Travis County

Texas

2010 Hazard Mitigation Plan Update

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Section 2
Executive Summary

Background

Travis County, Texas undertook development of the original *Hazard Mitigation Plan* because of increasing awareness that natural and man-made hazards, especially flood hazards, may affect many people and property in the area. The Plan was a requirement associated with receipt of Federal Emergency Management Agency (FEMA) mitigation grant program funds, administered by the Texas Division of Emergency Management (TDEM) and the Texas Water Development Board (TWDB). In addition, the Plan is a pre-qualification of eligibility for other mitigation funds.

The original Plan, prepared in 2004 and approved in 2005, (hereinafter referred to as the 2004 Plan) was prepared by a Mitigation Planning Committee (MPC) composed of County staff from Emergency Management Services and the Transportation & Natural Resources Department, with input from representatives from the Lower Colorado River Authority, City of Austin and Texas Water Development Board. The 2010 update was completed using a similar process, with a Mitigation Planning Committee that included representatives from Travis County EMS, TNR, and the Cities of Sunset Valley, Pflugerville, and Village of the Hills. Specifics of the process are discussed in Section 4 of the update, Introduction to Mitigation Planning.

Hazards and Risk

This Plan update includes a re-evaluation of Travis County's risks from natural hazards, and quantitative risk assessments for the County as a whole, with more detailed assessments for certain asset classes. Good indications of the hazards that have affected the Travis County area in the past are the Emergency Operations Center (EOC) activations. Since 1994, the EOC has been activated 83 times. Many of these were associated with natural hazards. A summary of the natural hazard related activations since 1994 include: twenty six activations due to flooding (five of these were Presidential disaster declarations directly affecting Travis County); eleven activations due to ice storms; nine activations due to high wind events (including tornadoes); one activation due to wildfire (this was also a State of Texas declaration); and two due to drought conditions (one of which was also a Presidential disaster declaration). The remaining activations were primarily related to non-natural hazard events, such as the swine flu outbreak.

Eight hazards were initially identified and profiled by the MPC. These hazards included: Floods; Tornadoes; Wildland Grass/Brush Fire; Drought; Severe Storms; Winter Storms; Seismic/ Earthquakes; and Landslides. After these initial eight hazards were profiled, the MPC used a ranking system with five criteria to reduce the list of hazards to those with the most potential to impact the County. The criteria included: (1) History, (2) Potential for mitigation, (3) Presence of susceptible areas, (4) Data availability, and (5) Federal disaster declarations and local emergency declarations. This classification allowed the County to focus its update efforts on the most significant hazards. This assessment, which is consistent with the original plan, resulted in two hazards of significance, for which a more detailed risk assessment was completed. These two hazards are; floods and tornadoes: The following table is a summary of the flood and tornado risk assessment completed as part of the Plan update process.

Summary of Travis County Flood and Tornado Risks
by Asset and Hazard Type (100-year horizon)

Asset	Hazard	Risk (100-year horizon)
Residential repetitive loss (RL) properties	Floods	$6,766,163
Residential severe repetitive loss (SRL) properties	Floods	$2,033,208
Per capita (Countywide)	Tornado wind (life safety)	$1,498

Flooding poses the most significant risk in Travis County. Most rivers and streams in the planning area have some existing buildings that are exposed to flood damage. It is estimated that about 20 percent of buildings in Travis County are exposed to some degree of flooding. Travis County has experienced periodic flooding, often resulting in localized damage. It is estimated that nearly 6,800 buildings and many more parcels of undeveloped land in Travis County are located within areas shown on flood hazard maps prepared by the Federal Emergency Management Agency (FEMA).

FEMA maintains statistics on prior flood losses within each NFIP participating jurisdiction. They categorize the most flood-prone properties as Repetitive Loss (two or more paid building losses of at least $1,000 over a 10 year period) and Severe Repetitive Loss (four paid building losses of at least $5,000 over a 10 year period or two losses exceeding the building's value). There are 97 repetitive loss properties in unincorporated Travis County and one in the City of Pflugerville. Of the repetitive loss properties in Travis County, 17 are also categorized as severe repetitive loss. The following is a summary of the repetitive loss property claim history.

Residential

Unincorporated Area/City	Properties	Building	Contents	Total	# Claims	Average
Unincorporated Travis County	96	$7,589,183	$801,020	$8,390,202	252	$33,294
City of Pflugerville	1	$129,558	$15,000	$144,558	2	$72,279
Total / Average	97	$7,718,741	$816,020	$8,534,760	254	$33,601

Non-Residential

Street Name	Properties	Building	Contents	Total	# Claims	Average
FM Road 969	1	$0	$86,284	$86,284	2	$43,142
Total	1	$0	$86,284	$86,284	2	$43,142

Mitigation Action Items

The original *Hazard Mitigation Plan* set the stage for long-term disaster resistance through identification of actions that reduce the exposure of people and property to natural hazards. The list of actions in the original mitigation plan was reviewed as part of the update, and the status of each action determined and recorded in the updated table in Section 7 of this document. A series of new actions was also identified and included in the section.

The following is an overview of the significant actions from the 2004 plan with progress made since the original plan's adoption.

Action Item Description	Status as of 2010
Develop a communications plan to improve consistency and efficiency of dealing with the public before and after natural hazard events.	Several initiatives have been completed over the past 5 years – others are ongoing. Completed initiatives include: • Expand County Web page; explore linking County Web page to other sources (City of Austin, Travis Conservation, Texas Cooperative Extension/TAMU, TX Forest Service). • Prepare handouts for property owners and permit applicants; keep at permit counter. • Develop brief presentation that can be made to local groups (homebuilders, realtors, neighborhood organizations, employers) • Establish central phone number that County residents can call for information about post-disaster recovery, cleanup, mitigation, and permits. • Translate certain materials into Spanish.
Review floodplain and subdivision regulations and develop recommended revisions and clarifications to facilitate administration and public understanding.	Action completed – the County's floodplain regulations were updated in 2008. The County is implementing a process of updating its floodplain regulations on a four year cycle.
Review flood history and vulnerability of top flood-prone roads and bridges. Communicate priorities and concerns to the appropriate Agency (County or TXDOT). Request that safety be factored into upgrade review.	In cooperation with the Texas Water Development Board (through a 50/50 cost-shared grant of $400,000), the County completed a County-wide drainage study that includes detailed assessments of flood-prone roads.
Acquire and demolish flood prone homes in Timber Creek Subdivision.	The County acquired and demolished flood-prone properties in this area, starting in 1998, and its efforts continue. As of the 2010 HMP update, the County has purchased and demolished 105 properties, using a range of federal programs sponsored by FEMA and the U.S. Army Corps of Engineers, and Travis County bond funds.
Acquire and demolish flood prone homes in Grave Yard Point and Citation Ave.	The County acquired and demolished one flood-prone property in Graveyard point and eighteen on Citation Avenue, using FEMA grant funds and Travis County bond funds.
Provide community outreach and education to individuals and businesses concerning winter storm alerts and preparatory actions for homes and businesses.	September 2009- "Too Prepared to be Scared" Campaign - 10,000 children activity books printed (English and Spanish) - distributed to area schools and various community safety fairs. March 2010- Travis County developed and distributed Public

Action Item Description	Status as of 2010
	Service Announcements in conjunction with the "Turn Around Don't Drown" campaign. August 2009 & August 2010 -Travis County sponsored pages in the City of Austin Home Safe Calendar with information on Wildland/Urban Interface safety and fireworks safety. July 2010-Travis County participated in the development of a PSA regarding the dangers of flash flooding.
Encourage the construction of tornado safe community shelters.	In 2004, the Combined Transportation, Emergency and Communications Center (CTECC) was commissioned. The facility serves as the 911 center for the City of Austin and Travis County with the exception of Pflugerville. The facility houses the City of Austin, Travis County, Texas Department of Transportation and Capital Metropolitan Transit Authority. CTECC has numerous redundancies incorporated into its design and was built to withstand a direct hit from an F2 tornado without interruption of service.
Join the NFIP Community Rating System.	As of 2010 HMP update, Travis County is in the process of applying for entry into the CRS.

The County has made significant progress in removing flood-prone homes from harm's way. The following is an overview of the areas where acquisitions have occurred.

Acquisition Mitigation Projects in Travis County					
Program	# Acquired	Location	Total Funds	Federal Funds	Local (TC) Funds
HMGP DR 1257	40	Timber Creek	$ 1,600,000.00	$ 1,200,000.00	$ 400,000.00
FMA 05	3 1	Thoroughbred Farms Graveyard Point	$ 750,000.00	$ 562,500.00	$ 187,500.00
PDM 05	10	Timber Creek	$ 400,000.00	$ 300,000.00	$ 225,000.00
TC Bond Funds	55	Timber Creek	$ 5,000,000.00		$ 5,000,000.00
TC Bond Funds	11	Thoroughbred Farms	$ 1,300,000.00		$ 1,300,000.00
HMGP DR 1697	4	Thoroughbred Farms	$ 320,000.00	$ 240,000.00	$ 80,000.00
Total	124		$ 9,370,000.00	$ 2,302,500.00	$ 7,192,500.00

The following is an overview of the significant actions that were added or updated as part of the 2010 plan update process.

New Actions for 2010 Hazard Mitigation Plan Update
Evaluate the feasibility of structural elevations as flood mitigation for properties on Lake Travis.
The restudy of Lake Travis has resulted in a significant increase in the actual Base Flood Elevation (BFE) around the Lake. It was always known the area was flood-prone, but the new maps and BFEs provide the empirical data to prove various mitigation measures would be cost effective. Consider multiple mitigation alternatives to remove these homes from harm's way to include: Elevation,

Mitigation Reconstruction, and Acquisition/Demolition. Apply for grant funds and implement when feasible, cost effective, and supported by the Travis County Commissioners' Court.
Establish central phone number that County residents can call for information about post-disaster recovery, cleanup, mitigation, and permits. (carryover from original plan) This already exists for flood 512-854-4215
Complete acquisitions and demolitions in the Timber Creek area to remove all remaining properties within the 25-year floodplain from the area.
Continue to pursue acquisition/demolition as the preferred mitigation alternative on Citation Avenue.
Post information from the Elevation Mark Database on the County's web site.

Review and Adoption

Commissioners' Court is responsible for approving and adopting the 2010 Hazard Mitigation Plan Update. The FEMA requirement relative to approval and adoption is for the County to submit the final draft of the Plan for FEMA review. Once FEMA has completed its' review and determines the plan is ready for adoption, they will inform the County and the County will then adopt the plan. For this reason, the adoption date is not yet identified. The Court adoption date will be referenced only in the executive summary section this plan. The following table will be filled in when the final Plan is adopted and the adopted resolutions can be found in Appendix C

Commissioners' Court reviewed and approved the Plan update on [insert date]. The three participating municipal jurisdictions adopted the Plan update on the following dates.

Municipal Participants in the Plan Update

Municipality	Approval Date	Adoption Date
City of Pflugerville	Pending	Pending
City of Sunset Valley	Pending	Pending
Village of the Hills	Pending	Pending

The Plan update was submitted to the Texas Division of Emergency Management (TDEM) by:

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Section 3
Background

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3.1 Scope of the Plan

The original Travis County HMP was a concerted effort on the part of the County to develop anall-hazards, County-wide approach to disaster damage reduction. In order to focus on a process needed to attain a sustainable future, Travis County employed a FEMA-approved process to identify and assess all potential hazards that may affect the unincorporated areas of the County, and to develop an action plan to address those hazards. The original Plan was completed in December 2004 and approved by the FEMA in 2005. It has been used to better articulate specific needs for the community, based on a process that involved all stakeholders, including the general public, government and non-government organizations.

The Travis County HMP update included re-evaluating the original hazards, the risk assessment, mitigation goals, and mitigation priorities. As part of the update process, these sections of the Plan were re-assessed to identify changes and updates that may have occurred since December 2004. It should be noted that as part of the 2010 update, the County determined that man-made hazards would be eliminated from the Plan.

There are 22 municipal jurisdictions in Travis County. The development and adoption of the original 2004 Plan included only unincorporated Travis County. Three jurisdictions (the Cities of Pflugerville, Sunset Valley, and Village of the Hills) requested that the County include them in the 2010 Travis County update. Each of these jurisdictions has its own appendix:

- Pflugerville Appendix H
- Sunset Valley Appendix I
- Village of the Hills Appendix J

Hazard identification, risk assessments, background, goals, and mitigation actions were developed for each jurisdiction.

3.2 Organization and Mission of Travis County

This subsection describes the purpose, structure and operations of Travis County. The Texas Constitution outlines the structure of County governments, thereby making counties functional agents of the State. Thus, counties, unlike cities, are limited in their actions to areas of responsibility specifically addressed in laws passed by the Texas Legislature. The section was reviewed in detail by the Mitigation Planning Committee as part of the 2010 HMP update, and modifications were made where appropriate.

At the heart of Texas county government is the Commissioners Court, composed of a county judge and four precinct commissioners. Although this body conducts the general business for each county and oversees financial matters, the Texas Constitution established a strong system of checks and balances by creating other elective offices in each county, including the county attorney, county and district clerk, county treasurer, sheriff, tax assessor-collector, justice of the peace, and constable. The county auditor is appointed by the district court. See the jurisdiction-specific appendices for an overview of the government structure for the City of Pflugerville, Village of the Hills, and City of Sunset Valley.

Travis County government is generally organized based on this prescribed structure. With respect to planning for and responding to natural hazard events, the key elements of the Travis County organization (www.co.travis.tx.us) are:

- **Commissioners Court** is the governing body of Travis County. As a group, the county judge and the four commissioners are the chief policy-making and administrative branch of County government. Among their many functions, the Court is responsible for the County's budget, sets the tax rate, determines fees for many County services, and determines how the collected revenues will be distributed among County departments to provide services to the community.
- **Transportation & Natural Resources Department** (TNR) is a diverse department, responsible for the engineering, design, construction, and maintenance of Travis County roads, drainage, and bridges; fleet services for all County vehicles and equipment; natural resource and environmental quality protection; solid waste management and resource conservation; park system development and management; capital improvement projects; land development review, including subdivision review, permits and floodplain management regulations in Travis County.
- **Emergency Services** provides for the safety of Travis County residents through emergency preparedness and response. The Office of Emergency Management serves as the coordinating point of disaster preparedness, mitigation, response, and recovery capabilities for Travis County in cooperation with the County's various municipal governments. Travis County assists in staffing and sponsoring a joint City of Austin-Travis County Emergency Operations Center.
- **Facilities Management** coordinates the construction of new County facilities, implements and monitors how those facilities are used, coordinates the maintenance and renovation of existing County property, and negotiates contracts.

The State of Texas has not specifically authorized counties to adopt building codes other than fire safety for commercial buildings. Travis County does not administer a building code and has not been assigned a Building Code Effectiveness Grading Schedule classification (BCEGS). A number of Emergency Service Districts administer a fire safety code. The Fire Marshal conducts fire safety

inspections of public buildings, day care centers, nursing homes, and schools. For years 2006 to 2009, there were approximately 680 fire inspections conducted.

The State of Texas has not specifically authorized regulate land use or implement zoning. Therefore, Travis County cannot use these development tools.

Mission Statement

Travis County has a broad mission statement to guide its long-term and short-term actions.

Travis County Mission Statement

To preserve health, provide a safety net for the needy, ensure the public safety, facilitate the resolution of disputes, foster an efficient transportation system, promote recreational opportunities, and manage County resources in order to meet the changing needs of the community in an effective manner.

How the County Addresses Hazards

As part of the Plan update, members of the Mitigation Planning Committee (MPC) were interviewed to gain an understanding of hazards and how they are addressed, and to gather information about damage associated with past hazard events.

The following is an overview of how the different entities that make up Travis County government address hazards.

Transportation & Natural Resources Department

- **Natural Resources and Environmental Quality Division.** This office is charged with coordinating development of environmental policies and intra-departmental review of development proposals. It conducts compliance reviews of specific County capital projects (primarily new roads and bridges) and serves a key function in coordinating with State and Federal environmental programs. Identifying, applying for, and managing grants for a variety of projects are ongoing functions.

  This Division is also responsible for managing the Balcones Canyonlnads Perserve. Located in western Travis County, the Balcones Canyonlands Preserve contains 28,497 of the 30,428 acres set aside as protected habitat by the Balcones Canyonlands Conservation Plan. It includes land owned or managed by several property owners, including Travis County. The Preserve System was established to meet the terms and conditions of a regional permit, issued in 1996, by the U.S. Fish & Wildlife Service under Sec. 10(a)(1(B) of the Endangered Species Act. The regional permit for the BCCP requires Travis County and the City of Austin to protect 30,428 acres of golden-cheeked warbler habitat by 2016. Significant portions of the Preserve are uplands or steep canyons where the land is so steeply sloped that stream

channels run in narrow valleys with little or no floodplain. Wildfire is the most significant hazard threatening the lands of the Preserve, due not only to the nature of the vegetation and geography, but also the build-up of woody materials that results when ice storms cause tree damage and limb falls.

- **Development Services Division.** This group processes applications for subdivisions, development permits, utility permits, driveway permits, and onsite sewerage permits. As of 2010, three members of Development Services are nationally Certified Floodplain Managers.

  The functions of TNR Development Services that address threats from natural hazards, particularly from flood hazard, include processing proposals for development, onsite sewage systems, improvements of existing buildings, subdivision of land, and stormwater management.

  Development Services inspectors are charged with performing inspections of permitted activities, with particular emphasis on Class "B" development permits (activities that are affected by floodplain or drainage). A formal enforcement policy sets forth procedures to inform property owners of permit requirements, to encourage compliance, and to allow referral of unresolved situations for legal action. Inspectors routinely check for unpermitted activities, including building and fill or dumping. If a permit is not produced during inspections, a "red tag" is issued and work suspended until a permit is obtained.

- **Road & Bridge Maintenance Division.** Primary functions of Road & Bridge Maintenance include rebuilding and maintaining approximately 1,200 miles of County-owned roads, including mowing and cleaning drainage ditches. Maintenance includes debris removal within the County's right-of-way. If debris appears to pose an imminent threat, maintenance crews can go outside the right-of-way. As of 2010, there were approximately 10,000 culverts and 144 bridges (clear span of +20 feet) located within the County. Routine inspections are conducted to evaluate the structural conditions of bridges and culverts and to check for scour.

  The County has roughly 110 low water crossings that are expected to flood even under minor increases in flow rates. Although originally installed on roads with low traffic volume, a number of these crossings now carry considerably increased numbers of vehicles.

  The Road & Bridge Maintenance staff has significant responsibilities related to flooding. When floods are predicted, emergency teams are organized, roads are closed (based on experience), and teams are prepared to respond to problems. While damage to roads has been minimal (primarily shifted asphalt), debris has been the biggest flood-related expense. After heavy rains, maintenance crews inspect areas that historically have had problems to check for debris and damage. With respect to non-flood hazards, Road & Bridge Maintenance stockpiles sand to use on roads and bridges during icy conditions, and has equipment used to assist in firefighting efforts.

- **Public Works Division.** Planning, design, and engineering of County roads are the primary responsibilities of Public Works. Developers must build roads to County standards before the County takes ownership. Designs are based on traffic volume and road classification. Most waterway crossings and highway projects are funded by the County. The TXDOT periodically inspects every bridge with a clear span of more than 20-feet to examine structural integrity and look for evidence of scour. County bridges and culvert openings are generally sized to minimize floodway impacts, result in no more than 6–9 inches of water over the road surface during the Base Flood, minimize backwater increases to the water surface of the Base Flood (typically 3–4 inches, but not more than 1-foot), and protect piers and abutments against erosion.

- **Parks Division.** Every five years, the County undertakes a revision to its comprehensive master plan for parks and recreation. The revision cycle is conducted according to State guidelines and includes an evaluation of population growth and trends in park usage and demand. The most recent master plan, *Travis County Parks and Natural Areas Master Plan* was adopted by the Travis County Commissioners Court in May 2006. As part of the Plan update, this version of the master plan updated the goals and objectives of the previous master plan completed in 2000. As stated in the 2006 master plan, part of the mission of Travis County Parks is to "focus on the development of a system of greenways and riparian corridors that link parks and natural areas within the County." To achieve this mission, the Plan includes twelve goals (A – L) with supporting objectives. As demonstrated by approval of bonds in 2005 to support park development, the citizens of the County support the master plan's goal and objectives, which also include acquiring and managing land of significant environmental value and protecting and improving environmental quality of natural resources. This, in part, resulted in the acquisitions and demolition of properties in the Timber Creek subdivision, along Onion Creek.

- **Planning and GIS Program.** The Geographical Information System (GIS) technology used by Planning and GIS allows the graphical representation of spatial information to provide an organized view of a community, its environment, and its development impacts. Analysis of the interrelationships among many types of information is a key function of the Travis County GIS. The Digital Floodplain Insurance Rate Map (DFIRM) was prepared by FEMA and was effective September 28, 2008. Other types of data and map layers are available and were used to create the characterizations of hazards and risks in included in Section 5 and 6 of this Plan update.

- **Office of Emergency Management.** The Travis County Department of Emergency Services, Office of Emergency Management (OEM), provides for the safety of residents through emergency preparedness and response. Founded in 1992 to comply with State and federal regulations, OEM maintains the County's Emergency Operations Plan (EOP), which covers the County and 16 cities. The primary purpose of the EOP is to promote County preparedness in handling disasters by coordinating emergency planning and response, defining responsibilities, and establishing protocols. The County operates a joint Emergency Operations Center with the City of Austin. The OEM coordinates mitigation and recovery in cooperation with other governmental units.

- **Public Safety Answering Program** is a system that receives emergency calls and routes them to the appropriate police, fire, or EMS dispatcher. Outside the City of Austin, 13 Emergency Service Districts (ESDs) serve the County, providing fire and emergency medical services. The ESDs coordinate through the County if incidents require additional resources.

- **Facilities Management.** Facilities Management coordinates the construction of new County facilities, implements and monitors how those facilities are used, and coordinates the maintenance and renovation of the facilities. The Risk Management office manages property insurance on County facilities. The County's property insurance coverage for buildings and improvements has a $500,000 deductible. Covered losses include those associated with natural hazards, such as wind and lightning. Individual flood insurance policies are not maintained on County facilities located in flood hazard areas, although flood damage has been sustained by these facilities on a number of occasions. It is notable that most damaged facilities have been park and recreational facilities, some of which are not insurable under the NFIP because they do not qualify as insurable structures (which must be walled and roofed).

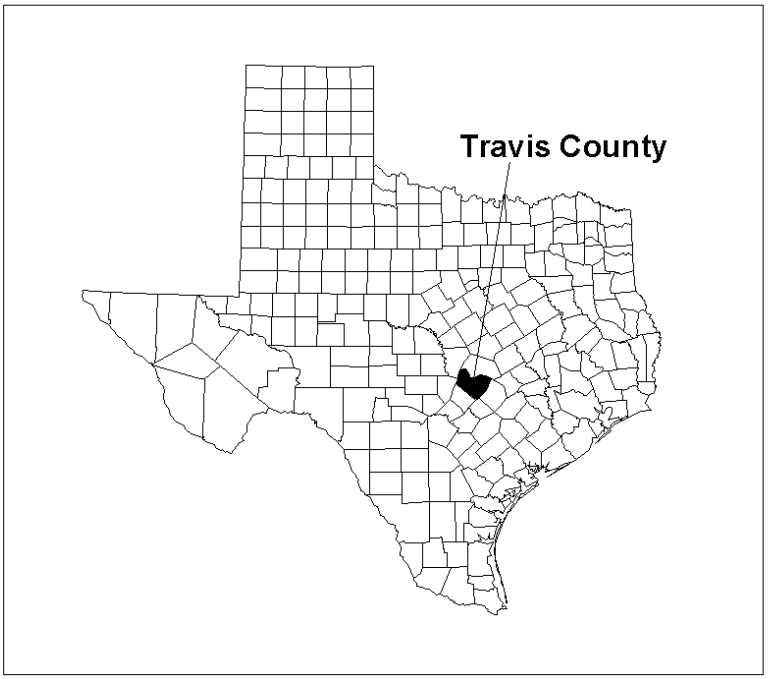
3.3 Background Information about Travis County

Prior to addressing the hazards that our community faces, this Plan Update presents a brief overview of Travis County, taking into account the geography, history, climate, transportation, community assets, and population and growth.

3.3.1 Travis County's Location and Geography

Travis County is located in Central Texas, 150 miles inland from the Gulf of Mexico (Figure 3-1). The County's geographic features are relatively diverse. The northern and western portions are characterized by the hilly and rugged topography of the Edwards Plateau and the Balcones Escarpment. The remainder of the County is characterized by the gently rolling hills and plains of the Blackland Prairies to the east and the Gulf Coast Plains to the south. As of 2010, Travis County consists of 1,024 square miles (including incorporated areas). The hilly, karst topography of the far western part of the County limits new development, leading to greater activity in those areas which contain more land that is subject to flooding.

Figure 3-1
State of Texas
Location Map Showing Travis County
(Source: Travis County Archives)



Soils throughout the County reflect the geographic diversity. Calcareous stony clays and some clay loams are found in the Edwards Plateau region. Moving eastward into the southern plains, the soils grade into dark calcareous clays interspersed with acidic sandy loams.

3.3.2 Planning Area

As mentioned earlier, this Plan Update is prepared for the unincorporated areas of Travis County and three of the 22 municipal jurisdictions within the County. The three jurisdictions include the Cities of Pflugerville, Sunset Valley, and Village of the Hills. Figure 3-2 displays the current municipal jurisdictions in Travis County, Texas. The map was developed by the Travis County Department of Natural Resources in March 2007 and identifies the 22 municipal jurisdictions. The County-wide map is followed by Figures 3-3 to 3-5, displaying the geographic location within Travis County for the three participating municipal jurisdictions.

Figure 3-2
Municipal Jurisdictions in Travis County, Texas
(Source: Travis County – Transportation and Natural Resources Department, March 2007)

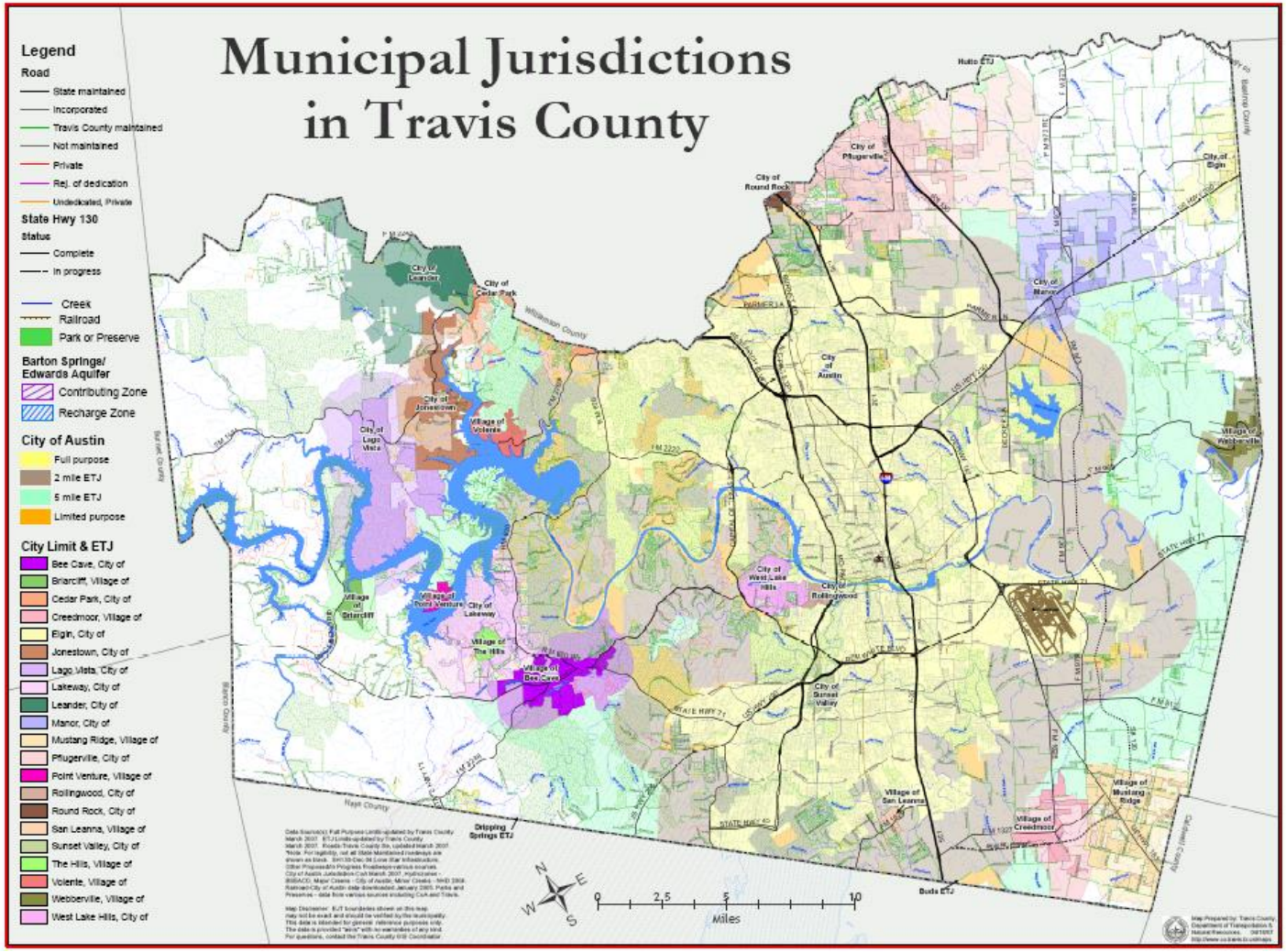


Figure 3-3 identifies the geographic location within Travis County for the City of Pflugerville. The City boundary is shaded pink on the map.

Figure 3-3
City of Pflugerville, Texas
(Source: Travis County – Transportation and Natural Resources Department, March 2007)

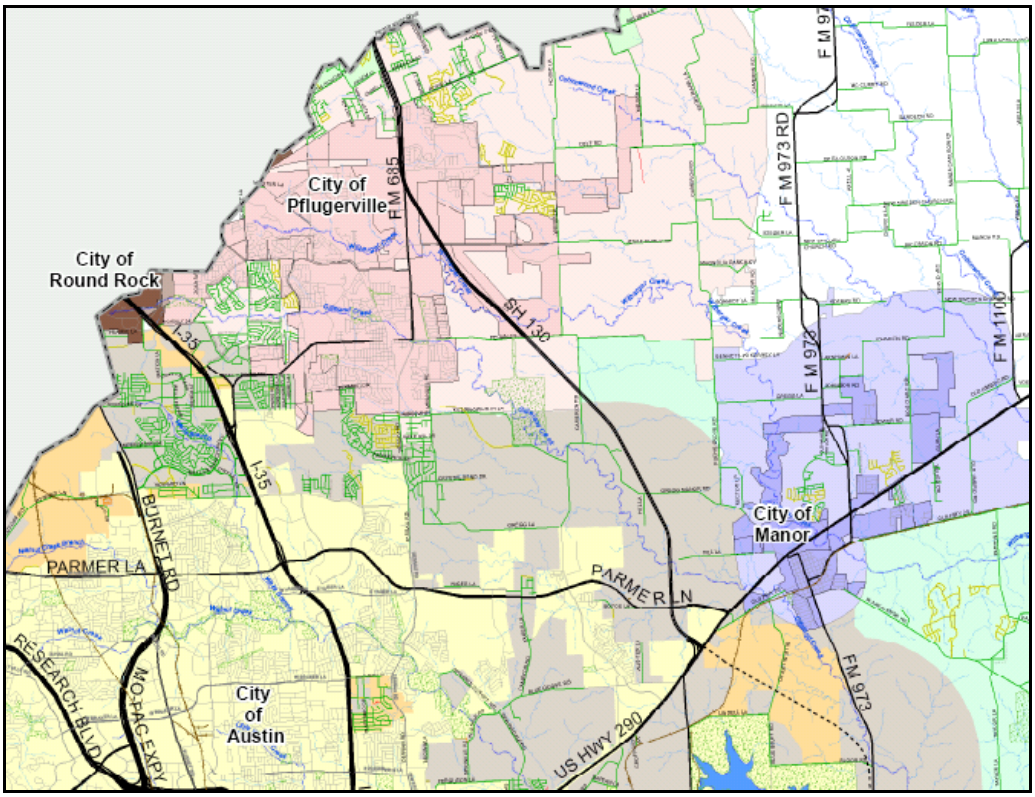


Figure 3-4 identifies the geographic location within Travis County for the City of Sunset Valley. The City boundary is shaded green on the map.

Figure 3-4
City of Sunset Valley, Texas
(Source: Travis County – Transportation and Natural Resources Department, March 2007)

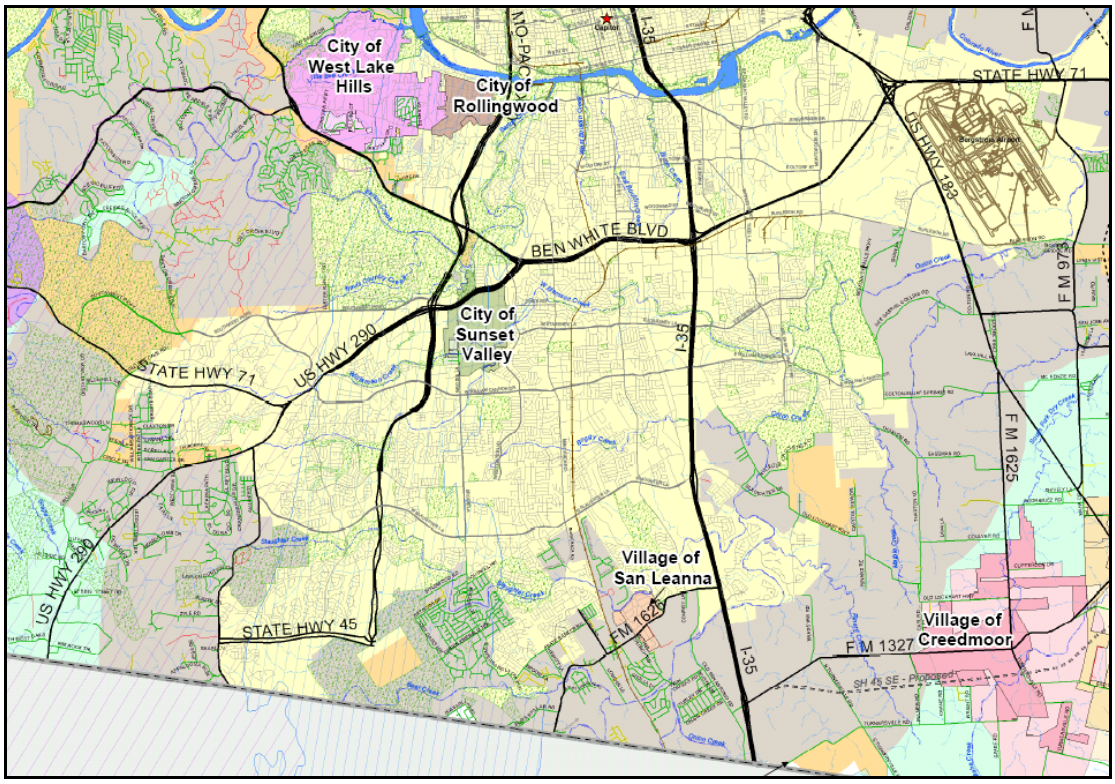
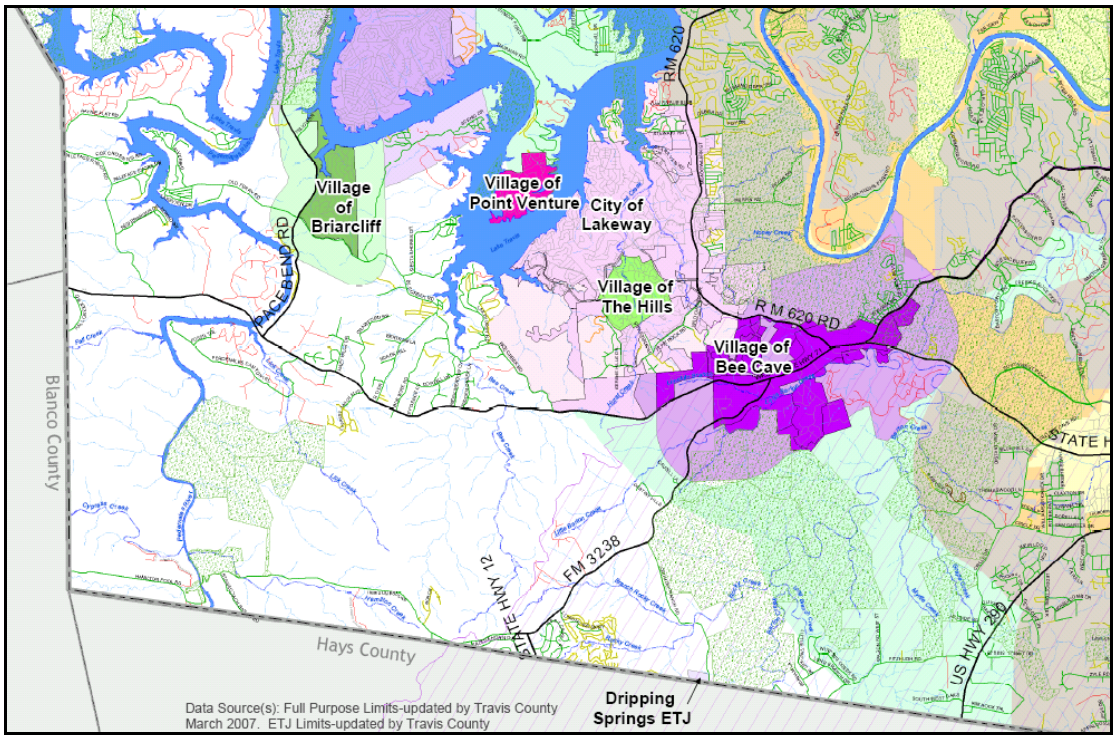


Figure 3-5 identifies the geographic location within Travis County for the Village of the Hills. The City boundary is shaded light green on the map.

Figure 3-5
Village of the Hills, Texas
(Source: Travis County – Transportation and Natural Resources Department, March 2007)



3.3.3 County History

Travis County, located in Central Texas, was established on January 25, 1840, by an act of the Fourth Congress of the Republic of Texas, days after the community of Waterloo had been renamed Austin and designated the capital city. The County was named after William Barret Travis, legendary commander of the Republic of Texas forces at the Battle of the Alamo.[1]

Travis County was created from Bastrop County, one of the original twenty-three counties formed in 1836. The encompassing area was known as the Travis District, which consisted of roughly 40,000 square miles. As mentioned earlier, Travis County currently consists of approximately 1,025 square miles.

The first election of County officials was held in February,1840, at which time the population was reported to be 856.[2] The first officially recognized courthouse was constructed in 1855. Since then, Travis County government has operated out of two additional Courthouses, including the ornate 1876 structure, and the current Courthouse building, which was constructed in 1930. Travis County and its

[1] *The Heman Marion Sweatt Travis County Courthouse, Austin, Texas: A Historical Perspective* (Austin, Texas, 2008).
[2] Handbook of Texas Online, Travis County.

government have grown rapidly since its formation. Offices such as the Commissioners Court, County Clerk, Treasurer, Sheriff, Courts of Law and Judges have been a part of Travis County government since establishment. Over the years, numerous new offices and departments have been added; currently there are over 40 departments, including 48 elected offices, within the County.[3]

3.3.4 Climate

The climate of the region is humid subtropical, with hot summers and relatively mild winters. A wide variation between maximum and minimum temperatures is experienced due to the interplay of warm and humid weather moving northward from the Gulf of Mexico and strong, polar fronts from the north. Prevailing winds are from the southeast and frequently persist for several days. The strongest winds are from the north, with recorded wind speeds in excess of 50 miles per hour.

Generally, the heaviest precipitation occurs as thunderstorms in late spring or early fall, and often is associated with tropical systems and hurricanes moving through the region. Rainfall averages about 33 inches per year and, although evenly distributed, the heaviest occurs in late spring or early fall, with much of it a direct result of thunderstorm activity associated with seasonal cold fronts.

3.3.5 Transportation

The principal highways in Travis County are Interstate 35 (I-35) and State Highway Loop 1 (known locally as MoPac). Other important arteries in the County and immediate vicinity are US Highway 183, US Highway 290, State Highway 71, and State Highway Loops 275 and 360. Further out, two toll roads, State Highway 45 and State Highway 130, also serve the metropolitan area.

3.3.6 Community Assets

Travis County's asset inventory comprises slightly more than 3 million square feet of owned assets, and about 35,000 square feet of leased assets. Assets include a typical range of government-owned and –operated facilities, infrastructure, fire and police facilities, and municipal buildings, among other types.

[3] Travis County. Travis County Archives. Austin, Texas. A Brief History of Travis County.

Population and Growth of the Planning Area

3.3.7 Population

The estimated population for Travis County for the year 2008 was 954,973, a 26% increase since 2000.[4] The population of the unincorporated area is estimated to be 172,650. As of 2000, the most recent reported by the US Census, the average population density in Travis County was 821 persons per square mile (the statewide average was 79.6 persons per square mile). The Texas Department of Human Services (TDHS) reports 16,152 births and 4,339 deaths in 2006. This rapid population increase contributes to development pressure and has the potential for long-lasting impacts on the quality of life.

Travis County is partitioned into four precincts for the purpose of election of and representation by precinct commissioners. As of July 2009, the geographic boundaries of the precincts are as shown in Figure 3-6.

Figure 3-6
Travis County Commissioners Precinct Map
(Sources: Travis County- maps (County website), Google Maps)

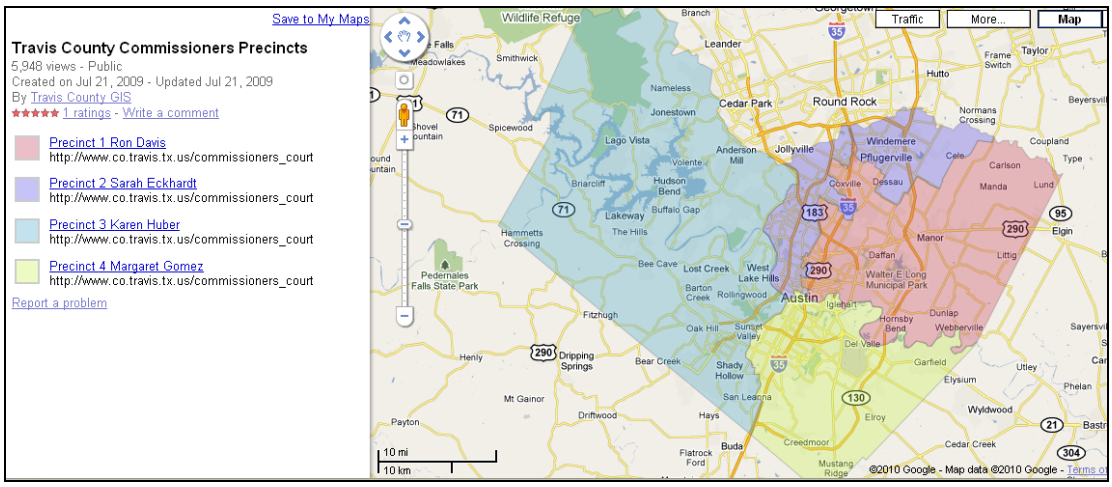


Table 3-3 shows population and approximate number of buildings in each precinct. The population estimates by precinct were developed by the Capital Area Metropolitan Planning Organization in 2008 for use in the Travis County 2035 Comprehensive Plan. The table shows that the highest population for unincorporated Travis County is located in Precinct 3. This unincorporated area of this precinct has a total population of 92,404. Buildings are grouped by size. Although not a definitive characterization, it is reasonable to assume that buildings with a footprint of more than 4,000 square feet are likely to be non-residential or multi-family residential buildings. The building statistics were provided by the Travis County Department of Transportation and Natural Resources and are current as of August, 2010.

[4] U.S. Census Bureau – State and County Quickfacts. Travis County, Texas.

Table 3-1
Travis County Population and Buildings, by Precinct
(Source: CAMPO, 2008, Department of Transportation and Natural Resources, 2010)

	Precinct 1	Precinct 2	Precinct 3	Precinct 4
Incorporated areas of Travis Co.	181,494	206,212	192,118	202,499
Unincorporated Travis County	34,295	32,873	92,404	13,078
Total Population	215,789	239,085	284,522	215,577
Buildings (smaller than 4,000 s.f.)	11,443	22,284	34,960	4,028
Buildings (larger than 4,000 s.f.)	287	536	1,476	122

Table 3-4 summarizes the total population and building statistics for the three jurisdictions participating in the 2010 Travis County Plan update. Of the three jurisdictions, the table shows that the City of Pflugerville has the highest population and number of housing units. Additional population statistics for the three participating jurisdictions can be found in Appendices H, I, and J.

Table 3-2
Population and Building Statistics for Pflugerville, Sunset Valley and Village of the Hills
(Sources: Us Census Bureau, City of Pflugerville - 2030 Plan, 2010 Sunset Valley Comprehensive Plan)

Municipality	Population	Housing Units
City of Pflugerville	50,850	5,239
City of Sunset Valley	575	154
Village of the Hills	1,492	585

Growth

As of 2008, the US Census Bureau reported 430,741 housing units in Travis County. This is a 25.5 percent increase over the past 10 years when the US Census Bureau reported 320,766 households in 2000. Approximately 64.2 percent of the housing units in Travis County are located in the City of Austin. As of 2000, the US Census reported 276,842 housing units in the City of Austin. The percentage of housing units located in the City of Austin is most likely slightly higher than 64 percent since the most recent US Census reporting statistics for housing units in Austin was 2000, while the Travis County statistics are for 2008. In 2000, the most recent year data was available, the US Census indicated median value of owner-occupied housing units was $134,700.[5]

The City of Austin is part of the Austin-Round Rock-San Marcos Metropolitan Statistical Area (MSA). This area covers a portion of several counties including; Travis, Williamson, Hays, Bastrop, and Caldwell Counties. The Austin MSA is one of the fastest growing areas in the Country, with the U.S. Census reporting that population has increased in this area from 1,249,763 people in 2000 to an

[5] US Census Bureau – State and County Quickfacts. Travis County, Texas.

estimate of 1,705,075 people in 2009.[6] Based on the results of the 2000 US Census, the Austin MSA was estimated to have a total of 496,004 housing units. The majority of the homes in the Austin metro area are 10–30 years old. This is notable because Travis County began managing mapped floodplain areas in March 1982, thus homes in flood hazard areas should be reasonably protected through elevation.

Travis County surrounds the City of Austin, the State capital. Table 3-5 identifies the employment percentage by category for Travis County. The Table shows that Federal, State, and local government positions comprise 22 percent of the employment in Travis County. The information provided in the Table is based on figures from Travis County Department of Health and Human Services for the year 2009. The statistics in the Table indicate that employment is not dominated by any single industry.

Table 3-3
Employment, by Category
(Source: Travis County – 2009 Community Impact Report Part 1: Community Condition Highlights)

Category	Percentage
Federal, State, and local Government	22%
Professional and Business Services	16%
Trade, Transportation, Utilities	15%

As of April 2010, the unemployment rate in Travis County was 7 percent. This figure is 1.2 percent lower than the State unemployment rate of 8.2 percent.[7] The unemployment percentage in the County has increased slightly since March 2002, when the unemployment rate was 5.4%.

Land Use and Development

The State of Texas has not specifically authorized counties to develop and adopt comprehensive plans for land use or zoning. Therefore, Travis County does not use these development tools. However, as detailed in Section 6, Table 6-10, development permits are the clearest indication of land use and development trends throughout Travis County. Between calendar years 2003 and 2009, a total of 21,791 development permits were issued in Travis County. The western half of Travis County (including Lake Travis) is experiencing the fastest development and growth. Additional details about future development trends can be found in Section 6.6 of the Plan Update.

[6] US Census Bureau. Annual estimates of the Population of Metropolitan and Micropolitan Statistical Areas. April 1, 2000 to July 1, 2009.
[7] Bureau of Labor Statistics. Economic News Release. Regional and State Employment and Unemployment Summary. April 16, 2010.

3.4 Special Consideration Communities

For the purpose of this Plan update, Travis County, Texas, is not a "special consideration community." The federal government defines special consideration communities to be those with 3,000 or fewer individuals that is a rural community, and is not a remote area within the corporate boundaries of a larger community. Such communities are economically disadvantaged, with residents having an average per capita annual income not exceeding 80% of the national per capita income, based on best available data. Further, special consideration communities have a local unemployment rate that exceeds by one percentage point or more, the most recently reported, average national unemployment rate.

The *Travis County 2006-2010 Consolidated Plan (August 2007 Amendment)* noted that slightly less than 107,000 residents (12.6%) were living at or below the poverty level. In 2009, the "federal poverty level" was defined as incomes of $10,830 (individual) and $22,050 (family of four) per year. Service gaps to low-income residents, including legal immigrants, were identified. Gaps included a shortage of subsidized housing and affordable housing. Since 1990, average rental costs in the area increased 12–16% per year, while construction of new rental units declined. The number of housing units without plumbing was reported to have steadily declined, from 1.2% in 1980 to 0.5% in 1990.

3.5 The Texas State Hazard Mitigation Plan

The State of Texas has long been aware that it is exposed to a variety of natural hazards. Of particular concern are flood hazards associated with thunderstorms, hurricanes, and tropical storms. The 2010 *State of Texas Hazard Mitigation Plan Update* is summarized below.

Originally prepared by TDEM to fulfill the requirements set forth by Congress in the Stafford Act (Section 409), the State's Hazard Mitigation Plan was completed in 2004 and was updated in 2007 and again in 2010 to satisfy new planning requirements prompted by the Disaster Mitigation Act of 2000.

The State's Plan acknowledges that people and property in Texas are at risk from a variety of hazards that have the potential to cause widespread loss of life and damage to property, infrastructure, and the environment. The Plan "establishes hazard mitigation goals, strategies, and specific measures designed to reduce the occurrence or severity of the consequences of hazards." It also documents procedures for implementation and administration of certain mitigation grant programs.

The State Hazard Mitigation Team is designated to coordinate and influence mitigation and is composed of several agencies that participate on the Emergency Management Board. Primary agencies are the Texas Division of Emergency Management; Texas Water Development Board Texas Department of Housing and Community Affairs; Texas Parks and Wildlife Department; Texas Department of Environmental Quality (formerly the Texas Natural Resource Conservation Commission); Texas Department of Transportation, General Land Office; Railroad Commission of Texas; Texas Department of Insurance; Texas Forest Service; and Texas Engineering Extension Service;. Brief summaries of each of these primary agencies are provided in the State Plan, noting key natural hazard mitigation measures associated with each agency. For the most part, existing measures are ongoing agency functions and responsibilities.

As currently structured, the State's Hazard Mitigation Plan contains attachments outlining specific strategies for dealing with hazards related to floods, tornadoes, hurricanes and tropical storms, wildfires, and drought. Strategies particularly pertinent to local jurisdictions are described below:

Flood Mitigation

Historically, floods are and continue to be one of the most frequent, destructive, and costly natural hazards facing the State of Texas, constituting over 90% of the disaster damage in the State. Texas, on average, suffers approximately 400 floods annually, double the number of the second highest State. State Strategies include: 1. Mitigating severe repetitive loss properties (SRL) either by elevation or acquisition. According the 2010 State Hazard Mitigation Plan, there were 3,162 properties on the SRL list (Statewide); 2. Redirect $6.1 million in taxes and license fees collected by TDI biannually and give to TWDB so they can fund floodplain management training compliance functions and other mitigation activities; and 3. Adopt a —No Adverse Impact Policy to ensure that future development activity both in and out of the floodplain be part of mitigation planning.

Tornado Mitigation

Tornadoes occur annually and most frequently in the northern two-thirds of the State caused by cool frontal systems that enter from the north and west, and in the remainder of the State primarily caused as a cascading hazard from tropical storms. State Strategies include: 1. Adopt and enforce building codes and/or design criteria for construction of storm shelters and the construction of safe rooms, 2. Promote and provide for expanded coverage options for standard peril and windstorm insurance coverage for public and private property; and 3. Promote and provide enhanced statewide awareness concerning the risks and consequences of tornadoes. Promote and provide enhanced warning capabilities.

Hurricane/Tropical Storm Mitigation

Texas has experienced 23 Federal disaster declarations due to hurricane/ tropical storm events, the most recent events being Hurricane Rita (DR-1607) that was declare on September 24, 2005, Hurricane Dolly (DR-1780) that was declared on July 24, 2008, Hurricane Ike (DR-1791) that was declared on September 13, 2008, and Hurricane Alex (DR-1931) that was declared on September 16, 2010. State Strategies include: 1. Continue to fund Coastal Erosion and Response Act Projects, and 2. Continue to promote the Hurricane Local Grant Program.

Wildfire Mitigation

With the semi-arid climate of the western, southern and panhandle counties of the State, wildland fires are most common in the spring and summer months, but can occur at anytime during the year. These wildland fires can have significant economic impact to local and regional economies. Threats to improved structures are a growing problem. State Strategies include: 1. Provide Urban Forestry Grants to improve community forestry programs, 2. Establish and implement burning standards, 3. Continue Urban Wildfire Interface, a traveling exhibit maintained by the Texas Forest Service (TFS) and 4. Continued maintenance of the TFS website that contains fire safe mitigation initiatives.

Drought Mitigation

Given the expanse of the land mass within Texas and the geographic location of 2/3rds of the counties of the State are located either in an arid or semi-arid climate, roughly those west of a North-South line formed by Interstate Highway 35, are almost always in varying stages of drought. During the past 15 years, the worst droughts in Texas occurred in 1996, 2000, 2002, 2006, and 2009. Mitigation Strategies include providing training and education programs for EMCs. The Texas Department of State Health Services maintains a web site that provides tips and actions for citizens, governments and medical facilities.

Section 4
Planning Process

Contents of this Section

4.1 IFR Requirements for the Planning Process
4.2 Agencies and Organizations Addressing Hazard Mitigation
4.3 Federal Mitigation Planning Requirements
4.4 Description of the Planning Process
4.5 How the Public and Jurisdictions were involved
4.6 Other Local Planning Mechanisms
4.7 Review and Incorporation of Plans, Studies, Reports and other Information

This Plan update was prepared in accordance with the guidelines provided by the Federal Emergency Management Agency (FEMA), advice from the Texas Division of Emergency Management (TDEM) and the Texas Water Development Board (TWDB). The 2004 Plan was used as a basis for this Plan update. The team reviewed each section of the 2004 Plan to address hazards and impacts that affected the planning area between 2004 and 2010. Each section was updated as required to incorporate these new data. In addition, status was provided for each action in the 2004 Plan and new actions were added as appropriate.

The *Hazard Mitigation Plan* serves several purposes. It sets the stage for long-term disaster resistance through identification of actions that will, over time, reduce the exposure of people and property to hazards. Completion of the original Plan and Plan update also provides additional credit under the NFIP's Community Rating System (CRS), and maintains eligibility for certain mitigation grant funds.

The Plan provides overviews of the natural hazards that threaten the County, the people and property exposed to those hazards, the planning process, how hazards are recognized in the County's normal processes and functions, and priority mitigation action items. The hazards summary and disaster history help to characterize future hazards. In terms of sheer numbers, more wildfire incidents occur. However, when magnitude of past events, the number of people and properties affected, and the severity of damage is taken into account, flood hazards clearly are the most significant natural hazard to threaten Travis County. Therefore, the Plan concentrates primarily on flood hazards.

This Plan update acknowledges that many buildings were built before the adoption of regulations for development in floodplains of the County's lakes and waterways. Current regulations require new development to recognize reasonably anticipated flood hazards. Older buildings, then, may reasonably be expected to sustain more property damage than newer buildings.

Travis County followed a well-established planning process to develop the original *2004 Hazard Mitigation Plan* and to complete this update. The update process included a Mitigation Planning Committee, which carried out most of the planning duties, and a Stakeholders group, which was responsible for reviewing the document at key points, and providing feedback.

4.1 Interim Final Rule Requirements for the Planning Process

IFR §201.6(c)(1): [*The Plan shall document] the planning process used to develop the Plan, including how it was prepared, who was involved in the process, and how the public was involved.*

IFR §201.6(b): *In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:*

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

IFR §201.6(c)(4)(ii): [*The Plan shall include a] process by which local governments incorporate the requirements of the mitigation Plan into other planning mechanisms such as comprehensive or capital improvement Plans, when appropriate.*

4.2 Agencies and Organizations Addressing Hazard Mitigation

At the federal level, the Federal Emergency Management Agency (FEMA) administers mitigation programs that foster planning and project implementation to address existing risks. At the State and regional levels, several agencies and organizations sponsor programs that support hazard mitigation. The following sections provide an overview of existing Texas agencies, organizations, and programs addressing hazard mitigation.

Texas Division of Emergency Management

The Texas Division of Emergency Management (TDEM) (www.txdps.State.tx.us/dem) is designated by the Governor as the State's coordinating agency for disaster preparedness, emergency response, and disaster recovery assistance. TDEM is also tasked with coordinating the State's natural disaster mitigation initiatives, chairing the State Hazard Mitigation Team, and maintaining the State of Texas Emergency Management Plan. TDEM supports and reviews local mitigation plans and administers Hazard Mitigation Grant Program funds provided through FEMA.

Texas Water Development Board

The Texas Water Development Board (TWDB) (www.twdb.State.tx.us) administers a variety of programs related to water. The TWDB is the agency charged with Statewide water planning and administration of

financial assistance programs for the planning, design, and construction of water supply, wastewater treatment, flood control, and agricultural water conservation projects. TWDB administers funding from FEMA under the Flood Mitigation Assistance Program (FMA) and Severe Repetitive Loss Program (SRL) (see Section 5.8). In addition, TWDB is designated by the Governor as the State Coordinating Agency for the National Flood Insurance Program. In this capacity, the agency assists communities with floodplain mapping matters and interpretation and enforcement of local floodplain management regulations.

Texas Commission on Environmental Quality

The Texas Commission on Environmental Quality (TCEQ; www.tceq.State.tx.us) is a diversified agency dealing with permitting, licensing, compliance, enforcement, pollution prevention, and educational programs related to preservation and protection of air and water quality and the safe disposal of waste. Related to mitigation of natural hazards are TCEQ programs that deal with drought, dam safety, flood control, and floodplain management.

Lower Colorado River Authority

Created by the Texas Legislature in 1934, the Lower Colorado River Authority (LCRA; www.lcra.org) is a conservation and reclamation district created to improve the quality of life in Central Texas serving all or parts of 58 counties. Through a system of dams, LCRA supplies electricity to more than one million Texans. It also serves numerous water customers, including cities, the rice-growing industry, and municipal utility districts. Other LCRA services include managing floods, protecting the quality of the lower Colorado and its tributaries, providing parks and recreational facilities, offering economic development assistance, helping water and wastewater utilities, and providing soil, energy, and water conservation programs.

LCRA manages Marshall Ford Dam (also known as Mansfield Dam), which impounds Lake Travis. One of the primary purposes of the dam is to manage flood flows to minimize downstream flood damage.

Texas Colorado River Floodplain Coalition

The Texas Colorado River Floodplain Coalition (www.tcrfc.org) is a partnership of cities and counties in the Colorado River basin seeking better ways to reduce and mitigate flood damage. Established by the Texas Legislature by resolution in 2001, it was formed in response to a combination of rapid growth, significant increases in the number of flood-prone homes and businesses, and devastating floods throughout the basin.

The mission statement of the Coalition reflects the cooperative spirit of the partnership:

> "Encourage comprehensive, consistent management of the floodplain along the Colorado River and its tributaries; provide a forum for data exchange; and facilitate a structured approach to managing the complex issues related to floodplain management."

A series of Coalition objectives are set forth under four categories: technical, emergency management, training, and legislative/legal/funding. An early initiative undertook an "independent review" of the floodplain management programs of Coalition partner communities. The LCRA provides administrative and technical support to the Coalition.

4.3 Federal Mitigation Planning Requirements

The Disaster Mitigation Act of 2000 requires State and local governments to develop and adopt natural hazard mitigation plans in order to be eligible for some types of federal assistance, including mitigation grants. The Act authorizes up to seven percent of HMGP funds available to a State after a disaster to be used for the development of State, tribal, and local mitigation Plans.

In addition to the Disaster Mitigation Act of 2000, mitigation planning requirements are set forth in various FEMA policies and guidance documents, including the Interim Final Rule of February 26, 2002, and the "386" series of mitigation planning how-to guides. There are five FEMA hazard Mitigation programs. The Flood Mitigation Assistance program, Hazard Mitigation Grant Program, Pre-Disaster Mitigation grant program, and the Severe Repetitive Loss program all require a FEMA approved Hazard Mitigation plan as a prerequisite to grant funding. The Repetitive Flood Claim program is the only FEMA mitigation program that does not require a Mitigation Plan.

NFIP Community Rating System (CRS) offers recognition to communities that exceed minimum requirements of the National Flood Insurance Program. Recognition comes in the form of discounts on flood insurance policies purchased by citizens. The CRS offers credit for mitigation plans that are prepared according to a multi-step process. As of the 2010 Plan update, the County is completing an application for entry into the CRS program.

4.4 Description of the Planning Process

How the Plan was Prepared and Updated

The Plan Update process followed the FEMA guidance document titled *Local Multi-Hazard Mitigation Planning Guidance (July 1, 2008)*. This document describes the Local Hazard Mitigation Plan regulations from the 44 Code of Federal Regulations (CFR) Part 201, and is FEMA's official source for defining the requirements for original and updated local hazard mitigation plans. The mitigation planning regulation at 44 CFR 201.6 (d) (3) states that a local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and re-submit it for approval within five years in order to continue to be eligible for mitigation project grant funding

This guide provides the structure for the process that was used to develop the Plan update. Other sections of this Plan include details about how the IFR requirements were met, and the process that was used to obtain and interpret data, and eventually make decisions in such areas as mitigation goals, as well as project and action priorities. These are discussed only generally in this section.

As part of the 2010 Plan Update, there was a particular focus on incorporating new hazard information, updating the County risk assessment, providing status on all prior actions, and identifying new actions.

Step 1 Organize Resources

Travis County used a standard organization to develop its original Hazard Mitigation Plan and for the 2010 Update. The Travis County Department of Transportation & Natural Resources (TNR) was charged by the Commissioners Court with coordinating a committee comprised of County departments that are responsible

for drainage permits, subdivision approvals, community development, parks and recreation, roads and bridges maintenance, public facilities, and emergency management.

The organization of the Plan update has three tiers. The Mitigation Planning Committee (MPC), the Stakeholders group, and Travis County Commissioners' Court/participating jurisdictions' City Council.

The Travis County Plan update was funded through a grant from the Texas Water Development Board. Early in the Update process, Travis County secured the services of a professional planning consultant to facilitate the process.

Composition of the Travis County Mitigation Planning Committee Team

As part of the update, government officials from several jurisdictions were members of the MPC. The MPC is comprised of the following individuals found in table 4-1:

Table 4-1
2010 Travis County Hazard Mitigation Plan Update, Mitigation Planning Committee

Team Member	Job Title	Organization
Pete Baldwin	Emergency Management Coordinator	Travis County Emergency Services
Stacy Moore-Guajardo	Assistant Emergency Management Coordinator	Travis County Emergency Services
Stacey Scheffel	OSSF Program Manager / Floodplain Administrator	Travis County Transportation and Natural Resources (TNR)
David Shore	GIS Coordinator	Travis County TNR
Melinda Mallia	Environmental Project Manager	Travis County TNR
Mickey Roberts	Senior Environmental Specialist	Travis County TNR
Don Ward	Road Maintenance, Bridge, Fleet Division Director	Travis County TNR
Brandon Wade	City Manager	City of Pflugerville
Jim McLean	Assistant Chief of Police	City of Pflugerville – Police Department
Chuck Hooker	Chief of Police	City of Pflugerville – Police Department
Clay Collins	City Administrator	City of Sunset Valley
Sara Wilson	Assistant City Administrator	City of Sunset Valley
Terry Browder	Emergency Management Coordinator	Village of the Hills
Dan Roark	City Administrator	Village of the Hills

Mitigation Planning Committee (MPC) Meeting Schedule

The County maintains a copy of the original Plan on the County website, or can be reviewed upon request.

The MPC and the consultant hired by the County were responsible for completing the Plan update. The MPC met twice during the Plan Update. The initial MPC meeting took place on April 30, 2010 at the Travis County Office of Emergency Management (OEM) in Austin, Texas. Some of the topics discussed at the first

MPC meeting included: the purpose of the Plan update, identify the MPC members and Stakeholders, discuss the planning process and mitigation strategies section, and review the request for information (RFI). The second MPC meeting was held on August 5, 2010 and was also held at the County Office of Emergency Management (OEM). Appendix A of the updated Plan includes minutes and attendees of all meetings.

Meeting 1	April 30, 2010
Meeting 2	August 5, 2010

MPC members had an opportunity to provide input and feedback on the content and process of the Plan Update during these meetings. The Stakeholders group was periodically contacted by email to review and provide comments on meeting minutes, the updated Plan structure, as well as the draft and final Plan updates. Copies of all meeting agendas, sign-in sheets, and minutes can be found in Appendix A of the updated HMP.

Composition of the Stakeholders Group

Early in the update process, the County determined that a group of interested organizations, neighboring communities, businesses, academia and individuals with an interest in the Travis County Plan update should be identified. This Stakeholders Group was provided regular updates on the planning process and given the opportunity to review the draft Plan Update at key points in its development. Members of the Stakeholders group were also invited to attend and participate in public meetings. This Stakeholder group, found in Table 4-2 below, was identified by the MPC.

As drafts of the Plan update were prepared, the County used email to distribute them to Stakeholders and requested that they provide comments. Stakeholders were requested to provide feedback through email or by telephoning the Travis County POC (Mr. Pete Baldwin) or a member of the consultant team. The consultant was responsible for archiving the comments and including them in edited versions of the Plan Update.

Table 4 -2
Travis County Hazard Mitigation Plan 2010 Update, Stakeholders Group

Group Member	Organization
Joe Gieselman	Travis County TNR
Jon White	Travis County TNR
Tom Weber	Travis County TNR
Dave Folwer	Travis County TNR
Steve Schiewe	Travis County TNR
Ed Schaefer	Capital Area Council of Governments
Jo Moss	Pflugerville Independent School District
John Gaete	Austin Independent School District
Jarred Thomas	Williamson County
Brad Bradford	Round Rock
Billy Atkins	City of Austin Homeland Security
Kevin Braun	Wildland Fire

Group Member	Organization
Rich Gray	Wildland Fire
Glen Gillman	City of Austin Water Utility
Carolyn Sudduth	Texas Division of Emergency Management
Gilbert Ward	Texas Water Development Board
Ivan Ortiz	Texas Water Development Board
Pat Schafer	FEMA – Region VI
Jim Weatherford	Texas General Land Office
Mitch Hibbs	Lower Colorado River Authority
Mike Segner	Texas Commission on Environmental Quality

Step 2 Assess Risks

In accordance with general mitigation planning practice, as well as the process FEMA established in its Planning "How-To" series of guides, the risk assessment forms the basis for the hazard mitigation Plan by quantifying and rationalizing information about how natural hazards affect the County. The processes used to complete the hazard identification and risk assessments, and the results of these activities, are described in detail in Sections 5 and 6 of this Plan update. The assessment determined several aspects of the risks of natural hazard faced by the County and each jurisdiction:

- The natural hazards that are most likely to affect the County
- How often hazards are expected to impact the County
- The expected severity of the hazards
- What areas of Travis County are likely to be affected by hazards
- How County assets, operations, people and infrastructure may be impacted by hazards
- How private and commercial assets, operations, and infrastructure may be impacted by hazards
- The expected future losses if the risk is not mitigated

Through a qualitative ranking (explained in detail in Section 5 of this Plan update), the MPC reduced the initial hazard profile list from eight to two. These are the predominant risks to the area: floods and tornadoes. The planning team completed risk assessments (calculations of expected losses) for these two hazards, in addition to the required profiling for the larger list of hazards. These findings were presented to the MPC, discussed by the group, and reviewed by the Stakeholders Group as the basis for later phases of the planning process. The results of the risk assessment were also made available to the public during the public presentations noted elsewhere in this Plan Update.

Step 3 Develop the Mitigation Plan/Update

Throughout the document there are cross references to Interim Final Rule and FEMA crosswalk criteria.

Early in the Plan update process, the MPC and consultant team completed a detailed review of every section of the existing plan, and prepared a comprehensive gap analysis. The purpose of this analysis was two-fold. First, it identified all the subject areas in the 2004 version of the Plan where specific updates were required. For example, census figures, the numbers and locations of City-owned buildings, impacts of recent

hazard events, and so on. The second purpose of the gap analysis was to ensure that the updated Plan is fully compliant and responsive to recent FEMA guidance, specifically the "Blue Book" of July 2008.

The gap analysis showed that while changes and updates were needed throughout the document, most of the modifications were relatively small, and did not require a significant initial public component such as focus groups or surveys.

The Plan update process took place in multiple steps:

MPC and Consultant	Detailed review of the 2004 version of the County HMP
MPC	Discussion, modifications and approval of updates
Consultant	Updated planning process and non-technical sections
Consultant	Updated technical sections (Hazard Identification and Risk Analysis (HIRA) and mitigation strategy)
Consultant and MPC	Review of complete first draft
Consultant	Modifications based on review, Stakeholder feedback
Consultant	Presentation to public, compile feedback
Consultant	Final draft
Consultant	Second public presentation, compile feedback
Consultant	Prepare and submit final draft
TDEM and FEMA	Review and letter of approvability
MPC, Commissioners' Court and City Councils	Final approval and adoption

Step 4 Implement the Plan and Monitor Progress

Once approved by FEMA and formally adopted by Travis County and the three participating jurisdictions, the 2010 Plan Update must be updated every five years in order for the County to maintain its eligibility for various FEMA grant programs. During this five year period, the Plan is periodically reviewed to ensure compliance with FEMA and the State of Texas requirements for Plan maintenance (See Section 8 – Plan Monitoring and Maintenance for more details). After the 2010 Plan update is approved, the County and Cities will attempt to implement specific actions to achieve the goals described in the Mitigation Strategies section. In addition to listing the mitigation goals and actions the County and Cities are pursuing, the section describes the progress the County has made towards reaching the individual goals and actions since the original Plan was adopted.

The Travis County Commissioners Court governs the County and has the final decision on what projects are funded and initiated. The City Councils have the same authority of each of the participating Cities. The action items fall under their jurisdiction and they will delegate the tasks of the action items. Therefore, the Commissions Court (or City Council) will coordinate with the County OEM, Floodplain Manager and Lead Manager for each mitigation item to accomplish the goals and action items

4.5 How the Public and Jurisdictions were Involved

During the 2010 Plan update, the public was involved by requesting their attendance and participation at a public presentation held during a Commissioners' Court meeting. The purpose of this meeting was to solicit input from the public and Commissioners' Court and to request approval from the Court to submit the Plan

update to the State and FEMA for review. Drafts of the Plan Update were available for public review, and the public was invited to provide input on the document. In accordance with legal requirements, the County published public notice about the presentation in the local newspaper two weeks beforehand. The ads explained the purpose of the meeting, and provided the date, time, and location of the meeting place.

The public had a second opportunity to review the final draft Plan prior to approval by the State and FEMA when the document was posted on the County website and placed at the Public Library. Prior to placing the update online and at the Library, the County placed an advertisement in *The Statesman* explaining that the County's HMP update was in the final draft stages and available for review. The County encouraged members of the public to review the draft and provide feedback. No comments or questions were submitted by the public during this time period. The advertisement can be found in Appendix B. The MPC also identified local Civic Groups located in or near Travis County. These groups were notified via email about the availability of the Plan update on the County's website and at the Public Library and encouraged review the draft Plan update.

4.6 Incorporating Mitigation Plan Requirements into Other Local Planning Mechanisms

As required by the FEMA Interim Final Rule that governs mitigation planning, actions from the County mitigation plan must be incorporated into other planning mechanisms, as applicable, during the routine re-evaluation and update of the County HMP. It should be noted that Counties in Texas, such as Travis County, have very little land use and zoning authority. Travis County, as well as the Cities of Pflugerville and Sunset Valley are members of the NFIP and have Floodplain Management Ordinances. When the municipalities or County update their Floodplain Ordinances, the requirements from this HMP will be included in the revisions. This HMP update will be made available to each committee leader responsible for revising their Floodplain Ordinances.

Both the County and the municipalities will use the specific actions from this Plan as part of their capital budgeting processes, in particular when projects require local match for federal grants. Where possible, the County will use elements of this HMP to supplement Community Rating System (CRS) planning and mitigation activities. The County will also look for opportunities to use the updated HMP in conjunction with drainage plans.

The County follows the International Residential Building Code guidelines. On September 1, 2009, Travis County adopted the provisions of House Bill (HB) 2833 enacted by the 81st Texas Legislator. By adopting the provisions, the County required that professional home builders use a version of the International Residential Code to construct new single family homes and duplexes. If the County decides to amend any of the International Residential Code, within the process of amending them, Travis County will take into account the requirements from this HMP.

4.7 Review and Incorporation of Plans, Studies, Reports and other Information

Other planning documents can be used as a valuable resource for integrating information related to hazard mitigation into the HMP. The Plan update included the review and incorporation of other Plans, studies, and reports that are applicable to the hazards discussed in the Plan.

The following Plans and other documents were considered during the Travis County Plan update: Onion Creek Interim Feasibility Report (October, 2006); Travis County Parks and Natural Areas Master Plan; The Texas State Hazard Mitigation Plan (2007),;Travis County Greenprint for Growth; and the Southwest Travis County Growth Dialog. This HMP Plan update has been made available to each committee leader responsible for updating these other Plans. In addition, any changes or updates to the Flood Insurance Study (FIS), Flood Insurance Rate Maps (FIRMs) are reflected in the Plan update.

The specific Plans, Studies and Reports are listed below along with a discussion on how they were incorporated into the HMP Update.

- **Onion Creek Interim Feasibility Report (October, 2006):** In October, 2006 the United States Army Corps of Engineers (USACE) completed the *Onion Creek Interim Feasibility Study*. The report included two volumes with Volume II dedicated to Onion Creek which is partially located in both Hays and Travis County. The report was completed in coordination with the Lower Colorado River Authority (LCRA) and three additional cost sharing sponsors- the City of Austin, Travis County, and City of Sunset Valley. The Onion Creek portion of the study was reviewed to identify details about flood hazard data and some of the more historical flood events that have occurred within the Travis County portion of the Onion Creek watershed
- **The 2007 and 2010 Texas State Hazard Mitigation Plans**: See Section 3.5 for a detailed summary and overview of the 2010 Texas State Plan. The goals and strategies in the State Plan were considered by the MPC as the planning team updated the Travis County Plan, and to the extent possible, the team patterned the update to reflect the spirit and details of the State document.
- **Floodplain Ordinances:** Travis County, Sunset Valley, and Pflugerville participate in the National Flood Insurance Program (NFIP) and therefore have adopted floodplain ordinances (Village of the Hills does not participate in NFIP). These ordinances were reviewed to incorporate any new requirements. Discussion of the updated Floodplain Ordinances can be found in Section 7.2, Mitigation Goals and Accomplishments of the Updated Plan.
- **Travis County Parks and Natural Areas Master Plan (2006):** The Parks Master Plan was used to identify areas of the County that are set aside for greenways and riparian corridors. A summary of the Plan was included in Section 3 of the Plan update.
- **Travis County Flood Insurance Study**: The revised FIS for Travis County is dated September 26, 2008. This FIS compiles all previous flood information and includes data collected on numerous waterways. The FIS was used to identify floodprone areas of the County (See Section 5.4.1).
- **Travis County Greenprint for Growth:** This report was published in October 2006 and applies Geographical Information System modeling to recommend land conservation priorities. The model identifies currently unprotected areas in Travis County that offer the highest conservation benefit based on locally identified goals and criteria. This report was used to identify proposed conservation areas in Travis County as part of the future development trends section (See Section 6.6).
- **Southwest Travis County Growth Dialog:** The report was developed and funded by Travis County and LCRA to seek community and stakeholder input on growth-related issues in southwestern Travis County. The Advisory Panel Final report was completed in May 2005.

This report was used to identify future development trends in southwestern Travis County (See Section 6.6).

- **Travis County Drainage Basin Study:** The report was completed and approved in 2009, and included the results of extensive drainage studies throughout the County, as well as numerous drainage improvement projects. These include dozens of road drainage projects, and seven subdivision drainage projects. All of these possible projects are prioritized based on a series of criteria that were developed for the report. The 2010 HMP update incorporates numerous projects from this study. These are listed in the main table in Section 8 of this document.

Section 5
Hazard Identification and Profiling

Contents of this Section

5.1 IFR Requirement for Hazard Identification and Profiling
5.2 Hazard Identification
5.3 Losses Due to Major Disasters
5.4 Overview of Type and Location of All Natural Hazards that can affect Travis County
- 5.4.1 Floods
- 5.4.2 Wildland, grass/brush fire
- 5.4.3 Tornadoes
- 5.4.4 Drought
- 5.4.5 Severe Storms
- 5.4.6 Winter Storms
- 5.4.7 Seismic/Earthquakes
- 5.4.8 Landslide

5.5 Methodology for Identifying Natural Hazards for Additional Analysis

5.1 IFR Requirement for Hazard Identification and Profiling

IFR §201.6(c)(2)(i): *[The risk assessment shall include a] description of the … location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.*

5.2 Hazard Identification

In accordance with IFR requirements, and as part of its efforts to support and encourage hazard mitigation initiatives, Travis County's Mitigation Planning Committee (MPC) prepared this general assessment of the hazards that have potential to impact the County. The following subsections provide an overview of past hazard events in Travis County and brief descriptions of the potential for future losses. Section 6 (Risk Assessment) includes much more detailed information about past and potential losses (risk) from a subset of the most significant hazards in Travis County.

The term "planning area" is used frequently in this section. This term refers to the geographic limits of the County, but specifically excludes jurisdictions that are not included in the Plan, except where noted. The risk assessment section addresses the effects of hazards on Travis County and its citizens.

Overview of Travis County's Natural Hazards History

According to the National Oceanic Atmospheric Administration's (NOAA) National Climatic Data Center (NCDC) database (and other sources), between 1950 and 2009, Travis County has experienced:

- 113 Floods
- 61 Tornadoes (25 F0s, 24 F1s, 8 F2s, 3 F3s, and 1 F4)
- 6 Droughts
- 174 Severe thunderstorms
- 10 Winterstorms
- 0 Seismic/Earthquake

Numerous federal agencies maintain a variety of records regarding losses associated with natural hazards. Unfortunately, no single source is considered to offer a definitive accounting of all losses. The Federal Emergency Management Agency (FEMA) maintains records on federal expenditures associated with declared major disasters. The U.S. Army Corps of Engineers (USACE) and the Natural Resources Conservation Service (NRCS) collect data on losses during the course of some of their ongoing projects and studies. Additionally, NOAA and the NCDC collect and maintain data about natural hazards in summary format. The data includes occurrences, dates, injuries, deaths, and costs. The basis of the cost estimates, however, is not identified.

Some Historic Events: Greater Austin Area

- *1869: rain lasted 64 hours, damage was catastrophic*
- *1900: 7-inch rain storm created a wall of water claiming 23 lives*
- *1913: 10-day storm with 14 inches of rain*
- *1974: flooding claimed 13 lives*
- *1981: 10-inch rain resulted in $35.5 million damage and killed 13 people*

In the absence of definitive data on some of the natural hazards that may occur in Travis County, illustrative examples are useful. In 1965, the federal government began to maintain records of events deemed significant enough to warrant declaration of a major disaster by the U.S. President. Since 1965, Travis County has received five Presidential Disaster Declarations which are included as part of the summary below in Table 5-1. Of the five Presidential Disaster Declarations that Travis County received between 1965 and 2009, 4 were flood related and one tropical storm. This list is not meant to capture every event that has affected the area, but rather to highlight significant events that have occurred here in the past. A number of these events caused property damage and injuries.[8] These figures and events are discussed in more detail in the hazard-specific subsections that follow.

Table 5-1
Natural Hazards and Declared Major Disasters in Travis County (1965 to 2009)
(Sources: Public Entity Risk Institute (PERI) website, FEMA, NCDC database)

Date	Nature of Event
July, 1869	**Flooding**. Probably the biggest flood in Texas history - Produced by heavy rain, which extended into Northwest Texas - Tremendous flooding down the Colorado River from the headwaters to the mouth. The rise was estimated at forty-six feet. The mass of waters rushed down from the narrow and confined channel between the mountains above, to the wider one below, with such fearful velocity that the middle of the stream was higher than the sides.
September 6, 1921	**Flooding.** A tropical storm formed the morning of Sep 6, 1921 - made hurricane intensity that afternoon - made landfall near Vera Cruz the early morning of Sep 7 - veered right and fell below depression intensity just as it crossed the Rio Grande. The storm total was 39.7" in 36 hrs - With 215 drownings Statewide, this was the deadliest flood in Texas history.
June 9- 15, 1935	**Flooding.** During the peak of normal flood season – the storm stalled west of Central Texas for six days. A low-level jet from Gulf and mid and upper level flow off Eastern Pacific over Central Texas caused widespread, disastrous flooding over the Texas Hill Country.

[8] National Oceanic and Atmospheric Administration (NOAA) – National Climatic Data Center

Table 5-1
Natural Hazards and Declared Major Disasters in Travis County (1965 to 2009)
(Sources: Public Entity Risk Institute (PERI) website, FEMA, NCDC database)

Date	Nature of Event
September 11, 1952	**Flooding.** In 1952 during the worst drought in Texas history, a disastrous flood occurred. This flood followed the El Nino winter of 1951/1952. The highway 281 bridge was washed away and destroyed at Johnson City on the Pedernales River. Major flooding also passed down from the mid Guadalupe River.
December 25, 1991 (DR-930)	**Flood.** Heavy rains produced the historical maximum flood on Lake Travis. Residents and businesses affected in Travis County were primarily those situated within the flood pool of Lake Travis, along the Colorado River, and along the creeks in the southeast part of the County that feed into the Colorado river. Federal declaration was for Individual Assistance only. (DR 930)
1994	**Wildfires/Brush Fire.** One of the worst brush fires in Travis County history, the "Dessau Road" fire burned over 600 acres, destroyed two abandoned buildings, and damaged a fire truck. Eleven fire departments were involved in containing and extinguishing the blaze.
April 5, 1996	**Lightning**. Lightning struck a 51-year-old visitor from Scotland as he was playing golf in the southeast part of Austin. He remained in critical condition for nearly 2 weeks after the strike, and died on April 13th.
May 27, 1997	**Tornado**. The (F4) Pedernales Valley tornado began on the shore of Lake Travis, destroying trees and a floating marina, where nearly all of the watercraft were destroyed. Numerous trees were twisted and uprooted, a Southwestern Bell building housing telephone switching equipment destroyed, and 50 houses/mobile homes destroyed. The only death associated with this tornado occurred when a man's mobile home was demolished and his vehicle tossed several hundred feet. Survey team members were unable to determine whether he was in the mobile home or had left it to drive away.
June 22, 1997 (DR-1179)	**Lake Travis Flood.** Heavy rains inundated more than 100 homes in the flood pool of Lake Travis. Additionally, homes in southeast Travis County along several creeks were affected by this event. Residential damage was estimated to be over $1M.
October 17, 1998 (DR-1257)	**Flood.** Hurricane Georges caused extensive flooding throughout the County. The storm dumped over 8 inches of rain on Travis within a 24-hour period. Roads, culverts, and other public facilities sustained over $200,000 in damages.
July 23, 2000	**Excessive Heat.** A 2-year-old boy died of heat stroke. He had a temperature of 108 degrees when he reached the hospital. He was left on the floor of a sunroom and his mother had fallen asleep. A 72-year-old woman also died of heat stroke. Although air conditioning was available in her home, she had not turned it on.

July 31, 2000	**Drought.** In spite of the rainfall east of I-35 in June, the severe drought that began early in 2000 across the southwest parts of South Central Texas spread again in July to cover all but the southeast counties. Little to no rain was recorded across these counties in July, and nearly all river levels were reported to be low. Aquifer levels and lake levels were approaching all-time low readings, and strong conservation measures were enacted across much of the area. Numerous small creeks and streams ceased flowing. Agricultural activities were essentially brought to a halt.
November 15, 2001	**Flood and Flash Floods**. Heavy rains caused flash flooding and power outages for several hours to almost 40,000 homes. Most low-water crossings flooded and dozens of rescues were required. More than 80 people were evacuated from around the Onion Creek area south of Austin. Onion Creek went above flood stage, in some of the worst flooding since October of 1998, cresting at 36.5' (flood stage is 17.0'). There were two deaths, 50 injuries, and $500,000 in property damage as a result of these storms.
June 26, 2002	**Hail, Thunderstorms, and Wind.** High winds and large hail struck Lake Travis, causing damage to windows and roofs of homes and boats in the area. The worst damage occurred when the high winds shoved a boat into the wall at Mansfield Dam with sufficient force to sink the boat. Severe thunderstorm winds knocked down trees across the city of Austin. Many of these trees fell on utility lines, knocking out power to one thousand residents for several hours.
July 01, 2002 (DR-1425)	**Flood and Flash Floods.** Heavy rains fell over a four-day period causing damage to homes, roads, and bridges. Barton Creek crested at 17.9 feet, where flood stage is 11.0 feet. Onion Creek crested at 23.8 feet, where flood stage is 17.0 feet. There was one death and significant property damage as a result of these storms. Federal emergency declaration – IA only.
June 28, 2007 (DR-1709)	**Severe Storms, Tornadoes, and Flooding.** The heavy rains produced flash flooding along Interstate Highway 35 corridor from Georgetown southward to San Antonio on the morning of June 28, 2007. Heavy thunderstorms over northern Travis and southern Williamson Counties produced two to four inches of rain with localized areas receiving higher amounts. The highest rain total in Travis County was six inches reported in Jollyville.

5.3 Losses Due to Major Disasters

No definitive record exists of all losses – public and private – due to disasters for Travis County. For the United States as a whole, estimates of the total public and private costs of natural hazards range from $2 billion to over $6 billion per year. Most of those costs can only be estimated. In most declared major disasters, the federal government reimburses 75% of the costs of cleanup and recovery, with the remaining 25% covered by the State and affected local jurisdictions.

The Federal Emergency Management Agency's estimate of its expenditures in the State of Texas for flood disasters alone for the period from 1991 through 2009 exceeds $7 billion. This period includes Tropical Storm Allison, which inflicted damages in excess of $1 billion, and Hurricanes Rita and Ike, which inflicted damages in excess of $4B. These costs, which do not include costs incurred by other federal agencies or by State and local agencies, include:

- Public assistance for debris removal, emergency works, roads and bridges, flood control facilities, public buildings and equipment, public utilities, and parks and recreational facilities;
- Assistance paid out for individual and family grants, emergency food and shelter, National Flood Insurance Program payments, and other assistance to individuals; and
- Funds set aside to support hazard mitigation grants.

Travis County has been part of five Presidential Disaster Declaration and received federal hazard mitigation funds to support the following mitigation initiatives:

Table 5-2
FEMA Mitigation Funding in Travis County

Mitigation Funding in Travis County					
Program	Year	Location	Federal Funds	Project Type	# or Properties Acq
	1997		$ 6,000.00	Encoder/Decoder	
HMGP DR 1257	1998	Timber Creek	$ 1,200,000.00	Acq/Demolition	40
FMA	2004		$ 35,000.00	Plan Development	
FMA	2006	Thoroughbred Farms Graveyard Point	$ 562,500.00	Acq/Demolition	3 1
PDM	2006	Timber Creek	$ 300,000.00	Acq/Demolition	10
HMGP DR 1697	2008	Thoroughbred Farms	$ 240,000.00	Acq/Demolition	4
FMA	2009	Plan Update	$ 30,000.00	Plan Update	
Total			$ 2,373,500.00		58

Natural Hazard Related Deaths, Injuries and Property Damage

According to the NCDC database, Travis County has experienced 23 deaths and 250 injuries from natural hazards in the period from 1950 to 2009.[9] Property damage from natural hazards in Travis County during this same time period was estimated at slightly more than $810 million.

5.4 Overview of the Type and Location of Natural Hazards that can affect Travis County

The MPC determined that the focus of the Plan update should be on natural hazards and therefore hazardous materials - which was included in the original plan - was deleted in the 2010 version.
In the initial identification process of this Plan update, the MPC catalogued potential hazards to identify those with the most chance to significantly affect the County. The hazards include those that have occurred in the past and may occur in the future. A variety of sources were used in the investigation. These included national, regional, and local sources such as websites, published documents,

[9]National Oceanic and Atmospheric Administration (NOAA) – National Climatic Data Center

newspapers, databases, and maps, as well as discussion with the MPC staff. In the initial phase of the planning process, Travis County's MPC identified eight natural hazards and the risks they create for the County, its material assets, operations, and staff. These hazards were selected for inclusion in the Plan by the MPC. The hazards selected to be profiled include the following:

- Floods
- Wildland/grass/brush fire
- Tornadoes
- Drought
- Severe storms
- Winter storms
- Seismic/Earthquake
- Landslides

The following section profiles the eight hazards listed above, and includes descriptions of the hazards, location and extent of the hazards, severity of the hazards, impact on life and property, and past occurrences.

For each hazard profiled in Section 6.4, the planning team assigned a high, medium, or low probability of future occurrences. The hazard probability was assigned based on calculating the annual percent probability of occurrence by dividing the number of previous events by the duration in years of historical data. Table 5-3 summarizes the annual percent probability ranges for assigning the low, medium, and high probability for a particular hazard. Note that the percent ranges in the Table below are not exact probabilities and are estimates made by the planning team, intended to be used as a general guide for future planning purposes. Also note that future probability is only one component of the risk calculation. Some hazards, such as major hurricanes and earthquakes, have a low probability but potentially very high impact on life and property in the planning area.

Table 5-3
Annual Percent Probability Ranges

Probability	Annual Percent Probability Range (%)
Low	1-9
Medium	10-24
High	25-100

5.4.1 Floods

Description of the Flood Hazard

Flooding is defined as the accumulation of water within a water body and the overflow of excess water onto adjacent floodplain lands. The floodplain is the land adjoining the channel of a river, stream, ocean, lake, or other watercourse or water body that is susceptible to flooding.

Hundreds of floods occur each year in the United States, including overbank flooding of rivers and streams and shoreline inundation along lakes and coasts. Flooding typically results from large-scale weather systems generating prolonged rainfall. Flooding in Travis County can be the result of the following weather events: hurricanes, thunderstorms (convectional and frontal), storm surge or winter storms. For a more detailed description of flood hazards visit FEMA's web site on hazards, http://www.fema.gov/hazard/.

Location and Extent of the Flood Hazard

The Flood Insurance Rate Maps (FIRMs) prepared by FEMA provide an overview of flood risk, but can also be used to identify the areas of the County that are vulnerable to flooding. FIRMs are used to regulate new development and to control the substantial improvement and repair of substantially damaged buildings. Flood Insurance Studies (FISs) are often developed in conjunction with FIRMs. The FIS typically contains a narrative of the flood history of a community and discusses the engineering methods used to develop the FIRMs. The study also contains flood profiles for studied flooding sources and can be used to determine Base Flood Elevations for some areas.[10]

The revised FIS for Travis County is dated September 26, 2008. This FIS compiles all previous flood information and includes data collected on numerous waterways. Review of the FIS indicates that

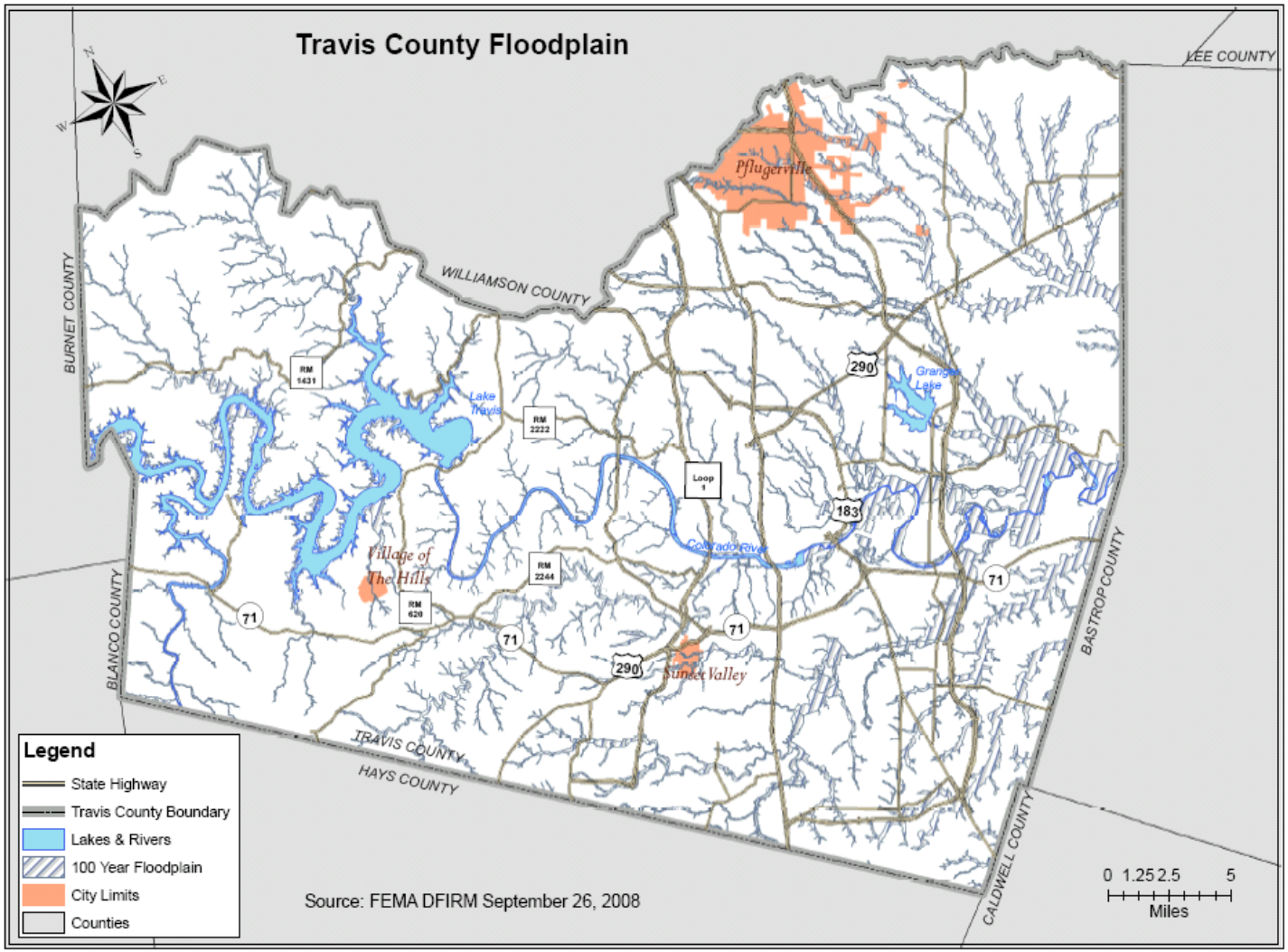
> Stream channels along the north and west of the Balcones Escarpment tend to be narrow, with rock beds and banks of high relief. Because soils in these areas are relatively nonporous, there is considerable runoff and, hence, a possibility of flash flooding. As the soils change into clay and sand toward the south and east, the stream channels widen, increasing the area of floodplain. [11]

Certain tributaries of the Colorado River within Travis County have experienced significant flooding in the past. The FIS indicates that the flood of September, 1952 produced a peak discharge along the Pedernales River, a tributary of the Colorado River, not seen since 1869. Sections of the Llano River have also been susceptible to flooding in the past.

Figure 6-1 identifies the Special Flood Hazard Areas (or 100-year floodplain) for Travis County. The map shows the 100-year floodplain is predominately found along Lake Travis, Lake Austin, and the Colorado River. At 146 square miles, the 100-year floodplain makes up 14.7 percent of the total land area in Travis County (total land area is 989 square miles, and total County area, including water bodies and incorporated cities, is 1,024 square miles). Floodplain maps for the Cities of Pflugerville, City of Sunset Valley, and the Village of the Hills can be found in Appendices H, I, and J respectively.

[10] FEMA –Flood Insurance Study definition
[11] FEMA. Travis County Flood Insurance Study (FIS), Page 18

Figure 5-1
Travis County Floodplain Map
(Sources: FEMA – DFIRM, Travis County –Transportation and Natural Resources Department)



FIRMs for Travis County show the following flood zones:

- AE Zones along rivers and streams for which detailed engineering methods were used to determine Base Flood Elevations. AE Zones (or A1-30 Zones) are shaded in gray. Most of the waterways mapped using detailed methods have designated floodways.
- A Zones or "approximate" flood zones, where detailed information on the Base Flood Elevations (elevation to which flood waters associated with the 1-percent-annual chance flood are predicted to rise) has not been developed. A Zones are shaded in gray.
- B Zones and Shaded X Zones, which are areas of "moderate" flood hazard, typically associated with the 500-year flood (or 0.2% annual chance).
- C Zones and Unshaded X Zones are areas of "minimal" flood hazard, typically considered to be "out of the floodplain." Although local drainage problems and ponding may still occur, these minor flood problems typically are not shown on the FIRM.

Major flood protection is provided by a system of dams and reservoirs developed along the Colorado River that stretches from Lake Buchanan in Llano and Burnet Counties to Lake Austin, the site of the Tom Miller Dam (formerly Lake Austin Dam). Six dams comprise the system, stretching like massive steps down the length of the lower Colorado River. The six dams are maintained by the Lower Colorado River Authority. Below this chain lies the smaller channel lake, Town Lake, which is impounded by Longhorn Dam, built and maintained by the City of Austin. Travis County has adopted ordinances for subdivision design and drainage, and floodplain management regulations. The City of Austin has installed a Flood Early Warning System.[12]

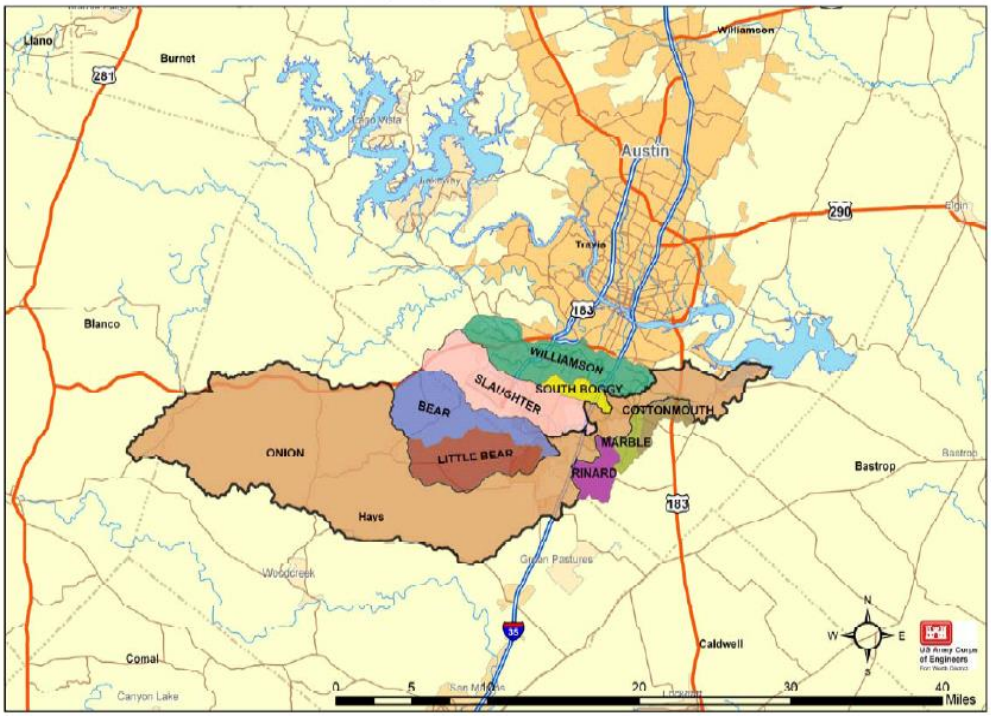
Onion Creek Watershed

In October, 2006 the United States Army Corps of Engineers (USACE) completed the *Onion Creek Interim Feasibility Study*. The report included two volumes with Volume II dedicated to Onion Creek which is partially located in both Hays and Travis County. The Onion Creek portion of the study was reviewed to identify details about flood hazard data and some of the more historical flood events that have occurred within the Travis County portion of the Onion Creek watershed. The report was completed in coordination with the Lower Colorado River Authority (LCRA) and three additional cost sharing sponsors that included the City of Austin, Travis County, and City of Sunset Valley.

The Onion Creek watershed encompasses approximately 343 square miles and is located primarily in southern Travis and northern Hays Counties with a minor portion of the upper portion of the basin extending into eastern Blanco County. The longest stream length, from the headwaters to its confluence with the Colorado River, is approximately 78 river miles. Major tributaries on Onion Creek include Cottonmouth, Williamson, Marble, South Boggy, Slaughter, Rinard, Bear and Little Bear Creeks.[13] Figure 5-2 identifies the Onion Creek Watershed.

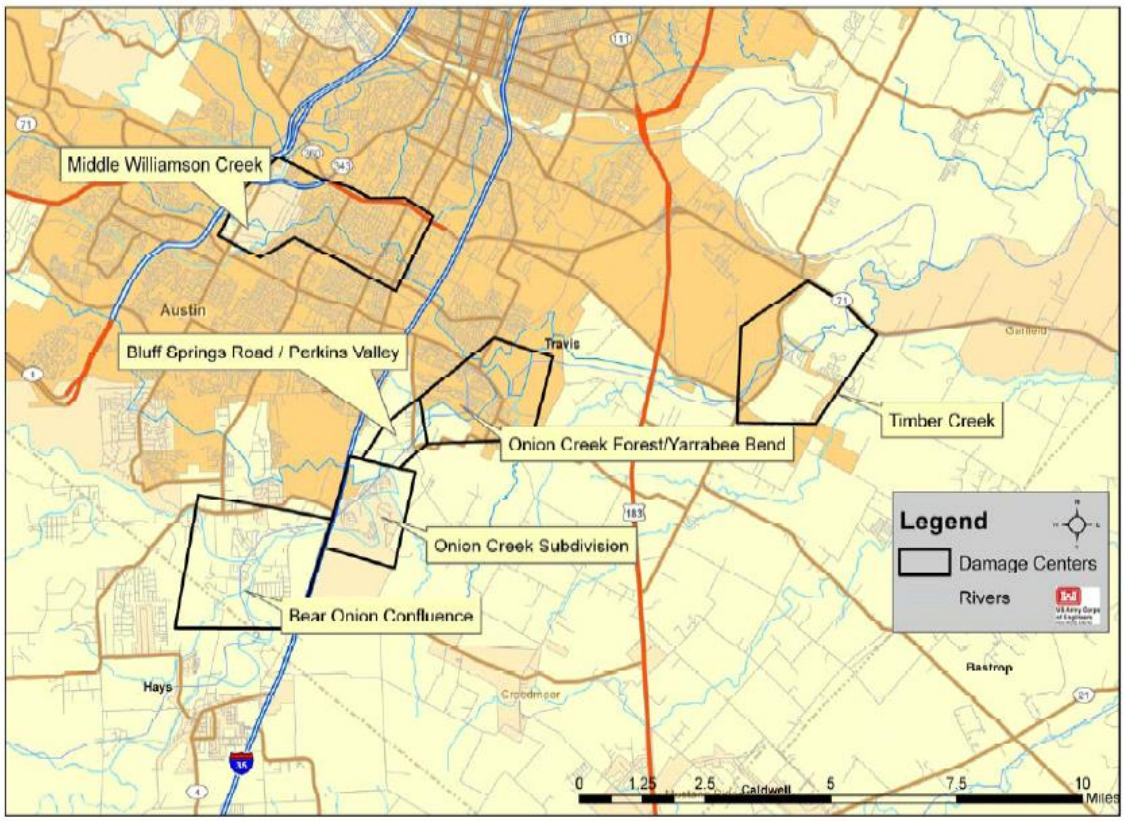
[12] Travis County Flood Insurance Study (FIS)
[13] USACE Onion Creek Interim Feasibility Study, October 2006

Figure 5-2
Onion Creek Watershed Location Map
(Source: USACE – Onion Creek Interim Feasibility Study)



Although the feasibility study covered the entire Onion Creek watershed, the primary focus was limited to six specific areas of interest within the Onion and Williamson Creek Watersheds. Figure 5-3 shows the designated areas of interest for the study area. Three of these areas are located in the unincorporated areas of Travis County and the City of Sunset Valley. The three areas include Timber Creek, Onion Creek Subdivision, and Rear Onion Confluence. Recent flood events in the Onion Creek watershed are described in the *Occurrences of the Flood Hazard* subsection.

Figure 5-3
Designated Areas of Interest within Onion Creek
(Source: USACE – Onion Creek Interim Feasibility Study)



Severity of the Flood Hazard

Flood severity is measured in various ways, including frequency, depth, velocity, duration and contamination, among others. In Travis County, characterizing the severity of the flood hazard depends on what part of the County is being considered, but generally speaking the issues relate to how often floods occur. Historically, floods are and continue to be the most frequent, destructive, and costly natural hazard facing the State of Texas. Most recently, the County has been impacted by four significant flood events: in 1997, 1998, 2001, and 2007.

Impact on Life and Property

The National Climatic Data Center (NCDC) database indicates that there have been 113 floods in Travis County in the period from 1950 to 2009, with property damages slightly over $7.6 million. The NCDC database indicates the events occurred between 1994 and 2009. The database provides no indication as to why there are no events recorded prior to 1994, but presumably past flood events follow a similar pattern as the 16 years of historical data.

Figures maintained by NCDC indicate that Travis County has experienced no deaths or injuries due to floods from 1994 on.[14] Section 6 of this plan includes a much more detailed discussion of flood impacts on the County, in particular the history of National Flood Insurance Program (NFIP) claims, and the number of FEMA "repetitive loss" properties.

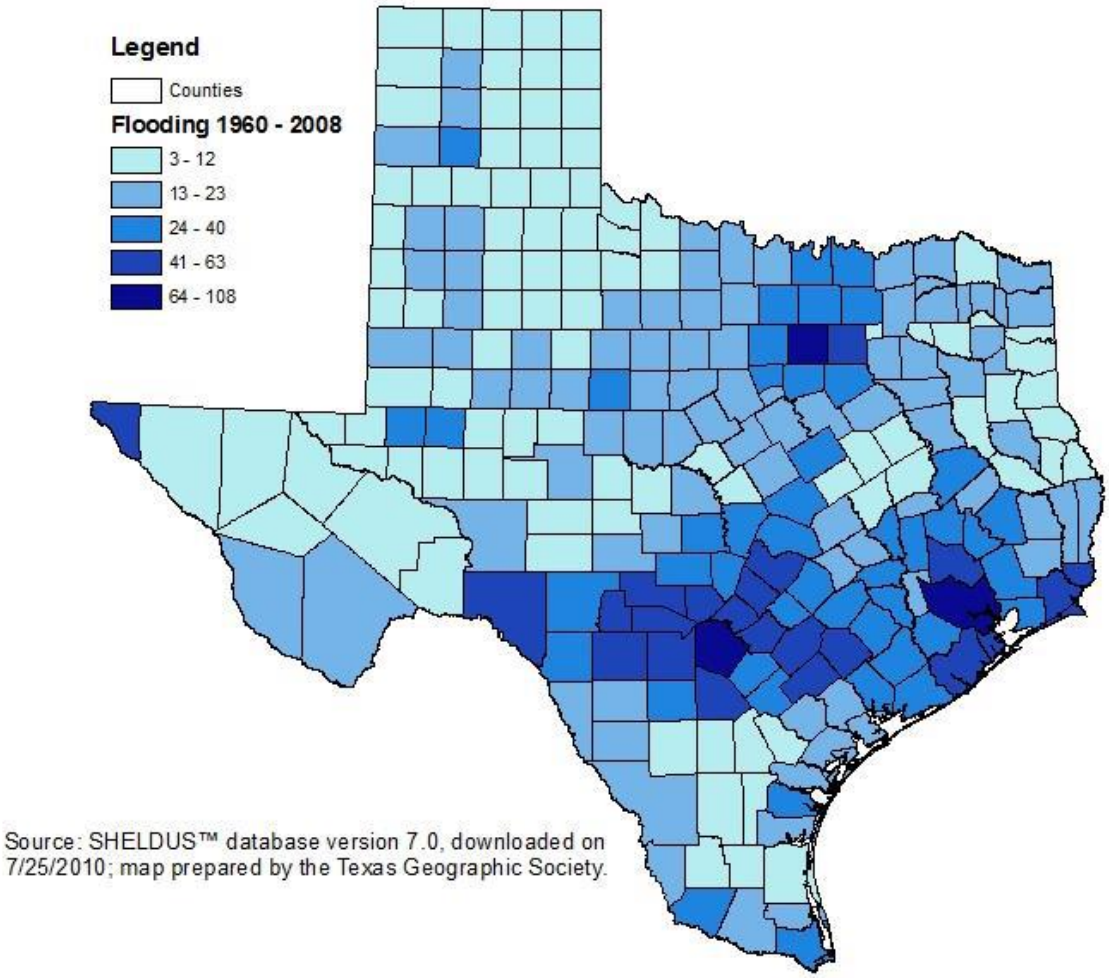
Occurrences of the Flood Hazard

Figures maintained by the NCDC and the Centers for Disease Control indicate that Texas leads the country with more flood-related deaths than any other State. Deaths due to floods, tropical storms and flash floods accounted for 38% of all weather-related deaths statewide.

Figure 5-5 below is a map from the 2010 Texas State Hazard Mitigation Plan that displays both previous flood occurrences and location of floods, by county, for the State between 1960 and 2080. The map is classified into four value ranges using the natural breaks (Jenks) method. The State Plan indicates that Travis County falls within the second highest class (24 - 40 floods). Counties that fall within this category are considered to have a moderate to high risk for experiencing a flood event again.

[14] NOAA, NCDC – Texas – Flood Events

Figure 5-4
Flood Occurrences in Texas 1961-2008
(Source: State of Texas Hazard Mitigation Plan, 2010)



As mentioned above, the NCDC indicates there have been 113 flood events in Travis County. Note that the NCDC reports data at a County level, so there are flood events that may be specific to some of the individual jurisdictions (not participating in the Plan update), and therefore outside of the planning area. With the data reported at the County level it is not possible to separate out these events. Of the 113 floods, 21 resulted in property damage in excess of $25,000. These flood events are listed below.

Table 5-4
Travis County: Flood Events Resulting in Property Damage, 1950 – 2009
(Source: NOAA/NCDC)

Texas								
Location or County	**Date**	**Time**	**Type**	**Mag**	**Dth**	**Inj**	**PrD**	**CrD**
1 TRAVIS	10/07/1994	2000	Flash Flood	N/A	0	0	50K	3K
2 Countywide	05/29/1995	0230	Flash Flood	N/A	0	0	40K	5K
3 Austin	08/24/1996	11:30 AM	Flash Flood	N/A	0	0	30K	0
4 TXZ171>172 - 192	10/28/1996	08:00 AM	Flood	N/A	0	0	250K	70K
5 Countywide	05/23/1997	05:00 PM	Flash Flood	N/A	0	0	50K	0K
6 Countywide	06/08/1997	11:30 PM	Flash Flood	N/A	1	10	100K	0
7 Countywide	06/22/1997	01:00 PM	Flood	N/A	0	0	1.0M	50K
8 Austin	07/30/1997	06:00 PM	Flash Flood	N/A	0	0	50K	0
9 Countywide	12/20/1997	08:45 PM	Flash Flood	N/A	1	0	50K	0K
10 Countywide	10/17/1998	08:30 AM	Flash Flood	N/A	1	50	1.5M	100K
11 TXZ192	10/17/1998	10:00 AM	Flood	N/A	0	50	1.0M	50K
12 Southwest Portion	06/09/2000	12:30 PM	Flash Flood	N/A	0	0	30K	0
13 Countywide	05/20/2001	08:30 PM	Flash Flood	N/A	0	5	60K	0
14 Countywide	08/26/2001	07:15 PM	Flash Flood	N/A	0	0	30K	0
15 Countywide	11/15/2001	10:00 AM	Flash Flood	N/A	2	50	500K	0
16 Countywide	09/08/2002	09:15 AM	Flash Flood	N/A	0	2	30K	0
17 Oak Hill	06/03/2007	20:50 PM	Flash Flood	N/A	0	0	50K	0K
18 Pflugerville	06/25/2007	13:00 PM	Flash Flood	N/A	0	0	30K	0K
19 Pflugerville	06/28/2007	00:00 AM	Flash Flood	N/A	0	0	50K	0K
20 Austin	06/11/2009	21:00 PM	Flash Flood	N/A	0	0	2.0M	0K
21 Lake Travis	10/22/2009	10:31 AM	Flood	N/A	0	0	500K	0K
				TOTALS:	5	167	7.400M	278K

The September 2008 Travis County FIS also indicates that in addition to the events listed in Table 5-5 above, significant flood events in Travis County after 1950 have occurred in September 1952, June 1957, October 1959, 1960, 1961, May 1965, May 1970, May 1981, June 1981, December 1991 through February 1992.

The FIS indicates the greatest flood on record in Travis County occurred on July 7, 1869. This flood event created flood heights in area creeks and rivers greater than any recorded flood since 1833. Since the completion of Lake Travis reservoir in 1940, there have been no floods on the Colorado River comparable in magnitude to the flood of 1869. The NCDC data and other sources indicate more recent significant flood events in Travis County have occurred in October 1998, and November, 2001.

Within the Onion Creek watershed, recent flood events occurred in June 1981, October 1998, and November, 2001. These peak flows for each event are summarized below in Table 5-6. The USACE study indicates that according to a 1997 Loomis & Moore Onion Creek Study, the 1% annual chance of exceedence (ACE) flood flow around the Onion Creek Forest/Yarrabee Bend area is 117,000 cubic feet per second (CFS) and the 4% ACE is 55,000 cfs.[15]

Table 5-5
Peak Flow for Recent Flood Events
(Source: USACE – Onion Creek Interim Feasibility Study)

Date	Peak Flow (CFS)	Annual Chance Exceedence
June, 1981	46,200	4-10%
October, 1998	53,900	4-10%
November, 2001	92,200	1-2%

June, 1981: Two major flood events occurred in one weekend. On Thursday, June 11, 1981 there were unofficial reports of up to 8 inches of rainfall in south Austin which produced overbank flooding in Williamson and Onion Creeks in Austin. Several homes were flooded, but no lives were lost. Then on the evening of June 13, the creek experienced out of bank flooding again. According to the USACE's reconnaissance reports, significant damages occurred in Timber Creek with five mobile homes being completely destroyed and 29 more damaged. According to local newspapers, the flooding damage in the Austin area was estimated at over $40 million (in 1981 dollars).

October, 1998: An approximate 25-year flood event (4% annual chance of occurrence) occurred in the Onion and Williamson Creek watersheds. Flows in Onion Creek at the Highway 183 Bridge were approximately 53,900 cubic feet per second. Many homes were damaged, but no loss of life occurred on Williamson or Onion Creek.

November, 2001: A major flood event occurred with an estimated return interval of approximately once every 40 years (2.5% annual chance of occurrence), struck the Onion and Williamson Creek watershed. The storm inundated hundreds of homes and caused millions of dollars in property damage. Numerous homes in the Timber Creek neighborhood were flooded. Figure 5-7 shows the high water mark for a home located within Timber Creek Estates. After the flood event Travis County applied for federal grant funds to acquire structures within Timber Creek. As of 2010, 105 properties have been acquired. See Section 7.4, Ongoing and Previous Mitigation Initiatives for additional details about the Timber Creek acquisition project.

[15] USACE Onion Creek Interim Feasibility Study, October 2006. Chapter 3 - Identification of Problems and Needs.

Figure 5-5
Timber Creek Flooded Property – High Water Mark
(Source: USACE – Onion Creek Interim Feasibility Study)

Future Flood Probability for Travis County

With a total of 113 flood events between 1950 and 2009, Travis County experiences, on average, slightly less than two floods per year. As with most areas of its size, there is a virtual 100% chance that a flood of some magnitude will occur somewhere in Travis County. As noted above, the NCDC reports data at a County level, so separating all past flood events specific to the unincorporated areas was not possible. Based on the high, medium, and low ranges identified in Table 5-3, there is a high probability of future floods occurring in Travis County. This is not intended to be an exact, scientific assessment of probability – site-specific engineering studies such as the FIS should be used to determine flood probability on a case-by-case basis when specific metrics are needed.

5.4.2 Wildland Grass/Brush Fire

Description of the Wildland Grass/Brush Fire

Wildfires are uncontrolled fires often occurring in wildland areas, and can consume houses or agricultural resources if not contained. Wildfires/urban interface is defined as the area where structures and other human development blend with undeveloped wildland. For a more detailed description of the wildland/grass/brush fire hazard visit FEMA's web site on hazards, http://www.fema.gov/hazard/.

Location and Extent of the Wildland Grass/Brush Fire

The State of Texas faces major wildfire problems each year. The risk for wildfire is increased and compounded by increasing development within the zone commonly referred to as the "urban-wildland interface." Within this zone of natural landscape, buildings become additional fuel for fires when fires do occur. Most wildland fires are man-caused and occur in the interface of developed lands and forest and range lands. In particular, the dry conditions, high temperatures, and low humidity that characterize drought periods set the stage for wildfires.

As reported by the City of Austin, the Assistant Fire Chief and Fire Marshall of the Austin Fire Department completed a comprehensive, GIS-based, multivariate analysis of the numerous factors that influence wildland fire risk. The study identified the levels of risk, based on an identified risk model, within the west Austin and Travis County urban-wildland interface. For the most part, Travis County's Precinct 3 is considered to have a relatively high risk for wildland fire. The factors assessed by the City included fuel types and sizes, burn behavior of predominate vegetation, fuel densities, topography (slope and aspect), weather, spatial relationships to human values, and temporal elements of frequency.

Severity of the Wildland Grass/Brush Fire

Travis County is at risk for wildfire year-round. Wildfires can spread quickly and may affect large areas of the County in a very short period of time. Continued growth and development throughout the County have increased the threat from wildfire, especially in the west of the County, where subdivisions abut grasslands and wooded areas in and adjacent to the Balcones Canyonlands Preserve. Narrow roads and long driveways, which increase response time, intensify the risk.

Impact on Life and Property

The U.S. Department of the Interior has developed the Wildland Fire Assessment System website to communicate information to the public via the Internet. Web visitors can view maps showing potential for fire, including satellite-derived "greenness" maps. The system shows each day's high-risk areas in real time.

Occurrences of the Wildland Grass/Brush Fire

The NCDC indicated there were no wildfire incidents between 1950 and 2009. However, review of the other sources identified several significant past events for Travis County. In 1998, in what is considered the worst wildfire in State history, wildfires throughout the State burned a total of 422,939 acres and threatened 4,031 structures. No formal record exists of the number of wildfires occurring in Travis County over the past decade. Records do exist for the brief period from mid-1997 to October 1998, reporting that 693 wildfires burned more than 500 acres during this time period. It is also known that one of the worst wildfires in recent memory, known as the Dessau Road Fire, swept through more than 600 acres southwest of Pflugerville in 1994.

In terms of probability, although incidents are expected to occur more frequently due to the increase in human activity in forested areas, there is no acceptable mechanism to assign a probability to specific fire occurrences. No estimate is available as to the dollar value damage to existing or future buildings due to wildfires. However, history is a good indication of the future and since no prior wildfires have

resulted in building losses, it is estimated that this will carry into the future. As noted, wildfire incidents are directly related to weather patterns and antecedent conditions, and thus probabilities are dynamic.

5.4.3 Tornadoes

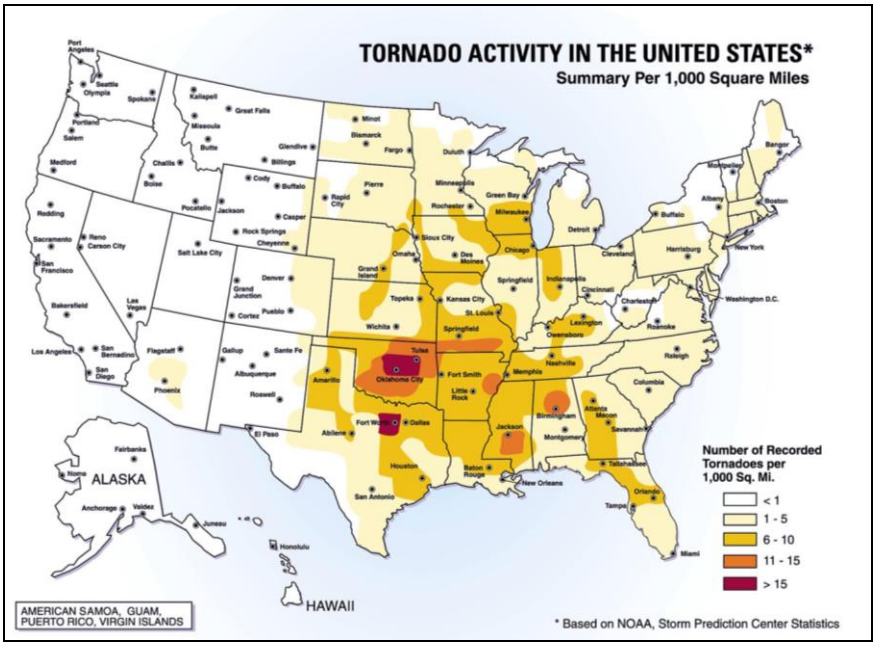
Description of the Tornado Hazard

The National Weather Service (NWS) defines a tornado as a violently rotating column of air in contact with the ground and extending from the base of a thunderstorm. Tornadoes can form any time of the year; but the season of greatest activity runs from March to August. Tornadoes are related to larger vortex formations, and therefore often form in convective cells such as thunderstorms or in the right forward quadrant of a hurricane, far from the hurricane eye. For a more detailed description of tornado hazards, visit FEMA's web site on hazards, http://www.fema.gov/hazard/.

Location and Extent of the Tornado Hazard

From 1953 to 1993, Texas experienced the highest average annual number of tornadoes with 128, followed by Oklahoma (52), Kansas (47), Florida (46), and Nebraska (38). Figure 5-8 illustrates the frequency of tornado strikes in the U.S. per 1,000 square miles. The map indicates that NOAA has recorded 6-10 tornadoes per 1,000 square miles in central-eastern Texas including Travis County.

Figure 5-6
Tornado Activity in the United States
(Source: FEMA)

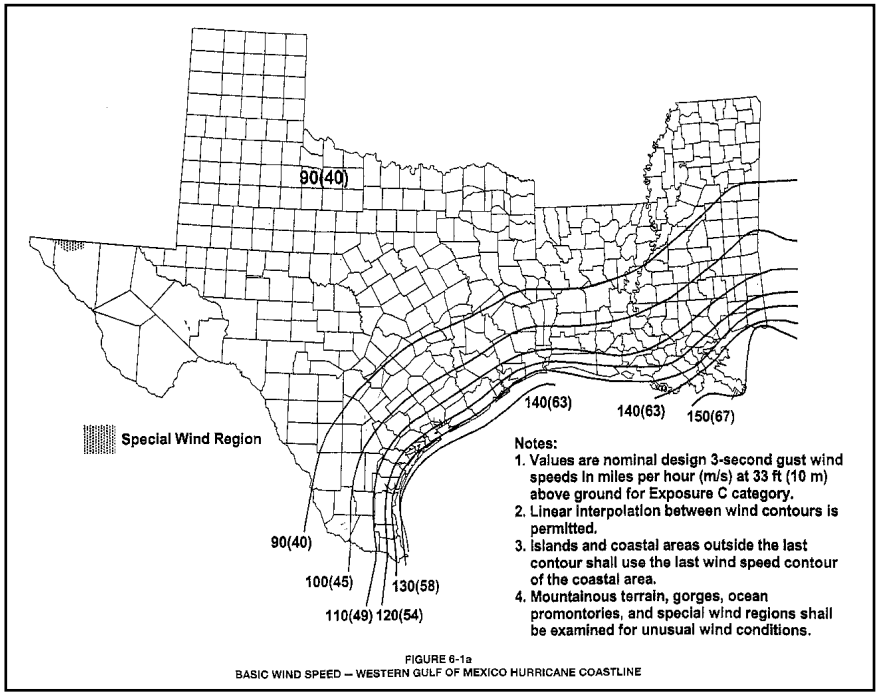


With an average of 153 tornadoes touching down each year, Texas is considered the U.S. "tornado capital", although this is obviously a function of the State's size as well as its location. While Texas

tornadoes can occur in any month and at all hours of the day or night, they occur with greatest frequency during the late spring and early summer months during late afternoon and early evening hours. In Travis County, most wind damage has been limited to downed trees, blocked roads, and disabled power lines.

Figure 5-9 provides the "basic wind speed" map for the western Gulf of Mexico coastline. The map was developed by the International Code Council (ICC) and is referenced in model building codes as the International Building Code (IBC). The map is used to assist with designing buildings to withstand reasonably anticipated winds in order to minimize property damage.[16] The map shows that Travis County falls within the area where the "design wind" speed is 90 to 95 miles per hour.

Figure 5-7
Basic Wind Speed: Texas
(Source: International Building Code)



Severity of the Tornado Hazard

Tornado damage severity is currently measured by the Enhanced Fujita Tornado Scale (F-Scale), named after Dr. T. Theodore Fujita who first introduced the scale in 1971. The original Fujita Scale, used until February of 2007, assigned numerical values based on wind speeds and categorizes tornadoes from 0 to 5. The scale was based on damage caused by a tornado related to the fastest ¼ mile wind speed at the height of a damaged structure.

[16] American Society of Civil Engineers, 2002

In February, 2007 the F-Scale was replaced with a more accurate Enhanced Fujita Scale (EF-scale). It was the Jarrell, Texas tornado of May 27, 1997 and the Oklahoma City/Moore tornado of May 3, 1999 that brought to the forefront the problem that perhaps the wind estimates were too high in the F-Scale. The changes to the original scale were proposed by a committee of meteorologist and engineers searching for a more accurate method of assessing the magnitude of tornadoes. The modifications made to the F-scale were limited to ensure that the new Enhanced F-scale could continue to support the original tornado database found within the NCDC.

The Enhanced F-scale is a set of wind estimates (not measurements) based on observed damages after a tornado. Its uses three-second gusts estimated at the point of damage based on a judgment of eight levels of damage to 28 indicators that include various commercial and residential building types, transmission towers, poles and trees. Similar to the original scale, the new Enhanced F-scale includes five classes ranging from EF0 to EF5 (Source: NOAA, National Weather Service – Storm Prediction Center). The wind speeds from the Fujita Scale were used as basis for development of the Enhanced F-scale. Table 5-10 displays the wind speed ranges for the original Fujita Scale, the derived wind speeds (Enhanced F-scale), and the new Enhanced F-scale currently in use since February of 2007.

Table 5-6
Wind Speed Comparison of the Fujita Scale and Enhanced Fujita Scale
(Source: NOAA – National Weather Service)

Fujita Scale			Derived EF Scale		Operational EF Scale	
F Number	Fastest 1/4-mile (mph)	3 Second Gust (mph)	EF Number	3 Second Gust (mph)	**EF Number**	**3 Second Gust (mph)**
0	40-72	45-78	0	65-85	**0**	**65-85**
1	73-112	79-117	1	86-109	**1**	**86-110**
2	113-157	118-161	2	110-137	**2**	**111-135**
3	158-207	162-209	3	138-167	**3**	**136-165**
4	208-260	210-261	4	168-199	**4**	**166-200**
5	261-318	262-317	5	200-234	**5**	**Over 200**

Within the planning area it is possible for a tornado of any magnitude to occur, with the probability decreasing as the intensity scale increases. Although the NCDC indicates the strongest historical tornadoes in Travis County were rated F4 on the Fujita scale, the climate in southeastern Texas, and the potential for extreme atmospheric instability, allow for the possibility that tornadoes in the planning area could reach EF-5 severity. For example the Jarrell, Texas tornado in 1997 was officially categorized by NOAA as an F5. This tornado occurred in neighboring Williamson County where climate conditions are similar to Travis. With wind speeds over 200 mph, a tornado of this magnitude would potentially cause catastrophic damage to a localized area of Travis County.

Between 1975 and 1995, 106 major federal disaster declarations included impacts caused by tornadoes. The States with the greatest number of tornado-related disasters were: Mississippi (14); Alabama and Illinois (9 each); Oklahoma (8); Wisconsin (7); Ohio (6); and Missouri, Minnesota, Louisiana, Georgia, and Arkansas (5 each).

According to NOAA, between 1950 and 1994 Texas ranked first in the United States for frequency of tornadoes when compared to other States. The State of Texas also ranked first in the number of fatalities and injuries.[17] Tornadoes have an impact on Travis County equally and uniformly. The severity of the tornadoes identified in the NCDC database for Travis County ranged from F0 to F4.

Impact on Life and Property

Tornadoes pose a significant threat to life and safety in Travis County. Historically, lightly constructed residential structures (in particular, manufactured housing) located within the planning area are most vulnerable to the tornado hazard. Data related to the number of structures by building type and past damages for specific building types was unavailable at the time of the 2010 Plan update. The NCDC database reports there have been two deaths and 38 injuries from tornadoes in Travis County. The tornadoes caused an estimated $268 million in property damage. Section 7 of the Plan update includes a more detailed assessment of the tornado hazard.

Occurrences of the Tornado Hazard

The NCDC reports that 61 tornadoes have occurred in Travis County between 1950 and 2009. As mentioned, the NCDC reports data at a County level, so there are tornado events that may be specific to some of the individual jurisdictions, and therefore outside of the planning area. The database indicates there were 25 FO, 24 F1s, eight F2s, three F3s and one F4 tornadoes. Table 5-11 summarizes the 12 tornado events categorized as F2 or greater. These 12 events caused property damage totaling approximately $266.3 million.

[17] NOAA – Tornado Numbers, Deaths, Injuries, and Adjusted Damage 1950 - 1994

Table 5-7
Travis County: Tornado Events – F2 and Stronger 1950 – 2009
(Source: NOAA/NCDC)

Query Results

12 TORNADO(s) of magnitude **F2 and Higher** were reported in **Travis County, Texas** between **01/01/1950** and **01/31/2010**.

*Click on **Location or County** to display Details.*

Mag: Magnitude
Dth: Deaths
Inj: Injuries
PrD: Property Damage
CrD: Crop Damage

Texas

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 TRAVIS	04/30/1954	0610	Tornado	F3	0	0	0K	0
2 TRAVIS	03/31/1957	0905	Tornado	F2	0	0	250K	0
3 TRAVIS	03/31/1957	1050	Tornado	F2	0	0	25K	0
4 TRAVIS	05/10/1959	1520	Tornado	F3	0	0	250K	0
5 TRAVIS	07/04/1970	1800	Tornado	F2	1	4	0K	0
6 TRAVIS	01/20/1973	2100	Tornado	F2	0	0	25K	0
7 TRAVIS	05/07/1975	1600	Tornado	F2	0	0	250K	0
8 TRAVIS	04/14/1977	1720	Tornado	F2	0	0	250K	0
9 TRAVIS	04/07/1980	1730	Tornado	F3	0	3	250K	0
10 TRAVIS	08/10/1980	1340	Tornado	F2	0	4	250.0M	0
11 Four Pts	05/27/1997	03:11 PM	Tornado	F2	0	0	50K	10K
12 Lakeway	05/27/1997	03:50 PM	Tornado	F4	1	5	15.0M	0K
				TOTALS:	2	16	266.350M	10K

The strongest tornado in Travis County was an F4 tornado on May 27, 1997 that caused an estimated $15 million in damages. This event was known as the Pedernales Valley tornado and began on the shore of Lake Travis destroying trees and a floating marina where nearly all of the watercraft were destroyed. A number of structures sustained varying damage until the tornado reached Bee Creek Road. At this location, a Southwest Bell building housing telephone switching equipment was destroyed. The building was well constructed and was one of several buildings which indicated an F4 rating for this tornado. In the Hazy Hills subdivision, numerous houses and several mobile homes were totally destroyed. Several houses in this subdivision survived but sustained major damage. The tornado caused one death when a mobile home was demolished and a vehicle was tossed several hundred feet.[18]

Although the F4 tornado in 1997 was the strongest in Travis County, the tornado on August 10, 1980 caused the greatest property damage. This event caused an estimated $250 million in property damage.[19] The NCDC provides no detailed description of the event.

With a total of 61 tornado events between 1950 and 2009, Travis County experiences on average approximately one tornado per year, and based on this information it is possible to infer an approximate 100% annual probability of occurrence County-wide. Clearly it is possible, however, for zero tornadoes or many tornadoes to occur in any specific year. This percentage would be somewhat lower if only events within unincorporated Travis County (and the three incorporated areas) were included in such

[18] NOAA/NCDC Database: Travis County, Texas - Tornado events
[19] NOAA/NCDC Database: Travis County, Texas - Tornado events

an assessment. Based on the high, medium, and low ranges identified in Table 5-3, there is a high probability of future tornadoes occurring in Travis County. It is predicted that tornados have the same probability of impacting current and future buildings throughout the planning area.

5.4.4 Drought

Description of the Drought Hazard

A drought is an extended dry climate condition when there is not enough water to support urban, agricultural, human, or environmental water needs. It usually refers to a period of below-normal rainfall, but can also be caused by drying bores or lakes, or anything that reduces the amount of liquid water available. Drought is a recurring feature of nearly all the world's climatic regions. For a more detailed description of drought hazards visit FEMA's web site on hazards, http://www.fema.gov/hazard/.

Location of the Drought Hazard

Droughts may occur anywhere in the United States. Effects seen in different regions vary depending on normal meteorological conditions such as precipitation and temperature, as well as geological conditions such as soil type and subsurface water levels. Texas is divided into ten climatic divisions that range from substantially heavy precipitation through semi-arid to arid climates. Most of Texas is prone to periodic droughts of differing degrees of severity. One reason is the State's proximity to the Great American Desert of the southwestern United States. In every decade of this century, Texas has fallen victim to one or more serious droughts. The severe-to-extreme drought that affected every region of the State in the early to mid-1950s was the most serious in recorded U.S. history.
Drought is possible throughout the planning area and the central Texas region in general. Because there is no defined geographic boundary for this hazard, all property in Travis County is exposed to the risk of drought. The probability of a drought occurring in any specific region depends on certain atmospheric and climatic conditions. Duration and frequency can be used as indicators of potential severity. Effects seen in different regions vary depending on normal meteorological conditions such as precipitation and temperature, as well as geological conditions such as soil type and subsurface moisture. Variations in drought risks to people and property cannot be distinguished by area; the hazard is reasonably predicted to have uniform probability of occurrence across the entire County.

Severity and Extent of the Drought Hazard

A drought's severity depends on numerous factors, including duration, intensity, and geographic extent as well as regional water supply demands by humans and vegetation. The severity of drought can be aggravated by other climatic factors, such as prolonged high winds and low relative humidity[20]. Due to its multi-dimensional nature, drought is difficult to define in exact terms and also poses difficulties in terms of comprehensive risk assessments.

One method used by scientists to calculate the severity and duration of a drought is the Palmer Drought Severity Index (PDSI). The PDSI indicates the prolonged and abnormal moisture deficiency or excess and indicate general conditions, not local variations caused by isolated rain. The PDSI is an important

[20] FEMA, 1997

climatological tool for evaluating the scope, severity, and frequency of prolonged periods of abnormally dry or wet weather.[21] The equation for the PDSI was empirically derived from the monthly temperature and precipitation scenarios of 13 instances of extreme drought in western Kansas and central Iowa and by assigning an index value of -4 for these cases. Conversely, a +4 represents extremely wet conditions. From these values, 7 categories of wet and dry conditions can be defined. Table 5-12 identifies the values used to define the PDSI.[22]

Table 5-8
Palmer Drought Severity Index
(Source: NOAA, National Weather Service - Climate Prediction Center)

Palmer Drought Severity Index
-4.0 or less (Extreme Drought)
-3.0 or -3.9 (Severe Drought)
-2.0 or -2.9 (Moderate Drought)
-1.9 to +1.9 (Near Normal)
+2.0 or +2.9 (Unusual Moist Spell)
+3.0 or +3.9 (Very Moist Spell)
+4.0 or above (Extremely Moist)

Impact on Life and Property

Droughts have the ability to impact many sectors of the economy, and reach well beyond the area experiencing drought. Drought impacts are commonly referred to as direct and indirect. Reduced crop productivity, increased fire hazard, reduced water levels, and damage to wildlife and fish habitat are a few examples of direct impacts. Drought can cause extensive damage to commercial and residential structure foundations, framing and walls, levees, roads, bridges, pipelines and other integral infrastructure. Indirect impacts of drought include increased food prices, unemployment, and reduced tax revenues because of reduced supplies of agriculture products. There are no known deaths or injuries from droughts in the planning area.

The NCDC indicates that droughts have caused an estimated $140 million dollars in property damage and crop loss.[23] The drought hazard affects all residential and commercial building types about equally within the planning area. Data related to the number of structures by building type and past damages for specific building types was unavailable at the time of the 2010 Plan update.

Occurrences of the Drought Hazard

According to the NCDC database, Travis County has experienced nine drought events in the period from 1950 to 2009. All nine events are between 1996 and 2000. The database provides no indication as to why there are no events prior to 1996, although presumably occurrences follow the same pattern and frequency as shown in the NCDC list. Also note that the events are listed by months. For example,

[21] NOAA. NWS. Climate Prediction Center. Drought Indices – Explanation.
[22] NOAA. NWS. Climate Prediction Center. Drought Indices – Explanation.
[23] NOAA NCDC database. Texas – Travis County. Drought event history.

if a drought lasts several continuous months, it is listed in the database as separate events. If the continuous months are combined into single events, the number of events is reduced from nine to two events.

Table 5-9
Travis County: Drought Events 1996 - 2000
(Source: NOAA/NCDC)

9 DROUGHT event(s) were reported in **Travis County, Texas** between **01/01/1950** and **01/31/2010**.

*Click on **Location or County** to display Details.*

Mag: Magnitude
Dth: Deaths
Inj: Injuries
PrD: Property Damage
CrD: Crop Damage

Texas

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 TXZ171>173 - 183>194 - 202>209 - 217>225 - 228>230 - 233>234 - 239 - 247	04/01/1996	12:01 AM	Drought	N/A	0	0	0	0
2 TXZ171>173 - 183>194 - 202>209 - 217>225 - 228	05/01/1996	12:01 AM	Drought	N/A	0	0	20.0M	40.0M
3 TXZ171>173 - 183>194 - 202>209 - 217>225 - 228	06/01/1996	12:01 AM	Drought	N/A	0	0	20.0M	40.0M
4 TXZ171>173 - 183>194 - 202>209 - 217>225 - 228	07/01/1996	12:01 AM	Drought	N/A	0	0	20.0M	40.0M
5 TXZ171>173 - 183 - 185>194 - 202>209 - 217>225 - 228	08/01/1996	12:01 AM	Drought	N/A	0	0	20.0M	40.0M
6 TXZ171>173 - 183>194 - 202>208 - 217>221 - 228	07/01/2000	12:01 AM	Drought	N/A	0	0	0	0
7 TXZ171>173 - 183>194 - 202>209 - 217>225 - 228	08/01/2000	12:01 AM	Drought	N/A	0	0	0	0
8 TXZ171>173 - 183>194 - 202>209 - 217>225 - 228	09/01/2000	12:01 AM	Drought	N/A	0	0	0	0
9 TXZ171>173 - 183>194 - 202>209 - 217>225 - 228	10/01/2000	12:01 AM	Drought	N/A	0	0	0	0
				TOTALS:	0	0	80.000M	160.000M

Review of various other sources indicates that severe droughts in central Texas, including Travis County have also occurred between 1950-1957, 1998, 2006, and 2007 – 2009. The most recent severe drought occurred between 2007 and 2009. The head of the Department for Soil and Crop Sciences at Texas A & M indicated that this drought was considered one of the worst dry spells to impact the State since the 1950's. For nearly two years, Texas suffered through one of the worst droughts in State history. According to the Lower Colorado River Authority (LCRA) meteorologist when taking the entire period since the summer of 2007 into consideration, this drought was more intense than the 1950s. The only other drought in recorded history that was worse was between 1917-1918. So, when talking about the intensity of the drought, this was worse than the 1950s. It has a much stronger correlation to the drought of a century ago.[24] The drought from 2007 - 2009 cost farmers an estimated $1 billion in failed crops and dead or undernourished livestock; fueled wildfires that in 2009 destroyed 200 homes and scorched 424,000 acres across the State, including 1,500 in a Bastrop blaze in February 2009. The drought conditions have also threatened coastal wildlife, including crabs and whooping cranes.[25]

[24] Lake Travis View. Current Drought is the Worst Since 1917-1918. Charles McClure. May 14, 2010.
[25] The Statesman. Despite Recent Rains, Drought Persists. Andrea Ball. April 25, 2009.

The second most severe drought recorded in Texas history stretched from 1950 to 1957. That drought caused agricultural damage equaling more than $3 billion, according to a 1959 report by the Texas Board of Water Engineers, or roughly $24 billion in 2008 dollars.[26]

With a total of six significant drought events between 1950 and 2009, Travis County experiences a severe drought event on average slightly less than every 10 years. The six events have occurred over a period of 59 years, which calculates to approximately a 10% annual probability of future drought occurrences. Based on historical drought data, the probability of future events occurring in Travis County is considered medium. See Table 5-3 for the definition of high, medium and low probability of occurrence. It should be noted that climate change experts suggest increased patterns of drought over the next 10 years. This does affect our probability estimate.

5.4.5 High Wind/Severe Storms

Description of the High Wind/Severe Storm Hazard

Thunderstorms are local storms produced by cumulonimbus clouds, and always accompanied by lightning and thunder. Thunderstorms are the by-products of atmospheric instability, which promotes vigorous rising of air particles. A typical thunderstorm may cover an area three miles wide. The National Weather Service (NWS) considers a thunderstorm "severe" if it produces tornadoes, hail of 0.75 inches or more in diameter, or winds of 58 miles per hour or more. Structural wind damage may imply the occurrence of a severe thunderstorm. The high wind/severe storms hazard affect the entire planning. For a more detailed description of high wind/severe storms hazards visit FEMA's web site on hazards, http://www.fema.gov/hazard/.

Location and Extent of the High Wind/Severe Storm Hazard

The entire planning area is subject to the wind effects from high wind/severe storms hazard. Figure 5-14 shows how the frequency and strength of extreme windstorms vary across the United States. The map is based on a combination of all past occurrences and shows that Texas, and Travis County, falls within wind Zone III, where wind speeds can reach as high as 200 mph.[27]

[26] The Statesman. Despite Recent Rains, Drought Persists. Andrea Ball. April 25, 2009.
[27] Source: FEMA, Wind Zone map

Figure 5-8
Wind Zones in the United States
(Source: FEMA)

See Section 5.4.3, Tornadoes which shows the basic wind speed map from the International Building Code. As mentioned, this map is used to design buildings to withstand reasonably anticipated winds in order to minimize property damage.[28] The County falls within the area where the "design wind" speed is 90 to 95 mph. The building code administered by the County requires all new construction to be designed and constructed for 95 mile per hour wind loads.

Severity of the High Wind/Severe Storms Hazard

Severe storms are frequent in Texas and occur throughout the year, with highest frequency during the spring and summers months. The severity of the wind hazard is measured primarily by velocity, although effects are clearly exacerbated by duration and the presence of windborne debris. Inland Texas is not particularly prone to high wind hazards, but occasionally thunderstorms are severe enough to cause moderate damage in the area. The severity of thunderstorms can be categorized primarily by their wind speed and rainfall.

Impact on Life and Property

All people and assets in Travis County are considered to have the same degree of exposure to the high wind/severe storms hazard. Within Travis County, the risk to people and property from the high wind

[28] American Society of Civil Engineers, 2002

hazard cannot be distinguished by area; the hazard is expected to have a relatively uniform probability of occurrence across the entire County.

Several meteorological conditions can result in winds severe enough to cause property damage. In Travis County, most wind damage has been limited to downed trees, blocked roads, and disabled power lines. Typically, assets of lighter construction (such as mobile homes) are most vulnerable to the high winds hazard. Data related to the number of structures by building type and past damages for specific building types was unavailable at the time of the 2010 Plan update.

The NCDC database indicates that between 1950 and 2009 Travis County experienced no deaths, injuries or property damage from high wind events. Statistics indicate that in the seven-county Greater Austin area, 7% of weather-related deaths have been associated with lightning and severe thunderstorms combined.

Occurrences of the High Wind/Severe Storms Hazard

The NCDC database indicates that between 1950 and 2009, Travis County experienced no high wind/severe storm events. With no reported high wind events reported in the database, County officials were interviewed during the development of the 2004 Plan to identify past high wind events. The County staff and the 2010 MPC reported past storm damage, including:

- Lightning and high winds damaged trees and sport field light poles in County parks in May 2001. Repairs were under warrant; and
- The Exposition and Heritage Center in East Austin sustained damage to windows due to wind in March 1995; the repairs cost $15,300 and were covered by insurance.

5.4.6 Winter Storm

Description of the Winter Storm Hazard

Winter storms bring various forms of precipitation that occur only at cold temperatures, such as snow, sleet, or a rainstorm where ground temperatures are cold enough to allow icy conditions. These cold weather storms can also take the form of freezing rain or a wintry mix.

Heavy snowfall and extreme cold can immobilize an entire region. Even areas that normally experience mild winters can be hit with a major snowstorm or extreme cold. Winter storms can result in flooding, storm surge, closed highways, blocked roads, downed power lines and hypothermia. For a more detailed description of winter storm hazards visit FEMA's web site on hazards, http://www.fema.gov/hazard/.

Location and Extent of the Winter Storm Hazard

Generally, the winter storm season in Texas runs from late November to mid-March, although severe winter weather has occurred as early as October and as late as May in some areas. Within Travis County, the risk to people and property from winter weather cannot be distinguished by area; the

hazard is reasonably predicted to have uniform probability of occurrence across the entire County. All people and assets are considered to have the same degree of exposure.

Figure 5-15 shows the average annual snowfall totals for the United States. The map shows central Texas receives less than eight inches of snow per year. NOAA indicates that over the past 57 years, Austin, Texas has averaged slightly less than one inch of snow per year.

Figure 5-9
United States Average Annual Snowfall Map

Severity of Winter Storm Hazard

With the County's generally dry climate, any frozen precipitation falling in Travis County poses a potentially hazardous situation due to ice, wind, and cold temperature. During these cold periods, the weather is often volatile, changing from warm and sunny to freezing in just a few hours. Many homes generally have inadequate cold-weather pipe protection, so are at a greater risk of freezing and bursting water pipes when the outdoor temperature drops to 20°F. In Travis County, where the climate is considered subtropical, winter storms of such severity that property damage results are rare.

Based on past winter storm events, it would be possible for Travis County to experience an occasional snow or ice storm. Accumulations of up to a foot of snow are possible in the higher elevations of the planning area. An occasional ice storm is also possible with accumulations up to a ¼ inch of ice coating all surfaces such as road and trees. An extreme cold event with temperatures in the single digits and wind chills below zero are possible in Travis County.

Travis County has sustained damage from winter storm events. While infrequent, such storms have affected the entire County, restricting travel, downing trees, interrupting electrical power, and causing water main breakage. Although the NCDC database has not categorized any previous storms in Travis County as blizzards, this is perhaps the most severe type of winter storm, characterized by low temperatures, strong winds, and heavy blowing snow.

Impact on Life and Property

Winter storms in Texas, although not as numerous or severe as in the northern States, do occur often enough and with sufficient severity to be a minor threat to people and property. The NCDC reports there have been no injuries or deaths due to snow and ice conditions. The database reports approximately $7.5 million in property damages related to three past winter storms. The winter storm hazard affects all residential and commercial building types about equally within the planning area.

Travis County is in a climatic region that is extremely unlikely to experience snow depths sufficient to cause property damage such as collapsed roofs. Burst pipes do cause minor property damage, and icing causes transportation problems and affects power lines. However, on the whole, Travis County is not exposed to any significant risk of major property damage due to winter storms. Figure 5-16 summarizes the winter storm events in Travis County between 1996 and 2009. Note, three of these storms resulted in property damage.

Table 5-10
Travis County: Winter Storm Events Travis County, 1996 – 2009
(Source: NOAA/NCDC)

10 SNOW & ICE event(s) were reported in **Travis County, Texas** between **01/01/1950** and **01/31/2010**.

*Click on **Location or County** to display Details.*

Mag: Magnitude
Dth: Deaths
Inj: Injuries
PrD: Property Damage
CrD: Crop Damage

Texas

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 TXZ171>173 - 185>194 - 204>209	02/01/1996	01:40 AM	Winter Storm	N/A	0	0	1.5M	50K
2 TXZ183>192	01/07/1997	08:00 AM	Winter Storm	N/A	0	0	5.0M	100K
3 TXZ183>192 - 202>209 - 217>225	01/11/1997	08:00 PM	Winter Storm	N/A	0	0	1.0M	20K
4 TXZ171>173 - 186 - 188>193 - 205>206	12/23/1998	02:00 AM	Winter Storm	N/A	0	0	0	0
5 TXZ171>173 - 183>194 - 202>209 - 221 - 223	12/12/2000	02:00 PM	Winter Storm	N/A	0	0	0	0
6 TXZ171>173 - 183>192 - 194 - 202>208 - 217	11/28/2001	07:00 AM	Winter Storm	N/A	0	0	0	0
7 TXZ171>173 - 184>194 - 204>209	02/24/2003	07:00 PM	Winter Storm	N/A	0	0	0	0
8 TXZ173 - 192	12/07/2005	09:00 PM	Winter Storm	N/A	0	0	0	0
9 TXZ192 - 208	01/15/2007	15:00 PM	Winter Storm	N/A	0	0	0K	0K
10 TXZ171>173 - 184>186 - 188 - 190 - 192 - 206	01/27/2009	18:00 PM	Winter Storm	N/A	0	0	0K	0K
				TOTALS:	0	0	7.500M	170K

When ice storms are predicted, bridges are sanded to improve road safety. Sand is stockpiled for spreading on bridges when icy conditions occur. The State's ice response plan addresses major roads

throughout the County. Statistics on weather-related deaths indicate that in the seven-county Greater Austin area, 4% of all weather-related deaths have been associated with winter storms.

Occurrences of the Winter Weather Hazard

In Travis County, the NCDC reports there have been ten snow and ice events between 1950 and 2009. Although the query results begin in 1950, the first reported event is in 1996. It is unclear why the database does not include any events prior to 1996, although presumably occurrences prior to this date follow the same pattern as found in the NCDC list.

The NCDC indicates that one of the most severe winter storms in Travis County occurred on January 7, 1997 when an ice storm caused more than $5 million in damages. Over 60,000 residents suffered power outages across the area due to tree limbs falling onto power lines. Many of the outages continued for as long as five days.[29] Many residents considered this to be one of the worst winter storms in the past 25 years. The winter storm in 1996 was also relatively severe. This storm resulted in the Travis County Emergency Operations Center (EOC) being activated for three days to coordinate Countywide emergency service delivery. A major storm in 2000 caused widespread damage in the Balcones Canyonlands Preserve.

With a total of ten winter storm events between 1996 and 2009, the County experiences a winter storm on average slightly less than once per year. With one event every 1.3 years, there is a 77% annual probability of a winter storm event occurring in Travis County. Based on the high, medium, and low ranges identified in Table 5-3, there is a high probability of future winter storms occurring in Travis County.

5.4.7 Seismic/Earthquake

Description of the Earthquake Hazard

An earthquake is a sudden release of energy from the earth's crust that creates seismic waves. Tectonic plates become stuck, putting a strain on the ground. When the strain becomes so great that rocks give way, fault lines occur. At the Earth's surface, earthquakes may manifest themselves by a shaking or displacement of the ground, which may lead to loss of life and destruction of property. Size of an earthquake is expressed quantitatively as magnitude and local strength of shaking as intensity. The inherent size of an earthquake is commonly expressed using a magnitude. For a more detailed description of seismic/earthquake hazards visit FEMA's web site on hazards, http://www.fema.gov/hazard/.

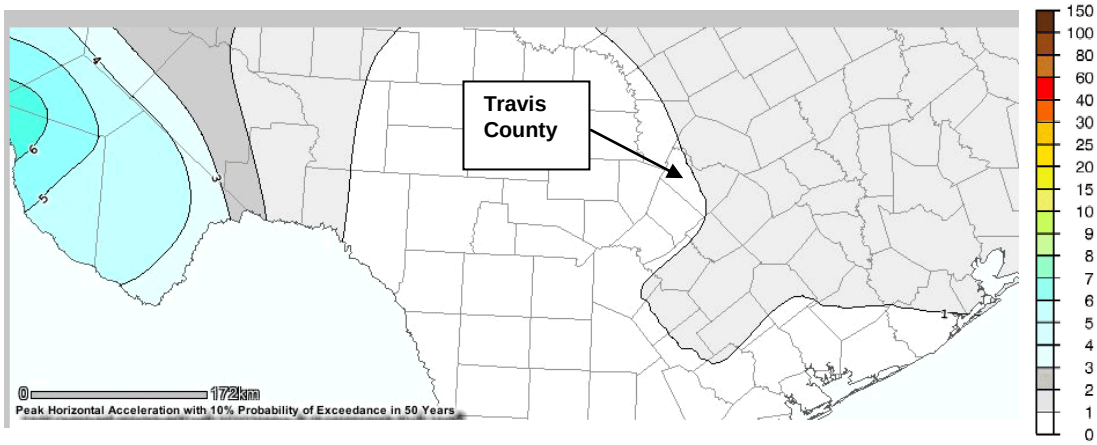
Location and Extent of the Earthquake Hazard

The entire planning area is susceptible to the effects of earthquakes. Figure 5-17 displays the central Texas portion of a United States Geological Survey (USGS) earthquake hazard map produced in 2008. The map shows peak ground acceleration (pga) with a 10% chance of being exceeded over 50 years is in the 0 to 1%g range across most of central Texas, including Travis County. The eastern part of Travis

[29] NOAA. NCDC. Texas – Travis County – Winter Storm events. January, 7, 1997

County is in the 1%g range. The *FEMA How-To Guidance, Understanding Your Risks*, FEMA 386-2, p. 1-7, suggests the earthquake hazard should be profiled if the pga is greater than 3%g.

Figure 5-10
Texas Seismic Hazard Map, showing Peak Ground Acceleration in Percent of *g*, with 10 % exceednce in 50 years
(Source: USGS, 2008)



Severity of the Earthquake Hazard

Most past earthquakes in Texas have been of low magnitude and have mainly occurred in west Texas, or the Panhandle area. As shown in Figure 5-17 above, the probability of any severe earthquake in the area is low. Although there have been no known earthquakes that have impacted the planning area, an earthquake in the Richter magnitude 4 range is possible in Travis County. The severity of earthquakes is influenced by several factors, including the depth of the quake, the geology in the area, and the soils. The severity of soil liquefaction is dependent on the soils grain size, thickness, compaction, and degree of saturation.[30]

Impact on Life and Property

There are no known deaths or injuries from earthquakes in Travis County. Some of the past earthquake events were severe enough in Texas to cause minor property damage such as broken windows or contents falling from shelves. The effects on life and property in the planning area could be significant if a large earthquake were to occur, because of the nature of the built environment. However, the very low probability of an event suggests that potential for these impacts is minimal.

Occurrences of the Earthquake Hazard

The USGS earthquake history was reviewed for the State of Texas to identify past earthquake occurrences that have impacted Travis County. The USGS earthquake history for Texas indicates there

[30] USGS

have been 12 earthquakes statewide between 1882 and 2009. Of the 12 events in Texas, the earthquake descriptions provided by the USGS indicates none of the events affected Travis County.[31]

With no earthquakes affecting Travis County in the past, there will most likely be minimal future impacts to the planning area. Based on previous data, the probability of earthquakes occurring in the future is considered low. Due to the extremely low probability of an earthquake within Travis County and the fact that there is no record of any historical building damage as a result of seismic activity in the County a more detailed risk assessment was not performed for this hazard.

5.4.8 Landslide

Description of the Landslide Hazard

A landslide is a natural geologic process involving the movement of earth materials down a slope, including rock, earth, debris, or a combination of these, under the influence of gravity. However, there are a variety of triggers for landslides such as: a heavy rainfall event, earthquakes, or human activity. The rate of landslide movement ranges from rapid to very slow. A landslide can involve large or small volumes of material. Material can move in nearly intact blocks or be greatly deformed and rearranged. The slope may be nearly vertical or fairly gentle[32].

Landslides include mudflows, mudslides, debris flows, rock falls, rock slides, debris avalanches, debris slides, and earth flows. Most landslides are associated with heavy and prolonged rains, which saturate soils. For a more detailed description of landslide hazard visit FEMA's web site on hazards, http://www.fema.gov/hazard/.

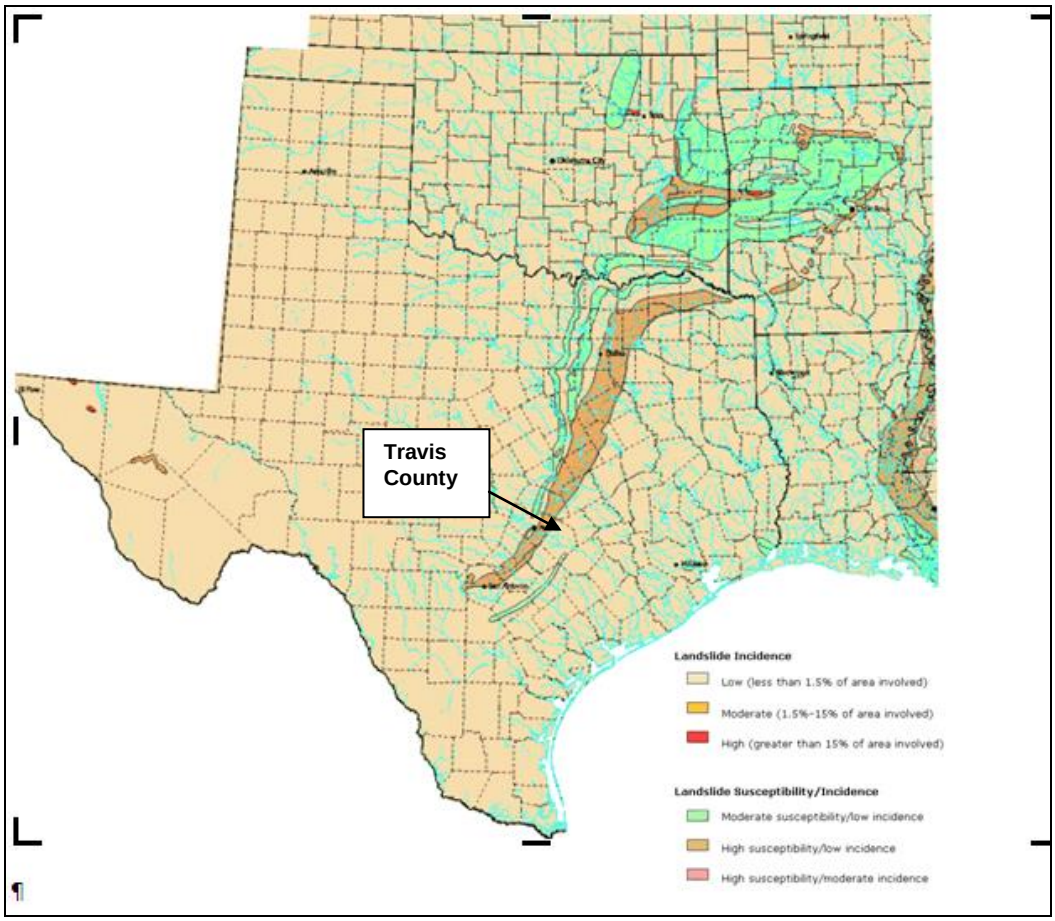
Location and Extent of the Landslide Hazard

Landslides are usually associated with mountainous areas but can also occur in areas of generally low relief. In low-relief areas, landslides occur due to steepening of slopes: as cut and fill failures (roadway and building excavations), river bluff failures, collapse of mine waste piles, and a wide variety of slope failures associated with quarries and open-pit mines[33] .

In 1997, the U.S. Geological Survey (USGS) published a national map to illustrate landslide risk areas. The map combines past incidents with a measure of "susceptibility", defined as the "probable degree of response of rocks and soils to natural or artificial cutting or loading of slopes, or to anomalously high precipitation." Figure 5-18 displays the USGS landslide map for the State of Texas. The map indicates that central Texas, including the majority of Travis County, is shown as having had less than 1.5% of its land area affected by movement of soils on slopes (no planning period is identified). The map shows that the western part of the County, known as the Hill Country, is shown as having moderate susceptibility.

[31] USGS. Earthquake Hazards Program – Texas Earthquake History.
[32] Delano and Wilshusen, 2001
[33] USGS, Landslide Types and Process, 2004

Figure 5-11
Landslide Overview Map for the State of Texas
(Source: USGS, 1997)



Severity of the Landslide Hazard

Landslides are considered highly site-specific events and are concentrated in areas of steep slopes. The severity of the landslide hazard depends on a combination of slope angle and the geologic material underlying the slope.

Impact on Life and Property

In the planning area, landslide risks to people and property cannot be distinguished by area; the hazard is reasonably predicted to have uniform probability of occurrence (extremely rare) across the entire County. All people and assets are considered to have the same degree of exposure. There are no known instances of injuries or death from past events in the County. Most likely impacts on life and property in the planning area will continue to be minimal.

Occurrences of the Landslide Hazard

As part of the 2010 Plan update, the MPC reviewed the landslide hazard and identified no significant landslide events since the original Plan was prepared in 2004.

Landslide probabilities are largely a function of surface geology, but are also influenced by both weather and human activities. The probability of future landslides having a significant impact on property and life in the planning area is considered low.

Due to the extremely low probability of landslides within Travis County, the limited number of buildings near the susceptible areas and the fact that there is no record of any historical building damage as a result of landslides in the County, the estimated dollar value damage to existing or future buildings due to landslides is zero. For these reasons, landslides have been eliminated from further evaluation and risk assessment.

5.5 Methodology for Identifying Hazards of Concern

In accordance with the requirements of the Interim Final Rule, all hazards with potential to affect Travis County are profiled in this section of the Plan. However, because this is a County-level hazard mitigation plan, it is useful to identify the hazards that are of the most concern Countywide, so these can be the focus of more detailed assessment. It is important to note, however, that many hazards and risks are very site-specific, so as local municipalities perform more detailed risk assessments and identify mitigation actions they should recognize that this process and the resulting table should be used only as a guide.

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

1. **History** – incorporating historical accounts and records that the hazard has affected the County often in the past, and that the hazard has occurred often and/or with widespread or severe consequences.
2. **Potential for mitigation** – acknowledging that there are ways to address the hazard, and that the methods are technically feasible and have the potential to be cost-effective [i.e. mitigation measures are available at a reasonable cost, and damages to property, lives and/or community functions would be reduced or eliminated.]
3. **Presence of susceptible areas or vulnerability** – indicating that Travis County has numerous facilities, operations or populations that may be subjected to damage from the hazard.
4. **Data availability** – demonstrating that sufficient quality data is available to permit an accurate and comprehensive risk assessment.
5. **Federal disaster declarations and local emergency declarations** – noting that Travis County has received numerous disaster declarations for the particular hazard.

The Table 5-19 lists the hazards, describes the rationale for identifying (or not identifying) hazards as significant, shows sources of information that were consulted for the determination, and the disposition of the hazard with regard to hazard identification and risk assessment in this Plan Update. The initial hazards in the shaded portion of the table are those that were identified by Travis County's MPC as significant enough to warrant a full risk assessment.

Table 5-11
Travis County Qualitative Hazard Ranking

Hazard	Rationale	Sources	Disposition
Flood	Widespread impacts, history of occurrences in the County, significant annual damages	FEMA Flood Insurance Studies, FEMA Flood Insurance Rate Maps, FEMA Public Assistance records, FEMA National Flood Insurance Program claims data, US Army Corps of Engineers (USACE), and National Oceanographic and Atmospheric Administration (NOAA), studies and records.	Profile and risk assessment
Tornado	High annual probability, widespread impacts, losses generally limited except in most extreme events.	NOAA -NCDC, National Weather Service	Profile and risk assessment
Wildland Grass/Brush Fire	High annual probability of site-specific events, with moderate impacts	NOAA and National Climatic Data Center (NCDC) records,	Profiled, but not part of detailed risk assessment
Drought	High annual probability, but impacts generally limited.	NOAA – NCDC;	Profiled, but not part of detailed risk assessment
Severe Storms	High annual probability, widespread impacts, but losses generally limited except in most extreme events.	NOAA, NCDC, National Weather Service (NWS),	Profiled, but not part of detailed risk assessment
Winter Storms	Low to moderate annual probability with impacts relatively limited	NOAA, NCDC, National Weather Service (NWS),	Profiled, but not part of detailed risk assessment
Earthquake / Geological	Low annual probability, but potential for significant consequences.	United States Geologic Survey (USGS),	Profiled, but not part of detailed risk assessment
Landslide (non-seismic)	Low probability with losses typically limited	USGS	Profiled, but not part of detailed risk assessment

Section 6
Risk Assessment

Contents of this Section

6.1 IFR Requirement for Risk Assessments
6.2 Public Awareness of Hazards and Risk
6.3 Overview and Analysis of Travis County's Vulnerability to Hazards
6.4 Estimate of Potential Losses
6.4.1 Flood Risk in Travis County
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6.5 How Travis County Estimates Impacts
6.6 Future Development Trends in Travis County
6.7 Summary of Risk Assessment

6.1 Interim Final Rule Requirement for Risk Assessments

IFR §201.6(c)(2): *The plan shall include a risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.*

IFR §201.6(c)(2)(ii): *[The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.*

IFR §201.6(c)(2)(ii): *[The risk assessment]* ***must*** *also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged floods.*

IFR §201.6(c)(2)(ii)(B): *[The plan* ***should*** *describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate.*

Requirement §201.6(c)(2)(ii)(C): *[The plan* ***should*** *describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.*

6.2 Public Awareness of Hazards and Risk

The public becomes aware of local hazards in a number of ways. For example, public awareness of flood hazards is enhanced during the following activities:

- Buying property in a floodplain triggers the federal requirement to obtain flood insurance when obtaining a federally insured and regulated mortgage. Federally insured and regulated mortgage lenders are required to make homebuyers purchase flood insurance if the building is located in a mapped flood hazard area. Buyers are supposed to be notified well in advance of closing.
- Applying for permits may lead to a determination that the property or construction site is within a mapped floodplain and therefore subject to the drainage and floodplain management requirements.
- When flooding occurs, the news media frequently carries stories about travel hampered by flooded roads and homes damaged by floodwaters. Research has shown that many flood victims themselves tend to discount the likelihood that flooding will occur again. This tendency is attributed to a general lack of understanding of probability (see Comparing Risks, below). All too often, people interpret the phrase "100-year storm" to mean that it only occurs once every 100 years, rather than that such an event has a 1-in-100 chance of happening each year. FEMA reports that, based on insurance statistics, a building in the floodplain is five times more likely to be damaged by flood than to sustain major damage by fire.
- Flood warnings reach the Travis County public as regional warnings from the National Weather Service or local warnings in areas covered by The City of Austin's Flood Early Warning System.

Weather-Related Deaths

The National Weather Service (NWS) and the Travis County Office of Emergency Management (OEM) maintain data on weather-related deaths. Summary statistics based on those data are provided in Table 6-1. Because the reporting periods are different, percentages, not actual numbers, are provided. Deaths due to floods and flash floods accounted for 30% of all weather-related deaths Statewide, and 35% in the seven-county Greater Austin area. Figures maintained by the National Climatic Data Center (NCDC) and the Centers for Disease Control (CDC) indicate that Texas leads the country with more flood-related deaths than any other State.

Table 6-1
Weather-Related Deaths
(as percent of all weather-related deaths)

Hazard	Statewide (1950–2010)	Greater Austin (1970–2010)
Flood/Flash Flood	30%	35%
Tornado	15%	9%

Table 6-1
Weather-Related Deaths
(as percent of all weather-related deaths)

Lightning	6%	4%
Winter Storm	6%	0%
Extreme Heat	33%	35%
Severe Thunder Storm	6%	17%
Hurricane/Tropical Storm	4%	0%

6.3 Overview and Analysis of Travis County's Vulnerability to Hazards

This section describes the risks to Travis County, including its citizens, residential, government and commercial assets, and County operations. These include flooding and tornadoes. As noted above, risk is an expression of expected future monetary losses resulting from the impacts of natural hazards. Risk assessment methodologies differ based on the nature of data that is available, the hazard, and the way that the results are expressed.

6.4 Estimate of Potential Losses (Risk Assessment)

This section describes the risks to Travis County, including its citizens, residential, government and commercial assets, and County operations. These include flooding and tornadoes. As noted above, risk is an expression of expected future monetary losses resulting from the impacts of natural hazards. Risk assessment methodologies differ based on the nature of data that is available, the hazard, and the way that the results are expressed. The sections below provide brief descriptions of the methodologies.

6.4.1 Flood Risk in Travis County

This subsection of the Plan update provides estimates of future flood losses, i.e. risk. Each of the loss calculations is based on best available data, but they must be considered estimates because highly detailed engineering studies were not performed as part of this planning process. This subsection is intended to provide a moderately-detailed overview of risk in the County.

Flood Risk - Buildings

The Travis County Geographic Information System (GIS) maintains and accesses numerous digital map products and electronic data files. Among the data and maps are FEMA's Q3 Digital Flood Data map (derived from the Flood Insurance Rate Maps), and maps showing County/City boundaries, waterways and watershed boundaries, and "footprints" of buildings and other facilities.

As of 2010, there are 21,630 parcels in the County with at least some overlap with the 100-year floodplain. As a practical matter, it is not possible to complete a risk assessment with this level of information because of the uncertainty about the number and size of buildings that are exposed to flooding.

Approximately 9% of all buildings in the County are prone to some degree of flooding. The database of buildings does not allow determination by use (residential versus non-residential), but it did allow discrimination by size (smaller than or larger than 4,000 sq ft). The fact that most buildings in the County are smaller than 4,000 sq ft suggests that the majority of buildings in the floodplain were single-family homes.

NFIP Policies In-Force. Data provided by FEMA indicates that as of January 2010, federal flood insurance policies were in-force on 1,905 buildings in Travis County. These policies are administered by the National Flood Insurance Program (NFIP). This represents a dollar value of property and contents coverage in excess of $469 million. *F*or the most part, two factors prompt people to purchase flood insurance – when mortgage lenders require it and when actual flood damage makes it clear to homeowners that a building is, indeed, located in a flood-prone area. Thus, the number and distribution of flood insurance policies is one way to characterize potential risk throughout the County.

NFIP Claims Paid. Between 1978 and May 2010, there have been 712 paid losses in Travis County totally over $13.8 million. Review of the NFIP claims data for Travis County indicates that the large majority of these claims were for residential properties. Table 6-2 summarizes the number of polices, number of losses and total paid claims for the three participating municipalities in Travis County between 1978 and May 2010. The number of policies in force indicated for each municipality is current as of May, 2010.

Table 6-2
NFIP Claims for the City of Pflugerville, City of Sunset Valley, and the Village of the Hills
(Source: FEMA – NFIP Statistics, May 2010)

Municipality	# of Polices	# of Losses	Total Paid Claims
City of Pflugerville	68	4	$169,847
City of Sunset Valley	30	10	$210,584
Village of the Hills	0	0	--0--

Analysis of the National Flood Insurance Program Repetitive Loss and Severe Repetitive Loss Data

The flood risk assessment method is based on analysis of NFIP data on repetitive loss (RL) and severe repetitive loss (SRL) properties. The NFIP defines repetitive loss properties as those that have received at least two NFIP insurance payments of more than $1,000 each in any rolling ten-year period. As of Spring 2010, Travis County had 98 such properties, based on a query of the FEMA BureauNet NFIP interface. Of this total, there are 97 residential and one non-residential property. SRL properties are discussed in greater detail later in this section.

Residential Repetitive Loss Properties

Table 6-3 provides a summary of residential repetitive loss claims for unincorporated Travis County and the City of Pflugerville. As of spring 2010, no repetitive loss properties were identified in Sunset Valley or Village of the Hills. The table below includes the number of repetitive loss properties, building and contents damages, the total number of claims, and the average claim amounts. The City of Pflugerville has one residential repetitive loss property.

Table 6-3
Summary of Residential NFIP Repetitive Loss Statistics, Unincorporated Travis County and the City of Pflugerville
(Source: FEMA NFIP query May, 2010)

Unincorporated Area/City	Properties	Building	Contents	Total	# Claims	Average
Unincorporated Travis County	96	$7,589,183	$801,020	$8,390,202	252	$33,294
City of Pflugerville	1	$129,558	$15,000	$144,558	2	$72,279
Total / Average	**97**	**$7,718,741**	**$816,020**	**$8,534,760**	**254**	**$33,601**

It should be noted that the numbers of claims or repetitive loss properties are not necessarily good indicators of risk, except on a general, community level. This is in part because communities with larger populations will normally have more insurance policies and more claims (holding constant the exposure to flood hazards).

Non-Residential Repetitive Loss Properties

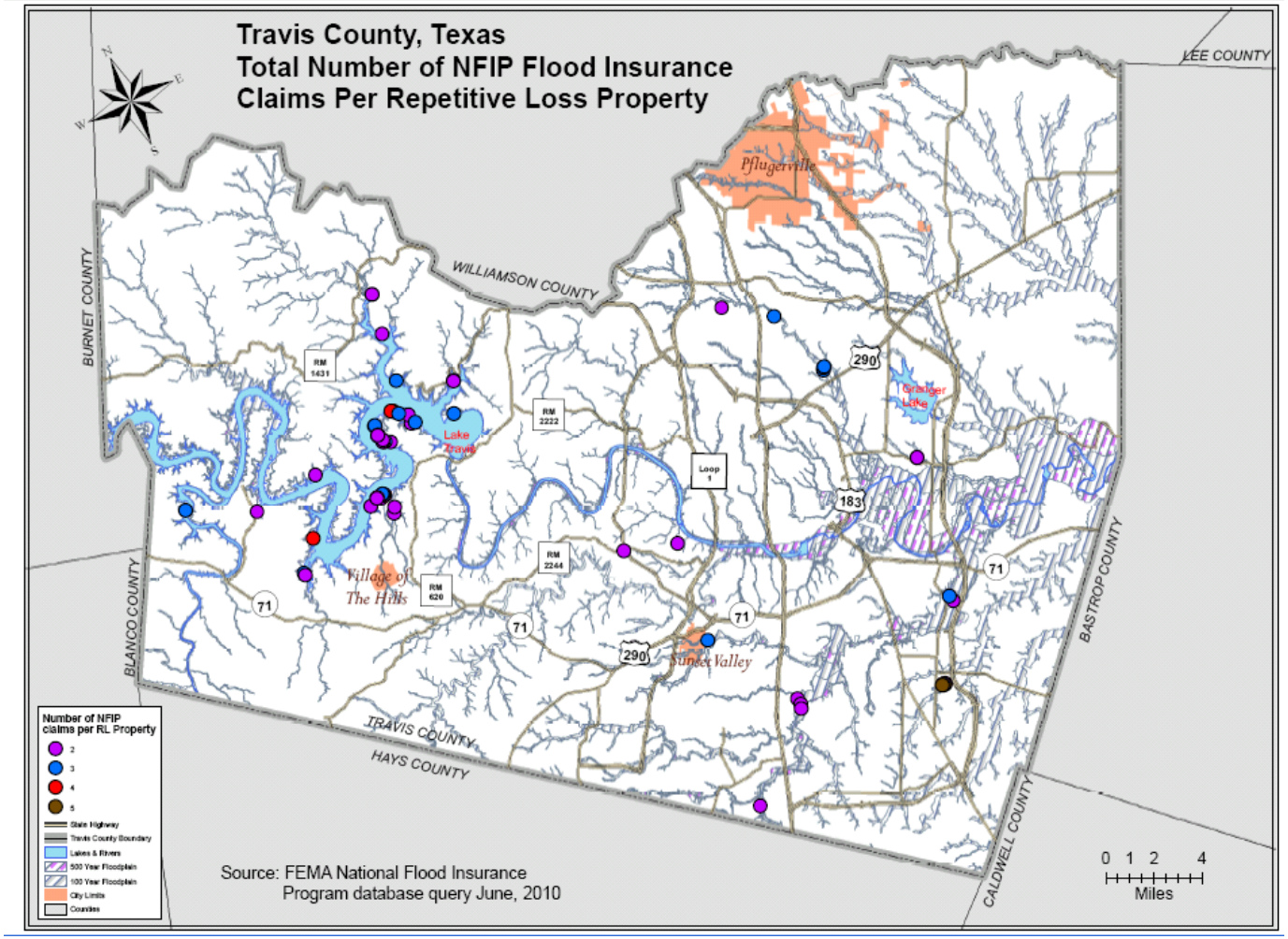
Table 6-4 provides a summary of non-residential RL claims for unincorporated Travis County. The table includes the number of RL properties for unincorporated Travis County, building and contents damages, the total number of claims, and the average claim amounts.

Table 6-4
Summary of Non-Residential Repetitive Flood Loss Claims in Unincorporated Travis County
(Source: FEMA NFIP query May, 2010)

Street Name	Properties	Building	Contents	Total	# Claims	Average
FM Road 969	1	$0	$86,284	$86,284	2	$43,142
	1	**$0**	**$86,284**	**$86,284**	**2**	**$43,142**

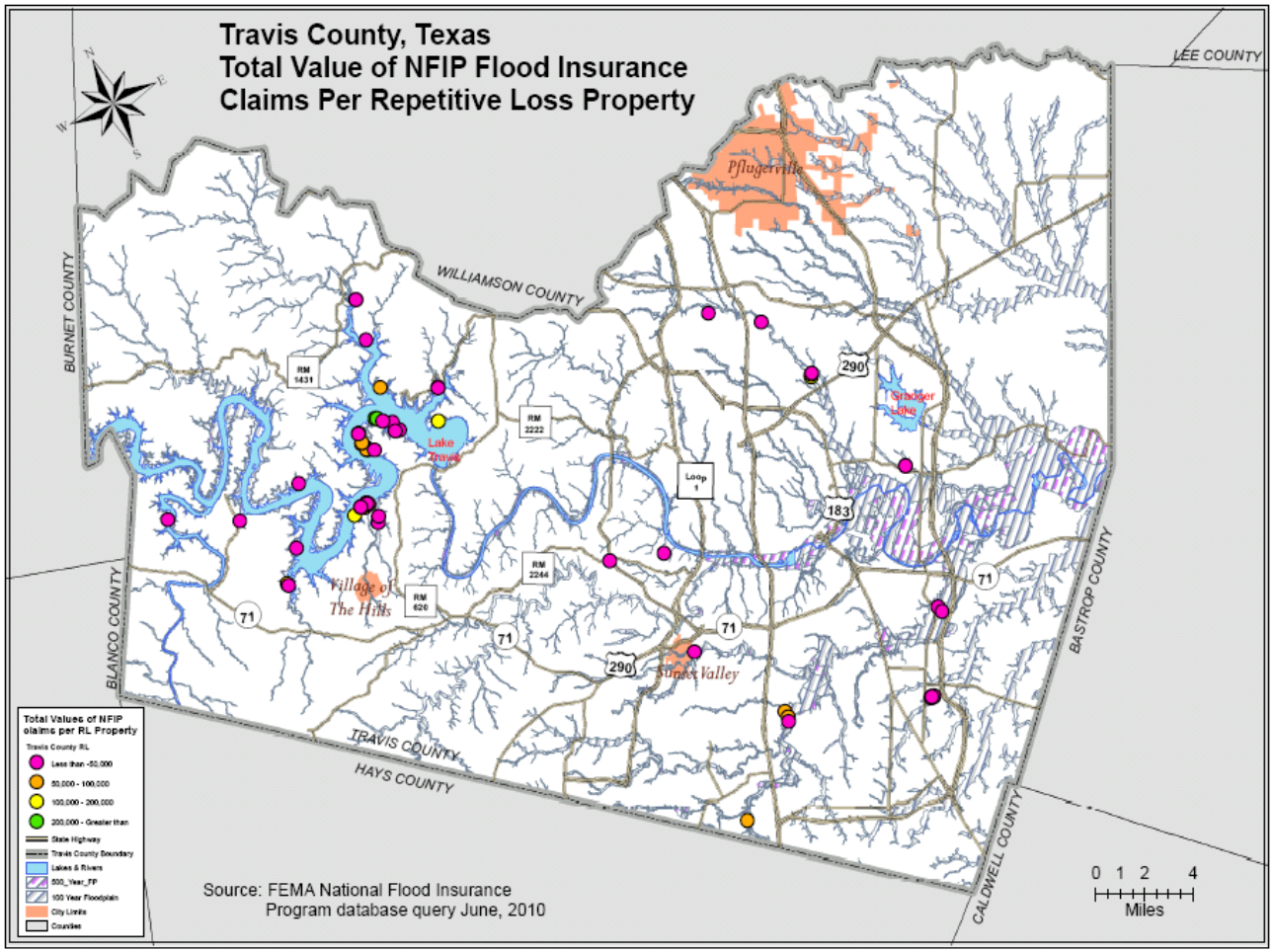
The series of maps below display information about the residential and non-residential repetitive flood loss insurance claims in Travis County. The first map (Figure 6-1) highlights the numbers of insurance claims by property. The second map (Figure 6-2) shows the cumulative amounts of insurance claims for the same properties.

Figure 6-1
Number of NFIP Flood Insurance Claims Per Repetitive Loss Property in Travis County
(Sources: FEMA - NFIP)



The following map highlights the total value of NFIP RL flood insurance claims per property in Travis County.

Figure 6-2
Value of NFIP Flood Insurance Claims Per Repetitive Loss Property in Travis County
(Sources: FEMA - NFIP)



The RL claims can be further broken down by focusing on individual street level data. Table 6-5 provides a summary of residential RL claims for individual streets within Travis County. The data displayed in the table summarizes the NFIP RL data for 59 individual streets in the County that include an RL property. The buildings, contents, and total claims data has been combined for streets that include RL properties. Address data about individual sites is omitted for reasons of confidentiality. The data shows that Graveyard Point Road in unincorporated Travis County has the most residential RL properties, with nine RL properties and 27 prior NFIP claims totaling $801,295.

Table 6-5
Summary of Residential NFIP RL Statistics, Unincorporated Travis County and the City of Pflugerville, ordered by number of Properties on each Street
(Source: FEMA NFIP query May, 2010)

Street Name	Properties	Building	Contents	Total	# of Claims	Average (Per Policy)
Graveyard Point Road	9	$656,328	$144,967	$801,295	27	$29,678
Blue Cat Lane	5	$586,008	$36,760	$622,768	16	$38,923
Rocky Ridge Road	5	$501,251	$34,043	$535,294	13	$41,176
South Ridge Lane	4	$476,465	$56,183	$532,648	11	$48,423
Bluff Springs Road	3	$230,986	$10,332	$241,317	6	$40,220
Hurst Creek Road	3	$300,795	$26,001	$326,796	8	$40,850
Springdale Road	3	$198,732	$92,956	$291,689	9	$32,410
Arrowhead Point	2	$83,730	$4,074	$87,804	4	$21,951
Blue Bluff Road	2	$65,762	$6,286	$72,048	4	$18,012
Cat Hollow Club Drive	2	$536,566	$0	$536,566	4	$134,142
Cross Street	2	$50,309	$0	$50,309	4	$12,577
FM 2769	2	$236,972	$42,408	$279,380	5	$55,876
Forest Way	2	$906,660	$69,665	$976,324	8	$122,041
Oak Ridge Drive	2	$147,495	$735	$148,230	5	$29,646
West Beach Circle	2	$202,019	$29,090	$231,109	6	$38,518
Unknown	1	$100,706	$13,601	$114,306	2	$57,153
Acres Edward Flint	1	$129,558	$15,000	$144,558	2	$72,279
Bay Circle	1	$52,466	$0	$52,466	4	$13,117
Beacon Drive	1	$4,700	$0	$4,700	2	$2,350
Bee Creek	1	$18,205	$1,935	$20,140	3	$6,713
Brooks Hollow Road	1	$216,518	$3,065	$219,583	2	$109,792
Bulian Lane	1	$54,393	$1,053	$55,446	2	$27,723
Castle Ridge Road	1	$26,124	$0	$26,124	2	$13,062
Chipmonk Road	1	$109,907	$0	$109,907	4	$27,477
Chipmunk Trail	1	$62,208	$11,100	$73,308	2	$36,654
Clara Van Street	1	$52,972	$7,638	$60,610	2	$30,305
Commanche Trail	1	$148,107	$3,450	$151,557	3	$50,519
Cornell Loop	1	$2,400	$600	$3,000	2	$1,500
Crk Pk	1	$10,453	$13,176	$23,629	2	$11,814
East Darleen Drive	1	$24,351	$0	$24,351	2	$12,176
Eck Lane	1	$24,523	$3,104	$27,627	2	$13,813
Edwards Drive	1	$40,612	$2,653	$43,265	2	$21,633
February Drive	1	$36,873	$16,664	$53,537	3	$17,846

Street Name	Properties	Building	Contents	Total	# of Claims	Average (Per Policy)
Foley Circle	1	$94,203	$9,272	$103,475	2	$51,737
Foxhead Drive	1	$10,368	$6,821	$17,190	2	$8,595
HC 4	1	$27,402	$0	$27,402	3	$9,134
Hopkins Drive	1	$24,184	$0	$24,184	3	$8,061
Hudson Bend	1	$37,531	$4,300	$41,831	2	$20,915
Jackson Street	1	$75,631	$0	$75,631	3	$25,210
Lakeshore Drive West	1	$39,673	$556	$40,229	2	$20,115
Lincolnshire Drive	1	$6,998	$0	$6,998	2	$3,499
Old San Antonio Road	1	$124,671	$5,706	$130,377	3	$43,459
Parkwood	1	$13,641	$2,419	$16,061	2	$8,030
Pedernales Point Drive	1	$43,572	$7,300	$50,872	3	$16,957
Resubdivision	1	$50,590	$22,895	$73,485	2	$36,743
Rittenhouse Shore Drive	1	$57,115	$500	$57,615	3	$19,205
RR 11	1	$9,062	$0	$9,062	2	$4,531
Route 1	1	$42,371	$19,671	$62,042	2	$31,021
Route 2	1	$76,226	$10,500	$86,726	3	$28,909
Sleat Drive	1	$45,396	$0	$45,396	2	$22,698
Stagecoach Way	1	$53,292	$32,979	$86,271	2	$43,135
Stewart Road	1	$30,632	$0	$30,632	2	$15,316
Sunset Trail	1	$12,879	$5,583	$18,463	3	$6,154
Timber Creek Drive	1	$53,893	$8,200	$62,093	3	$20,698
Travis Oak	1	$18,428	$500	$18,928	2	$9,464
West Lake Drive	1	$28,652	$14,080	$42,732	3	$14,244
Wilke	1	$37,033	$18,198	$55,231	2	$27,616
Winterberry	1	$14,350	$0	$14,350	2	$7,175
Grand Total	**97**	**$7,718,741**	**$816,020**	**$8,534,761**	**254**	**$33,601**

Flood Risk to Residential Properties

Residential flood risk is calculated by a methodology that uses the NFIP claims history in conjunction with FEMA default present-value coefficients from the benefit-cost analysis software modules. To perform this calculation, the RL data were reviewed to determine an approximate period over which the claims occurred. This is not an exact method, because there are numerous properties in the database, and insurance policies come into force at different times, and are cancelled and reinstated periodically. These variables are not part of the query output. With the exception of a few claims in the 1980s, almost all of the claims in the most recent NFIP query occurred between 1992 and the present, a period of 18 years.

As shown in Table 6-6, there have been 254 residential RL claims in this 18-year period, for an average number of claims per year of 14.1. Based on a 100-year planning horizon and a present value coefficient of 14.27 (the coefficient for a 100-year planning horizon using the mandatory Office of Management and Budget (OMB) discount rate of 7%), the projected flood risk to these properties is calculated, and shown at the bottom of the Table. It must be understood that individuals can obtain and cancel flood insurance policies, and the flood hazard depends on many variables, including the

weather, so this projection is simply an estimate of potential damages. Nevertheless, it offers a useful metric that can be used in assessing the potential cost effectiveness of mitigation actions.

Table 6-6
Projected 100-year Flood Risk in Unincorporated Travis County and the City of Pflugerville RL Properties
(Source: FEMA NFIP Query May, 2010; note that the City of Sunset Valley and Village of the Hills are not represented in the Table because they have no NFIP repetitive loss properties as of the 2010 Plan update)

Data	Value
Period in years	18
Number of claims	254
Average claims per year	14.1
Total value of claims	$8,534,760
Average value of claims per year	$474,153
Projected risk, 100-year horizon	$6,766,163

Table 6-7 shows risk projections for the two streets that appear to have the most risk in unincorporated Travis County, based on NFIP RL records. Based on number of claims, the streets with the most risk are Graveyard Point Rd and Blue Cat Ln. These risk figures are a good basis for determining total amount that can be spent (either overall, or per property) on mitigation actions. The ultimate cost effectiveness is also a function of the effectiveness and useful life of the project itself.

Table 6-7
Projected 100-year Flood Risk, Select Streets in Unincorporated Travis County with Highest Number of RL Claims in the NFIP Database
(Source: FEMA NFIP, Query May, 2010)

Graveyard Point Road	
Total number of paid claims	27
Average number of paid claims per year	1.5
Total value of claims	$801,295
Average value of paid claims per year	$44,516
Projected risk, 100-year horizon	$635,243
Number of claimants	9
Projected risk per policy, 100-year horizon	$70,582
Blue Cat Lane	
Total number of paid claims	16
Average number of paid claims per year	0.88
Total value of paid claims	$622,768
Average value of paid claims per year	$34,598
Projected risk, 100-year horizon	$493,713
Number of claimants	5
Projected risk per policy, 100-year horizon	$98,743

Flood Risk at Timber Creek Subdivision

In October, 2006 the United States Army Corps of Engineers (USACE) completed the *Onion Creek Interim Feasibility Study*. The report included two volumes with Volume II dedicated to Onion Creek, which is partially located in both Hays and Travis County. Within the Onion Creek portion of the study, a risk assessment was performed for several subdivisions located including the Timber Creek area of Travis County.

The USACE study calculated flood depths within the Onion Creek Forest/Yarrabee Bend area for various flood frequency scenarios. For Timber Creek, the study indicated that structures impacted by a four percent annual chance flood (25-year flood) consist mostly of mobile homes with varying first floor elevations ranging from less than a foot to 10 feet or more above ground level. However, many of these structures are located in the floodway; consequently, when flood waters rise above finish floor elevations, many of the mobile homes get swept off of their foundations and float several hundred feet downstream. The one percent annual chance flood (100-year flood event) in the Timber Creek area impacts a combination of slab-on-grade residences and mobile homes.[34]

Figures 6-3 and 6-4 identify the 25-year and 100-year flood elevations for structures within Timber Creek. The flood elevations are color coded with flood depths ranging from a few inches to more than five feet.

It should be noted that Travis County is actively acquiring and demolishing homes in this subdivision in support of the USACE study findings and recommendations. More information about this program, and progress to date, can be found in section 7.4 of this plan update.

[34] USACE Onion Creek Interim Feasibility Study, October 2006, Chapter 3, Page 3-5.

Figure 6-3
Timber Creek- 4 Percent Annual (25-year) Chance Flood Elevations
(Source: USACE – Onion Creek Interim Feasibility Study)

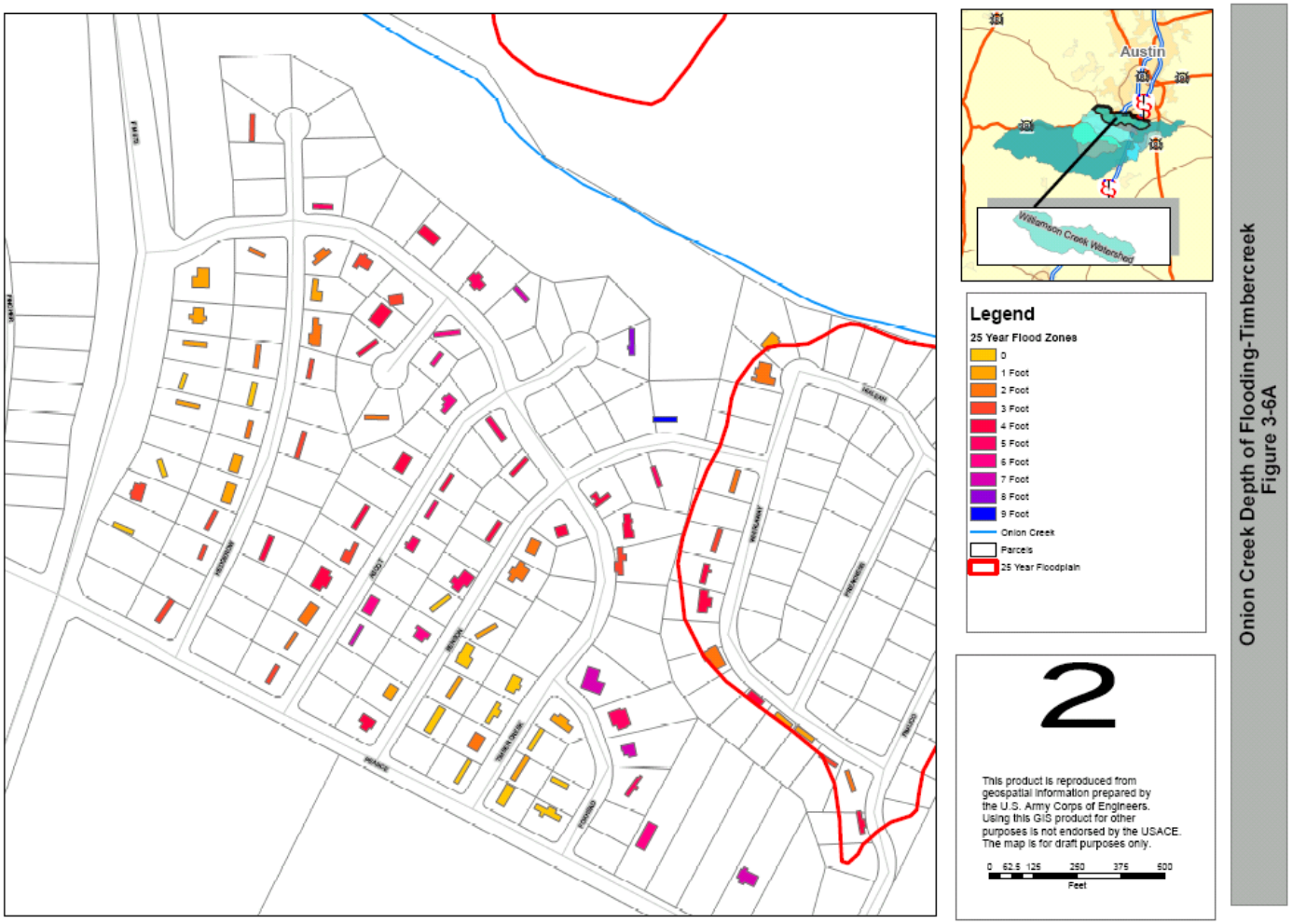
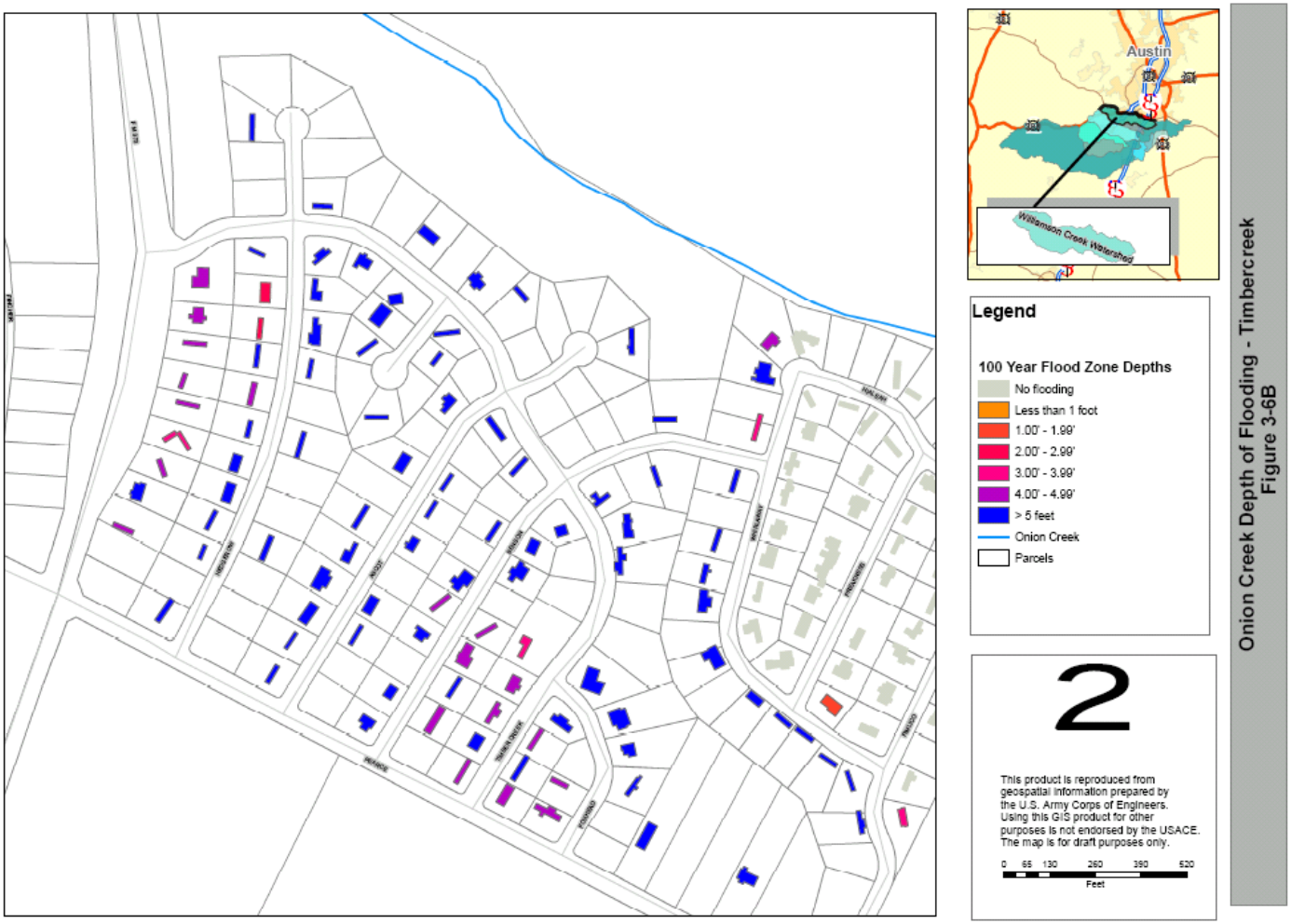


Figure 6-4
Timber Creek- 1 Percent Annual (100-year) Chance Flood Elevations
(Source: USACE – Onion Creek Interim Feasibility Study)



Flood Risk to Non-Residential Properties

There is only one non-residential repetitive loss property in the NFIP database within the unincorporated areas of Travis County (including the three participating municipalities). The relatively small number and amount of claims for this property makes it impossible to accurately determine an annual value for flood losses. Because of this, it is also not possible to estimate losses over a longer time, such as the 100-year planning horizon that is used elsewhere in this section. If a risk projection is required in the future, it may be possible to use an approach based on survey and engineering information.

Severe Repetitive Loss Properties

In 2004, FEMA developed the Severe Repetitive Loss (SRL) Grant Program in an effort to reduce or eliminate flood damages to residential properties that met certain minimum requirements. The Agency initiated the program early in 2008. An SRL property is defined as a residential property that is covered under an NFIP flood insurance policy and has at least four NFIP claim payments (including building and contents) over $5,000 each, and the cumulative amount of such claims payments exceeds $20,000; or at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building As of spring 2010, the unincorporated areas of Travis County had a total of 13 non-mitigated residential SRL properties. The City of Pflugerville, City of Sunset Valley and Village of the Hills had no SRL properties.

Table 6-8 provides loss estimates for SRL properties at the level of individual streets, as calculated by FEMA and the National Flood Insurance Program. As part of its initiation of the SRL grant program, FEMA provided States with actuarial calculations of risk (maximum benefits of mitigation) for 30- and 100-year planning horizons. The data provided by FEMA includes more details about claims histories at the policy level, but that information is not included here because of data confidentiality limitations. The information can be obtained from Travis County on a need-to-know basis.

The columns labeled “30-year Risk” and “100-year Risk” show the expected future losses over those planning horizons, for each street in Travis County that includes a SRL property. As noted, the FEMA/NFIP calculations include these figures on the level of individual addresses and policies. It should be noted that the FEMA methodology does not express a complete range of potential risk (and benefits if the data is used in a Benefit Cost Analysis for a mitigation project), so individual properties should not be dropped from consideration for mitigation based solely on this calculation. More extensive risk assessment and benefit-cost analysis would include additional loss calculations that would likely increase the apparent risk, and concomitant benefits of reducing or eliminating it.

Table 6-8
FEMA NFIP Actuarial Calculation of Potential Maximum Benefits for Mitigating SRL Properties, ordered by Number of SRL Properties in Unincorporated Travis County and the City of Pflugerville
(Source: FEMA/NFIP, query in May, 2010)

Street Name	# of Properties	Paid Claims	Cumulative Claims	30-year Risk	100-year Risk
Graveyard Point Road	4	7	$152,612	$139,135	$159,993
Blue Cat Lane	3	12	$620,510	$494,723	$568,886
Forest Way	2	8	$1,494,536	$794,809	$913,957
South Ridge Lane	2	7	$455,498	$250,323	$287,849
Chipmunk Road	1	4	$126,571	$89,157	$102,523
Hurst Creek Road	1	4	$238,710		
Grand Total	**13**	**42**	**$3,088,437**	**$1,768,149**	**$2,033,208**

Flood Risks – Public Buildings

Travis County government owns many buildings and parcels of land in various locations throughout the County. OEM reports that many of the County's critical facilities are located in the City of Austin, including hospitals and the Emergency Operations Center. A query of the County GIS completed for the 2010 Plan update shows that three County facilities are presently located all or partly in the 100-year floodplain. Note that two related but distinct facilities are co-located at the Lockhart Highway address. These are:

- Satellite Four Administration and Maintenance facilities, located at Lockhart Highway.
- Vehicle Services Building, located at 1000 North Lamar in the floodplain of Shoal Creek, is a 2,100 square foot facility used to service County vehicles. No structural damage in past floods.
- Southeast Service Facility, located at 5412 Lockhart Highway, partially in the floodplain of Onion Creek: covered garage sheds, maintenance sheds, small office building; anchored fuel storage tank.

Some public entities, besides the County, own buildings and facilities in Travis County. Below is a list of these facilities.

- Thirteen Emergency Service Districts (ESDs) serve the County, providing fire and emergency medical services.
- One facility, Fire Station #1108, located at 1600 Citation Drive, appears to be in the floodplain.

- Two public schools appear to have some degree of flood risk (Reilly Elementary and Ortega Elementary). With sites as large as 10 acres, flooding may only affect land and not buildings.

- Ninety-five private water treatment companies operate facilities throughout the County. Records on hazardous materials are managed by the Local Emergency Preparedness Committee (LEPC), which operates under "community right to know" rules established by the

federal government.

- County parks facilities and improvements have been damaged by flood, including the fee booth, picnic tables and pavilions, restrooms, playscapes, fences, electrical and irrigation systems, and trails. Most damage is associated with heavy debris loads carried by floodwaters.

- Moya Park has sustained the most damage in the past decade (cost for recovery has been as high as $280,000); some improvements have been relocated to higher ground, where flood velocities are expected to be lower.

- The Moya Park Ranger residence has sustained repetitive damage due to flooding, most recently in October 1998 and November 2001. It was not reoccupied after the 2001 event, has since been demolished, and will not be rebuilt

- At Hamilton Pool, extensive sections of fencing were damaged due to debris loading.

- Lake Travis parks are known to experience flood damage, including damage to docks due to rapid rise. Inundation of park restrooms has caused damage, especially when deep enough to cover roofs and damage shingles.

- The Northeast Metro Park low-water crossing has been damaged by floodwaters eroding its base. Repairs to the crossing will include additional concrete.

- County parks with streams have sustained some bank erosion damage. In Moya Park, repairs were made with riprap and gabions.

- The Vehicle Services building was flooded in November 2001. The cost to clean up the building and vehicles was approximately $8,000.

- Damage sustained by County buildings as a result of federally declared disasters has not been covered by FEMA because damaged buildings were determined by FEMA to be either ineligible or "below the $500,000 deductible" for buildings not insured for flood damage.

Flood Risks – Roads

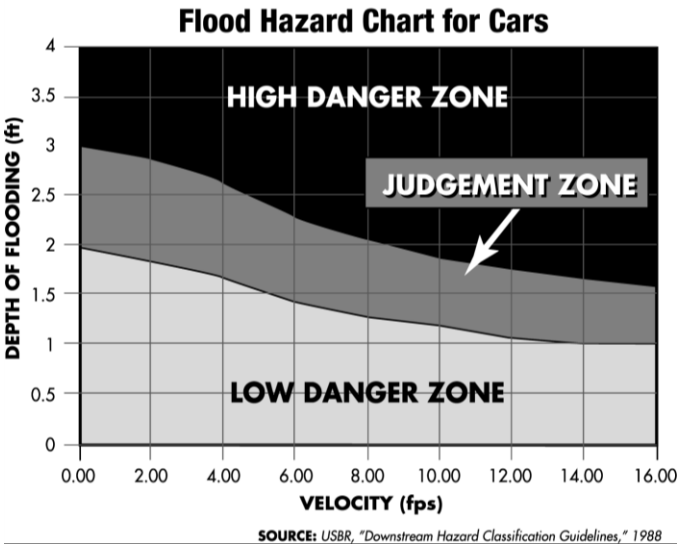
Nationwide, flooded roads pose the greatest threat to people during floods. Most of the more than 200 people who die in floods each year are lost when they try to cross flooded roads. Driving into water is the number one weather-related cause of death in Central Texas. Statewide, between 1960 and 1996, 76% of flood-related deaths were vehicle-related.[35]

As illustrated in Figure 6-5, flood hazards for cars vary with both velocity and depth of floodwaters. Many cars will float in less than 24 inches of water. Fast-moving water can quickly wash cars off the road or wash out a low section of road.

[35] Texas Environmental Center, Online.

Although most roads in Travis County area are unlikely to have deep or fast-moving water during flood conditions up to the level of the 100-year flood, many are still known to flood regularly.

Figure 6-5
Flood Hazard Chart for Cars
(Source: USBR – Downstream Hazard Classification Guidelines 1988)



The following lists summarize the roads and road crossings subject to frequent flooding in Travis County, as of August 2010, by Precinct.

Precinct 1	Precinct 3
Bitting School Rd @ Wilbarger Creek	Wild Basin Ledge @ Tributary to Bee Creek
Cameron Rd @ Schmidt Ln / Wilbarger Creek	Lime Creek Rd @ Fisher Hollow (Creek)
Gregg Ln @ Wilbarger Creek	Cow Creek Rd -- 4 crossings of Cow Creek plus numerous tributary crossings
Jesse Bohls Rd @ Tributary to Wilbarger Creek	Flint Rock Rd @ Tributary to Hurst Creek
Jones Rd @ Wilbarger Creek	Pedernales Canyon Trl @ Lick Creek
Springdale Rd @ Walnut Creek	Hamilton Pool Rd @ Pedernales River
Springdale Rd @ Ferguson Branch (Creek)	Weir Loop Cir @ Devil's Pen Creek -- 2 locations
Cadillac Dr near FM 969	Ledgestone Terr @ Tributary to Pen Creek
County Line Rd S of 290E	Flintrock Circle @ Tributary to Pen Creek
Lockwood Rd East of Parsons Rd	Wyldwood Rd @ Slaughter Creek
Felder Ln @ Cottonwood Creek	Wyldwood Rd @ Tributary to Slaughter Creek
Brita Olson Rd @ Tributary to Cottonwood Creek	Slaughter Creek Dr @ Tributary to Slaughter Creek
Jacobson Rd @ Cottonwood Creek	Wier Lp @ Williamson Creek
Johnson Rd west of Bois D'Arc	Williamson Creek Dr @ Williamson Creek
Old Kimbro Rd @ Cottonwood Creek	Pitter Pat Ln @ Williamson Creek
Littig Rd @ Cottonwood Creek	Mowinkle Dr @ Williamson Creek
Hogeye Rd East of Blake-Manor Rd	Big Sandy Dr @ Long Hollow (Creek)
Albert Voelker Rd @ Dry Creek	Juniper Trl @ Long Hollow (Creek)
Albert Voelker Rd west of Dry Creek	Live Oak Dr @ Long Hollow (Creek)
Littig Rd @ Dry Creek	Cottonwood Dr @ Long Hollow (Creek)
Littig Rd @ Willow Creek	Nameless Rd @ tributaries to Big Sandy Creek -- 2 locations
Lund Carlson Rd @ Tributary to Dry Creek	Nameless Rd @ Nameless Hollow (Creek)
Carlson Rd @ Dry Creek	Round Mountain Rd @ Bingham Creek
Crystal Bend @ Harris Branch (Creek)	Twin Creeks Rd (Manchaca area) near FM 1626
Wells Trace north of Nez Perce Trace	
Taylor Ln near Decker Lake Rd	**Precinct 4**
	Jacobson Rd between Alpine Dr and Linden Rd
Precinct 2	Linden Rd @ Maha Creek
Killingsworth Rd east of Immanuel Rd	Citation Dr (Thoroughbred Farms subdiv) between Man-O-War Ave and Ponder Ln
Immanuel Rd north of Killingsworth Rd	Pearce Ln near FM 973
Cameron Rd east of Cele Rd	Turnersville Rd @ Maha Creek
Cameron Rd -- two locations between Hamann Ln and No Name St	Blocker Ln @ Tributary to Dry Creek
	Rodriguez Rd @ Dry Creek
Precinct 3	Elroy Rd near Kellam Rd
Spicewood Springs Rd --7 crossings of Bull Creek	Doyle-Overton Rd @ Eilers Rd
Old San Antonio Rd @ Onion Creek	Peterson Rd @ Tributary to Maha Creek
Bee Creek Rd @ Bee Creek	Doyle Rd @ Tributary to Maha Creek
Fall Creek Rd @ Tributary to Fall Creek	Plover Place @ Maha Creek
Fitzhugh Rd @ Barton Creek	Wright Rd @ Tributary to Maha Creek
Crumley Ranch Rd @ Rocky Creek	Colton Rd @ Cottonmouth Creek
Great Divide @ Little Barton Creek	Williamson Rd NW of Elm Grove Rd
Tumbleweed Trl @ Tributary to Lake Austin	Williamson Rd SE of Elm Grove Rd
Westlake Dr between Woodcutter's Way and Elohi Dr	Laws Rd between US 183 and Evelyn Rd

Replacing roads and bridges damaged or washed out by floods costs millions of dollars each year. If the damage is caused by a Presidentially Declared Disaster, FEMA may pay up to 75% of the repair or replacement costs, with the remaining 25% covered by the local governments. The full costs of a damaging event that is not declared a major disaster must be borne by the State and local communities.

As of 2010, there are approximately 4,750 miles of road in Travis County. Of these, 1,261 miles are County-owned, 500 miles are State-owned, and 3,000 miles are owned by cities or other entities. When building new State roads, the Texas Department of Transportation considers the NFIP's floodplain and floodway requirements to evaluate the impact of new and replacement structures. The County considers floodplain and floodway impacts in its planning and design for Country roads and waterway crossings.

The following statistics broadly characterize the flood-related risks associated with roads in Travis County as of August, 2010:

- 69.7 miles of County-owned roads are in the mapped floodplain.
- 35 miles of State-owned roads are in the mapped floodplain.
- 110.1 miles of city-owned roads are in the mapped floodplain.

Past flood events have caused damage to Travis County roads and low water crossings. Staff interviews resulted in the following characterizations of past flooding to County roadways.:

- Jones Road was flooded, scouring the embankment behind the abutment; no structural damage was sustained because the abutment is founded on deep piers.
- Parsons Road experienced erosion at the bridge due to flow alignment; upstream channel work with gabions were installed to divert flow more efficiently through the bridge.
- County maintenance records indicate that little road, bridge, and culvert damage resulted from the November 2001 flood.
- The Christmas 1991 flood caused minor road damage.
- Parsons Road is typically affected when Wilbarger Creek floods with water depths of over two feet for 24–48 hours. This usually occurs with 3–4 inches of rainfall. As development expands into the vicinity, Parsons Road is experiencing an increase in traffic. Non-flood-related improvements to this road are already in the planning phases.
- Woody debris resulting from the December 2001 “Christmas” flood was ground up for mulch and stockpiled in County parks for use in park maintenance. However, due to the large volumes of mulch, some had to be hauled to landfills for disposal.
- Since the mid-1980s, bridge piers have not been undermined by flood events.

Flood Risks – Stormwater Management

Past flooding in Travis County shows that most drainage problems are not life threatening. Many areas experience accumulations of rainfall that are slow to drain away, which may cause disruption of normal traffic, crop damage, soil erosion, and water quality problems.

The County has the authority to adopt reasonable specifications for drainage for streets and roads. County stormwater management provisions, included in the drainage and subdivisions regulations (Chapter 82), require that waterways, drainageways, and floodplains be shown on subdivision plans. Drainage easements must be sized to contain storm discharges and be protected from erosion and scour.

Subdivision proposals with impervious cover that exceeds 20% of the total land area must be accompanied by a drainage plan. The plan must include “controls that may be required to attenuate the effects of the proposed increase in stormwater to, from, across or along roadways within or adjacent to the subdivision” (Section 82.302(e)(3)).

Flood Risks – Dams

FEMA and the U.S. Army Corps of Engineers (USACE) maintain the National Inventory of Dams (NID), a database of high and significant hazard dams. For the most part, data are provided by State agencies responsible for regulation and inspection of dams or by theUS Army Corps of Engineers.

The Lower Colorado River Authority (LCRA) regulates dams on the Colorado River and has an extensive dam safety program that includes inspections, maintenance, and repair. Other dams are regulated by the Texas Council on Environmental Quality (formerly known as the Texas Natural Resources Conservation Commission).

Dams are categorized into three hazard potential classes:

- High hazard potential dams are those whose failure or operational failure will probably cause loss of life and/or significant infrastructure losses.
- Significant hazard potential dams are those whose failure or operational problems are unlikely to cause lose of human life, but can cause economic loss, environmental damage, disruption of lifelines, or other concerns.
- Low hazard potential dams are those whose failure would probably cause no loss of human life and only low economic and/or environmental losses, which would typically be limited to the dam owner's property.

As of July, 2010 the USACE's National Inventory of Dams (NID) database indicated there were 59 dams in Travis County. Of these 59 dams, 26 were classified as high hazard, 14 significant hazard dams, and 19 low hazard dams. Figure 6-6 shows the location of high, significant, and low hazard dams in Travis County. Mapped locations are based on latitude and longitude data contained in the National Inventory of Dams.

Figure 6-6
Dams in Travis County
(USACE – National Inventory of Dams)

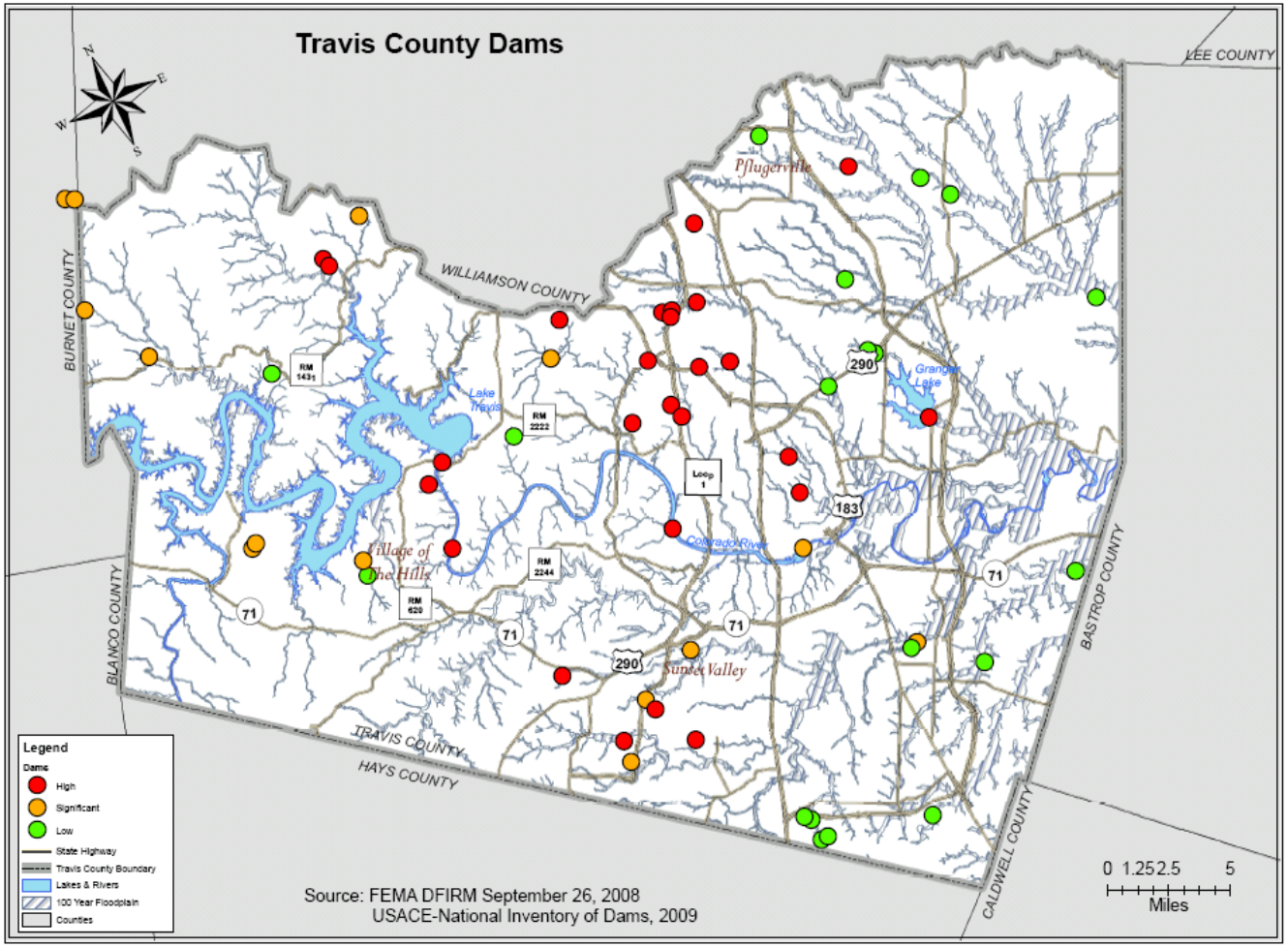


Table 6-9 summarizes information reported by the NID for the 26 high hazard dams located within Travis County. The 26 high hazard dams reported in 2009 represents a 42 percent increase from the 15 high hazard dams which were reported by the NID in 2004.

Based on data provided by the USACE's NID, as of 2009, an Emergency Action Plan has been completed for four high hazard dams. At the time of the 2010 Plan update, data related to dam inundation zones was unavailable. Without this information, a risk assessment for the dam hazard could not be performed. Without dam inundation zone determinations, at-risk people, buildings and infrastructure cannot be determined.

Table 6-9
High Hazard Dams in Travis County, ordered by Year Built
(USACE – National Inventory of Dams, 2009)

Dam Name	Year Built	River	Inspection Date	Dam Length	Dam Height	Primary Purpose	EAP
Evergreen Dam	unknown	Tannehill Branch	6/28/2001	745	36	Flood Control	No
Stener Ranch Lake Dam	unknown	TR-Colorado River	5/26/2005	3,700	26	Recreation	No
Wells Branch Mill Pond Dam	unknown	TR-Wells Branch	6/17/2005	0	16.5	Flood Control	No
Tom Miller Dam	1939	Colorado River	5/19/2006	1,590	85	Water Supply	Yes
Mansfield Dam (Marshall Ford)	1942	Colorado River	6/2/2006	7,089	278	Water Supply	Yes
Nameless Valley Ranch Dam No. 1	1962	Palmetto Hollow	6/16/2005	566	25	Recreation	No
Nameless Valley Ranch Dam No. 2	1962	Palmetto Hollow	6/1/1987	200	24	Recreation	No
Decker Creek Dam	1967	Decker River	4/20/1998	6,390	83	Other	No
Apache Lake Dam	1969	TR-Colorado River	2/26/2004	255	41	Recreation	No
Hidden Lake	1969	TR-Bull Creek	7/27/2005	400	42	Irrigation	No
Water Quality Pond SP960112D	1977	UN TR_Walnut Creek	Unavailable	240	15.5	Water Supply	No
Great Northern Dam	1978	Unavailable	2/13/2007	1,200	20	Fish and Wildlife Pond	No
Wood Hollow Dam	1979	Unavailable	2/12/2007	344	33	Fish and Wildlife Pond	No
Cat Mountain North Dam 4	1982	TR-Bull Creek	9/20/2006	0	0	Water Supply	No
Park Bend Dam	1983	TR-Walnut Creek	2/12/2007	800	16	Unavailable	No
Slaughter Dam	1983	Unavailable	2/16/2007	1,020	8	Unavailable	No
Duval Dam West	1984	Walnut Creek	9/1/2004	1,200	28	Flood Control	Yes
Duval Dam East	1984	Walnut Creek	9/1/2004	510	36	Flood Control	Yes
Arboretum Stormwater Detention	1985	TR-Bull Creek	9/20/2006	292	43	Flood Control	No
Circle C Ranch North Dam	1986	Slaughter Creek	5/26/2005	1,768	24	Flood Control	No
Mearns Meadow Dam	1994	Little Walnut Creek	2/12/2007	750	14	Unavailable	No

Dam Name	Year Built	River	Inspection Date	Dam Length	Dam Height	Primary Purpose	EAP
Davis Dam 2	1996	Kincheon BR-Williamson Creek	2/16/2007	1,300	12	Unavailable	No
Metric Dam	1996	Unavailable	2/13/2007	600	12	Fish and Wildlife Pond	No
Bartholomew Pond Dam	1997	Tannehill Branch	9/1/2004	425	25	Flood Control	No
Highway 71 Dam	1999	Unavailable	2/15/2007	730	25	Unavailable	No
Pflugerville Dam	2005	TR-Wilbarger Creek	10/12/2006	2,944	46.5	Water Supply	No

Flood Warnings

For Lake Travis and some other waterways in the County, flood warnings are closely coordinated with the City of Austin and the Lower Colorado River Authority (LCRA). The EOC monitors situations, informs the public of road closures, and serves as a clearinghouse for requests for resources.

Onion Creek is problematic because much of the 343 square mile watershed is in Hays and Blanco Counties and only three of the City's FEWS precipitation gauges are in the mid-reach of Onion Creek. Therefore only general warnings can be issued for this watershed.

Lake Travis flooding is influenced by the operation of LCRA dams. For downstream areas, LCRA typically provides about 6 hours warning prior to opening gates on Lake Travis/Mansfield Dam.

FEMA National Flood Insurance Program

In 1968, Congress authorized FEMA's National Flood Insurance Program (NFIP) for two primary purposes: (1) to have flood-prone property owners contribute to their own recovery from flood damage through an insurance program; and (2) to guide development such that it is less prone to flood damage. To facilitate implementation, the NFIP created Flood Insurance Rate Maps (FIRMs) that, based on best available information and engineering methodologies, show areas subject to flooding by the 1-percent-annual chance flood (also called the "100-year flood"). Communities use the maps to guide and regulate development. Citizens and insurance professionals use the maps to determine insurance needs.

It is notable that, whereas flood insurance claims are paid when damage is sustained from any qualifying flood event, federal disaster assistance is available only after a flood is determined to be a "major disaster." A major disaster exceeds state and local capabilities. In addition, disaster grants to individuals and families are limited. Therefore, owners of insured buildings that are in areas known to flood, especially as shown on FIRMs, are protected financially as long as they carry sufficient flood insurance coverage. Additional information on flood insurance coverage for property owners and consumers is available online at www.fema.gov/nfip.

Basic federal flood insurance helps pay for property damage and loss of contents. Under certain circumstances – for example, if flood damage causes "substantial damage" – an additional mitigation claim payment is available to help owners bring buildings into compliance with NFIP flood protection standards. Compliance is required when a building is substantially improved (includes repair of substantial damage). Substantial improvement is defined as improvements valued at 50% or more of the building's market value before improvement.

Continued Compliance with the NFIP

To participate in the National Flood Insurance Program (NFIP), a local jurisdiction adopts an ordinance or regulations to regulate development within flood hazard areas. The ordinance must be consistent with the minimum federal requirements of the NFIP (44 CFR 60.3). The processes for administration, including enforcement, must support effective compliance with the minimum requirements.

Travis County satisfied requirements for initial participation in the NFIP and joined the Emergency Program on January 22, 1976. By adoption of Chapter 64, Regulations for Floodplain Management and Guidelines and Procedures for Development Permits, on March 29, 1982, Travis County satisfied the requirements of the NFIP's Regular Program. The effective Flood Insurance Rate Map (FIRM) for Travis County was adopted and is now used as the minimum flood hazard area within which development must conform to floodplain management regulations. To date, neither FEMA nor TWDB have conducted a Community Assistance Visit (CAV) in Travis County.

Property owners proposing to substantially improve buildings or to repair substantially damaged buildings (proposed improvements or repairs cost 50% or more of the market value of the building) are required to obtain a development approval if the buildings are located in floodplains or drainage easements. The substantial improvement provision requires that buildings not conforming with NFIP requirements be brought into compliance. In support of this provision, the County accumulates costs of any repair, reconstruction, or improvement made to a structure since March 28, 1995. These costs are applied towards the 50% figure for a given structure. Applicants for improvements are notified of this "cumulative provision".

Subdivisions are approved pursuant to standards for streets and drainage (Travis County Code, Chapter 82, revised August 28, 1997). An average of 167 plans for new subdivisions are submitted for review each year. Most subdivision plans delineate floodplain boundaries and drainage easements. Plat notes generally state that no construction in drainage easements (which include the mapped floodplain) is allowed without County approval. When evaluating and approving new subdivisions, the County works with developers to identify and implement ingress and egress to adjacent communities that have a history of flooding and/or access restrictions. In general, efforts are made to avoid putting new roads in flood hazard areas.

Provisions for the management of increased stormwater runoff are included in the County subdivision regulations. Increases are managed to avoid increasing flood damage. The most common management technique is through ponds placed in commonly owned areas, typically owned by homeowner associations or municipal utility districts. The County has begun maintaining records of reported drainage problems (such as standing water in yards and ditches). At this time, there are no criteria for resolution of such problems and the County does not have a "master drainage plan."

A total of 13 of the 22 incorporated municipalities within Travis County also participate in the NFIP, having joined the Regular Program at different times since 1978. Two of the three municipalities participating in the Plan update are members of the NFIP. The City of Pflugerville joined the NFIP in 1978 and the City of Sunset Valley joined in 1979.

6.4.2 Tornado Wind Risk in Travis County

Relative to other parts of the nation, the tornado risk is moderate to high in Travis County. There is significant enough exposure to the hazard to perform a simple risk assessment to characterize the potential future losses. The risk was done using FEMA's Benefit-Cost Analysis (BCA) software (version 4.5.5.0), and some relatively straightforward methods to estimate the total exposure of assets in the County.

The FEMA BCA analysis methodology and tornado element of the software are based entirely on avoided injuries and fatalities. As a result, it is not necessary to separate public assets from private ones in order to estimate potential future losses (risk) – the calculation is based on the population at risk, rather than the square footage or value of buildings or functions. Table 6-10 provides the dollar amount estimates used in the module for treating different levels of injuries.

Table 6-10
Estimates for Treating Different Levels of Injuries
(Source: FEMA BCA Software, Version 4.5.5.0)

Injury Death Cost

Injury Costs

Severity of Injury	WTP Value (Rounded $)
Dead - Fatal	$5,800,000
Hospitalized	$1,088,000
Self Treat	$12,000
Treat & Release	$90,000

Note that the BCA module (tornado hazard) used to calculate the expected future losses (risk) is not configured to support extremely large shelter population figures, so it was necessary to truncate the input figures. This was accomplished by simply entering 100 as the number of occupants, so the expected annual risk (benefits in Table 6-13 below) can then be expanded to the entire County population to determine the actual risk.

The FEMA BCA module requires analysts to provide some basic project information for a proposed tornado safe room in order to complete the risk assessment. Table 6-11 summarizes the project information entered into the module. The general radius of the County was determined using the total square miles (1,024) and a basic area formula ($a = pi\ r^2$).

Table 6-11
Tornado Risk Assessment - Project Information

Data	Value
Project useful life	50
Number of Occupants	100
Gross square footage	1,000
Maximum Design Wind Speed (mph)	250
Predominant structure Type	1 or 2 story Family Residence
Size of community (radius in miles) that will use the safe room	18.11

For the analysis, it was estimated that the safe room was 1,000 square feet with occupancy of 100. Based on the number of total occupants, the module calculates the occupancy based on the time of the day a tornado occurs. Table 6-12 shows that average occupancy would be 77 residents.

Table 6-12
Number of Occupants
(Source: FEMA BCA Software, Version 4.5.5.0)

Occupancy Results

Calculated Number Of Occupants Per Structure Type Based On Occupancy Percentage And Warning Response: *

	Time	Residences
Night	Midnight - 6:00 AM	36.00
Evening	6:00 PM - Midnight	72.25
Day	6:00 AM - 6:00 PM	100.00
	Average Occupancy:	77.06

The software then uses inputs related to building occupancy by time of day to calculate the expected loss of life and number of injuries for tornado classes EF0 to EF5. Table 6-13 shows the summary of benefits from the tornado risk assessment. The figures in the *Expected Avoided Damages After Mitigation* box are the calculated benefits per 100 residents. The annual benefits (per 100 residents) are calculated at $10,504 and the net present value of the benefits over the lifetime of the project (50-years) is $144,961.

Table 6-13
Tornado Risk in Travis County, Per 100 Occupants
(Source: FEMA BCA Software, Version 4.5.5.0)

SUMMARY OF BENEFITS

Expected Annual Damages Before Mitigation		Expected Annual Damages After Mitigation	
Annual	$ 10,683	Annual	$ 179
Present Value	$ 147,428	Present Value	$ 2,467

Expected Avoided Damages After Mitigation (BENEFITS)	
Annual	$ 10,504
Present Value	$ 144,961

MITIGATION BENEFITS	$ 144,961
MITIGATION COSTS	$ 376,015
BENEFITS MINUS COSTS	$ -231,054
BENEFIT-COST RATIO	0.39

The risk per 100 residents can then be expanded to include the 172,650 residents in the unincorporated area of the County. The population figure for unincorporated portion of the County was based on the estimates developed by CAMPO for the Travis County 2035 Comprehensive Plan. To determine the annual avoided damages for unincorporated Travis County, the number of residents was divided by 100 and then

multiplied by $10,504. This calculates to an expected annual damage figure of $18,135,156. This translates to a 100-year risk figure of $258,788,867 ($1,498 per capita), using a calculation based a 7% discount rate. Although this is a very large figure compared to some other risks in the County, it is very important to recognize that (1) the figure is based on life safety and FEMA has relatively high values assigned to injuries and deaths, and (2) it is very difficult to develop meaningful tornado mitigation measures for large populations such as Travis County. Although warning systems can address risk to a degree, such measures will not mitigate risk to significant percentages of the population for a variety of reasons.

Note that a tornado risk assessment has been completed for each of the three jurisdictions participating in the Plan update (City of Pflugerville, Village of the Hills, and City of Sunset Valley). See Appendices H, I, and J for the completed risk assessments.

6.5 How Travis County Estimates Impacts

After a natural hazard event causes damage, Travis County undertakes a rapid estimate of the impacts to buildings. Impacts to both County property and private property are examined.

In the event of damage to Travis County owned property or facilities, the initial damage assessment is conducted by trained staff in the Risk Management Office. Because the County's buildings are covered by property loss insurance, the insurer generally requires additional damage assessments that go into more detail. These assessments are overseen by a third party administrator to insure accuracy in estimating losses. For the County's non-building items such as picnic tables, trail damage, fencing, etc. that are normally associated with parks in the floodplain area, County personnel prepare damage assessments based upon experience with repairs or replacement costs. If damage is sustained by building contents, such as computers or other equipment, estimates would also be based on replacement costs or experience with repairs.

When privately-owned property is damaged by natural hazards, The County attempts to contact owners within the first 24 hours to gather estimated costs. This activity is usually started in the Emergency Operations Center during the activation phase. The Disaster Summary Outline is initially generated based on early estimates and is subsequently amended as more accurate numbers are received. Depending on the scope of an event, the American Red Cross conducts a"windshield assessment" to assist the County with estimating the number of households affected and other recovery activities, but it does not develop estimates of the costs of damage.

For private residences and small businesses, the County has access to the Travis County Appraisal District's database. The data can be used to prepare a rough estimate based upon the valuation of homes in an affected area and the number of homes/businesses identified as showing damage. The County does not gather estimated damage costs from insurance companies.

For non-building damage, such as roads, TNR's staff who are experienced in estimating costs for non-disaster related work, prepare cost estimates.

6.6 Future Development Trends in Travis County

To identify future development trends in Travis County, the *Travis County Greenprint for Growth* report and the *Southwest Travis County Growth Dialog report* were reviewed The most recent Comprehensive Plan for Travis County was completed in 1999. The Plan titled, *Travis Tomorrow* was reviewed, but any information related to future development was considered too outdated to be of value for the Plan update. As of summer 2010, the County had just initiated the process of updating its 1999 Comprehensive Plan. It is anticipated that the update will take between 18 and 24 months to complete.

As part of the 2010 Plan update, an extensive search of open sources for plans and studies related to development trends was performed. After review of numerous documents, the two reports identified above appear to provide the best potential for identifying future development trends in Travis County.

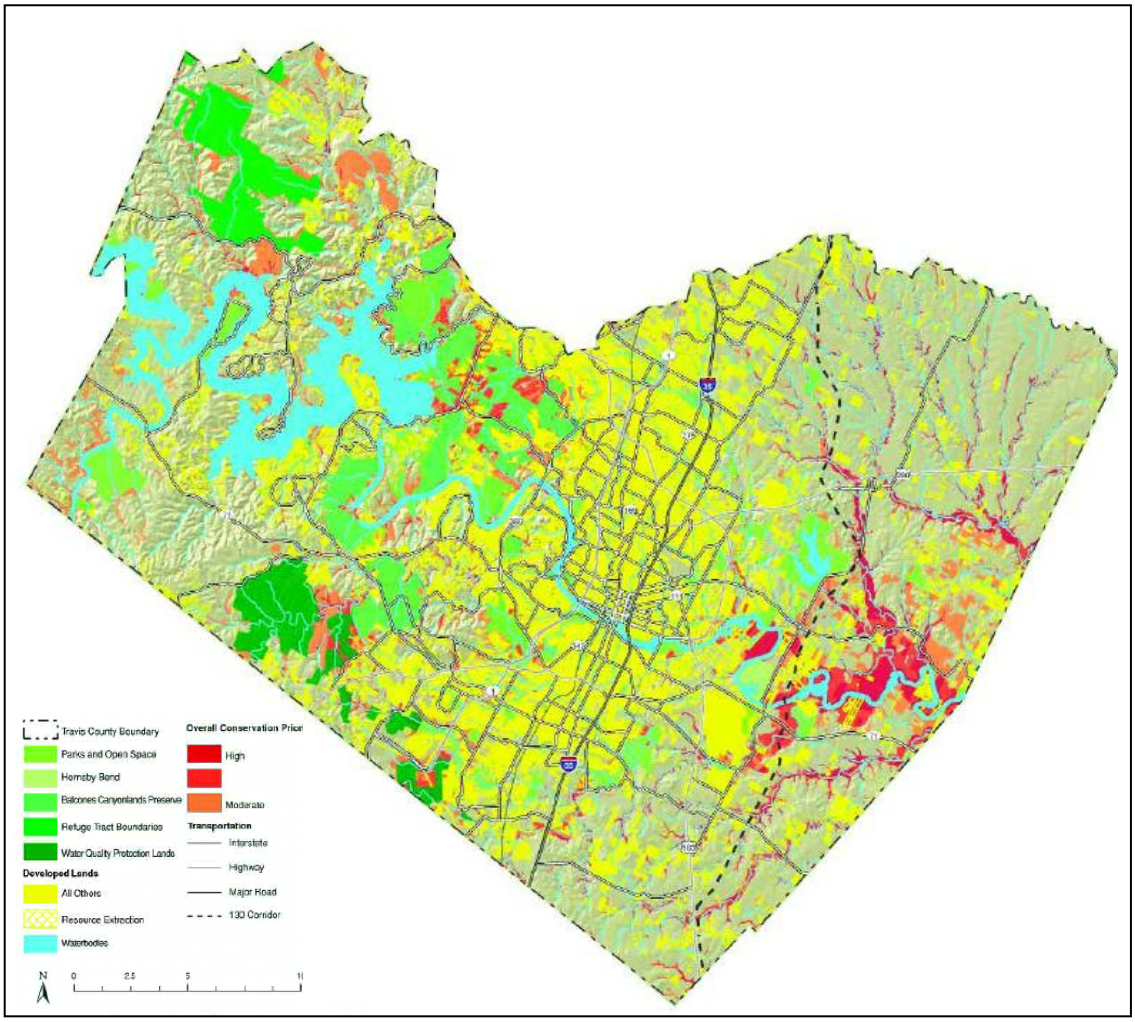
The *Travis County Greenprint for Growth* was published in October 2006 and applies Geographical Information System modeling to recommend land conservation priorities. The model identifies currently unprotected areas that offer the highest conservation benefit based on locally identified goals and criteria.[36] The report identified the following areas for special focus and future acquisition opportunities.

- The Colorado River Corridor east of Interstate Highway 35 to the County boundary. The conservation areas identified in this area predominately located within the floodplain of the Colorado River and its tributaries.
- The central city neighborhood parks and the Walnut Creek Watershed
- Balcones Canyonlands Preserve
- Southwest Travis County
- The Balcones National Wildlife Refuge

Figure 6-7 identifies the overall conservation priorities with protected and developed land. Areas shaded dark red have a high conservation priority while areas shaded orange have a moderate conservation priority. The existing developed areas of the County are shown in yellow. The map shows the majority of the high conservation priority areas are located along the eastern Colorado River Corridor.

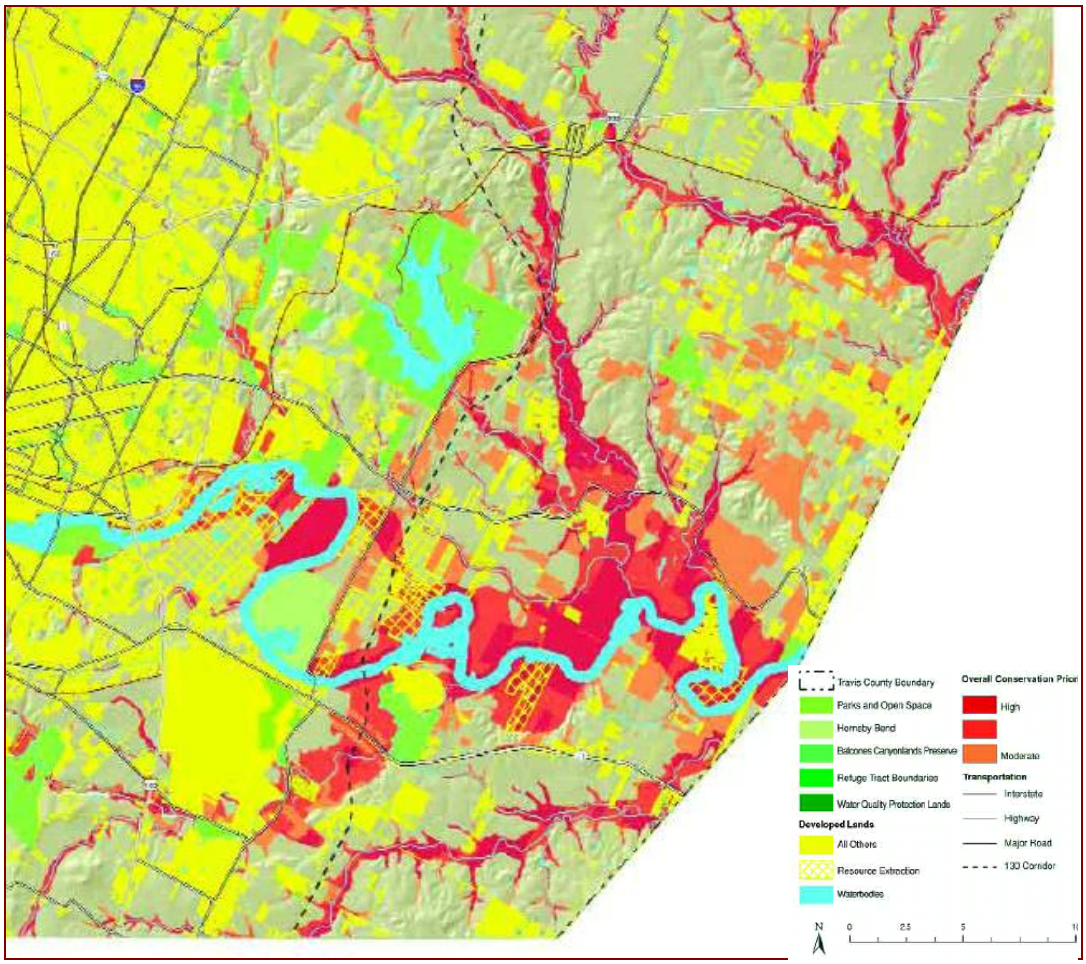
[36] Travis County Greenprint for Growth, The Trust for Public Land. October 2006

Figure 6-7
Overall Conservation Priorities with Protected and Developed Land
(Source: Travis County Greenprint for Growth, October 2006)



The Colorado River Corridor east of Interstate Highway 35 to the County boundary was identified as one of the land conservation priority areas. Figure 6-8 identifies the overall conservation priorities for the Colorado River Corridor in eastern Travis County. The map shows the high priority conservation areas (shown in red) are predominately located along the floodplain of the Colorado River and its tributaries. Adopting these areas as conservation in the future would further limit development in the floodplain.

Figure 6-8
Colorado River Corridor East of Interstate Highway 35 with Protected and Developed Land
(Source: Travis County Greenprint for Growth, October 2006)



Southwest Travis County

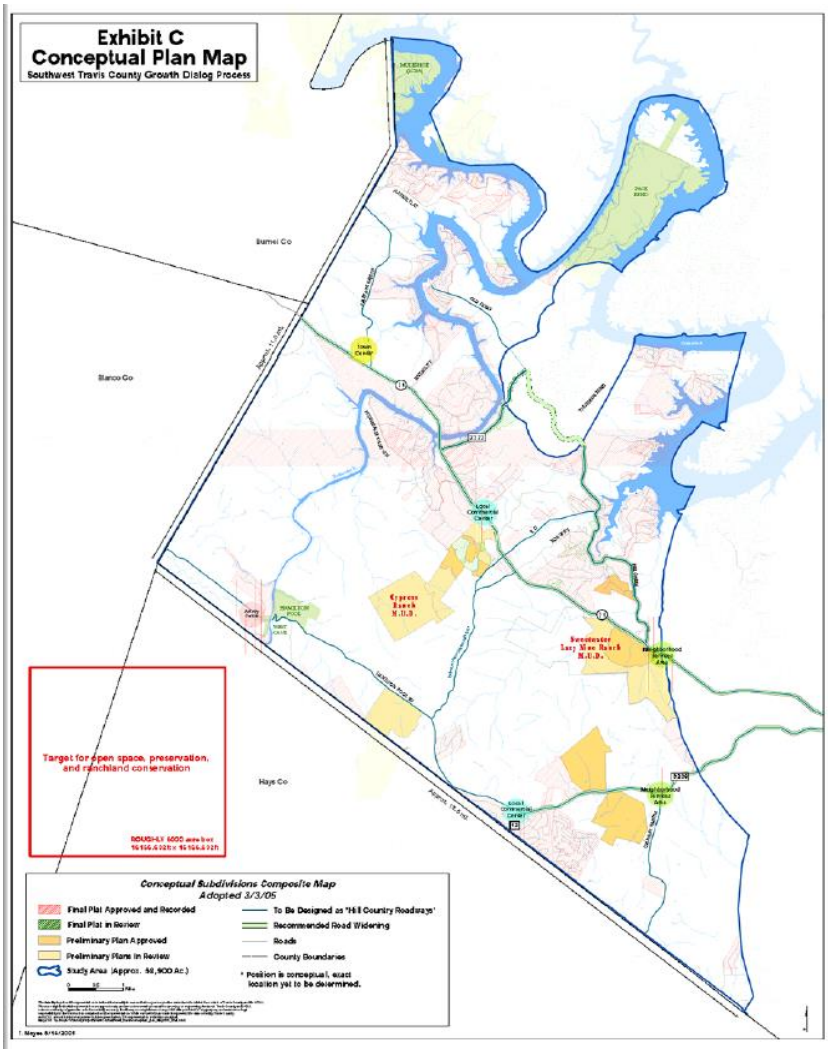
To identify future development in southwestern Travis County, the planning team reviewed the *Southwest Travis County Growth Dialo*g. The report was developed and funded by Travis County and LCRA to seek community and stakeholder input on growth-related issues in southwestern Travis County. The Advisory Panel Final report was completed in May 2005. Although published in 2005 (several years prior to the Plan update), the report provided the best available resource as to insight on future development trends in the southwestern part of Travis County. The study area addressed in the Growth Dialog is defined as the unincorporated area of Travis County (outside municipal corporate and extraterritorial boundaries) bounded to the west and south by the County boundary, to the north by Lake Travis and the Village of Briarcliff extraterritorial jurisdiction (ETJ) and, to the east by the City of Austin and City of Lakeway ETJ boundaries. The study area is an environmentally diverse and beautiful Hill Country setting.[37]

[37] Southwest Travis County Growth Dialog Advisory Panel Final Report, May 31, 2005.

The Growth Dialog report indicates that population growth in Travis County is estimated to be averaging 2.4% annually since the 2000 census. The Growth Dialog report indicates that development interest in the southwest portion of Travis County increased between 2003 and 2005 as convenient, new development alternatives in the more developed and previously more growth oriented northwest portion of the County have been reduced.

The report developed 38 implementation proposals which were recommended as the final result of the Advisory Panel's considerations and was organized under ten topical item headings. The advisory panel indicates that implementing these recommendations will promote the region's Hill Country character and provide cultural, environmental and recreational amenities of value to all of Travis County both now and in the long-term. Figure 6-9 identifies the Conceptual Plan that was developed based on the implementation proposals.

Figure 6-9
Colorado River Corridor East of Interstate Highway 35 with Protected and Developed Land
(Source: Travis County Greenprint for Growth, October 2006)



Permitting Development

Table 6-12 shows the total number of development permits issued by TNR between 2003 and 2009, by precinct. The table shows that over the past six years, new development has occurred most rapidly in Precinct 3 (western half of Travis County) and Precinct 1 (Northeast Travis County).

Table 6-14
Building Permits Issued Between 2003 - 2009, by Precinct
(Source: Travis County)

	Precinct 1	Precinct 2	Precinct 3	Precinct 4	Total
Calendar Years 2003 - 2009					
Class A	5,982	3,212	9,711	1,202	20,107
Class B*	287	67	1118	212	1,684
Total	**6,269**	**3,279**	**10,829**	**1,414**	**21,791**

* Not all Class B permits involved a building in the floodplain.

Class "B" permits that authorize buildings in flood hazard areas contain specific notations regarding the minimum elevation of the lowest floor and the requirement for an Elevation Certificate. The County maintains a database of countywide elevation information. Table 6-14 shows that between 2003 and 2009 a total of 1,684 permits (or 8.3%) were issued in the floodplain.

Between 2003 and 2009, 464 permits were issued for manufactured homes. In flood areas, dry stack block piers are not allowed and foundations higher than six feet must be professionally engineered.

As of 2010, the inspection staff includes one lead inspector and six construction inspectors. On average, at least one inspection is performed for all Class "B" permits and all permits for non-residential buildings. Only about 20% of Class "A" permits are inspected. Table 6-15 shows inspections by precinct for calendar years 2003 – 2009.

Table 6-15
Inspections in Travis County 2003 - 2009, by Precinct

	Precinct 1	Precinct 2	Precinct 3	Precinct 4	Total
Calendar Years 2003 – 2009					
Class A	601	316	982	122	2,021
Class B*	301	75	1265	245	1,886
Non-residential	680	482	1,258	260	2,680
Total	**1,582**	**873**	**3,505**	**627**	**6,587**

6.7 Summary of Risk Assessment

Table 6-16 shows the results of the risk assessments for floods and tornadoes for Travis County.

Table 6-16
Summary of Travis County Flood and Tornado Risks
by Asset and Hazard Type (100-year horizon)

Asset	Hazard	Risk (100-year horizon)
Residential repetitive loss (RL) properties	Floods	$6,766,163
Residential severe repetitive loss (SRL) properties	Floods	$2,033,208
Per capita (Countywide)	Tornado wind (life safety)	$1,498

These figures must be considered with some caution because of the underlying data and assumptions that were used in the analyses. Although these summary data compare risk by the same planning horizon, it is important to recognize that, generally speaking, mitigation efforts are highly localized. Although the table shows County-wide risk, many of the hazards are difficult or impossible to mitigate on a large scale. For this reason, it is important to read and consider the detailed results in the sections above.

Section 7
Mitigation Strategy

Contents of this Section

7.1 IFR Requirements for Mitigation Strategy
7.2 Mitigation Goals and Accomplishments
7.3 Public Private Partnerships
7.4 Ongoing and Previous Mitigation Initiatives
7.5 Mitigation Objectives and Strategies
7.6 Prioritized Mitigation Actions

7.1 IFR Requirements for Mitigation Strategy

IFR §201.6(c)(3): *The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.*

IFR §201.6(c)(3)(i): *[The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.*

IFR §201.6(c)(3)(ii): *[The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.*

IFR §201.6(c)(3) (iii): *[The mitigation strategy section shall include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.*

7.2 Mitigation Goals and Accomplishments

Goals are general descriptions of desired long-term outcomes. State and federal guidance and regulations pertaining to mitigation planning require the development of mitigation goals to reduce or avoid long-term vulnerabilities to identified hazards. Mitigation goals have been established by FEMA, the Texas Division of Emergency Management (TDEM), and Travis County.

FEMA's Mitigation Goal

FEMA's mitigation strategy is set forth in a document originally prepared in the late 1990s. This strategy is the basis on which FEMA implements mitigation programs authorized and funded by the U.S. Congress. The national mitigation goal Statement is as follows:

FEMA's Two-Part Mitigation Goal

To engender fundamental changes in perception so that the public demands safer environments in which to live and work; and

To reduce, by at least half, the loss of life, injuries, economic costs, and destruction of natural and cultural resources that result from natural disasters.

State of Texas Mitigation Goals

The Texas Division of Emergency Management (TDEM) is designated by the Governor as the State's coordinating agency for disaster preparedness, emergency response, and disaster recovery assistance. TDEM also is tasked to coordinate the State's natural disaster mitigation initiatives and administer grant funding provided by the Federal Emergency Management Agency. A key element in that task is the preparation of the *State of Texas Hazard Mitigation Plan.* The State's plan includes a series of mitigation goals, as follows:

Texas State Mitigation Goals

- *Reduce or eliminate hazardous conditions that cause loss of life;*
- *Reduce or eliminate hazardous conditions which inflict injuries;*
- *Reduce or eliminate hazardous conditions which cause property damage; and*
- *Reduce or eliminate hazardous conditions which degrade important natural resources.*

Texas Hazard Mitigation Plan (2010)

Travis County's Mitigation Goal

As required by the planning process, the original Mitigation Planning Committee (MPC) developed a goal Statement in 2004. To do so, the Committee reviewed FEMA's national mitigation goals, Travis County's Mission Statement, several examples of goal Statements from other states and communities, and the State of Texas' Mitigation Goal. The Committee also considered information about natural hazards that may occur in the County and their potential consequences and losses. As part of the 2010 Plan update, the goal

statement was reviewed by the MPC. Elements of a mitigation goal statement were discussed and the committee agreed that the following were important concepts to address.

- Capture the sense of "reduce the tremendous costs associated with response and recovery."
- Focus on public and private property damage reduction.

After these discussions, the MPC still considered the Mitigation Goal Statement valid for the 2010 Plan update, without modification. The final mitigation goal Statement is as follows:

Travis County Mitigation Goal Statement

It is the goal of Travis County to protect public health, safety, and welfare and to reduce losses due to hazards by identifying hazards, by minimizing exposure of citizens and property to hazards, and by increasing public awareness and involvement.

As part of the 2004 Plan development process, the MPC met on numerous occasions to discuss possible mitigation measures to reduce or eliminate disaster-related damages in the County. From these discussions, an Action Plan was prepared. It identified specific actions to achieve identified goals. As part of the 2010 Plan update, these actions have been reviewed and updated by the MPC. See Section 7.4 for the updated Action Plan.

7.3 Public Private Partnerships

Citizen Corps and the Community Emergency Response Team (CERT)

Citizen Corps is managed at the local level by Citizen Corps Councils, which bring together leaders from law enforcement, fire, emergency medical and other emergency management, volunteer organizations, local elected officials, the private sector, and other community stakeholders. The City of Austin's Office of Homeland Security and Emergency Management (HSEM) has teamed up with first responder and volunteer organizations to establish the Central Texas Citizen Corps Council (CTXCCC). The goal of CTXCCC is to provide a forum in which volunteer organizations can coordinate disaster response and resources in Austin and Travis County and surrounding areas within the Capitol Area Council of Governments (CAPCOG) region. The initial step was the establishment of a Central Texas Citizen Corps Council in January 2003. Soon after, the Council supported the establishment of the City of Austin CERT program. Activities under Citizen Corps include Community Emergency Response Teams (CERT). Travis County is a stakeholder in the City of Austin's Citizens Corps program. The former Disaster Ready Austin is now one of several initiatives that are part of the City of Austin's CERT program.

The CERT program supports local response capability by training volunteers to organize themselves and spontaneous volunteers at the disaster site, to provide immediate assistance to victims, and to collect disaster intelligence to support responders' efforts when they arrive. Citizen Corps, a nationally recognized

program, provides opportunities for people across the country to participate in a range of measures to make their families, their homes, and their communities safer from the threats of crime, terrorism, public health issues, and disasters of all kinds. Through public education, training opportunities, and volunteer programs, every American can do their part to be better prepared and better protected and to help their communities do the same.

Flood hazards

The Web page (www.ci.austin.tx.us/oem/oem_results.cfm) helps citizens determine who is at risk, how to prepare, what to do if flooding occurs, and how to clean up. Simple and low-cost mitigation measures are highlighted, including raising electric panels, elevating utilities on platforms, anchoring fuel tanks, and installing backflow valves in sewer lines. In addition, OEM participates in the Texas Flash Flood Coalition in which stakeholders from both the private and public sector explore ways to reduce lives lost to flash floods. OEM contracted for a Public Service Announcement production in both English and Spanish supporting "Turn Around, Don't Drown", The PSAs ran for several months on various local TV stations.

Tornado and lightning hazards

Using partner donations, NOAA Weather/All Hazard alert radios were placed in all schools in the Austin Independent School District. One partner provided 60 radios for smaller public school districts in Travis County. Videos and coloring books on tornado and lightning safety were distributed to the Austin Independent School District schools. Participation in the National Lightning Safety Awareness Week to teach lightning safety skills to millions of school children.

Wildfire hazards

The managing partners of the Balcones Canyonlands Preserve and a number of private property owners coordinate under the umbrella of the Balcones Canyonlands Conservation Plan to participate in the wildland study. Private property owners include non-profit organizations such as the Travis Audubon Society and the Nature Conservancy of Texas.

Natural Resources

Travis County Development Services reviews permit applications to determine if applicants have contacted other regulatory authorities. Specifically, any proposed project within a wetland must have an approval from the U.S. Army Corps of Engineers, or a letter indicating that the Corps' approval is not required.

7.4 Ongoing and Previous Mitigation Initiatives

Dealing with flood hazards, the most significant natural hazard in Travis County is not a new proposition for the County, which has experienced numerous flooding events in its history. The County has undertaken a number of cooperative efforts, studies, and projects to address flood hazards. Foremost among these efforts is the County's participation, since 1976, in the NFIP.

Lower Colorado River Authority

LCRA helps communities plan and coordinate water and wastewater needs, operates an environmental laboratory, and monitors the water quality of the lower Colorado River. Additionally, it enforces ordinances to control illegal dumps, regulates onsite sewage systems, and institutes measures to reduce the impact of major new construction along and near the Highland Lakes. This last responsibility includes coordinating development around Lake Travis.

LCRA owns about 16,000 acres of park and recreational lands along the Highland Lakes and Colorado River. It encourages the use and expansion of these recreational lands through "Partnerships in Parks", which supports local efforts to improve park facilities throughout the region. More than 40 parks, environmental learning centers, and nature preserves are contained within the LCRA parkland.

A partner in the Texas Colorado River Floodplain, LCRA is working with the County and the U.S. Army Corps of Engineers to update of the Lower Colorado River Flood Study (in process as of early 2003).

U.S. Army Corps of Engineers' Studies

The U.S. Army Corps of Engineers (USACE) participates in and undertakes a wide variety of projects, including studies of large river systems such as the Lower Colorado River and smaller watersheds such as Onion Creek in the City of Austin and Travis County.

Lower Colorado River Study. This multi-year effort is designed to improve knowledge about flooding throughout the Lower Colorado River Basin and to identify ways to reduce property damage and loss of life during major floods. On Lake Travis, final results of the study included a 100-year flood level that is approximately six feet higher than previously determined. These new flood levels have been incorporated into Travis County Flood Insurance Rate Maps dated September 28, 2008.

Onion Creek Interim Feasibility Report (October, 2006): In October, 2006 USACE completed the *Onion Creek Interim Feasibility Study*. The report included two volumes with Volume II dedicated to Onion Creek which is partially located in both Hays and Travis County. The report was completed in coordination with the Lower Colorado River Authority (LCRA) and three additional cost sharing sponsors that included the City of Austin, Travis County, and City of Sunset Valley. The Onion Creek portion of the study was reviewed to identify details about flood hazard data and some of the more historical flood events that have occurred within the Travis County portion of the Onion Creek watershed.

Texas Colorado River Floodplain Coalition

The Texas Colorado River Floodplain Coalition's goals and objectives, as well as some recent activities include:

- Provide improved and updated flood insurance maps and risk information (a FEMA grant supports starting this initiative; additional funding is being sought over 5 years);
- Enhance training for floodplain administrators and elected officials;
- Offer program coordination, information sharing, and technical assistance (obtained FEMA funding to work with communities to develop mitigation plans);

- Encourage effective and consistent building requirements to address cumulative impacts;
- Identify and implement cost-effective alternatives to structural controls that also provide recreational and environmental benefits; and
- Become a one-stop clearinghouse for information and resource material relevant to floodplain management and emergency response (supported passage of SB 938 to enhance authority, funding, and enforcement of floodplain requirements).

Timber Creek Floodplain Acquisition

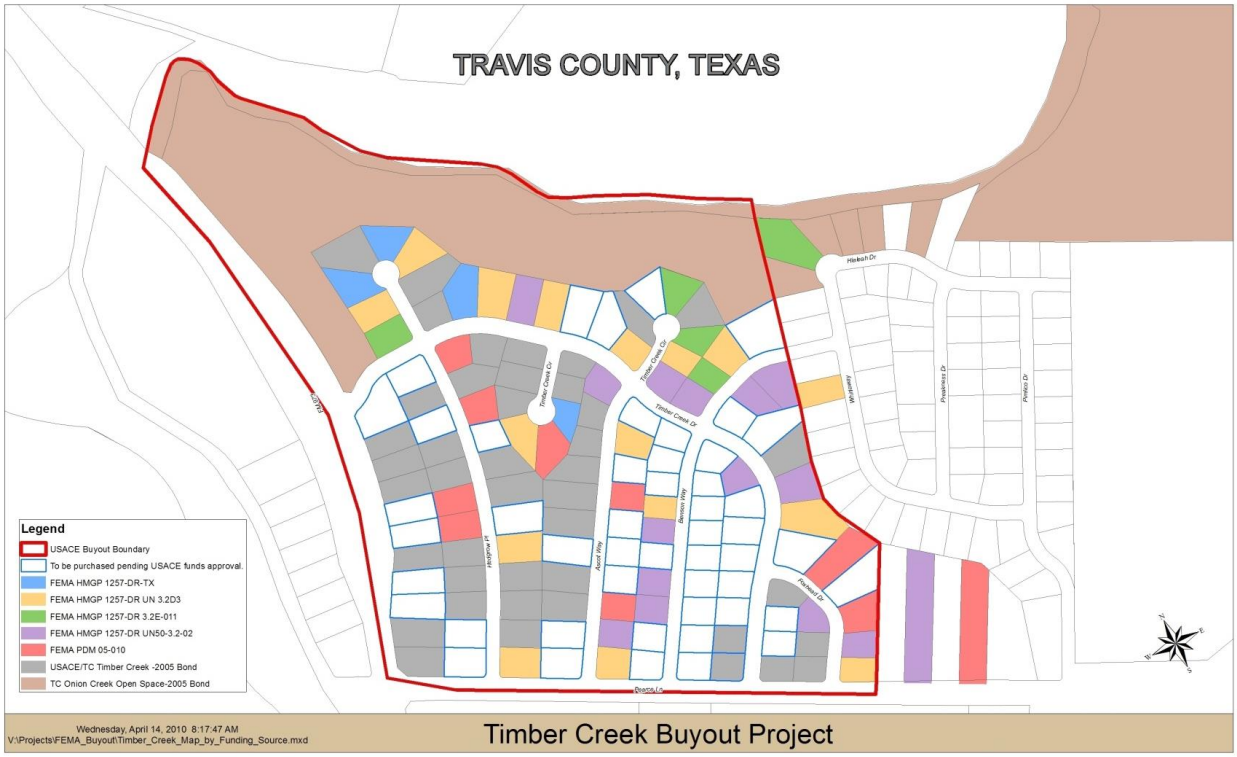
In September 1997, the City of Austin finalized the Flood Control Study for the City of Austin Drainage Utility using modeling developed by the U.S. Army Corps of Engineers. The study examined existing flood threats and mitigation options for neighborhoods along Onion Creek and upstream of the Roy Kizer Golf Course. The study defined the magnitude of flood conditions in Onion Creek Forest, Onion Creek Plantations, and Yarabee Bend subdivisions. Further, it assessed a range of structural and nonstructural options to mitigate flood losses. Structural options investigated included channel modification, levee construction, flood detention, raising buildings on higher foundations, and two flow diversion scenarios. Nonstructural options included purchase and removal of buildings from the floodplain. Benefits and costs of these mitigation options are summarized in the report generated from the study.

Prompted by significant flooding in 1998, which resulted in Presidential Declaration DR-1257, and based in part on the results of the City's study, Travis County initiated acquisitions of flood-damaged homes in the neighborhood of Timber Creek. Following DR-1257 Travis County applied for funding through FEMAs Hazard Mitigation Grant Program (HMGP) as well as funding from a National Unmet Needs allocation. Initial funding for the Timber Creek acquisition project was provided through the HMGP and administered by the Texas Division of Emergency Management (TDEM).

In November 2001, a significant number of homes in Timber Creek were substantially damaged as a result of Onion Creek flooding. However, a Presidential Disaster Declaration was not made and additional assistance funds were not made available. Travis County is evaluating various grant programs that may provide funds to assist in the potential acquisition of some of these flood-damaged homes.

In 2005 additional federal funding for the project was awarded to Travis County through the Pre-Disaster Mitigation (PDM) grant program and USACE. Travis County also contributed funds through the approval of an open space bond for Onion and Timber Creeks. The total combined funding allocated for the Timber Creek Acquisition project is just over $7 million, resulting in the acquisition and demolition of 105 properties.

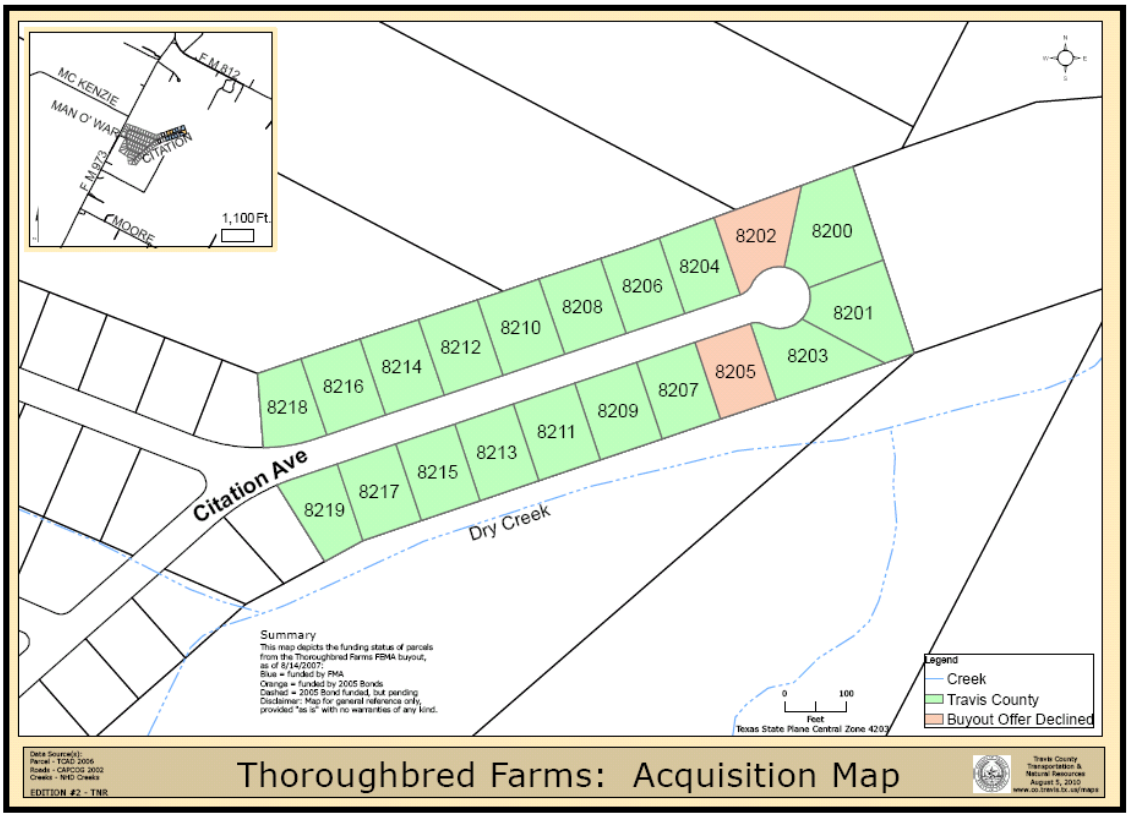
Figure 7-1
Timber Creek Acquisition Project
Source: Travis County – Department of Transportation and Natural Resources, April, 2010)



Thoroughbred Farms Acquisition

Figure 7-2 identifies the properties along Citation Avenue that have been approved for acquisition through grant funds provided by FEMA and Travis County bond funding. As of August, 2010 a total of 18 properties have been acquired.

Figure 7-2
Thoroughbred Farms Acquisition Project
Source: Travis County – Department of Transportation and Natural Resources, August, 2010)



Texas Water Development Board

In 2004, Travis County received a Flood Mitigation Assistance Planning Grant (FMA) in the amount of $35,000 to assist with the development of the flood-related portion of this Mitigation Plan. The grant and the assistance of the Texas Water Development Board were critical to the successful completion of this plan. In 2009 Travis County received another FMA grant to assist with the plan update.

7.5 Prioritized Mitigation Actions Items

Throughout the planning process for the 2004 Plan, the MPC discussed hazards, the number of people and types of property that are exposed, and the development process. Based on a review of the background materials and the Committee's understanding, 13 potential actions were identified, circulated, reviewed, and prioritized for the original Plan.

As part of the 2010 Plan update, the mitigation actions items from the original Plan were updated to reflect Travis County's current priorities for specific activities to achieve the goals outlined in Travis County's Mitigation Goal Statement. Each action item identifies an appropriate lead department for each action, cost effectiveness, a schedule for completion and suggested funding sources. For the 2010 Plan update, the MPC chose the (STAPLEE) methodology to prioritize mitigation actions. STAPLEE assesses actions based on six general criteria: **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic, and **E**nvironmental. Table 8-1 describes the criteria used in the STAPLEE methodology.

Table 7-1
STAPLEE Methodology

STAPLEE	Criteria Explanation
S – Social	Mitigation actions are acceptable to the community if they do not adversely affect a particular segment of the population, do not cause relocation of lower income people, and if they are compatible with the community's social and cultural values.
T – Technical	Mitigation actions are technically most effective if they provide long-term reduction of losses and have minimal secondary adverse impacts.
A – Administrative	Mitigation actions are easier to implement if the jurisdiction has the necessary staffing and funding.
P – Political	Mitigation actions can truly be successful if all stakeholders have been offered an opportunity to participate in the planning process and if there is public support for the action.
L – Legal	It is critical that the jurisdiction or implementing agency have the legal authority to implement and enforce a mitigation action.
E – Economic	Budget constraints can significantly deter the implementation of mitigation actions. Hence, it is important to evaluate whether an action is cost-effective, as determined by a cost benefit review, and possible to fund.
E - Environmental	Sustainable mitigation actions that do not have an adverse effect on the environment, that comply with Federal, State, and local environmental regulations, and that are consistent with the community's environmental goals, have mitigation benefits while being environmentally sound.

The 2010 Planning Committee members developed and prioritized the actions using the STAPLEE criteria. As part of the Plan update, the action tables from the 2004 plan were distributed to the MPC and members were requested to update and provide comments. The updates and comments received were integrated into the Action Table for the 2010 Plan update. The highest priority actions are generally those that are most effective in reducing risks to multiple assets simultaneously.

The Planning Committee defined High, Medium, and Low priorities in the Action Plan as follows:

- High: Meets five of the seven STAPLEE criteria
- Medium: Meets four of the seven STAPLEE criteria
- Low: Meets three of the seven STAPLEE criteria

Table 7-2 identifies each High-priority mitigation actions and identifies the proposed lead office and support assignments, cost, and schedule for completion. The proposed timeframes are consistent with the five-year review cycle required for this Plan update. For each High-priority action, the MPC characterized anticipated support by the Travis County Commissioners Court, OEM, and the community at-large, discussed funding limitations and status, and developed a qualitative statement regarding cost effectiveness. In this context, the cost of accomplishing the action was compared to the perceived benefits, including community-wide safety. In some cases, several of the high-priority actions and projects were subjected to preliminary feasibility assessments and benefit-cost analyses to determine if they were good candidates for mitigation actions.

As part of the 2010 Plan update, the MPC completed a comprehensive review of the actions table below, and the table now shows the current status of all actions from the original version of the Plan and lists additional actions added as part of the plan update. Mitigation action items pertain to both current and future development as well as infrastructure, as applicable, within unincorporated Travis County, the City of Pflugerville, City of Sunset Valley and the Village of the Hills. An updated version of this table will be included in periodic progress reports submitted to the TDEM and FEMA.

The following actions, from the original plan, were determined to be out of the control and responsibility of Travis County and therefore, the MPC made the decision to remove them from the Plan update.

- Dam Safety. For high and significant hazard dams located in the County or on waterways that drain through the County, determine if an Emergency Action Plan (EAP) has been prepared for each dam and coordinate with owners/operators to encourage EAP development. [Note: The National Inventory of Dams was used to identify these dams.]

- Conduct major tree pruning initiative along power lines. Travis County will work closely with local energy companies to develop a realistic schedule for tree pruning along electrical power lines.

- Environmental Safety. For the following types of facilities, inform owners/operators that they have been determined to be in or near mapped floodplains and encourage planning and protective measures; Water companies (reactive materials) and Hazardous materials handlers with reportable quantities.

Table 7-2
Travis County Mitigation Actions
Status of Actions from original HMP, and Actions added for the 2010 Update

No.	Action Item Description / Benefits	Lead Manager	Funding/Support	Hazard	Cost-Effectiveness	Status as of 2010
Status of 2004 Plan High Priority Actions						
1	**Public Communications.** Develop a communications plan to improve consistency and efficiency of dealing with the public before and after natural hazard events. Consider such elements as: a. Expand County Web page; explore linking County Web page to other sources (City of Austin, Travis Conservation, Texas Cooperative Extension/TAMU, TX Forest Service). Priority: high. b. Prepare handouts for property owners and permit applicants; keep at permit counter. Priority: high c. Develop brief presentation that can be made to local groups (homebuilders, realtors, neighborhood organizations, employers, etc.). Priority: high d. Establish central phone number that County residents can call for information about post-disaster recovery, cleanup, mitigation, and permits. Priority: high e. Plan to hold post-disaster public meeting (especially with permit materials and handouts for mitigation). f. Translate certain materials into Spanish. Priority: high	TNR and OEM	Elements (a), (c), (e) and (f) can be undertaken within existing budget. Element (d) requires additional funding. Support: strong – encourages citizen awareness and participation in reducing damage.	All Hazards	Presumed very cost effective because of significant long-term positive effects, though direct effects difficult to quantify.	a. Complete b. Complete c. Complete d. Complete e. Ongoing, added as action in 2010 County HMP update to continue indefinitely, as needed f. Complete

No.	Action Item Description / Benefits	Lead Manager	Funding/Support	Hazard	Cost-Effectiveness	Status as of 2010
2	**Flood Warning.** Increase predictive capability (e.g., stream gauges) on flooding sources with associated high-risk damage centers where there is currently little advanced warning: a. Examine feasibility of integrating with City/FEWS and/or LCRA/HydroMet. Priority: high b. Identify Manufactured Home Parks (and other concentrations of pre-FIRM structures) that are in the SFHA and determine if modification of warning and evacuation procedures for these groups of dwellings is warranted. Priority: high	TNR and OEM	Element (a) is not included in budget (2004); future budget request will be required for equipment. Element (b) can be done with existing resources Support: Moderate	Flood	Very cost effective.	a. County determined that this action was feasible but not necessary. TNR presently has access to gauge data at no expense to the County. b. Ongoing, Added as action in 2010 County HMP update. b. The State, County and other agencies have also undertaken various other efforts related to warning and evacuation. These include the LCRA's Lake Travis flood warning system, signage on Hamilton Road, the Statewide "Turn Around, Don't Drown" campaign, and County public service announcements regarding the dangers of low water crossings (PSAs shown on various local Travis County channels)
3	**Property Parcel Maps and Hazard Awareness.** Support linking property parcel maps with tax database for multiple uses, including: a. For parcels with buildings, develop mailing list to contact building owners about permit requirements (substantial improvements, substantial damage, replacement Manufactured Home units);	TNR	Development of linkage: requires additional resources; not in FY04 budget, will pursue in future budget.	Flood, Wildfire, High winds/ Severe Storms, Tornado	Cost effective.	a. Not initiated as of the 2010 HMP update, although the County intends to follow through and complete this action, which is carried forward in the Plan Update.

No.	Action Item Description / Benefits	Lead Manager	Funding/Support	Hazard	Cost-Effectiveness	Status as of 2010
	encourage flood insurance and mitigation measures. Priority: high b. For undeveloped parcels, develop mailing list to alert owner of permit requirements and encourage development out of floodplain. Priority: high c. For properties in the Balcones Canyonlands, identify and contact owners about mitigation measures (e.g., defensible space, fire-resistant materials). Priority: high		Use of linked data for elements within current resource levels. Support: Moderate			b. As (a), above. c. After the initial version of the HMP was adopted, the County undertook various public outreach efforts, although this was not accomplished with mailing lists. The County does not intend to continue any efforts in this regard.
4	**Mitigation Projects and Risk Assessment.** Continue efforts to mitigate high-risk problem areas. Gather information on buildings in high-risk damage centers (for flood hazards, this would include repetitive loss areas) to have available post-event; use to target efforts for recovery, permitting, and grant application development: a. Develop Floodplain Buyout Policies and Procedures Manual. Priority: high b. Share information with Emergency Service Districts that go neighborhood to neighborhood to encourage evacuation. Priority: high c. Take photographs to document "existing conditions." d. Task survey crew to collect ground and floor elevations (can prepare Elevation Certificates, which may help encourage purchase of flood insurance). Priority: high e. Encourage purchase of flood insurance to increase options for post-flood buyout/elevation. Priority: high f. Maintain awareness of different sources of mitigation funding (pre-disaster, post-disaster, HUD, ORCA/HOME, ICC claims,	TNR	Seek funds to implement elements (a) – (c); otherwise work within existing budget to extent feasible. County cost-share will be required in future budgets if federal grant funds are obtained for projects. Support: Moderate	All Hazards	Activities to identify and prepare for future flood mitigation projects are cost effective. Projects identified for future grant funds must be determined to be cost effective to be eligible for funding.	a. County has determined that existing procedures are presently adequate in this subject area; although this action may be revisited at some point, there is no immediate plan to complete this action. b. Action is ongoing. c. This action is ongoing, and the County intends to continue it indefinitely. d. Not yet completed, and not a high priority for the County as of the 2010 HMP update. The County still considers this a viable long-term action, but it will be initiated only if there is sufficient funding.

No.	Action Item Description / Benefits	Lead Manager	Funding/Support	Hazard	Cost-Effectiveness	Status as of 2010
	etc). Priority: high **g.** Continue to seek mitigation grant funds to implement high priority actions. Priority: high					e. With the adoption of new Flood Insurance Rate Maps, the County completed a direct-mail campaign to inform the public that floodplain delineations were changing in some areas. These mailings included information on flood insurance. f. Ongoing. g. Ongoing – the County will continue this effort indefinitely.
5	**Public Private Partnership.** Continue participation in and support of Disaster Ready Austin and the Texas Colorado River Floodplain Coalition. Priority: high	TNR and OEM	County general funds for dues and staff participation Support: Strong	All Hazards	Cost effective.	The County is a dues-paying member in good standing of the Texas Colorado River Floodplain Coalition, and intends to maintain its involvement with the group indefinitely. The County also continues to participate in the Disaster Ready Austin program (now part of Citizen Corps), and will continue to do so indefinitely.
6	**Floodplain Regulations Review.** Review floodplain and subdivision regulations and develop recommended revisions and clarifications to facilitate administration and public understanding. Priority: high	TNR	County general funds Support: Moderate	Flood	Cost effective.	Action completed – the County's floodplain regulations were updated in 2008. The County is implementing a process of updating its

No.	Action Item Description / Benefits	Lead Manager	Funding/Support	Hazard	Cost-Effectiveness	Status as of 2010
						floodplain regulations on a four year cycle.
7	**Road & Bridge Safety.** Review flood history and vulnerability of top flood-prone roads and bridges. Communicate priorities and concerns to the appropriate Agency (County or TXDOT). Request that safety be factored into upgrade review. Priority: high	TNR	Cost-shared grant with TWDB for a study that included flood-prone roads and bridges Support: Strong	Flood	Cost effective.	In cooperation with the Texas Water Development Board (through a 50/50 cost-shared grant of $400,000), the County completed a County-wide drainage study that includes detailed assessments of flood-prone roads.
8	**Acquisition/Demolition of flood prone homes in Timber Creek Subdivision.** Timber Creek consists of mostly mobile homes deep in the floodplain. Most homes in this subdivision have experienced repetitive losses – to include many that were substantially damaged in an undeclared event, November 2001. However, there was not a Presidential Disaster declaration following this flooding and Travis County did not submit an application to the State of Texas DEM for acquisition of these homes. Travis County views mitigating flood damage in Timber Creek a priority and wants to take every opportunity to seek funds to assist in this endeavor. Submit a PDM application to acquire and demolish flood prone homes in the Timber Creek subdivision. If PDM is unsuccessful, continue to seek other sources of funding to acquire and demolish these flood prone homes. Priority: high	TNR	Funding has been provided through FEMA's Hazard Mitigation Grant Program, the Pre-Disaster Mitigation Program the USACE, and local bond funding. Support: Strong	Flood	Cost effective – B/C analysis has been complete with a result of above 1.0.	The County initiated actions to acquire and demolish flood-prone properties in this area, starting in 1998, and its efforts continue. As of the 2010 HMP update, the County has purchased and demolished 105 of flood-prone properties, using a range of federal programs sponsored by FEMA and the Army Corps of Engineers and County Bond funds.
9	**Acquisition/Demolition of flood prone homes in Grave Yard Point and Citation Ave.** Grave Yard Point lies along Lake Travis. Low lying homes in this neighborhood have experienced multiple flood losses. Travis County views mitigating flood damage in Grave Yard Point a priority and wants to take every opportunity to seek	TNR	FEMA grant funds (FMA), local bond funding,and County matching funds. Travis County has the 25%	Flood	Cost effective – B/C analysis for the acquired property was completed, with a	As of the 2010 HMP update, the County has acquired and demolished one floodprone property in Graveyard point and seven on Citation Avenue,

No.	Action Item Description / Benefits	Lead Manager	Funding/Support	Hazard	Cost-Effectiveness	Status as of 2010
	funds to assist in this endeavor. Travis County was recently awarded a FMA grant to acquire and demolish several homes on FEMA's repetitive loss list. This action is to execute the acquisition and demolish of the homes approved under this grant program. Priority: high		local match set aside in its current budget. Support: Strong		result of above 1.0. Any additional FEMA-funded acquisitions will be subject to benefit-cost analysis to verify cost-effectiveness.	using FEMA grant funds from the Flood Mitigation Assistance program and the Hazard Mitigation Grant Program (DR-1697). In additional, TNR acquired an additional seven properties on Citation Ave using bond funds.
10	**Provide community outreach and education to individuals and businesses concerning winter storm alerts and preparatory actions for homes and businesses.** This is part of an effort of Disaster Ready Austin education and outreach initiative. Through Travis County's continued participation with Disaster Ready Austin, the County will work to ensure the effort reaches the unincorporated areas of Travis County. As part of the Disaster Ready Austin initiative, prior to and during severe winter storm season, citizens should be informed about: • Location of emergency shelters that may be opened as needed; • Preparations to wait out a winter storm at home, including advice on staying warm in an unheated house; • Guidance on the use of portable and standby generators; • Fire hazards of space heaters; • Protecting plumbing during a winter storm; and, • Coping with winter power failures. Priority: high	OEM	Costs for this effort are part of Disaster Ready Austin education and outreach initiative. Travis County will continue to coordinate with Disaster Ready Austin to ensure the initiative reaches citizens within unincorporated Travis County. Support: Strong	All Hazards	Cost effective.	September 2009- "Too Prepared to be Scared" Campaign kicked off. Funded through the State of Texas Homeland Security Grant. 10,000 children activity books were printed in English and Spanish and distributed to area schools and various community safety fairs. March 2010- Travis County wrote and produced a Public Service Announcement in conjunction with Turn Around Don't Drown flash flooding campaign. The DVD's were produced in English and in Spanish and were broadcast on various local TV Stations. The DVD's were also

No.	Action Item Description / Benefits	Lead Manager	Funding/Support	Hazard	Cost-Effectiveness	Status as of 2010
						distributed to various other NWS offices, broadcast networks as well as OEM offices across Texas August 2009 & August 2010 - Travis County has sponsored pages in the City of Austin Home Safe Calendar with information on Wildland/Urban Interface safety and fireworks safety.
Status of 2004 Plan Medium Priority Actions						
11	**Encourage the building of tornado safe community shelters.** In 1999, Texas A&M University, coordinating with the American Red Cross, conducted an evaluation of five Red Cross shelters in Travis County. The purpose of this evaluation was to determine suitability for use as hurricane shelters. All five were determined to meet wind resistance standards as related to hurricanes but the evaluation did not include use as tornado shelters. Work with Red Cross and a registered Engineer to designate a tornado safe area in existing facilities. Encourage the installation of a tornado safe room in new public facilities or designated shelters. Priority: high	OEM/Red Cross	Travis County currently has no budget for this initiative and the initiative is mostly out of the control and responsibility of Travis County. Implementation is dependent on Red Cross budget. Support: Moderate	Tornado, High Wind/Severe Storm	Cost effective.	In 2004 the Combined Transportation, Emergency and Communications Center (CTECC) was commissioned. The facility serves as the 911 center for the City of Austin and all of Travis County with the exception of Pflugerville. The facility houses the City of Austin, Travis County, Texas Department of Transportation and Capital Metropolitan Transit Authority. CTECC has numerous redundancies

No.	Action Item Description / Benefits	Lead Manager	Funding/Support	Hazard	Cost-Effectiveness	Status as of 2010
						incorporated into its design and was built to withstand a direct hit from an F2 tornado without interruption of service.
12	**NFIP Community Rating System.** Evaluate benefits and costs of joining the NFIP's Community Rating System, which credits the County for sound floodplain management practices that exceed federal minimum requirements. Property owners may receive discounts on flood insurance premiums. Priority: medium	TNR	Existing Travis County budget Support: Strong	Flood	Although the County will bear some expense related to this action, joining the CRS will not only reduce the County's flood risk over time, but flood insurance premiums will be reduced, making the action highly cost-effective.	As of 2010 HMP update, County is in the process of applying for entry into the CRS.
13	**At-Risk Public Buildings.** For County-owned NFIP-insurable buildings ("walled and roofed" only) determined to be in a mapped floodplain, examine flood hazard and risk factors to determine if flood insurance policies are appropriate and if mitigation measures are feasible. Share hazard information with other public entities (fire stations, water companies, schools, etc.) and encourage evaluation of at-risk buildings (depth, frequency, potential damage) and examination of options to minimize exposure, including flood insurance. Priority: medium	TBD	Existing Travis County budget Support: Moderate	Flood	Presumed cost-effective, though difficult to determine.	As of 2010 HMP update, County remains self insured for all at-risk public buildings

No.	Action Item Description / Benefits	Lead Manager	Funding/Support	Hazard	Cost-Effectiveness	Status as of 2010
14	**Elevation Mark Database.** Develop a comprehensive database of benchmarks, reference marks, and elevation monuments (as specified in subdivision standards); publicize database and make it available to surveyors to facilitate their preparation of Elevation Certificates, required for flood insurance. Priority: medium	TNR	Existing Travis County budget Support: Moderate	Flood	Not cost-effective as a stand-alone project, but directly contributes to other County hazard mitigation initiatives by providing baseline information.	Action is complete as of 2010 HMP update. Data is not yet posted on County web site, but is available to surveyors through the County. Additional action to post data on web site, as below.
15	**Manufactured Housing Installation.** Improve understanding of contractors and manufactured home installers of wind/tie-down installation and floodplain requirements by requesting that the State Department of Housing and Community Affairs (DHCA) send specific information to all contractors and installers in its annual mailing. Request cooperation of other interested local jurisdictions through the Texas Floodplain Management Association. Priority: high	TNR, Building Inspections	Existing Travis County budget Support: Moderate	Flood, High winds/ Severe Storms, Tornado	Cost-effective based on presumed improvements in wind and flood performance of residential structures. Benefits are related to both structural protection as well as life safety.	The County developed a brochure with technical information on MHU tie-down procedures and disseminated the brochure as part of normal permitting process. Action will be continued indefinitely.
New High Priority Actions for 2010 Hazard Mitigation Plan Update – Timeframe for all New High Priority Actions is 2011 to 2015						
N1	Evaluate the feasibility of structural elevations as flood mitigation throughout unincorporated Travis County. Priority: high	TNR	Existing Travis County budget Support: Moderate	Flood, High winds/ Severe Storms, Tornado	Not independently cost –effective, but forms basis of mitigation actions.	New action for 2010 update.

No.	Action Item Description / Benefits	Lead Manager	Funding/Support	Hazard	Cost-Effectiveness	Status as of 2010
N2	The restudy of Lake Travis has resulted in a significant increase in the actual Base Flood Elevation (BFE) around the Lake. It was always known the area was flood-prone but the new maps and BFEs provide the empirical data to prove various mitigation measures would be cost effective. Consider multiple mitigation alternatives to remove these homes from harm's way to include: Elevation, Demo/Rebuild, and Acquisition/Demolition. Apply for grant funds and implement when feasible, cost effective and supported by the Travis County Leadership. Priority: high	TNR	Existing Travis County budget Support: Moderate	Flood, High winds/ Severe Storms, Tornado	On a structure by structure basis, cost-effective, demonstrated by benefit-cost analysis required for FEMA program eligibility.	New action for 2010 update.
N3	Establish central phone number that County residents can call for information about post-disaster recovery, cleanup, mitigation, and permits. (carryover from original plan) Priority: high	TNR	Existing Travis County budget Support: Moderate	Flood, High winds/ Severe Storms, Tornado	Not independently cost-effective, but part of the County's overall priorities.	New action for 2010 update.
N4	Complete acquisitions and demolitions in the Timber Creek area to remove all remaining flood-prone properties from the area. Priority: high	TNR	Grants through FEMA and USACE Support: Strong	Floods	Cost-effective, demonstrated by benefit-cost analysis required for FEMA program eligibility.	Ongoing initiative that the County intends to continue until flood-prone properties are acquired.
N5	Continue to pursue acquisition/demolition as the preferred mitigation alternative in Graveyard Point. Priority: high	TNR	Grants through FEMA Support: Strong	Floods	Cost-effective, demonstrated by benefit-cost analysis required for FEMA program eligibility.	Ongoing initiative that the County intends to continue until floodprone properties are acquired.
N6	Continue to pursue acquisition/demolition as the preferred mitigation alternative on Citation Avenue. Priority: high	TNR	Grants through FEMA Support: Strong	Floods	Cost-effective, demonstrated by benefit-cost	Ongoing initiative that the County intends to continue until floodprone properties are

No.	Action Item Description / Benefits	Lead Manager	Funding/Support	Hazard	Cost-Effectiveness	Status as of 2010
					analysis required for FEMA program eligibility.	acquired.
N7	Post information from the Elevation Mark Database on the County's web site. Priority: high	TNR	County general fund Support: Strong	Floods	Not independently cost-effective, but contributes to cost-effective mitigation measures.	Initiated as part of 2010 HMP update.
Note that projects listed below were developed, discussed and prioritized in the *2009 Travis County Drainage Basin Study.* The first group of projects is related to mitigation of low-water crossing flood risks, and the second group addresses subdivision flooding risks. The projects are listed here in the priority order in the study. Additional details (including the costs of the individual projects) can be found in the study. All of the following new actions are prioritized as medium and all would need additional clarification before submittal for any grant.						
Low-water Crossing Flood Mitigation Projects Mitigate low-water crossing would involve a potential structural solution. Such solutions are not yet identified. These actions are in the place as a place holder. As additional, specific solutions are identified for any of the following, the action would be updated with specific data regarding the proposed solution.						
N8	Mitigate low-water crossing flooding: Big Sandy Drive @Long Hollow Creek	Roads and Bridges	County general fund, State funds, FEMA grant funds if project determined programmatically eligible, and if project is cost-effective Support: Medium	Floods	Presumed cost-effective based on study methodology and prioritization. Will require benefit-cost analysis to be eligible for FEMA grant funds.	New action for 2010 update.
N9	Mitigate low-water crossing flooding: Springdale Road @ Walnut Creek	Roads and Bridges	Same	Floods	Same	New action for 2010 update.
N10	Mitigate low-water crossing flooding: Juniper Trail @ Long Hollow	Roads and Bridges	Same	Floods	Same	New action for 2010 update.

No.	Action Item Description / Benefits	Lead Manager	Funding/Support	Hazard	Cost-Effectiveness	Status as of 2010
N11	Mitigate low-water crossing flooding: Wyldwood Road @ Slaughter Creek	Roads and Bridges	Same	Floods	Same	New action for 2010 update.
N12	Mitigate low-water crossing flooding: Great Divide Road @ Little Barton Creek	Roads and Bridges	Same	Floods	Same	New action for 2010 update.
N13	Mitigate low-water crossing flooding: Fall Creek Road @ Fall Creek	Roads and Bridges	Same	Floods	Same	New action for 2010 update.
N14	Mitigate low-water crossing flooding: Pedernales Canyon Trail @ Lick Creek	Roads and Bridges	Same	Floods	Same	New action for 2010 update.
N15	Mitigate low-water crossing flooding: Slaughter Creek Drive @ Tributary 1 to Slaughter Creek	Roads and Bridges	Same	Floods	Same	New action for 2010 update.
N16	Mitigate low-water crossing flooding: Tumbleweed Trail @ unnamed tributary to Lake Austin	Roads and Bridges	Same	Floods	Same	New action for 2010 update.
N17	Mitigate low-water crossing flooding: Crystal Bend Drive @ Harris Branch	Roads and Bridges	Same	Floods	Same	New action for 2010 update.
N18	Mitigate low-water crossing flooding: Cottonwood Drive @ Long Hollow	Roads and Bridges	Same	Floods	Same	New action for 2010 update.
N19	Mitigate low-water crossing flooding: Jacobson Road @ Maha Creek	Roads and Bridges	Same	Floods	Same	New action for 2010 update.
N20	Mitigate low-water crossing flooding: Live Oak Drive @ Sheep Hollow	Roads and Bridges	Same	Floods	Same	New action for 2010 update.
N21	Mitigate low-water crossing flooding: Springdale Road @ Tributary 5 to Walnut Creek	Roads and Bridges	Same	Floods	Same	New action for 2010 update.

No.	Action Item Description / Benefits	Lead Manager	Funding/Support	Hazard	Cost-Effectiveness	Status as of 2010
N22	Mitigate low-water crossing flooding: Gregg Lane @ Wilbarger Creek	Roads and Bridges	Same	Floods	Same	New action for 2010 update.
N23	Mitigate low-water crossing flooding: Jesse Bohls Road @ unnamed tributary to Wilbarger Creek	Roads and Bridges	Same	Floods	Same	New action for 2010 update.
N24	Mitigate low-water crossing flooding: Lime Creek Road @ Fisher Hollow	Roads and Bridges	Same	Floods	Same	New action for 2010 update.
N25	Mitigate low-water crossing flooding: Nameless Road @ unnamed tributary to Big Sandy	Roads and Bridges	Same	Floods	Same	New action for 2010 update.
N26	Mitigate low-water crossing flooding: D. Morgan Road @ Tributary to Grape Creek	Roads and Bridges	Same	Floods	Same	New action for 2010 update.
N27	Mitigate low-water crossing flooding: Bee Creek Road @ Bee Creek	Roads and Bridges	Same	Floods	Same	New action for 2010 update.
N28	Mitigate low-water crossing flooding: Navarro Creek Road @ Navarro Creek	Roads and Bridges	Same	Floods	Same	New action for 2010 update.
N29	Mitigate low-water crossing flooding: Bitting School Road @ unnamed tributary to Wilbarger Creek	Roads and Bridges	Same	Floods	Same	New action for 2010 update.
N30	Mitigate low-water crossing flooding: Weir Loop Circle @ Devil's Pen Creek	Roads and Bridges	Same	Floods	Same	New action for 2010 update.
N31	Mitigate low-water crossing flooding: Tom Sassman Road @ Maha Creek	Roads and Bridges	Same	Floods	Same	New action for 2010 update.
N32	Mitigate low-water crossing flooding: Felder Lane @ Cottonwood Creek	Roads and Bridges	Same	Floods	Same	New action for 2010 update.

No.	Action Item Description / Benefits	Lead Manager	Funding/Support	Hazard	Cost-Effectiveness	Status as of 2010
N33	Mitigate low-water crossing flooding: Parsons Road @ Wilbarger Creek	Roads and Bridges	Same	Floods	Same	New action for 2010 update.
N34	Mitigate low-water crossing flooding: Westlake Drive @ unnamed tributary to Lake Austin	Roads and Bridges	Same	Floods	Same	New action for 2010 update.
N35	Mitigate low-water crossing flooding: Nameless Road @ Nameless Hollow	Roads and Bridges	Same	Floods	Same	New action for 2010 update.
N36	Mitigate low-water crossing flooding: Ledgestone Terrace @ unnamed tributary to Pen Creek	Roads and Bridges	Same	Floods	Same	New action for 2010 update.
N37	Mitigate low-water crossing flooding: Wild Basin Street @ unnamed tributary to Bee Creek	Roads and Bridges	Same	Floods	Same	New action for 2010 update.
N38	Mitigate low-water crossing flooding: Caldwell Lane @ River Timber Drive	Roads and Bridges	Same	Floods	Same	New action for 2010 update.
N39	Mitigate low-water crossing flooding: Nameless Road @ unnamed tributary to Big Sandy	Roads and Bridges	Same	Floods	Same	New action for 2010 update.
N40	Mitigate low-water crossing flooding: Weir Loop @ Williamson Creek	Roads and Bridges	Same	Floods	Same	New action for 2010 update.
Subdivision Flood Mitigation Projects The following Flood Mitigation Actions would involve a potential structural solution. Such solutions are not yet identified. These actions are in the place as a place holder. As additional, specific solutions are identified for any of the following, the action would be updated with specific data regarding the proposed solution.						
N41	Flood mitigation: Swiss Alpine Subdivision	Engineering	County general fund, State funds, FEMA grant funds if project determined programmatically eligible, and if project is cost-	Floods	Presumed cost-effective based on study methodology and prioritization. Requires benefit-	New action for 2010 update.

No.	Action Item Description / Benefits	Lead Manager	Funding/Support	Hazard	Cost-Effectiveness	Status as of 2010
			effective Support: TBD		cost analysis to be eligible for FEMA grant.	
N42	Flood mitigation: Arroyo Doble Subdivision	Engineering	Same	Floods	Same	New action for 2010 update.
N43	Flood mitigation: Twin Creeks Park Subdivision	Engineering	Same	Floods	Same	New action for 2010 update.
N44	Flood mitigation: Thoroughbred Farms Subdivision (repeated from above for consistency with drainage study priorities)	Engineering	Same	Floods	Same	New action for 2010 update.
N45	Flood mitigation: Southwest Territory Subdivision	Engineering	Same	Floods	Same	New action for 2010 update.
N46	Flood mitigation: Austin Lake Subdivision	Engineering	Same	Floods	Same	New action for 2010 update.

Section 8
Plan Monitoring and Maintenance

Contents of this Section

8.1 IFR Requirements for Plan Monitoring and Maintenance
8.2 Distribution
8.3 Implementation
8.4 Monitoring and Progress Reports
8.5 Circumstances that Will Initiate Plan Review and Updates
8.6 Continued Public Involvement

8.1 IFR Requirements for Plan Monitoring and Maintenance

Requirement §201.6(c)(4)(i): *[The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.*

Requirement §201.6(c)(4)(ii): *[The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.*

Requirement §201.6(c)(4)(iii): *[The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.*

Progress on the mitigation action items will be monitored and evaluated periodically by the County Floodplain Manager.

8.2 Distribution

The 2010 Travis County *Hazard Mitigation Plan Update* will be posted on the County's Website, and notices of its availability will be distributed to the following:

- The Federal and State agencies that were notified and invited to participate in Plan update development;
- The Cities within the County;
- Citizens who attended public meetings and provided contact information; and
- The organizations, agencies, and elected officials who received notices of public meetings (see Appendix B).

8.3 Implementation

Through the mitigation planning process, the Travis County agencies that are involved in managing hazards and implementing measures to minimize future risk considered a range of mitigation actions. Actions were identified and prioritized, and are shown in Section 7. Each lead agency is responsible for factoring the action into its work plan and schedule over the indicated time period. Annual reports on the status of implementation, including obstacles to progress, will be submitted by lead agencies to the Travis County Office of Emergency Management.

8.4 Monitoring & Progress Reports

This Plan will be monitored by the Travis County Office of Emergency Management (OEM) for several related purposes:

- Maintain the currency of hazard and risk information.
- Ensure that mitigation projects and actions reflect the priorities of Travis County, the MPC and the Stakeholders group.
- To comply with FEMA and State of Texas requirements for Plan maintenance, and maintain Travis County's eligibility for federal disaster assistance and mitigation grants.

The County's Emergency Management Coordinator is responsible for monitoring and maintaining this Plan, and will continuously monitor the Plan for the purposes noted above, and with respect to the update triggers noted below.

Upon adoption of the 2010 Plan update, TNR and OEM will annually convene a meeting of representatives from each department on MPC to discuss and determine implementation accomplishments and/or implementation problems and recommended solutions.

Each of the three incorporated municipalities that are included in this Plan update will have a representative on the Mitigation Planning Committee (MPC). Although the individuals filling the positions may change from year to year, the future MPC and Stakeholders group will continue to be comprised of the same job functions or titles. However, the decision of specific job duties will be left to the County's Emergency Management Coordinator, to be assigned as deemed appropriate.

As part of its responsibilities as described under Annex P of the Travis County Emergency Management Plan, the Travis County OEM will be responsible for monitoring and preparing the annual progress reports. TNR and OEM will utilize the data obtained from the annual meeting to note progress made on the mitigation action items in annual progress reports and to record such progress. The annual report will include the name, phone, fax, email address of the person(s) who conducted the review and the date that it was prepared and submitted to TDEM.

In addition to the scheduled reports, OEM will convene meetings after damage-causing natural hazard events to review the effects of such events. Based on those effects, adjustments to the mitigation actions and priorities may be made, or additional event-specific actions may be identified. Adjustments will be reflected in revisions to the Plan, which shall be documented as outlined in Section 8.5.

8.5 Circumstances that will initiate Plan Review and Updates

This section identifies the circumstances or conditions under which Travis County will initiate Plan reviews and updates.

- On the recommendation of the Executive Manager of TNR or on its own initiative, Travis County Commissioners Court may initiate a Plan review at any time.
- At approximately the one-year anniversary of the Plan's re-adoption, and every year thereafter.
- After natural hazard events that appear to significantly change the apparent risk to County and participating jurisdiction's assets, operations and/or citizens.
- When activities of the incorporated areas (participating), County or State significantly alter the potential effects of natural hazards on County assets, operations and/or citizen. Examples include completed mitigation projects that reduce risk, or actions or circumstances that increase risk.
- When new mitigation opportunities or sources of funding are identified.

In addition to the circumstances listed above, revisions that warrant changing the text of this Plan update or incorporating new information may be prompted by a number of circumstances, including identification of specific new mitigation projects, completion of several mitigation actions, or requirements for qualifying for specific funding. Minor revisions may be handled by addenda.

Major comprehensive review of and revisions to the Travis County *Hazard Mitigation Plan Update* will be considered on a five-year cycle. Adopted in 2011, the Plan will enter its next review cycle in 2015, with adoption of revisions anticipated in 2016. The MPC will be convened to conduct the comprehensive evaluation and revision to include the identification and prioritization of additional mitigation action items, as required.

8.6 Continued Public Involvement

Upon adoption of the 2010 Plan update, the public will be notified of any substantial changes to the document between 2010 and the next scheduled Plan update in 2015. Any changes proposed by the MPC considered significant will be distributed to the list of Stakeholders identified in Section 4 of the 2010 HMP update. The Stakeholders will be encouraged to review the changes and provide comments on any proposed plan revisions.

Appendix A

Mitigation Planning Committee Meeting Minutes

Meeting #1
April 30, 2010

These minutes document the proceedings of the first meeting of the Travis County Mitigation Planning Committee, with regard to the County's 2010 Hazard Mitigation Plan update. The meeting was held at the offices of the Travis County Office of Emergency Management, in Austin. These minutes were prepared by Steve Pardue. The meeting commenced at 2:00 p.m.

Participants

Pete Baldwin	Travis County OEM (PB)
Melinda Mallia	Travis County TNR (MM)
Sara Wilson	City of Sunset Valley (SW)
Patrice Reisen	Travis County OEM (PR)
Mickey Roberts	Travis County TNR (MR)
Jim McLean	City of Pflugerville Police Department (JM)
Chuck Hooker	City of Pflugerville Police Department (CH)
Stacy Moore-Guajardo	Travis County OEM (SM)
Jeff Ward	Jeffrey S. Ward & Associates (JW)
Steve Pardue	Vissering Pardue & Associates (SP)
Stacey Scheffel	Travis County TNR (SS)

The MPC was provided handout materials that included an agenda, a Request for Information (RFI) document, a sample HMP Table of Contents, and a sample of the goals/objectives/actions section.

Agenda

1. Welcome and introductions
2. Background and purpose of the plan update
3. Mitigation Planning Committee and Stakeholders
4. Exchanging information – protocols
5. Reformatting and reorganizing the plan, proposed structure
6. Executive summary, background, and approval/adoption sections
7. Planning process section
8. Hazard profile section
9. Vulnerability and loss estimation section
10. Mitigation strategies section
11. Monitoring and maintenance section
12. Request for information
13. Mapping and GIS
14. Working with other jurisdictions (coordination)

15. Schedule
16. Other discussion
17. Adjourn

Minutes

1. Welcome and Introductions (Sign-in)

A sign-in sheet was distributed to all meeting members (see attached). JW introduced the consultant team.

2. Background and Purpose of the Plan Update

SP explained the process for updating the plan, including the FEMA Interim Final Rule (IFR) that identifies the requirements and provides guidance for how the plan must be completed. SP also mentioned the crosswalk, which is the document that FEMA uses to review and score the hazard mitigation plan after it is completed.

3. Mitigation Planning Committee and Stakeholders

SP noted that the update process usually includes two groups, a Mitigation Planning Committee (MPC) and Stakeholder group. The MPC is comprised of representatives of the Hazard Mitigation Plan (HMP) and the jurisdictions that are included in the Plan. There was a short discussion about the composition of the MPC, and the group agreed that the individuals attending the present meeting would comprise the MPC, with the addition of a representative of the Village of the Hills. Regarding the Stakeholder group, SP will send the MPC the list from the existing HMP and request that the group update the list and provide suggestions about any additional members or deletions.

4. Exchanging information – protocols

SP briefly explained that most communications among the MPC and consultants would be via email. There was no discussion.

5. Reformatting and Reorganizing the Plan, Proposed Structure

SP and JW proposed that the HMP be reorganized as part of the update, to align the document with the FEMA crosswalk requirements. The group agreed that the document should be reorganized using the general structure outlined in the sample table of contents. SP noted that the Planning Process section would provide a general description of the methodology used in the update. Each of the three sub-jurisdictions will have its own appendix in the document, although the exact content of these appendices will be determined later.

Additionally, SP requested the MPC concurrence that text that is no longer germane to the Plan can be deleted from the updated document, and referred to in text where necessary. The group concurred with this approach. There was a discussion about the timing of drafts of the Plan – JW noted that this is a function of how quickly new information is obtained and incorporated, and that the team would have a better sense of the timing when some progress is made on the data in the RFI (see below).

6. Executive Summary, Background, and Approval/Adoption Sections

There was a brief discussion about the Executive Summary and Background section. JW explained that the County and three jurisdictions would eventually have to adopt the document, and resolutions will have to be included in the HMP update.

7. Planning Process Section

There was a brief discussion about the contents of the Planning Process section of the updated document. There was also discussion about the public outreach element, and the process of involving the Stakeholders group. The MPC determined that there should be a meeting or presentation to the Stakeholder group; this meeting/presentation can be held around the time of the first public presentation, once the first draft is completed. SP noted that FEMA does not prescribe how the public outreach requirement is met, but often the most efficient process is to hold a public presentation after the first draft update is completed. When the second (final) draft is completed, the document can be posted on the County web site, and paper copies placed at libraries, and the public notified by legal ad or posting on the web site. The MPC generally agreed with this, although specifics will be determined later in the process.

8. Hazard Profile Section

JW noted that FEMA does not require any manmade (non-natural) hazards be included in the HMP, and that these should be deleted as part of the update process. SP will send the MPC a list of hazards that will be included in the update, for the group's concurrence. The MPC concurred with this approach. SP indicated that all natural hazards would be updated in accordance with FEMA requirements, and that the crosswalk document would be notated as appropriate. Some of the updated hazard information will be part of the RFI response process, as below. There was a short discussion about the wildfire hazard, which will be expanded in the update.

9. Vulnerability and Loss Estimation Section

SP noted that the Vulnerability and Loss Estimation Section is one of the two most significant parts of the Plan update, the other being the actions section. There is no specific FEMA requirement that risk be expressed as dollar losses, but this is usually the most effective way to use the data, because it can support the benefit-cost analysis process if the County decides to pursue FEMA mitigation grant funding. SP noted that the ability to do monetary loss projections will be based on the type and accuracy of data, which will be determined after the RFI process is underway.

10. Mitigation Strategies Section

SP discussed the mitigation strategies section of the document, and the proposed re-structuring based on the sample that was provided. There was a short discussion of the STAPLEE process, which SP said was used in developing the information in the template. The MPC concurred that the sample provided was an acceptable structure for the Travis County HMP update. The consultants will use information in the existing plan, reformat the section using the template as the basis, and provide an initial draft for the group to review. The RFI process will be used to identify and develop additional actions, and determine the status of those that were listed in the original version of the HMP. SP will send the MPC a summary of the goals, objectives and strategies (not the actions) from the original HMP, for the group's review and concurrence that they remain valid, or that changes are needed.

11. Monitoring and Maintenance Section

JW explained the monitoring and maintenance section, noting a re-draft will be provided to the group shortly.

12. Request for information

A multi-page Request for Information (RFI) document was distributed to the group. SP explained that the RFI will be used to organize all data collection for the update. There was a short discussion about how to assign responsibility for collecting the various data. It was agreed that JW will start the process by assigning certain parts of the data collection to the consultants, and after this is done he will send the RFI document (with assignments noted) to MM, who will organize the process on the County side; a conference call will be scheduled as required. SP noted that his colleague Rick Becker will be compiling the data, and that members of the MPC can expect to receive emails from him (email will be rbecker@visseringpardue.com).

13. Mapping and GIS

JW asked if the County is going to provide GIS support. MM indicated yes, but that the GIS staff usually has a high work load, so any requests for mapping or analysis should be made well in advance of when products are needed.

14. Working with other Jurisdictions (Coordination)

There was no discussion about this coordination, as it was covered in the process discussion above.

15. Schedule

JW indicated that a normal plan update would take about six months to complete, but the Travis County update should not take that long. However, the schedule to complete will depend to a degree on how time-consuming the RFI process is. The MPC agreed that scheduling the stakeholder and public meetings can be deferred until the RFI process is further along

16. Other discussion

There was a short discussion about the review and adoption process. The MPC indicated that a work session with the Court will be scheduled when the first complete draft is ready for review.

17. Adjourn

The meeting adjourned at 1:50 p.m.

Figure A-1
Sign-In Sheet from April 30, 2010 Travis County MPC Meeting

Travis County, Texas 2010 Hazard Mitigation Plan Update

Sign-In Sheet

Travis County, Texas
Hazard Mitigation Plan Update
First Meeting of the Mitigation Planning Committee
April 30, 2010

Name	Email	Affiliation
Steve Pardue	spardue@visservingpardue.com	VPA
Stacey Scheffel	stacey.scheffel@co.travis.tx.us	Travis Co
Pete Baldwin	pete.baldwin@co.travis.tx.us	TC OEM
Patrice Reisen	patrice.reisen@co.travis.tx.us	TC OEM
Sarz Wilson	swilson@sunsetvalley.org	City of Sunset Valley
Stacy Moore-Guajardo	Stacy.Moore@co.travis.tx.us	TCOEM
JIM MCLEAN	JMCLEAN@CITYOFPFLUGERVILLE.COM	PFLUGERVILLE PD
JEFF WARD	Jward@rsfmail.com	JSWA
Mickey Roberts	mickey.roberts@co.travis.tx.us	Travis Co. TNR
Melinda Mallia	melinda.mallia@co.travis.tx.us	TravisTNR
CHUCK HOOKER	chooker@cityofpflugerville.com	Pflugerville P.D.

Meeting #2

Meeting #2

August 5, 2010

These minutes document the proceedings of the second meeting of the Travis County Mitigation Planning Committee, in regard to the County's 2010 Hazard Mitigation Plan Update. The meeting was held at the offices of the Travis County Office of Emergency Management, in Austin. These minutes were prepared by Steve Pardue. The meeting commenced at 9:00 a.m.

Participants

Melinda Mallia	Travis County TNR (MM)
Stacey Scheffel	Travis County TNR (SS)
David Shore	Travis County (DS)
Sara Wilson	City of Sunset Valley (SW)
Trish Houston	City of Sunset Valley Police Department (TH)
Patrice Reisen	Travis County OEM (PR)
Terry Browder	Village of the Hills (TB)
Sandy Rodgers	Village of the Hills (SR)
Mickey Roberts	Travis County TNR (MR)
Chuck Hooker	City of Pflugerville Police Department (CH)
Stacy Moore-Guajardo	Travis County OEM (SM)
Jeff Ward	Jeffrey S. Ward & Associates (JW)
Steve Pardue	Vissering Pardue & Associates (SP)

The MPC was provided handout materials that included an agenda, a CD with the most recent version of the draft plan (and appendices for Sunset Valley and Pflugerville), an updated Request for Information (RFI) document, a draft of the goals/objectives/actions section, and a draft of the risk assessment section (two copies).

Agenda

1. Welcome and reminder to sign in
2. Final approval of minutes of last MPC meeting
3. Status Report (including remaining RFI items)
1. Discussion regarding schedule going forward (in particular MPC and public presentations)
2. Venues for public presentations
3. Stakeholder outreach
4. Brief review of each section of the revised plan
5. Discussion of remaining data needs
6. Brief update on process/results of field visits to critical facilities in jurisdictions
7. Discussion of risk assessment section
8. Discussion of goals/strategies/actions section – additions and prioritization
9. Other discussion
10. Adjourn

Minutes

1. Welcome and Reminder to Sign In

A sign-in sheet was distributed to all meeting members (see attached). Attending members introduced themselves.

2. Final Approval of Minutes of Last MPC Meeting

SP noted that the group had been emailed a copy of the minutes with a request to provide any corrections or additions. SS noted that her name should be added to the list of participants. There was unanimous consent to approve the minutes of the first MPC, with this change.

3. Status Report

SP provided a brief update on each section of the plan, and noted that the County had been provided with a complete draft copy of the document before the meeting. There are a few remaining items in various sections, and the main task remaining is to complete the Goals and Actions section, which will be discussed later in the meeting. SP explained that each of the three participating jurisdictions (Sunset Valley, Pflugerville and Village of the Hills) would have a separate appendix in the updated plan document, and that each appendix would have several sections: a brief background on the jurisdiction; hazards and risks; goals, actions; and adoption and monitoring processes. Copies of draft appendices for Pflugerville and Sunset Valley were circulated to the group.

SP indicated that the previous day he visited all three jurisdictions to look at their public infrastructure and visit sites where there have been hazard events in the past. This information (in addition to the results of various interviews with city officials) will be included in the appendices.

4. Discussion Regarding Schedule going forward

There was a discussion about the timing to complete the plan, in particular public presentations and meetings with officials of the various jurisdictions to discuss the draft plan. SW and TH indicated that Sunset Valley would probably require a separate public presentation, as discussed below.

1. Venues for Public Presentations

There was a discussion about how Travis County will review the document and move toward the presentation and adoption stages. MM noted that it will be necessary to have a work session with the Commissioners to go over the draft document, in particular the proposed actions. Such a work session will take place before any formal consideration of adoption by the Commissioners (i.e. a voting session), and prior to public presentations. The MPC set a tentative target of the first week of October for a work session, which must be scheduled three weeks in advance. MM will work with JW and SP to determine specific needs for the meeting, i.e. numbers of drafts, supporting materials, etc.

SW indicated that Sunset Valley will require a public presentation. CH noted that the City of Pflugerville will not require its own public presentation. TB indicated the same for Village of the Hills. In these two cases, the jurisdictions

will advertise the plan update presentation locally, and the presentation will be held at a common site in Travis County. SP will provide language for legal advertisements when the presentation date/s are established.

There was a brief discussion of County acquisition policy. MM noted that a restudy of Lake Travis increased the base flood elevation by six feet.

6. Stakeholder Outreach

This discussion was tabled pending additional work on the draft document.

7. Brief Review of each Section of the Revised Plan

SP provided a brief overview of each of the nine sections of the Plan (and the various appendices), indicating where each is in the draft process. He indicated that most sections are substantially complete, with the exception of the Goals/Actions (Section 7), as described below.

8. Discussion of Remaining Data Needs

SP noted that there are still some items remaining on the RFI that need to be addressed. He distributed copies of the RFI to all MPC members. There were brief discussions about each of the remaining pending items – these are noted in an updated version of the RFI (dated circa 8/12/10).

Disposition of Remaining Issues in Section 6 (Risk Assessment) – there is some overlap with remaining data needs in the RFI – this section of the minutes is intended to provide additional detail.

- Table of weather-related deaths needs to be updated (SP)
- Buildings in floodplain – as per discussion, information about buildings in floodplain is no longer available in this format – DS will provide similar data by parcel
- Table of floodprone buildings and values, by precinct; assigned to DS, as above
- Precincts with more than 100 buildings in floodplain; open question to GIS/DS – can this be provided again, or does data not support this now? Table can be cut from HMP if data does not allow this type of analysis/summary
- Policies in force data in text; assigned to SP and JW
- Policies in force by precinct; unassigned, SP to follow up to determine who responsible
- Policies and losses for three jurisdictions; assigned to SP, no claims in Village of the Hills
- Projected 100-year flood risk for streets; assigned SP – delete risk projection for Citation Avenue Page 7-16
  NFIP calculation of maximum benefits table; assigned to SP – delete Citation Avenue
- Buildings in floodplain; see notes above
- Table of maximum exposure of flood-prone County facilities; needs review to remove mitigated properties; assigned to SS and MM
- Flood-prone roads; assigned to DS for update/verification

9. Brief update on Process/Results of Field Visits to Critical Facilities in Jurisdictions

SP noted that on 8/4 he had visited each of the three jurisdictions to tour hazard-prone sites, photograph infrastructure, and discuss potential mitigation actions and projects. The information will be incorporated into the jurisdictional appendices, and the main body of the County plan as appropriate.

10. Discussion of Risk Assessment Section

SP provided a detailed review of the updated risk assessment section, focusing on the flood analysis using the NFIP repetitive flood loss data. He noted the required connection between the risk assessment section and the actions that the County will include in Section 7 of the HMP. He noted that the jurisdiction appendices will include analyses of tornado risks to specific facilities that were visited and photographed the previous day. The County section of the risk assessment includes a simplified assessment of County-wide tornado risks for residential uses.

There was a discussion of the wildfire/urban interface fire hazard, and its counterpart in the risk section, and the group determined that there is insufficient wildfire risk to merit including the hazard as a subject of risk assessment. It will be removed from the risk assessment section, with edits to other parts of the document as appropriate.

The group discussed resolving various remaining data issues in this section and made determinations about specific requirements and how they will be addresses. These are noted above under item 8 of the minutes.

11. Discussion of Goals/Actions Section – Additions and Prioritization

There was an extended discussion of this section of the Plan, in order to identify individuals who will provide data to complete the status updates, and to list additional projects in the table. The item numbers in the list below refer to the high priority mitigation actions table from Section 8 of the plan update. SP suggested that the additional table of medium-priority mitigation actions should be merged with the main table as above. The group concurred, and this will be completed. The two subsections immediately below refer to the Section 7 in the body of the County HMP. See below for discussion of jurisdiction-level actions table.

High-priority actions table

Item 1 – Public communications (multiple sub-actions); SP to work with SS and SM to determine status.
Item 2 – Flood warning; assigned to SS
Item 3 – Property parcel maps and hazard awareness; assigned to SS
Item 4 – Mitigation projects and risk assessments; assigned to SS
Item 5 – Public private partnership; assigned to SM
Item 6 – Floodplain regulations review; assigned to SS
Item 7 – Dam safety; responsibility of LCRA – delete from table
Item 8 – Road and bridge safety; notes incomplete – to be discussed and assigned
Item 9 – Timber Creek acquisition; information in hand to complete
Item 10 – Project completed – suggest leaving in table; need project costs
Item 11 – Community outreach/education; assigned to SM; delete reference to winter storm (general)
Item 12 – Tree pruning; delete from table
Item 13 – Encourage safe rooms; assigned to SM (to be discussed with P. Baldwin)
Item 14 – Dam inundation zones; TCEQ and LCRA responsibility – delete from table
Item 15 – Correct addresses for 21 RL properties; completed

Item 16 – Correct addresses for three SRL properties; completed

Medium-priority actions table (numbers in existing table, to be merged with above and re-numbered)

Item 14 – Environmental safety; delete from table
Item 15 – CRS; assigned to SS – near completion – need details as per actions table above
Item 16 – At- risk public buildings; assigned to SS
Item 17 – Elevation mark database; assigned to SS – need details as per actions table above
Item 18 – Manufactured housing installation; assigned to SS

During the visit to Pflugerville, SP discussed filling in data in the actions table, and was provided a list of City contacts to work on adding information. SP will also backfill the table with information from the LCRA plan that included Pflugerville, Sunset Valley and Village of the Hills. For Sunset Valley, SW and TH will work on filling in the table. The Village of the Hills appendix had not yet been drafted – when it is available it will be provided to TB and SR to insert information about whatever actions are included.

12. Other Discussion

There was no additional discussion.

13. Adjourn

The meeting adjourned at 11:45.

Figure A-2
Sign-In Sheet from August 5, 2010 Travis County MPC Meeting

Travis County, Texas 2010 Hazard Mitigation Plan Update

Sign-In Sheet

Travis County, Texas
Hazard Mitigation Plan Update
First Meeting of the Mitigation Planning Committee
August 5, 2010

Name	Email	Affiliation
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Appendix B

Public Notice Documents and Public Meeting Minutes

Appendix C

Adoption Resolution

To be added to final version of plan.

Appendix D

Approval Letters

To be added to final version of plan.

Appendix E

Sources

American Society of Civil Engineers. 2002. *Minimum Design Loads for Buildings and Other Structures* (SEI/ASCE 7-02). Reston, VA.

Federal Emergency Management Agency. Various Panel Dates. *Flood Insurance Study and Flood Insurance Rate Maps.* Washington, DC. [Available for public review at the Travis County Transportation & Natural Resources Department.]

Federal Emergency Management Agency. 1997. *Multi-Hazard Mitigation and Risk Assessment.* Washington, DC. Online at http://www.fema.gov/mit/tsd/ft_mhira.htm.

Federal Emergency Management Agency and U.S. Army Corps of Engineers. 1996. *Water Control Infrastructure, National Inventory of Dams on CD-ROM, Updated Data.* Washington, D.C. [As of February 2002, the online database was inaccessible to the public.]

Lower Colorado River Authority. Online at http://www.lcra.org. Accessed 2002/2003.

National Oceanographic and Atmospheric Administration, National Climatic Data Center (U.S. Local Storm Reports). Online at http://lwf.ncdc.noaa.gov/oa/climate/severeweather/extremes.html. Accessed May 25, 2001.

Slade, R.M., and Patton, J. *Major and Catastrophic Storms and Floods in Texas* (U.S. Geological Survey, Open File Report 03-193). Online at http://www.floodsafety.com/USGSdemo/patton.htm#1. Accessed May, 2003.

Texas Association of Counties. Online at http://www.county.org/resources/countydata/basic.asp. Accessed December, 2002.

Texas Colorado River Floodplain Coalition. Online at http://www.tcrfc.org. Accessed 2002/2003.
Texas Department of Human Services, quoted in Austin/Travis County Health and Human Services Department. *Community Overview,* Sec. V. Housing, Homelessness and Basic Needs. Online at http://www.co.travis.tx.us/health_human_services/community_overview/intro.htm. Accessed January, 2003.

Texas Department of Public Safety, Division of Emergency Management. *State of Texas Emergency Management Plan (2001 Revision)*. Austin, TX. Available online at http://www.txdps.State.tx.us/dem.

Texas Department of Public Safety, Division of Emergency Management. *State of Texas Hazard Assessment (2000*). Austin, TX.

Texas Department of Public Safety, Division of Emergency Management. *State of Texas Hazard Mitigation Plan (2000 Revision)*. Austin, TX. Available online at http://www.txdps.State.tx.us/dem.

Texas Department of Public Safety, Division of Emergency Management. *State of Texas Mitigation Handbook (DEM 21), (June 2002)*. Austin, TX. Available online at http://www.txdps.State.tx.us/dem.

Texas Department of Public Safety, Division of Emergency Management. Online at http://www.txdps.State.tx.us/dem. Accessed 2002/2003.

Texas Environment Center. Online at http://www.floodsafety.com. Accessed January, 2003.

Texas House of Representatives, House Research Organization. Focus Report Number 77-26 (November, 2002): *Do Counties Need New Powers to Cope with Urban Sprawl?*

Texas Workforce Commission (cited by the Texas Association of Counties Online Resources). Online at http://www.county.org/counties/txcounties.asp. Accessed March, 2003.

Travis County Office of Emergency *Hazard Analysis for Travis County* (updated November, 1999).

Appendix F

Key Terms

For the most part, terms used in the Plan have the meanings that are commonly associated with them:

- **Disaster** means the occurrence of widespread or severe damage, injury, loss of life or property, or such severe economic or social disruption that supplemental disaster relief assistance is necessary for the affected political jurisdiction(s) to recover and to alleviate the damage, loss, hardship, or suffering caused thereby.
- **Federal Emergency Management Agency (FEMA)** coordinates the federal government's efforts to plan for, respond to, recover from, and mitigate the effects of natural and man-made hazards.
- **Flood Insurance Rate Map (FIRM)** is prepared by the Federal Emergency Management Agency to show Special Flood Hazard Areas; this map is the basis for regulating development according to the Regulations for Flood Plain Management (Travis County Code, Chapter 64) and Standards for Construction of Streets and Drainage in Subdivisions (Travis County Code, Chapter 82).
- **Floodplain:** See "Special Flood Hazard Area (SFHA)" below.
- **Hazard** is defined as the natural or technological phenomenon, event, or physical condition that has the potential to cause property damage, infrastructure damage, other physical losses, and injuries and fatalities.
- **Mitigation** is defined as actions taken to reduce or eliminate the long-term risk to life and property from hazards. Mitigation actions are intended to reduce the *need* for emergency response – as opposed to improving the *ability* to respond.
- **National Flood Insurance Program (NFIP),** located within FEMA, is charged with preparing FIRMs, developing regulations to guide development, and providing insurance for flood damage.
- **National Climatic Data Center (NCDC)**, is the world's largest active archive of weather data. NCDC produces numerous climate publications and responds to data requests from all over the world.
- **Risk** is defined as the potential losses associated with a hazard. Ideally, risk is defined in terms of expected probability and frequency of the hazard occurring, people and property exposed, and potential consequences.
- **Special Flood Hazard Area (SFHA)** or **Floodplain** is the area adjoining a river, stream, shoreline, or other body of water that is subject to partial or complete inundation. The SFHA is the area predicted to flood during the 1% annual chance flood, commonly called the "100-year" flood.

Appendix G

Acronyms

The following acronyms are used in the document:

- **CAPCOG –** Capital Area Planning Council of Governments
- **CRS –** Community Rating System (NFIP)
- **DEM** – Texas Division of Emergency Management
- **EAP** – Emergency Action Plan (for dams)
- **EOC** – Emergency Operations Center
- **ESD** – Emergency Service District
- **FEMA** – Federal Emergency Management Agency
- **FEWS** – Flood Early Warning System
- **FIRM** – Flood Insurance Rate Map
- **FIS** – Flood Insurance Study
- **FMA** – Flood Mitigation Assistance (FEMA)
- **GIS** – Geographic Information System
- **HMGP** – Hazard Mitigation Grant Program (FEMA)
- **LCRA** – Lower Colorado River Authority
- **NCDC** – National Climatic Data Center (NCDC)
- **NFIP** – National Flood Insurance Program (FEMA)
- **NOAA** – National Oceanic and Atmospheric Administration
- **OEM** – Office of Emergency Management (within the Travis County Department of Emergency Services)
- **SFHA** – Special Flood Hazard Area
- **TCEQ –** Texas Commission on Environmental Quality
- **TNR** – Travis County Transportation & Natural Resources
- **TWDB** – Texas Water Development Board
- **TXDOT** – Texas Department of Transportation