

Texas Township Michigan

Natural Hazards Mitigation Plan 2020



January 24, 2020

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I. ACKNOWLEDGEMENTS

The Hazard Mitigation Plan (HMP) is the culmination of the interdisciplinary and interagency planning effort that required the assistance and expertise of numerous agencies, organizations, and individuals. Without the technical assistance and contributions of time and ideas of these agencies, organizations, and individuals, this plan could not have been completed.

This Plan is for a single jurisdiction, Texas Township. The following is a list of contributors within and the Township and externally who were instrumental in the development of the Natural Hazards Mitigation Plan:

- Andrew Alspach, Kalamazoo County Planner/Emergency Management
- James Baker, City of Kalamazoo Public Services Director
- Tony Banas, Texas Township Fire Department Captain
- Travis Bartholomew, Operations Director for Kalamazoo County Road Commission
- John Bayha, EGLE Floodplain Engineer for Kalamazoo County
- Don Boven, Texas Township Trustee
- Tim Brown, Texas Township Trustee
- Kathy Buckham, Kalamazoo County Planning Commission
- Michael Collins, KVCC Executive Vice President
- Michael Corfman, Director of Kalamazoo County Emergency Management
- Steve Deisler, Texas Township Planner
- Richard Fuller, Kalamazoo County Sheriff
- Scott Ganton, Business Owner-Ganton Senior Communities
- John Hinkle, Texas Township Supervisor
- Linda Kerr, Texas Township Clerk
- Nick Loeks, Texas Township Trustee
- Wendy Mazer, Texas Township Trustee
- Richard McGrew, Texas Township Building Inspector
- Christine Morse, Kalamazoo County Commissioner
- Dan Moyle, Township Resident
- Trish Roberts, Texas Township Treasurer
- Julie Rogers, Kalamazoo County Commissioner
- James Rutherford, Kalamazoo County Health Department
- Michael Sobocinski, Michigan State Hazard Mitigation Planner
- Thomas Smith, Prein&Newhof
- Chad Tackett, Texas Township Fire Chief
- Jeff VanBelle, Kalamazoo County Deputy Drain Commissioner
- Julie VanderWiere, Texas Township Superintendent
- Thomas Wheat, Texas Township Engineer

II. LETTER OF TRANSMITTAL

Mike Sobocinski
Michigan State Police Emergency Management Division
4000 Collins Road
PO Box 30636
Lansing MI 48909-8136

Dear Mr. Sobocinski:

Enclosed, please find the Texas Township Natural Hazards Mitigation Plan. This Plan has been created in conjunction with Prein & Newhof, County Emergency Management Staff, Task Force Members, the public, and the State of Michigan. The Plan lays out the process of evaluating the potential natural hazards, land use, and mitigation strategies to protect lives and property in the Township.

The intent of the Natural Hazards Mitigation Plan is not to limit development, but to ensure that all development occurs in a manner that minimizes the possibility of damage from potential natural hazards to the greatest extent possible. This transmittal letter serves notice that all future development decisions in Texas Township will consider hazard vulnerability reduction as a standard practice.

The Texas Township Hazards Mitigation Plan will be reviewed and revised as needed by the Township. The plan will be reviewed on an annual basis.

Thank you for your time and consideration. If you have any questions, please feel free to contact us.

Sincerely,

Township Board of Trustees

III. PREFACE

Hazard mitigation is any action taken before, during, or after a disaster or emergency to permanently eliminate or reduce the long-term risk to human life and property from hazards (44 CFR 201.2). This procedure is an essential element of emergency management, along with preparedness, response, and recovery. When successful, hazard mitigation will lessen the need for a community to respond to subsequent hazard events, as some events may remain as mere incidents and not become disasters. Similarly, disaster events should involve lesser levels of impact than they otherwise would have. Hazard Mitigation strives to reduce the impact of hazards on people, property, the environment and economy, and continuity of services through the coordination of available resources, programs, initiatives, and authorities.

Federal, state, and local agencies have vital roles to play in this effort. Laws and processes governing the use of land and development and property are administered at the local level. State agencies administer a wide variety of programs that originate in federal government, including programs that affect, either directly or indirectly, the development or use of land within hazard-prone areas. Higher levels of government originate various hazard mitigation measures that have widespread applicability and implications, but local levels of government typically provide the implementation details within their jurisdiction.

This plan is intended to provide a framework and foundation for hazard mitigation activities within Texas Township, in accordance with the planning requirements set forth in the federal Disaster Mitigation Act of 2000 and subsequent regulations and FEMA policies. Implementation of this plan should result in greater protection of human life, property, and the environment, as well as lessen amounts of physical, economic, and social disruption to residents from natural hazards. The ideal end-state is the integration of hazard mitigation activities, programs, capabilities, and actions into normal, day-to-day local government and private sector functions and business management practices, at all levels of organization, across township boundaries, to include neighboring communities, and across all phases of emergency management.

The Texas Township Natural Hazard Mitigation Plan (HMP) provides an approach to permanently eliminate or reduce long-term risks to people and property from natural hazards so that Township assets can be sustained and strengthened. This can be accomplished through collaborative efforts and activities amongst local agencies. Mitigation allows repairs and reconstruction to be completed after an incident occurs in such a way that restores the damaged property to pre-disaster conditions as quickly as possible. This process is needed to ensure that cycles of slow recovery are broken, that post-disaster repairs and reconstruction take place after damages are analyzed, and that sounder, less vulnerable conditions are produced. Through a combination of regulatory, administrative, and engineering approaches, losses can be limited by reducing susceptibility to damage.

Recognizing the importance of reducing the community’s vulnerability to natural hazards, Texas Township is actively addressing the issue through the development and implementation of this plan. The many benefits to be realized from this effort are:

Table 1: Community Benefit of a Natural Hazard Mitigation Plan

Community Benefits of a Natural Hazard Mitigation Plan
Protection of the public health and safety
Preservation of essential services
Prevention of property damage
Preservation of the local economic base

This process will help ensure that Texas Township remains a vibrant, safe, enjoyable place in which to live, raise a family, and continue to conduct business.

IV. EXECUTIVE SUMMARY

In 2000, the Disaster Mitigation Act shifted the Federal Emergency Management Agency’s (FEMA) scope of work to promoting and supporting prevention and hazard mitigation planning. FEMA now requires government entities to have natural hazards mitigation plans in place as a condition for receiving hazard mitigation grant money, such as hazard mitigation grant program funds, in the future.

Kalamazoo County is currently updating their January 2013 Hazard Mitigation Plan. Thus, to meet the FEMA requirement for funding, Texas Township is developing its own Hazard Mitigation Plan. The contents of this plan will be considered in the Kalamazoo County updated plan as well.

The Local Planning Team, along with Prein & Newhof worked to create a plan which includes a general community profile, a comprehensive inventory of existing hazards, a hazard analysis, goals and objectives, and feasible mitigation strategies to address the prioritized hazards.

The Texas Township Natural Hazards Mitigation Plan focuses on natural hazards such as drought, wildfires, flooding, thunderstorms, winter weather, and pandemics, and was created to protect the health, safety, and economic interests of the residents and businesses by reducing the impacts of natural hazards through planning, awareness, and implementation. Through this Plan, a broad perspective was taken in examining multiple natural hazard mitigation activities and opportunities in Texas Township. Each natural hazard was analyzed from a historical perspective, evaluated for potential risk, and considered for possible mitigative action.

The Plan serves as the foundation for natural hazard mitigation activities and actions within Texas Township and will be a resource for building coordination and cooperation within the community and surrounding areas for local control of future mitigation and community preparedness around the following goals:

Table 2: Planning Goals for Texas Township

Natural Hazards Mitigation Planning Goals for Texas Township	
Goal 1:	Utilize available resources and apply for additional funding for natural hazard mitigation projects
Goal 2:	Integrate natural hazard mitigation considerations into the community’s comprehensive planning process
Goal 3:	Provide disaster planning and mitigation resources to appropriate elements of Texas Township
Goal 4:	Increase awareness and participation in natural hazard mitigation strategies

To aid in the process of developing mitigation strategies and determining leadership in mitigation activities, a community capabilities assessment was completed. Table 3 provides the results of that assessment. The township Board, superintendent, engineer, and the overall LPT provided input in developing the table headings and determining appropriate personnel. The public also had the opportunity to comment on the data in the table.

Table 3 - Community Capabilities Assessment

Township Name	Texas Township						
Reviewer							
CAPABILITIES	WE HAVE ONE	THIS PLAN IS AVAILABLE ONLINE	POINT PERSON IS ON PLANNING TEAM	POINT PERSON SHOULD BE ON PLANNING TEAM	POINT PERSON CONTACT	LIST ADDITIONAL JURISDICTIONS THAT HAVE THEIR OWN	HOW COULD THIS CAPABILITY BE IMPROVED?
Local Planning Plans and Tools							
Capital Improvement Plan	X		X		TWP PLANNER		
Redevelopment Plan			X		TWP PLANNER		Consider Developing a Redevelopment plan
Growth Management Plan			X		TWP PLANNER		
Emergency Operations Plan							
County / Local Emergency Plan	X		X		M CORFMAN		
County / Local Recovery Plan							Consider Developing a Local Recovery Plan
Local Mitigation Plan							
Economic Development Plan							Consider Developing an Economic Development Plan
Land-use Plan	X	X	X		TWP PLANNER		
Pandemic or Public Health Incident Response Plan	X		X		J RUTHERFORD		
Transportation Plan	X	X			J START		Consider Kalamazoo Area Transportation Study
School Disaster Plan							Consider Developing School Disaster Plans
Environment and Natural Resources Plan							Consider Developing Environmental and Natural Resources Plan
Strategy Implementation Plan							Consider Developing a Strategic Implementation Plan
County Parks Plan							
Water / Watershed Management Plan	X				T WHEAT		
Critical Facilities Plan (Mitigation/Response/Recovery)							Consider Developing Critical Facilities Plan
College Campus Plans	X		X		M COLLINS		
Evacuation Route Map / Plan							Consider Developing an Evacuation Route Map/Plan
Critical Facilities Inventory	X		X		T WHEAT		
Vulnerable Population Inventory							
Soil Conservations Plans							
National Flood Insurance Program	X		X		J VANDERWEIRE		Currently Participating in NFIP
Emergency Response Plan							
Emergency Action Plan							
Groundwater Protection Plan	X		X		J BAKER		Also Participating in Groundwater Guardian
Wellhead Protection Plan	X		X		J BAKER		
Snow Removal Plan	X		X		T BARTHOLOMEW		
Communications Plan							
NFIP Floodplain Management Plan							Consider Developing an NFIP Floodplain Management Plan
Local Planning Assistance Mock-Hazard Plan							Consider Developing a Local Planning Assistance Mock-Hazard Plan
Road Closure Plan	X		X		T BARTHOLOMEW		
Human Quarantine Plan	X		X		J RUTHERFORD		
Community Needs Assessment							Consider Developing a Community Needs Assessment

CAPABILITIES	WE HAVE ONE	THIS PLAN IS AVAILABLE ONLINE	POINT PERSON IS ON PLANNING TEAM	POINT PERSON SHOULD BE ON PLANNING TEAM	POINT PERSON CONTACT	LIST ADDITIONAL JURISDICTIONS THAT HAVE THEIR OWN	OTHER POINT PERSON CONTACT
Policies / Ordinance							
Zoning Ordinance	X	X	X		TWP PLANNER		
Building Code	X				R MCGREW		
Planning Ordinance	X	X	X		TWP PLANNER		
Fire Code	X		X		T BANAS		
Floodplain Ordinance							
Subdivision Ordinance	X	X	X		TWP PLANNER		
Nuisance Ordinance	X	X	X		TWP PLANNER		
Storm Water Ordinance	X	X	X		TWP PLANNER		
Drainage Ordinance					T WHEAT		
County Park Ordinance							
Site Plan Review Requirements	X	X	X		TWP PLANNER		
Soil Erosion Control Ordinance	X	X	X		DRAIN COMM OFF		
Land Use Ordinance	X	X	X		TWP PLANNER		
Methamphetamine Lab Ordinance							
CAPABILITIES	WE HAVE ONE		POINT PERSON IS ON PLANNING TEAM	POINT PERSON SHOULD BE ON PLANNING TEAM	POINT PERSON CONTACT	LIST ADDITIONAL JURISDICTIONS THAT HAVE THEIR OWN	OTHER POINT PERSON CONTACT
Local Staff/ Departments							
Building Code Official	X		X		R MCGREW		
Building Inspector	X		X		R MCGREW		
Mapping Specialist (GIS)	X		X		T WHEAT		
Engineer	X		X		T WHEAT		
Land Use Planner	X		X		TWP PLANNER		
Public Works Official	X		X		J BAKER		
Emergency Management Coordinator / Emergency Management Program	X		X		M CORFMAN		
NFIP Floodplain Administrator							Consider creating a NFIP Floodplain Administrator role
Emergency Response Team	X		X		R FULLER, T BANAS		
Hazardous Materials Expert							
Local Emergency Planning Cmte	X		X		TWP PLANNER		
Sanitation Department (or Solid Waste)							Consider developing a Sanitation Department if applicable.
Transportation Department	X				R KEYES		
Economic Development Department							
Environmental Health Department							
Public Works Department	X		X		J BAKER/T WHEAT		
Planning Department	X				TWP PLANNER		
Zoning Department	X				TWP PLANNER		

CAPABILITIES	WE HAVE ONE	POINT PERSON IS ON PLANNING TEAM	POINT PERSON SHOULD BE ON PLANNING TEAM	POINT PERSON CONTACT	LIST ADDITIONAL JURISDICTIONS THAT HAVE THEIR OWN	OTHER POINT PERSON CONTACT
Local Staff/ Department (Continued)s						
Historic Preservation						
Public Health Coordinator/Department						
Water / Watershed Planner		X		T WHEAT		
Critical Infrastructure Planner						
Township Administrator	X	X		J VANDERWEIRE		
Township Assessor	X			T GRUZINGA		
Environment Services Department						
Citizen Planning Team						
Soil & Water Conservation District						
Sheriff's Department	X	X		R FULLER		
Management Information Systems						
Social Services						
County Commissioners	X	X		C MORSE		
Fire Department	X	X		T BANAS,C TACKETT		
Red Cross						
Public Library						
Watershed Districts						Consider creation of a watershed district if applicable
Township Representatives	X	X		S GANTON, D MOYLE		
CAPABILITIES	POINT PERSON IS ON PLANNING TEAM	POINT PERSON SHOULD BE ON PLANNING TEAM	POINT PERSON CONTACT	LIST ADDITIONAL JURISDICTIONS THAT HAVE THEIR OWN	OTHER POINT PERSON CONTACT	
State of Michigan						
Michigan DNR						
Michigan Department of Agriculture						Consider mutually beneficial ways to partner with these organizations
Michigan Department of Transportation						Consider mutually beneficial ways to partner with these organizations
Michigan Department of Public Safety						Consider mutually beneficial ways to partner with these organizations
Michigan Pollution Control Agency (MPCA)						Consider mutually beneficial ways to partner with these organizations
MI MSP EMHSD				M SOBOCINSKI		
MI DHHS						
Michigan Department of Health						Consider mutually beneficial ways to partner with these organizations
Michigan State Police				M SCHNEPP		
Michigan National Guard						Consider mutually beneficial ways to partner with these organizations

CAPABILITIES	POINT PERSON IS ON PLANNING TEAM	POINT PERSON SHOULD BE ON PLANNING TEAM	POINT PERSON CONTACT	LIST ADDITIONAL JURISDICTIONS THAT HAVE THEIR OWN	OTHER POINT PERSON CONTACT
National Organizations					
National Weather Service					
U.S. Forest Service					Consider mutually beneficial ways to partner with these organizations
U.S. EPA					Consider mutually beneficial ways to partner with these organizations
U.S. Fish and Wildlife Service					Consider mutually beneficial ways to partner with these organizations
U.S. Army Corps of Engineers					Consider mutually beneficial ways to partner with these organizations
U.S. Geological Survey					Consider mutually beneficial ways to partner with these organizations
Federal Emergency Management Agency (FEMA)					Consider mutually beneficial ways to partner with these organizations
USDA Natural Resources Conservation					Consider mutually beneficial ways to partner with these organizations

V. PURPOSE OF THE PLAN

In 2000, the Disaster Mitigation Act shifted the Federal Emergency Management Agency's (FEMA) scope of work to promoting and supporting prevention and hazard mitigation planning. FEMA requires government entities to have natural hazards mitigation plans in place and updated on a 5-year cycle as a condition for receiving grant money related to natural hazard remediation.

The purpose of the Texas Township Natural Hazards Mitigation Plan is to find solutions to existing problems, anticipate future problems, prevent wasteful public and private expenditures, protect property values, and allocate land resources. The implementation of the Plan is to prevent injury, loss of life, property damage, breakdown in vital services like transportation and infrastructure, economic slumps, liability issues, and damage to a community's reputation. For Texas Township, the planning process utilized the following steps in the development of the Plan. Emphasis was placed on natural hazards that have had significant impact on the community in the past.

Table 4: Steps in the planning process

Steps in the Planning Process
Creation of a Local Planning Team
Identification of natural hazards
Risk Assessment
Identification of natural hazards mitigation goals and objectives for emergency management programs
Benefit Cost Analysis
Selection of mitigation strategies using locally chosen criteria
Preparation of draft plan
Public Comment
Completion of the final plan
Adoption of final plan

VI. COMMUNITY PROFILE

Texas Township is in Kalamazoo County located in southwest Michigan. The Townships 36 square miles constitutes an area in a 6 mile by 6 mile square. There are over 11 inland lakes totaling over 1,200 acres. Local lakes and streams provide activities for fishermen, boaters, and canoeists. Over 19 miles of paved trails sprawl across the township connecting many neighborhoods and the Al Sabo Land Preserve.

The population and labor force of Texas Township continues to grow and diversify with both agricultural land and residential communities. The township has a unique mix of farmland, neighborhood housing, and commercial/retail establishments providing for a diverse demographic. The local terrain consists of rolling hills, flatlands, vineyards, and open farmland. Texas Township is home to Kalamazoo Valley Community College and serves 4 school districts (Mattawan Community, Portage Public, Kalamazoo Public, and Schoolcraft Community).

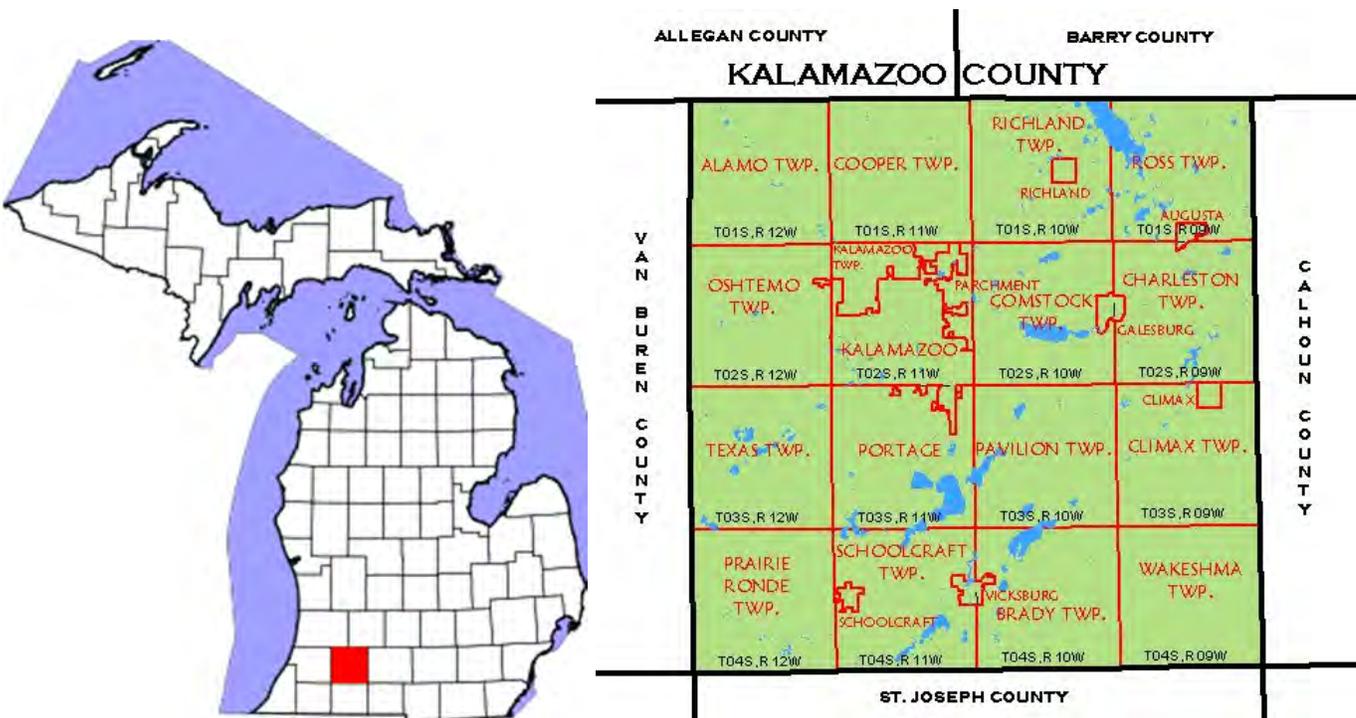
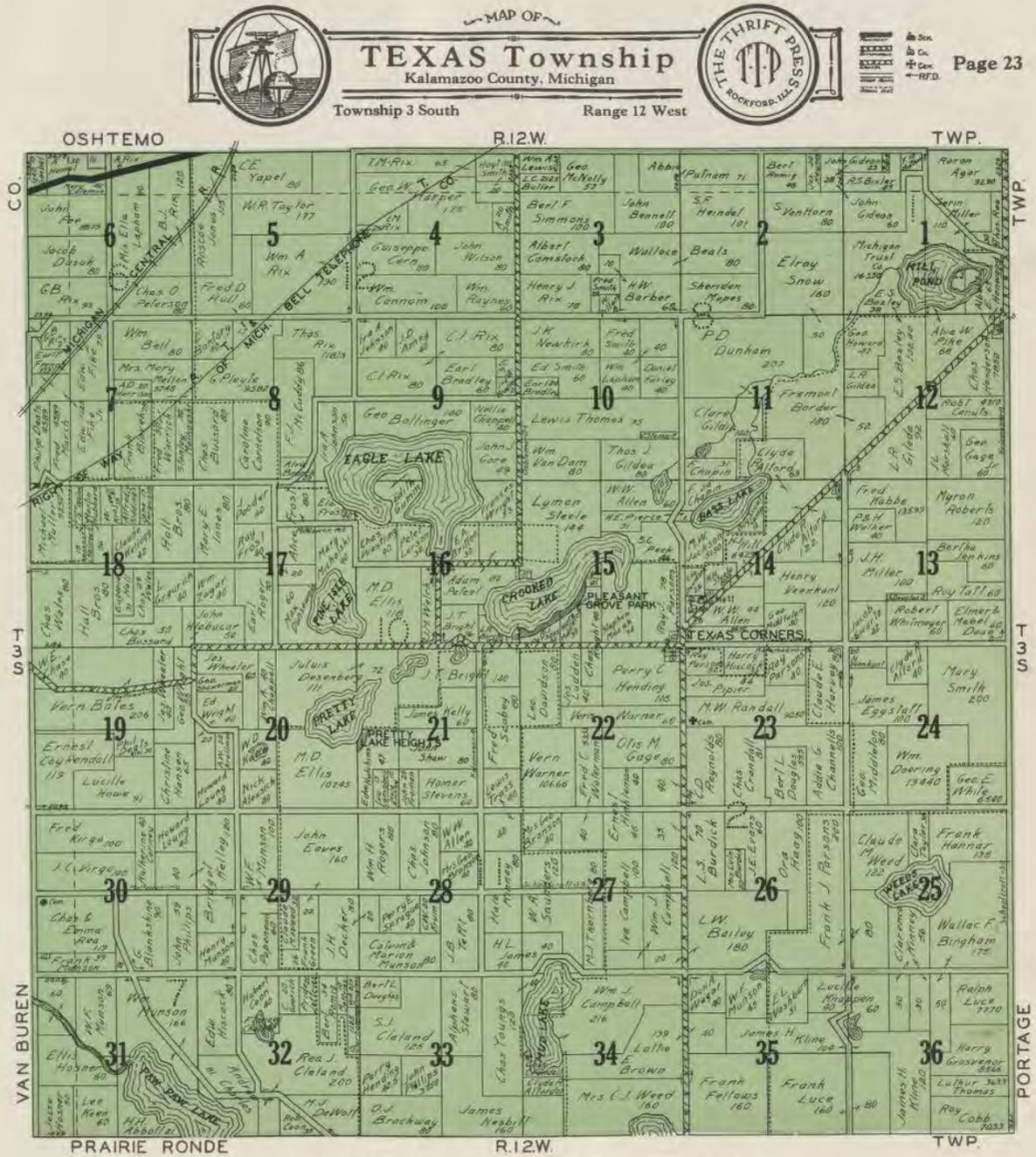


Figure 1: Detailed map of Texas Township



List of Small Property Owners in this Township Shown on Map by Numbers

No.	Sec.	Name	Acres	No.	Sec.	Name	Acres
1	4	Mary N. King	1.50	1	15	Ernl Sober	1.50
2	12	J. Hendon	2.50	2	15	H. View	2.50
3	12	Fred Myle	2.50	3	15	Mrs. Boney	2.50
4	12	A. F. Dunlap	2.50	4	15	Mrs. Cover	2.50
5	14	Chas. Hendon	1.50	5	15	Mrs. Hill	1.50
6	14	C. Woodgast	1.50	6	15	C. Paxon	1.50
7	15	John Myles	1.50	7	15	Mrs. Nancy Munson	1.50
8	15	N. H. Buel	1.50	8	15	Conk Bue	1.50
				9	15	2 School Districts	

This community data is provided to describe Texas Township for planning and implementing the mitigation strategies. There has not been any major infrastructure development, nor major hazard mitigation efforts, in the township.

Table 5: Geographic features for Texas Township

Feature	Measure	Percent
Area in Water	1,230 acres	5.3%
Forest Lands	7,140 acres	31.0%
Wetlands	3,760 acres	16.3%
Agricultural	11,790 acres	51.2%
Operating Farms	9	NA

Source: US Agricultural Census, 2012; Township GIS data

According to the 2010 Census, the total Township population in 2018 is 17,132. Based on projected growth, the projected population for 2020 is 19,782. Demographics for the Township are as follows:

- There are approximately 6,532 *Housing Units* in Texas Township with an average household size of 2.6 people per household.
- The percentage of owner-occupied housing was 93.5% of the population.
- The percentage of residents 65 years and over was 10.5% of the population.
- The percentage of residents 18 years and under was 28.8% of the population.
- The total number of residents with a disability was 3.3% of the population.
- The number of residents that have a primary language other than English was 8.4% of the population.
- The total number of Veteran residents was 5.2% of the population.
- The total number of foreign-born residents was 6.8% of the population.
- The median owner-occupied housing value was \$271,500
- The median household income was \$109,385
- November 2018 Poverty level:
 - \$25,100 Family of 4
 - \$12,140 Family of

Table 6: Poverty Statistics for Texas Township

Poverty	Statistics
Families in poverty	182
Population in poverty	4.0%
Median Income	\$88,250
Per capita Income	\$32,151

Source: U.S. Census Bureau, 2008-2012 American Community Survey, and Township poverty resolution

Table 7: Economic Census for Texas Township

Industry Description	Number of Establishments
Food & Drink	26
Retail	9
Professional Services	15
Health & Beauty	14
Insurance & Finance	12
Auto Service	7
Pet Services	5
Education	7
Public Buildings	4
Industrial	9

Source: Township Masterplan data and onsite survey data

VII. Hazard Identification

Hazard Profiles

The first element of the risk assessment is to identify hazards that could impact the township. To facilitate the planning process, a list of natural hazards was identified by Prein & Newhof. After developing a list of hazards, the list was sent to the planning committee who vetted the hazards based on event history, vulnerability of buildings, infrastructure, and people.

Table 8: Principal Natural Hazards

Principle Natural Hazards in Southern Lower Michigan
Thunderstorms
Tornadoes
Flooding
Winter Weather
Hail
Disease Outbreak
Drought
Wildfires

Source: NOAA NCEI online database and LPT

Thunderstorms

Severe thunderstorms most frequently occur in Michigan during the spring and summer months but can occur in any month of the year at any time of day. Thunderstorms are often accompanied by strong winds, lightning and heavy rain. The risks associated to Texas township regarding the events of a thunderstorm are significant damage to the infrastructure of mobile homes, transportation facilities and a risk to human safety. Lightning risks with these storms can strike buildings, trees and people causing injury or even death to those involved via trees falling on buildings, electrical fires caused by the lightning, and burns due to being directly struck by lightning.

More specifically, windstorms can occur at any time through the year; however, most commonly are experienced with severe thunderstorms in warm weather months. Windstorms most commonly include downbursts, tornadoes, and straight-lined winds. These hazards are defined as events with wind speeds greater than 60 miles per hour.

Tornado

A tornado is defined as a violently rotating column of air in contact with the ground and independent from a cumulonimbus cloud. Tornadoes can be categorized as “weak”, “strong”, and “violent”; with weak tornadoes often having a thin, rope-like appearance and rotating wind speeds no greater than about 110 MPH.

The typical strong tornado often has what is popularly considered a more “classic” funnel-shaped cloud associated with the whirling updraft and rotating wind speeds varying from 110 to 200 MPH. Violent tornadoes can level a well-anchored, solidly constructed home. However, less than 2 percent of all tornadoes usually form in association with mesocyclones, a strong rotating updraft usually associated with a super cell, which tend to occur with the most intense events in the thunderstorm spectrum.

A supercell has the potential to be one of most dangerous convective storms, often producing high winds, large hail, and long-lived tornadoes. In its most simple form, a supercell consists of a single, quasi-steady, rotating updraft and associated downdraft, which may have a lifetime of several hours. A consistent lowering of the cloud base is often referred to as a wall cloud and is frequently a precursor to the development of tornadoes. The most violent severe weather of all types is almost always associated with supercells, including the majority of strong and violent (F2–F5 on the Fujita scale) tornadoes and giant hailstones

Tornadoes are most likely to occur within Texas Township in the warm, humid months of May, June, July and August. Most tornadoes occur during the warmest parts of the day, in the late afternoon and early evening with over 80% of tornadoes occurring between noon and midnight. The risk to Texas Township caused by a Tornado event is property damage. This damage can occur when a tornado passes through a residential area. Specific areas of priority regarding tornadoes are mobile homes which are often far more vulnerable to wind damage and flying debris. The damage can be catastrophic for an unanchored mobile home resulting in complete collapse.

The magnitude of tornadoes is measured according to the Enhanced Fujita Scale, commonly known as the “F” Scale. This scale displays the magnitude of a tornado based on several criteria including amount of destruction, wind speeds, and other data collection after the affected area has been assessed.

Flooding and Flash Flooding

Flooding is the overflowing of water into land areas that are normally dry. For the most part flooding can be predictable. In working with floodplain management, the Federal Emergency Management Agency uses the “100-year Flood.” The 100-year flood is a delineated area of land where at least a one percent (1%) chance may be unpredictable in such cases as dam or levee failure or flash flood events, again with a 1% chance of future flooding events. With this amount of uncertainty, a 100-year flood event could occur more often than once in 100 years. The 100-year floodplain standard is commonly used by federal, state, and local agencies, as well as the National Flood Insurance Program (NFIP) as the standard for floodplain management.

A flash flood is a rapid rise along a stream or low-lying urban area due to rain, levee or dam failure, rapid snowmelt, ice jams and similar causes. Flash flooding can also occur when slow moving or multiple thunderstorms occur over the same area. The effect of a flash flood is often greater in areas with inadequate storm sewers and storm drainage system. However, in general, Texas Township is not at high risk from flash flooding. Texas Township is more vulnerable to extended periods of flooding at lakes that do not have a positive outlet. Examples of these lakes include: Crooked Lake, Duck Lake, Eagle Lake, Pine Island Lake, and Pretty Lake (Examples of lakes with an outlet include Bass Lake (see Appendix D for water levels) and Atwater Pond). The risks associated with flooding are damage to residential infrastructure, the deterioration of the transportation network, and the safety to the public associated with high fast-moving water. Modular homes, and unanchored buildings have the potential to be carried downstream by the fast-moving water. The flooding events that are more likely to affect Texas township are slowly rising lake levels that do not outlet properly cause significant property damage.

Dam Failure: The collapse or failure of an impoundment that results in downstream flooding.

A dam failure has a potential to cause a loss of life and extensive property damage or damage to natural resources. Dam failures can occur under many circumstances which can include, or result from, overtopping of a dam, operation failures, a lack of proper maintenance and repair, or vandalism. Such failures have the potential to be catastrophic as they can occur unexpectedly, with no time for evacuation. EGLE has documented approximately 278 dam failures in Michigan (KCHMP 2012). There are no High Risk or Significant Risk dams in Texas Township nor upstream in the surrounding areas. With no significant risk or High Risk dams near or surrounding Texas Township, there is not a significant risk associated with this natural hazard.

The NFIP is a program of the Federal Emergency Management Agency (FEMA). FEMA provides aid to states for disaster preparedness, response, recovery, and mitigation. Through this program, FEMA offers flood insurance opportunities to communities that agree to regulate development in flood-prone areas. Texas Township participates in the National Flood Insurance Program (NFIP). Flood hazard information can usually be derived from the Flood Rate Insurance Maps (FIRM) for Texas Township. Many lakes in Texas Township do not have a formally delineated floodplain nor identified still water elevations in the Flood Insurance Study. The maps that follow are images of the DFIRM maps for Texas Township that show the location of floodplains in the Township.

Figure 2a: Floodplains of Texas Township

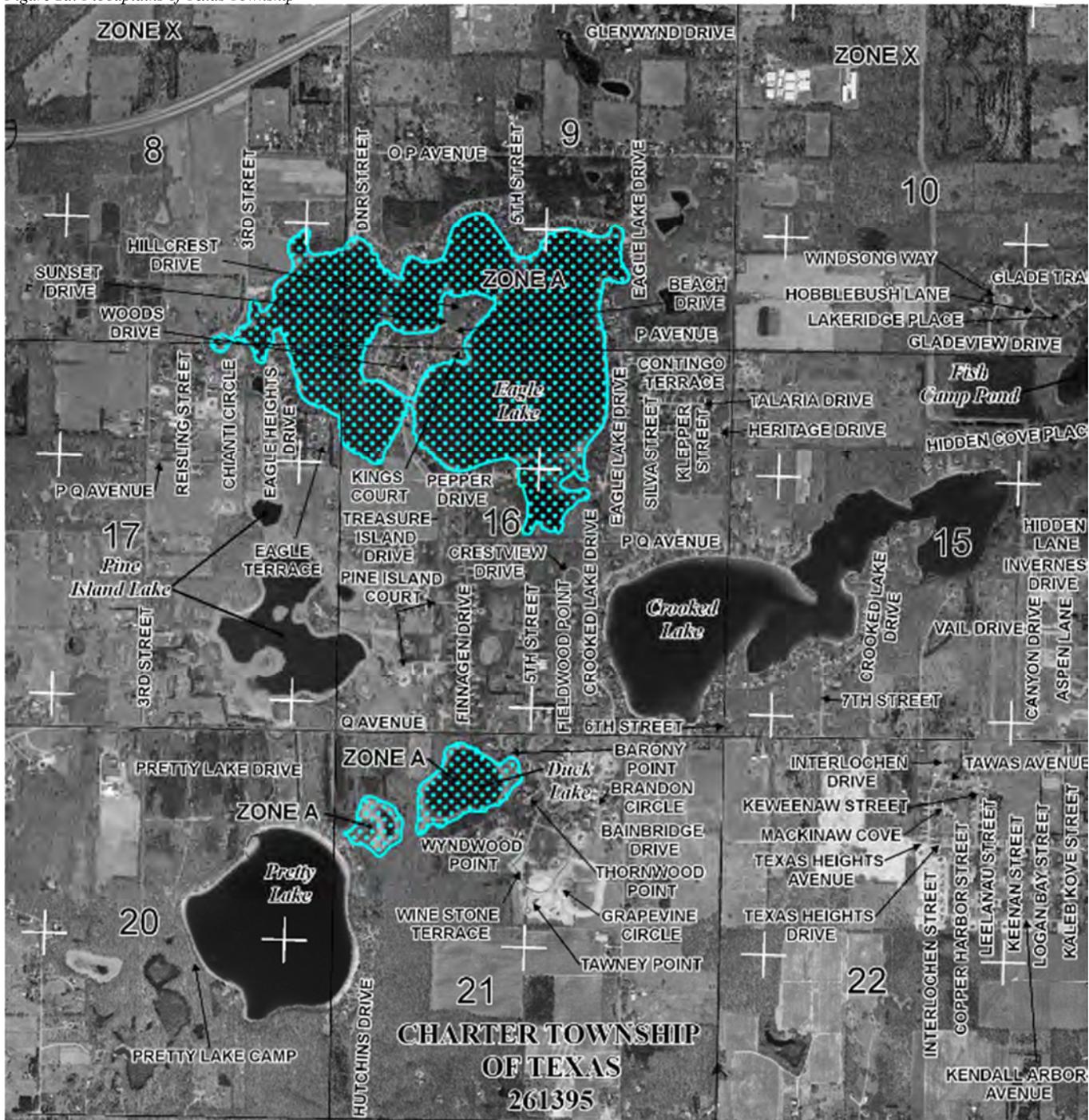


Figure 2b: Floodplains of Texas Township



Winter Weather

Blizzards

A blizzard includes strong winds averaging or frequently gusting to, or above, 35 miles an hour and very low visibility due to blowing or falling snow. These are the most dangerous winter storms and can be especially severe when combined with temperatures below freezing.

Ice Storms

Ice storm conditions are most common when a rain event occurs and air temperature exceeds 32 degrees Fahrenheit, but the surface temperature remains at or below freezing. When the precipitation meets the surface

and structures, ice accumulations occur. The National Weather Service defines an ice storm as accumulations of ice greater than ¼ inches.

Sleet

Sleet forms when precipitation originating as rain travels through freezing temperatures causing the precipitation to freeze before reaching the ground. Generally, sleet storm events are shorter in duration than ice storms, and generally have lower impacts.

Extreme Cold

While there is no clear definition of “extreme cold”, the temperature can be generally defined as temperatures well below zero degrees Fahrenheit. Exposure to extremely cold temperatures can cause frostbite, hypothermia, and can be life threatening if exposure is prolonged. In addition, extremely cold conditions can cause damage to infrastructure, homes, automobiles, etc., if proper measures are not taken for cold weather preparation. Extreme cold is also associated with wind chill. Wind Chill is the term used to describe the rate of heat loss on the human body resulting from the combined effect of low temperature and wind. As winds increase, heat is carried away from the body at a faster rate, driving down both the skin temperature and eventually the internal body temperature. While wind chill will take heat away from an object faster, it cannot cool that object below the actual temperature.

Hail Storm

The product of a thunderstorm, hail is formed when water droplets are carried through the updrafts and downdrafts of the cloud mixing with other water droplets until a pellet of ice is formed that can no longer be supported by the updrafts. When this occurs the ice pellets or hailstones fall to the ground. Most hail pellets in Michigan range in size from pea size to golf ball size however larger hailstones have been reported on a more infrequent basis.

Pandemic and Infectious Disease

A pandemic occurs when infection from of a new strain of a disease, to which most humans have no immunity, significantly exceeds the number of expected cases over a given period. Such a disease may or may not be transferable between humans and animals. (Martin & Martin-Granel, 2006). Distinguished as contagious, such a disease can be communicated by germs carried in the air or water, and thus spread without contact with the patient such as; measles, Strep throat, Flu and Pneumonia. Historically, the primary concern is with three diseases with pandemic and infectious potential: Zika virus, West Nile virus, and influenza. The 1918 Spanish flu pandemic remains the worst-case pandemic event on record worldwide. It is unclear how many occurrences of pandemics and infectious disease may surface in the future. Reported cases of West Nile virus have generally been decreasing due to efforts of eradication. Protective measures against mosquito born illness is in place and continuing to improve.

Drought

Although the definition of a drought varies from location to location, a simple definition of the hazard is a prolonged period of dry weather due to a deficiency in precipitation. Drought is further defined as meteorological, agricultural, hydrological, and socioeconomic. Meteorological drought refers to a period of dry weather associated with lack of precipitation, agricultural drought refers to crop damage as a result of drought, hydrological drought refers to a drop in surface and groundwater levels due to a lack of replenishment of the aquifer, and socioeconomic drought refers to impacts on humans individually or collectively.

Drought causes approximately \$8.4 Million Dollars in damages statewide across Michigan (MHA 2019). The damages caused by drought are regional. Historically, drought has an impact on agriculture in Michigan and can be considered to have a high priority due to the large agricultural industry. The impacts are felt in several ways from economic, social and environmental. Michigan falls into the 0 to 2nd percentile for an Exceptional (of D4) drought. Based on Kalamazoo County, from January 1, 1996 to April 30, 2017 no drought events were recorded (MHA 2019). While the effects of drought can be significant across the State, county-wide and specific to Texas Township the risk associated with drought is considered low. There are 9 large operating farms in Texas Township. The effects of a drought event would cause significant crop damage to the area, influencing the livelihood and economic benefit these farms have on the community. With several wellhead protection areas in the Township, the risk due to drought is a decrease in capacity potentially triggering a shortage of water for the community. The most extreme drought to hit this area was in February 1931 with a Palmer index of -6.45. From 1901 to 2005, there were 8 drought events reported in the southwest region of Michigan including Allegan, Berrien, Cass, Kalamazoo, Kent, Ottawa and Van Buren Counties.

Wildfire

A wildfire is essentially an uncontrolled fire spreading through vegetative fuels over a large area. Wildfires can be caused by natural causes such as lightning but are often caused by humans. There are essentially four types of wildfire or stages of wildfire including ground, surface, crown, and spotting. Historically the wildfires located in Michigan do not involve ground fire. The surface fire generally burns approximately four feet in height and the difficulty of extinguishing the fire is associated with potential nearby fuels.

With drought often comes wildfire. The statewide expected loss due to wildfire is \$1.1 Million (MHA 2019). Across the state there is on average 1 wildfire event annually with a higher risk to the environment relative to its risk of property. According to the MHA the most common natural cause of wildfires is dry lightning that comes with precipitation that does not reach the ground. While this is the most common natural cause, lightning strikes only attribute to 4% of the causes of wildfires in Michigan. Wildfire dangers are escalated during high wind events, and even more so during the combination of a high wind and drought.

According to 2017 MDNR information, the leading causes of wildfires from the previous ten years were: 1. Debris burning (32%) 2. Miscellaneous (17%) 3. Powerline (16%) 4. Equipment (11%) 5. Campfires (9%) 6. Arson (6%) 7. Lightning (4%) 8. Fireworks (2%) 9. Structural fires (2%) 10. Smoking (1%). Associated with the risk of Drought in Texas Township, the risk of wildfires is also considered low. While the risk of a wildfire is low, it should not be overlooked as the damages can be extensive. There are ways to reduce the townships vulnerability to wildfires and drought. The township can work with the Kalamazoo County to coordinate with their efforts on wildfire and drought protection. The areas at risk in Texas Township include the Kalamazoo Valley Community College, the Texas Township Bible church, Southridge Church, the Texas Township Hall, and Fire Department. Along with these buildings, the nine large operating farms in Texas township would be at risk of being destroyed. This is a risk to the livestock and crops in these farms. These areas serve as community gathering areas and sources of organization for events and in the case of an emergency. Their risk posed by Wildfires has the potential to affect the townships socioeconomic and administrative activities.

Once a fire begins burning the tops of trees it is known as a crown fire. This fire can be extremely difficult to control due to winds which may cause spotting. Spotting is caused by the throwing or blowing of large embers of crown fire or surface fire ahead of a wildfire. Spotting makes the controlling of a fire extremely difficult depending on wind speeds, etc. Smoke created by wildfire may also pose a risk to wildlife, persons and property.

Earthquakes

A shaking or trembling of earth's crust caused by the breaking and shifting of rock beneath the surface.

Earthquakes range in intensity from slight tremors to great jolts. They may last from a few seconds to several minutes or come as a series of tremors over a period of several days (KCHMP 2012). Earthquakes typically occur without any warning. In some instances, the geology of the area can be used to provide advanced warnings. However, scientists have not yet been able to predict exactly when or where an earthquake will occur.

Earthquakes tend to strike repeatedly along fault lines formed deep within the earth's crust that push the tectonic plates against one another. Earthquake monitoring is conducted by the U.S. Geological Survey, the National Oceanic and Atmospheric Administration, and other locations such as universities around the nation. The physical movement of the ground in an earthquake is seldom the direct cause of injury or death. Most casualties are a result of falling objects and debris associated with the tremors. Disruption of communications systems, electric power lines, gas, sewer and water mains can be expected. Water supplies can become compromised.

Significant Earthquakes in Michigan are rare; however, the strongest recorded event to take place in Michigan was a 4.7 magnitude earthquake that occurred near Coldwater, Michigan on August 10th, 1947. Coldwater is located approximately one hour south west of Texas Township. This earthquake caused structural damage to buildings in the City of Coldwater and Kalamazoo. The tremors could be felt as far away as Chicago (aroundmichigan.com). Several mildly damaging earthquakes have been felt since the early 1800s. The exact number is difficult to determine. Damages regarding most of these earthquakes, is limited to cracked plaster, broken dishes, damaged chimneys, and broken windows.

The risk associated to Texas Township regarding earthquakes is low, with few reports of damages and minimal historical records. While the risk is acknowledged as low, the 1990 Executive Order 12699, Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction, was signed into law. This legislation requires that design and

construction standards for new federal buildings follows best practice standards for new construction of Federal buildings and Federally funded buildings during or after the event of an earthquake. Applying new and current best practices and building standards will ensure that the vulnerability to earthquakes remains low in the future.

Subsidence

The lowering or collapse of the land surface caused by natural or human-induced activities that erode or remove subsurface support. Subsidence is classified as the lowering or collapse of the land surface due to loss of subsurface its support. Natural subsidence occurs when the ground collapses into underground cavities. These cavities are produced by the reaction of limestone or other soluble materials dissolving through the introduction of groundwater. Texas Township is not at risk to natural subsidence due to its subsurface ground composition not being comprised of limestone, salt or gypsum.

Data Methodology and Map Development

Texas Township staff and engineer obtained a list of critical facilities from the Township Master Plan and a survey conducted by LandUseUSA on behalf of the Township in 2018.

Table 9: Critical Facilities and Infrastructure in Texas Township

2	Airstrip - Clear Sky, Whitcomb Field
5	Bridges - 1 the County system, 4 on the State
1	Communications Facilities - MDOT
0	Community Shelter
0	Dams
1	Fire Stations – Texas Township Fire Department
1	Government Buildings – Township Hall
4	Hospital Facility – Dentist, Animal Hospital, Eye Care, Bronson Family 9 th St.
9	Industrial Facilities – J. Sterling Industries, UPS
0	Police Stations
6	Recreational Facility – Wings West, Bronson Athletic Club, Branch Gymnastics, Centered Pilates, Excel Dance Studio, Momentum Dance
0	School System with various buildings
70	Utility Facilities – Booster Station, Lift Station, Production well, Communication Towers, Electric Grid Substation
	Water and Sewage Treatment Facility <ul style="list-style-type: none"> • Water: 39.3% public system; 60.6% individual wells • Sewer: 20.3% public sewer; 79.6% individual septic

Source: Texas Township Master Plan, Texas Corners Market Assessment, and onsite survey by LandUseUSA

National Centers for Environmental Information (NCEI) Records

Staff utilized historical data for several hazards that are available from the National Centers for Environmental Information (NCEI). NCEI records are estimates of damage compiled by the National Weather Service from various local, state, and federal sources. When NCEI records were not available for a given hazard, other credible national, state or local sources were utilized.

Data for weather events was compiled from the National Oceanic and Atmospheric Administration’s (NOAA) website utilizing the following sections:

- Weather/Climate Events, Information, Assessments
- Climatology and Extreme Events
- NOAA Storm Event Database; 1950 to present, local storm reports, damage reports, events checked for Texas Township included: Flood (Flash Flood, Flood, Lakeshore Flood), Hail (Hail), Snow and Ice (Blizzard, Extreme Cold/Wind Chill, Freezing Fog, Frost/Freeze, Heavy Snow, Ice Storm, Lake-effect Snow, Sleet, Winter Storm, Winter Weather), Tornado (Tornado, Funnel Cloud), Thunderstorm and High Wind (Heavy Rain, High Wind, Lightning, Strong Wind, Thunderstorm Wind), Wildfire (Wildfire)

The following list includes the frequency, dates, and descriptions of the most severe natural hazard events that have occurred within Texas Township, according to the NOAA Storm Event Database. *Extreme Winter Weather* includes events with ice covering, property damage, and over 12 in. of snow. *Severe Thunderstorm* include 50 knot winds + and property damage figures.

Note that while the Database goes back to information from 1950, not all events have data recorded for events going back to 1950. When researching events, the database was set to include 1950 to present and the events were recorded in the following tables. Events specific to Texas Township were all included as well as those County-wide events that are not specific to a different community. And finally, events in neighboring VanBuren County communities were included when appropriate. For hazards where Texas Township was identified in the description, or for tornado paths through the area, they were included in the hazard list. For county hazards where a specific community or location is not identified in the description (such as for winter weather), the county information was included. For hazard instances that identified specific surrounding locations but not Texas Township, Texas Township was not included. Since Texas Township is on the western edge of the Township, we also included hazards that occurred in VanBuren County if identified as on the east side of the County.

Legend: Mag=Magnitude, Dth=#Deaths, Inj=# Injured, PrD=Property Damage, CrD=Crop Damage

Flash Flooding 2001-2019

Table 10: Flash Flood Events

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
COUNTYWIDE	KALAMAZOO CO.	MI	02/09/2001	09:00	EST	Flash Flood		0	0	100.00K	0.00K
COUNTYWIDE	KALAMAZOO CO.	MI	08/22/2001	10:30	EST	Flash Flood		0	0	100.00K	0.00K
Totals:								0	0	200.00K	0.00K

- **COUNTYWIDE, KALAMAZOO CO., MI 02/09/2001 Flash Flood**
 - Anywhere from one or two to as many as a dozen roads were partially washed out or closed in each county on the 9th. There were also many reports of standing water in low lying areas and poor drainage areas.
- **COUNTYWIDE, KALAMAZOO CO., MI 08/22/2001 Flash Flood**
 - Doppler radar estimates indicated that 3 to 5 inches of rain fell across that area in less than 6 hours. Trained weather spotters reported that widespread street flooding occurred in Oshtemo and Kalamazoo (Kalamazoo county). Several streets were blocked off and several underpasses were flooded. There were also a few reports of cars stuck in flooded underpasses and businesses having to pump water out of their stores in Kalamazoo during the height of the storms.

Flooding 1997-2019

Table 11: Flood Events

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
KALAMAZOO CITY	KALAMAZOO CO.	MI	09/13/2008	10:00	EST-5	Flood		0	0	11.000M	0.00K
ALAMO	KALAMAZOO CO.	MI	04/17/2013	16:00	EST-5	Flood		0	0	5.000M	0.00K
Totals:								0	0	16.0M	0.00K

- **TEXAS TOWNSHIP, KALAMAZOO CO, MI 1953 Flood**
 - Anecdotal evidence indicates that high groundwater caused substantial flooding for many months. It is believed that many structures and the surrounding environment were damaged as water levels were excessive. However, no specific data on water levels nor damages is available.
- **KALAMAZOO CITY, KALAMAZOO CO. MI 09/13/2008 Flood**
 - Extensive flooding occurred across Kalamazoo County as a result of excessive rainfall which began on the twelfth and continued the thirteenth and fourteenth. Many roads in the city of Kalamazoo were closed

for several days and damage to public infrastructure (mostly roads and bridge washouts) was estimated at eleven million dollars.

- **ALAMO KALAMAZOO CO. MI 04/17/2013 Flood**
 - Most areas saw between 2 to 4 inches of rainfall. Some local areas near Holland and Grand Rapids saw around 5 inches of rainfall. All of this rainfall fell on top of already fully saturated soil from big rains that came during early to mid-April.
- **TEXAS TOWNSHIP, KALAMAZOO CO, MI 2017-2020 Flood**
 - High groundwater has caused substantial flooding for over the past two years to structures on and around several lakes in Texas Township. These include Crooked Lake, Eagle Lake, Duck Lake, Pine Island Lake, and Pretty Lake.
 - Residents have been displaced from their homes, roads have been closed, seawalls have been built and substantial damage has occurred to structures and the surrounding environment.
 - Damages are likely in the tens of millions but cannot be estimated accurately until the water levels subside.
 - Texas Township began short-term mitigation for this event in May 2019 by pumping water from Crooked Lake and Eagle Lake to a positive outlet. The lake levels dropped, as shown in the figures in Appendix D, but a permanent solution is needed as lake levels may not continue to drop with the rainfall volumes that have been achieved in the area over the past 2+ years – especially during the wet seasons.
 - At least one hundred sixty structures have been flooded for periods of up to more than 2 years due to the continued high rainfall. Sixteen homes have been abandoned (either permanently or temporarily, roads have been closed and repaired, pumps have been operating at hundreds of homes 24/7 for more than 2 years, sea walls have been built, and mold and other health concerns exist.
 - There were 16 homes abandoned due to this flooding event.
 - The long-term permanent solution to lake flooding is a high priority for Texas Township to ensure that flooding of structures no longer occurs on a periodic basis.
 - One proposed solution includes the construction of a weir overflow outlet from Crooked Lake with a gravity pipe discharging into the adjacent wetland and overland flow ultimately to Bass Lake (which has a positive outlet). In addition, the project would include construction of a weir overflow outlet from Eagle Lake with gravity piping into Crooked Lake. The outlets will allow flow to pass downstream when levels exceed normal.

Hail 1968-2019

Table 12: Hail Events

<u>Location</u>	<u>County/Zone</u>	<u>St.</u>	<u>Date</u>	<u>Time</u>	<u>T.Z.</u>	<u>Type</u>	<u>Mag</u>	<u>Dth</u>	<u>Inj</u>	<u>PrD</u>	<u>CrD</u>
TEXAS CORNERS	KALAMAZOO CO.	MI	06/06/2008	16:05	EST-5	Hail	1.75 in.	0	0	0.00K	0.00K
VAN BUREN CO	MATTAWAN	MI	05/07/2004	2:40	CST	Hail	0.75 in.	0	0	10.00K	10.0K
VAN BUREN CO	PAW	MI	06/28/2003	13:26	CST	Hail	0.88 in.	0	0	25.00K	25.0K
KALAMAZOO CO.	KALAMAZOO CO.	MI	06/11/1968	12:00	CST	Hail	1.75 in.	0	0	0.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	06/23/1968	17:20	CST	Hail	1.50 in.	0	0	0.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	04/17/1969	16:20	CST	Hail	0.75 in.	0	0	0.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	04/17/1969	16:30	CST	Hail	1.75 in.	0	0	0.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	04/01/1974	10:45	CST	Hail	1.50 in.	0	0	0.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	06/12/1976	16:00	CST	Hail	2.00 in.	0	0	0.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	06/15/1976	15:15	CST	Hail	1.50 in.	0	0	0.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	04/02/1977	13:20	CST	Hail	0.75 in.	0	0	0.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	06/20/1979	08:45	CST	Hail	1.50 in.	0	0	0.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	07/11/1980	12:15	CST	Hail	2.00 in.	0	0	0.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	07/12/1980	09:30	CST	Hail	1.00 in.	0	0	0.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	07/12/1980	09:30	CST	Hail	1.00 in.	0	0	0.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	05/30/1985	22:45	CST	Hail	1.75 in.	0	0	0.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	05/30/1985	23:00	CST	Hail	1.75 in.	0	0	0.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	07/09/1985	20:52	CST	Hail	0.75 in.	0	0	0.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	07/29/1987	15:15	CST	Hail	2.75 in.	0	0	0.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	07/29/1987	15:34	CST	Hail	0.83 in.	0	0	0.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	04/03/1988	12:50	CST	Hail	1.00 in.	0	0	0.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	04/23/1988	19:55	CST	Hail	1.75 in.	0	0	0.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	07/23/1988	15:52	CST	Hail	0.75 in.	0	0	0.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	06/22/1990	17:25	CST	Hail	0.75 in.	0	0	0.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	03/27/1991	18:10	CST	Hail	1.00 in.	0	0	0.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	03/27/1991	18:25	CST	Hail	4.50 in.	0	0	0.00K	0.00K
Totals:								0	0	35.0K	35.0K

- **TEXAS CORNERS KALAMAZOO CO. MI 06/06/2008 Hail**
 - One and three quarters inch diameter hail was reported near Texas Corners near the intersection of US-131.

** See Figure 1 for Location of Texas Corners*

Winter Weather 1996-2019

Table 13: Severe Winter Weather Events

<u>Location</u>	<u>County/Zone</u>	<u>St.</u>	<u>Date</u>	<u>Time</u>	<u>T.Z.</u>	<u>Type</u>	<u>Mag</u>	<u>Dth</u>	<u>Inj</u>	<u>PrD</u>	<u>CrD</u>
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	01/27/1996	13:00	EST	Winter Storm	0	0	0.00K	0.00K	
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	02/28/1996	14:00	EST	Winter Storm	0	0	0.00K	0.00K	
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	03/25/1996	07:00	EST	Winter Storm	0	0	0.00K	0.00K	
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	11/10/1996	01:00	EST	Heavy Snow	0	0	0.00K	0.00K	
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	01/10/1997	02:00	EST	Heavy Snow	0	0	0.00K	0.00K	
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	03/14/1997	01:30	EST	Ice Storm	0	0	0.00K	0.00K	
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	10/26/1997	16:00	EST	Heavy Snow	0	0	0.00K	0.00K	
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	11/11/1997	21:00	EST	Lake-effect Snow	0	0	0.00K	0.00K	
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	12/04/1997	19:00	EST	Lake-effect Snow	0	0	0.00K	0.00K	
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	12/10/1997	01:00	EST	Winter Storm	0	0	0.00K	0.00K	
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	01/07/1998	17:00	EST	Winter Storm	0	0	0.00K	0.00K	
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	01/22/1998	19:00	EST	Winter Storm	0	0	0.00K	0.00K	
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	03/09/1998	07:00	EST	Winter Storm	0	0	0.00K	0.00K	
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	03/13/1998	15:00	EST	Heavy Snow	0	0	0.00K	0.00K	
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	03/20/1998	16:00	EST	Winter Storm	0	0	0.00K	0.00K	
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	12/21/1998	13:00	EST	Lake-effect Snow	0	0	0.00K	0.00K	
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	01/02/1999	07:00	EST	Blizzard	0	0	0.00K	0.00K	
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	01/03/1999	00:00	EST	Heavy Snow	0	0	0.00K	0.00K	
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	01/04/1999	00:00	EST	Winter Weather	0	0	0.00K	0.00K	
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	01/10/1999	04:00	EST	Winter Storm	0	0	0.00K	0.00K	
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	01/11/1999	04:00	EST	Winter Weather	0	0	0.00K	0.00K	
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	02/05/1999	19:00	EST	Winter Weather	0	0	0.00K	0.00K	
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	02/12/1999	11:00	EST	Lake-effect Snow	0	0	0.00K	0.00K	

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	03/04/1999	22:00	EST	Winter Weather		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	03/08/1999	22:00	EST	Winter Weather		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	01/04/2000	19:00	EST	Winter Storm		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	11/19/2000	18:00	EST	Winter Storm		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	12/11/2000	06:00	EST	Winter Storm		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	12/13/2000	14:00	EST	Heavy Snow		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	12/16/2000	22:00	EST	Heavy Snow		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	12/23/2001	15:00	EST	Winter Storm		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	12/28/2001	16:00	EST	Winter Storm		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	01/30/2002	04:00	EST	Winter Storm		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	02/26/2002	19:00	EST	Winter Storm		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	03/02/2002	01:00	EST	Winter Storm		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	11/30/2002	05:00	EST	Heavy Snow		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	12/24/2002	21:00	EST	Heavy Snow		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	03/04/2003	18:00	EST	Heavy Snow		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	01/27/2004	07:00	EST	Winter Storm		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	11/24/2004	12:00	EST	Winter Storm		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	12/12/2004	19:00	EST	Heavy Snow		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	01/04/2005	19:00	EST	Heavy Snow		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	01/21/2005	23:00	EST	Heavy Snow		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	12/01/2006	04:00	EST-5	Ice Storm		0	0	75.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	12/04/2006	07:00	EST-5	Lake-effect Snow		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	01/14/2007	09:00	EST-5	Winter Storm		0	0	25.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	01/27/2007	17:00	EST-5	Lake-effect Snow		0	0	0.00K	0.00K
Totals:								0	0	100.00K	0.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	01/29/2007	12:00	EST-5	Lake-effect Snow		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	02/02/2007	19:00	EST-5	Blizzard		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	12/01/2007	16:00	EST-5	Winter Storm		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	12/15/2007	19:00	EST-5	Heavy Snow		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	12/31/2007	22:30	EST-5	Winter Storm		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	01/01/2008	00:00	EST-5	Winter Storm		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	01/01/2008	10:38	EST-5	Lake-effect Snow		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	02/01/2008	01:45	EST-5	Winter Storm		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	02/10/2008	05:59	EST-5	Blizzard		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	03/21/2008	10:15	EST-5	Winter Storm		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	12/06/2008	03:00	EST-5	Winter Storm		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	12/19/2008	03:00	EST-5	Winter Storm		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	12/21/2008	01:00	EST-5	Winter Storm		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	01/09/2009	08:30	EST-5	Winter Storm		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	02/21/2009	07:00	EST-5	Winter Storm		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	12/09/2009	15:00	EST-5	Winter Storm		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	12/24/2009	11:00	EST-5	Winter Weather		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	02/09/2010	05:00	EST-5	Heavy Snow		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	02/21/2010	21:00	EST-5	Heavy Snow		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	01/03/2011	16:00	EST-5	Winter Weather		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	01/06/2011	07:00	EST-5	Winter Weather		0	0	0.00K	0.00K
KALAMAZOO (ZONE)	KALAMAZOO (ZONE)	MI	02/01/2011	17:00	EST-5	Winter Storm		0	0	0.00K	0.00K

Severe Thunderstorms and Damaging Winds 2007-2019

Table 14: Thunderstorms and Damaging Wind Events

<u>Location</u>	<u>County/Zone</u>	<u>St.</u>	<u>Date</u>	<u>Time</u>	<u>T.Z.</u>	<u>Type</u>	<u>Mag</u>	<u>Dth</u>	<u>Inj</u>	<u>PrD</u>	<u>CrD</u>
KALAMAZOO	KALAMAZOO	MI	06/07/2007	11:10	EST-5	Strong Wind	43 kts. EG	0	0	15.00K	0.00K
TEXAS CORNERS	KALAMAZOO CO.	MI	06/27/2007	18:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	7.00K	0.00K
TEXAS CORNERS	KALAMAZOO CO.	MI	08/23/2007	17:14	EST-5	Thunderstorm Wind	51 kts. MG	0	0	100.00K	0.00K
TEXAS CORNERS	KALAMAZOO CO.	MI	10/18/2007	21:25	EST-5	Thunderstorm Wind	52 kts. EG	0	0	5.00K	0.00K
TEXAS CORNERS	KALAMAZOO CO.	MI	10/18/2007	21:25	EST-5	Thunderstorm Wind	52 kts. EG	0	0	5.00K	0.00K
TEXAS CORNERS	KALAMAZOO CO.	MI	07/11/2011	09:38	EST-5	Thunderstorm Wind	65 kts. EG	0	0	1.000M	0.00K
VAN BUREN CO	MATTAWAN PARK	MI	07/19/2013	22:10	EST-5	Thunderstorm Wind	55 kts. EG	0	0	20.0K	0.00K
VAN BUREN CO	MATTAWAN PARK	MI	11/17/2013	08:38	EST-5	Thunderstorm Wind	65 kts. EG	0	0	250.0K	0.00K
TEXAS CORNERS	KALAMAZOO CO.	MI	06/18/2014	12:45	EST-5	Thunderstorm Wind	52 kts. EG	0	0	10.00K	0.00K
Totals:								0	0	1.412M	0.00K

- **TEXAS CORNERS KALAMAZOO CO. MI 06/23/2007 Thunderstorm Wind**
 - Several trees were blown down five miles west of Portage, in Schoolcraft and one mile east of Vicksburg.
- **TEXAS CORNERS KALAMAZOO CO. MI 08/23/2007 Thunderstorm Wind**
 - A large severe weather event unfolded on August 23rd and resulted in numerous reports of wind damage in Texas Township. A confirmed tornado in Montcalm county (north of Kalamazoo County) resulted in minimal damage to several sheds and thousands of trees were either uprooted or snapped off in a rural portion of the county.
- **TEXAS CORNERS KALAMAZOO CO. MI 10/18/2007 Thunderstorm Wind**
 - About a hundred structures were damaged in a subdivision on the south side of Williamston in Ingham county (near Lansing). The two fatalities occurred about four miles northeast of Williamston, where a modular home was flipped into a pond by the tornado.
- **TEXAS CORNERS KALAMAZOO CO. MI 07/11/2011 Thunderstorm Wind**
 - A bow echo raced east across Kalamazoo county during the late morning hours, bringing down numerous trees and power lines. A trained spotter reported a measured wind gust of 71 mph in Schoolcraft. The public report lots of tree damage in and near Portage. Radar data suggests that downed trees were likely countywide.
- **TEXAS CORNERS KALAMAZOO CO. MI 06/18/2014 Thunderstorm Wind**
 - Multiple rounds of thunderstorms affected Southwest Lower Michigan beginning late at night on the 17th and continuing through the day on the 18th. There were several reports of large hail, damaging wind gusts and heavy rainfall with brief street flooding.

Tornado 1954-2019

Table 15: Tornado Events

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
KALAMAZOO CO.	KALAMAZOO CO.	MI	04/07/1954	18:00	CST	Tornado	F1	0	0	25.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	05/28/1955	08:00	CST	Tornado	F2	0	0	250.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	05/28/1955	17:00	CST	Tornado	F0	0	0	2.50K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	08/03/1960	13:51	CST	Tornado	F1	0	0	25.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	04/11/1965	18:30	CST	Tornado	F3	0	17	250.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	05/19/1966	20:15	CST	Tornado	F1	0	0	2.50K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	08/08/1968	14:15	CST	Tornado	F0	0	0	0.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	09/17/1972	19:25	CST	Tornado	F0	0	0	0.25K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	07/27/1973	20:05	CST	Tornado	F0	0	1	250.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	04/12/1974	19:20	CST	Tornado	F1	0	0	0.25K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	06/15/1975	11:15	CST	Tornado	F0	0	0	0.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	08/21/1975	14:15	CST	Tornado	F0	0	0	0.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	03/12/1976	15:50	CST	Tornado	F1	0	0	25.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	04/02/1977	13:32	CST	Tornado	F4	0	10	2.500M	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	08/16/1978	00:30	CST	Tornado		0	1	250.00K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	05/13/1980	13:58	CST	Tornado	F3	5	79	25.000M	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	08/26/1986	15:40	EST	Tornado	F1	0	0	2.50K	0.00K
KALAMAZOO CO.	KALAMAZOO CO.	MI	06/22/1990	17:25	EST	Tornado	F0	0	0	0.00K	0.00K
RICHLAND	KALAMAZOO CO.	MI	01/18/1996	17:01	EST	Tornado	F0	0	0	0.50K	0.00K
RICHLAND	KALAMAZOO CO.	MI	05/21/2001	13:20	EST	Tornado	F2	0	0	500.00K	100.00K
AUGUSTA	KALAMAZOO CO.	MI	07/27/2002	21:25	EST	Tornado	F1	0	0	100.00K	40.00K
SCHOOLCRAFT	KALAMAZOO CO.	MI	05/10/2006	14:40	EST	Tornado	F0	0	0	0.00K	2.00K
MILLER CORNER	KALAMAZOO CO.	MI	09/13/2008	15:40	EST-5	Tornado	EF0	0	0	0.00K	0.00K
ALAMO	KALAMAZOO CO.	MI	06/19/2009	20:53	EST-5	Tornado	EF1	0	0	50.00K	0.00K
RICHLAND JCT	KALAMAZOO CO.	MI	06/19/2009	21:08	EST-5	Tornado	EF2	0	0	40.00K	0.00K
Totals:								5	108	29.273M	142.00K

Drought 1950-2019

Table 16: Drought Events

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	0.00K	0.00K

- The NCEI database does not have specific drought information for Kalamazoo county, see hazard description for more information.

Wildfire 1950-2019

Table 17: Wildfire Events

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	0.00K	0.00K

- The NCEI database does not have specific Wildfire information for Kalamazoo county, see hazard description for more information.

Pandemics or other Public Health Emergencies

Naturally occurring pandemics may cause widespread precautions around the world. Earlier in 2019, Eastern Equine Encephalitis was an issue in Kent County southwestern Michigan. No specific pandemic has been identified for Texas Township, at least in recent history.

Probability of Natural Hazards

Natural hazards such as hail, thunderstorm and high wind, tornadoes, snow and ice, and flooding, that will affect Southwest Michigan are a perennial concern. The magnitude and severity depend on the season, which determines temperature, moisture in the air, ice cover on the lakes, etc.

The areas where natural hazards overlap in Texas Township may include heavy snow that causes trees and power lines to come down, and then melting, rain and flooding. Rising water levels with high winds can cause coastal landslides/debris flow/erosion.

Table 18: Hazard Risk Table

Risk									
	<u>Flooding</u>	<u>Winter Weather</u>	<u>Thunder Storms</u>	<u>Tornado</u>	<u>Hail</u>	<u>Drought</u>	<u>Wild Fire</u>	<u>Pandemic</u>	<u>Earthquake</u>
Damage Occurrences	4	3	9	20	2	1	.5	2	1
Time Range (years)	22	23	12	65	51	69	69	69	69

Damage Occurrence Freq	18%	13%	75%	30%	4%	2%	1%	3%	2%
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LEGEND	
Low	0%-5%
Medium	5%-50%
High	>50%

The risk assessment above is approximate based on available data for Flooding, Winter Weather, Thunder Storms and Hail. The risk assessment is estimated for events that are not covered by the NCEI database, for Drought Wild Fire and Pandemic. The LPT agreed that it is likely that the risk would NOT change in the foreseeable future.

Risk Assessment Summary Table: TEXAS TOWNSHIP

Table 19: Hazard Risk Summary

HAZARD (Years of Record)	Number of Events w/ Damage	Probability**	Geographic Size Affected	Population Impacted	Specific Priority Area	Estimated Damage (Known Costs)
Flood/Flash Flood (1997-2019)	4	Occasional	County-wide	17,153	2	\$16,200,000
Winter Weather (1996 – 2019)	3	Occasional	County-wide		2	\$100,000
Hail (1968 – 2019)	2	Occasional	County-wide		2	\$35,000
Thunderstorms (2007 – 2019)	9	Frequent	Township-wide		1	\$1,412,000
Tornadoes (1951 – 2019)	30	Occasional	County-wide		2	\$29,273,000
Drought (2001 – 2019)	1	Rare	SW MI		3	\$0
Wildfire (2001-2019)	.5	Rare	SW MI		3	\$0
Pandemic (2000-2019)	2	Rare	Statewide		3	\$0
Earthquake (1947-2019)	1	Rare	SW MI		1	\$0

***Rare* - Hazard event is likely to occur less than once every 30 years.

Occasional - Hazard event is likely to occur less than once every 2 years, but more often than once every 30 years.

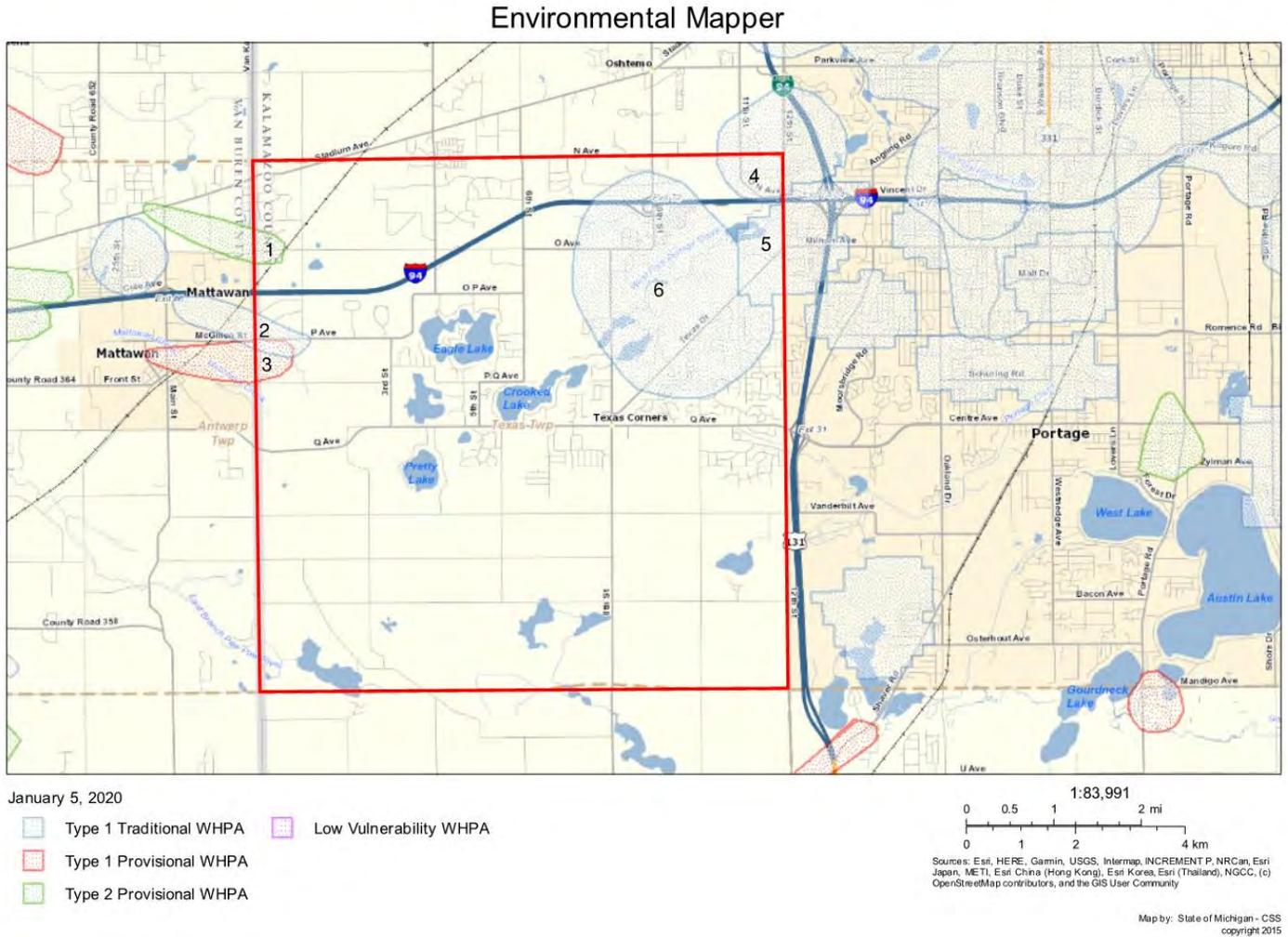
Frequent - Hazard event is likely to occur more than once every 2 years.

Specific Priority areas (from Table 18): 1= High-frequency of hazards 2= Medium-frequency hazard, 3= Low-frequency hazards

To develop the top priority hazards, the risk ratings in Table 18 were separated into high, medium and low. Table 19 then list the specific priority ratings from Table 18 along with other risk data.

From this, Natural Hazards Priority Areas were narrowed to the top four most significant hazards according to the risk assessment and drought was added by the LPT to cover the critical wellhead protection area. Figure 3 shows a map of the wellhead protection areas located in Texas Township according to EGLE.

Figure 3: Wellhead Protection Areas



Source: EGLE Environmental mapper website

Top Five Natural Hazards Priority Areas

1. Potential for Thunderstorms

There is a historical record of high wind events and storm events in and near Texas Township. Severe winds or straight-line winds that sometimes occur during severe thunderstorms can be very damaging to a community. Severe winds have the potential to cause loss of life from property damage and flying debris. Damage from straight line winds is more widespread than tornadoes and usually affects multiple counties. There is also risk of infrastructure damage from downed power lines from falling trees and limbs.

2. Potential for Tornadoes

Tornadoes are medium-profile hazards that can cause catastrophic damage to a limited or extensive area. There has been damage due to tornadoes in the area, and there is concern regarding the potential damage to utility facilities and other damage.

3. Potential for Flooding

Flooding is a high-profile hazard that can cause substantial damage to residents of Texas Township. There is minimal history of stream flooding. Lakes have flooded when the water table rises due to much higher than

normal rainfall. This occurred most significantly in 1953 and more recently from 2017 (to present). There is major concern regarding the risks to human safety, utility facilities and other damage including to many residential structures.

There has been no indicator of lake levels for historical events, but flooding details have been documented since approximately August 2018. As of November 2019, there were 16 homes abandoned due to the flooding that occurred from the lake levels. Figures showing the lake levels are provided in Appendix D. These show that lakes with outlets (E.g. Bass Lake) are not experiencing high water levels, while lakes without outlets are flooded significantly (e.g. Crooked Lake and Eagle Lake). These figures show the impact of short-term mitigation (pumping from Crooked Lake and Eagle Lake) toward Bass Lake, and provide proof that a long term mitigation project of providing an outlet in Crooked lake and Eagle lake, will result in a significant reduced risk to the health and human safety of the residence.

The Township is a member of the NFIP and has remained in compliance with NFIP regulations. It is also important to note that there are NO repetitive loss structures in Texas Township, according to the newest FEMA/NFIP list from December 5, 2019. There are 103 policies enforced in Texas Township.

4. Potential for Winter Weather

The Township experiences frequent heavy snow events due to its location in Michigan and near Lake Michigan. However, it is considered a medium-profile hazard due to community awareness and the lack of associated damages. Heavy snow events have the potential to shut down businesses for periods of time. Blowing and drifting snow with blizzard conditions cause driving hazards.

5. Potential for Drought

The Township could experience drought events that could be a concern at the wellhead protection areas. However, it is considered a low-profile hazard due to the lack of documented historical events.

Emergency Warning System Coverage

There are no sirens located in Texas Township. Warnings for emergencies are communicated via County emergency warning systems. The County initiates the warning for tornadoes and is used each time the Township Fire Department is dispatched. The County would also initiate (per the warning section of the County Emergency Plan) public notification via their emergency response plan (e.g. EAS alerts over TV/Radio/NOAA Weather Radio; door-to-door, and telephonic contact for warning). The Township does not employ its own independent police service, it contracts within the Kalamazoo County Sheriff for their police/public safety and emergency response programs.

Economic Impact Analysis

The total Damaging Events’ Costs recorded since 1950 with the National Oceanic and Atmospheric Administration for Texas Township are as follows:

Table 20: Damage Cost by Natural Hazard

Texas Township	Known Property Damage Cost
Flood	\$16,000,000
Hail	\$35,000
Winter Weather	\$100,000
Tornado	\$ 29,273,000
Thunderstorm	\$1,412,000

VIII. NATURAL HAZARDS MITIGATION GOALS AND OBJECTIVES

The mission of the Texas Township Natural Hazards Mitigation Plan is to protect the health and safety of the public and property in the Township, which includes prevention of injury, loss of life, property damage, breakdown in vital services like transportation and infrastructure, economic slumps, and liability issues. This is done by acting to permanently eliminate or reduce the long-term risks from natural hazards.

Specific goals and objectives have been established based upon the community's natural hazards analysis, as well as input from the LPT participants and the public through meetings and the posting of the draft plan on the Township website.

Goal 1: Utilize available resources and apply for additional funding for natural hazard mitigation projects.

- Encourage public and private organizations to participate in education and planning
- Provide a list of desired community mitigation measures to the State for possible future funding
- Encourage the application for project funding from diverse entities

Goal 2: Integrate natural hazard mitigation considerations into the community's comprehensive planning process.

- Encourage cooperation and communication between planning and emergency management officials
- Encourage participation in natural hazard mitigation projects not funded by other organizations

Goal 3: Provide disaster planning and mitigation resources to appropriate elements of Texas Township

- Integrate natural hazards mitigation into the capital improvement planning process so that public infrastructure does not lead to development in natural hazards areas
- Encourage township and associated county agencies to review local roads, bridges, and related transportation infrastructure for natural hazards vulnerability

Goal 4: Increase awareness and participation in natural hazard mitigation strategies.

- Participate in the natural hazards mitigation education and planning for all segments of Township
- Enforce and/or incorporate natural hazards mitigation provisions in building code standards, ordinances, and procedures; and into the associated Kalamazoo county comprehensive master plan

IX. IDENTIFICATION AND SELECTION OF MITIGATION STRATEGIES

Selection of Feasible Mitigation Strategies

A set of evaluation criteria was developed to determine which mitigation strategies were best suited to address the identified problems in Texas Township.

- The measure must be technically feasible.
- The measure must be financially feasible.
- The measure must be environmentally sound and not cause any permanent, significant environmental concerns.
- The measure must be acceptable to those participating in the strategy and/or primarily impacted by the strategy.

By anticipating future problems, the Township can reduce potential injury, structure losses, loss of power such as electric and gas, and prevent wasteful public and private expenditures.

Priority 1. Potential of Severe Thunderstorms

- Organize outreach to isolated, vulnerable, or special-needs populations.
- Encourage residents to develop a Family Disaster Plan that includes the preparation of a Disaster Supplies Kit.
- Install backup power generators at key facilities within the Township.
- Completion of Site Emergency Plans for schools, factories, office buildings, shopping malls, long-term care facilities, stadiums, recreation areas, and other appropriate sites.
- Develop awareness for site emergency plans for schools, factories, office buildings, shopping malls, long-term care facilities, stadiums, recreation areas, and other appropriate sites.
- Enhance awareness and participation in emergency planning activities, including civil disturbance, WMD-related, and threat/risk assessment, planning, and analysis activities.
- Review and Establish Design requirements for schools, factories, office buildings, shopping malls, long-term care facilities, stadiums, recreation areas, etc. that take into consideration emergency and security needs
- Provide NOAA Weather Radios (which can also provide notification to the community during any period of emergency, including enemy attack).
- Provide emergency information to residents and guests who speak English as a second language.
- Support County and encourage use of ITS (Intelligent Transportation Systems) Technology for public warning and emergency information purposes.
- Participate in the Michigan Citizen Corps Council (MCCC) for the purpose of providing informed observers and links to law enforcement.

Priority 2. Potential of Extreme Winter weather, Floods or Tornadoes

- Investigate Best Practices for Protecting Critical Infrastructures
- Construct a long-term permanent solution to lake flooding to ensure that flooding of structures no longer occurs on a periodic basis. One proposed solution includes the construction of a weir overflow outlet from Crooked Lake with a gravity pipe discharging into the adjacent wetland and overland flow ultimately to Bass Lake (which has a positive outlet). In addition, the project would include construction of a weir overflow outlet from Eagle Lake with gravity piping into Crooked Lake. The outlets will allow flow to pass downstream when levels exceed normal.
- Enhance awareness and participation in stream and lake flooding emergency planning activities of the Township.
- Enforce basic building code requirements related to flood mitigation.
- Educate residents on available heating centers/shelters for vulnerable populations.
- Support County implementation plans for Floodplain Management and Protection of wetlands.
- Enhance awareness and participation in general winter weather emergency planning activities of the Township.
- Improve design, routing, and traffic control at problem roadway areas.
- Educate on take-cover locations for manufactured housing communities.
- Promote awareness of the benefits of obtaining flood insurance.

- Encourage the anchoring of vulnerable mobile homes to a secure foundation (to lessen damages from winds, tornadoes, and floods).
- Promote an annual "Emergency Evacuation Day" for testing/evaluating site emergency plans for schools, factories, office buildings, shopping malls, long-term care facilities, stadiums, recreation areas, and other appropriate sites.
- Support County approaches for using low-power AM radio broadcasts (e.g. "Highway Advisory Radios") for the purpose of transmitting localized emergency management information
- Enhance awareness of livestock and pet needs/problems during severe weather

Priority 3. Drought

- Promote awareness and protection of the Wellhead Protection Area. For example, Texas Township residents are involved with Groundwater Guardian which supports protection of groundwater resources in the Kalamazoo Area.

The following tables represent the evaluation for alternative mitigation strategies:

Table 21: Benefit to Cost Analysis

Priority Area 1											
Actions	Criteria	Social	Technical	Admin	Political	Legal	Economic	Env	Sub-total of cost/benefit	Total Score	Priority
Organize outreach to isolated, vulnerable, or special-needs populations.	Cost	0	-1	-1	0	0	0	0	-2	2	Medium
	Benefit	2	0	0	2	0	0	0	4		
Encourage residents to develop a Family Disaster Plan that includes the preparation of a Disaster Supplies Kit.	Cost	0	-1	0	0	0	0	0	-1	2	Medium
	Benefit	1	0	0	2	0	0	0	3		
Install backup power generators at key facilities within the Township.	Cost	0	-1	0	0	0	0	0	-1	3	High
	Benefit	0	2	0	1	0	1	0	4		
Promote Completion of Site Emergency Plans for schools, factories, office buildings, shopping malls, long-term care facilities, stadiums, recreation areas, and other appropriate sites.	Cost	0	-1	-1	0	0	0	0	-2	2	Medium
	Benefit	0	1	2	0	1	0	0	4		
Promote awareness for developing site emergency plans for schools, factories, office buildings, shopping malls, long-term care facilities, stadiums, recreation areas, and other appropriate sites.	Cost	0	-1	0	0	0	0	0	-1	2	Medium
	Benefit	1	0	0	1	1	0	0	3		

Priority Area 1 (continued)											
Actions	Criteria	Social	Technical	Admin	Political	Legal	Economic	Env	Sub-total of cost/benefit	Total Score	Priority
Enhance awareness and participation in emergency planning activities, including civil disturbance, WMD-related, and threat/risk assessment, planning, and analysis activities.	Cost	0	-1	0	0	0	0	0	-1	2	Medium
	Benefit	1	1	1	0	0	0	0	3		
Review and Establish Design requirements for schools, factories, office buildings, shopping malls and long-term care facilities ensuring they are adequately designed to withstand earthquake tremors.	Cost	0	-1	-1	0	0	0	0	-2	2	Medium
	Benefit	2	0	0	0	1	0	1	4		
Encourage use of NOAA Weather Radio (which can also provide notification to the community during any period of emergency, including enemy attack).	Cost	0	0	-1	0	0	0	0	-1	2	Medium
	Benefit	2	1	0	0	0	0	0	3		
Provide emergency information to residents and guests who speak English as a second language.	Cost	-1	-1	-1	0	0	0	0	-3	2	Medium
	Benefit	2	0	0	2	1	0	0	5		
Support County and encourage use of ITS (Intelligent Transportation Systems) Technology for public warning and emergency information purposes.	Cost	0	-1	0	0	0	0	0	-1	2	Medium
	Benefit	1	1	1	0	0	0	0	3		
Promote participation in the Michigan Citizen Corps Council (MCCC) for the purpose of providing informed observers and links to law enforcement.	Cost	0	-1	-1	0	0	0	0	-2	1	Low
	Benefit	1	0	0	0	2	0	0	3		

Priority Area 2											
Actions	Criteria	Social	Technical	Admin	Political	Legal	Economic	Environmental	Sub-total of cost/benefit	Total Score	Priority
Enhance awareness and participation in riverine and lake flooding emergency planning activities of the Township as well as mitigation projects.	Cost	0	-1	-1	0	0	0	0	-2	3	High
	Benefit	1	0	2	1	0	1	0	5		
Construct a long-term permanent solution to lake flooding. One proposed solution includes the construction of an outlet from Crooked Lake with a gravity pipe discharging into the adjacent wetland and overland flow ultimately to Bass Lake. In addition, the project would include construction of an outlet from Eagle Lake with gravity piping into Crooked Lake.	Cost	0	0	0	0	0	-1	0	-1	3	High
	Benefit	1	0	0	1	1	0	1	4		
Investigate Best Practices for Protecting Critical Infrastructures	Cost	0	0	-1	0	0	0	0	-1	3	High
	Benefit	0	1	1	0	0	2	0	4		
Promote basic building code requirements related to flood mitigation.	Cost	0	0	0	0	-1	0	0	-1	2	Medium
	Benefit	0	1	0	1	0	1	0	3		
Educate residents on available heating centers/shelters for vulnerable populations.	Cost	0	0	-1	0	-1	0	0	-2	3	High
	Benefit	2	0	0	2	0	1	0	5		
Support County implement plans for Floodplain Management and Protection of wetlands.	Cost	0	-1	0	0	0	0	0	-1	2	Medium
	Benefit	0	0	1	0	0	0	2	3		

Priority Area 2 (continued)											
Actions	Criteria	Social	Technical	Admin	Political	Legal	Economic	Environmental	Sub-total of cost/benefit	Total Score	Priority
Enhance awareness and participation in general winter weather emergency planning activities of the Township.	Cost	0	-1	0	0	0	0	0	-1	2	Medium
	Benefit	1	0	2	0	0	0	0	3		
Improve design, routing, and traffic control at problem roadway areas.	Cost	0	-1	0	0	0	0	0	-1	2	Medium
	Benefit	1	0	0	1	0	1	0	3		
Educate on take-cover locations for manufactured housing communities.	Cost	0	-1	0	-1	0	-1	0	-3	2	Medium
	Benefit	2	0	2	1	0	0	0	5		
Promote awareness of the benefits of obtaining flood insurance.	Cost	0	0	0	0	0	0	0	0	2	Medium
	Benefit	1	0	1	0	0	0	0	2		
Priority Area 2 (continued)											
Actions	Criteria	Social	Technical	Admin	Political	Legal	Economic	Environmental	Sub-total of cost/benefit	Total Score	Priority
Encourage and implement the anchoring of vulnerable mobile homes to a secure foundation (to lessen damages from winds, tornadoes, and floods).	Cost	0	-1	-1	0	0	0	0	-2	2	Medium
	Benefit	1	0	0	1	1	1	0	4		

Promote an annual "Emergency Evacuation Day" for testing/evaluating site emergency plans for schools, factories, office buildings, shopping malls, long-term care facilities, stadiums, recreation areas, and other appropriate sites.	Cost	0	-1	-1	0	0	0	0	-2	2	Medium
	Benefit	2	1	1	0	0	0	0	4		
Enhance awareness livestock and pet needs/problems during severe weather	Cost	0	-1	-1	0	0	0	0	-2	1	Low
	Benefit	1	0	0	1	1	0	0	3		
Support County approaches for using low-power AM radio broadcasts (e.g. "Highway Advisory Radios") for the purpose of transmitting localized emergency management information	Cost	0	-1	0	0	0	0	0	-1	2	Medium
	Benefit	1	0	1	1	0	0	0	3		

Priority Area 3											
Actions	Criteria	Social	Technical	Admin	Political	Legal	Economic	Environmental	Sub-total of cost/benefit	Total Score	Priority
Enhance Awareness and Participation in Wildfire Emergency Planning Activities of the Township in coordination with Kalamazoo County.	Cost	-3	-1	-1	0	0	-1	0	-5	2	Medium
	Benefit	0	0	0	0	1	2	0	3		
Promote awareness and protection of the Wellhead Protection Area	Cost	0	0	0	0	0	0	0	0	3	High
	Benefit	0	0	1	0	0	0	2	3		

Table 22: Priority Areas for Texas Township

Natural Hazards Mitigation Priority Areas
Priority Area 1: Potential of severe thunderstorms Mitigation Strategies: Thunderstorms
Priority Area 2: Potential high groundwater with no outlet, high vulnerability of flooding during such times Mitigation Strategies: Flooding due to high Groundwater
Priority Area 3: Potential of tornadoes Mitigation Strategies: Tornadoes
Priority Area 4: Potential of severe winter weather with snow and ice hazards Mitigation Strategies: Winter Weather

Table 23: Mitigation Strategies for Texas Township

Natural Hazard	Mitigation Strategies
Thunderstorms	
	<ul style="list-style-type: none"> • Pursue the opportunity for grants for mitigation of storm impacts • Promote emergency planning for the residents, as well as schools, factories, etc • Public education for trailer, mobile, and modular homes to ensure safety. • Evaluate emergency warning alternatives and needs
Tornadoes	
	<ul style="list-style-type: none"> • Pursue the opportunity for grants for mitigation of storm impacts • Promote emergency planning for the residents, as well as schools, factories, etc • Public education for trailer, mobile, and modular homes to ensure safety. • Evaluate emergency warning alternatives and needs
Winter Weather	
	<ul style="list-style-type: none"> • Educate vulnerable residents regarding about County-wide available shelters. • Public education regarding preparing for winter weather. • Consider transportation impacts during winter weather and potential mitigation
Flooding	
	<ul style="list-style-type: none"> • Pursue the opportunity for grants for flood mitigation projects • Complete mitigation projects to reduce the risk and vulnerability to flooding • Continue enforcement of building code requirements related to flooding during the permitting process • Education regarding the NFIP and encouragement to obtain flood insurance
Drought/Wildfire	
	<ul style="list-style-type: none"> • Maintain wellhead protection program including public education and public volunteer organizations such as Groundwater Guardian • Enhance Awareness and Participation in Wildfire Emergency Planning Activities of the Township in coordination with Kalamazoo County.
Earthquakes	
	<ul style="list-style-type: none"> • Review and Establish Design requirements for schools, factories, office buildings, shopping malls and long-term care facilities ensuring they are adequately designed to withstand earthquake tremors.

X. PARTICIPATION IN THE DEVELOPMENT OF THE TEXAS TOWNSHIP NATURAL HAZARDS MITIGATION PLAN

The opportunities for public review and comment as well as review by other governmental entities took place in the month of December 2019 and through January 10, 2020. In addition to having the opportunity to attend the LPT meetings as described below, the public also had the opportunity to review and comment on the DRAFT plan prior to the adoption process online at the Texas Township Website and/or in the Township newsletter.

- The Natural Hazards Mitigation Plan was presented to the Texas Township Board of Trustees, where the meetings are highlighted in the weekly newsletter, posted in the newspaper, and are open to the public. Board meetings were held on December 2nd and December 16th, 2019 at the Township Hall and are open to the public. The Township Board, Engineer and Superintendent, among others, received comment at these meetings.
- During development of the plan, the public was provided the opportunity to formally comment on plan drafts and other related materials. They were given the opportunity via emails and draft copies of the plan for comment (the draft HMP was posted on the website on December 2, 2019 and updated with revisions on January 7, 2020). Notification via email and the Township newsletter was also provided to the public that the plans were posted on the Township website and could be reviewed there. The Township also invited neighboring communities to participate via word of mouth or email.
- Specific public meetings to receive public input on the draft HMP were held in the Township Hall on December 12, 2019 and January 8, 2020. The Township Board, Engineer and Superintendent, among others, received comments and addressed questions at these meetings.
- Feedback from the public meetings took the form of phone calls, emails and conversations that occurred at various mitigation and non-mitigation related meetings. The feedback focused primarily on the emphasis on flood mitigation for the lakes in the plan. This information was provided back to Township staff and engineer and used in development of the plan, including the risk assessment and community profile sections.

In general, community planning services are provided by the professional staff of the Texas Township Planning Department. The Department assists in developing plans and zoning ordinances, provides resource information and technical assistance, and convenes communities to address land use issues of common interest. The Texas Township Planning department coordinates and reviews local zoning and master plans to ensure consistency across jurisdictional boundaries. Building permits are issued by the Texas Township Building Department.

For the development of the Hazard Mitigation Plan, however, the Township Engineers Prein&Newhof led in the process and preparation of the HMP. The Texas Township Planning Department provided input, including many specifics in the community profile.

With help from the LPT, the action items were given a priority ranking by LPT. The list of priorities was sent out and it was asked that the action items be ranked in priority level for the township. With the responses an average of the priority ranking for each action item was assigned and sorted from high to low. This is the priority of actions that the LPT and those involved in the planning process found most pressing and of their highest priority. The action items listed on the following pages go along with the goals that follow:

- Goal 1: Utilize available resources and apply for additional funding for natural hazards mitigation projects**
- Goal 2: Integrate natural hazard mitigation considerations into the community's comprehensive planning process**
- Goal 3: Provide disaster planning and mitigation resources to appropriate elements of Texas Township.**
- Goal 4: Increase awareness and participation in natural hazard mitigation strategies**

Planning Process Details

The Hazard Mitigation Planning process requires open involvement of the community. In this case, the process was expedited to meet the deadline for application of a FEMA grant.

- Preliminary meetings were held with the Township Engineers, the Township Superintendent, Township Supervisor, Township Treasurer as the Board of Trustees prior to initiating the process. This informational meeting served to provide basic information for Board Approval of the project.
- The Township Board formally approved the project at a public meeting on November 4, 2019.
- The Local Planning Team (LPT) was developed with input from the Township Superintendent and Engineer on November 21, 2019. The Township Superintendent communicated the invitation to LPT members via email and verbally. The invitation email is provided in Appendix C along with other communications.
- The LPT was emailed a list of potential Goals, Objectives and Action Items developed by the Township Engineer on November 22, 2019 to stimulate thinking about what might be included in the plan. This information was developed following reviews of Hazard Mitigation Plans for the County and other nearby government entities.
- From November 22 through 25, 2019, LPT members emailed priority ratings for various activities provided in the November 22, 2019 email as well as suggestions.
- The LPT held a meeting at Texas Township Hall on November 26, 2019. The committee reviewed and discussed the process, the schedule, the goals, objectives, activities and actions.
- The Risk Analysis was completed by the Township Engineer on November 27, 2019. The results were emailed to the LPT for review and comment on November 27, 2019.
- The Benefit Cost Analysis was completed by the Township Engineer on November 29, 2019. The results were emailed to the LPT for review and comment on November 29, 2019.
- With all comments incorporated as necessary, a draft Hazard Mitigation Plan was compiled by the Township Engineer emailed to LPT members on December 2, 2019 for review and comment.
- Comments were gathered from LPT members on December 3, 2019 and incorporated as appropriate by the Township Engineer and Project Lead.
- The Draft Hazard Mitigation Plan was posted on the Township website for public review and comment from December 3, 2019 through January 3, 2020. The Township communicated to local residents, including neighboring community officials and residents, via email and the website the draft plan availability as well as the public meeting to be held on December 12, 2019.
- A public meeting was held on December 12, 2019 to obtain comments and answer questions regarding the draft Hazard Mitigation Plan. The email communications are attached.
- With membership of the LPT, public posting of the draft plan, the public meeting, and communications, opportunity for input from various entities was provided throughout the process. These entities include local and County agencies involved in hazard mitigation activities, agencies that have the authority to regulate development, as well as business, academia (KVCC) and other private and non-profit interests.
- Comments from the public on the draft plan were added to the plan and integrated where appropriate on December 19th, 2019. There were not a significant number of comments on the plan – see meeting minutes attached.
- The State Hazard Mitigation Planner provided comments on January 2nd and 3rd, 2020 and these were incorporated in the plan.
- A revised Hazard Mitigation Plan was posted on the Township website for public review and comment from January 7 through 13, 2020. The Township communicated to local residents, including neighboring community officials and residents, via email and the website this draft plan availability as well as the public meeting held on January 8, 2020.
- The second public meeting was held on January 8, 2020 to obtain comments and answer questions regarding the draft Hazard Mitigation Plan. The email communications are attached.
- Comments from the public on the revised draft plan were added to the plan and integrated where appropriate on January 10th, 2020. There were not a significant number of comments on the plan – see meeting minutes attached.
- Report was resubmitted to the State Hazard mitigation Planner for submittal to FEMA on January 10th, 2020.

The Local Planning Team (LPT) provided oversight, with authority over the planning process as well as providing input on areas of expertise. In addition, the (LPT) was developed to provide a wide array of perspectives ranging from the Township officials to County and State agencies. Furthermore, Texas Township only represents a single jurisdiction. LPT members and other contributors were actively involved in the following ways:

- Attending the HMP meetings
- Review and provide feedback on emails and other materials provided.
- Providing available GIS data

- Identifying and Profiling Hazards
- Development/Review of the Risk Assessment
- Reviewing and providing comments on the draft plans
- Development/Review of mitigation goals and strategies
- Development/Review of activities
- Coordination and participation in the public input process
- Attend and participate in Public Meetings
- Review and provide comments on the draft plans
- Coordinating the formal adoption of the plan by Texas Township

Table 4 below lists the members of the Local Planning Team and their affiliations. The team was identified by the Township Superintendent, Township Board, Township Engineer and Planning Lead to ensure appropriate coverage was provided including public representation, Township Leadership and Hazard Mitigation/Emergency Response personnel, County Leadership and Hazard Mitigation/Emergency Response personnel, and State Hazard Mitigation/Emergency Response personnel.

Table 24: Members of Local Planning Team

Members of Local Planning Team		
Name, Last	Name, First	Affiliation
Baker	James	City of Kalamazoo Public Services
VanBelle	Jeff	Kalamazoo County Drain Commissioner
Bartholomew	Travis	Kalamazoo County Road Commission Director
Rogers	Julie	Kalamazoo County Commissioner
Morse	Christine	Kalamazoo County Commissioner
Corfman	Michael	Kalamazoo County Emergency Mgmt Division
Alspach	Andrew	Kalamazoo County Emergency Mgmt Division
Rutherford	James	Kalamazoo County Health Department
Buckham	Kathy	Kalamazoo County Planning Commission
Fuller	Richard	Kalamazoo County Sheriff
Collins	Michael	Kalamazoo Valley Community College
Bayha	John	EGLE Floodplain Engineer
Ganton	Scott	Ganton Senior Communities–Business Owner
Moyle	Dan	Resident
McGrew	Richard	Township Building Inspector
Kerr	Linda	Township Clerk
Wheat	Tom	Township Engineer
Banas	Tony	Township Fire Captain
Tackett	Chad	Township Fire Chief
VanderWiere	Julie	Township Superintendent
Deisler	Steve	Township Planner
Hinkle	John	Township Supervisor
Roberts	Trish	Township Treasurer
Boven	Don	Township Trustee
Brown	Tim	Township Trustee
Loeks	Nick	Township Trustee
Mazer	Wendy	Township Trustee
Smith	Tom	Planning Process lead: Prein & Newhof

Note: Neighboring communities including the Antwerp Township, Kalamazoo Township, Village of Mattawan, Oshtemo Township, City of Portage, Portage Township, Prairie Ronde Township, Schoolcraft Township, among others, were not included on the LPT but were invited to participate in public meetings and provide comment on the posted draft HMP.

XI. IMPLEMENTATION OF THE TEXAS TOWNSHIP NATURAL HAZARDS MITIGATION PLAN

Natural Hazards Mitigation Plan Managers and Technical Assistance

The leader for implementing the Natural Hazards Mitigation Plan is the Texas Township Board of Trustees. Working partnerships can be established with the following to provide technical assistance to accomplish the goals and objectives of the Plan.

- Kalamazoo County Government
- Kalamazoo County Drain Commissioner
- Kalamazoo County Road Commission
- Environment, Great Lakes and Energy (EGLE)
- Michigan Department of Natural Resources
- Neighboring Townships, cities, and villages
- U.S. Environmental Protection Agency
- U.S. Department of Agriculture Natural Resources Conservation Service
- American Red Cross
- Insurance Companies
- Real Estate Companies
- Natural Gas and Electric Companies
- Pipeline Companies
- Fiber Optic and Broadband Cable Companies

Funding the Implementation of the Plan

To assist with the funding of the proposed natural hazards mitigation strategies, here is a list of potential financial assistance entities to help fund the implementation of projects in the Plan.

- Federal Emergency Management Administration – Hazard Mitigation Grant Program
- U.S. Environmental Protection Agency
- U.S. Department of Agriculture Natural Resources Conservation Service
- U.S. Department of Agriculture Rural Development: Rural broadband opportunity – high speed telecommunication funding from the Public Telecommunications Facilities
- Planning and Construction grants
- U.S. Department of Housing and Urban Development
- Environment, Great Lakes and Energy (EGLE)
- Michigan Department of Natural Resources
- National Oceanic and Atmospheric Administration
- Community/Regional Foundations

Action Agenda

Following is summary for accomplishing the recommended natural hazards mitigation actions for Texas Township.

1. Obtain and install backup power generators at key facilities within the Township.

- Deliverables: 1) Investigate opportunities for installing generators at key facilities such as water pumping stations, lift stations, cell phone facilities, medical care facilities, and. Current generators may be undersized. 2) Identify costs involved. 3) Obtain funding, as needed and available. 4) Install generators at key selected locations, when possible. 5) Some generators may be able to be shared between more than one facility when these are located near each other.
- Assign Lead Manager: Township Engineer
- Schedule to Initiate Action: 2020
- Potential Sources for Technical Information: Fire Department; RCKC; KCDC; MSP
- Potential Sources of Financial Assistance: FEMA; MSP
- Priority: High
- Goal: 1

2. **Enhance awareness and participation in stream and lake flooding emergency activities of the Township**
 - Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations and/or Mitigation Strategies developed or disseminated by participating representatives.
 - Assign Lead Manager: Township Superintendent
 - Schedule to Initiate Action: 2020-21
 - Priority: High
 - Goal: 1

3. **Construct Outlet from Eagle Lake and Crooked Lake to Mitigate Lake Flooding**
 - Deliverable: 1) Obtain funding to construct an outlet from Crooked Lake and from Eagle Lake. 2) Determine a proper lake level for Eagle Lake and Crooked Lake 3) Construction of positive outlets from Eagle Lake and Crooked Lake 4) Maintain Outlets from Eagle Lake and from Crooked Lake
 - Lead Manager Assigned: Township Engineer
 - Schedule to Initiate Action: 2020-21
 - Potential Sources of Technical Assistance: Kalamazoo County Drain Commissioner
 - Potential Sources of Financial Assistance: FEMA; Kalamazoo County, Impacted Property Owners
 - Priority: High
 - Goal: 1

4. **Provide NOAA Weather Radios.**
 - Deliverable: 1) Obtain funding to purchase weather radios for vulnerable facilities such as schools and nursing homes, as well as potentially for residents. 2) Encourage residents to follow WWF34 NOAA weather radio coverage 3) provide the ability to use the local Weather Radio transmitter for emergency broadcasts 4) assist County with dissemination of instructions and public awareness of the existence and use of the WWF34 NOAA broadcasting of weather data.
 - Lead Manager Assigned: Township Fire Department
 - Schedule to Initiate Action: 2020
 - Potential Sources of Technical Assistance: Kalamazoo Amateur Radio Club (providers of WWF34); Red Cross; MSU Extension; KCDC
 - Potential Sources of Financial Assistance: FEMA; Red Cross
 - Priority: High
 - Goal: 1

5. **Encourage the anchoring of vulnerable mobile homes to a secure foundation (to lessen damages from winds, tornadoes, and floods).**
 - Deliverables: 1) Provide educational opportunities (meetings and educational materials) to the manufactured home community regarding successful anchoring of mobile homes, and/or the promotion of the concept to encourage relevant owners, inhabitants, and managers to engage in anchoring activities. 2) Obtain funding, as needed and available 3) Secure manufactured homes to foundations.
 - Target Audience: Code officials, building officials, building inspectors, mobile home residents, mobile home park owners/operators, the insurance industry, etc.
 - Lead Manager Assigned: Township Building Department
 - Scheduled to Initiate: 2022
 - Proposed Sources of Technical Assistance: KCDC; Broadcast Media; WMU; OEM
 - Potential Sources of Financial Assistance: FEMA, Local and private funds
 - Priority: Medium
 - Goal: 2

6. **Organize outreach to isolated, vulnerable, or special-needs populations.**
 - Deliverables: Investigation and tabulation of priority needs populations; recommendations for action.
 - Assign Lead Manager: Township Superintendent
 - Scheduled to Initiate: 2021
 - Potential Sources of Technical Assistance: FEMA; Red Cross
 - Potential Sources of Financial Assistance: FEMA; Red Cross;
 - Priority: High
 - Goal: 3

7. **Encourage residents to develop a Family Disaster Plan that includes the preparation of a Disaster Supplies Kit.**
 - Deliverables: Help disseminate the Homeland Security messages for it. Establish a presence for it on the Web. Establish discussion group - with process to monitor and evaluate for encouraging discussion and obtaining information.
 - Assign Lead Manager: Township Fire Department
 - Scheduled to Initiate Action: 2022
 - Potential Sources of Technical Assistance: Office of Homeland Security
 - Potential Sources of Financial Assistance: Office of Homeland Security; FEMA
 - Priority: High
 - Goal: 4

8. **Promote Completion of Site Emergency Plans for schools, factories, office buildings, shopping malls, long-term care facilities, stadiums, recreation areas, and other appropriate sites.**
 - Deliverables: Establish a consortium of public citizenry (MCCC, KCDC, etc.) to obtain, review, and report best practices relating to emergency plans, mitigation activities, and success stories.
 - Assign Lead Manager: Township Fire Department
 - Schedule to Initiate Action: 2021
 - Potential Sources of Technical Assistance: KCDC; FEMA; Office of Homeland Security; Insurance Industry
 - Priority: High
 - Goal: 4

9. **Enhance awareness and participation in emergency planning activities of the KCDC, including civil disturbance, WMD-related, and threat/risk assessment, planning, and analysis activities.**
 - Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item. 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC. 4) Regular analysis and recommendations regarding WMD-related threats/activity. 5) Inclusion of risk and threat assessment information within continuity of operations plan. 6) Continue to participate in annual MSP reviews. 7) Include in COOP plans.
 - Lead Manager Assigned: Township Superintendent
 - Priority: High
 - Goal: 4

10. **Review and Establish Design requirements for schools, factories, office buildings, shopping malls and long-term care facilities ensuring they are adequately designed to withstand earthquake tremors.**
 - Deliverables: Establishment of Best Practices for Building Emergency and Security Needs as well as a set of construction standards.
 - Assign Lead Manager: Planning Department
 - Schedule to Initiate Action: 2020
 - Potential Sources of Technical Assistance: WMU; KCDC; Building Inspectors; Planning Dpts; Industry
 - Potential Sources of Financial Assistance: FEMA; Office of Homeland Security;
 - Priority: Medium

- Goal: 3
11. **Provide emergency information to residents and guests who speak English as a second language.**
 - Deliverables: Advertising/Educating of its availability; Partnering with selected radio and TV stations; Interpretation services for partnering stations; Procedures on how to broadcast such messages.
 - Lead Manager Assigned: Township Staff
 - Scheduled to Initiate: 2021
 - Potential Sources of Financial Assistance: Office of Homeland Security, Local donations
 - Priority: High
 - Goal: 2

 12. **Support County and encourage the use of ITS (Intelligent Transportation Systems) Technology for public warning and emergency information purposes.**
 - Deliverables: 1) Investigate opportunities for coordination with MDOT, 2) Installation of actual ITS devices, 3) Identify all involved costs and potential liabilities 4) Evaluate, select, and implement options, as coordination and resources allow, 5) Participate in KCDC planning, drills, and evaluation
 - Lead Manager Assigned: Kalamazoo County Road Commission
 - Schedule to Initiate Action: 2020
 - Potential Sources for Technical Information: MDOT; KCRC; Police Departments; MSP; KCDC
 - Potential Sources of Financial Assistance: MDOT; MSP
 - Priority: High
 - Goal: 2

 13. **Investigate Best Practices for Protecting Critical Infrastructures**
 - Deliverables: Analysis and recommendations for protecting Critical Infrastructures within Texas Township
 - Assign Lead Manager: Township Engineer
 - Schedule to Initiate Action: 2023
 - Potential Sources of Technical Assistance: Michigan Quality Council; KCDC; WMU; CIAO; NIPC
 - Potential Sources of Financial Assistance:
 - Priority: Medium
 - Goal: 3

 14. **Promote basic building code requirements related to flood mitigation.**
 - Deliverables: 1) Develop benchmark building code requirements 2) Develop recommendations for comprehensive planning, code enforcement, zoning, open space requirements, subdivision regulations, land use and capital improvements planning.
 - Assign Lead Manager Assigned: Building Officials
 - Scheduled to Initiate: 2022
 - Potential Sources of Technical Assistance: NFIP
 - Potential Sources of Financial Assistance: Township
 - Priority: Medium
 - Goal: 4

 15. **Educate residents on available heating centers/shelters for vulnerable populations.**
 - Deliverables: Establish and publish a list of available shelters.
 - NOTE: This task ties in with the need for backup power generators at the shelter facilities.
 - Assign Lead Manager: Township Staff
 - Schedule to Initiate Action: 2021
 - Potential Sources of Technical Assistance: MSU Extension; FEMA; Red Cross
 - Potential Sources of Financial Assistance: Red Cross;
 - Priority: Medium
 - Goal: 4

- 16. Enhance awareness and participation in general winter weather emergency planning activities of the Township.**
- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
 - Lead Manager Assigned: Township Superintendent, KCRC, Sherriff's department
 - Schedule to Initiate Action: 2020
 - Priority: Medium
 - Goal: 4
- 17. Improve design, routing, and traffic control at problem roadway areas.**
- Deliverables: 1) Investigate opportunities for improved traffic control 2) Identify costs 3) Identify liabilities
 - Lead Manager Assigned: KCRC
 - Schedule to Initiate Action: 2023
 - Potential Sources for Technical Information: MDOT; KCRC; Police Departments; MSP; KCDC
 - Potential Sources of Financial Assistance: MDOT; MSP
 - Priority: Medium
 - Goal: 2
- 18. Educate on take-cover locations for manufactured housing communities.**
- Deliverables: 1) Identify take-cover/shelter options for the manufactured housing community such as Kalamazoo Valley Community College or community centers in case of a tornado. 2) Provide education opportunities to the manufactured housing community.
 - Lead Manager Assigned: Township Superintendent
 - Scheduled to Initiate: 2021
 - Proposed Sources of Technical Assistance: KCDC; KARC; WMU; MSU Extension
 - Proposed Sources for Financial Assistance: FEMA; Office of Homeland Security; Local In-Kind contributions
 - Priority: Medium
 - Goal: 4
- 19. Promote awareness of the benefits of obtaining flood insurance.**
- Deliverables: Established mechanisms to promote the use of flood insurance under the National Flood Insurance Program to residents in flood prone areas or areas with a history of flooding. Possible measurable: An increased the number of policies and participating communities.
 - Lead Manager Assigned: Township Staff
 - Scheduled to Initiate: 2022
 - Potential Sources of Technical Assistance: NFIP, MDEQ, FEMA
 - Potential Sources of Financial Assistance: County
 - Priority: Medium
 - Goal: 3
- 20. Promote an annual "Emergency Evacuation Day" for testing/evaluating site emergency plans for schools, factories, office buildings, shopping malls, long-term care facilities, stadiums, recreation areas, and other appropriate sites.**
- Deliverables: 1) Public awareness campaign to promote a day of testing in-place procedures by home, business, school, etc. 2) Raise awareness for facilities/homes that do not have a working emergency plan.

- Lead Manager Assigned: Township Fire Department
- Schedule to Initiate Action: 2020
- Potential Sources of Technical Assistance:
- Potential Sources of Financial Assistance: FEMA
- Priority: Medium
- Goal: 1

21. Enhance awareness livestock and pet needs/problems during severe weather.

- Deliverables: 1) Obtain best practices for animal/pet housing, emergency procedures, shelter, and care during storms, and rescue. 2) Coordinate with KC Animal Control Advisory Board 3) Dissemination of information to the community.
- Lead Manager Assigned: Extension Service
- Scheduled to Initiate: 2021
- Potential Sources of Technical Asst: KC Animal Control Adv Board, 4H; FEMA; Laboratory Animal Medicine and Science - Worldwide Safety Sciences, Pfizer; Veterinary House Calls of Grand Rapids⁹²; Red Cross
- Potential Sources of Financial Assistance: N/A
- Priority: Medium
- Goal: 3

22. Support County approaches for using low-power AM radio broadcasts (e.g. “Highway Advisory Radios”) for the purpose of transmitting localized emergency management information.

- Deliverables: 1) Consider educational opportunities 2) Install local signs that inform residents and travelers of the availability of such information on a radio station.
- Target Audience: All residents, businesses, travelers, and visitors.
- Lead Manager Assigned: Township Supervisor
- Scheduled to Initiate: 2021
- Priority: Medium
- Goal: 2

23. Promote awareness and protection of the Wellhead Protection Area

- Deliverables: 1) Monitor, map, and manage awareness and of proper groundwater use 2) Develop and administer programs for ensuring safe drinking water sources. 3) Actively participate in the Wellhead Protection Committee planning activities.
- Assign Lead Manager: Township Engineer, Township Planning Department
- Schedule to Initiate Action: 2020
- Potential Sources of Technical Assistance: EPA; KCDC
- Potential Sources of Financial Assistance:
- Priority: High
- Goal: 1

24. Enhance Awareness and Participation in Wildfire Emergency Planning Activities of the Township in coordination with Kalamazoo County.

- Deliverables: 1) Support and/or participate in cooperative efforts between Texas Township and Kalamazoo County towards the identification of hazards related to wildfires 2) Identify areas within Texas Township that are more likely to be vulnerable to wildfires. Maintain property in or near farm land.
- Lead Manager Assigned: Texas Township Fire Department
- Schedule to Initiate Action: 2020
- Priority: Medium
- Goal 3

XII. Monitoring and Evaluation, and Plan Maintenance

The Texas Township Natural Hazards Mitigation Plan will be reviewed and revised as needed by the Township governing authorities. Because Texas Township is a dynamic, changing township with potential population growth, it is expected that the plan should be reviewed on an annual basis.

To assess the effectiveness of the Plan, some questions that will be asked include:

- 1) How many and which mitigation strategies were developed? Implemented?
- 2) Did any new natural hazards events take place the past year to report?

This review would be administered by the Township Board of Trustees, Township Engineer, and the public. If changes are needed, the plan will be presented to the LPT participants for revisions. The Hazard Mitigation Plan will be maintained going forward as follows:

- Beginning in January of each year, the plan will be posted for review on the Township website for public comment for 1 month. Continued public involvement is critical to the successful implementation of the mitigation strategies.
- If changes are determined to be needed by the Board of Trustees, the Township Engineer shall review the LPT membership and determine whether contacts are no longer filling the same role. Replacements will be found as necessary.
- The plan will be emailed to the LPT for review and comment, and a meeting will be scheduled. The public will be notified of annual LPT review meetings through notices on the website.
- The Engineer shall compile comments in a separate document and edit the plan as necessary.
- Within 5 years, the Hazard Mitigation Plan shall be formally updated and formally adopted. Comments compiled on an annual basis will be included as appropriate.

Although review of the plan will occur annually, and a formal revision may not be needed each year, a new edition of the plan is expected within every five-year period. New additions of the plan will be based on annual reviews, monitoring, evaluation, and an accumulation of official feedback and public input. The revised plan will be posted online and publicized via email and social media, stressing the importance and need for the document. The public can review and comment on the document, and a public meeting will also be held to receive comments and ask questions. Each new edition of the plan will again be officially adopted by the Texas Township Board of Commissioners.

Throughout the five-year planning cycle, the Texas Township Supervisor and/or Engineer will reconvene the Local Planning Team to monitor, evaluate, and update the plan on an annual basis.

Additionally, a meeting will be held one year before the plan expires to address the five-year plan update. Members of the Planning Team are readily available to engage in email correspondence between annual meetings. If the need for a special meeting, due to new developments or a declared disaster occurs in the county, the team will meet to update mitigation strategies. Depending on grant opportunities and fiscal resources, mitigation projects may be implemented independently by individual communities or through local partnerships.

The committee will review the goals and objectives to determine their relevance to changing situations in the Township. In addition, state and federal policies will be reviewed to ensure they are addressing current and expected conditions. The committee will also review the risk assessment portion of the plan to determine if this information should be updated or modified. The parties responsible for the various implementation actions will report on the status of their projects, and will include which implementation processes worked well, any difficulties encountered, how coordination efforts are proceeding, and which strategies should be revised.

Updates or modifications to the Texas Township Multi-Hazard Mitigation Plan Update during the five-year planning process will require a public notice and a meeting prior to submitting revisions to the individual jurisdictions and or approval. The plan will be updated via written changes and submissions when the committee deems appropriate and necessary, and as approved by the Township Board.

The results of this plan will be incorporated into ongoing planning efforts, such as the 2020 Master Plan Update, and the 2020 Emergency Response Plan Update.

XIII. NATURAL HAZARDS MITIGATION PLAN ADOPTION RESOLUTION

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XIV. APPENDICES

Appendix A

Glossary of Mitigation Planning Terms

Alluvial fan: A gently sloping fan-shaped landform created over time by the deposition of eroded sediment and debris.

Base Flood: A flood having a one percent chance of being equaled or exceeded in any given year.

Coastal high hazard area: An area of special flood hazard extending from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high velocity wave action from storms.

Disaster: A major detrimental impact of a hazard upon the population and economic, social, and built environment of an affected area.

Exposure: The number, types, qualities, and monetary values of various types of property or infrastructure and life that may be subject to an undesirable or injurious hazard event.

Flood Insurance Rate Map: As defined under the National Flood Insurance Program, an official map of the community on which the administrator of the Flood Insurance Administration has delineated both the special flood hazard areas and the risk premium zones applicable to the community.

Floodplain or flood prone area: Any land area susceptible to being inundated by water from any source.

Floodplain management: The operation of an overall program of corrective and preventive measures for reducing flood damage, including but not limited to emergency preparedness plans, flood control works, and floodplain management regulations.

Fuel: Combustible plant material, both living and dead, that can burn in a wildland situation; any other flammable material in the built environment that feeds a wildfire.

Hazard: An event or physical condition that has the potential to cause fatalities, injuries, property damage, infrastructure damage, agricultural loss, damage to the environment, interruption of business, or other types of harm or loss.

Hazard identification: The process of defining and describing a hazard, including its physical characteristics, magnitude and severity, probability and frequency, causative factors, and locations or areas affected.

Hydric Soils: A soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic (a situation in which oxygen is absent from the environment) conditions in the upper part of the soil.

Lifeline systems: Public works and utilities such as electrical power, gas and liquid fuels, telecommunications, transportation, and water and sewer systems.

Major disaster: As defined in the Stafford Act, “any natural catastrophe or, regardless of cause, any fire, flood, or explosion in any part of the United States, which in the determination of the President causes damage of sufficient severity and magnitude to warrant major disaster assistance under this Act to supplement the efforts and available resources of states, local governments, and disaster relief organizations in alleviating the damage, loss, hardship, or suffering caused thereby.”

Mitigation: Sustained action taken to reduce or eliminate the long-term risk to human life and property from natural hazards and their effects. Note that this emphasis on long-term risk distinguishes mitigation from actions geared primarily to emergency preparedness and short-term recovery.

Multiple-objective management: A holistic approach to floodplain management (or the management of other hazards) that emphasizes the involvement of multiple distinct interest in solving land use problems related to the hazardous area.

Natural hazard: Hurricanes, tornadoes, storms, floods, tidal wave, tsunamis, high or wind-driven waters, volcanic eruptions, earthquakes, snowstorms, wildfires, droughts, landslides, and mudslides.

One hundred year flood: The flooding event that has a one percent chance of occurring in a particular location in any given year. While this is the most common reference point statistically because it is used for regulatory purposes in the National Flood Insurance Program, the same language applies in referring to other actual or hypothetical events in terms of their statistical probabilities.

Risk: The potential losses associated with a hazard, defined in terms of expected probability and frequency, exposure, and consequences.

Risk assessment: A process or method for evaluating risk associated with a specific hazard and defined in terms of probability and frequency of occurrence, magnitude and severity, exposure, and consequences.

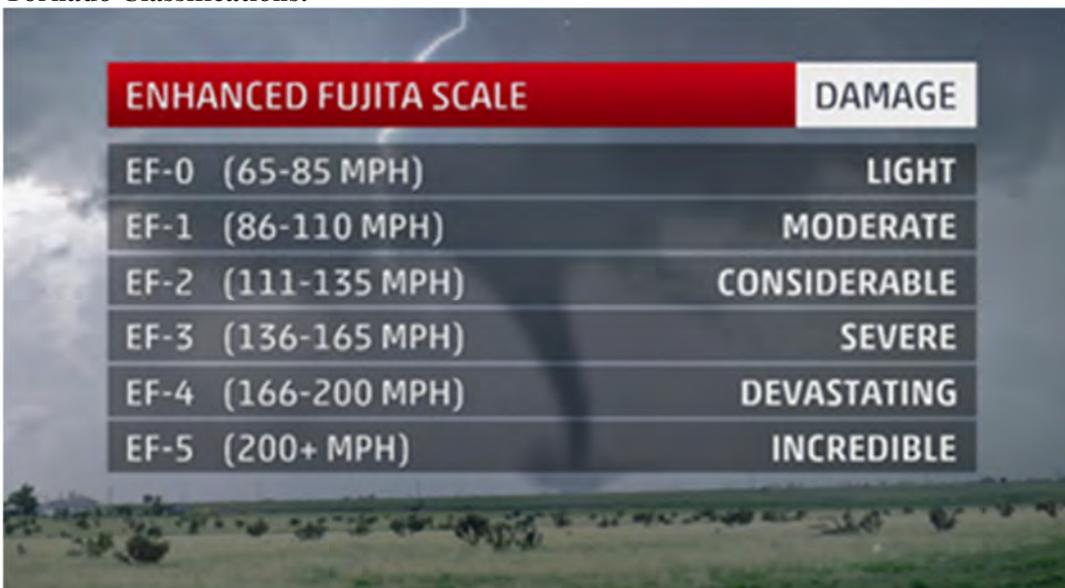
Special flood hazard area: Land in the floodplain within a community subject to one percent or greater chance of flooding in any given year.

Spotting: Behavior of a fire producing sparks or embers that are carried by the wind and start new fires beyond the zone of direct ignition by the main fire.

Stafford Act: The Robert T. Stafford Disaster Relief and Emergency Assistance Act (P.L. 93-288, as amended by P.L. 100-707), which provides the greatest single source of federal disaster assistance.

Structure: A walled and roofed building, including a storage tank for gas or liquid, that is principally above ground, as well as a manufactured home.

Tornado Classifications:



ENHANCED FUJITA SCALE		DAMAGE
EF-0	(65-85 MPH)	LIGHT
EF-1	(86-110 MPH)	MODERATE
EF-2	(111-135 MPH)	CONSIDERABLE
EF-3	(136-165 MPH)	SEVERE
EF-4	(166-200 MPH)	DEVASTATING
EF-5	(200+ MPH)	INCREDIBLE

Urban Wildfire: A fire moving from a wildland environment, consuming vegetation as fuel, to an environment where the fuel consists primarily of buildings and other structures.

Urban/wildland interface: A developed area, also known as the “I-zone,” occupying the boundary between an urban or settled area and a wildland characterized by vegetation that can serve as fuel for a forest fire.

Vulnerability: The level of exposure of human life and property to damage from natural hazards.

Watershed management: The implementation of a plan or plans for managing the quality of flow of water within a watershed, the naturally defined area within which water flows into a particular lake or river or its tributary. The aims of watershed management are holistic and concern the maintenance of water quality, the minimization of stormwater runoff, the preservation of natural flood controls such as wetlands and pervious surface, and the preservation of natural drainage patterns. Watershed management is, in many ways, an enlargement of most of the concerns that underlie floodplain management.

Wildland: An area in which development has not occurred with the exception of some minimal transportation infrastructure such as highways and railroads, and any structures that are widely spaced and serve largely recreational purposes.

Appendix B

Resources

2018-2019 Poverty Resolution, Charter Township of Texas. November 12, 2018.

<http://www.texastownship.org/wp-content/uploads/2019/01/18-35-2018-2019-POVERTY-RESOLUTION.pdf>.

Five-Year Recreation Plan. Charter Township of Texas. December 2014. <http://www.texastownship.org/wp-content/uploads/2019/03/2014-Texas-Twp-Parks-Rec-Master-Plan.pdf>.

General Data Resources, Inc., AntennaSearch.com. Accessed November 2019.

Hazard Mitigation Assistance Guidance. FEMA. February 2015. https://www.fema.gov/media-library-data/1424983165449-38f5dfc69c0bd4ea8a161e8bb7b79553/HMA_Guidance_022715_508.pdf.

Integrating Human-Caused Hazards into Mitigation Planning, State and Local Mitigation Planning how-to guide: Federal Emergency Management Agency, September 2002, FEMA 386-7 CD.

Kalamazoo County Hazard Mitigation Plan, January 2013

Local Business Map – Texas Township. Texas Township Downtown Development Authority (DDA).

<http://www.texastownship.org/wp-content/uploads/2019/05/TexasCornersDDA-04172019.pdf>.

Local Hazard Mitigation Planning Workbook: EMD-PUB 207, February 2003, Emergency Management Division, Michigan Department of State Police.

Michigan Hazard Analysis 2012, EMD-PUB 103, July 2012, Emergency Management and Homeland, Security Division / Michigan Department of State Police

National Oceanic and Atmospheric Administration: Weather/Climate Events, Information, Assessments; Climatology and Extreme Events; U.S. Storm Events Data Base; 1950-present, local storm reports, damage reports, etc. from various sources. www.NCEI.noaa.gov

Planning for a Disaster-Resistant Community: A One-Day Workshop for City and County Planners, Planning Officials, and Consultants: American Planning Association Research Department, American Planning Association, 2002 in cooperation with the Federal Emergency Management Agency, Planning and Mitigation Branch (materials only).

Southcentral Michigan Planning Council Website Data, <https://smpcregion3.org/>.

State and Local Mitigation Planning how to guide: Understanding Your Risks, identifying hazards and estimating losses: Federal Emergency Management Agency, August 2001, FEMA 386-2.

Texas Corners Market Assessment with Grocery Sales. LandUseUSA. November 2018.

<http://www.texastownship.org/wp-content/uploads/2018/11/Texas-Corners-Market-Assessment-with-Grocery-Sales-LandUSA-2018.pdf>.

Texas Township QuickFacts: United States Census Bureau, 2010 Census. July 1, 2018.

<https://www.census.gov/quickfacts/texaschartershipkalamazooountymichigan#qf-flag-X>.

United States Department of Agriculture. Nass.usda.gov/Agcensus.

Appendix C

Public Meeting Minutes

LPC Email – November 21, 2019

From: Julie VanderWiere <julievw@texastownship.org>
Sent: Thursday, November 21, 2019 4:35 PM
To: Rich McGrew <rmcgrew@texastownship.org>; rfull@kalamazoo.org; jdvanb@kalamazoo.org; bakerj@kalamazoo.org; tbartholomew@kalamazoo.org; jaruth@kalamazoo.org; Julie.Rogers@kalamazoo.org; Christine.Morse@kalamazoo.org; macorf@kalamazoo.org; jjbayha@gmail.com; Steve Deisler <sdeisler@texastownship.org>; buckhamfarms@yahoo.com; Linda Kerr <lindak@texastownship.org>; Tom Wheat <TWheat@preinnewhof.com>; Thomas Smith <TSmith@preinnewhof.com>; Chad Tackett - TF <ctackett@texasfire.org>; Julie VanderWiere <julievw@texastownship.org>; mcollins@kvcc.edu; danieljmoyle@aol.com; s.ganton@gantonseniorcommunities.com; John Hinkle <jhinkle@texastownship.org>; Nick Loeks <nloeks@texastownship.org>; Tim Brown <tbrown@texastownship.org>
Subject: Texas Township Hazard Mitigation Plan

Texas Township Hazard Mitigation Plan Committee Member.

As you all are aware, many Texas Township residents have been dealing with flooding for a couple years. A short-term plan for relief is in process, and the long-term plan is under development. Given the costs to residents, we have been looking at possible financial assistance, including FEMA grants, for a while. Based on recent changes to the process, we are not guaranteed to get a grant for the long-term solution, but we are moving forward with an application to at least try.

*The Township needs to have a Multi-Hazard Mitigation Plan in order to get a FEMA Grant. We are inviting you to participate on the committee. We would like committee members to provide input and ideas for the Hazard Mitigation Plan. The schedule is very tight since the grant applications are due in two month.....so we need to fast-track the Hazard Mitigation Plan process. In fact, we will be communicating via email and scheduling one face-to-face meeting for next **Tuesday, November 26, 2019 at 4pm**. We hope that you will be willing to at least participate via email as we feel your role is important.*

Please let me know if you have any questions. You will likely be receiving your first email within the next 24 hours.

Thanks

Julie VanderWiere

Superintendent
Charter Township of Texas
7110 West Q Ave, Kalamazoo MI 49009
269.375.1591

LPC Email – November 22, 2019

From: Thomas Smith <TSmith@preinnewhof.com>

Sent: Friday, November 22, 2019 9:29 AM

To: Julie VanderWiere <julievw@texastownship.org>; Rich McGrew <rmcgrew@texastownship.org>; rcfull@kalcounty.com; jdvanb@kalcounty.com; bakerj@kalamazoocity.org; tbartholomew@kalamazoocountyroads.com; jaruth@kalcounty.com; Julie.Rogers@kalcounty.com; Christine.Morse@kalcounty.com; macorf@kalcounty.com; jibayha@gmail.com; Steve Deisler <sdeisler@texastownship.org>; buckhamfarms@yahoo.com; Linda Kerr <lindak@texastownship.org>; Tom Wheat <TWheat@preinnewhof.com>; Chad Tackett - TF <ctackett@texasfire.org>; mcollins@kvcc.edu; danieljmoyle@aol.com; s.ganton@gantonseniorcommunities.com; John Hinkle <jhinkle@texastownship.org>; Nick Loeks <nloeks@texastownship.org>; Tim Brown <tbrown@texastownship.org>

Subject: RE: Texas Township Hazard Mitigation Plan

Texas Township HMP Team.

Thanks for making time to assist with the expedited preparation of a Multi-Hazard Mitigation Plan for Texas Township. We appreciate whatever input you can provide.

As Julie mentioned, given the time frame we are under some of the communication will be via email. I am attaching an initial document for your review. This document includes ideas for Goals, Natural Hazards Mitigation Priority Areas and Action Items. These are just some ideas based on other Hazard Mitigation Plans, and hopefully would stimulate thought/discussion.

Please provide thoughts on other goals, priority areas and action items. And please rate the action items from 0 to 5 (0 is low and 5 is high), to help determine the priority or need for these. Please send your rating and comments back asap (today if possible?). We can discuss these at the meeting next week, but hopefully we will be able to compile your comments before the meeting and can spend a lot of time at the Tuesday meeting also discussing next steps and other issues.

Thanks again for your assistance!

Tom

Thomas A. Smith, P.E., CFM

Prein&Newhof

[Website](#) | [Blog](#) | [LinkedIn](#)

TEXAS TOWNSHIP MULTI-HAZARD MITIGATION PLAN

Working Documents

Community Benefits of a Natural Hazard Mitigation Plan

1. Protection of the public health and safety
2. Preservation of essential services
3. Prevention of property damage
4. Preservation of the local economic base

Natural Hazards Mitigation Priority Areas

Priority Area 1: Potential of severe thunderstorms and high and straight line winds, and tornadoes

Priority Area 2: Potential wildfire/urban interface area

Priority Area 3: Potential of severe winter weather with snow and ice hazards

Priority Area 4: Potential high groundwater with no outlet, low freq of flooding but high vulnerability

Priority Area 4: Potential for flash flooding od streams, low frequency of flooding

Potential Goals

Goal 1: Increase local awareness and participation in natural hazards mitigation strategies.

Goal 2: Increase public awareness of hazard mitigation methods and resources.

Goal 3: Develop and complete natural hazards mitigation projects in a timely manner

Goal 4: Provide disaster planning and mitigation resources to appropriate elements of Texas Township.

Goal 5: Expand and refine the detailed analysis of hazards affecting Texas Township.

Goal 6: Strengthen the effectiveness of the Townships ongoing processes and roles.

Goal 7: Comply with FEMA requirements in order to obtain and use hazard mitigation grants.

Goal 8: Complete or make progress toward implementing the most viable of the hazard mitigation projects described in the Mitigation Actions section of the HMP.

TEXAS TOWNSHIP MULTI-HAZARD MITIGATION PLAN

Working Documents

Potential Action Items

- _____ Promote awareness and protection of the Wellhead Protection Area
- _____ Promote safety and effectiveness of the US94 and M131 Interchange
- _____ Promote the use of snow fences or "living snow fences" (rows of trees or vegetation) to limit the blowing and drifting of snow over critical roadway segments.
- _____ Develop & enhance community awareness of evacuation plans addressing hazardous material risks.
- _____ Promote awareness and participation in the programs of the U.S. Office of Homeland Security
- _____ Promote awareness for developing site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, and other appropriate sites.
- _____ Promote awareness of the benefits of obtaining flood insurance.
- _____ Enhance awareness and participation in emergency planning activities, including civil disturbance, WMD-related, and threat/risk assessment, planning, and analysis activities.
- _____ Enhance awareness and participation in general winter weather emergency planning activities of the Township.
- _____ Enhance awareness and participation in riverine and lake flooding emergency planning activities of the Township.
- _____ Enhance awareness livestock and pet needs/problems during severe weather
- _____ Promote community awareness of shelters and warning systems.
- _____ Increase awareness, coverage and use of NOAA Weather Radio (which can also provide notification to the community during any period of emergency, including enemy attack).
- _____ Enhance truck traffic weight, travel, and usage restriction awareness to reduce the risk of hazardous material transportation accidents.
- _____ Establish avenues of reporting (and rewards) for information preventing terrorist incidents and sabotage.
- _____ Develop implement plans for Floodplain Management and Protection of wetlands.
- _____ Improve design, routing, and traffic control at problem roadway areas.
- _____ Investigate Best Practices for Protecting Critical Infrastructures
- _____ Investigate the Use of ITS (Intelligent Transportation Systems) Technology for public warning and emergency information purposes.

TEXAS TOWNSHIP MULTI-HAZARD MITIGATION PLAN

Working Documents

- _____ Investigate the use of video recording equipment at incident scenes to aid in identification and follow-up
- _____ Develop and/or enhance a method for using low-power AM radio broadcasts (e.g. “Highway Advisory Radios”) for the purpose of transmitting localized emergency management information
- _____ Obtain and install backup power generators at key facilities within the Township.
- _____ Organize outreach to isolated, vulnerable, or special-needs populations.
- _____ Encourage residents to develop a Family Disaster Plan that includes the preparation of a Disaster Supplies Kit.
- _____ Promote Completion of Site Emergency Plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, and other appropriate sites.
- _____ Review and Establish Design requirements for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, etc. that take into consideration emergency and security needs
- _____ Encourage Structure/Property Insurance in Risky Areas.
- _____ Promote an annual "Emergency Evacuation Day” for testing/evaluating site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, and other appropriate sites.
- _____ Promote participation in the Michigan Citizen Corps Council (MCCC) for the purpose of providing informed observers and links to law enforcement.
- _____ Provide an Educational Process and Resources for Addressing Agricultural Issues.
- _____ Provide emergency information to residents and guests who speak English as a second language.
- _____ Provide NWS weather monitors to selected agencies.
- _____ Reduce roadway/railway hazardous material incidents through training, planning, and increased preparedness (in addition to fixed site emergencies).
- _____ Promote basic building code requirements related to flood mitigation.
- _____ Establish heating centers/shelters for vulnerable populations.
- _____ Provide take-cover locations for manufactured housing communities.
- _____ Encourage and implement the anchoring of vulnerable mobile homes to a secure foundation (to lessen damages from winds, tornadoes, and floods).

Agenda

Texas Charter Township

Hazard Mitigation Planning Committee Meeting

November 26, 2019

1. Introductions
2. Purpose
3. Planning Process (non-standard)
4. Township Profile
5. Hazard Analysis Information
- 6- Mitigation Goals and Strategies
- 7- Activities and Action Items
8. Schedule
9. Questions

Steps in the Planning Process

Texas Charter Township Board Meeting

Hazard Mitigation Planning Committee Meeting

August 26, 2019

1. Creation of a Local Planning Team
2. Identification of natural hazards and risks
3. Identification of natural hazards mitigation goals and objectives for emergency management programs
4. Selection of evaluation criteria
5. Selection of mitigation strategies using locally chosen criteria
6. Preparation of draft plan
7. Public Comment
8. Completion of the final plan
9. Adoption of final plan

LPC Meeting Minutes November 26, 2019

In attendance: Andrew Alspach, Tony Banas, Travis Bartholomew, Steve Diesler, Richard Fuller, Scott Ganton, John Hinkle, Rich McGrew, James Rutherford, John Hinkle, Nick Loeks, Tim Brown (telephone), Jeff VanBelle, Julie VanWieren, Thomas Smith, Thomas Wheat

- Tom Smith welcomed the LPC at 4:00 pm, and team members introduced themselves.
- A brief description of the purpose was provided by HMP Leader Tom Smith. This includes thanks to all, explanation why we are preparing a Township HMP and that cannot wait for the County HMP next year.
- Tom Smith provided a description of the planning process steps and emphasized that this process must be expedited.
- A basic Township profile was provided. The committee confirmed that there are no dams, hospitals, hazardous materials, or jails in Texas Township.
- The hazards the Township is vulnerable to were discussed. Flooding of streams is not a frequent issue and lakes without outlets are a bigger concern relative to flooding. A list of past events was provided based on the online database. The hazard analysis was provided for LPC review and comment.
- Several potential hazards are not relevant to Texas Township including dam failures, shoreline hazards and subsidence.
- A list of potential mitigation goals and strategies was provided in a February 22, 2019 email. This was introduced for comment. Tim commented about the importance of flood mitigation as a goal. Linda commented about the importance of protecting the wellhead protection area and that the community already places an emphasis on this.
- Mattawan should be included in Benefit-Cost Analysis.
- There isn't concern about evacuations issues due to density.
- A list of activities and action items was emailed on February 22, 2019 for LPC members to provide a priority rating of 0 through 5. The results of the survey were provided. Ratings were relatively consistent.
- Need to have agreements with KVCC, churches or apartments to provide shelter for manufactured home communities.
- An approximate schedule was discussed which included the dates to complete specific sections of the report, to complete a draft report, to hold public meetings, to adopt the plan for final FEMA approval.
- LPC members were requested to provide additional comments by November 29, 2019.
- The LPC meeting ended at 5:40 pm.

Texas Twp HMP Activity Prioritization (5=Highest, 0=Lowest)

Avg	ACTIVITIES
4.5	Investigate Best Practices for Protecting Critical Infrastructures
4.0	Enhance awareness and participation in riverine and lake flooding emergency planning activities of the Township.
4.0	Organize outreach to isolated, vulnerable, or special-needs populations.
3.8	Encourage residents to develop a Family Disaster Plan that includes the preparation of a Disaster Supplies Kit.
3.7	Promote awareness and protection of the Wellhead Protection Area
3.7	Obtain and install backup power generators at key facilities within the Township.
3.7	Promote Completion of Site Emergency Plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, and other appropriate sites.
3.7	Promote basic building code requirements related to flood mitigation.
3.7	Establish heating centers/shelters for vulnerable populations.
3.5	Develop implement plans for Floodplain Management and Protection of wetlands.
3.3	Promote awareness for developing site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, and other appropriate sites.
3.3	Enhance awareness and participation in general winter weather emergency planning activities of the Township.
3.2	Enhance awareness and participation in emergency planning activities, including civil disturbance, WMD-related, and threat/risk assessment, planning, and analysis activities.
3.2	Promote community awareness of shelters and warning systems.
3.2	Improve design, routing, and traffic control at problem roadway areas.
3.2	Review and Establish Design requirements for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, etc. that take into consideration emergency and security needs
3.0	Develop & enhance community awareness of evacuation plans addressing hazardous material risks.
3.0	Increase awareness, coverage and use of NOAA Weather Radio (which can also provide notification to the community during any period of emergency, including enemy attack).
3.0	Encourage Structure/Property Insurance in Risky Areas.
2.8	Reduce roadway/railway hazardous material incidents through training, planning, and increased preparedness (in addition to fixed site emergencies).
2.8	Provide take-cover locations for manufactured housing communities.
2.7	Investigate the use of video recording equipment at incident scenes to aid in identification and follow-up
2.7	Make available safe rooms (or shelters) in houses, manufactured home communities, community facilities and business districts.
2.5	Promote awareness of the benefits of obtaining flood insurance.
2.5	Provide emergency information to residents and guests who speak English as a second language.
2.3	Establish avenues of reporting (and rewards) for information preventing terrorist incidents and sabotage.
2.2	Promote the use of snow fences or "living snow fences" (rows of trees or vegetation) to limit the blowing and drifting of snow over critical roadway segments.
2.2	Enhance truck traffic weight, travel, and usage restriction awareness to reduce the risk of hazardous material transportation accidents.
2.2	Encourage and implement the anchoring of vulnerable mobile homes to a secure foundation (to lessen damages from winds, tornadoes, and floods).
2.2	Generate greater awareness of, and provision for, mental health services in schools, workplaces, and institutional settings.
2.0	Promote safety and effectiveness of the US94 and M131 Interchange
2.0	Promote awareness and participation in the programs of the U.S. Office of Homeland Security
2.0	Investigate the Use of ITS (Intelligent Transportation Systems) Technology for public warning and emergency information purposes.
1.8	Promote an annual "Emergency Evacuation Day" for testing/evaluating site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, and other appropriate sites.
1.8	Add new warning systems (e.g. outdoor sirens) where needed to fill gaps in current coverage
1.7	Enhance awareness livestock and pet needs/problems during severe weather
1.7	Develop and/or enhance a method for using low-power AM radio broadcasts (e.g. "Highway Advisory Radios") for the purpose of transmitting localized emergency management information
1.7	Provide an Educational Process and Resources for Addressing Agricultural Issues.
1.3	Promote participation in the Michigan Citizen Corps Council (MCCC) for the purpose of providing informed observers and links to law enforcement.
1.3	Use safe interior designs and furniture arrangements to reduce the chances of damage/injury from earthquakes, wildfires, and tornado/wind hazards
1.2	Provide NWS weather monitors to selected agencies.
1.0	Conduct Railroad Inspections and Improve Designs at Problem Railway/Roadway Intersections
0.8	Install video cameras at select rail crossings to encourage voluntary compliance with traffic laws and reduce major transportation accidents.

LPC Email – November 27, 2019

From: Thomas Smith

Sent: Wednesday, November 27, 2019 6:29 PM

To: 'Julie VanderWiere' <julievw@texastownship.org>; 'Rich McGrew' <rmcgrew@texastownship.org>; 'rcfull@kalcounty.com' <rcfull@kalcounty.com>; 'jdvanb@kalcounty.com' <jdvanb@kalcounty.com>; 'bakerj@kalamazoocity.org' <bakerj@kalamazoocity.org>; 'tbartholomew@kalamazoocountyroads.com' <tbartholomew@kalamazoocountyroads.com>; 'jaruth@kalcounty.com' <jaruth@kalcounty.com>; 'Julie.Rogers@kalcounty.com' <Julie.Rogers@kalcounty.com>; 'Christine.Morse@kalcounty.com' <Christine.Morse@kalcounty.com>; 'macorf@kalcounty.com' <macorf@kalcounty.com>; 'jjbayha@gmail.com' <jjbayha@gmail.com>; 'Steve Deisler' <sdeisler@texastownship.org>; 'buckhamfarms@yahoo.com' <buckhamfarms@yahoo.com>; 'Linda Kerr' <lindak@texastownship.org>; Tom Wheat <TWheat@preinnewhof.com>; 'Chad Tackett - TF' <ctackett@texasfire.org>; 'mcollins@kvcc.edu' <mcollins@kvcc.edu>; 'danieljmoyle@aol.com' <danieljmoyle@aol.com>; 's.ganton@gantonseniorcommunities.com' <s.ganton@gantonseniorcommunities.com>; 'John Hinkle' <jhinkle@texastownship.org>; 'Nick Loeks' <nloeks@texastownship.org>; 'Tim Brown' <tbrown@texastownship.org>

Subject: RE: Texas Township Hazard Mitigation Plan

Happy Thanksgiving HMP Team!

Attached is the Risk Analysis, which includes historic natural hazard events in VanBuren County per our discussion yesterday.

Results indicate that Thunderstorms have caused the most frequent damage. Thus we will need to consider Goals and Activities that relate to the impact of thunderstorms. The HMP should tell a story.....areas of highest risk and vulnerability should be addressed.

Please let me know if you have any thoughts regarding any goals, strategies, activities, etc.

Thanks again for any feedback you can provide.
Tom

Thomas A. Smith, P.E., CFM

Prein&Newhof

[Website](#) | [Blog](#) | [LinkedIn](#)

LPC Email - November 29, 2019

From: Thomas Smith

Sent: Friday, November 29, 2019 5:56 PM

To: 'Julie VanderWiere' <julievw@texastownship.org>; 'Rich McGrew' <rmcgrew@texastownship.org>; 'rcfull@kalcounty.com' <rcfull@kalcounty.com>; 'jdvanb@kalcounty.com' <jdvanb@kalcounty.com>; 'bakerj@kalamazoocity.org' <bakerj@kalamazoocity.org>; 'tbartholomew@kalamazoocountyroads.com' <tbartholomew@kalamazoocountyroads.com>; 'jaruth@kalcounty.com' <jaruth@kalcounty.com>; 'Julie.Rogers@kalcounty.com' <Julie.Rogers@kalcounty.com>; 'Christine.Morse@kalcounty.com' <Christine.Morse@kalcounty.com>; 'macorf@kalcounty.com' <macorf@kalcounty.com>; 'jjbayha@gmail.com' <jjbayha@gmail.com>; 'Steve Deisler' <sdeisler@texastownship.org>; 'buckhamfarms@yahoo.com' <buckhamfarms@yahoo.com>; 'Linda Kerr' <lindak@texastownship.org>; Tom Wheat <TWheat@preinnewhof.com>; 'Chad Tackett - TF' <ctackett@texasfire.org>; 'mcollins@kvcc.edu' <mcollins@kvcc.edu>; 'danieljmoyle@aol.com' <danieljmoyle@aol.com>; 's.ganton@gantonseniorcommunities.com' <s.ganton@gantonseniorcommunities.com>; 'John Hinkle' <jhinkle@texastownship.org>; 'Nick Loeks' <nloeks@texastownship.org>; 'Tim Brown' <tbrown@texastownship.org>

Subject: RE: Texas Township Hazard Mitigation Plan

Happy Black Friday HMP 😊

Attached is a cost-benefit analysis for various activities (per the list we discussed at the meeting Tuesday). These create a priority within the risk prioritization (With the highest priority hazard being Thunderstorms in Priority Area 1, Followed by Floods, Winter Weather and Tornados in Priority Area 2, and finally Priority Area 3 includes Hail, Drought, and Wildfires).

This Cost Benefit analysis was prepared using STAPLEE and Simple Scores method. The STAPLEE and Simple Scores Method uses a simple yet in depth Benefit-Cost Review of each of the action items in each priority area. This approach demonstrates that the actions are being evaluated in terms of their pros and cons, which are represented as costs and benefits.

Please provide comments on any of this information as soon as you can. Thanks!

Priority Area 1: Thunderstorms

- Obtain and install backup power generators at key facilities within the Township.
- Organize outreach to isolated, vulnerable, or special-needs populations.
- Encourage residents to develop a Family Disaster Plan that includes the preparation of a Disaster Supplies Kit.
- Promote Completion of Site Emergency Plans for schools, factories, office buildings, shopping malls, long-term care facilities, stadiums, recreation areas, and other appropriate sites.
- Promote awareness for developing site emergency plans for schools, factories, office buildings, shopping malls, long-term care facilities, stadiums, recreation areas, and other appropriate sites.
- Enhance awareness and participation in emergency planning activities, including civil disturbance, WMD-related, and threat/risk assessment, planning, and analysis activities.

- Review and Establish Design requirements for schools, factories, office buildings, shopping malls, long-term care facilities, stadiums, recreation areas, etc. that take into consideration emergency and security needs
- Increase awareness, coverage and use of NOAA Weather Radio (which can also provide notification to the community during any period of emergency, including enemy attack).
- Provide emergency information to residents and guests who speak English as a second language.
- Investigate the Use of ITS (Intelligent Transportation Systems) Technology for public warning and emergency information purposes.
- Add new warning systems (e.g. outdoor sirens) where needed to fill gaps in current coverage
- Promote participation in the Michigan Citizen Corps Council (MCCC) for the purpose of providing informed observers and links to law enforcement.

Priority Area 2: Floods, Winter Weather, Tornadoes

- Investigate Best Practices for Protecting Critical Infrastructures
- Enhance awareness and participation in riverine and lake flooding emergency planning activities of the Township.
- Establish heating centers/shelters for vulnerable populations.
- Promote basic building code requirements related to flood mitigation.
- Develop implement plans for Floodplain Management and Protection of wetlands.
- Enhance awareness and participation in general winter weather emergency planning activities of the Township.
- Promote community awareness of shelters and warning systems.
- Improve design, routing, and traffic control at problem roadway areas.
- Provide take-cover locations for manufactured housing communities.
- Promote awareness of the benefits of obtaining flood insurance.
- Encourage and implement the anchoring of vulnerable mobile homes to a secure foundation (to lessen damages from winds, tornadoes, and floods).
- Promote safety and effectiveness of the US94 and 9th Street Interchange
- Promote an annual "Emergency Evacuation Day" for testing/evaluating site emergency plans for schools, factories, office buildings, shopping malls, long-term care facilities, stadiums, recreation areas, and other appropriate sites.
- Develop and/or enhance a method for using low-power AM radio broadcasts (e.g. "Highway Advisory Radios") for the purpose of transmitting localized emergency management information
- Enhance awareness livestock and pet needs/problems during severe weather

Priority Area 3: Drought, Hail, Wildfire

- Promote awareness and protection of the Wellhead Protection Area
- Use safe interior designs and furniture arrangements to reduce the chances of damage/injury from earthquakes, wildfires, and tornado/wind hazards

- Review and Establish Design requirements for schools, factories, office buildings, shopping malls, long-term care facilities, stadiums, recreation areas, etc. that take into consideration emergency and security needs
- Increase awareness, coverage and use of NOAA Weather Radio (which can also provide notification to the community during any period of emergency, including enemy attack).
- Provide emergency information to residents and guests who speak English as a second language.
- Investigate the Use of ITS (Intelligent Transportation Systems) Technology for public warning and emergency information purposes.
- Add new warning systems (e.g. outdoor sirens) where needed to fill gaps in current coverage
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Priority Area 3: Drought, Hail, Wildfire

- Promote awareness and protection of the Wellhead Protection Area
- Use safe interior designs and furniture arrangements to reduce the chances of damage/injury from earthquakes, wildfires, and tornado/wind hazards

LPC Email – December 2, 2019

From: Thomas Smith

Sent: Monday, December 2, 2019 4:42 PM

To: 'Julie VanderWiere' <julievw@texas-township.org>; 'Rich McGrew' <rmcgrew@texas-township.org>; 'rcfull@kalcounty.com' <rcfull@kalcounty.com>; 'jdvanb@kalcounty.com' <jdvanb@kalcounty.com>; 'bakerj@kalamazoocity.org' <bakerj@kalamazoocity.org>; 'tbartholomew@kalamazoocountyroads.com' <tbartholomew@kalamazoocountyroads.com>; 'jaruth@kalcounty.com' <jaruth@kalcounty.com>; 'Julie.Rogers@kalcounty.com' <Julie.Rogers@kalcounty.com>; 'Christine.Morse@kalcounty.com' <Christine.Morse@kalcounty.com>; 'macorf@kalcounty.com' <macorf@kalcounty.com>; 'jjbayha@gmail.com' <jjbayha@gmail.com>; 'Steve Deisler' <sdeisler@texas-township.org>; 'buckhamfarms@yahoo.com' <buckhamfarms@yahoo.com>; 'Linda Kerr' <lindak@texas-township.org>; Tom Wheat <TWheat@preinnewhof.com>; 'Chad Tackett - TF' <ctackett@texasfire.org>; 'mcollins@kvcc.edu' <mcollins@kvcc.edu>; 'danieljmoyle@aol.com' <danieljmoyle@aol.com>; 's.ganton@gantonseniorcommunities.com' <s.ganton@gantonseniorcommunities.com>; 'John Hinkle' <jhinkle@texas-township.org>; 'Nick Loeks' <nloeks@texas-township.org>; 'Tim Brown' <tbrown@texas-township.org>; 'Andy M. Alspach' <amalisp@kalcounty.com>

Subject: RE: Texas Township Hazard Mitigation Plan

Texas Twp HMP Team (or LPT – Local Planning Team).

I hope you all had a nice Thanksgiving.

Below you will find a link to the draft Hazard Mitigation Plan document. As we have discussed, this all has been expedited, so please provide comments (by tomorrow if at all possible).

[Texas Twp Draft HMP 2019-12-02](#)

We all understand that flooding is a huge concern right now – please note that the probability analysis does not rate flooding as the highest risk for the Township, but it is listed as a significant vulnerability and is addressed such that we can obtain grant funding. The critical nature of the flooding is being further highlighted in the grant application that we are preparing since that will make an impact on the decision-makers.

Please let me know if you have any questions.

Thanks,

Tom

Thomas A. Smith, P.E., CFM

Prein&Newhof

[Website](#) | [Blog](#) | [LinkedIn](#)

Invitation to December 12, 2019 Public Meeting

From: Emily Beutel

Sent: Wednesday, December 4, 2019 2:37 PM

To: Emily Beutel <emilyb@texastownship.org>

Subject: Hazard Mitigation Plan Public Input Open House - Thursday, December 12, 3-5 p.m.

Good afternoon,

Texas Township is working to develop and adopt a Hazard Mitigation Plan in order to apply for a 2019 FEMA Pre-Disaster Mitigation (PDM) Grant to help mitigate the township and resident costs for the long-term flood relief project. Prein & Newhof has been working diligently to complete a draft on a very short timeline, and a draft is now available for review and public input at www.texastownship.org/hmp.

We are looking for public input and engagement as we review this plan and would appreciate you sharing the information with your networks and neighborhoods. A Facebook event is also available at <https://www.facebook.com/events/762403430925210/> for easy social media sharing.

If you have any questions, please don't hesitate to contact us at 269-375-1591. Thanks for helping us get the word out as we work on this very short timeline!

Thanks!

Emily Beutel

Deputy Clerk/Administrative Assistant

Charter Township of Texas

7110 West Q Avenue | Kalamazoo, MI 49009

P: 269.375.1591 | F: 269.375.0791

emilyb@texastownship.org

www.texastownship.org



Open House Meeting Minutes December 12, 2019

In attendance: See attached sign-in sheet

- John Hinkle welcomed those who arrived at the public meeting at 3:00 pm
- A brief introduction was provided regarding the purpose of the meeting, and specifically that we will accept comments and answer questions until 5:00pm.
- Those in attendance were encouraged to provide comments and questions during the public meeting and any time after the meeting.
- There was a discussion about the hazards. Only Natural Hazards are required for this Plan. The County Plan must cover all hazards.
- The Township will participate in the development of the County Plan as well. Information from this plan will be incorporated into the County Plan.
- The specific hazards for the Township were analyzed to determine priority and the highest priority hazards are addressed with activities in the Hazard Mitigation Plan.
- Impoverished Map seems odd. This map will be modified to better describe the meaning of the map.
- Mobile homes are recommended to be “strapped down”. One mobile home park owner indicated they are in his mobile home park. This is great news, but the statement should remain in the Hazard Mitigation Plan for other existing and future mobile home parks.
- A resident questioned the recommended use of weather radios. While this may not be used by a segment of the population, we believe it is still appropriate to include since other segment(s) of the population may use them over other communication alternatives.
- There were questions and discussion about the timing of the hazard mitigation plan and the potential grant
- There were questions about legal lake levels. These aren’t relevant to the plan.
- There were questions about the short-term and long-term mitigation solution. These aren’t relevant to the plan.
- The public meeting ended at 5:00 pm.

HAZARD MITIGATION PLAN OPEN HOUSE
12.12.19

Name	Address	Phone
Tom Wheat	2528 Aberdeen K200 49008	269 373 0469
John Lovely	8083 W. P.O. Ave	269-580-6397
JIM RIDENOUR	1733 E. CROOKED LAKE DR	269 873-2255
ROD KRAFF	43 N. CROOKED LAKE DR	269-509-7231
Patti Stone	1423 E Crooked Lake Dr	269-760-9527
Charles DeVries	1473 E. Crooked Lake Dr	269-832-8069
MIKE COLLINS (KVC) 6767 WEST O		269.488.4255
JOHN HINKLE	6589 S. 6 th Kalamazoo Mi 49004	269-599-4333
Steve Otd	854 E Fish Lake Dr., Kalamazoo, MI 49009	269-350-3260
TIM BROWN	7248 BRETON WOODS CT.	269 217 5177
Gene Hunter	1254 E. Crooked Lake DR	269-267-1141
Rajesh Doshi	500 E. Eagle Lake Dr.	269.324-1721
Sanjay Kalani	834 E. Eagle Lake Dr	269-598-5292
TOM ROGERS	895 TREASURE ISLAND DR.	269 760-6448
Gary Steinbach	184 W. Crooked Lake DR	269-353-7307
Julie VanderWier	7110 W. Q Ave Kalamazoo	269.375-1591

Invitation to January 8, 2020 Public Meeting

From: Emily Beutel <emilyb@texastownship.org>

Sent: Friday, January 3, 2020 4:20 PM

To: Emily Beutel <emilyb@texastownship.org>

Subject: Hazard Mitigation Plan Public Input Open House - Wednesday, January 8, 3-5 p.m.

Good afternoon,

Last month, Texas Township reached out to you seeking input on our draft Hazard Mitigation Plan in order to apply for a FEMA Pre-Disaster Mitigation (PDM) Grant to help mitigate the township and resident costs for the long-term flood relief project. We are hosting another Open House for the public to ask questions and provide feedback tomorrow, **Wednesday, January 8 from 3:00 – 5:00 p.m.** A revised draft is available for review and public input at www.texastownship.org/hmp.

We are again looking for public input and would appreciate you sharing the information with your networks and neighborhoods. A Facebook event is also available at <https://www.facebook.com/events/576170522940653/> for easy social media sharing.

If you have any questions, please don't hesitate to contact us at 269-375-1591. Thanks for helping us get the word out as we work on this very short timeline!

Thanks!

Emily Beutel

Deputy Clerk/Administrative Assistant

Charter Township of Texas

7110 West Q Avenue | Kalamazoo, MI 49009

P: 269.375.1591 | F: 269.375.0791

emilyb@texastownship.org

www.texastownship.org



Public Open House #2 Meeting Minutes January 8, 2020

In attendance: See attached sign-in sheet

- John Hinkle welcomed those who arrived at the public meeting at 3:00 pm
- A brief introduction was provided by the LPT leader Tom Smith regarding the purpose of the meeting including that a second public meeting was needed. And specifically, we indicated that we will accept comments and answer questions until 5:00pm and after that via email, voicemail or snail mail by January 10, 2020.
- There was a brief description of the major changes to the draft report. This included some changes to the goals and the risk area, as well as modifications and clarification of the activities.
- Some changes to Table 5 representatives in light of the change in planning personnel at the Township.
- The lead person for each activity was reviewed and modified as necessary.
- The flood text on page 17 needs to be expanded further regarding the lake flooding.
- There was some discussion about the Township having an app for emergencies and weather.
- Activities 7 and 8 and Activities 21 and 23 are too similar. They will be combined.
- The location on page 23 is not correct.
- There were not a lot of comments about the draft plan, though many mentioned that they appreciate the detail that goes into it.
- The public meeting ended at 5:00 pm.

HAZARD MITIGATION
PUBLIC COMMENT MEETING

1-8-2020
3:00 PM TEX TWP
HALL

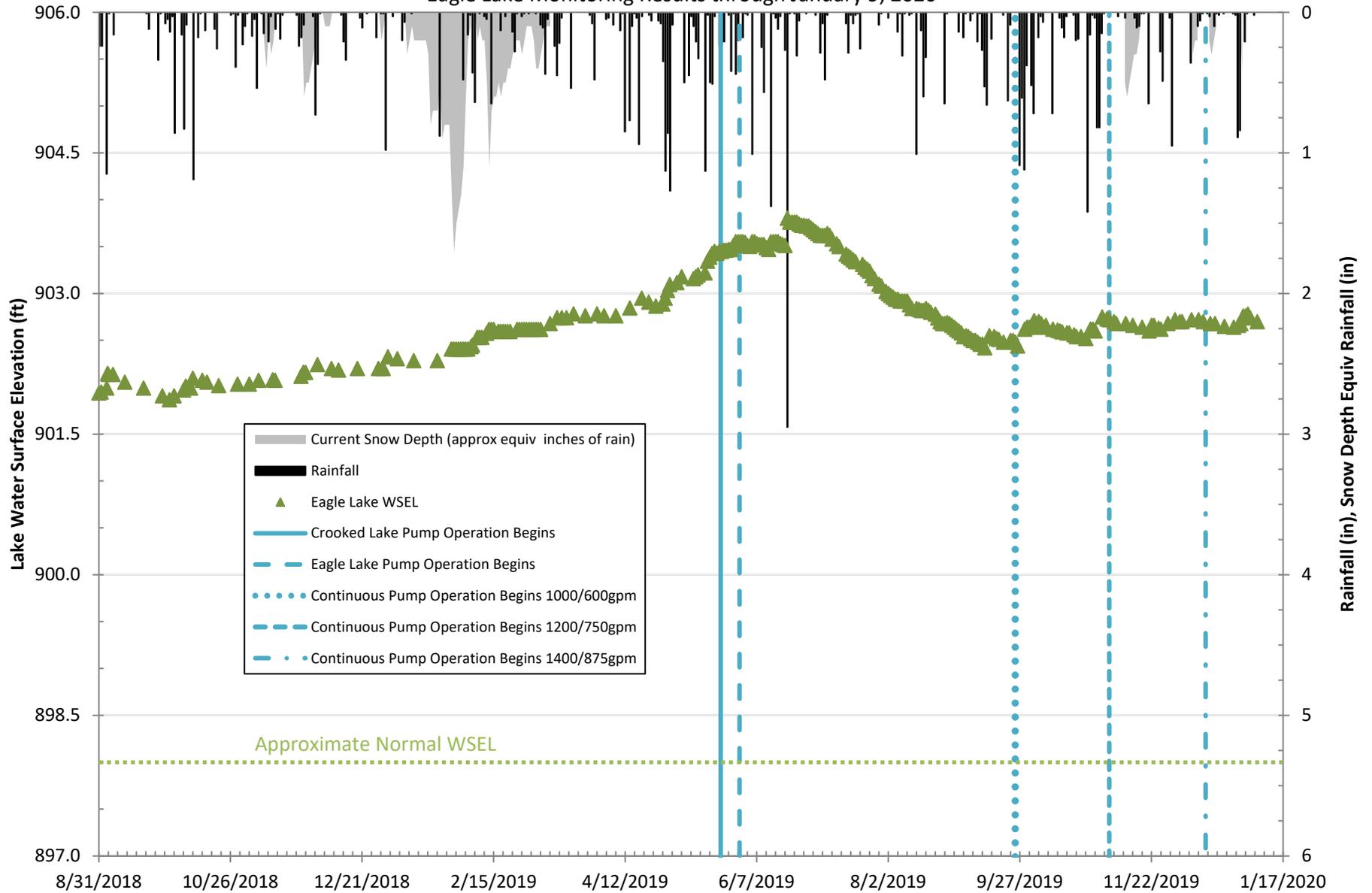
NAME	Address	Phone
Tom Wheat Township Engineer	2528 Aberdeen Kalamazoo MI	269 373 2469
John Hinkle Texas Township Supervisor	6589 S. 6 th ST. Kalamazoo, MI. 49009	269-599-4333
TIMOTHY BROWN TWP. TRUSTEE	7348 BRETON WOODS CT. 49009	269-217-5177
Julie VanderWiere Texas Township Superintendent	7116 West Q Ave Kalamazoo, MI 49009	269-375-1591
Tom Smith Prein & Newhof	2528 Aberdeen Kalamazoo, MI	616-540-7530
Cleo Tennant	233 21 st STREET OTSEGO, MI 49078	(269) 217-3513
Frank Zlowek	5267 Green Ave Kalamazoo MI 49009	269 372-7000
Jennie Miller	45322 Crunk Road 652 Mattawan, MI 49071	269-370-3351
Emily Bental	8221 West S Ave Schoolcraft, MI 49087	269-353-2942
Ted Gracienya	7260 S Ave East Clinton MI 49088	269-559-2377
Leann Koerner	4753 Kaline Ave. Kalamazoo, MI 49009	269-547-3130
Patricia & Roberto	1213 E Crooked Lake Dr Kalamazoo MI 49004	269-372-7084
Yumda Kuu	4824 Paw Paw Lake Dr Mattawan, MI 49071	269-668-7263
Julie Johnston	1053 Nidge wood Drive Phenixville, MI 49080	269-266-0540

Appendix D

Flood Figures

Crooked Lake Does Not Have An Existing Outlet
Data Collection Began in August 2018, Pumping Began in May 2019

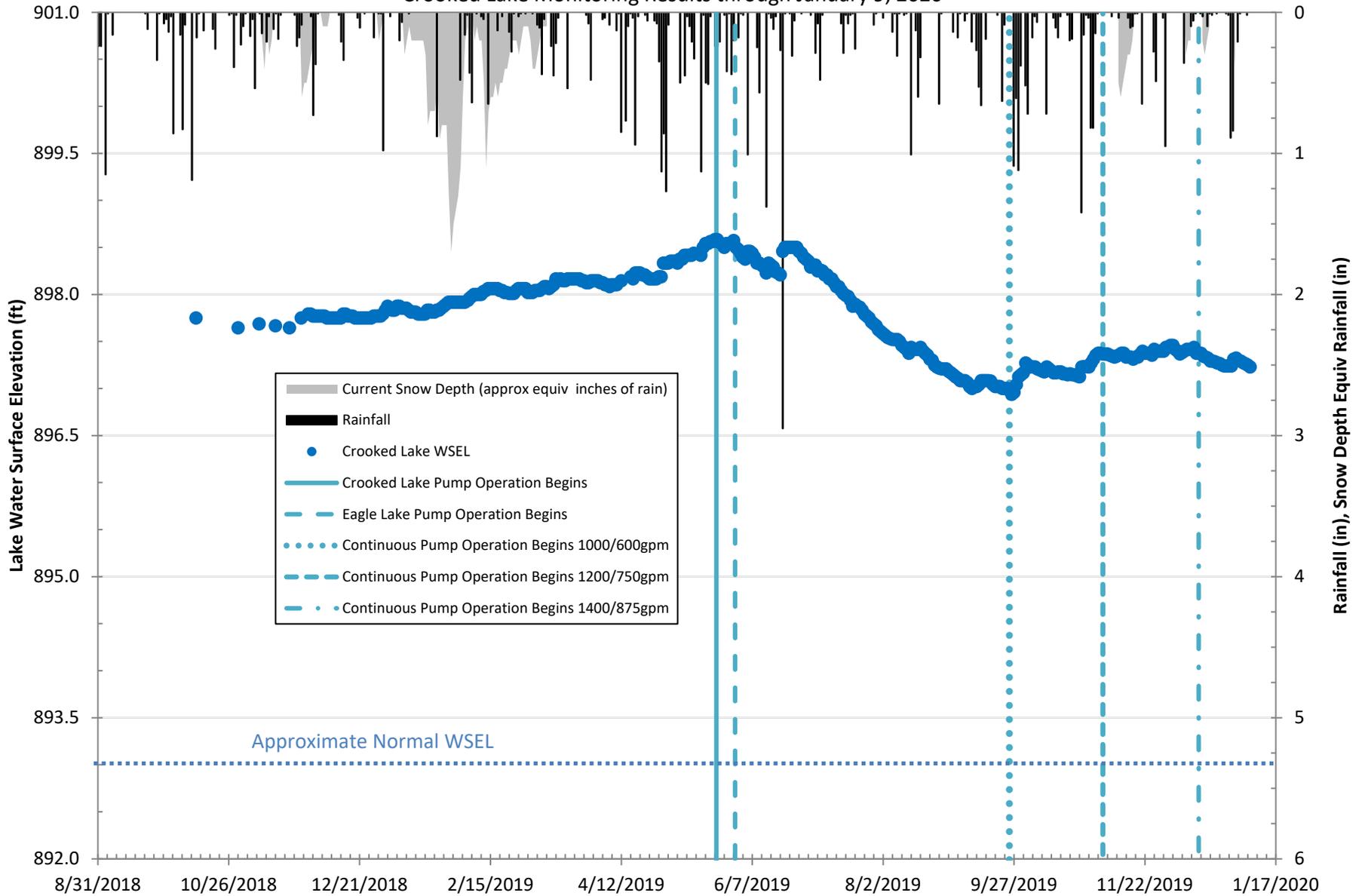
Charter Township of Texas Flood Study
Figure
Eagle Lake Monitoring Results through January 9, 2020



Crooked Lake Does Not Have An Existing Outlet
Data Collection Began in September 2018, Pumping Began in May 2019

Charter Township of Texas Flood Study
Figure

Crooked Lake Monitoring Results through January 9, 2020



Bass Lake Has An Existing Outlet
Data Collection Began in January 2019, Pumping Began in May 2019

Charter Township of Texas Flood Study
 Figure

Bass Lake Monitoring Results through January 9, 2020

