each declared event had at least some impact on the City, whether directly (in the form of physical damages) or indirectly (such as utility disruption).
### Table 8: Previous Hazard Occurrences

<table>
<thead>
<tr>
<th>Description of the Event</th>
<th>DR/EM/FM Number</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe Storms and Flooding</td>
<td>DR-398</td>
<td>1973</td>
</tr>
<tr>
<td>Severe Storms and Flooding</td>
<td>DR-510</td>
<td>1976</td>
</tr>
<tr>
<td>Severe Storms, Tornadoes, and Flooding</td>
<td>DR-580</td>
<td>1979</td>
</tr>
<tr>
<td>Severe Storms and Flooding</td>
<td>DR-603</td>
<td>1979</td>
</tr>
<tr>
<td>Hurricane Alicia</td>
<td>DR-689</td>
<td>1983</td>
</tr>
<tr>
<td>Severe Storms and Flooding</td>
<td>DR-727</td>
<td>1984</td>
</tr>
<tr>
<td>Severe Storms, Tornadoes, and Flooding</td>
<td>DR-828</td>
<td>1989</td>
</tr>
<tr>
<td>Tropical Storm Allison</td>
<td>DR-836</td>
<td>1989</td>
</tr>
<tr>
<td>Severe Storms and Flooding</td>
<td>DR-937</td>
<td>1992</td>
</tr>
<tr>
<td>Severe Thunderstorms and Tornadoes</td>
<td>DR-970</td>
<td>1992</td>
</tr>
<tr>
<td>Severe Thunderstorms and Flooding</td>
<td>DR-1041</td>
<td>1994</td>
</tr>
<tr>
<td>Tropical Storm Charley</td>
<td>DR-1239</td>
<td>1998</td>
</tr>
<tr>
<td>Flooding</td>
<td>DR-1257</td>
<td>1998</td>
</tr>
<tr>
<td>Hurricane Georges</td>
<td>DR-1245</td>
<td>1998</td>
</tr>
<tr>
<td>Extreme Fire Hazards</td>
<td>EM-3142</td>
<td>1999</td>
</tr>
<tr>
<td>Tropical Storm Allison</td>
<td>DR-1379</td>
<td>2001</td>
</tr>
<tr>
<td>Severe Storms, Tornadoes, and Flooding</td>
<td>DR-1439</td>
<td>2002</td>
</tr>
<tr>
<td>Hurricane Katrina Evacuation</td>
<td>EM-3216</td>
<td>2005</td>
</tr>
<tr>
<td>Hurricane Rita</td>
<td>EM-3261</td>
<td>2005</td>
</tr>
<tr>
<td>Hurricane Rita</td>
<td>DR-1606</td>
<td>2005</td>
</tr>
<tr>
<td>Extreme Wildfire Threat</td>
<td>DR-1624</td>
<td>2006</td>
</tr>
<tr>
<td>Tropical Storm Erin</td>
<td>DR-1730</td>
<td>2007</td>
</tr>
<tr>
<td>Hurricane Dean</td>
<td>EM-3277</td>
<td>2007</td>
</tr>
<tr>
<td>Hurricane Gustav</td>
<td>EM-3290</td>
<td>2008</td>
</tr>
<tr>
<td>Hurricane Ike</td>
<td>EM-3294</td>
<td>2008</td>
</tr>
<tr>
<td>Hurricane Ike</td>
<td>DR-1791</td>
<td>2008</td>
</tr>
<tr>
<td>Forest Brook Fire</td>
<td>FM-2924</td>
<td>2011</td>
</tr>
<tr>
<td>Severe Storms, Tornadoes, Straight Line Winds, and Flooding</td>
<td>DR-4223</td>
<td>2015</td>
</tr>
<tr>
<td>Severe Storms, Tornadoes, Straight Line Winds, and Flooding</td>
<td>DR-4245</td>
<td>2015</td>
</tr>
<tr>
<td>Severe Storms and Flooding</td>
<td>DR-4272</td>
<td>2016</td>
</tr>
<tr>
<td>Severe Storms and Flooding</td>
<td>DR-4269</td>
<td>2016</td>
</tr>
<tr>
<td>Hurricane Harvey</td>
<td>DR-4332</td>
<td>2017</td>
</tr>
<tr>
<td>Tropical Storm Imelda</td>
<td>DR-4466</td>
<td>2019</td>
</tr>
<tr>
<td>Covid-19</td>
<td>EM-3458</td>
<td>2020</td>
</tr>
<tr>
<td>Covid-19 Pandemic</td>
<td>DR-4485</td>
<td>2020</td>
</tr>
<tr>
<td>Hurricane Hanna</td>
<td>EM-3530</td>
<td>2020</td>
</tr>
<tr>
<td>Tropical Storms Marco and Laura</td>
<td>EM-3540</td>
<td>2020</td>
</tr>
<tr>
<td>Severe Winter Storm</td>
<td>EM-3554</td>
<td>2021</td>
</tr>
<tr>
<td>Severe Winter Storms</td>
<td>DR-4586</td>
<td>2021</td>
</tr>
</tbody>
</table>

### 4.4 Probability of Future Events Determination Methodology

As required by the applicable regulations, the following methodology was used to determine the probability of a future occurrence of the natural hazards that can affect the community:

- Hazards that occur less than once every five years – Low Probability
- Hazards that occur at least once every five years – Moderate Probability
- Hazards that occur at least annually – High Probability

Because of the limitation of the available data at the City level, this plan relies heavily on data available at the county and state level. It is intended that future iterations of this plan will be able to obtain and use more refined data that will include more specific impacts and occurrences at the City level.

4.5 Hazard Profiles
For reference, Table 5 contains the details of the hazards considered, included, and included in this local mitigation plan. For those hazards that were excluded from further consideration, the table also contains the justification for why these hazards were excluded from further consideration.

The following sub-sections provide the required information related to natural hazards, the area they can impact, the severity or magnitude of the hazard, previous occurrences of the hazards, and the probability of future occurrences of the hazards. The following natural hazards have the highest potential of occurrence in the community and will have an in-depth analysis in the sub-sections below.

4.5.1 Hazard Description: Drought
Drought is a normal part of virtually all climatic regions, including areas with high and low average rainfall. Drought is the consequence of anticipated natural precipitation reduction over an extended period, usually a season or more in length. Drought is one of the most complex natural hazards, as it is difficult to determine a precise beginning or end. In addition, drought can lead to or be exacerbated by other hazards, such as extreme heat or wildfires.

Droughts are classified as meteorological, hydrologic, agricultural and socioeconomic. Each of these classifications can be defined as follows:

- **Meteorological drought** is defined by a period of substantially diminished precipitation duration and/or intensity. The commonly used definition of meteorological drought is an interval of time, generally on the order of months or years, during which the actual moisture supply at a given place consistently falls below the climatically appropriate moisture supply.

- **Agricultural drought** occurs when there is inadequate soil moisture to meet the needs of a particular crop at a particular time. Agricultural drought usually occurs after or during meteorological drought, but before hydrological drought and can affect livestock and other dry-land agricultural operations.

- **Hydrological drought** refers to deficiencies in surface and subsurface water supplies. It is measured as stream flow, snow pack, and as lake, reservoir, and groundwater levels. There is usually a delay between lack of rain or snow and less measurable water in streams, lakes, and reservoirs. Therefore, hydrological measurements tend to lag behind other drought indicators.
Socio-economic drought occurs when physical water shortages start to affect the health, well-being, and quality of life of the people, or when the drought starts to affect the supply and demand of an economic product.

4.5.1.1 Geographic Area Affected
Droughts can affect areas as small as a few counties to entire regions of the country. Droughts are not defined by a specific geographic boundary or location. The City occupies an area of .2 mi², all within Harris County. The entirety of the area occupied by City is subject to the drought hazard.

4.5.1.2 Severity or Magnitude of the Hazard
Droughts are measured using the Palmer Drought Severity Index (PDSI), also known as the Palmer Index. The Palmer Index was developed by Wayne Palmer in the 1960s and uses temperature and rainfall information in a formula to determine dryness. It has become the semi-official drought index.

The Palmer Index is most effective in determining long term drought—a matter of several months—and is not as good with short-term forecasts (a matter of weeks). It uses 0 as normal, and drought is shown in terms of minus numbers; for example, -2 is moderate drought, -3 is severe drought, and -4 is extreme drought. The Palmer Index is also useful for reflecting excess rain using a corresponding level reflected by plus figures; i.e., 0 is normal, +2 is moderate rainfall, etc.

The advantage of the Palmer Index is that it is standardized to local climate, so it can be applied to any part of the country to demonstrate relative drought or rainfall conditions. The negative is that it is not as good for short term forecasts, and is not particularly useful in calculating supplies of water locked up in snow, so it works best east of the Continental Divide.

Table 9: Palmer Drought Severity Index

<table>
<thead>
<tr>
<th>Classification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.00 or more</td>
<td>Extremely wet</td>
</tr>
<tr>
<td>3.00 to 3.99</td>
<td>Very wet</td>
</tr>
<tr>
<td>2.00 to 2.99</td>
<td>Moderately wet</td>
</tr>
<tr>
<td>1.00 to 1.99</td>
<td>Slightly wet</td>
</tr>
<tr>
<td>0.50 to 0.99</td>
<td>Incipient wet spell</td>
</tr>
<tr>
<td>0.49 to -0.49</td>
<td>Near normal</td>
</tr>
<tr>
<td>-0.50 to -0.99</td>
<td>Incipient dry spell</td>
</tr>
<tr>
<td>-1.00 to -1.99</td>
<td>Mild drought</td>
</tr>
<tr>
<td>-2.00 to -2.99</td>
<td>Moderate drought</td>
</tr>
<tr>
<td>-3.00 to -3.99</td>
<td>Severe drought</td>
</tr>
<tr>
<td>-4.00 or less</td>
<td>Extreme drought</td>
</tr>
</tbody>
</table>

Drought is monitored nation-wide by the National Drought Mitigation Center (NDMC). Indicators are used to describe broad scale drought conditions across the country. Indicators correspond to the intensity of the drought. Based on information obtained from the US Drought Monitor, as of this plan most of Texas is currently experiencing drought conditions. The City is not currently experiencing drought conditions.
Harris County and the City of Southside Place are subject to periodic dry spells, as is all coastal Texas. Should a prolonged drought occur on the mainland or affect the source of potable water for the City, the City would experience the more severe effects of drought, even if local drought conditions were not severe. The City could experience the full extent of the PDSI scale, either directly or indirectly.

### 4.5.1.3 Impacts to Life, Property, or Operations

Droughts can affect a large geographic area, and can range in size from a few counties to a few states. Their potential to impact wildlife and agricultural concerns can be enormous. Droughts can kill crops, edible plants and wildlife habitat, and destroy grazing lands and trees. Dead or dying vegetation, a normal result of drought, can then serve as a prime ignition source for wildfires.

Perhaps the best-known example of the impacts on life and property from drought is the Dust Bowl. The phenomenon was caused by severe drought coupled with decades of poor farming and land management practices. Deep plowing of the virgin topsoil of the Great Plains killed the natural grasses that normally kept the soil in place and trapped moisture even during periods of drought and high winds.
During the (naturally occurring) drought of the 1930s, with no natural anchors to keep the soil in place, it dried, turned to dust, and blew away eastward and southward in large dark clouds. At times the clouds blackened the sky reaching all the way to East Coast cities such as New York and Washington, D.C. Much of the soil ended up deposited in the Atlantic Ocean, carried by prevailing winds which were in part created by the dry and bare soil conditions. These immense dust storms—given names such as ‘Black Blizzards’ and ‘Black Rollers’—often reduced visibility to a few feet and produced deadly electrical storms. The Dust Bowl affected an estimated 100M acres, centered on the panhandles of Texas and Oklahoma, and adjacent parts of New Mexico, Colorado, and Kansas.

The Dust Bowl was an ecological and human disaster caused by misuse of land and years of sustained, naturally occurring drought. Millions of acres of farmland became useless, and hundreds of thousands of people were forced to leave their homes to survive.

The worst drought in 50 years affected at least 35 states during the summer of 1988. In some areas the lack of rainfall dated back to 1984. In 1988, rainfall totals over the Midwest, Northern Plains, and the Rockies were 50-85% below normal. Crops and livestock died and some areas became desert. Forest fires began over the Northwest, and by autumn 4,100,000 acres had burned. A government policy called ‘Let Burn’ was in effect for Yellowstone National Park, with disastrous results. Half of the National Park - 2,100,000 acres - was charred when a huge forest fire developed.

For the City, the impact of a drought could be enormous. As a very small jurisdiction that relies on outside providers for utility support, the City controls no local source of potable water. All potable water must be purchased from suppliers and transported to the City. In the event of a prolonged drought, it is possible that there would not be enough water available to the City to maintain its current pressure levels (and therefore to maintain the safety of the potable water system), or to support the population.

Drought has the potential to significantly affect special populations, including the elderly and children. In addition, a drought of a prolonged nature could have significant impacts on the City’s ability to obtain and distribute potable water, which is required to sustain life, safety and health.

4.5.1.4 Previous Occurrences of the Hazard

While location-specific information for the City level is hard to locate, the US Drought Monitor does provide the following data points regarding current conditions via their website (drought.gov):

- No areas or people within Harris County are currently experiencing drought conditions
- September 2021 was the 29th wettest September on record in the previous 127 years, with 2.4 inches of above-average precipitation
- 2021 (to date) is the 22nd wettest year in the previous 127 years, with 9.14 inches of above-average precipitation

Table 9 (following) lists all drought events in Harris County since 2000, by the number of weeks the event lasted. It is assumed at least some of these events may have impacted the City.
### Table 10: Consecutive Weeks of Drought Events (Harris County)

<table>
<thead>
<tr>
<th>Start Date</th>
<th>End Date</th>
<th>Consecutive Weeks</th>
<th>State</th>
<th>County</th>
</tr>
</thead>
<tbody>
<tr>
<td>06-01-00</td>
<td>25-05-00</td>
<td>21</td>
<td>TX</td>
<td>Harris County</td>
</tr>
<tr>
<td>13-07-00</td>
<td>16-11-00</td>
<td>19</td>
<td>TX</td>
<td>Harris County</td>
</tr>
<tr>
<td>09-08-01</td>
<td>30-08-01</td>
<td>4</td>
<td>TX</td>
<td>Harris County</td>
</tr>
<tr>
<td>25-04-02</td>
<td>11-07-02</td>
<td>11</td>
<td>TX</td>
<td>Harris County</td>
</tr>
<tr>
<td>01-05-03</td>
<td>17-07-03</td>
<td>12</td>
<td>TX</td>
<td>Harris County</td>
</tr>
<tr>
<td>16-06-05</td>
<td>04-08-05</td>
<td>8</td>
<td>TX</td>
<td>Harris County</td>
</tr>
<tr>
<td>15-09-05</td>
<td>19-10-06</td>
<td>57</td>
<td>TX</td>
<td>Harris County</td>
</tr>
<tr>
<td>07-12-06</td>
<td>04-01-07</td>
<td>5</td>
<td>TX</td>
<td>Harris County</td>
</tr>
<tr>
<td>22-05-08</td>
<td>11-09-08</td>
<td>17</td>
<td>TX</td>
<td>Harris County</td>
</tr>
<tr>
<td>22-01-09</td>
<td>23-04-09</td>
<td>14</td>
<td>TX</td>
<td>Harris County</td>
</tr>
<tr>
<td>11-06-09</td>
<td>08-10-09</td>
<td>18</td>
<td>TX</td>
<td>Harris County</td>
</tr>
<tr>
<td>22-04-10</td>
<td>03-06-10</td>
<td>7</td>
<td>TX</td>
<td>Harris County</td>
</tr>
<tr>
<td>17-06-10</td>
<td>01-07-10</td>
<td>3</td>
<td>TX</td>
<td>Harris County</td>
</tr>
<tr>
<td>19-08-10</td>
<td>09-09-10</td>
<td>4</td>
<td>TX</td>
<td>Harris County</td>
</tr>
<tr>
<td>30-09-10</td>
<td>12-07-12</td>
<td>92</td>
<td>TX</td>
<td>Harris County</td>
</tr>
<tr>
<td>01-12-10</td>
<td>23-11-11</td>
<td>2</td>
<td>TX</td>
<td>Harris County</td>
</tr>
<tr>
<td>25-10-12</td>
<td>14-11-13</td>
<td>55</td>
<td>TX</td>
<td>Harris County</td>
</tr>
<tr>
<td>16-01-14</td>
<td>17-07-14</td>
<td>27</td>
<td>TX</td>
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</tr>
<tr>
<td>04-09-14</td>
<td>18-09-14</td>
<td>3</td>
<td>TX</td>
<td>Harris County</td>
</tr>
<tr>
<td>23-10-14</td>
<td>20-11-14</td>
<td>5</td>
<td>TX</td>
<td>Harris County</td>
</tr>
</tbody>
</table>
Finally, the National Centers for Environmental Information (NCEI), maintained by the National Oceanic and Atmospheric Administration (NOAA), records reports of severe weather throughout the country. A review of their collected data reveals two reports of drought for Harris County, August and September 2000. It must be understood that these reports do not necessarily constitute distinct events; rather, many of them establish the chronology of a single ongoing event.

### 4.5.1.5 Probability of a Future Occurrence

The Drought Risk Atlas provides the following estimates of recurrence intervals for the PDSI scale for the greater Harris County area, including the City of Southside Place. (Note: This data is assumed to apply to the City.)
Table 11: Drought Risk Atlas Frequency by PDSI Threshold

<table>
<thead>
<tr>
<th>Threshold</th>
<th>Frequency</th>
<th>Return Period (Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4.5</td>
<td>1</td>
<td>69.92</td>
</tr>
<tr>
<td>-4</td>
<td>4</td>
<td>17.42</td>
</tr>
<tr>
<td>-3.5</td>
<td>8</td>
<td>8.67</td>
</tr>
<tr>
<td>-3</td>
<td>7</td>
<td>9.92</td>
</tr>
<tr>
<td>-2.5</td>
<td>8</td>
<td>8.67</td>
</tr>
<tr>
<td>-2</td>
<td>9</td>
<td>7.75</td>
</tr>
<tr>
<td>-1.5</td>
<td>13</td>
<td>5.33</td>
</tr>
<tr>
<td>-1</td>
<td>22</td>
<td>3.17</td>
</tr>
<tr>
<td>-0.5</td>
<td>18</td>
<td>3.83</td>
</tr>
<tr>
<td>0</td>
<td>9</td>
<td>7.75</td>
</tr>
<tr>
<td>0.5</td>
<td>8</td>
<td>8.67</td>
</tr>
<tr>
<td>1</td>
<td>14</td>
<td>4.92</td>
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<td>1.5</td>
<td>22</td>
<td>3.17</td>
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<tr>
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<td>23.25</td>
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<tr>
<td>5.1</td>
<td>2</td>
<td>34.92</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>69.92</td>
</tr>
</tbody>
</table>

Using the scale provided in Section 4.4, and in consideration of the return period frequencies in Table 8, the probability of a future occurrence of a mild drought is moderate. The probability of a future occurrence of a moderate, severe, or extreme drought is low.

4.5.2 Hazard Description: Extreme Cold

What is considered an extreme cold temperature varies according to the normal climate for that region. Whenever temperatures drop decidedly below normal and wind speed increases, heat leaves the human body more rapidly, increasing the possibility of negative effects of these extreme temperatures.

The greatest danger from extreme cold is to people, as prolonged exposure can cause frostbite or hypothermia, and can become life threatening. Body temperatures that are too low affect the brain, making it difficult for the victim to think clearly or move well. This makes hypothermia particularly dangerous for those suffering from it, as they may not understand what is happening to them or what to do about it.
Typically, the coldest temperatures in the planning area occur in December, January, and February, with average low temperatures being around 48°F. For the planning area, extreme cold is considered to be any temperature below approximately 40°F.

Excessive or extreme cold can accompany severe winter weather, or it can occur without severe weather. For this reason, extreme cold has been separated from Winter Storms, and is profiled separately.

4.5.2.1 Geographic Area Affected
From the State Hazard Mitigation Plan:

‘Extreme cold can happen anywhere in the state, although its levels can range extensively. In the panhandle extreme cold means days below zero Fahrenheit while in the Rio Grande Valley it means reaching temperatures below freezing.’

Extreme cold is a non-spatial hazard that can occur anywhere within the .2 miles² of the City.

4.5.2.2 Severity or Magnitude of the Hazard
Extreme cold has a wide range of extent and severity markers and characteristics. Winter temperatures in the area of the City typically range from 64°F to 48°F, with the coldest temperatures typically occurring in January.

Perhaps the most common extent/severity marker for extreme cold is the Wind Chill scale. Figure 4 (following) depicts the National Weather Service’s methodology for determining wind chill, using wind speed and actual temperature. While wind chill is not necessarily related to extreme cold as a single cause, the advisory system that the NWS currently uses relies on wind chill to relay warning and advisory information to the public. Extreme cold severity is a function of wind chill and other factors, such as precipitation amount (rain, sleet, ice, and/or snow).
Because occurrences of extreme cold are rare in the area, the City does not have a defined point at which extreme cold temperatures require action on their part. Rather, the City actions are dependent on a combination of the temperature (real or forecast) and other factors, such as planned outdoor activities and the real or forecast windchill, and makes data-based mitigation decisions according to real-world conditions.

4.5.2.3 Impacts to Life, Property, or Operations
Extreme cold weather poses a significant threat to utility production, which in turn threatens facilities and operations that rely on utilities, specifically climate stabilization. As temperatures drop and stay low, increased demand for heating places a strain on the electrical grid, which can lead to temporary or prolonged outages. These outages can impact operations throughout the City, which can result in interruptions and delays in services. These outages may also negatively impact research efforts throughout the City, as the inability to maintain a steady, constant temperature may result in negative impacts on the residents, as temperatures drop and utility support is unavailable.

Additionally, the population of Southside Place is aging, with approximately 25% of the City’s residential structures being occupied by persons 65 years of age or older. As older people typically have more vulnerability to extreme cold, this is a concern for the City. During the February 2021 winter storm event,
the City opened the Park Clubhouse/Community Center as a warming center, to provide a warm, safe place for those at risk residents whose residences had lost power or heat due to the storm event.

4.5.2.4 Previous Occurrences of the Hazard
The National Centers for Environmental Information (NCEI), maintained by the National Oceanic and Atmospheric Administration (NOAA), records reports of severe weather throughout the country. A review of their collected data reveals five reports of extreme cold reported for Harris County, all in January 2018. On January 17, 2018, NCEI recorded that overnight temperatures in the region fell into the teens and middle twenties. Several fatalities were blamed on the cold, though none of these were specific to Southside Place.

In February 2021, the entire State of Texas – including Harris County and the City – experienced a severe and prolonged extreme cold event. From the National Weather Service:

‘It all began Wednesday, February 10th when a cold front moved through the area bringing the first surge of cold air into the region. With this cold air in place, lingering precipitation the following day fell as sleet and freezing rain across the northwestern counties. The first Winter Weather Advisory of this prolonged winter event was issued in the morning hours of Thursday, February 11th for Burleson, Brazos, and Madison counties as area roads began to become hazardous from the icy precipitation. This Advisory would end up getting expanded to include Washington and Grimes counties after sunset that evening and continued through Friday morning due to lingering precipitation. While this first taste of winter precipitation was impacting the region, a stronger Arctic cold front was progressing through the country and was expected to reach Southeast Texas late Sunday. On Friday, February 12th, a Winter Storm Watch was issued for the entire region for Sunday in anticipation for the potential snow, sleet, and freezing rain that this Arctic front would bring. A Winter Storm Warning ended up getting issued on Saturday, February 13th for Colorado, Austin, Waller, Montgomery, San Jacinto, Polk counties and for counties north as sleet and freezing rain formed ahead of the approaching cold front. The counties that remained in the Winter Storm Watch (Jackson, Wharton, Fort Bend, Harris, and Liberty counties and the other counties along the coast) got upgraded to a Warning for Sunday.

‘As expected, the strong Arctic cold front passed through Southeast Texas on Sunday (Valentine’s Day). It served as the turning point from a significant winter storm the preceded the front to the historic winter event that would eventually unfold.
‘On Sunday, every square inch of Texas was in a Winter Storm Warning. Snow, sleet, and freezing rain began to encroach into Southeast Texas Sunday afternoon, and then increased in coverage and intensity overnight Sunday night into Monday. Thunder snow was reported near the town of Snook, Burleson County Sunday evening, and then thunder sleet occurred near the Brazoria and Galveston counties coastline Sunday night. Roads began to become impassable through the region Sunday evening due to ice and snow and some would not become safe until Friday. Temperatures crashed down Sunday night behind the cold front with much of the area getting down into the teens or single digits with wind chills down into the single digits or even below zero. Because of these conditions, a Hard Freeze Warning and a Wind Chill Warning (the first in our office’s history) was in effect Sunday night/Monday morning. A combination of the icy conditions and extreme cold temperatures caused widespread power outages that would last for the next several days. The wintry precipitation continued through Monday morning with storm total snow/sleet accumulations being around trace along the coast, around an inch near the Houston Metro, and up to three to six inches up across the north. The extreme cold temperatures not just persisted through Tuesday morning, but dipped down even colder and produced the coldest morning of the event: the City of Houston went down to 13°F, Galveston down to 20°F, and College Station bottomed out at just 5°F.

‘Unfortunately, the week wasn’t done yet. Another winter storm was anticipated to bring significant freezing rain along and north of Interstate-10 Tuesday night requiring an additional Winter Storm Warning. This new ice accumulation, combined with any refreezing of previous moisture, continued the hazardous road conditions Tuesday evening through the day on Wednesday. Conditions did not improve Wednesday night as lingering precipitation brought snow and sleet to the northern half of the region that lasted through midday Thursday. While the wintry precipitation wound down Thursday evening, the dangerously cold temperatures and
hazardous road conditions continued. It wasn’t until 9am Saturday morning that the last Hard Freeze Warning would expire for this event.

‘There was a total of 8 days, 23 hours, and 23 minutes of winter highlights between the first Winter Weather Advisory issued on Thursday, February 11th at 9:37am to when the last Hard Freeze Warning expired at 9am on Saturday, February 20th.

‘The winter outbreak in February 2021 will be on the minds of every Texan for a very long time.’

The Weather Forecast office in Houston/Galveston published the following graphic after the event, which provides a visual reference for the record-breaking cold that impacted the area.

![February Winter Outbreak Timeline](image)

Figure 4: February 2021 Winter Weather Timeline

Thankfully, this winter weather event and its accompanying extreme temperatures left no lasting impact on the infrastructure or residents of Southside Place.

4.5.2.5 Probability of a Future Occurrence
Documentation exists of six occurrences of the extreme cold hazard in the previous 21 years (2000-2021). As five of the six documented occurrences happened within a single month, they are blips within the period of record. Using the scale provided in Section 4.4, the probability of a future occurrence is low.

4.5.3 Hazard Description: Extreme Heat
North American summers are hot; most summers see heat waves in one section or another of the US. East of the Rockies, they tend to combine both high temperature and high humidity, although some of the worst have been catastrophically dry.
Extreme heat is defined as summertime weather that is substantially hotter and/or more humid than average for a location at that time of year. Extreme heat conditions can increase the incidence of mortality and morbidity in affected populations.

4.5.3.1 Geographic Area Affected
From the State Hazard Mitigation Plan:

‘All of the state is vulnerable to extreme heat. In addition, large metropolitan areas, such as Dallas/Fort Worth and Houston may experience extreme heat since they have an abundance of concrete which absorbs and then radiates solar energy. This effect is known as urban heat island and can be dangerous to those without air conditioners.’

Extreme heat is a non-spatial hazard that can occur anywhere within the .2 miles² of the City.

4.5.3.2 Severity or Magnitude of the Hazard
The National Weather Service (NWS) issues a range of watches and warnings associated with extreme heat, as illustrated below:

- **Excessive Heat Outlook**: when the potential exists for an excessive heat event in the next three to seven days. An outlook is used to indicate that a heat event may develop. It is intended to provide information to those who need considerable lead time to prepare for the event, such as public utilities, emergency management and public health officials.

- **Excessive Heat Watch**: when conditions are favorable for an excessive heat event in the next 12 to 48 hours. A watch is used when the risk of a heat wave has increased, but its occurrence and timing is still uncertain. It is intended to provide enough lead time so those who need to set their plans in motion can do so, such as established individual city excessive heat event mitigation plans.

- **Excessive Heat Warning/Advisory**: when an excessive heat event is expected in the next 36 hours. These products are issued when an excessive heat event is occurring, is imminent, or has a very high probability of occurrence. The warning is used for conditions posing a threat to life or property. An advisory is for less serious conditions that cause significant discomfort or inconvenience and, if caution is not taken, could lead to a threat to life and/or property.

The NWS also developed the Heat Index (HI). The HI is sometimes referred to as the ‘apparent temperature’. The HI, given in degrees F, is a measure of how hot it feels when relative humidity (RH) is added to the actual air temperature. To find the HI, NWS uses the Heat Index Chart, found following in Figure 6. As an example, if the air temperature is 96°F (found on the top of the table) and the RH is 65% (found on the left of the table), the HI - or how hot it feels - is 121°F. This is at the intersection of the 96° column and the 65% row.
Since HI values were devised for shady, light wind conditions, exposure to full sunshine can increase HI values by up to 15°F. Also, strong winds, particularly with very hot, dry air, can be extremely hazardous.

Note the shaded zone above 105°F on the Heat Index Chart. This corresponds to a level of HI that may cause increasingly severe heat disorders with continued exposure and/or physical activity.

The City could experience the full extent of the hazard, as defined NOAA’s Heat Index Chart, though it is mostly likely that high temperatures max out in the ‘extreme caution’ or ‘danger range’ of the scale, based on data maintained by the NCEI.

When extreme heat occurs or is forecast to occur, the NWS issues heat advisories based on heat indices; these advisories are issued through the media and the Emergency Alert System. The NWS aids state and local health officials in preparing civil emergency messages for severe heat waves, in addition to preparing special weather statements that define who is most at risk, safety rules, and the expected severity of the situation. The NWS also aids state and local authorities with issuing warnings and survival tips.

The NWS has defined criteria for these heat advisories, which are issued by the local office of the NWS. Table 11 (following) provides these criteria.
12.21.21

**Table 12: National Weather Service – Heat Product Criteria**

<table>
<thead>
<tr>
<th>Alert Issued</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excessive Heat</td>
<td>An Excessive Heat Warning is issued within 12 hours of the onset of extremely dangerous heat conditions. The general rule of thumb for this Warning is when the maximum heat index temperature is expected to be 105° or higher for at least 2 days and night time air temperatures will not drop below 75°; however, these criteria vary across the country, especially for areas not used to extreme heat conditions. If you don’t take precautions immediately when conditions are extreme, you become seriously ill or even die.</td>
</tr>
<tr>
<td>Warning</td>
<td></td>
</tr>
<tr>
<td>Excessive Heat</td>
<td>Heat watches are issued when conditions are favorable for an excessive heat event in the next 24 to 72 hours. A Watch is used when the risk of a heat wave has increased but its occurrence and timing is still uncertain.</td>
</tr>
<tr>
<td>Watch</td>
<td></td>
</tr>
<tr>
<td>Heat Advisory</td>
<td>A Heat Advisory is issued within 12 hours of the onset of extremely dangerous heat conditions. The general rule of thumb for this Advisory is when the maximum heat index temperature is expected to be 100° or higher for at least 2 days, and night time air temperatures will not drop below 75°; however, these criteria vary across the country, especially for areas that are not used to dangerous heat conditions. Take precautions to avoid heat illness. If you don’t take precautions, you could become seriously ill or even die.</td>
</tr>
<tr>
<td>Excessive Heat</td>
<td></td>
</tr>
<tr>
<td>Outlook</td>
<td>Excessive Heat Outlooks are issued when the potential exists for an excessive heat event in the next 3-7 days. An Outlook provides information to those who need considerable lead-time to prepare for the event.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 4.5.3.3 Impacts to Life, Property, or Operations

Health risks from extreme heat include sunburn, dehydration, heat cramps, heat exhaustion, and heat stroke. Heat disorders generally result from a reduction or collapse of the body’s ability to cool itself by circulatory changes and sweating, or a chemical (salt) imbalance caused by too much sweating. When the body cannot cool itself, or when it cannot compensate for fluids and salt lost through perspiration, the temperature of the body’s inner core begins to rise, and heat-related illness may develop. All other factors being equal, the severity of heat disorders tends to increase with age. Heat cramps in a 17-year-old may be heat exhaustion in someone who is 40, and heat stroke in a person over 60.

Table 12 (following) provides the potential health hazards associated with heat, by category.
Table 13: Potential Health Hazards Associated with Heat Index

<table>
<thead>
<tr>
<th>Category</th>
<th>Heat Index</th>
<th>Health Hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extreme Danger</td>
<td>130°F- Higher</td>
<td>Heat stroke/ sunstroke is likely with continued exposure.</td>
</tr>
<tr>
<td>Danger</td>
<td>105°F- 129°F</td>
<td>Sunstroke, muscle cramps, and/or heat exhaustion with prolonged exposure and/or physical activity.</td>
</tr>
<tr>
<td>Extreme Caution</td>
<td>90°F- 105°F</td>
<td>Sunstroke, muscle cramps, and/or heat exhaustion with prolonged exposure and/or physical activity.</td>
</tr>
<tr>
<td>Caution</td>
<td>80°F- 90°F</td>
<td>Fatigue possible with prolonged exposure and/or physical activity.</td>
</tr>
</tbody>
</table>

The City has a resident population of 1,835. Many of residents are older adults who may be more susceptible to the hazards associated with extreme heat.

In addition to the effects that extreme heat can have on people, there are also potential effects to the City’s assets from extreme heat. Increases in the exterior temperature mean that the utilities and processes by which interior spaces are controlled and conditioned must work harder to regulate those interior temperatures. This places an additional strain on existing utility systems, which can fail under the increased workload. Failure of cooling mechanisms places people at risk from prolonged exposure to extreme heat.

4.5.3.4 Previous Occurrences of the Hazard
The National Centers for Environmental Information (NCEI), maintained by the National Oceanic and Atmospheric Administration (NOAA), records reports of severe weather throughout the country. A review of their collected data reveals one reported incident of the extreme heat hazard for Harris County between January 2000 and June 2021. This does not necessarily mean that the hazard has not occurred more frequently. Given the relatively high normal temperatures for the area, it is more likely that the hazard has not been reported because it has not been recognized as a hazard relative to normal conditions.

4.5.3.5 Probability of a Future Occurrence
Documentation exists of one occurrence of the extreme heat hazard in the previous 21 years (2000 - 2021). Using the scale provided in Section 4.4, the probability of a future occurrence is low.

4.5.4 Hazard Description: Flood
Floods are naturally occurring events. Excess water from snowmelt, rainfall, or storm surge accumulates and either overflows onto banks or backs up into adjacent floodplains. Flooding in coastal environments can be exacerbated by tidal influence in low lying areas.

The National Flood Insurance Program (NFIP) defines flood in the following way:
‘A general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties from overflow of inland or tidal waters, from unusual and rapid accumulation or runoff of surface waters from any source, or from mudflow.’

4.5.4.1 Geographic Area Affected

From the 2020 Harris County Multi-Hazard Hazard Mitigation Action Plan:

‘Harris County is subject to intense local thunderstorms of short duration, general storms extending over periods of several days, and torrential rainfall associated with tropical events. The area features flat terrain, clay soils that do not absorb water well, and an average annual rainfall of 48 inches. The potential for extreme rainfall events, coupled with the flat topography and poorly draining soils, contribute to frequent flooding. Flooding also results from tidal surge along Galveston Bay caused by hurricanes and tropical storms.

‘The Harris County planning area also is subject to chronic urban flooding. As land use within Harris County has transitioned from rural/agricultural, to more high density urban, the propensity for urban drainage flooding has increased. The two key factors that contribute to urban flooding are rainfall intensity and duration. Topography, soil conditions, urbanization and groundcover also play an important role. Urban flooding occurs when available conveyance systems lack the capacity to convey rainfall runoff to nearby creeks, streams, rivers and bayous. As drainage facilities are overwhelmed, roads and transportation corridors become conveyance facilities.

‘Urban floods can be a great disturbance of daily life in urban areas. Roads can be blocked, and people may be unable to go to work or school. Economic damage can be high, but the number of casualties is usually limited, because of the nature of the flood. When the city is on flat terrain, the flow speed is low, and people can still drive through it. The water rises relatively slowly and usually does not reach life endangering depths’

The majority of the area within the City’s jurisdiction lays within an identified Special Flood Hazard Area (SFHA), and is designated as an AE zone. A small portion of the northern and southern areas of the City fall outside the SFHA. Please refer to the figure following for details of the regulatory flood zone locations within the City.
For reference, the following figure provides the general area landmarks found in and around Southside Place, including the major roadways (Bellaire Boulevard) and the main thoroughfares within the City (Auden Street and Edloe Street).
4.5.4.2 Severity or Magnitude of the Hazard
In support of the NFIP, FEMA identifies those areas that are more vulnerable to flooding by producing Flood Hazard Boundary Maps (FHBMs), Flood Insurance Rate Maps (FIRMs), and Flood Boundary and Floodway Maps (FBFMs). Several areas of flood hazards are commonly identified on these maps. One of the areas identified in the Special Flood Hazard Area (SFHA), which is a high-risk area defined as any land that would be inundated by a flood having a 1% chance of occurring in any given year (also known as the base flood). The flood zone designations are defined as follows:

- **Zone V (1% annual chance flooding).** Areas along coasts subject to inundation by the 1% annual chance of flooding with additional hazards associated with storm-induced waves. Because hydraulic analyses have not been performed, no BFEs or flood depths are shown.
- **Zones VE and V1-30 (1% annual chance flooding).** Areas along coasts subject to inundation by the 1% annual chance of flooding with additional hazards associated with storm-induced waves. BFEs derived from detailed hydraulic analyses are shown within these zones. (Zone VE is used on new and revised maps in place on Zones V1-30.)
- **Zone A (1% annual chance flooding).** Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas, no depths or base flood elevations are shown within these areas.

Please refer to Appendix D for asset-by-asset information, including the determined flood zone of each asset.
• **Zone AE (1% annual chance of flooding).** Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. In most instances, base flood elevations derived from detailed analyses are shown at selected intervals within these zones.

• **Zone AH (1% annual chance of flooding).** Areas with a 1% annual chance of flooding where shallow flooding (usually areas of ponding) can occur with average depths between one and three feet.

• **Zone AO (1% annual chance of flooding).** Areas with a 1% annual chance of flooding, where shallow flooding average depths are between one and three feet.

• **Zone B/X (shaded) (0.2% annual chance of flooding).** Represents areas between the limits of the 1% annual chance flooding and 0.2% chance flooding.

• **Zone C/X (unshaded).** Areas outside of the 1% annual chance floodplain and 0.2% annual chance floodplain, areas of 1% annual chance sheet flow flooding where average depths are less than one (1) foot, areas of 1% annual chance stream flooding where the contributing drainage area is less than one (1) square mile, or areas protected from the 1% annual chance flood by levees. No Base Flood Elevation or depths are shown within this zone.

The National Weather Service has established definitions of flood stages and accompanying watches and warnings, used in warnings and notifications to all users of their products, including the public and emergency managers. Table 13 (below) provides these terms and their definitions.

**Table 14: National Weather Service Flood Stages**

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flood stage</td>
<td>An established gage height for a given location at which a rise in water surface level begins to impact lives, property, or commerce. The issuance of flood (and in some case flash flood) warnings is linked to flood stage. Not necessarily the same as bankfull stage.</td>
</tr>
<tr>
<td>Flood categories</td>
<td>Terms defined for each forecast point which describe or categorize the severity of flood impacts in the corresponding river/stream reach. The severity of flooding at a given stage is not necessarily the same at all locations along a river reach due to varying channel/bank characteristics or presence of levees on portions of the reach. Therefore, the upper and lower stages for any given flood category are usually associated with water levels corresponding to the most significant flood impacts somewhere in the reach.</td>
</tr>
<tr>
<td>Minor flooding</td>
<td>Minimal or no property damage, but possibly some public threat (e.g., inundation of roads)</td>
</tr>
<tr>
<td>Moderate flooding</td>
<td>Some inundation of structures and roads near stream. Some evacuations of people and/or transfer of property to higher elevations.</td>
</tr>
<tr>
<td>Major flooding</td>
<td>Extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations.</td>
</tr>
<tr>
<td>Record flooding</td>
<td>Flooding which equals or exceeds the highest stage or discharge observed at a given site during the period of record. The highest stage on record is not necessarily above the other three flood categories – it may be within any of them or even less than the lowest, particularly if the period of record is short (e.g., a few years).</td>
</tr>
</tbody>
</table>

The City has experienced the complete extent of the flood hazard, including major flooding, and could experience the complete range in the future. The City experiences minor flooding routinely, largely through stormwater and urban flood events resulting from heavy rainfall, where roads and walkways
are inundated by a few (typically one to three) inches of standing water for a period of time until it can drain. These events are typically fairly quick onset, but are often forecast based on the expected storm duration or amount of rainfall.

For the purposes of this plan, the City expects the extent of the flood hazard to be less than 24 inches in depth for the worst-case scenario. This expectation is based on historic anecdotal accounts of flooding, some of which were near but slightly below this estimated level.

4.5.4.3 Impacts to Life, Property, or Operations
A flood event could pose a significant threat to the City, its assets, and its population. Structures are subject to damage from flood waters and floating debris, as well as to being undermined by erosion or scour. Moving water exerts hydrodynamic pressure on such structures, whereas still water exerts hydrostatic pressure. Both hydrostatic and hydrodynamic forces can cause serious damage, including complete destruction, of non-mitigated structures. Utility systems, such as HVAC systems, water and septic lines, and electrical systems, can be compromised, damaged or destroyed by flood waters, even if not completely inundated. Additionally, flood waters could impede ingress and egress routes, making it difficult or impossible to safely move people.

The NFIP, Repetitive Loss Properties, and Severe Repetitive Loss Properties
The City is a member in good standing of the National Flood Insurance Program (NFIP). As of October 2021, there are approximately 405 NFIP policies in effect for structures within the City, meaning that the overwhelming majority of structures within the City are insured against flood damage and loss.

Records indicate that there have been approximately 36 claims filed for flood damage to structures within the City, with structure payments totaling $730,373 and contents payments totaling $159,345.

Additionally, there are two structures within the City that are designated by the NFIP as Repetitive Loss structures. Of these, one is listed as mitigated and the other is not.

There are no structures in the City that have been designated as Severe Repetitive Loss.

4.5.4.4 Previous Occurrences of the Hazard
The National Centers for Environmental Information (NCEI), maintained by the National Oceanic and Atmospheric Administration (NOAA), records reports of severe weather throughout the country. A review of their collected data reveals the following reported incidents of the flood hazard for the City between 2000 and June 2021:

- Flash Flood (May 2007), causing flooded and impassable streets

Another 25 flash flood events were recorded for the areas around the City (including Bellaire and Houston), but were not reported as specifically impacting Southside Place. It can be assumed, however, that at least some of these events impacted Southside Place.
4.5.4.5 Probability of a Future Occurrence
In the previous 21 years (2000-2021), NCEI has recorded 26 occurrences of flooding in the area of Harris County near the City of Southside Place. It is assumed that these occurrences would have at least some impacts on the City, whether direct or indirect. This translates to an average recurrence of less than one year between events. Using the scale provided in Section 4.4, the probability of a future occurrence is high.

4.5.5 Hazard Description: Hail
Hail is defined as falling ice, roughly round in shape and at least 0.2 inch in diameter. Hail develops in the upper atmosphere as ice crystals that are bounced about by high velocity updraft winds; the ice crystals accumulate frozen droplets and fall after developing enough weight. The size of hailstones varies and is a direct consequence of the severity and size of the storm that produces them – the higher the temperatures at the Earth’s surface, the greater the strength of the updrafts and the amount of time hailstones are suspended, the greater the size of the hailstone.

4.5.5.1 Geographic Area Affected
Hail is a non-spatial hazard. All locations within the City are at risk from the hail hazard.

4.5.5.2 Severity or Magnitude of the Hazard
The National Oceanic and Atmospheric Administration (the parent agency for the NWS) and the Tornado and Storm Research Organization (TORRO) both created Hailstorm Intensity Scales. Table 14 (below) provides details of these scales.

Table 15: Combined NOAA/TORRO Hailstorm Intensity Scale

<table>
<thead>
<tr>
<th>Size Code</th>
<th>Intensity Category</th>
<th>Typical Hail Diameter</th>
<th>Approximate Size</th>
<th>Typical Damage Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>H0</td>
<td>Hard Hail</td>
<td>Up to 0.33”</td>
<td>Pea</td>
<td>No damage</td>
</tr>
<tr>
<td>H1</td>
<td>Potentially Damaging</td>
<td>0.33” – 0.60”</td>
<td>Marble or mothball</td>
<td>Slight damage to plants and crops</td>
</tr>
<tr>
<td>H2</td>
<td>Potentially Damaging</td>
<td>0.60” – 0.80”</td>
<td>Dime or grape</td>
<td>Significant damage to fruit, crops and vegetation</td>
</tr>
<tr>
<td>H3</td>
<td>Severe</td>
<td>0.80” – 1.20”</td>
<td>Nickel to quarter</td>
<td>Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored</td>
</tr>
<tr>
<td>H4</td>
<td>Severe</td>
<td>1.20” – 1.60”</td>
<td>Half dollar to ping pong ball</td>
<td>Widespread glass damage, vehicle body damage</td>
</tr>
<tr>
<td>H5</td>
<td>Destructive</td>
<td>1.60” – 2.0”</td>
<td>Silver dollar to golf ball</td>
<td>Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries</td>
</tr>
<tr>
<td>H6</td>
<td>Destructive</td>
<td>2.0” – 2.4”</td>
<td>Lime or egg</td>
<td>Aircraft body dented, brick walls pitted</td>
</tr>
<tr>
<td>H7</td>
<td>Very Destructive</td>
<td>2.4” – 3.0”</td>
<td>Tennis ball</td>
<td>Severe roof damage, risk of serious injuries</td>
</tr>
<tr>
<td>H8</td>
<td>Very Destructive</td>
<td>3.0” – 3.5”</td>
<td>Baseball to orange</td>
<td>Severe damage to aircraft body</td>
</tr>
<tr>
<td>H9</td>
<td>Super Hailstorms</td>
<td>3.5” – 4.0”</td>
<td>Grapefruit</td>
<td>Extensive structural damage, risk of severe or fatal injuries to persons caught in the open</td>
</tr>
</tbody>
</table>
The area of the County where the City is located has experienced at least 57 hail events in the previous 21 years. Of these, at least 19 were 1 inch or greater (severe); 10 were 1.5 inches or greater (destructive); and one was 2.5 inches (very destructive). These events are assumed to demonstrate the extent of the hail hazard that the City is likely to experience, though it is possible that the City could experience a Super Hailstorm in the future.

4.5.5.3 Impacts to Life, Property, or Operations

In general, the impacts to assets and operations with the City from the hail hazard are expected to be moderate to low. The more modern structures meet stringent wind and flood construction standards, which should provide residual protection from hail events, which are often short-lived. More likely to be damaged are assets on exposed rooftops, such as satellite and communications equipment, solar panels and emergency lighting.

Vehicles are another area of concern. Vehicles are often in use and parked in uncovered areas, and are constantly exposed to the weather, and would be at significant risk to hail events. Each vehicle parked in the open is vulnerable to hail damage.

While it is possible that people could be injured by hail, this is a very rare occurrence, with no occurrences recorded in the City.

4.5.5.4 Previous Occurrences of the Hazard

The National Centers for Environmental Information (NCEI), maintained by the National Oceanic and Atmospheric Administration (NOAA), records reports of severe weather throughout the country. A review of their collected data reveals 57 reported incidents of the hail hazard for the general area of the City between 2000 and June 2021. At least 27 of these occurrences were hailstones less than 1 inch in size; the remaining 30 documented hailstones of 1 inch or greater in diameter. No hailstones in excess of 2.5 inches have been recorded by NCEI or reported by the City.

4.5.5.5 Probability of a Future Occurrence

In the previous 21 years (1950-2021), NCEI has recorded 57 occurrences of hail in the area of Harris County occupied by the City. It is assumed that these occurrences would have at least some impacts on the City, whether direct or indirect. This translates to an average recurrence of less than one year between events. Using the scale provided in Section 4.4, the probability of a future occurrence is high.

4.5.6 Hazard Description: Hurricane/Tropical Storm

Per the National Hurricane Center, a hurricane is an intense tropical weather system of strong thunderstorms with well-defined surface circulation and sustained winds of 74 MPH or higher. Hurricanes begin as a tropical disturbance in the open ocean. The following table illustrates the terms used to define the various tropical weather systems.
Table 16: Tropical Weather System Definitions

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tropical Disturbance</td>
<td>A discrete tropical weather system of apparently organized convection -- generally 100 to 300 NMI in diameter -- originating in the tropics or subtropics, having a non-frontal migratory character, and maintaining its identity for 24 hours or more. It may or may not be associated with a detectable perturbation of the wind field.</td>
</tr>
<tr>
<td>Tropical Cyclone</td>
<td>A warm-core non-frontal synoptic-scale cyclone, originating over tropical or subtropical waters, with organized deep convection and a closed surface wind circulation about a well-defined center. Once formed, a tropical cyclone is maintained by the extraction of heat energy from the ocean at high temperature and heat export at the low temperatures of the upper troposphere. In this they differ from extratropical cyclones, which derive their energy from horizontal temperature contrasts in the atmosphere.</td>
</tr>
<tr>
<td>Tropical Depression</td>
<td>A tropical cyclone in which the maximum sustained surface wind speed (using the U.S. 1-minute average) is 33 KT (38 MPH or 62 KM/HR) or less.</td>
</tr>
<tr>
<td>Tropical Storm</td>
<td>A tropical cyclone in which the maximum sustained surface wind speed (using the U.S. 1-minute average) ranges from 34 KT (39 MPH or 63 KM/HR) to 63 KT (73 MPH or 118 KM/HR).</td>
</tr>
<tr>
<td>Hurricane</td>
<td>A tropical cyclone in which the maximum sustained surface wind (using the U.S. 1-minute average) is 64 KT (74 MPH or 119 KM/HR) or more. The term hurricane is used for Northern Hemisphere tropical cyclones east of the International Dateline to the Greenwich Meridian. The term typhoon is used for Pacific tropical cyclones north of the Equator west of the International Dateline.</td>
</tr>
</tbody>
</table>

The ingredients for a hurricane include a pre-existing weather disturbance, warm tropical waters, moisture and relatively light winds aloft. Persistent, favorable conditions can produce violent winds, destructive waves, torrential rains and powerful floods. Annually, an average of ten tropical systems develop over the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico. Many of these storms remain over open water and never move towards land. In an average year, six of these storms become hurricanes. In an average three-year period, five hurricanes strike the US coastline, anywhere from Texas to Maine. Of these, two are typically major or intense hurricanes, with classifications of Category 3 or higher.

A hazard associated with hurricanes is extreme wind. As wind speeds increase, pressure against objects is added at a disproportionate rate. Pressure against a wall rises with the square of the wind speed, which means that a threefold increase in wind speed gives a nine-fold increase in pressure. Thus, a 25 MPH wind causes approximately 1.6 pounds of pressure per foot². A 4”x8” sheet of plywood will be pushed by a weight of 50 pounds. In 75 MPH winds, that force becomes 450 pounds, and in 125 MPH winds, it becomes 1,250 pounds. For some structures, this force is enough to cause failure. These winds will weaken after landfall due to loss of warm-water energy source, and the encountering of great friction over land.

4.5.6.1 Geographic Area Affected

Extreme winds can and do impact the entirety of the City. As the City is located within a coastal county, all assets of the City are equally exposed to and at risk from tropical systems and hurricanes.
4.5.6.2 Severity or Magnitude of the Hazard

Hurricanes are categorized according to the strength of their winds using the Saffir-Simpson Wind Scale. This scale ranks only wind speed, and increases in scale. It is important to note that lower category storms can inflict greater damage than higher category storms, depending on where they strike, other weather they interact with, and how slow their forward speed.

A prime example is Hurricane Ike, which devasted the northern Texas coast in 2008. This storm had winds classified as Category 2, yet was one of the costliest and most destructive hurricanes in US history, due largely to its (then) Category 4 storm surge. This disparity in Hurricane Ike’s Saffir-Simpson Scale categorization resulted in the removal of storm surge predictions from Saffir-Simpson Wind Scale classifications.

Table 16 (following) illustrates the wind speed classification and expected wind effects on land from various coastal storm categories, as provided by the National Hurricane Center. These descriptions of land effects are general and are for explanatory purposes only. The actual damage to land from a given storm will be reliant on a variety of factors, including construction, placement, age, and condition of the structure.

<table>
<thead>
<tr>
<th>Category</th>
<th>Expected Wind Speed (mph)</th>
<th>Example Storm(s)</th>
<th>Effects on Land</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category 1</td>
<td>74 – 95</td>
<td>Hurricane Dolly (2008) – South Padre Island, Texas</td>
<td>Very dangerous winds will produce some damage: Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.</td>
</tr>
<tr>
<td>Hurricane</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category 2</td>
<td>96 – 110</td>
<td>Hurricane Frances (2004) – Port St. Lucie, Florida</td>
<td>Extremely dangerous winds will cause extensive damage: Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.</td>
</tr>
<tr>
<td>Hurricane</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category 3</td>
<td>111 – 130</td>
<td>Hurricane Ivan (2004) – Gulf Shores, Alabama</td>
<td>Devastating damage will occur: Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.</td>
</tr>
<tr>
<td>Hurricane</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>Expected Wind Speed (mph)</td>
<td>Example Storm(s)</td>
<td>Effects on Land</td>
</tr>
<tr>
<td>------------------------</td>
<td>----------------------------</td>
<td>-----------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Category 4 Hurricane</td>
<td>131 – 155</td>
<td>Hurricane Harvey (2017) – San Jose Island, Texas</td>
<td>Catastrophic damage will occur: Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.</td>
</tr>
<tr>
<td>Category 5 Hurricane</td>
<td>&gt;156</td>
<td>Hurricane Andrew (1992) – Homestead, Florida</td>
<td>Catastrophic damage will occur: A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.</td>
</tr>
</tbody>
</table>

The Saffir-Simpson Wind Scale does not address the potential for other hurricane-related impacts, such as storm surge, rainfall-induced floods, and tornadoes. In general, these wind-caused damage general descriptions are to some degree dependent upon the local building codes in effect and how well and how long they have been enforced.

For example, building codes enacted during the 2000s along the Gulf and Atlantic Coasts are likely to reduce the damage to newer structures from that described in Table 16 (previous). However, for a long time to come, a significant portion of the building stock in existence on the coast will not have been built to higher code; the City is no exception to this. This is especially true for historic or older structures. Hurricane wind damage is also very dependent upon other factors, such as duration of high winds, change of wind direction, and age of structures.

As a municipality in a coastal county, the City has experienced a range of tropical storm and hurricane events. Based on records obtained from FEMA, the City has experienced at least 13 events since 2000, ranging from tropical storms to a Category 4 hurricane. Based on the information available, which provides the range of historic occurrences of the hazard, it is expected that the extent of the hurricane/tropical storm hazard is Category 4 for the City of Southside Place.
Table 18: Tropical Storm & Hurricanes Impacting Planning Area

<table>
<thead>
<tr>
<th>Description of the Event</th>
<th>DR/EM/FM Number</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hurricane Alicia</td>
<td>DR-689</td>
<td>1983</td>
</tr>
<tr>
<td>Tropical Storm Charley</td>
<td>DR-1239</td>
<td>1998</td>
</tr>
<tr>
<td>Hurricane Georges</td>
<td>DR-1245</td>
<td>1998</td>
</tr>
<tr>
<td>Tropical Storm Allison</td>
<td>DR-1379</td>
<td>2001</td>
</tr>
<tr>
<td>Hurricane Rita</td>
<td>EM-3261</td>
<td>2005</td>
</tr>
<tr>
<td>Hurricane Rita</td>
<td>DR-1606</td>
<td>2005</td>
</tr>
<tr>
<td>Tropical Storm Erin</td>
<td>DR-1730</td>
<td>2007</td>
</tr>
<tr>
<td>Hurricane Dean</td>
<td>EM-3277</td>
<td>2007</td>
</tr>
<tr>
<td>Hurricane Gustav</td>
<td>EM-3290</td>
<td>2008</td>
</tr>
<tr>
<td>Hurricane Ike</td>
<td>EM-3294</td>
<td>2008</td>
</tr>
<tr>
<td>Hurricane Ike</td>
<td>DR-1791</td>
<td>2008</td>
</tr>
<tr>
<td>Hurricane Harvey</td>
<td>DR-4332</td>
<td>2017</td>
</tr>
<tr>
<td>Tropical Storm Imelda</td>
<td>DR-4466</td>
<td>2019</td>
</tr>
<tr>
<td>Hurricane Hanna</td>
<td>EM-3530</td>
<td>2020</td>
</tr>
<tr>
<td>Tropical Storms Marco and Laura</td>
<td>EM-3540</td>
<td>2020</td>
</tr>
</tbody>
</table>

4.5.6.3 Impacts to Life, Property, or Operations

Extreme winds have the potential to devastate the City. The City’s location in a coastal county makes it particularly susceptible to extreme winds. All areas of the City are at risk from the extreme wind hazard. Though Harris County has adopted, continually evaluates, and enforces stringent building codes, designed to protect the built environment, these building codes only apply to newer construction in most circumstances. Older building stock remains at risk from extreme wind events in most cases.

In August 2017, Hurricane Harvey devasted much of eastern Texas. An estimated quarter to half million structures in Texas were damaged or destroyed. NOAA estimated the damages from Harvey at $125B, making it the costliest natural disaster in Texas until February 2021 (Severe Winter Storm). At least 103 people died in storm-related incidents, with 68 of those fatalities being directly related to the storm.

Harvey made landfall as a Category 4 hurricane, in Aransas County. Wind gusts of 132 MPH were recorded near Port Aransas; entire city blocks were destroyed by winds. As reported by the National Weather Service:

“As Harvey moved inland, its forward motion slowed to near 5 mph after landfall and then meandered just north of Victoria, TX by the 26th. Rain bands on the eastern side of the circulation of Harvey moved into southeast Texas on the morning of the 25th and continued through much of the night and into the 26th. A strong rainband developed over Fort Bend and Brazoria Counties during the evening hours of the 26th and spread into Harris County and slowed while training from south to north. This resulted in a rapid development of flash flooding between 10:00 p.m. and 1:00 a.m. as tremendous rainfall rates occurred across much of Harris County. The morning of the 27th saw additional rain bands continued to develop and produced additional excessive rainfall amounts. As the center of Harvey slowly moved east-southeast and back offshore heavy rainfall continued to spread through much of the 29th and the 30th exacerbating the ongoing widespread and devastating flooding. All of this rainfall caused catastrophic drainage issues and

12.21.21
made rivers rise greatly. Only around 10% of the river forecast points in southeast Texas remained below flood stage due to the event, and approximately 46% of the river forecast points reached new record levels. Harvey maintained tropical storm intensity the entire time while inland over the Texas coastal bend and southeast Texas. After moving offshore, Harvey made a third landfall just west of Cameron, Louisiana on the morning of the 30th and brought more heavy rainfall to the Northern Gulf States.’

The following image illustrates the amount of rainfall associated with Hurricane Harvey.

![Hurricane Harvey Rainfall Amounts](image)

4.5.6.4 Previous Occurrences of the Hazard
There have been a number of federal disaster declarations related to hurricanes and tropical storms that have included Harris County, and therefore the City of Southside Place. Since 2000, declarations for Hurricanes Alicia, Georges, Rita, Dean, Gustav, Ike, Harvey, and Hanna have all included the City, as have declarations for Tropical Storms Charley, Allison, Erin, Imelda, Marco, and Laura.

The National Centers for Environmental Information (NCEI), maintained by the National Oceanic and Atmospheric Administration (NOAA), records reports of severe weather throughout the country. A review of their collected data reveals three reported incidents of the hurricane hazard and five tropical storm occurrences for Harris County between 2000 and June 2021. The absence of other documented events is curious, and clearly reveals a data deficiency within NCEI’s data set or recording methodology.

4.5.6.5 Probability of a Future Occurrence
In the previous 21 years (2000-2021), NCEI has recorded three occurrences of hurricanes and five tropical storms for Harris County. However, there have been at least 13 federal disaster declarations that included Harris County since 2000. It is assumed that these occurrences would have at least some impacts on the City, whether direct or indirect. Using the 21-year period of record for federal disaster declarations, this translates to an average recurrence of 1.61 years between events. Using the scale provided in Section 4.4, the probability of a future occurrence is moderate.
4.5.7 Hazard Description: Land Subsidence
According to the Harris County Hazard Mitigation Action Plan:

‘Subsidence is the sinking of the land surface in an area. The elevation of the land surface is lowered by compressing the many layers of clay below. Some natural land subsidence occurs over long periods of time, due to the natural settling of sediments left over from millions of years ago; however, the main causes of subsidence are human-induced. Mining, removal of groundwater, and organic materials are some of the most common causes of subsidence.’

4.5.7.1 Geographic Area Affected
According to the Harris County Hazard Mitigation Action Plan:

‘In the Houston-Galveston region, land subsidence is caused by compaction of fine-grained aquifer sediments (silts and clays) below the land surface due to groundwater withdrawals. Removing water from fine-grained aquifer sediments compresses the aquifer, leaving less pore space available to store water resulting in the lowering (sinking or settling) of the land-surface. Most compaction that occurs as a result of groundwater withdrawals is irreversible; even if groundwater levels rise, compacted sediments and the associated land-surface lowering would remain.’

Figure 9: Subsidence Areas Within Harris County
While this information is specific to the much larger Harris County, and not to the City, it illustrates the widespread nature of the subsidence hazard within the area that is occupied by the City’s 0.2 miles². Members of the Planning Committee reported that there have been no impacts to assets in the City from the land subsidence hazard, either measured or reported.

4.5.7.2 Severity or Magnitude of the Hazard
Land subsidence is measured by the subsidence of land in feet or inches per year or per event. According to the Harris County Hazard Mitigation Action Plan:

‘The severity of the risk for mass movements in the planning area is considered to be low due to the lack of exposure. Unless the frequency of occurrence increases in the future, a worst-case-scenario would be any occurrence of a mass movement, or something comparable the May 2008 Daisetta, Texas, sinkhole event, which measured 900 feet across and 260 feet deep.’

4.5.7.3 Impacts to Life, Property, or Operations
The Texas Living Waters Project provides the following information regarding the impacts to life, property, and operations from subsidence in the general planning area:

‘Texans started withdrawing groundwater from Houston-Galveston area aquifers as early as at least 1836, and since then the region has been slowly sinking. Roads, buildings and entire neighborhoods have shifted and cracked as the land has collapsed beneath them, succumbing to subsidence.

‘In the Houston-Galveston area, subsidence is mainly a result of over-pumping groundwater: as groundwater levels have been depleted faster than the aquifers can recharge, the soil and other materials have shifted, causing the ground to seemingly swallow itself whole.’

While none of these impacts have been reported or documented by the City, this is likely because of the efforts of the Houston-Galveston Coastal Subsidence District, which was established in 1975 to reduce and manage the subsidence from groundwater pumping in the area.

4.5.7.4 Previous Occurrences of the Hazard
According to the Texas Living Waters Project:

‘Since 1836, groundwater withdrawals have caused about 3,200 square miles of the Houston-Galveston area to subside more than a foot, with some areas subsiding as much as 12 to 13 feet. Over the last century, aquifers in this area have lost between 300 and 400 feet of water, leaving some of the land to collapse.’

While some level of subsidence continues to occur, it has been largely moderated by the Houston-Galveston Coastal Subsidence District’s efforts and activities.
4.5.7.5 Probability of a Future Occurrence
In the previous 21 years (2020-2021), NCEI has recorded no occurrences of land subsidence in Harris County, nor have any federal disaster declarations been issued. The State of Texas Hazard Mitigation Plan reports that land subsidence is an unlikely event, and places the occurrence of an event at once every decade. Based on this assessment, and using the scale provided in Section 4.4, the probability of a future occurrence is low.

4.5.8 Hazard Description: Lightning
Lightning is an atmospheric discharge of electricity accompanied by thunder, which typically occurs during thunderstorms, and sometimes during volcanic eruptions or dust storms. In the atmospheric electrical discharge, a leader of a bolt of lightning can travel at speeds of 130,000 MPH, and can reach temperatures approaching 54,000°F, hot enough to fuse silica sand into glass. There are some 16 million lightning storms in the world every year.

Lightning can also occur within the ash clouds from volcanic eruptions, or can be caused by violent forest fires which generate sufficient dust to create a static charge.

Lightning rapidly heats the air in its immediate vicinity to about 36,000°F - approximately three times the temperature of the surface of the sun. This compresses the surrounding air and creates a supersonic shock wave, which decays to an acoustic wave that is heard as thunder.

How lightning initially forms is still a matter of debate: Scientists have studied root causes ranging from atmospheric conditions (wind, humidity, friction, and atmospheric pressure) to the impact of solar wind and accumulation of charged solar particles. Ice inside a cloud is thought to be a key element in lightning development, and may cause a forcible separation of positive and negative charges within the cloud, thus assisting in the formation of lightning.

Some lightning strikes exhibit particular characteristics; scientists and the general public have given names to these various types of lightning. The lightning that is most-commonly observed is streak lightning. This is nothing more than the return stroke, the visible part of the lightning stroke. Most lightning occurs inside a cloud and is not observed during a thunderstorm.

The following are descriptions of various terms used to describe lightning, both scientific and common usage:

- **Cloud-to-Ground Lightning.** This is the best known and second most common type of lightning. Of all the different types of lightning, it poses the greatest threat to life and property since it strikes the ground. Cloud-to-ground lightning is a lightning discharge between a cumulonimbus cloud and the ground. It is initiated by a leader stroke moving down from the cloud.

- **Bead Lightning.** Bead lightning is a type of cloud-to-ground lightning which appears to break up into a string of short, bright sections, which last longer than the usual discharge channel. It is relatively rare. Several theories have been proposed to explain it; one is that the observer sees
portions of the lightning channel end on, and that these portions appear especially bright. Another is that, in bead lightning, the width of the lightning channel varies; as the lightning channel cools and fades, the wider sections cool more slowly and remain visible longer, appearing as a string of beads.

- **Ribbon Lightning.** Ribbon lightning occurs in thunderstorms with high cross winds and multiple return strokes. The wind will blow each successive return stroke slightly to one side of the previous return stroke, causing a ribbon effect.

- **Staccato Lightning.** Staccato lightning is a cloud to ground lightning strike which is a short-duration stroke that appears as a single very bright flash and often has considerable branching.

- **Ground-to-Cloud Lightning.** Ground-to-cloud lightning is a lightning discharge between the ground and a cumulonimbus cloud initiated by an upward-moving leader stroke. It is much rarer than cloud-to-ground lightning. This type of lightning forms when negatively charged ions called the stepped leader rises from the ground and meets the positively charged ions in a cumulonimbus cloud. Then the strike goes back to the ground as the return stroke.

- **Cloud-to-Cloud Lightning.** Lightning discharges may occur between areas of cloud without contacting the ground. When it occurs between two separate clouds it is known as inter-cloud lightning and when it occurs between areas of differing electric potential within a single cloud, it is known as intra-cloud lightning. Intra-cloud lightning is the most frequently occurring type.

- **Heat Lightning.** Heat lightning is a common name for a lightning flash that appears to produce no thunder because it occurs too far away for the thunder to be heard. The sound waves dissipate before they reach the observer.

- **Dry Lightning.** Dry lightning is a term used for lightning that occurs with no precipitation at the surface. This type of lightning is the most common natural cause of wildfires. Pyrocumulus clouds produce lightning for the same reason that it is produced by cumulonimbus clouds. When the higher levels of the atmosphere are cooler, and the surface is warmed to extreme temperatures due to a wildfire, volcano, etc., convection will occur, and the convection produces lightning. Therefore, fire can beget dry lightning through the development of more dry thunderstorms which cause more fires.

4.5.8.1 *Geographic Area Affected*

Lightning is a non-spatial hazard that can affect the entire area that is occupied by the City’s .2 miles².

4.5.8.2 *Severity or Magnitude of the Hazard*

The National Weather Service (NWS) uses a Lightning Activity Level scale to indicate the frequency and character of cloud-to-ground (C/G) lightning, the most common form of lightning on Earth. The scale uses a range of 1 – 6, with 6 being the high end of the scale. Table 18 (below) provides this severity scale.
The City of Southside Place, Texas Hazard Mitigation Plan

Table 19: Lightning Activity Level

<table>
<thead>
<tr>
<th>Rank</th>
<th>Cloud and Storm Development</th>
<th>Areal Coverage</th>
<th>Counts C/G per 5 Minutes</th>
<th>Counts C/G per 15 Minutes</th>
<th>Average C/G per Minute</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No Thunderstorms</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>2</td>
<td>Cumulus clouds are common but only a few reach the towering stage. A single thunderstorm must be confirmed in the rating area. The clouds mostly produce virga but light rain will occasionally reach ground. Lightning is very infrequent.</td>
<td>&lt;15%</td>
<td>1-5</td>
<td>1-8</td>
<td>&lt;1</td>
</tr>
<tr>
<td>3</td>
<td>Cumulus clouds are common. Swelling and towering cumulus cover less than 2/10 of the sky. Thunderstorms are few, but 2 to 3 occur within the observation area. Light to moderate rain will reach the ground, and lightning is infrequent.</td>
<td>15% to 24%</td>
<td>6-10</td>
<td>9-15</td>
<td>1-2</td>
</tr>
<tr>
<td>4</td>
<td>Swelling cumulus and towering cumulus cover 2-3/10 of the sky. Thunderstorms are scattered but more than three must occur within the observation area. Moderate rain is commonly produced, and lightning is frequent.</td>
<td>25% to 50%</td>
<td>11-15</td>
<td>16-25</td>
<td>2-3</td>
</tr>
<tr>
<td>5</td>
<td>Towering cumulus and thunderstorms are numerous. They cover more than 3/10 and occasionally obscure the sky. Rain is moderate to heavy, and lightning is frequent and intense.</td>
<td>&gt;50%</td>
<td>&gt;15</td>
<td>&gt;25</td>
<td>&gt;3</td>
</tr>
<tr>
<td>6</td>
<td>Dry lightning outbreak. (LAL of 3 or greater with majority of storms producing little or no rainfall.)</td>
<td>&gt;15%</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

The City frequently experiences moderate to severe lightning, because of its relative location in a subtropical climate. It is possible that all areas within the City could experience the entire extent of the lightning hazard, as defined in the above table, though the mid-range of the scale is a more frequent occurrence, based on historical records and anecdotal accounts.
4.5.8.3 Impacts to Life, Property, or Operations

Lightning is the leading cause of weather-related personal injuries. Perhaps because lightning is a common weather phenomenon, most people do not take the associated risks of exposure to lightning as seriously as they should.

Lightning is a major cause of storm related deaths in the US, out pacing hurricanes and tornados in most years. A lightning strike can result in a cardiac arrest (heart stopping) at the time of the injury, although some victims may appear to have a delayed death a few days later if they are resuscitated but have suffered irreversible brain damage. Those struck by lightning report a variety of after effects, including:

- Fatigue
- Brain and nervous system damage
- Headaches
- Ringing in the ears
- Dizziness
- Nausea and vomiting
- Sleep difficulties
- Seizures
- Chronic pain
- Personality changes, likely due to frontal lobe damage

In addition to the impact lightning can have on people, lightning can have significant impact on property, including utility infrastructure, such as lift stations and electrical sub-stations. The introduction of a significant electrical charge can destroy an electrical system that supplies power to buildings on the island, damaging or destroying anything connected to the electrical system of the building.

Lightning is the leading natural cause of wildfires, and can lead to structure fires as well.

In addition to direct losses such as property damage to buildings, a lightning strike may result in indirect losses that often accompany the destruction or damage of buildings and their contents. For example, municipalities rely upon the integrity of their structures as they provide services to their communities. A stroke of lightning to an unprotected building that house the police or fire station may result in an interruption of vital services to the community. The consequences of such an interruption can range from the public's loss of confidence to a citizen's death when a department is unable to respond to an emergency call.

4.5.8.4 Previous Occurrences of the Hazard

The National Centers for Environmental Information (NCEI), maintained by the National Oceanic and Atmospheric Administration (NOAA), records reports of severe weather throughout the country. A review of their collected data reveals ten reported incidents of the lightning hazard for the area in and around the City from 2000 through June 2021. No additional specific reports of lightning were reported by the Planning Committee; this is likely due to the commonness and frequency of lightning in the planning area.
4.5.8.5 Probability of a Future Occurrence
In the previous 21 years (2020-2021), NCEI has recorded ten reported incidents of the lightning hazard for the area in and around the City. Using the scale provided in Section 4.4, the probability of a future occurrence is moderate. However, it is more realistic to say that the probability of a future occurrence of the lighting hazard is high, but the probability of damage resulting from the event is low.

4.5.9 Hazard Description: Tornado
Tornadoes are also extreme wind events. The most destructive of all atmospheric phenomena, tornadoes are violently rotating columns of air. These columns extend between and in contact with a cloud and the Earth’s surface. The most violent tornadoes have rotational wind speeds of 250 MPH; in extreme cases, rotational wind speeds may approach 300 MPH. Tornadoes are often produced by severe thunderstorms and hurricanes as they move ashore.

4.5.9.1 Geographic Area Affected
Tornadoes are a non-spatial hazard that can affect the entire area that is occupied by the City’s .2 miles². All assets owned and operated by the City are assumed to be equally at risk.

4.5.9.2 Severity or Magnitude of the Hazard
Tornado wind forces are measured and described according to the Fujita Scale. The Fujita Scale is largely a residential structure damage scale, which tends to much more standardized construction than commercial structures. The Fujita Scale is intended to describe the expected damage to well-built residential structures. This makes its use often misleading, as poorly built structures can suffer significant structural damage under lesser winds than the Scale would suggest. The Storm Prediction Center, a NOAA office, states the following regarding the use of the Fujita Scale:

Do not use F-scale winds literally. These precise wind speed numbers are actually guesses and have never been scientifically verified. Different wind speeds may cause similar-looking damage from place to place -- even from building to building. Without a thorough engineering analysis of tornado damage in any event, the actual wind speeds needed to cause that damage are unknown.

Table 19 (following) illustrates the Fujita Scale in use prior to February 2007.

<table>
<thead>
<tr>
<th>F-Scale Number</th>
<th>Intensity Phrase</th>
<th>Wind Speed</th>
<th>Type of Damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>F0</td>
<td>Gale tornado</td>
<td>40-72 mph</td>
<td>Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.</td>
</tr>
<tr>
<td>F1</td>
<td>Moderate tornado</td>
<td>73-112 mph</td>
<td>The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.</td>
</tr>
</tbody>
</table>
In February 2007, use of the Fujita Scale was discontinued. In its place, the Enhanced Fujita Scale was put into use. The Enhanced Fujita Scale retains the same basic design as its predecessor, but reflects a more refined assessment of tornado damage surveys, standardization and damage consideration to a wider range of structure types. The new scale considers how most structures are designed, and is thought to be a much more accurate representation of the surface wind speeds in the most violent tornadoes. It is important to note the date a tornado occurred, as tornadoes which occurred prior to February 2007 are classified by the old scale and will not be converted to the Enhanced Fujita Scale.

Table 20 (following) illustrates the Enhanced Fujita Scale, currently in use.

Table 21: Enhanced Fujita Tornado Scale (Post-February 2007)

<table>
<thead>
<tr>
<th>Enhanced Fujita Category</th>
<th>Wind Speed (mph)</th>
<th>Potential Damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>EF0</td>
<td>65-85</td>
<td><strong>Light damage.</strong> Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.</td>
</tr>
<tr>
<td>EF1</td>
<td>86-110</td>
<td><strong>Moderate damage.</strong> Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.</td>
</tr>
<tr>
<td>EF2</td>
<td>111-135</td>
<td><strong>Considerable damage.</strong> Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.</td>
</tr>
</tbody>
</table>
Enhanced Fujita Category | Wind Speed (mph) | Potential Damage
--- | --- | ---
EF3  | 136-165 | **Severe damage.** Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4  | 166-200 | **Devastating damage.** Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
EF5  | >200 | **Incredible damage.** Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly more than 100 m (109 yd); high-rise buildings have significant structural deformation; incredible phenomena will occur.

The City can expect to experience the entire range of tornadoes, though the historic record indicates that EF0 and EF1 are the most common category. Therefore, EF1 is considered the most likely extent of the hazard for the City.

4.5.9.3 Impacts to Life, Property, or Operations
Tornadoes are one of the most destructive natural phenomena on Earth. They can – and do – destroy everything they come into contact with. Due to the unpredictable nature of their appearance and path, it is difficult to say specifically what damages will occur in any given event. It is common, however, for areas affected by a tornado to experience:

- Structure damage or destruction
- Utility infrastructure failure
- Ingress/egress disruption
- Injuries
- Fatalities
- Disruption of operations (often for an extended period of time)

4.5.9.4 Previous Occurrences of the Hazard
NCEI has recorded six tornadoes and six funnel clouds in the area of Harris County that is home to the City between 2000 and June 2021. No direct reports of occurrence within the City were discovered.

4.5.9.5 Probability of a Future Occurrence
In the previous 21 years (2000-2021), NCEI has recorded 12 occurrences of tornadoes/funnel clouds in the general area of the City. This equates to one event approximately every 1.75 years for the period of record. Using the scale provided in Section 4.4, the probability of a future occurrence is moderate.
4.5.10 Hazard Description: Wind Storm
This section focuses on the wind storm hazard. This hazard is most often accompanied by other storm hazards, but can occur as a stand-alone hazard event.

As defined by the National Weather Service, wind is

The horizontal motion of the air past a given point. Winds begin with differences in air pressures. Pressure that’s higher at one place than another sets up a force pushing from the high toward the low pressure. The greater the difference in pressures, the stronger the force. The distance between the area of high pressure and the area of low pressure also determines how fast the moving air is accelerated. Meteorologists refer to the force that starts the wind flowing as the "pressure gradient force." High and low pressures are relative. There’s no set number that divides high and low pressure. Wind is used to describe the prevailing direction from which the wind is blowing with the speed given usually in miles per hour or knots.

The extreme winds hazard will focus on severe thunderstorms and straight-line winds.

The National Oceanic and Atmospheric Administration (NOAA) defines a severe thunderstorm as

A thunderstorm that produces a tornado, winds of at least 58 mph (50 knots), and/or hail at least ¾” in diameter. Structural wind damage may imply the occurrence of a severe thunderstorm. A thunderstorm wind equal to or greater than 40 mph (35 knots) and/or hail of at least ¾” is defined as approaching severe.

Straight line winds are responsible for most thunderstorm wind damages, and can exceed 100 MPH. One type of straight-line wind, the downburst, is a small area of rapidly descending air beneath a thunderstorm. A downburst can cause damage equivalent to a strong tornado and can be extremely dangerous to aviation

4.5.10.1 Geographic Area Affected
Wind storms are a non-spatial hazard. Extreme winds can and do impact the entirety of the City’s .2 miles². All assets of the City are equally exposed to and at risk from wind storm events.

4.5.10.2 Severity or Magnitude of the Hazard
The severity and extent of extreme winds events varies, depending on the type of storm that produces the event. Table 21 (below) demonstrates the Beaufort Wind Force Scale, used to describe primarily maritime wind conditions.

<table>
<thead>
<tr>
<th>Beaufort Number</th>
<th>Wind Speed in MPH</th>
<th>Seaman’s Term</th>
<th>Effects on Land</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>&gt; 1</td>
<td>Calm</td>
<td>Calm; smoke rises vertically</td>
</tr>
<tr>
<td>1</td>
<td>1-3</td>
<td>Light Air</td>
<td>Smoke drift indicates wind direction; vanes do not move</td>
</tr>
<tr>
<td>2</td>
<td>4-7</td>
<td>Light Breeze</td>
<td>Wind felt on face; leaves rustle; vanes begin to move</td>
</tr>
</tbody>
</table>
City of Southside Place, Texas Hazard Mitigation Plan

<table>
<thead>
<tr>
<th>Beaufort Number</th>
<th>Wind Speed in MPH</th>
<th>Seaman’s Term</th>
<th>Effects on Land</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>8-12</td>
<td>Gentle Breeze</td>
<td>Leaves, small twigs in constant motion; light flags extended</td>
</tr>
<tr>
<td>4</td>
<td>13-18</td>
<td>Moderate Breeze</td>
<td>Dust, leaves and loose paper raised up; small branches move</td>
</tr>
<tr>
<td>5</td>
<td>19-24</td>
<td>Fresh Breeze</td>
<td>Small trees begin to sway</td>
</tr>
<tr>
<td>6</td>
<td>25-31</td>
<td>Strong Breeze</td>
<td>Large branches of trees in motion; whistling heard in wires</td>
</tr>
<tr>
<td>7</td>
<td>32-28</td>
<td>Moderate Gale</td>
<td>Whole trees in motion; resistance felt in walking against the wind</td>
</tr>
<tr>
<td>8</td>
<td>39-46</td>
<td>Fresh Gale</td>
<td>Twigs and small branches broken off trees</td>
</tr>
<tr>
<td>9</td>
<td>47-54</td>
<td>Strong Gale</td>
<td>Slight structural damage occurs; slate blown from roofs</td>
</tr>
<tr>
<td>10</td>
<td>55-63</td>
<td>Whole Gale</td>
<td>Seldom experienced on land; trees broken; structural damage occurs</td>
</tr>
<tr>
<td>11</td>
<td>64-72</td>
<td>Storm</td>
<td>Very rarely experienced on land; usually with widespread damage</td>
</tr>
<tr>
<td>12</td>
<td>73&lt;</td>
<td>Hurricane Force</td>
<td>Violence and destruction</td>
</tr>
</tbody>
</table>

The City can expect to experience the entire range of winds. The City has experienced the full extent of the scale on numerous occasions, including a large number of thunderstorms and straight line wind events.

**4.5.10.3 Impacts to Life, Property, or Operations**

Extreme winds have the potential to devastate the City. The City’s location in a coastal county makes it particularly susceptible to winds. Wind can damage buildings, building components, infrastructure, exposed equipment, vehicles, exposed utilities, trees, and people. Trees may be uprooted, which may result in downed power lines, vehicle damages, and building damages when they fall.

Flying debris is a primary concern with wind, as is the structural integrity of buildings. Though the City enforces stringent building codes, designed to protect the built environment, these building codes only apply to newer construction in most circumstances. Older building stock remains at risk from extreme wind events in most cases.

**4.5.10.4 Previous Occurrences of the Hazard**

NCEI has recorded 70 instances of high, strong, or thunderstorm wind in the general area of the City between 2000 and 2021. Many of these events were reported for the same day, making it likely that they are in reference to the same storm or storm system. It is almost certain that there have been many, many additional instances of windstorm that have impacted the area. But, as with lightning, it is likely that they simply were not reported, and therefore are not included in NCEI’s records.

**4.5.10.5 Probability of a Future Occurrence**

In the previous 21 years (2000-2021), NCEI has recorded 70 occurrences of extreme wind in the area of the City. This equates to 3.33 events annually for the period of record. As previously stated, however, it is likely that these reports do not account for all occurrences, and that the actual occurrence rate is much
higher. Using the scale provided in Section 4.4 and the official reports, however, the probability of a future occurrence is high.

4.5.11 Hazard Description: Winter Storm
Winter storms are uncommon in the planning area, but they do happen. In some cases, these winter storms can and have caused serious damage in areas where they occur. Winter storms encompass a variety of hazards that can produce life threatening situations and damage to property, as detailed below.

Snow
The National Weather Service defines snow as ‘precipitation is the form of ice crystals, mainly of intricately branched, hexagonal form and often agglomerated into snowflakes, formed directly from the freezing [disposition] of the water vapor in the air.’

Heavy snow accumulations, generally more than 6 inches of snow in less than 24 hours or more than 4 inches in less than 12 hours, can immobilize a community by bringing transportation to a halt. Until the snow can be removed, transportation routes are slowed or closed completely, limiting or halting the transportation of goods, services, and people. These closures also disrupt emergency services. In addition, accumulations of snow on roofs can cause collapse, and can cause trees and power lines to fall. A quick thaw after a significant snowfall can lead to substantial flooding, particularly in urban areas where there is more impermeable surface. Injuries and fatalities related to heavy snow are often associated with physical exertion (from shoveling) and from hypothermia.

Ice
Ice is the solid form of water, produced by freezing temperatures. The National Weather Service defines an ice storm as ‘occasions when damaging accumulations of ice are expected during freezing rain situations. Significant accumulations of ice pull down tress and utility lines, resulting in loss of power and communication. These accumulations of ice make walking and driving extremely dangerous. Significant ice accumulations are usually accumulations of ¼ inch or greater.’

The term ‘ice storm’ is used to describe occasions when damaging accumulations of ice are expected during freezing rain situations. Ice storms can be the most damaging of winter phenomena, and are often the cause of automobile accidents, utility failures, personal injury, and death. Moreover, they significantly impact the delivery of emergency services.

4.5.11.1 Geographic Area Affected
Winter storms are a non-spatial hazard. Winter storms can and do impact the entirety of the City’s .2 miles². All assets of the City are equally exposed to and at risk from winter storm events.
4.5.11.2 Severity or Magnitude of the Hazard
Severe winter storms have a wide range of extent and severity markers and characteristics.

Snow
Various intensities of snowfall are defined differently:

- **Blizzard** describes winds of 35 mph or more with considerable falling and/or blowing snow that reduces visibility to less than one-quarter mile for at least three hours.
- **Blowing snow** describes wind-driven snow that reduces surface visibility. Blowing snow may be falling snow and/or snow on the ground that is picked up by the wind. Blowing snow if typically accompanied by drifting snow.
- **Snow squall** describes a brief, intense snow shower accompanied by strong, gusty winds. Accumulation from snow squalls can be significant.
- **Snow shower** describes snow that falls at varying intensities for short durations. Accumulations are possible, but not required.

Blizzard warnings are issued for winter storms that are predicted to meet the definition of a blizzard. Blowing snow advisories are issued when such conditions are expected. Snow advisories are issued when a low-pressure system produces snow that may cause significant inconveniences, but do not meet warning criteria, and – if caution is not exercised – could lead to life threatening situations. The threshold criterion carries from area to area. Such an advisory may be issued if the forecaster feels the situation warrants one, even if the minimum criteria is not expected to be met. For example, a snow advisory may be issued for the first snow of the season, or if snow has not fallen in some time.

Ice
Ice presents a hazard in a variety of forms:

- **Ice storm** is an occasion when damaging accumulations of ice during freezing rain situations. Significant amounts of ice typically damage trees and utility lines, and accumulations can make walking and driving exceptionally hazardous. Significant accumulations are typically one-quarter inch or greater.
- **Sleet** is rain that freezes into ice pellets before it reaches the ground. Sleet usually bounces when hitting a surface and does not stick to objects; however, it can accumulate like snow and cause roads and walkways to become hazardous.
- **Freezing drizzle** is a drizzle that falls as a liquid but freezes into a glaze upon contact with the cold ground or surface structures.
- **Freezing rain** is rain that falls onto a surface that has a temperature below freezing. The cold surface causes the rain to freeze so the surfaces—trees, utility wires, vehicles, and roads—become glazed with ice.
An ice storm warning is issued by the National Weather Service when freezing rain produces a significant and possibly damaging accumulation of ice. The criteria for this warning varies from place to place, but will typically be issued any time more than one-quarter inch of ice is expected to accumulate in a given area.

A sleet warning is issued when an accumulation of more than one-half inch of sleet is expected. This is a relatively rare scenario; most warnings are issued as winter storm warnings for heavy sleet.

A freezing drizzle advisory or a freezing rain advisory is issued when freezing rain or freezing drizzle is forecast but significant accumulation is not expected. However, even small amounts of freezing rain or freezing drizzle can cause significant travel disruptions.

Finally, the National Weather Service may issue a winter weather advisory when a low-pressure system produces a combination of winter weather (snow, freezing rain, etc.) that present a hazard but does not meet established warning criteria. A winter storm watch is issued when there is a potential for heavy snow or significant ice accumulations, usually at least 24-36 hours in advance; the criteria for what defines a winter storm varies from place to place. A winter storm warning is issued when a winter storm is actively producing or is forecast to produce heavy snow or significant ice accumulations; the criteria for what defines a winter storm varies from place to place.

The Sperry-Piltz Ice Accumulation Index, or “SPIA Index” – Copyright, February, 2009

<table>
<thead>
<tr>
<th>ICE DAMAGE INDEX</th>
<th>DAMAGE AND IMPACT DESCRIPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.</td>
</tr>
<tr>
<td>1</td>
<td>Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.</td>
</tr>
<tr>
<td>2</td>
<td>Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.</td>
</tr>
<tr>
<td>3</td>
<td>Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1 – 5 days.</td>
</tr>
<tr>
<td>4</td>
<td>Prolonged &amp; widespread utility interruptions with extensive damage to main distribution feeder lines &amp; some high voltage transmission lines/structures. Outages lasting 5 – 10 days.</td>
</tr>
<tr>
<td>5</td>
<td>Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.</td>
</tr>
</tbody>
</table>

(Categories of damage are based upon combinations of precipitation totals, temperatures and wind speeds/directions.)

Figure 10: Sperry-Piltz Ice Accumulation Index
Winter storms are a rare occurrence in the planning area. Because of this, when they do occur, it does not take a great deal of accumulation to have a significant impact on the City. NCEI has recorded two incidents of severe winter weather since 2000, in January and March of 2014; eight other occurrences of less severe winter weather were recorded for the same period. These severe winter weather events were a mixture of freezing temperatures and precipitation, which resulted in icy roads, downed tree limbs, and power failures in the area. These events are presumed to illustrate the extent of the winter storm hazard that the City can expect to experience. Based on these records, and in consideration of the Sperry-Pilz Ice Accumulation Index, the anticipated extent of this hazard for the City of Southside Place would be a Category 3 on the Sperry-Pilzx Index, with Categories 0-2 being much more frequent occurrences.

Typically, winter storm events are forecast in advance for the planning area, with significant warning time prior to arrival or onset. Because of the coastal climate of the area, accumulation is typically minimally and the duration is typically brief, even in the most extreme of events.

4.5.13 Impacts to Life, Property, or Operations

According to the National Severe Storms Laboratory (NSSL), most deaths from winter storms are not related to the storm itself. Rather, they are related to traffic accidents, heart attacks (from shoveling snow), and hypothermia (from prolonged exposure to cold).

Heavy accumulations of ice can bring down trees and topple utility poles and communication towers. Ice can disrupt communications and power for days while utility companies repair damage. Even small accumulations of ice can be severely dangerous to motorists and pedestrians. Bridges and overpasses are particularly dangerous because they freeze before other surfaces.

Winter storms can bring the City to a standstill by inhibiting outdoor activities, knocking down trees and utility lines, and by inhibiting transportation routes.

In addition to the threat posed to humans, severe winter storms pose a significant threat to utility production, which in turn threatens facilities and operations that rely on utilities, specifically climate stabilization. As temperatures drop and stay low, increased demand for heating places a strain on the electrical grid, which can lead to temporary outages.

4.5.14 Previous Occurrences of the Hazard

NCEI has recorded ten instances of winter weather in the general area of the City between 2000 and 2021. Additionally, the Houston/Galveston Office of the National Weather Service has published a report on the February 2021 Winter Storm Uri event. No other events were reported by the Planning Committee.

4.5.15 Probability of a Future Occurrence

In the previous 21 years (2000-2021), NCEI recorded ten occurrences of winter storm in the general area of the City, though these ten occurrences are multiple reports of two storm events. The NWs report for Winter Storm Uri from February 2021 brings the total number of events to three. This equates to one
event approximately every seven years for the period of record. Using the scale provided in Section 4.4, the probability of a future occurrence is low.

4.6 Risk and Vulnerability Assessment

4.6.1 Risk Assessment Methodology Description
Risk is an expression of expected future losses. In the case of this plan, the risks assessed are from the hazards identified previously. This risk assessment was developed with the support and coordination of Southside Place’s Mitigation Planning Committee. The Committee members represent a cross section of City leadership and staff, with varying responsibilities, tenure, and experiences.

As this is the inaugural hazard mitigation plan for the City, there is no existing plan to update or draw information from or comparisons with. Additionally, as this is the inaugural plan, there are a number of data deficiencies that have been identified during plan development. the City will work in the future to collect and maintain additional and more specific data for future plan updates and incarnations, now that they are aware of the type and level of data that is useful to support this planning effort. For this plan, however, data deficiencies are noted throughout the risk assessment, and are addressed as action items in the mitigation strategy (Chapter 6).

Because of the lack of City-level data available, the risk assessment for this plan has two parts:

1. A quantitative assessment, completed through an exercise with the Planning Committee, that provides insight as to the vulnerabilities and risks to the City’s people, operations, and assets; and
2. A quantitative assessment, based on designed hazard scenarios, to estimate potential losses.

In both assessments, the best available data was used.

4.6.2 Qualitative Risk Assessment Ranking
The Planning Committee was asked to provide their individual, subjective assessment of the risk of each identified hazard and the vulnerability of the City to those hazards, using the scale and criteria in Table 22 (below).

<table>
<thead>
<tr>
<th>Table 23: Qualitative Risk Assessment Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ranking</strong></td>
</tr>
<tr>
<td>--------------</td>
</tr>
<tr>
<td>Low</td>
</tr>
<tr>
<td>Moderate</td>
</tr>
</tbody>
</table>
The following table provides the results of the qualitative risk ranking for each hazard. Each member of the Planning Committee was asked to provide their individual assessment; those individual assessments were averaged to produce the results below. For the purposes of this assessment, the following scores were used:

- High – 3 points
- Moderate – 2 points
- Low – 1 point
- Not Applicable – dropped from average

### Table 24: Risk Assessment Ranking

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Potential Impact to People/Life Safety</th>
<th>Potential Impact to Assets/Buildings</th>
<th>Potential Impact to Infrastructure</th>
<th>Potential Impact to Service Delivery/Mission</th>
<th>Overall Average Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drought</td>
<td>Low</td>
<td>Low</td>
<td>Moderate</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Extreme Cold</td>
<td>Low</td>
<td>Low/Moderate</td>
<td>Moderate</td>
<td>Low/Moderate</td>
<td>Low/Moderate</td>
</tr>
<tr>
<td>Extreme Heat</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Flood</td>
<td>Low</td>
<td>Low/Moderate</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Hail</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Hurricane/Tropical Storm</td>
<td>Low</td>
<td>Low/Moderate</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Land Subsidence</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Lightning</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Tornado</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Wind Storm</td>
<td>Low</td>
<td>Low/Moderate</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Winter Storm</td>
<td>Low</td>
<td>Low/Moderate</td>
<td>Moderate</td>
<td>Low/Moderate</td>
<td>Low/Moderate</td>
</tr>
</tbody>
</table>

4.6.3 Estimate of Potential Losses

This sub-section describes the potential losses to the City, including its population, assets, and mission, from the hazards identified and profiled earlier in this chapter. Where available and appropriate, estimated losses are described in terms of dollars, though insufficient data exists at this time to perform this type of estimate for each and every hazard included in this plan.

4.6.3.1 Estimate of Potential Losses: Drought

As a small municipality, the City receives all utilities – including water – from external providers. They do not control the delivery of their support utilities, and do not have the ability to quickly obtain potable.
water, electricity, etc. from alternate sources. This makes them highly susceptible to the risks of drought, particularly when those drought conditions impact the ability of their service providers to provide utility service.

In the event of a prolonged drought, the City may be asked to curtail their utility consumption, particularly their consumption of water and electricity. Any curtailing of consumption, including that necessary due to depleted availability from suppliers, would have a detrimental impact on the City, specifically:

- **People/Life Safety** – a lack of sufficient utility support would result in increased risks to life safety, particularly if the decreased availability of potable water occurred in conjunction with extreme heat or other hazard conditions. If the decreased availability of water or electricity resulted in a limited ability to control and condition spaces – public spaces, and other spaces that are routinely occupied by at risk people (including children and the elderly) – the City may be forced to identify:
  - alternate means of water for drinking, sanitation, and space conditioning;
  - alternate means of power, should availability be limited to ensure grid stability; and/or
  - alternate means of delivering services.

- **Assets/Buildings** – a lack of sufficient utility support could render assets and buildings uninhabitable for a period of time. Any loss of ability to control or condition occupied spaces would create risks for those people that normally occupy those spaces. Additionally, the southern coastal climate of the area means that space conditioning is necessary to maintain healthy and safe environments for human occupation, as it helps to prohibit the creation of unhealthy environmental conditions, such as mold growth.

- **Infrastructure** – as the City does not control the utility infrastructure that is owned and operated by their utility service providers, they must rely on their providers to ensure that all infrastructure that requires utility support is properly operating. In the event of utility infrastructure failure, people and life safety would quickly become at increased risk from the effects of drought (and its usual companion, heat). Additionally, prolonged drought conditions could create increased strain on infrastructure, would could result in failure, either over time or catastrophically.

- **Service Delivery/Mission** – the City relies on their utility service providers to be able to deliver educational services and complete their mission, which is to provide an array of government services. If a drought placed their utilities at risk, this would negatively the City’s ability to deliver service and achieve their mission. The City may be able to make other arrangements for a short time period, such as through the purchase of bulk or bottled water from suppliers, or through the use of generator support, but these measures would be limited by availability, and may not be practical long-term solutions.

Droughts can have serious financial impacts on the City. While it is unlikely that a drought would cause direct damage to the City’s assets and infrastructure, a drought could result in a disruption to operations. A drought event that resulted in the disruption or temporary cessation on operations would create operational costs – and losses – well above the financial assistance available to the City to compensate for such a loss.
A short-term drought would be a manageable risk for the City to address. Drought is typically a slow-developing hazard, which would afford sufficient time to plan accordingly. In a typical drought they would have sufficient time to make arrangements and plans to mitigate the risks and vulnerabilities associated with that particular scenario, and would be able to communicate the risk management plan to their community.

But any risk management plan would likely only be viable for a short-term event, and would require revision and reconsideration for a longer-term event, as the needs for a longer-term event would be very different, both in volume and in practicality. A long-term, severe drought would require a very different response from the City, and would require significantly more coordination and planning with local, regional, state, and (likely) federal partners, as the amount of alternate utility support would be much greater, and resources may be scarcer for such an event.

Conclusion
Drought poses a real and significant hazard to the City; a severe or long-term drought has the potential to seriously disrupt operations. Potential losses could occur across multiple sectors, including people, assets, and service delivery.

Data that could be developed, identified, or collected to improve this risk assessment for future plan updates include:

- Estimates of increased operating costs due to the unavailability or limited availability of normal utility support;
- Detailed plans for alternate utility purchase or supply, including estimated costs for access, delivery, storage, and distribution; and
- Plans for agreements with partners, providers, and other stakeholders that could provide support during a drought to help mitigate risks and vulnerabilities and to limit potential losses.

4.6.3.2 Estimate of Potential Losses: Extreme Cold
Extreme cold is not a routine hazard for the City, though it is one that does occur. It is a hazard that is currently at the forefront of thinking and planning throughout Texas, given the severe winter weather than occurred in February 2021.

The following specific potential losses related to extreme cold exist for the City:

- **People/Life Safety** – Extreme cold poses a significant risk to people; the City’s population no exception. Populations that are accustomed to warm, coastal climates and weather have a difficult time adjusting to and dealing with the opposite extreme, as neither the population nor their built environment are equipped to deal with opposite conditions. The City’s population would be at high risk, as the majority of the population is comprised of older adults, who have a more difficult time weathering and surviving extreme cold. The City’s population would be reliant on the protection of the built environment and sufficient utility support for survival in an extreme cold event.
- **Assets/Buildings** – The City’s assets and buildings were not designed or constructed for routine exposure to extreme cold. Rather, they were designed and constructed for the warm, coastal
climate that is more typical to the area. A prolonged exposure to extreme cold could have negative or detrimental effects on assets and buildings, as the very materials used in construction could be damaged by sudden or prolonged constriction caused by extreme cold temperatures.

- **Infrastructure** – As was evident in the February 2021 event, a good deal of the infrastructure that supports much of Texas – including the City of Southside Place – was not designed or constructed to withstand extreme cold. Electrical grid failures and frozen/ruptured pipes were national news for a week during the event, as they occurred at previously-unseen levels across Texas. These utility failures led to buildings that were unsafe to occupy, and placed people at serious risk from the effects of extreme cold temperatures. Disruptions in utility service delivery also resulted in disruptions to municipal operations and ability to deliver service to their community.

- **Service Delivery/Mission** – The potential losses related to service delivery are a cascading result of the potential losses to assets and infrastructure, as both are necessary for the City to deliver governmental services and achieve their mission.

Extreme cold could have financial impacts on the City. As can be seen in Appendix D, the City holds a small number of assets. The total estimated value of their assets is $10,100,000. A period of extreme cold that resulted in damages of 10% would create $1,010,000 in potential losses for the City. Even a smaller event – one that resulted in 1% in damages – would still create the potential for $101,000 in losses.

The potential for loss of contents is also significant. The City has contents in their assets with an estimated value of $1,100,000. Using the scenarios above, an event that damaged 10% of these contents would result in potential losses of $110,000. A smaller event that resulted in damages in 2% of the City’s contents would still result in potential losses of $22,000.

The City can capitalize their most recent experience with extreme cold temperatures by assessing the experience, the losses suffered, and the impact the event had on the community, and developing or updating plans to address these new experiences. These recent experiences provide valuable information that can be used to inform mitigation strategies for the hazard, and that can be used to assess and amend (where necessary) operational plans and processes.

**Conclusion**

Extreme cold poses a real, though infrequent, hazard to the City. Potential losses could occur across multiple sectors, including people, assets, infrastructure, and service delivery.

Data that could be developed, identified, or collected to improve this risk assessment for future plan updates include:

- Estimates of increased operating costs due to the unavailability or limited availability of normal utility support, in the event of utility disruption as a result of extreme cold;
- Detailed plans for alternate utility purchase or supply, including estimated costs for access, delivery, storage, and distribution, in the event of utility disruption as a result of extreme cold;
- Periodic documentation of pre-event condition of utilities, infrastructure, and other at-risk assets, to assist with any insurance or other financial claim documentation after an event; and
• Plans for agreements with partners, providers, and other stakeholders that could provide support during extreme cold conditions to help mitigate risks and vulnerabilities and to limit potential losses.

4.6.3.3 Estimate of Potential Losses: Extreme Heat

Extreme heat is a more routine hazard experienced by the City than its opposite twin, extreme cold. The typical climate of the area lends itself to higher temperatures and humidity, which comes with its own specific risks.

The following specific potential losses related to extreme heat exist for the City:

• People/Life Safety – Extreme heat poses a significant risk to people; the City’s population is certainly no exception. Health risks from extreme heat include:
  - Sunburn
  - Dehydration
  - Heat cramps
  - Heat exhaustion
  - Heat stroke

Heat-related risks to people generally result from a reduction or collapse of the body’s ability to cool itself by circulatory changes and sweating, or from a chemical (salt) imbalance caused by too much sweating. When the body cannot cool itself, or when it cannot compensate for fluids and salt lost through perspiration, the temperature of the body’s inner core begins to rise, and heat-related illness may develop. All other factors being equal, the severity of heat disorders tends to increase with age. Heat cramps in a 17-year-old may be heat exhaustion in someone who is 40, and heat stroke in a person over 60. The City’s population would be at high risk, as a significant percentage of the City’s residents are older adults, who have a more difficult time weathering and surviving extreme heat. The City’s population would be reliant on the protection of the built environment and sufficient utility support for survival in an extreme heat event.

• Assets/Buildings – The City’s assets and buildings constructed and designed for the warm climate of the area. The potential for loss to assets and structures as a result of extreme heat is very low.

• Infrastructure – Utility infrastructure is at risk from extreme heat events, as the demand for service can place a severe strain on systems. Increased demand for potable water can result in diminished supplies, which can result in problems with delivery, for example if there is insufficient pressure to maintain flow levels or to pump. Increased demands on the electrical grid can overtax the infrastructure, resulting in diminished availability (leading to brown outs) or outright failure of the components (leading to black outs). Disruptions in utility service delivery can result in disruptions to the City’s operations and ability to deliver service to their community.

• Service Delivery/Mission – The potential losses related to service delivery are a cascading result of the potential losses to assets and infrastructure, as both are necessary for the City to deliver governmental services and achieve their mission.

Extreme heat could have financial impacts on the City. As can be seen in Appendix D, the City has four critical assets. The total estimated value of their is $10,100,000. A period of extreme heat that resulted in
damages of 5% would create $505,000 in potential losses for the City. Even a smaller event – one that resulted in 1% in damages – would still create the potential for $101,000 in losses.

The potential for loss of contents is also significant. The City has contents with an estimated value of $1,100,000. Using the scenarios above, an event that damaged 20% of these contents would result in potential losses of $220,000. A smaller event that resulted in damages in 5% of the City’s contents would still result in potential losses of $55,000.

Conclusion
Extreme heat poses a real, though infrequent, hazard to the City. Potential losses could occur across multiple sectors, including people, assets, infrastructure, and service delivery. It is possible that the effects of future changes to climate conditions could increase this vulnerability for the City.

Data that could be developed, identified, or collected to improve this risk assessment for future plan updates include:

- Estimates of increased operating costs due to the unavailability or limited availability of normal utility support, in the event of utility disruption as a result of extreme heat;
- Detailed plans for alternate utility purchase or supply, including estimated costs for access, delivery, storage, and distribution, in the event of utility disruption as a result of extreme heat;
- Identification and increased monitoring of assets and infrastructure that may be a particular or specific risk from the effects of extreme heat conditions;
- Plans for monitoring the community for potential physical impacts of extreme heat, which can quickly be life-threatening, particularly in children or the elderly;
- Periodic documentation of pre-event condition of utilities, infrastructure, and other at-risk assets, to assist with any insurance or other financial claim documentation after an event; and
- Plans for agreements with partners, providers, and other stakeholders that could provide support during extreme heat conditions to help mitigate risks and vulnerabilities and to limit potential losses.

4.6.3.4 Estimate of Potential Losses: Flood
The majority of the City’s area lays within the 1%-annual-chance floodplain, as do most of the assets – both public and private – within the City. Each of the City’s four critical assets lays within the SFHA; all are in Zone AE.

As of October 2021, there were more than 400 active NFIP policies in place under the City’s Community ID number, and the City was an active member of the program in good standing. Additionally, assets within the City have received more than $730,000 in structure claim payments from the NFIP, and an additional $159,000 in contents payments.

NFIP & Repetitive Loss Structures
According to data obtained from the NFIP, there are two designated Repetitive Loss (RL) structures within the City. Both of these structures are residential. According to NFIP data, one has been mitigated, and the other has not. Combined, these two structures account for $217,926 in structure claims payments, and more than $44,000 in contents payments.
The following specific potential losses related to flood exist for the City:

- **People/Life Safety** – Flooding poses a risk to the community. The majority of flood events that have impacted the City have flash flooding or other situations that had little or no warning. The larger impact to people comes from post-flood conditions, during the time between the flood event and the removal/replacement of flood-damaged materials, and from the inability to travel safely within the flooded area.

- **Assets/Buildings** – The City’s assets and buildings have the potential for losses from urban or stormwater flood events. Prior flooding events have resulted in issues with assets and systems, such as:
  - Damage to structures.
  - Disruption of travel.
  - Damage to utility systems.
  - Disruption of ingress and egress.

  In severe events, these and similar types of damages may render a building temporarily uninhabitable while repairs are made. This creates operational concerns for the City, as they may be prevented from delivering services to residents.

- **Infrastructure** – Similar to buildings and assets, the infrastructure that supports the City’s operations is also at risk from flooding. Flood water can disrupt service delivery by damaging pipes and lines, or by rendering them isolated from workers for repair or replacement. Flood waters can dislodge or dislocate buried lines, or disrupt connection points into facilities. Some utility providers will elect to shut down service during flood events, which can impact facilities and structures that are outside the flood-impacted area. Disruptions in utility service delivery can result in disruptions to operations and the inability to deliver service to their community.

- **Service Delivery/Mission** – The potential losses related to service delivery are a cascading result of the potential losses to assets and infrastructure, as both are necessary for the City to deliver governmental services and achieve their mission.

Even smaller flood events can have serious financial impacts on the City. As can be seen in Appendix D, the City has four assets, all of which are critical. The total value of their buildings is $10,100,000. A flood event that resulted in damages of 25% would create $2,525,000 in potential losses for the City. Even a smaller flood event – one that resulted in 10% in damages – would still create the potential for $1,010,000 in losses.

The potential for loss of contents is also significant. The City has contents in their assets with an estimated value of $1,100,000. Using the scenarios above, a flood event that damaged 50% of these contents would result in potential losses of $550,000. A smaller event that resulted in damages in 10% of the City’s contents would still result in potential losses of $11,000.

**Conclusion**

Flooding – even smaller events – poses a real hazard to the City. Potential losses could occur across multiple sectors, including people, assets, infrastructure, and service delivery. It is possible that the effects of future changes to climate conditions could increase this vulnerability for the City.
Data that could be developed, identified, or collected to improve this risk assessment for future plan updates include:

- Estimates of increased operating costs due to the unavailability or limited availability of normal utility support, in the event of utility disruption as a result of flooding;
- Detailed plans for alternate utility purchase or supply, including estimated costs for access, delivery, storage, and distribution, in the event of utility disruption as a result of flooding;
- Identification and increased monitoring of assets and infrastructure that may be a particular or specific risk from the effects of flood conditions;
- Periodic documentation of pre-event condition of utilities, infrastructure, and other at-risk assets, to assist with any insurance or other financial claim documentation after an event; and
- Plans for agreements with partners, providers, and other stakeholders that could provide support to help mitigate risks and vulnerabilities and to limit potential losses.

4.6.3.5 Estimate of Potential Losses: Hail

Hail is a non-spatial, often unpredictable hazard. While the conditions that allow for hail formation can be forecast with some accuracy, it is not always possible for accurately forecast the size, intensity, or location of hail events. As a result of this, all assets owned and operated by the City are at some risk to hail. While the most vulnerable assets are vehicles and rooftop mounted equipment (such as communications equipment), it is possible that all assets could be damaged by hail in a significant event. While modern construction methods and techniques have resulted in buildings that are stronger and less susceptible to damage, not all assets owned or operated by the City were designed or constructed according to the same standard; this results in varying vulnerability and potential losses among their varied assets.

The following specific potential losses related to hail exist for the City:

- People/Life Safety – Hail poses a minimal risk to the community, though there is at least some level of risk. While it is possible that people could be injured by a sudden hail event, all structures in the City are more than capable of providing protection during even the most extreme hail storm. Anyone caught outside or unaware during a hail event need only quickly seek refuge in the nearest building to be protected and avoid injury.
- Assets/Buildings – the City’s assets and buildings have some vulnerability to hail, though the exact level on a building-by-building basis is unclear as of this plan. There is a likelihood that there has been superficial damage to buildings from prior hail events, but this damage appears to be limited to finishes (i.e., paint and siding), as no claims or reports could be located. No other structure damages were identified during plan development, and there is no reason to believe that any structure owned or operated by the City would be susceptible to damage as a result of even the most violent hail event.

The assets most likely to be damaged by hail are vehicles, both those owned and operated by the City and those belonging to residents and visitors. Vehicles are typically parked in uncovered areas, and would be fully exposed to hail during any event. A significant or widespread event could result in the complete loss of one or more vehicles for insurance purposes.
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- Infrastructure – As is typical in most areas, the City’s infrastructure is at risk from hail. Hail can damage communications equipment – such as satellite dishes or cell towers, leading to disruptions in communications. Exterior meters may be damaged, leading to service interruptions, though these disruptions would likely be limited to the most extreme events, and would be short-term.
- Service Delivery/Mission – The potential losses related to service delivery are a cascading result of the potential losses to assets and infrastructure, as both are necessary for the City to deliver governmental services and achieve their mission.

Hail storms can have financial impacts on the City. As can be seen in Appendix D, the City’s four assets would all be exposed to a hail event. The total value of their buildings is $10,100,000. A hail event that resulted in damages of 10% would create $1,010,000 in potential losses for the City. Even a smaller event – one that resulted in 1% in damages – would still create the potential for $101,000 in losses.

The potential for loss of contents is also significant. The City’s assets contain contents estimated at 1,100,000. Using the scenarios above, an event that damaged 10% of these contents would result in potential losses of $110,000. A smaller event that resulted in damages in 2% of the City’s contents would still result in potential losses of $22,000.

Conclusion
Hail poses a minimal, though infrequent, hazard to the City. Potential losses could occur across multiple sectors, including assets, infrastructure, and service delivery. It is possible that the effects of future changes to climate conditions could increase this vulnerability for the City.

Data that could be developed, identified, or collected to improve this risk assessment for future plan updates include:
- Estimates of increased operating costs due to the unavailability or limited availability of normal utility support, in the event of utility disruption as a result of hail;
- Detailed plans for alternate utility purchase or supply, including estimated costs for access, delivery, storage, and distribution, in the event of utility disruption as a result of hail;
- Identification and increased monitoring of assets and infrastructure that may be a particular or specific risk from the effects of hail conditions;
- Periodic documentation of pre-event condition of vehicles, utilities, infrastructure, and other at-risk assets, to assist with any insurance or other financial claim documentation after an event; and
- Plans for agreements with partners, providers, and other stakeholders that could provide support to help mitigate risks and vulnerabilities and to limit potential losses.

4.6.3.6 Estimate of Potential Losses: Hurricane/Tropical Storm
The City has a long history experience with hurricanes and tropical storms; fortunately, their losses have been minimal. This is largely due to their very small size and limited number of assets.
All assets, infrastructure, and operations of the City have some level of risk from hurricanes and tropical storms. Though the City has experienced no physical losses from recent hurricanes and tropical storms, including Hurricane Harvey in 2017, the risk remains.

Modern forecasting skill means that the City typically has time to make preparations prior to landfall of any hurricane or tropical storm. These preparations may include things like cancelling events, removing or securing sensitive or at-risk equipment or contents, installing wind or flood barriers, disconnecting utilities, and similar actions. These preparations can result in diminished losses from an event, as they mitigate the potential for loss prior to the storm’s arrival.

The following specific potential losses related to hurricanes/tropical storms exist for the City:

- **People/Life Safety** – The community has long experience with hurricanes and tropical storms, and is well versed in the need to either evacuate or batten down prior to the storm’s arrival. The City and its residents seek to limit the exposure of their community when reasonable to do so, often by cancelling events and closing buildings in advance of landfall. This pre-emptive action serves to protect the community from the approaching storm, by removing them from the potential.
- **Assets/Buildings** – the City’s assets and buildings have the potential for losses from hurricanes and tropical storms. In severe events, damages may render a building temporarily uninhabitable while repairs are made.
- **Infrastructure** – Similar to buildings and assets, the infrastructure that supports the City’s operations is also at risk from hurricanes and tropical storms. Water can disrupt service delivery by damaging pipes and lines, or by rendering them isolated from workers for repair or replacement. Flood waters can dislodge or dislocate buried lines, or disrupt connection points into facilities. High winds can result in damaged or destroyed lines. Some utility providers will elect to shut down service during events, which can impact facilities and structures that are outside the impacted area. Disruptions in utility service delivery can result in disruptions to the City’s operations and ability to deliver service to their community.
- **Service Delivery/Mission** – The potential losses related to service delivery are a cascading result of the potential losses to assets and infrastructure, as both are necessary for the City to deliver governmental services and achieve their mission.

Even smaller events can have serious financial impacts on the City. As can be seen in Appendix D, the City has four assets, each of which is critical to their operation. The total value of their buildings is $10,100,000. A hurricane or tropical storm event that resulted in damages of 20% would create $2,020,000 in potential losses for the City. Even a smaller event – one that resulted in 5% in damages – would still create the potential for $505,000 in losses.

The potential for loss of contents is also significant. The City estimates the value of their asset contents at $1,100,000. Using the scenarios above, an event that damaged 20% of these contents would result in potential losses of $220,000. A smaller event that resulted in damages in 10% of contents would still result in potential losses of $110,000.
Conclusion

Hurricanes and tropical storms – even smaller events – pose a real hazard to the City. Potential losses could occur across multiple sectors, including people, assets, infrastructure, and service delivery. It is possible that the effects of future changes to climate conditions could increase this vulnerability for the City, as storms increase in both frequency and magnitude.

The City’s return to full operation after an event is critical. Residents rely on a functioning government to provide them with information after an event such as a hurricane. While it is not always possible for operations to resume quickly, successful mitigation of identified risks and vulnerabilities – activities that begin with the creation of plans like this – can ease the way for future mitigation efforts to minimize future losses.

Data that could be developed, identified, or collected to improve this risk assessment for future plan updates include:

- Estimates of increased operating costs due to the unavailability or limited availability of normal utility support, in the event of utility disruption as a result of hurricanes or tropical storms;
- Detailed plans for alternate utility purchase or supply, including estimated costs for access, delivery, storage, and distribution, in the event of utility disruption as a result of hurricanes or tropical storms;
- Identification and increased monitoring of assets and infrastructure that may be a particular or specific risk from the effects of post-storm conditions;
- Periodic documentation of pre-event condition of utilities, infrastructure, and other at-risk assets, to assist with any insurance or other financial claim documentation after an event; and
- Plans for agreements with partners, providers, and other stakeholders that could provide support to help mitigate risks and vulnerabilities and to limit potential losses.

4.6.3.7 Estimate of Potential Losses: Land Subsidence

Land subsidence in coastal areas can have significant and widespread impacts. Land subsidence can result in structural damage to buildings and infrastructure, such as transportation or utilities. Buried utility lines are at particular risk, as they can be damaged without notice by humans until service is interrupted or they fail. Land subsidence rarely if ever results in threats to life safety, but often results in property damage and utility failure to function.

The following specific potential losses related to land subsidence exist for the City:

- **People/Life Safety** – the City’s population is at very little risk from land subsidence, as this hazard rarely manifests in sudden or catastrophic occurrences.
- **Assets/Buildings** – the City’s assets and buildings are at risk from the effects of land subsidence, as their foundations are reliant upon the stability of the ground upon which they are built. Subsidence of the soils under foundations will eventually result in damage to the foundation, which could render the structure permanently uninhabitable or in need of significant repairs before it can be safely occupied. Buildings in coastal areas may also be damaged by increased saltwater intrusion in subsidence areas, which creates further instability in the ground and foundation.
Infrastructure – Underground infrastructure is at risk from the effects of subsidence. Shifting soils can create pressure on buried lines or pipes, which can result in service disruption or loss of function. Disruptions in utility service delivery could result in disruptions to the City’s operations and ability to deliver service to their community.

Service Delivery/Mission – The potential losses related to service delivery are a cascading result of the potential losses to assets and infrastructure, as both are necessary for the City to deliver governmental services and achieve their mission.

While unlikely, land subsidence could have financial impacts on the City. As can be seen in Appendix D, the City owns/operates four assets. The total value of their buildings is $10,100,000. An event or incident that resulted in damages of 10% would create $1,010,000 in potential losses for the City. Even a smaller event – one that resulted in 1% in damages – would still create the potential for $101,000 in losses.

The potential for loss of contents is also significant. The City estimates that the value of the contents of its assets is $1,100,000. Using the scenarios above, an event that damaged 10% of these contents would result in potential losses of $110,000. A smaller event that resulted in damages in 1% of the City’s asset contents would still result in potential losses of $11,000.

Conclusion
Land subsidence poses a hazard to the City. Potential losses could occur across multiple sectors, including assets, infrastructure, and service delivery.

Data that could be developed, identified, or collected to improve this risk assessment for future plan updates include:

- Estimates of increased operating costs due to the unavailability or limited availability of normal utility support, in the event of utility disruption as a result of land subsidence;
- Detailed plans for alternate utility purchase or supply, including estimated costs for access, delivery, storage, and distribution, in the event of utility disruption as a result of land subsidence;
- Operational plans to increase inspections and monitoring of soil conditions in the greater community;
- Periodic documentation of pre-event condition of foundations, utilities, infrastructure, and other at-risk assets, to assist with any insurance or other financial claim documentation after an event; and
- Plans for agreements with partners, providers, and other stakeholders that could provide support to help mitigate risks and vulnerabilities and to limit potential losses.

4.6.3.8 Estimate of Potential Losses: Lightning
Lightning is a leading cause of weather-related injuries. Perhaps because lightning is a common weather phenomenon, people often do not take the associated risks of exposure to lightning as seriously as they should. Lightning is a major cause of storm related deaths in the US, out pacing hurricanes and tornados in most years. A lightning strike can result in a cardiac arrest (heart stopping) at the time of the injury, although some victims may appear to have a delayed death a few days later if they are resuscitated but have suffered irreversible brain damage.
In addition to the impact lightning can have on people, lightning can have significant impact on property, including utility infrastructure, such as lift stations and electrical sub-stations. Lightning is the leading natural cause of wildfires, and can lead to structure fires as well.

The following specific potential losses related to lightning exist for the City:

- **People/Life Safety** – the City’s population is at risk from lightning. If people are caught outside when lightning strikes, they may be injured or killed. If people are unaware of the best ways or places to seek shelter during lightning, they may choose poorly and put themselves at further risk of exposure, injury, or death.

- **Assets/Buildings** – the City’s assets and buildings are at some risk from lightning, as lightning strikes may result in structure fires that damage or completely destroy buildings, rendering them uninhabitable for a period of time. For a community like Southside Place, where space is at a premium and there is little space not occupied, this can create significant problems.

- **Infrastructure** – Infrastructure is at risk from lightning. Direct strikes to utilities poles, station, or lines can result in disruption, failure, or even fire, resulting in a prolonged loss of function. Disruptions in utility service delivery could result in disruptions to the City’s operations and ability to deliver service to their community.

- **Service Delivery/Mission** – The potential losses related to service delivery are a cascading result of the potential losses to assets and infrastructure, as both are necessary for the City to deliver governmental services and achieve their mission.

Lightning can have financial impacts on the City. As can be seen in Appendix D, the City owns/operates four assets. The total value of their buildings is $10,100,000. A lightning event that resulted in damages of 10% would create $1,010,000 in potential losses for the City. Even a smaller event – one that resulted in 1% in damages – would still create the potential for $101,000 in losses.

The potential for loss of contents is also significant. The City estimates the value of their building contents as $1,100,000. Using the scenarios above, an event that damaged 10% of these contents would result in potential losses of $110,000. A smaller event that resulted in damages to 1% of the City’s contents would still result in potential losses of $11,000.

**Conclusion**

Lightning poses a hazard to the City. Potential losses could occur across multiple sectors, including people, assets, infrastructure, and service delivery.

Data that could be developed, identified, or collected to improve this risk assessment for future plan updates include:

- Estimates of increased operating costs due to the unavailability or limited availability of normal utility support, in the event of utility disruption as a result of lightning;

- Detailed plans for alternate utility purchase or supply, including estimated costs for access, delivery, storage, and distribution, in the event of utility disruption as a result of lightning;

- Study to determine priority and location for lighting rods and other protective equipment across all assets;
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- Periodic documentation of pre-event condition of buildings, utilities, infrastructure, and other at-risk assets, to assist with any insurance or other financial claim documentation after an event; and
- Plans for agreements with partners, providers, and other stakeholders that could provide support to help mitigate risks and vulnerabilities and to limit potential losses.

4.6.3.9 Estimate of Potential Losses: Tornado

The City has experience with tornado warnings and events. All people, assets, infrastructure, and operations are at risk from tornadoes, as tornadoes are a non-spatial hazard that can occur anywhere. While there are no records to show that the City has been directly impacted by a tornado, records do show that several small tornadoes have occurred in neighboring communities, such as Bellaire.

Modern forecasting skill means that the City often has at least some time to make preparations prior to the arrival of a tornado, though this is not always the case. These preparations include things like communicating the warning to residents and staff, and staff to designated areas of protection within the building. These preparations can result in diminished losses from an event, as they mitigate the potential for loss prior to the tornado’s arrival.

The following specific potential losses related to tornadoes exist for the City:

- People/Life Safety – The community is at risk from tornadoes. The City seeks to limit the exposure of their community when time exists to do so, by instructing staff and residents in the safest places and positions to move to. This pre-emptive action serves to protect the community from the approaching storm, by sheltering them from the potential for harm.
- Assets/Buildings – The City’s assets and buildings have the potential for losses from tornadoes. Tornadoes pose a significant risk to assets and buildings, and may result in a myriad of damages, including:
  - damage roofs and interior ceilings,
  - damage to entry points, such as windows and doors,
  - damage to building exteriors,
  - damage to outdoor equipment and landscaping (often in place to control runoff), and
  - damage to exterior utilities and infrastructure, such as A/C units.
In severe events, these and similar types of damages may render a building temporarily uninhabitable while repairs are made. Assets are also at risk from damage due to trees that are damaged or destroyed during tornadoes, as buildings could be damaged when large trees fall. The City reports that they have experienced a small tornado, that resulted in damage to trees as well as damaging the façade of a residential structure.
- Infrastructure – Similar to buildings and assets, the infrastructure that supports the City’s operations is also at risk from tornadoes. High winds can result in damaged or destroyed lines. Flying debris can also damage lines and exposed connections. Disruptions in utility service delivery can result in disruptions to operations and ability to deliver service to the community.
- Service Delivery/Mission – The potential losses related to service delivery are a cascading result of the potential losses to assets and infrastructure, as both are necessary for the City to deliver governmental services and achieve their mission.
Tornadoes can have serious financial impacts on the City. As can be seen in Appendix D, the City has four assets – all of them critical. The total value of their buildings is $10,100,000. A tornado that resulted in damages of 10% would create $1,010,000 in potential losses for the City. Even a smaller event – one that resulted in 1% in damages – would still create the potential for $101,000 in losses.

The potential for loss of contents is also significant. The City estimates their asset contents as $1,100,000. Using the scenarios above, an event that damaged 20% of these contents would result in potential losses of $220,000. A smaller event that resulted in damages in 10% of the City’s contents would still result in potential losses of $110,000.

Conclusion
Tornadoes – even smaller, less powerful events – pose a real hazard to the City, and are a hazard that the City has experienced. Potential losses could occur across multiple sectors, including people, assets, infrastructure, and service delivery. It is possible that the effects of future changes to climate conditions could increase this vulnerability for the City, as storms become both more frequent and more intense.

Data that could be developed, identified, or collected to improve this risk assessment for future plan updates include:

- Estimates of increased operating costs due to the unavailability or limited availability of normal utility support, in the event of utility disruption as a result of tornadoes;
- Detailed plans for alternate utility purchase or supply, including estimated costs for access, delivery, storage, and distribution, in the event of utility disruption as a result of tornadoes;
- Identification and increased monitoring of assets and infrastructure that may be a particular or specific risk from the effects of post-storm conditions;
- Detailed data regarding structure vulnerability and current load estimates for all occupied buildings in the community;
- Periodic documentation of pre-event condition of utilities, infrastructure, and other at-risk assets, to assist with any insurance or other financial claim documentation after an event; and
- Plans for agreements with partners, providers, and other stakeholders that could provide support to help mitigate risks and vulnerabilities and to limit potential losses.

4.6.3.10 Estimate of Potential Losses: Wind Storm
Wind storms are a known risk for the City. All people, assets, infrastructure, and operations are at risk from this non-spatial hazard.

Modern forecasting skill means that the City often has at least some time to make preparations prior to the arrival of a wind storm, though this is not always the case. These preparations include things like communicating the warning and moving residents and staff to designated areas of protection within the building. These preparations can result in diminished losses from an event, as they mitigate the potential for loss prior to the storm’s arrival.

The following specific potential losses related to wind storms exist for the City:
People/Life Safety – Similar to other high wind events, the community is at risk from wind storms. The City seeks to limit the exposure of their community when time exists to do so, by instructing residents and staff in the safest places and positions to. This pre-emptive action serves to protect the community from the approaching storm, by sheltering them from the potential for.

Assets/Buildings – the City’s assets and buildings have the potential for losses from high or extreme winds. Just as with hurricanes, tropical storms, and tornadoes, these winds pose a significant risk to assets and buildings, and may result in a myriad of damages, including:
- damage roofs and interior ceilings,
- damage to entry points, such as windows and doors,
- damage to building exteriors,
- damage to outdoor equipment and landscaping (often in place to control runoff), and
- damage to exterior utilities and infrastructure, such as A/C units.
In severe events, these and similar types of damages may render a building temporarily uninhabitable while repairs are made.

Infrastructure – Similar to buildings and assets, the infrastructure that supports the City’s operations is also at risk from wind storms. High winds can result in damaged or destroyed lines. Flying debris can also damage lines and exposed connections. Disruptions in utility service delivery can result in disruptions to operations and ability to deliver service to the community.

Service Delivery/Mission – The potential losses related to service delivery are a cascading result of the potential losses to assets and infrastructure, as both are necessary for the City to deliver governmental services and achieve their mission.

Just like with hurricanes, tropical storms, and tornadoes, wind storms can have serious financial impacts on the City. As can be seen in Appendix D, the City has four critical assets. The total value of their buildings is $10,100,000. A wind event that resulted in damages of 15% would create $1,515,000 in potential losses for the City. Even a smaller event – one that resulted in 5% in damages – would still create the potential for $505,000 in losses.

The potential for loss of contents is also significant. The City has building contents estimated at $1,100,000. Using the scenarios above, an event that damaged 10% of these contents would result in potential losses of $110,000. A smaller event that resulted in damages in 2% of the City’s asset contents would still result in potential losses of $22,000.

Conclusion
Wind storms – even smaller, less powerful events – pose a real hazard to the City. Potential losses could occur across multiple sectors, including people, assets, infrastructure, and service delivery. It is possible that the effects of future changes to climate conditions could increase this vulnerability for the City, as storms become both more frequent and more intense.

The City’s return to full operation after an event is critical. This allows the community to begin the resumption of normal activities and to move forward from the event. While it is not always possible for operations to resume quickly, successful mitigation of identified risks and vulnerabilities – activities that begin with the creation of plans like this – can ease the way for future mitigation efforts to minimize future losses.
Data that could be developed, identified, or collected to improve this risk assessment for future plan updates include:

- Estimates of increased operating costs due to the unavailability or limited availability of normal utility support, in the event of utility disruption as a result of wind storms;
- Detailed plans for alternate utility purchase or supply, including estimated costs for access, delivery, storage, and distribution, in the event of utility disruption as a result of wind storms;
- Identification and increased monitoring of assets and infrastructure that may be a particular or specific risk from the effects of post-storm conditions;
- Detailed data regarding structure vulnerability and current load estimates for all occupied buildings;
- Periodic documentation of pre-event condition of utilities, infrastructure, and other at-risk assets, to assist with any insurance or other financial claim documentation after an event; and
- Plans for agreements with partners, providers, and other stakeholders that could provide support to help mitigate risks and vulnerabilities and to limit potential losses.

4.6.3.11 Estimate of Potential Losses: Winter Storm

Winter storms are not a routine hazard for the City, though it is one that does occur. It is a hazard that is currently at the forefront of thinking and planning throughout Texas, given the severe winter weather than occurred in February 2021.

The following specific potential losses related to winter storms exist for the City:

- People/Life Safety – Winter storms pose a serious risk to people; the City’s population is no exception. Populations that are accustomed to warm, coastal climates and weather have a difficult time adjusting to and dealing with winter weather, as neither the population nor their built environment are equipped to deal with opposite conditions. The City’s population would be at risk from a winter storm event, and would be reliant on the protection of the built environment and sufficient utility support for survival during a winter storm event.
- Assets/Buildings – the City’s assets and buildings were not designed or constructed for routine exposure to winter storms. Rather, they were designed and constructed for the sub-tropical climate that is more typical to the area. A prolonged exposure to winter weather – such as snow or ice – could have negative or detrimental effects on assets and buildings, as the very materials used in construction could be damaged by sudden or prolonged constriction caused by winter storms and the accompanying cold temperatures.
- Infrastructure – As was evident in the February 2021 event, a good deal of the infrastructure that supports much of Texas – including Southside Place – was not designed or constructed to withstand winter weather and storms. Electrical grid failures and frozen/ruptured pipes were national news for a week during the event, as they occurred at previously-unseen levels across Texas. These utility failures led to buildings that were unsafe to occupy, and placed people at serious risk from the effects of winter weather, including cold temperatures. Disruptions in utility service delivery also resulted in disruptions to the City’s operations and ability to deliver service to their community.
• Service Delivery/Mission – The potential losses related to service delivery are a cascading result of the potential losses to assets and infrastructure, as both are necessary for the City to deliver governmental services and achieve their mission.

Similar to extreme cold, winter storms could have financial impacts on the City. As can be seen in Appendix D, the City owns/operates four critical assets. The total value of their buildings is $10,100,000. A winter storm event that resulted in damages of 10% would create $101,000 in potential losses for the City. Even a smaller event – one that resulted in 1% in damages – would still create the potential for $101,000 in losses.

The potential for loss of contents is also significant. The City estimates their assets’ contents as valued at $1,100,000. Using the scenarios above, an event that damaged 5% of these contents would result in potential losses of $55,000. A smaller event that resulted in damages in 1% of the City’s contents would still result in potential losses of $11,000.

The City can capitalize their most recent experience with winter storms by assessing the experience, the losses suffered, and the impact the event had on the community, and developing or updating plans to address these new experiences. These recent experiences provide valuable information that can be used to inform mitigation strategies for the hazard, and that can be used to assess and amend (where necessary) operational plans and processes.

Conclusion
Winter storms pose a real, though infrequent, hazard to the City. Potential losses could occur across multiple sectors, including people, assets, infrastructure, and service delivery.

Data that could be developed, identified, or collected to improve this risk assessment for future plan updates include:

• Estimates of increased operating costs due to the unavailability or limited availability of normal utility support, in the event of utility disruption as a result of winter storms;
• Detailed plans for alternate utility purchase or supply, including estimated costs for access, delivery, storage, and distribution, in the event of utility disruption as a result of winter storms;
• Periodic documentation of pre-event condition of utilities, infrastructure, and other at-risk assets, to assist with any insurance or other financial claim documentation after an event; and
• Plans for agreements with partners, providers, and other stakeholders that could provide support during extreme cold conditions to help mitigate risks and vulnerabilities and to limit potential losses.

4.6.4 Facilities and Critical Assets
The following contains a complete listing of all assets and contents owned and/or operated by the City, and their assigned value.
Because of the critical function provided by the City, all assets owned and/or operated by the City are deemed to be critical assets.

### 4.6.5 Social Vulnerabilities

As incorporated municipality, Southside Place is responsible for providing an array of services to the residents of Southside Place, including police and fire services. Additionally, the City provides more general government services, including programs and project delivery.

The City’s population is small – 1,865 as of the last Census estimate, and it is aging. A quarter of the City’s residents are 65 years of age or greater, making them more vulnerable to the risks associated with natural hazards than other populations.

The City recognizes the inherent vulnerabilities of the community they serve, and has developed an array of plans, protocols, and processes to address these risks. For example, the City asks residents to register to receive emergency notifications and alerts via email, text, or both. As of this plan, 325 residents have registered for this service, which also offers notifications for police activities, parks, and public works.

The City’s website offers information and links for an array of natural hazards, with an emphasis on hurricane season. Given their general location, this is a logical and helpful service. Information is also available to City website visitors for CenterPoint Energy regarding electrical and natural gas safety and preparedness tips.

### 4.6.6 Future Conditions

As of this plan, the City of Southside Place is built out. All available land is currently in use, and the City is land locked by the communities of Houston, Bellaire, and West University Place. Because of this, no changes to future conditions from changes in development are anticipated.

The City has two stormwater improvement projects planned for the near future. One – the Auden-Edloe-Harper Streets Project – is funded, and will begin in 2022. The other – the Auden Street Project – is seeking funding as of this plan. These projects are expected to significantly improve the stormwater system that serves the City and its neighboring community of West University Place by increasing the amount of stormwater the system can handle and the rate at which it can be moved out of the City. These projects will be designed in consideration of expected changes to future conditions in the area, to the extent possible and practicable.

### 4.6.7 Summary of Hazards and Impacts
Southside Place has at least some level of exposure to almost a dozen natural hazards. Each of these hazards presents a challenge to the City, as each poses a risk to the community, assets, infrastructure, and mission of the City. Because the City is a small, land-locked City, however, there are limitations to the mitigation actions that it has the authority to undertake, as many actions are not the actual or legal responsibility of the City of Southside Place; rather, they fall under the authority of the City of Houston, Harris County, the State of Texas, or some other entity.

This hazard identification and risk assessment identifies a host of risks and vulnerabilities to natural hazards, and documents the need to improve data and documentation relates to these hazards, risks, and vulnerabilities. This information informs the mitigation strategy for the City, and will provide guidance to future development plans and decisions.

This plan is the City’s initial step towards the identification of a two-pronged mitigation strategy – one that contains both actions that are within the City’s authority to implement, and another that will require collaboration and partnership with other entities to implement.
Chapter 5: Capability Assessment

This section will establish a baseline capability for the community, to allow for determination of technical assistance and training needs.

5.1 Plan and Regulation Capabilities

It is important that the planning team have members from the community. The community should bring recent, current, and future projects to the planning table. This will provide both background for planning purposes as well as points of insertion for hazard mitigation strategies. Examples of plans include general plans, capital improvement plans, and emergency preparedness and response plans. Regulatory capabilities include building codes and zoning ordinances. It is important to note these plans and regulations specifically include information for hazard mitigation. Also, this is an opportunity to identify where plans and regulations do not identify mitigation for hazards and could pose a risk to the community.

5.2 Administrative and Technical Capabilities

Mitigation actions need to be implemented through administrative and technical capabilities; specifically, staff and their skills to achieve them. The community has identified not only government administrative capabilities but contractor and private partner capabilities.

5.3 Financial Capabilities

The community as well as the State of Texas and federal agency programs may provide resources to fund mitigation actions. Each mitigation action must be analyzed for costs and whether funding is available for its implementation. The analysis supports prioritizing of mitigation actions. An aggregated assessment of financial capabilities will assist the community in selecting mitigation actions.

Table 25 provides an overview of the current capabilities of the City of Southside Place.

<table>
<thead>
<tr>
<th>Southside Community Capability Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Planning/Regulatory Tool</strong></td>
</tr>
<tr>
<td>Hazard mitigation plan</td>
</tr>
<tr>
<td>Comprehensive Plan</td>
</tr>
<tr>
<td>Floodplain management plan</td>
</tr>
<tr>
<td>Storm water management plan</td>
</tr>
<tr>
<td>Floodplain or Flood Damage Prevention ordinance</td>
</tr>
<tr>
<td>Building code</td>
</tr>
</tbody>
</table>
### Southside Community Capability Assessment

<table>
<thead>
<tr>
<th>Fire code</th>
<th>X</th>
<th>City Council</th>
<th>Part of building code</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFIP Member</td>
<td>X</td>
<td>City Council</td>
<td></td>
</tr>
</tbody>
</table>

#### Staff/Personnel Resources

<table>
<thead>
<tr>
<th>Role Description</th>
<th>Yes</th>
<th>No</th>
<th>Future position</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineers or professionals trained in construction practices related to buildings and/or infrastructure</td>
<td>X</td>
<td></td>
<td></td>
<td>Includes use of approved vendors</td>
</tr>
<tr>
<td>Planning or engineers with an understanding of natural hazards</td>
<td>X</td>
<td></td>
<td></td>
<td>Includes use of approved vendors</td>
</tr>
<tr>
<td>Emergency manager</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Floodplain manager</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staff with expertise or education in the community's vulnerability to natural hazards</td>
<td>X</td>
<td></td>
<td></td>
<td>Includes use of approved vendors</td>
</tr>
<tr>
<td>Resource development staff or grant writer</td>
<td>X</td>
<td></td>
<td></td>
<td>Includes use of approved vendors</td>
</tr>
<tr>
<td>Project manager</td>
<td>X</td>
<td></td>
<td></td>
<td>Includes use of approved vendors</td>
</tr>
</tbody>
</table>

#### Financial Resource

<table>
<thead>
<tr>
<th>Resource Type</th>
<th>Yes</th>
<th>No</th>
<th>Unknown</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital improvement funds</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community Development Block Grants (CDBG)</td>
<td>X</td>
<td></td>
<td></td>
<td>Received CDBG-DR award through Harris County for project design/implementation</td>
</tr>
<tr>
<td>Utility fees</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storm water fees</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General obligation, revenue, and/or special tax bonds</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partnering arrangements or intergovernmental agreements</td>
<td>X</td>
<td></td>
<td></td>
<td>Frequent collaboration with other entities for project design/implementation</td>
</tr>
</tbody>
</table>

As a small community, the City recognizes the need to increase their capacity and capability for hazard mitigation opportunities. Their recent experience with seeking stormwater project funding has also identified a need for increased community partnerships and relationships, to both enhance recovery.
timelines and to better leverage mitigation opportunities when they arise. To meet this need, the City has invested in staff and partnerships to assist with forming stronger relationships with community partners. For example, the City plans to discuss and consider re-joining Harris County’s hazard mitigation plan in the future, which will allow their specific risks, vulnerabilities, and mitigation priorities to be considered and profiled with the greater community’s, which is expected to create opportunities for partnerships and leveraging for the area as a whole. It is anticipated that these partnerships will also create shared knowledge and opportunities for knowledge sharing, which will strengthen the capabilities and capacities of all partners, including the City of Southside Place. Additionally, the City is committed to continuing their good-standing membership in the National Flood Insurance Program (NFIP), and will continue to enforce their flood damage prevention ordinance to ensure compliance and flood risk reduction.
Chapter 6: Mitigation Strategy

6.1 Mitigation Strategy Requirements

44 CFR, 201.6(c)(3) provides the requirements related to the mitigation strategy for local mitigation plans.

The plan must include the following:

- A mitigation strategy that provides the jurisdiction’s blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, polices, programs, and resources, and its ability to expand on and improve these existing tools.
- The section must include:
  - A description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards;
  - A section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure;
  - A description of the jurisdiction’s participation in the NFIP, and continues compliance with NFIP requirements, as appropriate; and
  - An action plan describing how the action identified will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

6.2 Mitigation Goals and Objectives

The following goals and objectives were developed and validated by the Planning Committee to provide guidance and direction in the development and implementation of the mitigation strategy.

1. **Goal 01: Protect community health and safety.**
   - Objective 1.1: Implement natural hazard mitigation actions that will protect life and property by ensuring assets and infrastructure are more resilient to hazards and risks.
   - Objective 1.2: Reduce the overall vulnerability of the community.

2. **Goal 02: Build and support partnerships to enhance mitigation opportunities and decrease vulnerability and risk.**
   - Objective 2.1: Build and support partnerships with local and regional entities to increase mitigation effectiveness.
   - Objective 2.2: Work with community partners to build mitigation and risk concerns into planning and budgeting processes.

3. **Goal 03: Leverage available resources to maximize investment in hazard mitigation.**
   - Objective 3.1: Maximize and leverage all available resources to ensure the most effective mitigation possible.
   - Objective 3.2: Maximize insurance coverage to provide financial protection from natural hazards.

4. **Goal 04: Increase awareness and understanding of natural hazard mitigation and resiliency within the community.**
a. Objective 4.1: Establish processes to ensure hazard mitigation and resiliency are considerations in all planning and decision-making processes.

b. Objective 4.2: Work with the community at large to increase understanding and awareness of the importance of natural hazard mitigation and resiliency activities.

5. **Goal 05: Address flood hazards in the community.**
   a. Objective 5.1: Implement planned stormwater mitigation projects.
   b. Objective 5.2: Work with Repetitive Loss properties to effectively mitigate flood risk to structures.

6.3 **Identification and Analysis of Mitigation Techniques**

There are an array of mitigation techniques that can be utilized to address risks and vulnerabilities. While not all of the techniques that follow are available to the City or are within their existing authority, it is important to consider all available options. In those instances where the best technique is not within the City’s authority, it may be possible to develop a partnership with other entities that do have the missing authority.

6.3.1 **Prevention**

Preventative activities are intended to keep hazard problems from getting worse and are typically administered through government programs or regulatory actions that influence the way land is developed and buildings are built. They are particularly effective in reducing a community’s future vulnerability, especially in areas where development has not occurred, or capital improvements have not been substantial. Examples of preventative activities include:

- Planning and zoning
- Building codes
- Open space preservation
- Floodplain regulations
- Stormwater management regulations
- Drainage system maintenance
- Capital improvements programming

6.3.2 **Property Protection**

Property protection measures involve the modification of existing buildings and structures to help them better withstand the forces of a hazard, or removal of the structures from hazardous locations. Examples include:

- Relocation
- Building elevation
- Utility retrofit
- Critical facilities protection
- Retrofitting (e.g., windproofing, floodproofing, etc.)
- Safe rooms, shutters, shatter-resistant glass
- Insurance
6.3.3 Natural Resource Protection
Natural resource protection activities reduce the impact of natural hazards by preserving or restoring natural areas and their protective functions. Such areas include floodplains, wetlands, steep slopes, and sand dunes. Parks, recreation, or conservation agencies and organizations often implement these protective measures. Examples include:

- Floodplain protection
- Watershed management
- Erosion and sediment control
- Wetland preservation and restoration
- Habitat preservation

6.3.3 Structural Projects
Structural mitigation projects are intended to lessen the impact of a hazard by modifying the environmental natural progression of the hazard event through construction. They are usually designed by engineers and managed or maintained by public works staff. Examples include:

- Reservoirs
- Dams/levees/dikes/floodwalls
- Diversions/detention/retention
- Channel modification
- Storm sewers

6.3.5 Emergency Services
Although not typically considered a mitigation technique, emergency service measures do minimize the impact of a hazard event on people and property. These commonly are actions taken immediately prior to, during, or in response to a hazard event. Examples include:

- Warning systems
- Evacuation planning and management
- Emergency response training and exercises
- Sandbagging for flood protection
- Installing temporary shutters for wind protection

6.3.6 Public Education and Awareness
Public education and awareness activities are used to advise residents, elected officials, business owners, potential property buyers, and visitors about hazards, hazardous areas, and mitigation techniques they can use to protect themselves and their property. Examples of measures to educate and inform the public include:

- Outreach projects
- Speaker series/demonstration events
- Hazard map information
City of Southside Place, Texas Hazard Mitigation Plan

- Library materials
- School-aged children educational programs
- Hazard expositions

6.4 Mitigation Strategy
The following table provides the mitigation strategy for the City. As this is the inaugural hazard mitigation plan for the City, all actions are new actions. All costs presented are estimates only; actual costs will depend on specific scope. All projects presented are intended for implementation between 2022 and 2027, depending on resource availability.

Each action has been assigned a priority for implementation – either low, medium, or high:

- Actions that are considered to have the highest return on investment were prioritized as high; these actions are expected to provide the greatest benefits, of both qualitative and quantitative varieties.
- Actions prioritized as medium are expected to have a positive return on investment, though not as high as actions prioritized as high; these actions are expected to have positive qualitative and quantitative benefits.
- Actions prioritized as low are those actions that are expected to have the lowest return on the investment; there is some question as to whether or not they would be deemed qualitatively cost-effective, though the expectation remains that they would be qualitatively cost-effective.
### Table 27: Mitigation Action Strategy

<table>
<thead>
<tr>
<th>Action Number</th>
<th>Goal Supported</th>
<th>Objective supported</th>
<th>Hazard(s) Addressed</th>
<th>Action Description</th>
<th>New or Existing Facilities?</th>
<th>Responsible Agency/Department</th>
<th>Estimated Cost</th>
<th>Potential Funding Source(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>01 - Protect community health and safety</td>
<td>1.1 - Implement natural mitigation actions that will protect life and property by ensuring assets and infrastructure are more resilient to hazards and risks</td>
<td>Flood - Hurricane/Tropical Storm</td>
<td>Design and elevation, floodproofing, or other protection of structures at risk from flooding.</td>
<td>All</td>
<td>City Manager</td>
<td>$100,000+</td>
<td>FEMA HMGP, FEMA BRIC, State of Texas, Local Funds</td>
<td>Medium</td>
</tr>
<tr>
<td>02</td>
<td>01 - Protect community health and safety</td>
<td>1.1 - Implement natural mitigation actions that will protect life and property by ensuring assets and infrastructure are more resilient to hazards and risks</td>
<td>Hail - Hurricane/ Tropical Storm - Lightning - Tornado - Wind Storm - Winter Storm</td>
<td>Design and harden facilities at risk from wind and other storm damage, including possible safe rooms</td>
<td>All</td>
<td>City Manager</td>
<td>$100,000+</td>
<td>FEMA HMGP, FEMA BRIC, State of Texas, Local Funds</td>
<td>High</td>
</tr>
<tr>
<td>Action Number</td>
<td>Goal Supported</td>
<td>Objective supported</td>
<td>Hazard(s) Addressed</td>
<td>Action Description</td>
<td>New or Existing Facilities?</td>
<td>Responsible Agency/Department</td>
<td>Estimated Cost</td>
<td>Potential Funding Source(s)</td>
<td>Priority</td>
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</tr>
<tr>
<td>03</td>
<td>01 - Protect community health and safety</td>
<td>1.1 - Implement natural mitigation actions that will protect life and property by ensuring assets and infrastructure are more resilient to hazards and risks</td>
<td>Drought - Extreme Cold - Extreme Heat - Flood - Hail – Hurricane /Tropical Storm - Land Subsidence - Lightning - Tornado - Wind Storm - Winter Storm</td>
<td>Identify assets that require emergency utility support, including power and cooling; purchase and install emergency utility support equipment and related housing, noise attenuation, and connection equipment</td>
<td>All</td>
<td>City Manager</td>
<td>$20,000+</td>
<td>FEMA HMGP, FEMA BRIC, State of Texas, Local Funds</td>
<td>High</td>
</tr>
<tr>
<td>04</td>
<td>01 - Protect community health and safety</td>
<td>1.1 - Implement natural mitigation actions that will protect life and property by ensuring assets and infrastructure are more resilient to hazards and risks</td>
<td>Drought - Extreme Cold - Extreme Heat - Flood - Hail – Hurricane /Tropical Storm - Land Subsidence - Lightning - Tornado - Wind Storm - Winter Storm</td>
<td>Perform hardening/protection retrofits of critical utilities. Work with service providers to identify responsibility and authority for work.</td>
<td>All</td>
<td>City Manager</td>
<td>$20,000+</td>
<td>FEMA HMGP, FEMA BRIC, State of Texas, Local Funds</td>
<td>High</td>
</tr>
<tr>
<td>Action Number</td>
<td>Goal Supported</td>
<td>Objective supported</td>
<td>Hazard(s) Addressed</td>
<td>Action Description</td>
<td>New or Existing Facilities?</td>
<td>Responsible Agency/Department</td>
<td>Estimated Cost</td>
<td>Potential Funding Source(s)</td>
<td>Priority</td>
</tr>
<tr>
<td>---------------</td>
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<td>-----------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>05</td>
<td>01 - Protect community health and safety</td>
<td>1.1 - Implement natural mitigation actions that will protect life and property by ensuring assets and infrastructure are more resilient to hazards and risks</td>
<td>Drought - Extreme Cold - Extreme Heat - Flood - Hail – Hurricane /Tropical Storm - Land Subsidence - Lightning - Tornado - Wind Storm - Winter Storm</td>
<td>Investigate and implement hardening or other protection of IT and phone (communication) infrastructure, to include critical functions at all assets.</td>
<td>All</td>
<td>City Manager</td>
<td>$5,000+</td>
<td>FEMA HMGP, FEMA BRIC, State of Texas, Local Funds</td>
<td>High</td>
</tr>
<tr>
<td>06</td>
<td>01 - Protect community health and safety</td>
<td>1.1 - Implement natural mitigation actions that will protect life and property by ensuring assets and infrastructure are more resilient to hazards and risks</td>
<td>Lightning</td>
<td>Harden/retrofit assets and utilities to protect from lightning and other electrical surge/failures.</td>
<td>All</td>
<td>City Manager</td>
<td>$25,000+</td>
<td>FEMA HMGP, FEMA BRIC, State of Texas, Local Funds</td>
<td>Medium</td>
</tr>
</tbody>
</table>
## City of Southside Place, Texas Hazard Mitigation Plan

<table>
<thead>
<tr>
<th>Action Number</th>
<th>Goal Supported</th>
<th>Objective supported</th>
<th>Hazard(s) Addressed</th>
<th>Action Description</th>
<th>New or Existing Facilities?</th>
<th>Responsible Agency/Department</th>
<th>Estimated Cost</th>
<th>Potential Funding Source(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>07</td>
<td>01 - Protect community health and safety</td>
<td>1.1 - Implement natural hazard mitigation actions that will protect life and property by ensuring assets and infrastructure are more resilient to hazards and risks</td>
<td>Drought - Extreme Heat</td>
<td>Increase native canopy by tree planting to reduce heat levels and to increase shade.</td>
<td>NA</td>
<td>City Manager</td>
<td>$5,000+</td>
<td>FEMA HMGP, FEMA BRIC, State of Texas, Local Funds</td>
<td>Low</td>
</tr>
<tr>
<td>08</td>
<td>01 - Protect community health and safety</td>
<td>1.2 - Reduce the overall vulnerability of the community</td>
<td>Extreme Cold - Extreme Heat - Flood - Hail - Hurricane/Tropical Storm - Lightning - Tornado - Wind Storm - Winter Storm</td>
<td>Purchase and distribute NOAA All-Hazard radios or other public notification devices to all assets and other critical services</td>
<td>All</td>
<td>City Manager</td>
<td>$2,500+</td>
<td>FEMA HMGP, State of Texas, Local Funds</td>
<td>Low</td>
</tr>
<tr>
<td>09</td>
<td>01 - Protect community health and safety</td>
<td>1.2 - Reduce the overall vulnerability of the community</td>
<td>Drought</td>
<td>Investigate feasibility of on-site rainfall collection, and storage of collected water for non-potable uses, such as irrigation or process water</td>
<td>All</td>
<td>City Manager</td>
<td>$1,500+</td>
<td>State of Texas, Local Funds</td>
<td>Low</td>
</tr>
</tbody>
</table>
## City of Southside Place, Texas Hazard Mitigation Plan

<table>
<thead>
<tr>
<th>Action Number</th>
<th>Goal Supported</th>
<th>Objective supported</th>
<th>Hazard(s) Addressed</th>
<th>Action Description</th>
<th>New or Existing Facilities?</th>
<th>Responsible Agency/Department</th>
<th>Estimated Cost</th>
<th>Potential Funding Source(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>02 - Build and support partnerships to enhance mitigation opportunities and decrease vulnerability and risk</td>
<td>2.1 - Build and support partnerships with local and regional entities to increase mitigation effectiveness</td>
<td>Drought - Extreme Cold - Extreme Heat - Flood - Hail – Hurricane /Tropical Storm - Land Subsidence - Lightning - Tornado - Wind Storm - Winter Storm</td>
<td>Investigate possible collaborations and partnerships with local and regional entities to share hazard, risk, and mitigation knowledge and strategies, to develop community-wide knowledge-base and increase awareness of other entity's activities</td>
<td>NA</td>
<td>City Manager</td>
<td>$2,500+</td>
<td>Local Funds</td>
<td>High</td>
</tr>
<tr>
<td>11</td>
<td>02 - Build and support partnerships to enhance mitigation opportunities and decrease vulnerability and risk</td>
<td>2.2 - Work with community partners to build mitigation and risk concerns into planning and budgeting processes</td>
<td>Drought - Extreme Cold - Extreme Heat - Flood - Hail – Hurricane /Tropical Storm - Land Subsidence - Lightning - Tornado - Wind Storm - Winter Storm</td>
<td>Work with community partners, including county and municipal partners, to participate in planning for all hazards.</td>
<td>NA</td>
<td>City Manager</td>
<td>$2,500+</td>
<td>State of Texas, Local Funds</td>
<td>High</td>
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<tr>
<td>12</td>
<td>03 - Leverage available resources to maximize investment in hazard mitigation</td>
<td>3.1 - Maximize and leverage all available resources to ensure the most effective mitigation possible</td>
<td>Drought - Extreme Cold - Extreme Heat - Flood - Hail – Hurricane /Tropical Storm - Land Subsidence - Lightning - Tornado - Wind Storm - Winter Storm</td>
<td>Develop and maintain a hazard and risk data repository, which details all assets, risks, vulnerabilities, and related data points.</td>
<td>All</td>
<td>City Manager</td>
<td>$5,000+</td>
<td>FEMA HMGP, FEMA BRIC, State of Texas, Local Funds</td>
<td>High</td>
</tr>
<tr>
<td>13</td>
<td>03 - Leverage available resources to maximize investment in hazard mitigation</td>
<td>3.1 - Maximize and leverage all available resources to ensure the most effective mitigation possible</td>
<td>Land Subsidence</td>
<td>Work with community partners to identify known and emergent areas subject to subsidence that could impact assets, and to develop a mapping/tracking system for monitoring these areas</td>
<td>All</td>
<td>City Manager</td>
<td>$2,500+</td>
<td>FEMA HMGP, State of Texas, Local Funds</td>
<td>Low</td>
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<tr>
<td>14</td>
<td>03 - Leverage available resources to maximize investment in hazard mitigation</td>
<td>3.1 - Maximize and leverage all available resources to ensure the most effective mitigation possible</td>
<td>Drought - Extreme Cold - Extreme Heat - Flood - Hail - Hurricane/ Tropical Storm - Lightning - Tornado - Wind Storm - Winter Storm</td>
<td>Work with community partners, including county and municipal partners, to identify community-wide projects to provide mitigation and protection to both the City and greater community populations, such as safe rooms, warming/cooling centers, and shelters, and to develop funding requests for identified partnered efforts.</td>
<td>All</td>
<td>City Manager</td>
<td>$5,000+</td>
<td>FEMA HMGP, FEMA BRIC, State of Texas, Local Funds</td>
<td>High</td>
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<tr>
<td>15</td>
<td>03 - Leverage available resources to maximize investment in hazard mitigation</td>
<td>3.1 - Maximize and leverage all available resources to ensure the most effective mitigation possible</td>
<td>Land Subsidence</td>
<td>Inventory and monitor trees and vegetation that are planted near building foundations, to determine if any are causing or contributing to land subsidence; remove or prune to curb growth of root system, as needed</td>
<td>All</td>
<td>City Manager</td>
<td>$1,500+</td>
<td>State of Texas, Local funds</td>
<td>Low</td>
</tr>
<tr>
<td>16</td>
<td>03 - Leverage available resources to maximize investment in hazard mitigation</td>
<td>3.1 - Maximize and leverage all available resources to ensure the most effective mitigation possible</td>
<td>Drought - Extreme Cold - Extreme Heat - Flood - Hail - Hurricane /Tropical Storm - Land Subsidence - Lightning - Tornado - Wind Storm - Winter Storm</td>
<td>Design new buildings to be flexible and adaptable to changing uses as well as fully mitigated.</td>
<td>All</td>
<td>City Manager</td>
<td>$5,000+</td>
<td>FEMA HMGP, FEMA BRIC, State of Texas, Local Funds</td>
<td>High</td>
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<td>Action Number</td>
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<tr>
<td>17</td>
<td>03 - Leverage available resources to maximize investment in hazard mitigation</td>
<td>3.2 - Maximize insurance coverage to provide financial protection from natural hazards</td>
<td>Drought - Extreme Cold - Extreme Heat - Flood - Hail - Hurricane /Tropical Storm - Land Subsidence - Lightning - Tornado - Wind Storm - Winter Storm</td>
<td>Periodically review insurance coverage to ensure maximum natural hazard coverage reasonable is in place, including membership in and policies under the NFIP</td>
<td>All</td>
<td>City Manager</td>
<td>$2,500+</td>
<td>Local Funds</td>
<td>High</td>
</tr>
<tr>
<td>18</td>
<td>04 - Increase awareness and understanding of natural hazard mitigation and resiliency within the community</td>
<td>4.1 - Establish processes to ensure hazard mitigation and resiliency are considerations in all planning and decision-making processes</td>
<td>Drought - Extreme Cold - Extreme Heat - Flood - Hail - Hurricane /Tropical Storm - Land Subsidence - Lightning - Tornado - Wind Storm - Winter Storm</td>
<td>Develop detailed inventory of structural assets, to include first floor and utility elevations, construction materials, and other risk-associated data points</td>
<td>All</td>
<td>City Manager</td>
<td>$50,000+</td>
<td>FEMA HMGP, FEMA BRIC, State of Texas, Local Funds</td>
<td>High</td>
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<tr>
<td>Action Number</td>
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<td>19</td>
<td>04 - Increase awareness and understanding of natural hazard mitigation and resiliency within the community</td>
<td>4.1 - Establish processes to ensure hazard mitigation and resiliency are considerations in all planning and decision-making processes</td>
<td>Drought - Extreme Cold - Extreme Heat - Flood - Hail - Hurricane /Tropical Storm - Land Subsidence - Lightning - Tornado - Wind Storm - Winter Storm</td>
<td>Establish and implement process to periodically document current condition of assets, including photographs and other documentation</td>
<td>All</td>
<td>City Manager</td>
<td>$5,000+</td>
<td>State of Texas, Local Funds</td>
<td>High</td>
</tr>
<tr>
<td>20</td>
<td>04 - Increase awareness and understanding of natural hazard mitigation and resiliency within the community</td>
<td>4.2 - Work with the community at large to increase understanding and awareness of the importance of natural hazard mitigation and resiliency activities</td>
<td>Drought - Extreme Cold - Extreme Heat - Flood - Hail - Hurricane /Tropical Storm - Land Subsidence - Lightning - Tornado - Wind Storm - Winter Storm</td>
<td>Provide hazard and disaster awareness and preparedness information to the community, including residents, visitors, vendors, and others</td>
<td>NA</td>
<td>City Manager</td>
<td>$5,000+</td>
<td>FEMA HMGP, State of Texas, Local Funds</td>
<td>Medium</td>
</tr>
<tr>
<td>Action Number</td>
<td>Goal Supported</td>
<td>Objective supported</td>
<td>Hazard(s) Addressed</td>
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<tr>
<td>21</td>
<td>04 - Increase awareness and understanding of natural hazard mitigation and resiliency within the community</td>
<td>4.2 - Work with the community at large to increase understanding and awareness of the importance of natural hazard mitigation and resiliency activities</td>
<td>Extreme Cold - Extreme Heat - Flood - Hail - Hurricane/Tropical Storm - Lightning - Tornado - Wind Storm - Winter Storm</td>
<td>Conduct information sessions and briefings in advance of hazard 'seasons'</td>
<td>NA</td>
<td>City Manager</td>
<td>$2,000+</td>
<td>FEMA HMGP, State of Texas, Local Funds</td>
<td>High</td>
</tr>
<tr>
<td>22</td>
<td>05 – Address flood hazards in the community</td>
<td>5.1 – Implement planned stormwater mitigation projects</td>
<td>Flood</td>
<td>Implement the planned Auden-Edloe-Harper Stormwater Improvement Project</td>
<td>Both</td>
<td>City Manager</td>
<td>$5,000,000+</td>
<td>CDBG-DR, TWDB, Local</td>
<td>High</td>
</tr>
<tr>
<td>23</td>
<td>05 – Address flood hazards in the community</td>
<td>5.1 – Implement planned stormwater mitigation projects</td>
<td>Flood</td>
<td>Implement the planned Auden Street Stormwater Improvement Project, in collaboration with the City of West University Place</td>
<td>Both</td>
<td>City Manager</td>
<td>$5,000,000+</td>
<td>FEMA HMGP, FEMA BRIC</td>
<td>High</td>
</tr>
<tr>
<td>Action Number</td>
<td>Goal Supported</td>
<td>Objective supported</td>
<td>Hazard(s) Addressed</td>
<td>Action Description</td>
<td>New or Existing Facilities?</td>
<td>Responsible Agency/Department</td>
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<tr>
<td>24</td>
<td>05 – Address flood hazards in the community</td>
<td>5.2 – Work with Repetitive Loss properties to effectively mitigate flood risk to structures</td>
<td>Flood</td>
<td>Survey owners/residents to determine possible mitigation opportunities and options for structure; develop projects and funding requests, as appropriate</td>
<td>Existing</td>
<td>City Manager</td>
<td>$1,000+</td>
<td>Local</td>
<td>High</td>
</tr>
<tr>
<td>25</td>
<td>05 – Address flood hazards in the community</td>
<td>5.2 – Work with Repetitive Loss properties to effectively mitigate flood risk to structures</td>
<td>Flood</td>
<td>Incorporate mitigation of RL properties into other projects and plans, as appropriate</td>
<td>Existing</td>
<td>City Manager</td>
<td>$1,000+</td>
<td>Local</td>
<td>High</td>
</tr>
</tbody>
</table>
Chapter 7: Plan Maintenance and Monitoring

7.1 Plan Maintenance Requirements
44 CFR, 201.6(c)(4) provides the requirements related to the plan maintenance process for local mitigation plans.

The plan must include the following:
- A section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle;
- A process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate; and
- Discussion on how the community will continue public participation in the plan maintenance process.\(^9\)

7.2 Plan Maintenance Point of Contact
The person responsible for monitoring, maintaining, and updating the plan is:

David Moss
City Manager
City-mgr@southside-place.org

7.3 Monitoring the Plan
The City’s maintenance strategy for implementation, monitoring, and evaluation provides a structure that encourages collaboration, information sharing, and innovation. Through a multi-tiered implementation method, the City will work with residents, staff, and partners to implement a localized approach to loss reduction while serving community needs through coordination. Through this strategy, the City will work to disrupt the disaster cycle and achieve greater disaster resiliency.

This plan will be monitored for several related purposes:
- To maintain the accuracy of hazard and risk information;
- To ensure that the mitigation strategies reflect the priorities of the City;
- To comply with State of Texas and federal requirements for plan maintenance;
- To maintain eligibility for mitigation grant funding;
- To ensure continued public involvement in the planning process;
- To ensure the planning process is integrated as appropriate; and
- To ensure this plan is in harmony with other planning efforts.

\(^9\) 44 CFR, §201.6(c)(4)
To ensure efficient and effective implementation, the City will make use of existing capabilities and planning infrastructure. The City intends to implement the mitigation strategies described in this plan over the next five years, as funding and available resources allow.

7.4 Evaluating the Plan
Plan evaluation will be ongoing. In addition to the FEMA-required five-year cycle, the City will perform a review of the plan annually, or more often as circumstances require. At least annually, a progress report will be prepared and incorporated into the plan, noting any updates to information in the plan and any progress made towards achieving the mitigation strategy.

In addition to these annual updates, a review may be conducted after significant hazard occurrences to review and document the impacts of the event. Based on those impacts, adjustments to the mitigation strategy may be made and submitted to the State Hazard Mitigation Officer.

7.5 Updating the Plan
This plan will be updated within five years of approval and will be submitted to the State Hazard Mitigation Officer for review and approval.

This update will include a comprehensive review and revision of the complete plan. Approximately 18 months prior to the expiration of the plan, the City will initiate this review process, with particular attention paid to guidance and requirements.

7.6 Incorporation into Existing Planning Mechanisms
A variety of existing plans and documents were reviewed and considered during the development of this plan.
City of Southside Place, Texas Hazard Mitigation Plan

Table 28: Existing Planning Mechanisms

<table>
<thead>
<tr>
<th>Authoring Agency</th>
<th>Source Title</th>
<th>How Utilized In Plan</th>
<th>Section of Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southside Place</td>
<td>Comprehensive Plan</td>
<td>Informed as to planning history, established priorities and procedures, and areas of concern</td>
<td>Community Profile, Hazard Identification &amp; Risk Assessment, &amp; Mitigation Strategy</td>
</tr>
<tr>
<td>Southside Place</td>
<td>Stormwater Management Plan (2014)</td>
<td>Informed as to planning history, established priorities and procedures, and areas of concern</td>
<td>Community Profile, Hazard Identification &amp; Risk Assessment, &amp; Mitigation Strategy</td>
</tr>
<tr>
<td>Southside Place</td>
<td>Drainage &amp; Flooding Mitigation Strategy (2020)</td>
<td>Informed as to planning history, established priorities and procedures, and areas of concern</td>
<td>Community Profile, Hazard Identification &amp; Risk Assessment, &amp; Mitigation Strategy</td>
</tr>
<tr>
<td>Southside Place</td>
<td>Auden-Edloe-Harper Drainage Improvement Project plans, studies, and grant applications</td>
<td>Informed as to planning history, established priorities and procedures, and areas of concern</td>
<td>Community Profile, Hazard Identification &amp; Risk Assessment, &amp; Mitigation Strategy</td>
</tr>
<tr>
<td>Southside Place</td>
<td>Auden Street Drainage Improvement Project plans, studies, and grant applications</td>
<td>Informed as to planning history, established priorities and procedures, and areas of concern</td>
<td>Community Profile, Hazard Identification &amp; Risk Assessment, &amp; Mitigation Strategy</td>
</tr>
<tr>
<td>Harris County</td>
<td>Harris County Multi-Hazard Mitigation Plan (2020)</td>
<td>Informed as to hazards, risks, vulnerabilities, and mitigation strategies for the communities surrounding the City</td>
<td>Community Profile, Hazard Identification &amp; Risk Assessment, &amp; Mitigation Strategy</td>
</tr>
<tr>
<td>State of Texas</td>
<td>State of Texas Hazard Mitigation Plan (2018)</td>
<td>Informed as to hazards, risks, vulnerabilities, and mitigation strategies for the communities surrounding the City</td>
<td>Community Profile, Hazard Identification &amp; Risk Assessment, &amp; Mitigation Strategy</td>
</tr>
</tbody>
</table>

Going forward, this plan will be considered in the development and update of new and existing plans and planning efforts, specifically those related to land use, zoning, disaster-related risk reduction, and floodplain management.

For example, the City will use the information contained within this hazard mitigation plan when it next updates its Comprehensive Plan, and when new iterations of both building codes and the City’s flood damage prevention ordinance are considered for adoption. The information and findings of this plan will inform those decisions.

In all cases where information from this plan will be incorporated into other planning mechanisms, the information incorporated will be reviewed and vetted as appropriate at the time of incorporation, and will be reviewed by appropriate staff and leadership after inclusion. Any comments or notes will be collected and considered, and adjustments may be made. This process may occur multiple times prior to final integration. Once the plans are final, they will be guided through their normal review and approval/acceptance channels, including through presentation to and acceptance by the City Council.
(where required and appropriate). All accepted/approved plans will be provided to the appropriate staff and leadership, and will be provided to the public (as appropriate).

7.7 Continued Public Involvement

The City is dedicated to continued public involvement and education. This dedication is reflected in many of the mitigation strategies described in this plan. The public is welcome to comment and provide input into this plan, at any time, and may request to view a copy of this plan.

The public will be periodically surveyed/provided a questionnaire regarding hazards, risks, and mitigation strategies specific to the community, to allow for and document direct involvement in the plan. Additionally, each time a progress report is completed for this plan, a copy of that report will be made available to the public for review; the progress will also be periodically discussed at regularly scheduled public meetings and may be disseminated through various social media outlets.

The City will also provide periodic presentations to community groups regarding the plan content and progress. These groups may include elected officials, municipal and county officials, and other neighborhood groups.

At the individual stakeholder level, public education and outreach programs provide the community with localized mechanisms for plan implementation. This approach to mitigation can adapt to the varying vulnerabilities and needs of communities. Public education programs are also a means for involving the public in mitigation policy development. Departments and agencies conducting mitigation-related programs will provide information regarding proposed mitigation measures to individuals, to aid individuals in choosing methods that are more effective for their communities.
Chapter 8: Plan Adoption and Approval

8.1 Plan Adoption Requirements
44 CFR, §201.6(c)(5) provides the requirements related to the adoption documentation for local mitigation plans.

The plan must include the following:

- Documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan.
- For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted. ¹⁰

8.2 Plan Adoption
This plan was adopted by the City of Southside Place on January 11, 2022. A copy of the adoption resolution is included in Appendix A.

8.3 Plan Approval
This plan was approved by FEMA and the Texas Division of Emergency Management on xx xx, xxxx. A copy of the approval letter is included in Appendix A.

¹⁰ 44 CFR, §201.6(c)(5)
Appendix A: Plan Adoption and Approval Documents

A.1 Plan Adoption Documentation
A.2 Plan Approval Documentation
A.3 Final Plan Review Tool
Appendix B: Meeting Documentation
This appendix contains all documentation related to meetings of the Planning Committee.

Planning Committee Meeting #01

City of Southside Place Hazard Mitigation Plan: Planning Process & Hazard Identification

Hazard Mitigation Planning Overview

- **Hazard Mitigation** sustained actions that reduce loss of life and property by lessening the impact of disasters which have the potential to damage the built and natural environment, and threaten the life, safety, health and welfare of residents.

- A **Hazard Mitigation Plan (HMP)** identifies and evaluates risks and vulnerabilities associated with natural hazards and resulting disasters, and leads to the development of long-term strategies (policies and actions) for risk reduction, making your community more resilient.

- Mitigation can take place before and after hazard events, and is an investment in your community’s future. Studies show that every $1 spent on mitigation saves $6 in future damages avoided.

- By participating in this planning process, your community will be eligible for federal pre-disaster mitigation funding (HMGP, BRIC, FMA).
Hazard Mitigation Plan: Requirements

- Hazard Identification & Profiling
  - Must address all possible natural hazards of concern
- Risk & Vulnerability Assessment
  - Quantitative where data allows
  - Must address future development where practical
- Mitigation Strategy
  - Must address hazards identified and risks/vulnerabilities identified
- Documentation of the plan development process
- Documentation of public & external stakeholder participation in the plan development process
- Schedule for implementation, maintenance, and update

Hazard Mitigation Plan: Benefits

- Provides identification of specific hazards, risks, & vulnerabilities that can impact Southside Place assets’s and operations

- Provides an identified, documented mitigation strategy to aid mitigation funding requests

- Ensures eligibility for FEMA’s Hazard Mitigation Assistance funding (without an approved hazard mitigation plan, Southside Place is not eligible to receive this funding)
Plan Development Process

- Stakeholders and consultants work to develop the HIRA, Capability Assessment, Mitigation Strategy, and documentation
- Stakeholders affirm draft of plan, and release the plan for public review/comment
- Public review/comment period #1
- Final draft is submitted to TDEM (Deadline: November 15, 2021)
- TDEM reviews final draft and requests technical revisions as needed
- After concurrence from TDEM, TDEM submits final draft to FEMA, who has final review/approval authority; revisions may occur
- When satisfied, FEMA issues letter stating the draft is Approvable Pending Adoption (APA)
- Southside Place adopts the plan, and submits documentation to TDEM
- FEMA issues formal approval letter; update clock begins for next 5-year update

Stakeholder Responsibilities

- Provide oversight to the plan update process
- Serve as a source of institutional/planning area knowledge
- Provide feedback
- Review/comment on draft of plan update
Hazard Identification Exercise

Hazard Identification Exercise Description

- Stakeholder task:
  - To determine the natural hazards to be included in the Southside Place hazard mitigation plan

- Sources of information:
  - State of Texas Hazard Mitigation Plan (2018 Update)
  - Harris County Hazard Mitigation Plan (2020 Update)
  - FEMA 386
  - Stakeholders
### Hazard Identification Exercise

#### Hazard: Coastal Erosion

<table>
<thead>
<tr>
<th>Included in Harris County Plan?</th>
<th>Included in State of Texas Plan?</th>
<th>Prior occurrence that impacted Southside Place?</th>
<th>Include in Southside Place Plan?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Yes (also includes Inland Erosion as a separate hazard)</td>
<td>no</td>
<td>no</td>
</tr>
</tbody>
</table>

#### Hazard: Dam/Levee Failure

<table>
<thead>
<tr>
<th>Included in Harris County Plan?</th>
<th>Included in State of Texas Plan?</th>
<th>Prior occurrence that impacted Southside Place?</th>
<th>Include in Southside Place Plan?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>no</td>
<td>no</td>
</tr>
</tbody>
</table>
## Hazard Identification Exercise

### Hazard: Drought

<table>
<thead>
<tr>
<th>Included in Harris County Plan?</th>
<th>Included in State of Texas Plan?</th>
<th>Prior occurrence that impacted Southside Place?</th>
<th>Include in Southside Place Plan?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>Yes – there have been potable water restrictions in the past – 80% of water comes from City of Houston</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Hazard: Earthquake

<table>
<thead>
<tr>
<th>Included in Harris County Plan?</th>
<th>Included in State of Texas Plan?</th>
<th>Prior occurrence that impacted Southside Place?</th>
<th>Include in Southside Place Plan?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
### Hazard Identification Exercise

#### Hazard: Expansive Soils

<table>
<thead>
<tr>
<th>Included in Harris County Plan?</th>
<th>Included in State of Texas Plan?</th>
<th>Prior occurrence that impacted Southside Place?</th>
<th>Include in Southside Place Plan?</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

#### Hazard: Extreme Cold

<table>
<thead>
<tr>
<th>Included in Harris County Plan?</th>
<th>Included in State of Texas Plan?</th>
<th>Prior occurrence that impacted Southside Place?</th>
<th>Include in Southside Place Plan?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes (under Severe Weather – thunderstorms, hail, extreme heat, tornadoes and damaging winds, winter storms, and freezes)</td>
<td>Yes</td>
<td>Yes – Winter Storm URI</td>
<td>Yes</td>
</tr>
</tbody>
</table>
### Hazard Identification Exercise

#### Hazard: Extreme Heat

<table>
<thead>
<tr>
<th>Included in Harris County Plan?</th>
<th>Included in State of Texas Plan?</th>
<th>Prior occurrence that impacted Southside Place?</th>
<th>Include in Southside Place Plan?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes (under Severe Weather – thunderstorms, hail, extreme heat, tornadoes and damaging winds, winter storms, and freezes)</td>
<td>Yes</td>
<td>Yes – 25% of houses are occupied by residents over 65</td>
<td>Yes</td>
</tr>
</tbody>
</table>

#### Hazard: Flooding

<table>
<thead>
<tr>
<th>Included in Harris County Plan?</th>
<th>Included in State of Texas Plan?</th>
<th>Prior occurrence that impacted Southside Place?</th>
<th>Include in Southside Place Plan?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Yes (separates riverine from coastal)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
### Hazard Identification Exercise

#### Hazard: Hail

<table>
<thead>
<tr>
<th>Included in Harris County Plan?</th>
<th>Included in State of Texas Plan?</th>
<th>Prior occurrence that impacted Southside Place?</th>
<th>Include in Southside Place Plan?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes (under Severe Weather – thunderstorms, hail, extreme heat, tornadoes and damaging winds, winter storms, and freezes)</td>
<td>Yes</td>
<td>Yes – utilities and fleet/vehicles</td>
<td>Yes</td>
</tr>
</tbody>
</table>

#### Hazard: Hurricane/Tropical Storm

<table>
<thead>
<tr>
<th>Included in Harris County Plan?</th>
<th>Included in State of Texas Plan?</th>
<th>Prior occurrence that impacted Southside Place?</th>
<th>Include in Southside Place Plan?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes (as Hurricanes and coastal storms)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
### Hazard Identification Exercise

#### Hazard: Land Subsidence

<table>
<thead>
<tr>
<th>Included in Harris County Plan?</th>
<th>Included in State of Texas Plan?</th>
<th>Prior occurrence that impacted Southside Place?</th>
<th>Include in Southside Place Plan?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes (as Mass Movement – landslides, sinkholes, and subsidence)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

#### Hazard: Lightning

<table>
<thead>
<tr>
<th>Included in Harris County Plan?</th>
<th>Included in State of Texas Plan?</th>
<th>Prior occurrence that impacted Southside Place?</th>
<th>Include in Southside Place Plan?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes (under Severe Weather – thunderstorms, hail, extreme heat, tornadoes and damaging winds, winter storms, and freezes)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
## Hazard Identification Exercise

### Hazard: Tornado

<table>
<thead>
<tr>
<th>Included in Harris County Plan?</th>
<th>Included in State of Texas Plan?</th>
<th>Prior occurrence that impacted Southside Place?</th>
<th>Include in Southside Place Plan?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes (under Severe Weather – thunderstorms, hail, extreme heat, tornadoes and damaging winds, winter storms, and freezes)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Hazard: Tsunami

<table>
<thead>
<tr>
<th>Included in Harris County Plan?</th>
<th>Included in State of Texas Plan?</th>
<th>Prior occurrence that impacted Southside Place?</th>
<th>Include in Southside Place Plan?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
## Hazard Identification Exercise

### Hazard: Wildfire

<table>
<thead>
<tr>
<th>Included in Harris County Plan?</th>
<th>Included in State of Texas Plan?</th>
<th>Prior occurrence that impacted Southside Place?</th>
<th>Include in Southside Place Plan?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

### Hazard: Windstorm

<table>
<thead>
<tr>
<th>Included in Harris County Plan?</th>
<th>Included in State of Texas Plan?</th>
<th>Prior occurrence that impacted Southside Place?</th>
<th>Include in Southside Place Plan?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes (under Severe Weather – thunderstorms, hail, extreme heat, tornadoes and damaging winds, winter storms, and freezes)</td>
<td>Yes</td>
<td>Yes – 2016</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Hazard Identification Exercise

Hazard: Winter Storm

<table>
<thead>
<tr>
<th>Included in Harris County Plan?</th>
<th>Included in State of Texas Plan?</th>
<th>Prior occurrence that impacted Southside Place?</th>
<th>Include in Southside Place Plan?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes (under Severe Weather – thunderstorms, hail, extreme heat, tornadoes and damaging winds, winter storms, and freezes)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Question for Stakeholders

- Are there any other natural hazards that you believe should be considered as part of this hazard mitigation plan?
  - ___x____ No
  - _____ Yes

- If yes, what natural hazard(s) do you believe should be considered?
  - ____NA________________________
  - ______________________________
Data/Documentation Request

- I will need information about each critical facility/asset that is owned/operated by the City. To whom should I send the worksheet?
  - Send to David Moss

- When the final draft is ready for public review and comment, to whom should I send the information for posting on the City’s website?
  - Send to Olga Garza

Project Manager/Planner for Southside Place’s HMP:

Kelly George, CFM
kgeorge@dmcpartners.com

If you have any questions, please let me know!
Hazard Selection Overview

- The following hazards were validated by the Committee for inclusion in the plan:
  - Drought
  - Extreme Cold
  - Extreme Heat
  - Flood
  - Hail
  - Hurricane/Tropical Storm
  - Land Subsidence
  - Lightning
  - Tornado
  - Windstorm
  - Winter Storm
Risk Assessment Methodology

- The plan’s risk assessment will include two different risk assessment methodologies:
  - A qualitative risk assessment where risks are considered relative to measures of risk by subjective ranking, based on the evaluators knowledge, experience, and perspective
  - A quantitative risk assessment that provides estimates of potential losses and identification of vulnerabilities based on scenarios

Risk Assessment Task

- Stakeholder objective:
  - To determine the qualitative risks associated with the hazards included in the plan

- Stakeholder task:
  - To complete the qualitative assessment of potential hazard impacts, using the scale provided on the following slide
# Qualitative Impact Scale

<table>
<thead>
<tr>
<th>Ranking</th>
<th>Potential impact to people/life safety</th>
<th>Potential impact to assets/buildings</th>
<th>Potential impact to infrastructure</th>
<th>Potential impact to service delivery/miss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low (1 point)</td>
<td>Some injuries possible but significant injuries unlikely</td>
<td>Cosmetic damages to structures; 1 day loss of function</td>
<td>Some systems temporarily down; restoration in &lt;1 day</td>
<td>Services/operations suspended or interrupted; &lt;1 day loss of function</td>
</tr>
<tr>
<td>Moderate (2 points)</td>
<td>Injuries expected (some significant); some fatalities possible</td>
<td>Some structural damages; 2 days loss of function</td>
<td>System failure; utility loss; restoration in 2 days</td>
<td>Services / operations temporarily unavailable; 2 day loss of function</td>
</tr>
<tr>
<td>High (3 points)</td>
<td>Severalfatalities expected</td>
<td>Some structures significantly damaged; 3+ days loss of function</td>
<td>Longterm system damage / utility loss; restoration 3+ days</td>
<td>Cancellation of services / operations until repairs are made; 4+ day loss of function</td>
</tr>
<tr>
<td>Not Applicable (0 points)</td>
<td>Not applicable for this hazard</td>
<td>Not applicable for this hazard</td>
<td>Not applicable for this hazard</td>
<td>Not applicable for this hazard</td>
</tr>
</tbody>
</table>

# Qualitative Hazard Impact Ranking

<table>
<thead>
<tr>
<th>Hazard</th>
<th>People / Life Safety Impact Ranking</th>
<th>Assets/Facilities Impact Ranking</th>
<th>Infrastructure Impact Ranking</th>
<th>Service Delivery Impact Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drought</td>
<td>Low</td>
<td>Low</td>
<td>Moderate</td>
<td>Low</td>
</tr>
<tr>
<td>Extreme Cold</td>
<td>Low</td>
<td>Low/Moderate</td>
<td>Moderate</td>
<td>Low/Moderate</td>
</tr>
<tr>
<td>Extreme Heat</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Flood</td>
<td>Low</td>
<td>Low/Moderate</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Heat</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Hurricane/Tropical Storm</td>
<td>Low</td>
<td>Low/Moderate</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Land Subsidence</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Lightning</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Tornado</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Windstorm</td>
<td>Low</td>
<td>Low/Moderate</td>
<td>Moderate</td>
<td>Low/Moderate</td>
</tr>
<tr>
<td>Winter Storm</td>
<td>Low</td>
<td>Low/Moderate</td>
<td>Moderate</td>
<td>Low/Moderate</td>
</tr>
</tbody>
</table>
Strategy Goal Determination Exercise

- The plan’s mitigation strategy must have specific, defined goals and objectives
- These goals and objectives form the foundation of the mitigation strategy of the plan, and serve as the guiding principles for mitigation actions in the future
- To ensure compatibility, the goals of the 2020 Harris County Plan were reviewed and inform these suggestions
Strategy Goal #01 Suggestion

• Suggested Goal #1:
  • Protect community health and safety

• Suggested Objective #1.1:
  • Implement natural mitigation actions that will protect life and property by ensuring assets and infrastructure are more resilient to hazards and risks

• Suggested Objective #1.2:
  • Reduce the overall vulnerability of the community

• Committee Comments: Concur as presented

Strategy Goal #02 Suggestion

• Suggested Goal #2:
  • Build and support partnerships to enhance mitigation opportunities and decrease vulnerability and risk

• Suggested Objective #2.1:
  • Build and support partnerships with local and regional entities to increase mitigation effectiveness

• Suggested Objective #2.2:
  • Work with community partners to build mitigation and risk concerns into planning and budgeting processes

• Committee Comments: Concur as presented
Strategy Goal #03 Suggestion

- Suggested Goal #3:
  - Leverage available resources to maximize investment in hazard mitigation
- Suggested Objective #3.1:
  - Maximize and leverage all available resources to ensure the most effective mitigation possible
- Suggested Objective #3.2:
  - Maximize insurance coverage to provide financial protection from natural hazards
- Committee Comments: Concur as presented

Strategy Goal #04 Suggestion

- Suggested Goal #4:
  - Increase awareness and understanding of natural hazard mitigation and resiliency within the community
- Suggested Objective #4.1:
  - Establish processes to ensure hazard mitigation and resiliency are considerations in all planning and decision-making processes
- Suggested Objective #4.2:
  - Work with the community at large to increase understanding and awareness of the importance of natural hazard mitigation and resiliency activities
- Committee Comments: Concur as presented
Strategy Goal #05 Suggestion

- Suggested Goal #5:
  - Address flood hazards in the community
- Suggested Objective #5.1:
  - Implement planned stormwater mitigation projects
- Suggested Objective #5.2:
  - Work with Repetitive Loss properties to effectively mitigate flood risk to structures.
- Committee Comments: Concur as presented

Next Meeting

- Tuesday, November 9th @ 10am
- Don’t forget to turn your clocks back on Sunday!
Strategy Goal #01

- Suggested Goal #1:
  - Protect community health and safety
- Suggested Objective #1.1:
  - Implement natural mitigation actions that will protect life and property by ensuring assets and infrastructure are more resilient to hazards and risks
- Suggested Objective #1.2:
  - Reduce the overall vulnerability of the community
# Action #01 Suggestion

<table>
<thead>
<tr>
<th>Action Number</th>
<th>Goal Supported</th>
<th>Objective supported</th>
<th>Hazard(s) Address</th>
<th>Action Description</th>
<th>New or Existing Facilities</th>
<th>Responsible Agency/Department</th>
<th>Estimated Cost</th>
<th>Potential Funding Source(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>01-Protect community health and safety</td>
<td>1.1-implement natural mitigation actions that will protect life and property by ensuring assets and infrastructure are more resilient to hazards and risks</td>
<td>Flood, Hurricane, Tropical Storm</td>
<td>Design and elevation, floodproofing, or other protection structures at risk from flooding.</td>
<td>All</td>
<td>City Manager</td>
<td>$100,000+</td>
<td>FEMA, HMGP, FEMA BRIC, State of Texas, Local Funds</td>
<td>Medium</td>
</tr>
</tbody>
</table>

# Action #02 Suggestion

<table>
<thead>
<tr>
<th>Action Number</th>
<th>Goal Supported</th>
<th>Objective supported</th>
<th>Hazard(s) Address</th>
<th>Action Description</th>
<th>New or Existing Facilities</th>
<th>Responsible Agency/Department</th>
<th>Estimated Cost</th>
<th>Potential Funding Source(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
<td>01-Protect community health and safety</td>
<td>1.1-implement natural mitigation actions that will protect life and property by ensuring assets and infrastructure are more resilient to hazards and risks</td>
<td>Hail, Hurricane, Tropical Storm, Lightning, Tornado, Wind Storm</td>
<td>Design and harden facilities at risk from wind and other storm damage, including possible safe rooms</td>
<td>All</td>
<td>City Manager</td>
<td>$100,000+</td>
<td>FEMA, HMGP, FEMA BRIC, State of Texas, Local Funds</td>
<td>High</td>
</tr>
</tbody>
</table>
## Action #03 Suggestion

<table>
<thead>
<tr>
<th>Action Number</th>
<th>Goal Supported</th>
<th>Objective supported</th>
<th>Hazard(s) Address</th>
<th>Action Description</th>
<th>New or Existing Facilities</th>
<th>Responsible Agency/Department</th>
<th>Estimated Cost</th>
<th>Potential Funding Source(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>03</td>
<td>01: Protect community health and safety</td>
<td>1.1: Implement natural mitigation actions that protect life and property by ensuring assets and infrastructure are more resilient to hazards and risks</td>
<td>Drought, Extreme Cold, Extreme Heat, Flood, Hail, Hurricane, Tropical Storm, Land Subsidence, Lightning, Tornado, Winter Storm</td>
<td>Identify assets that require emergency utility support, including power and cooling; purchase and install emergency utility support equipment and related housing, noise attenuation and connection equipment</td>
<td>All</td>
<td>City Manager</td>
<td>$20,000+</td>
<td>FEMA, HMGP, FEMA BRIC, State of Texas, Local Funds</td>
<td>High</td>
</tr>
</tbody>
</table>

## Action #04 Suggestion

<table>
<thead>
<tr>
<th>Action Number</th>
<th>Goal Supported</th>
<th>Objective supported</th>
<th>Hazard(s) Address</th>
<th>Action Description</th>
<th>New or Existing Facilities</th>
<th>Responsible Agency/Department</th>
<th>Estimated Cost</th>
<th>Potential Funding Source(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>04</td>
<td>01: Protect community health and safety</td>
<td>1.1: Implement natural mitigation actions that protect life and property by ensuring assets and infrastructure are more resilient to hazards and risks</td>
<td>Drought, Extreme Cold, Extreme Heat, Flood, Hail, Hurricane, Tropical Storm, Land Subsidence, Lightning, Tornado, Winter Storm</td>
<td>Perform hardening/protection retrofit of critical utilities. Work with service providers to identify responsibility and authority for work.</td>
<td>All</td>
<td>City Manager</td>
<td>$20,000+</td>
<td>FEMA, HMGP, FEMA BRIC, State of Texas, Local Funds</td>
<td>High</td>
</tr>
</tbody>
</table>
## Action #05 Suggestion

<table>
<thead>
<tr>
<th>Action Number</th>
<th>Goal Support</th>
<th>Objective supported</th>
<th>Hazard(s) Address</th>
<th>Action Description</th>
<th>New or Existing Facilities</th>
<th>Responsible Agency/Department</th>
<th>Estimated Cost</th>
<th>Potential Funding Source(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>05</td>
<td>01 Protect community health and safety</td>
<td>1.1 Implement natural mitigation actions that will protect life and property by ensuring assets and infrastructure are more resilient to hazards and risks</td>
<td>Drought, Extreme Cold, Extreme Heat, Flood, Hurricane, Tropics, Storm, Land Subsidence, Lightning, Tornado, Wind Storm, Winter Storm</td>
<td>Investigate and implement hardening or other protection of IT and phone (communication) infrastructure, to include critical functions at all assets.</td>
<td>All</td>
<td>City Manager</td>
<td>$5,000+</td>
<td>FEMA, HMGP, FEMA BRIC, State of Texas, Local Funds</td>
<td>High</td>
</tr>
</tbody>
</table>

## Action #06 Suggestion

<table>
<thead>
<tr>
<th>Action Number</th>
<th>Goal Support</th>
<th>Objective supported</th>
<th>Hazard(s) Address</th>
<th>Action Description</th>
<th>New or Existing Facilities</th>
<th>Responsible Agency/Department</th>
<th>Estimated Cost</th>
<th>Potential Funding Source(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>06</td>
<td>01 Protect community health and safety</td>
<td>1.1 Implement natural mitigation actions that will protect life and property by ensuring assets and infrastructure are more resilient to hazards and risks</td>
<td>Lightning</td>
<td>Harden/retrofit assets and utility to protect from lighting and other electrical surge/failures.</td>
<td>All</td>
<td>City Manager</td>
<td>$25,000+</td>
<td>FEMA, HMGP, FEMA BRIC, State of Texas, Local Funds</td>
<td>Medium</td>
</tr>
</tbody>
</table>
### Action #07 Suggestion

<table>
<thead>
<tr>
<th>Action Number</th>
<th>Goal Support</th>
<th>Objective Supported</th>
<th>Hazard(s) Addressed</th>
<th>Action Description</th>
<th>New or Existing Facilities</th>
<th>Responsible Agency/Department</th>
<th>Estimated Cost</th>
<th>Potential Funding Source(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>07</td>
<td>01-Protect community health and safety</td>
<td>1.1-implement natural mitigation actions that protect life and property by ensuring assets and infrastructure are more resilient to hazards and risks</td>
<td>Drought, Extreme Heat</td>
<td>Increase native canopy by tree planting to reduce heat levels and increase shade.</td>
<td>NA</td>
<td>City Manager</td>
<td>$5,000+</td>
<td>FEMA, HGP, FEMA BRIC, State of Texas, Local Funds</td>
<td>Low</td>
</tr>
</tbody>
</table>

### Action #08 Suggestion

<table>
<thead>
<tr>
<th>Action Number</th>
<th>Goal Support</th>
<th>Objective Supported</th>
<th>Hazard(s) Addressed</th>
<th>Action Description</th>
<th>New or Existing Facilities</th>
<th>Responsible Agency/Department</th>
<th>Estimated Cost</th>
<th>Potential Funding Source(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>08</td>
<td>01-Protect community health and safety</td>
<td>1.2-Reduce the overall vulnerability of the community</td>
<td>Extreme Cold, Extreme Heat, Flood, Hurricane, Tropics, Storm, Lightning, Tornado, Wind, Storm, Winter Storm</td>
<td>Purchase and distribute NOAA All-Hazard radios or other public notification devices to all assets and other critical services</td>
<td>All</td>
<td>City Manager</td>
<td>$2,500+</td>
<td>FEMA, HGP, State of Texas, Local Funds</td>
<td>Low</td>
</tr>
</tbody>
</table>
Action #09 Suggestion

<table>
<thead>
<tr>
<th>Action Number</th>
<th>Goal Supported</th>
<th>Objective supported</th>
<th>Hazard(s) Address</th>
<th>Action Description</th>
<th>New or Existing Facilities</th>
<th>Responsible Agency/Department</th>
<th>Estimated Cost</th>
<th>Potential Funding Source(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>09</td>
<td>01-Protect community health and safety</td>
<td>1.2-Reduce the overall vulnerability of the community</td>
<td>Drought</td>
<td>Investigate feasibility of on-site rainfall collection, and storage of collected water for non-potable uses, such as irrigation or process water</td>
<td>All</td>
<td>City Manager</td>
<td>$1,500+</td>
<td>State of Texas, Local Funds</td>
<td>Low</td>
</tr>
</tbody>
</table>

Strategy Goal #02

- Suggested Goal #2:
  - Build and support partnerships to enhance mitigation opportunities and decrease vulnerability and risk

- Suggested Objective #2.1:
  - Build and support partnerships with local and regional entities to increase mitigation effectiveness

- Suggested Objective #2.2:
  - Work with community partners to build mitigation and risk concerns into planning and budgeting processes
### Action #10 Suggestion

<table>
<thead>
<tr>
<th>Action Number</th>
<th>Goal Supported</th>
<th>Objective supported</th>
<th>Hazard(s) Address</th>
<th>Action Description</th>
<th>New or Existing Facilities</th>
<th>Responsible Agency/Department</th>
<th>Estimated Cost</th>
<th>Potential Funding Source(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>02: Build and support partnerships to enhance mitigation opportunities and decrease vulnerability and risk</td>
<td>2.1: Build and support partnerships with local and regional entities to increase mitigation effectiveness</td>
<td>Drought, Extreme Cold, Extreme Heat, Flood, Hail, Hurricane, /Tropical Storm, Land Subsidence, Lightning, Tornado, -Wind Storm, Winter Storm</td>
<td>Investigate possible collaborations or partnerships with local and regional entities to share hazard, risk, and mitigation knowledge and strategies, to develop communitywide knowledgebase and increase awareness of other entities’ activities</td>
<td>NA</td>
<td>City Manager</td>
<td>$2,500+</td>
<td>Local Funds</td>
<td>High</td>
</tr>
</tbody>
</table>

### Action #11 Suggestion

<table>
<thead>
<tr>
<th>Action Number</th>
<th>Goal Supported</th>
<th>Objective supported</th>
<th>Hazard(s) Address</th>
<th>Action Description</th>
<th>New or Existing Facilities</th>
<th>Responsible Agency/Department</th>
<th>Estimated Cost</th>
<th>Potential Funding Source(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>02: Build and support partnerships to enhance mitigation opportunities and decrease vulnerability and risk</td>
<td>2.2: Work with community partners to build mitigation and risk concerns into planning and budgeting processes</td>
<td>Drought, Extreme Cold, Extreme Heat, Flood, Hail, Hurricane, /Tropical Storm, Land Subsidence, Lightning, Tornado, -Wind Storm, Winter Storm</td>
<td>Work with community partners, including county and municipal partners, to participate in planning for all hazards.</td>
<td>NA</td>
<td>City Manager</td>
<td>$2,500+</td>
<td>State of Texas, Local Funds</td>
<td>High</td>
</tr>
</tbody>
</table>
Strategy Goal #03

- Suggested Goal #3:
  - Leverage available resources to maximize investment in hazard mitigation
- Suggested Objective #3.1:
  - Maximize and leverage all available resources to ensure the most effective mitigation possible
- Suggested Objective #3.2:
  - Maximize insurance coverage to provide financial protection from natural hazards

Action #12 Suggestion

<table>
<thead>
<tr>
<th>Action Number</th>
<th>Goal Supported</th>
<th>Objective supported</th>
<th>Hazard(s) Addressed</th>
<th>Action Description</th>
<th>New or Existing Facilities</th>
<th>Responsible Agency/Department</th>
<th>Estimated Cost</th>
<th>Potential Funding Source(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>03-Leverage available resources to maximize investment in hazard mitigation</td>
<td>3.1-Maximize and leverage available resources to ensure the most effective mitigation possible</td>
<td>Drought, Extreme Cold, Extreme Heat, Flood, Hail, Hurricane, Tropic Storm, Land Subsidence, Lightning, Tornado, Wind Storm, Winter Storm</td>
<td>Develop and maintain a hazard and risk data repository, which details all assets, vulnerabilities, and related data points.</td>
<td>City Manager</td>
<td>$5,000+</td>
<td>FEMA HMG, FEMA BRIC, State of Texas, Local Funds</td>
<td>High</td>
<td></td>
</tr>
</tbody>
</table>
### Action #13 Suggestion

<table>
<thead>
<tr>
<th>Action Number</th>
<th>Goal Support</th>
<th>Objective supported</th>
<th>Hazard(s) Address</th>
<th>Action Description</th>
<th>New or Existing Facilities</th>
<th>Responsible Agency/Department</th>
<th>Estimated Cost</th>
<th>Potential Funding Source(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>O3-Leverage available resources to maximize investment in hazard mitigation</td>
<td>3.1 Maximize and leverage available resources to ensure the most effective mitigation possible</td>
<td>Land Subsidence</td>
<td>Work with community partners to identify known and emergent areas subject to subsidence that could impact assets, and to develop a mapping/tracking system for monitoring these areas</td>
<td>All</td>
<td>City Manager</td>
<td>$2,500+</td>
<td>FEMA HMGP, State of Texas, Local Funds</td>
<td>Low</td>
</tr>
</tbody>
</table>

### Action #14 Suggestion

<table>
<thead>
<tr>
<th>Action Number</th>
<th>Goal Support</th>
<th>Objective supported</th>
<th>Hazard(s) Address</th>
<th>Action Description</th>
<th>New or Existing Facilities</th>
<th>Responsible Agency/Department</th>
<th>Estimated Cost</th>
<th>Potential Funding Source(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>O3-Leverage available resources to maximize investment in hazard mitigation</td>
<td>3.1-Maximize and leverage available resources to ensure the most effective mitigation possible</td>
<td>Drought, Extreme Heat, Cold, Extreme Heat - Flood, Hail, Hurricane, Tropical Storm, Lightning, Tornado, Storm, Winter Storm</td>
<td>Work with community partners, including county municipal partner, to identify community wide projects to provide mitigation and protection to both the City and greater community populations, such as safe rooms, warming/cooling centers, and shelter and to develop funding requests for identified partner efforts</td>
<td>All</td>
<td>City Manager</td>
<td>$5,000+</td>
<td>FEMA HMGP, FEMA BRIC, State of Texas, Local Funds</td>
<td>High</td>
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</table>
### Action #15 Suggestion

<table>
<thead>
<tr>
<th>Action Number</th>
<th>Goal Supported</th>
<th>Objective supported</th>
<th>Hazard(s) Address</th>
<th>Action Description</th>
<th>New or Existing Facilities</th>
<th>Responsible Agency/Department</th>
<th>Estimated Cost</th>
<th>Potential Funding Source(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>03 - Leverage available resources to maximize investment in hazard mitigation</td>
<td>3.1 Maximize and leverage available resources to ensure the most effective mitigation possible</td>
<td>Land Subsidence</td>
<td>Inventory and monitor trees and vegetation that a planted near building foundations, to determine if any are causing or contributing to land subsidence; remove or prune to curb growth of root system, as needed</td>
<td>All</td>
<td>City Manager</td>
<td>$1,500+</td>
<td>State of Texas, Local funds</td>
<td>Low</td>
</tr>
</tbody>
</table>

### Action #16 Suggestion

<table>
<thead>
<tr>
<th>Action Number</th>
<th>Goal Supported</th>
<th>Objective supported</th>
<th>Hazard(s) Address</th>
<th>Action Description</th>
<th>New or Existing Facilities</th>
<th>Responsible Agency/Department</th>
<th>Estimated Cost</th>
<th>Potential Funding Source(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>03 - Leverage available resources to maximize investment in hazard mitigation</td>
<td>3.1 Maximize and leverage available resources to ensure the most effective mitigation possible</td>
<td>Drought, Extreme Cold, Extreme Heat, Flood, Hail, Hurricane, Tropic Storm, Land Subsidence, Lightning, Tornado, Wind Storm, Winter Storm</td>
<td>Design new buildings to be flexible and adaptable to changing uses as well as fully mitigated.</td>
<td>All</td>
<td>City Manager</td>
<td>$5,000+</td>
<td>FEMA HMGIP, FEMA BRIC, State of Texas, Local Funds</td>
<td>High</td>
</tr>
</tbody>
</table>
Action #17 Suggestion

<table>
<thead>
<tr>
<th>Action Number</th>
<th>Goal Supported</th>
<th>Objective supported</th>
<th>Hazard(s) Addressed</th>
<th>Action Description</th>
<th>New or Existing Facilities</th>
<th>Responsible Agency/Department</th>
<th>Estimated Cost</th>
<th>Potential Funding Source(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>03 - Leverage available resources to maximize investment in hazard mitigation</td>
<td>3.2 - Maximize insurance coverage to provide financial protection from natural hazard</td>
<td>Drought</td>
<td>Extreme Cold, Extreme Heat, Hurricane, Tropic Storm, Land Subsidence, Lightning, Tornado, Wind Storm, Winter Storm</td>
<td>Periodically review insurance coverage to ensure maximum natural hazard coverage is in place</td>
<td>City Manager</td>
<td>$2,500+</td>
<td>Local Funds</td>
<td>High</td>
</tr>
</tbody>
</table>

Strategy Goal #04

- Suggested Goal #4:
  - Increase awareness and understanding of natural hazard mitigation and resiliency within the community

- Suggested Objective #4.1:
  - Establish processes to ensure hazard mitigation and resiliency are considerations in all planning and decision-making processes

- Suggested Objective #4.2:
  - Work with the community at large to increase understanding and awareness of the importance of natural hazard mitigation and resiliency activities
### Action #18 Suggestion

<table>
<thead>
<tr>
<th>Action Number</th>
<th>Goal Supported</th>
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<th>Hazard(s) Address</th>
<th>Action Description</th>
<th>New or Existing Facilities</th>
<th>Responsible Agency/Department</th>
<th>Estimated Cost</th>
<th>Potential Funding Source(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>04-Increase awareness and understanding of natural hazard mitigation and resiliency within the community</td>
<td>4.1: Establish processes to ensure hazard mitigation and resiliency are considerations in all planning and decision making processes</td>
<td>Drought, Extreme Cold, Extreme Heat, Flood, Hail, Hurricane, Tropic Storm, Land Subsidence, Lightning, Tornado, Wind Storm, Winter Storm</td>
<td>Develop detailed inventory of structural assets to include first floor and utility elevations, construction materials, and other risk associated data points</td>
<td>All</td>
<td>City Manager</td>
<td>$50,000+</td>
<td>FEMA, HMGP, FEMA BRIC, State of Texas, Local Funds</td>
<td>High</td>
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</table>

### Action #19 Suggestion

<table>
<thead>
<tr>
<th>Action Number</th>
<th>Goal Supported</th>
<th>Objective supported</th>
<th>Hazard(s) Address</th>
<th>Action Description</th>
<th>New or Existing Facilities</th>
<th>Responsible Agency/Department</th>
<th>Estimated Cost</th>
<th>Potential Funding Source(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>04-Increase awareness and understanding of natural hazard mitigation and resiliency within the community</td>
<td>4.1: Establish processes to ensure hazard mitigation and resiliency are considerations in all planning and decision making processes</td>
<td>Drought, Extreme Cold, Extreme Heat, Flood, Hail, Hurricane, Tropic Storm, Land Subsidence, Lightning, Tornado, Wind Storm, Winter Storm</td>
<td>Establish and implement process to periodically document current condition of assets including photographs and other documentation</td>
<td></td>
<td>City Manager</td>
<td>$5,000+</td>
<td>State of Texas, Local Funds</td>
<td>High</td>
</tr>
</tbody>
</table>
### Action #20 Suggestion

<table>
<thead>
<tr>
<th>Action Number</th>
<th>Goal Support</th>
<th>Objective supported</th>
<th>Hazard(s) Address</th>
<th>Action Description</th>
<th>New or Existing Facilities</th>
<th>Responsible Agency/Department</th>
<th>Estimated Cost</th>
<th>Potential Funding Source(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>04-Increase awareness and understanding of natural hazard mitigation and resiliency within the community</td>
<td>4.2: Work with the community at large to increase understanding and awareness of the importance of natural hazard mitigation and resiliency activities</td>
<td>Drought/Extreme Cold/Extreme Heat/Flood/Hail/Hurricane/Tropical Storm/Land Subsidence/Lightning/Flood Storm/Winter Storm</td>
<td>Provide hazard and disaster awareness and preparedness information to the community, including residents, visitors, vendors, and others</td>
<td>NA</td>
<td>City Manager</td>
<td>$5,000+</td>
<td>FEMA, HMGP, State of Texas, Local Funds</td>
<td>Medium</td>
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</table>

### Action #21 Suggestion

<table>
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<tr>
<th>Action Number</th>
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<th>Hazard(s) Address</th>
<th>Action Description</th>
<th>New or Existing Facilities</th>
<th>Responsible Agency/Department</th>
<th>Estimated Cost</th>
<th>Potential Funding Source(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>04-Increase awareness and understanding of natural hazard mitigation and resiliency within the community</td>
<td>4.2: Work with the community at large to increase understanding and awareness of the importance of natural hazard mitigation and resiliency activities</td>
<td>Extreme Cold/Extreme Heat/Flood/Hail/Hurricane/Tropical Storm/Lightning/Flood Storm/Winter Storm</td>
<td>Conduct information sessions and briefings in advance of hazard seasons</td>
<td>NA</td>
<td>City Manager</td>
<td>$2,000+</td>
<td>FEMA, HMGP, State of Texas, Local Funds</td>
<td>High</td>
</tr>
</tbody>
</table>
Strategy Goal #05

- Suggested Goal #5:
  - Address flood hazards in the community
- Suggested Objective #5.1:
  - Implement planned stormwater mitigation projects
- Suggested Objective #5.2:
  - Work with Repetitive Loss properties to effectively mitigate flood risk to structures.

Action #22 Suggestion

<table>
<thead>
<tr>
<th>Action Number</th>
<th>Goal Supported</th>
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<th>Hazard(s) Address</th>
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<th>Potential Funding Source(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>05—Address flood hazards in the community</td>
<td>5.1—Implement planned stormwater mitigation projects</td>
<td>Flood</td>
<td>Implement the planned Auden Edloe Harper Stormwater Improvement Project</td>
<td>Both</td>
<td>City Manager</td>
<td>$5,000,000+</td>
<td>CDBGDR, TWDB, Local</td>
<td>High</td>
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## Action #23 Suggestion

<table>
<thead>
<tr>
<th>Action Number</th>
<th>Goal Support</th>
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<th>Estimated Cost</th>
<th>Potential Funding Source(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>05—Address flood hazards the community</td>
<td>5.1—Implement planned stormwater mitigation projects</td>
<td>Flood</td>
<td>Implement the planned Auden Street Stormwater Improvement Project, in collaboration with the City of West University Place</td>
<td>Both</td>
<td>City Manager</td>
<td>$5,000,000+</td>
<td>FEMA HMGP, FEMA BRIC</td>
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## Action #24 Suggestion

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<tr>
<th>Action Number</th>
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<th>Potential Funding Source(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>05—Address flood hazards the community</td>
<td>5.2—Work with repetitive loss properties to effectively mitigate flood risk to structures</td>
<td>Flood</td>
<td>Survey owners/residents to determine possible mitigation opportunities and options for structure; develop projects and funding requests as appropriate</td>
<td>Existing</td>
<td>City Manager</td>
<td>$1,000+</td>
<td>Local</td>
<td>High</td>
</tr>
</tbody>
</table>
## Action #25 Suggestion

<table>
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<tr>
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<th>Goal Support</th>
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<th>Hazard(s) Address</th>
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<th>New or Existing Facilities</th>
<th>Responsible Agency/Department</th>
<th>Estimated Cost</th>
<th>Potential Funding Source(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>5- Address flood hazards in the community</td>
<td>5.2- Work with repetitive loss properties to effectively mitigate flood risk to structures</td>
<td>Flood</td>
<td>Incorporate mitigation of RL properties into other projects and plans, as appropriate</td>
<td>Existing</td>
<td>City Manager</td>
<td>$1,000+</td>
<td>Local</td>
<td>High</td>
</tr>
</tbody>
</table>

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## Committee Question

- Are there any other planned or proposed natural hazard mitigation projects that you want to discuss or consider including?
- Committee Consensus: No
What Happens Next

- The final draft plan will be finalized today
- The final draft plan will be posted on the City’s website with a notice requesting public review/comment
- The final draft plan notice will be sent to stakeholders from neighboring jurisdictions/entities
- City Council will be asked to approve submission of the final draft to TDEM
- The final draft plan will be submitted to TDEM no later than Friday, November 12th

Thank you so much for your time and attention!
Appendix C: Public & Stakeholder Outreach Documentation

Public comment posting on City’s main website.

Public comment posting on City’s website.
Public comment posting on City’s Public Works Department Page.
November 9, 2021

The City of Southside Place has prepared a local hazard mitigation plan, in accordance with 44 CFR, Part 201. This plan identifies the hazards, risks, and vulnerabilities specific to the City, and identifies specific mitigation actions that can address them. The completion of this plan allows the City to apply for and receive various federal mitigation grants, including from the Federal Emergency Management Agency (FEMA).

As part of the plan development process, the City requests that any interested party review and comment on the draft of the plan. Public input is important to this process, and we welcome the opportunity to have your input as we work to mitigate our risks to natural hazards.

If you have comments, please use the form provided. Comments will be accepted until Tuesday, November 30, 2021, and may be emailed to our plan development consultant, Kelly George, at kgeorge@dcmcpartners.com.

Thank you for your interest in reducing the risks and vulnerabilities of our community!

<table>
<thead>
<tr>
<th>Section</th>
<th>Page(s)</th>
<th>Line Number(s)</th>
<th>Comment</th>
</tr>
</thead>
</table>

Form provided for public comment.
City of Southside Place, Texas Hazard Mitigation Plan

**This message sent on behalf of the City of Southside Place**

The City of Southside Place has prepared a local hazard mitigation plan, in accordance with 44 CFR, Part 201. This plan identifies the hazards, risks, and vulnerabilities specific to the City, and identifies specific mitigation actions that can address them. The completion of this plan allows the City to apply for and receive various federal mitigation grants, including from the Federal Emergency Management Agency (FEMA).

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Kelly George, CFM
Senior Hazard Mitigation Manager | DCMC Partners

813.810.5429 | kgeorge@dcmcpartners.com

24/7 Support: 1.855.CRISIS-8 (1.855.274.7478)

Request for comment from external stakeholder.
Request for comment from external stakeholder.

Kelly George

**This message sent on behalf of the City of Southside Place**

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Kelly George, CFM
Senior Hazard Mitigation Manager | DCMC Partners

813.810.5429 | kgeorge@dcmcpartners.com

24/7 Support: 1.855.CRISIS-8 (1.855.274.7478)
## Appendix D: Asset Data

<table>
<thead>
<tr>
<th>Critical Asset Name</th>
<th>Asset Type</th>
<th>Asset Function</th>
<th>Latitude</th>
<th>Longitude</th>
<th>Street Address</th>
<th>Zip Code</th>
<th>Square Footage</th>
<th>Year of Construction</th>
<th>Asset Value (estimated)</th>
<th>Contents Value (estimated)</th>
<th>SFHA?</th>
</tr>
</thead>
<tbody>
<tr>
<td>City Hall/EOC</td>
<td>Government; Emergency Services</td>
<td>Public Safety (police); Fire Response Center; 911 Center; Sleeping quarters for public safety personnel</td>
<td>29.71472405</td>
<td>-95.43351838</td>
<td>6309 Edloe Street</td>
<td>77005</td>
<td>11,000</td>
<td>2010</td>
<td>$3,600,000</td>
<td>$500,000</td>
<td>Yes - AE</td>
</tr>
<tr>
<td>Water Plant</td>
<td>Utility</td>
<td>Water distribution (ground and surface)</td>
<td>29.70664056</td>
<td>-95.43586716</td>
<td>3756 Bellaire Boulevard</td>
<td>77005</td>
<td>3,000</td>
<td>1956</td>
<td>$1,500,000</td>
<td>$300,000</td>
<td>Yes - AE</td>
</tr>
<tr>
<td>Wastewater Treatment Plant</td>
<td>Utility</td>
<td>Wastewater treatment</td>
<td>29.70546952</td>
<td>-95.4360487</td>
<td>3701 Bellaire Boulevard</td>
<td>77005</td>
<td>8,500</td>
<td>1956</td>
<td>$2,000,000</td>
<td>$200,000</td>
<td>Yes - AE</td>
</tr>
<tr>
<td>Park Clubhouse/Community Center</td>
<td>Government; Recreation</td>
<td>Sheltering; warming station; commodity distribution site</td>
<td>29.71117457</td>
<td>-95.43479912</td>
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<td>4,000</td>
<td>2001</td>
<td>$3,000,000</td>
<td>$100,000</td>
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$10,100,000 $1,100,000