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City of Buda Annex Section 1: Organize and Review

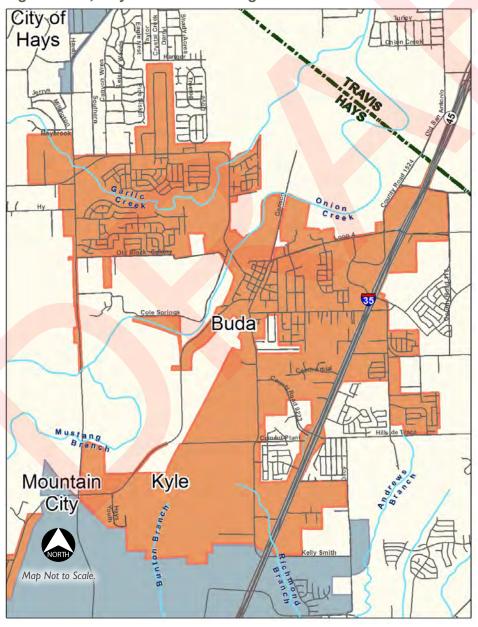
This section contains a brief description of the City of Buda and its jurisdictional features. In addition, Section 1 contains the following details regarding Buda's:

- participation in the Hays County HMP Update process,
- stakeholder engagement,
- public outreach strategy,
- incorporation efforts and
- plan maintenance procedures.

*Population:	7,959
Size of Community:	8.8 sq. miles
*Population over 65 years old	527
*Population under 16 years old	2,414
*Economically Disadvantaged Population (\$0-\$20k)	284
Buda is serviced by the following responders:	
Fire & EMS - Buda Fire Department/Buda EMS	
Law Enforcement- Buda Police Department	

*HAZUS-MH 3.2 Updated Census 2010 Population Estimates

Figure BA.1, City of Buda Planning Area



Community Description

When planning, it is important to take into account the characteristics that make a community unique. Consideration of unique needs when it comes to mitigating or recovering from natural hazards ensures that all members of the community and their needs are addressed.

Buda is located along Interstate Highway 35 (IH 35) and State Highway 45, just 20 minutes from both downtown Austin and Austin-Bergstrom International Airport. The population in Buda has grown over 205% percent from 2000 to 2010. With more parkland per-capita than any City in the State, Buda is known as the Outdoor Capital of Texas.

The City is served by Hays Consolidated Independent School District (ISD), which has 22 campuses throughout Buda and Kyle. There are also 4 private schools that serve Buda, 1 of which is located within the jurisdictional boundaries.

There are over 15 subdivisions that will host more than 4,800 homes once build out is complete. In 2013 alone, the City approved 456 new residential building permits. Incorporated in 1948, Buda is a Home Rule City that has a council-manager form of government (Buda Economic Development Corporation, 2017). Buda's major employers are shown in Table BA.1 and BA.2 shows the City's utility providers.

Table BA.1, Major Employers

Business Type	Name of Employer		
Manufacturing	Texas Lehigh Cement		
Manufacturing	Centex Materials		
Manufacturing	CTX Builders Supply		
Manufacturing	Chatleff Controls		
Manufacturing	Nighthawk Foods		
Retail	Cabela's		

Table BA.2, Utility Providers

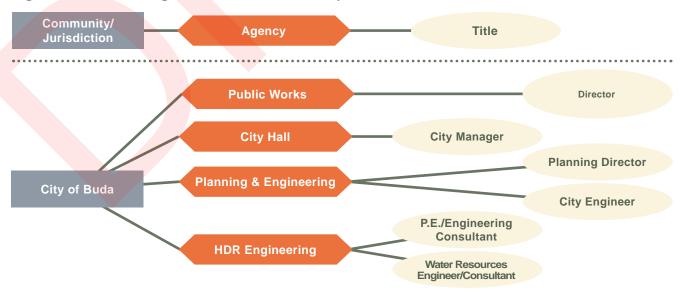
Туре	Provider
Electric	Pedernales Electric Cooperative (PEC)
Natural Gas	CenterPoint Energy
Water	The City of Buda, Goforth Water Supply Corp, Southwest Water Utilities, LP (Monarch Water)
Cable	Time Warner Cable, Verizon, Hughes Net, Direct TV, Frontier

(Buda Economic Development Corporation, 2017)

Planning Committee

Planners who represented Buda for the update process are collectively known as the Buda Mitigation Planning Committee (MPC) and are shown in Figure BA.2.

Figure BA.2, Planning Committee Membership





Community Planning Involvement

MPC planning activities for the Hays County Hazard Mitigation Plan (HMP) Update are captured in Figure BA.3, which utilizes check-marks to indicate each of the activities that were completed by the Buda MPC.

The City of Buda participated in planning activities with their engineering consultants from HDR, Inc. Representatives from both the City offices and the consulting firm were present for each meeting and completed each community task within the requested time period.

Figure BA.3, City of Buda Plan Participation

Meetings

- ✓ Kick-Off
- ✓ Risk Assessment
- Mitigation Strategy

Data Submission



- ✓ Planner's Survey
- ✓ Data Collection Spreadsheet/ GIS Data
- ✓ Planning Worksheets
- ✓ Phone Interview

Public Involvement



- ✓ City Council/Commissioner's Court Agenda Items
- ✓ Public Survey Posting/ Collection

Stakeholders

During the Phase 1 Kick-Off Meeting, planners were provided with a Planner/Stakeholder worksheet, referred to in Chapter 1, the Plan Process portion of the Hays County HMP Update. This document allowed planners to identify stakeholders for inclusion in the Risk Assessment and Mitigation Strategy Meetings.

BA.3 identifies the stakeholders that were invited to participate by the following email:

Good Morning.

You or your organization has been identified by a local community planner as a stakeholder (interested/affected party) for the Hays County Hazard Mitigation Plan Update process. The planning team, made up of community officials from throughout Hays County, is working to update this plan that identifies actions for reducing and mitigating the risk from natural hazards (flood, tornado, severe winter, etc...) affecting Hays County and the communities within it. If your schedule allows, your insight would be valuable at a meeting being held on Thursday, January 12, 2017, from 1 p.m. to 4 p.m. at

Wimberley Community Center 14068 Ranch Road 12 Wimberley, TX 78676

Please register for the Hazard Mitigation Plan Update- Risk Assessment Meeting. https://www.eventbrite.com/e/hays-county-hazardmitigation-plan-update-risk-assessment-meeting-registration-30892049953

If unable to complete registration on the Eventbrite site, please reply to this email and indicate who will attend from your organization so that the meeting facility can be prepared for the proper number of attendees.

JWSA and Halff Associates are providing coordination and facilitation support for this process for Hays County and participating communities utilizing FEMA mitigation grant funding. Any questions regarding this meeting can be directed to Paloma Alaniz at palaniz@halff.com.

Thank you.





Table BA.3, Plan Stakeholders

Organization	Agency	Title
City of Buda	Fire Department/EMS	Fire Chief
City of Buda	Police Department	Police Chief
City of Buda	Engineering/Public Works	Water Specialist
City of Buda	Economic Development	Secretary
City of Buda	Government	Mayor
City of Buda	Parks and Recreation	Director
Buda Chamber of Commerce	Non-Profit	BACC Managing Director
Hays Consolidated ISD	School District	Director
City of Buda	Economic Development Corporation	President
Travis County	Office of Emergency Management	Emergency Management Coordinator
Hays County	Office of Emergency Services	Director/Emergency Management Coordinator
Mountain City	City Hall	Mayor
Pedernales Electric Cooperative	Utilities	Chief Executive Officer
CenterPoint Energy	Utilities	Government Relations
Goforth Water Supply Corp	Utilities	General Manager
Spectrum Cable	Telecommunication Telecommunication	Government Affairs Manager

Outreach Strategy

The City of Buda was very active in their outreach activities used to request public participation in the Hays County Hazard Mitigation Plan Update.

Public Survey Promotion

Buda advertised the Hays County Hazard Mitigation Plan Update Public Survey on the Buda homepage www. ci.buda.tx.us.

As of March 10, 2017, Buda had 242 residents respond to the public survey. A copy of the survey questions can be found in Appendix A of the Hays County HMP Update. Details on how the survey data was directly incorporated into the Risk Ranking process for hazards is included in Chapter 2, the Risk Assessment portion of the Hays County HMP Update.

Figure BA.4, Survey Link on City of Buda Home Page



City Council Meeting Announcement

On February 7, 2017, the City of Buda's Emergency Management Coordinator presented information on the Hays County Hazard Mitigation Plan Update to the Buda City Council. During the presentation, the Council was given a staff report executive summary of the effort, the background/history of mitigation

planning, and pros and cons of the activity. The Council agenda and item report for this presentation are included in Appendix A. The Buda City Councilmembers were also provided a copy of the MPC published Hazard Mitigation Plan Update Newsletter that was published at each phase of the process.

Plan Phase Newsletters

The City of Buda was provided with newsletters at each phase of the planning process in order to be able to share updates on the planning process with stakeholders, elected officials, City staff and the public. Copies of the newsletter can be found in Appendix A of the Hays County HMP Update.

Plan Draft Public Review and Comment Period

The link to the draft Hays County HMP (hosted on the Hays County Office of Emergency Services page) was posted on the City of Buda website and announced in the Hays Free Press with an open comment period from July 12, 2017 until July 26, 2017. A hard copy was placed in the Buda Public Library. Comments were collected via SurveyMonkey.

Incorporation of Sources

In addition to stakeholder and public input, the MPC also reviewed other planning resources that could provide useful information to the plan update process. Table BA.4 lists the documents reviewed and how they were considered for incorporation in the updated plan.

Table BA.4. Review/Incorporation of Sources

Table BA.4, Neview/incorporation of Sources			
Name of Document	Туре	How Incorporated	
2013 State of Texas Hazard Mitigation Plan	Plan	Utilized hazard definitions and hazard classification names. (Texas Division of Emergency Management, 2013)	
Flood Insurance Study	Study	Incorporated best available hydraulic and hydrologic study results for flood hazard profile.	
Repetitive Flood Damage Data	Report	Used flood damage reports to profile structures/addresses that show trends in experiencing flood damage for Risk Assessment Flood Hazard Profile (National Flood Insurance Program, 2016)	





Table BA.4, Review/Incorporation of Sources (cont.)

Name of Document	Туре	How Incorporated	
		Use of the Guiding Values: Environmental Protection - Being stewards of the environment Responsible Planning - planning for civic infrastructure and services in advance of growth Livability for All - ensuring that someone can live his or her entire life in Buda	
		Future Land Development Character Districts - Considered mitigation measures that can be applied to the community future development districts	
D 1 2020 C		Consideration of Mitigation Plan Actions that would meet the Comprehensive Plan Objectives and Benchmarks to:	
Buda 2030 Comprehensive Plan	Plan	 Preserve open space assets throughout the area Protect Buda's environmental quality and identity by preserving the existing "urban forest" Protect established neighborhoods Utilize innovative methods for water and wastewater services and facilities in order to meet or surpass state and Federal standards (reduce amount of City potable water used for irrigation) (Halff Associates, 2011) 	
		Incorporation of actions that also serve mitigation purposes:	
		 Action P-7.2 - Develop staff expertise to manage the community's trees, enforcement of tree care ordinance and materials to educate residents as to the importance ofproper tree care (mitigates wildfire, windstorm, severe winter) p. 123 Action CF-3.4 - Establish a Neighborhood Services program to provide support services and materials to neighborhoods (Mitigates multi-hazards through awareness/education opportunities) (Halff Associates, 2011) 	
		Review of the report for opportunities to improve Insurance Services Office (ISO) ratings while also instituting mitigation actions. (Rating of 6 for 1-family and 2-family residential and 4 for commercial and industrial)	
Buda 2014 ISO Benchmark Report	Report	 Buda received a 0 for the lack of adoption of a Wildland Urban Interface Code for Commercial and Residential Development The Code Enforcement personnel training score could be improved to meet State and National averages through technical training. This could be achieved through introductory Floodplain Management courses. (ISO Building Code Effectiveness Grading Schedule (BCEGS), 2014) 	

Table BA.4, Review/Incorporation of Sources (cont.)

Name of Document	Туре	How Incorporated
		Review of problem areas defined by public survey results included in Transportation Master Plan
Master Transportation Plan	Plan	 Bradford Village - Goforth and Bonita Vista are in poor condition with potholes and flooding Creekside Park - Rebel Rd/Main needs road repairs and has drainage problems Creekside Park - Large oak on FM 967 doesn't allow for emergency access Ingress/egress problems at 4 subdivisions; Oxbow Trails, Garlic Creek, Coves of Cimarron and Creekside Park Whispering Hollow - getting out of Whispering Hollow to FM 1626 needs access to Old Black Colony (Lockwood, Andrews & Newnam, Inc., 2013)
		Inclusion of goals
		 Consolidate prior piecemeal watershed plans/projects Assess concerns related to City's rapid growth Address residents' complaints Solve problems arising from 2013 Halloween Day Flood (Lockwood, Andrews & Newnam, Inc, 2014)
City of Buda Drainage Master Plan: Phase 1	Plan	Use of top 10 flooding problem areas for identifying flood location • West Goforth Street Area Flooding • Fire Station Area Flooding • Houston Street Area Flooding • West Lifschutz Area Flooding • Hillside Terrace Neighborhood
		 Oxbow Neighborhood Area Flooding Bluff Street Area Flooding Lifschutz Headwaters Park 35 South Drainage Ditch Cole Springs Roadway Flooding (Lockwood, Andrews & Newnam, Inc, 2014)
City of Buda Drainage Master Plan: Phase 2	Plan	Use of additional 20 problem areas for flooding, as shown in Figure BA.12. (Freese and Nichols, Inc., 2015)
		Consideration of public survey input from plan development for consideration for actions.
The 2012 Buda Parks, Recreation, Trails and Open Space Master Plan	Plan	"One complaint that came outwas that drainage corridors and detention basins in Buda take away from the City's natural beauty and are often unattractiveto improve the drainage corridors and detention basins with park-like features even if it increases maintenance costs." (Halff Associates, 2012)
City of Buda Space Needs Assessment and Facilities Master Plan	Plan	This document that covered a study of the staffing, space needs and facilities needed for the City of Buda was used to identify City facility locations and review for potential integration opportunities. The plan identifies the City Hall Annex building as having reached its effective lifespan and should be eventually sold. This indicates the structure is likely susceptible to damage in the event of a natural hazard. In addition the plan indicates that the community will likely need triple of the public building space (from 28,900 SF footage to a total of 150,000) within a period of 20 years based on anticipated population growth. (Wigninton Hooker Jeffry Architects, 2014)



Table BA.4, Review/Incorporation of Sources (cont.)

Name of Document	Туре	How Incorporated	
2015 Downtown Master Plan for Buda, TX	Plan	Considered future development suggestion for the following: Northeast along Main Street - enhance floodplain areas along Main Street so that they become assets. Encourage the development of ponds with permanent water as signature gateway elements leading into the downtown area. (Halff Associates, 2015)	
City of Buda 5-Year Capital Improvement Plan	Plan	Consideration of inclusion of projects from CIP: Park 35 South - Fire Water (209) Hillside Terrace Wastewater Improvements (309) (TWDB) Wastewater Impact Fee (310) Drainage projects 601-630 Culvert and Park Improvements (805,808,809,810,811,812) Oxbow Water Service Sportsplex Effluent Irrigation (to reduce demand on potable water) Apple Blossom Street Home Flooding Bradfield Village Culverts Under Main Street Brushy Creek Culvert 2 (warning and flood stage signs) Brushy Creek Culvert 3 Dacy Lane Low Water Crossing FM 967 Onion Creek Bridge Automatic High Water Warning Gates Garlico Creek Tributary Culvert Replacements Old San Antonio Ditch Old Town South Culvert 1 Onion Creek Low Water Crossing signs, flood depth signs and automatic road closure gates Bradfield Park Improvement could be enhanced to include shelter for citizens from lightning Bluff Street Area Flooding Fire Station Area Flooding West Goforth Street Area Flooding Houston Street Area Flooding Oxbow Drainage Improvements Cole Springs Road Flood Warning Signs (City of Buda Engineering, 2015)	
Buda Economic Development Strategic Plan	Plan	 Incorporate Plan Action to: Action 2.3 - Ensure water availability in all development sites Action 2.4 - Foster regional detention at FM 967/FM 1626 Action 7.13 - Support Implementation of Parks and Trails Plan (Pegasus, 2013) 	
City of Buda Flood Emergency Warning System	Project	Plan for potential Flood Emergency Warning System, with overlapping CIP projects that can be included in Mitigation action plan for the multiple flood warning system sites. (City of Buda Office of Emergency Management)	
City of Buda Drought Contingency Plan	Plan	Considered drought stage alignment with other mitigation activities considered in the HMP, such as including migration measures within the drought stage triggers.	

Continued Public Participation in Maintenance Process

The strategy for updates at the local level for the City will include opportunities for public involvement as shown in Table BA.5.

Table BA.5, Public Involvement for Updates

Activity	Public Involvement	Method Available
Monitoring	The public will be given notice when items will be reviewed and receive the opportunity to review the notes from any notable developments.	Newspaper/Social Media
Evaluation	The public will be given a means to voice their opinion on the completed actions.	SurveyMonkey/Paper Survey
Updates	Once updates are made, the changes will be recorded in a public revision history document.	Newspaper/Social Media/Council Meeting Announcements/ SurveyMonkey



Maintenance

Table BA.6 lists the method, schedule, and responsible agent for the monitoring, evaluation, and updating of the adopted 2017 HMP within the Plan's 5-year update cycle.

Table BA.6, Hays County Hazard Mitigation Plan Maintenance Schedule, City of Buda

Task	Scope	Method	Schedule	Responsible Agent
Monitoring	Jurisdictional	Reviews of mitigation action items using Mitigation Action Progress Report Worksheets (Appendix C of the Hays County HMP Update).	Every 12 months	City of Buda Public Works, Director; City of Buda Office of Emergency Management, Director
Evaluation	Jurisdictional	Complete Online Planner Survey (using SurveyMonkey) with evaluation of plan process.	Every 12 months	City of Buda, Engineering, City Engineer; City of Buda, Engineering, Floodplain Administration
Updates	Jurisdictional	Perform updates to Mitigation Strategy to edit/add/omit actions identified during monitoring activities. Conduct post-disaster review of community annex in order to update for significant occurrences, construction of new critical infrastructure or facilities, changes in jurisdictional boundaries and development. Participate in MPC for 5-year HMP update process.	As needed	Buda Fire Department, Fire Chief; City of Buda, Planning Department, Planning Director; City of Buda, Engineering, City Engineer; City of Buda, Engineering, Floodplain Administration; City of Buda Public Works, Director; City of Buda Office of Emergency Management, Director

Section 2: Risk Assessment

City of Buda Jurisdictional Hazards

This section contains Buda's hazard profiles for each natural hazard included in the Hays County HMP Update. Profiles include:

- Location the area where the hazard is known to occur
- Previous Occurrences a history of reported events for the hazard
- Significant Previous Occurrences (when applicable) notable hazard events within the community
- Extent the strength or magnitude of the hazard
- Probability the likelihood of the hazard event occurring in the future
- Impact the consequence or effect (or possible effect) of hazard events
- Vulnerability Summary identification of structures, systems, populations or assets susceptible to loss or damage

Hazard descriptions and extent scales for hazard magnitudes, are found in Chapter 2, the Risk Assessment portion of the Hays County HMP Update.

When available, data specific to Buda was used for hazard analysis. When no instances were reported specifically for the jurisdiction for regional hazards, County level data was applied.

State and national datasets were used to determine occurrence, extent, and the respective probabilities, rather than verbal testimonies, in an effort to retain data consistency. For some hazards, the National Oceanic and Atmospheric Administration (NOAA) Storm Events Database was used as the most comprehensive data available for hazards. As a result, fatality, injury and damage amounts shown for previous hazard occurrences do not always reflect the most recent totals. The Previous Occurrences paragraphs identify instances in which this may occur. Verbal testimony, when available, was integrated into impact or vulnerability summaries, when applicable.

Hazards profiled within the Risk Assessment include:

- Drought
- Extreme Heat
- Severe Winter Storms
- Lightning
- Hailstorms
- Windstorms
- Tornadoes
- Expansive Soils
- Floods
- Land Subsidence
- Hurricanes/Tropical Storms
- Earthquakes
- Dam/Levee Failure
- Wildfires





Drought

Drought: Location

Drought occurs on a regional scale, therefore, all of the City of Buda is equally at risk as it can occur anywhere in the planning area.

Drought: Previous Occurrences

NOAA Storm Events Database documents 27 drought events for Hays County since the year 1996 (see Table BA.7). Although there were no drought events reported specifically for the City of Buda, the jurisdiction would have been affected by the events that were reported for the surrounding County area.

Fatality, injury and damage amounts are shown in Table BA.7, per the NOAA Storm Events Database. Community testimony indicates that these amounts do not reflect the most recent totals, however NOAA data is being used as the best source of information available for the record period.

Table BA.7, Reported Drought Occurrence, Hays County

Location	Date	Туре	Fatalities	Injuries	Property Damage	Crop Damage
HAYS (ZONE)	4/1/1996	Drought	0	0	0.00	0.00
HAYS (ZONE)	5/1/1996	Drought	0	0	0.00	0.00
HAYS (ZONE)	6/1/1996	Drought	0	0	0.00	0.00
HAYS (ZONE)	7/1/1996	Drought	0	0	0.00	0.00
HAYS (ZONE)	8/1/1996	Drought	0	0	0.00	0.00
HAYS (ZONE)	7/1/2000	Drought	0	0	0.00	0.00
HAYS (ZONE)	8/1/2000	Drought	0	0	0.00	0.00
HAYS (ZONE)	9/1/2000	Drought	0	0	0.00	0.00
HAYS (ZONE)	10/1/2000	Drought	0	0	0.00	0.00
HAYS (ZONE)	5/1/2011	Drought	0	0	0.00	0.00
HAYS (ZONE)	6/1/2011	Drought	0	0	0.00	0.00
HAYS (ZONE)	7/1/2011	Drought	0	0	0.00	0.00
HAYS (ZONE)	8/1/2011	Drought	0	0	0.00	0.00
HAYS (ZONE)	9/1/2011	Drought	0	0	0.00	0.00
HAYS (ZONE)	10/1/2011	Drought	0	0	0.00	0.00
HAYS (ZONE)	11/1/2011	Drought	0	0	0.00	0.00
HAYS (ZONE)	12/1/2011	Drought	0	0	0.00	0.00
HAYS (ZONE)	1/1/2012	Drought	0	0	0.00	0.00
HAYS (ZONE)	6/ <mark>1/20</mark> 12	Drought	0	0	0.00	0.00
HAYS (ZONE)	12/1/2012	Drought	0	0	0.00	0.00
HAYS (ZONE)	2/1/2013	Drought	0	0	0.00	0.00
HAYS (ZONE)	3/1/2013	Drought	0	0	0.00	0.00
HAYS (ZONE)	4/1/2013	Drought	0	0	0.00	0.00
HAYS (ZONE)	6/1/2013	Drought	0	0	0.00	0.00
HAYS (ZONE)	7/1/2013	Drought	0	0	0.00	0.00
HAYS (ZONE)	8/1/2013	Drought	0	0	0.00	0.00
HAYS (ZONE)	8/1/2014	Drought	0	0	0.00	0.00
		Total			\$0.00	\$0.00



Drought: Significant Past Events

Several significant regional drought events have previously impacted the City. Refer to the *Drought: Significant Past Events* paragraph within Section 2, Risk Assessment of the Hays County Annex, for narratives discussing these events.

Drought: Extent

The US Drought Monitor Drought Intensity scale classifies drought by 5 categories, D0 through D4. According to the reported previous drought occurrences in the jurisdiction, the maximum drought extent experienced is a Category D4 drought. Refer to Chapter 2, the Risk Assessment portion of the Hays County HMP Update, for a description of US Drought Monitor Drought Intensity Index.

Drought: Probability

Based on 6 years with reported drought events from the NOAA Storm Events Database within 20 years, a drought event occurs approximately once every 3 years on average in Hays County. Since drought events can happen anywhere throughout the HMP update area and occur on a regional scale, the City of Buda's future probability is assumed to be similar to the surrounding County areas and therefore, can expect a drought event approximately once every 3 years on average with up to a Category D4 Drought.

Number of Years with Reported Event (Drought Year)	Number of Years in Dataset	Probability
6	20	0.30

Drought: Impact

Table BA.8 and BA.9 list the impact of drought from 1996 to 2016 for Hays County as well as the City of Buda according to the Drought Impact Reporter (DIR). The DIR is the nation's first comprehensive database of drought impacts. This database contains information from multiple Federal agencies, such as NOAA and United States Geological Survey (USGS), related to drought impacts from a national to city level by category and extent of impact. As the effects of drought are not confined to jurisdictional boundaries and occur on a regional scale, impacts reported on the Hays County level are applicable in illustrating impact to the City of Buda.

Table BA.8, Reported Drought Impacts, Hays County

Hays County Drought Impacts 1996-2016							
Category	# of Incidents Reported						
Agriculture	45						
Business & Industry	3						
Energy	2						
Fire	24						
Plants & Wildlife	33						
Relief, Response & Restrictions	48						
Society & Public Health	7						
Tourism & Recreation	3						
Water Supply & Quality	53						

(University of Nebraska-Lincoln, 2016)

Table BA.9, Reported Drought Impacts, City of Buda

Buda Drought Impacts 1996-2016					
Category	# of Incidents Reported				
Agriculture	N/A				
Business & Industry	N/A				
Energy	N/A				
Fire	N/A				
Plants & Wildlife	1				
Relief, Response & Restrictions	N/A				
Society & Public Health	N/A				
Tourism & Recreation	N/A				
Water Supply & Quality	N/A				

(University of Nebraska-Lincoln, 2016)



Drought: Vulnerability Summary

Among communities in Texas that have a population over 10,000, Buda is considered 1 of the fastest growing populations in the state of Texas. Additional wells are being dug in order to meet the demand of the growth in the City. Water shortages are a concern and water availability could be impacted during a drought as some of the City's water supply is composed of surface water. This could also affect fire response as it could result in lowered pressure for hydrants. Water conservation education programs could help encourage the public to be a part of the solution.





Extreme Heat

Extreme Heat: Location

Extreme heat occurs on a regional scale; therefore, all of the City of Buda is equally at risk as it could occur anywhere in the planning area.

Extreme Heat: Previous Occurrences

NOAA's Online Weather Data (NOWData) provides temperature data ranging from 2000 to 2016. NOAA's National Weather Service (NWS) Heat Index (located in Chapter 2, the Risk Assessment portion of the Hays County HMP Update) indicates that temperatures meeting or exceeding 90°F are designated with an "Extreme Caution" or greater warning classification. According to Canyon Dam Station, the closest local weather data collection center with comprehensive data, the mean number of days with a daily max temperature equal or greater to 90°F is 94 days. Currently, the greatest number of days during which the jurisdiction experienced extreme heat is 119 in 2008 while the highest temperature experienced was 109°F in August 2011 (a "Danger" NWS Heat Index classification). Canyon Dam Station is the closest reporting NOWData station to the jurisdiction and applies equally to the City of Buda due to the regional nature of extreme heat occurrence.

Extreme Heat: Extent



Extreme heat extent is classified by temperatures as well as levels, within the NWS Heat Index. The extent of extreme heat that the City of Buda has experienced can be derived from the data provided from NOWData at Canyon Dam Station since the year 2000. The highest daily mean temperature experienced was 109°F in August 2011. This event is classified by the NWS Heat Index as "Danger". Refer to Chapter 2, the Risk Assessment portion of the Hays County HMP Update, for a description of heat extent scale, NOAA's NWS Heat Index.

Extreme Heat: Probability

The probability of future events can be determined by assessing historical averages. Since extreme heat events occur on a regional scale, the City of Buda's future probability is assumed to be similar to the area surrounding Canyon Dam Station. Based on NOWData, the City can expect, on average, approximately 94 days a year with temperatures equal or greater to 90°F, and up to a "Danger" warning classification per the NOAA NWS Heat Index. As extreme heat events have occurred every year since 2000, the probability of extreme heat affecting the community is 100% in any given year.

Extreme Heat: Impact

Extreme heat has physical impacts on the public and the infrastructure that supports them. According to the Texas Health Care Information Collection and Trauma Registry from the Texas Department of State Health Servicesfeet Injury Epidemiology & Surveillance Branch, the following number of patients were received in Hays County medical facilities for Heat Related Injuries and Trauma, as shown in Tables BA.10 and BA.11.

Table BA.10, Hays County Hospital Inpatient Data, Extreme Heat

Description	2010	2011	2012	2013	2014
Accidents caused by excessive heat due to weather conditions	1	3	5	0	0
Accidents due to excessive heat of unspecified origin	1	0	0	0	0

(Texas Department of State Health Services- Injury Epidemiology & Surveillance Branch, 2017)

Table BA.11, Hays County Trauma Data, Extreme Heat

Description	2010	2011	2012	2013	2014
Accidents due to excessive heat of unspecified origin	0	1	0	0	0

(Texas Department of State Health Services- Injury Epidemiology & Surveillance Branch, 2017)

In addition to the physical impacts, an excessive heat event can also be the cause of cascading incidents. Electrical outages could occur due to the high demands of electricity needed to power cooling systems. A loss of critical resources, such as power, has significant impact on the entire population, with higher impacts to those with vulnerabilities to such conditions. The following portion of the City of Buda's population, according to HAZUS-MH 3.2 updated Census 2010 population estimates, would be greatly impacted by the severe temperatures related to excessive heat and/or the loss of electrical energy in their dwellings.

Population over 65 years old: 527
Population under 16 years old: 2,414
Economically Disadvantaged Population (\$0-\$20k): 284

An organization called Inside Energy (http://insideenergy.org) provided a compiled database outlining 15 years of power outages across the United States from annual data available at the Department of Energy. Within the database, the following excessive heat events affected electrical availability in the areas in or near Hays County (Table BA.12).

Table BA.12, Extreme Heat Affecting Electrical Availability

Event Description	Year	Start Date	Start Time	End Date	Respondent	Location	Customers Affected
Declared Energy Emergency Alert2/Heat Wave	2007	8/14/2007	2:00 p.m.	8/14/2007	American Electric Power (CSWS)	CSWS Control Area of Southwest Power Pool Parts of Oklahoma, Texas, Louisiana, Arkansas	N/A

(Wirfs-Brock, 2014)



Extreme Heat: Vulnerability Summary

Buda does not have a cooling station plan for the community but does have locations available in order to cool people. An existing strategy for helping the public with extreme heat events is a fan donation program done by the fire department. This could be enhanced upon by adding additional public benefits and services.





Severe Winter Storms

Severe Winter Storms: Location

Severe winter storms occur on a regional scale; therefore, all of the City of Buda is equally at risk.

Severe Winter Storms: Previous Occurrences

NOAA Storm Events Database documents 13 winter storm events for Hays County since the year 1996 (see Table BA.13). Although there were no winter storm events reported specifically for the City of Buda, the jurisdiction would have been affected by the events that were reported for the surrounding County area.

Fatality, injury and damage amounts are shown in Table BA.13, per the NOAA Storm Events Database. Community testimony indicates that these amounts do not reflect the most recent totals, however NOAA data is being used as the best source of information available for the record period.

Table BA.13, Winter Weather Occurrences, Hays County

Location	Date	Туре	Fatalities	Injuries	Property Damage	Crop Damage
HAYS (ZONE)	2/1/1996	Winter Storm	0	0	0.00	0.00
HAYS (ZONE)	1/7/1997	Winter Storm	0	0	0.00	0.00
HAYS (ZONE)	1/11/1997	Winter Storm	0	0	0.00	0.00
HAYS (ZONE)	12/23/1998	Winter Storm	0	0	0.00	0.00
HAYS (ZONE)	12/12/2000	Winter Storm	0	0	0.00	0.00
HAYS (ZONE)	11/28/2001	Winter Storm	0	0	0.00	0.00
HAYS (ZONE)	2/24/2003	Winter Storm	0	0	0.00	0.00
HAYS (ZONE)	12/7/2005	Winter Storm	0	0	0.00	0.00
HAYS (ZONE)	1/15/2007	Winte <mark>r Sto</mark> rm	0	0	125,000.00	0.00
HAYS (ZONE)	2/3/2011	Winter Storm	0	0	0.00	0.00
HAYS (ZONE)	11/26/2013	Winter Weather	0	0	0.00	0.00
HAYS (ZONE)	1/23/2015	Winter Weather	0	0	0.00	0.00
HAYS (ZONE)	2/16/2015	Winter Weather	0	0	0.00	0.00
	Total		0	0	\$125,000.00	\$0.00

(National Oceanic and Atmospheric Administration Storm Event Database, 2016)

Severe Winter Storms: Significant Past Events

Regionally, there were significant winter weather events reported as Hays (Zone) that may have impacted the City, as shown in Table BA.13. Refer to the Severe Winter Storms: Significant Past Events section within the Hays County Annex for narratives discussing these events.

Severe Winter Storms: Extent

Ice accumulation is captured and measured with the Regional Snowfall Index (RSI) and the Sperry-Piltz Ice Accumulation (SPIA) Index, as detailed in Chapter 2, the Risk Assessment portion of the Hays County HMP Update. According to the reported previous winter weather occurrences in the jurisdiction, the maximum winter weather extent experienced is a RSI Category 1 snowfall event or SPIA Ice Index Category 2 ice event.



Severe Winter Storms: Probability

Based on 13 reported events from the NOAA Storm Events Database in 20 years, a winter weather event occurs approximately every 2 years on average in Hays County. There were no events reported specifically for the City of Buda. Since these events can happen anywhere throughout the HMP planning area and occur on a regional scale, the City's future probability is assumed to be similar to the surrounding County areas. The planning area can expect a winter weather event approximately once every 2 years on average in the future, with up to a RSI Category 1 snowfall event or SPIA Ice Index Category 2 ice event.

Number of Reported Events	Number of Years in Dataset	Probability
13	20	0.65

Severe Winter Storms: Impact

Severe winter weather has physical impacts upon the public and the infrastructure that supports them. According to the Texas Health Care Information Collection and Trauma Registry from the Texas Department of State Health Services' Injury Epidemiology & Surveillance Branch, the following number of patients were received in Hays County medical facilities for Cold Related Injuries and Trauma (see Tables BA.14 and BA.15).

Table BA.14, Hays County Hospital Inpatient Data, Severe Winter Storms

Description	2010	2011	2012	2013	2014
Accidents caused by excessive cold due to weather conditions	2	0	0	0	0
Accidents due to excessive cold of unspecified origin	1	0	0	0	1

(Texas Department of State Health Services- Injury Epidemiology & Surveillance Branch, 2017)

Table BA.15, Hays County Trauma Data, Severe Winter Storms

4	Description	2010	2011	2012	2013	2014
_	Accidents due to excessive cold due to weather conditions	1	0	0	0	0

(Texas Department of State Health Services- Injury Epidemiology & Surveillance Branch, 2017)





In addition to the physical impacts, a severe winter storm event can also be the cause of cascading incidents. Electrical outages could occur due to the high demands of electricity needed to power heating systems. A loss of critical resources, such as power, has significant impact on the entire population, with higher impacts to those with vulnerabilities to such conditions. The following portion of Buda's population, according to HAZUS-MH 3.2 updated Census 2010 population estimates, would be greatly impacted by the extreme temperature conditions related to severe winter storms and/or the loss of electrical energy in their dwellings.

Population over 65 years old: 527
Population under 16 years old: 2,414
Economically Disadvantaged Population (\$0-\$20k): 284

An organization called Inside Energy (http://insideenergy.org) provided a compiled database outlining 15 years of power outages across the United States from annual data available at the Department of Energy. Within the database, the following winter storm events affected electrical availability in the areas in or near Hays County.

Table BA.16, Severe Winter Storms Affecting Electrical Availability

Event Description	Year	Start Date	Start Time	End Date	Respondent	Location	Customers Affected
Cold Weather Event	2011	2/9/2011	4:30 PM	2/10/2011	ERCOT ISO	Texas	N/A
Public Appeal due to Severe Weather - Cold	2014	1/6/2014	7:01 AM	1/7/2014	ERCOT	Texas	N/A
Public Appeal due to Severe Weather - Cold	2014	3/2/2014	7:00 PM	3/4/2014	ERCOT	ERCOT Region Texas	N/A

^{*}Electrical Reliability Council of Texas (ERCOT)

(Wirfs-Brock, 2014)

In addition, severe winter storms and the icy roads that accompany them lead to dangerous driving conditions. As shown in Table BA.17, city-level data available from the Texas Department of Transportation's Crash Records Information System shows that between the years of 2010 and (May) 2017, Buda experienced 13 crashes related to sleet/hail and snow conditions (all in 2011). Injuries sustained from these crash events included 1 non-incapacitating injury and 1 possible injury.

Table BA.17, Severe Winter Storms, Vehicle Accidents, City of Buda

City	Fatality	Incapacitating Injury	Non- Incapacitating	Possible Injury	Crash Year	Street Name	Surface Condition	Weather Condition
Buda	0	0	0	0	2011	IH0035	Ice	Sleet/Hail
Buda	0	0	0	0	2011	IH0035	Ice	Sleet/Hail



Table BA.17, Severe Winter Storms, Vehicle Accidents, City of Buda (cont.)

	-			(33111)				
City	Fatality	Incapacitating Injury	Non- Incapacitating	Possible Injury	Crash Year	Street Name	Surface Condition	Weather Condition
Buda	0	0	0	0	2011	IH0035	Ice	Sleet/Hail
Buda	0	0	0	0	2011	IH0035	Ice	Sleet/Hail
Buda	0	0	0	0	2011	IH0035	Ice	Sleet/Hail
Buda	0	0	0	0	2011	IH0035	Ice	Sleet/Hail
Buda	0	0	0	0	2011	IH0035	Ice	Sleet/Hail
Buda	0	0	0	1	2011	IH0035	Ice	Sleet/Hail
Buda	0	0	1	0	2011	IH0035	Ice	Snow
Buda	0	0	0	0	2011	IH0035	Ice	Snow
Buda	0	0	0	0	2011	IH0035	Ice	Snow
Buda	0	0	0	0	2011	IH0035	Ice	Snow
Buda	0	0	0	0	2011	IH0035	Ice	Snow

Crash Records Information System Query for Accidents in Hays County from County from 2010-2017 from non-Clear Weather Conditions (Texas Department of Transportation, 2017)



Severe Winter Storms: Vulnerability Summary

The majority of surface powerlines in Buda pose a vulnerability due to the impact on homes and businesses during cold temperatures, when an accumulation of ice and snow on branches could cause them to fall on surface lines.

The bridges in Buda are owned by TxDOT and the State handles sanding efforts during ice events. They are normally prompt in sanding efforts, however there are Alzheimer clinics and nursing homes located near these bridges and accessing these locations during severe winter weather could pose a challenge for first responders.

The community has a turf spreader that could be used for sanding efforts, but no staff are dedicated for spreading sand. Additionally, there is a senior van owned by the City that shuttles elderly residents to different locations and cannot operate during winter events.





Lightning

Lightning: Location

The entire extent of the City of Buda is exposed to some degree of lightning hazard, though exposed points of high elevation have a significantly higher frequency of occurrence. Since lightning can occur at any location, lightning events could be experienced anywhere within the planning area.

Lightning: Previous Occurrences

Figure BA.5 reflects the City of Buda within the area that was calculated to receive approximately 9 to 12 lightning strikes per square mile per year according to National Lightning Detection Network (NLDN) data for the years 1997 to 2012. There were no lightning events reported specifically for the jurisdiction in the NOAA Storm Events Database.

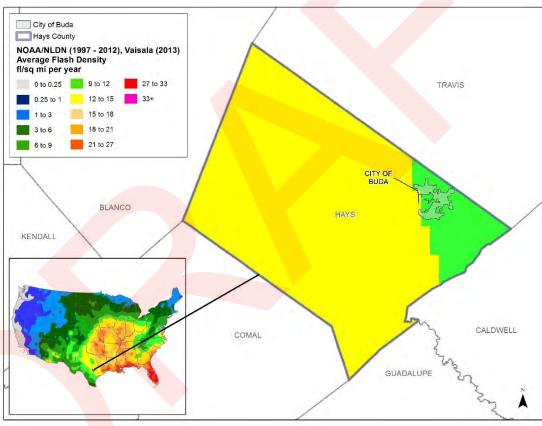


Figure BA.5, Average Annual Lightning Density



Lightning: Extent

Due to the lack of reported occurrences, there is not sufficient data to determine the maximum Lightning Activity Levels (LAL) for the planning area (refer to Chapter 2 for a description of the lightning extent scale LAL Grids). However, with the data available, the extent of lightning events that the City of Buda has experienced can be derived from the NOAA/NLDN data in Figure BA.5. There were up to 9 to 12 strikes per square mile per year within the City (approximately 8.8 square miles).





Lightning: Probability

Since lightning can occur at any location, lightning events could be experienced anywhere within the planning area. Based on the data provided in Figure BA.5, the City of Buda can expect future events to fall in line with NLDN data from previous years with an average occurrence of up to approximately 9 to 12 lightning strikes per square mile per year.

Lightning: Impact

The National Lightning Detection Network (NLDN) reported 217 lightning fatalities within the State between the years 1959 and 2013. According to the Texas Health Care Information Collection and Trauma Registry from the Texas Department of State Health Services' Injury Epidemiology & Surveillance Branch, the following number of patients were received in Hays County medical facilities for Lightning Related Trauma (see Table BA.18).

Table BA.18, Hays County Trauma Registry Data, Lightning Events

Description	2010	2011	2012	2013	2014
Accidents due to lightning	0	1	0	0	1

(Texas Department of State Health Services- Injury Epidemiology & Surveillance Branch, 2017)

In addition to the physical impacts, a lightning event can also be the cause of cascading incidents. Electrical outages could occur due to the impact that lightning strikes can have on electrical utility infrastructure. A loss of critical resources, such as power, has significant impact on the entire population, with higher impacts to those with vulnerabilities to such conditions. The following portion of the City of Buda's population, according to HAZUS-MH 3.2 updated Census 2010 population estimates, would be greatly impacted by the loss of electrical energy in their dwellings.

Population over 65 years old: 527
Population under 16 years old: 2,414
Economically Disadvantaged Population (\$0-\$20k): 284

An organization called Inside Energy (http://insideenergy.org) provided a compiled database outlining 15 years of power outages across the United States from annual data available at the Department of Energy. Within the database, the following thunderstorm/severe storm events affected electrical availability in the areas in or near Hays County (Table BA.19).

Table BA.19, Lightning Affecting Electrical Availability

Event Description	Year	Start Date	Start Time	End Date	Respondent	Location	Customers Affected
Severe Weather	2008	4/9/2008	4:00 p.m.	4/13/2008	Oncor Electric Delivery Company LLC	North, Central and East Texas	488,689
Severe Thunderstorms	2008	6/17/2008	9:01 a.m.	6/19/2008	Oncor Electric Delivery Company LLC	North, Central and East Texas	234,393



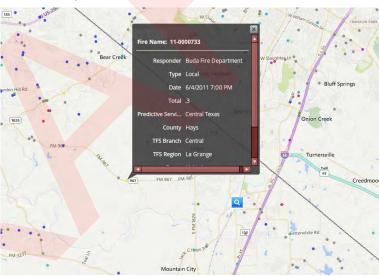
Table BA.19, Lightning Affecting Electrical Availability (cont.)

Event Description	Year	Start Date	Start Time	End Date	Respondent	Location	Customers Affected
Severe Thunderstorms	2008	8/3/2008	1:30 a.m.	8/3/2008	Entergy Corporation	Mississippi, Louisiana, Texas	59,500
Severe Storms	2009	6/10/2009	6:00 p.m.	6/14/2009	Oncor Electric Delivery Company, LLC	North and Central Texas	800,000
Thunderstorms	2010	6/8/2010	11:00 a.m.	6/8/2010	Centerpoint Energy	Southeastern Texas	79,741

(Wirfs-Brock, 2014)

Lightning strikes also cause wildfire ignitions. According to the National Fire Protection Association (NFPA), "during 2007-2011, U.S. local fire departments responded to an average of 22,600 fires per year that were started by lightning. These fires caused an average of 9 civilian deaths, 53 civilian injuries and \$451 million in direct property damage per year." The source also cites that the fires are more common in June through August and in the late afternoon and evening. The Texas A&M Forest Service's Wildfire Risk Assessment Portal shows that the Buda Fire Department responded to a wildfire ignited by lighting on June 4, 2011 at 7:00 PM during which 0.3 acres burned (see Figure BA.6).

Figure BA.6, Lightning Ignited Wildfire In or Near Buda, Texas



(Texas A&M Forest Service, 2016)



Lightning: Vulnerability Summary

According to community testimony, past lightning events in Buda have taken out City WiFi communications for the water towers to the SCADA systems (Supervisory Control and Data Acquisitions). SCADA software application programs are systems for remote monitoring and control that operate with coded signals over communication channels. The interruption of these systems would affect critical infrastructure for the community. In addition, the community is predominantly serviced by surface powerlines that are susceptible to lightning strike. There are Comprehensive Plan action items regarding burying powerlines along the IH-35 corridor.

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Hailstorms

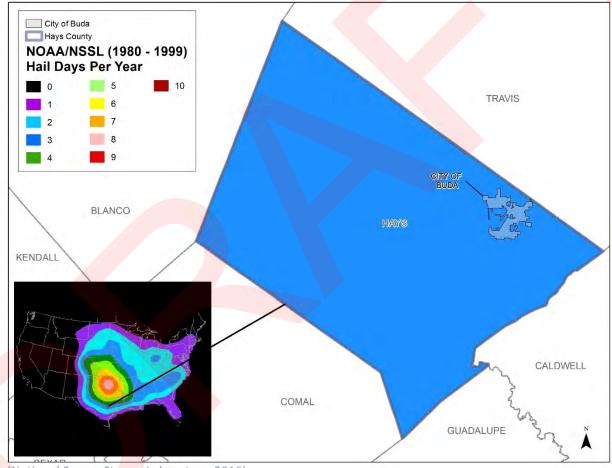


Hailstorms: Location

The entire extent of the City of Buda is exposed to some degree of hail hazard. Since hail can occur at any location, hail events could be experienced anywhere within the planning area. NOAA's National Severe Storms Laboratory used historical data from 1980 to 1999 to estimate the daily probability of hail occurrences, of at least 0.75-inch diameter hail across the U.S. Figure BA.7 shows the average number

of hail days per year determined from this analysis and the corresponding location of the City of Buda. The density of hail days per year in the map's legend indicates the probable number of hail days for each 25-square-mile cell within the contoured zone that can be expected per year. It should be noted that the density number does not indicate the number of events that can be expected within each cell, rather the average number of days per year with 1 or more events occurring within each cell.

Figure BA.7, National Hail Days Per Year, Buda, Texas



(National Severe Storms Laboratory, 2016)

Hailstorms: Previous Occurrences

According to the NOAA Storm Events Database, there were 6 documented hail events listed for the City of Buda and 57 documented events listed for Hays County and its unincorporated jurisdictions from year 1967. While the NOAA Storm Events Database lists events since the year 1967 for the County, events were not documented per jurisdiction until 1993. The hail events reported for the City of Buda are shown in Table BA.20.

Fatality, injury and damage amounts are shown in Table BA.20, per the NOAA Storm Events Database. Community testimony indicates that these amounts do not reflect the most recent totals, however NOAA data is being used as the best source of information available for the record period.



Table BA.20, Hai	l Events,	City of	Buda
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Location	Date	Туре	Extent (mm)	Fatalities	Injuries	Property Damage	Crop Damage
Buda	5/9/1993	Hail	19.05	0	0	0.00	0.00
Buda	4/20/1995	Hail	44.45	0	0	0.00	0.00
Buda	9/20/1996	Hail	31.75	0	0	0.00	0.00
Buda	5/24/1999	Hail	25.40	0	0	0.00	0.00
Buda	4/3/2012	Hail	22.35	0	0	0.00	0.00
Buda	5/27/2014	Hail	38.10	0	0	0.00	0.00
	Tota	I		0	0	\$0.00	\$0.00

(National Oceanic and Atmospheric Administration, 2016)

Hailstorms: Extent



The Tornado and Storm Research Organization (TORRO) created a hail extent index to measure hail called the Hailstorm Intensity Scale. According to the reported previous hail occurrences in the planning area, the maximum hail extent experienced is hail up to 1.75 in., or 44.45 mm. in diameter, corresponding to a TORRO Hailstorm Intensity Scale classification of "Destructive." Refer to Chapter 2, the Risk Assessment portion of the Hays County HMP Update, for hail extent scale descriptions.

Hailstorms: Probability

Figure BA.7 reports 3 hail days per year as a result of NLDN's nationwide analysis. Since this calculation is based off of national data, a more specific calculation based on local-level NOAA reports was utilized to calculate probability. Based on 6 reported events in 23 years, the City of Buda can expect a hail event approximately once every 4 years on average in the future with hail up to 1.75 in., or 44.45 mm. in diameter, a Corresponding to a TORRO Hailstorm Intensity Scale classification of "Destructive."

Number of Reported Events	Number of Years in Dataset	Probability
6	23	0.26

Hailstorms: Impact

Although there are no specific occurrences for which hailstorm damages are captured, based on the maximum hail extent experienced (44.45 mm), the TORRO Hailstorm Intensity Scale (found in Chapter 2, the Risk Assessment portion of the Hays County HMP Update) indicates that impact can be expected to include any of the following:

- Varying degrees of damage to vegetation and crops
- Damage to plastic structures
- Varying degrees of damage to glass
- Paint and wood scored
- Vehicle bodywork damage
- Varying degrees of roof damage
- Varying degrees of risk of injuries
- Varying degrees of aircraft damage
- Brick walls pitted



Hailstorms: Vulnerability Summary

Although the City has not experienced significant past damage to public property due to hail, the roof types on the City structures could be susceptible to hail. There is not a dedicated sheltering structure for protecting critical City equipment or vehicles. This could be a possible future incorporation into the Facilities Master Plan.





Windstorms

Windstorms: Location

The entire extent of the City of Buda is exposed to some degree of wind hazard. Since wind can occur at any location, wind events could be experienced anywhere within the planning area. NOAA's National Severe Storms Laboratory used historical data from 1980 - 1999 to estimate the daily probability of wind occurrences across the U.S., with gusts of at least 58 mph. Figure BA.8 shows the estimates for wind

days determined from this analysis and the corresponding location of the City of Buda. The density of wind days per year in the map's legend indicates the probable number of wind days for each 25-squaremile cell within the contoured zone that can be expected per year. It should be noted that the density number does not indicate the number of events that can be expected within each cell, rather the average number of days per year with 1 or more events occurring within each cell.

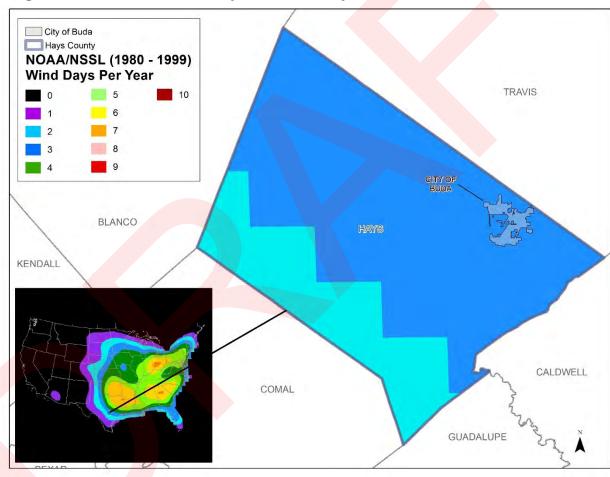


Figure BA.8, National Wind Days Per Year, City of Buda

(National Severe Storms Laboratory, 2016)

Windstorms: Previous Occurrences

According to the NOAA Storm Events Database, there were 4 documented wind events listed for the City of Buda and 38 documented events listed for Hays County and its unincorporated jurisdictions since the year 1974. While the NOAA Storm Events Database lists events since 1974 for the County, events were not documented per jurisdiction until 1994. The wind events reported for the City of Buda are shown in Table BA.21.





Fatality, injury and damage amounts are shown in Table BA.21, per the NOAA Storm Events Database. Community testimony indicates that these amounts do not reflect the most recent totals, however NOAA data is being used as the best source of information available for the record period.

Table BA.21, Reported Wind Events, City of Buda

Location	Date	Туре	Extent (knots)	Fatalities	Injuries	Property Damage	Crop Damage
Buda	5/31/1995	Thunderstorm Wind	NA	0	0	0.00	0.00
Buda	7/22/1997	Thunderstorm Wind	NA	0	0	5,000.00	0.00
Buda	8/30/1998	Thunderstorm Wind	NA	0	0	20,000.00	0.00
Buda	4/7/2002	Thunderstorm Wind	NA	0	0	100,000.00	0.00
		Total		0	0	\$125,000.00	\$0.00

NA - No data available

(National Oceanic and Atmospheric Administration, 2016)

Windstorms: Extent

Wind is measured by the Beaufort Wind Scale that relates wind speed to observed conditions on land and sea. The reported wind events for the City did not indicate magnitude, however, as wind events can happen anywhere in the HMP update area, the extent of a wind event for the City of Buda can be assumed to be similar to the surrounding County areas. According to the reported previous windstorm occurrences for the surrounding County, the maximum wind extent experienced was 70 knots (Beaufort Wind Scale Classification: Hurricane). Refer to Chapter 2, the Risk Assessment portion of the Hays County HMP Update, for a description of wind extent scales.

Windstorms: Probability

Figure BA.8 reports 3 wind days per year as a result of NLDN's nationwide analysis. Since this calculation is based on national data, a more specific calculation based on local-level NOAA reports was utilized to calculate probability. Based on 4 reported events in 22 years, the City of Buda can expect a wind event approximately every 5 to 6 years, on average up to a Hurricane Classification in the Beaufort Wind Scale.

Number of Reported Events	Number of Years in Dataset	Probability
4	22	0.18

Windstorms: Impact

City level data available from the Texas Department of Transportation's Crash Records Information System shows that between the years of 2010 and 2017, Buda experienced 2 crashes in 2011 related to severe crosswind weather conditions. There were no reported injuries for these crash events.



Table BA.22, Windstorms, Vehicle Accidents, City of Buda

City	Fatality	Incapacitating Injury	Non- Incapacitating	Possible Injury	Crash Year	Street Name	Surface Condition	Weather Condition
Buda	0	0	0	0	2011	IH0035	Wet	Severe Crosswinds
Buda	0	0	0	0	2011	IH0035	Wet	Severe Crosswinds

Query for Accidents in Buda from 2010-2017 from non-Clear Weather Conditions (Texas Department of Transportation, 2017)



Windstorms: Vulnerability Summary

Buda has previously experienced debris accumulation on roadways during past windstorm events. Such incidents could cause impact on the ability of public safety officials to access emergency calls. In addition, those swerving to avoid debris in the road could damage their vehicles or experience physical harm during a collision.



Tornado



Tornadoes: Location

The entire extent of the City of Buda is exposed to some degree of tornado hazard. Since tornadoes can occur at any location, tornado events can be experienced anywhere within the planning area. NOAA's National Severe Storms Laboratory used historical data from 1980 to 1999 to estimate the daily probability of tornado occurrences across the U.S., regardless of tornado magnitude. Figure BA.9 shows

the average number of tornado days resulting from this analysis and the respective location of the City of Buda. The density of average tornado days per year in the map's legend indicates the probable number of tornadoes days for each 25-square-mile cell within the contoured zone that can be expected per year. This density number does not indicate the number of events that can be expected within each cell, rather the average number of days per year with 1 or more events occurring within each cell.

City of Buda Hays County NOAA/NSSL (1980 - 1999) Average Tornado Days TRAVIS Per Year 0 1.0 2.0 0.2 1.2 0.4 1.4 1.6 0.6 0.8 1.8 BLANCO HAYS KENDALL CALDWELL COMAL GUADALUPE

Figure BA.9, National Tornado Days Per Year, City of Buda

(National Severe Storms Laboratory, 2016)

Tornadoes: Previous Occurrences

Since tornadoes can occur at any location, tornado events can be experienced anywhere within the planning area. While the City of Buda has not had any previous occurrences reported through the NOAA Storm Events Database, if an event were to occur, the event would be similar in size and magnitude to events within the surrounding County areas. Table BA.23 lists the 16 tornado events reported for Hays County and its unincorporated jurisdictions since the year 1953.



Fatality, injury and damage amounts are shown in Table BA.24, per the NOAA Storm Events Database. Community testimony indicates that these amounts do not reflect the most recent totals, however NOAA data is being used as the best source of information available for the record period.

Table BA.23, Tornado Events, Hays County

Location	Date	Туре	Extent	Fatalities	Injuries	Property Damage	Crop Damage
Hays County	4/28/1953	Tornado	F3	1	5	250,000.00	0.00
Hays County	4/30/1954	Tornado	F1	0	0	250,000.00	0.00
Hays County	5/2/1958	Tornado	F1	0	0	30.00	0.00
Hays County	11/12/1961	Tornado	F2	0	0	2,500.00	0.00
Hays County	9/20/1967	Tornado	NA	0	0	250.00	0.00
Hays County	9/20/1967	Tornado	NA	0	0	30.00	0.00
Hays County	5/10/1975	Tornado	F1	0	0	25,000.00	0.00
Hays County	3/30/1976	Tornado	F2	0	0	25,000.00	0.00
Hays County	3/30/1976	Tornado	F2	0	1	250,000.00	0.00
Hays County	8/10/1980	Tornado	F2	0	0	25,000,000.00	0.00
Hays County	4/22/1985	Tornado	F2	0	0	250,000.00	0.00
Hays County	8/22/1991	Tornado	F1	0	0	2,500.00	0.00
Countywide	5/13/1994	Tornado	FO	0	0	500.00	500.00
Henly	11/15/2001	Tornado	FO	0	1	50,000.00	0.00
Driftwood	10/8/2002	Tornado	F0	0	0	70,000.00	0.00
Mt. Gainor	5/23/2015	Tornado	EF0	0	0	0.00	0.00
	Tot	al		1	7	\$26,175,810.00	\$500.00

(National Oceanic and Atmospheric Administration Storm Event Database, 2016)

Tornadoes: Extent

Tornadoes are measured by severity on the Enhanced Fujita Scale, with a range from 0-6. According to the reported previous tornado occurrences in the planning area, the maximum tornado extent experienced was a category F3. Refer to Chapter 2, the Risk Assessment portion of the Hays County HMP Update for a description of tornado extent scales, Fujita (F) Scale and Operational Enhanced Fujita (EF) Scale.

Tornadoes: Probability

Figure BA.9 reports 0.8 tornado days per year as a result of NLDN's nationwide analysis. Since this calculation is based on national data, a more specific calculation based on local-level NOAA reports was utilized to calculate probability. Based on 16 reported events in 63 years, a tornado event occurs approximately every 4 years on average in Hays County. Since tornado events can happen anywhere throughout the HMP update area, the City of Buda's future probability is assumed to be similar to the surrounding County areas. The City can expect a tornado event approximately once every 4 years on average in the future, with up to an F3 magnitude.

Number of Reported Events	Number of Years in Dataset	Probability
16	63	0.25



Tornadoes: Impact

According to the Office of Emergency Management for Buda, the City has about 50 units of factory-built housing to include manufactured homes and mobile homes. Due to their permanent attachment to a chassis and transportability, these structures are more susceptible from impact during the extreme conditions caused by a tornado event.

In addition, the Buda City Hall Annex is a building that the Buda Facilities Study (Wigninton Hooker Jeffry Architects, 2014) found to have reached its effective

lifespan. This is potentially a risk to the integrity of the structure and its ability to withstand the conditions of a tornado.

Additional impacts from tornado events could include downed utility poles, communication towers, street signals, and debris created from residential and commercial property.

Critical infrastructure could be disrupted, resulting in periods of impact to service due to the lack of backup utility resources. See Lightning Impact section for more information on utility interruption.

Tornadoes: Vulnerability Summary

Residents of multi-story apartment complexes are at greater risk if they are not located on the lowest floor of the structure. The Buda Economic Development Corporation (Buda Economic Development Corporation, 2017) maps for subdivision show approximately 1,329 multi-family development units within the City Limits and ETJ. Approximately 1,007 units are in the City limits. Public education for encouraging apartment residents to seek shelter in the lowest possible level during tornado events would be beneficial.

There are also approximately 50 manufactured homes within Buda according to local sources. There are not currently any emergency shelters designated for manufactured home residents.





Expansive Soils

Expansive Soils: Location

Areas within the City of Buda with structures that are underlain by soils containing clays with swelling potential are most affected by expansive soils. Figure 2.4 within Chapter 2 (the Risk Assessment portion of the Hays County HMP Update) shows the location of expansive soil areas for the City.

Expansive Soils: Previous Occurrences

There was no documentation of site-specific past events for structural damage due to expansive soils from local, state, or national datasets found.

Expansive soils cannot be documented as a time-specific event, except when they lead to structural and infrastructure damage. There are no specific damage reports or historical records of events in the City, however future events can occur.

Expansive Soils: Extent

According to the USGS Expansive Soils Regions (Geology.com, 2016), Figure 2.4 within Chapter 2 (the Risk Assessment portion of the Hays County HMP Update), on the northern side of the City, less than 50% of the area is underlain with soils with clayey textures that have high shrink-swell properties, whereas the southern side has over 50% of the area underlain with soils with abundant clays with high swelling potential and is the area with the highest magnitude of expansive soil potential within the planning area.

Expansive Soils: Probability

Considering the amount of swelling potential within the planning area, as well as the lack of reported events, the probability of a future event is low (unlikely in next 10 years).

Expansive Soils: Impact

Areas within Buda that are experiencing higher amounts of development on previously undeveloped land may find a higher impact as this will offer increased opportunity for structural foundation damage in areas with high clay content. The expansion of the jurisdictional boundaries continuing to grow and the development of more land between Austin, Texas and Buda can lead to exposure of previously unidentified areas of expansive soil.

Expansive Soils: Vulnerability Summary

The lack of current problems faced in the community leads to a lessened concern for the issue. Should parts of the community with higher concentrations of clay in the soil begin to experience development, there may be a heightened amount of impact within Buda.



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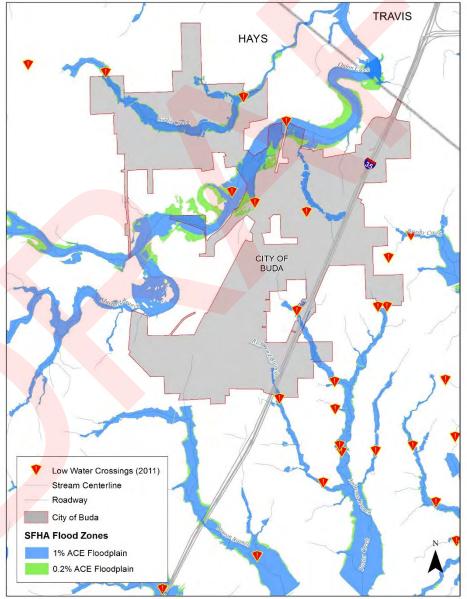
Floods

Floods Location

Onion Creek and Garlic Creek are 2 major bodies of water that run through Buda. The floodplain along these creeks limits development along its banks; however the creeks and greenways along them present an opportunity for preservation and possible recreation.

The location of low water crossings as well as the 1% (100 year) and 0.2% (500 year) Annual Chance Event (ACE) floodplains for the City of Buda are shown in Figure BA.10 and are the locations within the planning area that are most affected by flooding. This figure is based upon newly developed hydrologic and hydraulic analysis and is the best information available to date. Table BA.24 provides the total acreage in the jurisdiction that is located in the 1% and 0.2% floodplains.

Figure BA.10, Special Flood Hazard Areas and Low Water Crossings, City of Buda



(Texas Natural Resources Information System, 2011)







Table BA.24, , City of Buda Floodplain Acreage

Jurisdiction	100yr (1%) Floodplain Acres (Includes Floodway)	500yr (0.2%) Floodplain Acres (Includes 100yr)
City of Buda	476	571

Drainage Plan Identified Flooding Problem Areas

The City of Buda had a Drainage Master Plan: Phase 1 prepared in 2014, in which the top 10 Flooding Problem Areas were identified, shown in Figure BA.11. The Phase 2 plan was prepared in 2015 that identified 20 additional problem areas.

By utilizing these already identified problem areas, planners for Buda can ensure that actions align with the solutions that are already incorporated into the Phase 1 and Phase 2 plans. (Phase 1 Plan: Lockwood, Andrews & Newman, Inc., 2014; Phase 2 Plan: Freese and Nichols, Inc., 2015).

Figure BA.11, Top 10 Flooding Problem Areas, City of Buda

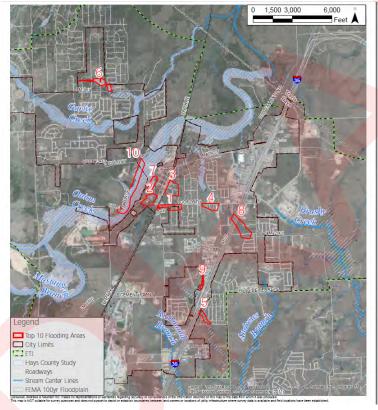


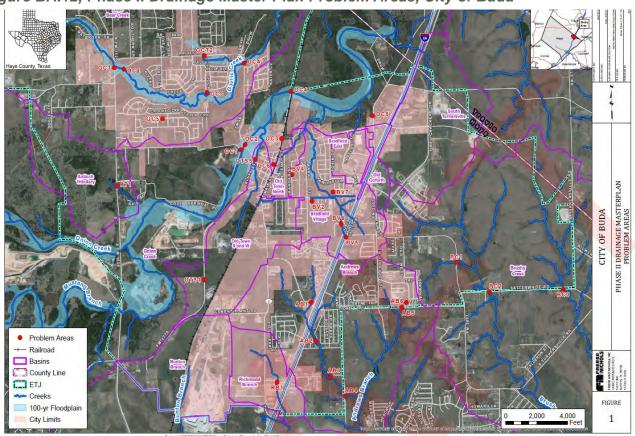
EXHIBIT No. 3 TOP 10 FLOODING PROBLEM AREAS Date: 03/2014 ID Site Name OTS2 West Goforth Street Area Flooding OTS3 Fire Station Area Flooding OTN1 3 Houston Street Area Flooding 4 BV2 West Lifschutz Area Flooding 5 Hillside Terrace Neighborhood AB₂ 6 GCT2 Oxbow Neighborhood Area Flooding OTS4 Bluff Street Area Flooding 8 BV1 Lifschutz Headwaters 9 AB1 Park 35 South Drainage Ditch Cole Springs Roadway Flooding





(Lockwood, Andrews & Newnam, Inc, 2014)

Figure BA.12, Phase II Drainage Master Plan Problem Areas, City of Buda



(Freese and Nichols, Inc., 2015)



Floods: Previous Occurrences

Hays County received 3 disaster declarations for flooding since October of 2013. According to the NOAA Storm Events Database, there were 4 documented flood events listed for the City of Buda and 69 documented events listed for Hays County and its unincorporated jurisdictions from the year 1997. While NOAA Storm Events Database lists events since 1997 for the County, events were not documented per jurisdiction until 2004. The flood events reported for the City of Buda are shown in the Table BA.25.

Fatality, injury and damage amounts are shown in Table BA.25, per the NOAA Storm Events Database. Community testimony indicates that these amounts do not reflect the most recent totals, however NOAA data is being used as the best source of information available for the record period.

Table BA.25, Flood Events, City of Buda

Location	Date	Туре	Magnitude (mm)	Fatalities	Injuries	Property Damage	Crop Damage
Buda	5/29/2005	Flash Flood	0	0	0.00	0.00	0.00
Buda	5/26/2016	Flash Flood	0	0	0.00	0.00	0.00
Buda	5/27/2016	Flash Flood	0	0	0.00	0.00	0.00
Buda	8/20/2016	Flash Flood	0	0	0.00	0.00	0.00
	Total			1	7	\$0.00	\$0.00

(National Oceanic and Atmospheric Administration Storm Event Database, 2016)



Floods: Significant Past Events

According to the NOAA Storm Events Database, in May of 2016, an upper level trough moved out of the southern Rockies and provided sufficient lift to form thunderstorms along a dryline in West Texas. These storms moved into South Central Texas and were further enhanced by an outflow boundary that moved out of north Texas. Some of these storms produced large hail, damaging wind gusts, and heavy rain that led to flash flooding. These storms produced heavy rain that caused flash flooding resulting in a water rescue in the City of Buda.

Floods: Extent

Flood extent is described by a combination of ground elevation, river gauge heights, 100 year Water Surface Elevations (WSE's) and HAZUS depth grids. Areas along Onion Creek are exposed to some of the greatest flood extents. An example of flooding within the jurisdiction along Onion Creek is a neighborhood near Bluff Street and FM 2770. This neighborhood has an approximate overbank ground elevation of 690 feet above mean sea levelwith an intersecting 100 year WSE of 692 feet. For a 100 year event, water depth of approximately 2 feet can be expected within this area. A further analysis of the Onion Creek extent is described below.

With Onion Creek having an approximate normal in-channel elevation of 660 feet above mean sea level (per Light Detection and Ranging [LiDAR] and USGS gauge data), and an intersecting 100 year WSE of approximately of 692', flood depths would be approximately 32 feet. Such an event is categorized as a "Major Flood Stage." Refer to the Water Depth Extent Scale in Chapter 2 (the Risk Assessment portion of the Hays County HMP Update).



Floods: Probability

Probability has been calculated on the basis of NOAA reported events, as a standard, consistent calculation method for all hazards profiled with the Hays County HMP. Based on 4 reported events in 12 years, the City of Buda can expect a flood event approximately once every 3 years on average in the future, with flood water depths in the category of "Major Flood Stage."

Number of Reported Events	Number of Years in Dataset	Probability
4	12	0.33

Floods: Impact

The following describes the inventory counts and building replacement values for the jurisdictional area.

Buda Building Counts			
Residential	Commercial	Other	Total
2,529	93	72	2,694

Buda Building Replacement Value			
Building (\$)	Content (\$)	Total (\$)	
916,526,051	527,610,582	1,444,136,633	

A Probabilistic 100-year Return Period HAZUS-MH 3.2 analysis was run on the participating communities. HAZUS results are calculated to census blocks. This analysis utilized the best available LiDAR (COA 2012 and CAPCOG 2008) and Depth Grids. These blocks where then intersected with the participating community to run a weighted area analysis to get jurisdictional results. The following describes results of the 100-year Return (1% Annual Chance Event) weighted area analysis.



HAZUS-MH Results

General Building Stock Damage

HAZUS estimates that 11 buildings will be at least moderately damaged in the City of Buda. "At least moderately damaged" is defined by HAZUS as greater than 10% damage to a building. For this scenario, only residential buildings were at least moderately damaged.

Residential Buildings	Commercial Buildings	Other Buildings	Total Buildings
11	0	0	11

Building-Related Losses

Exposed Value is the total building and content values for structures within the community. The exposed value for the community is \$1,444,136,633. The total building-related losses were \$3,784,095. This represents 0.3% of the total replacement value of the community. Loss values are divided into building and content loss dollars.

Building Loss (\$)	Content Loss (\$)	Total Loss (\$)
2,325,215	1,458,880	3,784,095

Essential Facility Damage

HAZUS does not estimate any critical facilities or infrastructure to be out of service for more than 1 day on the day of the event. Additionally, the model estimates that 100% of available hospital beds are ready for use by patients already in the hospital and for those injured by an event.

Debris Generation

HAZUS estimates the amount of debris that will be generated in this scenario. The model estimates that a total of 406 tons of debris will be generated. If the building debris tonnage is converted to an estimated number of truckloads, it will require 17 truckloads (with 1 to 25 tons per truck) to remove the building debris generated in this scenario.

Debris on remnants on Main Street in Buda, Texas.







Shelter Requirements

HAZUS estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. HAZUS also estimates those people displaced that will require accommodations in temporary public shelters. The model estimates 30 people will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 19 people are estimated to seek temporary shelter in public shelters.

paid claims for the 3 structures. None are mitigated and only 1 is shown as insured at present.

Floods: Vulnerability Summary

The proximity of Onion Creek Village (32-1 story units that are part of the Equal Housing Opportunity that is characterized by its Handicap Accessible units) in an area between the Onion Creek watershed and the Tributary crossing FM 2770, also known as Jack C. Hays Trail, near 300 Bluff Street is a concern. This warrants consideration for potential mitigation activities, due to the social demographics of the residents that may or may not have the ability or vehicles necessary for a fast evacuation in the event of flash flooding.

Buda Fire Department Station #1 is located near the floodplain, at 209 Jack C. Hays Trail.

There are multiple schools in or near the floodplain along Onion Creek. Buda Elementary- Lower Campus is located in the floodplain.

There are multiple low water crossings on Jack C. Hays Trail near school zones. The inexperience of young drivers driving to or from a high school through a low water crossing could result in drivers attempting to cross while flood waters are high and risking being swept away.

National Flood Insurance Program Repetitive Loss (RL)

There are currently 3 properties in Buda classified as Repetitive Loss structures. There are 2 are on W. Goforth Road. The third is located on FM 967. The total losses for the last 10 years total \$351,463.17 on 6

Structure Type	Number of Structures	Number of Claims	Amount of Claims
Residential	2	4	\$149.765.67
Non-Residential	1	2	\$201,697.50

Road damage from past flooding event, Buda, Texas.







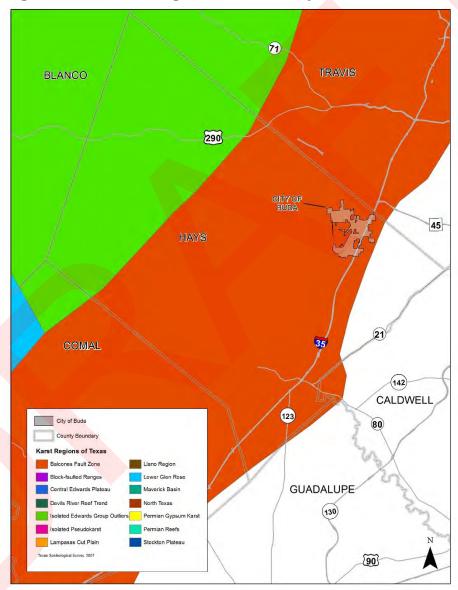
Fault Zone.

Land Subsidence

Land Subsidence: Location

Karst features are a landscape formed from the dissolution of soluble rocks, such as limestone, that can cause sinkholes and caves. Locations within Buda that are underlain by karst features or that are experiencing extensive groundwater depletion, are most at risk. Figures BA.13 and BA.14 illustrate the planning area's location in conjunction with the karst regions of Texas and USGS Groundwater Depletion Zones. According to Figure BA.13, the City is located within the Balcones

Figure BA.13, Karst Regions of Texas, City of Buda



(Texas Speleological Survey, 2007)

Land Subsidence: Previous Occurrences

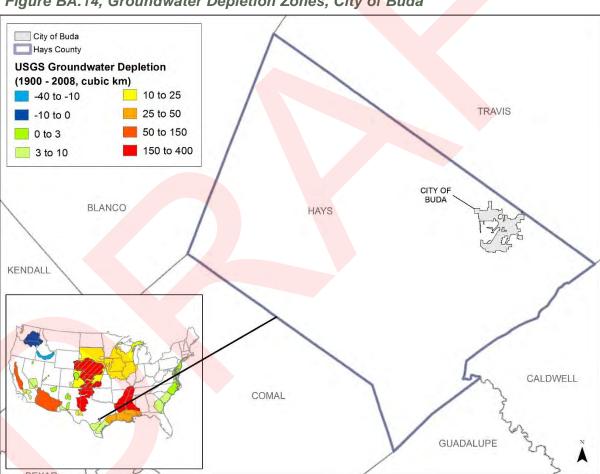
Although there were no sinkhole or land subsidence events documented specifically for the City of Buda found, there was verbal community testimony discussing land subsidence complaints from 3 subdivisions. However, there was no data associated with these complaints available. As the data displayed in Figure BA.14 illustrates, the HMP update area does not have a significant history of groundwater depletion.

Land subsidence can occur in the Central Texas Hill County areas. Recently, a small event occurred in Travis County (located ~ 9 miles north of the study area) when a

25-foot-wide and 12-foot-deep sinkhole opened up at a Costco parking lot in Austin, Texas (Mashhood, 2012). The area could potentially experience an event of similar depths, widths, and impact as the event described above, but conditions would vary depending on the location and geography of the event. Since future events cannot be predicted but are possible, the estimated extents previously described are hypothetical.

Land Subsidence: Extent

Figure BA.14, Groundwater Depletion Zones, City of Buda



(Groundwater depletion in the United States (1900–2008), 2013)

Due to the lack of reported occurrences, there is not sufficient data to determine the maximum extent of land subsidence for the planning area. However, if a future event were to occur, it can be assumed it would be similar in extent to previous events in the region. This includes the aforementioned sinkhole in Austin, Texas measuring 25-feet-wide and 12-feet-deep.





Land Subsidence: Probability

The occurrence of subsidence is an ongoing process resulting from natural and human-induced causes. As seen in Figure BA.13, the entire City of Buda is located within a known karst region. However, with no documented history of subsidence, the probability of a future land subsidence event for the City is low (unlikely in next 10 years). If a future event were to occur, however unlikely, it can be assumed it would be similar in extent to previous events in the area. This includes the previously mentioned sinkhole documented in Austin, Texas.

Land Subsidence: Impact

When considering the impact of land subsidence, it is important to note that many areas within the karst zone have structures and infrastructure and could be affected by a collapsed area. The possible impact of isolated incidents within the karst region could include damage to any, but not all, of the 2,984 structures located in the zone in the unlikely event of a future occurrence. All structures are cumulatively valued at approximately \$1,444,136,633 based on HAZUS building and content values.

Land Subsidence: Vulnerability Summary

The City of Buda is located in the Balcones Fault Zone karst region of Texas. It is closer to a farmland region, less susceptible to the lowering of land surface or collapses.

With rapid industry and residential development, undeveloped areas that are susceptible to subsidence may begin to be built upon. Consideration of karst zones and existing issues should be considered by planning and zoning and permitting operations.



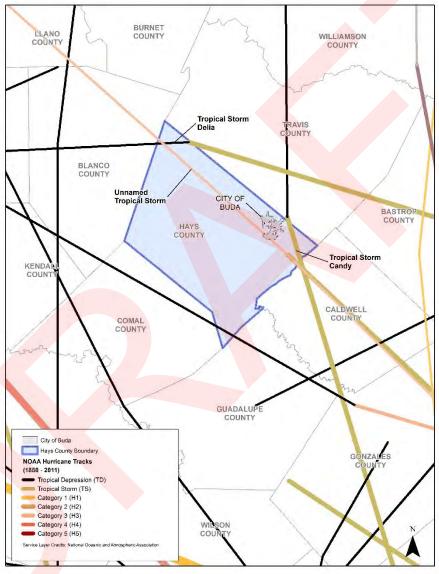


Hurricanes/Tropical Storms

Hurricanes/Tropical Storms: Location

Due to the regional nature of a hurricane or tropical storm event, the entire extent of the City of Buda is equally exposed to a hurricane or tropical storm. Figure BA.15 illustrates the location of the planning area with historical hurricane and tropical storm paths documented by NOAA's Hurricane Tracker from 1850 to 2011.

Figure BA.15, Historical Hurricane/Tropical Storm Paths, City of Buda



(National Oceanic and Atmospheric Administration, 2016)

Hurricanes/Tropical Storms: Previous Occurrences

Previous events are listed below from NOAA Storm Events Database for Tropical Storm Hermine and NOAA Hurricane Tracker for all other events. By the time most hurricanes reach the County, they are tropical storms, depressions or thunderstorms. Because hurricane and tropical storm events occur on a regional scale, all events listed for Hays County have been included as they would impact the City of Buda.





July 13 to July 22, 1909 – An unnamed storm made landfall near Freeport, as a Category 3 Hurricane. This storm impacted Hays County and participating communities as a tropical depression with wind speeds up to 30 knots. No significant damages, injuries, or fatalities were reported for the City of Buda.

June 22 to June 26, 1968 – Tropical Storm Candy made landfall near Port Aransas. This storm impacted Hays County and participating communities as a tropical storm with wind speeds slowing to 30 knots as a tropical depression just after leaving the County. No significant damages, injuries, or fatalities were reported for the City.

September 1 to September 7, 1973 – Tropical Storm Delia made landfall near the border of Brazoria and Matagorda Counties. This storm impacted Hays County and participating communities as a tropical storm with wind speeds slowing to 30 knots as a tropical depression just after leaving the County. No significant damages, injuries, or fatalities were reported for the jurisdiction.

September 6 to September 8, 2010 – According to the NOAA Storm Events Database, Tropical Storm Hermine made landfall near the Texas/Mexico border on the night of September 6. South Central Texas was hit very hard with widespread rains of 8 to 12 inches across much of the IH-35 corridor from Austin down to San Antonio.

Hurricanes/Tropical Storms: Extent

The Saffir-Simpson Scale measures pressure, wind speed, and storm surge in 5 categories. According to the reported previous hurricane occurrences in the jurisdiction, the maximum hurricane extent experienced was categorized as a Tropical Storm. Refer to Chapter 2, the Risk Assessment portion of the Hays County HMP Update, for a description of storm extents.

Hurricanes/Tropical Storms: Probability

Based on 4 reported events in 107 years, a hurricane or tropical storm event occurs approximately every 27 years on average in Hays County. Since hurricane and tropical storm events can happen anywhere throughout the HMP update area, the City of Buda's future probability is assumed to be similar to the surrounding County areas. In the future, the City can expect an event approximately once every 27 years on average, up to a magnitude of a Tropical Storm based on historical extents for the planning area.

Number of Events Reported	Number of Years in Dataset	Probability	100yr Max Wind Speed (mph)
4	107	0.04	74

Hurricanes/Tropical Storms: Impact

A Probabilistic 100-year Return Period HAZUS-MH 3.2 analysis was run on the participating community. The following describes the results of this analysis.

HAZUS-MH Results

General Building Stock Damage

The total property damage losses were \$239,388. The majority of damage can be expected to impact residential areas (98%). The remaining damages (2%) are for commercial, industrial, agricultural and religious buildings. While some building damage is experienced, it is estimated that no buildings will be completely destroyed or experience severe damage. Exposed Value is the total building and content values for structures within the community. Loss values are divided separately for building and content loss in dollars.



Exposed Value (\$) (Building + Content)	Building Loss (\$)	Content Loss (\$)	Total Loss (\$)
1,444,136,633	2,325,215	1,458,880	3,784,095



Essential Facility Damage

HAZUS does not estimate any critical facilities or infrastructure to be out of service for more than 1 day on the day of the event. Additionally, the model estimates that 100.0% of available hospital beds are ready for use by patients already in the hospital and for those injured by the hurricane.

Debris Generation

HAZUS estimates the amount of debris that will be generated by the hurricane at a total of 14 tons. Of the total amount, Brick/Wood comprises 100% of the total. If the building debris tonnage is converted to an estimated number of truckloads, it will require 1 (with 1 to 25 tons per truck) to remove the building debris generated by the hurricane.

Shelter Requirements

HAZUS estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates no households to be displaced due to the hurricane. While there is an estimation of over \$239,000 in property damages expected, it is aforementioned that "no buildings would be completely destroyed or experience severe damage." Residents would likely remain in their homes as damages were repaired, therefore no temporary shelter is needed.



Hurricanes/Tropical Storms: Vulnerability Summary

Similar to the impacts of windstorms, hailstorms, and lightning, Buda can expect to be impacted with debris and possible interruptions of critical infrastructure. In addition, the community's proximity to IH-35 could lead to traffic delays caused by major evacuation efforts if the highway is used as an evacuation route for coastal residents.



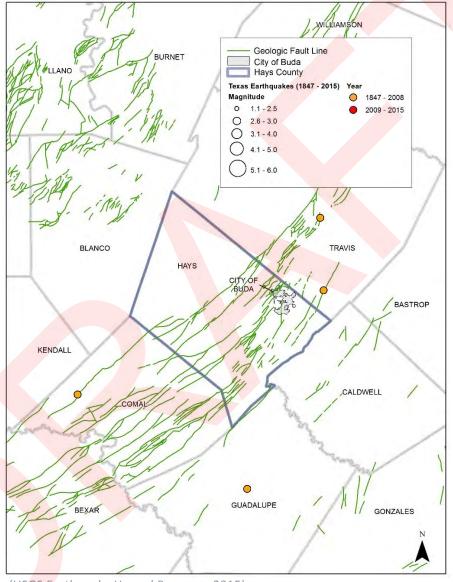


Earthquakes

Earthquakes: Location

Locations within proximity to fault lines are typically the areas most at risk for earthquakes. Figure BA.16 shows USGS documented fault lines and the locations of earthquakes from 1847 to 2015 in relation to the City of Buda.

Figure BA.16, Texas Earthquakes, 1847 – 2015, City of Buda



(USGS Earthquake Hazard Program, 2015)

Earthquakes: Previous Occurrences

There have been no documented earthquake events for the City of Buda according to USGS 1847-2015 data as illustrated in Figure BA.16.





Earthquakes: Extent

The HAZUS Max Peak Ground Acceleration (PGA) for the planning area is 1.58% (see City of Buda Earthquakes: Impact Section for a description of the HAZUS Analysis). This corresponds to the Modified Mercalli Scale Category IV, with light perceived shaking and no potential structure damage. HAZUS measures PGA on a census tract level. Cities within more than 1 census tract were assigned the highest PGA level to reflect the maximum possible extent. Refer to Chapter 2 for extent scale descriptions (the Risk Assessment portion of the Hays County HMP Update).

Earthquakes: Probability

As there have been no recorded previous occurrences of earthquakes for the City of Buda and the PGA is less than 2% for the area, the probability of an earthquake in the City in the future is low (unlikely within the next 10 years).

Number of Reported Events	Number of Years in Dataset	500yr PGA %
0	170	1.58

Earthquakes: Impact

The FEMA How-To Guidance, Understanding Your Risks (FEMA 386-2, page 1-7), suggests the earthquake hazard should be profiled if the PGA is greater than 3%g, where PGA measures the acceleration of gravity (g). The City's PGA is less than 3%g (0.03) and there have been no recorded earthquakes in or near the jurisdiction. Therefore, only a minimum level-1 HAZUS analysis was profiled using the 500-year probability event scenario. The HAZUS analysis produced a PGA of 1.58%. HAZUS also produced \$0 in building damages (Residential, Commercial, Agriculture, Religious and Government) from an event. Critical facilities and Infrastructure did not experience any loss of service. There were no critical facilities or infrastructure that experienced moderate to complete damage. No debris was generated from this event and no people or households required temporary housing. There were no moderate, extensive or completely damaged buildings by this event. HAZUS estimates no households are expected to be displaced from their homes or will require accommodations in temporary public shelters due to the earthquake. Additionally, there were no causalities or fatalities from this event.

Earthquakes: Vulnerability Summary

While the probability of an earthquake in Buda is low, with no significant prior events on file, there are fault lines within the community that could cause impact if there were to be an increase in seismic activity in the area. There are 6 fault lines located within the jurisdiction according to USGS data. Buda could expect to be impacted with debris and possible interruptions if an event were to occur in this unlikely and unprecedented scenario. If an event were to incapacitate a roadway, emergency responders would be hindered from responding, thus leaving the residents who were affected at risk. The following local roadways are crossed by the USGS fault lines displayed on Figure BA.16: RM 967, Pine Siskin, FM 1626, Cement Plant Road, Oxbow Trail and Remuda Trail. Critical facilities that are located near the fault lines (according to HAZUS and community submitted critical facility data) include Elm Grove Elementary School Located only 0.2 miles away as well as Dahlstrom Middle School located directly adjacent to a fault line on the west side of the City.





Pages 47-50, Dam/Levee Failure have been redacted from this copy of the plan.

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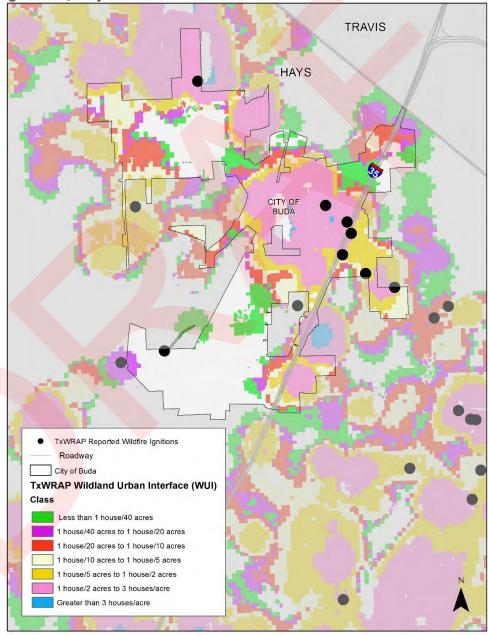
Wildfires

Wildfires: Location

The Texas A&M Forest Service Texas Wildfire Risk Assessment Portal (TxWRAP) can be used to help communities understand their wildfire risk. Figure BA.19 below shows the location of TxWRAP's documented wildfire occurrences with Wildland Urban Interface (WUI) classifications within the City of Buda. The WUI illustrates areas of development that are abutting natural areas. Here, communities and the built environment have an increased vulnerability to a wildfire event. Wildfires can

be ignited from a variety of sources including lightning or human activity such as campfires, smoking, arson, or equipment use.

Figure BA.19, Wildland Urban Interface (WUI) and Reported Wildfire Ignitions, City of Buda









Wildfires: Previous Occurrences

Table BA.27 shows the reported wildfire ignitions within the City of Buda according to TxWRAP and USGS Federal Fire Occurrence data from the years 1980 to 2015.

Table BA.27, Wildfire Ignitions, City of Buda

FPA ID	Date	Fire Size
SFO-TX02240706-16701	1/7/2006	3
SFO-TX0483-74168	10/10/2008	6
TFS-TXFD2011-328665	1/1/2011	0.1
TFS-TXFD2011-328676	2/18/2011	0.25
TFS-TXFD2011-328684	5/5/2011	0.01
TFS-TXFD2011-328693	6/16/2011	2
NA	NA	0.1
NA	NA	0.1

N/A - Data not available

Wildfires: Extent

Table BA.28 lists the Fire Intensity Acreage for the City according to TxWRAP. For a description of the Characteristic Fire Intensity Scale, refer to Chapter 2, the Risk Assessment portion of the Hays County HMP Update.

Table BA.28, Fire Intensity Acreage, City of Buda

, in the second					
Class	Acres	Percent			
Non-Burnable	1,386	41.4 %			
1 (Very Low)	47	1.4 %			
1.5	184	5.5 %			
2 (Low)	63	1.9 %			
2.5	583	17.4 %			
3 (Moderate)	598	17.9 %			
3.5	398	11.9 %			
4 (High)	46	1.4 %			
4.5	45	1.3 %			
5 (Very High)	0	0.0 %			
Total	3,350	100.0 %			

Wildfires: Probability

Based on 8 reported events in 35 years, the City of Buda can expect a wildfire event approximately once every 4 years, on average, in the future with up to a potential fire intensity of 4.5, or "High" classification on the TxWRAP Characteristic Fire Intensity Scale.

Number of Reported Events	Number of Years in Dataset	Probability
8	35	0.23







Wildfires: Impact

Impact on the community can be measured using TxWRAP Housing Density levels within the WUI. Areas with a higher housing and population density would be affected to a greater extent than more rural areas, and especially areas near burnable fuels. Table BA.29 below lists the population, percent of total population, WUI acreage and percent of WUI acreage for the City of Buda, according to the Texas A&M Forest Service TxWRAP Community Summary Report. See Figure BA.19 for the location of WUI areas within the jurisdiction.

Table BA.29, WUI Acreage, City of Buda

Housing Density		WUI Population	Percent of WUI Population	WUI Acres	Percent of WUI Acres
	LT 1hs/40ac	8	0.2 %	260	9.4 %
	1hs/40ac to 1hs/20ac	2	0.0 %	131	4.7 %
1hs/20ac to 1hs/10ac 42		0.9 %	345	12.5 %	
	1hs/10ac to 1hs/5ac 90		90 1.9 % 381	381	13.8 %
1hs/5ac to 1hs/2ac		297	6.1 %	469	17.0 %
	1hs/2ac to 3hs/1ac	4,343	89.5 %	1,160	42.1 %
GT 3hs/1ac		68	1.4 %	9	0.3 %
	Total	4,850	100.0 %	2,755	100.0 %

Wildfires: Vulnerability Summary

Fire and Emergency Services are provided to the 10,162 residents and 3,238 households of Buda (population from Buda EDC demographic data) and surrounding 75 square mile area by Emergency Services District #8 (www.budafire.org). The station is located in Buda and has a response time of approximately 3 minutes in town. As the fastest growing population center in Texas with a population over 10,000, Buda has a population growth rate of 14.87% (according to the Buda Economic Development Corporation) and has increased 39.3% since 2010. This rate of growth and amount area covered by the fire response capabilities increases the need of mitigating wildfire risk to the over 4,800 single family homes that will make up the fully built-out 15 subdivisions in the community.

Hydrant pressure can be lowered in some subdivisions during water shortage events, however a recent new potable water supply well may help with this issue. The City of Buda's current ISO Public Protection Classification is 3 (TX Department of Insurance, State Fire Marshall's Office, January 11, 2010).

Risk Ranking Result

On January 12, 2017, planning representatives from the City of Buda completed a questionnaire as part of the Hays County Hazard Mitigation Plan Update: Risk Assessment. The questions covered the risk associated with the hazards that affect each community based on the level of concern over each profiled hazard, the hazards' impact on Health & Safety as well as Property Damage and Business Continuity. The answers from this questionnaire were combined with public survey results on perception of risk, and the values from both sources were analyzed using the Halff Risk Ranking Tool (details regarding the risk ranking tool are in Chapter 2, the Risk Assessment portion of the Hays County HMP Update). The results provided a quantified ranking of risk with values ranging from 0 to 100. The results for Buda are shown below (hazard values shown from highest risk to lowest):

Ranking Order	Hazard	Risk Ranking Value
1	Drought	97.5
2	Tornadoes	89.0
3	Severe Winter Storms	86.7
4	Floods	77.3
5	Wind Storms	53.3
6	Extreme Heat	53.2
7	Lightn <mark>ing</mark>	52.6
8	Wildfire	51.9
9	Expansive Soils	51.6
10	Hail Storms	49.5
11	Land Subsidence	44.2
12	<u>Earthquakes</u>	40.1
13	Dam/Levee Failure	38.3
14	Hurricanes Tropical Storms	37.5

Section 3: Mitigation Strategy

This section examines the community's ability to perform mitigation (review of existing capabilities, shown in Table BA.30) and identifies specific mitigation actions to address vulnerabilities for each hazard profiled in the Hays County HMP Update. The mitigation strategy is the application of actions into an approach for performing structural and non-structural mitigation efforts within the jurisdiction. Actions are also prioritized and considered for incorporation into other community programs, regulations, projects or plans.

Completed and canceled actions are also included in a separate section for future reference.

Table BA.30, Existing Capabilities

Capability Name	Capability Type	Application to Mitigation	
Mayor	Elected Official	Provides political support for approving and funding mitigation actions.	
Council Members	Elected Officials	Supplements political support for implementation of mitigation actions.	
Emergency Management Coordinator	Contract Staff	Coordinates MPC, implementation of mitigation actions, and monitoring/evaluation/updating HMP.	
Floodplain Administrator	City Staff	Ensures enforcement of existing flood damage prevention ordinance, and continued compliance with NFIP requirements.	
Civil Engineer	City Staff and Consultants	Provides expertise and guidance for structural mitigation actions.	
Chief Building Official	City Staff	Collaborates with MPC on ensuring compliance with existing mitigation-related building requirements and consideration of new building practices to increase mitigation.	
Community Planner City Staff City Staff City Staff		Considers HMP-identified risk areas when consulting with community planning stakeholders.	
		Can graphically demonstrate changes in development and changes in hazard areas.	
Parks and Recreation Director	City Staff	Assists in identifying opportunities for integration of mitigation activities into long-term park development plans. Can also assist with coordinating public outreach events.	
Economic Development Director	Corporation Staff	Can integrate mitigation into future development plans and practices.	
Police Chief	City Staff	Assists with flood-related traffic control and evacuation planning.	
Fire Chief	City Staff	Assists with wildfire-related mitigation through existing programs and efforts as well as implementation of new measures.	
Chapter 211 of the Local Government Code: Zoning	Authority	Authorizes the City to regulate Zoning (State of Texas, 1987)	
Chapter 213 of the Local Government Code: Municipal Comprehensive Plans	Authority	Authorizes the City to adopt a comprehensive plan for the long-range development of the City (State of Texas, 1997)	





Table BA.30, Existing Capabilities (cont.)

Capability Name	Capability Type	Application to Mitigation
Chapter 214 of the Local Government Code	Authority	Authorizes the City to have regulatory authority as it related to building code (such as structural integrity and plumbing) (State of Texas, 1995)
Section 7.03 Buda Code of Ordinances- Comprehensive Plan Ordinance		Authorizes the Planning and Zoning Commission to prepare a Comprehensive Plan for Buda (City of Buda, 2017)
Ordinance No. 080415-1- Amending Parks and Open Space Requirements of Unified Development Code	Ordinance	Establishes easements, land dedication, or a fee-in lieu of payment for the acquisition and development of park land. This is an integral part of the procedure for planning and developing property or subdivisions in the City. Mitigation consideration during applications for Park Land Dedication could serve as opportunity to ensure hazardous Wildland Urban Interface is not developed.
Article 24.07 Illicit Discharges of Pollutants into the MS4 or Conveyances	Ordinance	Regulates non-stormwater discharges to the storm drainage system by controlling the introduction of pollutants into the municipal separate storm sewer system (MS4). Can be enhanced to add language that specifically prohibits unauthorized or private dams in a conveyance, as that is also prohibited in the Flood Prevention Ordinance (as an encroachment in a floodway). Encroachments that cause a rise in the Base Flood Elevation can be considered debris and debris can be considered encroachments. This would allow for a criminal penalty to be given, resulting in a \$2,000 fine. (City of Buda, 2017)
Unified Development Code	Building Code	Codes dedicated to promoting public health, safety, general welfare and quality of life to the citizens of Buda. Can include higher standards for flood. Could also include Mitigation Planning Committee Planners as Review Authorities during code updates to look for opportunities to incorporate Mitigation practices (City of Buda Planning & Engineering, 2015)
Sales Tax	Funding	Provides potential funding for Hazard Mitigation items
Property Tax	Funding	Provides potential funding for Hazard Mitigation items
Franchise Tax	Funding	Provides potential funding for Hazard Mitigation items
Permitting and Licensing Fees	Funding	Provides potential funding for Hazard Mitigation items
Capital Improvement Plan Funding	Funding	Budget dollars obligated to projects over a 5 year plan that involve multiple mitigation related actions.
Helicopter Rescue Drill Partnerships	Programs	Partnership between Buda Fire Department and Texas Department of Public Safety to perform simulated helicopter rescues for aircraft and swift water technicians to practice rescues from locations such as roof tops, trees and vehicles. This demonstration for flash flood preparedness could be enhanced through the incorporation of flood mitigation outreach and education.
Police Outreach Programs	Programs	A community involvement and outreach effort that can be utilized to promote hazard education and awareness

Table BA.30, Existing Capabilities (cont.)

Capability Name	Capability Type	Application to Mitigation				
Fire Department Citizen Fire Academy	Program	Public program available to citizens to learn about the services provided to them by the City of Buda. This could be enhanced to include mitigation education for additional hazards.				
Buda City Government Lessons for Schools	Program	An outreach program that teaches school children about City government. This program could also provide children with hazard awareness and simple mitigation best practically advice.				
Stormwater Program Program		Controls surface water as a flood control system to allow water from heavy waterways to avoid flooding and can be enhanced to protect more areas				
Office of Emergency Management	Program	Leadership, support and coordination during disasters in the community. This City program can lead mitigation efforts by conducting plan updates and maintenance while also working mitigation measures into other parts of their operations.				
Wastewater Department	Public Works	Treats 1.5 million gallons of water a day and can be enhanced assist with conservation methods				
Water Department	Public Works	Ensures the delivery of water to citizens in Buda and can take enhanced measures to help conserve				
Buda Connect Mobile App	Tool	Mobile phone application that residents can use to make requests, contact the City, pay bills, apply for permits and receive alerts. The app could be enhanced to receive photo submissions of disaster data post-events to assist with ensuring proper permitting is conducted where damage occurred. The tool could also take suggestions for locations that need mitigation actions.				

National Flood Insurance Program Participation

The Buda Floodplain Administrator (FPA) is a Certified Floodplain Manager (CFM). Floodplain management is integrated into their existing functions. The Floodplain development standards exceed minimum standards by incorporating a 2-foot freeboard. The City will continue to explore options for higher standards.

The City of Buda has a total of 64 NFIP polices in force, as of June 2016. This totals \$16,193,800 in total insurance coverage.



Buda Connect Mobile Phone App



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Mitigation Goals

The plan-level Mitigation Goals can be found in Chapter 3, The Mitigation Strategy portion of the Hays County HMP Update. These apply to each community and were mutually decided upon as the guiding goals for the development of actions in each planning area.

Mitigation Actions

- *E= Actions reducing risk to existing buildings and infrastructure
- *F= Actions reducing risk to new development and redevelopment

Number/Title	Hazard	Item Description		Impleme Ager		
Reduce flood losses in West Goforth Rd, Buda Fire Station/FM 2770, and Bluff St Drainage Project Area (2014 Drainage Master Plan Phase 1 Project OTS2, OTS3, & OTS4)	Flood	Upsizing and improving existing channel and culverts along West Goforth Road and the Union Pacific Railroad line; constructing a relief channel from Buda Fire Station under FM 2770 to the Onion Creek main channel stem. (November 11, 2016 Preliminary Engineering Report)		& Engine	ity of Buda Planning & Engineering Department	
Cost Estimate/Funding Schedule			Status as of 2017	*Risk Focus		
\$4,522,000; Funding: 2014 Buda Bond Proposition 4 – Drainage (\$7M) 2017-2018			Ongoing	Е		
Cost and Benefit Considerations						

This project will remove structures from existing flooding (i.e., water above the finish floor elevation) and reduce road overtopping at selected culvert crossings.

	Number/Title	Hazard	Item Description	Implementation Agency				
	Reduce flood losses in Houston Street Drainage Project Area (2014 Drainage Master Plan Phase 1 Project OTN1)	Flood	Improving Railroad Branch and Old Town North tributaries from East Street to Rose Street. (November 11, 2016 Preliminary Engineering Report)		City of Buda & Engino Depart	eering		
	Cost Estimate/Funding Schedule				Status as of 2017	*Risk Focus		
ĺ	\$1,041,000; Funding: 2014 Bud	a Bond Proposition 4 – Drainage (\$7M) 2017-2018			Ongoing	E		
ĺ		Cost and Benefit Considerations						

This project will remove structures from existing flooding (i.e., water above the finish floor elevation) and reduce road overtopping at selected culvert crossings.

Number/Title	Hazard	Item Description	Implementation Agency		
Reduce flood losses in Oxbow Subdivision Drainage Project Area (2014 Drainage Master Plan Phase 1 Project GCT1)	Flood	Upsizing existing culverts at Remuda Oxbow Trail, and Bullwhip Pass; and the existing channel from upstream Pass to upper limits of Coves at Cim (November 11, 2016 Preliminary En Report)	City of Buda Planning & Engineering Department		
Cos	Cost Estimate/Funding Schedule				
\$1,437,000; Funding: 2014 Bud	uda Bond Proposition 4 – Drainage (\$7M) 2017-2018			Ongoing	E
Cost and Benefit Considerations					
This project will remove structures from existing flooding (i.e., water above the finish floor elevation) and reduce road overtopping at selected culvert crossings.					

Number/Title	Hazard	Item Description		Impleme Ager	
Reduce flood losses in Lifschutz Headwaters Drainage Project Area (2014 Drainage Master Plan Phase 1 Project BV1)	Flood	Voluntary, targeted buyouts for 1 or more affected properties. (November 11, 2016 Preliminary Engineering Report)		City of Buda Planning & Engineering Department	
Cost	Estimate	/Funding	Schedule	Status as of 2017	*Risk Focus:
TBD			TBD/as need is identified	Ongoing	E

Cost and Benefit Considerations

This project will remove entire residential structures from lots with existing flood.

Number/Title	Hazard	Item Description		Impleme Ager	
Reduce flood losses through construction of a permanent Flood Early Warning System (FEWS) installation at the Onion Creek Bridge on RM 967	Flood	Monitoring of precipitation, stream and water rise at low water crossing designated project location 24 hour days a year. During a flood event, Ci emergency management personnel to work more closely for effective a community response.	& Engino Departmo Public V	City of Buda Planning & Engineering Department and Public Works Department	
Cost Estimate/Funding			Schedule	Status as of 2017	*Risk Focus
\$121,928; Funding: TWDB Disaster Contingency Fund Flood Protection Planning Grant (50%) and City of Buda General Fund & In-Kind Services (50%)			2017-2018	Ongoing	Е
Cost and Benefit Considerations					

This project will help improve safety in flood prone areas of the City of Buda; will be compatible with and enhance the existing FEWS network within Hays County; and provide flood monitoring data to further support future flood mitigation efforts. Not independently cost-effective, but critical for minimizing loss of life and injuries during flood events.



Number/Title	Hazard	Item Description		Impleme Ager		
Reduce flood losses through construction of a permanent Flood Early Warning System (FEWS) installation at Cole Springs Road and RM 967	Flood	Monitoring of precipitation, stream levels, and water rise at low water crossings at the designated project location 24 hours a day, 365 days a year. During a flood event, City staff and emergency management personnel will be able to work more closely for effective and timely community response.		& Engine Departme Public V	ty of Buda Planning & Engineering Department and Public Works Department	
Cost	Schedule	Status as of 2017	*Risk Focus			
\$216,894; Funding: TWDB Disaster Contingency Fund Flood Protection Planning Grant (50%) and City of Buda General Fund & In-Kind Services (50%)				Ongoing	E	

Cost and Benefit Considerations

This project will help improve safety in flood prone areas of the City of Buda; will be compatible with and enhance the existing FEWS network within Hays County; and provide flood monitoring data to further support future flood mitigation efforts. Not independently cost-effective, but critical for minimizing loss of life and injuries during flood events.

Number/Title	Hazard	Item Description		Impleme Ager		
Reduce flood losses through construction of a permanent Flood Early Warning System (FEWS) installation at the Garlic Creek Culvert on RM 967	Flood	Monitoring of precipitation, stream levels, and water rise at low water crossings at the designated project location 24 hours a day, 365 days a year. During a flood event, City staff and emergency management personnel will be able to work more closely for effective and timely community response.		City of Buda & Engine Departme Public V Depart	eering ent and Works	
Cost Estimate/Funding				Status as of 2017	*Risk Focus	
\$122,962; Funding: TWDB Disa Planning Grant (50%) and City	2017-2018	Ongoing	E			
Cost and Panofit Considerations						

Cost and Benefit Considerations

This project will help improve safety in flood prone areas of the City of Buda; will be compatible with and enhance the existing FEWS network within Hays County; and provide flood monitoring data to further support future flood mitigation efforts. Not independently cost-effective, but critical for minimizing loss of life and injuries during flood events.

Number/Title	Hazard	Item Description		Implementation Agency				
Reduce flood losses through construction of a permanent Flood Early Warning System (FEWS) installation on Bluff Street south of RM 967	Flood	Monitoring of precipitation, stream levels, and water rise at low water crossings at the designated project location 24 hours a day, 365 days a year. During a flood event, City staff and emergency management personnel will be able to work more closely for effective and timely community response.		City of Buda & Engine Departme Public V Depart	eering ent and Vorks			
Cost	Cost Estimate/Funding			Status as of 2017	*Risk Focus			
\$122,962; Funding: TWDB Disaster Contingency Fund Flood Protection Planning Grant (50%) and City of Buda General Fund & In-Kind Services (50%)			2017-2018	Ongoing	Е			
	Cost and Benefit Considerations							

This project will help improve safety in flood prone areas of the City of Buda; will be compatible with and enhance the existing FEWS network within Hays County; and provide flood monitoring data to further support future flood mitigation efforts. Not independently cost-effective, but critical for minimizing loss of life and injuries during flood events.



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Number/Title	Hazard	Item Description		Implementation Agency	
9 Reduce flood losses through construction of a permanent Flood Early Warning System (FEWS) installation at Main Street at Bradfield Park	Flood	Monitoring of precipitation, stream levels, and water rise at low water crossings at the designated project location 24 hours a day, 365 days a year. During a flood event, City staff and emergency management personnel will be able to work more closely for effective and timely community response.		City of Buda & Engine Departme Public V Depart	eering ent and Vorks
Cost Estimate/Funding Schedule				Status as of 2017	*Risk Focus
122 062: Funding: TWDP Disaster Contingency Fund Flood Protection 2017 2019			Ongoing	Е	

\$122,962; Funding: TWDB Disaster Contingency Fund Flood Protection Ongoing Planning Grant (50%) and City of Buda General Fund & In-Kind Services (50%)

Cost and Benefit Considerations

This project will help improve safety in flood prone areas of the City of Buda; will be compatible with and enhance the existing FEWS network within Hays County; and provide flood monitoring data to further support future flood mitigation efforts. Not independently cost-effective, but critical for minimizing loss of life and injuries during flood events.

Number/Title	Hazard	Item Description		Impleme Ager	
Provide training for local floodplain administrators and Certified Floodplain Managers (previously action 3 in 2011 plan)	Flood	Providing floodplain management training by hosting NFIP compliance courses, and hosting TFMA and ASFPM approved workshops; assisting stakeholders and providing continuing education credits for local floodplain administrators, certified floodplain managers, Engineers, Surveyors, and the general public.		City of Buda & Engino Depart	eering
Co	Schedule	Status as of 2017	*Risk Focus		
Existing staff resources and	Annually 2017 - 2022	Ongoing	N/A		

Cost and Benefit Considerations

This action will improve awareness and skills related to floodplain management, flood hazard mitigation, National Flood Insurance Program regulation, flood preparedness, flood warning measures, and flood disaster recovery. Not independently cost-effective.

Number/Title	Hazard	Item Description		Impleme Ager		
Promote flood insurance coverage (previously action 10 in 2011 plan)	Flood	Promoting the importance of flood insurance is a part of the development permitting process; promoting the NFIP through brochure distribution, City website, and press releases.		& Engine Departme Public Info	City of Buda Planning & Engineering Department and Public Information Office	
Cost Estimate/Funding			Schedule	Status as of 2017	*Risk Focus	
Existing staff resources			Ongoing	Ongoing	N/A	

Cost and Benefit Considerations

This action will seek to promote an offset of undue financial and material burden in recovering from the impact of flooding on private structures. Not independently cost-effective.

Number/Title	Hazard	Item Description		Implementation Agency				
Increase public awareness of hazards (Buda 2030 Comprehensive Plan Action Items CF-4.1, CF-4.3, & CF-4.4) (previously action 11 in 2011 plan)	All	Increasing public awareness of natural hazards and hazardous areas; distributing public awareness information regarding hazards and potential mitigation measures. Promotional sources would include City website, social media, and public education programs. Provide link to HaysInformed on local page.		City of Bud Works Dep and Pu Informatio	artment ıblic			
Cos	t Estimate	/Funding	Schedule	Status as of 2017	*Risk Focus			
Existing staff re-sources Ongoing			Ongoing	N/A				
Cost and Benefit Considerations								
This action will promote a well informed and engaged citizenry and support a high quality of life. Not independently cost-effective.								

Number/Title	Hazard	Item Description		Impleme Ager				
Improve emergency communication/ warning systems (Buda 2030 Comprehensive Plan Action Items PS-1.1, PS-1.2, & PS-1.3) (previously action 4 in 2011 plan)	All hazards (except L.Sub & Exp. Soil) Purchasing equipment and training personnel to improve local and Countywide emergency communication.		City of Buda Public Works Department and Police Department					
Cost Estimate/Funding Schedule					*Risk Focus			
Existing staff resourc <mark>es and</mark> annual depa <mark>rtme</mark> nt budget allo <mark>catio</mark> ns Ongoing					Е			
Cost and Bonofit Considerations								

Cost and Benefit Considerations

This action promotes public safety services through facility development, high quality equipment, adequate staffing, and healthy partnerships. Not independently cost-effective, but critical for minimizing loss of life and injuries during emergencies.

	Number/Title	Hazard	Item Description	Implementation Agency			
	Monitor drought conditions and ground water levels (Buda 2030 Comprehensive Plan Action Item CF-6.1) (previously action 13 in 2011 plan)	Drought	urchasing equipment and software to mprove monitoring and control of water use nroughout the City's potable water pumping, torage, and distribution network.		· '	City of Buda Public Works Department	
	Cost	Estimate	/Funding	Schedule	Status as of 2017	*Risk Focus	
	Annual Water Conservation Program - \$36,00 / SCADA System Upgrades -\$30,000					N/A	
Ì		Cos	st and Benefit Considerations				

This action will ensure water availability for future needs and reduce costs for future water capital infrastructure that can be redirected to other vital needs. Not independently cost-effective.





Number/Title	Hazard	Item Description	Impleme Ager		
Promote awareness of evacuation plans (previously action 21 in 2011 plan)	Floods, Hurr/ Trop, Dam Failure, Wildfire	Ensuring that the community members are aware of and understand notification and evacuation plans related to natural hazards.		City of Buc Works Dep	
Cost Estimate/Funding				Status as of 2017	*Risk Focus
Existing staff resources 2			2018-2019	Not started	N/A

Cost and Benefit Considerations

This action will help reduce fatalities and injuries by improving the ability of the public to react and respond to changing weather conditions. Not independently cost-effective.

Number/Title	Hazard	Item Description		Impleme Ager			
Minimize dam failure risk (previously action 20 in 2011 plan)	Dam/ Levee Failure	the earthen fill dams; requiring that repairs are		& Engine	City of Buda Planning & Engineering Department		
Cos	Schedule	Status as of 2017	*Risk Focus				
Existing staff resources Ongoin				Ongoing	E		
Cost and Ponsit Considerations							

Cost and Benefit Considerations

This action will reduce the loss of lives, and public and private property due to dam failure. Not independently cost-effective.

Number/Title	Hazard	Item Description	Impleme Agen				
Mandate engineered slabs and proper building inspections	Expansive Soils, Land Subsidence	Requiring design compliance certifications as a condition of release of a structural certificate of occupancy.		City of Buda & Engine Departi	eering		
Cost I	Schedule	Status as of 2017	*Risk Focus				
Existing staff resources	Ongoing	Ongoing	F				
Cost and Benefit Considerations							

This action will reduce the loss of public and private property due to ground movement. Not independently cost-

effective.



Number/Title	Hazard	Item Description	on	Impleme Ager				
Review plans and resources to address risk posed by severe weather events (previously action 16 in 2011 plan)	Severe Winter Storms, Hurricane/ Tropical Storms, Windstorms, Hailstorms, Tornadoes	Continuing update of City's of and resources to address the by severe weather hazards f potentially at-risk population community.	e risks posed ocusing on	City of Buda & Engin Departm Public V Depart	eering ent and Works			
Cost Estimate/Funding Schedule					*Risk Focus			
Existing staff resources	Ongoing	N/A						
	Cost and Benefit Considerations							

This action will help identify shortfalls in staff or material resources to better assist the public during severe weather events. Not independently cost-effective.

Number/Title	Hazard	Item Description		Impleme Ager	
Develop various mitigation actions to reduce wildfire risk (previously action 17 in 2011 plan)	Wildfire	antecedent fire hazard conditions. & Er Depai		City of Buda & Engine Departme Public V Depart	eering ent and Vorks
Cost	Schedule	Status as of 2017	*Risk Focus		
Existing staff resources			2018-2019	Not started	N/A
	Cos	st and Benefit Considerations			

Cost and Benefit Considerations

This action will reduce the loss of lives, and public and private property due to wildfire. Not independently cost-effective.

×	Number/Title	Hazard	Item Description	Agency
	20 Develop plans for tree management	Lightning, Windstorms, Drought, Wildfire	Enhancing Comprehensive Plan goal of establishing a Neighborhood Services Program by utilizing the resource to educate the public on tree care in order to get them to plant drought resistant trees and keep existing trees alive so that dead trees will not impact power lines during wind, severe winter and lightning events.	City of Buda Planning & Engineering Department and Public Works Department

	willter and lighthing events.			
Cost Estimat	e/Funding	Schedule	Status as of 2017	*Risk Focus
Existing staff resources		2018-2019	Not started	N/A

Cost and Benefit Considerations

This action will minimize interruption of critical infrastructure services due to fallen limbs from drought or windstorm, and minimize debris that could become ignited by lightning causing a wildfire. Not independently cost-effective.



Capabilities Assessment

Evaluation/Prioritization of Actions

Each action added to the plan was developed using the Mitigation Action Summary Worksheet shown in Figure BA.20. The cost/benefit calculation occurred on this document. Non-cost effective projects were not included in prioritization activity. Risk Ranking Score used a high water mark effort of utilizing the highest score from the hazards that the action will mitigate impact from.

Figure BA.20, Mitigation Action Summary Worksheet







Table BA.31, Mitigation Action Prioritization Tool, City of Buda

Table BA.31, Mitigation Action Prioritization Tool, City of Buda												
Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community	Risk Ranking Score	Total Score
12. Increase public awareness of hazards	1	1	1	1	0	0	1	1	0	1	98	105
14. Monitor drought conditions and ground water levels	1	0	1	1	0	0	1	1	0	1	98	104
20. Develop plans for tree management	0	1	1	0	0	1	1	1	0	1	97	103
18. Review plans and resources to address risk posed by severe weather events	1	1	1	1	0	0	1	1	0	1	89	96
13. Improve emergency communication/ warning systems	1	0	1	1	0	0	1	1	0	1	89	95
2. Reduce flood losses in Houston Street Drainage Project Area (2014 Drainage Master Plan Phase 1 Project OTN1)	1	1	1	1	0	1	1	1	0	1	77	85
3. Reduce flood losses in Oxbow Subdivision Drainage Project Area (2014 Drainage Master Plan Phase 1 Project GCT1)	1	1	1	1	0	1	1	1	0	1	77	85
4. Reduce flood losses in Lifschutz Headwaters Drainage Project Area (2014 Drainage Master Plan Phase 1 Project BV1)	1	1	1	1	0	1	1	1	0	1	77	85
1. Reduce flood losses in West Goforth Rd, Buda Fire Station/ FM 2770, and Bluff St Drainage Project Area (2014 Drainage Master Plan Phase 1 Project OTS2, OTS3, & OTS4)	1	1	1	1	0	0	1	1	0	1	77	84
5. Reduce flood losses through construction of a permanent Flood Early Warning System (FEWS) installation at the Onion Creek Bridge on RM 967	1	0	1	1	0	0	1	1	1	1	77	84
6. Reduce flood losses through construction of a permanent Flood Early Warning System (FEWS) installation at Cole Springs Road and RM 967	1	0	1	1	0	0	1	1	1	1	77	84
7. Reduce flood losses through construction of a permanent Flood Early Warning System (FEWS) installation at the Garlic Creek Culvert on RM 967	1	0	1	1	0	0	1	1	1	1	77	84
8. Reduce flood losses through construction of a permanent Flood Early Warning System (FEWS) installation on Bluff Street south of RM 967	1	0	1	1	0	0	1	1	1	1	77	84
9. Reduce flood losses through construction of a permanent Flood Early Warning System (FEWS) installation at Main Street at Bradfield Park	1	0	1	1	0	0	1	1	1	1	77	84
16. Minimize dam failure risk	1	1	1	1	0	0	1	1	0	1	77	84
15. Promote awareness of evacuation plans	1	0	1	1	0	0	1	1	0	1	77	83
10. Provide training for local floodplain administrators and Certified Floodplain Managers	0	1	1	1	0	0	1	1	0	0	77	82
11. Promote flood insurance coverage	0	0	1	1	0	0	0	1	0	0	77	80
19. Develop various mitigation actions to reduce wildfire risk	1	1	1	1	0	-1	0	1	1	1	52	58
17. Mandate engineered slabs and proper building inspections	0	1	1	-1	0	0	-1	1	0	1	51	53

Mitigation Actions by Hazard

The mitigation actions in Table BA.32 are shown with the corresponding hazards.

Table BA.32, Mitigation Action Impact, City of Buda

Action Number	Drought	Extreme Heat	Severe Winter Storms	Lightning	Hailstorms	Windstorms	Tornadoes	Expansive Soils	Floods	Land Subsidence	Hurricanes/ Tropical Storms	Earthquakes	Dam/ Levee Failure	Wildfire
1									Х					
2									х					
3									Х					
4									х					
5									Х					
6									х					
7									х					
8									х					
9									х					
10									Х					
11									Х					
12	х	х	Х	Х	х	х	х	х	х	х	х	х	х	х
13	х	х	х	х	х	х	х		х		х	х	х	х
14	х													
15									х		х		х	х
16													х	
17								Х		х				
18			х		Х	Х	х				х			
19														Х
20	х			Х		Х								Х



Integration Efforts

Table BA.33 captures ways that the Risk Assessment, Goals and Actions developed in the HMP can be integrated into other City of Buda documents, programs and regulations.

Table BA.33. Plan Integration Efforts

Name of Document	Туре	Item Type	Opportunity for Integration
Buda 2030 Comprehensive Plan	Comprehensive Plan	Risk Assessment	 Trail requirements for new developments or subdivisions (require floodplain administrator review with Risk Assessment data and comment) Location standards for school facilities (to include emergency management and floodplain administrator review with RA data) enhancement Enhance action item for development of Neighborhood Services Department and create a give the department a public safety education mission that includes mitigation and natural hazards
Unified Development Code	Building Code	Actions/Risk Assessment	Include recommendations to Building Standards Commission during periods of Code revision and updates in order to look for opportunities to add new mitigation items to the plan, such as • Add raingardens and xeriscaping to Green building or green practice requirements • Add requirement for evacuation routes to subdivision codes- Connectivity requirements for streets and pedestrian bike paths • Incorporate a fire break requirement in codes that "Promote cluster developments" (include fire breaks when near WUI) • Include land subsidence focus on measures that promote
Ordinance No. 080415-1- Amending Parks and Open Space Requirements of Unified Development Code	Ordinance	Risk Assessment	Establishes easements, land dedication, or a fee-in lieu of payment for the acquisition and development of park land. This is an integral part of the procedure for planning and developing property or subdivisions in the City. Mitigation consideration during applications for Park Land Dedication could serve as opportunity to ensure hazardous Wildland Urban Interface is not developed.
Acquisition of Open Space	Program	Risk Assessment	The last open space acquisition took place on March 15, 2016, during which the City of Buda acquired 39.51 acres of land. This appeared to be acquisitions related to flood control and water conservation efforts. Additional hazard areas could be considered for future acquisitions to include data from the risk assessment regarding areas susceptible to land subsidence and expansive soils.
Hazard Mitigation Grant Program (HMGP)	Funding	Action	Identify actions that can be funded through new and existing grant awards.
Pre-Disaster Mitigation (PDM)	Funding	Action	Identify actions that can be funded through new and existing grant awards.
Flood Mitigation Assistance (FMA)	Funding	Action	Identify actions that can be funded through new and existing grant awards.



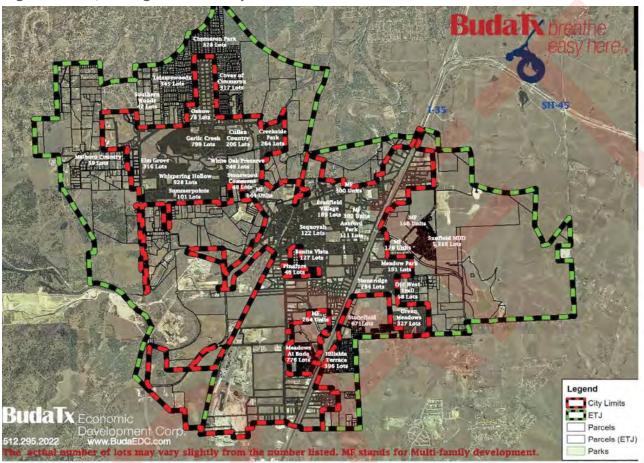
Table BA.33, Plan Integration Efforts (cont.)

Name of Document	Туре	Item Type	Opportunity for Integration
TWDB Flood Protection Planning (FPP) Grant	Funding	Action	Identify actions that can be funded through new and existing grant awards.
TWDB Clean Water State Revolving Fund (CWSRF)	Funding	Action	Identify actions that can be funded through new and existing grant awards.
Texas Water Development Fund (DFund)	Funding	Action	Identify actions that can be funded through new and existing loans.



Section 4: Finalize Plan Update (Review, Evaluation and Implementation)

Figure BA.21, Changes in Development



Buda has experienced a significant boom of residential and industrial development due in great part to a significant population growth of 205% since 2000. In 2013, the City approved 456 new residential building permits, and now is home to over 15 subdivisions that at full build-out will home 4,800 families.

This change in development since the 2011 Hazard Mitigation Plan Update was an underlying consideration while planning to ensure that Buda's future growth is done so with mitigation measures in mind to protect their growing community.



Past Mitigation Action Progress Reports Summary- Completed and Canceled

	Item Descrip	Lead Department						
Flood		Engineering Department						
stimate/Fundin	ıg	Schedule	Status as of 2017					
	6 months	Completed.						
Cost Effectiveness								
	stimate/Fundir	Damage Prevention Order stimate/Funding Cost Effectiveness	Damage Prevention Ordinance Stimate/Funding Schedule 6 months					

No independently cost-effective, but critical for reducing property damage and minimizing loss of life and injuries during flood events

2011 Action Number	Hazard	Item Des	cription	Lead Department				
5	All Hazards	Development of and Countywide and indiv HAZMAP Plan		Public Works				
Cost E	stimate/Fundi	ng	Schedule	Status as of 2017				
Existing staff resources			Origina <mark>l Plan</mark> adopted on April 20, 2004	Canceled. Not an eligible action.				
Cost Effectiveness								
Not independently cost-ef	fective							

2011 Action Number	Hazard	Item De	scription	Lead Department						
6	Thunderstorms, high winds, cyclones, tornadoes and floods	Storm Ready De Hays County Cor	•	Public Works						
Cos	t Estimate/Funding		Schedule	Status as of 2017						
Existing staff resources			Phased over 5 years, 2006- 2010	Canceled. Designation is not currently a priority for the community.						
	Cost Effectiveness									

Not independently cost

2011 Action Number	Hazard	Item Description		Lead Department
7	Extreme Heat	Reduce Impacts on Extreme Heat on Elderly, Disabled, Low-Income and Infants		Public Works
Cost Estimate/Funding			Schedule	Status as of 2017
\$2,000 to purchase and distribute 100 box fans \$3,000 estimated costs for a/c repairs			Ongoing, as needed during	Canceled. Short-staffed for this type of coordination
Funding Sources: United Way, Rotary Clubs, Lions Clubs, Red Cross, Churches and charitable organizations, power companies			events	
Cost Effectiveness				
Not independently cost-effective				



2011 Action Number	Hazard	Item De	escription	Lead Department
12	Wildfire	Wildfire I	Hazard Areas	Public Works
Cost Estimate/Funding			Schedule	Status as of 2017
\$500		TBD, likely initiated in 2011	Removing from plan because it is a County run project to enter Fire-wise and not specific to the jurisdiction.	
Cost Effectiveness				
Not independently cost-effective, but essential in minimizing loss of life and injuries during significant storms				

2011 Action Number	Hazard	Item De	escription	Lead Department
14	Drought	Public Infor Campaign f	mation or Water Use	Public Works
Cost Estimate/Funding		Schedule	Status as of 2017	
No additional cost- uses existing staff resources.			TBD, likely initiated in 2011	Combined with 2011 Action 13 to monitor drought conditions now a part of 2017 Plan Action 26) Program to Monitor Drought Conditions and Groundwater levels.
Cost Effectiveness				
Very difficult to determine but presumed very cost-effective because actions preserves essential function				

2011 Action Number	Hazard	Item	Description	Lead Department
15	Extreme heat	Evaluate Excess Heat Risks		Public Works
Cost Estimate/Funding			Schedule	Status as of 2017
No additional cost- uses existing staff resources			TBD- probably initiated in 2011	Removed due to the item no longer qualifying as an eligible mitigation action.
Cost Effectiveness				
Not independently cost-effective, but needed to develop adequate risk reduction efforts				



2011 Action Number	Hazard	ltem	Description	Lead Department
18	Flood, thunderstorms, high winds, tornadoes, seismic	Upgrades to At-Risk Structures		Engineering, Planning, Public Works, Fire Dept
Cost Estimate/Funding			Schedule	Status as of 2017
Varies depending on measure. Funding from General Fund or FEMA grant program/s			TBD based on study	Modified to be a specific action of mitigating new City Hall Annex structure.
Cost Effectiveness				
Cost-effectiveness will vary with level of risk and project cost.				

2011 Action Number	Hazard	Item Description		Lead Department
19	Floods, thunderstorms, high winds, tornadoes, seismic	Structural/Engineering Study of Public Facilities		Engineering, Planning, Public Works, Fire Dept
Cost Estimate/Funding			Schedule	Status as of 2017
To be determined, but if initiated probably from General Fund			Not yet established- to be commenced only if funding is available	Completed. See City of Buda Space Needs Assessment and Facilities Master Plan in Sources (Section 1
Cost Effectiveness				
Not independently cost-effective				

Changes in Priorities

Changes in development for Buda and an impact on the community water supply has led to a significant shift of priorities toward ensuring that water conservation is a consideration during mitigation planning efforts. The Economic Development Council provides action items as part of the EDC Strategic plan regarding creating an availability of water, as the accessibility is critical to growth and development. In addition, the Buda Comprehensive Plan also has objectives that concern conservation and preservation practices.



Section 5: Approval and Adoption

Table BA.34, Municipal Jurisdiction Adoption Date

Municipality	APA Date	Adoption Date
City of Buda		



Jurisdiction Adoption Documentation Placeholder

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